

Rubidium™ MG362x1A Series Low-Noise RF/Microwave Signal Generators

MG36221A, 9 kHz to 20.0 GHz

MG36241A, 9 kHz to 43.5 GHz

MG36271A, 9 kHz to 70.0 GHz



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Table of Contents

Chapter 1 — General Information

1-1	Scope of Manual	1-1
1-2	Introduction	1-1
1-3	Description	1-1
1-4	Identification Number	1-1
	Additional Documentation	1-1
1-5	Contacting Anritsu	1-2
1-6	Specifications and Options	1-2
1-7	Level of Maintenance	1-2
	Preventive Maintenance	1-2
	Troubleshooting	1-2
	Repair	1-2
	Calibration	1-2
1-8	ESD Requirements	1-2

Chapter 2 — Functional Description

2-1	Introduction	2-1
2-2	MG362x1A Subsystems	2-2
	Digital Control	2-2
	Front Panel Assembly	2-2
	Frequency Synthesis	2-2
	Reference Module	2-2
	Synthesizer Module	2-2
	YIG Assembly	2-2
	ALC/AM/Pulse Modulator	2-3
	RF Deck	2-3
	Power Supply	2-3
	Inputs/Outputs	2-3
2-3	Frequency Synthesis	2-3
	9 kHz to 2.2 GHz Digital Down Converter	2-3
	RF Outputs 2.2 GHz to 20 GHz	2-4
	Frequency Extension Module (FEM)	2-4
	Frequency Switching Speed	2-4
	Step Sweep Mode	2-5
	Analog Sweep Mode	2-5
2-4	Modulation	2-6
	Amplitude Modulation	2-6
	Pulse Modulation Operation	2-6
	Pulse Generator Operation	2-6
	Frequency Modulation	2-7
	Phase Modulation	2-7

Table of Contents (Continued)

2-5	ALC Loop Operation	2-8
	External Leveling	2-8
	Power Sweep.	2-8
2-6	RF Deck Assemblies.	2-9
	RF Deck Configurations.	2-9
	YIG-tuned Oscillator	2-9
	RF Signal Filtering	2-10
	Frequency Extension Module (FEM)	2-10
	Step Attenuators	2-10
	Block Diagram MG36221A	2-11

Chapter 3 — Performance Verification

3-1	Introduction	3-1
3-2	Test Records.	3-1
3-3	Connector and Key Notation.	3-1
3-4	Test Equipment List	3-2
3-5	Measurement Uncertainty.	3-5
	Maximum Permissible Tolerance of Return Loss of Adapters, Attenuators and Cables . . .	3-5
3-6	Internal Time Base Aging Rate Test.	3-8
	Internal Time Base Aging Rate Test with Absolute Time Model 300.	3-9
	Internal Time Base Aging Rate Test with Symmetricom (Datum) Model 9390-9600	3-10
3-7	Spurious Signals Tests	3-11
	Harmonic Test Setup	3-12
	Harmonic Test Procedure	3-13
	Sub-Harmonic Test Setup	3-14
	Sub- Harmonic Test Setup	3-14
	Sub-Harmonic Test Procedure	3-15
3-8	Single Sideband Phase Noise Test	3-17
3-9	Power Level Accuracy and Flatness Test.	3-22
	Equipment Required	3-22
	Power Level Accuracy (≥ -20 dBm) All Models.	3-23
	Power Level Accuracy and Flatness (< -20 dBm to -90 dBm)	3-24
	MG36221A and MG36241A Models	3-24
	MG36271A.	3-25
	Maximum Leveled Power	3-27
3-10	FM Verification	3-29
	Test Methodology	3-29
	Equipment Required	3-29
3-11	FM Deviation Accuracy Tests	3-31
	Ext Low Noise FM Accuracy	3-31
	Int Low Noise FM Accuracy.	3-32
3-12	FM Harmonic Distortion Tests	3-33
	Ext Low Noise FM THD	3-33
	Int Low Noise FM THD	3-33

Table of Contents (Continued)

3-13	FM Mode and Incidental AM Tests	3-34
	Ext Low Noise FM Mode Residual FM / Incidental AM	3-34
3-14	Phase Mod - Max Deviation Tests	3-35
	Ext Low Noise Φ M - Max Phase Deviation	3-35
	Int Low Noise Φ M - Max Phase Deviation	3-38
	Ext Wide Φ M - Max Phase Deviation	3-39
	Modulation Index Calculations	3-42
3-15	Phase Mod - Deviation Accuracy Tests	3-44
	Ext Low Noise Φ M - Phase Deviation Accuracy	3-44
	Int Low Noise Φ M - Phase Deviation Accuracy	3-45
	Ext Wide Φ M - Phase Deviation Accuracy	3-45
	Int Wide Φ M - Phase Deviation Accuracy	3-46
3-16	Amplitude Modulation Tests	3-47
	Equipment Required	3-47
	AM Internal Source Verification (Linear Mode) MG36221A, MG36241A	3-48
	AM External Mod Linear Verification (Linear Mode) MG36221A, MG36241A	3-50
	AM External Mod LOG Verification (Linear Mode) MG36221A, MG36241A	3-52
	AM Internal Source Verification (Linear Mode) MG36271A	3-54
	AM External Mod LOG Verification (Linear Mode) MG36271A	3-56
	AM External Mod Linear Verification (Linear Mode) MG36271A	3-58
3-17	Pulse Modulation Tests with the N1000A Oscilloscope	3-60
	Pulse Rise Time, Fall Time and Overshoot Measurement	3-62
	Pulse Power Accuracy Measurement	3-63

Chapter 4 — Adjustment

4-1	Introduction	4-1
4-2	Test Equipment List	4-1
	Maximum Permissible Tolerance of Return Loss	4-3
4-3	RAMS Installation	4-6
4-4	RAMS Graphical User Interface	4-12
4-5	Station Asset Utility	4-13
	Station Asset Utility Procedure	4-13
4-6	Select Interface	4-14
	Select Interface Procedure	4-14
4-7	Setting up a Verification	4-14
	Calibration Procedure	4-14
4-8	Tree View Control Window	4-15
	Starting a New Cal Procedure	4-16
4-9	Adjustments	4-16
	Starting an Adjustment Procedure	4-16
4-10	Post-Calibration	4-16

Table of Contents (Continued)

Chapter 5 — Troubleshooting

5-1	Introduction	5-1
5-2	Error Messages.	5-1
	Self Test Error Messages	5-1
5-3	MG362x1A Block Diagram	5-2
5-4	Basic Configuration.	5-3
5-5	Troubleshooting	5-4
	Malfunctions Not Displaying an Error Message.	5-4
	MG362x1A Does Communicate Via Ethernet Connection	5-5
5-6	Self Test Messages	5-6
	System Messages that Display Fail.	5-6
5-7	SG Messages	5-6
	MOD Supply Voltage Errors	5-6
	ALC Temperature Error.	5-6
	YIG Temperature Error	5-7
	SWF Errors (Switched Filter Errors)	5-7
	REG Errors (Regulator Errors)	5-7
	The OCXO module is Not Phase-locked to the External 10 MHz Reference.	5-7
	The Hi-Performance Reference Not Phase-Locked to the External 100 MHz Reference.	5-8
	The MG362x1A Displays Lock Error.	5-8
	ALC Error.	5-9
	Output Power Level Related Problems in the DDC (9 kHz to 2.2 GHz).	5-9
	Output Power Level Related Problem Above 20 GHz	5-10
	AM Modulation Circuitry Failed	5-10
	Internal FM or Φ Modulation Circuitry Failed	5-10
	Pulse Circuitry Failed.	5-11

Chapter 6 — Removal and Replacement

6-1	Introduction	6-1
6-2	Replaceable Parts.	6-1
6-3	Adjustment and Verification After Replacing an Assembly.	6-4
6-4	Semi-Rigid Cable Installation (Standard Model).	6-7
6-5	SMA Cable Installation (Standard Model).	6-8
6-6	Frequency Extension Module (FEM) Cable Installation	6-9
6-7	Option 13 Configuration	6-10
6-8	Option 3 and Option 56 Configuration	6-11
6-9	Option 23 Configuration	6-12

Table of Contents (Continued)

6-10	Removal Procedures	6-13
	Remove the Handles	6-13
	Remove the Rear Feet	6-14
	Remove the Covers	6-15
	Remove the Top Sub-panel	6-16
	Remove Front Panel	6-16
	Remove the Rear Panel	6-18
	Remove the Rear Panel BNC PCB	6-20
	Remove the Power Supply	6-21
	Remove the Sub-panel	6-22
	Remove the Standard Reference Module	6-23
	Remove the Modules with Mounting Flange	6-25
	Remove the YIG Module	6-27
	Procedure	6-27
	Remove The Frequency Extension Module (FEM)	6-28
	Procedure	6-29
	Remove the Modules with Mounting Bracket	6-29
	Procedure	6-30
	Remove the Dielectric Resonator Oscillator (DRO) (Option 13)	6-31
	Remove the Main Board	6-33

Appendix A — Test Records

A-1	Introduction	A-1
A-2	Uncertainty Specifications	A-1
A-3	Adapter, Attenuator and Cable Insertion Loss	A-1
A-4	Test Records	A-1

Table of Contents (Continued)

A-5	Technical Reference	A-1
	Internal Time Base Aging Rate Test (Optional)	A-2
	All MG362x1A Models Harmonics and Harmonically Related Signal Test Records	A-3
	Harmonics and Harmonically Related Signal Test Records	A-4
	Non-Harmonic Testing (Part 1)	A-5
	Non-Harmonic Testing (Part 1)	A-6
	Non-Harmonic Testing (Part 1)	A-7
	Non-Harmonic Testing (Part 1)	A-8
	Non-Harmonic Testing (Part 2)	A-9
	Non-Harmonic Testing (Part 2)	A-10
	Single Sideband Phase Noise Test (Standard)	A-11
	Single Sideband Phase Noise Test (Standard)	A-12
	Single Sideband Phase Noise Test (Standard)	A-13
	Single Sideband Phase Noise Test (Option___)	A-14
	Single Sideband Phase Noise Test (Option___)	A-15
	Single Sideband Phase Noise Test (Option___)	A-16
	Power Line & Fan	A-17
	Power Line & Fan	A-18
	Power Level Log Conformity	A-19
	Power Level Accuracy Test	A-21
	Power Level Accuracy Test	A-22
	Power Level Accuracy Test	A-23
	Power Level Accuracy Test	A-24
	Power Level Accuracy Test	A-25
	Power Level Accuracy Test	A-26
	Power Level Accuracy Test	A-27
	Power Level Accuracy Test	A-28
	Power Level Accuracy Test	A-29
	Power Level Accuracy Test	A-30
	Power Level Accuracy Test	A-31
	Power Level Accuracy Test	A-32
	Power Level Accuracy Test	A-33
	Power Level Accuracy Test	A-34
	Power Level Accuracy Test	A-35
	Power Level Accuracy and Flatness Test (Option 2)	A-36
	Power Level Accuracy and Flatness Test (Option 2)	A-37
	Power Level Accuracy and Flatness Test (Option 2)	A-38
	Power Level Accuracy and Flatness Test (Option 2)	A-39
	Power Level Accuracy and Flatness Test (Option 2)	A-40
	Power Level Accuracy and Flatness Test (Option 2)	A-41
	Power Level Accuracy and Flatness Test (Option 2)	A-42
	Power Level Accuracy and Flatness Test (Option 2)	A-43
	Power Level Accuracy and Flatness Test (Option 2)	A-44
	Power Level Accuracy and Flatness Test (Option 2)	A-45
	Power Level Accuracy and Flatness Test (Option 2)	A-46
	Power Level Accuracy and Flatness Test (Option 2)	A-47
	Power Level Accuracy and Flatness Test (Option 2)	A-48

Table of Contents (Continued)

Power Level Accuracy and Flatness Test (Option 2)	A-49
Power Level Accuracy and Flatness Test (Option 2)	A-50
Power Level Accuracy and Flatness Test (Option 2)	A-51
Power Level Accuracy and Flatness Test (Option 2)	A-52
Power Level Accuracy and Flatness Test (Option 2)	A-53
Power Level Accuracy and Flatness Test (Option 2)	A-54
Power Level Accuracy and Flatness Test (Option 2)	A-55
Power Level Accuracy and Flatness Test (Option 2)	A-56
Power Level Accuracy and Flatness Test (Option 2)	A-57
Power Level Accuracy and Flatness Test (Option 2)	A-58
Power Level Accuracy and Flatness Test (Option 2)	A-59
Maximum Levelled Power (Without Option 2, Without Option 15)	A-60
Maximum Levelled Power (With Option 2, Without Option 15)	A-61
Maximum Levelled Power (Without Option 2, With Option 15)	A-62
Maximum Levelled Power (With Option 2, With Option 15)	A-63
Maximum Levelled Power (Without Option 2, Without Option 15)	A-64
Maximum Levelled Power (Without Option 2, Without Option 15) (Continued)	A-65
Maximum Levelled Power (With Option 2, Without Option 15)	A-66
Maximum Levelled Power (With Option 2, Without Option 15) (Continued)	A-67
Maximum Levelled Power (Without Option 2, With Option 15)	A-68
Maximum Levelled Power (Without Option 2, With Option 15) (Continued)	A-69
Maximum Levelled Power (With Option 2, With Option 15)	A-70
Maximum Levelled Power (With Option 2, With Option 15) (Continued)	A-71
Maximum Levelled Power (Without Option 2, Without Option 15)	A-72
Maximum Levelled Power (Without Option 2, Without Option 15) (Continued)	A-73
Maximum Levelled Power (With Option 2, Without Option 15)	A-74
Maximum Levelled Power (Without Option 2, Without Option 15) (Continued)	A-75
Maximum Levelled Power (Without Option 2, With Option 15)	A-76
Maximum Levelled Power (Without Option 2, With Option 15) (Continued)	A-77
Maximum Levelled Power (Without Option 2, With Option 15) (Continued)	A-78
Maximum Levelled Power (With Option 2, With Option 15)	A-79
Maximum Levelled Power (With Option 2, With Option 15) (Continued)	A-80
Maximum Levelled Power (With Option 2, With Option 15) (Continued)	A-81
Frequency Modulation Tests (Option 12)	A-82
Frequency Modulation Tests (Option 12)	A-83
Frequency Modulation Tests (Option 12)	A-84
Frequency Modulation Tests (Option 12)	A-85
Frequency Modulation Tests (Option 12)	A-86
Frequency Modulation Test (Option 12)	A-87
Amplitude Modulation Test (Option 12)	A-88
Pulse Modulation Tests (Option 12)	A-91
Pulse Modulation Tests (Option 12)	A-92
Pulse Modulation Tests (Option 12)	A-93
Pulse Modulation Tests (Option 12)	A-94
Pulse Modulation Tests (Option 12)	A-95
Pulse Modulation Tests (Option 12)	A-96

Appendix B — Instrument Messages

B-1 Introduction B-1

B-2 Error Messages. B-1

B-3 Informational Messages B-3

B-4 Warning Messages B-5

B-5 Self Test Messages B-6

Appendix C — Updating Firmware

C-1 Introduction C-1

C-2 Updating Firmware on the MG362x1A C-1

 Use the MG362x1A WEB UPDATES Menu C-1

 Use a USB Memory Device C-2

Chapter 1 — General Information

1-1 Scope of Manual

This manual provides service information for the MG362x1A signal generators. The service information includes replaceable parts information, troubleshooting, performance verification tests, calibration procedures, functional circuit descriptions and block diagrams, and assembly/subassembly removal and replacement.

Throughout this manual, the terms *MG362x1A*, *synthesizer*, or *signal generator* are used to refer to the instrument. Otherwise, the full model number is used where applicable. Manual organization is shown in the table of contents.

1-2 Introduction

This chapter provides a general description of the MG362x1A identification numbers, related manuals, and options. Information is included concerning level of maintenance, replaceable subassemblies and RF components, exchange assembly program, and preventive maintenance. Static-sensitive component handling precautions and lists of exchangeable subassemblies and recommended test equipment are also provided.

1-3 Description

The series MG362x1A is a microprocessor-based, synthesized signal source with high resolution, ultra low phase noise, and phase-lock capability. It generates both discrete CW frequencies and broad (full range) and narrow band step sweeps across the frequency range of 9 kHz to 70 GHz.

All functions of the CW generator are fully controllable locally from the front panel or remotely (except for power on/standby) via Ethernet (Sockets over TCP/IP) or GPIB (IEEE-488 interface bus). The technical data sheet (PN: 11410-00928) is available Online.

1-4 Identification Number

All Anritsu instruments are assigned a unique six-digit ID number, such as “050101.” The ID number is imprinted on a decal that is affixed to the rear panel of the instrument.

When ordering parts or corresponding with Anritsu customer service, please use the correct serial number with reference to the specific instrument’s model number (i.e., model MG36271A Signal Generator and Serial No. 230103).

Additional Documentation

Table 1-1. Related Manuals

Document Part Number	Description
10100-00070	Rubidium™ MG362x1A Product Information, Compliance, and Safety
10370-10383	Rubidium™ MG362x1A Operation Manual
10370-10385	Rubidium™ MG362x1A Programming Manual
11410-00928	Rubidium™ MG362x1A Technical Data Sheet

1-5 Contacting Anritsu

To contact Anritsu, visit the following URL and select the services in your region: <http://www.anritsu.com/>

1-6 Specifications and Options

The specifications and options available for the Anritsu MG362x1A series signal generators are described in the technical data sheet (PN: 11410-00928) available Online.

1-7 Level of Maintenance

Maintenance of the MG362x1A consists of:

- Preventive maintenance
- Calibration
- Troubleshooting the instrument to a replaceable subassembly or RF component
- Repair by replacing the failed subassembly or RF component.

Preventive Maintenance

The MG362x1A signal generator care and preventive maintenance consists of cleaning the unit and inspecting and cleaning the RF connectors on the instrument and all accessories. The RF and Microwave Connector Care Instruction Sheet (10100-00031) provides instructions for the use and care of RF and microwave connectors.

Troubleshooting

The MG362x1A firmware includes internal diagnostics that self test the internal assemblies. When the MG362x1A fails self test, one or more error messages appear on screen to aid in isolating the failure to a replaceable subassembly or RF component. [Chapter 5, “Troubleshooting”](#) lists and describes the self test error messages and provides procedures for isolating MG362x1A failures to a replaceable subassembly or RF component.

Repair

Most instrument failures are field repairable by replacing the failed subassembly or RF component. Detailed instructions for removing and replacing failed subassemblies and components are provided in [Chapter 6, “Removal and Replacement”](#).

Calibration

The MG362x1A may require calibration after repair. Refer to [Chapter 3, “Performance Verification”](#) for a listing of requirements and procedures.

1-8 ESD Requirements

The MG362x1A contains components that can be easily damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the MG362x1A instrument.

Chapter 2 — Functional Description

2-1 Introduction

This chapter provides brief functional descriptions of the major subsystems that are contained in each model of the MG362x1A. In addition, the operation of the frequency synthesis, automatic level control (ALC), and RF deck subsystems is described so that the instrument operator may better understand the overall operation of the MG362x1A. Block diagrams are included to supplement the written descriptions.

The parts listed below can be ordered from Anritsu Customer Service should they need to be replaced. For more detailed information about each module, please refer to [Chapter 6, “Removal and Replacement”](#).

Table 2-1. Replaceable Parts List

Part Number	Description
2300-617	Rubidium Automated Maintenance Software (RAMS), 2 year license
2300-618	Rubidium Automated Maintenance Software (RAMS), 5 year license
3-ND86358-RFB	ALC Processing Module
3-ND86361-RFB	MG362X1A Standard Reference Module
3-ND86366	MG362X1A Front Panel Display
3-ND86367-RFB	Regulator Module Assembly
3-ND86370-RFB	Digital Control Assembly
3-ND86872-RFB	Synthesizer RF Module 2
3-ND86873-RFB	YIG Module Assembly
3-ND86874-RFB	Digital Down Converter, 20/43.5 GHz
3-ND87565-RFB	Digital Down Converter, 70 GHz
3-ND86875-RFB	Switch Filter Module
3-ND86876-RFB	Standard FEM Assembly, 43.5 GHz
3-ND86877-RFB	High Power FEM Assembly, 20/43.5 GHz
3-ND86878-RFB	Modulation Processing Module
3-ND86879-RFB	OCXO Module Assembly
3-ND86880-RFB	High Performance Reference Module
3-ND86881-RFB	Switched Filter Module
3-ND86882-RFB	Dielectric Resonator Oscillator
3-ND86886-RFB	Phase Noise Amp Module
3-ND87566-RFB	ALC Processing Assembly New
3-ND87567-RFB	Standard FEM Assembly, 70 GHz
3-ND87564-RFB	High Power FEM Assembly, 70 GHz
3-85457	Panel Connector, DC to 43.5 GHz, K(m) – K(m)
3-86641	Panel Connector, DC to 70 GHz, V(m) – V(m)
3-260-79	Rear Panel On/Off Switch with AC Main Receptacle
3-631-73	AC Main Receptacle
3-86123	Fan Assembly, 92MMx92MM
3-86124	Fan Assembly, 60MMx60MM

2-2 MG362x1A Subsystems

The MG362x1A circuitry consists of various distinct subsystems that are contained on one or more printed circuit board assemblies or in microwave components located on the RF deck. The five major subsystems consist of the Digital Control, Front Panel Assembly, Rear Panel Assembly, Power Supply Assembly, and RF Deck Assembly.

Digital Control

This circuit subsystem consists of the B2 microprocessor module. The central processor unit (CPU) located on this module is the main controller for the MG362x1A. This controller directly or indirectly controls all functions of the instrument. The CPU contains memory that stores the main operating system components and instrument firmware, instrument calibration data, and front panel setup data during the power-off condition. It has a GPIB interface that allows it to communicate with external devices over the GPIB, an Ethernet interface (VXI-11 over TCP/IP) for LAN connectivity, and a serial interface to a serial terminal port. These interfaces are all located on the rear panel. The CPU is directly linked via a dedicated data and address bus to the front panel assembly, the B4 auxiliary/analog instruction module, the B6 ALC module, the B11 synthesizer module, B14 referenced synthesizer module, and B6 YIG module.

The digital control module (B2) contains circuits that perform parallel-to-serial and serial-to-parallel data conversion. The B2 also contains circuitry for many of the rear panel signals and a 14-bit resolution digital volt meter (DVM).

Front Panel Assembly

This circuit subsystem consists of the front panel, the front panel rotary data knob, the front panel control PCB, and the graphical user interface (GUI). The subsystem interfaces the front panel via the dedicated data and address bus. The front panel rotary data knob is also linked to the CPU via the data and address bus.

The front panel PCB has circuits to control the GUI, turn the front panel LEDs on and off, and convert keyboard switch matrix signals to parallel key code. It also contains the standby/operate line switch and the optical encoder for the rotary data knob.

Frequency Synthesis

The frequency synthesis subsystem consists of the reference synthesizer module (B14), synthesizer module (B11), and the YIG assembly (B6) which provide the reference frequencies and phase lock circuits for precise control of the YIG-tuned oscillator frequencies. Options 03, 13, 26, 56 and 66 provide optimized phase noise performance and stability.

Reference Module

The reference module consists of 10, 100, and 1600 MHz inputs and outputs with the high-stability 100 MHz OCXO, or ultra-high stability Rubidium clock, or GPS clock via 1PPS.

Synthesizer Module

The synthesizer module contains the DDS up converter, 1600 MHz tone generator, course PLL, and fine PLL. The YIG loop frequency input provided by the YIG driver is phase locked and generates the lock circuitry for the synthesizer 2 - 20 GHz out to the switched filter.

YIG Assembly

The YIG assembly (B6) contains the YIG-tuned oscillator and associated circuit assemblies. This assembly contains the driver circuitry that provides the tuning current and bias voltages for the YIG-tuned oscillator. The CPU controls the YIG assembly via the serial bus.

ALC/AM/Pulse Modulator

The CPU controls the ALC PCB and AM module via the dedicated data and address bus. This ALC circuit subsystem consists of the ALC PCB, AM of the modulation module, output coupler, and switched filter. It provides the following:

- Level control of the RF output power
- Current drive signals to the PIN switches located in the switched filter assembly (SWF) and the frequency extension module (FEM)
- Drive signals for the step attenuator (Option 2)

RF Deck

This subsystem contains elements related to the generation, modulation, sweep control, power level control, and CW-frequency RF signals. These elements include the YIG-tuned oscillator, frequency extension module to obtain performance beyond 20 GHz, directional coupler/level detector, and optional step attenuator. Refer to [Section 2-6](#) for a functional overview of the RF deck subsystem.

Power Supply

The power supply subsystem consists of the power input connector/filter module, the regulator PCB, the power supply PCB, the standby power supply PCB, and the power module fan unit. It supplies all the regulated DC voltages used by the MG362x1A circuits. The voltages are routed throughout the instrument via the motherboard PCB.

Inputs/Outputs

The rear panel and the digital control module (B2) contain the interface circuits for the majority of the rear panel input and output connectors including the AUX I/O connector.

The rear panel EXT ALC, AM IN, and AM OUT are routed through the rear panel PCB and then through the motherboard PCB to the ALC module (B5). The rear panel connectors, 10 MHz REF OUT and 10 MHz REF IN, are routed through the rear panel PCB and coupled to the reference module (B14).

The rear panel FM/FM IN and FM/FM OUT connectors are routed through the rear panel PCB, and then through the Motherboard PCB to the YIG-lock module (B6). The rear panel PULSE IN connector is routed through the rear panel PCB, and then to the ALC module (B5). The rear panel PULSE SYNC and PULSE OUT connectors are routed through the rear panel PCB and then to the optional pulse generator via coaxial cables. The rear panel EFC IN connector is routed to the reference module (B14) via coaxial cables.

The rear panel IEEE-488 GPIB and SERIAL I/O connectors are routed through the rear panel PCB and then through the motherboard to the microprocessor module (B2). The rear panel (Ethernet over TCP/IP) connector is routed through the mother board to the Ethernet/GPIB Controller assembly, and then to the microprocessor module (B2).

2-3 Frequency Synthesis

The frequency synthesis subsystem provides phase-lock control of the MG362x1A output frequency. It consists of a phase-locking loops that operating together, produce an accurately synthesized, low-noise RF output signal.

9 kHz to 2.2 GHz Digital Down Converter

The 9 kHz to 2.2 GHz digital down converter assembly provides the digitized frequency control below 2.2 GHz. During CW or step frequency operations in the 9 kHz to 2.2 GHz frequency range, a 2 to 4.4 GHz RF signal output from J3 of the switched filter assembly goes to the input connector J1 of the down converter.

This signal is then down converted through a series of dividers resulting in a 9 kHz to 2.2 GHz RF signal output. The resultant RF signal is fed through a series of band-pass filters, then detected, amplified, and coupled out for use in internal leveling before being routed to the output connector J3. The detected RF sample is routed to the ALC module. digital control signals from the CPU module are routed through the auxiliary PCB.

Table 2-2. Digital Down Converter Frequency Bands

Band	Frequency Range (in MHz)
0	0.009 to 12.5
1	12.5 to 17.5
2	17.5 to 22.5
3	22.5 to 31.25
4	31.25 to 43.75
5	43.75 to 62.5
6	62.5 to 87.5
7	87.5 to 125
8	125 to 175
9	175 to 250
10	250 to 350
11	350 to 500
12	500 to 700
13	700 to 1050
14	1050 to 1500
15	1500 to 2200

RF Outputs 2.2 GHz to 20 GHz

Refer to the block diagrams of the RF deck in [Figure 2-1 on page 2-11](#) through [Figure 2-3 on page 2-13](#), for the following descriptions. The MG362x1A uses one YIG-tuned oscillator capable of generating RF signals in the frequency range of 2.2 to 20 GHz.

Frequency Extension Module (FEM)

The FEM (B11) is used on all MG362x1A models with RF output frequencies > 20 GHz.

The RF signal from the switched filter assembly is input to the FEM. The RF signal is filtered, amplified, then doubled (43.5 GHz) or quadrupled (70 GHz) in frequency. The frequency extension module has three bandpass filter paths that maximize harmonic performance.

Frequency Switching Speed

The frequency switching speed is the elapsed time from the beginning of a frequency change to the point at which frequency is settled to within 1 kHz of the destination frequency. There is a “Frequency Valid” logic output to the rear panel. A high-to-low transition of this bit will indicate that RF frequency is about to change. The bit will remain low until RF is settled at the new frequency. This bit will serve as the trigger for frequency-related switching time measurements.

Step Sweep Mode

Step (digital) frequency sweeps of the YIG-tuned oscillator RF output consist of a series of discrete, synthesized steps between a start and stop frequency. Each frequency step is generated by applying the tuning signal from the YIG module (B6) to the YIG-tuned oscillator's main tuning coil, then phase-locking the RF output. Every frequency step in the sweep range is phase-locked.

Analog Sweep Mode

Broad-band analog frequency sweeps (> 100 MHz wide) of the YIG-tuned oscillator RF output are accomplished by applying appropriate analog sweep ramp signals, generated by the B4 Analog Instruction PCB, to the YIG-tuned oscillator's main tuning coil. In this mode, the start, stop, and band switching frequencies are phase-lock-corrected during the sweep.

Note

For instruments with the digital down converter, frequencies of ≤ 2.2 GHz, broadband analog frequency sweeps are > 25 MHz wide; narrow-band analog frequency sweeps are ≤ 25 MHz.

Narrow-band analog frequency sweeps (≤ 100 MHz wide) of the YIG-tuned oscillator RF output are accomplished by summing appropriate analog sweep ramp signals, generated by the B4 Analog Instruction PCB, into the YIG-tuned oscillator's FM tuning coil control path. The YIG-tuned oscillator's RF output is then swept about a center frequency. The center frequency is set by applying a tuning signal (also from the B4 PCB) to the YIG-tuned oscillator's main tuning coil. In this mode, YIG loop phase locking is disabled except during center frequency correction, which occurs during sweep retrace.

2-4 Modulation

The modulation hardware (Option 27) is required to provide amplitude modulation (AM), frequency modulation (FM), phase modulation (ΦM), and pulse modulation (PM) of the RF output signal. The modulation module (B3) provides the modulation processing for each modulation mode.

Amplitude Modulation

Amplitude modulation (AM) of the RF output signal is accomplished by summing an external or internal modulating signal into the ALC loop. External modulating signals come from the rear panel AM IN inputs, the internal modulating signal comes from the function generator module (B3).

The AM input sensitivity DAC and the AM calibration DAC, under the control of the CPU, adjust the modulating signal for the proper amount of AM in both the linear and the log modes of operation. The adjusted modulating signal is summed with the level reference, slope, and detector inputs into the ALC loop. This produces an ALC control signal that varies with the modulating signal. The action of the ALC loop then causes the envelope of the RF output signal to track the modulation signal.

Pulse Modulation Operation

During pulse modulation, the ALC level amplifier ALC Module (B5) is operated as a sample/hold amplifier. The level amplifier is synchronized with the modulating pulses from the function generator module (B3) so that the ALC loop effectively operates only during the ON portion of the pulsed modulated RF output.

Pulse Generator Operation

The function generator module (B3) provides the internal pulse generating function for the MG362x1A and interfaces external pulse inputs from the rear panel to the pulse modulator driver in the external mode.

The pulse generator produces a pulse modulation waveform consisting of single, doublet, triplet, or quadruplet pulse trains at variable pulse rates, widths, and delays. It operates at 100 MHz clock rate. The pulse generator produces a sync pulse and video pulse output that goes to the rear panel and a sample/hold signal that goes to the ALC module (B5). The sync pulse output is for synchronizing auxiliary instruments to the internally generated pulse; the video pulse is a TTL level copy of the RF output pulse; and the sample/hold signal synchronizes the ALC loop to the ON portion of the pulse modulating waveform. The MG362x1A pulse modulation modes include:

- Internal pulse modulation mode: The pulse modulation waveform is generated and timed internally.
- External pulse mode: The external pulse source signal from the rear panel connectors is interfaced by the pulse generator to the pulse modulation driver.
- External triggered mode: The pulse generator is triggered by the external pulse source signal to produce the pulse modulation waveform.
- Free Running: The pulse generator produces pulses at the internal PRF. Single, Doublet, Triplet, or Quadruplet pulse modulation waveforms at the internal pulse repetition rate. Pulse delay is not available in this trigger mode.
- Gated: an external pulse gates the internal pulse generator on and off. When gated on, the pulse generator produces a single pulse at the internal PRF.
- Delayed: The pulse generator produces Single, Doublet, Triplet, or Quadruplet pulse modulation waveforms at the internal pulse repetition rate.
- Triggered: The pulse generator is triggered by an external trigger to produce Single, Doublet, Triplet, or Quadruplet pulse modulation waveforms: Pulse delay is not available in this trigger mode.
- Trgdelay: Triggered with delay: The pulse generator is triggered by an external trigger to produce Single, Doublet, Triplet, or Quadruplet pulse modulation waveforms delayed by pulse delay.
- Composite: An external pulse triggers the internal pulse generator and also pulse modulates the output signal. The internal pulse generator produces a single pulse 'delayed by pulse delay1' which also pulse modulates the output signal.

Frequency Modulation

Frequency modulation (FM) of the YIG-tuned oscillator RF output is achieved by summing an external or internal modulating signal into the FM control path of the YIG loop.

The external modulating signal comes from the rear panel FM/FM IN input connector. The internal modulating signal comes from the modulation processing module (B4). Circuits on the FM module (B3) adjust the modulating signal for the FM sensitivity selected, then sum it into the YIG loop FM control path. There, it frequency modulates the RF output signal by controlling the YIG-tuned oscillator's FM (fine tuning) coil current.

Phase Modulation

Phase modulation (Φ M) of the YIG-tuned oscillator RF output is achieved by summing an external or internal modulating signal into the FM control path of the YIG loop. The external modulating signal comes from the rear panel FM IN/FM IN input connector; the internal modulating signal comes from the function generator module (B3).

Circuits on the FM module (B3) adjust the modulating signal for the Φ M sensitivity selected, convert the modulating signal to a Φ M signal by differentiation, and then sum it into the YIG loop FM control path. There, it phase modulates the RF output signal by controlling the YIG-tuned oscillator's FM (fine tuning) coil current.

2-5 ALC Loop Operation

In the MG362x1A, a portion of the RF output is detected and coupled out of the directional coupler/level detector as the feedback input to the ALC loop. The feedback signal from the detector is routed to the B5 ALC Module where it is compared with a reference voltage that represents the desired RF power output level. If the two voltages do not match, an error correction signal is fed to the modulator shaper amplifier circuits located on the ALC module (B5). The resulting ALC control voltage output causes the level control circuits, located on the B12 switched filter assembly, to adjust the RF output level. Thus, the feedback signal voltage from the level detector will be set equal to the reference voltage.

Note

The instrument uses two internal level detection circuits. For frequencies < 2 GHz, the level detector is part of the down converter. The signal from this detector is routed to the ALC module (B5) as the Detector 0 input. For frequencies ≥ 2 GHz, the level detector is part of the main directional coupler. The signal from this detector is routed to the ALC module (B5) as the Detector 1 input.

The level reference DAC, under the control of the CPU, provides the RF level reference voltage. By setting the output of this DAC to the appropriate voltage, the CPU adjusts the RF output power to the level selected by the user.

External Leveling

In the external leveling mode, an external detector or power meter monitors the RF output level of the MG362x1A instead of the internal level detector. The signal from the external detector or power meter goes to the ALC module (B5) assembly from the rear panel input. The ALC controls the RF power output level as previously described.

Power Sweep

In this mode, the CPU has the ALC step the RF output through a range of levels specified by the user. This feature can be used in conjunction with the sweep mode to produce a set of identical frequency sweeps, each with a different RF power output level.

2-6 RF Deck Assemblies

The primary purpose of the RF deck assembly is to generate CW RF signals and route these signals to the front panel RF OUTPUT connector. It is capable of generating RF signals in the frequency range of 9 kHz to 70 GHz.

The MG362x1A uses a single YIG-tuned oscillator. All other frequencies (except for 0.1 Hz to 10 MHz), are derived from the fundamental frequencies generated by this oscillator, as follows:

- RF output frequencies of 9 kHz to 2.2 GHz are developed by successively dividing the fundamental frequencies of 2 to 4.4 GHz.
- RF output frequencies of 2.2 GHz to 20 GHz are produced directly from the YIG-tuned Oscillator.
- RF output frequencies of 20 to 31.8 GHz are produced by doubling the fundamental frequencies of 10 to 15.9 GHz.
- RF output frequencies of 20 to 43.5 GHz are produced by doubling the fundamental frequencies of 10 to 20 GHz using the Frequency Extension Module.
- RF output frequencies of 43.5 to 70.0 GHz are produced by quadrupling the fundamental frequencies of 10 to 12.5 GHz using the Frequency Extension Module.

RF Deck Configurations

All MG362x1A RF deck assemblies contain a YIG-tuned oscillator, a switched filter assembly, and a directional coupler. The configuration of the RF deck assembly varies according to the particular instrument model and options installed.

Refer to the block diagrams in [Figure 2-1 on page 2-11](#) through [Figure 2-3 on page 2-13](#), which show the various RF deck configurations and include all of the common RF components found in the series MG362x1A RF deck assemblies.

YIG-tuned Oscillator

The MG362x1A models use a dual-band, 2 to 20 GHz YIG-tuned oscillator. The dual-band YIG-tuned oscillator contains two oscillators: one covering the frequency range of 2.0 to 10.0 GHz and one covering the frequency range of >10.0 to 20.0 GHz. Both of these oscillators use a common internal amplifier.

The YIG-tuned oscillator generates RF output signals that have low broadband noise and low spurious content. It is driven by the main tuning coil current and bias voltages from the B6 YIG Module assembly and the fine tuning coil current from the YIG lock Module. During CW mode, the main tuning coil current tunes the oscillator to within a few megahertz of the final output frequency. The phase-lock circuitry of the YIG loop then fine adjusts the oscillator's fine tuning coil current to make the output frequency exact.

RF Signal Filtering

The RF signal from the YIG-tuned oscillator is routed to the level control circuits located on the switched filter assembly and then, via PIN switches, to switched low-pass filters. The PIN switch drive current signals are generated on the ALC module (B5) and routed to the switch control input on the B12 assembly.

The switched low-pass filters provide rejection of the harmonics that are generated by the YIG-tuned oscillator. In MG362x1A models, the 2 to 20 GHz RF signal from the level control circuits has four filtering paths and a through path. The four filtering paths are 3.3 GHz, 5.5 GHz, 8.4 GHz, and 13.5 GHz. Signals above 13.5 GHz are routed via the through path.

To generate RF signals from 9 kHz to 2 GHz, the MG362x1A couples the RF signal to the down converter. A coupler in the B12 switched filter path provides this RF signal, which is routed through a 8.5 GHz low-pass filter to connector J3, and then to the down converter. The 9 kHz to 2 GHz RF signal output from the down converter is routed back to the B12 assembly and then multiplexed through the same path to the switched filter output.

The RF signal is multiplexed by the PIN switches and goes via a 20 GHz low-pass filter to the switched filter assembly (B12). The RF signal routes to the input of the directional coupler (MG36221A). For the MG36241 or MG36271A, the input is routed into of the frequency extension module or to an amplifier if the instrument is fitted with Option 15.

Frequency Extension Module (FEM)

The Frequency Extension Module (FEM) provides five basic functions for the MG36241A (43.5 GHz) and MG36271A (70 GHz). The FEM performs the same functional description for both models.

1. It multiplies the 10 to 20 GHz input from the synthesizer module to obtain 20 to 70 GHz.
2. It amplifies the multiplied 20 to 70 GHz signal to increase power available at the front panel.
3. It filters the multiplied signal to reduce harmonic and sub-harmonic levels using a switched band pass and a switched low pass filter bank.
4. It provides amplitude modulation for level control and AM.
5. It provides for multiplexing the 0 to 20 GHz switched filter main output signal with the 20 GHz to 43.5 GHz or 70 GHz FEM signal to route it to the output connector.

The 10 to 20 GHz output signal from the SWF module is supplied via semi-rigid coax to FEM input. The 0 to 20 GHz SWF output signal is received on J3 and multiplexed with the 20 to 70 GHz signal. The main output of 0 to 70 GHz is cabled to the leveling coupler. All power and control signals except the pulse modulation input come in on the 98 pin connector. The ALC control voltage and pulse modulation signal comes from the ALC module via the 98 pin connector. The bias supply comes from the regulator module also via the 98-pin connector (P1).

Step Attenuators

The Option 2 step attenuators are available for use with the MG362x1A models. Step attenuators provide attenuation of the RF output in 10 dB steps. Maximum rated RF output power is reduced. The step attenuator drive current for Option 2 is supplied by the ALC module (B5).

Block Diagram MG36221A

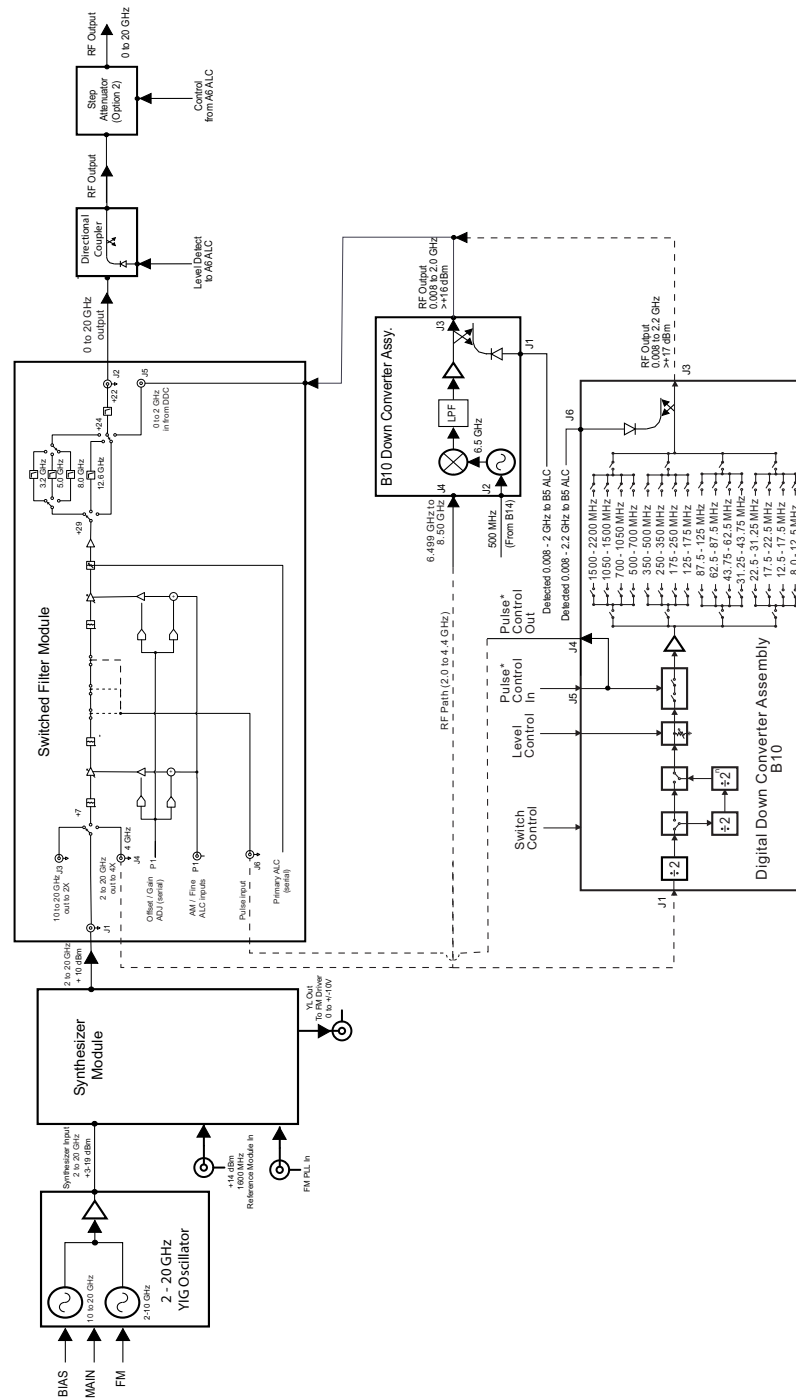


Figure 2-1. Block Diagram of the RF Deck Assembly for Model MG36221A

Block Diagram MG36241A

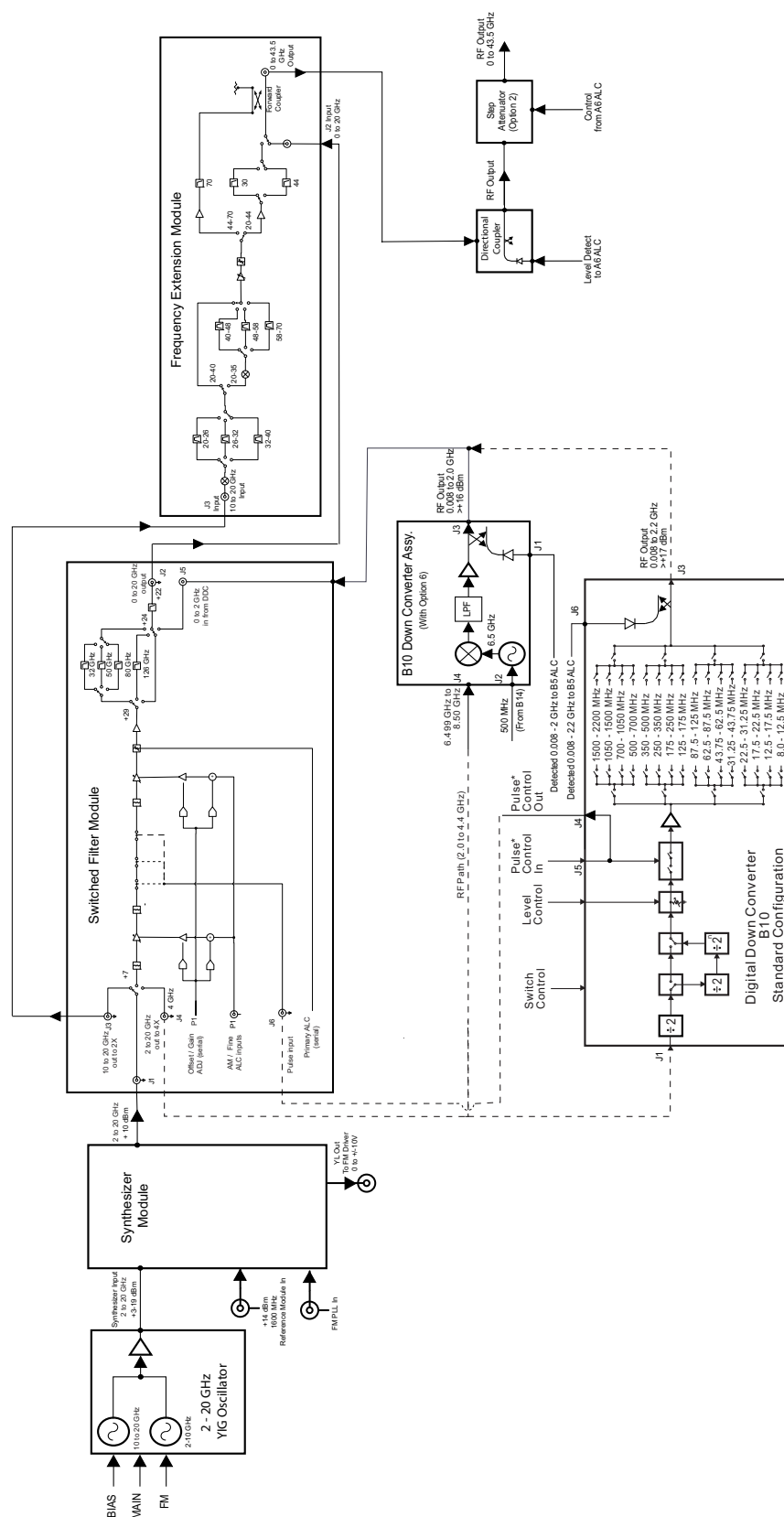


Figure 2-2. Block Diagram of the RF Deck Assembly for Model MG36241A.

Block Diagram MG36271A

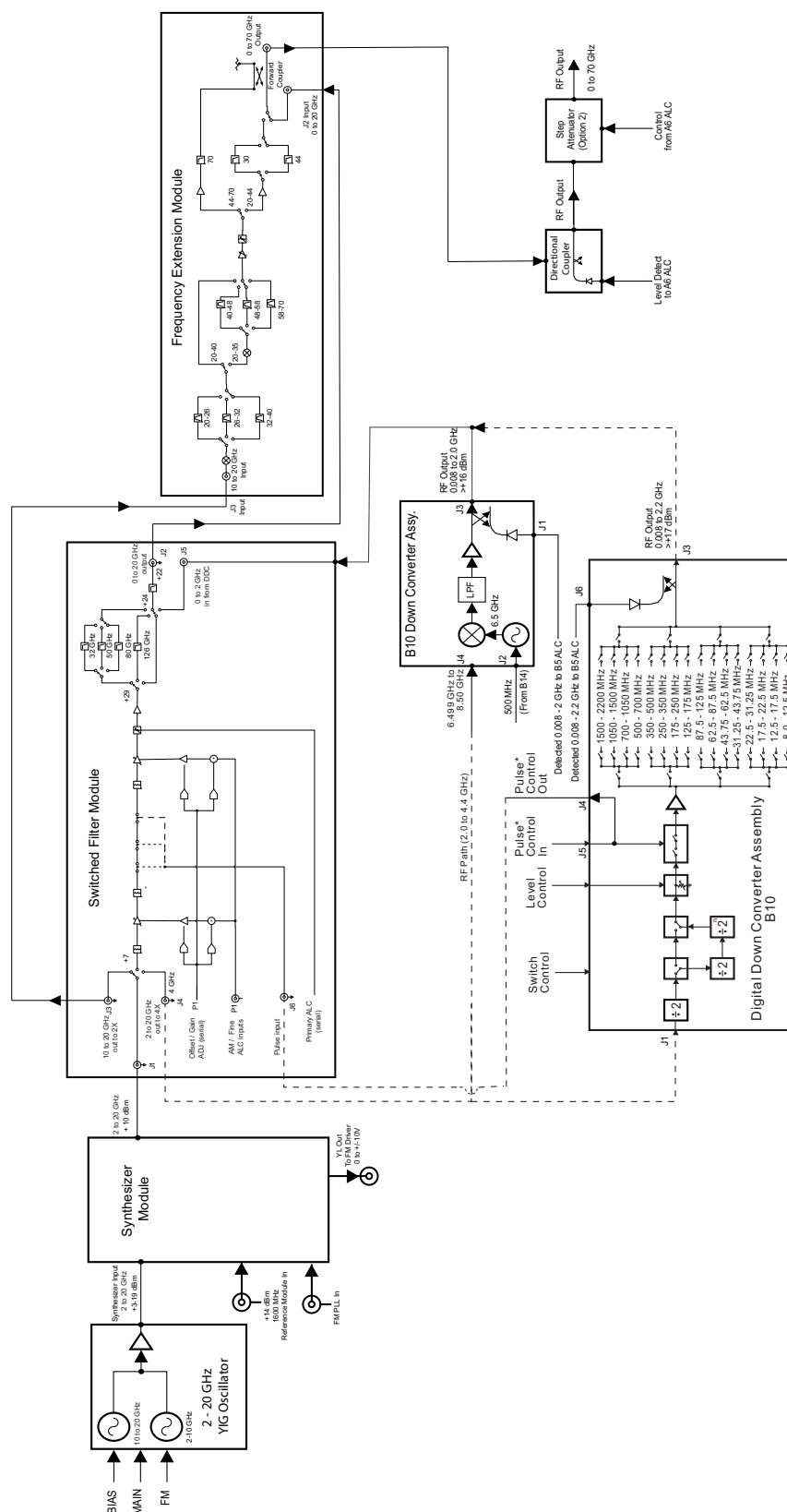


Figure 2-3. Block Diagram of the RF Deck Assembly for Model MG36271A

Chapter 3 — Performance Verification

3-1 Introduction

This chapter contains tests that can be used to manually verify the performance of the series MG362x1A Synthesized Signal Generator. These tests support all instrument models having any version of firmware and instrument models with the following options:

- Option 2, Mechanical Step Attenuator, 110 dB
- Option 3, Low phase noise and high stability
- Option 6, Analog Sweep (MG36221A and MG36241A only)
- Option 9, Rear Panel K(m)-Connector RF Output
- Option 10, User Defined Modulation (Requires Option 12, 26, and 27)
- Option 11, Rack Mount without Slides (Shelf Mount)
- Option 12, Amplitude, frequency and phase modulation, internal/external
- Option 13, Ultra low phase noise (Requires Option 3)
- Option 15, High power output
- Option 18, Onsite User Level Calibration
- Option 23, Premium Phase Noise, CW (Requires Option 3 and 13)
- Option 25, Pulse Train Modulation (Requires option 26 and 27)
- Option 26, Pulse Modulation, Internal/External
- Option 27, Modulation hardware (Requires Option 12 or 26, or both for functionality)
- Option 29, Front Panel Modulation Input Output Access
Option 27 required when ordering Option 12 or 26, or both
- Option 30, 600 Ohms External AM/FM Input Impedance)
- Option 33, Phase Noise, Export Option (Cannot be ordered with Options 3, 13, 23 and 56)
- Option 37, Removable SDIO memory
- Option 56, Ultra Stability Time Base (Requires Option 3 or 13)
- Option 66, GNSS Atomic Clock Receiver (Requires Option 3 or 13)

3-2 Test Records

A blank copy of a sample performance verification test record for the MG362x1A models is provided in [Appendix A, “Test Records”](#). Each test record contains the model-specific variables called for by the test procedures. It also provides a means for maintaining an accurate and complete record of instrument performance. We recommend that you copy these pages and use them to record the results of your initial testing of the instrument. These initial test results can later be used as benchmark values for future tests of the same instrument.

3-3 Connector and Key Notation

The test procedures include many references to equipment interconnections and control settings. For all MG362x1A references, specific labels are used to denote the appropriate menu key, data entry key, data entry control, or connector (such as RF Output). Most references to supporting test equipment use general labels for commonly used controls and connections such as Span or RF Input.

3-4 Test Equipment List

Table 3-1 provides a list of alternate test equipment used for the performance verification tests and adjustments of the instrument. The test equipment setup is critical to making accurate measurements. In some cases, you may substitute test equipment having the same critical specifications as the test equipment indicated in the test equipment list (refer to “[Measurement Uncertainty](#)” on page 3-5).

Table 3-1. Test Equipment List (1 of 3)

Instrument	Critical Specification	Recommended Manufacturer/Model
Computer running Windows 7 or higher 4 GB RAM (8 GB or higher recommended) With any Intel CPU (10th Generation or higher recommended) Operation between the instrument and remote program is accomplished via a TCP/IP raw socket connection to port 9001	Recommended computer configuration: Pentium 4 2.8 GHz 1 GB RAM Ethernet Sockets and IEEE-488 General Purpose Interface Bus (GPIB). Mouse, Keyboard, Monitor, Network The computer must be dedicated during calibration and verification activities.	Dell, HP, or other common source
Spectrum Analyzer, For MG36221A/MG36241A	Frequency: 100 kHz to 54 GHz Resolution bandwidth: 10 Hz	Anritsu MS2090A-0754.
Spectrum Analyzer, For MG36271A	Frequency 9 kHz to 170 GHz, Resolution bandwidth: 10 Hz	Anritsu MS2760A-0170
Phase noise measurement system	B1 Spectrum Analyzer K7 Analog Demod B80 Demod Bandwidth For MG36271A B21 LO/IF Conn. for external mixer	Rohde & Schwarz FSWP50
Frequency counter <i>For use in calibration and performance verification.</i> <i>For use with performance verification only.</i>	Frequency range: 0.01 to 20 GHz Input impedance: 50 Ω Resolution: 1 Hz Other: External time base input Frequency range: 0.01 to 6 GHz Input impedance: 50 Ω Resolution: 1 Hz Other: External time base input	For calibration and performance verification the recommendation is Anritsu model MF2413B or MF2413 For performance verification the recommendation is Anritsu model MF2412B
Digital multimeter	Minimum 1% RMS ACV accuracy at 100 kHz	Fluke 8840A or Agilent 34401A
Function generator	Frequency: 0.1 Hz to 15 MHz	Agilent 33120A
Digital sampling oscilloscope with sampling head for pulse verification	80 Giga-Sample/Seconds	Keysight DCA-X N1000A Oscilloscope
Frequency reference	Frequency: 10 MHz Accuracy: 5×10^{-12} parts/day	Absolute Time Corp., model 300 or Symmetricom (Datum) model 9390-9600
K(m) to K(m) Adapter	DC to 40 GHz	Anritsu K220B
Mixer box (for low level calibration)	Frequency range: 0.01 GHz to 40 GHz	Anritsu PN: T2579
Low pass filter (Qty = 2)	1.9 GHz LPF	Mini-Circuits BPL-1.9 or Anritsu PN: 1030-104

Table 3-1. Test Equipment List (2 of 3)

Instrument	Critical Specification	Recommended Manufacturer/Model
Fixed coaxial attenuator	Frequency range: DC to 40 GHz Attenuation: 3, 6, 10, and 20 dB (sizes and counts are determined depending on options and maximum output power of instrument)	Anritsu part number SC7879 K set of attenuators (41KC-3, 41KC-6, 41KC-10, 41KC-20) (Which is calibrated to data point in footnote ^(a)) or Anritsu, model 41KC-3, 41KC-6, 41KC-10 or 41KC-20 (Must be calibrated - See footnote ^(a))
Fixed coaxial attenuators For MG36271A	Frequency Range: DC to 67 GHz Attenuation: 3, 6, 10, and 20 dB (sizes and counts are determined depending on options and maximum output power of instrument)	Anritsu part number SC7880 V set of attenuators (41V-3, 41V-6, 41V-10, 41V-20) (Calibrated to data point in footnote ^(b)) or Anritsu, model 41V-3, 41V-6, 41V-10 and 41V-20 (Must be calibrated - See footnote ^(b))
BNC Tee (Qty 2)	Connectors: 50 Ω BNC(f)	Any common source
BNC (f) to double stacking banana plug	BNC (f) to double stacking banana plug	Pomona Electronics P/N 1269
BNC cable BNC(m)-BNC(m), 50 Ω , 6 ft (Qty = 4)	BNC cable BNC(m)-BNC(m), 50 Ω , 6 ft	Anritsu 2000-1627-R
BNC cable BNC(m)-BNC(m), 50 Ω , 2 ft	BNC cable BNC(m)-BNC(m), 50 Ω , 2 ft	Anritsu 3-806-225
GPIO cable, 6 ft (Qty = 4)	GPIO cable, 6 ft (2 m)	Anritsu 2100-2
Semi-rigid cable (used for LO to Mixer box)	K Semi-rigid cable, 25 cm	Anritsu K120MM-25CM
6 dB pad (attenuator) (Qty = 2)	6 dB pad (attenuator) for digital scope pulse testing	Anritsu 41KC-6
BNC to SMA adapter	BNC to SMA Adapter	Any common source
Armored Semi Rigid Test Port Cable K(m) to K(m) or semi-rigid cables	K(m) to K(m) flex cables or Semi-rigid cables	Anritsu SC3855 K(m) to K(m) flex cable (Must be calibrated - See footnote (a) ^(c)) or Anritsu K120mm-60CM custom semi-rigid cable (Must be calibrated - See footnote (a) (c))
50 Ohm feed through	DC to 1 GHz	any common source
1.85 mm to 2.92 mm Adapter	V(m) to K(f) DC to 43.5 GHz	Anritsu 34VKF50A (Must be calibrated - See footnote ^(a))
2.92 mm to N type adapter	N(m) to K(f) DC to 18 GHz	Anritsu 34NKF50 (Must be calibrated - See footnote 1.85 mm to 1.85 mm adapter V(f) to V(f) DC to 65 GHz 34VV50
Armored Semi Rigid Test Port Cable (K Connector Female to K Connector Male)	Armored Semi Rigid Test Port Cable (K Connector Female to K Connector Male)	Anritsu 3670K50-2 (Must be calibrated - See footnote ^(a) (c))

Table 3-1. Test Equipment List (3 of 3)

Instrument	Critical Specification	Recommended Manufacturer/Model
Armored Semi Rigid Test Port Cable (V Connector Female to V Connector Male)	Armored Semi Rigid Test Port Cable (V Connector Female to V Connector Male)	Anritsu 3670V50A-2 (Must be calibrated - See footnote ^(b) ^(c))

- a. Calibrated at the following data points: 100 kHz, 1 MHz, 10 MHz, 100 MHz, 500 MHz to 40 GHz in 500 MHz steps
- b. Calibrated at the following data points: 100 kHz, 1 MHz, 10 MHz, 100 MHz, 500 MHz to 67 GHz in 500 MHz steps
- c. These cables are not designed for repeated bending. Bend them into the desired shape, then avoid further bending.

3-5 Measurement Uncertainty

The test records found in [Appendix A, “Test Records”](#) specify a measurement uncertainty. The measurement uncertainty listed in each test record includes the best estimate of the errors contributed by the measurement, test equipment, standards, and other correction factors (for example, calibration factors and mismatch error) based on the suggested equipment, the equipment setup, and the prescribed test procedure. Most of the uncertainties are type-B per the ISO/IEC TAG 4 Guide for the Expression of Uncertainty in Measurement (GUM).

Maximum Permissible Tolerance of Return Loss of Adapters, Attenuators and Cables

The uncertainty budgets listed in the performance verification section were derived from measured values of calibrated attenuators, cables and adapters. In order to achieve the same level of uncertainty, it is important to perform calibrations of attenuators, cables and adapters which are recommended in the performance verification section.

Note Connector Type Nomenclature: 1.85 mm = V-connector; 2.92 mm = K-connector

Adapters

Maximum permissible tolerances of the adapters listed below are tabulated in [Table 3-2](#) through [Table 3-5](#).

- Adapter 1.85 mm (m) to 2.4 mm (f) part number PE9673
- Adapter 2.4 mm (f) to 2.92 mm (m) part number 11904D
- Adapter 1.85 mm (m) to 2.92 mm (f) part number 34VKF50
- Adapter 2.92 mm (m) to N (f) part number 34NFK50

Table 3-2. Adapter 1.85 mm (m) to 2.4 mm (f) part number **PE9673** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	1.85 mm (m)	1.85 mm (m)	2.4 mm (f)	2.4 mm (f)
(0.0001 to 10) GHz	30	0.032	30	0.032
(10.05 to 20) GHz	25	0.056	24	0.063
(20.5 to 30) GHz	21	0.089	21	0.089
(30.5 to 40) GHz	20	0.100	15	0.178
(40.5 to 50) GHz	15	0.178	15	0.178

Table 3-3. Adapter 2.4 mm (f) to 2.92 mm (m) part number **11904D** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	2.92 mm (m)	2.92 mm (m)	2.4 mm (f)	2.4 mm (f)
(0.0001 to 10) GHz	40	0.010	37	0.014
(10.05 to 20) GHz	34	0.020	24	0.014
(20.5 to 30) GHz	36	0.016	31	0.028
(30.5 to 40) GHz	27	0.045	28	0.040

Table 3-4. Adapter 1.85 mm (m) to 2.92 mm (f) part number **34VKF50** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	1.85 mm (m)	1.85 mm (m)	2.92 mm (f)	2.92 mm (f)
(0.0001 to 10) GHz	33	0.022	32	0.025
(10.05 to 20) GHz	34	0.020	32	0.025
(20.5 to 30) GHz	25	0.056	23	0.071
(30.5 to 40) GHz	23	0.071	22	0.079

Table 3-5. Adapter 2.92 mm (m) to N (f) part number **34NFK50** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	2.92 mm (m)	2.92 mm (m)	N (f)	N (f)
(0.0001 to 4) GHz	40	0.010	40	0.010

Attenuators

Maximum permissible tolerances of the 10 dB attenuators listed below are tabulated in [Table 3-6](#) and [Table 3-7](#)

- 2.92 mm Attenuator kit (3, 6, 10, and 20 dB) part number SC7879
- 1.85 mm Attenuator kit (3, 6, 10, and 20 dB) part number SC7880

Table 3-6. 2.92 mm Attenuator (10 dB) from kit **SC7879** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	2.92 mm (m)	2.92 mm (m)	2.92 mm (f)	2.92 mm (f)
(0.0001 to 10) GHz	37	0.014	35	0.018
(10.05 to 20) GHz	31	0.028	35	0.056
(20.5 to 30) GHz	24	0.063	23	0.071
(30.5 to 40) GHz	24	0.063	23	0.071

Table 3-7. 1.85 mm Attenuator (10 dB) from kit **SC7880** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector	1.85 mm (m)	1.85 mm (m)	1.85 mm (f)	1.85 mm (f)
(0.0001 to 10) GHz	37	0.014	31	0.028
(10.05 to 20) GHz	31	0.028	28	0.040
(20.5 to 30) GHz	24	0.063	29	0.035
(30.5 to 40) GHz	22	0.079	23	0.071
(40.5 to 50) GHz	17	0.141	18	0.126

Cables

Maximum permissible tolerances of the cables listed below are tabulated in [Table 3-8](#) and [Table 3-9](#)

- Armored Semi Rigid Test Port Cable (2.92 mm Connector Female to 2.92 mm Connector Male) part number 3670K50-2
- Armored Semi Rigid Test Port Cable (1.85 mm Connector Female to 1.85 mm Connector Male) part number 3670V50A-2

Table 3-8. Armored Semi Rigid Test Port Cable (2.92 mm Connector Female to 2.92 mm Connector Male) part number **3670K50-2** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector	2.92 mm (m)	2.92 mm (m)	2.92 mm (f)	2.92 mm (f)
(0.0001 to 10) GHz	27	0.045	27	0.045
(10.05 to 20) GHz	21	0.089	23	0.071
(20.5 to 30) GHz	23	0.071	22	0.079
(30.5 to 40) GHz	22	0.079	21	0.089

Table 3-9. Armored Semi Rigid Test Port Cable (1.85 mm Connector Female to 1.85 mm Connector Male) part number 3670V50A-2 - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector	1.85 mm (m)	1.85 mm (m)	1.85 mm (f)	1.85 mm (f)
(0.0001 to 10) GHz	35	0.018	33	0.022
(10.05 to 20) GHz	26	0.050	27	0.045
(20.5 to 30) GHz	24	0.063	25	0.056
(30.5 to 40) GHz	22	0.079	22	0.079
(40.5 to 50) GHz	22	0.079	21	0.089

3-6 Internal Time Base Aging Rate Test

The following test can be used to verify that the MG362x1A 10 MHz time base is within its aging specification. The instrument derives its frequency accuracy from an internal 10 MHz crystal oscillator standard. An inherent characteristic of crystal oscillators is the effect of crystal *aging* within the first few days to weeks of operation. Typically, the frequency of the crystal oscillator increases slightly at first, then settles to a relatively constant value for the rest of its life.

Note Do not confuse crystal aging with other short term frequency instabilities, for example, noise and temperature. The internal time base of the instrument may not achieve its specified aging rate before the specified warm-up time of 7 to 30 days has elapsed; therefore, this performance test is optional.

For the greatest absolute frequency accuracy, allow the MG362x1A to warm up until its RF output frequency has stabilized (usually 7 to 30 days). Once stabilized, the change in reference oscillator frequency should remain within the aging rate if:

- The time base oven is not allowed to cool
- The instrument does not sustain any mechanical shock
- Ambient temperature is held constant

This test should be performed upon receipt of the instrument and again after several days or weeks to fully qualify the aging rate.

Note Before performing this procedure, ensure that all test equipment is calibrated. Refer to the manufacturer's test equipment manual.

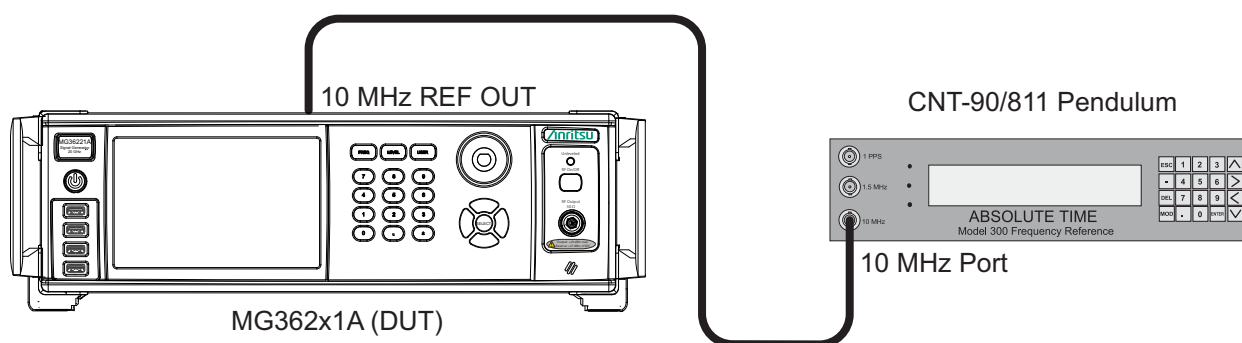


Figure 3-1. Equipment Setup for Internal Time Base Aging Rate Tests

Note There are two procedures for Internal Time Base Aging Rate based on the frequency reference used. The first procedure is for Absolute Time Corp model 300 use, the second is for Symmetricom (Datum) model 9390-9600 use.

Internal Time Base Aging Rate Test with Absolute Time Model 300

Test Setup

Connect the MG362x1A rear panel 10 MHz REF OUT to the frequency reference rear panel input connector labeled 10 MHz when directed to do so during the test procedure.

Test Procedure

The frequency error is measured at the start and finish of the test time period of 24 hours. The aging rate is the difference between the two error readings.

1. Set up the model 300 frequency reference as follows:
 - a. Press the ESC key until the MAIN MENU is displayed.
 - b. At the MAIN MENU display, press 1 to select the CONFIGURATION MENU.
 - c. At the CONFIGURATION MENU display, press 8 to select MEAS.
 - d. Press the MOD key and use the Up/Down arrow keys to get to the menu display: MEASUREMENT = FREQ.
 - e. Press the ENTER key.
 - f. Press the ESC key until the MAIN MENU is displayed.
 - g. At the MAIN MENU display, press 3 to select the REVIEW MENU.
 - h. At the REVIEW MENU display, press 8 to select TFM.
2. Connect the MG362x1A rear panel 10 MHz REF OUT signal to the frequency reference front panel 10 MHz input.
3. Wait approximately 90 minutes (default setting) until the FMFOM on the frequency reference display decreases from 9 to 1. (The default setting is recommended to achieve optimum measurements.)
4. The frequency error in the signal under test is displayed in ps/s (picoseconds/second). For example, an error of -644681 ps/s is -644681×10^{-12} or -6.44681×10^{-7} away from the 10 MHz internal reference on the frequency reference.
5. The frequency error display is continuously updated as a running 5,000-second average. The averaging smooths out the short-term instability of the oscillator.
6. Record the frequency error value displayed on the frequency reference in the test record.
7. Wait for 24 hours, then record the frequency error value in the test record.
8. The aging rate is the difference between the two frequency error values.
9. Record the computed result in the test record. To meet the specification, the computed aging rate should be as shown in [Table 3-10](#).

Table 3-10. Internal Timebase Aging Rate

	Standard	Option 3	Option 56
Time Base Type	OCXO	OCXO	Rubidium
Aging Rate per year	$< \pm 5 \times 10^{-7}$	$< \pm 2 \times 10^{-8}$	$< \pm 1 \times 10^{-9}$
Temperature Effects from 0 to 55 °C	$< \pm 3 \times 10^{-7}$	$< \pm 2 \times 10^{-9}$	$< \pm 3 \times 10^{-10}$
Short-term Stability (Allan Deviation per 100 s after 2 hours warm up)	NA	NA	$< 8 \times 10^{-12}$

Internal Time Base Aging Rate Test with Symmetricom (Datum) Model 9390-9600

Test Setup

Connect the MG362x1A rear panel 10 MHz REF OUT to the Symmetricom (Datum) model 9390-9600 frequency standard rear panel BNC connector labeled J10. The frequency standard must be actively tracking at least three satellites, and the oscillator should be stabilized/locked (i.e., the front panel TRACKING and LOCKED LEDs should be illuminated).

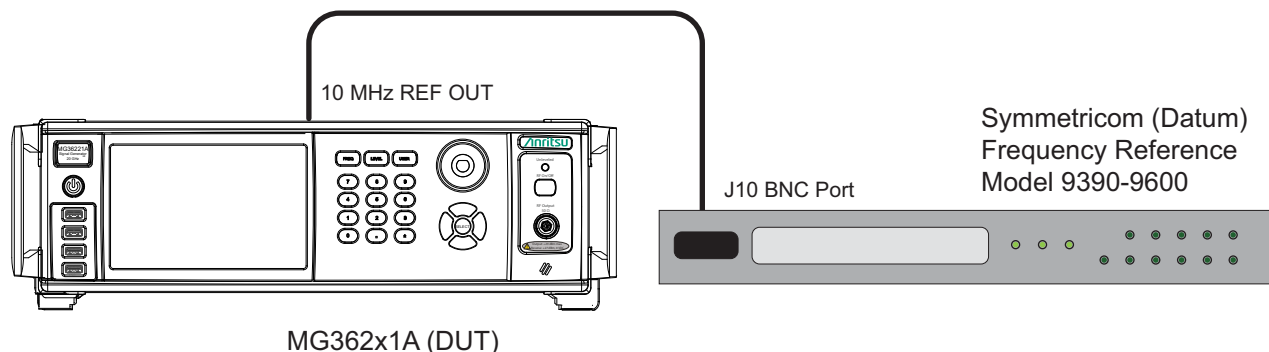


Figure 3-2. Internal Time Base Aging Rate Test Setup

Test Procedure

On the frequency standard:

1. Cycle the menu screen to the sixth screen (External Frequency Measurement) as shown below.

Row 1	EXT Freq: +0000E-14 / +0000E+00 SEC *
Row 2	<1>Enter Freq <2>ENABLE <3>DISABLE

2. Push keyboard switch “1” followed by the number 10000000. This will input the test frequency of 10 MHz.
3. Push keyboard switch “2” to ENABLE the external frequency measurement option. (pushing switch “3” will DISABLE it)
4. Confirm that the external frequency measurement option is enabled and the unit is locked by observing an “*” in row 1, column 35 of the display. If “NOTLK” appears then the frequency standard is not locked and testing must be halted. If no “*” appears then the unit is not connected properly.
5. Confirm that the measurement count has started to increment. This will be displayed in row 1, columns 20 through 29 of the display. Allow approximately 5 minutes for everything to stabilize.
6. Record the date/time of the test starting and the frequency offset displayed in row 1 column 9 through 17 on the test record as frequency error value.
7. After 24 hours push keyboard switch 3 to disable the measurement. Note that the “*” will disappear.
8. Record the date and time of the testing completion, and also the frequency offset displayed in row 1 column 9 through 17 on the test record as frequency error value (after 24 hours).
9. The aging rate is the difference between frequency error value and frequency value (after 24 hours). Record this value into the test record and compare it to the upper limit.

3-7 Spurious Signals Tests

The following tests can be used to verify that the signal generator meets its spurious emissions specifications for RF output signals from 9 kHz to 70 GHz.

The MG362x1A CW RF output signal is fed directly into a spectrum analyzer. The CW frequency and power level is referenced and a peak search function on the spectrum analyzer is utilized to find any spurious signals above the specified limit.

Note

Before performing this procedure, ensure that all test equipment is calibrated. Refer to the manufacturer's test equipment manual.

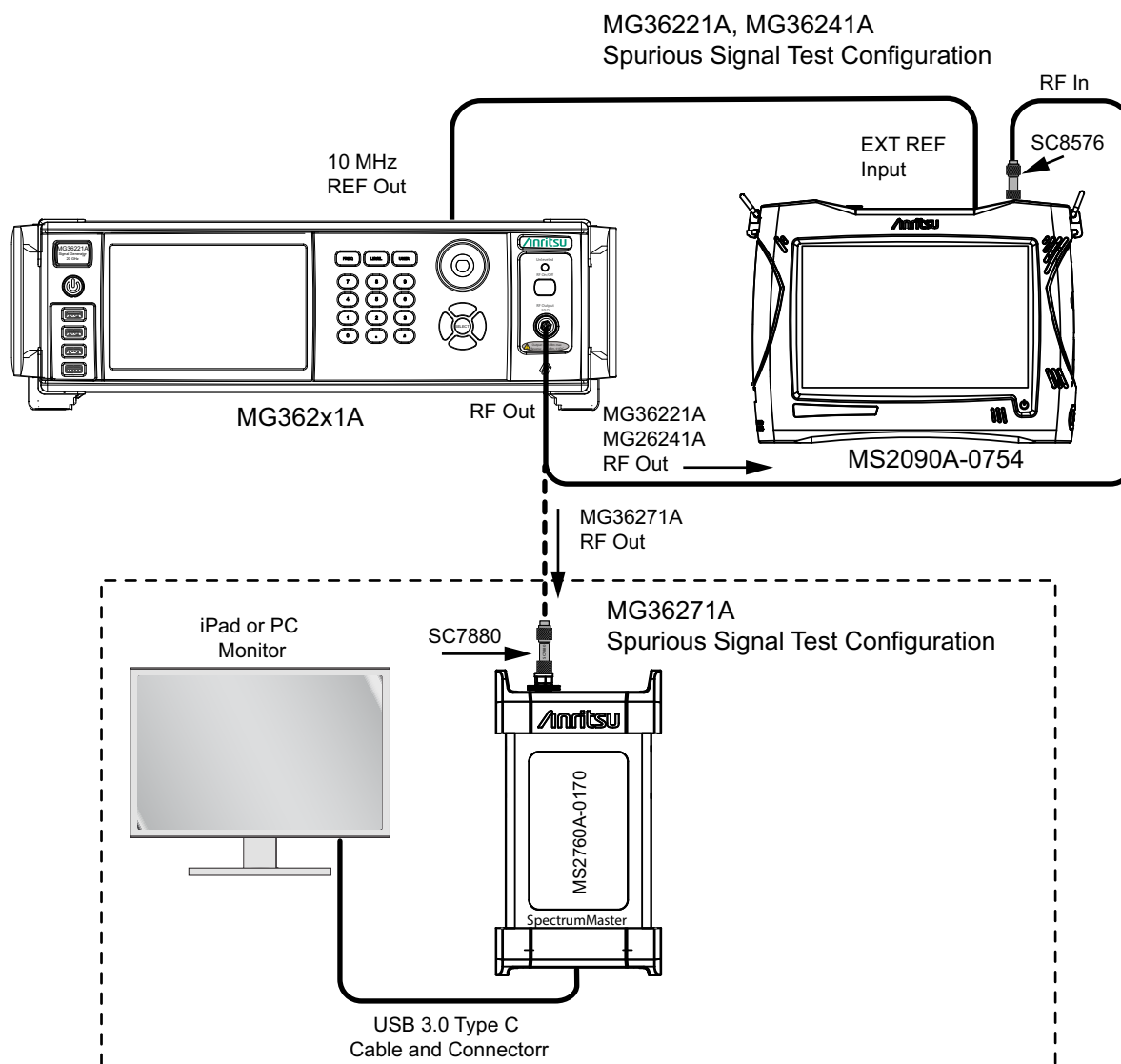


Figure 3-3. Equipment Setup for Spurious Signals Test

Harmonic Test Setup

Connect the equipment shown in [Figure 3-3](#), as follows:

1. Connect the MG362x1A rear panel 10 MHz REF OUT to the MS2090A-0754 external reference input.
2. Connect the MG362x1A RF Output to the MS2090A-0754 RF input.

Note

Power line and fan rotation spurious emissions are tested as part of the single sideband phase noise test in [Section 3-8](#).

3. Set up the spectrum analyzer as follows:
 - a. Press the PRESET MODE key.

Harmonic Test Procedure

1. Determine the first test frequency to test based on the test record, options and model number.
2. Set up the MG362x1A as follows:
 - a. Reset the instrument by pressing **SYSTEM | RESET | Preset**. After reset, the **CW** menu is displayed.
 - b. Press **FREQUENCY** to open the current frequency parameter for editing and set **F1** to the first appropriate test frequency (based on model and options) in the test record.
 - c. Press **LEVEL** to open the current power level parameter for editing.
 - d. Set **L1** to +10 dBm or to the maximum specified power level, whichever is less. For the MG36271A, the level will be lowered to +5 dBm when testing above 40 GHz.
3. Set up the MS2090A-0754 as follows:
 - a. Press the **AMPLITUDE** key. Press **REF LEVEL** and enter the current power level setting (**L1**) of the MG362x1A.
 - b. Press the **FREQUENCY** key and enter the current frequency setting (**F1**) of the MG362x1A.
 - c. Press the **AMPLITUDE** key and set **SCALE/DIV** value to 10 dB/ Div. Set **ATTEN LEVEL** to 50 dB.
 - d. Press the **TRACE** key and set **AVERAGES** to 5.
 - e. Press the **BANDWIDTH** key and toggle the **AUTO RBW** and **AUTO VBW** off. Set to the first appropriate test frequency's **RBW/VBW** value (based on model and options) in the test record.
 - f. Press the **SPAN** key and set to the first appropriate test frequency's **SPAN** value (based on model and options) in the test record.
4. Press the **MARKER** key, then select **PEAK SEARCH**.
5. Press the **FREQUENCY** key on the spectrum analyzer and enter next harmonic frequency listed in the test records.
6. Press the **PEAK SEARCH** key,
7. Record the reading from the spectrum analyzer into the test record.
8. Repeat Step 5 through Step 7 for each of the harmonic frequencies listed in the test record.
9. Press **FREQUENCY** on the MG362x1A to open the current frequency parameter for editing and set **F1** to the next appropriate test frequency (based on model and options) in the test record.
10. On the SPA, press the **FREQUENCY** key and enter the current frequency setting (**F1**) of the MG362x1A.
11. Determine if the power level for the MG362x1A and spectrum analyzer changes based on the new frequency or options, if so, adjust the MG362x1A **L1** and spectrum analyzer amplitude as needed.
12. Press the **SPAN** key and enter the value listed in the test record for the appropriate test frequency.
13. Press the **BW** key and enter the value listed in the test record for the appropriate test frequency.
14. Repeat Step 4 through Step 13 for each of the test frequencies listed in the test record.

Sub-Harmonic Test Setup

Connect the equipment, shown in [Figure 3-4](#).

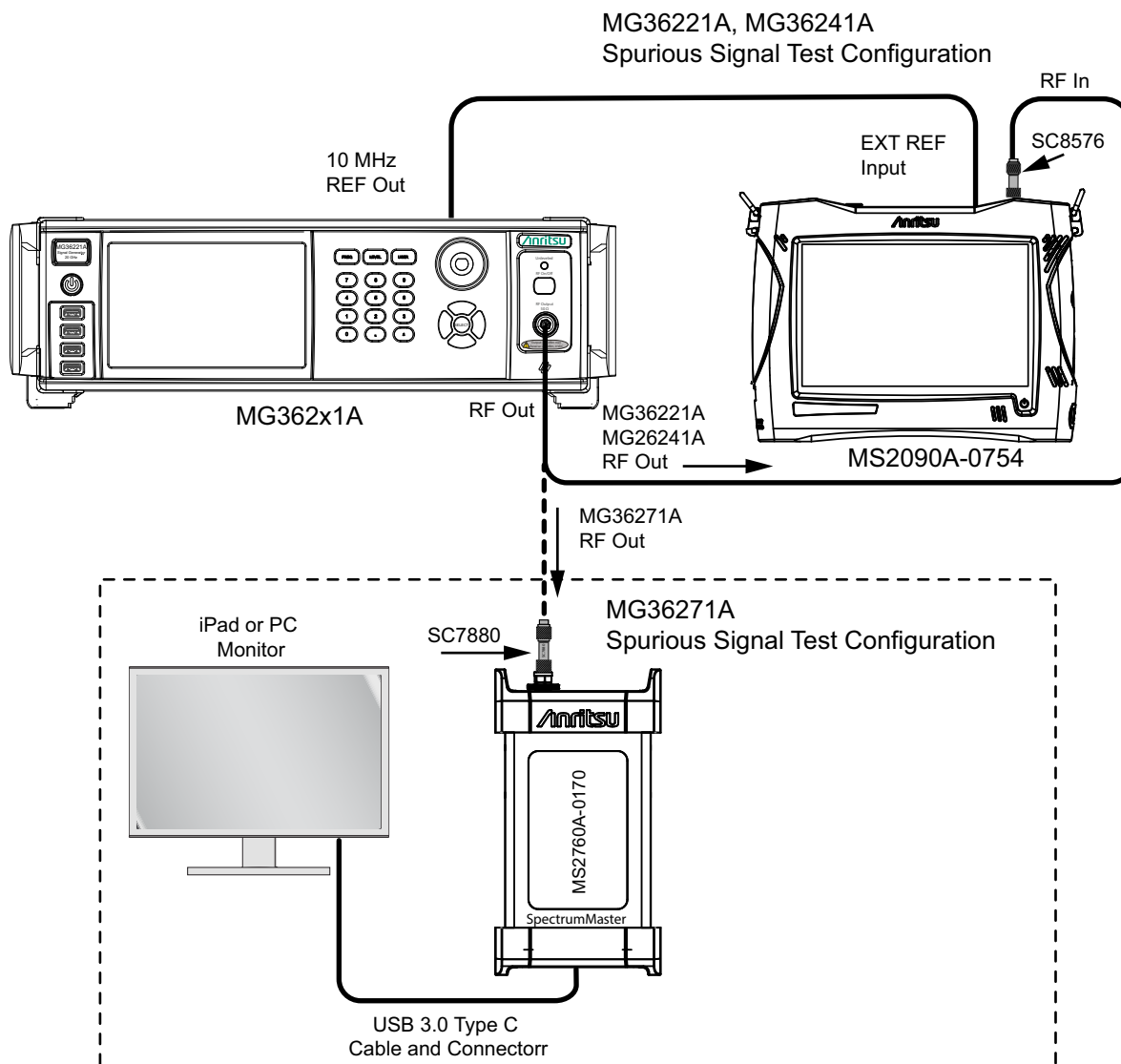


Figure 3-4. Equipment Setup for Spurious Signals Test

Sub- Harmonic Test Setup

1. Connect the MG362x1A rear panel 10 MHz REF OUT to the MS2090A-0754 external reference input.
2. Connect the MG362x1A RF Output to the MS2090A-0754 RF input.

Note Power line and fan rotation spurious emissions are tested as part of the single sideband phase noise test in [Section 3-8](#).

3. Set up the spectrum analyzer as follows:
 - a. Press the PRESET MODE key.

Sub-Harmonic Test Procedure

Part 1

1. Determine the first test frequency to test based on the test record, options and model number.
2. Set up the MG362x1A as follows:
 - a. Reset the instrument by pressing **SYSTEM | RESET | Preset**. After reset, the **CW** menu is displayed.
 - b. Press **FREQUENCY** to open the current frequency parameter for editing and set **F1** to the first appropriate test frequency (based on model and options) in the test record.
 - c. Press **LEVEL** to open the current power level parameter for editing.
 - d. Set **L1** to +10 dBm or to the maximum specified power level, whichever is less. For the MG36271A, the level will be lowered to +5 dBm when testing above 40 GHz.
3. Set up the MS2090A-0754 as follows:
 - a. Press the **AMPLITUDE** key. Press **REF LEVEL** and enter the current power level setting (**L1**) of the MG362x1A.
 - b. Press the **FREQUENCY** key and enter the current frequency setting (**F1**) of the MG362x1A.
 - c. Press the **AMPLITUDE** key and set **SCALE/DIV** value to 10 dB/ Div. Set **ATTEN LEVEL** to 50 dB.
 - d. Press the **TRACE** key and set **AVERAGES** to 5.
 - e. Press the **BANDWIDTH** key and toggle the **AUTO RBW** and **AUTO VBW** off. Set to the first appropriate test frequency's **RBW/VBW** value (based on model and options) in the test record.
 - f. Press the **SPAN** key and set to the first appropriate test frequency's **SPAN** value (based on model and options) in the test record.
4. Press the **MARKER** key, then select **PEAK SEARCH**.
5. Press the **FREQUENCY** key on the spectrum analyzer and enter next harmonic frequency listed in the test records.
6. Press the **PEAK SEARCH** key,
7. Record the reading from the spectrum analyzer into the test record.
8. Repeat Step 5 through Step 7 for each of the harmonic frequencies listed in the test record.
9. Press **FREQUENCY** on the MG362x1A to open the current frequency parameter for editing and set **F1** to the next appropriate test frequency (based on model and options) in the test record.
10. On the SPA, press the **FREQUENCY** key and enter the current frequency setting (**F1**) of the MG362x1A.
11. Determine if the power level for the MG362x1A and spectrum analyzer changes based on the new frequency or options, if so, adjust the MG362x1A **L1** and spectrum analyzer amplitude as needed.
12. Press the **SPAN** key and enter the value listed in the test record for the appropriate test frequency.
13. Press the **BW** key and enter the value listed in the test record for the appropriate test frequency.
14. Repeat Step 4 through Step 13 for each of the test frequencies listed in the test record.

Part 2

1. Set up the MG362x1A as follows:
 - a. Press **FREQUENCY** to open the current frequency parameter for editing.
 - b. Set F1 to the appropriate test frequency (based on model and options) in the test record, part 2.
 - c. Press **LEVEL** to open the current power level parameter for editing.
 - d. Set L1 to +10 dBm or to the maximum specified power level, whichever is less. For the MG36271A, the level will be lowered to +5 dBm when testing above 40 GHz.
2. Set up the spectrum analyzer as follows:
 - a. Press the **AMPLITUDE** key.
 - b. Press **REF LVL** and enter the current power level setting (L1) of the MG362x1A.
 - c. Press the **FREQUENCY** key.
 - d. Press **Center Freq.**
 - e. Enter the current spectrum analyzer center frequency from the test record.
 - f. Press **SPAN**.
 - g. Enter the current spectrum analyzer span frequency from the test record.
 - h. Press the **BW** key.
 - i. Press **Res BW** to **MAN**.
 - j. Enter the current spectrum analyzer RBW value from the test record.
3. Press the **PEAK SEARCH** key, and then select **MARKER DELTA**, which sets the reference for the following measurements.
4. Set up the spectrum analyzer as follows:
 - a. Press the **FREQUENCY** key.
 - b. Press **Center Freq.**
 - c. Enter the next spectrum analyzer center frequency from the test record.
 - d. Press the **BW** key.
 - e. If needed, press **Res BW** to **MAN**.
 - f. Enter the next spectrum analyzer RBW value from the test record.
5. Press **PEAK SEARCH** then **Next Peak**.
6. Record the reading from the spectrum analyzer Delta MKH reading into the test record.
7. Repeat steps 4 through 6 for same specified MG362x1A frequency listed in the test record, part 2.
8. Repeat steps 1 through 7 for each of the MG362x1A frequency groups listed in the test record, part 2.

3-8 Single Sideband Phase Noise Test

The section below contains the information to perform the verification using a Rohde & Schwarz FSWP50.

Table 3-11. Recommend Equipment

Recommend Part Number	Quantity	Description	Vendor
K222B	1	Insertable F-F	Anritsu
34NKF50	1	N Male to K Female Adapter	Anritsu
FSWP50	1	Phase Noise Analyzer	Rohde & Schwarz
FSWP50	1	Phase Noise Analyzer - Option B21 (Use for MG36271A)	Rohde & Schwarz
FS-Z75	2	Harmonic Mixer	Rohde & Schwarz
K120MM-20CM	2	Semi ridged cables K120MM-20CM (this will need to be bent on site to fit)	Anritsu
1.85 mm (V) Power Splitter		N/A	Anritsu

Test Setup

1. Set up the MG362x1A as follows:

- a. Reset the instrument by pressing **System**, then **Reset**. Upon reset, the CW menu is displayed.
- b. Press **Frequency** to open the current frequency parameter for editing.
- c. Set F1 to the CW frequency indicated in the test record.

Note	Use the correct table based on the options installed in the MG362x1A.
-------------	---

- d. Press **LEVEL** to open the current power level parameter for editing. Set L1 to +10 dBm or the maximum leveled power of the instrument which ever is lower.

Note	If you are not using the splitter, reduce L1 power level to +8 dBm.
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- e. Connect the MG36221A and MG36241A as shown in [Figure 3-5](#).
- f. Connect the MG36271 as shown in [Figure 3-6](#).

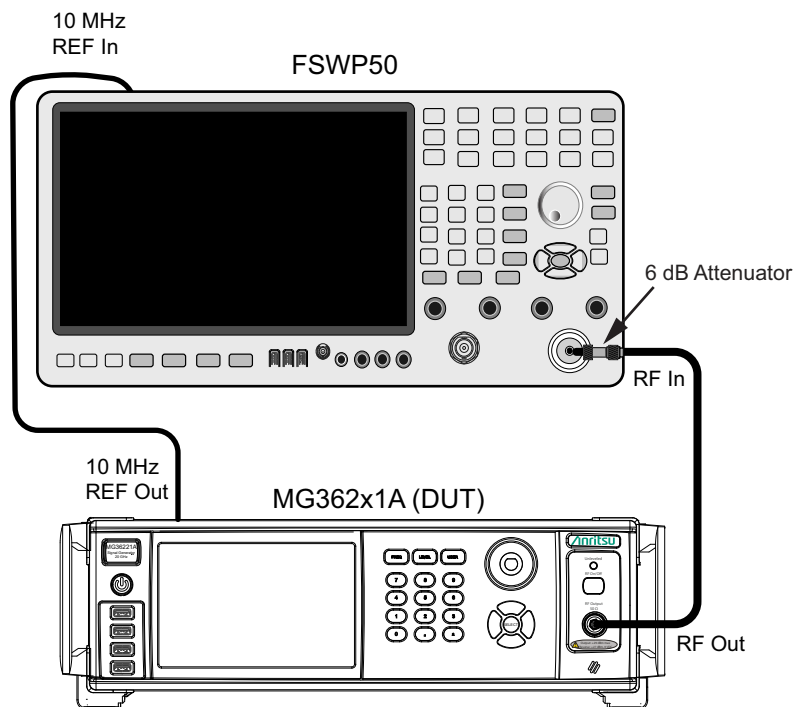


Figure 3-5. Phase Noise Test Setup

Equipment Setup

For MG36221A and MG36241A, use the following setup:

FSWP: Tab mode Phase Noise

Noise Config/ Start Offset 10 Hz/ Stop Offset 10 MHz/ RBW 3.0%/ XCORR Factor 100

Integrated Measurements/ Range 1/ Range Manual/ Range Start 50.0 Hz/ Range Stop 15.0 Hz

Spot Noise/ Decade Edges Off

Stability/ Tau Start 100 ns/ Tau Stop 100 ms

Equipment Setup

For MG36271A, please use the following setup:

FSWP : Tab mode Phase Noise

Noise Config/ Start Offset 10 Hz/ Stop Offset 100 MHz/ RBW 10.0%/ XCORR Factor 100

Integrated Measurements/ Range 1/ Range Manual/ Range Start 50.0 Hz/ Range Stop 15.0 Hz

Spot Noise/ Decade Edges Off

Stability/ Tau Start 100 ns/ Tau Stop 100 ms

Input/Output / External Mixer Config / On

Basic Settings / Mixer 1 LO Level 15.5 dBm/ Mixer 2 LO Level 15.5 dBm

Conversion Loss Table / Edit Table / Add files provided for mixers

Edit Conversion Loss Table/ Band V / Harmonic Order 6 / Bias 0A / Mixer Type 3-port

Mixer Settings / Band V / Mixer XCORR ON

Mixer Settings / Mixer 1 / Harmonic Type Even / Harmonic Order 6 / Conversion Loss Table

Mixer Settings / Mixer 2 / Harmonic Type Even / Harmonic Order 6 / Conversion Loss Table

Input/Output / Output Config / DC Config / Channel Coupling On / Settings Off/ Mode Voltage / Value 0V

Input/Output / Output Config / DC Config / Limits / Minimum VTune & VAux -10.0 V VSupply 0V

Maximum VTune 28.0V VAux 10.0 V VSupply 16.0 V

Max Curr/Volt VTune 20 mA VAux 0 mA VSupply 0 mA

Input/Output / Output Config / Signal Source / Channel Coupling On

Input/Output / Output Config / Noise Source Off3

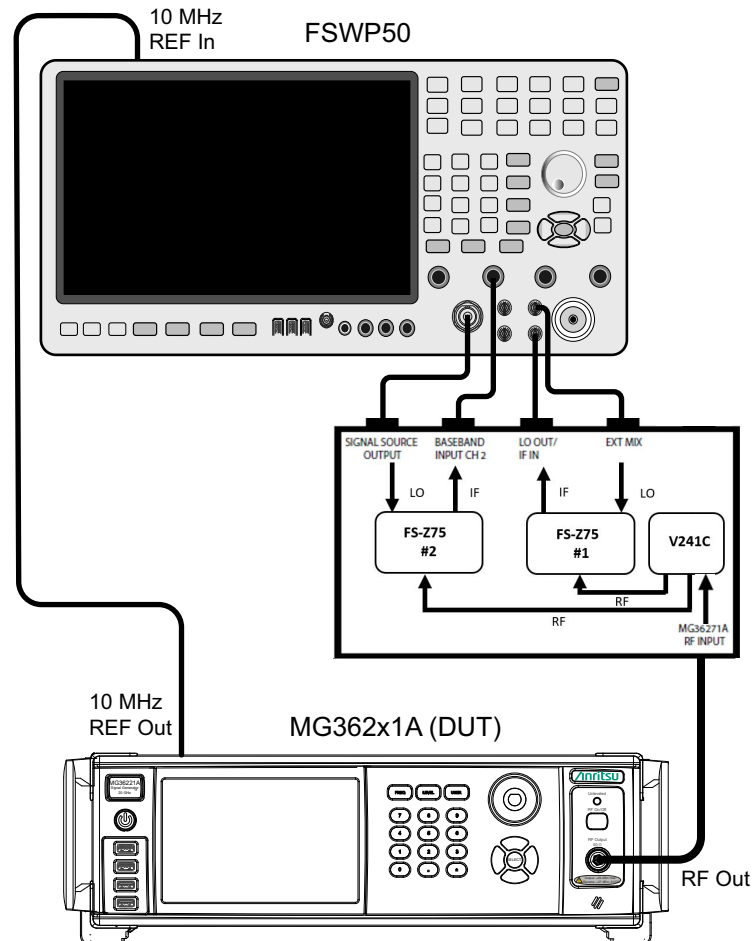


Figure 3-6. MG36271A Phase Noise Test

2. FSWP setup:

- a. Press the green **Preset** button, then touch **Factory**.
- b. Press **Measure/View**, then touch **Phase Noise**.
- c. Press **Window Max**.
- d. Press **Start/Center**, then touch **10 Hz** (enter 1 Hz if phase noise options are installed).
- e. Press **Stop/Span**, then touch **1 MHz**.
- f. For standard units and units with low phase noise options, press **Marker**, then:
Touch **Marker 1**, enter 10 then press **X1** to obtain 10 Hz.
Touch **Marker 2**, enter 100 then press **X1** to obtain 100 Hz.
Touch **Marker 3**, enter 1 then press **k/M** to obtain 1 kHz.

Touch Marker 4, enter 10 then press k/M to obtain 10 kHz.

Touch Marker 5, enter 100 then press k/m to obtain 100 kHz.

Touch Marker 6, enter 1 then press M/u to obtain 1 MHz.

- g.** For units with low phase noise options, press Marker, then:

Touch Marker 1, enter 1 then press X1 to obtain 1 Hz.

Touch Marker 2, enter 10 then press X1 to obtain 10 Hz.

Touch Marker 3, enter 100 then press X1 to obtain 100 Hz.

Touch Marker 4, enter 1 then press k/M to obtain 1 kHz.

Touch Marker 5, enter 10 then press k/M to obtain 10 kHz.

Touch Marker 6, enter 100 then press k/m to obtain 100 kHz.

Touch Marker 7, enter 1 then press M/u to obtain 1 MHz.

- h.** Press **Avg/BW**, then touch correlation and set to 10.

Test Procedure

1. Refer to the test records for Phase Noise. Use the correct table based on the options installed in the MG362x1A.
2. Determine the test frequency.
3. Set the MG362x1A F1 to the frequency called out in the test records.
4. Press Setup.
 - a.** Touch Frequency Band.

If the test frequencies is from 10 MHz to 40 MHz, touch 10M - 41MHz.

If the test frequencies is from 39 MHz to 101 MHz, touch 39M - 101MHz.

If the test frequencies is from 99 MHz to 1.5 GHz, touch 99M - 1.5GHz.

If the test frequencies is from 250 MHz to 5 GHz, touch 250M - 7GHz.

If the test frequencies is from > 5 GHz to 10 GHz (requires downconverter is on and is the selected input), touch 3G - 10GHz.

If the test frequencies is from 9 GHz to 26.5 GHz (requires downconverter is on and is the selected input), touch 9G - 26.5GHz.
 - b.** Set IF Gain to:

50 dB if DUT CW frequency < 5 GHz.

40 dB if DUT CW frequency ≥ 5GHz.
 - c.** Touch Nominal Frequency and enter the test frequency from the test record.
5. Press ATTN.
 - a.** Set to 0 dB if DUT CW frequency is < 5 GHz.
 - b.** set to 10 dB if DUT CW frequency ≥ 5GHz.
6. Press Trigger
 - a.** Touch Continuous.
 - b.** Touch Single.

7. Press Trace/View.

- a. Press Spurious.**
- b. Press Power (dBc).**

Now white spikes may appear on the screen indicating the spurs.

- c. Press Spurious List and a new screen will appear.**
- d. This screen gives the spurious signal's frequency and power levels. The format is:**

Frequency in hertz, Power level in dBc

8. Compare these values to the appropriate frequency in the test records for "Single Sideband Phase Noise Test: Power Line and Fan Rotation Emissions". Record any values which are out of specification.**9. Close the Spurious List window.****10. Press Trace/View.**

- a. Press Spurious (note: it may be required to touch the down arrow at the bottom of the right screen to locate).**
- b. Touch OMIT.**
- c. Record phase noise/marker values into the test records.**

11. Refer to the next frequency in the Single Sideband Phase Noise Test.**12. Press Trigger | Continuous.****13. Return to Step 2 and repeat this test until all test frequencies are verified for the particular model and option configuration under test.**

3-9 Power Level Accuracy and Flatness Test

The following tests can be used to verify that the MG362x1A meets its power level specifications. Power level verifications are divided into four parts: log conformity, power level accuracy (to -20 dBm), power level accuracy (-20 dBm to -90 dBm), and power level flatness.

- “Power Level Accuracy (≥ -20 dBm) All Models” on page 3-23
- “Power Level Accuracy and Flatness (< -20 dBm to -90 dBm)” on page 3-24

Equipment Required

- PC with R&S Power Viewer Software installed
- NRP67T sensor
- SC8580 20 dB fixed attenuator
- 34VFKF50A V(f) to K(f) adapter

Note

Before performing this procedure, ensure that all test equipment is calibrated. Refer to the manufacturer's test equipment manual.

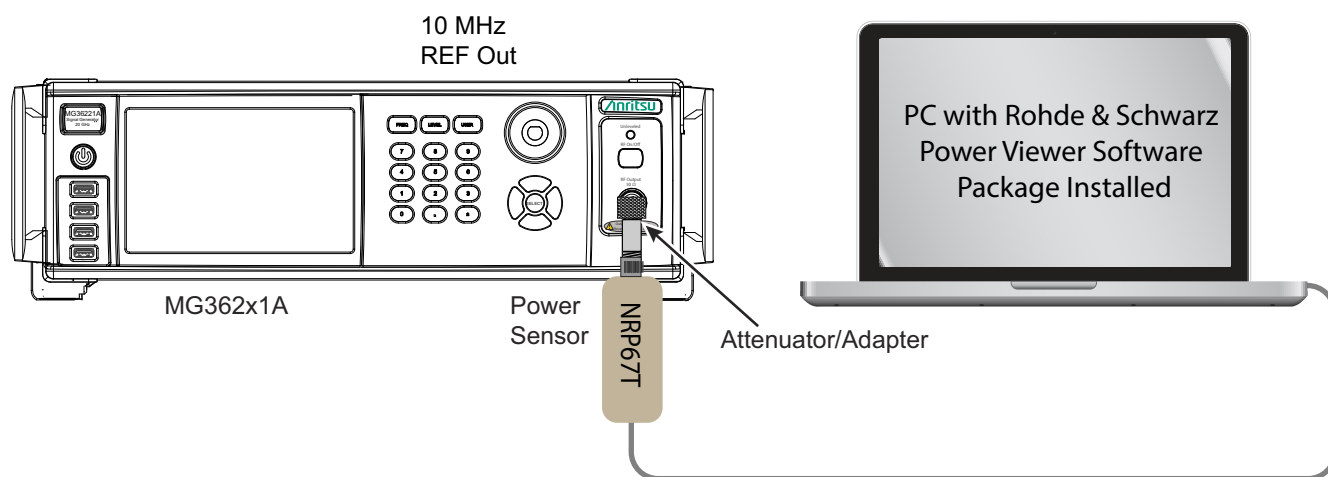


Figure 3-7. Equipment Setup for Power Level Accuracy and Flatness Tests Above -20 dBm

Procedure

Depending on the instruments and options types installed will determine the equipment to use when using the level calibration program. For all power level measurements above -50 dBm, connect the equipment as shown in [Figure 3-7](#),

Caution

To prevent damage to the power sensor, use a fixed attenuator when measuring power levels above $+19$ dBm.

Note

The NRP67T sensor is used for calibrating power measurements from $+19$ dBm to -20 dBm. For calibrating power levels from $+19$ dBm to $+15$ dBm the SC8580 20 dBm attenuator is used. The SC8580 is characterized and the attenuation at each frequency needs to be used to offset the power readings. For calibrating power levels $+15$ dBm to -20 dBm no attenuator is needed.

1. Load the Rohde & Schwarz Power Viewer Software onto the PC.
2. Start the level calibration and verification program.

3. Follow the prompts through the program until completion.

Caution	To prevent damage to the power sensor, use a fixed attenuator when measuring power levels above +19 dBm.
----------------	--

Power Level Accuracy (≥ -20 dBm) All Models

Power level accuracy for power levels of -20 dBm and above are tested by stepping the output power level down in 10 dB increments or as indicated by data table from its maximum rated power level and measuring the output power level using a power meter at each step.

All Models

Connect the equipment as shown in [Figure 3-7](#). Use the K222B or 34VFKF50A adapter for MG36221A and MG36241A. For the MG36271A use the appropriate adapters or V(f) to V(f) test cable.

1. Connect NRP67T to PC and open R&S Power Viewer Software.
2. Ensure MG362x1A RF Output is set to Off.
3. Connect NRP67T to MG362x1A RF Out using an adapter and/or test cable.
4. Loss of the adapter or test cable or both will need to be measured and entered in the appropriate Test Data Tables Offset column for each frequency.
5. In R&S Power Viewer Software set:
 - Measurement to Continuous
 - Averaging to Auto
 - Count 256
 - Duty Cycle 10%
 - Aperture 10 ms
 - Level Offset 0
 - Set Signal Frequency to frequency indicated in the test record.
6. Set up the MG36271A as follows:
 - Preset the instrument choosing SYSTEM | RESET | PRESET APPLICATION.
 - Set FREQUENCY to the frequency indicated in the test record.
 - Set LEVEL to the power level indicated in the test record.
 - With RF Output set to Off in R&S Power Viewer, Zero the NRP67T sensor.
 - Set RF Output ON.
7. Measure the output power level using the NRP67T sensor by selecting Measurement, then Start. Record the power reading in the test record.
8. Repeat steps for each of the CW frequencies listed in the test record (+15 to -20 dBm) It is necessary to zero the sensor at each frequency being tested.
9. Repeat for all power levels and CW frequencies listed in all level accuracy test records (+15 dBm to -20 dBm).

Power Level Accuracy and Flatness (< -20 dBm to -90 dBm)

“Power Level Accuracy (≥ -20 dBm) All Models” on page 3-23 must be performed first before calibrating levels below -20 dBm

MG36221A and MG36241A Models

Setup for testing Level Accuracy and Flatness on MG36221A and MG36241A from -30 dBm to -90 dBm is shown in Figure 3-8

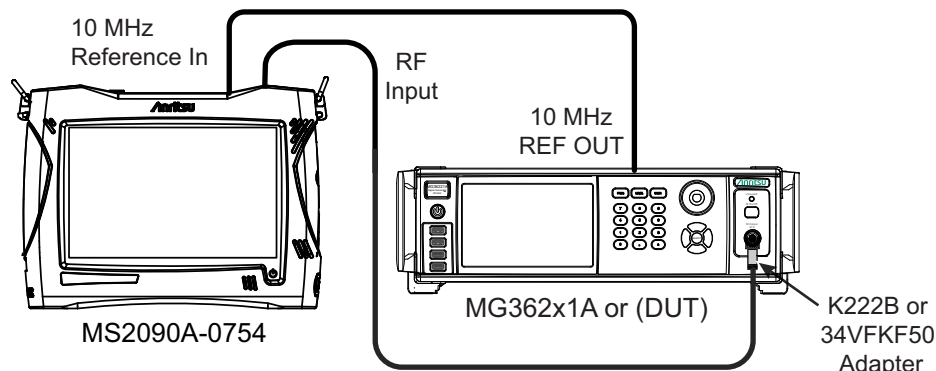


Figure 3-8. Setup for Power Level Accuracy and Flatness Tests Below -20 dBm

Preliminary Steps

1. For testing level accuracy at 9 kHz, 1 MHz, and 100 MHz:
 - Set the MS2090A-0754 RBW to 10 Hz
 - Set VBW to 1 Hz, Span to 200 Hz, Points to 1001
 - Turn Pre-Amp off for power levels -30 to -50 dBm
 - Turn Pre-Amp on for power levels from -60 to -90 dBm.
2. For testing level accuracy at frequencies 1 GHz and above:
 - Set the MS2090A-0754 RBW to 100 Hz
 - Set VBW to 30 Hz
 - Set Span to 10 kHz
 - Set Points to 1001
 - Turn the Pre-Amp off for power levels -30 to -50 dBm
 - Turn the Pre-Amp on for power levels from -60 to -90 dBm.

At each power level tested, set the MS2090A-0754 Ref Level to 10 dBm higher than the power level being tested.

Adapter and test cable or both will be needed. You need to account for the loss of the adapter, test cable, or both at each frequency tested and enter these values in the appropriate Test Data Tables Offset column.

Set Up the MG36221A and MG36241A

1. Connect the signal generator to the MS2090A-0754 RF input.
2. Connect from signal generator 10 MH Ref Out to MS2090A 10 MHz Ref In.
3. Reset the instrument by pressing SYSTEM, then Reset. After reset, the CW menu is displayed.
4. Press FREQUENCY to open the current frequency parameter for editing.
5. Set F1 to the CW frequency indicated in the test record.
6. Press LEVEL to open the current power level parameter for editing.
7. Set L1 to the power level indicated in the test record. Ensure RF Output is On.
8. Measure the output power level on the MS2090A-xxxx go to Marker | Peak Search | Peak Search.
9. Record the power reading in the test record.
10. Set the signal generator to the next frequency in the test record.
11. Measure and record the power reading in the test record.
12. Repeat steps all power levels and CW frequencies listed in the level accuracy test records (–30 dBm to –90 dBm for the MG36221A and MG36241A models).

MG36271A

Use MS2760A-0070 and Spectrum Master MS276xA Software to verify the power level accuracy and flatness of the MG36271A as shown in [Figure 3-9](#).

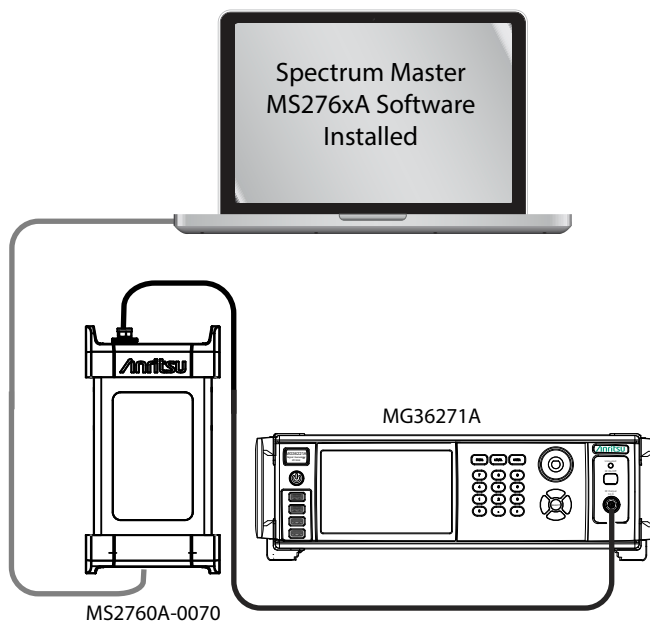


Figure 3-9. Setup for Power Level Accuracy and Flatness Tests Below –20 dBm

Preliminary Steps

1. Connect MS2760A-0070 to PC and open Spectrum Master MS276xA Software.
2. Ensure MG36271A RF Output is set to Off.
3. Connect MS2760A-0070 Ref to MG36271A 10MHz Ref Out.
4. Connect MS2760A-0070 RF In to the MG36271A RF Out using adapter and/or test cable.
5. Record the measured loss of the adapter or test cable or both and enter them in the appropriate Test Data Tables Offset column for each frequency.

Set Up the MS2760A-0070

1. Set up the MS2760A-0070 as follows:
2. Preset the instrument by choosing PRESET, then PRESET ALL
3. Set Frequency Reference to External
4. Set Center Frequency to the frequency indicated in the test record.
5. Set Span to 100 kHz, RBW to 1 kHz, VBW to 300 Hz and points to 1001.
6. Under the Trace Menu set Type to Average, and number of Averages to 50.
7. Set Reference Level to -10 dBm and IF Gain (Pre-Amp) to Off for power levels from -30 to -50 dBm
8. Set Reference Level to -50 dBm and IF Gain (Pre-Amp) to On for power levels from -60 to -90 dBm
9. Turn Pre-Amp off for power levels -30 to -50 dBm.
10. Turn Pre-Amp on for power levels -60 to -90 dBm.

Set Up the MG36271A

1. Preset the instrument choosing SYSTEM, then RESET, then PRESET APPLICATION.
2. Set FREQUENCY to the frequency indicated in the test record
3. Set LEVEL to the power level indicated in the test record. (Ensure IF Gain of the MS2760A-0070 is Off for levels of -30 to -50 dBm.)
4. Set RF Output ON.
5. Measure the output power level using the MS2760A-0070 by choosing Marker | Peak Search | Peak Search. Record the power reading in the test record.
6. On the MG36271A, change the power level to the next level in the test record. Measure and record the power reading in the test record.
7. Repeat for all power levels and CW frequencies listed in all the level accuracy test records (-30 dBm to -90 dBm).

Maximum Leveled Power

Maximum leveled power is tested by measuring the output power level during a full band sweep in the manual sweep mode. Refer to [Figure 3-10](#).

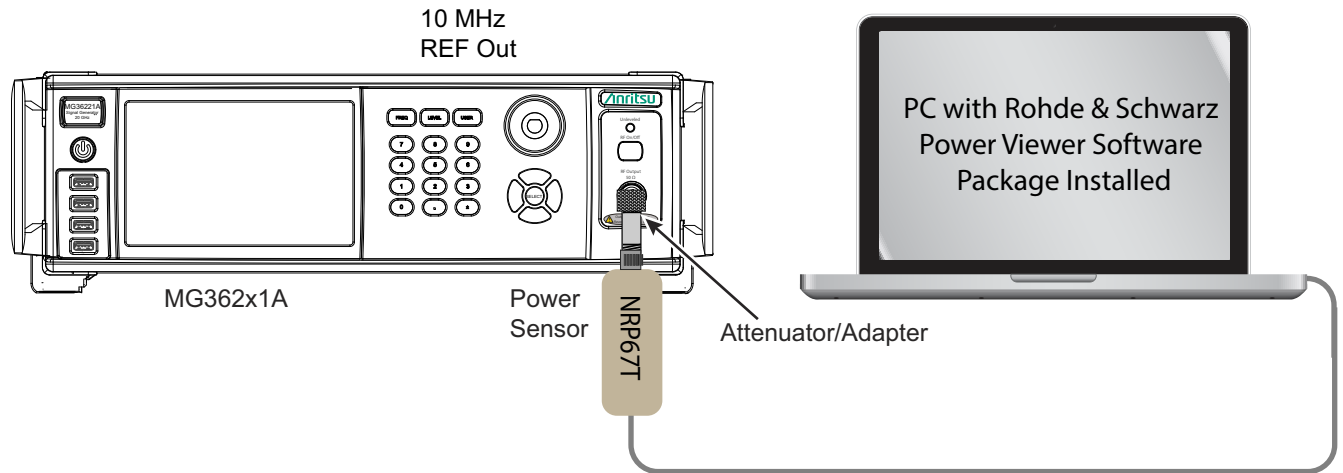


Figure 3-10. Measure Maximum Leveled Power

Note option dependencies for maximum leveled power in MG362x1A test records.

- Without Option 2, without Option 15
- With Option 2, without Option 15
- With Option 15, without Option 2
- With Option 2, and with Option 15

Test Setup

Note

To prevent damage to the power sensor, use a fixed attenuator when measuring power levels above +19 dBm.

Maximum Leveled Power setup for MG36221A, MG36241A and MG36271A:

- A 20 dBm 5-Watt attenuator. Use attenuator 62-0501-20 (MG36221A/41A/71A) or Anritsu 1010-145-R (MG36221A and MG36241A).
 - An adapter, test cable or both is required. Account for the loss of the attenuator, adapter, or test cable (if used) at each frequency tested and enter these values in the appropriate Test Data Tables.
1. Connect NRP67T to PC and open R&S Power Viewer Software.
 2. Ensure MG362x1A RF Output is set to Off.
 3. Connect NRP67T to MG362x1A RF Out using proper attenuator, adapter and/or test cable.
 4. Loss of the attenuator, adapter or test cable or both will need to be measured and entered in the appropriate Test Data Tables Offset column, for each frequency.

In R&S Power Viewer Software set:

1. Measurement to Continuous
2. Averaging to Auto
3. Count 256
4. Duty Cycle 10%
5. Aperture 10 ms.
6. Level Offset 0.
7. Set Signal Frequency to frequency indicated in the test record.
8. With RF Output set to Off in R&S Power Viewer Zero the NRP67T sensor. NPP67T should be Zeroed for each frequency being tested.

6.Set up the MG362x1A as follows:

1. Preset the instrument choosing SYSTEM, then RESET, then PRESET APPLICATION.
2. Set FREQUENCY to the frequency indicated in the Max Power Level MG362x1A test record.
3. Set LEVEL to the power level indicated in the Max Power Level MG362x1A test record.
4. Set RF Output ON.

Measure Output Power

1. Measure the output power level using the NRP67T sensor by selecting Measurement | Start.
2. Record the power reading in the Max Power Level test record.
3. Repeat steps for each of the CW frequencies and power levels listed in the Max Leveled Power test record. Zero the sensor at each frequency being tested.
4. Ensure RF Out is set to OFF when Zeroing the NRP67T sensor.

3-10 FM Verification

This section provides a manual procedure to verify the performance of the frequency and phase modulation of the MG362x1A.

Test Methodology

Note	Before performing this procedure, ensure that all test equipment is calibrated. Refer to the manufacturer's test equipment manual.
-------------	--

The test methodology is the RF output of the MG362x1A is modulated on and off while monitored on a spectrum analyzer display. The FM accuracy is determined by measuring the delta of Carrier Wave (FM/ Φ M on and FM/ Φ M off). This delta is converted to modulation index by applying Inverse Bessel Null, Taylor Series and Newton's Method for Finding Roots calculations. The modulation index is then converted to the actual deviation or dB. These tests quantify how the modulating input signal affects the signal generator's RF output.

Equipment Required

The equipment required to perform Initial Calibration is shown in [Figure 3-12](#).

Table 3-12. Equipment List for Initial Calibration

Model Number	Critical Spec	Recommended Manufacturer
FSWP50	Frequency: 9 kHz - 43.5 GHz Phase noise sensitivity better than MG362x1A specs + MU	Rohde & Schwarz Phase Noise Analyzer
33511B	Rise Time < 5n Sec	Keysight/function Generator
34401A or equivalent	6.5 Digits of resolution	KEYSIGHT/DVM
RF cable	RF cable, K-type, 50 Ω , 3' length, with adapters suitable for MG362x1A RF Out and FSWP RF In	3670 series cable or equivalent
Coaxial fixed attenuator	6 dB K-type 50 Ω , 3- BNC cables 50 Ω 5' length, BNC-T connector,	BNC male termination 50 Ω

Equipment Setup

Connect equipment as shown in [Figure 3-11](#).

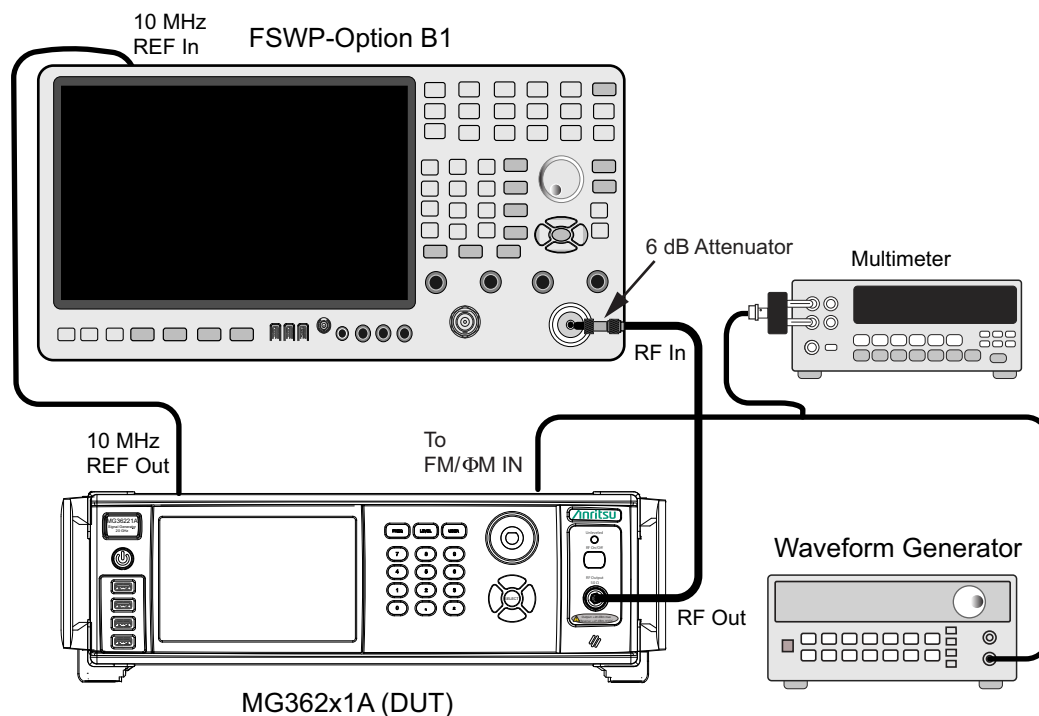


Figure 3-11. FM Verification Setup

Waveform Generator: Waveform = Sine, Output Impedance = 50 Ω , Output voltage = 2Vpp, OVDC, Frequency = 1 kHz (Default), Channel = Off (Default).

DVM: (Connected only for the FM and Φ M accuracy tests): RMS AC, 1V range

FSWP: Preset.Enable External Freq Reference: Setup / Reference / External Reference 10 MHz Mode / Replace Channel / Analog Demod. This closes the default phase noise display and activates analog demodulation. FM Time domain and Summary windows will display.

Set: Frequency = 5 GHz

Set: Ampt / RF Atten Manual = 10 dB.

If Spectrum tab is not visible at top of screen, then:

Mode / New Channel / Spectrum. This brings up the spectrum analyzer display and tab.

If Spectrum tab is visible, press the tab to enter Spectrum mode.

Set Frequency = 5 GHz, and Ampt / RF Atten Auto, Ref Level = 10 dBm.

MG362x1A: Frequency = 5 GHz, Level = 15 dBm, RF On, AM/FM/ Φ M/PulseMod = Off

3-11 FM Deviation Accuracy Tests

FM deviation accuracy is specified relative to DUT indication of FM deviation. For Ext FM, uncertainty due to resolution of the deviation indicator comes into play, whereas for Int FM it does not. Also, for Ext FM, accuracy of mod input sensitivity is of interest, and has its own spec. FM Deviation accuracy is measured with sinusoidal FM, 1 kHz mod rate, 2 MHz peak deviation, 5 GHz carrier.

Ext Low Noise FM Accuracy

FSWP analog demod is used to measure RMS phase deviation, and from that, FM peak deviation is calculated. 2 MHz deviation at 1 kHz rate gives an FM mod index of $2 \text{ MHz}/1 \text{ kHz} = 2000$ radians. Corresponding FSWP phase deviation uncertainty (spec) is $0.0002 \times (1 + 2000 \text{ rad}) = 0.400 \text{ rad}$, which compared to 2000 radians is 0.020 %. Resolution of MG362x1A's FM deviation display is 3 digits. So a readout of 2.00 MHz has uniformly distributed uncertainty of $\pm 0.005 \text{ MHz}$ and 2 σ uncertainty of $(0.005 \text{ MHz}) \times 2/\sqrt{3} = 0.00577 \text{ MHz}$, or 0.289 % of reading. Combined uncertainty for the Ext LNFM accuracy test is then $\sqrt{(0.02 \text{ \%})^2 + (0.289 \text{ \%})^2} = 0.29 \text{ \%}$. Expected DUT gain drift is negligible, but add 0.5 % margin. Uncertainty + margin = 0.8 %, which makes the test limit = $\pm 2.2 \text{ \%}$ for a $\pm 3 \text{ \%}$ sales spec.

For the Ext LNFM Input Sensitivity Accuracy test, resolution of the Deviation display is not a factor. Precision of sensitivity control is roughly 0.01 %. FSWP demod uncertainty at a mod index of 2000 is 0.02 %. DVM accuracy at 1 kHz rate is 0.132 %. Combined measurement uncertainty is $\sqrt{(0.02 \text{ \%})^2 + (0.132 \text{ \%})^2} = 0.134 \text{ \%}$. Allow 0.5 % margin for DUT variation. Uncertainty + margin = 0.63 %, which suggests a test limit = $\pm 2.37 \text{ \%}$ for a $\pm 3 \text{ \%}$ sales spec.

But the sales spec is currently $\pm 3 \text{ \%}$ nominal, so let the test limit = $\pm 3 \text{ \%}$.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#). Connect equipment (including the DVM) (Test at 5 GHz).

FSWP: Tab Analog Demod, Meas Config / Display Config / drag “PM Time Domain” to screen center. This will replace FM measurement with Phase Mod measurement. The “Summary” Display will now show Phase Mod results.

Meas Config / Demod BW 8 MHz, Meas Time = 350 msec.

Demod Config / Demod / AF Coupling = AC

Demod Config / Demod / Unit / Phase Unit = rad

Scale Config = 500 rad/div.

Reference Level = 0 dBm

Atten Max Mode = 20 dB

RBW = 3 MHz

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: 1 kHz, 2Vpp, Output ON

External DVM: RMS AC volts, 1V range

MG362x1A: Low Noise FM mode, Ext FM, Filter to DC, Sensitivity = 2 MHz/V, FM ON, RF Output = ON.

Test Procedure

1. Wait 2sec for FSWP to complete the RMS Phase Deviation measurement. Note RMS Phase Deviation (radians) shown in the FSWP “Summary” window. Also note the DVM RMS AC voltage readout.
2. Calculate FM Deviation = $\sqrt{2} \times (\text{RMS phase deviation, rad}) \times (\text{mod rate, Hz})$.
Note FM Deviation indicated by the DUT.
Calculate “% Error” = $100 \times ((\text{Calculated Deviation})/(\text{Deviation indicated by DUT}) - 1)$
Record “% Error” for Ext LNFM Accuracy test. If “% Error” is $\geq -2.2 \text{ \%}$ and $\leq 2.2 \text{ \%}$, Record “Pass” for Ext LNFM Accuracy test, otherwise record “Fail”.

3. Calculate FM Sensitivity = (Calculated FM deviation)/(sqrt(2)*(DVM RMS voltage readout)). Calculate “% Error” = 100*((Calculated FM Sensitivity)–(2 MHz/V))/(2 MHz/V)
Record % Error for the Ext LNFN Sensitivity Accuracy test. If error is within the ± 3 %, report “Pass”, otherwise report “Fail”.

Int Low Noise FM Accuracy

(Perform this test if the optional internal modulation source is installed)

FM deviation measurement is done the same as for the Ext Low Noise FM Accuracy test.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: If PM Time Domain window is not already displayed, then: Tab Analog Demod, Meas Config / Display Config / drag “PM Time Domain” to screen center. This will replace FM measurement with Phase Mod measurement. The “Summary” Display will now show Phase Mod results.

Meas Config / Demod BW 8 MHz, Meas Time = 350 msec.

Demod Config / Demod / AF Coupling = AC

Demod Config / Demod / Unit / Phase Unit = rad

Scale Config = 500 rad/div.

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: Channel OFF

Ref Level = 0 dBm

Press Freq/Chan and set to 5 GHz

RBW = 3 MHz

Atten Max Mode = 20 dBm

External DVM: Not used.

MG362x1A: Low Noise FM mode, Int FM, DC Coupled, FM Deviation = 2 MHz, FM Rate = 1 kHz, FM ON, Set Waveform to sinewave, set filter to DC, set State to ON, Set RF Out to ON

Test Procedure

1. Wait 2sec for FSWP to complete the RMS Phase Deviation measurement. Note RMS Phase Deviation (radians) shown in the FSWP “Summary” window.
2. Calculate FM Deviation = sqrt(2)*(RMS phase deviation, rad)*(mod rate, Hz). Record this FM deviation value for the Int LNFN Accuracy test.
3. Calculate “% Error” = 100*((Calculated FM Deviation)–2 MHz)/(2 MHz)
4. Record % Error. If % Error is within ± 2 % report “Pass”, otherwise report “Fail”.
5. Repeat test at 10 GHz by setting CW on MG362x1A to 10 GHz and setting Freq/Chan on FSWP to 10 GHz and record results.

3-12 FM Harmonic Distortion Tests

The FM harmonic distortion tests are as follows:

Ext Low Noise FM THD

Measured at 5 GHz RF, 300 kHz/V FM Ext FM sensitivity, with 1 kHz 2Vpp sinewave applied to the Ext FM input.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Analog Demod mode, Demod BW 1.6 MHz, Meas Time = 350 msec.

Meas Config: open “FM Time Domain”, “FM Spectrum”, and “Result Summary” windows

Soft key for FM Time Domain window: Set “Scale Config” = 100 kHz/div.

Meas Config: Scale Config/Unit/THD: Select “%”.

Trigger button: Set “FM Offline” as the trigger source.

External Function Generator : 1 kHz, Channel ON.

MG362x1A: FM OFF, Low Noise FM mode, Ext FM, Sine Wave, Offset set to 0VDC, 2V Pk to Pk, DC Coupled, Sensitivity = 300 kHz/V, FM ON, Set Level to 0 dBm, Set Center Frequency to 5 GHz, Set RF Out to ON.

Test Procedure

1. Wait 500 msec for FSWP to complete the THD measurement.
For “THD Ext 1 kHz” test, Record “THD” shown in the FSWP “Summary” window.
2. If THD < or equal to 1% record "Pass" otherwise record as fail.
3. Repeat test at 10 GHz changing CW on MG362x1A and Freq/Channel on FSWP to 10 GHz.
4. Change External Function Generator to 50 kHz and repeat test at 5 and 10 GHz.

Int Low Noise FM THD

Measured at 5 GHz RF, 300 kHz FM Deviation, 1 kHz and 50 kHz FM rates.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Analog Demod mode, Demod BW 1.6 MHz, Meas Time = 350 msec.

Meas Config: open “FM Time Domain”, “FM Spectrum”, and “Result Summary” windows.

Soft key for FM Time Domain window: Set “Scale Config” = 100 kHz/div

Meas Config: Scale Config/Unit/THD: Select “%”.

Trigger button: Set “FM Offline” as the trigger source.

Run: Continuous.

External Function Generator: Not used. Set Channel OFF.

MG362x1A: FM OFF, Low Noise FM mode, Int FM, DC Coupled, Sensitivity = 300 kHz/V, Int FM rate = 1 kHz, FM ON.

Test Procedure

1. Wait 500 msec for FSWP to complete the FM measurement.
2. For “THD Int 1 kHz” test, record “THD” shown in the FSWP “Summary” window. Skip the following pass/fail indication until a THD spec is published: If $\text{THD} \leq 0.80\%$, record “Pass”, otherwise record “Fail”.

3. Set Int FM rate = 50 kHz.
4. Wait 500 msec for FSWP to complete the FM measurement.
5. For “THD Int 50 kHz” test, record “THD shown in the FSWP “Summary” window. Skip the following pass/fail indication until a THD spec is published: If THD is ≤ 0.80 %, record “Pass”, otherwise record “Fail”.

3-13 FM Mode and Incidental AM Tests

The FM mode and incidental AM tests are as follows:

Ext Low Noise FM Mode Residual FM / Incidental AM

Measured at 5 GHz RF, 50 kHz/V Ext FM sensitivity, with 1 kHz 2Vpp sinewave applied to the Ext FM input. FSWP phase noise mode AM detect is used for the measurement. AM is integrated from 50 Hz to 15 kHz.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Mode: Phase noise

Meas Config / Noise Config / Start Offset: 30 Hz, Stop Offset: 30 kHz

Meas Config / Integrated Meas / Ranges 1-5 / Show: Trace 1, Range: Manual, Range Start: 50 Hz, Range Stop: 15 kHz, Show: Trace 2, Range: Manual, Range Start: 50 Hz, Range Stop: 15 kHz

Meas Config / Display Config / If not already there, drag “Integrated Measurements” icon to bottom sector of the display.

Trace / Trace 1: Clear-Write, Phase Noise, Smoothing: Off, Spurious: On 6 dB.

Trace / Trace 2: Blank, AM Noise, Smoothing Off, Spurious OFF

Trigger: Free Run.

RBW = 10 %

Atten = 0

External Function Generator: 1 kHz, 2Vpp, Freq/Chan = 5 GHz, Channel ON.

MG362x1A: Low Noise FM mode, Ext FM, Set Filter to DC, Sensitivity = 50 kHz/V, FM ON. RF Output = ON

Test Procedure

1. Wait 500 msec for FSWP to complete a measurement. Record FM/AM indication from the Integrated Measurements window as “Residual FM”.
2. If measured FM is < 2.5 kHz, record “Pass” for Residual FM, otherwise record “Fail”.
3. FSWP / Trace / Trace 1: Blank, Phase Noise, Smoothing: Off, Spur Removal: On, 6 dB.
FSWP / Trace / Trace 2: Clear-Write, AM Noise, Smoothing Off, Spur Removal OFF.
4. Wait 500 msec for FSWP to complete a measurement. Record FM/AM indication from the Integrated Measurements window as “Integrated AM”.
5. Function Generator: Set Channel Off.
6. Wait 500 msec for FSWP to complete a measurement. Record FM/AM indication from the Integrated Measurements window as “Residual AM”.
7. Calculate Incidental AM = $\sqrt{\max(0, (\text{Integrated AM})^2 - (\text{Residual AM})^2)}$.
Record as “Incidental AM”.
8. If Incidental AM is ≤ 0.25 %, record “Pass” for Incidental AM, otherwise record “Fail”.

3-14 Phase Mod - Max Deviation Tests

The Phase Mod - maximum deviation tests are as follows:

Ext Low Noise Φ M - Max Phase Deviation

This procedure verifies that the DUT can produce phase deviation $\geq$ (lesser of 5 radians or 7 MHz/(mod rate)) at mod rates up to 7 MHz at Nmod = 1. The test is done at 2.6 GHz, 5 GHz, 10 GHz, and 20 GHz to account for variations in YIG oscillator FM tuning behavior vs. carrier frequency.

At carrier frequencies ≤ 2.56 GHz or > 20 GHz max phase deviation and max deviation spec scale by a factor of Nmod (see [Table 3-13](#)) due to frequency multiplication or division.

Table 3-13. Ext Low Noise Φ M - Max Phase Deviation

HW Config	Fout, MHz	Fout, MHz	Nmod	Low Rate Phase Dev Max Spec, rad	Phase Deviation Control Limit, rad
HET	≥ 10	$< 2,000$	1	5.00E+00	6.28E+00
DDC	≥ 0.009	≤ 20	0.0625	3.13E-01	3.93E-01
DDC	> 20	≤ 31.25	0.125	6.25E-01	7.85E-01
DDC	> 31.25	≤ 40	0.0078125	3.91E-02	4.91E-02
DDC	> 40	≤ 80	0.015625	7.82E-02	9.82E-02
DDC	> 80	≤ 160	0.03125	1.56E-01	1.96E-01
DDC	> 160	≤ 320	0.0625	3.13E-01	3.93E-01
DDC	> 320	≤ 640	0.125	6.25E-01	7.85E-01
DDC	> 640	$\leq 1,280$	0.25	1.25E+00	1.57E+00
DDC	$> 1,280$	$< 2,000$	0.5	2.50E+00	3.14E+00
Any	$> 2,000$	$\leq 2,560$	0.5	2.50E+00	3.14E+00
Any	$> 2,560$	$\leq 5,120$	1	5.00E+00	6.28E+00
Any	$> 5,120$	$\leq 10,240$	1	5.00E+00	6.28E+00
Any	$> 10,240$	$\leq 20,000$	1	5.00E+00	6.28E+00
FEM	$> 20,000$	$\leq 40,000$	2	1.00E+01	1.26E+01
FEM	$> 40,000$	$\leq 70,000$	4	2.00E+01	2.51E+01

Table 3-14. Max Phase Deviation Spec and Test Limits

Mod Rate Hz	Ext Input Sensitivity Setting rad/V	Phase Dev Max Spec rad pk	Test Limit, rad pk
1.00E+04	6.28	5.00	5.050
1.00E+05	6.28	5.00	5.050
1.00E+06	6.28	5.00	5.050
2.00E+06	5.00	3.50	3.535
5.00E+06	2.00	1.40	1.414
7.00E+06	1.43	1.00	1.010

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Tab: Analog Demod. Then: Meas Config / Display Config / drag “PM Time Domain” to screen center.

The “Summary” window will now show Phase Mod results.

Meas Config / Demod BW 80 MHz, Meas Time = 100 msec.

Scale Config = 2 rad/div.

Demod Config / Demod / AF Coupling = AC

Demod Config / Demod / Unit / Phase Unit = rad

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: 10 kHz, 2.0Vpp, 50 Ω , Channel ON.

MG362x1A: Φ M OFF, Low Noise Φ M mode, Ext Φ M, DC Coupled, Sensitivity = 6.28 rad/V.

Test Procedure

1. Set DUT and FSWP RF frequency per the following list, starting at the lowest freq:
2.6 GHz, 5 GHz, 10 GHz, 20 GHz.
At each RF frequency, test max phase deviation for each of the mod rates and conditions in the Max Phase Deviation Table.
2. Set external function generator Frequency = mod rate from the table.
Set MG362x1A Ext Phase Mod Sensitivity to the table value for the current mod rate.
Wait 25 msec for PLL. Set Φ M ON. Wait 60 msec for PLL.
3. Check PLL lock status. If unlocked:
Report “Lock Fail” for the current mod rate. Set Φ M OFF.
Go to step [Step 8](#).
4. Wait approx 1sec for FSWP to complete a full cycle of RMS Phase Deviation measurement.
5. Note RMS Phase Deviation shown in the FSWP “Summary” window.
6. Calculate Peak Deviation = 1.414*(RMS deviation). Record this value for the current mod rate.
7. If calculated Peak Deviation is < (Test Limit value in the table for the current mod rate), record “Fail” for the current mod rate.
8. If current mod rate is < 7 MHz, pick the next mod rate from [Table 3-14](#) and go to [Step 2](#).
9. If RF < 20 GHz, set DUT and FSWP to next RF freq (from list in [Step 1](#)), go to [Step 2](#), and a mod rate of 10 kHz.

10. If no Fails have been reported for any of the mod rates at any of the RF test frequencies, indicate “Pass” for the overall test.
11. Exit

Int Low Noise Φ M - Max Phase Deviation

Setup is essentially the same as for the Ext Low Noise Φ M Max Phase Deviation test, except that the external mod source is not needed; Int Phase Mod is used instead. FSWP setup is the same.

Table 3-15. Int Low Noise Φ M - Max Phase Deviation

Mod Rate Hz	Phase Dev Setting rad	Max Spec Dev rad pk	Test Limit rad pk
1.00E+04	6.28	5.00	5.050
1.00E+05	6.28	5.00	5.050
1.00E+06	6.28	5.00	5.050
2.00E+06	5.00	3.50	3.535
5.00E+06	2.00	1.40	1.414
7.00E+06	1.43	1.00	1.010

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Tab: Analog Demod. Then: Meas Config / Display Config / drag “PM Time Domain” to screen center.

The “Summary” window will now show Phase Mod results.

Meas Config / Demod BW 80 MHz, Meas Time = 100 msec.

Scale Config = 2 rad/div.

Demod Config / Demod / AF Coupling = AC

Demod Config / Demod / Unit / Phase Unit = rad

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: Channel OFF.

MG362x1A: Φ M OFF, Low Noise Φ M mode, Int Φ M, DC Coupled, Deviation = 6.28 rad.

Test Procedure

1. Set DUT and FSWP RF frequency per the following list, starting at the lowest freq:
2.6 GHz, 5 GHz, 10 GHz, 20 GHz.
At each RF frequency, test max phase deviation for each of the mod rates and conditions in the Max Phase Deviation [Table 3-15](#)
2. Set Int LNPM mod rate = mod rate from [Table 3-15](#).
Set MG362x1A Int Phase Deviation to the table value for the current mod rate.
Wait 25 msec for PLL. Set Φ M ON. Wait 10 msec for PLL.
3. Check PLL lock status. If unlocked:
Report “Lock Fail” for the current mod rate. Set Φ M OFF.
Go to [Step 8](#).
4. Wait approx 1sec for FSWP to complete a full cycle of RMS Phase Deviation measurement.
5. Note RMS Phase Deviation shown in the FSWP “Summary” window.
6. Calculate Peak Deviation = 1.414*(RMS deviation). Record this value for the current mod rate.
7. If calculated Peak Deviation is < (Test Limit value in the table for the current mod rate), record “Fail” for the current mod rate.
8. If current mod rate is < 7 MHz, pick the next mod rate from the table and go to [Step 2](#).
9. If RF < 20 GHz, set DUT and FSWP to next RF freq (from [Step 1](#)), go to [Step 2](#), and a mod rate of 10 kHz.

10. If no Fails have been reported for any of the mod rates at any of the RF test frequencies, indicate “Pass” for the overall test.
11. Exit

Ext Wide Φ M - Max Phase Deviation

This procedure verifies that the DUT can produce phase deviation $\geq$ (lesser of 640 radians or 7 MHz/(mod rate)) at mod rates up to 1 MHz at $N_{\text{mod}} = 1$. The test is done at 2.6 GHz, 5 GHz, 10 GHz, and 20 GHz to account for variations in YIG oscillator FM tuning behavior vs. carrier frequency.

At carrier frequencies ≤ 2.56 GHz or > 20 GHz max phase deviation and max deviation spec scale by a factor of N_{mod} (see [Table 3-16](#)) due to frequency multiplication or division.

Table 3-16. Ext Wide Φ M - Max Phase Deviation

HW Config	Fout, MHz	Fout, MHz	Nmod	Phase Deviation Max Spec, rad	Phase Deviation Control Limit, rad
HET	≥ 10	$< 2,000$	1	640	8.04E+02
DDC	≥ 0.009	≤ 20	0.0625	40	5.03E+01
DDC	> 20	≤ 31.25	0.125	80	1.01E+02
DDC	> 31.25	≤ 40	0.0078125	5	6.28E+00
DDC	> 40	≤ 80	0.015625	10	1.26E+01
DDC	> 80	≤ 160	0.03125	20	2.51E+01
DDC	> 160	≤ 320	0.0625	40	5.03E+01
DDC	> 320	≤ 640	0.125	80	1.01E+02
DDC	> 640	$\leq 1,280$	0.25	160	2.01E+02
DDC	$> 1,280$	$< 2,000$	0.5	320	4.02E+02
Any	$> 2,000$	$\leq 2,560$	0.5	320	4.02E+02
Any	$> 2,560$	$\leq 5,120$	1	640	8.04E+02
Any	$> 5,120$	$\leq 10,240$	1	640	8.04E+02
Any	$> 10,240$	$\leq 20,000$	1	640	8.04E+02
FEM	$> 20,000$	$\leq 40,000$	2	1281	1.61E+03
FEM	$> 40,000$	$\leq 70,000$	4	2562	3.22E+03

Table 3-17. Max Phase Deviation Spec and Test Limits

Mod Rate Hz	Ext Input Sensitivity rad/V	Phase Dev Max Spec rad pk	Test Limit rad pk
1.00E+03	804	640	646.4
1.00E+04	804	640	646.4
9.00E+04	100	70	70.7
1.90E+05	50	35	35.35
4.90E+05	20	14	14.14
6.90E+05	14.1	10	10.10
1.01E+06	10	7	7.07

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Tab: Analog Demod. Then: Meas Config / Display Config / drag “PM Time Domain” to screen center. The “Summary” window will now show Phase Mod results.

Meas Config / Demod BW 40 MHz, Meas Time = 100 msec.

Scale Config = 200 rad/div.

Demod Config / Demod / AF Coupling = AC

Demod Config / Demod / Unit / Phase Unit = rad

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: 1 kHz, 2.0Vpp, Channel ON.

MG362x1A: ΦM OFF, Wide ΦM mode, Ext ΦM, DC Coupled, Sensitivity = 640 rad/V.

Test Procedure

- Set DUT and FSWP RF frequency per the following list, starting at the lowest freq:
2.6 GHz, 5 GHz, 10 GHz, 20 GHz
At each RF frequency, test max phase deviation for each of the mod rates and conditions in the Max Phase Deviation [Table 3-16](#).
- Set external function generator Frequency = mod rate from the table.
Set Ext Wide Phase Mod input sensitivity = per the table for the chosen mod rate.
Wait 25 msec for PLL. Set ΦM ON. Wait 60 msec for PLL.
- Check PLL lock status. If unlocked:
Report “Lock Fail” for the current mod rate. Set ΦM OFF. Go to [Step 8](#).
- Wait approx 1sec for FSWP to complete a full cycle of RMS Phase Deviation measurement.
- Note RMS Phase Deviation shown in the FSWP “Summary” window.
- Calculate Peak Deviation = 1.414*(RMS deviation). Record this value for the current mod rate.
- If calculated Peak Deviation is < (Test Limit value, in [Table 3-17](#) corresponding to the current mod rate), record “Fail” for the current mod rate.
- If current mod rate is < 1 MHz, pick the next mod rate from [Table 3-17](#) and go to [Step 2](#).
- If RF < 20 GHz, set DUT and FSWP to next RF freq (from list in [Step 1](#)), go to [Step 2](#), and a mod rate of 1 kHz.

10. If no Fails have been reported for any of the mod rates at any of the RF test frequencies, indicate “Pass” for the overall test.
11. Exit

Int Wide Φ M - Max Phase Deviation

Setup is essentially the same as for the Ext Wide Φ M Max Phase Deviation test, except that the external mod source is not needed; Int Phase Mod is used instead. FSWP setup is the same:

Table 3-18. Max Phase Deviation Spec and Test Limits

Mod Rate, Hz	Phase Dev Setting, rad	Phase Dev Max Spec, rad pk	Test Limit, rad pk
1.00E+03	804	640	646.4
1.00E+04	804	640	646.4
9.00E+04	100	70	70.7
1.90E+05	50	35	35.35
4.90E+05	20	14	14.14
6.90E+05	14.1	10	10.10
1.01E+06	10	7	7.07

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Tab: Analog Demod. Then: Meas Config / Display Config / drag “PM Time Domain” to screen center. The “Summary” window will now show Phase Mod results.

Meas Config / Demod BW 40 MHz, Meas Time = 100 msec.

Scale Config = 200 rad/div.

Demod Config / Demod / AF Coupling = AC

Demod Config / Demod / Unit / Phase Unit = rad

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: Channel OFF.

MG362x1A: Φ M OFF, Low Noise Φ M mode, Int Φ M, DC Coupled, Deviation = 640 rad.

Test Procedure

1. Set DUT and FSWP RF frequency per the following list, starting at the lowest freq:
2.6 GHz, 5 GHz, 10 GHz, 20 GHz
At each RF frequency, test max phase deviation for each of the mod rates and conditions in the Max Phase Deviation [Table 3-18](#) starting with 1 kHz mod rate.
2. Set Int mod rate = mod rate from the table.
Set Phase Deviation = per the table for the chosen mod rate.
Wait 25 msec for PLL. Set Φ M ON. Wait 60 msec for PLL.
3. Check PLL lock status. If unlocked:
Report “Lock Fail” for the current mod rate. Set Φ M OFF.
Go to [Step 8](#).
4. Wait approx 1sec for FSWP to complete a full cycle of RMS Phase Deviation measurement.

5. Note RMS Phase Deviation shown in the FSWP “Summary” window.
6. Calculate Peak Deviation = $1.414 \times (\text{RMS deviation})$. Record this value for the current mod rate.
7. If calculated Peak Deviation is $<$ (Test Limit value, in [Table 3-18](#), corresponding to the current mod rate), record “Fail” for the current mod rate.
8. If current mod rate is $<$ 1 MHz, pick the next mod rate from [Table 3-18](#) and go to [Step 2](#).
9. If RF $<$ 20 GHz, set DUT and FSWP to next RF freq (from list in [Step 1](#)), go to [Step 2](#), and a mod rate of 1 kHz.
10. If no Fails have been reported for any of the mod rates at any of the RF test frequencies, indicate “Pass” for the overall test.
11. Exit

Modulation Index Calculations

The modulation index calculation was developed using a Taylor series and Newtons method and is used to find the root of the Bessel function. The calculation is in the table below.

Note	If you are viewing this document online as part of a PDF portfolio, Table 3-19 can be previewed and saved as a separate text file (modulation_index_calculations.txt) or Excel file (modulation_index_calculations.xls).
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Table 3-19. Modulation Index Calculations (1 of 2)

Vmodon = dBm measurement of the CW with Modulation on
Vmodoff = dBm measurement of the CW with Modulation off
Constant_A= 1
RESULT_FINAL = Modulation Index
RESULT_1 = $\text{CONSTANT_A} - (1 - \text{CONSTANT_A}^{2/4} + \text{CONSTANT_A}^{4/64} - \text{CONSTANT_A}^{6/2304} + \text{CONSTANT_A}^{8/147456} - \text{CONSTANT_A}^{10/14745600} - 10^{((\text{Vmodon} - \text{Vmodoff})/20)}) / (-\text{CONSTANT_A}^{2/2} + \text{CONSTANT_A}^{3/16} - \text{CONSTANT_A}^{5/384} + \text{CONSTANT_A}^{7/18432} - \text{CONSTANT_A}^{9/1474560})$
RESULT_2 = $\text{RESULT_1} - (1 - \text{RESULT_1}^{2/4} + \text{RESULT_1}^{4/64} - \text{RESULT_1}^{6/2304} + \text{RESULT_1}^{8/147456} - \text{RESULT_1}^{10/14745600} - 10^{((\text{Vmodon} - \text{Vmodoff})/20)}) / (-\text{RESULT_1}^{2/2} + \text{RESULT_1}^{3/16} - \text{RESULT_1}^{5/384} + \text{RESULT_1}^{7/18432} - \text{RESULT_1}^{9/1474560})$
RESULT_3 = $\text{RESULT_2} - (1 - \text{RESULT_2}^{2/4} + \text{RESULT_2}^{4/64} - \text{RESULT_2}^{6/2304} + \text{RESULT_2}^{8/147456} - \text{RESULT_2}^{10/14745600} - 10^{((\text{Vmodon} - \text{Vmodoff})/20)}) / (-\text{RESULT_2}^{2/2} + \text{RESULT_2}^{3/16} - \text{RESULT_2}^{5/384} + \text{RESULT_2}^{7/18432} - \text{RESULT_2}^{9/1474560})$
RESULT_4 = $\text{RESULT_3} - (1 - \text{RESULT_3}^{2/4} + \text{RESULT_3}^{4/64} - \text{RESULT_3}^{6/2304} + \text{RESULT_3}^{8/147456} - \text{RESULT_3}^{10/14745600} - 10^{((\text{Vmodon} - \text{Vmodoff})/20)}) / (-\text{RESULT_3}^{2/2} + \text{RESULT_3}^{3/16} - \text{RESULT_3}^{5/384} + \text{RESULT_3}^{7/18432} - \text{RESULT_3}^{9/1474560})$
RESULT_5 = $\text{RESULT_4} - (1 - \text{RESULT_4}^{2/4} + \text{RESULT_4}^{4/64} - \text{RESULT_4}^{6/2304} + \text{RESULT_4}^{8/147456} - \text{RESULT_4}^{10/14745600} - 10^{((\text{Vmodon} - \text{Vmodoff})/20)}) / (-\text{RESULT_4}^{2/2} + \text{RESULT_4}^{3/16} - \text{RESULT_4}^{5/384} + \text{RESULT_4}^{7/18432} - \text{RESULT_4}^{9/1474560})$
RESULT_6 = $\text{RESULT_5} - (1 - \text{RESULT_5}^{2/4} + \text{RESULT_5}^{4/64} - \text{RESULT_5}^{6/2304} + \text{RESULT_5}^{8/147456} - \text{RESULT_5}^{10/14745600} - 10^{((\text{Vmodon} - \text{Vmodoff})/20)}) / (-\text{RESULT_5}^{2/2} + \text{RESULT_5}^{3/16} - \text{RESULT_5}^{5/384} + \text{RESULT_5}^{7/18432} - \text{RESULT_5}^{9/1474560})$

Table 3-19. Modulation Index Calculations (2 of 2)

$\text{RESULT_7} = \frac{\text{RESULT_6} - (1 - \text{RESULT_6}^{2/4} + \text{RESULT_6}^{4/64} - \text{RESULT_6}^{6/2304} + \text{RESULT_6}^{8/147456} - \text{RESULT_6}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_6}^{2/2} + \text{RESULT_6}^{3/16} - \text{RESULT_6}^{5/384} + \text{RESULT_6}^{7/18432} - \text{RESULT_6}^{9/1474560})}$
$\text{RESULT_8} = \frac{\text{RESULT_7} - (1 - \text{RESULT_7}^{2/4} + \text{RESULT_7}^{4/64} - \text{RESULT_7}^{6/2304} + \text{RESULT_7}^{8/147456} - \text{RESULT_7}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_7}^{2/2} + \text{RESULT_7}^{3/16} - \text{RESULT_7}^{5/384} + \text{RESULT_7}^{7/18432} - \text{RESULT_7}^{9/1474560})}$
$\text{RESULT_9} = \frac{\text{RESULT_8} - (1 - \text{RESULT_8}^{2/4} + \text{RESULT_8}^{4/64} - \text{RESULT_8}^{6/2304} + \text{RESULT_8}^{8/147456} - \text{RESULT_8}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_8}^{2/2} + \text{RESULT_8}^{3/16} - \text{RESULT_8}^{5/384} + \text{RESULT_8}^{7/18432} - \text{RESULT_8}^{9/1474560})}$
$\text{RESULT_10} = \frac{\text{RESULT_9} - (1 - \text{RESULT_9}^{2/4} + \text{RESULT_9}^{4/64} - \text{RESULT_9}^{6/2304} + \text{RESULT_9}^{8/147456} - \text{RESULT_9}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_9}^{2/2} + \text{RESULT_9}^{3/16} - \text{RESULT_9}^{5/384} + \text{RESULT_9}^{7/18432} - \text{RESULT_9}^{9/1474560})}$
$\text{RESULT_11} = \frac{\text{RESULT_10} - (1 - \text{RESULT_10}^{2/4} + \text{RESULT_10}^{4/64} - \text{RESULT_10}^{6/2304} + \text{RESULT_10}^{8/147456} - \text{RESULT_10}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_10}^{2/2} + \text{RESULT_10}^{3/16} - \text{RESULT_10}^{5/384} + \text{RESULT_10}^{7/18432} - \text{RESULT_10}^{9/1474560})}$
$\text{RESULT_12} = \frac{\text{RESULT_11} - (1 - \text{RESULT_11}^{2/4} + \text{RESULT_11}^{4/64} - \text{RESULT_11}^{6/2304} + \text{RESULT_11}^{8/147456} - \text{RESULT_11}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_11}^{2/2} + \text{RESULT_11}^{3/16} - \text{RESULT_11}^{5/384} + \text{RESULT_11}^{7/18432} - \text{RESULT_11}^{9/1474560})}$
$\text{RESULT_13} = \frac{\text{RESULT_12} - (1 - \text{RESULT_12}^{2/4} + \text{RESULT_12}^{4/64} - \text{RESULT_12}^{6/2304} + \text{RESULT_12}^{8/147456} - \text{RESULT_12}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_12}^{2/2} + \text{RESULT_12}^{3/16} - \text{RESULT_12}^{5/384} + \text{RESULT_12}^{7/18432} - \text{RESULT_12}^{9/1474560})}$
$\text{RESULT_FINAL} = \frac{\text{RESULT_13} - (1 - \text{RESULT_13}^{2/4} + \text{RESULT_13}^{4/64} - \text{RESULT_13}^{6/2304} + \text{RESULT_13}^{8/147456} - \text{RESULT_13}^{10/14745600} - 10^{((V_{\text{modon}} - V_{\text{modoff}})/20)})}{(-\text{RESULT_13}^{2/2} + \text{RESULT_13}^{3/16} - \text{RESULT_13}^{5/384} + \text{RESULT_13}^{7/18432} - \text{RESULT_13}^{9/1474560})}$

3-15 Phase Mod - Deviation Accuracy Tests

The Phase Mod - deviation accuracy tests are as follows:

Ext Low Noise Φ M - Phase Deviation Accuracy

FSWP analog demod is used to measure 5 radian phase deviation (at $N_{mod} = 1$) at 1 kHz mod rate. Ext LNPM accuracy at 1 kHz mod rate is insensitive to variations of YIG tuning sensitivity vs. carrier frequency. Phase deviation accuracy will be tested at 5 GHz and 10 GHz.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#). Include the DVM.

FSWP: Tab Analog Demod. If “PM Time Domain” window does not appear, then: Meas Config / Display Config / drag “PM Time Domain” to screen center. The “Summary” Display will now show Phase Mod results.

Meas Config / Demod BW = 25 kHz, Meas Time = 350 msec

Scale Config = 2 rad/div.

Demod Config / Demod / AF Coupling = AC, AF HPF = 50 Hz

Trace Config: Trace 1 Clear/Write, Logarithm, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: 1 kHz, 2 Vpp, Channel ON

External DVM: RMS AC volts, 1V range

MG362x1A: Ext Low Noise Phase Mod mode, DC Coupled, Sensitivity = 5 rad/V, Phase Mod ON, Source External.

Test Procedure

1. Wait 2sec for FSWP to complete the RMS Phase Deviation measurement. Note RMS Phase Deviation (radians) shown in the FSWP “Summary” window. Also note the DVM RMS AC voltage readout.
2. Calculate Peak Phase Deviation = $\sqrt{2} \times (\text{RMS phase deviation, rad})$.
Note Phase Deviation indicated by the DUT.
Calculate “Ext LNPM Deviation % Error” = $100 \times (\text{Calculated Peak Deviation}) / (\text{Deviation indicted by DUT} - 1)$. Record the result. If result is $\geq -4.4\%$ and $\leq 4.4\%$, Record “Pass”, otherwise record “Fail”.
3. Calculate LNPM Sensitivity = $(\text{Calculated Peak Phase Deviation}) / (\sqrt{2} \times (\text{DVM RMS voltage readout}))$.
Calculate “Ext LNPM Sensitivity % Error” = $100 \times ((\text{Calculated LNPM sensitivity}) / (5 \text{ rad/V}) - 1)$. Record the result. If the result is $\geq -4\%$ and $\leq 4\%$, Record “Pass”, otherwise record “Fail”.

Int Low Noise Φ M - Phase Deviation Accuracy

Perform this test if the optional internal modulation source is installed.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Tab MODE Analog Demod. If “PM Time Domain” window does not appear, then: Meas Config / Display Config / drag “PM Time Domain” to screen center. The “Summary” Display will now show Phase Mod results.
Meas Config / Demod BW = 25 kHz, Meas Time = 350 msec, Atten = 20 dB
Scale Config = 2 rad/div. Unit = rad
Demod Config / Demod / AF Coupling = AC, AF HPF = 50 Hz

Trace Config: Trace 1 Clear/Write, Linear, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: Channel OFF

External DVM: Not used.

MG362x1A: Int Low Noise Phase Mod mode, DC Coupled, Phase Deviation = 5 rad, Mod rate = 1 kHz, Phase Mod ON, Level +0 dBm.

Test Procedure

1. Wait 2sec for FSWP to complete the RMS Phase Deviation measurement. Note RMS Phase Deviation (radians) shown in the FSWP “Summary” window.
2. Calculate Peak Phase Deviation = $\sqrt{2} \times (\text{RMS phase deviation, rad})$
Calculate “Int LNPM % Error” = $100 \times ((\text{Calculated peak phase deviation}) / (5 \text{ rad}) - 1)$. Record the result.
If the result is $\geq -4.5 \%$ and $\leq 4.5 \%$, Record “Pass”, otherwise record “Fail”.

Ext Wide Φ M – Phase Deviation Accuracy

FSWP analog demod is used to measure 640 radian phase deviation at 100 Hz mod rate.

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#). Include the DVM.

FSWP: Tab Analog Demod. If “PM Time Domain” window does not appear, then: Meas Config / Display Config / drag “PM Time Domain” to screen center. The “Summary” Display will now show Phase Mod results.
Meas Config / Demod BW = 400 kHz, Meas Time = 350 msec, Atten = 20 dB.
Scale Config = 200 rad/div.
Demod Config / Demod / AF Coupling = AC, AF HPF = 20 Hz

Trace Config: Trace 1 Clear/Write, Logarithm, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: 100 Hz, 2Vpp, Channel ON

External DVM: RMS AC volts, 1V range

MG362x1A: Ext Wide Noise Phase Mod mode, DC Coupled, Sensitivity = 640 rad/V, Phase Mod ON.

Test Procedure

1. Wait 60 msec for the PLL to settle, then wait 2sec for FSWP to complete the RMS Phase Deviation measurement. Note RMS Phase Deviation (radians) shown in the FSWP “Summary” window. Also note the DVM RMS AC voltage readout.
2. Calculate Peak Phase Deviation = $\sqrt{2} \times (\text{RMS phase deviation, rad})$.
Note Phase Deviation indicated by the DUT.

Calculate “Ext WPM % Error” = $100 * (\text{Calculated Deviation}) / (\text{Deviation indicated by DUT}) - 1$
 Record the result. If result is $\geq -4.4\%$ and $\leq 4.4\%$, Record “Pass” for Ext WPM Accuracy, otherwise record “Fail”.

3. Calculate Ext WPM Sensitivity = $(\text{Calculated Peak Phase deviation}) / (\sqrt{2} * (\text{DVM RMS voltage readout}))$. Calculate “Ext WPM Sensitivity % Error” = $100 * ((\text{Calculated Ext WPM sensitivity}) / (5 \text{ rad/V}) - 1)$. Record the result. If the result is $\geq -4\%$ and $\leq 4\%$, Record “Pass”, otherwise record “Fail”.

Int Wide Φ M - Phase Deviation Accuracy

Perform this test if the optional internal modulation source is installed

Test Setup

Connect equipment as shown in [Figure 3-11 on page 3-30](#).

FSWP: Tab Analog Demod. If “PM Time Domain” window does not appear, then: Meas Config / Display Config / drag “PM Time Domain” to screen center. The “Summary” Display will now show Phase Mod results.

Meas Config / Demod BW = 400 kHz, Meas Time = 350 msec, Atten = 20 dB.

Scale Config = 200 rad/div.

Demod Config / Demod / AF Coupling = AC, AF HPF = 20 Hz

Trace Config: Trace 1 Clear/Write, Logarithm, Smoothing = 1 %.

Trigger button: Set “PM Offline” as the trigger source.

External Function Generator: Channel OFF

External DVM: Not Used

MG362x1A: Int Wide Noise Phase Mod mode, DC Coupled, Deviation = 640 rad, Mod Rate = 100 Hz, Phase Mod ON.

Test Procedure

1. Wait 60 msec for the PLL to settle, then wait 2sec for FSWP to complete the RMS Phase Deviation measurement. Note RMS Phase Deviation (radians) shown in the FSWP “Summary” window.
2. Calculate Peak Phase Deviation = $\sqrt{2} * (\text{RMS phase deviation, rad})$. Calculate “Int WPM % Error” = $100 * ((\text{Calculated Peak Deviation}) / (640 \text{ rad}) - 1)$. Record the result. If result is $\geq -4.5\%$ and $\leq 4.5\%$, Record “Pass” for Int WPM Accuracy, otherwise record “Fail”.

3-16 Amplitude Modulation Tests

This procedure verifies the operation of the MG362x1A amplitude modulation input sensitivity circuits. The actual modulation values are then computed from the modulation analyzer readings. (The absolute AM PK(+) and AM PK(−) readings are used in the given procedures to compensate for non-linearity errors in the test equipment).

- Note** Before performing this procedure, ensure that all test equipment is calibrated. Refer to the manufacturer’s test equipment manual.
- Note** For recording test data for this section, refer to [Appendix A, “Test Records”](#).

Equipment Required

Setup Equipment as shown in [Figure 3-12](#).

Table 3-20. Equipment Required

Model Number	Manufacturer	Description
33511B or equivalent	Keysight	Waveform Generator
MS2090A-0754 or equivalent (For models MG36221A, MG36241A)	Anritsu	Spectrum Analyzer
MS2670-0170 For model MG36271A	Anritsu	Spectrum Analyzer
34460A or equivalent	Keysight	Digital Multimeter
6 dB Fixed Attenuator	Any	6 dB Fixed Attenuation Pad

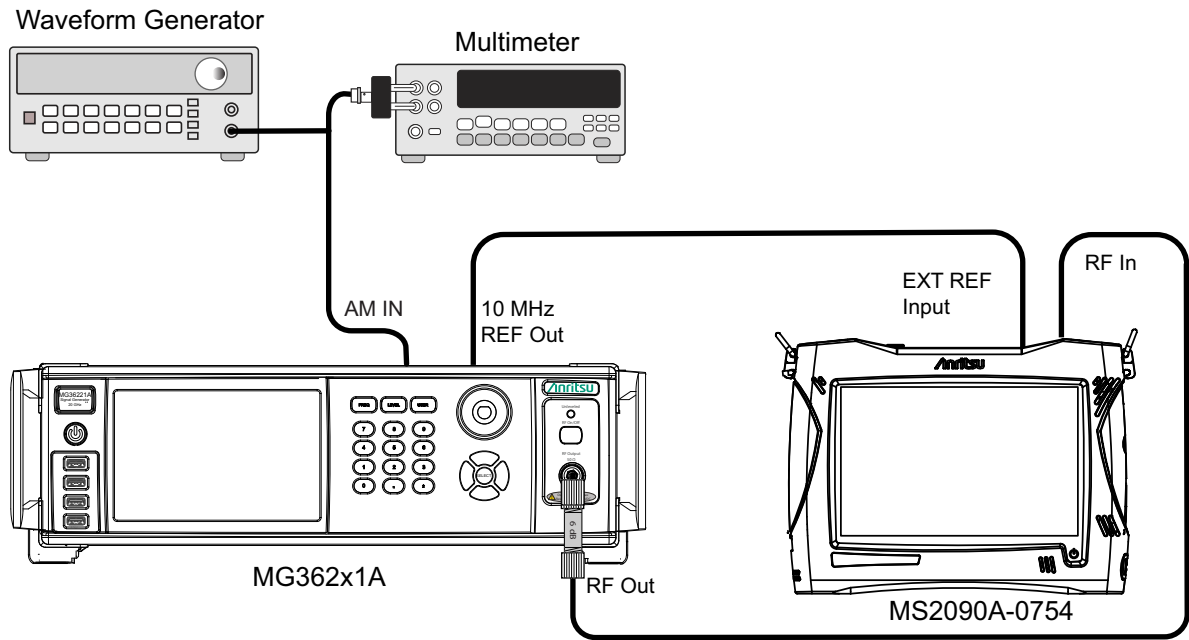


Figure 3-12. Equipment Setup for AM Test for MG36221A and MG36241A

AM Internal Source Verification (Linear Mode) MG36221A, MG36241A

Refer to [Figure 3-12 on page 3-47](#).

Test Setup for MG362x1A

1. Preset (Reset All) on MG362x1A.
2. Set Modulation. Verify Source = Internal, Type = Linear, Depth = 50%, Rate = 1kHz, Waveform = Sine, State = ON.
3. Set frequency = 25 MHz.
4. Set Power Level to 6 dB below the maximum specified output power level. Refer to the technical datasheet (11410-00928) to determine the maximum leveled output power.
5. Ensure RF Out = OFF.

Test Setup MS2090A-0754

1. Set Center Frequency to 25 MHz.
2. Set RBW and VBW = Auto, Ref Level = +20 dBm, Span = 5 kHz.

Test Procedure

1. Turn MG362x1A RF = ON
2. On MS2090A use a marker to measure the carrier power at 25 MHz,
3. On MS2090A use a marker to measure the lower sideband power at 24.999 MHz.
4. On MS2090A use a marker to measure the upper sideband power at 25.001 MHz.
5. Average the 2 powers levels from the lower and upper sidebands in the previous 2 steps. Subtract the carrier power from the average of the 2 sidebands found in the previous step. This value is the SB suppression and will be a negative value.
6. Record the measured SB suppression in [Table 3-22](#).
7. Compute Mod Depth % using the following equation:
$$2 * 10^{(SB \text{ suppression} / 20)}$$
, then multiply x 100 to get the percentage value.
8. Record the Computed Mod Depth % in [Table 3-22](#).
9. Enter the difference between the Expected Mod Depth of 50% and the Computed Mod Depth %. Verify it is within the specified Accuracy or +/- 7%.
10. Repeat tests at 500 MHz, 1.5 GHz, 4 GHz, 10 GHz, 20 GHz, and 40 GHz ensuring proper RF Output Level is used. The output level is 6 dB below the maximum specified level. Refer to the technical datasheet (11410-00928) to determine the maximum leveled output power.

Table 3-21. AM Internal Source Verification

DUT Freq (GHz)	Expected Mod Depth (%)	Measured SB suppression (dBc)	Computed Mod Depth (%)	Difference (%)	Specification $\pm 7\%$
0.025	50				
0.05	50				
1.5	50				
4	50				
10	50				
20	50				
40	50				

AM External Mod Linear Verification (Linear Mode) MG36221A, MG36241A**Test Setup MG362x1A**

1. Set (Reset All) on MG362x1A.
2. Select Modulation and ensure amplitude modulation is selected. Set source = External, Type = Linear, Depth = 0%, Sensitivity = 50%V, Set state = ON.
3. Set frequency = 25 MHz.
4. Set Power Level to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).
5. Set RF Out = ON.

Test Setup MS2090A-0754

1. Set Center Frequency to 25 MHz.
2. Set RBW and VBW = Auto, Ref Level = +20 dBm, Span = 5 kHz.

Test Procedure

1. Select DC-V on 34401A multimeter.
2. On 33250A Waveform Generator press Utility and set DC = ON
3. Set Waveform Generator to 0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-22](#), column Vpos.
4. Measure the power level of the CW signal on the MS2090A-0754 and record this level in [Table 3-22](#), column SPA level (dBm) at +0.5Vdc.
5. Set Waveform Generator to -0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-22](#), column Vneg.
6. Measure the power level of the signal on the MS2090A-0754 and record this level in [Table 3-22](#), column SPA level (dBm) at -0.5Vdc.
7. Enter the power delta ΔP from the 2 SPA readings in Table 3-32, column Measured Delta (dB) on SPA.
8. Compute Mod Depth %/V using $\{10^{(\Delta P/20)} - 1\} / \{V_{pos} - 10^{(\Delta P/20)} * V_{neg}\}$ and enter in [Table 3-22](#), column Computed Mod Depth (%V).
9. Enter the difference between 50(%V) and Computed Mod Depth (%V) and enter this value in column Difference (%V). If this value is less than +/- 7% it passes.
10. Repeat test at remaining frequencies in this table. At each frequency tested the MG362x1A power level needs to be set to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).

Table 3-22. AM External Mod Linear Verification MG36221A, MG36241A

DUT Freq GHz	Mod Sen (%V)	Vpos	Vneg	SPA level (dBm) at +0.5Vdc	SPA level (dBm) at -0.5Vdc	Measured Delta (dB) on SPA	Computed Mod Depth (%V)	Difference (%V)	Accuracy Spec
0.025	50								±7%
0.5	50								±7%
1.5	50								±7%
4	50								±7%
10	50								±7%
20	50								±7%
28	50								±7%
40	50								±7%

AM External Mod LOG Verification (Linear Mode) MG36221A, MG36241A**Test Setup MG362x1A**

1. Set (Reset All) on MG362x1A.
2. Select Modulation and ensure amplitude modulation is selected. Set source = External, Type = Log, Depth = 0 dB, Sensitivity = 10dB/V, Set state = ON.
3. Set frequency = 25 MHz.
4. Set Power Level to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).
5. Set RF Out = ON.

Test Setup MS2090A-0754

1. Set Center Frequency to 25 MHz.
2. Set RBW and VBW = Auto, Ref Level = +20 dBm, Span = 5 kHz.

Test Procedure

1. Select DC-V on 34401A multimeter. On 33250A Waveform Generator press Utility and set DC = ON
2. Set Waveform Generator to 0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-23](#), column Vpos.
3. Measure the power level of the CW signal on the MS2090A-0754 and record this level in [Table 3-23](#), column SPA level (dBm) at +0.5Vdc.
4. Set Waveform Generator to -0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-23](#), column Vneg.
5. Measure the power level of the signal on the MS2090A-0754 and record this level in [Table 3-23](#), column SPA level (dBm) at -0.5Vdc.
6. Enter the power delta ΔP from the 2 SPA readings in [Table 3-23](#) column Measured Delta (dB) on SPA.
7. Compute Mod Sensitivity dB/V using $\Delta P / (V_{neg} + V_{pos})$. Record value in column Computed Mod Sen (dB/V) in [Table 3-23](#).
8. Enter the difference between Mod Sen (dB/V) 10 and Computed Mod Sen (dB/V) and enter this value in column Difference in Mod Sen(dB/V). If this value is less than 2 dB/V it passes.
9. Repeat test at remaining frequencies in this table. At each frequency tested the MG362x1A power level needs to be set to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).

Table 3-23. AM External Mod LOG MG36221A, MG36241A

DUT Freq GHz	Mod Sen (dB/V)	Vpos	Vneg	SPA level (dBm) at +0.5Vdc	SPA level (dBm) at -0.5Vdc	Measured Delta (dB) on SPA	Computed Mod Sen (dB/V)	Difference in Mod Sen (dB/V)	Spec (+/- dB/V)
0.025	10								2
0.5	10								2
1.5	10								2
4	10								2
10	10								2
20	10								2
28	10								2
40	10								2

AM Internal Source Verification (Linear Mode) MG36271A.

Setup equipment as shown in [Figure 3-13](#).

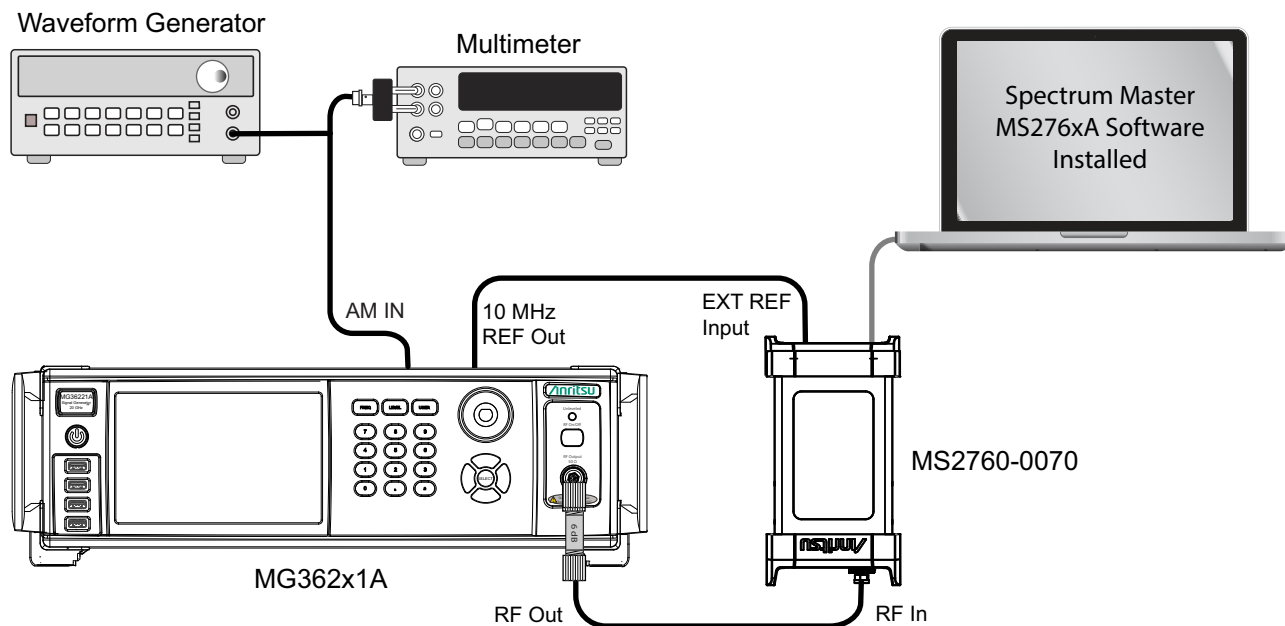


Figure 3-13. Equipment Setup for AM Test for MG36271A

Test Setup MG36271A

1. Preset (Reset All) on MG36271A.
2. Select Modulation. Verify Source = Internal, Type = Linear, Depth = 50%, Rate = 1kHz, Waveform = Sine, State = ON.
3. Set frequency = 25 MHz.
4. Set Power Level to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power.
5. Ensure RF Out = OFF.

Test Setup MS2760A-0170

1. Set Center Frequency to 25 MHz.
2. Set RBW and VBW = Auto, Ref Level = +20 dBm, Span = 5 kHz.

Test Procedure

1. Turn MG36271A RF Out = ON
2. On MS2760A-0170 use a marker to measure the carrier power at 25 MHz.
3. On MS2760A-0170 user marker to measure the lower sideband power at 24.999 MHz.
4. On MS2760A-0170 user marker to measure the upper sideband power at 25.001 MHz.
5. Average the 2 powers levels from the lower and upper sidebands in the previous 2 steps.
6. Subtract the carrier power from the average of the 2 sidebands found in the previous step. This value is the SB suppression and will be a negative value.
7. Record the measured SB suppression in [Table 3-23 on page 3-53](#).

8. Compute Mod Depth % using the following equation:
$$2 * 10^{(SB \text{ suppression} / 20)}$$
, then multiply x 100 to get the percentage value.
9. Record the Computed Mod Depth % in [Table 3-23 on page 3-53](#).
10. Enter the difference between the Expected Mod Depth of 50% and the Computed Mod Depth %. Verify it is within the specified Accuracy or +/- 7%.
11. Repeat tests at 500 MHz, 1.5 GHz, 4 GHz, 10 GHz, 20 GHz, 40 GHz, 50 GHz, 60 GHz, and 70 GHz ensuring proper RF Output Level is used. The output level is 6 dB below the maximum specified level. Refer to the technical datasheet to determine the maximum leveled output power.

AM External Mod LOG Verification (Linear Mode) MG36271A.

Setup equipment as shown in [Figure 3-12 on page 3-29](#).

Test Setup MG36271A

1. (Reset All) on MG36271A.
2. Select Modulation and ensure amplitude modulation is selected. Set source = External, Type = Log, Depth = 0 dB, Sensitivity = 10dB/V, Set state = ON.
3. Set frequency = 25 MHz.
4. Set Power Level to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).
5. Ensure RF Out = ON.

Test Setup MS2670A-0170

1. Set Center Frequency to 25 MHz.
2. Set RBW and VBW = Auto, Ref Level = +20 dBm, Span = 5 kHz.

Test Procedure

1. Select DC-V on 34401A multimeter.
2. On 33250A Waveform Generator press Utility and set DC = ON
3. Set Waveform Generator to 0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-24 on page 3-57](#), column Vpos.
4. Measure the power level of the CW signal on the MS2670A-0170 and record this level in [Table 3-24 on page 3-57](#), column SPA level (dBm) at +0.5Vdc.
5. Set Waveform Generator to -0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-24 on page 3-57](#) column Vneg.
6. Measure the power level of the signal on the MS2670A-0170 and record this level in [Table 3-24 on page 3-57](#), column SPA level (dBm) at -0.5Vdc.
7. Enter the power delta ΔP from the 2 SPA readings in [Table 3-24 on page 3-57](#) column Measured Delta (dB) on SPA.
8. Compute Mod Sensitivity dB/V using $\Delta P / (V_{neg} + V_{pos})$. Record value in column Computed Mod Sen (dB/V) in table 3-33.
9. Enter the difference between Mod Sen (dB/V) 10 and Computed Mod Sen (dB/V) and enter this value in column Difference in Mod Sen(dB/V). If this value is less than 2 dB/V it passes.
10. Repeat test at remaining frequencies in this table. At each frequency tested the MG362x1A power level needs to be set to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).

Table 3-24. AM External Mod LOG MG36271A

DUT Freq GHz	Mod Sen (dB/V)	Vpos	Vneg	SPA level (dBm) at +0.5Vdc	SPA level (dBm) at -0.5Vdc	Measured Delta (dB) on SPA	Computed Mod Sen (dB/V)	Difference in Mod Sen (dB/V)	Spec (+/- dB/V)
0.025	10								2
0.5	10								2
1.5	10								2
4	10								2
10	10								2
20	10								2
28	10								2
40	10								2
50	10								2
60	10								2
70	10								2

AM External Mod Linear Verification (Linear Mode) MG36271A.

Setup equipment as shown in [Figure 3-13 on page 3-54](#).

Test Setup MG362x1A

1. Settings, reset (Reset All) on MG36271A.
2. Select Modulation and ensure amplitude modulation is selected. Set source = External, Type = Linear, Depth = 0%, Sensitivity = 50%V, Set state = ON.
3. Set frequency = 25 MHz.
4. Set Power Level to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).
5. Ensure RF Out = ON.

Test Setup MS2760A-0170

1. Set Center Frequency to 25 MHz.
2. Set RBW and VBW = Auto, Ref Level = +20 dBm, Span = 5 kHz.

Test Procedure

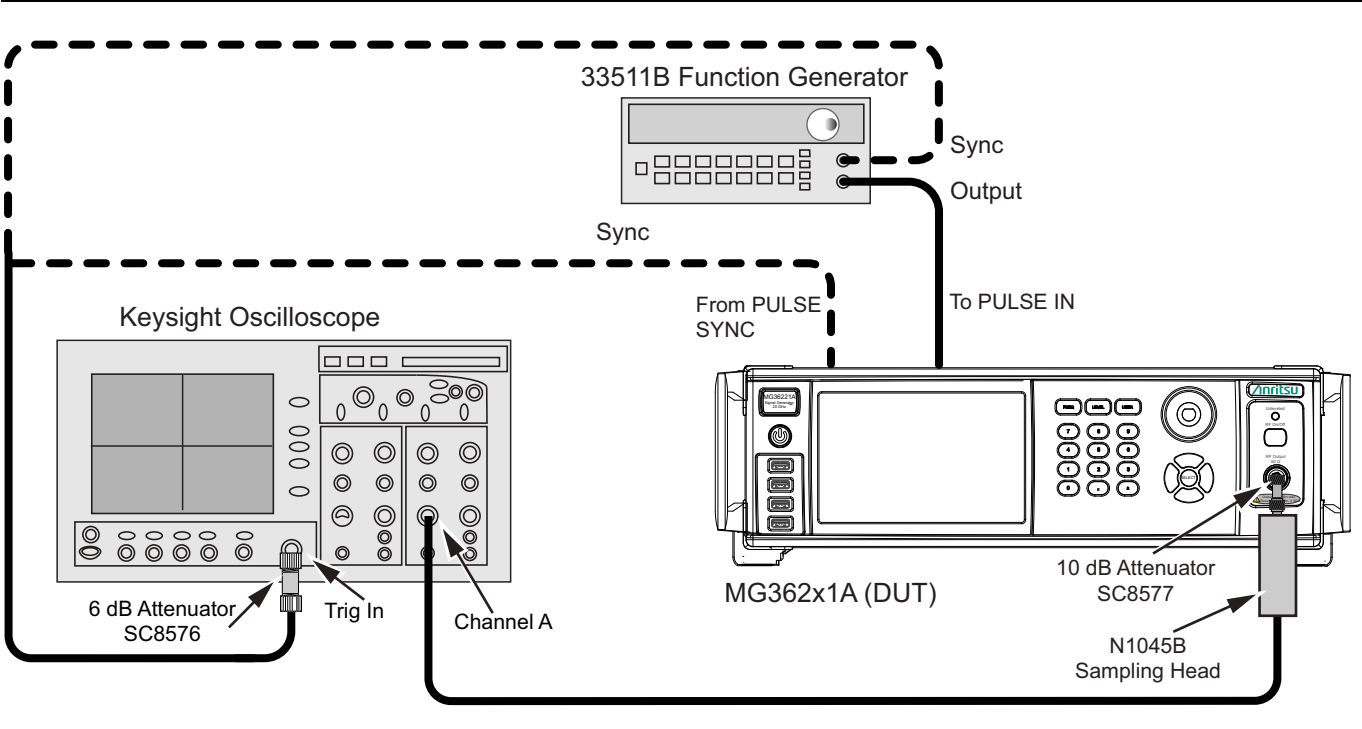
1. Select DC-V on 34401A multimeter.
2. On 33250A Waveform Generator press Utility and set DC = ON
3. Set Waveform Generator to 0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-25](#) column Vpos.
4. Measure the power level of the CW signal on the MS2760-0170 and record this level in [Table 3-25](#), column SPA level (dBm) at +0.5Vdc.
5. Set Waveform Generator to -0.5 Vdc. Read voltage on 34401A multimeter and record in [Table 3-25](#), column Vneg.
6. Measure the power level of the signal on the MS2760-0170 and record this level in [Table 3-25](#), column SPA level (dBm) at -0.5Vdc.
7. Enter the power delta ΔP from the 2 SPA readings in Table 3-32, column Measured Delta (dB) on SPA.
8. Compute Mod Depth %/V using $\{10^{(\Delta P/20)} - 1\} / \{V_{pos} - 10^{(\Delta P/20)} * V_{neg}\}$ and enter in [Table 3-25](#), column Computed Mod Depth (%V).
9. Enter the difference between 50(%V) and Computed Mod Depth (%V) and enter this value in column Difference (%V). If this value is less than +/- 7% it passes.
10. Repeat test at remaining frequencies in this table. At each frequency tested the MG362x1A power level needs to be set to 6 dB below the maximum specified output power level. Refer to the technical datasheet to determine the maximum leveled output power (Configuration and Freq dependent).

Table 3-25. AM External Mod Linear Verification MG36271A

DUT Freq GHz	Mod Sen (%V)	Vpos	Vneg	SPA level (dBm) at +0.5Vdc	SPA level (dBm) at -0.5Vdc	Measured Delta (dB) on SPA	Computed Mod Depth (%V)	Difference (%V)	Accuracy Spec
0.025	50								±7%
0.5	50								±7%
1.5	50								±7%
4	50								±7%
10	50								±7%
20	50								±7%
28	50								±7%
40	50								±7%
50	50								±7%
60	50								±7%
70	50								±7%

3-17 Pulse Modulation Tests with the N1000A Oscilloscope

The pulse modulation tests verify the operation of the pulse modulation circuits in the MG362x1A. Rise time, fall time, overshoot, and power accuracy of the pulsed RF output are verified using a high speed digital sampling oscilloscope. Pulse depth (on/off ratio) is measured using a spectrum analyzer. This procedure uses the Keysight N1000A oscilloscope with the N1045B sampling head.



Index	Description
1	PULSE SYNC from the MG362x1A rear panel to the Trig In on the N1000A oscilloscope front panel for internal pulse tests.
2	Connect Sync on the function generator front panel to Trig in on the N1000A oscilloscope front panel. Connect Output on the function generator front panel to PULSE IN on the MG362X1A rear panel for external pulse tests.
3	The function generator is required only if the MG362x1A does not have Option 24 or Option 27.
4	Connect the attenuator as specified in the procedure.

Figure 3-14. Equipment Setup for the Pulse Modulation Tests

Test Setup

Connect the equipment shown in Figure 3-14, as follows:

1. Using the 2.4 mm (f) to K (f) adapters, connect a 6 dB fixed attenuator to the oscilloscope’s Channel 1 Sampling Head and Trigger inputs.
2. Connect a RF coaxial cable to the 6 dB attenuator at the oscilloscope’s Channel 1 Sampling Head input.
3. For models without internal pulse, use a BNC to SMA adapter to connect a 50Ω BNC cable from the Function Generator’s SYNC to the 6 dB attenuator at the oscilloscope’s Trigger input.
4. For models with internal pulse, use a BNC to SMA adapter to connect a 50Ω BNC cable from the MG362x1A’s PULSE SYNC to the 6 dB attenuator at the oscilloscope’s Trigger input.
5. For models without internal pulse, connect a 50Ω BNC cable from the Function Generator’s signal output to the MG362x1A’s rear panel PULSE IN connector.
6. Set up the oscilloscope as follows:

- a. Press the Default Setup key.
- b. Select Keysight N1045B (Slot 1) setup in the lower left-hand of graphical user interface. set the following parameters:
 - Scale 88.5 mv
 - Offset 251 mV
 - BW 60 GHz
- c. Select Timebase tab. Set the following parameters:

Pulse Overshoot

- Scale 120 ns
- Delay at Reference 16 ns
- Reference left

Pulse Rise Time

- Scale 10 ns
- Delay at Reference 1.03 us
- Reference left

Pulse Fall Time

- Scale 10 ns
- Delay at Reference 24 ns
- Reference left

- d. Select Acquisition tab. Set the following parameters:
 - Waveform / specify record length/ samples per unit
 - Waveform / manual 1024 samples/waveform
 - Smoothing / Smoothing none
 - Smoothing / Number of Waveforms 16
 - Smoothing / Feedthrough compression best throughput
 - e. Select Trigger tab. Set the following parameters:
 - Advanced / Slope rising edge
 - Advanced / Pattern lock / Min timebase pos 16 ns
 - General Trig Setup / Source Front Panel
 - General Trig Setup / Edge trigger DC to 2.5 GHz
 - General Trig Setup / Trigger level 500 mV
 - f. Select Math tab. Set the following parameters:
 - Operators / Maximum. Drag the maximum function to the math screen to display.
 - Tap the maximum button and tap the F1 button to turn F1 display on.
 - g. Select the Waveform tab and press tiled view graphic to show split screen.
7. For models without internal pulse, set up the Function Generator as follows:
- a. Turn the Function Generator off, then back on to reset the instrument.
 - b. Press the key to select the square wave function.

- c. Press the Freq key, then the green Enter Number key and enter 250 kHz.
- d. Press Duty Cycle key, then the green Enter Number key and enter 100 us.
- e. Press the Ampl key, then the green Enter Number key and enter 2.2 Vp-p.
- f. Press Edge Time, the Enter Number key and enter 5 ns.
- g. Press the Offset key, then the green Enter Number key and enter 1.1 VDC.

Pulse Rise Time, Fall Time and Overshoot Measurement

The following procedure lets you measure the rise time, fall time, and overshoot of the MG362x1A's pulse modulated RF output.

Repeat the measurements of the pulse rise time, pulse fall time, and pulse overshoot based on the DUT frequencies in test records.

Pulse Rise Time

1. Set up the MG362x1A as follows:

- a. Reset the instrument by pressing SYSTEM, then Reset. After reset, the CW menu is displayed.
- b. Turn RF output off.
- c. Press FREQUENCY to open the current frequency parameter for editing.
- d. Press the Frequency button and set F1 to the first/next applicable frequency in the test record with an additional 3 Hz. For example, 1 GHz would be set to 1000.000003 MHz.
- e. Press Level to open the current power level parameter for editing.
- f. Set L1 to the maximum specified leveled output power level for the frequency and instrument being tested
- g. Turn RF output ON.
- h. Determine if internal pulse is installed.
 - If internal pulse is **not** installed, perform Step j.
 - If internal pulse **is** installed, skip to Step k.
- i. For models *without* internal pulse:

Press Modulation | Pulse | Internal/External to select the External Pulse Status menu.

Ensure that the polarity is set to High RF On.

Press On/Off to turn the external pulse on.
- j. For models with internal pulse:

Set the frequency to 250 kHz.

Set Trigger to Delayed.

Set Polarity to Normal.

Set Period to 4 us.

Set Trigger Polarity to Positive.

Set Count to 1.

Press the arrow in the lower right hand corner to go to the Pulse Width Delay menu.

Set Delay to 40 ns.

Set Width to 1000 ns.

Return to the previous menu screen.

2. On the Oscilloscope, select the Time tab on the menu (furthest left hand side).

3. Select Rise Time. In the tiled screen, set Rise time to F1.
4. On the MG362x1A, turn on pulse modulation.
 - a. Select the Time/Delay button on the bottom of the display.
 - b. Set the scale to 10 ns/div and the delay to 4 μ s. Select **Close** to close the window.
 - c. Press the **Clear Display** key. Allow the oscilloscope to sample the signal and wait for a clearly defined waveform to appear on the display.
 - d. Select the 1 button at the lower left corner of the display.
 - e. Adjust the scale and offset voltages so that the positive peak of the pulse is centered and the amplitude is optimally displayed. Select **Close** to close the window.
 - f. Select the **Rise Time** button (on the left hand side of the display).
5. Read the measured result from the bottom of the rise time display and enter the result in the test record.

Pulse Fall Time

6. On the Oscilloscope, select the Time tab on the menu (furthest left hand side).
7. Select Fall Time. In the tiled screen, set Fall time to F1.
8. On the MG362x1A, turn on pulse modulation.
9. Read the measured result from the bottom of the rise time display and enter the result in the test record

Overshoot

10. Set up the oscilloscope as follows:
11. On the Oscilloscope, select the Amplitude tab on the menu (furthest left hand side).
12. Select Overshoot. In the tiled screen, set Overshoot to F1.
13. On the MG362x1A, turn on pulse modulation.
14. Read the measured results from the bottom of the overshoot display and enter the results in the test records.

Pulse Power Accuracy Measurement

The following procedure lets you measure the pulse power accuracy of the MG362x1A's pulse modulated RF Output. The accuracy is tested with a 1 μ s and a 0.5 μ s pulse width.

1. Disconnect the MG362x1A's RF coaxial cable from the front of the unit. Set up the equipment as described in [Figure 3-14](#). Perform steps 1 to 6 in ["Test Setup" on page 3-60](#).
2. For models without internal pulse, set up the Function Generator as follows:
 - a. Turn the Function Generator off, then back on to reset the instrument.
 - b. Press the square wave key to select the square wave function.
 - c. Press the **Freq** key, then the green **Enter Number** key and enter 250 kHz.
 - d. Press the blue **Shift** key, then the **%Duty Cycle** key and use the rotary knob to adjust the duty cycle to 25%.
 - e. Press the **Ampl** key, then the green **Enter Number** key and enter 2.2 Vp-p.
 - f. Press the **Offset** key, then the green **Enter Number** key and enter 1.1 VDC.
3. Set up the MG362x1A as follows:
 - a. Reset the instrument by pressing **SYSTEM**, then **Reset**. After reset, the CW menu is displayed.
 - b. Turn RF output OFF.
 - c. Press **FREQUENCY** to open the current frequency parameter for editing.
 - d. Set F1 to the first/next applicable frequency in the test record.

- e. Press **Level** to open the current power level parameter for editing.
- f. Set **L1** to the maximum specified leveled output power level for the instrument being tested.
- g. Connect a fixed attenuator with the proper attenuation value (refer to [Table 3-26](#)) to the MG362x1A RF Output and then connect the RF coaxial cable from the Channel 1 Input of the Oscilloscope to the fixed attenuator.
- h. Turn RF output ON.
- i. For models without internal pulse:
 - Press **Modulation | Pulse | Internal/External** to select the External Pulse Status menu.
 - Ensure that the polarity is set to **High RF Off**.
 - Press **On/Off** to turn the external pulse on.

Table 3-26. MG362x1A Attenuation

MG362x1A Rated Power	Required Attenuation
≥18 dBm	20 dB
≥13 dBm	10 dB
≥10 dBm	6 dB
≥8 dBm	3 dB
<8 dBm	0 dB

- j. For models with internal pulse:
 - Press **Modulation | Pulse | Internal/External** to select the Internal Pulse Status menu.
 - Press **Edit Period** and enter 4 μ s.
 - Press **Wdth/Dly List... | Edit Selected** and enter 1 μ s (or 0.5 μ s).
 - Press **Previous**, then **On/Off** to turn the internal pulse mode off.
- 4. Set up the oscilloscope as follows:
 - a. Press the **Source** button (near the trigger) until **Free Run** is illuminated.
 - b. Select the **1** button at the lower left corner of the display and set the scale to 20 mV/div.
 - c. Set the **Offset** so that the trace is centered on the display, and select **Close**.
 - d. Select the **Amplitude** button and then the **Vavg** button (on the left hand side of the display), touch **OK** to close.

Note Click **More** to locate the Vavg button.

- 5. Read the measured result on the display and record the result as V_{ref} in the test record.
- 6. On the MG362x1A, press **On/Off** to turn pulse modulation on.
- 7. Set up the oscilloscope as follows:
 - a. Press the **Source** button (near the trigger) until **Front Panel** is illuminated.
 - b. Press the **Clear** display key. Allow the oscilloscope to sample the signal and wait for a clearly defined waveform to appear on the display.
 - c. Select **Time Delay** and **Scale** and adjust them so that only the positive peak portion of the pulse fills the display. For example, set the scale to 90 ns/div and the delay time to 4.075 μ s for a 1 μ s pulse or set the scale to 45 ns/div and the delay time to 4.075 μ s for a 500 μ s pulse.

Press **Close** to close the window.

d. Select the **Vavg** button and read the measured result on the display.

8. Record the result as V_{pulse} in the test record.

9. Calculate the difference of the two voltages using the following equation, then record the result in the test record as P_{accuracy} .

$$P_{\text{accuracy}} = 20 \times \log\left(\frac{V_{\text{pulse}}}{V_{\text{ref}}}\right)$$

10. Repeat Step 3b. For models without internal pulse, repeat Step 3b to Step 9 using a Function Generator square wave frequency input of 500 kHz with a 25% duty cycle.

11. For models with internal pulse, repeat Step 3b to Step 9 using a pulse width of 0.5 μs .

Chapter 4 — Adjustment

4-1 Introduction

Performance adjustments with Anritsu Rubidium Automated Maintenance Software (RAMS) currently supports Rubidium MG36221A and MG36241A. RAMS provides three different calibration stages. Pre-Cal, Adjustments, and Post-Cal. Adjustments can be done to bring a system level specification into tolerance, but also when an exchange part is replaced and adjustments need to be performed with component level calibrations on the replaced modules. This chapter contains instructions for using RAMS to verify, calibrate and adjust instruments and modules for the series MG362x1A Synthesized Signal Generator. Manual MG362x1A performance verification procedures are contained in [Chapter 3, “Performance Verification”](#)

Note	Ensure the ambient temperature is within 20 °C to 26 °C (68 °F to 79 °F), the MG362x1A covers are on, and the internal instrument temperature is stable (requires about 45 minutes operating in 20 °C to 26 °C).
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These tests support all instrument models with the following options:

- Option 2, Mechanical step attenuator, 110 dB
- Option 3, Low phase noise and ultra hi stability
- Option 6, Analog sweep (MG36221A and MG36241A only)
- Option 12, Amplitude, frequency, and phase modulation (internal/external)
- Option 13, Low phase noise and high stability
- Option 15, High power output
- Option 26, Internal/external pulse modulation
- Option 27, Internal low frequency and pulse generators

4-2 Test Equipment List

[Table 4-1](#) provides a list of the test equipment used by the RAMS for the performance verification tests and adjustments of the instrument. The test equipment setup is critical to making accurate measurements. In some cases, you may substitute certain test equipment having the same critical specifications as the test equipment indicated in the test equipment list (refer to [“Measurement Uncertainty”](#) on page 3-5).

Table 4-1. Equipment List for Initial Calibration

Instrument	Critical Specification	Recommended Manufacturer/ Model
Computer running Windows 7 or higher 4 GB RAM (8 GB or higher recommended) With any Intel CPU (10th Generation or higher recommended) Operation between the instrument and remote program is accomplished via a TCP/IP raw socket connection to port 9001	Recommended computer configuration: Pentium 4 2.8 GHz 1 GB RAM Ethernet Sockets and IEEE-488 General Purpose Interface Bus (GPIB). Mouse, Keyboard, Monitor, Network The computer must be dedicated during calibration and verification activities.	Dell, HP or other common source
Rubidium Automated Maintenance Software (RAMS)	N/A	Anritsu

Table 4-1. Equipment List for Initial Calibration (Continued)

Instrument	Critical Specification	Recommended Manufacturer/ Model
GPIB-USB-HS+	N/A	National Instruments, P/N 783368-01
Accessories		
BNC Tee	N/A	Any Common Source
BNC (f) To double stack banana plug	P/N 1269	Pomona Electronics
BNC Cable	BNC(m)-BNC(m), 50 Ω , 6 ft P/N 2000-1627-R	Anritsu
BNC Cable	BNC(m)-BNC(m), 50 Ω , 2 ft P/N 3-806-225	Anritsu
Initial Calibration		
Meter, Power	N/A	Anritsu, ML2438A
Generator, Signal 86486	N/A	Hewlett Packard, 86486
Fieldmaster Pro	Frequency: 9 kHz - 43.5 GHz	Anritsu, MS2090A-0754
Power Sensor	2 - 20 GHz	Anritsu, MA2475X
Thermal Power Sensor	N/A	Rohde & Schwarz, NRP67T
Waveform Generator	Rise Time < 5nSec	Keysight, 33510B
Generator, Signal	100, 1600 MHz: @ 10 dBm	Hewlett Packard, 8648D
Frequency Counter	Up to 46 GHz	Pendulum, CNT-90XL
Adapter	V(f) to V(f)	Anritsu, 34VFVF50A.
Spurs and Harmonics		
Fieldmaster Pro SPA	Frequency: 9 kHz - 54 GHz	Anritsu, MS2090A-0754
Fixed Attenuator	6 dB Attenuation	Anritsu, SC8576
Spectrum Master	170 GHz SPA (USE > 43.5 GHz)	Anritsu, MS2760-170 with 0.8(m)
Adapter	W(f) to 0.8(f)	Anritsu, 33WF.8F50
Adapter	V(f) to K(f)	Anritsu, 34VFKF50
Adapter	W(m) to V(m)	Anritsu, 34WV50
Phase Noise		
Phase Noise Analyzer All MG362x1A	Frequency: 9 kHz - 43.5 GHz	Phase Noise Analyzer, FSWP50
1.85 mm to waveguide adapter MG36271A model only	V(m) to WR15	Anritsu
1.85 mm (v) power splitter MG36271A model only	N/A	Anritsu, V241C
harmonic mixer MG36271A model only	50 to 70 GHz	WR15
Level Calibration		
Thermal, Power Sensor	Frequency: 9 kHz - 43.5 GHz	Rohde & SCHWARZ, NRP67T
Fieldmaster Pro SPA	Frequency: 9 kHz - 54 GHz	Anritsu, MS2090A-0754
Spectrum Master SPA	Frequency: > 43.5 GHz	Anritsu, MS2760-170

Table 4-1. Equipment List for Initial Calibration (Continued)

Instrument	Critical Specification	Recommended Manufacturer/ Model
Fixed Attenuator	Frequency: 9 kHz - 43.5 GHz 6 dB Attenuation	Anritsu, SC8576
Fixed Attenuator	Frequency: 9 kHz - 43.5 GHz 10 dB Attenuation	Anritsu, SC8577
V Semi-Rigid Cable	Frequency: 9 kHz - 43.5 GHz	Anritsu, 3670V50A-2
Fixed Attenuator	ABLE BRIGHT, P/N 202/1116 Frequency: 9 kHz - 43.5 GHz 20 dB Attenuation, 5 watt	Able Bright, P/N 202/1116
Attenuator	10dB W Attenuator	Anritsu, 41W-10 (3 EACH)
Attenuator	10dB V Attenuator	Anritsu, 41VA-10 (3 EACH)
Attenuator	5W 20dB Attenuator	Anoisson, 62-0501-20
Adapter	W(f) to 0.8(f)	Anritsu, 33WF.8F50
Adapter	V(f) to K(f)	Anritsu, 34VFKF50
Adapter	W(m) to V(m)	Anritsu, 34WV50
Amplitude, Frequency, and Phase Modulation		
Waveform Generator	Up to 20MHz	Keysight, 33x Series
Spectrum Master SPA	MS2760-170 with 0.8(m)	Anritsu, MS2760-170
Digital Storage Oscilloscope	100 MHz, 4-Ch, 2 GS/s	Tektronix, TDS2014C
Multimeter (2)	6.5 Digits of resolution	Agilent, 34401A
Phase Noise Analyzer	Frequency: 9 kHz - 43.5 GHz	Rohde & Schwarz, FSWP50
Fieldmaster Pro SPA	Frequency: 9 kHz - 43.5 GHz	Anritsu, MS2090A-0754
Adapter	W(M) To V(M)	Anritsu, 34wv50
Attenuator	20 dB V Attenuator	Anritsu, 41VA-20
Pulse Modulation		
Waveform Generator	Up to 20MHz	Keysight, 33x Series
Dca-x Oscilloscope	N/A	Keysight, N1000A
Sampling Head	80 Giga-Sample/Seconds	Keysight, N1045B
Fixed Attenuator	6 dB Attenuation	Anritsu, SC8576
Fixed Attenuator	10 dB Attenuation	Anritsu, SC8577
Low Pass Filter	400 MHz	RLC Electronics, F-10-400-R

Maximum Permissible Tolerance of Return Loss

The uncertainty budgets listed were derived from measured values of calibrated attenuators, cables and adapters. In order to achieve the same level of uncertainty, it is important to perform calibrations of attenuators, cables and adapters which are recommended in the performance verification section.

Adapters

Maximum permissible tolerances of the adapters listed below are tabulated in [Table 4-2](#) through [Table 4-5](#).

- Adapter 1.85 mm (m) to 2.4 mm (f) part number PE9673
- Adapter 2.4 mm (f) to 2.92 mm (m) part number 11904D
- Adapter 1.85 mm (m) to 2.92 mm (f) part number 34VKF50
- Adapter 2.92 mm (m) to N (f) part number 34NFK50

Table 4-2. Adapter 1.85 mm (m) to 2.4 mm (f) part number **PE9673** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	1.85 mm (m)	1.85 mm (m)	2.4 mm (f)	2.4 mm (f)
(0.0001 to 10) GHz	30	0.032	30	0.032
(10.05 to 20) GHz	25	0.056	24	0.063
(20.5 to 30) GHz	21	0.089	21	0.089
(30.5 to 40) GHz	20	0.100	15	0.178
(40.5 to 43.5) GHz	15	0.178	15	0.178

Table 4-3. Adapter 2.4 mm (f) to 2.92 mm (m) part number **11904D** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	2.92 mm (m)	2.92 mm (m)	2.4 mm (f)	2.4 mm (f)
(0.0001 to 10) GHz	40	0.010	37	0.014
(10.05 to 20) GHz	34	0.020	24	0.014
(20.5 to 30) GHz	36	0.016	31	0.028
(30.5 to 43.5) GHz	27	0.045	28	0.040

Table 4-4. Adapter 1.85 mm (m) to 2.92 mm (f) part number **34VKF50** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	1.85 mm (m)	1.85 mm (m)	2.92 mm (f)	2.92 mm (f)
(0.0001 to 10) GHz	33	0.022	32	0.025
(10.05 to 20) GHz	34	0.020	32	0.025
(20.5 to 30) GHz	25	0.056	23	0.071
(30.5 to 43.5) GHz	23	0.071	22	0.079

Table 4-5. Adapter 2.92 mm (m) to N (f) part number **34NFK50** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	2.92 mm (m)	2.92 mm (m)	N (f)	N (f)
(0.0001 to 4) GHz	40	0.010	40	0.010

Attenuators

Maximum permissible tolerances of the 10 dB attenuators listed below are tabulated in [Table 4-6](#) and [Table 4-7](#)

- 2.92 mm Attenuator kit (3, 6, 10 and 20 dB) part number SC7879
- 1.85 mm Attenuator kit (3, 6, 10 and 20 dB) part number SC7880

Table 4-6. 2.92 mm Attenuator (10 dB) from kit **SC7879** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector Type	2.92 mm (m)	2.92 mm (m)	2.92 mm (f)	2.92 mm (f)
(0.0001 to 10) GHz	37	0.014	35	0.018
(10.05 to 20) GHz	31	0.028	35	0.056
(20.5 to 30) GHz	24	0.063	23	0.071
(30.5 to 43.5) GHz	24	0.063	23	0.071

Table 4-7. 1.85 mm Attenuator (10 dB) from kit **SC7880** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector	1.85 mm (m)	1.85 mm (m)	1.85 mm (f)	1.85 mm (f)
(0.0001 to 10) GHz	37	0.014	31	0.028
(10.05 to 20) GHz	31	0.028	28	0.040
(20.5 to 30) GHz	24	0.063	29	0.035
(30.5 to 40) GHz	22	0.079	23	0.071
(40.5 to 43.5) GHz	17	0.141	18	0.126

Cables

Maximum permissible tolerances of the cables listed below are tabulated in [Table 4-8](#) and [Table 4-9](#).

- Armored Semi Rigid Test Port Cable (2.92 mm Connector Female to 2.92 mm Connector Male) part number 3670K50-2
- Armored Semi Rigid Test Port Cable (1.85 mm Connector Female to 1.85 mm Connector Male) part number 3670V50A-2

Table 4-8. Armored Semi Rigid Test Port Cable (2.92 mm Connector Female to 2.92 mm Connector Male) part number **3670K50-2** - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector	2.92 mm (m)	2.92 mm (m)	2.92 mm (f)	2.92 mm (f)
(0.0001 to 10) GHz	27	0.045	27	0.045
(10.05 to 20) GHz	21	0.089	23	0.071
(20.5 to 30) GHz	23	0.071	22	0.079
(30.5 to 43.5) GHz	22	0.079	21	0.089

Table 4-9. Armored Semi Rigid Test Port Cable (1.85 mm Connector Female to 1.85 mm Connector Male) part number 3670V50A-2 - Maximum Permissible Tolerances

Frequency	Return loss (dB)	Reflection Coefficient	Return loss (dB)	Reflection Coefficient
Connector	1.85 mm (m)	1.85 mm (m)	1.85 mm (f)	1.85 mm (f)
(0.0001 to 10) GHz	35	0.018	33	0.022
(10.05 to 20) GHz	26	0.050	27	0.045
(20.5 to 30) GHz	24	0.063	25	0.056
(30.5 to 40) GHz	22	0.079	22	0.079
(40.5 to 43.5) GHz	22	0.079	21	0.089

4-3 RAMS Installation

Upon receipt of the RAMS software, please perform the following operations to install it.

1. Open the RAMS package and double click the setup.exe application file.

2. When the RAMS file package Open File dialog box comes up, select Run.

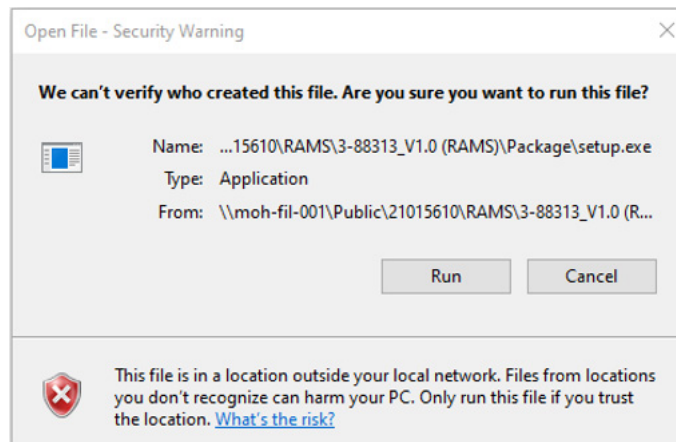


Figure 4-1. Installation Opening Screen

3. The next step is to accept the agreement for the Crystal reports Runtime engine. This will allow RAMS to generate reports at the completion of verifications.

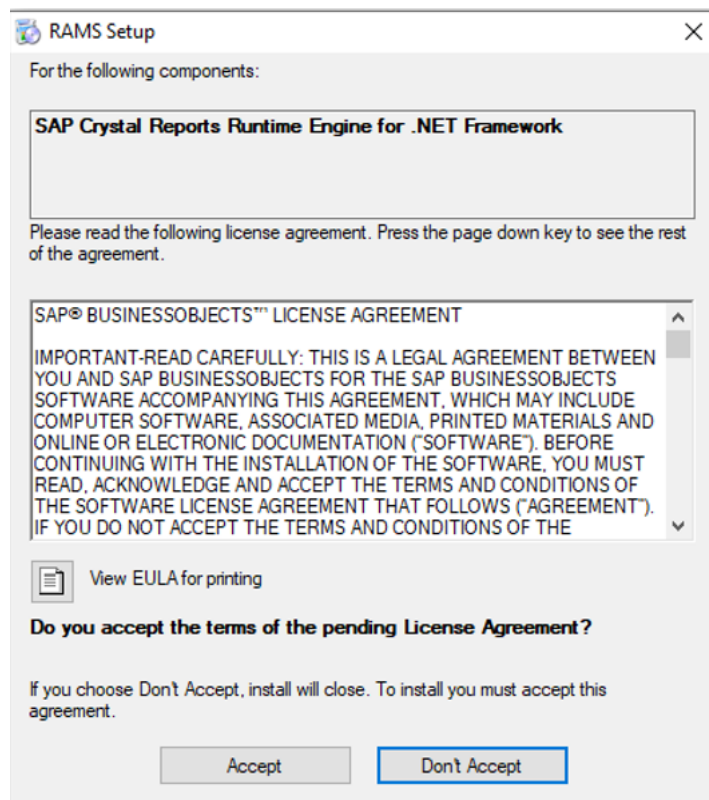


Figure 4-2. License Agreement Read Screen

4. Once the Crystal Reports runtime engine is setup, a new pop up will appear for setting up the remainder of the RAMS software. Press the Next button.

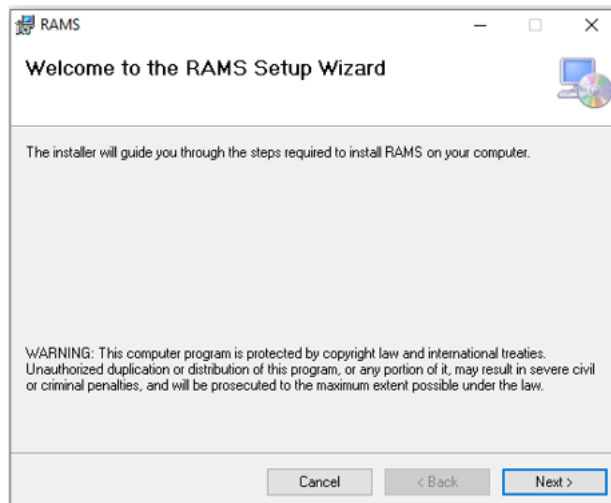


Figure 4-3. Welcome Screen

5. Select "I Agree" in the License agreement and then press the Next button.

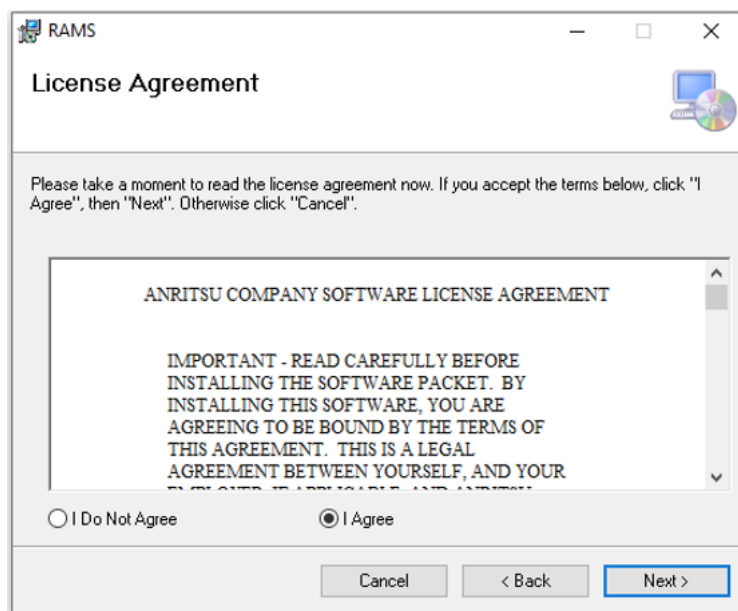


Figure 4-4. License Agreement Screen

- The next pop up will be the Select installation Folder. The default radio button for accessibility on the computer is Everyone. This should be selected if the workstation has multiple users. Just me is also an option for the user. Please select the appropriate choice and then press the Next button.

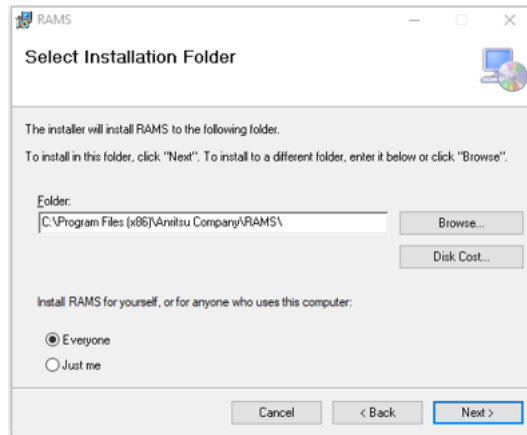


Figure 4-5. Select Folder Screen

- When Confirm Installation comes up, please press the Next button.

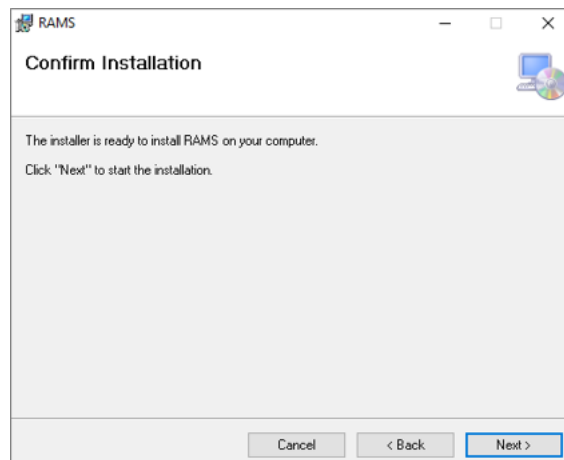


Figure 4-6. Confirm Installation Screen

8. Once Installation of the RAMS software is complete, a pop up will confirm this. Please press the close button.

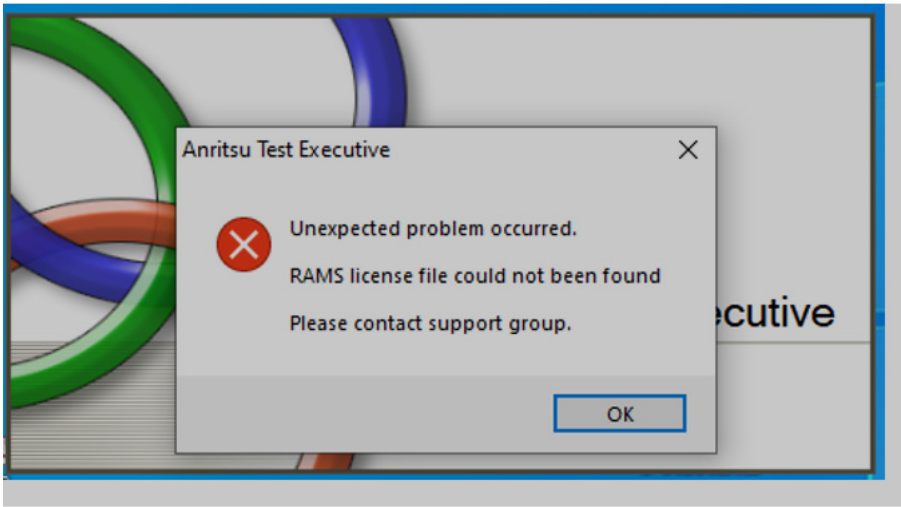


Figure 4-7. Problem Occurred Screen

9. A RAMS icon will now appear on the workstation desktop. The installation process is almost complete. The next step will be to add a license file to the workstation PC.

Note: RAMS will not launch without the license key. An error will be generated indicating that a license is necessary.

10. Please copy the provided license file to be placed within the correct folder on the workstation. The license file will be a RAMS.LF file.

☐ Name	Date modified	Type	Size
RAMS.LF	10/16/2024 9:48 AM	LF File	4 KB

Figure 4-8. Problem Occurred Screen

11. RAMS will install a directory in the Program Data folder for Anritsu Company in the C drive directory. Please paste the license file in this location.

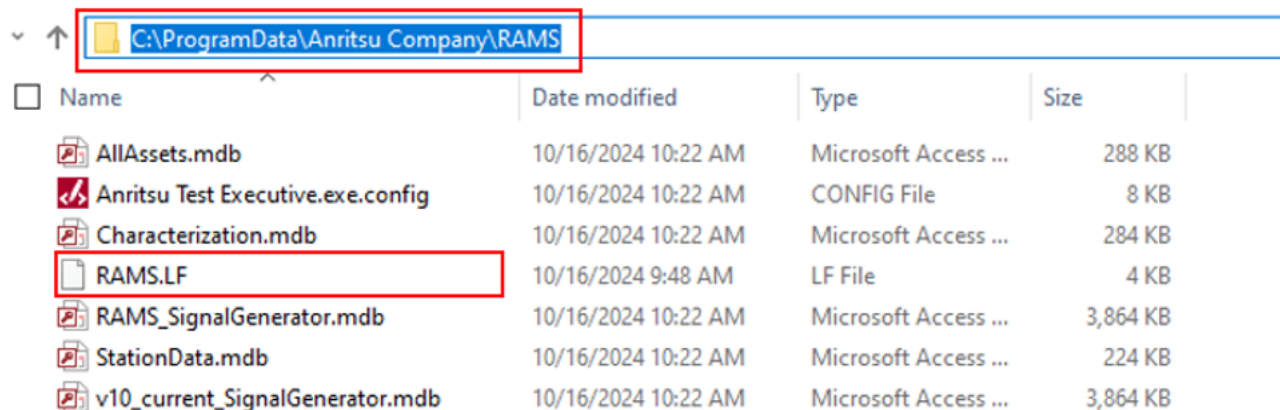


Figure 4-9. Problem Occurred Screen

12. You are now ready to use the RAMS program. There will be a small icon on the desktop that says RAMS. Double click this icon.



Figure 4-10. RAMS Icon

4-4 RAMS Graphical User Interface

RAMS user interface is divided into menu bar, interface setup, toolbars, test/adjustment tree view control and activity log.

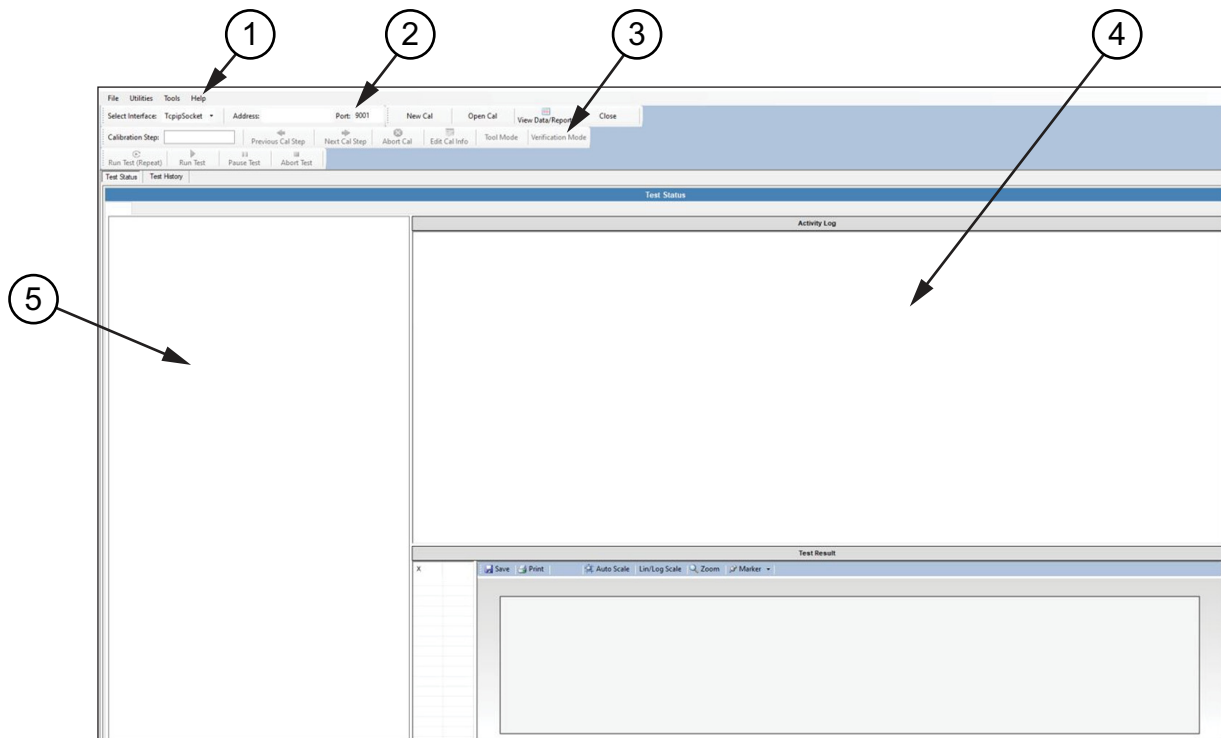
The menu bar is designed to facilitate the entry of instruments information used in verifications and adjustments.

The interface setup is used to establish communication with the MG362X1A. Next to the interface setup is the calibration setup. This section also allows access to data from a measurement and where a new calibration is setup or an open calibration is recalled.

The toolbars are used for the verification and adjustment processes. This is where verifications can be run, aborted or even moved to the next step in the verification/adjustment process.

The tree view control is where all test and adjustments are displayed. The user can select or deselect tests as needed. The tree view describes how tests are structured where a single test may include many other tests based on frequency or levels.

The activity log will show the current progress of the tests including where the test is in process, information regarding the setup, calculations and the results of the tests.



1. Menu Bar
2. Interface Setup
3. Toolbar
4. Tree View Control
5. Activity Log

Figure 4-11. Graphical User Interface

4-5 Station Asset Utility

The Station Asset Utility is a required program database that contains the test equipment used when performing automated verification and adjustment procedures. This utility is located in the Utilities menu bar. When verification and/or adjustments are performed, RAMS searches the Station Asset Utility database and applies the asset's characterization parameters for the test. All test equipment assets used for testing must be manually entered.

Station Asset Utility Procedure

- 1. Open Station Asset Utility from the Utilities drop-down menu.
- 2. Select Add Asset.
- 3. Enter in the Model, Serial Number, Characterization information, Interface and Address.
- 4. Press the last button in the row. A red indicates there is incorrect information and green indicates the unit is ready for use. See [Figure 4-12](#).
- 5. When all assets are entered, select Save & Exit.

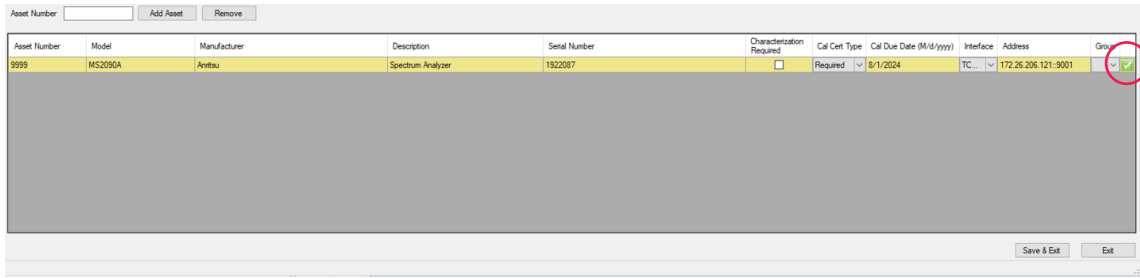


Figure 4-12. Information Pass/Fail Indicator

4-6 Select Interface

The Select Interface toolbar is used to set up the communication between RAMS and the MG362x1A signal generator. Once information is entered into the IP address and Port number and calibration is selected, RAMS will begin to query the equipment that is entered in [“Station Asset Utility” on page 4-13](#).

Select Interface Procedure

1. Open the System Information tab in the MG362x1A.
2. Select Connectivity. The IP address will be displayed.
3. Enter the IP address in the Select Interface field in RAMS.
4. Set the Port to 9001.
5. Select New Cal or Open Cal depending on which choice is needed.

4-7 Setting up a Verification

Use RAMS to start a new calibration or to open an existing calibration. The following instructions will only focus on setting up a new calibration.

Calibration Procedure

1. Once the Select Interface section is entered, select New Cal.
2. In the New Cal menu, provide information on the Rubidium unit for model number, serial number, and customer name.

Note The model and serial number for the unit being tested and for which the Select Information has been set must be the unit tested. RAMS will pop-up a warning if this criteria is not met as shown in [Figure 4-13](#).

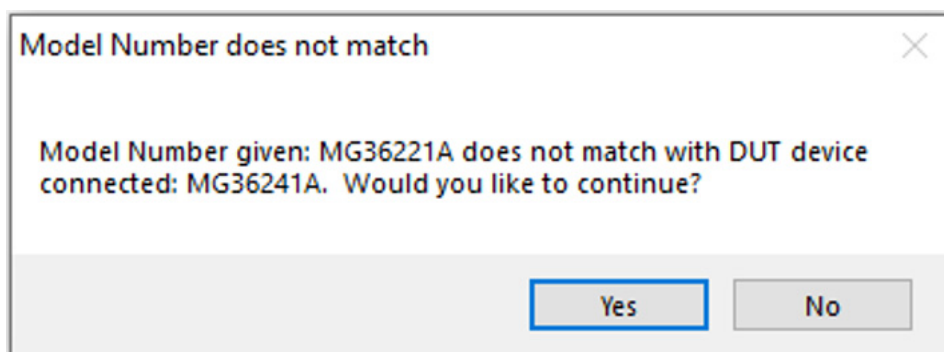


Figure 4-13. Incorrect Model Connected Dialog

4-8 Tree View Control Window

The tree view control window displays the verification tests and adjustments. The tests that are displayed are option dependent. The maximum leveled output power, harmonics and single side phase noise will be available for all instruments. Tree view control may also provide additional performance verification procedures that are not listed in the verification procedures in this manual.

This section is designed to help users understand the equipment needed for each test and to let the user know if the test has passed or failed. When a test is unavailable, the select box is grayed out when the required equipment is not present in the Station Asset Utility box. As shown in [Figure 4-14](#), testing cannot proceed until an NRP67T power sensor and other equipment are entered into the Station Asset Utility menu.

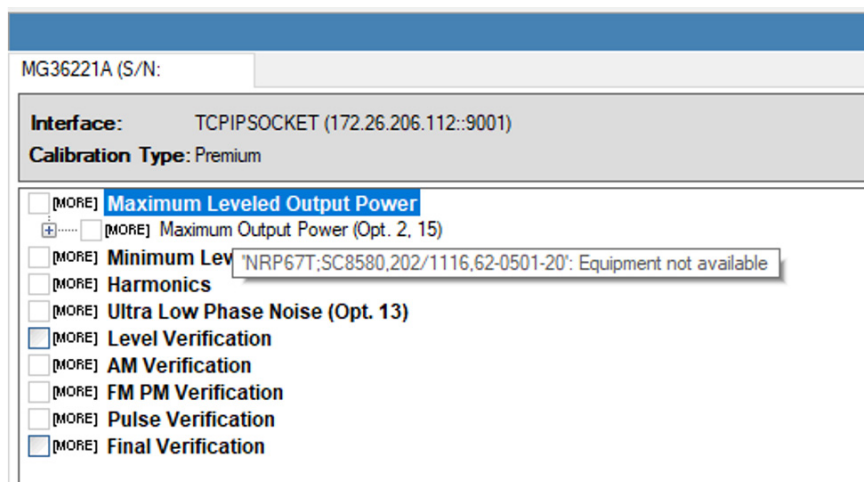


Figure 4-14. Equipment Not Available for Testing Message

Each test may also have additional tests for various power levels and frequencies as shown in [Figure 4-15](#). Pressing on the plus sign will expand the selection. The user can select each test individually or all tests. RAMS is designed so that tests will require minimal setup between tests from the user.

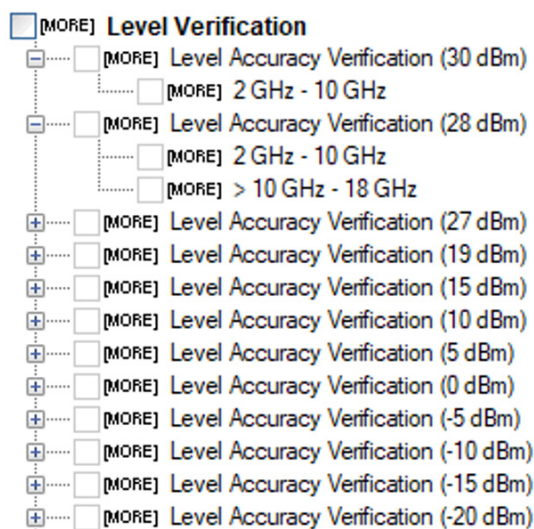


Figure 4-15. Select Tests Dialog

Starting a New Cal Procedure

1. Select the desired verification tests in the Tree View Control window.
2. Point over the test if the desired test is unavailable to see missing equipment. Add equipment to Station Asset Utility using the procedure in [“Station Asset Utility” on page 4-13](#).
3. Select Run Test to begin verification.

4-9 Adjustments

Adjustments is performed for units that are failing pre-verification in most tests as well as for units that have a module replacement. Adjustments will have a mix of required tests and option tests. Determining the test type can be accomplished by pointing to the test as shown in [Figure 4-16](#).

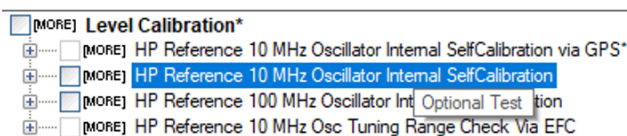


Figure 4-16. Determining Test Type Message (Optional Test)

As discussed in [“Tree View Control Window” on page 4-15](#), some test will be grayed out if equipment is missing.

Note: There are no manual procedures for performing adjustments.

Starting an Adjustment Procedure

1. Select the desired adjustment in the Tree View Control window.
2. Point to the test if the desired test is unavailable to see missing equipment. Add equipment to Station Asset Utility using the procedure in [“Station Asset Utility” on page 4-13](#).

Select Run Test to begin adjustments.

4-10 Post-Calibration

RAMS has a final calibration that is used to ensure that adjustments have improved performance for units failing specifications. Post-Calibration also checks units with replaced modules to ensure module calibrations that have been performed will meet specifications for the MG362x1A.

Chapter 5 — Troubleshooting

Note

Troubleshooting procedures presented in this chapter may require the removal of the instrument's covers to gain access to the test points on the printed circuit boards and other subassemblies.

Warning

Hazardous voltages are present inside the MG362x1A whenever AC line power is connected. Turn off the instrument and remove the line cord before removing any covers or panels. Troubleshooting or repair procedures should only be performed by service personnel who are fully aware of the potential hazards.

Many subassemblies in the instrument contain static sensitive components. Improper handling of these subassemblies may result in damage to the components. Always observe the static-sensitive component handling precautions.

Caution

ESD Requirements: The MG362x1A contains components that can be easily damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the MG362x1A instrument. Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

5-1 Introduction

This chapter provides information for troubleshooting the MG362x1A. The troubleshooting procedures presented in this chapter support fault isolation to a replaceable subassembly or RF component. Remove and replace procedures for the subassemblies and RF components are found in [Chapter 6, “Removal and Replacement”](#). Required calibrations after assembly replacement are shown in [Chapter 4, “Adjustment”](#).

5-2 Error Messages

During normal operation, the MG362x1A generates error messages to indicate internal malfunctions, abnormal instrument operations, or invalid signal inputs or data entries. It also displays warning messages to alert the operator of conditions that could result in inaccurate MG362x1A output. In addition, status messages are displayed to remind the operator of current menu selections or settings.

Self Test Error Messages

The MG362x1A firmware includes internal diagnostics that self test the instrument. These self test diagnostics perform a brief go/no-go test of most of the instrument PCBs and other internal assemblies.

You can perform an instrument self test at any time during normal operation.

Press: **SYSTEM > DIAGNOSTICS > SELF TEST**

If the MG362x1A fails self test, error messages are displayed on the front panel data display. These error messages describe the malfunction and, in most cases, provide an indication of what has failed. For the Error and Signal Generator messages, see [Appendix B](#).

Figure 5-1 shows the basic MG362x1A block diagram.

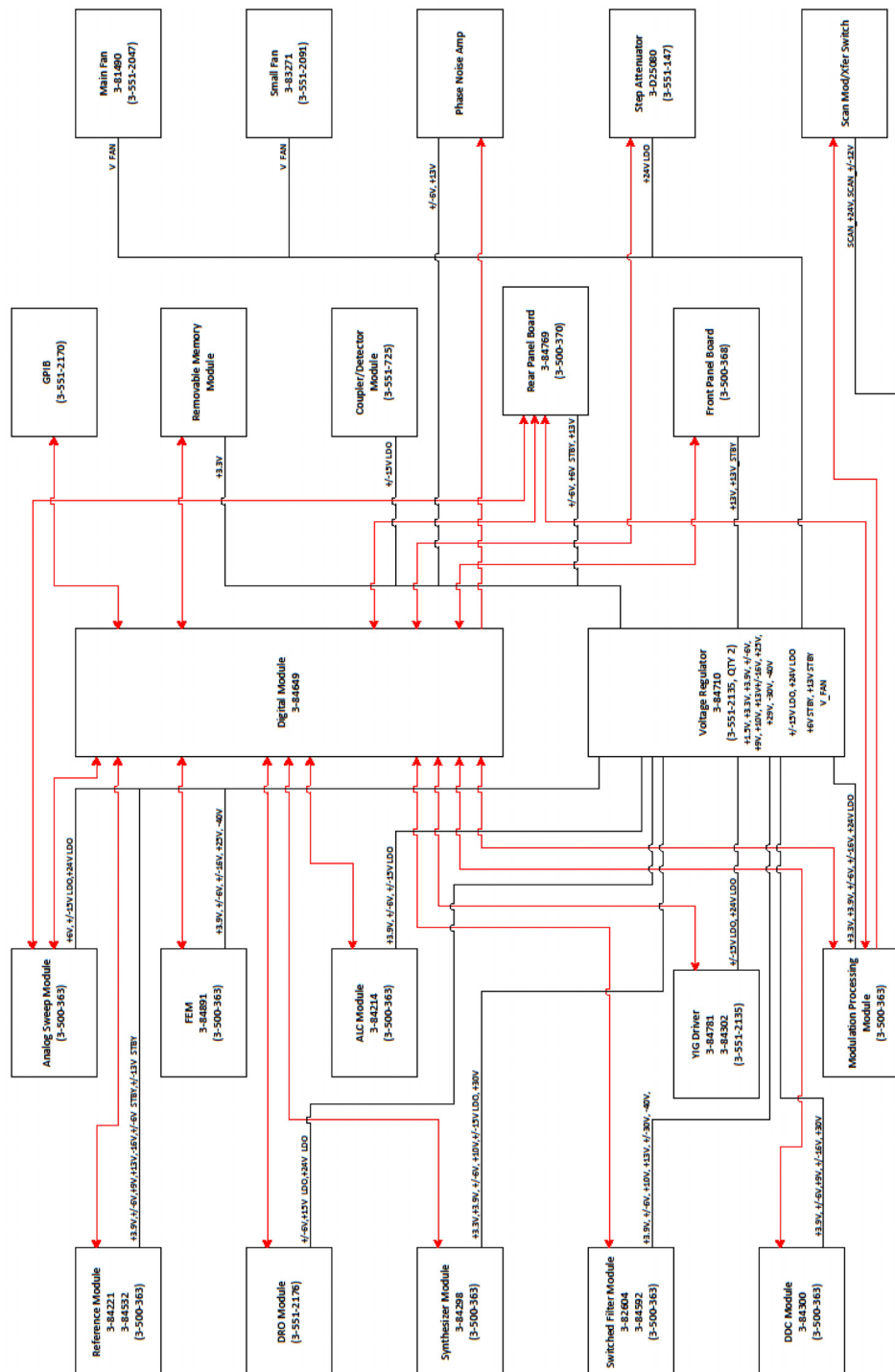
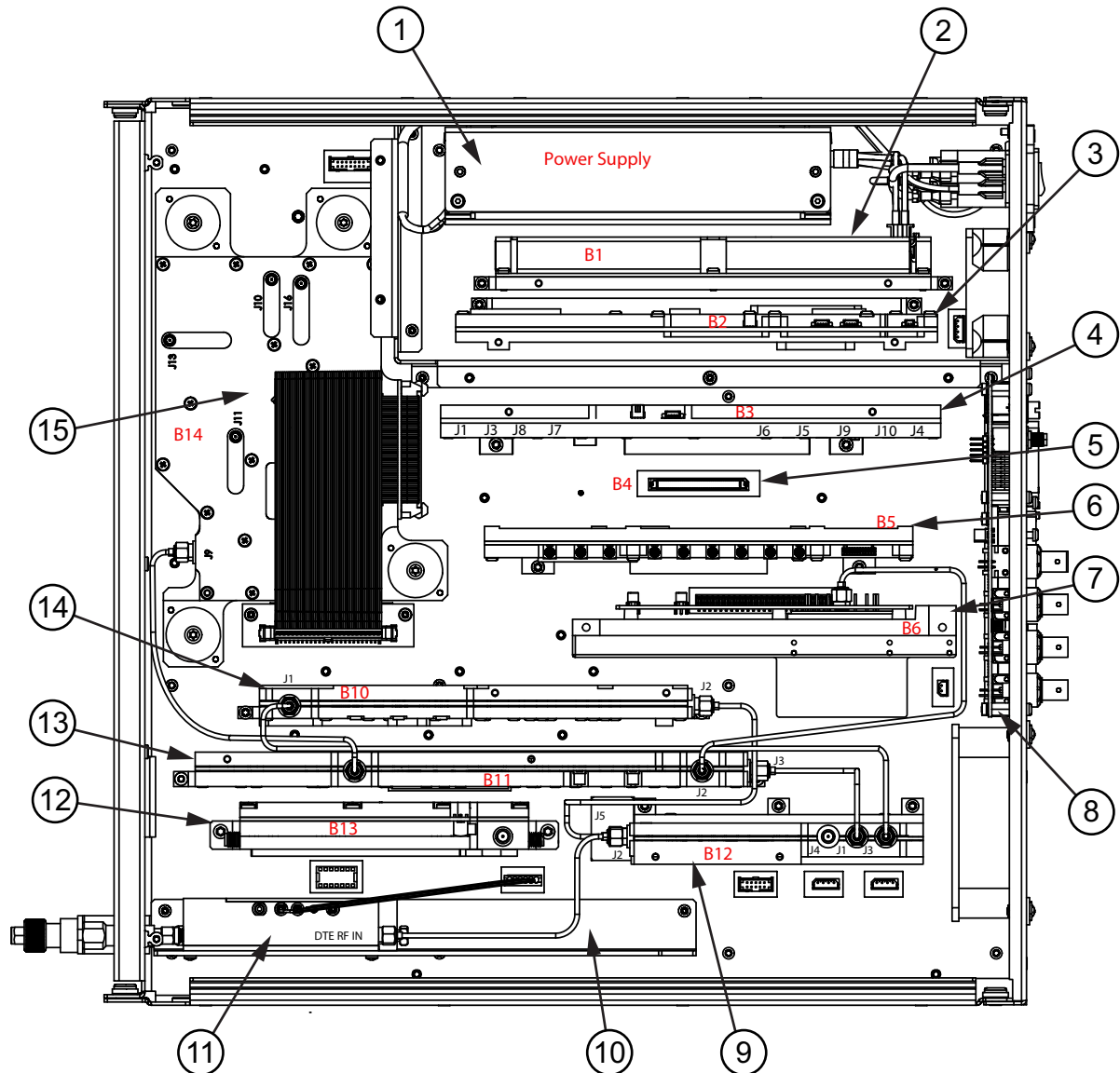


Figure 5-1. Block Diagram

5-4 Basic Configuration

The basic MG36221A Modules and Components are shown in Figure 5-11.



- | | |
|---|---|
| 1. Power Supply | 9. Switched Filter (B12) |
| 2. Voltage Regulator (B1) | 10. Option 2 moves the coupler back to rear position and the step attenuator moves to the forward position. |
| 3. Digital Control Module (B2) | 11. Coupler Position (without Option 2) |
| 4. Modulation Processor Module Slot (Option 29) | 12. Frequency Extension Module (MG36241A) |
| 5. Analog Sweep Module Location (B4)(Option 6) | 13. Synthesizer Module (B11) |
| 6. ALC Module (B5) | 14. Digital Down Converter (B10) |
| 7. YIG Driver (B6) | 15. Reference Synthesizer Module (B14) (Standard) |
| 8. Rear Panel/Aux I/O | |

Figure 5-2. MG362x1A Modules and Components

5-5 Troubleshooting

Error conditions and performance problems can be caused by a variety of singular or combined scenarios. This section provides basic troubleshooting suggestions. Any problems that are not resolved should be referred to an Anritsu Service Center.

Malfunctions Not Displaying an Error Message

Problem: MG362x1A Will Not Turn On (OPERATE light and FAN are OFF)

Normal Operation : When the MG362x1A is connected to the power source and the rear panel line switch is turned on, the OPERATE light should illuminate and the instrument should power up. When the MG362x1A is set to standby mode, the fans should run slow and the STANDBY light should illuminate.

Procedure

1. Check the line fuses.
 - If the line fuses are good, go to step 2.
 - If the line fuses are defective, replace the fuses.
2. Apply power to the instrument.
 - If the instrument powers up, the problem is cleared.
 - If the instrument fails to power up, go to step 3.
3. Disconnect the MG362x1A from the power source, then remove the MG362x1A top cover.
4. Refer to the assembly replacement procedures in [Chapter 6](#) as needed.
5. Inspect the ac line supply/switch block and the wiring to the main power supply and standby power supply for defects.
 - If a defect is found, replace as necessary.
 - If no defect is found, go to step 6.
6. Replace the standby and main power supplies.
 - If the instrument powers up, the problem is cleared.
 - If the instrument fails to power up, contact your local Anritsu Service Center for assistance

Problem: MG362x1A Will Not Turn On (OPERATE light is ON)

Normal Operation : When the MG362x1A is connected to the power source and the rear panel line switch is turned on, the OPERATE light should illuminate and the instrument should power up. When the MG362x1A is set to standby mode, the fans should run slow and the STANDBY light should illuminate.

Procedure

Remove the MG362x1A top and bottom cover.

1. Apply power and measure the regulated voltages at P1 and P2 of the motherboard [Table 5-1 on page 5-5](#).
 - If one or more, but not all of the related voltages are out of regulation, a malfunction of the regulation circuitry is indicated. Replace the B1 voltage regulator module.
 - If all of the related voltages are out of regulation, a malfunction of the regulator supply source is indicated. Replace the related supply source.
2. Check for normal operation.
 - If the instrument powers up, the problem is cleared.
 - If the instrument fails to power up, go to step 4.

3. Press the front panel **RF OUTPUT ON/OFF** button.

- If the red and yellow LEDs toggle, the malfunction may be caused by a failed front panel circuit. Replace the front panel assembly.
- If the LEDs do not toggle or if both LEDs are lit, the problem may be caused by a CPU malfunction. Replace the B2 PCB.

4. Check for normal operation.

- If the instrument powers up, the problem is cleared.
- If the instrument fails to power up, contact your local Anritsu Service Center for assistance.

Table 5-1. Power Supply Module Regulated Outputs

Mother Board Connector (P1)	Regulator Output (V)	Mother Board Connector (P2)	
Pin 2, 4	+24V_LDO	Pin 14	-6V_STBY
Pin 6, 8	-15V_LDO	Pin 16	-13V_STBY
Pin 10, 12	+15V_LDO	Pin 18, 20	+1V5
Pin 14, 16	-6V	Pin 22, 24	+3V3
Pin 18, 20	+25V	Pin 26, 28, 30	+3V9
Pin 22, 24	-16V	Pin 32, 34, 36, 38, 40, 42	+6V
Pin 26, 28	+16V	Pin 44,46	+9V
Pin 30, 32	+30V	Pin 48, 50	+10V
Pin 34	-40V	Odd Pins (13-49)	Ground
Pin 36	-30V		
Pin 38	+6V_STBY		
Pin 40	V_FAN		
Pin 42, 44, 46	+13V		
Pin 48, 50	+13V_STBY		
Odd Pins (1-49)	Ground		

MG362x1A Does Communicate Via Ethernet Connection

Normal Operation: When the MG362x1A is connected to Ethernet and configured correctly, the unit can communicate with other network devices.

Procedure

Test operation between each step and stop if Ethernet connection becomes operational.

1. Inspect the RJ45 connector on the rear panel for damage or bent pins.
2. Replace Ethernet cable from the instrument to the network connection.
3. Try another facility's Ethernet connection.
4. Refer to the MG362x1A Operation Manual 10370-10383, and follow the instructions to restore the Ethernet/GPIB Controller to factory default settings.
5. Replace the B2 CPU assembly.

5-6 Self Test Messages

Refer to [Table B-1 on page B-6](#).

System Messages that Display Fail

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Replace the B2 PCB, perform a manual pre-calibration and press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any error messages are displayed, contact your local Anritsu Service Center for assistance.

5-7 SG Messages

Refer to [Table B-2 on page B-6](#).

MOD Supply Voltage Errors

Applies to units installed with modulation hardware Option 27.

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Replace the B3 PCB, perform a manual pre-calibration and press SELF TEST.
 - If no error message is displayed, the problem is cleared.
4. Perform modulation calibrations and verify performance.

If any error messages are displayed, contact your local Anritsu Service Center for assistance.

ALC Temperature Error.

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Replace the B5 PCB, perform a manual pre-calibration and press SELF TEST.
 - If no error message is displayed, the problem is cleared.
4. Perform level calibrations and verify performance.

YIG Temperature Error

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Replace the B6 PCB, perform a manual pre-calibration and press SELF TEST.
 - If no error message is displayed, the problem is cleared.
4. Perform frequency calibrations and verify performance.

SWF Errors (Switched Filter Errors)

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Replace the B6 PCB, perform a manual pre-calibration and press SELF TEST.
 - If no error message is displayed, the problem is cleared.
4. Perform Level Cal calibrations and verify performance.

REG Errors (Regulator Errors)

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Replace the B1 module and perform a manual pre-calibration and press SELF TEST.
 - If no error message is displayed, the problem is cleared.
4. Perform all calibrations and verify performance.

The OCXO module is Not Phase-locked to the External 10 MHz Reference.

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
1. Using a coaxial cable with BNC connectors, connect the rear panel 10 MHz REF IN connector to the rear panel 10 MHz REF OUT connector.
2. Disconnect the SMA cable.

3. Using an oscilloscope, verify the presence of a 10 MHz signal at the end of the SMA cable (Connected to B8 J4).
The signal amplitude should be > 0.5 volts peak-to-peak (into 50 Ω).
 - If present, replace the B8 PCB.
 - If not present, replace the SMA cable

The Hi-Performance Reference Not Phase-Locked to the External 100 MHz Reference.

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12.](#)
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
1. Using a coaxial cable with BNC connectors, connect the rear panel 10 MHz REF IN connector to the rear panel 10 MHz REF OUT connector.
2. Disconnect the SMA cable.
3. Using an oscilloscope, verify the presence of a 100 MHz signal at the end of the SMA cable (Connected to B9 J3).
 - If present, replace the B9 PCB.
 - If not present, replace the SMA cable

The MG362x1A Displays Lock Error.

Lock error can be the result of a number of failing conditions that are occurring with the frequency lock circuitry.

Procedure

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12.](#)
2. Press SELF TEST.
 - If no error message is displayed, the problem is cleared.
 - If any errors are displayed, go to step 3.
3. Check the rear panel reference inputs.
 - Refer to [“The OCXO module is Not Phase-locked to the External 10 MHz Reference.” on page 5-7.](#)
 - Refer to [“The Hi-Performance Reference Not Phase-Locked to the External 100 MHz Reference.” on page 5-8.](#)
 - If lock error is displayed, continue to step 4.
4. Check the following voltages:
 - DRO voltages at P19
 - Synthesizer voltages at P9
 - Reference Module voltages at P8
 - YTO voltages at P3
5. Check the signal power level from the YIG module (B6). Disconnect the cable from B11 J2 and measure the power level of the signal at the male end of the cable with a spectrum analyzer.
 - If the signal is correct in both frequency and amplitude, go to Step 7
 - If the signals are incorrect, replace the YIG.

6. Press SELF TEST.

- If error 113 or 115 are not displayed, the problem is cleared.
- If either error 113 or 115 are displayed, contact your local Anritsu Service Center for assistance.

ALC Error

ALC errors pertain to the following error conditions:

- Unleveled Indicator Failed
- Level Reference Failed
- Detector Log Amp Failed
- Detector Input Circuit Failed
- Sample and Hold Circuit Failed
- Slope DAC Failed
- Unleveled Indicator Failed
- Level Reference Failed
- Detector Log Amp Failed
- Detector Input Circuit Failed
- Sample and Hold Circuit Failed
- Slope DAC Failed

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
3. Check if error conditions still exist. If error condition still exists, continue to the next step.
4. Replace ALC module (B5). If error condition still exists, continue to the next step.
5. Replace coupler.
6. Perform a Level Calibration.
 - If error condition still exists, contact your local Anritsu Service Center for assistance.

Output Power Level Related Problems in the DDC (9 kHz to 2.2 GHz)

The warning message UNLEVELED appears on the front panel display.

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
3. If error condition still exists, continue to the next step.
4. Measure the frequency and power at the semi-rigid cable into B10 J1. The frequency should be 2 GHz to 4 GHz and the power level should be about +10 dBm in.
 - If these conditions exist, go to the next step.
 - If these conditions do not exist, replace the synthesizer module (B11).
5. Using a spectrum analyzer with a 10 dB pad, measure the RF output at J2 of the switched filter assembly. The amplitude of the RF signal should be > +17 dBm throughout the full sweep.
 - If the amplitude of the RF signal is correct, replace the down converter assembly.
6. If there is no RF signal or if the amplitude of the RF signal is low, replace the switched filter assembly.
 - If no error message is displayed, the problem is cleared.
 - If any of the error messages, listed above, are displayed, contact your local Anritsu Service Center.

Output Power Level Related Problem Above 20 GHz

Error condition for MG36241A above 20 GHz.

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If error condition still exists, continue to the next step.
3. Measure the voltages at P6.
 - If voltages are correct go to the next step.
4. Replace the FEM Module.
5. If problem still exists, contact your local Anritsu Service Center for assistance.

AM Modulation Circuitry Failed

Indicates a failure of the internal amplitude modulation function. The MG362x1A may or may not provide amplitude modulation of the RF output signal using modulating signals from an external source.

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If error condition still exists, continue to the next step.
3. Press MODULATION on the MG362x1A, then AM to go to the Internal AM Status display.
4. Press On/Off to turn internal amplitude modulation on.
5. Using an oscilloscope, verify the presence of a 10 volt peak-to-peak sine wave signal with a period of 100 μ s at the rear panel AM OUT connector.
 - If present, replace the B3 modulation module.
6. Press SELF TEST again.
 - If error condition exists, contact your local Anritsu Service Center for assistance.

Internal FM or Φ Modulation Circuitry Failed

Indicates a failure of the internal frequency modulation function. The MG362x1A may or may not provide frequency modulation of the RF output signal using modulating signals from an external source.

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If error condition still exists, continue to the next step.
3. Press MODULATION on the MG362x1A, then FM to go to the Internal FM Status display.
4. Press On/Off to turn internal frequency modulation on.
5. Using an oscilloscope, verify the presence of a 10 volt peak to peak sine wave signal with a period of 10 ms at the rear panel FM OUT connector.
 - If present, replace the B3 modulation module.
6. Press SELF TEST again.
 - If error condition exists, contact your local Anritsu Service Center for assistance.

Pulse Circuitry Failed

Indicates a failure of the pulse generator.

1. Perform a manual pre-calibration. Refer to [“RAMS Graphical User Interface” on page 4-12](#).
2. Press SELF TEST.
 - If error condition still exists, continue to the next step.
3. Press MODULATION on the MG362x1A, then PULSE to go to the Internal PULSE Status display.
4. Press On/Off to turn internal frequency modulation on.
5. Using an oscilloscope, verify the presence of a 10 volt peak to peak sine wave signal with a period of 10 ms at the rear panel OUT connector.
 - If present, replace the B3 modulation module.
6. Press SELF TEST again.
 - If error condition exists, contact your local Anritsu Service Center for assistance.

Chapter 6 — Removal and Replacement

6-1 Introduction

This chapter describes opening and closing the MG362x1A covers along with basic parts replacement steps, a table of replaceable parts and procedures for gaining access to the major MG362x1A assemblies, subassemblies, and components for troubleshooting or replacement. Replacing most assemblies will require additional adjustments to the instrument. Refer to [Table 6-2](#) for a calibration/verification rework guide.

Warning

Hazardous voltages are present inside the MG362x1A whenever AC line power is connected. Turn off the instrument and remove the line cord before removing any covers or panels. Troubleshooting and repair procedures should only be performed by service personnel who are fully aware of the potential hazards.

Caution

ESD Requirements: The MG362x1A contains components that can be easily damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the S312D instrument. Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Note

Many assemblies, subassemblies, and components within the MG362x1A family of instruments are type and model dependent. Before replacing an assembly, subassembly, or component, always verify the part number of the replacement item. Part numbers can be found in [Table 6-1 on page 6-2](#).
When replacing RF components with SMA, K or V connectors, it is important to torque these to the proper value. In the MG362x1A unit that setting is 8 in/lbs. You can purchase a Anritsu torque wrench which is set to 8 in/lb. The Anritsu part number is 01-201.

6-2 Replaceable Parts

Anritsu maintains an exchange assembly program for selected MG362x1A subassemblies and RF components. All exchange subassemblies and RF components are warranted for 90 days from the date of shipment, or for the balance of the original equipment warranty, whichever is longer.

Please have the exact model number and serial number of your instrument available when requesting this service, as the information about your instrument is filed according to the instrument's model and serial number. For more information about the program, contact your local sales representative or call your local Anritsu Service Center. <http://www.anritsu.com/Contact-US/>

- [Table 6-1](#) – lists the replaceable parts and assemblies in the MG362x1A signal generators.
- [Table 6-2](#) – lists the required adjustments and verifications required after an assembly replacement

All parts are exchange assemblies except fuses, fans, and front panel Model ID plates.

Note

[Table 6-1, "Replacement Parts Assemblies"](#) lists the manufacturer assembly part number for reference only. Replacement assemblies are labeled with the manufacturer assembly part number, not the service part number.

Manufacturer part numbers cannot be ordered. Order the associated service part number instead.

Table 6-1. Replacement Parts Assemblies

Description	Ref Des	MG36221A Mfg Assy Part Number	MG36241A Mfg Assy Part Number	MG36271A Mfg Assy Part Number	Orderable Service Part Number	Configuration
Regulator Module Assy	B1	3-82700			3-ND86367	Standard
Microprocessor Assembly	B2	3-82696			3-ND86370	Standard
Modulating Processing	B3	3-82708			3-ND86878	Option 27
ALC Processing Module	B5	3-82910		–	3-ND86358	Standard
ALC Processing Module New	B5	–		3-87151	3-ND87566	Standard
YIG Module Assembly	B6	3-86172			3-ND86873	Standard
Ultra Lo Phase Noise	B7	3-82920			3-ND86882	Opt 13
Low Phase Noise & High Stability	B8	3-85025			3-ND86879	Opt 3, 56
Low Phase Noise & High Stability	B9	3-86804			3-ND86880	Opt 3
Digital Down Converter	B10	3-82915		–	3-ND86874	Standard
Digital Down Converter	B10	–		3-87436	3-ND87565	Standard
Synthesizer RF Module 2	B11	3-82904			3-ND86872	Standard
Switched Filter Module	B12 (Std)	3-82887			3-ND86881	Standard
Switched Filter Module	B12 (Hi Pwr)	3-82890			3-ND86875	Option 15
STD FEM Assy	B13 (Std)	NA	3-84984	–	3-ND86876	Standard
Std FEM Assy	B13 (Std)	–		3-86858	3-ND87567	Standard
Std FEM Assy	B13 (Hi Pwr)	3-85747		–	3-ND86877	Option 15
Std FEM Assy	B13 (Hi Pwr)	–		3-86649	3-ND87564	Option 15
Reference Module	B14	3-82894			3-ND86361	Standard
Reference Module	B14	3-82894			3-ND86361	Standard
Reference Module	B14	3-82894			3-ND86361	Standard

Table 6-1. Replacement Parts Assemblies

Description	Ref Des	MG36221A Mfg Assy Part Number	MG36241A Mfg Assy Part Number	MG36271A Mfg Assy Part Number	Orderable Service Part Number	Configuration
MG362X1A Rear Panel Pcba	Rear Panel	3-84769-3			None	All
MG362X1A Rear Panel Assembly	Rear Panel Assembly	3-87174			None	All
MG362X1A Frnt Panel Assy	Front Panel	3-82884-1			3-ND86366	All
MG362X1A, Frnt USB, Assy	Front Panel	3-84812-3			None	All
Phase Noise Amp Module	RF Assembly	3-85020			3-ND86886	All
Pnl Con KM-KM 43.5 GHz	RF Assembly	3-85457			3-85457	All
Pnl Con VM-VM 70.0 GHz	RF Assembly	3-86641			3-86641	All
Input Module, 6A, Flng Mt	AC Mains	3-260-79			3-260-79	All
6.3A/250V/5X2 0MM/SLO-BLO Fuse	AC Mains	3-631-73			3-631-73	All
92MMX92MM Fan Assy	Fan	3-86123			3-86123	All
60MMX60MM Fan Assy	Fan	3-86124			3-86124	All

6-3 Adjustment and Verification After Replacing an Assembly

Refer to [Table 6-2](#) to determine the required adjustments and verifications after replacing an assembly.

Table 6-2. Calibration/Verification Rework Guide (1 of 3)

Assembly	Calibration/Verification Procedure	Section Number
B2 Processor (Data Recovered)	Preliminary Calibration	"RAMS Graphical User Interface" on page 4-12
B2 Processor (Data Unrecovered)	Preliminary Calibration	All Calibrations
	Switched Filter Shaper Calibration	"RAMS Graphical User Interface" on page 4-12
	RF Level Calibration and Verification	
	ALC Bandwidth Calibration	
	Frequency Modulation Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "FM Verification" on page 3-29
	AM Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "Amplitude Modulation Tests" on page 3-47
DRO Reference Modules	Preliminary Calibration	"RAMS Graphical User Interface" on page 4-12
	Spurious Signals Verification	"Spurious Signals Tests" on page 3-11
	Phase Noise Verification	"Single Sideband Phase Noise Test" on page 3-17
B5 ALC	Switched Filter Shaper Calibration	"RAMS Graphical User Interface" on page 4-12 and "Power Level Accuracy and Flatness Test" on page 3-22
	RF Level Calibration or Verification	
	ALC Bandwidth Calibration	
	AM Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "Amplitude Modulation Tests" on page 3-47
	Pulse Modulation Verification	"RAMS Graphical User Interface" on page 4-12 and "Pulse Modulation Tests with the N1000A Oscilloscope" on page 3-60

Table 6-2. Calibration/Verification Rework Guide (2 of 3)

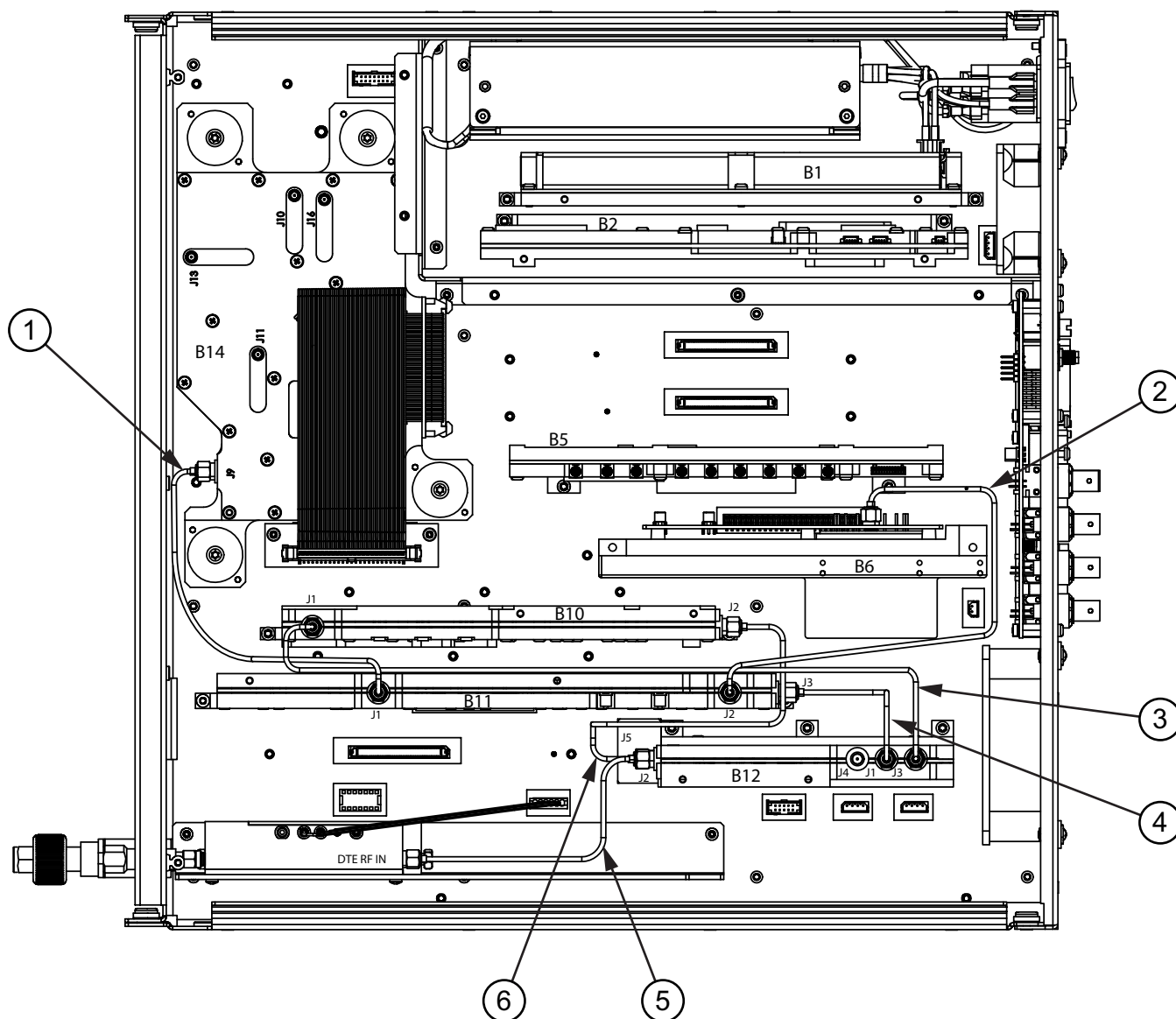
Assembly	Calibration/Verification Procedure	Section Number
B4 Internal Generator (Option 27)	Frequency Modulation Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "FM Verification" on page 3-29
	AM Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "Amplitude Modulation Tests" on page 3-47
	Pulse Modulation Verification	"RAMS Graphical User Interface" on page 4-12 and "Pulse Modulation Tests with the N1000A Oscilloscope" on page 3-60
B6 YIG Module Switched Filter or High Power (Option 15) Digital Down Converter	Preliminary Calibration	"RAMS Graphical User Interface" on page 4-12 "Power Level Accuracy and Flatness Test" on page 3-22
	Switched Filter Shaper Calibration	And All tests
	RF Level Calibration or Verification	
	ALC Bandwidth Calibration	
	Frequency Modulation Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "FM Verification" on page 3-29
	AM Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "Amplitude Modulation Tests" on page 3-47
	Pulse Modulation Verification	"RAMS Graphical User Interface" on page 4-12 and "Pulse Modulation Tests with the N1000A Oscilloscope" on page 3-60
	Phase Noise Verification	"Single Sideband Phase Noise Test" on page 3-17
	Spurious Signals Verification	"Spurious Signals Tests" on page 3-11

Table 6-2. Calibration/Verification Rework Guide (3 of 3)

Assembly	Calibration/Verification Procedure	Section Number
B4 FM/Phase Modulation Module (Option 12) AM Module (Option 14) FEM	Preliminary Calibration	"RAMS Graphical User Interface" on page 4-12
	Frequency Modulation Calibration and Verification	"RAMS Graphical User Interface" on page 4-12 and "FM Verification" on page 3-29
	Spurious Signals Verification	"Spurious Signals Tests" on page 3-11
	Phase Noise Verification	"Single Sideband Phase Noise Test" on page 3-17
	Switched Filter Shaper Calibration	"RAMS Graphical User Interface" on page 4-12, and "Power Level Accuracy and Flatness Test" on page 3-22
	RF Level Calibration or Verification	
	Phase Noise Verification	"Single Sideband Phase Noise Test" on page 3-17
	Spurious Signals Verification	"Spurious Signals Tests" on page 3-11
Front Panel Regulator Power Supply	Spurious Signals Verification	"Spurious Signals Tests" on page 3-11
	Phase Noise Verification	"Single Sideband Phase Noise Test" on page 3-17

6-4 Semi-Rigid Cable Installation (Standard Model)

Refer to [Figure 6-1](#). Install the semi-rigid cables to the designated locations as shown. Use a torque wrench to tighten to 8 in/lbs.



1. From B14-J9 to B11-J1

2. B6 to B11-J2

3. B12-J3 to B10-J1

4. B11-J3 to B12-J1

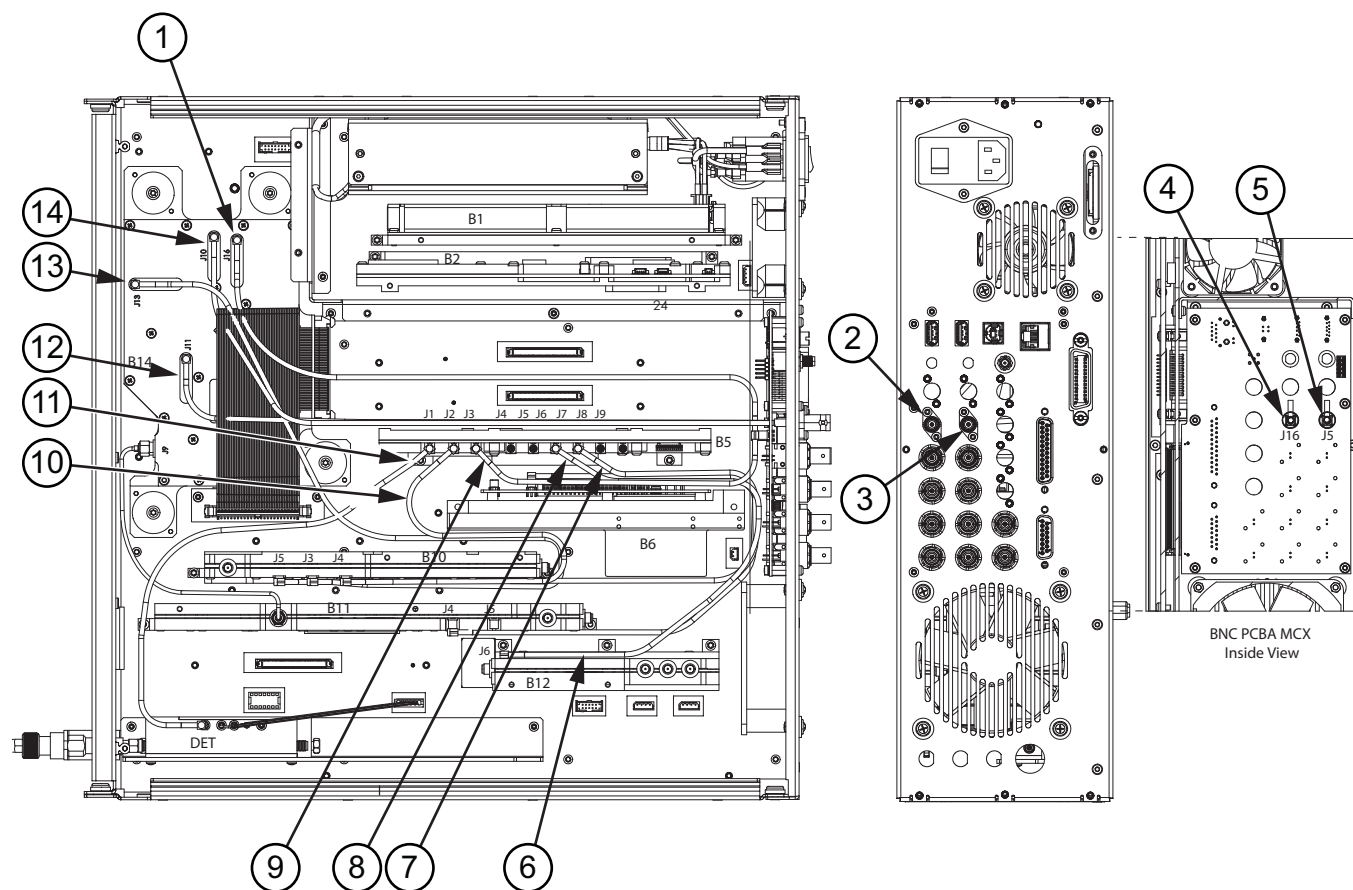
5. B12 J5 to B10-J2

6. B12-J2 to B14 RF In

Figure 6-1. Semi-Rigid Cable Connections

6-5 SMA Cable Installation (Standard Model)

Refer to [Figure 6-2](#). Install the SMA cables to the designated locations as shown.

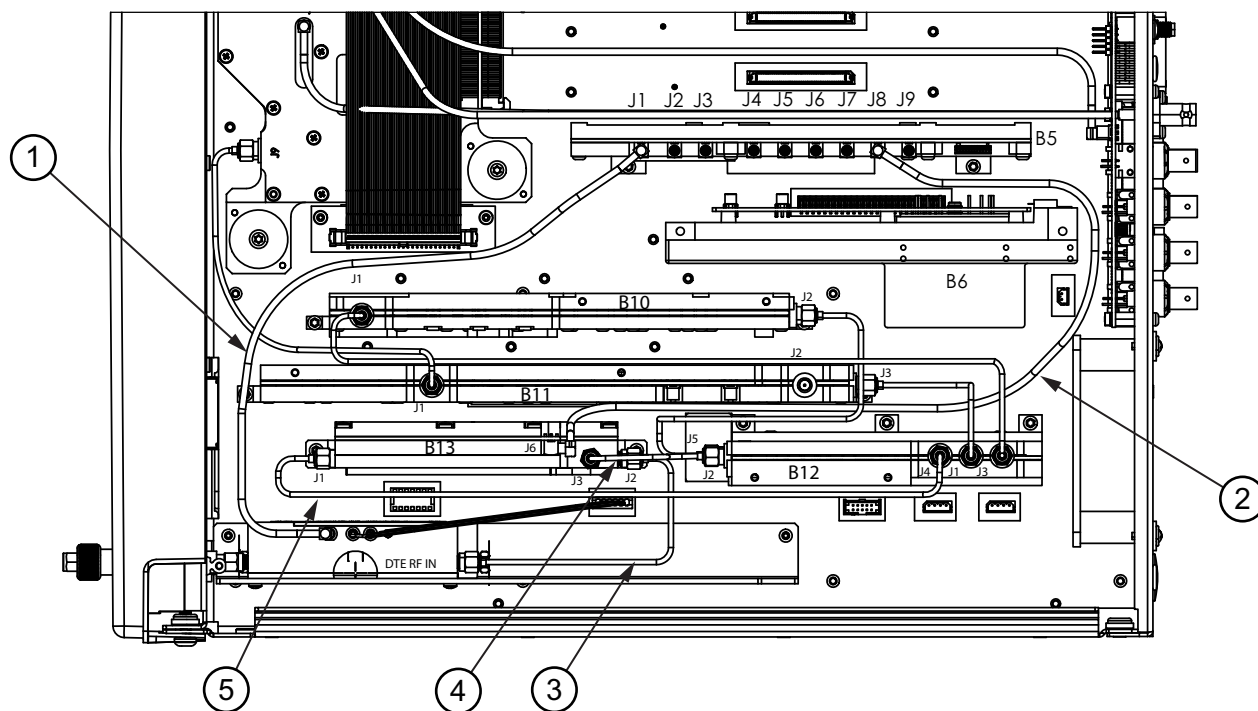


- | | |
|------------------------------|-------------------------------|
| 1. B14-J16 to Rear Panel J16 | 8. B5-J6 to B12-J6 |
| 2. 10 MHz REF IN to B14-J10 | 9. B5-J3 to Rear Panel J5 |
| 3. 10 MHz REF OUT to B14-J11 | 10. B5-J2 to B10-J4 |
| 4. B14-J16 to Rear Panel J16 | 11. B5-J1 Coupler DET |
| 5. B5-J3 Rear Panel J5 | 12. 10 MHz REF OUT to B14-J11 |
| 6. B11-J4 to B6-J4 | 13. B14-J13 to B10-J3 |
| 7. B5-J7 to B10-J5 | 14. 10 MHz REF IN to B14-J10 |

Figure 6-2. SMA Cable Connections

6-6 Frequency Extension Module (FEM) Cable Installation

Refer to [Figure 6-3](#). Install the SMA and semi-rigid cables to the designated locations as shown. Use a torque wrench to tighten semi-rigid cables to 8 in/lbs.

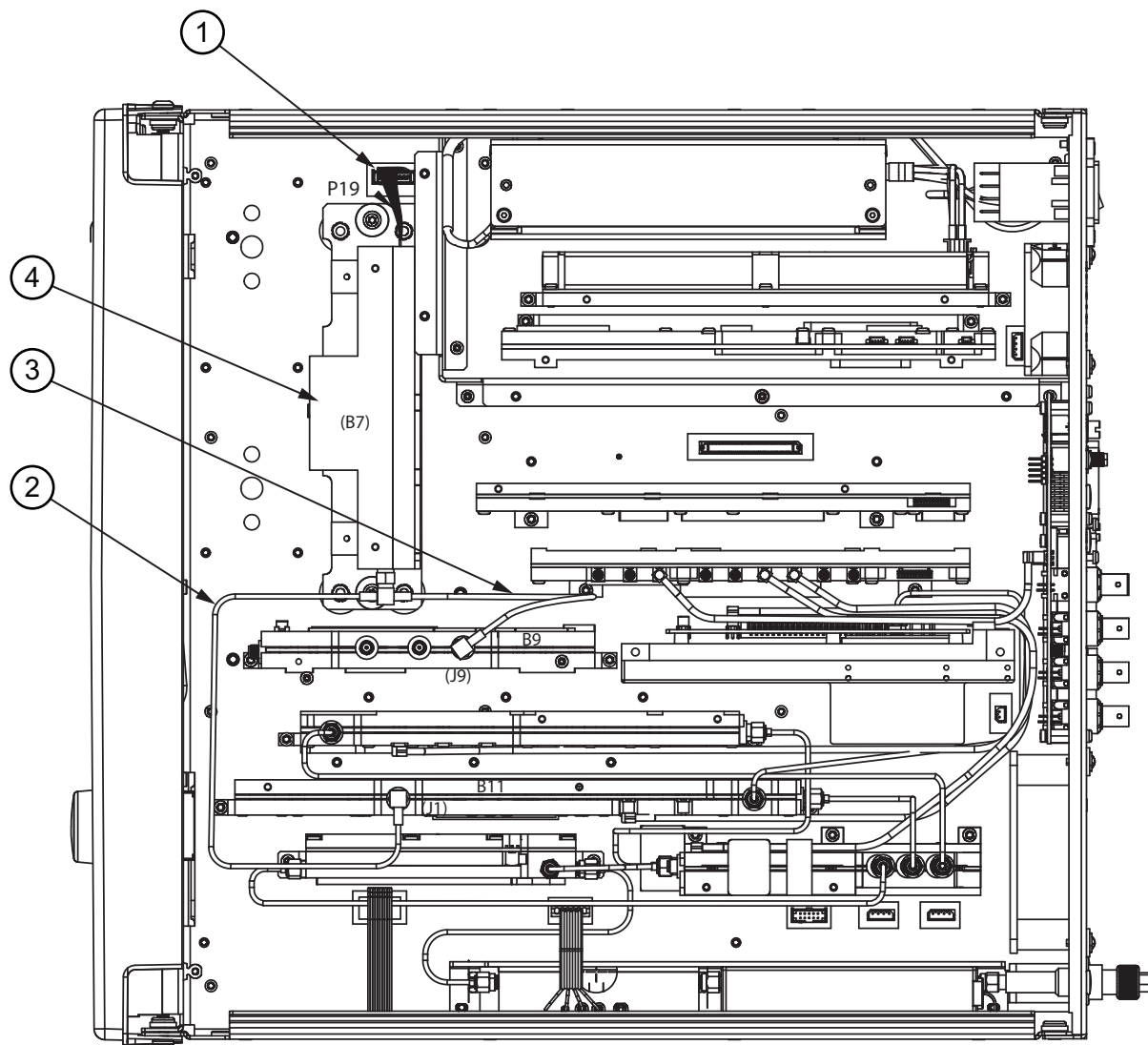


1. FEM
2. B13-J6 to B5-J8
3. Semi Rigid B13J2 to Coupler RF In (No Option 2)
4. B13-J3 to B12-J2
5. B13-J1 to B12-J4

Figure 6-3. FEM Cable Connection

6-7 Option 13 Configuration

Refer to [Figure 6-4](#). Install the Option 13 items to the designated locations as shown.

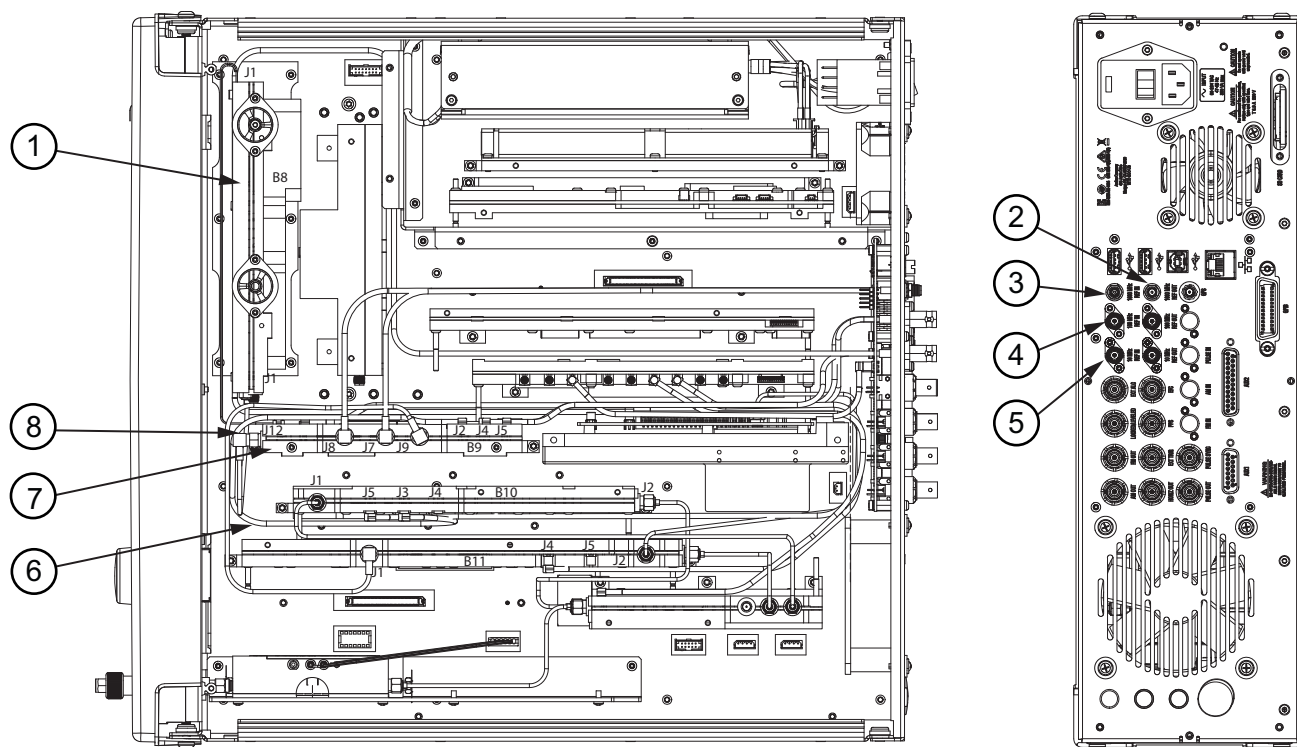


1. 14 Pin Cable Assembly
2. B7-J2 B11-J1 (SMA)
3. B9-J9 B7-J1 (SMA)
4. Dielectric Resonator Oscillator (DRO) (B7)

Figure 6-4. Option 3 Configuration

6-8 Option 3 and Option 56 Configuration

Refer to [Figure 6-5](#). Install the items to the designated locations as shown.

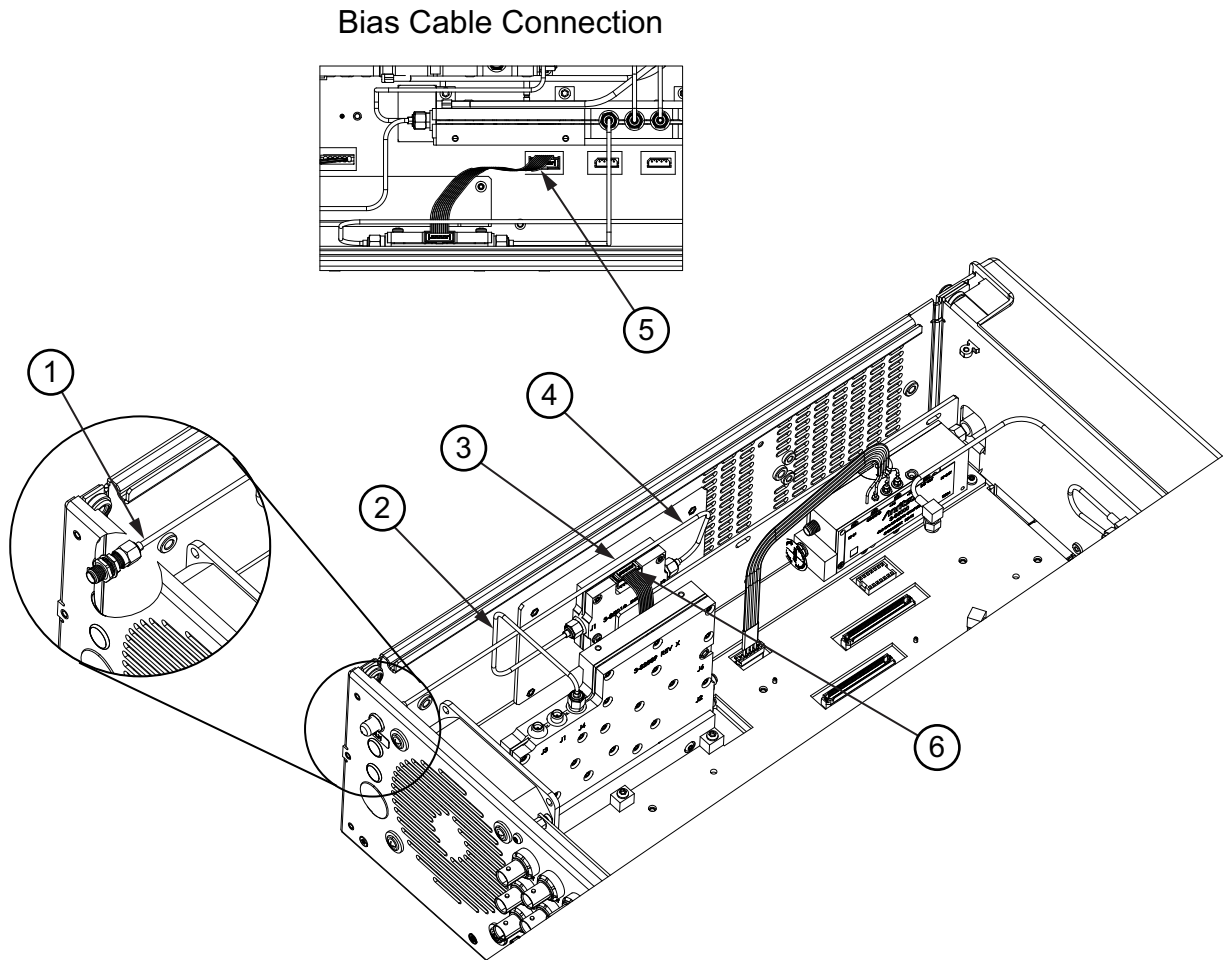


- | | |
|---|---|
| 1. OCXO Module (B8)
Opt 56 uses 3-86327
Opt 03 uses 3-85025 | 5. B8-J4 REAR PANEL 10 MHz IN (BNC to MCXM) |
| 2. B9-J8 REAR PANEL 1600MHz OUT (SMA to SMA) | 6. B9-J2 B10-J3 (SMA) |
| 3. B9-J7 REAR PANEL 1600MHz IN (SMA to SMA) | 7. HIGH PERFORMANCE REFERENCE MODULE (B9) |
| 4. B9-J3 REAR PANEL 100 MHz IN (BNC to MCXM) | 8. B8-J1 B9-J12 (SMA) |

Figure 6-5. Option 3 or Option 56 Configuration

6-9 Option 23 Configuration

Refer to [Figure 6-6](#). Option 23 includes the addition of the phase noise amp module shown below.



1. K(f) to K(f) ADAPTER, REAR PANEL MOUNT	4. PNA J2 REAR PANEL PNA OUT
2. PNA J1 B12 J4	5. PHASE NOISE AMP MODULE BIAS CABLE TO J6
3. PHASE NOISE AMP MODULE (Opt 23)	6. PHASE NOISE AMP MODULE BIAS CABLE

Figure 6-6. Option 23 Configuration

6-10 Removal Procedures

Removal and replacement procedures may require removal of the top and bottom covers. Replacement of some MG362x1A assemblies and parts require removal of all covers. The following procedure describes this process.

Remove the Handles

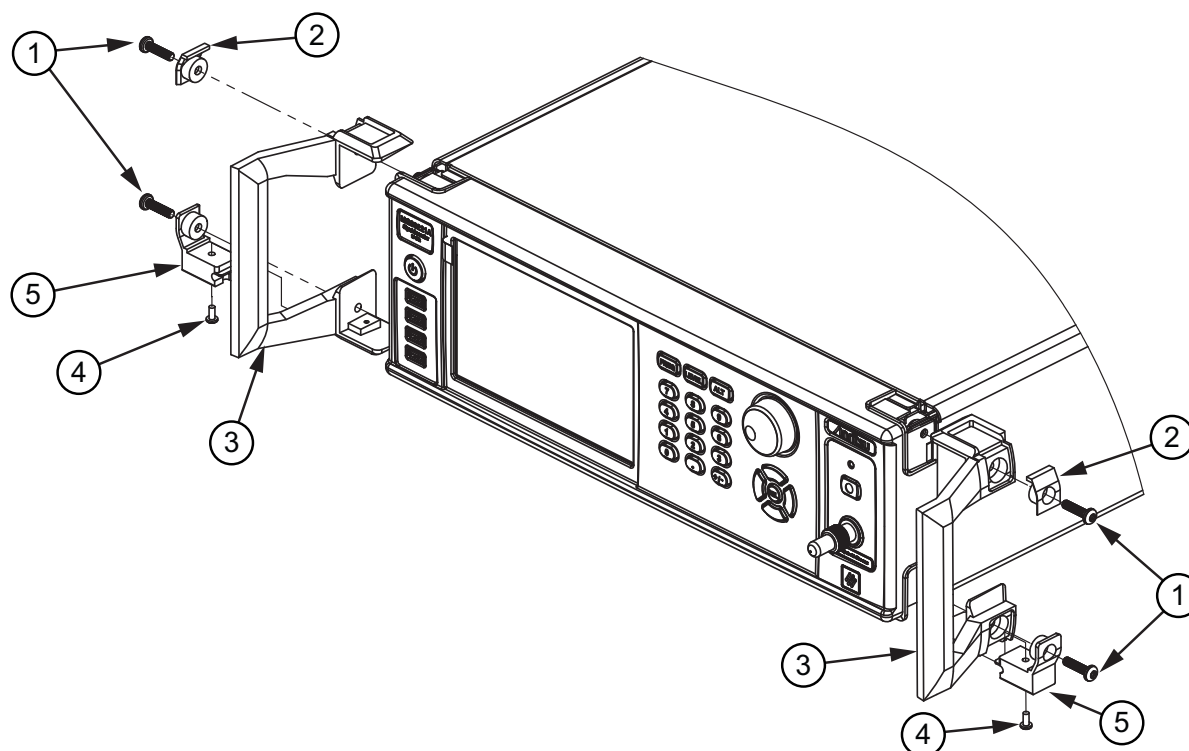
Use this procedure to remove the front handles.

Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument.



1. M5X20 Screws (x4)

2. Upper Insert

3. Handle

4. 6-32X.31 Screws (x2)

5. Bottom Foot

Figure 6-7. Remove Handles

Procedure

Refer to [Figure 6-7](#).

1. Remove the M5X20 screws for both handles. Retain the screws to use when reinstalling the handles.
2. Remove the 6-32X.31 screw for each handle. Retain the screws to use when reinstalling the handles.
3. Remove the handle. If the upper insert or bottom foot should come off during the removal, retain to use when reinstalling the handles.
4. Installation is performed in reverse order.

Remove the Rear Feet

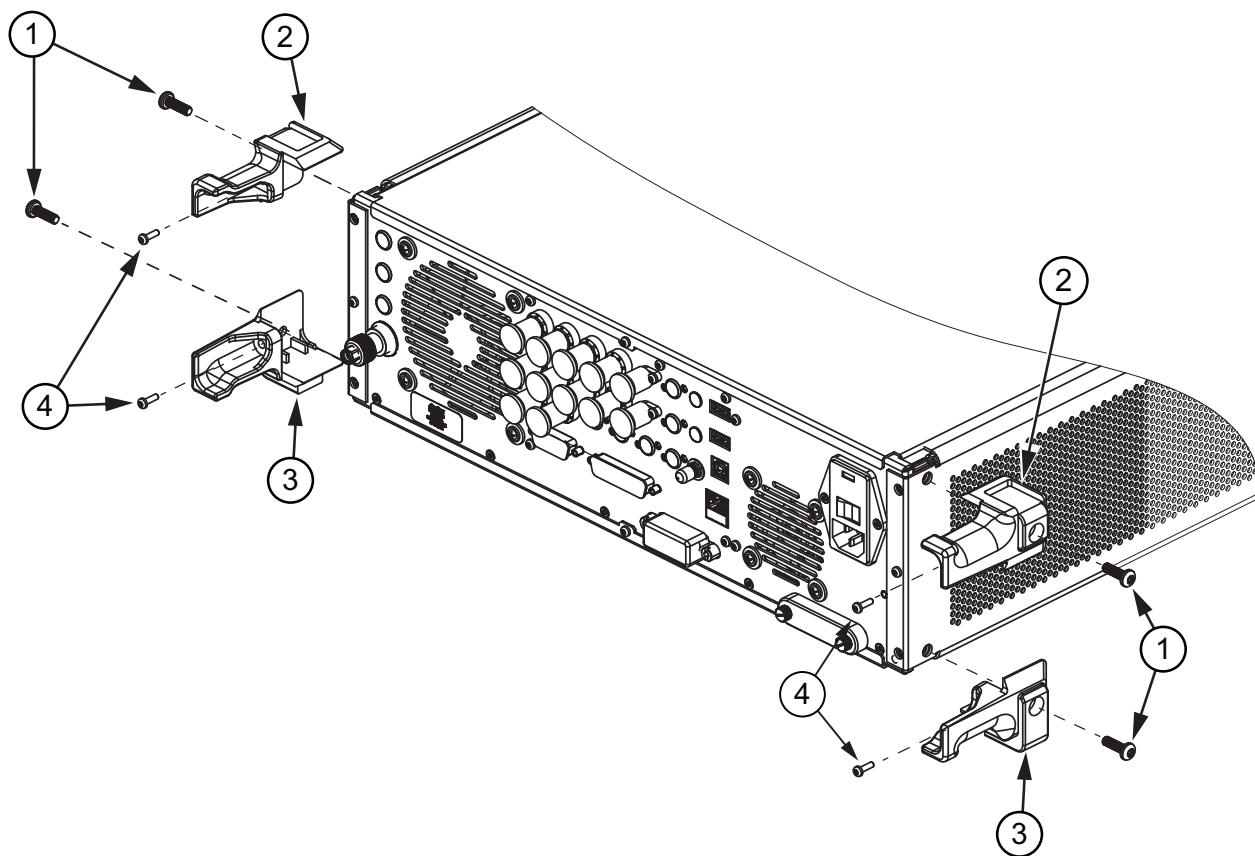
Use this procedure to remove the rear feet.

Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument.



1. M5X15MM Screw

2. Top Rear Foot

3. Bottom Rear Foot

4. M3X10 Screw

Figure 6-8. Remove Rear Feet

Procedure

Refer to [Figure 6-8](#).

1. Remove two M5X15 Screws from the top and bottom rear feet. Retain the screws to use when reinstalling the rear feet.
2. Remove the M3X10 Screws. Retain the screws to use when installing the rear feet.
3. Remove the top and bottom rear feet.
4. Installation is performed in reverse order.

Remove the Covers

Use this procedure to remove the covers.

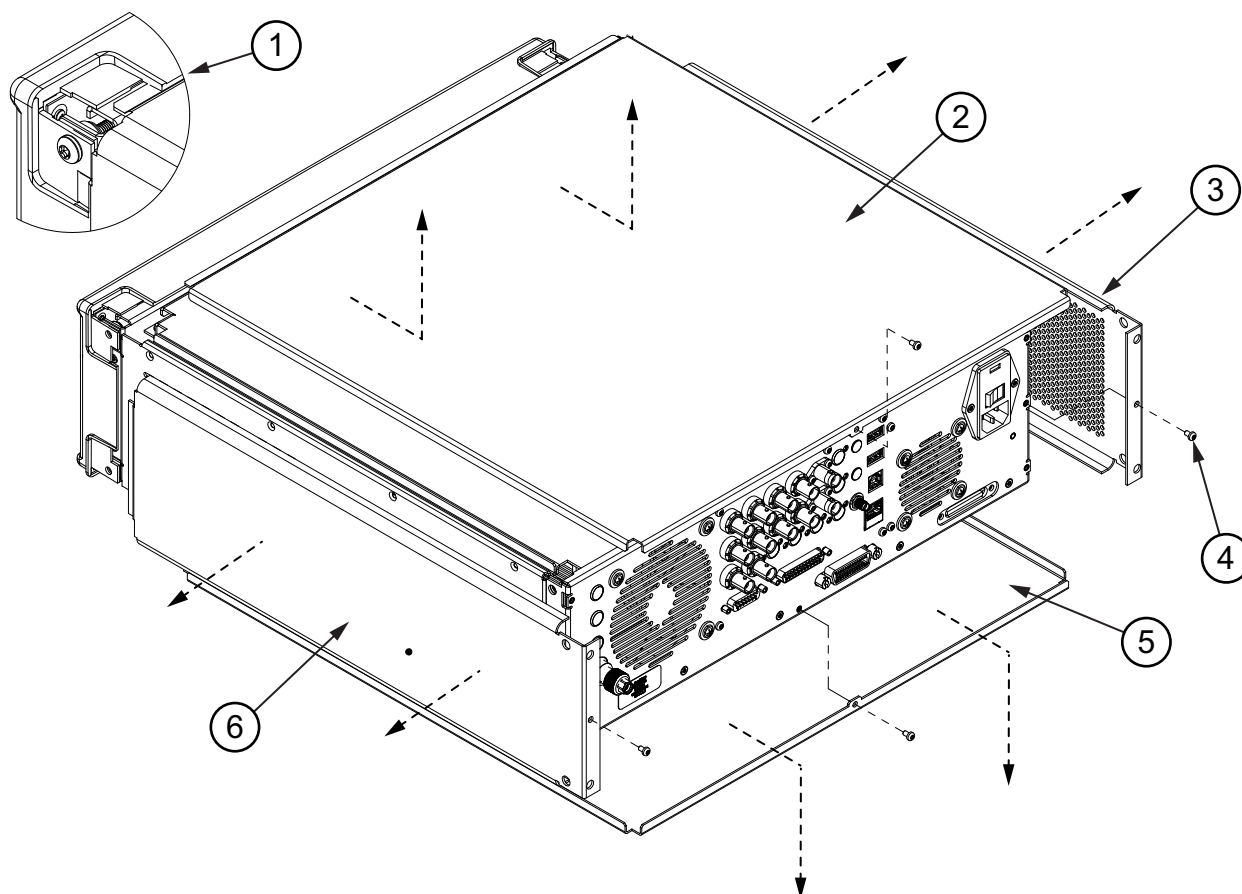
Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)



1. Flange Under Lip of Bezel

2. Top Cover

3. Vented Side Cover

4. M3X5 Screw (x4)

5. Bottom Cover

6. Non-Vented Side Cover

Figure 6-9. Remove Covers

Procedure

Refer to [Figure 6-9](#).

1. Remove the M3X5 screws (x4) that retain each cover from the rear panel. Retain the screws to use when reinstalling the covers.
2. Pull each cover away from the lip of the front bezel to remove.
3. Installation is performed in reverse order.

Remove the Top Sub-panel

Use this section to remove the top front sub-panel.

Tools Required

1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)

Procedure

Refer to [Figure 6-10 on page 6-17](#).

1. Remove the M3x5 screws (x16).
1. Lift to remove the top sub-panel.
2. Installation is performed in reverse order.

Remove Front Panel

Use this section when remove the front panel. Refer to [Figure 6-10 on page 6-17](#).

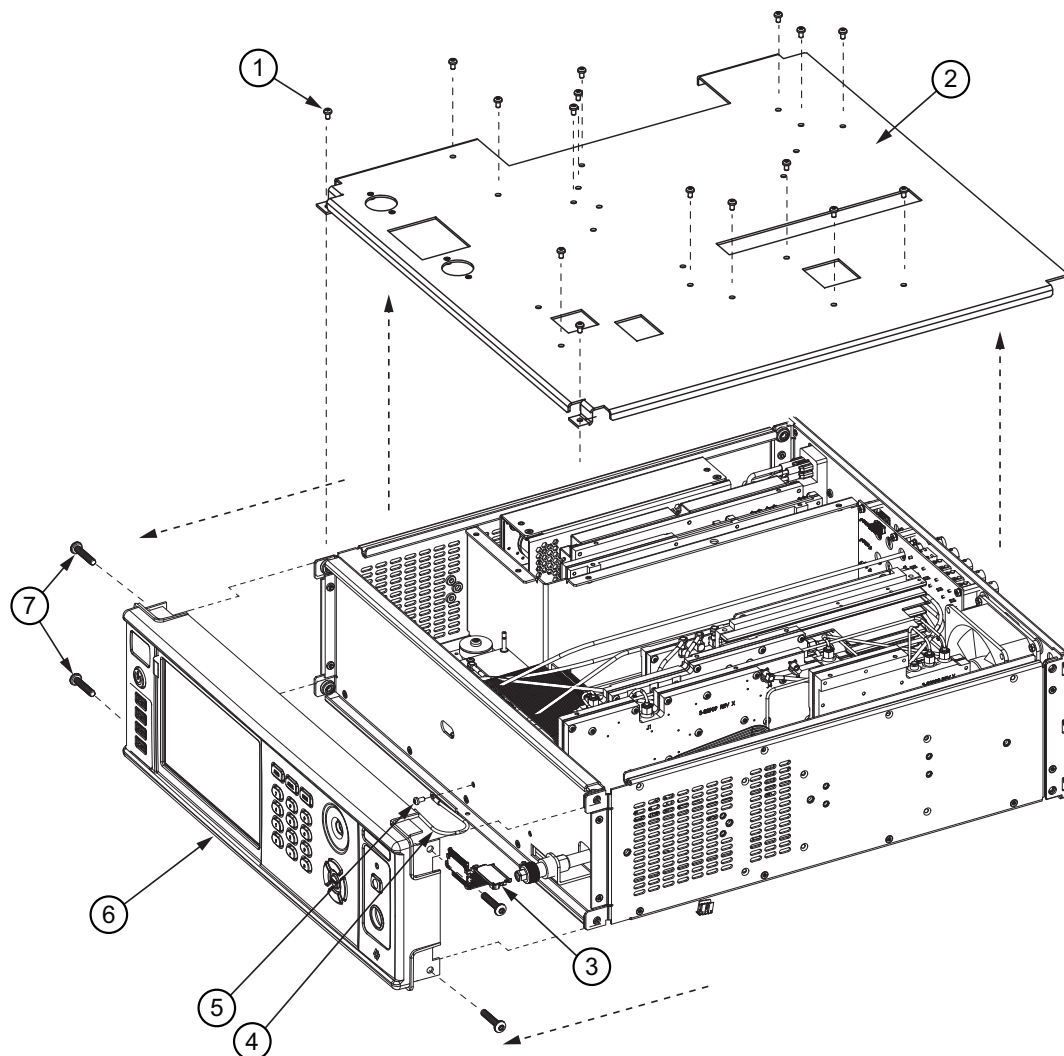
Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16](#)



1. M3x5 Screw (x16)

2. Top Sub-cover

3. Front Panel to Motherboard Ribbon Cable

4. Ground Wire

5. Ground Wire Screw

6. Front panel

7. M5X20 Screw (x4)

Figure 6-10. Remove Top Sub-panel and Front Panel

Procedure

Refer to [Figure 6-10](#).

1. Remove the M5X20 screws (x4) from each corner of the front panel. With the front handles and covers removed, gently pull the front panel from the chassis.
2. Carefully pull the front panel away from the chassis to gain access to the front panel ribbon cable that connects the front panel PCB assembly to the microprocessor PCB assembly.
3. Remove the screw that attaches the ground wire to the chassis frame.
4. Remove the front panel from the chassis.
5. Installation is performed in reverse order.

Remove the Rear Panel

Use this procedure to remove the rear panel.

Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16](#)

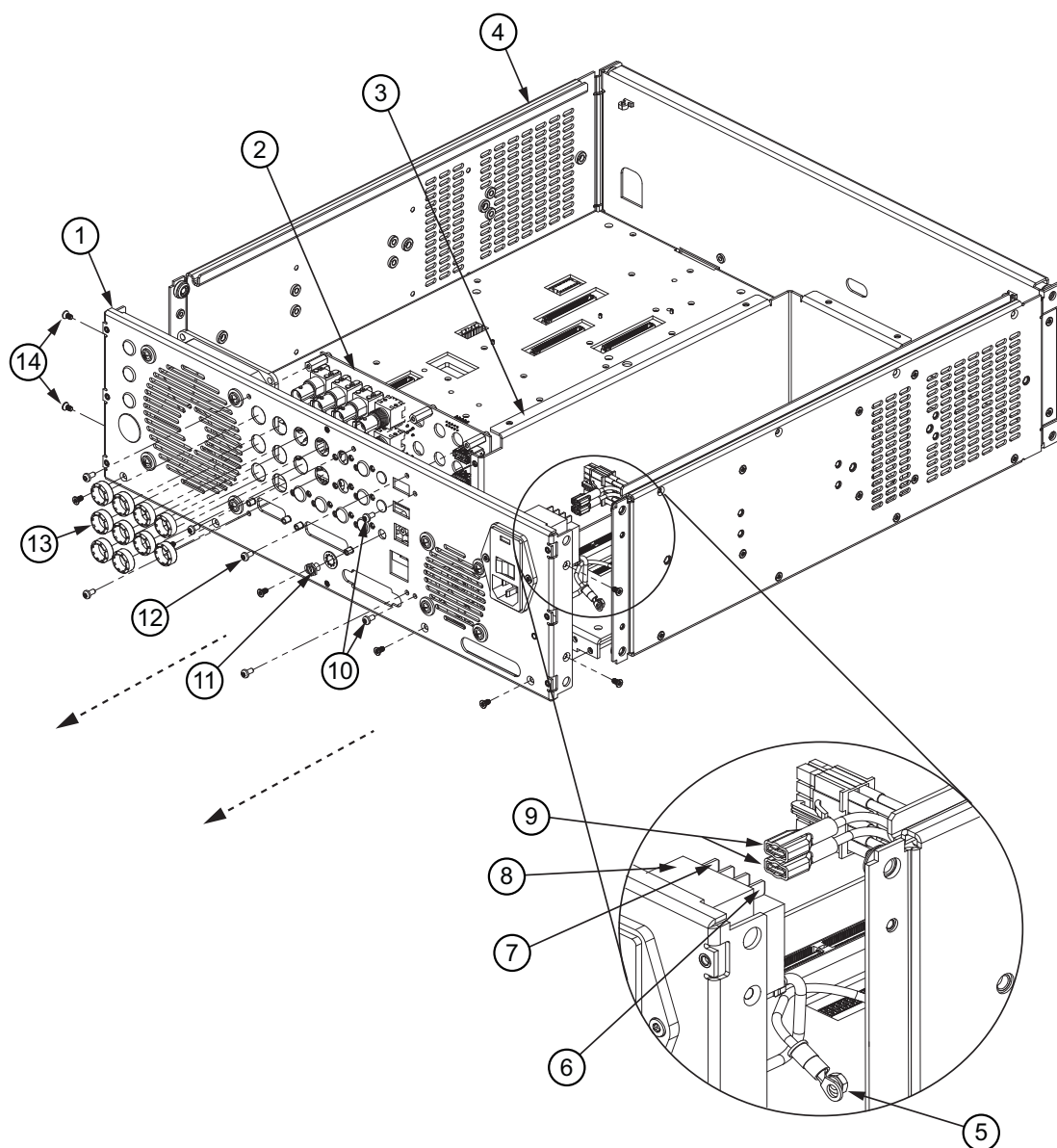


Figure 6-11. Remove Rear Panel

1. Rear Panel	8. EMI Module
2. BNC PCBA	9. Brown and Blue Wire Connectors
3. Bracket Sub Cover	10. Sub Cover to Rear Panel M3X6 Screws (x2)
4. Chassis Frame	11. Nut and Internal Lock Washer to SMA Connector
5. Power Supply Ground Lug and Kep Nut	12. BNC PCB to Rear Panel M3X6 Screws (x5)
6. EMI Brown Wire Connection Lug	13. BNC Dress Nuts
7. EMI Blue Wire Connection Lug	14. Rear Panel to Chassis Tray M3X6 Screws (x8)

Figure 6-11. Remove Rear Panel**Procedure**

Refer to [Figure 6-11](#).

1. Remove the nut and lock washer from the rear panel SMA connector.
2. Remove the BNC dress nuts from the BNC connectors.
3. Remove the M3X6 screws (x2) from the bracket sub cover to the rear panel
4. Remove the M3X6 screws (x5) from the rear BNC PCBA to the rear panel.
5. Remove M3X6 flat head screws (x8) from the rear panel to the chassis tray and side panels.
6. Remove the two fan connectors, P16 and P17, from the main board.
7. Remove the power supply kep nut and ground lug from the EMI plug.
8. Remove the power supply blue and brown wire from the EMI lugs.
9. Gently pull to remove the rear panel from the BNC panel and chassis frame.
10. Installation is performed in reverse order.

Remove the Rear Panel BNC PCB

Removing the rear panel BNC PCB requires the removal of the rear panel.

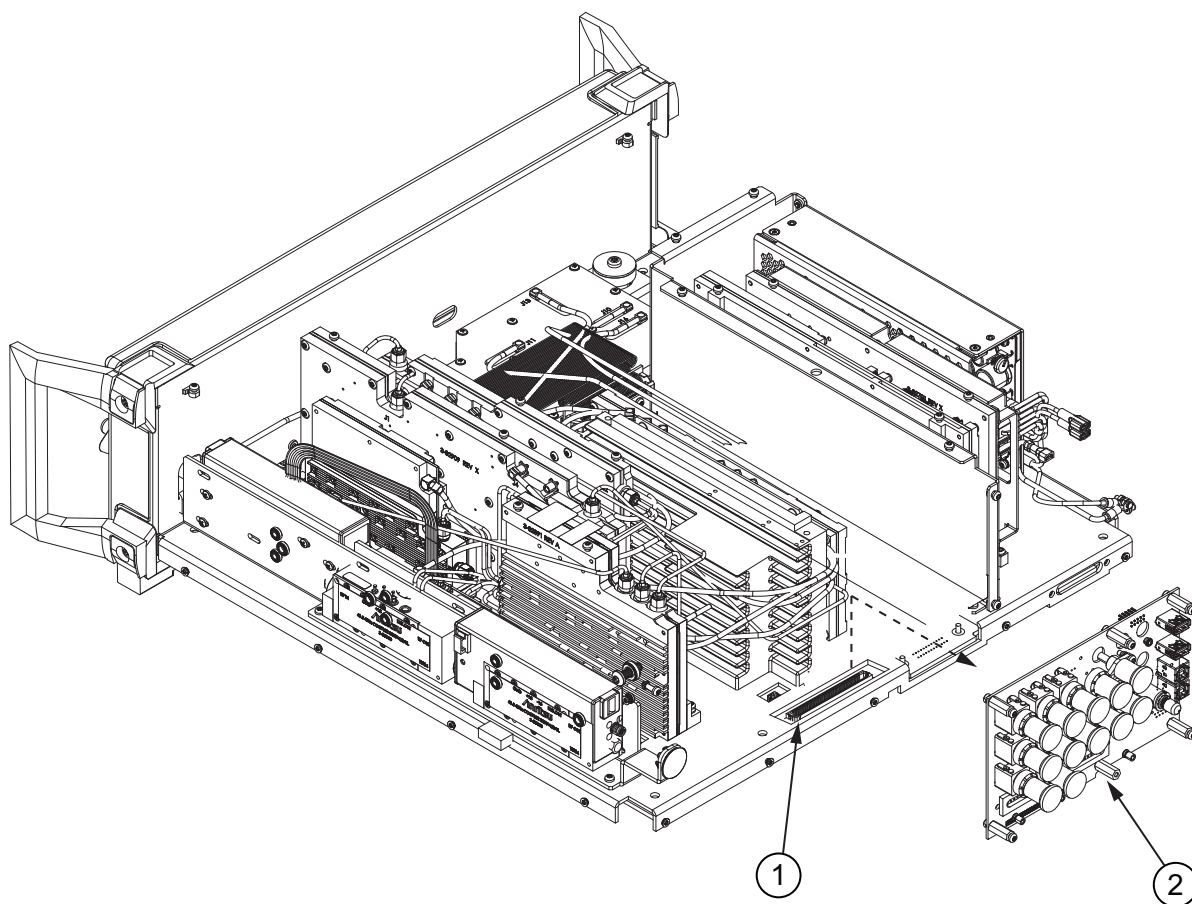
Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- “Remove the Handles” on page 6-13
- “Remove the Rear Feet” on page 6-14
- “Remove the Covers” on page 6-15
- “Remove the Top Sub-panel” on page 6-16
- “Remove the Rear Panel” on page 6-18



1. Main Board to BNC PCBA Connector
2. BNC PCBA

Figure 6-12. Remove BNC PCB

Procedure

Refer to [Figure 6-12 on page 6-20](#).

1. Lift the BNC PCBA from the Main Board connector.
2. Installation is performed in reverse order.

Remove the Power Supply

Use this procedure to remove the power supply.

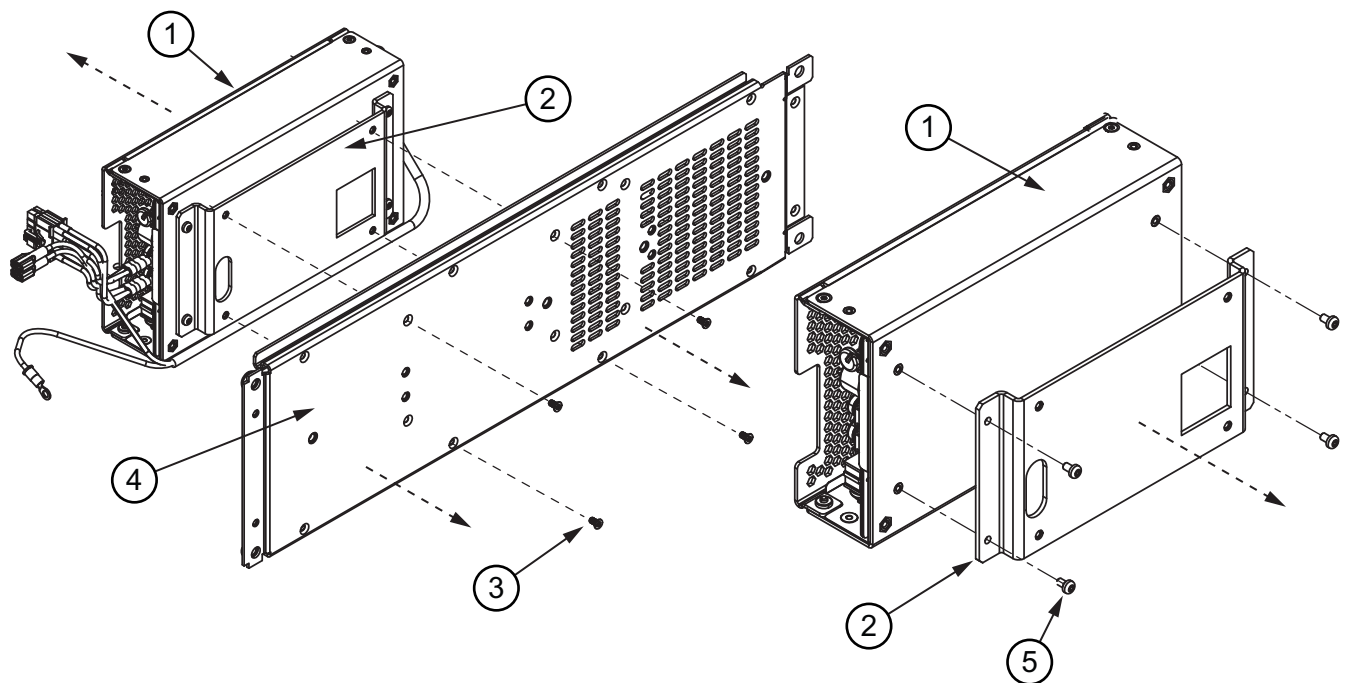
Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- “Remove the Handles” on page 6-13
- “Remove the Rear Feet” on page 6-14
- “Remove the Covers” on page 6-15
- “Remove the Top Sub-panel” on page 6-16



1. Power Supply	4. Side Panel
2. Power Supply Bracket	5. 3MX5 Screws (x4)
3. 3MX6 Screws (x4)	

Figure 6-13. Remove Power Supply

Procedure

Refer to [Figure 6-13 on page 6-21](#).

1. Remove the M3X6 screws (x4) that attach the power supply plate to the side panel.
2. Remove the 3MX5 screws (x4) from the power supply plate and the power supply.
3. Separate the power supply plate from the power supply.
4. Installation is performed in reverse order.

Remove the Sub-panel

Use this procedure to remove the sub-panel

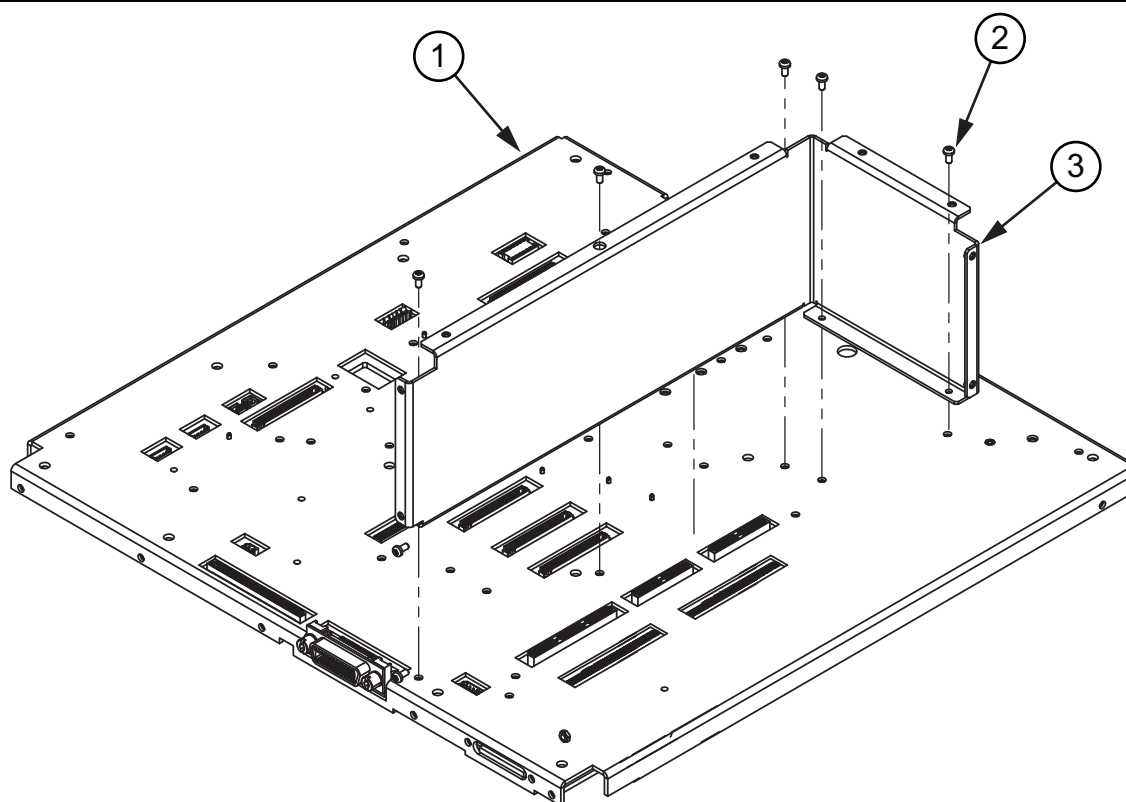
Tools Required

- # 1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to the following procedures:

- “Remove the Handles” on page 6-13
- “Remove the Rear Feet” on page 6-14
- “Remove the Covers” on page 6-15
- “Remove the Top Sub-panel” on page 6-16 .



1. Chassis

2. M3X6 Screws (x5)

3. Sub-panel

Figure 6-14. Remove Sub-Panel

Procedure

Refer to [Figure 6-14](#).

1. Remove the M3X6 screws (x5) connecting the sub-panel to the Chassis.
2. Remove the sub-panel.
3. Installation is performed in reverse order.

Remove the Standard Reference Module

Use this procedure to remove the power supply.

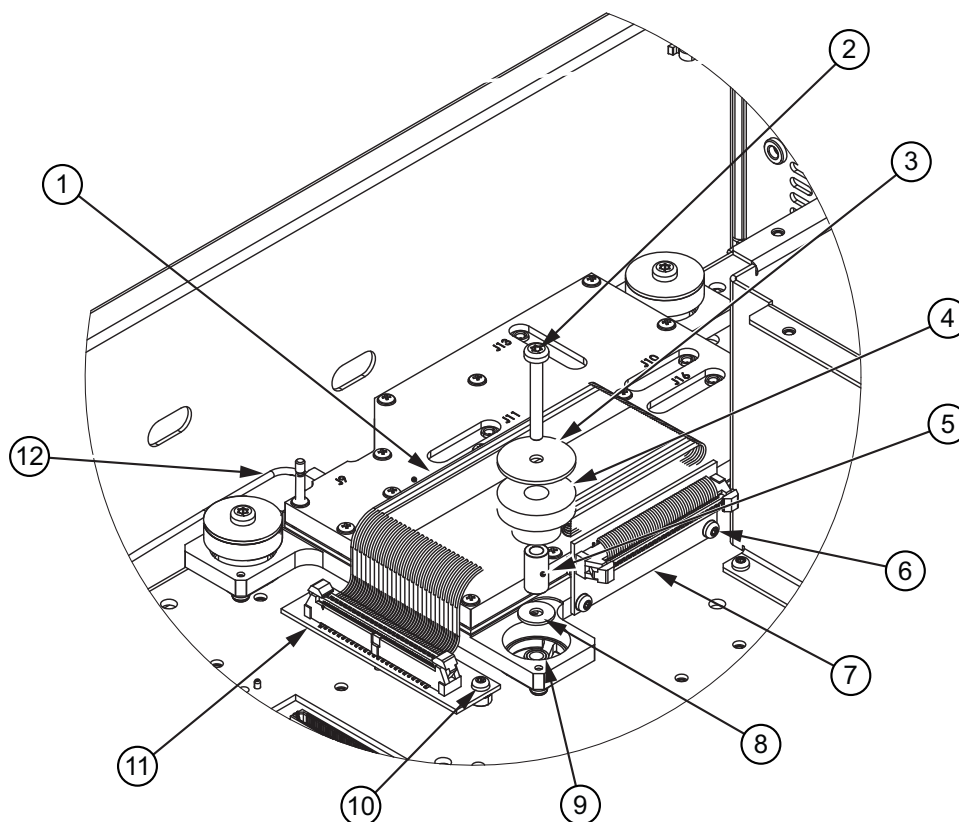
Tools Required

- # 1 Phillips screwdriver
- Anritsu 01-201 torque wrench (applies a preset 8 in. lb. torque)

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16.](#)



1. 50 Pin Cable Assembly	7. Adapter Board Cable (Reference Module Connection)
2. M4x32mm Screws (x4)	8. Flat Washer 12.00x4.30x1.00 (x4)
3. Flat Washer 1.00x.188xx.05 (1)	9. Isolator Housing
4. Isolator Bushing	10. M3x10mm, Screw (x6)
5. Sleeve Bushing	11. Adapter Board Cable (Motherboard Connection)
6. M3x6mm (x7)	12. SMA Connection

Figure 6-15. Replace Standard Reference Module

Procedure

Refer to [Figure 6-15](#).

1. Remove the four SMA cables (1, 12, 13, 14) shown in [Figure 6-17](#) from J10, J11, J13, and J16.
2. Remove the two M3x10mm screws from the adapter board cable (motherboard connection).
3. Lift to remove adapter board cable from the motherboard connector.
4. Disconnect and remove the semi-rigid cable from J9 connector.
5. Remove the M4x32mm screws that contain the isolator bushing, sleeve bushing, and two flat washers from each of the four isolator housings.
6. Remove the reference module.
7. Installation is performed in reverse order.
8. Use a torque wrench to tighten the semi-rigid connectors to 8 in. lbs.

Remove the Modules with Mounting Flange

The mounting flanges for most of the modules and components are located as shown in [Figure 6-16 on page 6-26](#).

The following modules have mounting flanges that attaches the module to the bottom plate.

- Voltage Regulator (B1)
- Digital Control Module (B2)
- Modulation Processor Module (Option 29)
- ALC Module (B5)
- Frequency Extension Module (MG36241A)
- Synthesizer Module (B11)
- Digital Down Converter (B10)
- High Performance Reference Module (B9) (Option 3)
- Reference Synthesizer Module (B14) (Standard Phase Noise)

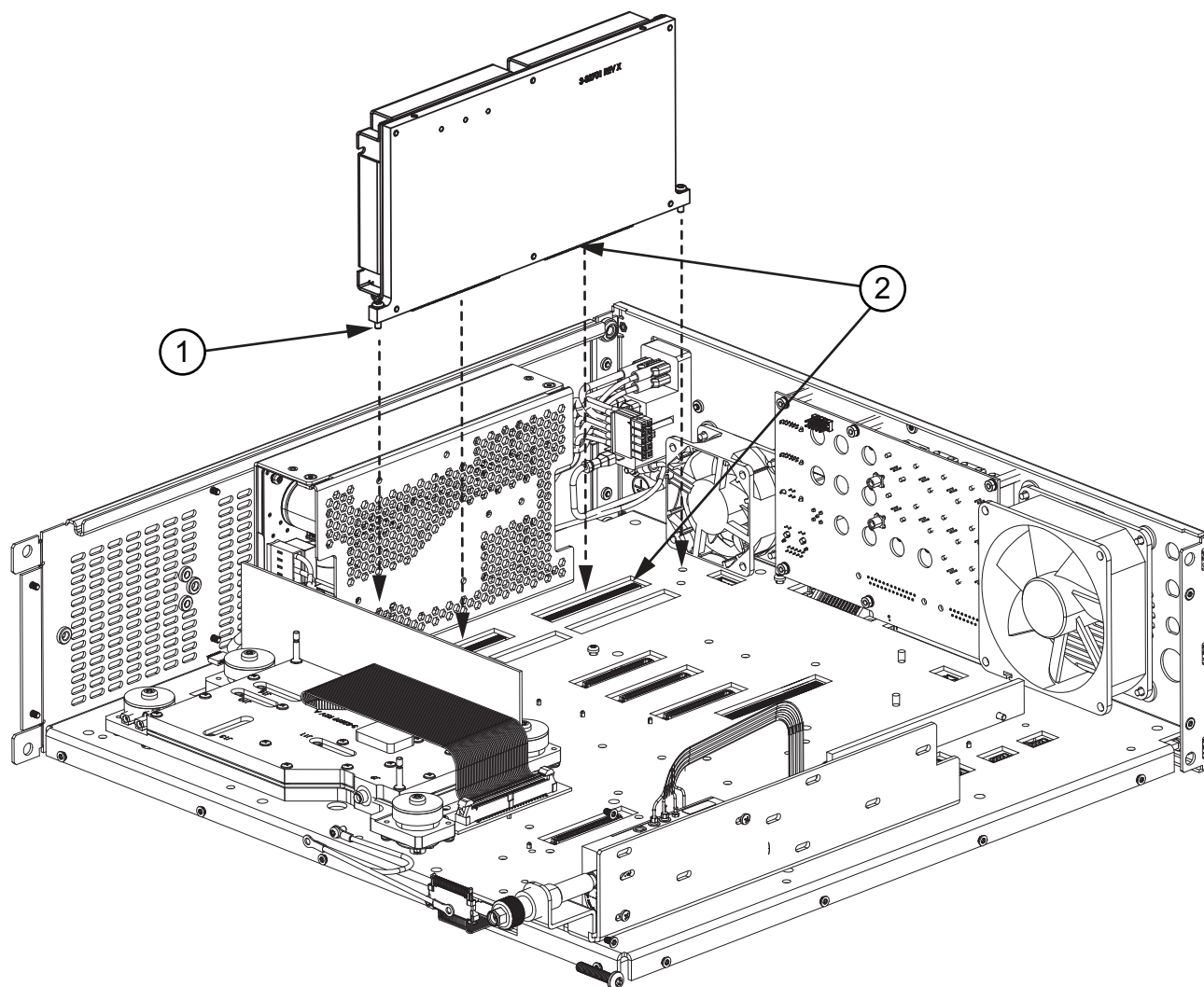
Tools Required

- # 1 Phillips screwdriver
- 5/16 open end wrench (Used to remove attached semi-rigid cable)
- Anritsu 01-201 torque wrench (applies a preset 8 in. lb. torque)

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16](#).



1. Mounting Flange and Screw

2. Px Connectors

Figure 6-16. Remove Modules and Components

Procedure

1. Refer to [Figure 6-16](#).
2. Remove all cables and connectors. Refer to [Section 6-4 “Semi-Rigid Cable Installation \(Standard Model\)” on page 6-7](#), and [Section 6-5 “SMA Cable Installation \(Standard Model\)” on page 6-8](#).
3. Remove the two screws that attach the module or component to the bottom tray.
4. Lift the module or component to disconnect the Px connectors from the motherboard.
5. Installation is performed in reverse order.
6. Use a torque wrench to tighten the semi-rigid connectors to 8 in. lbs.

Remove the YIG Module

Remove the YIG module as described below.

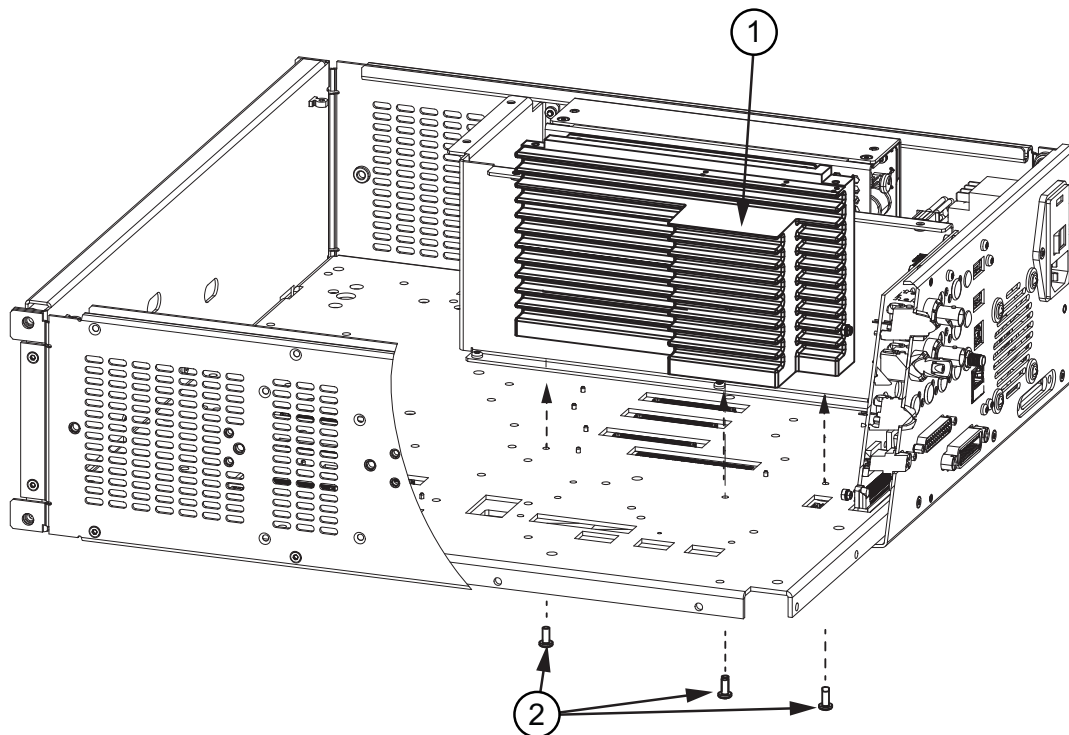
Tools Required

- # 1 Phillips screwdriver
- 5/16 open end wrench (Used to remove attached semi-rigid cable)
- Anritsu 01-201 torque wrench (applies a preset 8 in. lb. torque)

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16](#)



1. YIG Module
2. 632x31mm Pan Head Screws (x3)

Figure 6-17. Remove YIG Module

Procedure

Refer to [Figure 6-17](#).

1. Remove all cables and connectors. Refer to [Section 6-4 “Semi-Rigid Cable Installation \(Standard Model\)” on page 6-7](#), and [Section 6-5 “SMA Cable Installation \(Standard Model\)” on page 6-8](#).
2. Remove three 632x31mm pan head screws that attach the YIG module to the bottom tray.
3. Lift the YIG module to disconnect the Px connector from the motherboard.
4. Installation is performed in reverse order. Tighten the semi-rigid connectors to 8 in. lbs.

Remove The Frequency Extension Module (FEM)

Remove the FEM as described below.

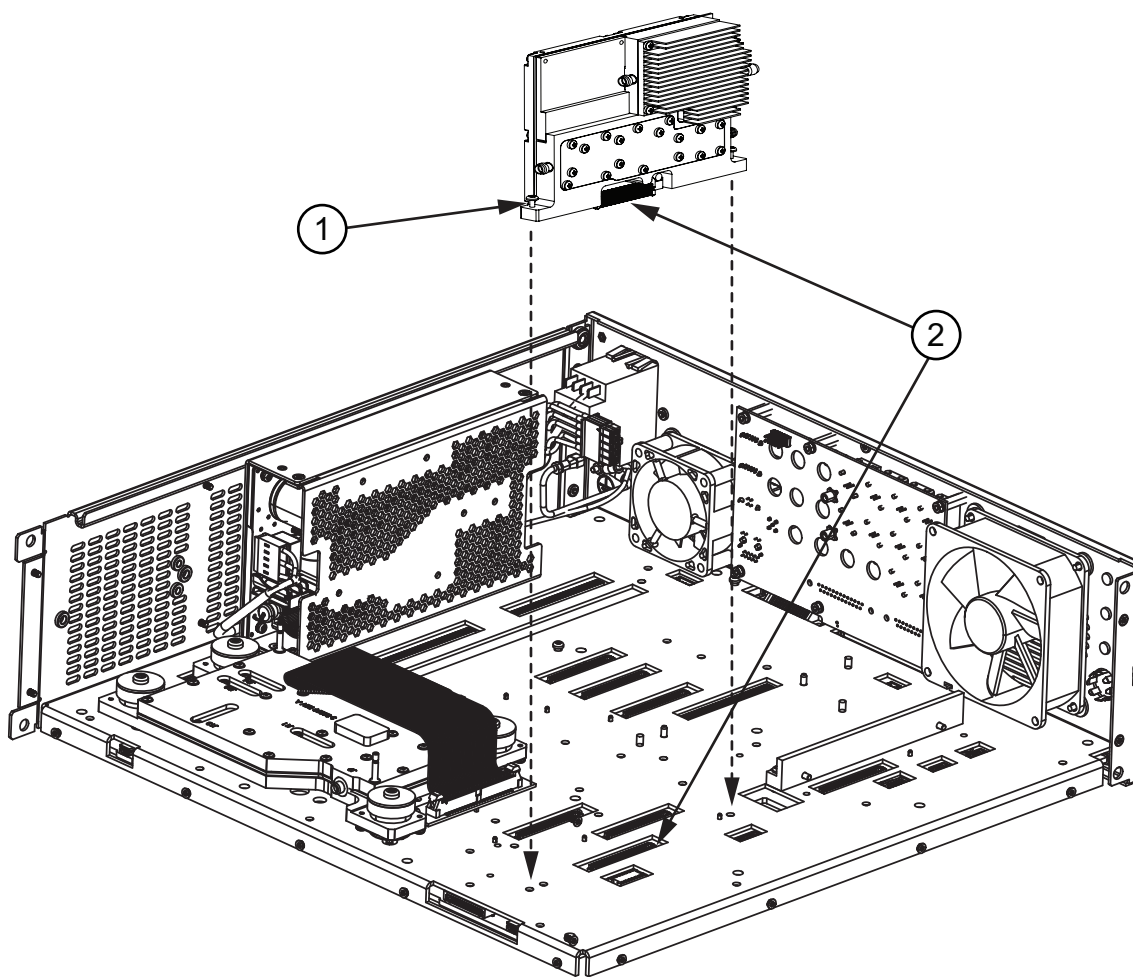
Tools Required

- # 1 Phillips screwdriver
- 5/16 open end wrench (Used to remove attached semi-rigid cable)
- Anritsu 01-201 torque wrench (applies a preset 8 in. lb. torque)

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16](#)



1. Frequency Extension Module (FEM)
2. 632x31mm Pan Head Screws (x2)

Figure 6-18. Remove FEM

Procedure

Refer to [Figure 6-19](#).

1. Remove all cables and connectors. Refer to [Section 6-4 “Semi-Rigid Cable Installation \(Standard Model\)”](#) on page 6-7. and [Section 6-5 “SMA Cable Installation \(Standard Model\)”](#) on page 6-8.
2. Remove two screws that attach the FEM to the bottom tray.
3. Lift the FEM to disconnect the Px connector from the motherboard.

Installation is performed in reverse order. Tighten the semi-rigid connectors to 8 in. lbs.

Remove the Modules with Mounting Bracket

The mounting bracket for most of the modules and components are shown in [Figure 6-19](#) on page 6-29.

The following modules have a mounting bracket that attaches the module to the bottom plate.

- Switched Filter
- Phase Noise Amp Module (Option 23)

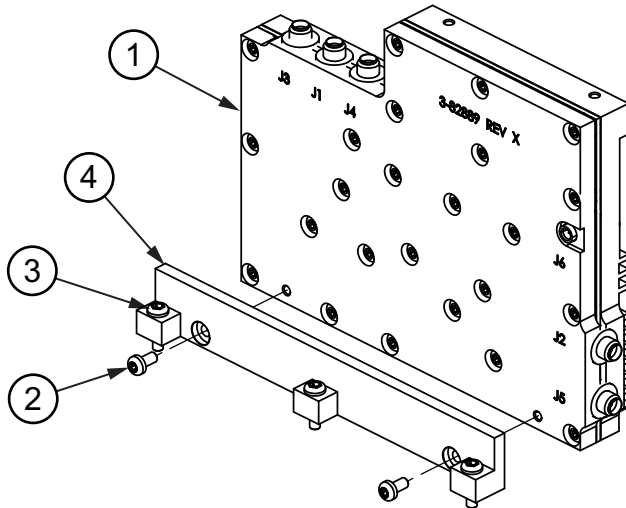
Tools Required

- # 1 Phillips screwdriver
- 5/16 open end wrench
- Anritsu 01-201 torque wrench (applies a preset 8 in. lb. torque)

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- [“Remove the Handles”](#) on page 6-13
- [“Remove the Rear Feet”](#) on page 6-14
- [“Remove the Covers”](#) on page 6-15
- [“Remove the Top Sub-panel”](#) on page 6-16.



1. Switched Filter	3. M3x12mm (x3)
2. M3x6 mm Screw (x2)	4. Mounting Bracket

Figure 6-19. Remove Mounting Bracket

Procedure

Refer to [Figure 6-19](#).

1. Remove all cables and connectors. Refer to [Section 6-4 “Semi-Rigid Cable Installation \(Standard Model\)” on page 6-7](#). and [Section 6-5 “SMA Cable Installation \(Standard Model\)” on page 6-8](#).
2. Remove three M3x12mm screws that attach the switched filter to the bottom tray.
3. Remove the switched filter/bracket assembly.
4. Remove the two M3x6 mm Screw from the switched filter.
5. Installation is performed in reverse order.
6. Tighten the semi-rigid connectors to 8 in. lbs.

Remove the Dielectric Resonator Oscillator (DRO) (Option 13)

Remove the DRO as described below.

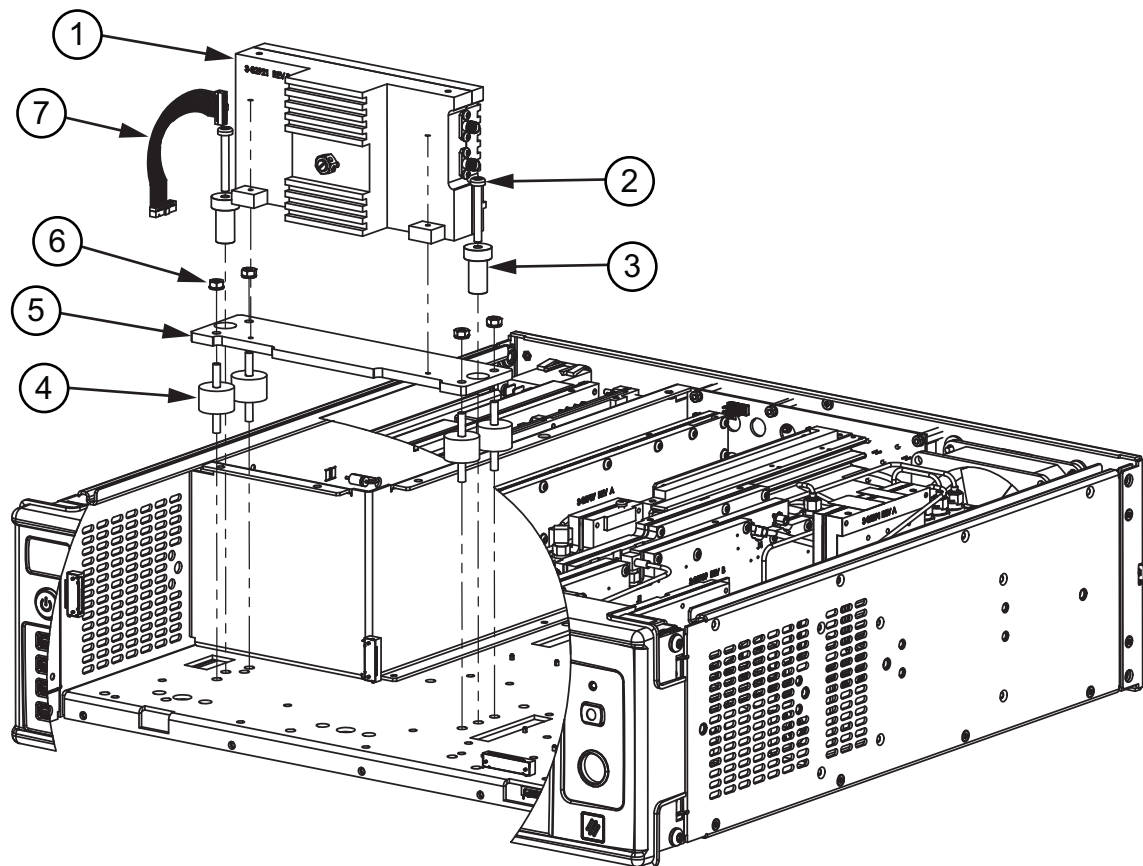
Tools Required

- # 1 Phillips screwdriver
- 5/16 open end wrench
- Kep nut driver (applies a preset 6 in. lb. torque)
- Anritsu 01-201 torque wrench (applies a preset 8 in. lb. torque)

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- [“Remove the Handles” on page 6-13](#)
- [“Remove the Rear Feet” on page 6-14](#)
- [“Remove the Covers” on page 6-15](#)
- [“Remove the Top Sub-panel” on page 6-16.](#)



1. Dielectric Resonator Oscillator (DRO)
2. M4x32mm Screw (x2)
3. T-Sleeve Bushing
4. Vibration Isolator (x4)

5. Vibration Plate
6. M4x0.7 Kep Nut (x4)
7. 14 Pin Cable Assembly

Figure 6-20. Remove DRO

Procedure

Refer to [Figure 6-20 on page 6-31](#).

1. Remove the two M4x0.7 kep nuts
2. Remove the four M4x32mm screws
3. Retain all hardware for installation
4. Lift DRO and isolation bracket.
5. Installation is performed in reverse order.
6. Tighten the two M4x0.7mm Kep nuts to 6 in. lbs
7. Tighten the four M4x32mm screws to 6 in. lbs
8. Tighten the semi-rigid connectors to 8 in. lbs.

Remove the Main Board

Remove the main board from the bottom plate as described below.

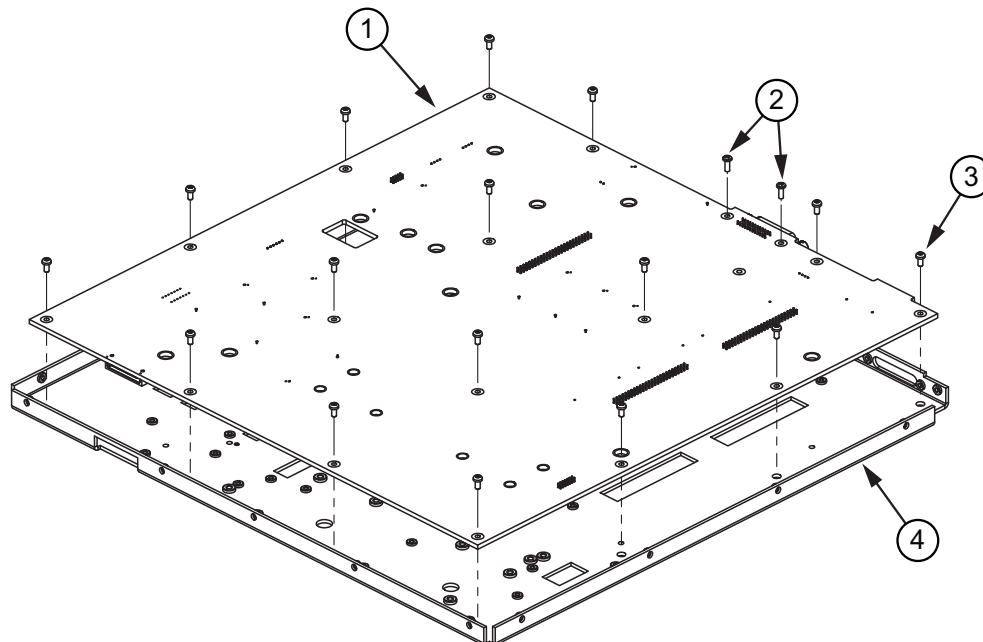
Tools Required

1 Phillips screwdriver

Preliminary

Disconnect the power cord from the instrument. Refer to following removal procedures:

- “Remove the Handles” on page 6-13
- “Remove the Rear Feet” on page 6-14
- “Remove the Covers” on page 6-15
- “Remove the Top Sub-panel” on page 6-16.
- “Remove the Rear Panel” on page 6-18
- “Remove the Power Supply” on page 6-21.
- Remove all remaining modules.



1. Main PCB

2. 4-40X.31 Screw (x2)

3. M3X6 Screws (x16)

4. Bottom Sub-panel

Figure 6-21. Remove Main PCB

Procedure

Refer to [Figure 6-21](#).

1. Lay four non-conductive spacers on clean flat conductive surface such as a ESD mat. (This is to lie the main PCB on)
2. Turn main PCB chassis assembly over and lie on the spacers.
3. Remove the 4-40X.31 screws (x2).
4. Remove the M3X6 screws (x16).
5. Lift the main PCB from the bottom sub-panel.

Appendix A — Test Records

A-1 Introduction

This appendix provides tables for recording the results of the performance verification tests. They jointly provide the means for maintaining an accurate and complete record of instrument performance.

These records contain references to frequency parameters and power levels that are applicable to the instrument with that option or set of options. When a test record is customized, it is labeled with the specific option list that it covers. Test records which are not customized do not specify an option list. These test records are generic and may contain specific references to frequency parameters and power levels that exceed the operational limits of the instrument being tested. When using generic test records, use only the parameters that fall within the operational limits of the instrument being tested. Refer to the MG362x1A technical Data Sheet (1410-00928) when referencing the specifications for the model being tested and the included options installed.

A-2 Uncertainty Specifications

All test records are provided with a measurement uncertainty, which consists of the type-B¹ components. The measurement uncertainty listed in each test record includes the best estimate of the errors contributed by the measurement, test equipment, standards, and other correction factors. The error contributions are measurement method, test equipment, standards, and other correction factors (for example, calibration factors and mismatch error) per the prescribed test procedure. The statement(s) of compliance with specification² is based on a 95% coverage probability for the expanded uncertainty of the measurement results on which the decision of compliance is based. Other values of coverage probability for the expanded uncertainty may be reported, where practicable, for some of the measured values it is not possible to make a statement of compliance with specification.²

A-3 Adapter, Attenuator and Cable Insertion Loss

In order to achieve the most accurate measurements, the insertion loss of adapters, attenuators and cables must be added to each measurement for the test records that require it. The process is to add up the insertion loss of the adapters, attenuators and cables and enter the results in the column labeled “Offset Value”. Then add this value to the “Measured Value” and enter the result in the “Final Value”. In some cases, the total insertion loss must be converted from dB into linear %. See the conversion formula below.

$$\% = 10^{(\text{dB}/10)} - 1$$

Where dB = the value to be converted to percentage

A-4 Test Records

We recommend that you make a copy of the test record pages each time a test procedure is performed. By dating each test record copy, a detailed history of the instrument’s performance can be accumulated.

A-5 Technical Reference

For MG362x1A specifications that apply to the specific model and option installed, refer to the technical data sheet (11410-00928).

-
1. BIPM JCGM 100:2008 Evaluation of measurement data- Guide to the expression of uncertainty in measurement.
 2. LAC-G8:03/2009: Guidelines on the Reporting of Compliance with Specification.

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Internal Time Base Aging Rate Test (Optional)

All MG362x1A Models

	Date and Time	Measured Value	Upper Limit See TDS (11410-00928)	Measurement Uncertainty
Frequency Error Value				N/A
Frequency Error Value (after 24 hours)				N/A
Computed Aging Rate	N/A	_____ per day		2×10^{-12} per day

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

All MG362x1A Models Harmonics and Harmonically Related Signal Test Records

without Option 15

Power level: The power level changes based on frequency, model and options installed. Set L1 to the lesser of +10 dBm or to the maximum specified power level. Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Test Frequency (MHz)	Spectrum Analyzer's Span (MHz)	Spectrum Analyzer BW/RBW/VBW (kHz)	2nd Harmonic Frequency (MHz)	Measured Value (dBc)	3rd Harmonic Frequency (MHz)	Measured Value (dBc)	1/2 Sub Harmonic (MHz)	Measured Value (dBc)	1/4 Sub Harmonic (MHz)	Measured Value (dBc)	3/4 Sub Harmonic (MHz)	Measured Value (dBc)	Spec See TDS (11410-00928)	Measurement Uncertainty (dB)
Frequencies: 9 kHz to ≤ 100 MHz														
.009	1	10	.018		.036		N/A		N/A		N/A			2.5
10	1	10	20		30		N/A		N/A		N/A			2.5
15	1	10	30		45		N/A		N/A		N/A			2.5
60	1	10	120		180		N/A		N/A		N/A			2.5
100	1	10	200		300		N/A		N/A		N/A			2.5
Frequencies: > 100 MHz to ≤ 2.2 GHz														
100.1	1	10	200.2		300.3		N/A		N/A		N/A			0.8
500	1	10	1000		1500		N/A		N/A		N/A			0.8
1500	1	10	3000		4500		N/A		N/A		N/A			0.8
2000	1	10	4000		6000		N/A		N/A		N/A			0.8
2200	1	10	4400		6600		N/A		N/A		N/A			0.8
Frequencies: > 2.2 GHz to ≤ 20 GHz														
2.201	1	10	4.402		6.603		N/A		N/A		N/A			0.8
9.99	1	10	19.98		29.97		N/A		N/A		N/A			2.5
10.01	1	10	20.02		30.03		N/A		N/A		N/A			2.5
20.0	1	10	40		N/A		N/A		N/A		N/A			2.5
Frequencies: > 20 GHz to ≤ 70 GHz														
2.201	1	10	4.402		6.603		N/A		N/A		N/A			0.8
9.99	1	10	19.98		29.97		N/A		N/A		N/A			2.5
10.01	1	10	20.02		30.03		N/A		N/A		N/A			2.5
20.0	1	10	40		N/A		N/A		N/A		N/A			2.5

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Harmonics and Harmonically Related Signal Test Records

All MG362x1A Models with Option 15

Power level: The power level changes based on frequency, model and options installed. Set L0 to the lesser of +10 dBm or to the maximum specified power level. Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels..

Test Frequency (MHz)	Spectrum Analyzer's Span (MHz)	Spectrum Analyzer's BW/RBW/VBW (kHz)	2nd Harmonic Frequency (MHz)	Measured Value (dBc)	3rd Harmonic Frequency (MHz)	Measured Value (dBc)	1/2 Sub Harmonic (MHz)	Measured Value (dBc)	1/4 Sub Harmonic (MHz)	Measured Value (dBc)	3/4 Sub Harmonic (MHz)	Measured Value (dBc)	Spec See TDS (11410-00928)	Measurement Uncertainty (dB)
Frequencies: 9 kHz to ≤ 100 MHz														
.009	1	10	.036		30		N/A		N/A		N/A			2.5
10	1	10	20		30		N/A		N/A		N/A			2.5
15	1	10	30		45		N/A		N/A		N/A			2.5
60	1	10	120		180		N/A		N/A		N/A			2.5
100	1	10	200		300		N/A		N/A		N/A			2.5
Frequencies: > 100 MHz to ≤ 20 GHz														
100.1	1	10	200.2		300.3		N/A		N/A		N/A			0.8
500	1	10	1000		1500		N/A		N/A		N/A			0.8
1500	1	10	3000		4500		N/A		N/A		N/A			0.8
2000	1	10	4000		6000		N/A		N/A		N/A			0.8
2200	1	10	4400		6600		N/A		N/A		N/A			0.8
10.01	1	10	20.02		30.03		N/A		N/A		N/A		−60	2.5
20.0	1	10	40		N/A		N/A		N/A		N/A		−60	2.5
Frequencies: > 20 GHz to ≤ 50 GHz														
20.01	1	10	40.02		N/A		10.005		5.0025		15.0075		−40	2.5
25.0	1	10	50		N/A		12.5		6.25		18.75		−40	2.5
30.0	1	10	N/A		N/A		15		7.5		22.5		−40	2.9
40.0	1	10	N/A		N/A		20		10		30		−40	2.4
50.0	1	10	N/A		N/A		25		12.5		37.5		−40	3.0
Frequencies: > 20 GHz to ≤ 70 GHz														
20.01	1	10	40.02		N/A		10.005		5.0025		15.0075		−40	2.5
25.0	1	10	50		N/A		12.5		6.25		18.75		−40	2.5
30.0	1	10	N/A		N/A		15		7.5		22.5		−40	2.9
40.0	1	10	N/A		N/A		20		10		30		−40	2.4
50.0	1	10	N/A		N/A		25		12.5		37.5			3.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Non-Harmonic Testing (Part 1)

(All MG362x1A Models) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels. All specifications apply at the lesser of +10 dBm output or Maximum specified leveled output power, unless otherwise noted.

Part 1 (1 of 4)

Frequency (GHz)	Output Power Level	Analyzer Start Frequency (GHz)	Analyzer Stop Frequency (GHz)	Analyzer RBW (kHz)	Test Result (dBc)	Offset Value (dB)	Final Value (dBc)	Spec. (dBc)	Measurement Uncertainty (dB)	Exclusions
2.650	10dBm	2.649	2.651	30.000			N/A	N/A	N/A	
2.650	10dBm	2.645	2.649	30.000				-60	0.89	
2.650	10dBm	2.595	2.645	100.000				-60	0.89	
2.650	10dBm	2.350	2.595	100.000				-60	0.89	
2.650	10dBm	2.651	2.655	30.000				-60	0.89	
2.650	10dBm	2.655	2.705	100.000				-60	0.89	
2.650	10dBm	2.705	2.950	100.000				-60	1.14	
2.650	10dBm	2.000	2.350	100.000				-60	0.89	
2.650	10dBm	2.950	5.000	100.000				-60	1.14	
2.650	10dBm	5.600	7.650	100.000				-60	1.42	
2.650	10dBm	8.250	10.300	100.000				-60	1.42	
2.650	10dBm	10.900	12.950	100.000				-60	1.42	
2.650	10dBm	13.550	16.775	30.000				-60	1.39	
2.650	10dBm	16.775	20.000	30.000				-60	1.39	
4.400	10dBm	4.399	4.401	30.000			N/A	N/A	N/A	
4.400	10dBm	4.395	4.399	30.000				-60	1.33	
4.400	10dBm	4.345	4.395	100.000				-60	1.33	
4.400	10dBm	4.100	4.345	100.000				-60	1.33	
4.400	10dBm	4.401	4.405	30.000				-60	1.33	
4.400	10dBm	4.405	4.455	100.000				-60	1.33	
4.400	10dBm	4.455	4.700	100.000				-60	1.33	
4.400	10dBm	2.500	3.000	100.000				-60	1.14	
4.400	10dBm	3.600	4.100	100.000				-60	1.33	
4.400	10dBm	4.700	8.500	100.000				-60	1.56	
4.400	10dBm	9.100	12.900	100.000				-60	1.56	

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Non-Harmonic Testing (Part 1)

(All MG362x1A Models) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels. All specifications apply at the lesser of +10 dBm output or Maximum specified leveled output power, unless otherwise noted.

Part 1 (2 of 4)

Frequency (GHz)	Output Power Level	Analyzer Start Frequency (GHz)	Analyzer Stop Frequency (GHz)	Analyzer RBW (kHz)	Test Result (dBc)	Offset Value (dB)	Final Value (dBc)	Spec. (dBc)	Measurement Uncertainty (dB)	Exclusions
4.400	10dBm	13.500	17.300	30.000				-60	1.54	
4.400	10dBm	17.900	20.000	30.000				-60	1.54	
6.950	10dBm	6.949	6.951	30.000			N/A	N/A	N/A	
6.950	10dBm	6.945	6.949	30.000				-60	1.75	
6.950	10dBm	6.895	6.945	100.000				-60	1.75	
6.950	10dBm	6.650	6.895	100.000				-60	1.75	
6.950	10dBm	6.951	6.955	30.000				-60	1.75	
6.950	10dBm	6.955	7.005	100.000				-60	1.75	
6.950	10dBm	7.005	7.250	100.000				-60	1.75	
6.950	10dBm	2.000	2.017	100.000				-60	1.42	
6.950	10dBm	2.617	3.175	100.000				-60	1.56	
6.950	10dBm	3.775	4.913	100.000				-60	1.56	
6.950	10dBm	5.513	6.650	100.000				-60	1.75	
6.950	10dBm	7.250	10.500	30.000				-60	1.75	
6.950	10dBm	10.500	13.600	30.000				-60	1.75	
6.950	10dBm	14.200	17.000	30.000				-60	1.73	
6.950	10dBm	17.000	20.000	30.000				-60	1.73	
10.950	10dBm	10.949	10.951	30.000			N/A	N/A	N/A	
10.950	10dBm	10.945	10.949	30.000				-60	1.75	
10.950	10dBm	10.895	10.945	30.000				-60	1.75	
10.950	10dBm	10.650	10.895	30.000				-60	1.75	
10.950	10dBm	10.951	10.955	30.000				-60	1.75	
10.950	10dBm	10.955	11.005	30.000				-60	1.75	
10.950	10dBm	11.005	11.250	30.000				-60	1.75	
10.950	10dBm	2.000	3.350	30.000				-60	1.56	
10.950	10dBm	3.950	5.175	30.000				-60	1.56	

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Non-Harmonic Testing (Part 1)

(All MG362x1A Models) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels. All specifications apply at the lesser of +10 dBm output or Maximum specified leveled output power, unless otherwise noted.

Part 1 (3 of 4)

Frequency (GHz)	Output Power Level	Analyzer Start Frequency (GHz)	Analyzer Stop Frequency (GHz)	Analyzer RBW (kHz)	Test Result (dBc)	Offset Value (dB)	Final Value (dBc)	Spec. (dBc)	Measurement Uncertainty (dB)	Exclusions
10.950	10dBm	5.775	7.913	30.000				-60	1.56	
10.950	10dBm	8.512	10.650	30.000				-60	1.75	
10.950	10dBm	11.250	15.500	10.000				-60	1.75	
10.950	10dBm	15.500	20.000	10.000				-60	1.73	
16.750 (reference frequency)	10dBm	16.749	16.751	30.000			N/A	N/A	N/A	
16.750	10dBm	16.745	16.749	30.000				-60	1.71	
16.750	10dBm	16.695	16.745	30.000				-60	1.71	
16.750	10dBm	16.450	16.695	30.000				-60	1.71	
16.750	10dBm	16.751	16.755	30.000				-60	1.71	
16.750	10dBm	16.755	16.805	30.000				-60	1.71	
16.750	10dBm	16.805	17.050	30.000				-60	1.71	
16.750	10dBm	2.000	5.283	30.000				-60	1.54	
16.750	10dBm	5.883	8.075	30.000				-60	1.73	
16.750	10dBm	8.675	12.263	30.000				-60	1.73	
16.750	10dBm	12.863	16.450	10.000				-60	1.73	
16.750	10dBm	17.050	20.000	10.000				-60	1.71	
20.001000 (reference frequency)	Option and Model Dependant	20.001000	100	1			N/A	N/A	N/A	Test not performed MG36221A
20.001000		40.000000	100	1					1.66	
24.999000 (reference frequency)		24.999000	100	1			N/A		N/A	
24.999000		45.800000	100	1					1.73	
24.999000		49.667000	100	1					1.72	

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Non-Harmonic Testing (Part 1)

(All MG362x1A Models) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels. All specifications apply at the lesser of +10 dBm output or Maximum specified leveled output power, unless otherwise noted.

Part 1 (4 of 4)

Frequency (GHz)	Output Power Level	Analyzer Start Frequency (GHz)	Analyzer Stop Frequency (GHz)	Analyzer RBW (kHz)	Test Result (dBc)	Offset Value (dB)	Final Value (dBc)	Spec. (dBc)	Measurement Uncertainty (dB)	Exclusions
25.001000 (reference frequency)	Option and Model Dependant	25.001000	100	30			N/A		N/A	Test not performed MG36221A
25.001000		49.799800	100	30					1.73	Test not performed MG36221A
31.886891 (reference frequency)		31.886891	100	100			N/A		N/A	Test not performed MG36221A
31.886891		26.246891	100	100					1.72	Test not performed MG36221A
32.892580 (reference frequency)		32.892580	100	30			N/A		N/A	Test not performed MG36221A
32.892580		28.555738	100	1					1.56	Test not performed MG36221A
39.999000 (reference frequency)		39.999000	100	1			N/A		N/A	Test not performed MG36221A
39.999000		36.515522	100	1					1.72	Test not performed MG36221A
40.001000 (reference frequency)		40.001000	100	1			N/A		N/A	Test not performed MG36221A
40.001000		39.935300	100	1					1.73	Test not performed MG36221A
43.634869		43.723037	100	1				-60	1.73	Test not performed on MG36221A and MG36241A
49.999000 (reference frequency)		49.999000	100	1			N/A	N/A	N/A	Test not performed on MG36221A and MG36241A

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Non-Harmonic Testing (Part 2)

(All MG362x1A Models) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels. All specifications apply at the lesser of +10 dBm output or Maximum specified leveled output power, unless otherwise noted. Dependent on maximum leveled power by options and model number.

Part 2 (1 of 2)

Frequency (GHz)	Output Power Level	Analyzer Start Frequency (GHz)	Analyzer Stop Frequency (GHz)	Analyzer RBW (kHz)	Test Result (dBc)	Offset Value (dB)	Final Value (dBc)	Spec. (dBc)	Measurement Uncertainty (dB)	Exclusions
25.001000 (reference frequency)	10 dBm	1.100000	100	1			N/A	N/A	N/A	
25.001000	10 dBm	0.500000	100	1				-60	0.40	
31.886891 (reference frequency)	10 dBm	1.500000	100	1				-60	0.40	
31.886891	10 dBm	2.000000	100	1				-60	0.39	
32.892580 (reference frequency)	10 dBm	6.500000	100	1				-60	0.93	
32.892580	10 dBm	7.600000	100	1				-60	1.12	
39.999000 (reference frequency)	Dependent on maximum leveled power by options and model number.	20.001000	100	1			N/A	N/A	N/A	Test not performed MG36221A
39.999000		40.000000	100	1				-60	1.66	Test not performed MG36221A
40.001000 (reference frequency)		24.999000	100	1			N/A	N/A	N/A	Test not performed MG36221A
40.001000		45.800000	100	1				-60	1.73	Test not performed MG36221A
43.634869		49.667000	100	1				-60	1.72	Test not performed MG36221A
49.999000 (reference frequency)		25.001000	100	1			N/A	N/A	N/A	Test not performed MG36221A
25.001000		49.799800	100	1				-60	1.73	Test not performed MG36221A
31.886891 (reference frequency)		31.886891	100	1			N/A	N/A	N/A	Test not performed MG36221A

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Non-Harmonic Testing (Part 2)

(All MG362x1A Models) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels. All specifications apply at the lesser of +10 dBm output or Maximum specified leveled output power, unless otherwise noted. Dependent on maximum leveled power by options and model number.

Part 2 (2 of 2)

Frequency (GHz)	Output Power Level	Analyzer Start Frequency (GHz)	Analyzer Stop Frequency	Analyzer RBW (kHz)	Test Result (dBc)	Offset Value (dB)	Final Value (dBc)	Spec. (dBc)	Measurement Uncertainty (dB)	Exclusions
32.892580 (reference frequency)	Dependent on maximum leveled power by options and model number.	32.892580	100	1			N/A	N/A	N/A	Test not performed MG36221A
32.892580		28.555738	100	1				-60	1.56	Test not performed MG36221A
39.999000 (reference frequency)		39.999000	100	1			N/A	N/A	N/A	Test not performed MG36221A
39.999000		36.515522	100	1				-60	1.72	Test not performed MG36221A
40.001000 (reference frequency)		40.001000	100	1			N/A	N/A	N/A	Test not performed MG36221A

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Single Sideband Phase Noise Test (Standard)

All MG362x1A Models (1 of 3) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc) See TDS for Specs (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 15 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 30 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 60 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 120 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Single Sideband Phase Noise Test (Standard)

All MG362x1A Models (2 of 3) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc) See TDS for Specs (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 250 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 499 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 1.0 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 2.19 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Single Sideband Phase Noise Test (Standard)

All MG362x1A Models (3 of 3) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc) See TDS for Specs (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 6.0 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 10.0 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 19.99 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 25.0 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Single Sideband Phase Noise Test (Option___)

All MG362x1A Models (1 of 3) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc) See TDS for Specs (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 15 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 60 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 499 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 2.19 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Single Sideband Phase Noise Test (Option___)

All MG362x1A Models (2 of 3) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc) See TDS for Specs (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 6 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 19.99 GHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 20.01 GHz (not performed on MG36221A)		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0
Test Frequency: 2.19 MHz		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Single Sideband Phase Noise Test (Option___)

All MG362x1A Models (3 of 3) Refer to the Technical Data Sheet (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc) See TDS for Specs (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 25 GHz (not performed on MG36221A)		
10 Hz		4.0
100 Hz		3.0
1 kHz		2.0
10 kHz		2.0
100 kHz		2.0
1 MHz		2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Line & Fan

All MG362x1A Models Refer to the Technical Data Sheet,(11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc/Hz)	Upper Limit (dBc/Hz) See TDS (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 15 MHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 60 MHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 499 MHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 15 MHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 60 MHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 499 MHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Line & Fan

All MG362x1A Models Refer to the Technical Data Sheet, (11410-00928) for the maximum specified power levels.

Frequency Offset	Measured Value (dBc/Hz)	Upper Limit (dBc/Hz) See TDS (11410-00928)	Measurement Uncertainty (dB)
Test Frequency: 2.19 GHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 6.0 GHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 10 GHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 19.99 GHz			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 20.01 GHz (not performed on MG36221A)			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0
Test Frequency: 25.0 GHz (not performed on MG36221A)			
< 300 Hz			4.0
300 Hz to 1 kHz			3.0
> 1 kHz			2.0

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Log Conformity

All MG362x1A Models Refer to the Technical Data Sheet,(11410-00928) for the maximum specified power levels

Set L1	Set F1 to 2.199 GHz			Set F1 to 2.201 GHz			Measurement Uncertainty (dB)
	Measured Power Non-pulse Mode (dBm)	Offset Value (dB)	Final Value (dBm)	Measured Power Non-pulse Mode (dBm)	Offset Value (dB)	Final Value (dBm)	
+21 dBm							0.28
+20 dBm							0.15
+19 dBm							0.15
+18 dBm							0.15
+17 dBm							0.15
+16 dBm							0.15
+15 dBm							0.15
+14 dBm							0.15
+13 dBm							0.15
+12 dBm							0.15
+11 dBm							0.15
+10 dBm							0.15
+9 dBm							0.15
+8 dBm							0.15
+7 dBm							0.15
+6 dBm							0.15
+5 dBm							0.15
+4 dBm							0.15
+3 dBm							0.15
+2 dBm							0.15
+1 dBm							0.15
+0 dBm							0.15
−1 dBm							0.016
−2 dBm							0.016
−3 dBm							0.016

NOTES

The following notes are applicable to all the tables in the following sections.

Note A

When setting the power level, set the Maximum Leveled Output Power within the instrument specification noted in the Technical Data Sheet (1410-00928).

Note B

To determine the lowest power setting:

The lowest power level is determined by the Model number, options installed and test frequency. Please refer to the Technical Data Sheet for lowest tested power level.

On units without Option 2 (Attenuator), the minimum power is -15 dBm.

If Option 2 (Attenuator) is installed, the lowest tested power level is 100 dB below the maximum leveled power of the unit with the appropriate options.

Note C

Accuracy with high power option (Option 15) is ± 1.5 dBm.

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36221A Models - Power Set to +15 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.26 dB			Skip if Option 6
1 MHz				± 1 dB	0.26 dB			Skip if Option 6
100 MHz				± 1 dB	0.26 dB			
1 GHz				± 1 dB	0.26 dB			
2 GHz				± 1 dB	0.26 dB			
4 GHz				± 1 dB	0.26 dB			
6 GHz				± 1 dB	0.26 dB			
8 GHz				± 1 dB	0.26 dB			
10 GHz				± 1 dB	0.26 dB			
12 GHz				± 1 dB	0.26 dB			
14 GHz				± 1 dB	0.26 dB			
16 GHz				± 1 dB	0.26 dB			
18 GHz				± 1 dB	0.26 dB			
20 GHz				± 1 dB	0.26 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36241A Models - Power Set to +15 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.26 dB			Skip if Option 6
1 MHz				± 1 dB	0.26 dB			Skip if Option 6
100 MHz				± 1 dB	0.26 dB			
1 GHz				± 1 dB	0.26 dB			
2 GHz				± 1 dB	0.26 dB			
4 GHz				± 1 dB	0.26 dB			
6 GHz				± 1 dB	0.26 dB			
8 GHz				± 1 dB	0.26 dB			
10 GHz				± 1 dB	0.26 dB			
12 GHz				± 1 dB	0.26 dB			
14 GHz				± 1 dB	0.26 dB			
16 GHz				± 1 dB	0.26 dB			
18 GHz				± 1 dB	0.26 dB			
20 GHz				± 1 dB	0.26 dB			
25 GHz				± 1 dB	0.26 dB			
30 GHz				± 1 dB	0.26 dB			
35 GHz				± 1 dB	0.26 dB			
40 GHz				± 1.4 dB	0.26 dB			
43.5 GHz				± 1.4 dB	0.26 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36271A Models - Power Set to +15 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.26 dB			Skip if Option 6
1 MHz				± 1 dB	0.26 dB			Skip if Option 6
100 MHz				± 1 dB	0.26 dB			
1 GHz				± 1 dB	0.26 dB			
2 GHz				± 1 dB	0.26 dB			
4 GHz				± 1 dB	0.26 dB			
6 GHz				± 1 dB	0.26 dB			
8 GHz				± 1 dB	0.26 dB			
10 GHz				± 1 dB	0.26 dB			
12 GHz				± 1 dB	0.26 dB			
14 GHz				± 1 dB	0.26 dB			
16 GHz				± 1 dB	0.26 dB			
18 GHz				± 1 dB	0.26 dB			
20 GHz				± 1 dB	0.26 dB			
25 GHz				± 1 dB	0.26 dB			
30 GHz				± 1 dB	0.26 dB			
35 GHz				± 1 dB	0.26 dB			
40 GHz				± 1.5 dB	0.26 dB			
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36221A Models - Power Set to +10 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.26 dB			Skip if Option 6
1 MHz				± 1 dB	0.26 dB			Skip if Option 6
100 MHz				± 1 dB	0.26 dB			
1 GHz				± 1 dB	0.26 dB			
2 GHz				± 1 dB	0.26 dB			
4 GHz				± 1 dB	0.26 dB			
6 GHz				± 1 dB	0.26 dB			
8 GHz				± 1 dB	0.26 dB			
10 GHz				± 1 dB	0.26 dB			
12 GHz				± 1 dB	0.26 dB			
14 GHz				± 1 dB	0.26 dB			
16 GHz				± 1 dB	0.26 dB			
18 GHz				± 1 dB	0.26 dB			
20 GHz				± 1 dB	0.26 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36241A Models - Power Set to +10 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.26 dB			Skip if Option 6
1 MHz				± 1 dB	0.26 dB			Skip if Option 6
100 MHz				± 1 dB	0.26 dB			
1 GHz				± 1 dB	0.26 dB			
2 GHz				± 1 dB	0.26 dB			
4 GHz				± 1 dB	0.26 dB			
6 GHz				± 1 dB	0.26 dB			
8 GHz				± 1 dB	0.26 dB			
10 GHz				± 1 dB	0.26 dB			
12 GHz				± 1 dB	0.26 dB			
14 GHz				± 1 dB	0.26 dB			
16 GHz				± 1 dB	0.26 dB			
18 GHz				± 1 dB	0.26 dB			
20 GHz				± 1 dB	0.26 dB			
25 GHz				± 1 dB	0.26 dB			
30 GHz				± 1 dB	0.26 dB			
35 GHz				± 1 dB	0.26 dB			
40 GHz				± 1.4 dB	0.26 dB			
43.5 GHz				± 1.4 dB	0.26 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36271A Models - Power Set to +10 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.26 dB			Skip if Option 6
1 MHz				± 1 dB	0.26 dB			Skip if Option 6
100 MHz				± 1 dB	0.26 dB			
1 GHz				± 1 dB	0.26 dB			
2 GHz				± 1 dB	0.26 dB			
4 GHz				± 1 dB	0.26 dB			
6 GHz				± 1 dB	0.26 dB			
8 GHz				± 1 dB	0.26 dB			
10 GHz				± 1 dB	0.26 dB			
12 GHz				± 1 dB	0.26 dB			
14 GHz				± 1 dB	0.26 dB			
16 GHz				± 1 dB	0.26 dB			
18 GHz				± 1 dB	0.26 dB			
20 GHz				± 1 dB	0.26 dB			
25 GHz				± 1 dB	0.26 dB			
30 GHz				± 1 dB	0.26 dB			
35 GHz				± 1 dB	0.26 dB			
40 GHz				± 1.5 dB	0.26 dB			
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36221A Models - Power Set to +0 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36241A Models - Power Set to +0 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			
25 GHz				± 1 dB	0.16 dB			
30 GHz				± 1 dB	0.16 dB			
35 GHz				± 1 dB	0.16 dB			
40 GHz				± 1.4 dB	0.16 dB			
43.5 GHz				± 1.4 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36271A Models - Power Set to +0 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			
25 GHz				± 1 dB	0.16 dB			
30 GHz				± 1 dB	0.16 dB			
35 GHz				± 1 dB	0.16 dB			
40 GHz				± 1.5 dB	0.16 dB			
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36221A Models - Power Set to -10 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36241A Models - Power Set to -10 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			
25 GHz				± 1 dB	0.16 dB			
30 GHz				± 1 dB	0.16 dB			
35 GHz				± 1 dB	0.16 dB			
40 GHz				± 1.4 dB	0.16 dB			
43.5 GHz				± 1.4 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36271A Models - Power Set to -10 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			
25 GHz				± 1 dB	0.16 dB			
30 GHz				± 1 dB	0.16 dB			
35 GHz				± 1 dB	0.16 dB			
40 GHz				± 1.5 dB	0.16 dB			
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36221A Models - Power Set to -20 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36241A Models - Power Set to -20 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			
25 GHz				± 1 dB	0.16 dB			
30 GHz				± 1 dB	0.16 dB			
35 GHz				± 1 dB	0.16 dB			
40 GHz				± 1.4 dB	0.16 dB			
43.5 GHz				± 1.4 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy Test

All MG36271A Models - Power Set to -20 dBm

Frequency	NRP67T Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.16 dB			Skip if Option 6
1 MHz				± 1 dB	0.16 dB			Skip if Option 6
100 MHz				± 1 dB	0.16 dB			
1 GHz				± 1 dB	0.16 dB			
2 GHz				± 1 dB	0.16 dB			
4 GHz				± 1 dB	0.16 dB			
6 GHz				± 1 dB	0.16 dB			
8 GHz				± 1 dB	0.16 dB			
10 GHz				± 1 dB	0.16 dB			
12 GHz				± 1 dB	0.16 dB			
14 GHz				± 1 dB	0.16 dB			
16 GHz				± 1 dB	0.16 dB			
18 GHz				± 1 dB	0.16 dB			
20 GHz				± 1 dB	0.16 dB			
25 GHz				± 1 dB	0.16 dB			
30 GHz				± 1 dB	0.16 dB			
35 GHz				± 1 dB	0.16 dB			
40 GHz				± 1.5 dB	0.16 dB			
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -30 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -30 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			
25 GHz				± 1 dB	0.17 dB			
30 GHz				± 1 dB	0.17 dB			
35 GHz				± 1 dB	0.17 dB			
40 GHz				± 1.4 dB	0.17 dB			
43.5 GHz				± 1.4 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -30 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB				Skip if Option 6
1 MHz				± 1 dB				Skip if Option 6
100 MHz				± 1 dB				
1 GHz				± 1 dB				
2 GHz				± 1 dB				
4 GHz				± 1 dB				
6 GHz				± 1 dB				
8 GHz				± 1 dB				
10 GHz				± 1 dB				
12 GHz				± 1 dB				
14 GHz				± 1 dB				
16 GHz				± 1 dB				
18 GHz				± 1 dB				
20 GHz				± 1 dB				
25 GHz				± 1 dB				
30 GHz				± 1 dB				
35 GHz				± 1 dB				
40 GHz				± 1.4 dB				
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -40 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -40 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			
25 GHz				± 1 dB	0.17 dB			
30 GHz				± 1 dB	0.17 dB			
35 GHz				± 1 dB	0.17 dB			
40 GHz				± 1.4 dB	0.17 dB			
43.5 GHz				± 1.4 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -40 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB				Skip if Option 6
1 MHz				± 1 dB				Skip if Option 6
100 MHz				± 1 dB				
1 GHz				± 1 dB				
2 GHz				± 1 dB				
4 GHz				± 1 dB				
6 GHz				± 1 dB				
8 GHz				± 1 dB				
10 GHz				± 1 dB				
12 GHz				± 1 dB				
14 GHz				± 1 dB				
16 GHz				± 1 dB				
18 GHz				± 1 dB				
20 GHz				± 1 dB				
25 GHz				± 1 dB				
30 GHz				± 1 dB				
35 GHz				± 1 dB				
40 GHz				± 1.4 dB				
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -50 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -50 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			
25 GHz				± 1 dB	0.17 dB			
30 GHz				± 1 dB	0.17 dB			
35 GHz				± 1 dB	0.17 dB			
40 GHz				± 1.4 dB	0.17 dB			
43.5 GHz				± 1.4 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -50 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB				Skip if Option 6
1 MHz				± 1 dB				Skip if Option 6
100 MHz				± 1 dB				
1 GHz				± 1 dB				
2 GHz				± 1 dB				
4 GHz				± 1 dB				
6 GHz				± 1 dB				
8 GHz				± 1 dB				
10 GHz				± 1 dB				
12 GHz				± 1 dB				
14 GHz				± 1 dB				
16 GHz				± 1 dB				
18 GHz				± 1 dB				
20 GHz				± 1 dB				
25 GHz				± 1 dB				
30 GHz				± 1 dB				
35 GHz				± 1 dB				
40 GHz				± 1.4 dB				
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -50 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -50 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.17 dB			Skip if Option 6
1 MHz				± 1 dB	0.17 dB			Skip if Option 6
100 MHz				± 1 dB	0.17 dB			
1 GHz				± 1 dB	0.17 dB			
2 GHz				± 1 dB	0.17 dB			
4 GHz				± 1 dB	0.17 dB			
6 GHz				± 1 dB	0.17 dB			
8 GHz				± 1 dB	0.17 dB			
10 GHz				± 1 dB	0.17 dB			
12 GHz				± 1 dB	0.17 dB			
14 GHz				± 1 dB	0.17 dB			
16 GHz				± 1 dB	0.17 dB			
18 GHz				± 1 dB	0.17 dB			
20 GHz				± 1 dB	0.17 dB			
25 GHz				± 1 dB	0.17 dB			
30 GHz				± 1 dB	0.17 dB			
35 GHz				± 1 dB	0.17 dB			
40 GHz				± 1.4 dB	0.17 dB			
43.5 GHz				± 1.4 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -50 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB				Skip if Option 6
1 MHz				± 1 dB				Skip if Option 6
100 MHz				± 1 dB				
1 GHz				± 1 dB				
2 GHz				± 1 dB				
4 GHz				± 1 dB				
6 GHz				± 1 dB				
8 GHz				± 1 dB				
10 GHz				± 1 dB				
12 GHz				± 1 dB				
14 GHz				± 1 dB				
16 GHz				± 1 dB				
18 GHz				± 1 dB				
20 GHz				± 1 dB				
25 GHz				± 1 dB				
30 GHz				± 1 dB				
35 GHz				± 1 dB				
40 GHz				± 1.4 dB				
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -60 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -60 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			
25 GHz				± 1 dB	0.18 dB			
30 GHz				± 1 dB	0.18 dB			
35 GHz				± 1 dB	0.18 dB			
40 GHz				± 1.4 dB	0.18 dB			
43.5 GHz				± 1.4 dB	0.19 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -60 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB				Skip if Option 6
1 MHz				± 1 dB				Skip if Option 6
100 MHz				± 1 dB				
1 GHz				± 1 dB				
2 GHz				± 1 dB				
4 GHz				± 1 dB				
6 GHz				± 1 dB				
8 GHz				± 1 dB				
10 GHz				± 1 dB				
12 GHz				± 1 dB				
14 GHz				± 1 dB				
16 GHz				± 1 dB				
18 GHz				± 1 dB				
20 GHz				± 1 dB				
25 GHz				± 1 dB				
30 GHz				± 1 dB				
35 GHz				± 1 dB				
40 GHz				± 1.5 dB				
45 GHz				± 1.5 dB				
50 GHz				± 1.5 dB				
55 GHz				± 1.5 dB				
60 GHz				± 1.5 dB				
65 GHz				± 1.5 dB				
67 GHz				± 1.5 dB				
70 GHz				± 1.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -70 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -70 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			
25 GHz				± 1 dB	0.18 dB			
30 GHz				± 1 dB	0.18 dB			
35 GHz				± 1 dB	0.18 dB			
40 GHz				± 1.4 dB	0.18 dB			
43.5 GHz				± 1.4 dB	0.19 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -70 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 2 dB				Skip if Option 6
1 MHz				± 2 dB				Skip if Option 6
100 MHz				± 2 dB				
1 GHz				± 2 dB				
2 GHz				± 2 dB				
4 GHz				± 2 dB				
6 GHz				± 2 dB				
8 GHz				± 2 dB				
10 GHz				± 2 dB				
12 GHz				± 2 dB				
14 GHz				± 2 dB				
16 GHz				± 2 dB				
18 GHz				± 2 dB				
20 GHz				± 2 dB				
25 GHz				± 2 dB				
30 GHz				± 2 dB				
35 GHz				± 2 dB				
40 GHz				± 2 dB				
45 GHz				± 2.5 dB				
50 GHz				± 2.5 dB				
55 GHz				± 2.5 dB				
60 GHz				± 2.5 dB				
65 GHz				± 2.5 dB				
67 GHz				± 2.5 dB				
70 GHz				± 2.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -80 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -80 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			
25 GHz				± 1 dB	0.18 dB			
30 GHz				± 1 dB	0.18 dB			
35 GHz				± 1 dB	0.18 dB			
40 GHz				± 1.4 dB	0.18 dB			
43.5 GHz				± 1.4 dB	0.19 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -80 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 2 dB				Skip if Option 6
1 MHz				± 2 dB				Skip if Option 6
100 MHz				± 2 dB				
1 GHz				± 2 dB				
2 GHz				± 2 dB				
4 GHz				± 2 dB				
6 GHz				± 2 dB				
8 GHz				± 2 dB				
10 GHz				± 2 dB				
12 GHz				± 2 dB				
14 GHz				± 2 dB				
16 GHz				± 2 dB				
18 GHz				± 2 dB				
20 GHz				± 2 dB				
25 GHz				± 2 dB				
30 GHz				± 2 dB				
35 GHz				± 2 dB				
40 GHz				± 2 dB				
45 GHz				± 2.5 dB				
50 GHz				± 2.5 dB				
55 GHz				± 2.5 dB				
60 GHz				± 2.5 dB				
65 GHz				± 2.5 dB				
67 GHz				± 2.5 dB				
70 GHz				± 2.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36221A Models - Power Set to -90 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36241A Models - Power Set to -90 dBm

Frequency	MS2090A -0754 Measured Power (dBm)	Enter offset of cables and adapters at each frequency tested - See Appendix A section A-3	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 1 dB	0.18 dB			Skip if Option 6
1 MHz				± 1 dB	0.18 dB			Skip if Option 6
100 MHz				± 1 dB	0.18 dB			
1 GHz				± 1 dB	0.18 dB			
2 GHz				± 1 dB	0.18 dB			
4 GHz				± 1 dB	0.18 dB			
6 GHz				± 1 dB	0.18 dB			
8 GHz				± 1 dB	0.18 dB			
10 GHz				± 1 dB	0.18 dB			
12 GHz				± 1 dB	0.18 dB			
14 GHz				± 1 dB	0.18 dB			
16 GHz				± 1 dB	0.18 dB			
18 GHz				± 1 dB	0.18 dB			
20 GHz				± 1 dB	0.18 dB			
25 GHz				± 1 dB	0.18 dB			
30 GHz				± 1 dB	0.18 dB			
35 GHz				± 1 dB	0.18 dB			
40 GHz				± 1.4 dB	0.18 dB			
43.5 GHz				± 1.4 dB	0.19 dB			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Power Level Accuracy and Flatness Test (Option 2)

All MG36271A Models - Power Set to -90 dBm

Frequency	MS2760 -0070 Measured Power (dBm)	Enter offset of cables and adapters at each test frequency	Calculated Value - Add measured power + Offset	Level Accuracy and Flatness Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz				± 2 dB				Skip if Option 6
1 MHz				± 2 dB				Skip if Option 6
100 MHz				± 2 dB				
1 GHz				± 2 dB				
2 GHz				± 2 dB				
4 GHz				± 2 dB				
6 GHz				± 2 dB				
8 GHz				± 2 dB				
10 GHz				± 2 dB				
12 GHz				± 2 dB				
14 GHz				± 2 dB				
16 GHz				± 2 dB				
18 GHz				± 2 dB				
20 GHz				± 2 dB				
25 GHz				± 2 dB				
30 GHz				± 2 dB				
35 GHz				± 2 dB				
40 GHz				± 2 dB				
45 GHz				± 2.5 dB				
50 GHz				± 2.5 dB				
55 GHz				± 2.5 dB				
60 GHz				± 2.5 dB				
65 GHz				± 2.5 dB				
67 GHz				± 2.5 dB				
70 GHz				± 2.5 dB (typical)				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, Without Option 15)

All MG36221A Models

Frequency	MG36221A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
50 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
100 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
1 MHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
10 MHz	+21 dBm				+20 dBm	0.3 dBm			
100 MHz	+21 dBm				+20 dBm	0.3 dBm			
500 MHz	+21 dBm				+20 dBm	0.3 dBm			
1 GHz	+21 dBm				+20 dBm	0.3 dBm			
1.999 GHz	+21 dBm				+20 dBm	0.3 dBm			
2.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
4.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
6.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
8.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
10.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
12.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
14.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
16.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
18.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
20 GHz	+21 dBm				+20 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (With Option 2, Without Option 15)

All MG36221A Models

Frequency	MG36221A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+21 dBm				+19 dBm	0.3 dBm			Skip if Option 6
50 kHz	+21 dBm				+19 dBm	0.3 dBm			Skip if Option 6
100 kHz	+21 dBm				+19 dBm	0.3 dBm			Skip if Option 6
1 MHz	+21 dBm				+19 dBm	0.3 dBm			Skip if Option 6
10 MHz	+21 dBm				+19 dBm	0.3 dBm			
100 MHz	+21 dBm				+19 dBm	0.3 dBm			
500 MHz	+21 dBm				+19 dBm	0.3 dBm			
1 GHz	+21 dBm				+19 dBm	0.3 dBm			
1.999 GHz	+21 dBm				+19 dBm	0.3 dBm			
2.0 GHz	+21 dBm				+19 dBm	0.3 dBm			
4.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
6.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
8.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
10.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
12.0 GHz	+21 dBm				+19 dBm	0.3 dBm			
14.0 GHz	+21 dBm				+19 dBm	0.3 dBm			
16.0 GHz	+21 dBm				+19 dBm	0.3 dBm			
18.0 GHz	+21 dBm				+19 dBm	0.3 dBm			
20 GHz	+21 dBm				+19 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, With Option 15)

All MG36221A Models

Frequency	MG36221A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
50 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
100 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
1 MHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
10 MHz	+21 dBm				+20 dBm	0.3 dBm			
100 MHz	+21 dBm				+20 dBm	0.3 dBm			
500 MHz	+21 dBm				+20 dBm	0.3 dBm			
1 GHz	+21 dBm				+20 dBm	0.3 dBm			
1.999 GHz	+21 dBm				+20 dBm	0.3 dBm			
2.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
4.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
6.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
8.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
10.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
12.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
14.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
16.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
18.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
20 GHz	+29 dBm				+28 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (With Option 2, With Option 15)

All MG36221A Models

Frequency	MG36221A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
50 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
100 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
1 MHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
10 MHz	+20 dBm				+19 dBm	0.3 dBm			
100 MHz	+20 dBm				+19 dBm	0.3 dBm			
500 MHz	+20 dBm				+19 dBm	0.3 dBm			
1 GHz	+20 dBm				+19 dBm	0.3 dBm			
1.999 GHz	+20 dBm				+19 dBm	0.3 dBm			
2.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
4.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
6.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
8.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
10.0 GHz	+31 dBm				+30 dBm	0.3 dBm			
12.0 GHz	+29 dBm				+28 dBm	0.3 dBm			
14.0 GHz	+29 dBm				+28 dBm	0.3 dBm			
16.0 GHz	+29 dBm				+28 dBm	0.3 dBm			
18.0 GHz	+29 dBm				+28 dBm	0.3 dBm			
20 GHz	+28 dBm				+27 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, Without Option 15)

All MG36241A Models

Frequency	MG3621A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
50 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
100 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
1 MHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
10 MHz	+20 dBm				+19 dBm	0.3 dBm			
100 MHz	+20 dBm				+19 dBm	0.3 dBm			
500 MHz	+20 dBm				+19 dBm	0.3 dBm			
1 GHz	+20 dBm				+19 dBm	0.3 dBm			
1.999 GHz	+20 dBm				+19 dBm	0.3 dBm			
2.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
4.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
6.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
8.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
10.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
12.0 GHz	+17 dBm				+16 dBm	0.3 dBm			
14.0 GHz	+17 dBm				+16 dBm	0.3 dBm			
16.0 GHz	+17 dBm				+16 dBm	0.3 dBm			
18.0 GHz	+17 dBm				+16 dBm	0.3 dBm			
20 GHz	+17 dBm				+16 dBm	0.3 dBm			
22 GHz	+17 dBm				+16 dBm	0.3 dBm			
24 GHz	+17 dBm				+16 dBm	0.3 dBm			
26 GHz	+17 dBm				+16 dBm	0.3 dBm			
28 GHz	+17 dBm				+16 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (Without Option 2, Without Option 15) (Continued)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
30 GHz	+17 dBm				+16 dBm	0.3 dBm			
32 GHz	+17 dBm				+16 dBm	0.3 dBm			
34 GHz	+17 dBm				+16 dBm	0.3 dBm			
36 GHz	+17 dBm				+16 dBm	0.3 dBm			
38 GHz	+17 dBm				+16 dBm	0.3 dBm			
40 GHz	+17 dBm				+16 dBm	0.3 dBm			
42 GHz	+17 dBm				+16 dBm	0.3 dBm			
43.5 GHz	+17 dBm				+16 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (With Option 2, Without Option 15)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+19 dBm				+18 dBm	0.3 dBm			Skip if Option 6
50 kHz	+19 dBm				+18 dBm	0.3 dBm			Skip if Option 6
100 kHz	+19 dBm				+18 dBm	0.3 dBm			Skip if Option 6
1 MHz	+19 dBm				+18 dBm	0.3 dBm			Skip if Option 6
10 MHz	+19 dBm				+18 dBm	0.3 dBm			
100 MHz	+19 dBm				+18 dBm	0.3 dBm			
500 MHz	+19 dBm				+18 dBm	0.3 dBm			
1 GHz	+19 dBm				+18 dBm	0.3 dBm			
1.999 GHz	+19 dBm				+18 dBm	0.3 dBm			
2.0 GHz	+19 dBm				+18 dBm	0.3 dBm			
4.0 GHz	+19 dBm				+18 dBm	0.3 dBm			
6.0 GHz	+19 dBm				+18 dBm	0.3 dBm			
8.0 GHz	+19 dBm				+18 dBm	0.3 dBm			
10.0 GHz	+19 dBm				+18 dBm	0.3 dBm			
12.0 GHz	+16 dBm				+15 dBm	0.3 dBm			
14.0 GHz	+16 dBm				+15 dBm	0.3 dBm			
16.0 GHz	+16 dBm				+15 dBm	0.3 dBm			
18.0 GHz	+16 dBm				+15 dBm	0.3 dBm			
20 GHz	+16 dBm				+15 dBm	0.3 dBm			
22 GHz	+16 dBm				+15 dBm	0.3 dBm			
24 GHz	+16 dBm				+15 dBm	0.3 dBm			
26 GHz	+16 dBm				+15 dBm	0.3 dBm			
28 GHz	+16 dBm				+15 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (With Option 2, Without Option 15) (Continued)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
30 GHz	+16 dBm				+15 dBm	0.3 dBm			
32 GHz	+16 dBm				+15 dBm	0.3 dBm			
34 GHz	+16 dBm				+15 dBm	0.3 dBm			
36 GHz	+16 dBm				+15 dBm	0.3 dBm			
38 GHz	+16 dBm				+15 dBm	0.3 dBm			
40 GHz	+16 dBm				+15 dBm	0.3 dBm			
42 GHz	+16 dBm				+15 dBm	0.3 dBm			
43.5 GHz	+16 dBm				+15 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, With Option 15)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
50 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
100 kHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
1 MHz	+21 dBm				+20 dBm	0.3 dBm			Skip if Option 6
10 MHz	+21 dBm				+20 dBm	0.3 dBm			
100 MHz	+21 dBm				+20 dBm	0.3 dBm			
500 MHz	+21 dBm				+20 dBm	0.3 dBm			
1 GHz	+21 dBm				+20 dBm	0.3 dBm			
1.999 GHz	+21 dBm				+20 dBm	0.3 dBm			
2.0 GHz	+21 dBm				+20 dBm	0.3 dBm			
4.0 GHz	+30 dBm				+29 dBm	0.3 dBm			
6.0 GHz	+30 dBm				+29 dBm	0.3 dBm			
8.0 GHz	+30 dBm				+29 dBm	0.3 dBm			
10.0 GHz	+30 dBm				+29 dBm	0.3 dBm			
12.0 GHz	+24 dBm				+23 dBm	0.3 dBm			
14.0 GHz	+24 dBm				+23 dBm	0.3 dBm			
16.0 GHz	+24 dBm				+23 dBm	0.3 dBm			
18.0 GHz	+24 dBm				+23 dBm	0.3 dBm			
20 GHz	+24 dBm				+23 dBm	0.3 dBm			
22 GHz	+21 dBm				+20 dBm	0.3 dBm			
24 GHz	+21 dBm				+20 dBm	0.3 dBm			
25 GHz	+21 dBm				+20 dBm	0.3 dBm			
26 GHz	+24 dBm				+23 dBm	0.3 dBm			
28 GHz	+24 dBm				+23 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (Without Option 2, With Option 15) (Continued)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
30 GHz	+24 dBm				+23 dBm	0.3 dBm			
32 GHz	+24 dBm				+23 dBm	0.3 dBm			
34 GHz	+24 dBm				+23 dBm	0.3 dBm			
35 GHz	+24 dBm				+23 dBm	0.3 dBm			
36 GHz	+21 dBm				+20 dBm	0.3 dBm			
38 GHz	+21 dBm				+20 dBm	0.3 dBm			
40 GHz	+21 dBm				+20 dBm	0.3 dBm			
42 GHz	+21 dBm				+20 dBm	0.3 dBm			
43.5 GHz	+21 dBm				+20 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (With Option 2, With Option 15)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
50 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
100 kHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
1 MHz	+20 dBm				+19 dBm	0.3 dBm			Skip if Option 6
10 MHz	+20 dBm				+19 dBm	0.3 dBm			
100 MHz	+20 dBm				+19 dBm	0.3 dBm			
500 MHz	+20 dBm				+19 dBm	0.3 dBm			
1 GHz	+20 dBm				+19 dBm	0.3 dBm			
1.999 GHz	+20 dBm				+19 dBm	0.3 dBm			
2.0 GHz	+20 dBm				+19 dBm	0.3 dBm			
4.0 GHz	+28 dBm				+27 dBm	0.3 dBm			
6.0 GHz	+28 dBm				+27 dBm	0.3 dBm			
8.0 GHz	+28 dBm				+27 dBm	0.3 dBm			
10.0 GHz	+28 dBm				+27 dBm	0.3 dBm			
12.0 GHz	+23 dBm				+22 dBm	0.3 dBm			
14.0 GHz	+23 dBm				+22 dBm	0.3 dBm			
16.0 GHz	+23 dBm				+22 dBm	0.3 dBm			
18.0 GHz	+23 dBm				+22 dBm	0.3 dBm			
20 GHz	+23 dBm				+22 dBm	0.3 dBm			
22 GHz	+20 dBm				+19 dBm	0.3 dBm			
24 GHz	+20 dBm				+19 dBm	0.3 dBm			
25 GHz	+20 dBm				+19 dBm	0.3 dBm			
26 GHz	+22 dBm				+21 dBm	0.3 dBm			
28 GHz	+22 dBm				+21 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (With Option 2, With Option 15) (Continued)

All MG36241A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
30 GHz	+22 dBm				+21 dBm	0.3 dBm			
32 GHz	+22 dBm				+21 dBm	0.3 dBm			
34 GHz	+22 dBm				+21 dBm	0.3 dBm			
35 GHz	+22 dBm				+21 dBm	0.3 dBm			
36 GHz	+19 dBm				+18 dBm	0.3 dBm			
38 GHz	+19 dBm				+18 dBm	0.3 dBm			
40 GHz	+19 dBm				+18 dBm	0.3 dBm			
42 GHz	+16 dBm				+15 dBm	0.3 dBm			
43.5 GHz	+16 dBm				+15 dBm	0.3 dBm			

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, Without Option 15)

All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+19 dBm				+18 dBm				Skip if Option 6
50 kHz	+19 dBm				+18 dBm				Skip if Option 6
100 kHz	+19 dBm				+18 dBm				Skip if Option 6
1 MHz	+19 dBm				+18 dBm				Skip if Option 6
10 MHz	+19 dBm				+18 dBm				
100 MHz	+19 dBm				+18 dBm				
500 MHz	+19 dBm				+18 dBm				
1 GHz	+19 dBm				+18 dBm				
1.999 GHz	+19 dBm				+18 dBm				
2.0 GHz	+19 dBm				+18 dBm				
4.0 GHz	+19 dBm				+18 dBm				
6.0 GHz	+19 dBm				+18 dBm				
8.0 GHz	+19 dBm				+18 dBm				
10.0 GHz	+19 dBm				+18 dBm				
12.0 GHz	+19 dBm				+18 dBm				
13.0 GHz	+19 dBm				18.0 dBm				
14.0 GHz	+14.5 dBm				+13.5 dBm				
16.0 GHz	+14.5 dBm				+13.5 dBm				
18.0 GHz	+14.5 dBm				+13.5 dBm				
20 GHz	+14.5 dBm				+13.5 dBm				
22 GHz	+14.5 dBm				+13.5 dBm				
24 GHz	+14.5 dBm				+13.5 dBm				
26 GHz	+14.5 dBm				+13.5 dBm				
28 GHz	+14.5 dBm				+13.5 dBm				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (Without Option 2, Without Option 15) (Continued)

All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
30 GHz	+14.5 dBm				+13.5 dBm				
32 GHz	+14.5 dBm				+13.5 dBm				
34 GHz	+14.5 dBm				+13.5 dBm				
36 GHz	+14.5 dBm				+13.5 dBm				
37 GHz	+14.5 dBm				+13.5 dBm				
38 GHz	+11.5 dBm				+10.5 dBm				
40 GHz	+11.5 dBm				+10.5 dBm				
42 GHz	+11.5 dBm				+10.5 dBm				
44 GHz	+11.5 dBm				+10.5 dBm				
46 GHz	+11.5 dBm				+10.5 dBm				
48 GHz	+11.5 dBm				+10.5 dBm				
50 GHz	+11.5 dBm				+10.5 dBm				
52 GHz	+11.5 dBm				+10.5 dBm				
54 GHz	+11.5 dBm				+10.5 dBm				
56 GHz	+11.5 dBm				+10.5 dBm				
58 GHz	+11.5 dBm				+10.5 dBm				
60 GHz	+11.5 dBm				+10.5 dBm				
62 GHz	+11.5 dBm				+10.5 dBm				
64 GHz	+11.5 dBm				+10.5 dBm				
65 GHz	+11.5 dBm				+10.5 dBm				
66 GHz	+10 dBm				+9 dBm				
67 GHz	+10 dBm				+9 dBm				
68 GHz	+7 dBm				+6 dBm Typical				
70 GHz	+7 dBm				+6 dBm Typical				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (With Option 2, Without Option 15)

All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+19 dBm				+18 dBm				Skip if Option 6
50 kHz	+19 dBm				+18 dBm				Skip if Option 6
100 kHz	+19 dBm				+18 dBm				Skip if Option 6
1 MHz	+19 dBm				+18 dBm				Skip if Option 6
10 MHz	+19 dBm				+18 dBm				
100 MHz	+19 dBm				+18 dBm				
500 MHz	+19 dBm				+18 dBm				
1 GHz	+19 dBm				+18 dBm				
1.999 GHz	+19 dBm				+18 dBm				
2.0 GHz	+19 dBm				+18 dBm				
4.0 GHz	+19 dBm				+18 dBm				
6.0 GHz	+19 dBm				+18 dBm				
8.0 GHz	+19 dBm				+18 dBm				
10.0 GHz	+19 dBm				+18 dBm				
12.0 GHz	+19 dBm				+18 dBm				
13.0 GHz	+19 dBm				+18 dBm				
14.0 GHz	+12.5 dBm				+11.5 dBm				
16.0 GHz	+12.5 dBm				+11.5 dBm				
18.0 GHz	+12.5 dBm				+11.5 dBm				
20 GHz	+12.5 dBm				+11.5 dBm				
22 GHz	+12.5 dBm				+11.5 dBm				
24 GHz	+12.5 dBm				+11.5 dBm				
26 GHz	+12.5 dBm				+11.5 dBm				
28 GHz	+12.5 dBm				+11.5 dBm				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (Without Option 2, Without Option 15) (Continued)

All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
30 GHz	+12.5 dBm				+11.5 dBm				
32 GHz	+12.5 dBm				+11.5 dBm				
34 GHz	+12.5 dBm				+11.5 dBm				
36 GHz	+12.5 dBm				+11.5 dBm				
37 GHz	+12.5 dBm				+11.5 dBm				
38 GHz	+10.5 dBm				+9.5 dBm				
40 GHz	+10.5 dBm				+9.5 dBm				
42 GHz	+10.5 dBm				+9.5 dBm				
44 GHz	+10.5 dBm				+9.5 dBm				
46 GHz	+10.5 dBm				+9.5 dBm				
48 GHz	+10.5 dBm				+9.5 dBm				
50 GHz	+10.5 dBm				+9.5 dBm				
52 GHz	+10.5 dBm				+9.5 dBm				
54 GHz	+10.5 dBm				+9.5 dBm				
56 GHz	+10.5 dBm				+9.5 dBm				
58 GHz	+10.5 dBm				+9.5 dBm				
60 GHz	+10.5 dBm				+9.5 dBm				
62 GHz	+10.5 dBm				+9.5 dBm				
64 GHz	+10.5 dBm				+9.5 dBm				
65 GHz	+10.5 dBm				+9.5 dBm				
66 GHz	+6 dBm				+5 dBm				
67 GHz	+6 dBm				+5 dBm				
68 GHz	+4 dBm				+3 dBm Typical				
70 GHz	+4 dBm				+3 dBm Typical				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, With Option 15)

All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+21 dBm				+20 dBm				Skip if Option 6
50 kHz	+21 dBm				+20 dBm				Skip if Option 6
100 kHz	+21 dBm				+20 dBm				Skip if Option 6
1 MHz	+21 dBm				+20 dBm				Skip if Option 6
10 MHz	+21 dBm				+20 dBm				
100 MHz	+21 dBm				+20 dBm				
500 MHz	+21 dBm				+20 dBm				
1 GHz	+21 dBm				+20 dBm				
1.999 GHz	+21 dBm				+20 dBm				
2.0 GHz	+21 dBm				+20 dBm				
4.0 GHz	+28 dBm				+27 dBm				
6.0 GHz	+28 dBm				+27 dBm				
8.0 GHz	+28 dBm				+27 dBm				
10.0 GHz	+28 dBm				+27 dBm				
12.0 GHz	+24 dBm				+23 dBm				
14.0 GHz	+24 dBm				+23 dBm				
16.0 GHz	+24 dBm				+23 dBm				
18.0 GHz	+24 dBm				+23 dBm				
20 GHz	+24 dBm				+23 dBm				
22 GHz	+15.5 dBm				+14.5 dBm				
24 GHz	+15.5 dBm				+14.5 dBm				
26 GHz	+15.5 dBm				+14.5 dBm				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (Without Option 2, With Option 15) (Continued)

All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
28 GHz	+15.5 dBm				+14.5 dBm				
30 GHz	+15.5 dBm				+14.5 dBm				
32 GHz	+15.5 dBm				+14.5 dBm				
34 GHz	+15.5 dBm				+14.5 dBm				
36 GHz	+15.5 dBm				+14.5 dBm				
37 GHz	+15.5 dBm				+14.5 dBm				
38 GHz	+12 dBm				+11 dBm				
40 GHz	+12 dBm				+11 dBm				
42 GHz	+12 dBm				+11 dBm				
44 GHz	+16 dBm				+15 dBm				
46 GHz	+16 dBm				+15 dBm				
48 GHz	+16 dBm				+15 dBm				
50 GHz	+16 dBm				+15 dBm				
52 GHz	+16 dBm				+15 dBm				
54 GHz	+16 dBm				+15 dBm				
56 GHz	+16 dBm				+15 dBm				
58 GHz	+16 dBm				+15 dBm				
60 GHz	+15 dBm				+15 dBm				
62 GHz	+14 dBm				+13 dBm				
64 GHz	+14 dBm				+13 dBm				
65 GHz	+14 dBm				+13 dBm				
66 GHz	+10 dBm				+9 dBm				
67 GHz	+10 dBm				+9 dBm				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (Without Option 2, With Option 15) (Continued)
All MG36271A Models

Frequency	MG36241A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
68 GHz	+10 dBm				+9 dBm Typical				
70 GHz	+10 dBm				+9 dBm Typical				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Leveled Power (With Option 2, With Option 15)

All MG36271A Models

Frequency	MG36271A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
9 kHz	+20 dBm				+19 dBm				Skip if Option 6
50 kHz	+20 dBm				+19 dBm				Skip if Option 6
100 kHz	+20 dBm				+19 dBm				Skip if Option 6
1 MHz	+20 dBm				+19 dBm				Skip if Option 6
10 MHz	+20 dBm				+19 dBm				
100 MHz	+20 dBm				+19 dBm				
500 MHz	+20 dBm				+19 dBm				
1 GHz	+20 dBm				+19 dBm				
1.999 GHz	+20 dBm				+19 dBm				
2.0 GHz	+20 dBm				+19 dBm				
4.0 GHz	+22 dBm				+21 dBm				
6.0 GHz	+22 dBm				+21 dBm				
8.0 GHz	+22 dBm				+21 dBm				
10.0 GHz	+22 dBm				+21 dBm				
12.0 GHz	+22 dBm				+21 dBm				
14.0 GHz	+22 dBm				+21 dBm				
16.0 GHz	+22 dBm				+21 dBm				
18.0 GHz	+22 dBm				+21 dBm				
20 GHz	+22 dBm				+21 dBm				
22 GHz	+12.5 dBm				+11.5 dBm				
24 GHz	+12.5 dBm				+11.5 dBm				
26 GHz	+12.5 dBm				+11.5 dBm				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (With Option 2, With Option 15) (Continued)

All MG36271A Models

Frequency	MG36271A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
28 GHz	+12.5 dBm				+11.5 dBm				
30 GHz	+12.5 dBm				+11.5 dBm				
32 GHz	+12.5 dBm				+11.5 dBm				
34 GHz	+12.5 dBm				+11.5 dBm				
36 GHz	+12.5 dBm				+11.5 dBm				
37 GHz	+12.5 dBm				+11.5 dBm				
38 GHz	+9.5 dBm				+8.5 dBm				
40 GHz	+9.5 dBm				+8.5 dBm				
42 GHz	+9.5 dBm				+8.5 dBm				
44 GHz	+12.5 dBm				+11.5 dBm				
46 GHz	+12.5 dBm				+11.5 dBm				
48 GHz	+12.5 dBm				+11.5 dBm				
50 GHz	+12.5 dBm				+11.5 dBm				
52 GHz	+12.5 dBm				+11.5 dBm				
54 GHz	+12.5 dBm				+11.5 dBm				
56 GHz	+12.5 dBm				+11.5 dBm				
58 GHz	+12.5 dBm				+11.5 dBm				
60 GHz	+12.5 dBm				+11.5 dBm				
62 GHz	+10.5 dBm				+9.5 dBm				
64 GHz	+10.5 dBm				+9.5 dBm				
65 GHz	+10.5 dBm				+9.5 dBm				
66 GHz	+6 dBm				+5 dBm				

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Maximum Levelled Power (With Option 2, With Option 15) (Continued)

All MG36271A Models

Frequency	MG36271A Power Output Level Setting	NRP67T Meas Power (dBm)	Enter offset of attenuator, cables and adapters at each frequency tested	Calculated Value - Add measured power + Offset	Max Power Specification	Measurement Uncertainty	Pass	Fail	Notes
67 GHz	+6 dBm				+3 dBm Typical				
68 GHz	+4 dBm				+3 dBm Typical				
70 GHz	+4 dBm								

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Frequency Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (1 of 6)

Note: All tests use Armored cable p/n 3670K50-2 and adapter p/n 11904D.

Locked External FM Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		2.68%

Locked Low-Noise External FM Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		2.68%

Locked External FM Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		3.23%

Locked Low-Noise External FM Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		3.23%

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Frequency Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (2 of 6)

Note: All tests use Armored cable p/n 3670K50-2 and adapter p/n 11904D.

Locked Internal FM Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		2.68%

Locked Low-Noise Internal FM Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		2.68%

Locked Internal FM Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		3.23%

Locked Low-Noise Internal FM Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
FMerror% =	N/A	N/A		3.23%

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Frequency Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (3 of 6)

Note: All tests use Armored cable p/n 3670K50-2 and adapter p/n 11904D.

Wide External Φ M Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		2.68%

Narrow External Φ M Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		2.68%

Wide External Φ M Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		3.23%

Narrow External Φ M Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		3.23%

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Frequency Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (4 of 6)

Note: All tests use Armored cable p/n 3670K50-2 and adapter p/n 11904D.

Wide Internal Φ M Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		2.68%

Narrow Internal Φ M Accuracy at 5 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		2.68%

Wide Internal Φ M Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		3.23%

Narrow Internal Φ M Accuracy at 20 GHz

Measured Test Results	Offset Value (%)	Final Value (%)	Specification See TDS (11410-00928)	Measurement Uncertainty
Vmodon =				None
Vmodoff =				None
Φ Merror% =	N/A	N/A		3.23%

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Frequency Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (5 of 6)

Note: All tests use Armored cable p/n 3670K50-2 and adapter p/n 11904D.

Locked External FM Flatness

Function Generator Frequency	MG362x1A FM Sensitivity	Vmodoff (dBm)	Vmodon (dBm)	Mod Index	FMflat (dB)	Offset Value (dB)	Final Value (dB)	Specification See TDS 11410-00928	Measurement Uncertainty (dB)
10 kHz	10 kHz/V								0.12
20 kHz	20 kHz/V								0.12
50 kHz	50 kHz/V								0.12
99.8 kHz ^(a)	99.8 kHz/V				Reference	—	—		—
200 kHz	200 kHz/V								0.12
500 kHz	500 kHz/V								0.12
1 MHz	1 MHz/V								0.12
9.98 MHz ^(b)	9.98 MHz/V ^(c)								0.12

a. A potential spurious beat note exists at a 100 kHz rate that can interfere with the carrier frequency null measurement.

Therefore, The measurement is performed at a 99.8 kHz rate with a function generator multimeter reading of 0.7070 Vrms.

b. Bandwidth test.

c. VBW setting on the spectrum analyzer may need to be reduced to 30 Hz to obtain a stable reading.

Narrow External Φ M Flatness

Function Generator Frequency	MG362x1A Φ M Sensitivity	Vmodoff (dBm)	Vmodon (dBm)	Mod Index	FMflat (dB)	Offset Value (dB)	Final Value (dB)	Specification See TDS 11410-00928	Measurement Uncertainty (dB)
10 kHz	1 rad/V								0.12
20 kHz	1 rad/V								0.12
50 kHz	1 rad/V								0.12
99.8 kHz ^(a)	1 rad/V				Reference	—	—		—
200 kHz	1 rad/V								0.12
500 kHz	1 rad/V								0.12
1 MHz	1 rad/V								0.12
10 MHz ^(b)	1 rad/V ^(c)								0.12

a. A potential spurious beat note exists at a 100 kHz rate that can interfere with the carrier frequency null measurement.

Therefore, The measurement is performed at a 99.8 kHz rate with a function generator multimeter reading of 0.7070 Vrms.

b. Bandwidth test.

c. VBW setting on the spectrum analyzer may need to be reduced to 30 Hz to obtain a stable reading.

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Frequency Modulation Test (Option 12)

All MG362x1A Models with Option 12 (6 of 6)

Note: All tests use Armored cable p/n 3670K50-2 and adapter p/n 11904D.

Wide External Φ M Flatness

Function Generator Frequency	MG362x1A Φ M Sensitivity	Vmodoff (dBm)	Vmodon (dBm)	Mod Index	FMflat (dB)	Offset Value (dB)	Final Value (dB)	Specification See TDS 11410-00928	Measurement Uncertainty (dB)
10 kHz	1 rad/V								0.12
20 kHz	1 rad/V								0.12
50 kHz	1 rad/V								0.12
99.8 kHz ^(a)	1 rad/V				Reference	—	—		—
200 kHz	1 rad/V								0.12
500 kHz	1 rad/V								0.12

- a. A potential spurious beat note exists at a 100 kHz rate that can interfere with the carrier frequency null measurement. Therefore, The measurement is performed at a 99.8 kHz rate with a function generator multimeter reading of 0.7070 Vrms.

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Amplitude Modulation Test (Option 12)

All MG362x1A Models with Option 12 (1 of 3)

All tests use power sensor P/N 5532B-550 and adapter P/N11904D.

Note: The attenuator value and type is determined based on procedure.

External AM Accuracy vs. Frequency at 50% Modulation

DUT F1 (GHz)	PK1 (%)	PK2 (%)	M (%)	Specification (%) See TDS (11410-00928)	Measurement Uncertainty (+/- %)
1.0					0.35%
1.4					0.35%
2.2					0.35%
2.3					0.35%
5					0.74%
8.3					0.74%
8.4					0.74%
14					0.74%
20					0.74%
23					0.74%
26.5					0.74%
30					1.32%
33					2.92%
36					2.92%
40					2.92%

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Amplitude Modulation Test (Option 12)

All MG362x1A Models with Option 12 (2 of 3)

All tests use power sensor P/N 5532B-550 and adapter P/N11904D.

Note: The attenuator value and type is determined based on procedure.

Internal AM Accuracy vs. Frequency at 50% Modulation

DUT F1 (GHz)	PK1 (%)	PK2 (%)	M (%)	Specification (%) See TDS (11410-00928)	Measurement Uncertainty (+/- %)
1.0					0.35%
1.4					0.35%
2.2					0.35%
2.3					0.35%
5					0.74%
8.3					0.74%
8.4					0.74%
14					0.74%
20					0.74%
23					0.74%
26.5					0.74%
30					1.32%
33					2.92%
36					2.92%
40					2.92%

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Amplitude Modulation Test (Option 12)

All MG362x1A Models with Option 12(3 of 3)

All tests use power sensor P/N 5532B-550 and adapter P/N11904D.

Note: The attenuator value and type is determined based on procedure.

AM Flatness

DUT F1 (GHz)	M0 (%)	M1 (%)	M2 (%)	M3 (%)	M4 (%)	M5 (%)	M6 (%)	M7 (%)	M8 (%)	M9 (%)	M10 (%)	AMflat (dB)	Spec (dB) See TDS (11410- 00926)	MU ^(a) (dB)
AM rate (Hz)	50	1 k	2 k	3 k	4 k	5 k	6 k	7 k	8 k	9 k	10 k	N/A	N/A	N/A
1.0														0.012
1.4														0.012
2.2														0.012
2.3														0.012
5														0.013
8.3														0.013
8.4														0.013
14														0.013
20														0.013
23														0.013
26.5														0.013
30														0.035
33														0.035
36														0.035
40														0.035

a. MU = Measurement Uncertainty

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Pulse Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (1 of 3)

Pulse Rise and Fall Times

DUT Frequency (GHz)	Rise Time (ns)	Fall Time (ns)	Specification (ns) See TDS (11410-00928)	Measurement Uncertainty ($\pm$ ns)
0.500 000 001				N/A
1.200 000 001				N/A
1.900 000 001				N/A
5.000 000 001				0.023
14.000 000 001				0.023
22.000 000 001				0.023
28.000 000 001				0.023
34.000 000 001				0.023
41.000 000 001				0.023

Pulse Overshoot

DUT Frequency (GHz)	Overshoot (%)	Specification (%) See TDS (11410-00928)	Measurement Uncertainty (%)
0.500 000 001			5
1.200 000 001			5
1.900 000 001			5
5.000 000 001			5
14.000 000 001			5
22.000 000 001			5
28.000 000 001			5
34.000 000 001			5
41.000 000 001			5

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Pulse Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (2 of 3)

Pulse Power Accuracy (Pulse Width $\geq 1 \mu\text{s}$)

DUT Frequency (GHz)	V _{ref} (Volts)	V _{pulse} (Volts)	P _{accuracy} (dB)	Specification (dB) See TDS (11410-00928)	Measurement Uncertainty (dB)
0.050 000 001					0.1
1.200 000 001					0.1
1.900 000 001					0.1
5.000 000 001					0.1
14.000 000 001					0.1
22.000 000 001					0.1
28.000 000 001					0.1
34.000 000 001					0.1
41.000 000 001					0.1

Pulse Power Accuracy (Pulse Width $< 1 \mu\text{s}$)

DUT Frequency (GHz)	V _{ref} (Volts)	V _{pulse} (Volts)	P _{accuracy} (dB)	Specification (dB) See TDS (11410-00928)	Measurement Uncertainty (dB)
2.200 000 001					0.1
5.000 000 001					0.1
14.000 000 001					0.1
22.000 000 001					0.1
28.000 000 001					0.1
34.000 000 001					0.1
41.000 000 001					0.1

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Pulse Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (3 of 3)

All tests use Armored cable P/N 3670K50-2 and adapter P/N 11904D.

Pulse On/Off Ratio

DUT Frequency (GHz)	P _{depth} (dB)	Specification (dB) See TDS (11410-00928)	Measurement Uncertainty (dB)
0.010			0.124
1.0			0.124
1.4			0.124
2.0			0.124
2.2			0.124
2.3			0.12
5.0			0.12
8.3			0.12
8.4			0.15
14.0			0.15
20.0			0.15
23.0			0.15
26.5			0.15
30.0			0.15
33.0			0.18
36.0			0.18
40.0 ^(a)			0.18
50.0 ^(a)			0.22

a. Must change RBW and VBW to 300 Hz.

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Pulse Modulation Tests (Option 12)

All MG362x1A Models with Option 12(1 of 3)

Pulse Rise and Fall Times

DUT Frequency (GHz)	Rise Time (ns)	Fall Time (ns)	Specification (ns) See TDS (11410-00928)	Measurement Uncertainty ($\pm$ ns)
0.500 000 001				N/A
1.200 000 001				N/A
1.900 000 001				N/A
5.000 000 001				0.01
14.000 000 001				0.01
22.000 000 001				0.01
28.000 000 001				0.01
34.000 000 001				0.01
41.000 000 001				0.01

Pulse Overshoot

DUT Frequency (GHz)	Overshoot (%)	Specification (%) See TDS (11410-00928)	Measurement Uncertainty (%)
0.500 000 001			2
1.200 000 001			2
1.900 000 001			2
5.000 000 001			2
14.000 000 001			2
22.000 000 001			2
28.000 000 001			2
34.000 000 001			2
41.000 000 001			2

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Pulse Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (2 of 3)

Pulse Power Accuracy (Pulse Width $\geq 1 \mu\text{s}$)

DUT Frequency (GHz)	V _{ref} (Volts)	V _{pulse} (Volts)	P _{accuracy} (dB)	Specification (dB) See TDS (11410-00928)	Measurement Uncertainty (dB)
0.050 000 001					0.02
1.200 000 001					0.02
1.900 000 001					0.02
5.000 000 001					0.02
14.000 000 001					0.02
22.000 000 001					0.02
28.000 000 001					0.02
34.000 000 001					0.02
41.000 000 001					0.02

Pulse Power Accuracy (Pulse Width $< 1 \mu\text{s}$)

DUT Frequency (GHz)	V _{ref} (Volts)	V _{pulse} (Volts)	P _{accuracy} (dB)	Specification (dB) See TDS (11410-00928)	Measurement Uncertainty (dB)
2.200 000 001					0.02
5.000 000 001					0.02
14.000 000 001					0.02
22.000 000 001					0.02
28.000 000 001					0.02
34.000 000 001					0.02
41.000 000 001					0.02

MG362_1A	Firmware Revision:		Operator:	
Serial Number:		Date:	Options:	

Pulse Modulation Tests (Option 12)

All MG362x1A Models with Option 12 (3 of 3)

All tests use Armored cable P/N 3670K50-2 and adapter P/N 11904D.

Pulse On/Off Ratio

DUT Frequency (GHz)	P _{depth} (dB)	Specification (dB) See TDS (11410-00928)	Measurement Uncertainty (dB)
0.010			0.124
1.0			0.124
1.4			0.124
2.0			0.124
2.2			0.124
2.3			0.12
5.0			0.12
8.3			0.12
8.4			0.15
14.0			0.15
20.0			0.15
23.0			0.15
26.5			0.15
30.0			0.15
33.0			0.18
36.0			0.18
40.0 ^(a)			0.18
50.0 ^(a)			0.22

a. Must change RBW and VBW to 300 Hz.

Appendix B — Instrument Messages

B-1 Introduction

This appendix provides a list of instrument error messages, their meaning and a sample self test log. If any error condition persists, contact your local Anritsu Service Center (<http://www.anritsu.com/contact-us>).

The MG362x1A signal generator displays the following message types:

- “Self Test Messages”, indicating self test pass or fail conditions.
- “Informational Messages”, such as rebooting instrument.
- “Warning Messages” such as a temperature high warning.
- “Error Messages” such as an internal instrument fault.

Messages have the following display characteristics:

- Transient messages appear briefly and then fade away.
- Persistent messages remain on the display and require user intervention to correct the condition.
- Some messages are logged but not displayed, such as messages in the event log.
- Messages may be displayed either in the toolbar or in a pop-up window.

B-2 Error Messages

Lock Error

In Toolbar, Log, Persistent

ALC unleveled

In Toolbar, No Log, Persistent

Power sweep setup error %1

In Toolbar, Log, Persistent

Power sweep setup error

In Toolbar, Log, Persistent

User level calibration table #%1 is invalid

In Toolbar, Log, Transient

ALC noise floor optimization complete

In Toolbar, No Log, Transient

RF Output Reset complete

In Toolbar, No Log, Transient

OCXO drift detected. Perform a 10 MHz reference calibration with an accurate external reference

In Toolbar, Log, Transient

Pulse configuration error %1

In Toolbar, Log, Transient

Reduce AM Input Level

In Toolbar, Log, Persistent

Reduce FM Input Level

In Toolbar, Log, Persistent

Reduce PM Input Level

In Toolbar, Log, Persistent

Reduce FM Deviation

In Toolbar, Log, Persistent

Reduce PM Deviation

In Toolbar, Log, Persistent

Reduce AM Rate

In Toolbar, Log, Persistent

Reduce FM Rate

In Toolbar, Log, Persistent

Reduce PM Rate

In Toolbar, Log, Persistent

ALC unleveled

In Toolbar, No Log, Persistent

B-3 Informational Messages

No application loaded. Factory reset required

In Toolbar, Log, Persistent

Rebooting Instrument

In Toolbar, No Log, Transient

Rebooting instrument into Recovery mode

In Toolbar, No Log, Transient

Attempt to reboot instrument into Recovery mode failed

In Toolbar, Log, Transient

Presetting Instrument

In Toolbar, No Log, Transient

Preset Completed

In Toolbar, No Log, Transient

Resetting Instrument

In Toolbar, Log, Transient

Reset Completed

In Toolbar, Log, Transient

External reference detected – switching reference source to external%1

In Toolbar, Log, Transient

External reference disconnected – switching reference source to internal%1

In Toolbar, Log, Transient

External reference disconnected – switching reference source to Internal High%1

In Toolbar, Log, Transient

External reference disconnected – switching reference source to GPS%1

In Toolbar, Log, Transient

Could not lock to external reference – check connection and try again%1"

In Toolbar, Log, Transient

GPS reference detected – acquiring GPS%1

In Toolbar, Log, Transient

GPS reference acquired – switching reference source to GPS

In Toolbar, Log, Transient

GPS reference disconnected – switching reference source to Internal%1

In Toolbar, Log, Transient

GPS reference no longer available – switching reference source to Internal High%1

In Toolbar, Log, Transient

Internal High reference no longer valid – switching frequency reference source to Internal%1

In Toolbar, Log, Transient

Internal High reference no longer valid – switching time reference source to Internal”

In Toolbar, Log, Transient

GPS reference detected – switching time reference source to GPS

In Toolbar, Log, Transient

GPS reference no longer available – switching time reference source to Internal High

In Toolbar, Log, Transient

Could not lock to internal reference

In Toolbar, Log, Persistent

Software update files found on USB

In Toolbar, No Log, Transient

USB drive %1 ejected

In Toolbar, No Log, Transient

Failed to connect to %1

In Toolbar, No Log, Transient

Successfully connected to %1

In Toolbar, No Log, Transient

Connecting to %1

In Toolbar, No Log, Persistent

File saved successfully %1

In Toolbar, No Log, Transient

File save failed %1

In Toolbar, No Log, Transient

File recalled successfully

In Toolbar, No Log, Transient

File does not exist

In Toolbar, No Log, Transient

Memory Full

In Toolbar, No Log, Transient

Memory Full

In Toolbar, No Log, Popup

Options %1 are not valid for the currently installed firmware version. The device might not function properly

In Toolbar, No Log, Persistent

Options upgraded. Please restart the instrument to use new features

In Toolbar, No Log, Transient

Error %1

In Toolbar, Log, Transient

File %1 import successfully

In Toolbar, No Log, Transient

File %1 export successfully

In Toolbar, No Log, Transient

Save failed. File size exceeds save limits. Adjust setup and try again

In Toolbar, Log, Transient

B-4 Warning Messages

Temperature High Warning

In Toolbar, Log, Persistent

Shutdown Temperature Reached

Popup, Log, Persistent

Save failed. File size exceeds save limits. Adjust setup and try again

In Toolbar, Log, Transient

B-5 Self Test Messages

The MG362x1A signal generator has built-in diagnostics that allow you to run a built-in self test. The test results can be viewed on the screen and saved to a log file. To perform a self test, use the 3-line-icon to access DIAGNOSTICS, then select SELF TEST and the press RUN SELF TEST. Below is a sample list of self tests with passing results:

Table B-1. System Messages

Name	Type	Actual	Expected	Tolerance	Status
System voltage	Voltage	13.02 V	13.00 V	4.00 V	pass
+1.0V digital supply	Voltage	0.99 V	1.00 V	0.10 V	pass
+3.3V digital supply	Voltage	3.28 V	3.30 V	0.33 V	pass
+5.0V digital supply	Voltage	5.00 V	5.00 V	0.50 V	pass
+1.8V digital supply	Voltage	1.83 V	1.80 V	0.18 V	pass
+0.85V PS transceiver AVCC	Voltage	0.84 V	0.85 V	0.09 V	pass
+1.8V PS transceiver AVTT	Voltage	1.80 V	1.80 V	0.18 V	pass
+2.5V DDR SODIMM supply	Voltage	2.49 V	2.50 V	0.25 V	pass
+1.2V DDR SODIMM supply	Voltage	1.20 V	1.20 V	0.12 V	pass
+0.85V FPGA core supply	Voltage	0.85 V	0.85 V	0.09 V	pass
CPU Temperature	Temperature	37.40 C	50.00 C	50.00 C	pass

Table B-2. SG Messages

Name	Type	Actual	Expected	Tolerance	Status
MOD +2.5V supply	Voltage	2.49 V	2.50 V	0.25 V	pass
MOD +3.3V supply	Voltage	3.31 V	3.30 V	0.33 V	pass
ALC	Temperature	59.56 C	30.00 C	60.00 C	pass
YIG	Temperature	40.25 C	30.00 C	60.00 C	pass
SWF +2.5V supply	Voltage	2.48 V	2.50 V	0.25 V	pass
SWF +3.3V supply	Voltage	3.33 V	3.30 V	0.33 V	pass
SWF +5.0V supply	Voltage	5.02 V	5.00 V	0.50 V	pass
SWF +8.0V supply	Voltage	8.07 V	8.00 V	0.80 V	pass
SWF +10.0V HP supply	Voltage	9.65 V	10.00 V	1.00 V	pass
SWF +28.0V supply	Voltage	27.68 V	28.00 V	2.80 V	pass
SWF -2.5V HP supply	Voltage	-2.52 V	-2.50 V	0.25 V	pass
SWF -5.0V HP supply	Voltage	-5.06V	-5.00 V	0.50 V	pass
SWF -32.0V HP supply	Voltage	-31.80 V	-32.00 V	3.20 V	pass
SWF -37.0V HP supply	Voltage	-36.41 V	-37.00 V	3.70 V	pass
SWF -3.3V HP supply	Voltage	-3.38 V	-3.30 V	0.33 V	pass
SWF ALC1 current monitor	Current	0.05 A	0.40 A	0.40 A	pass
SWF ALC2 current monitor	Current	0.32 A	0.40 A	0.40 A	pass
SWF DA1 current monitor	Current	0.41 A	0.40 A	0.40 A	pass
SWF DA2 current monitor	Current	0.00 A	0.40 A	0.40 A	pass

Table B-2. (Continued)SG Messages

Name	Type	Actual	Expected	Tolerance	Status
SWF PA1 current monitor	Current	0.30 A	0.70 A	0.70 A	pass
SWF PA2 current monitor	Current	0.25 A	0.70 A	0.70 A	pass
SWF PA3 current monitor	Current	0.50 A	0.70 A	0.70 A	pass
SWF Temperature	Temperature	32.00 C	30.00 C	60.00 C	pass
Frequency Extension Module Not Available in MG36221A	Voltage	0.00 V	0.00 V	0.00 V	pass
REG +13V Main Voltage	Voltage	13.04 V	13.00 V	1.30 V	pass
REG +6.0V Standby	Voltage	6.01 V	6.00 V	0.60 V	pass
REG +1.5V supply	Voltage	1.52 V	1.50 V	0.15 V	pass
REG +3.3V supply	Voltage	3.35 V	3.30 V	0.33 V	pass
REG +3.9V supply	Voltage	4.03 V	3.90 V	0.39 V	pass
REG +6.0V supply	Voltage	6.02 V	6.00 V	0.60 V	pass
REG +9.0V supply	Voltage	9.18 V	9.00 V	0.90 V	pass
REG +10.0V supply	Voltage	10.18 V	10.00 V	1.00 V	pass
REG +15.0V supply	Voltage	15.10 V	15.00 V	1.50 V	pass
REG +16.0V supply	Voltage	16.59 V	16.00 V	1.60 V	pass
REG +24.0V supply	Voltage	24.22 V	24.00 V	2.40 V	pass
REG +25.0V supply	Voltage	26.24 V	25.00 V	2.50 V	pass
REG +30.0V supply	Voltage	30.13 V	30.00 V	3.00 V	pass
REG -6.0V supply	Voltage	-5.86 V	-6.00 V	0.60 V	pass
REG -16.0V supply	Voltage	-15.76 V	-16.00 V	1.60 V	pass
REG -15.0V supply	Voltage	-14.61 V	-15.00 V	1.50 V	pass
REG -30.0V supply	Voltage	-28.59 V	-30.00 V	3.00 V	pass
REG -40.0V supply	Voltage	-38.39 V	-40.00 V	4.00 V	pass
REG -6.0V standby	Voltage	-5.81 V	-6.00 V	0.60 V	pass
REG -13.0V standby	Voltage	-12.57 V	-13.00 V	1.30 V	pass
Overall Status	Info value				pass

Appendix C — Updating Firmware

C-1 Introduction

Use this appendix to update the MG362x1A firmware.

C-2 Updating Firmware on the MG362x1A

Update with the latest MG362x1A firmware version using the MG362x1A WEB UPDATES menu or a USB memory stick loaded with the latest firmware version.

Use the MG362x1A WEB UPDATES Menu

1. Apply power to the MG362x1A.
2. Verify the MG362x1A is connected to the network and has been given an IP address.
3. Touch the front panel menu sequence as: 3-Line Menu | SYSTEM INFORMATION | SOFTWARE
4. Touch the WEB UPDATES button to the on position as shown in [Figure C-1](#) to automatically check the for Anritsu website for updates.

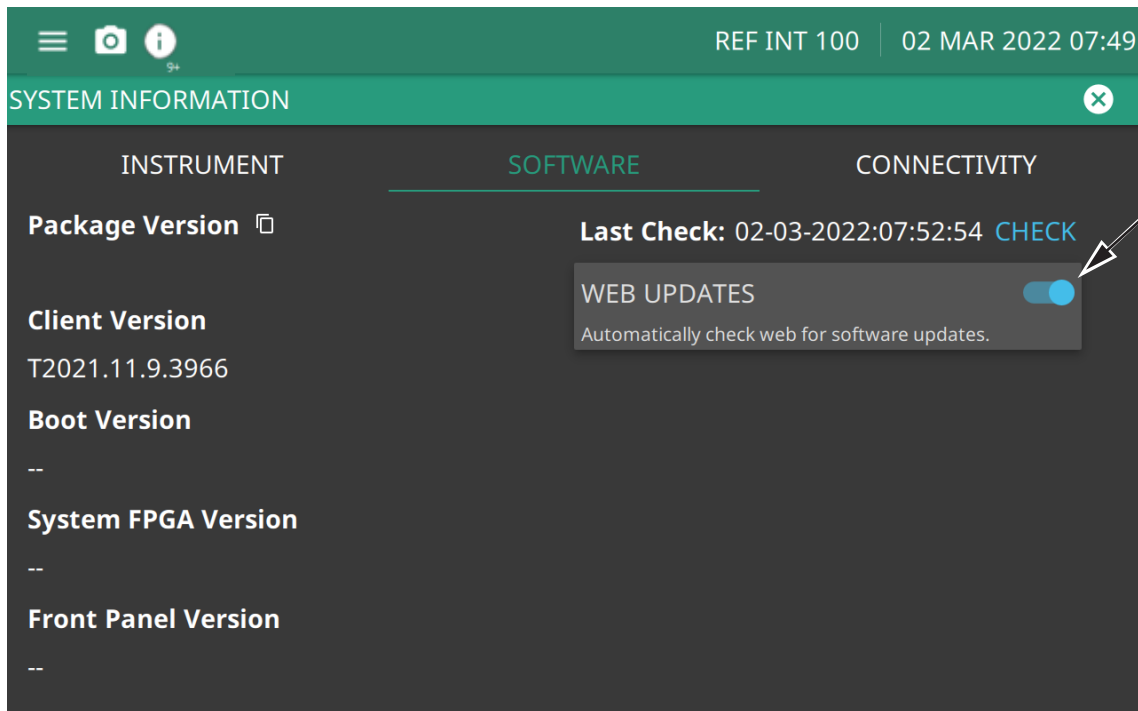


Figure C-1. Web Updates Button

If an update is available, the software update icon will appear on the taskbar as shown in [Figure C-2](#).



Figure C-2. Software Update Icon

5. Touch the software update icon to display the SOFTWARE UPDATE window as shown in [Figure C-3](#).

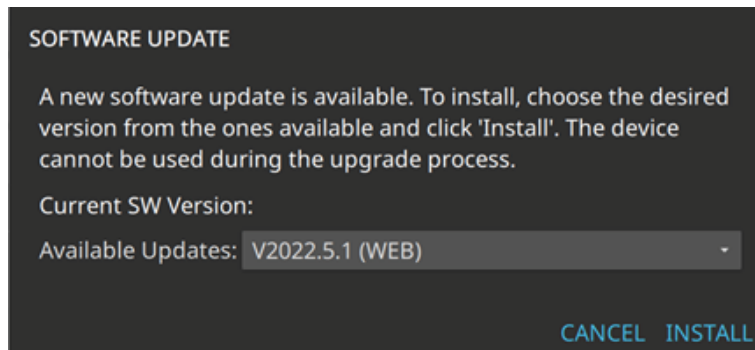


Figure C-3. Software Update Dialog

6. Touch the Available Updates drop down. If multiple versions of MG362x1A firmware are available, select the correct firmware version.
7. Touch INSTALL
8. The SOFTWARE UPDATE PROGRESS dialog is displayed as shown in [Figure C-4](#). The installation process may take a few minutes to complete.
9. When the software upgrade is complete, touch RESTART INSTRUMENT.

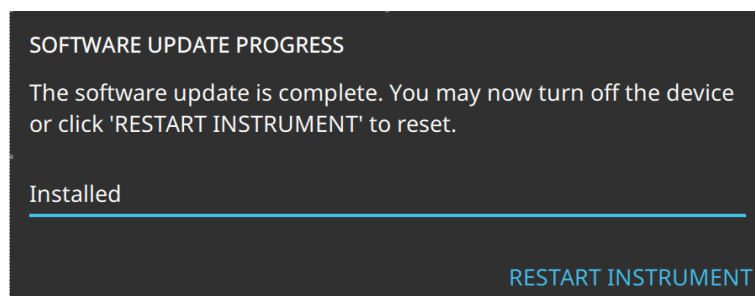


Figure C-4. Software Update Progress Dialog

10. The MG362x1A will reboot with the updated firmware installed.
11. Verify that the Package Version firmware as shown in [Figure C-1 on page C-1](#) shows the most recent version firmware is installed.

The WEB UPDATES button can remain in the on position to alert of future firmware updates when the MG362x1A is connected to the Web. When a new update is available, the software update icon will display on the taskbar as shown in [Figure C-2](#).

Use a USB Memory Device

1. Apply power to the MG362x1A.
2. Download an updated MG362x1A firmware file to a USB memory device. Go to the Anritsu MG362x1A firmware download page at:
<https://www.anritsu.com/en-us/test-measurement/support/downloads/software/dwl20700>
The file will be a .raucb file type.
3. Insert the USB memory device containing the firmware update into the MG362x1A USB slot located on the front panel or rear panel of the instrument. When the memory device is inserted, the software update icon will appear at the top of the touch-screen as shown [Figure C-2](#).

4. Touch the software update icon to display the SOFTWARE UPDATE window shown in [Figure C-3](#).
5. Touch the Available Updates drop down. If multiple versions of MG362x1A firmware are available, select the correct firmware version.
6. Touch INSTALL.
7. The SOFTWARE UPDATE PROGRESS dialog is displayed as shown in [Figure C-4 on page C-2](#). The installation process may take a few minutes to complete.
8. When the software upgrade is complete, touch RESTART INSTRUMENT. The MG362x1A will reboot with the updated firmware installed.
9. Verify the Package Version firmware, as shown in [Figure C-1 on page C-1](#), shows the most recent version firmware is installed.
10. Remove the USB memory device.



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