

**Maintenance Manual**

# **BTS Master™ MT822xB**

**The High Performance Handheld Base Station Analyzer**

The Anritsu logo, featuring the word "Anritsu" in a stylized, blue, sans-serif font. The letter "A" is unique, with a diagonal slash through it.

# **TRADEMARK ACKNOWLEDGMENTS**

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## Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

### Symbols Used in Manuals

#### Danger



This indicates a very dangerous procedure that could result in serious injury or death, and possible loss related to equipment malfunction, if not performed properly.

#### Warning



This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

#### Caution



This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

### Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

## For Safety

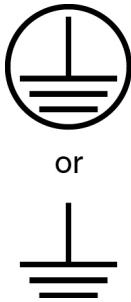
### Warning



Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

### Warning



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

### Warning



This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

### Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

### Warning



This equipment is supplied with a rechargeable battery that could potentially leak hazardous compounds into the environment. These hazardous compounds present a risk of injury or loss due to exposure. Anritsu Company recommends removing the battery for long-term storage of the instrument and storing the battery in a leak-proof, plastic container. Follow the environmental storage requirements specified in the product data sheet.



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# Chapter 1 — General Information

## 1-1 Introduction

This manual provides maintenance instructions for Anritsu BTS Master Models MT822xB. The manual includes:

- General information in this chapter, including:
  - Lists of necessary test equipment to perform verification testing ([Table 1-1](#), [Table 1-2](#), [Table 1-3](#), and [Table 1-4](#))
  - Replaceable parts list ([Table 1-5](#))
- Performance verification procedures:
  - [Chapter 2, “Spectrum Analyzer Verification”](#)
  - [Chapter 3, “Cable and Antenna Analyzer Verification”](#)
  - [Chapter 4, “Power Meter Verification”](#)
  - [Chapter 5, “Option Verification”](#)
- Battery pack information ([Chapter 6, “Battery Information”](#))
- Parts replacement procedures ([Chapter 7, “Assembly Replacement”](#))
- Blank test records are included in [Appendix A](#).
  - Copy the blank test records from [Appendix A](#) and use them to record measured values. These test records form a record of the performance of your instrument. Anritsu recommends that you make a copy of the blank test records to document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which can allow you to observe trends.

Familiarity with the basic operation of the front panel keys (for example, how to change measurement mode, preset the unit, or the meaning of soft key or submenu) is assumed.

<b>Caution</b> Before making any measurement, verify that all equipment has warmed up for at least 30 minutes.
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BTS Master

## 1-2 Anritsu Customer Service Centers

For the latest service and sales information in your area, please visit the following URL:

<http://www.anritsu.com/contact-us>

Choose a country for regional contact information.

## 1-3 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining Anritsu BTS Master Model MT822xB. [Table 1-1](#) is a list of test equipment that is required for verifying the Spectrum Analyzer functions. [Table 1-2](#) is a list of test equipment that is required for verifying the Cable and Antenna Analyzer. [Table 1-3](#) is a list of test equipment that is required for verifying the Power Meter. [Table 1-4](#) is a list of test equipment that is required for verifying the functions of installed options.

**Table 1-1.** Test Equipment Required for Verifying Spectrum Analyzer Functions

Instrument	Critical Specification	Recommended Manufacturer/Model
Signal Generator	Frequency: 0.1 Hz to 20 GHz, Power Output: +16 dBm, Step attenuator installed	Anritsu Model MG3692A or MG3692B with Options 2A, 4, 22, 15x <sup>a</sup>
Power Meter	Power Range: –70 dBm to +20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 100 kHz to 18 GHz Power Range: –30 dB to +20 dB	Anritsu Model MA2421D (Quantity 2) or SC7816 (Quantity 2)
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –67 dB to +20 dB	Anritsu Model MA2442D (Quantity 2)
50 ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Anritsu Model 34RKNF50
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(f), 50 ohm	Anritsu Model 15NN50-1.5B (Quantity 2)
Lowpass Filter	Frequency: 50 MHz	Anritsu Part Number 1030-96
Frequency Reference	Frequency: 10 MHz	Symmetricon RubiSource T&M
Signal Generator		Agilent Model 8648D with Options 1ES and 1EA
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10 (Quantity 2)
Fixed Attenuator	20 dB Attenuation	Aeroflex/Weinschel Model 44-20 (Quantity 2)
Fixed Attenuator	6 dB Attenuation	Aeroflex/Weinschel Model 44-6 (Quantity 2)
Fixed Attenuator	2 dB Attenuation	Aeroflex/Weinschel Model 44-2 (Quantity 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Any (Quantity 2) Anritsu Model 2000-1627-R

a. MG3692A models require Option 15 to achieve power of +16 dBm at 3.5 GHz. MG3692B models do not require Option 15 to achieve power of +16 dBm at 3.5 GHz.



**Table 1-2.** Test Equipment Required for Cable and Antenna Analyzer Verification

Instrument	Critical Specification	Recommended Manufacturer/Model
Frequency Counter	Frequency: 2 GHz	Anritsu Model MF2412B
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(f), 50 ohm	Anritsu Model 15NNF50-0.6B
Open/Short	Frequency: DC to 18 GHz	Anritsu Model 22N50
Termination	Frequency: DC to 18 GHz Return Loss: 40 dB min.	Anritsu Model 28N50-2
Termination	Frequency: DC to 18 GHz Return Loss: 40 dB min.	Anritsu Model 28NF50-2
6 dB Offset Termination	Frequency: DC to 6.0 GHz	Anritsu Model SC7424
20 dB Offset Termination	Frequency: DC to 6.0 GHz	Anritsu Model SC7423
Adapter	Frequency: DC to 20 GHz N(m) to N(m)	Anritsu Model 34NN50A

**Table 1-3.** Test Equipment Required for Power Meter Verification

Instrument	Critical Specification	Recommended Manufacturer/Model
Signal Generator	Frequency: 0.1 Hz to 20 GHz Power Output to +13 dBm	Anritsu Model MG3692A or MG3692B with options 2A, 4, 15, 22 <sup>a</sup>
Power Meter	Power Range: -70 to +20 dBm	Anritsu Dual Channel Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: -67 to +20 dB	Anritsu Model MA2442D (quantity 2)
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz K(m) to N(f), 50 ohm	Anritsu Model 34RKNF50
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-0.6B
Frequency Reference	Frequency: 10 MHz	Symmetricon Model RubiSource T&M

a. Option 15 is required for MG3692A models to achieve power of +13 dBm. MG3692B models do not require Option 15.

**Table 1-4.** Test Equipment Required for Verifying Options (1 of 3)

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesizer	Frequency: 0.1 Hz to 20 GHz, +16 dBm power	Anritsu Model MG3692A or MG3692B with options 2A, 4, 15, and 22 <sup>a</sup>

**Table 1-4.** Test Equipment Required for Verifying Options (2 of 3)

Instrument	Critical Specification	Recommended Manufacturer/Model
Vector Signal Generator	Frequency: 100 kHz to 3 GHz	Anritsu Model MG3700A with Options MG3700A-002 and MG3700A-021  Waveform licenses for TD-SCDMA (MX370001A), LTE (MX370108A) and TD-LTE (MX370110A) are required and must be purchased.
Power Meter	Power Range: –70 to + 20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –60 to +20 dBm	Anritsu Model MA2482D with Option 1 (Quantity 2)
Frequency Counter	Frequency: 20 GHz	Anritsu Model MF2412B
Programmable Attenuator	Frequency: DC to 2 GHz Attenuation: 100 dB (1 dB and 10 dB steps)	Anritsu Model MN63A
Fixed Attenuator	Frequency Range: DC to 18 GHz Attenuation: 10 dB	Aeroflex/Weinschel Model 44-10 (Quantity 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
RF Power Amplifier	Frequency: 100 to 1000 MHz Gain: 35 dB min	Mini Circuits Model TIA-1000-1R8 (Quantity 2)  BNC(m) to N(f) Adapters required
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Maury Microwave Model 8828B (Quantity 2)  One each required only if Anritsu Coupler and Circulator are used
Adapter	Frequency: DC to 20 GHz K(m) to N(f), 50 ohm	Anritsu Model 34RKNF50
Adapter	Frequency: 881.5 MHz BNC(m) to N(f), 50 ohm	ADT-2615-NF-BNM-02 (Quantity 2)
Adapter	Frequency: 881.5 MHz SMA(m) to N(f), 50 ohm	Midwest Microwave Model ADT-2582-NF-SMM-02 (Qty: 4)  Required only if Anritsu Coupler and Circulator are used.
Adapter	Frequency: 881.5 MHz SMA(m) to SMA(m), 50 ohm	Midwest Microwave Model ADT-2594-MM-SMA-02  Required only if Anritsu Coupler and Circulator are used.
50 ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
High Power Load	DC to 18 GHz, 10W	Aeroflex/Weinschel Model M1418
Coupler	Frequency: 881.5 MHz Coupling Factor: 30 dB	Midwest Microwave Model CPW-5140-30-NNN-05 or CPW-5141-30-NNN-05  Alternative: Anritsu pn: 1091-307  Two SMA(m) to N(f) adapters required.

**Table 1-4.** Test Equipment Required for Verifying Options (3 of 3)

Instrument	Critical Specification	Recommended Manufacturer/Model
Circulator	Frequency Range: 800 to 1000 MHz Isolation: 20 dB min	Meca Electronics, Inc. pn: CN-0.900  Alternative: Anritsu pn: 1000-50 Two SMA(m) to N(f) adapters and one SMA(m) to SMA(m) adapter required.
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-1.5B (Quantity 3)
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-0.6B
GPS Antenna		Anritsu 2000-1528-R
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Anritsu Model 2000-1627-R (Quantity 2)
Adapter	SMA to BNC(f)	Pomona 4290 or equivalent
Adapter	GPS Terminator	Amphenol B1004A1-ND3G-93R-0.05-1W or equivalent

a. Option 15 is required for MG3692A models to achieve power of +13 dBm. MG3692B models do not require Option 15.

## 1-4 Replaceable Parts

**Table 1-5.** List of Replaceable Parts

Part Number	Description
ND70330<R>	MT8221B Main/Spec Analyzer/VSG PCB Assembly where MB=3-68907-3 & VSG= 3-72203-3 <sup>a</sup> (for S/N < 1041134)
ND71754<R>	MT8221B Main/Spec Analyzer/VSG PCB Assembly <sup>a</sup> (for S/N > 1041133 and < 1118162)
ND74518<R>	MT8221B Main/SPA/VSG Assembly where MB=3-72815-4 & VSG= 3-72203-4
ND75333<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-4 <sup>a</sup>
ND75911<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-68236-3 with Opt 23 <sup>a</sup>
ND75912<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-68236-3 <sup>a</sup>
ND75913<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-72203-3 with Opt 23 <sup>a</sup>
ND75914<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-72203-4 <sup>a</sup>
ND75915<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-68236-3 <sup>a</sup>
ND75916<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-4 with Opt 23 <sup>a</sup>
ND75917<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-3 with Opt 23 <sup>a</sup>
ND75918<R>	MT8221B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-3 <sup>a</sup>
ND75919<R>	MT8221B Main/SPA/VSG Assembly where MB=3-72815-4 & VSG= 3-72203-4 with Opt 23 <sup>a</sup>
ND72130<R>	MT8222B Main/Spec Analyzer/VSG PCB Assembly <sup>a</sup> where MB=3-72815-4 & VSG= 3-72203-4 with Opt 23
ND75920<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-68236-3 with Opt 23
ND75921<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-68236-4
ND75922<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-3 & VSG= 3-72203-4
ND75923<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-68236-4 with Opt 23
ND75924<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-3 with Opt 23
ND75925<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-3
ND75926<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-4 with Opt 23
ND75927<R>	MT8222B Main/SPA/VSG Assembly where MB=3-68907-4 & VSG= 3-72203-4
ND75928<R>	MT8222B Main/SPA/VSG Assembly where MB=3-72815-4 & VSG= 3-72203-4
ND70320<R>	GPS Module (Option 31)
ND70324<R>	MT822xB Mezzanine PCB Assembly
ND70323<R>	MT822xB T3/T1 PCB Assembly (Option 51/53)
ND70322<R>	MT822xB E1 PCB Assembly (Option 52)
3-790-661	Gasket material for case edge
3-15-118	LCD Display with CF Backlight
3-15-154	LCD Display with LED Backlight

**Table 1-5.** List of Replaceable Parts

Part Number	Description
3-61368	Clear Plastic LCD Protector
3-66549-3	LCD Backlight Inverter PCB (for 3-15-118)
3-790-702	Gasket material for LCD edge
2000-1686-R	Soft Carrying Case
ND73920	Top Case Only (excludes model ID Label, LCD Display, LCD Cover and keypad items)
ND73921	Bottom Case Assembly <sup>b</sup>
3-65314	Plastic Left & Right Tilt Bail Holders (Set)
3-65316	Tilt Bail
3-65684	Tilt Bail Clip
3-68768	Model MT8221B ID Label
3-67151-3	Battery Door
633-75	High Capacity Li-ion Battery Pack
513-64 or 3-513-64	Type N RF connector
3-ND70948	Fan Assembly
40-187-R	AC to DC Power Converter
3-61470	Handle Hand Strap
3-61571	Ring Holder Hand Strap
3-71027-3	Main Numeric Keypad PCB
3-61362	Main Numeric Keypad Membrane
3-61363-1	Main Numeric Keypad Bezel
3-61361	Function Keypad Membrane
3-61378-1	Function Keypad Bezel
3-71030-3	Function Keypad PCB
790-625	Speaker
3-410-101	Encoder (excluding knob)
3-61360-2	Knob (excluding encoder)
ND81761<R>	CPRI Assembly, Option 750
3-ND82072<R>	CPRI Assembly, Option 751 or 759
3-ND70324<R>	Mezzanine Board
3-803-136	CPRI to Mezzanine Cable

a. When ordering the Main/Spectrum Analyzer/VSG PCB Assembly, in order to ensure installation of correct options, all options that are installed on the instrument must be declared on the order. The options are listed and shown in the **System** (Shift 8) / Status display.

b. The bottom cover which had the metal tilt bail is no longer available and is replaced with a new blue bottom cover with integrated plastic tilt bail.



# Chapter 2 — Spectrum Analyzer Verification

## 2-1 Introduction

This chapter describes the verification process for the Spectrum Analyzer in the MT8222xB BTS Master. The following tests are in this chapter:

- “Frequency Accuracy Verification” on page 2-2
- “Single Side Band (SSB) Phase Noise Verification” on page 2-3
- “Spurious Response (Second Harmonic Distortion) Verification” on page 2-4
- “Input Related Spurious (IRS) Signals Verification” on page 2-6
- “Resolution Bandwidth Accuracy Verification” on page 2-9
- “Spectrum Analyzer Absolute Amplitude Accuracy Verification” on page 2-10
- “Residual Spurious Response Verification” on page 2-18
- “Displayed Average Noise Level (DANL)” on page 2-20

<b>Note</b>	Allow all instruments to warm up to typical operating temperature before taking test readings.
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## 2-2 Frequency Accuracy Verification

The following test is used to verify the CW frequency accuracy of the Spectrum Analyzer in the MT822xB BTS Master.

### Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

### Procedure

1. Connect the 10 MHz Reference source to the Anritsu MG3692X Signal Generator.

<b>Note</b>	Do not connect the external 10 MHz Reference to the BTS Master.
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2. Turn on the 10 MHz Reference Standard and the Anritsu MG3692X Signal Generator.
3. Set the MG3692X output to 1 GHz CW, with an RF Output Level of –30 dBm.
4. Connect the output of the source to the RF In of the BTS Master.
5. Turn on the BTS Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key to reset the instrument to the default starting conditions.
8. Press the **Amplitude** soft key and then press the **Reference Level** soft key.
9. Use the keypad to enter –10 and select the dBm soft key.
10. Press the **Span** soft key, use the keypad to enter 10, and select the kHz soft key.
11. Press the **BW** soft key and select the **RBW** soft key.
12. Use the keypad to enter 100 and select the Hz soft key.
13. Press the **VBW** soft key, use the keypad to enter 30 and then select the Hz soft key.
14. Press the **Freq** soft key and select the **Center Freq** soft key.
15. Use the keypad to enter 1 and select the GHz soft key.
16. Press the **Marker** soft key, select the **More** soft key, turn Counter Marker On, press the **Back** soft key, and select the **Peak Search** soft key.
17. Verify that the marker frequency is 1 GHz, record its value in [Table A-1, “Spectrum Analyzer Frequency Accuracy” on page A-2](#), and verify it is within specification.
18. Set the MG3692X frequency to 7 GHz.
19. Set the MT822xB center freq to 7 GHz.
20. Press the **Marker** soft key, select the **More** soft key, turn Counter Marker On, press the **Back** soft key, and select the **Peak Search** soft key.
21. Verify that the marker frequency is 7 GHz, record its value in [Table A-1](#) and verify it is within specification.

<b>Note</b>	If the unit fails the <a href="#">Section 2-2 “Frequency Accuracy Verification”</a> test, then contact your local Anritsu Service Center ( <a href="http://www.anritsu.com/contact-us">http://www.anritsu.com/contact-us</a> ).
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## 2-3 Single Side Band (SSB) Phase Noise Verification

This test is used to verify the single side band (SSB) phase noise of the spectrum analyzer in the MT822xB BTS Master.

### Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable

### Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Signal Generator.
2. Turn on the 10 MHz reference source and the Anritsu MG3692X Signal Generator.
3. Set the MG3692X output to 7.09 GHz CW, with an RF output level of +13 dBm.
4. Connect the output of the MG3692X Signal Generator to the RF In connector of the BTS Master.
5. Turn on the BTS Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key to reset to the default starting conditions.
8. Press the **Amplitude** soft key, then press the **Reference Level** soft key.
9. Use the keypad to enter 0 and select the dBm soft key.
10. Press the **Atten Lvl** soft key, use the keypad to enter 15 and press the dB soft key.
11. Press the **Freq** soft key and select the **Center Freq** soft key.
12. Use the keypad to enter 7.090050 and press the GHz soft key.
13. Press the **Span** soft key, use the keypad to enter 110, and select the kHz soft key.
14. Press the **BW** soft key and select the **RBW** soft key.
15. Use the keypad to enter 1 and select the kHz soft key.
16. Press the **VBW** soft key and use the keypad to enter 3, then select the Hz soft key.
17. Press the **Shift** key and then press the **Trace** (5) key, then select the **Trace A Operations** soft key.
18. Press the **# of Average** soft key, use the keypad to enter 7, then press the **Enter** key.
19. Wait until the Trace Count displays “7/7”.
20. Press the **Marker** key and select the **Peak Search** soft key.
21. Press the **Delta On/Off** soft key to turn Delta on.
22. Use the keypad to enter 10 and press the kHz soft key.
23. Enter the measured value into [Table A-2, “Spectrum Analyzer SSB Phase Noise Verification” on page A-2](#).
24. Subtract 30 dB from the average value and verify that the result is less than –100 dBc/Hz (for 10, 20 and 30 kHz Offset) or –102 dBc/Hz (for 100 kHz offset) and record the Calculated Value results in the test records. Use [Table A-2](#).  
  
For example:  $-70 \text{ dBc measured} - 30 \text{ dB} = -100 \text{ dBc/Hz}$
25. Repeat [Step 15](#) through [Step 23](#) for 20 kHz, 30 kHz and 100 kHz. Enter the test results and calculations in the appropriate rows of [Table A-2](#).

## 2-4 Spurious Response (Second Harmonic Distortion) Verification

The following test is used to verify the input related spurious response of the spectrum analyzer in the MT822xB BTS Master.

### Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable
- 50 MHz Low Pass Filter (Anritsu part number 1030-96)
- BNC male to BNC male Coaxial Cable

### Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Signal Generator.
2. Turn on the 10 MHz reference source and the Anritsu MG3692X Signal Generator.
3. Set the MG3692X output to 50.1 MHz CW, with an RF Output Level of -30 dBm.
4. Connect one end of the 50 MHz Low Pass Filter to the output of the source and the other end to the BTS Master RF In with the coaxial cable.
5. Turn on the BTS Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset to the default starting conditions.
8. Press the Amplitude soft key and then press the Reference Level soft key.
9. Use the keypad to enter -27 and press the dBm soft key.
10. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
11. Press the Detection soft key, and then the Peak soft key.
12. Press the Freq soft key and select the Center Freq soft key.
13. Use the keypad to enter 50.1 and press the MHz soft key.
14. Press the Span soft key, use the keypad to enter 100, and select the kHz soft key.
15. Press the BW soft key and select the RBW soft key.
16. Use the keypad to enter 1 and select the kHz soft key.
17. Press the VBW soft key. Use the keypad to enter 10 and then select the Hz soft key.
18. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations soft key.
19. Press the # of Average soft key, use the keypad to enter 5 and then press the **Enter** key.
20. Wait until the Trace Count displays "5/5".
21. Press the **Marker** key and select the Peak Search soft key.
22. Record the amplitude for 50.1 MHz. Use [Table A-3, "Spectrum Analyzer Spurious Response \(Second Harmonic Distortion\)" on page A-2](#).
23. Press the Freq soft key and select the Center Freq soft key.
24. Use the keypad to enter 100.2 and press the MHz soft key.
25. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations soft key.
26. Press the # of Average soft key, use the keypad to enter 5 and then press the **Enter** key.

27. Wait until the Trace Count displays “5/5”.
28. Press the **Marker** key and select the Peak Search soft key.
29. Record the amplitude for 100.2 MHz in the test records. Use [Table A-3](#).
30. Calculate the 2nd Harmonic level in dBc by subtracting the 50.1 MHz amplitude from the 100.2 MHz amplitude using this formula:  
Second Harmonic Level Amplitude at 100.2 MHz = 100.2 MHz amplitude – 50.1 MHz amplitude = \_\_\_\_\_ dBc
31. Verify that the calculated Second Harmonic Level is  $\leq -50$  dBc and record in the test records. Use [Table A-3](#).

## 2-5 Input Related Spurious (IRS) Signals Verification

The following test is used to verify the input related spurious signals of the spectrum analyzer in the MT822xB at different frequencies.

### Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- BNC male to BNC male Coaxial Cable

### Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Signal Generator.
2. Connect the output of the Anritsu MG3692X Signal Generator to the MT822xB RF In.
3. Set the MG3692X RF Output Level to  $-30$  dBm.
4. Turn on the MT822xB.
5. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset to the default starting conditions.

### 1672 MHz Input Related Spurious Check

7. Set the MG3692X frequency to 1672 MHz CW.
8. On the MT822xB, press the **Amplitude** key and then press the Reference Level soft key.
9. Use the keypad to enter  $-27$  and press the dBm soft key.
10. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
11. Press Detection soft key and then the Peak soft key.
12. Press the Freq soft key and select the Center Freq soft key.
13. Use the keypad to enter 1672 and select the MHz soft key.
14. Press the Span soft key, use the keypad to enter 2, and select the MHz soft key.
15. Press the BW soft key and select the RBW soft key.
16. Use the keypad to enter 10 and select the kHz soft key.
17. Press the VBW soft key. Use the keypad to enter 1 and then select the kHz soft key.
18. Wait until one sweep is completed.
19. Press the Marker soft key and select the Peak Search soft key.
20. Record the Marker 1 amplitude reading for 1672 MHz. Use the **1672 MHz** row of [Table A-4, "Spectrum Analyzer Input Related Spurious \(IRS\) Signals" on page A-3](#).

<b>Note</b>	Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.
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21. Press the Freq soft key and select the Start Freq soft key.
22. Use the keypad to enter 100 and select the kHz soft key.
23. Press Stop Freq soft key, enter 1671 and press the MHz soft key. Wait until one sweep is completed.
24. Press the Marker soft key and select the Peak Search soft key.

25. Record the Marker 1 amplitude reading to the test record. Use the **100 kHz to 1671 MHz** row of [Table A-4](#).
26. Calculate the input related spurious level and verify that it is  $\leq -40$  dBc using the following formula and record it in the test records. Use the **1672 MHz** row of [Table A-4](#).  
$$\text{Input Related Spurious} = \text{Marker 1 Reading} - \text{Amplitude Reading for 1672 MHz}$$
27. Repeat [Step 21](#) through [Step 26](#) setting a start frequency of 1673 MHz and a stop frequency of 2800 MHz and record the results in the **1673 MHz to 2800 MHz** Measured Value row of [Table A-4](#).

### 1675 MHz Input Related Spurious Check

28. Set the MG3692X frequency to 1675 MHz CW.
29. On the MT822xB, press the Freq soft key and select the Center Freq soft key.
30. Use the keypad to enter 1675 and select the MHz soft key.
31. Press the Span soft key, use the keypad to enter 2, and select the MHz soft key.
32. Press the **Trace** (5) key, then select the Trace A Operations soft key.
33. Press the # of Average soft key, use the keypad to enter 5 and then press the **Enter** key.
34. Wait until the Trace Count displays “5/5”.
35. Press the Marker soft key and select the Peak Search soft key.
36. Record the amplitude at 1675 MHz to the test records. Use the **1675 MHz** row of [Table A-4](#).
37. Press the Freq soft key and select the Start Freq soft key.
38. Use the keypad to enter 2 and select the MHz soft key.
39. Press Stop Freq soft key, enter 4 and press the MHz soft key.
40. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations soft key.
41. Press the # of Average soft key, use the keypad to enter 5 and then press the **Enter** key.
42. Wait until the Trace Count displays “5/5”.
43. Press the **Marker** key and select the Peak Search soft key.
44. Record the Marker 1 amplitude reading to the test records. Use the **1675 MHz** row of [Table A-4](#).
45. Calculate the input related spurious level using the formula below, verify that it is  $\leq -60$  dBc, and record it in the test records. Use the **1675 MHz** row of [Table A-4](#).

$$\text{Input Related Spurious} = \text{Marker 1 reading} - \text{Amplitude reading for 1675 MHz}$$

### 3608 MHz Input Related Spurious Check

46. Set the MG3692X frequency to 3608 MHz CW.
47. On the MT822xB, press the Freq soft key and select the Center Freq soft key.
48. Use the keypad to enter 3608 and select the MHz soft key.
49. Press the Span soft key, use the keypad to enter 2, and select the MHz soft key.
50. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations soft key.
51. Press the # of Average soft key, use the keypad to enter 5 and then press the **Enter** key.
52. Wait until the Trace Count displays “5/5”.
53. Press the Marker soft key and select the Peak Search soft key.
54. Record the amplitude at 3608 MHz in the test records. Use the **3608 MHz** row of [Table A-4](#).
55. Press the Freq soft key and select the Start Freq soft key.
56. Use the keypad to enter 5489 and select the MHz soft key.

57. Press **Stop Freq** soft key, enter 5491 and press the **MHz** soft key.
58. Press the **Shift** key and then press the **Trace** (5) key, then select the **Trace A Operations** soft key.
59. Press the **# of Average** soft key, use the keypad to enter 5 and then press the **Enter** key.
60. Wait until the **Trace Count** displays "5/5".
61. Press the **Marker** soft key and select the **Peak Search** soft key.
62. Record the **Marker 1** amplitude reading in the test records. Use the **3608 MHz** row of [Table A-4](#).
63. Calculate the input related spurious level using the formula below, record the results in the test records and verify that it is  $\leq -60$  dBc. Use the **3608 MHz** row of [Table A-4](#).

$$\text{Input Related Spurious} = \text{Marker 1 Reading} - \text{Amplitude Reading for 3608 MHz}$$

## 5208 MHz Input Related Spurious Check

64. Set the MG3692X frequency to 5208 MHz CW.
65. On the MT822xB, press the **Freq** soft key and select the **Center Freq** soft key.
66. Use the keypad to enter 5208 and select the **MHz** soft key.
67. Press the **Span** soft key, use the keypad to enter 2, and select the **MHz** soft key.
68. Press the **Shift** key and then press the **Trace** (5) key, then select the **Trace A Operations** soft key.
69. Press the **# of Average** soft key, use the keypad to enter 5 and then press the **Enter** key.
70. Wait until the **Trace Count** displays "5/5".
71. Press the **Marker** soft key and select the **Peak Search** soft key.
72. Record the amplitude at 5208 MHz in the test records. Use the **5208 MHz** row of [Table A-4](#).
73. Press the **Freq** soft key and select the **Start Freq** soft key.
74. Use the keypad to enter 5489 and select the **MHz** soft key.
75. Press **Stop Freq** soft key, enter 5491 and press the **MHz** soft key.
76. Press the **Shift** key and then press the **Trace** (5) key, then select the **Trace A Operations** soft key.
77. Press the **# of Average** soft key, use the keypad to enter 5 and then press the **Enter** key.
78. Wait until the **Trace Count** displays "5/5".
79. Press the **Marker** soft key and select the **Peak Search** soft key.
80. Record the **Marker 1** amplitude reading in the test records. Use the **5208 MHz** row of [Table A-4](#).
81. Calculate the input related spurious level using the formula below, record the results in the test records and verify that it is  $\leq -60$  dBc. Use the **5208 MHz** row of [Table A-4](#).

$$\text{Input Related Spurious} = \text{Marker 1 Reading} - \text{Amplitude Reading for 3608 MHz}$$

## 2-6 Resolution Bandwidth Accuracy Verification

The following test is used to verify the resolution bandwidth accuracy of the spectrum analyzer in the MT822xB BTS Master.

### Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

### Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Signal Generator and the MT822xB BTS Master.
2. Turn on the MG3692X, set the frequency to 1 GHz CW and Level to –30 dBm.
3. Connect the output of the Anritsu MG3692X Signal Generator to the MT822xB Spectrum Analyzer RF In.
4. Turn on the MT822xB BTS Master.
5. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key to reset to the default starting conditions.
7. Press the **Amplitude** soft key and then press the **Reference Level** soft key.
8. Use the keypad to enter –10 and press the **dBm** soft key.
9. Press the **Atten Lvl** soft key and enter 0, then press the **dB** soft key.
10. Press the **Scale** soft key and enter 10, then press **dB/div** soft key.
11. Press the **Freq** soft key and select the **Center Freq** soft key.
12. Use the keypad to enter 1 and select the **GHz** soft key.

### RBW Test

13. Press the **Span** soft key, use the keypad to enter the span listed in the test records. Refer to the **Span** column of [Table A-5, “Spectrum Analyzer Resolution Bandwidth Accuracy” on page A-4](#).
14. Press the **BW** soft key and select the **RBW** soft key.
15. Use the keypad to enter 3 and select the **MHz** soft key.
16. Set the **VBW** from the value listed in the test records. Refer to the **VBW** column of [Table A-5](#).
17. Press the **Shift** key, press the **Measure** (4) key and then press the **OCC BW** soft key.
18. Press the **dBc** soft key and enter 3, then press the **Enter** key.
19. Press the **OCC BW On/Off** soft key to turn on occupied bandwidth.
20. Record the OCC BW reading in the test records. Use the **Measured Value** column of [Table A-5](#).
21. Verify that the OCC BW reading frequency is within 10% of the RBW.
22. Repeat [Step 13](#) through [Step 20](#) for the other settings and record in [Table A-5](#).

## 2-7 Spectrum Analyzer Absolute Amplitude Accuracy Verification

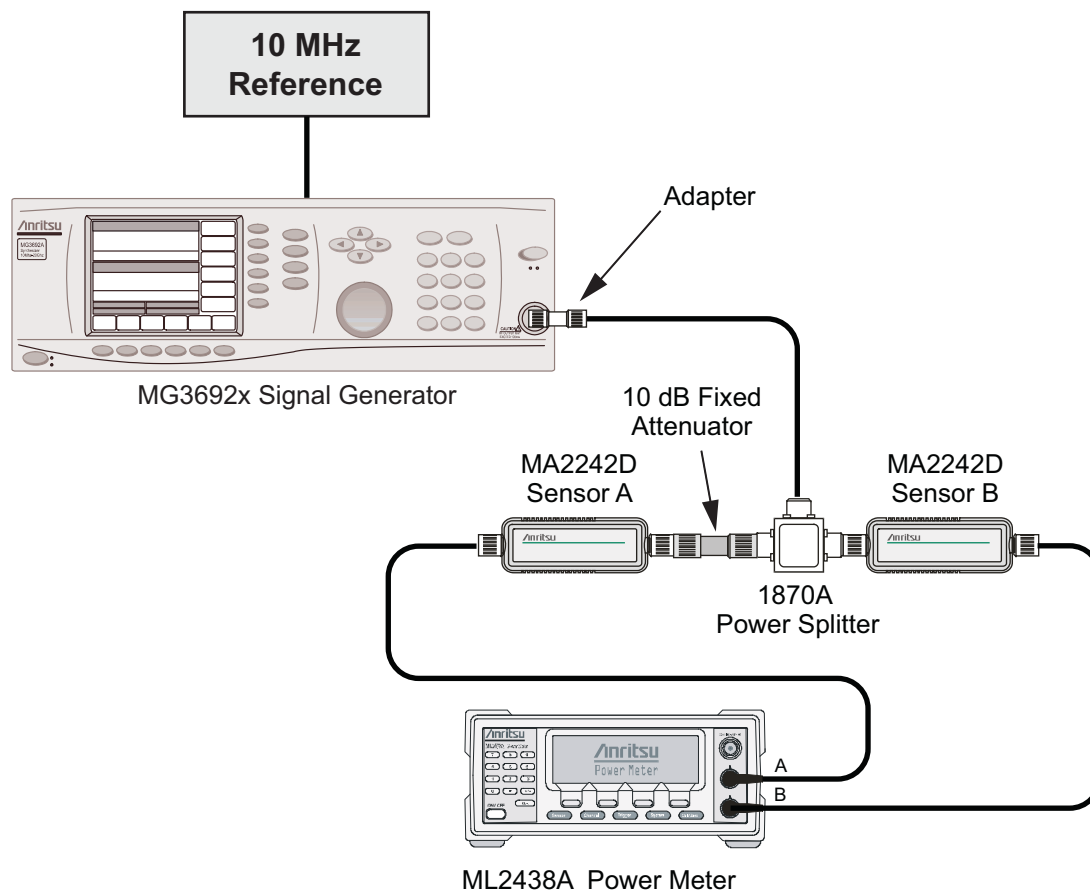
The tests in the following two sections verify the absolute amplitude accuracy of the Spectrum Analyzer in the MT822xB BTS Master. The two parts of this test are “[50 MHz Amplitude Accuracy Verification](#)” immediately below and “[Amplitude Accuracy Across Frequency Verification](#)” on page 2-14.

### 50 MHz Amplitude Accuracy Verification

#### Equipment Required

- Anritsu MG3692X Signal Generator
- Anritsu ML2438A Dual Channel Power Meter
- Anritsu MA2442D High Accuracy Power Sensors (2)
- Anritsu 34NN50A 50 ohm Adapter
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator

#### Setup



**Figure 2-1.** Absolute Amplitude Accuracy Verification Pretest Setup



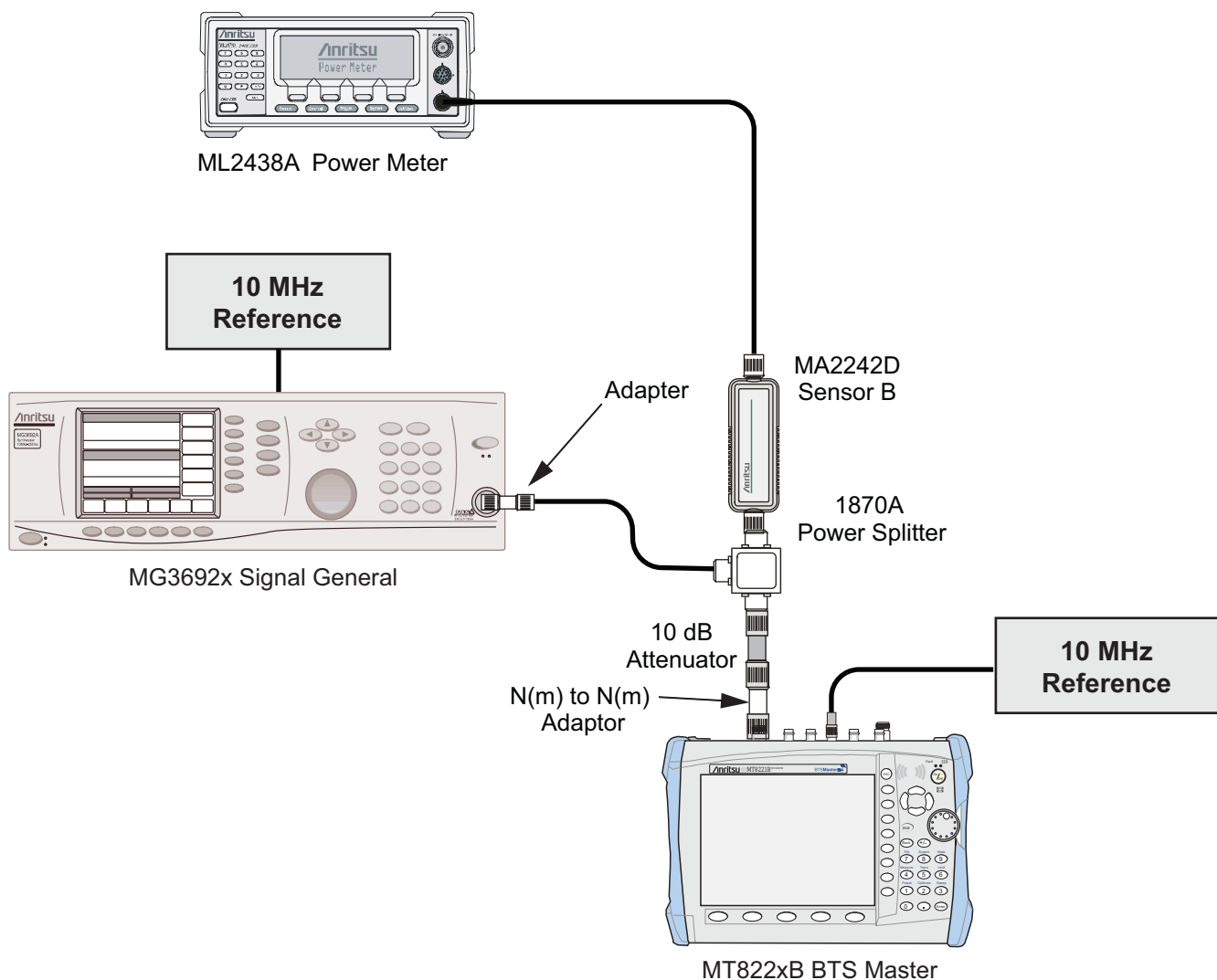
**Test Setup Components Characterization**

1. Turn on the ML2438A Power Meter, the MG3692X Signal Generator, and the MT822xB BTS Master.
2. On the power meter, press the **Channel** soft key, the **Setup** soft key and then the **Channel** soft key to display Channel 2 Setup menu.
  - a. Press the **Input** key twice to set the Input Configuration to B.
  - b. Press the **Sensor** key to display both Sensor A and Sensor B readings.
  - c. Connect the power sensors to the power meter and calibrate the sensors.
  - d. Connect the Power Splitter to the MG3692X Output and Sensor B to one of the Power Splitter Outputs.
3. Install the 10 dB Fixed Attenuator to the other Power Splitter Output and then connect Sensor A to the end of the attenuator as shown in [Figure 2-1, “Absolute Amplitude Accuracy Verification Pretest Setup”](#).
4. Set the MG3692X to a frequency of 50 MHz.
5. On the Power Meter, press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key.
  - a. Use the keypad to enter 50 MHz as the input signal frequency, do this for both Sensor A and Sensor B, which sets the power meter to the proper power sensor cal factor.
  - b. Press the **Sensor** key on the power meter to display the power reading.
6. Starting with 0 dBm, adjust the power level of the MG3692x to get a reading on Sensor A that matches the power level in the **Test Power Level at 50 MHz** column of [Table A-6, “Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy Setup Table”](#) on page A-5.
7. Record the Sensor B reading in the **Required Sensor B Reading** column of [Table A-6](#).
8. Repeat Step 7 and Step 8 for the other input levels from –4 dBm to –50 dBm.

<b>Note</b>	Note Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.
-------------	---

**Measuring 50 MHz Amplitude Accuracy**

1. Remove Sensor A, add the adapter and connect it to the Spectrum Analyzer RF In connector of the MT822xB BTS Master as shown in [Figure 2-2](#).



**Figure 2-2.** Absolute Amplitude Accuracy Verification Test Setup

2. On the MT822xB, press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
3. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset to the default starting conditions.
4. Press the Freq soft key and select the Center Freq soft key.
5. Use the keypad to enter 50 and select the MHz soft key.
6. Press the BW soft key and the RBW soft key.
7. Use the keypad to enter 1 and select the kHz soft key.
8. Press the VBW soft key and use the keypad to enter 10, then select the Hz soft key.
9. Press the Span soft key, use the keypad to enter 10, and select the kHz soft key.
10. Press the Amplitude soft key and then press the Reference Level soft key.

11. Use the keypad to enter 10 and press the dBm soft key.
12. Press the Atten Lvl soft key and enter 30, then press the dB soft key.
13. Adjust the source power so that the power meter displays the corresponding desired Sensor B reading as recorded for 0 dBm in the Required Sensor B Reading column of [Table A-6](#).
14. Press the Marker soft key and select the Peak Search soft key.
15. Record the Marker 1 amplitude reading in the **0 dBm** row of [Figure A-7](#), “Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy” on page A-5.
16. Verify that the Marker 1 amplitude reading is within the specification.
17. Repeat Step 13 through Step 16 for the other power level settings. Refer to [Table A-6](#) for Required Sensor B Readings. Use [Table A-7](#) to record test results.

## 2-8 Amplitude Accuracy Across Frequency Verification

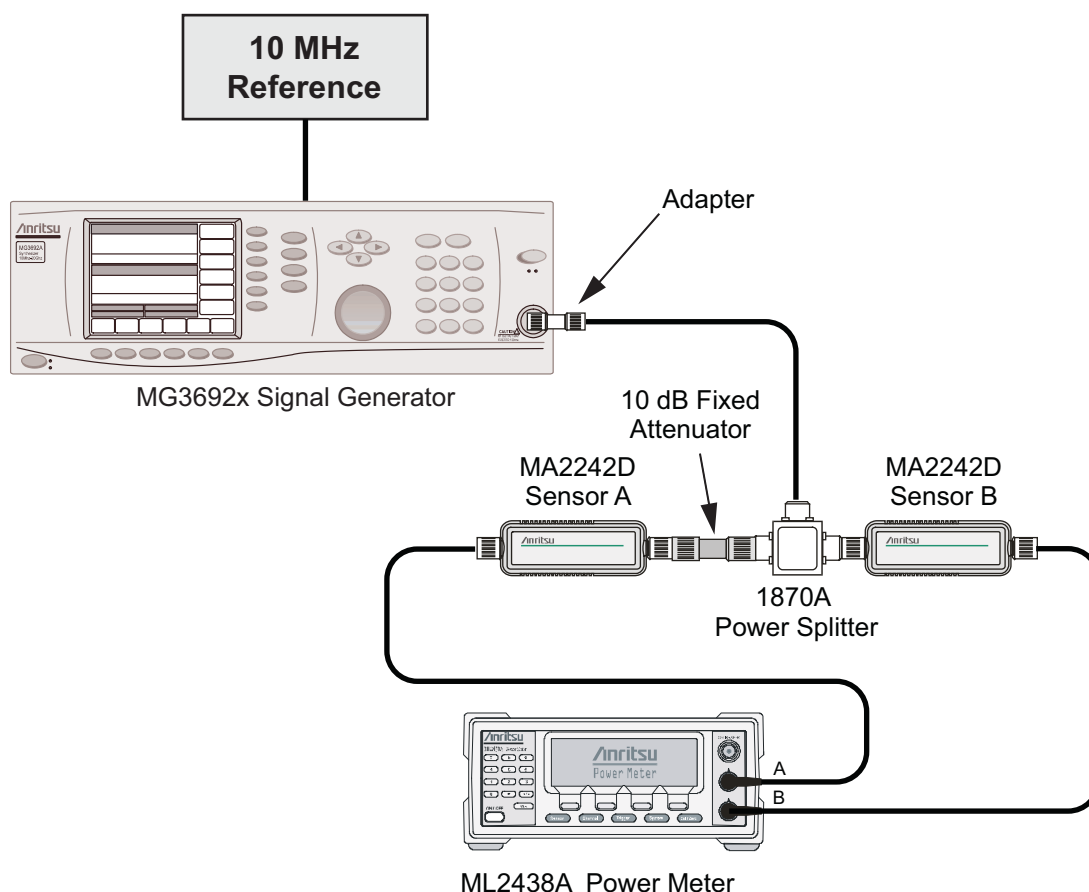
This procedure is the second test used to verify the absolute amplitude accuracy of the Spectrum Analyzer in the MT822xB BTS Master. The first procedure test was described above in [“50 MHz Amplitude Accuracy Verification”](#) on page 2-10.

### Equipment Required

- Anritsu MG3692X Signal Generator
- Anritsu ML2438A Dual Channel Power Meter
- Anritsu MA2442D High Accuracy Power Sensors (2)
- Anritsu 34NN50A 50 ohm Adapter
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator

### Test Setup Component Characterization

1. Connect both MA2442D power sensors to the power meter and calibrate the sensors.
2. Connect the equipment as shown in [Figure 2-3](#).

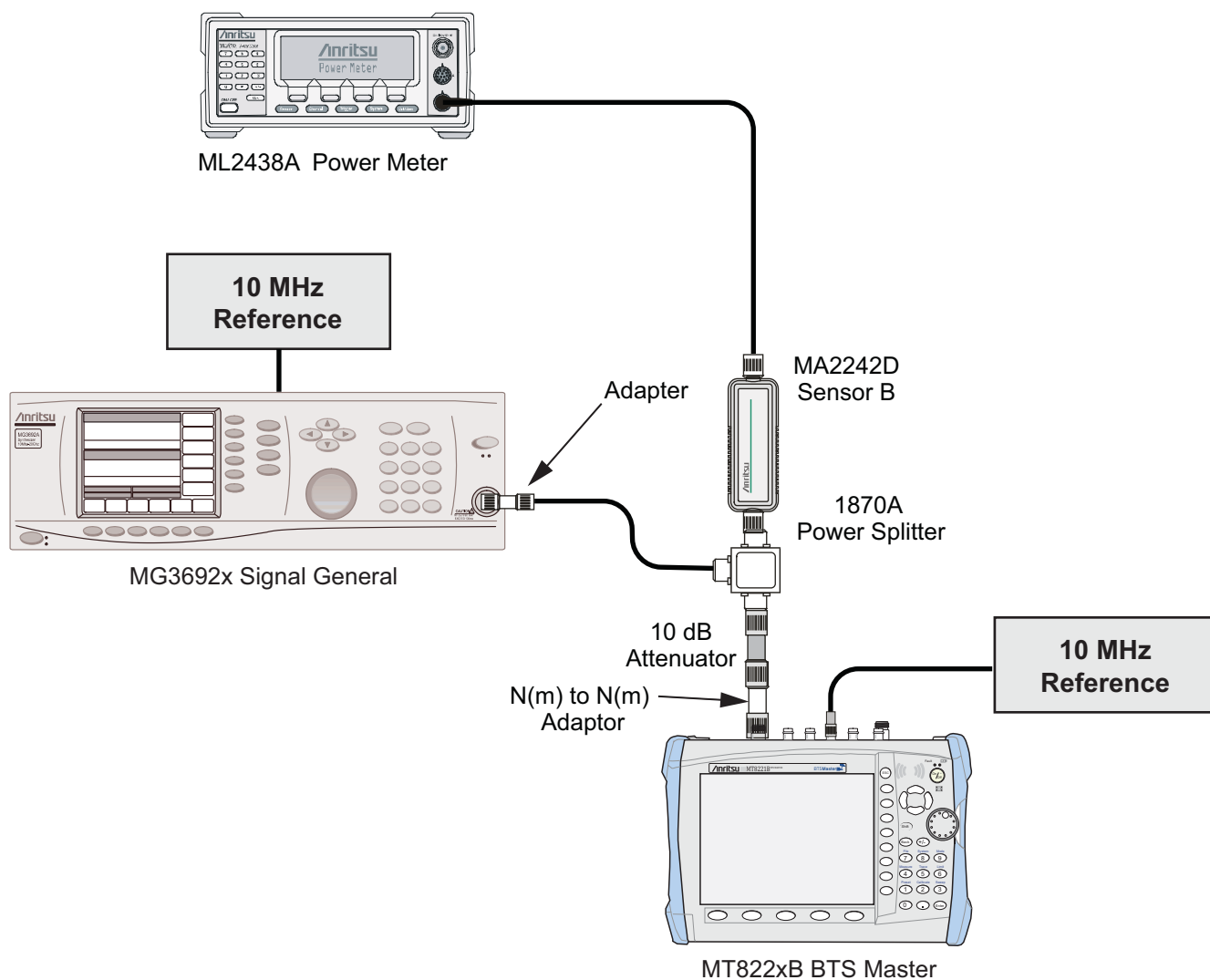


**Figure 2-3.** Fixed Level with Varying Frequency Setup

3. Set the MG3692x frequency to 10.1 MHz.
4. Set the power meter to display both Channel A and B. Press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Repeat for Channel B. Press the **System** key to display the power reading.
5. Adjust the MG3692x output level so that Sensor A reading is  $-2 \text{ dBm} \pm 0.1 \text{ dB}$ .
6. Record the Sensor B reading to the **-2 dBm** column of [Table A-8](#), “[Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency Setup Table](#)” on page A-6.
7. Adjust the MG3692x output level so that Sensor A reading is  $-30 \text{ dBm} \pm 0.1 \text{ dB}$ .
8. Record the Sensor B reading to the **-30 dBm** column of [Table A-8](#).
9. Repeat Steps 3 through 8 for all the frequencies listed in [Table A-8](#).

**Note** Before continuing, allow a 30 minute warm up for the internal circuitry to stabilize.

## Setup

**Figure 2-4.** Absolute Amplitude Accuracy Across Frequency Verification Test Setup

**Measuring Amplitude Accuracy Across Frequency**

1. Connect the equipment as shown in [Figure 2-4](#).

**Note**

To maintain test setup integrity, do not disconnect Sensor B, the power splitter or the fixed attenuator.

2. Set the MT822xB to Spectrum Analyzer mode and then preset the unit.
3. Press the BW soft key. Then set the RBW to 1 kHz and the VBW to 10 Hz.
4. Press the Span soft key, set span to 10 kHz.
5. Set the MG3692x frequency to 10.1 MHz CW.
6. Set the MG3692x Output to –20 dBm.
7. Set the power meter to display Channel B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
8. Adjust the MG3692x output power so that the power meter displays a reading which matches the Sensor B reading for –30 dBm in [Table A-8](#).
9. On the MT822xB, press the Amplitude soft key, then set the Reference Level to –20 dBm.
10. Press the Freq soft key and select the Center Freq soft key.
11. enter 10.1 MHz (or the next frequency).
12. Press the Amplitude soft key, then set the Atten Lvl to 0 dB.
13. Press the **Marker** key and select the Peak Search soft key.
14. Record the Marker 1 amplitude reading in [Table A-9](#), “Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency” on [page A-7](#).
15. Verify that the Marker 1 amplitude reading is within the specification.
16. Repeat Step 12 to Step 15 for Atten Lvl of 5 dB, 10 dB and 20 dB.
17. Adjust the MG3692x output power so that the power meter displays a reading which matches the Sensor B reading on the characterization chart for –2 dBm.
18. On the MT822xB, press the Amplitude soft key, then set the Reference Level to 10 dBm.
19. Repeat Steps 12 to Step 15 for Atten Lvl of 30 dB, 40 dB, 50 dB and 60 dB.
20. Repeat Steps 5 to Step 19 for all the frequencies in the test records in [Table A-9](#).

## 2-9 Residual Spurious Response Verification

The following two tests are used to verify the residual spurious response of the Spectrum Analyzer of the MT822xB BTS Master and is performed using the positive peak detection mode. The two parts to this test are the “[Residual Spurious Response Test with Preamp Off](#)” immediately below and “[Residual Spurious Response Test with Preamp On](#)” on page 2-19.

### Residual Spurious Response Test with Preamp Off

#### Equipment Required

- Anritsu 28N50-2 50 ohm Termination

#### Procedure

1. Connect the 50 ohm Termination to the MT822xB Spectrum Analyzer RF In.
2. Press the **On/Off** key to turn on the MT822xB BTS Master.
3. On the MT822xB:
  - a. Press the **Shift** key and then the **Mode** (9) key.
  - b. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
5. Press the Amplitude soft key, then press the Reference Level soft key.
6. Use the keypad to enter  $-40$  and press the dBm soft key.
7. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
8. Make sure that the Pre Amp On/Off soft key is in the Off position.
  - If the preamp is on, then press the Pre Amp On/Off soft key to turn it off.
9. Press the Detection soft key and then the Peak soft key.
10. Press the Freq soft key and select the Start Freq soft key.
11. Use the keypad to enter 100 and select the kHz soft key.
12. Press the Stop Freq soft key, enter 10 and press the MHz soft key.
13. Press the BW soft key and select the RBW soft key.
14. Use the keypad to enter 3 and select the kHz soft key.
15. Press the VBW soft key, use the keypad to enter 300 and then select the Hz soft key.
16. Wait until one sweep is completed.
17. Press the Marker soft key and select the Peak Search soft key.
18. Verify that the Marker 1 amplitude reading is less than  $-90$  dBm.

#### Note

If a spur larger than  $-90$  dBm appears, then wait another full sweep and observe whether the spur re-appears at the same point on the second sweep.

If the spur does not appear at the same point on the second sweep, then the spur on the first sweep was not real.

19. Record the “Marker 1 amplitude” reading to [Table A-10, “Spectrum Analyzer Residual Spurious with Preamp Off”](#) on page A-9.
20. Repeat Step 10 through Step 19 for the other frequency band settings in [Table A-10](#).



## Residual Spurious Response Test with Preamp On

### Equipment Required

- Anritsu 28N50-2 50 ohm Termination

### Procedure

1. Connect the 50 ohm Termination to the MT822xB Spectrum Analyzer RF In.
2. Press the **On/Off** key to turn on the MT822xB BTS Master.
3. On the MT822xB, press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
5. Make sure that the Pre Amp On/Off soft key is in the On position.
6. If the preamp is off, then press the Pre Amp On/Off soft key to turn it on.

<b>Note</b> Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.
--

7. Press the Amplitude soft key, then press the Reference Level soft key.
8. Use the keypad to enter  $-50$  and press the dBm soft key.
9. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
10. Press the Detection soft key and then the Peak soft key.
11. Press the BW soft key and select the RBW soft key.
12. Use the keypad to enter 10 and select the kHz soft key.
13. Press the VBW soft key and use the keypad to enter 1, then select the kHz soft key.
14. Press the Freq soft key and select the Start Freq soft key.
15. Use the keypad to enter 100 and select the kHz soft key.
16. Press the Stop Freq soft key, enter 10 and press the MHz soft key.
17. Wait until one sweep is completed.
18. Press the Marker soft key and select the Peak Search soft key.
19. Record the “Marker 1 amplitude” reading in the test records and verify that it is less than  $-100$  dBm. Use [Table A-11](#), “Spectrum Analyzer Residual Spurious with Preamp On” on page A-10.
20. Repeat Step 14 through Step 20 for the other Start and Stop frequencies and record in [Table A-11](#).

<b>Note</b>	<p>If a spur larger than <math>-100</math> dBm appears, then wait another full sweep and observe whether the spur re-appears at the same point on the second sweep.</p> <p>If the spur does not appear at the same point on the second sweep, then the spur on the first sweep was not real.</p>
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## 2-10 Displayed Average Noise Level (DANL)

The following test is used to verify the Displayed Average Noise Level (DANL) of the spectrum analyzer systems in the MT822xB BTS Master. This test is performed using the RMS detection mode.

### Equipment Required

- Anritsu 28N50-2 50 ohm Termination

### Procedure

1. Connect the 50 ohm Termination to the MT822xB Spectrum Analyzer RF In.
2. Press the **On/Off** key to turn on the MT822xB BTS Master.
3. On the MT822xB, press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.

<b>Note</b>	Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.
-------------	--

5. Press the Amplitude soft key, then press the Reference Level soft key.
6. Use the keypad to enter  $-50$  and press the dBm soft key.
7. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
8. Make sure that the Preamp is Off.
9. Press the Detection soft key and then the RMS soft key.
10. Press the BW soft key and select the RBW soft key.
11. Use the keypad to enter 100 and select the kHz soft key.
12. Select the VBW soft key.
13. Use the keypad to enter 1 and select the kHz soft key.
14. Press the Freq soft key and select the Start Freq soft key.
15. Use the keypad to enter 10 and select the MHz soft key.
16. Press the Stop Freq soft key, enter 1 and press the GHz soft key.
17. Wait until one sweep is completed.
18. Press the Marker soft key and then select Peak Search soft key.
19. Record the Marker reading to the test records. Use the **Measured Value at 100 kHz RBW** column of [Table A-12, "Spectrum Analyzer DANL with Pre Amp Off" on page A-11](#).

<b>Note</b>	The noise floor consists of totally random signals where a spur is a fixed spike of varying amplitude that is always visible.
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20. Repeat Step 14 through Step 19 for the other frequency settings in [Table A-12](#). Change the VBW setting as indicated in the VBW column of [Table A-12](#).
21. For each measured 100 kHz RBW value in the test record, convert it to 1 Hz RBW value by subtracting 50 dB.
 
$$-110 \text{ dBm} - 50 \text{ dB} = -160 \text{ dBm}$$

For example, if the marker shows a value of  $-110$  dBm at 100 kHz RBW, then the calculated value at 1 Hz RBW is  $-160$  dBm.
22. Enter the calculated values in the test records. Use the **Calculated for 1 Hz RBW** column of [Table A-12](#).

23. Verify that the calculated value is less than or equal to the value in the Specification column of [Table A-12](#).
24. Press the Amplitude soft key, press the Preamp On/Off soft key to turn the preamp on.
25. Repeat Step 10 through Step 23.
26. Record the Marker reading and calculated value in the test record using [Table A-13](#), “Spectrum Analyzer DANL with Pre Amp On” on page A-11.



# Chapter 3 — Cable and Antenna Analyzer Verification

## 3-1 Introduction

These tests verify that the Cable and Antenna Analyzer of the Model MT822xB BTS Master is functional. The functional tests include:

- [“Frequency Accuracy Verification” on page 3-1](#)
- [“Return Loss Accuracy Verification” on page 3-2](#)
- [“System Dynamic Range Verification” on page 3-3](#)

<b>Note</b> Allow all instruments to warm up to typical operating temperature before taking test readings.
--

## 3-2 Frequency Accuracy Verification

The following test is used to verify the CW frequency accuracy of the RF source in the MT822xB in Cable and Antenna Analyzer mode.

### Equipment Required

- Frequency Counter, Anritsu Model MF2412B
- RF Coaxial Cable, Anritsu Model 15NNF50-0.6B

### Procedure

1. Verify that the MT822xB is in Cable and Antenna Analyzer mode and preset the unit.
2. Verify that no external 10 MHz reference is connected to the MT822xB.
3. Press **Shift** then the **Sweep** key.
4. Verify that the RF Immunity is set to High.
5. Press the **Freq/Dist** key and set both the Start Freq and Stop Freq to 2 GHz.
6. Connect the RF cable from the MT822xB VNA Reflection RF Out to the Frequency Counter.
7. Turn on the Frequency Counter and press the **Preset** key.
8. Record the frequency data in [Table A-14, “VNA Frequency Accuracy” on page A-12](#).

## 3-3 Return Loss Accuracy Verification

The following test can be used to verify the accuracy of return loss measurements. Measurement calibration of MT822xB in Cable and Antenna Analyzer mode is required for this test.

### Equipment Required

- Open/Short, Anritsu Model 22N50
- Termination, Anritsu Model 28N50-2
- 6 dB Offset Termination, Anritsu Model SC7424
- 20 dB Offset Termination, Anritsu Model SC7423

### Procedure

1. Verify that the MT822xB is in Cable and Antenna Analyzer mode and preset the unit.
2. Press the **Measurement** key, then press the Return Loss soft key.
3. Press the **Shift** key, then press the **Calibrate** (2) key. Verify that Cal Type is set to 1-Port and Cal Power is High.
4. Press the **Start Cal** soft key. Follow the instructions on the screen to perform a calibration.
5. After the calibration is complete, install the 20 dB offset termination.
6. Press the **Amplitude** key, set Top to 17 dB, and Bottom to 23 dB.
7. Verify that the data display falls between 18.4 dB and 21.6 dB.
8. Press the **Marker** key and select the Marker to Peak soft key. Record the marker value, then select the Marker to Valley soft key and record the marker value. Record the worst case of the two values in [Table A-15, “VNA Return Loss Accuracy Verification” on page A-12.](#)
9. Remove the 20 dB offset and install the 6 dB offset.
10. Press the **Amplitude** key, set Top to 4.0 dB, and set Bottom to 8.0 dB.
11. Verify that the data display falls between 5 dB and 7 dB.
12. Press the **Marker** key and select the Marker to Peak soft key. Record the marker value, then select the Marker to Valley soft key and record the marker value. Record the worst case of the two values in [Table A-15.](#)

## 3-4 System Dynamic Range Verification

The following test can be used to verify the system dynamic range. Measurement calibration of the MT822xB in Cable and Antenna Analyzer mode is required.

### Equipment Required

- Open/Short, Anritsu Model 22N50
- Termination, Anritsu Model 28N50-2
- Termination, Anritsu Model 28NF50-2
- Adapter N(m) to N(m), Anritsu Model 34NN50A
- RF Coaxial Cable, Anritsu Model 15NNF50-0.6B

### Procedure

1. Verify that the MT822xB is in Cable and Antenna Analyzer mode and preset the unit.
2. Press the **Measurement** key, then select 2-Port Gain (a red dot is displayed on the selected item).
3. Press the **Shift** key, then press the **Sweep** (3) key.
4. Verify that RF Immunity is set to High
5. Press the **Shift** key, then press the **Calibrate** (2) key.
6. Verify that the Cal Type is set to 2-Port and the Output Power is set to High.
7. Press the Start Cal soft key and follow the on screen instructions to perform an OSL-THRU-ISOL calibration.
8. After the calibration is complete, disconnect one end of the cable and connect loads so that both the VNA Reflection port and VNA RF In port are terminated.
9. Press **Shift**, **Sweep**, and select Averaging. Verify that Averaging is set to Off.
10. Press the **Amplitude** key and set the Bottom to –120 dB and the Top to –50 dB.
11. Press **Shift**, **Limit** (6), and set the Limit to On.
12. Select Single Limit and set the limit to –80 dB.
13. Press the Multi-Segment Edit soft key.
14. Ensure that the left most point is selected (highlighted in red) and verify that the Point Frequency is set to 400 MHz.
15. Ensure that the Point Value is –80 dB, if not, then select Point Value and enter –80 dB.
16. Select Add Point, select Point Frequency, and enter 3.0 GHz.
17. Select Point Value and enter –80 dB.
18. Select Add Point, select Point Frequency, and enter 3.01 GHz.
19. Select Point Value and enter –70 dB.
20. Select Add Point and select Point Frequency and enter 4.00 GHz.
21. Select Point Value and enter –70 dB. If the instrument is a MT8221B, then skip steps 21 through 29.
22. Select Add Point and select Point Frequency and enter 4.01 GHz.
23. Select Point Value and enter –70 dB.
24. Select Add Point and select Point Frequency and enter 5.50 GHz.
25. Select Point Value and enter –70 dB.
26. Select Add Point and select Point Frequency and enter 5.51 GHz.
27. Select Point Value and enter –65 dB.

28. Select Add Point and select Point Frequency and enter 6.00 GHz.
29. Select Point Value and enter –65 dB.
30. Verify the display of the system dynamic range is below the limit lines (the data will be unstable, but should remain below the limit lines.)
31. Use a marker to find the maximum peak of each frequency band and enter the value in dB in [Table A-16](#), “VNA System Dynamic Range Verification” on page A-12.



# Chapter 4 — Power Meter Verification

## 4-1 Power Meter Level Accuracy

The following test verifies the level accuracy of the MT822xB Power Meter function in the MT822xB.

### Equipment Required

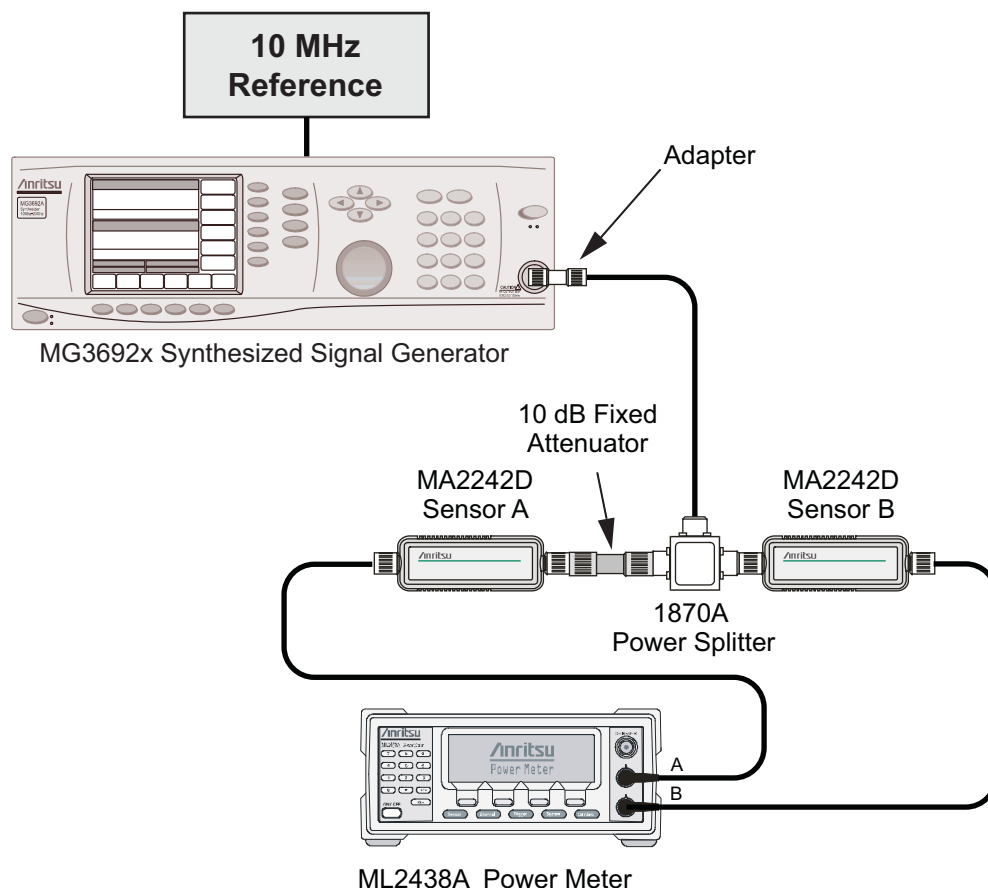
- Signal Generator, Anritsu Model MG3692A or B with options 2A, 4, 22, 15<sup>(2)</sup>
- Power Meter, Anritsu Dual Channel Model ML2438A
- Power Sensor, Anritsu Model MA2442D (quantity 2)
- Fixed Attenuator 10 dB, Aeroflex/Weinschel Model 44-10
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Adapter N(m) to N(m), Anritsu Model 34NN50A
- Adapter K(m) to N(f), Anritsu Model 34RKNF50
- RF Coaxial Cable, Anritsu Model 15NN50-0.6B

(2) Option 15 is required for MG3692A models to achieve power of +13 dBm. MG3692B models do not require Option 15.

### Procedure Component Characterization:

<b>Note</b>	Allow all instruments to warm up to typical operating temperature before taking test readings.
-------------	--

1. Connect both MA2442D power sensors to the power meter and calibrate the sensors.
2. Connect the model 1870A power splitter to the MG3692A/B output and Sensor B to one of the power splitter outputs ([Figure 4-1](#))

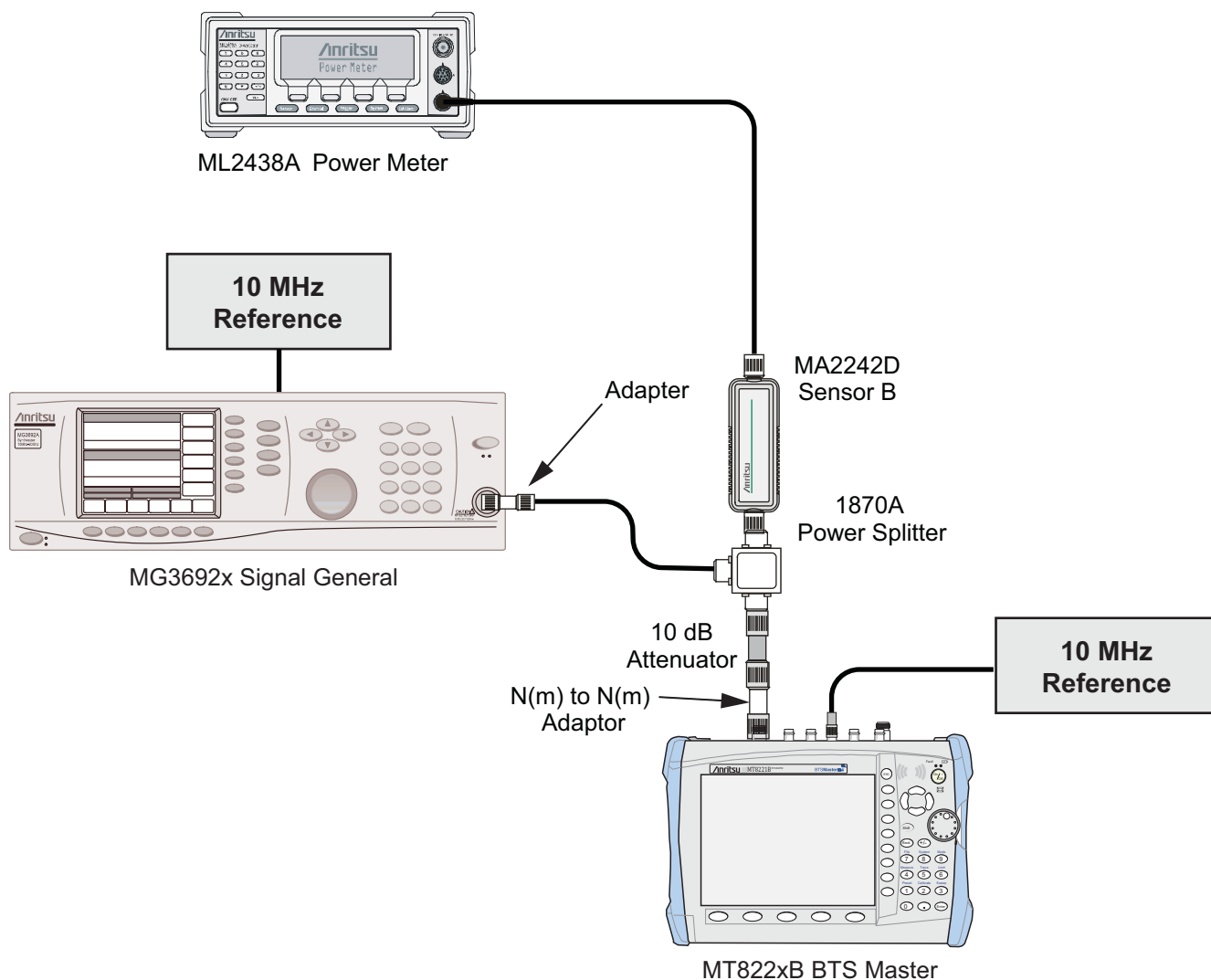


**Figure 4-1.** Power Meter Measurement Accuracy

3. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect Sensor A to the end of the Attenuator.
4. Set the power meter to display both Channels A and B. Press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key. Use the keypad to enter the value matching the frequency of MG3692A/B as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Repeat for Channel B. Press the **System** key to display the power reading.
5. Adjust the power level of the MG3692A/B to get a reading on Sensor A that matches the power level (within  $\pm 0.1$  dB) in the first column of [Table A-17, “Characterization Chart for Power Meter Verification”](#) on page A-13.
6. Record the Sensor B reading in the **Required Sensor B Reading** column of [Table A-17](#).
7. Repeat [Step 5](#) and [Step 6](#) for the other power level in the first column of [Table A-17](#), recording the Sensor B reading in the second column.
8. Repeat the above steps for the next input frequency.

## Power Meter Measurement Accuracy Procedure

1. Connect the equipment as shown in Figure 4-2.



**Figure 4-2.** Power Meter Measurement Accuracy

2. Verify that the MT822xB is in the Power Meter mode and preset the unit.
3. Set the MT822xB span to 3 MHz.
4. Set the MT822xB center frequency to 50 MHz.
5. Adjust the MG3692A/B power so that the power meter Sensor B matches the Sensor B value shown in the Table A-17.
6. Record the reading on the MT822xB display in Table A-18, "Internal Power Meter Accuracy Verification" on page A-13.
7. Repeat Step 4 through Step 6 for the next test power level in Table A-17.
8. Repeat Step 4 through Step 6 for the next test frequency in the Table A-17.



# Chapter 5 — Option Verification

## 5-1 Introduction

This chapter describes the verification process for options available for the MT8222xB BTS Master. The following tests are in this chapter:

- “Option 10, Bias Tee Verification” on page 5-2
- “Option 31, GPS Verification” on page 5-5
- “Option 40 and/or 41, GSM/GPRS/EDGE Signal Analyzer Verification” on page 5-7
- “Option 42 and/or 43, CDMA Signal Analyzer Verification” on page 5-12
- “Option 44, 45 and/or 65, WCDMA/HSDPA Signal Analyzer Verification” on page 5-16
- “Option 46 and/or 47, Fixed WiMAX Signal Analyzer Verification” on page 5-29
- “Option 51, T1 Analyzer Verification” on page 5-34
- “Option 52, E1 Analyzer Verification” on page 5-37
- “Option 53, T1/T3 Analyzer Verification ” on page 5-40
- “Option 60 and/or 61, TD-SCDMA Signal Analyzer Verification” on page 5-45
- “Option 62 and/or 63, EVDO Signal Analyzer Verification” on page 5-47
- “Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification” on page 5-51
- “Option 541 and/or 542 and/or 543, LTE Signal Analyzer Verification” on page 5-58
- “Option 551 and/or 552 and/or 543, TD-LTE Signal Analyzer Verification” on page 5-62

<b>Note</b> Allow all instruments to warm up to typical operating temperature before taking test readings.
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## 5-2 Option 10, Bias Tee Verification

This test verifies that the optional Bias Tee in the Cable and Antenna Analyzer of the Model MT822xB BTS Master is functional. These tests include:

- “Low Current Test Verification”
- “High Current Test Verification” on page 5-3
- “Fault Verification” on page 5-4

### Low Current Test Verification

The tests in this section verify the Bias-Tee Option 10 low current operation of the MT822xB in Cable and Antenna Analyzer mode.

#### Equipment Required

- Anritsu 40-168-R External Power Supply
- Anritsu T3377 105 ohm Load

#### Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT822xB BTS Master.
2. Press the **On/Off** key to turn on the MT822xB.
3. Set the MT822xB to Cable and Antenna Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (8) key, press the Applications Options soft key.

#### Low Current Test

1. Press the Bias Tee Voltage soft key and change voltage from 15 V to 12 V and confirm that the Current soft key is set to Low.
2. Connect the Anritsu T3377 105 ohm load to the RF In test port.
3. Press the Bias Tee On/Off soft key to turn On the Bias Tee.
4. Record the Voltage and Current readings displayed on the left side of the screen in the **105 ohm Load Low Current** section of [Table A-19, “Option 10 Bias-Tee” on page A-14](#). Verify the voltage and current readings are within the specifications.
5. Press the Bias Tee On/Off soft key to turn Off the Bias Tee.
6. Repeat [Step 3](#) through [Step 5](#), entering each of the voltage settings listed in the **105 ohm Load Low Current** section of [Table A-19](#).

## High Current Test Verification

The tests in this section verify the Bias-Tee Option 10 high current operation of the MT8221B in Cable and Antenna Analyzer mode.

### Equipment Required

- Anritsu 40-168-R External Power Supply
- Anritsu T3377 105 Ohm load
- Anritsu T2904 40 Ohm Load
- Anritsu T3536 78 Ohm Load

### Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT822xB BTS Master.
2. Press the **On/Off** key to turn on the MT822xB.
3. Set the MT822xB to Cable and Antenna Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (8) key, press the Applications Options soft key.

### High Current Test

1. Press the Bias Tee Voltage soft key and verify the voltage setting is 15 V, confirm that the Current soft key is set to High.
2. Connect the Anritsu T3377 105 ohm load to the RF In test port.
3. Press the Bias Tee On/Off soft key to turn On the Bias Tee.
4. Record the Voltage and Current readings displayed on the left side of the screen in the **105 ohm Load High Current** section of [Table A-19](#). Verify the voltage and current readings are within the specifications.
5. Press the Bias Tee On/Off soft key to turn Off the Bias Tee. Disconnect the Anritsu T3377 105 ohm load and connect the Anritsu T2904 40 ohm load to the RF In port.
6. Select the Bias Tee Voltage soft key and enter 15 V.
7. Press the Bias Tee On/Off soft key to turn On the Bias Tee.
8. Record the Voltage and Current readings displayed on the left side of the screen in **40 ohm Load High Current** section of [Table A-19](#). Verify the voltage and current readings are within the specifications.
9. Press the Bias Tee On/Off soft key to turn Off the Bias Tee. Disconnect the Anritsu T2904 40 ohm load and connect the Anritsu T3536 78 ohm load to the RF In port.
10. Select the Bias Tee Voltage soft key and enter 32 V.
11. Press the Bias Tee On/Off soft key to turn On the Bias Tee.
12. Record the Voltage and Current readings displayed on the left side of the screen in the **78 ohm Load High Current** section of [Table A-19](#). Verify the voltage and current readings are within the specifications.
13. Press the Bias Tee On/Off soft key to turn Off the Bias Tee.

## Fault Verification

The tests in this section verify the Bias-Tee Option 10 fault condition of the MT822xB in Cable and Antenna Analyzer mode.

### Equipment Required

- Anritsu 40-168-R External Power Supply
- Anritsu T2904 40 ohm Load

### Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT822xB BTS Master.
2. Press the **On/Off** key to turn on the MT822xB.
3. Set the MT822xB to Cable and Antenna Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (8) key, press the Applications Options soft key.

### Fault Test

5. Press the Bias Tee soft key and confirm that the Current soft key is set to Low.
6. Select the Bias Tee Voltage soft key and enter 32 V.
7. Connect the Anritsu T2904 40 ohm load to the RF In port.
8. Press the Bias Tee On/Off soft key to turn On the Bias Tee.
9. Verify that the instrument indicates a “Bias-T Fault Condition” and makes a clicking sound and the Bias Tee current reading displayed on the left side of the screen is 0 mA.
10. Press the Bias Tee On/Off soft key to turn Off the Bias Tee.



## 5-3 Option 31, GPS Verification

This test verifies that the optional GPS of the Model MT822xB BTS is functional.

### Frequency Accuracy Verification

The test in this section verifies the Spectrum Analyzer Frequency Accuracy with GPS Option 31 operation of the MT822xB in Spectrum Analyzer mode.

#### Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Anritsu 2000-1528-R GPS Antenna

#### Procedure

1. Connect the GPS antenna to the GPS Antenna connector on the MT822xB. On the MT822xB, change the mode to Spectrum Analyzer and preset the unit.

#### Note

If a fixed GPS antenna is not available, then the Anritsu 2000-1528-R GPS antenna can be used for this test.

Confirm that the Anritsu 2000-1528-R GPS antenna is in direct line-of-sight relationship to the satellites or place the antenna outside without any obstructions.

2. Press the **Shift** key and then the **System** key.
3. Press the **GPS** soft key, then press the **GPS On/Off** soft key to turn the GPS On.
4. When the GPS fix is acquired, the GPS indicator at the top of the LCD display will turn green.
5. The latitude and the longitude will also be displayed next to the GPS indicator.
6. Wait for about three minutes after the Reference Source indicator in the lower left hand corner of the LCD display has changed to GPS High Accuracy.

#### Note

If GPS fix is acquired using the Anritsu 2000-1528-R GPS antenna placed outside, then bringing the instrument inside may lose satellite tracking. A red cross is displayed on the green GPS indicator, and the Reference Source indicator changes to "Int Hi Accy". The following test verifies frequency accuracy to a lesser specification.

7. Connect the external 10 MHz Reference to the Anritsu MG3692x Signal Generator.

#### Note

Do not connect the external 10 MHz Reference to the MT822xB BTS Master.

8. Connect the output of the Signal Generator to the Spectrum Analyzer RF In of the MT822xB.
9. Set the MG3692x output to 7 GHz CW, with an RF output level of -30 dBm.
10. On the MT822xB, press the **Amplitude** key, and set the reference level to -10 dBm.
11. Press the **Freq** soft key and set the center frequency to 7.0 GHz.
12. Press the **Span** soft key and set the span to 10 kHz.
13. Press the **BW** soft key and set RBW to 100 Hz.

14. Press the VBW soft key and set to 30 Hz.
15. Press the **Marker** main menu key, select **More** soft key, set Counter Marker to On, select **Back** soft key and then the **Peak Search** soft key.
16. Note the Reference Source value and use the appropriate row to record the data in the following steps.
17. Record the marker frequency in the **Measured Value** column of [Table A-20, “Option 31 GPS Receiver” on page A-14](#).
18. Subtract the marker value from 7 GHz and record the result in the **Error** column of [Table A-20](#). Verify that it is within specification.
19. If the value of Reference Source indicates GPS High Accuracy, then remove the GPS antenna and wait until the Reference Source indicates “Int Hi Accy” and repeat steps 15 through 18.

## GPS Antenna Bias-Tee Verification

The tests in this section verify the GPS Antenna Bias-Tee Voltages of Option 31 in the MT822xB.

### Equipment Required

- Adapter SMA to BNC(f), Pomona 4290 or equivalent
- Adapter GPS Terminator, Amphenol B1004A1-ND3G-93R-0.05-1W or equivalent

### Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT822xB BTS Master.
2. Press the **On/Off** key to turn on the MT822xB.
3. Set the MT822xB to Spectrum Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (3) key.

#### 3.3 V Test

5. Connect the 4290 Adapter to the GPS Antenna SMA connector.
6. Connect the GPS Terminator to the 4290 Adapter.
7. Confirm the 3.3 V setting on the **GPS Voltage** soft key is selected (underlined).
8. Turn GPS On by toggling the GPS soft key so that the **On** text is underlined.
9. Select the **GPS Info** soft key. Record the GPS Antenna Current reading in the **Measured Value** column of [Table A-21, “Option 31 GPS Receiver Bias-Tee Verification” on page A-14](#). Verify that it is within specification.

#### 5 V Test

10. Press the **Escape** key to dismiss the GPS Info dialog.
11. Press the **GPS Voltage** soft key and select 5 V.
12. Select the **GPS Info** soft key. Record the GPS Antenna Current reading in the **Measured Value** column of [Table A-21](#). Verify that it is within specification.

## 5-4 Option 40 and/or 41, GSM/GPRS/EDGE Signal Analyzer Verification

The tests in this section verify that the optional GSM/GPRS/EDGE Signal Analyzer functions correctly in Anritsu Model MT822xB BTS Master. There are tests for the following:

- [“GSM Signal Analyzer Option Verification”](#)
- [“EDGE Burst Power, Frequency Error, and Residual Error Tests”](#) on page 5-10

### GSM Signal Analyzer Option Verification

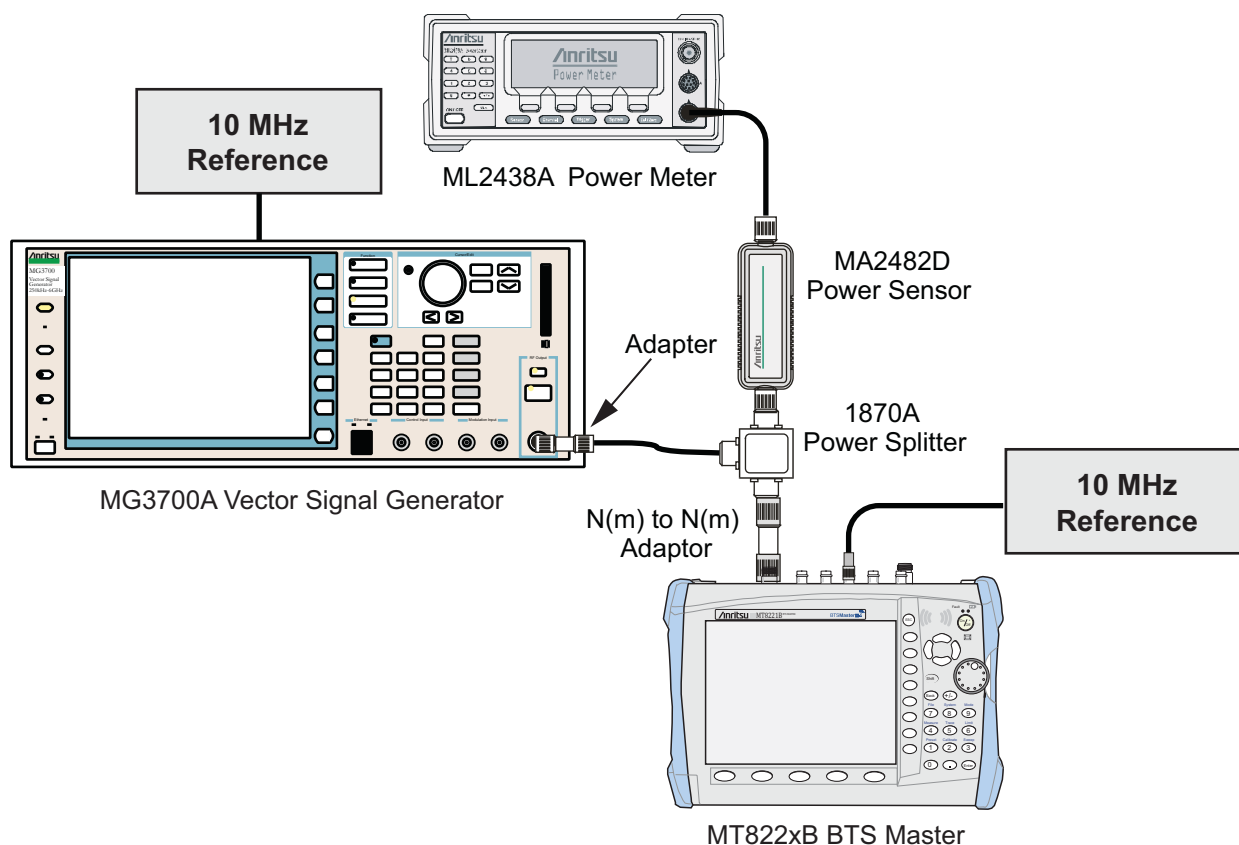
#### (Option 40 and/or Option 41)

The tests in this section verify the function of the optional GSM Signal Analyzer in Model MT822xB BTS Master.

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

## Setup

**Figure 5-1.** GSM/EDGE Signal Analyzer Option Verification**Procedure**

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in [Figure 5-1](#).
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MT822xB mode to GSM/GPRS/EDGE Signal Analyzer. Press **Shift** and press **Preset** (1) to preset the MT822xB.
5. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select Yes.
7. Press the **Set** key.

**Note** The MG3700A has two Set keys, and that they both have the same function.

8. Press the (F1) soft key to select Load File to Memory.
9. Press the (F1) soft key again to select Select Package.
10. Using the **Down Arrow** key, step through the selection list until the “GSM” option is highlighted.
11. Press the **Set** key.
12. Press the (F6) soft key Return.

13. Press the **Set** key. The **Select Package** box is displayed. Use the rotary knob to highlight GSM and press the **Set** key to select.
14. Another File List is displayed. Use the rotary knob to select **GsmBurst\_1slot** and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED On and verify that the “Playing” indicator in the center of the LCD is flashing.
16. Press the **Frequency** key and enter 850 MHz.
17. Press the **Level** key, enter  $-10$ , and press the dBm soft key.
18. Adjust the MG3700A output so that the power meter reads  $-10\text{ dBm} \pm 0.2\text{ dB}$ .
19. On the MT822xB, press the **Frequency** soft key and enter 850 MHz as the Center Frequency.
20. Press the **Measurements** soft key and select GSM/EDGE Summary (a red dot is displayed on the label).
21. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 18](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz,  $-10\text{ dBm}$  Level, TCH Pattern** in [Table A-22](#), “Option 40 GSM/GPRS/EDGE RF Measurements” on [page A-15](#).
22. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 850 MHz,  $-10\text{ dBm}$  Level, TCH Pattern** in [Table A-23](#), “Option 41 GSM/GPRS/EDGE Demodulator” on [page A-16](#).
23. Verify that the measured values in [Step 21](#) or [Step 22](#) (or both) are within specifications.
24. On the MG3700A, change the selected signal pattern to **GsmBurst\_8slot**.
25. Adjust the Level of the MG3700A so that the power meter reads  $-50\text{ dBm} \pm 0.2\text{ dB}$ . Then wait 15 seconds to allow the MT822xB to update its measured results.
26. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 25](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz,  $-50\text{ dBm}$  Level, TCH ALL Pattern** in [Table A-22](#).
27. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 850 MHz,  $-50\text{ dBm}$  Level, TCH ALL Pattern** in [Table A-23](#).
28. Verify that the measured values in [Step 26](#) and/or [Step 27](#) (or both) are within specifications.
29. Change the frequency of MG3700A to 1800 MHz.
30. On the power meter, press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key. Use the keypad to enter 1800 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
31. Adjust the level of the MG3700A so that the power meter reads  $-10\text{ dBm} \pm 0.2\text{ dB}$ .
32. On the MT822xB, set the Center Freq to 1800 MHz. Then wait 15 seconds to allow the MT822xB to update its measured results.
33. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 31](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz,  $-10\text{ dBm}$  Level, TCH ALL Pattern** in [Table A-22](#).
34. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 1800 MHz,  $-10\text{ dBm}$  Level, TCH ALL Pattern** in [Table A-23](#).
35. Verify that the measured values in [Step 33](#) or [Step 34](#) (or both) are within specifications.
36. On the MG3700A, change the selected pattern to **GsmBurst\_1slot**.
37. Adjust the level of the MG3700A so that the power meter reads  $-50\text{ dBm} \pm 0.2\text{ dB}$ . Then wait 15 seconds to allow the MT822xB to update its measured results.

38. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 37](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz, -50 dBm Level, TCH Pattern** in [Table A-22](#).
39. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 1800 MHz, -50 dBm Level, TCH Pattern** in [Table A-23](#).
40. Verify that the measured values in [Step 38](#) or [Step 39](#) (or both) are within specifications.

## EDGE Burst Power, Frequency Error, and Residual Error Tests

### (Option 40 and/or 41)

The tests in this section verify the function of the optional GSM Signal Analyzer in Model MT822xB BTS Master.

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

**Procedure**

1. Confirm that the equipment settings are unchanged from the previous test. Refer to [Figure 5-1 on page 5-8](#).
2. On the MG3700A, change the selected pattern to DL\_MCS-9\_1SLOT.
3. Adjust the level of the MG3700A so that the power meter reads  $-50 \text{ dBm} \pm 0.2 \text{ dB}$ . Then wait 15 seconds to allow the MT822xB to update its measured results.
4. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 3](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz,  $-50 \text{ dBm}$  Level, DL\_MCS-9\_1SLOT Pattern** in [Table A-22](#).
5. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 1800 MHz,  $-50 \text{ dBm}$  Level, DL\_MCS-9\_1SLOT Pattern** in [Table A-23](#).
6. Verify that the measured values in [Step 4](#) or [Step 5](#) (or both) are within specifications.
7. On the MG3700A, change the selected pattern to DL\_MCS-9\_4SLOT.
8. Adjust the level of the MG3700A so that the power meter reads  $-10 \text{ dBm} \pm 0.2 \text{ dB}$ . Then wait 15 seconds to allow the MT822xB to update its measured results.
9. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 8](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz,  $-10 \text{ dBm}$  Level, DL\_MCS-9\_4SLOT Pattern** in [Table A-22](#).
10. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 1800 MHz,  $-10 \text{ dBm}$  Level, DL\_MCS-9\_4SLOT Pattern** in [Table A-23](#).
11. Verify that the measured values in [Step 9](#) or [Step 10](#) (or both) are within specifications.
12. Change the frequency of MG3700A to 850 MHz.
13. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
14. Adjust the level of the MG3700A so that the power meter reads  $-50 \text{ dBm} \pm 0.2 \text{ dB}$ .
15. On the MT822xB, set the Center Freq to 850 MHz. Then wait 15 seconds to allow the MT822xB to update its measured results.
16. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 14](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz,  $-50 \text{ dBm}$  Level, DL\_MCS-9\_4SLOT Pattern** in [Table A-22](#).
17. For MT822xB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 850 MHz,  $-50 \text{ dBm}$  Level, DL\_MCS-9\_4SLOT Pattern** in [Table A-23](#).
18. Verify that the measured values in [Step 9](#) or [Step 10](#) (or both) are within specifications.
19. On the MG3700A, change the selected pattern to DL\_MCS-9\_1SLOT.
20. Adjust the level of the MG3700A so that the power meter reads  $-10 \text{ dBm} \pm 0.2 \text{ dB}$ . Then wait 15 seconds to allow the MT822xB to update its measured results.
21. For MT822xB with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in [Step 20](#). Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz,  $-10 \text{ dBm}$  Level, DL\_MCS-9\_1SLOT Pattern** in [Table A-22](#).
22. For MT822XB with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 850 MHz,  $-10 \text{ dBm}$  Level, DL\_MCS-9\_1SLOT Pattern** in [Table A-23](#).
23. Verify that the measured values in [Step 21](#) or [Step 22](#) (or both) are within specifications.

## 5-5 Option 42 and/or 43, CDMA Signal Analyzer Verification

The tests in this section verify the optional CDMA Signal Analyzer functions in Anritsu Model MT822xB BTS Master. There are tests for the following:

- “cdmaOne Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)”
- “CDMA2000 Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)”

### cdmaOne Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard



## Setup

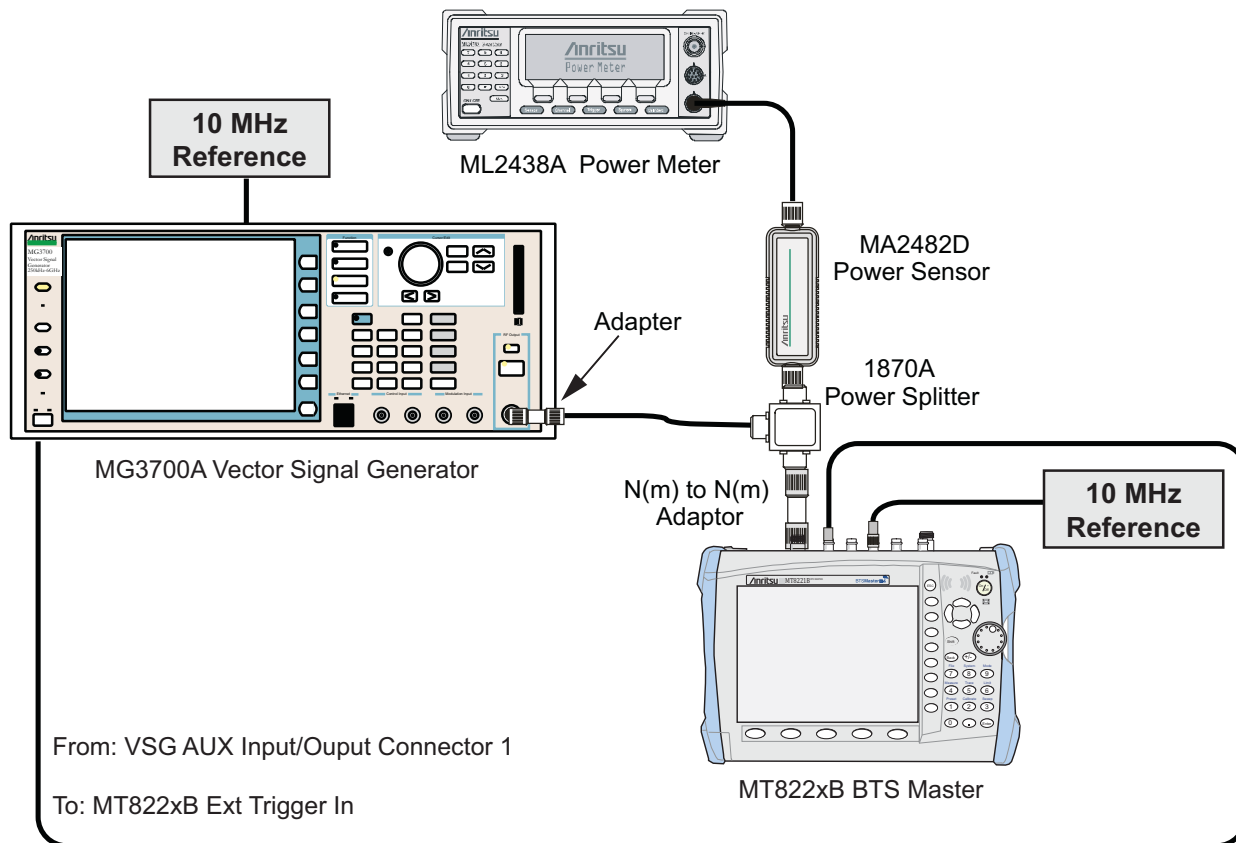


Figure 5-2. CDMA Signal Analyzer Option Verification

## Procedure

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 5-2.
3. On the power meter, press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MT822xB mode to CDMA Signal Analyzer. Press **Shift** and press **Preset** (1) to preset the MT822xB.
5. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select **Yes**.
7. Press the **Set** key.

**Note** The MG3700A has two Set keys, and that they both have the same function.

8. Press the (F1) soft key to select **Load File to Memory**.
9. Press the (F1) soft key again to select **Select Package**.
10. Using the **Down Arrow** key step through the selection list until the "CDMA2000" option is highlighted.

11. Press the **Set** key.
12. Press the (F6) soft key Return.
13. Press the **Set** key. The **Select Package** box is displayed. Use the rotary knob to highlight “CDMA2000” and press the **Set** key to select.
14. Another File List is displayed. Use the rotary knob to select “FWD\_RC1-2\_9channel” and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED On and verify that the “Playing” indicator in the center of the LCD is flashing.
16. Press the **Frequency** key, enter 870.03 MHz.
17. Press the **Level** key, enter –30 and press the dBm soft key.
18. Adjust the MG3700A output so that the power meter reads –30 dBm  $\pm$  0.2 dB.
19. On the MT822xB, press the Frequency soft key and enter 870.03 MHz as Center Frequency.
20. Press the **Measurements** soft key and select CDMA Summary (a red dot is displayed on the label).
21. Press the **Setup** soft key and select PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger soft key twice. Then wait 15 seconds to allow the MT822xB to update its measured results.
22. For MT822xB with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 18](#). Then record the calculated Channel Power error in section **At 870.03 MHz, –30 dBm Level, cdmaOne** in [Table A-24, “Option 42 CDMA RF Measurements”](#) on page A-17.
23. For MT822xB with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau in section **At 870.03 MHz, –30 dBm Level, cdmaOne** in [Table A-25, “Option 43 cdmaOne and CDMA2000 1xRTT Demodulator”](#) on page A-18.
24. Verify that the measured values in [Step 22](#) or [Step 23](#) (or both) are within specifications.
25. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
26. Set the MG3700A frequency to 1930.05 MHz.
27. Adjust the MG3700A output so that the power meter reads –30 dBm  $\pm$  0.2 dB.
28. On the MT822xB, press the Frequency soft key and enter 1930.05 MHz as Center Frequency. Then wait 15 seconds to allow the MT822xB to update its measured results.
29. For MT822xB with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 27](#). Then record the calculated Channel Power error in the test record in section **At 1930.05 MHz, –30 dBm Level, cdmaOne** in [Table A-24](#).
30. For MT822xB with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau in section **At 1930.05 MHz, –30 dBm Level, cdmaOne** in [Table A-25](#).
31. Verify that the measured values in [Step 29](#) or [Step 30](#) (or both) are within specifications.

## CDMA2000 Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)

The tests in this section verify the function of the optional CDMA Signal Analyzer in Model MT822xB BTS Master.

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

### Procedure

1. Confirm that the equipment settings are unchanged from the previous test. Refer to [Figure 5-2 on page 5-13](#).
2. On the MG3700A, change the selected pattern to “FWD\_RC3-5\_9channel”.
3. Adjust the level of the MG3700A so that the power meter reads  $-30 \text{ dBm} \pm 0.2 \text{ dB}$ . Then wait 15 seconds to allow the MT822xB to update its measured results.
4. For MT822xB with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 3](#). Then record the calculated Channel Power error in section **At 1930.05 MHz,  $-30 \text{ dBm}$  Level, CDMA2000** in [Table A-24](#).
5. For MT822xB with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau in section **At 1930.05 MHz,  $-30 \text{ dBm}$  Level, CDMA2000** in [Table A-25](#).
6. Verify that the measured values in [Step 4](#) or [Step 5](#) (or both) are within specifications.
7. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Set the MG3700A frequency to 870.03 MHz.
9. Adjust the MG3700A output so that the power meter reads  $-30 \text{ dBm} \pm 0.2 \text{ dB}$ .
10. On the MT822xB, press the Frequency soft key and enter 870.03 MHz as Center Frequency. Then wait 15 seconds to allow the MT822xB to update its measured results.
11. For MT822xB with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 9](#). Then record the calculated Channel Power error in section **At 870.03 MHz,  $-30 \text{ dBm}$  Level, CDMA2000** in [Table A-24](#).
12. For MT822xB with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau into the test record in section **At 870.03 MHz,  $-30 \text{ dBm}$  Level, CDMA2000** in [Table A-25](#).
13. Verify that the measured values in [Step 11](#) or [Step 12](#) (or both) are within specifications.

## 5-6 Option 44, 45 and/or 65, WCDMA/HSDPA Signal Analyzer Verification

The tests in this section verify the optional WCDMA Signal Analyzer functions in Anritsu Model MT822xB BTS Master. There are tests for the following:

- “WCDMA Absolute Power Accuracy Verification (Option 44)”
- “WCDMA Occupied Bandwidth (OBW) Verification” on page 5-21
- “WCDMA RF Channel Power Accuracy and ACLR Verification” on page 5-23
- “HSDPA RF Channel Power Accuracy and ACLR Verification” on page 5-24
- “Error Vector Magnitude (EVM) Verification” on page 5-26

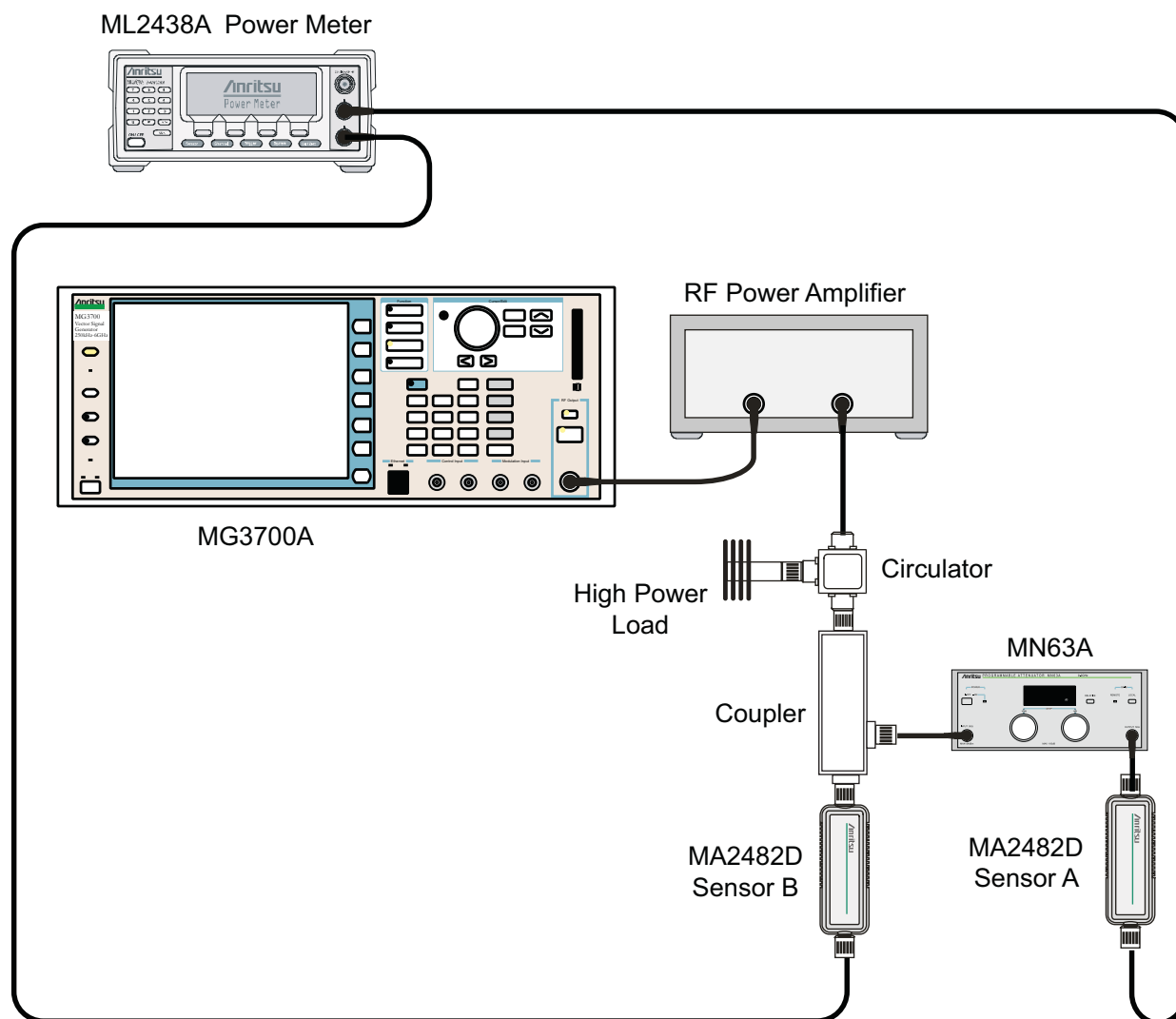
### WCDMA Absolute Power Accuracy Verification (Option 44)

This test verifies the WCDMA absolute power accuracy in WCDMA/HSDPA Signal Analyzer Mode in the Model MT822xB BTS Master.

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Mini Circuits Model TIA-1000-1R8 RF Power Amplifier
- Anritsu PN 1000-50 Circulator
- Aeroflex/Weinschel Model M1418 High Power Load
- Anritsu PN 1091-307 Coupler
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu Model MN63A Programmable Attenuator

## Setup



**Figure 5-3.** WCDMA Signal Analyzer Option Verification (Setup 1)

## Procedure

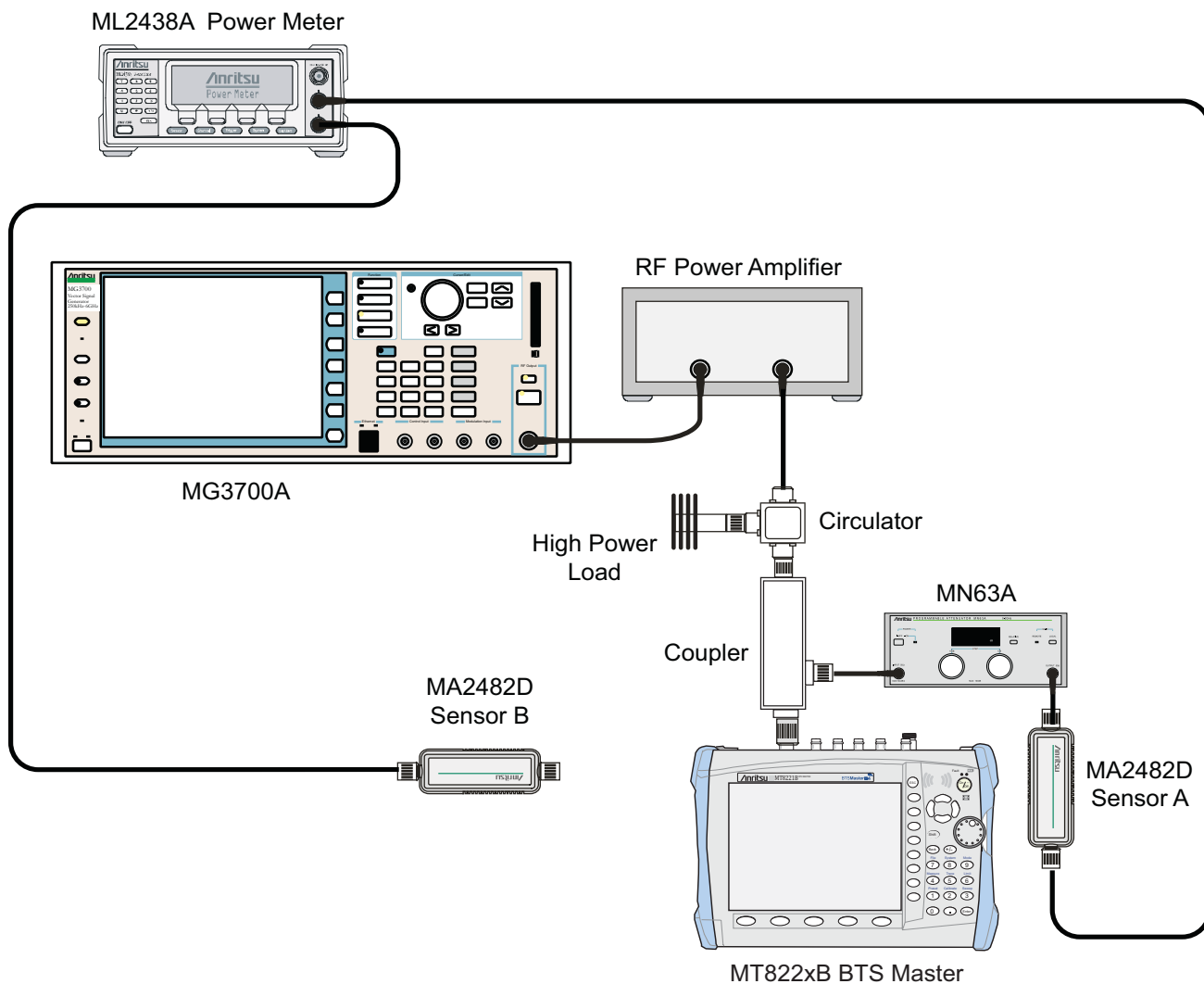
1. Connect the MG3700A, RF power amplifier, attenuator, power meter, and sensors as shown in [Figure 5-3](#).
2. Turn on the MG3700A, RF amplifier, attenuator and the power meter.
3. Connect the power sensors to the power meter and then calibrate the sensors.
4. Press the **On/Off** key to turn on the MT822xB and wait until the measurement display appears then press the **Shift** key and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.

9. Press the **Set** key.

<b>Note</b>	The MG3700A has two Set keys, and that they both have the same function.
-------------	--

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box is displayed. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list is displayed, using the **Down Arrow** key step through the selection list until the TestModel\_1\_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, enter 881.5 MHz then press the MHz soft key.
20. Press the **Level** key, enter -28 and press the dBm soft key.
21. Use the knob to adjust the power level so that Sensor B reads +10 dBm.
22. Set the MN63A attenuator to 0 dB.
23. Record the Sensor A reading (PMA.10) in [Table A-26, "Option 44, Sensor A and B Reading Components Characterization Table" on page A-19](#). This should be around -20 dBm.
24. Record the Sensor B reading (PMB.10) in [Table A-26](#).
25. Calculate D1 which is the error of the coupler output port deviation from ideal +10 dBm using the following formula:
$$D1 \text{ (dBm)} = (10 \text{ dBm} - \text{PMB.10})$$
26. Record the D1 value in [Table A-26](#).
27. Calculate the accurate value of Sensor A reading for coupler port output of +10 dBm (PMA.10C) using the following formula:
$$\text{PMA.10C} = \text{PMA.10} + D1$$
28. Record the calculated value in [Table A-26](#).
29. Set the MN63A attenuator to 18 dB and record Sensor A reading (PMA.18) in [Table A-26](#).
30. Calculate the accurate attenuation value using the following formula:
$$\text{ATT.18} = (\text{PMA.10} - \text{PMA.18})$$
31. Record the calculated value in [Table A-26](#).
32. Turn off the RF output of the MG3700A.

33. Disconnect the coupler from Sensor B and connect the coupler to the MT822xB SPA RF In connector. Refer to [Figure 5-4](#).



**Figure 5-4.** WCDMA Signal Analyzer Option Verification (Setup 2)

34. Set the MN63A attenuator to 0 dB.
35. On the MT822xB press the **Center Freq** soft key, enter 881.5 and then press the **MHz** soft key.
36. Press the **Measurements** soft key, then the **RF Measurement** soft key, then the **Channel Spectrum** soft key.
37. On the MG3700A turn on the RF output and use the knob to adjust power level to read the value of PMA.10C on Sensor A.
38. Record the MG3700A power level setting (MG3700A.10) in [Table A-27, “Option 44, Power Level Setting Components Characterization Table”](#) on page A-19.
39. On the MT822xB press the **Amplitude** key and then press the **Adjust Range** soft key.
40. Record the channel power reading in the **Measured Power** column of the **+ 10 dBm** row of [Table A-28, “Option 44, WCDMA Absolute Power Accuracy”](#) on page A-19.
41. Use the following formula to calculate the absolute power accuracy of the MT822xB at + 10 dBm:
- $$\text{Error} = \text{Measured Power} - 10$$
42. Record the calculated value in the **Error** column of the **+ 10 dBm** row of [Table A-28](#) and verify that it is within specification.

43. Turn off the RF output of the MG3700A.
44. Set the MN63A attenuator to 18 dB.
45. Calculate the value of the MG3700A setting (MG3700A.28) for + 28 dBm Test Level using the following formula:  

$$\text{MG3700A.28} = \text{MG3700A.10} + \text{ATT.18}$$
46. Record the calculated value in [Table A-27](#).
47. On the MG3700A turn on the RF output and use the knob to adjust power level to the recorded MG3700A.28 value in the [Table A-27](#).
48. On the MT822xB press the **Amplitude** key and then press the Adjust Range soft key.
49. Record channel power reading in the **Measured Power** column of the + 28 dBm row of [Table A-28](#).
50. Use the following formula to calculate the absolute power accuracy of the MT822xB at + 28 dBm:  

$$\text{Error} = \text{Measured Power} - 28$$
51. Record the calculated value in the **Error** column of the + 28 dBm row of [Table A-28](#) and verify that it is within specification.
52. Turn off the RF output of the MG3700A.
53. Set the MN63A attenuator to 0 dB.
54. Set power level of the MG3700A to -38 dBm.
55. Calculate the value of Sensor A reading (PMA-10) for -10 dBm Test Level using the following formula:  

$$\text{PMA-10} = \text{PMA.10C} - 30$$
56. Record the calculated value in [Table A-27](#).
57. Turn on the RF output and use the knob to adjust power level to read the value of PMA-10 on Sensor A.
58. On the MT822xB press the **Amplitude** key and then press the Adjust Range soft key.
59. Record channel power reading in the **Measured Power** column of the -10 dBm row of [Table A-28](#).
60. Use the following formula to calculate the absolute power accuracy of the MT822xB at -10 dBm:  

$$\text{Error} = \text{Measured Power} - (-10)$$
61. Record the calculated value in the **Error** column of the -10 dBm row of [Table A-28](#) and verify that it is within specification.
62. Turn off the RF output of the MG3700A.
63. Decrease power level of the MG3700A by 10 dB.
64. Calculate the value of Sensor A reading (PMA-20) for -20 dBm Test Level using the following formula:  

$$\text{PMA-20} = \text{PMA.10C} - 30$$
65. Record the calculated value in [Table A-27](#).
66. Turn on the RF output and use the knob to adjust power level to read the value of PMA-20 on Sensor A.
67. On the MT822xB press the **Amplitude** key and then press the Adjust Range soft key.
68. Record channel power reading in the **Measured Power** column of the -20 dBm row of [Table A-28](#).
69. Turn off the RF output of the MG3700A.
70. Use the following formula to calculate the absolute power accuracy of MT822xB at -20 dBm:  

$$\text{Error} = \text{Measured Power} - (-20)$$
71. Record the calculated value in the **Error** column of the -20 dBm row of [Table A-28](#) and verify that it is within specification.



## WCDMA Occupied Bandwidth (OBW) Verification

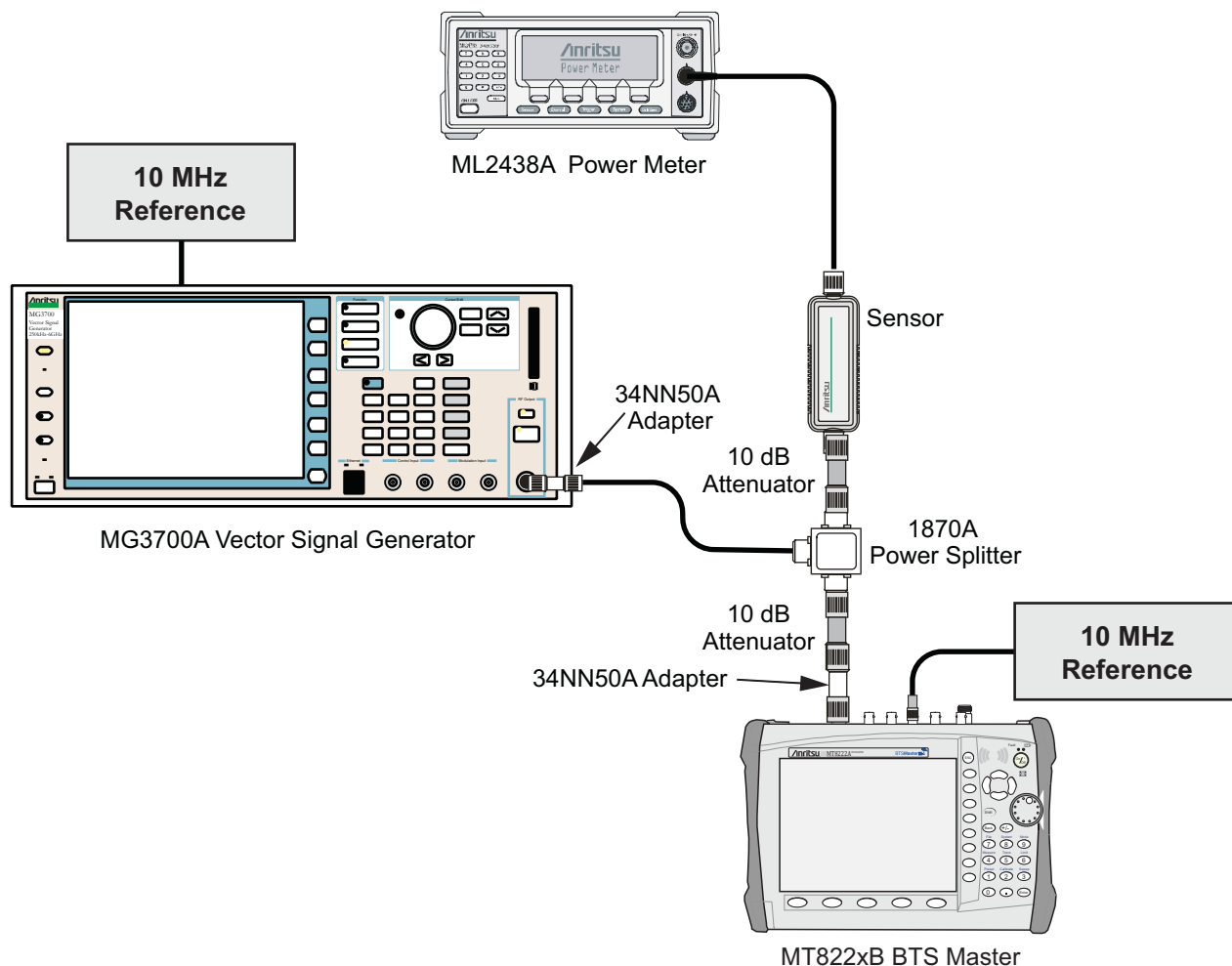
### (Option 44)

The tests in this section verify the function of the WCDMA occupied bandwidth in WCDMA/HSDPA Signal Analyzer Mode on Model MT822xB BTS Master.

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

### Setup



**Figure 5-5.** WCDMA Occupied Bandwidth (OBW) Verification

**Procedure**

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and Sensor As shown in [Figure 5-5](#).
4. Press the **On/Off** key to turn on the MT822xB and wait until the measurement display appears then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

<b>Note</b> The MG3700A has two Set keys, and that they both have the same function.
--

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box is displayed. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list is displayed, using the **Down Arrow** key step through the selection list until the TestModel\_1\_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter the frequencies from the WCDMA Occupied Bandwidth (OBW) [Table A-29, “Option 44, WCDMA Occupied Bandwidth \(OBW\)” on page A-19](#) starting with 881.5 and press the MHz soft key.
20. Press the **Level** key, then enter -2 and press the dBm soft key.
21. Use the knob to adjust the power level so that the power meter reads -20 dBm, record reading in the **Power Meter Reading** column of [Table A-29](#).
22. On MT822xB press the Center Frequency soft key, enter frequencies from [Table A-29](#) starting with 881.5 then press the **Enter** key.
23. Press the Measurements soft key, then the RF Measurement soft key and select Channel Spectrum soft key.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the OBW reading in the **OBW** column of [Table A-29](#) and verify that it is within 4.2 MHz  $\pm$  100 kHz.
26. Repeat [Step 19](#) to [Step 25](#) for the other frequencies listed [Table A-29](#).

## WCDMA RF Channel Power Accuracy and ACLR Verification

### Adjacent Channel Leakage Ratio (Option 44)

The tests in this section verify the function of the WCDMA RF Channel Power Accuracy and ACLR Accuracy in WCDMA/HSDPA Signal Analyzer Mode on Model MT822xB BTS Master.

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

#### Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and Sensor As shown in [Figure 5-5](#).
4. Press the **On/Off** key to turn on the MT822xB and wait until the measurement display appears then press the **Shift** key, then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

<b>Note</b> The MG3700A has two Set keys, and that they both have the same function.
--

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box is displayed. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list is displayed, using the **Down Arrow** key step through the selection list until the TestModel\_1\_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 881.5 and press the MHz soft key.

20. Press the **Level** key, then enter -2 and press the dBm soft key.
21. Use the knob to adjust the power meter to read -20 dBm and record the Power Meter reading in the **Power Meter Reading** column of [Table A-30, “Option 44, WCDMA RF Channel Power Accuracy” on page A-20](#).
22. On the MT822xB press the Center Frequency soft key, enter 881.5, and then press the **Enter** key.
23. Press the **Measurements** soft key, then the RF Measurement soft key and select ACLR.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the measured CH 1 power in dBm in the **Measured RF Channel Power** column [Table A-30](#).
26. Calculate the RF Channel Power Error using the following formula:

RF Channel Power Error (dB) = Measured RF Channel Power - 0.246 - Power Meter reading

27. Record calculated value to the **RF CH Power Error** column of [Table A-30](#) and verify that it is within specification ( $\pm 1.25$  dB).
28. Record all four measured Adjacent Channel Leakage Ratios in dB to the **Measured ACLR** column of the following rows in [Table A-31, “Option 44, WCDMA ACLR Accuracy” on page A-20](#)
  - 881.5 / -10 MHz
  - 881.5 / -5 MHz
  - 881.5 / 5 MHz,
  - 881.5 / 10 MHz

29. Calculate the ACLR Error at -10 MHz or +10 MHz Offset using the following formula:

ACLR Error at -10 or 10 MHz Offset =  $10\text{LOG}_{10}(10^{(-50/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-50)$  dB

30. Record in the calculated results to the corresponding cells in the **Calculated ACLR Error** column of [Table A-31](#) and verify that it is within specification.

31. Calculate the ACLR Error at -5 MHz or +5 MHz Offset using the following formula:

ACLR Error at -5 or 5 MHz Offset =  $10\text{LOG}_{10}(10^{(-45/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-45)$  dB

32. Record in the calculated results to the corresponding cells in the **Calculated ACLR Error** column of [Table A-31](#) and verify that it is within specification.
33. Repeat Steps 19 to 32 for the other frequencies and offsets listed in [Table A-31](#).

## HSDPA RF Channel Power Accuracy and ACLR Verification

### Adjacent Channel Leakage Ratio (Option 44)

The tests in this section verify the function of the RF Channel Power Accuracy and ACLR Accuracy for HSDPA signal in WCDMA/HSDPA Signal Analyzer Mode on Model MT822xB BTS Master.

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

**Procedure**

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and Sensor According to [Figure 5-5](#).
4. Press the **On/Off** key to turn on the MT822xB and wait until the measurement display appears then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

<b>Note</b>	The MG3700A has two Set keys, and that they both have the same function.
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10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the **W-CDMA(BS Tx test)** option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box is displayed. Again select **W-CDMA(BS Tx test)** and then press the **Set** key.
16. Another file list is displayed, using the **Down Arrow** key step through the selection list until the **TestModel\_5\_8HSPDSCH** option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 2680.5 and press the MHz soft key.
20. Press the **Level** key, then enter -2 and press the dBm soft key.
21. Use the knob to adjust the power meter to read -20 dBm and record the Power Meter reading in the **Power Meter Reading** column of [Table A-32, "Option 44, HSDPA RF Channel Power Accuracy" on page A-21](#).
22. On the MT822xB press the Freq soft key, then the Center Freq soft key, enter 2680.5, and then press the MHz soft key.
23. Press the **Measurements** soft key, then the RF Measurement soft key and select ACLR.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the measured CH 1 power in dBm to the **Measured RF Channel Power** column [Table A-32](#).
26. Calculate the RF Channel Power Error using the following formula:  

$$\text{RF Channel Power Error (dB)} = \text{Measured RF Channel Power} - 0.246 - \text{Power Meter reading}$$
27. Record calculated value to the **RF CH Power Accuracy** column of [Table A-32](#) and verify that it is within specification ( $\pm 1.25$  dB).
28. Record all four measured Adjacent Channel Leakage Ratios in dB at -10 MHz Offset, -5 MHz Offset, 5 MHz Offset and 10 MHz Offset in the **Measured ACLR** column of [Table A-33, "Option 44, HSDPA ACLR Accuracy" on page A-21](#).

29. Calculate the ACLR Error at –10 MHz or +10 MHz Offset using the following formula:

$$\text{ACLR Error at } -10 \text{ or } 10 \text{ MHz Offset} = 10\text{LOG}_{10}(10^{(-50/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-50) \text{ dB}$$

30. Record in the calculated results to the corresponding cells in the **Calculated ACLR Error** column of [Table A-33](#) and verify that it is within specification.

31. Calculate the ACLR Error at –5 MHz or +5 MHz Offset using the following formula:

$$\text{ACLR Error at } -5 \text{ or } 5 \text{ MHz Offset} = 10\text{LOG}_{10}(10^{(-45/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-45) \text{ dB}$$

32. Record in the calculated results to the corresponding cells in **Calculated ACLR Error** column of [Table A-33](#) and verify that it is within specification.

## Error Vector Magnitude (EVM) Verification

### (Option 45 or (Option 65))

The tests in this section can be used to verify the functionality of the WCDMA and/or HSDPA Demodulator of the WCDMA/HSDPA Signal Analyzer Mode on Model MT822xB BTS Master.

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

### Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and Sensor as shown in [Figure 5-5](#).
4. Press the **On/Off** key to turn on the MT822xB and wait until the measurement display appears then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select **Yes**.
9. Press the **Set** key.

**Note** The MG3700A has two Set keys, and that they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.

13. Press the **Set** key.
14. Press the (F6) soft key **Return**.
15. Press the **Set** key. The Select Package list box is displayed. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list is displayed, using the **Down Arrow** key step through the selection list until the TestModel\_4\_opt option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 1962.5 and press the MHz soft key.
20. Press the **Level** key, then enter -2 and press the dBm soft key.
21. Use the knob to adjust the power meter to read -20 dBm.
22. On the MT822xB, press the **Center Frequency** soft key, enter 1962.5 and then press the MHz soft key.
23. Press the **Measurements** soft key, then press the **Demodulator** soft key and select the **Modulation Summary** soft key.
24. Press the **Setup** soft key, then press the **Auto Scrambling** soft key to turn it on.
25. Press the **Max Spreading Factor** soft key to set it to 512.
26. Press the **Amplitude** key, then press the **Adjust Range** soft key.
27. Record the EVM reading in [Table A-34, “WCDMA Error Vector Magnitude \(Test Model 4; Option 45 or 65\)” on page A-21](#) and verify that it is  $\leq 2.5\%$ .
28. This completes the EVM test for MT822xB with Option 45 and the first EVM test for MT822xB with Option 65.

#### Continue Here For MT822xB with Option 65

29. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
30. Press the **Down Arrow** key to select Yes.
31. Press the **Set** key.

<b>Note</b>	The MG3700A has two Set keys, and that they both have the same function.
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32. Press the (F1) soft key to select Load File to Memory.
33. Press the (F1) soft key again to select Select Package.
34. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
35. Press the **Set** key.
36. Press the (F6) soft key **Return**.
37. Press the **Set** key. The Select Package list box is displayed. Again select W-CDMA(BS Tx test) and then press the **Set** key.
38. Another file list is displayed, using the **Down Arrow** key step through the selection list until the TestModel\_5\_8HSPDSCH option is highlighted.
39. Press the **Set** key.
40. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
41. Press the **Frequency** key, then enter 1962.5 and press the MHz soft key.
42. Press the **Level** key, then enter -2 and press the dBm soft key.

43. Use the knob to adjust the power meter to read  $-20$  dBm.
44. On the MT822xB, press the **Center Frequency** soft key, enter 1962.5 and then press the **MHz** soft key.
45. Press the **Measurements** soft key, then press the **Demodulator** soft key and select the **Modulation Summary** soft key.
46. Press the **Setup** soft key, and verify the **Scrambling Code** is set to **Auto**.
47. Verify the **Max Spreading Factor** soft key to set it to 512.
48. Press the **Amplitude** key, then press the **Adjust Range** soft key.
49. Record the EVM reading in [Table A-35, “HSDPA Error Vector Magnitude \(Test Model 5; Option 65\)”](#) on [page A-21](#) and verify that it is  $\leq 2.5\%$ .

This completes the two EVM tests for MT822xB with Option 65.



## 5-7 Option 46 and/or 47, Fixed WiMAX Signal Analyzer Verification

The tests in this section verify the performance of the optional Fixed WiMAX Signal Analyzer of the MT822xB BTS Master. There are tests for the following:

- [“Fixed WiMAX Signal Analyzer Option Verification \(Options 46\)”](#)
- [“Fixed WiMAX Signal Analyzer Option Verification \(Option 47\)”](#) on page 5-32

### Fixed WiMAX Signal Analyzer Option Verification (Options 46)

The tests in this section verify the Channel Power Accuracy of the optional Fixed WiMAX Signal Analyzer in Model MT822xB BTS Master.

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

## Setup

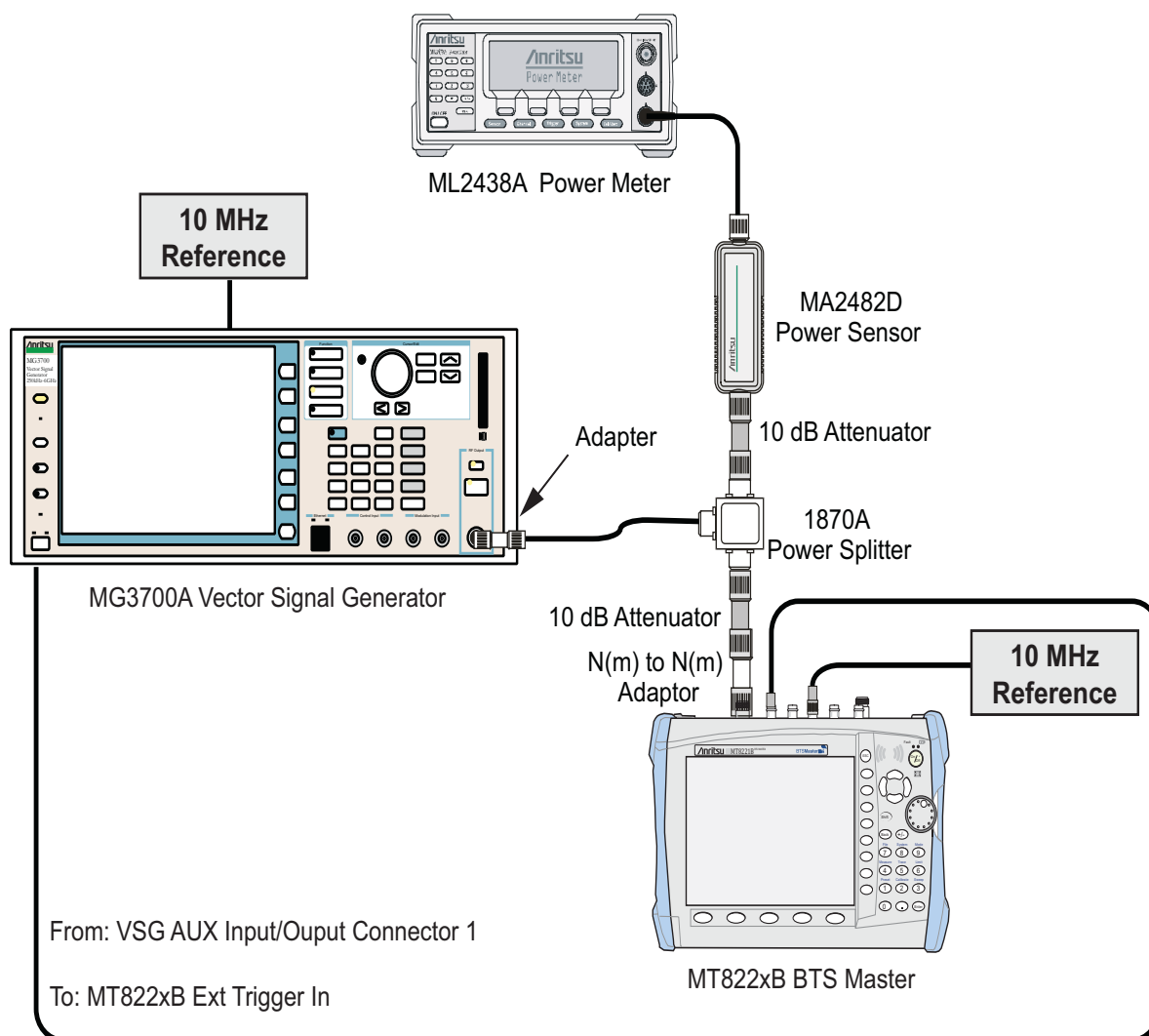


Figure 5-6. Fixed WiMAX Signal Analyzer Option Verification

## Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the cal factor frequency of the power sensor to 2600.5 MHz.
3. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in [Figure 5-6](#).
4. Set the MG3700A as follows:
  - a. Press the yellow **Preset** key (answer yes to the question).
  - b. Press the **Set** key.
  - c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.
  - e. Using the **Down Arrow** key step through the selection list until WiMax is highlighted.
  - f. Press the **Set** key.
  - g. Press the Return (F6) soft key.
  - h. Press the **Set** key. The Select Package list box is displayed. Again select WiMax and the **Set** key.

- i. Another file list is displayed. Select (highlight) Mx10g32.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is on. Confirm that the “Playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 2600.5 MHz.
  - m. Press the **Level** key, then enter 2 dBm. Turn the output On.
5. Adjust the MG3700A level setting with the knob so that the power meter reads 15.0 dBm  $\pm$  0.2 dB.
6. Set the MT822xB to Fixed WiMax Signal Analyzer mode and preset the unit.
7. Set the MT822xB as follows:
  - a. Press the **Freq** soft key and set the center frequency to 2600.5 MHz.
  - b. Press the **Setup** soft key and set the Bandwidth to 10 MHz.
  - c. Press the **CP Ratio** soft key (under the **Setup** soft key) and set the CP Ratio to 1/32.
  - d. Press the **Measurements** soft key and select RF, then select Power vs. Time.
8. Record the MT822xB Channel Power (RSSI) reading in the **Measured Channel Power (RSSI)** column of [Table A-36](#), “[Option 46, Fixed WiMAX Channel Power Accuracy](#)” on [page A-22](#).
9. Calculate the Channel Power Error by subtracting the MT822xA Channel Power (RSSI) reading from the power meter reading in [Step 5](#). Record the result in the **Error** column of [Table A-36](#).
10. Verify that the error is within specification.
11. Adjust the MG3700A level setting to approximately 33 dBm so that the power meter reads 50.0 dBm.
12. Record the MT822xB Channel Power (RSSI) reading in the **Measured Channel Power (RSSI)** column of [Table A-36](#).
13. Calculate the Channel Power Error by subtracting the MT822xB Channel Power (RSSI) reading from the power meter reading in [Step 11](#). Record the result to the **Error** column of [Table A-36](#).
14. Verify that the error is within specification.
15. Set the cal factor frequency of the power sensor to 3600.5 MHz.
16. Set the MG3700A frequency to 3600.5 MHz.
17. Change the MT822xB center frequency to 3600.5 MHz.
18. Measure the Channel Power (RSSI) for both 15 dBm and 50 dBm and then record the measured result and calculated error in [Table A-36](#).
19. Verify that the error is within specification.
20. Set the cal factor frequency of the power sensor to 5600.5 MHz.
21. Set the MG3700A frequency to 5600.5 MHz.
22. Change the MT822xB center frequency to 5600.5 MHz.
23. Repeat steps 18 to 19.

## Fixed WiMAX Signal Analyzer Option Verification (Option 47)

The tests in this section verify the Residual EVM and Frequency Error of the optional Fixed WiMAX Signal Analyzer in Model MT822xB BTS Master.

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

### Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the cal factor frequency of the power sensor to 2600.5 MHz.
3. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in [Figure 5-6](#).
4. Set the MG3700A as follows:
  - a. Press the yellow **Preset** key (answer yes to the question).
  - b. Press the **Set** key.
  - c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.
  - e. Using the **Down Arrow** key step through the selection list until WiMax is highlighted.
  - f. Press the **Set** key.
  - g. Press the Return (F6) soft key.
  - h. Press the **Set** key. The Select Package list box is displayed. Again select WiMax and the **Set** key.
  - i. Another file list is displayed. Select (highlight) Mx10g32.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is on. Confirm that the “Playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 2600.5 MHz.
  - m. Press the **Level** key, then enter 2 dBm. Turn the output On.
5. Adjust the MG3700A level setting with the knob so that the power meter reads 15.0 dBm  $\pm$  0.2 dB.
6. Set the MT822xB to Fixed WiMax Signal Analyzer mode and preset the unit.
7. Set the MT822xB as follows:
  - a. Press the **Freq** soft key and set the center frequency to 2600.5 MHz.
  - b. Press the **Setup** soft key and set the Bandwidth to 10 MHz.
  - c. Press the **CP Ratio** soft key (under the **Setup** soft key) and set the CP Ratio to 1/32.
  - d. Press the **Measurements** soft key and select Demodulator, then select Modulation Summary.

8. Record the MT822xB EVM(rms) reading in [Table A-37, “Option 47, Fixed WiMAX Residual EVM” on page A-22](#).
9. Verify that the measured EVM is within specification.
10. Adjust the MG3700A Level setting to approximately 33 dBm so that the power meter reads  $50.0 \text{ dBm} \pm 0.2 \text{ dB}$ .
11. Record the MT822xB EVM(rms) reading in [Table A-37](#).
12. Verify that the measured EVM is within specification.
13. Record the MT822xB Freq Error reading in [Table A-38, “Option 47, Fixed WiMAX Frequency Error” on page A-22](#).
14. Verify that the measured frequency error is within specification.
15. Set the cal factor frequency of the power sensor to 3600.5 MHz.
16. Set the MG3700A frequency to 3600.5 MHz.
17. Change the center frequency of the MT822xB to 3600.5 MHz.
18. Measure the EVM(rms) for both 15 dBm and 50 dBm, record the measured results in [Table A-37](#).
19. Verify that the measured EVM is within specification.
20. Set the cal factor frequency of the power sensor to 5600.5 MHz.
21. Set the MG3700A frequency to 5600.5 MHz.
22. Adjust the MG3700A level setting with the knob so that the power meter reads  $15.0 \text{ dBm} \pm 0.2 \text{ dBm}$ .
23. Change the center frequency of the MT822xB to 5600.5 MHz.
24. Record the MT822xB EVM(rms) reading in [Table A-37](#).
25. Verify that the measured EVM is within specification.
26. Adjust the MG3700A level setting to approximately 33 dBm so that the power meter reads  $50.0 \text{ dBm} \pm 0.2 \text{ dB}$ .
27. Record the MT822xB EVM(rms) reading in [Table A-37](#).
28. Verify that the measured EVM is within specification.
29. Record the MT822xB frequency error reading in [Table A-38](#).
30. Verify that the measured frequency error is within the specification.

## 5-8 Option 51, T1 Analyzer Verification

These tests verify the functionality of the T1 Analyzer in the Model MT822xB BTS Master. These tests include:

- “T1 Clock Frequency Test Verification”
- “T1 Transmit Level Test Verification”

### Equipment Required

- Anritsu MP1570A Sonet Analyzer with MP0121A and MP0122A modules
- Anritsu PN 806-16 Cable T1 Bantam Plug to Bantam Plug (Quantity 2)
- LeCroy Model WaveRunner 62Xi Digital Oscilloscope with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set

### T1 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

#### Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.
2. On the MT822xB, press **Shift, Mode** (9), and use the **Up/Down** keys to select T1 Analyzer.
3. Press **Shift, Preset** (1). Select the Preset soft key to preset the unit.

#### Basic Instructions for Operation of MP1570A:

The Test Menu, Result, and Analyze keys all should be pressed so that their LEDs are on.

The green Start/Stop key should also be pressed so that its LED is on.

The Setup key toggles between two displays. You will need to change Parameters under both these displays.

#### Note

If the required parameter is not visible under the present display, then press the **Setup** key, and the required parameter is presented on the new display.

#### Changing the Setup Parameters:

Use the arrow keys to highlight different parameters that will need to be changed. Use the **Set** key to display the menu of choices for each parameter.

Use the **Up/Down** arrow keys to highlight the desired setting, then press the **Set** key to accept the highlighted setting.

4. Set up the MP1570A as follows:

Mapping set to Tx&Rx

Configuration set to SDH/PDH

Meas. Mode set to Out\_of\_service

Bit Rate set to 1.5 M

MUX/DEMUX: set to OFF (not present on all units).

Frame set to ON

1.5M Code set to B8ZS

Framed set to ESF

DSX set to 0 ft.

Clock set to internal

Monitor Mode is set to OFF

5. Change to the other Setup display (press the Setup key again) and set as follows:  
Test Pattern set to PRBS15  
Invert mode set to OFF  
Analyze set to Freq. monitor.
6. Using an 806-16 bantam cable, connect the MT8222A TX connector to the MP1570A AMI/B8ZS Input (on the MP0122A module).
7. Using another 806-16 bantam cable, connect the MT822xB RX connector to the MP1570A AMI/B8ZS Output (on the MP0122A module).
8. On the MT822xB, press the **Configuration** soft key near the bottom left corner of the display and verify that “Tx Clock” is set to Internal, “Line Code” is set to B8ZS and “Framing” is set to ESF. Then set “Tx LBO” to 0 dB and “Pattern ” to PRBS-15.
9. The MT822xB T1 frequency and ppm error is displayed on the MP1570A. Record the ppm error value in the **Internal Clock Error** row of [Table A-39, “Option 51, T1 Frequency Clock” on page A-23](#).
10. On the MP1570A, change “Pattern” to “All One”.
11. On the MT822xB, press the **Configuration** soft key.
12. Use the rotary knob to select Tx Clock and set Tx Clock to Recovered.
13. Press the **Measurements** soft key and select Rx Signal.
14. Press the **Start/Stop** soft key so that “Measure On” is displayed.
15. Record the Frequency value on the MT822xB in the **Recovered Clock Frequency** row of [Table A-39](#).

## T1 Transmit Level Test Verification

The tests in this section verify the transmit level of the T1 signal from the MT822xB in T1 Analyzer mode.

### Procedure

1. Install the LeCroy AP100 100 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.
2. Connect the bantam to bantam cable from the Tx port on the T1 interface of the MT822xB to the input of the LeCroy AP100 adapter on the Oscilloscope.
3. Set the MT822xB to T1 Analyzer Mode and preset the unit.
4. Press the **Configuration** soft key and set up the MT822xB as follows:  
Test Mode - DS1  
Line code - B8ZS  
Tx Clock - Internal  
Receive Input - Terminate  
Framing - ESF  
Payload Type - 1.544 Mb  
Tx LBO - 0 dB
5. Press the **Pattern/Loop** soft key and select All Ones.
6. On the LeCroy Oscilloscope, use the stylus to tap on **File** on the Toolbar. Select **Recall Setup...** and then tap the **Recall Default** button to reset the Oscilloscope.
7. Press the **Auto Setup** key and then tap the “Confirm” button. Wait until the oscilloscope displays a stable trace.
8. Tap on **Measure** on the Toolbar and select **Std Vertical**.
9. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of [Table A-40, “T1 Transmitted Level Voltage” on page A-23](#).
10. Verify that the measured peak to peak voltage is between 4.8 V and 7.6 V.

11. Change “Tx LBO” to  $-7.5$  dB on the MT822xB.
12. Record the displayed peak to peak voltage in the **Tx LBO:  $-7.5$  dB** row of [Table A-40](#) and verify that it is between 1.9 V and 3.1 V.
13. Change “Tx LBO” to  $-15$  dB on the MT822xB.
14. Record the displayed peak to peak voltage in the **Tx LBO:  $-15$  dB** row of [Table A-40](#) and verify that it is between 0.5 V and 1.7 V.
15. Disconnect the bantam cable from the Oscilloscope and connect it to the Rx port on the MT822xB.
16. On the MT822xB, press the **Measurements** soft key and select Rx Signal.
17. Press the **Start/Stop** soft key to turn measurement on.
18. Read the Vpp value from the displayed table and record it in the **Tx LBO:  $-15$  dB** row of [Table A-41](#), “T1 Transmitted Level Vpp Reading” on page A-23.
19. Verify that the measured Vpp value is between 0.5 V and 1.7 V.
20. Change “Tx LBO” to  $-7.5$  dB on the MT822xB.
21. Record the displayed peak to peak voltage in the **Tx LBO:  $-7.5$  dB** row of [Table A-41](#) and verify that it is between 1.9 V and 3.1 V.
22. Change “Tx LBO” to 0 dB on the MT822xB.
23. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of [Table A-41](#) and verify that it is between 4.8 V and 7.6 V.



## 5-9 Option 52, E1 Analyzer Verification

These tests verify the functionality of the E1 Analyzer in the Model MT822xB BTS Master. These tests include:

- “E1 Clock Frequency Test Verification”
- “E1 Transmit Level Test Verification” on page 5-38

### E1 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

#### Equipment Required

- Anritsu MP1570A Sonet Analyzer with MP0121A and MP0122A modules
- Anritsu PN 3-806-169 Cable 75 ohm BNC(m) to BNC(m) (Quantity 2)
- Anritsu PN 806-117 Cable RJ48 to dual Bantam
- Anritsu PN T3450 Test Fixture
- LeCroy Model WaveRunner 62Xi Digital Oscilloscope with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set

#### Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.

#### Basic Instructions for Operation of MP1570A:

The Test Menu, Result, and Analyze keys all should be pressed so that their LEDs are on.

The green Start/Stop key should also be pressed so that its LED is on.

The Setup key toggles between two displays. You will need to change Parameters under both these displays.

#### Note

If the required parameter is not visible under the present display, then press the **Setup** key, and the required parameter is presented on the new display.

#### Changing the Setup Parameters:

Use the arrow keys to highlight different parameters that will need to be changed. Use the **Set** key to display the menu of choices for each parameter.

Use the **Up/Down** arrow keys to highlight the desired setting, then press the **Set** key to accept the highlighted setting.

2. Set up the MP1570A as follows:

Set Mapping to Tx&Rx  
Set Config. to SDH/PDH  
Set Bit Rate to 2M  
Set Frame to ON  
Set Channel to 30ch  
Set CRC4 to ON  
Set Signalling to OFF  
Set Interface to Unbalanced  
Set Clock to internal  
Set Monitor Mode to OFF

3. Press the **Test Menu** key and set up the MP1570A as follows:
  - Set Test menu to Manual
  - Set Test Pattern to PRBS15
  - Set Invert mode to OFF
  - Set Analyze to Freq. monitor
4. Set the Mode of the instrument to **E1 Analyzer** and preset the unit.
5. Press the “Configuration” soft key (below the display)
6. Confirm that “Tx Clock” is set to Internal.
7. Use the down arrow key to highlight Input Connector.
8. Select **BNC 75 ohms** soft key.
9. Press the **Pattern** soft key. Use the rotary knob to highlight “PRBS15” and press the **Select Pattern** soft key.
10. Connect a 75 ohm BNC cable (part number 3-806-169) between Tx port of the MT822xB and the CMI/HDB3 Input of the MP0121A Module on the MP1570A.
11. Connect a 75 ohm BNC cable (part number 3-806-169) between Rx port of the MT822xB and the CMI/HDB3 Output of the MP0121A Module on the MP1570A.
12. On the MP1570A, allow the status bar on the bottom of the display to complete at least one sweep.
13. Record the ppm reading in the **Internal Clock Error** row of [Table A-42, “Option 52, E1 Frequency Clock” on page A-24](#).
14. On the MT822xB, press the **Measurements** soft key and then the **Rx Signal** soft key.
15. Press the **Start/Stop** soft key to turn measurement on, “Measure ON” appears in the lower left corner of the display.
16. Record the Frequency reading on the display in the **Recover Clock Frequency** row of [Table A-42](#).
17. Press the **Start/Stop** soft key to stop the measurement.

## E1 Transmit Level Test Verification

The tests in this section verify the transmit level of the E1 signal from the MT822xB in T1 Analyzer mode.

### Procedure

#### BNC (75 ohm unbalanced [Single End]) Interface Check:

1. Install the LeCroy PP090 75 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.
2. Connect the 75 ohm BNC cable (part number 3-806-169) from the Tx port on the E1 interface of the MT822XB to the 75 ohm adapter on the Oscilloscope.
3. Set the MT822xB to **E1 Analyzer** mode and preset the unit.
4. Use the rotary knob to highlight **Input Connector** and then press the **BNC 75 ohms** soft key to switch the input connector.
5. Press the **Pattern** soft key and use the right arrow key to highlight **All Ones**. Press the **Select Pattern** soft key.
6. On the LeCroy Oscilloscope, use the stylus to tap on **File** on the Toolbar. Select **Recall Setup...** and then tap the **Recall Default** button to reset the Oscilloscope.
7. Press the **Auto Setup** key and then press the **Confirm** button. Wait until the oscilloscope displays a stable trace.
8. Press **Measure** on the Toolbar and select **Std Vertical**.

9. Record the displayed P1 peak to peak voltage in the **75 ohm** row of [Table A-43, “Option 52, E1 Transmitted Level Voltage” on page A-24](#).
10. Verify that the measured peak to peak voltage is between 4.2 V and 5.2 V.
11. Disconnect the BNC cable from the Oscilloscope and connect it to the Rx port on the MT822xB .
12. On the MT822xB, press the **Measurements** soft key and select Rx Signal.
13. Press the **Start/Stop** soft key to turn measurement on (“Measure ON” appears in the lower left corner of the display).
14. Read the Vpp value from the displayed table it in the **75 ohm** row of [Table A-44, “Option 52, E1 Transmitted Level Vpp Reading” on page A-24](#).

#### **RJ48 (120 ohm balanced [Differential Pair]) Interface Check:**

15. Install the LeCroy AP120 120 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.
16. Connect the RJ48 end of the Bantam “Y” Plug to RJ48 cable (part number 806-117) the E1 RJ48 interface of the MT822xB .
17. Connect the Transmit Bantam plug of the Bantam “Y” Plug to RJ48 cable to the T3450 Test Fixture (Bantam jack to Bantam jack adapter) and then connect a bantam plug to Siemens jack adapter cable between the open Bantam jack on the T3450 Test Fixture and the Siemens connector of the Telecom adapter on the Oscilloscope.
18. Set the MT822xB to E1 Analyzer mode and preset the unit.
19. Use the rotary knob to highlight **Input Connector** and then press the **RJ48 120 ohms** soft key to switch the input connector.
20. Press the **Pattern** soft key and use the right arrow key to highlight **All Ones**. Press the **Select Pattern** soft key.
21. On the LeCroy Oscilloscope, use the stylus to tap on **File** on the Toolbar. Select **Recall Setup...** and then tap the **Recall Default** button to reset the Oscilloscope.
22. Press the **Auto Setup** key and then tap the **Confirm** button. Wait until the oscilloscope displays a stable trace.
23. Tap on **Measure** on the Toolbar and select **Std Vertical**.
24. Record the displayed P1 peak to peak voltage in the **120 ohm** row of [Table A-43, “Option 52, E1 Transmitted Level Voltage” on page A-24](#).
25. Verify that the measured peak to peak voltage is between 5.4 V and 6.6 V.
26. On the T3450 Test Fixture, disconnect the Bantam plug end of the cable from the Oscilloscope.
27. Connect the Receive Bantam plug of the Bantam “Y” Plug to RJ48 cable to the open jack of T3450 Test Fixture.
28. On the MT822xB, press the **Measurements** soft key and select Rx VSignal.
29. Press the **Start/Stop** soft key to turn measurement on (“Measure ON” appears in the lower left corner of the display).
30. Read the Vpp value from the displayed table and record it in the **120 ohm** row of [Table A-44, “Option 52, E1 Transmitted Level Vpp Reading” on page A-24](#).

## 5-10 Option 53, T1/T3 Analyzer Verification

These tests verify the functionality of the T1/T3 Analyzer in the Model MT822xB BTS Master. These tests include:

- “T1 Clock Frequency Test Verification”
- “T1 Transmit Level Test Verification” on page 5-41
- “T3 Clock Frequency Test Verification” on page 5-43
- “T3 Transmit Level Test Verification” on page 5-44

### Equipment Required

- Anritsu MP1570A Sonet Analyzer with MP0121A and MP0122A modules
- Anritsu PN 806-16 Cable T1 Bantam Plug to Bantam Plug (Qty V2)
- LeCroy Model WaveRunner 62Xi Digital Oscilloscope with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set
- Anritsu PN 3-806-169 Cable 75 ohm BNC(m) to BNC(m) (Qty V2)

### T1 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

#### Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.
2. On the MT822xB, press **Shift, Mode**, and use the up/down keys to select **T1/T3 Analyzer**.
3. Press **Shift, Preset**. Select the Preset soft key to preset the unit.

#### Basic Instructions for Operation of MP1570A:

The Test Menu, Result, and Analyze keys all should be pressed so that their LEDs are on.

The green Start/Stop key should also be pressed so that its LED is on.

The Setup key toggles between two displays. You will need to change Parameters under both these displays.

**Note** If the required parameter is not visible under the present display, then press the **Setup** key, and the required parameter is presented on the new display.

#### Changing the Setup Parameters:

Use the arrow keys to highlight different parameters that will need to be changed. Use the **Set** key to display the menu of choices for each parameter.

Use the **Up/Down** arrow keys to highlight the desired setting, then press the **Set** key to accept the highlighted setting.

4. Set up the MP1570A as follows:

Mapping set to Tx&Rx  
Configuration set to SDH/PDH  
Meas. Mode set to Out\_of\_service  
Bit Rate set to 1.5M  
MUX/DEMUX: set to OFF (not present on all units).  
Frame set to ON  
1.5M Code set to B8ZS  
Framed set to ESF  
DSX set to 0 ft.  
Clock set to internal  
Monitor Mode is set to OFF

5. Change to the other Setup display (press the **Setup** key again) and set as follows:

Test Pattern set to PRBS15  
Invert mode set to OFF  
Analyze set to Freq. monitor.

6. Using an 806-16 bantam cable, connect the MT822xB TX connector to the MP1570A AMI/B8ZS Input (on the MP0122A module).
7. Using another 806-16 bantam cable, connect the MT822xB RX connector to the MP1570A AMI/B8ZS Output (on the MP0122A module).
8. On the MT822xB, press the **Configuration** soft key near the bottom left corner of the display and verify that “Tx Clock” is set to **Internal**, “Line Code” is set to **B8ZS** and “Framing” is set to **ESF**. Then set “Tx LBO” to **0 dB** and “Pattern/Loop” to **PRBS-15**.
9. The MT822xB T1 frequency and ppm error is displayed on the MP1570A. Record the ppm error in the **Internal Clock Error** row of [Table A-45](#), “[Option 53, T1/T3 Frequency Clock](#)” on page A-25.
10. On the MP1570A, change “Pattern” to **All One**.
11. On the MT822xB, press the **Configuration** soft key.
12. Use the rotary knob to select **Tx Clock** and set Tx Clock to **Recovered**.
13. Press the **Measurements** soft key and select **Rx Signal**.
14. Press the **Start/Stop** soft key so that **Measure On** is displayed on the lower left corner of the monitor screen.
15. Record the Frequency value on the MT822xB in the **Recovered Clock Frequency** row of [Table A-45](#), “[Option 53, T1/T3 Frequency Clock](#)” on page A-25.

## T1 Transmit Level Test Verification

The tests in this section verify the transmit level of the T1 signal from the MT822xB in T1/T3 Analyzer mode.

### Procedure

1. Install the LeCroy AP100 100 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.
2. Connect the bantam to bantam cable from the Tx port on the T1 interface of the MT822xB to the input of the LeCroy AP100 adapter on the Oscilloscope.
3. Set the MT822xB to T1/T3 Analyzer Mode and preset the unit.

4. Press the Configuration soft key and set up the MT822xB as follows:
  - Test Mode - DS1
  - Line code - B8ZS
  - Tx Clock - Internal
  - Tx LBO - 0dB
  - Rx Input - Terminate
  - Framing - ESF
  - Payload Type - 1.544Mb
5. Press the Pattern/Loop soft key and select All Ones.
6. On the LeCroy Oscilloscope, use the stylus to tap on File on the Toolbar. Select Recall Setup... and then tap the Recall Default button to reset the Oscilloscope.
7. Press the **Auto Setup** key and then tap the Confirm button. Wait until the oscilloscope displays a stable trace.
8. Tap on Measure on the Toolbar and select Std Vertical.
9. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of [Table A-46, “Option 53, T1 Transmitted Level Voltage”](#) on page A-25.
10. Verify that the measured peak to peak voltage is between 4.8 V and 7.6 V.
11. Change “Tx LBO” to –7.5 dB on the MT822xB.
12. Record the displayed peak to peak voltage in the **Tx LBO: –7.5 dB** row of [Table A-46](#) and verify that it is between 1.9 V and 3.1 V.
13. Change “Tx LBO” to –15 dB on the MT822xB.
14. Record the displayed peak to peak voltage in the **Tx LBO: –15 dB** row of [Table A-46](#) and verify that it is between 0.5 V and 1.7 V.
15. Disconnect the bantam cable from the Oscilloscope and connect it to the Rx port on the MT822xB.
16. On the MT822xB, press the Measurements soft key and select Rx Signal.
17. Press the Start/Stop soft key to turn measurement on.
18. Read the Vpp value from the displayed table and record it in the **Tx LBO: –15 dB** row of [Table A-47, “Option 53, T1 Transmitted Level Vpp Reading”](#) on page A-25.
19. Verify that the measured Vpp value is between 0.7 V and 1.5 V.
20. Change “Tx LBO” to –7.5 dB on the MT822xB.
21. Record the displayed peak to peak voltage in the **Tx LBO: –7.5 dB** row of [Table A-47](#) and verify that it is between 2.4 V and 3.6 V.
22. Change “Tx LBO” to 0 dB on the MT822xB.
23. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of [Table A-47](#) and verify that it is between 4.8 V and 7.6 V.

## T3 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

### Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.
2. On the MT822xB, confirm the mode is set to T1/T3 Analyzer. Preset the unit.
3. Under the Configuration soft key, highlight Test Mode and press the DS3 soft key.
4. Set “Tx Clock” to Internal.
5. Set “Tx LBO” to DSX.
6. Press the Pattern/Loop soft key and then select All Ones pattern.
7. Set up the MP1570A as follows:
  - Set Mapping to Tx&Rx
  - Set Config. to SDH/PDH
  - Set Meas. Mode to Out\_of\_service
  - Set Bit Rate to 45M
  - Set MUX/DEMUX to OFF (not present on all units)
  - Set Frame to ON
  - Set 45M Framed to C-bit
  - Set X-Bit to 11
  - Set DSX to 0 ft
  - Set Clock to internal
  - Set Monitor Mode to OFF
8. Change to the other Setup display and set the Test Pattern to All 1.
9. Set Analyze to Freq Monitor.
10. Using a 75 ohm BNC cable (part number 3-806-169), connect the MT822xB Tx connector to the MP1570A B3ZS Input (on the MP0122xB module).
11. Using a second 75 ohm BNC cable, connect the MT822xB Rx connector to the MP1570A B3ZS Output (on the MP0122xB module).
12. Allow the status bar on the bottom of the display to complete at least one sweep.
13. View the ppm error shown on the MP1570A and record in the Internal Clock Error row of [Table A-48](#), “Option 53, T3 Frequency Clock” on page A-25.
14. On the MT822xB, change the “Tx Clock” setting to Recovered.
15. Under the Measurements soft key, activate Rx Signal (red dot appears on label).
16. Press the Start/Stop soft key to turn the measurement on (“Measure ON” appears in the lower left corner of the display).
17. Record the Frequency reading (center of display) in the **Recovered Clock Frequency** row in [Table A-48](#).

## T3 Transmit Level Test Verification

The tests in this section verify the transmit level of the T3 signal from the MT8221B in T1/T3 Analyzer mode.

### Procedure

1. Preset the MT822xB. Under the **Configuration** soft key, highlight **Test Mode** and press the **DS3** soft key.
2. Confirm “Tx LBO” is set to “Low”.
3. Press the **Pattern/Loop** soft key and then select “All Ones” pattern.
4. Connect the PP090 75 ohm adapter to the oscilloscope Channel 1 input.
5. Install a 75 ohm BNC-BNC cable between the T3 Tx output and the 75 ohm adapter on the oscilloscope.
6. On the oscilloscope, press the blue **Auto Setup** button. Confirm the Touch Screen button is activated.
7. View the Channel 1 peak-to-peak voltage and record it the **LOW** row of [Table A-49, “Option 53, T3 Transmitted Level Voltage” on page A-26](#). (Horizontal instability of the signal is normal.)
8. On the MT822xB, change the “Tx LBO” setting to **DSX**.
9. Record the “DSX” Measured Voltage (peak-to-peak) in the **DSX** row of [Table A-49](#).
10. Press the **Measurements** soft key and select **Rx Signal**.
11. Disconnect the BNC cable from the oscilloscope and use the cable to connect the T3 Tx and Rx connectors together.
12. Press the **Start/Stop** soft key to turn the measurement on (“Measure ON” appears in the lower left corner of the display).
13. Record the Vpp measurement shown on the MT822xB display in the **DSX** row of [Table A-50, “Option 53, T3 Transmitted Level Vpp Reading” on page A-26](#).
14. Change the “Tx LBO” (**Configuration** soft key) to **Low**.
15. Under the **Measurements** soft key, view the Vpp value and record in the **LOW** row of [Table A-50](#).



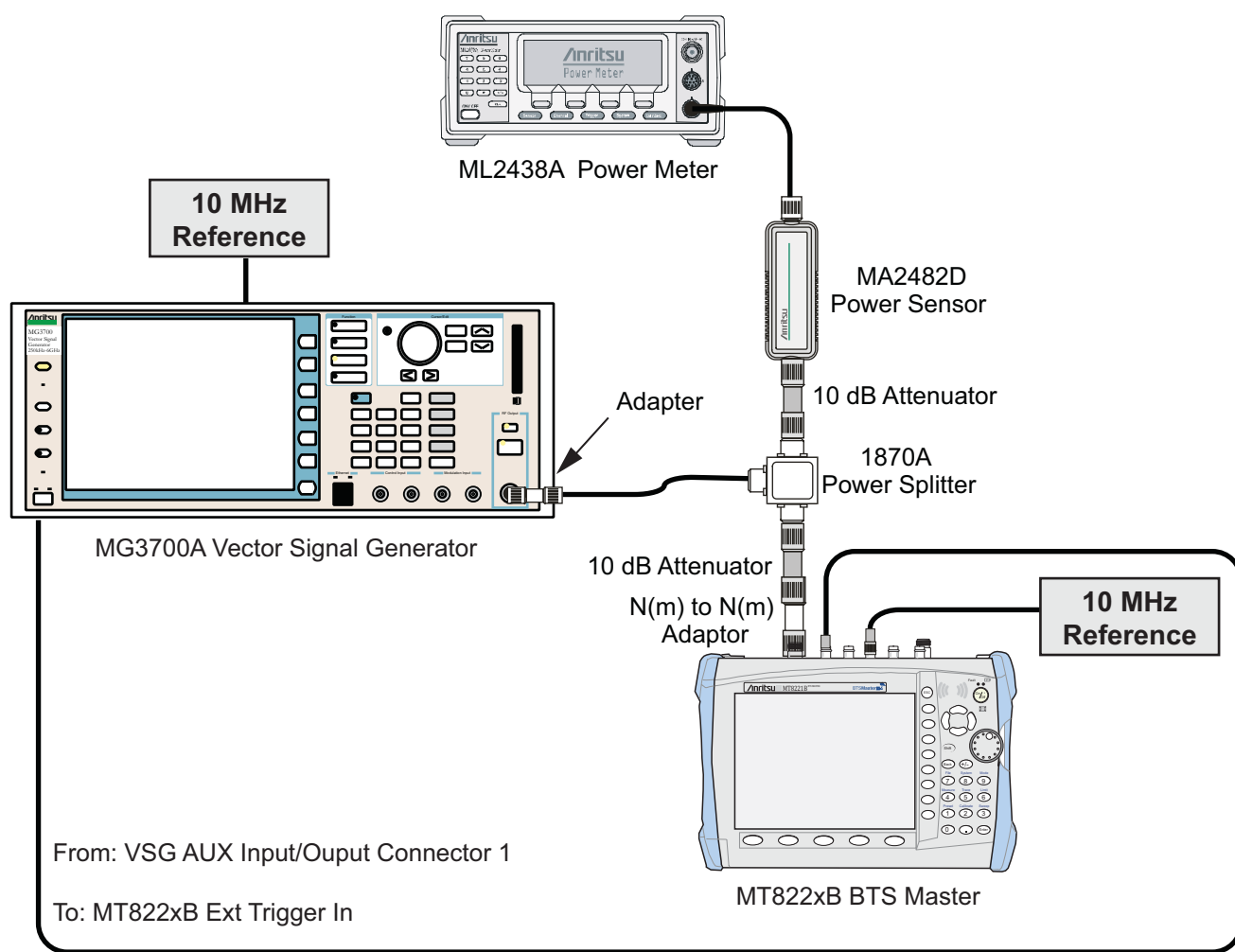
## 5-11 Option 60 and/or 61, TD-SCDMA Signal Analyzer Verification

The tests in this section verify the performance of the optional TD-SCDMA Signal Analyzer option of the MT822xB BTS Master. There is one test for the following:

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

### Setup



**Figure 5-7.** TD-SCDMA Signal Analyzer Option Verification

**Procedure**

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in [Figure 5-7](#).
3. On the power meter, press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key. Use the keypad to enter 2010 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the power meter to Averaging, Moving and 256 samples.
5. Set the MT822xB to TD-SCDMA Signal Analyzer mode and preset the unit.
6. On the MG3700A, press the **Preset** key (yellow key on the upper left hand side).
7. Press the down arrow key or turn the knob to select **Yes**.
8. Press the **Set** key.

<b>Note</b>	The TD-SCDMA pattern requires a Waveform Data license MX370001A that must be purchased.
-------------	---

9. Press the F1 soft key to select Load File to Memory.
10. Press the F1 soft key again to select Select Package.
11. Using the down arrow key step through the selection list until the TD-SCDMA(MX370001A) option is highlighted.
12. Press the **Set** key.

<b>Note</b>	Both Set keys on the MG3700A perform the same function.
-------------	---

13. Press the Return (F6) soft key.
14. Press the **Set** key. The Select Package box is displayed. Use the rotary knob to highlight TD-SCDMA(MX370001A) and press the **Set** key to select.
15. Another file list is displayed. Use the rotary knob to select rmc-P-CCPCH\_bs\_dl and press the **Set** key to select.
16. Press the **MOD On/Off** key to turn the Modulation LED On and verify the “Playing” indicator in the center of the LCD is flashing.
17. Press the **Frequency** key, enter 2010 MHz.
18. Press the **Level** key, enter -20 and press the dBm soft key.
19. Adjust the MG3700A output so that the power meter reads -45 dBm  $\pm$  0.5 dB.
20. On the MT822xB, press the Frequency soft key and enter 2010 MHz as center frequency.
21. Press the **Measurements** soft key and select TD-SCDMA Summary (a red dot is displayed on the label).
22. Press the **Setup** soft key and select Trigger. Then change Trigger Type to Ext by pressing the Trigger Type soft key twice. Then wait 15 seconds to allow the MT822XB to update its measured results.
23. For MT822xB with Option 60 (TD-SCDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 19](#). Then record the calculated Channel Power Error in [Table A-51, “Option 60, 61 TD-SCDMA Verification \(at 2010 MHz, -45 dBm Level, TD-SCDMA\)”](#) on page A-26.
24. For MT822XB with Option 61 (TD-SCDMA Demodulator), record the displayed Freq error, EVM, and Tau values in [Table A-51](#).
25. Verify that the measured values in [Step 23](#) or [Step 24](#) (or both) are within specifications.

## 5-12 Option 62 and/or 63, EVDO Signal Analyzer Verification

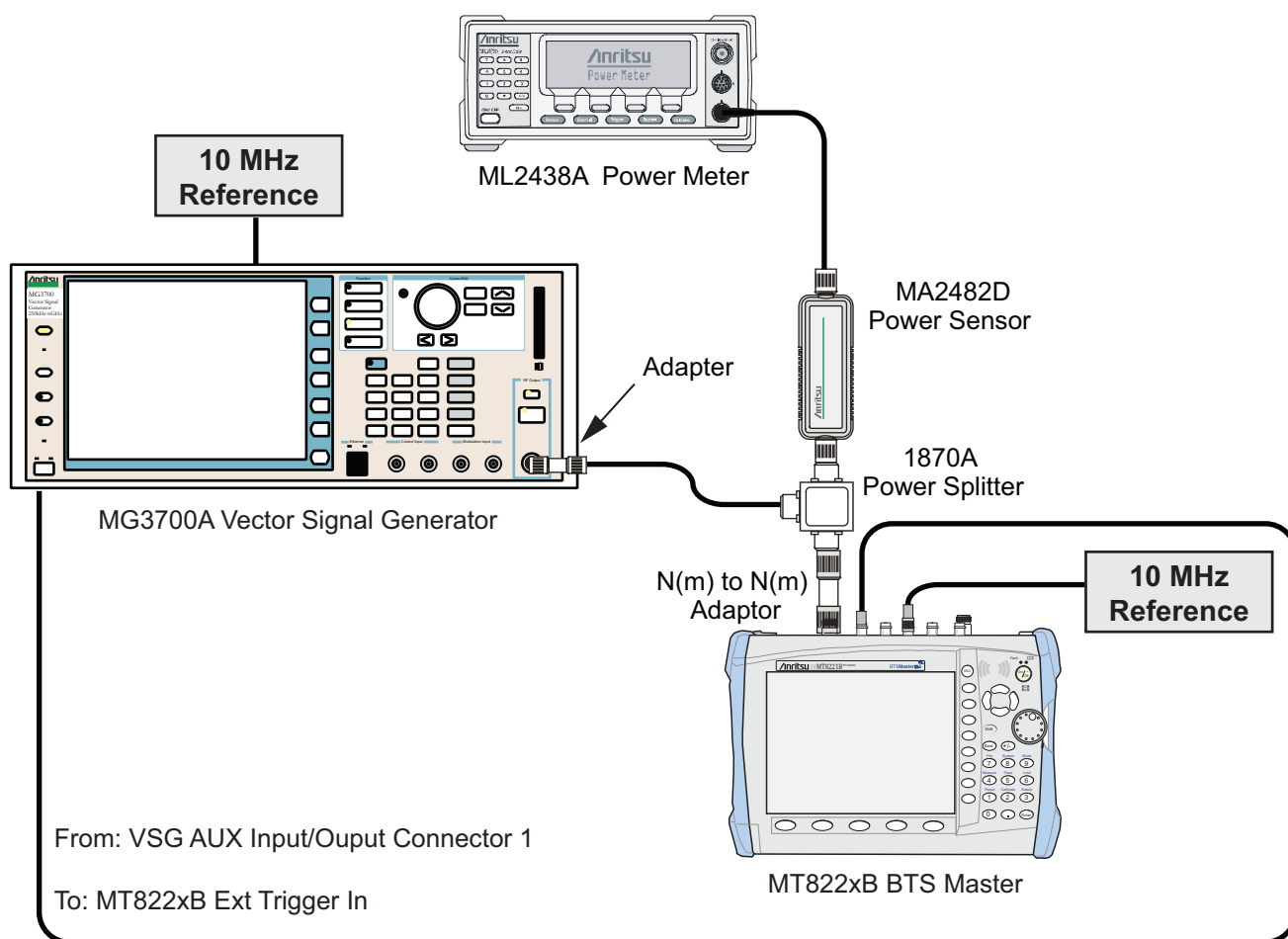
The tests in this section verify the optional EVDO Signal Analyzer functions in Anritsu Model MT822xB BTS Master. There are tests for the following:

- “8-PSK Modulation Channel Power, Frequency Error, Rho and Tau Verification”
- “QPSK Modulation Channel Power, Frequency Error, Rho, and Tau Verification” on page 5-49
- “16-QAM Modulation Channel Power, Frequency Error, Rho, and Tau Verification ” on page 5-49
- “Idle Slot Channel Power, Frequency Error, Rho, and Tau Verification – (Option 62 and/or 63)” on page 5-50

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

### Setup



**Figure 5-8.** EVDO Signal Analyzer Option Verification

## 8-PSK Modulation Channel Power, Frequency Error, Rho and Tau Verification

The tests in this section verify the function of the optional EVDO Signal Analyzer in the Model MT822xB BTS Master.

### Procedure

1. Calibrate the power sensor.
2. Connect the equipment as shown in [Figure 5-8](#).
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the MT822xB mode to EVDO Signal Analyzer. Preset the unit.
5. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select Yes.
7. Press the **Set** key.

<b>Note</b> The MG3700A has two Set keys, and that they both have the same function.
--

8. Press the (F1) soft key to select Load File to Memory.
9. Press the (F1) soft key again to select Select Package.
10. Using the **Down Arrow** key step through the selection list until the CDMA2000\_1xEV-DO option is highlighted.
11. Press the **Set** key.
12. Press the (F6) soft key Return.
13. Press the **Set** key. The Select Package box is displayed. Use the rotary knob to highlight CDMA2000\_1xEVDO and press the **Set** key to select.
14. Another File List is displayed. Use the rotary knob to select FWD\_921\_6KBPS\_2SLOT and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED On and verify the “Playing” indicator in the center of the LCD is flashing.
16. Press the **Frequency** key, enter 870.03 MHz.
17. Press the **Level** key, enter -40 and press the dBm soft key.
18. Adjust the MG3700A output so that the power meter reads -50 dBm  $\pm$  0.2 dB.
19. On the MT822xB, press the Frequency soft key and enter 870.03 MHz as Center Frequency.
20. Press the Measurements soft key and select EVDO Summary (red dot is displayed on the label).
21. Press the Setup soft key and select PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger soft key twice. Then wait 15 seconds to allow the MT822xB to update its measured results.
22. For MT822xB with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 18](#). Then record the calculated Channel Power Error in the **At 870.03 MHz, -50 dBm Level, 921.6kps 8-PSK Modulation** section of [Table A-52, “Option 62 EVDO RF Measurements”](#) on page A-27.
23. For MT822xB with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot, and Tau in the **870.03 MHz, -50 dBm Level, 921.6kps 8-PSK Modulation** section of [Table A-53, “Option 63 EVDO Demodulator”](#) on page A-28.
24. Verify that the measured values in [Step 22](#) or [Step 23](#) (or both) are within specifications.

## QPSK Modulation Channel Power, Frequency Error, Rho, and Tau Verification

The tests in this section verify the function of the optional EVDO Signal Analyzer in Model MT822xB BTS Master.

### Procedure

1. Confirm that the equipment settings are unchanged from the previous test.
2. On the MG3700A, change the selected pattern to “FWD\_38\_4KBPS\_16SLOT”.
3. On the power meter, press the **Sensor** key, the **Cal Factor** soft key, and then the **Freq** soft key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the MG3700A frequency to 1930.05 MHz.
5. Adjust the MG3700A output so that the power meter reads 0 dBm  $\pm$  0.2 dB.
6. On the MT822xB, press the **Frequency** soft key and enter 1930.05 MHz as Center Frequency. Then wait 15 seconds to allow the MT822xB to update its measured results.
7. For MT822xB with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 5](#). Then record the calculated Channel Power error to the **At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation** section of [Table A-52](#).
8. For MT822xB with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot, and Tau to the **At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation** section of [Table A-53](#).
9. Verify that the measured values in [Step 7](#) or [Step 8](#) (or both) are within specifications.

## 16-QAM Modulation Channel Power, Frequency Error, Rho, and Tau Verification

The tests in this section verify the function of the optional EVDO Signal Analyzer in Model MT822XB BTS Master.

### Procedure

1. Confirm that the equipment settings are unchanged from the previous test. The power sensor Cal Factor frequency should still be at 1930 MHz, the MG3700A frequency and MT822xB Center Frequency should still be at 1930.05 MHz.
2. On the MG3700A, change the selected pattern to FWD\_2457\_6KBPS\_1SLOT.
3. Adjust the MG3700A output so that the power meter reads -50 dBm  $\pm$  0.2 dB.
4. Then wait 15 seconds to allow the MT822xB to update its measured results.
5. For MT822xB with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 3](#). Then record the calculated Channel Power error in the **At 1930.05 MHz, -50 dBm Level, 2457.6kps 16-QAM Modulation** section of [Table A-52](#).
6. For MT822xB with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot, and Tau in the **At 1930.05 MHz, -50 dBm Level, 2457.6kps 16-QAM Modulation** section of [Table A-53](#).
7. Verify that the measured values in [Step 5](#) or [Step 6](#) (or both) are within specifications.

## Idle Slot Channel Power, Frequency Error, Rho, and Tau Verification – (Option 62 and/or 63)

The tests in this section verify the function of the optional EVDO Signal Analyzer in Model MT822xB BTS Master.

### Procedure

1. Confirm that the equipment settings are unchanged from the previous test. The power sensor Cal Factor frequency should still be at 1930 MHz, the MG3700A frequency and MT822xB Center Frequency should still be at 1930.05 MHz.
2. On the MG3700A, change the selected pattern to FWD\_IDLE.
3. Adjust the MG3700A output so that the power meter reads  $-50 \text{ dBm} \pm 0.2 \text{ dB}$ .
4. Then wait 15 seconds to allow the MT822xB to update its measured results.
5. For MT822xB with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 3](#). Then record the calculated Channel Power error in the **At 1930.05 MHz,  $-50 \text{ dBm}$  Level, IDLE SLOT** section of [Table A-52](#).
6. For MT822xB with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot, and Tau in the **At 1930.05 MHz,  $-50 \text{ dBm}$  Level, IDLE SLOT** section of [Table A-53](#).
7. Verify that the measured values in [Step 5](#) or [Step 6](#) (or both) are within specifications.
8. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
9. Set the MG3700A frequency to 870.03 MHz.
10. Adjust the MG3700A output so that the power meter reads  $-10 \text{ dBm} \pm 0.2 \text{ dB}$ .
11. On the MT822xB, press the Frequency soft key and enter 870.03 MHz as Center Frequency. Then wait 15 seconds to allow the MT822xB to update its measured results.
12. For MT822xB with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in [Step 10](#). Then record the calculated Channel Power error in the **At 870.03 MHz,  $-10 \text{ dBm}$  Level, IDLE SLOT** section of [Table A-52](#).
13. For MT822xB with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot, and Tau in the **At 870.03 MHz,  $-10 \text{ dBm}$  Level, IDLE SLOT** section of [Table A-53](#).
14. Verify that the measured values in [Step 12](#) or [Step 13](#) (or both) are within specifications.

## 5-13 Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification

The tests in this section verify the functionality of the Mobile WiMAX Signal Analyzer of the MT822xB. There are tests for the following:

- [“Mobile WiMAX Channel Power Accuracy Tests \(Option 66\) ”](#)
- [“Mobile WiMAX Residual EVM and Frequency Error Tests \(Option 67\) ” on page 5-55](#)

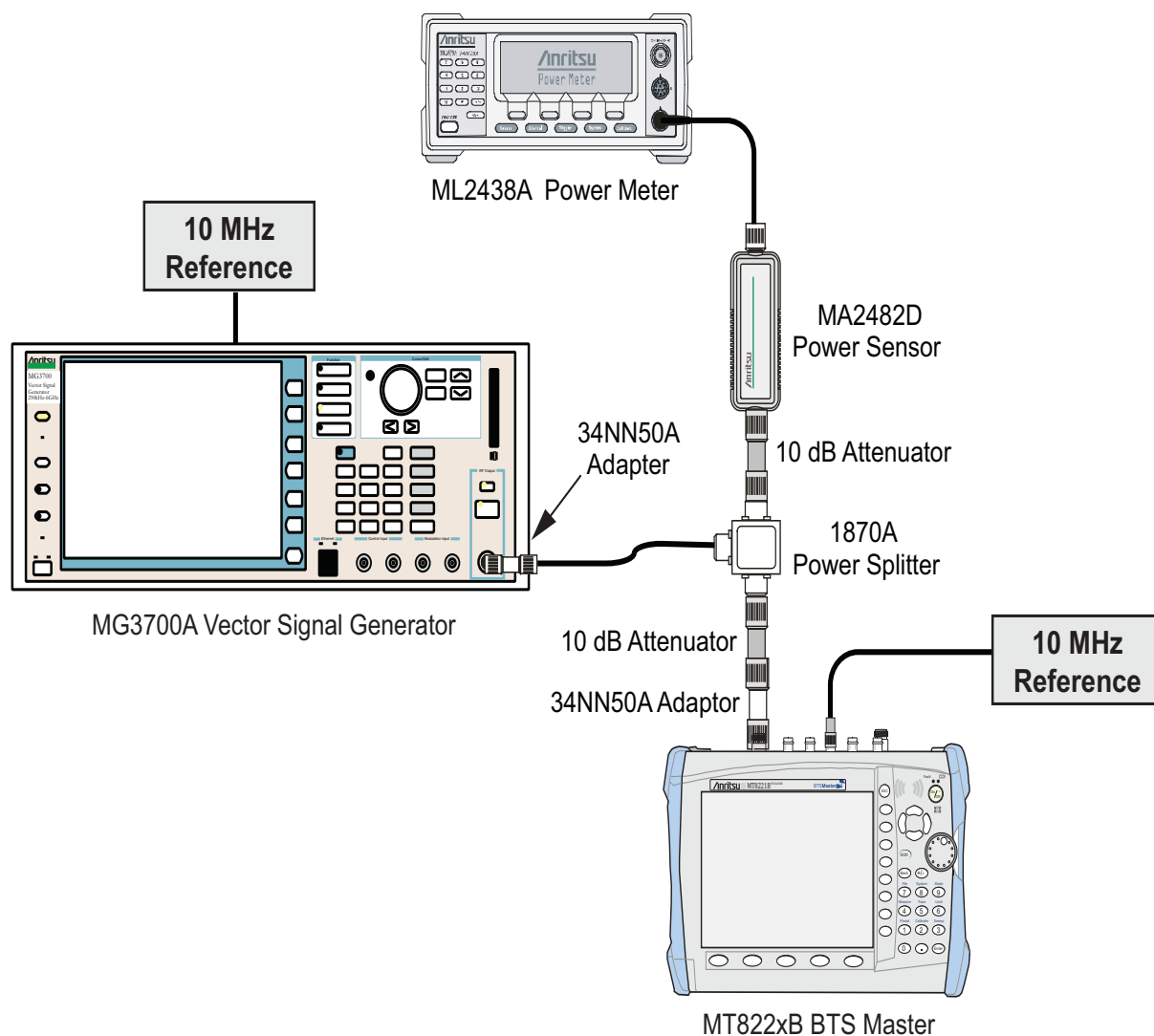
### Mobile WiMAX Channel Power Accuracy Tests (Option 66)

The tests in this section verify the function of the optional Mobile WiMAX Signal Analyzer in Model MT822xB BTS Master.

#### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

## Setup

**Figure 5-9.** Mobile WiMAX Signal Analyzer Option Verification**Procedure**

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
4. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in [Figure 5-9](#).

**Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)**

5. Set the MG3700A as follows:
  - a. Press the yellow button (answer yes to the question).
  - b. Press the **Set** key
  - c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.



- e. Using the **Down Arrow** key step through the selection list until “mWiMax” is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) soft key **Return**.
  - h. Press the **Set** key. The **Select Package** list box is displayed. Again select mWiMax and **Set**.
  - i. Another file list is displayed. Select (highlight) 10m1024g8\_0\_10\_cap.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 2600.5 MHz.
  - m. Press the **Level** key, then enter 2 dBm. Turn the output On.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads  $-15.0 \text{ dBm} \pm 0.2 \text{ dB}$ .
  7. Set the MT822xB to Mobile WiMax Signal Analyzer mode and preset the unit.
  8. Set the MT822xB as follows:
    - a. Press the **Freq** soft key and set the Center Freq to 2600.5 MHz.
    - b. Press the **Setup** soft key and set the Bandwidth to 10 MHz.
    - c. Press the **Frame Length** soft key and set the Frame Length to 10 ms.
    - d. Press the **Measurements** soft key and select RF, then select Power vs. Time.
  9. Record the MT822xB Channel Power (RSSI) reading in the **Measured Channel Power (RSSI)** column, **2600.5 MHz, -15 dBm** row of [Table A-54, “Option 66 Mobile WiMAX Channel Power Accuracy \(10 MHz Bandwidth and 10 ms Frame Length\)”](#) on page A-29.
  10. Calculate the Channel Power Error by subtracting the MT822xB “Channel Power (RSSI)” reading from the power meter reading in [Step 6](#). Record the result into the test record in the **Error** column, **2600.5 MHz, -15 dBm** row of [Table A-54](#).
  11. Verify that the error is within specification.
  12. Adjust the MG3700A Level setting to approximately -33 dBm so that the power meter reads  $-50.0 \text{ dBm} \pm 0.2 \text{ dB}$ .
  13. Record the MT822xB Channel Power (RSSI) reading in the **2600.5 MHz, -50 dBm** row of [Table A-54](#).
  14. Calculate the Channel Power Error by subtracting the MT822xB “Channel Power (RSSI)” reading from the power meter reading that was recorded in [Step 13](#). Record the result in [Table A-54](#).
  15. Verify that the error is within specification.
  16. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
  17. Set the MG3700A frequency to 3600.5 MHz.
  18. Change the MT822xB center frequency to 3600.5 MHz.
  19. Measure the Channel Power (RSSI) for both -15 dBm and -50 dBm and then record the measured result and calculated error in [Table A-54](#).
  20. Verify that the error is within specification.

#### Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

21. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key
  - c. Press the (F1) soft key to select Load File to Memory.

- d. Press the (F1) soft key again to select **Select Package**.
  - e. Using the **Down Arrow** key step through the selection list until mWiMax is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) soft key **Return**.
  - h. Press the **Set** key. The **Select Package** list box is displayed. Again select mWiMax and **Set**.
  - i. Another file list is displayed. Select (highlight) 5m512g8\_2\_5\_cap.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is on. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 2600.5 MHz.
  - m. Press the **Level** key, then enter 2 dBm. Turn the output On.
22. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
23. Adjust the MG3700A Level setting with the knob so that the power meter reads  $-15.0 \text{ dBm} \pm 0.2 \text{ dB}$ .
24. Set the MT822xB to Mobile WiMax Signal Analyzer mode and preset the unit.
25. Set the MT822xB as follows:
- a. Press the **Freq** soft key and set the Center Freq to 2600.5 MHz.
  - b. Press the **Setup** soft key and set the Bandwidth to 5 MHz.
  - c. Press the **Frame Length** soft key and set the Frame Length to 5 ms.
  - d. Press the **Measurements** soft key and select RF, then select Power vs. Time.
26. Repeat [Step 9](#) through [Step 20](#), recording the results into the test record in [Table A-55](#), “[Option 66 Mobile WiMAX Channel Power Accuracy \(5 MHz Bandwidth and 5 ms Frame Length\)](#)” on page A-29.

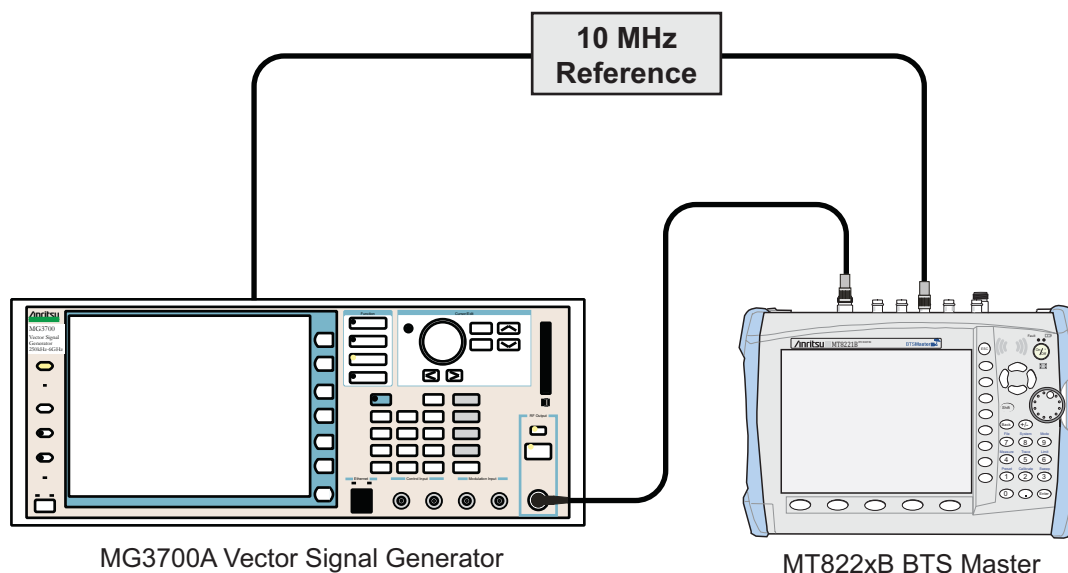
## Mobile WiMAX Residual EVM and Frequency Error Tests (Option 67)

The tests in this section verify the function of the optional Mobile WiMAX Signal Analyzer in Model MT822xB BTS Master.

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Anritsu PN 3-806-169 Coaxial Cable
- 10 MHz Reference Standard

### Setup



**Figure 5-10.** Mobile WiMAX Residual EVM and Frequency Error Test Setup

### Procedure

1. Connect the 10 MHz Reference to the 10 MHz/5 MHz Ref Input of the MG3700A and to the Ext Ref In of the MT822xB as shown in [Figure 5-10](#).
2. Connect the RF Out of the MG3700A to the Spectrum Analyzer RF In connector of the MT822xB.

### Residual EVM and Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

3. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key
  - c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.
  - e. Using the **Down Arrow** key step through the selection list until mWiMax is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) soft key Return.
  - h. Press the **Set** key. The Select Package list box is displayed. Again select mWiMax and Set.

- i. Another file list is displayed. Select (highlight) 10m1024g8\_0\_10\_cap.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 2600.5 MHz.
  - m. Press the **Level** key, then enter –15 dBm. Turn the output On.
4. Set the MT822xB to Mobile WiMax Signal Analyzer mode and preset the unit.
5. Set the MT822xB as follows:
  - a. Press the Freq soft key and set the Center Freq to 2600.5 MHz.
  - b. Press the Setup soft key and set the Bandwidth to 10 MHz.
  - c. Press the CP Ratio soft key (under the Setup soft key) and set the CP Ratio to 1/8.
  - d. Press the Frame Length soft key and set the Frame Length to 10 ms.
  - e. Press the Demod soft key and set Demod to FCH.
  - f. Press the Measurements soft key and select Demodulator, then select Modulation Summary.
6. Record the MT822xB EVM (rms) reading in the 2600.5 MHz, –15 dBm row of [Table A-56, “Option 67, Mobile WiMAX Residual EVM \(10 MHz Bandwidth and 10 ms Frame Length\)”](#) on page A-30 .
7. Verify that the measured EVM is within specification.
8. Set the MG3700A Level to –50.0 dBm.
9. Record the MT822xB EVM (rms) reading in the **2600.5 MHz, –50 dBm** row of [Table A-56](#).
10. Verify that the measured EVM is within specification.
11. On the MT822xB, press the Setup soft key and set Demod to Auto.
12. Record the MT822xB Freq Error reading in 2600.5 MHz, –50 dBm row of [Table A-57, “Option 67, Mobile WiMAX Frequency Error \(10 MHz Bandwidth and 10 ms Frame Length\)”](#) on page A-30.
13. Verify that the measured Freq Error is within specification.
14. Set the MG3700A frequency to 3600.5 MHz.
15. On the MT822xB, change the Center Frequency to 3600.5 MHz.
16. Press the Setup soft key and set Demod to FCH.
17. Measure the EVM (rms) for both –15 dBm and –50 dBm and then record the measured results in [Table A-56](#).
18. Verify that the measured EVM is within specification.
19. Repeat [Step 11](#) through [Step 13](#) to measure the Frequency Error at –50 dBm, record the results in [Table A-57](#).

#### Residual EVM and Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

20. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key
  - c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.
  - e. Using the **Down Arrow** key step through the selection list until “mWiMax” is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) soft key Return.

- h. Press the **Set** key. The **Select Package** list box is displayed. Again select mWiMax and **Set**.
  - i. Another file list is displayed. Select (highlight) 5m512g8\_2\_5\_cap.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 2600.5 MHz.
21. Press the **Level** key, then enter –15 dBm. Turn the output On.
- a. Set the MT822xB as follows:
  - b. Press the **Freq** soft key and set the Center Freq to 2600.5 MHz
  - c. Press the **Setup** soft key and set the Bandwidth to 5 MHz.
  - d. Press the **CP Ratio** soft key (under the **Setup** soft key) and set the CP Ratio to 1/8.
  - e. Press the **Frame Length** soft key and set the Frame Length to 5 ms.
  - f. Press the **Demod** soft key and set Demod to FCH.
22. Press the **Measurements** soft key and select Demodulator, then select Modulation Summary.
23. Repeat [Step 6](#) through [Step 19](#), recording the MT822xB EVM (rms) in [Table A-58, “Option 67, Mobile WiMAX Residual EVM \(5 MHz Bandwidth and 5 ms Frame Length\)”](#) on page A-31 and the Frequency Error readings in [Table A-59, “Option 67, Mobile WiMAX Frequency Error \(5 MHz Bandwidth and 5 ms Frame Length\)”](#) on page A-31.

## 5-14 Option 541 and/or 542 and/or 543, LTE Signal Analyzer Verification

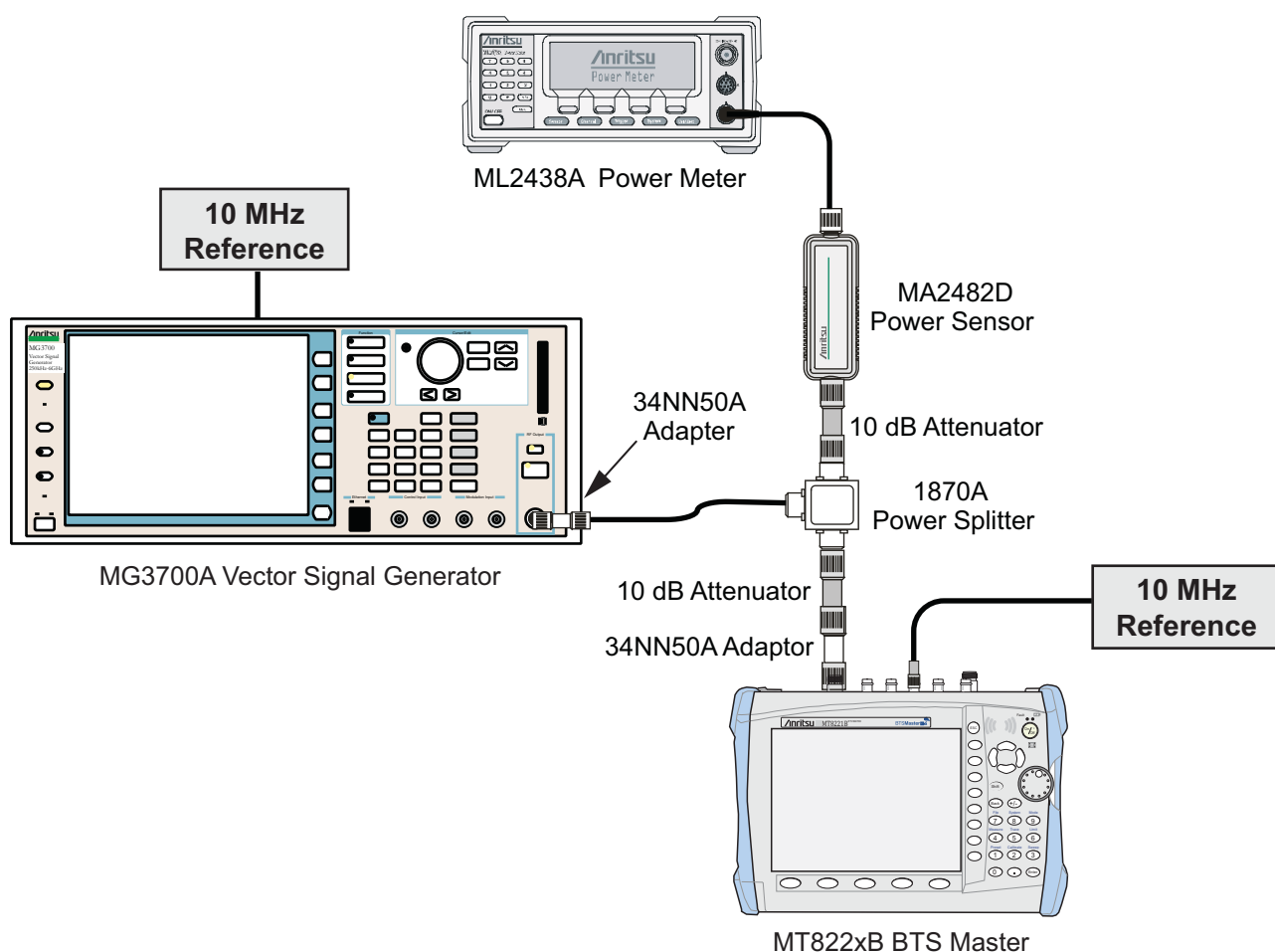
The tests in this section verify the functionality of the LTE Signal Analyzer of the MT822xB BTS Master. There are tests for the following:

- “LTE Channel Power Accuracy Tests (Option 541 and Option 543)”
- “LTE Residual EVM and Frequency Error Tests (Option 542 and Option 543)” on page 5-60

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cable
- 10 MHz Reference Standard

### Procedure



**Figure 5-11.** LTE Signal Analyzer Option Verification

## LTE Channel Power Accuracy Tests (Option 541 and Option 543)

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MT822xB BTS Master.

### Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in [Figure 5-11, “LTE Signal Analyzer Option Verification”](#).

<b>Note</b>	The LTE pattern requires a Waveform Data license MX370108A that must be purchased.
-------------	--

5. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key.

<b>Note</b>	Both <b>Set</b> keys on the MG3700A perform the same function.
-------------	--

- c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.
  - e. Using the **Down Arrow** key step through the selection list until “LTE\_DL\_E-TM” is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) soft key Return.
  - h. Press the **Set** key. The Select Package list box is displayed. Again select LTE\_DL\_E-TM and then the **Set** key.
  - i. Another file list is displayed. Select (highlight) E-TM\_1-1\_10M.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 750 MHz.
  - m. Press the **Level** key, then enter 2 dBm.
  - n. Turn on the output.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads  $-10.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
7. Set the MT822xB to LTE Signal Analyzer mode and preset the unit.
8. Set the MT822xB as follows:
  - a. Press the Freq soft key and set the Center Freq to 750 MHz.
  - b. Press the Measurements soft key and select RF, then select Channel Spectrum.
9. Record the MT822xB Channel Power reading in the **750 MHz, -10 dBm** row, **Measured Channel Power** column of [Table A-60, “Option 541 LTE Channel Power Accuracy”](#) on [page A-32](#).
10. Calculate the Channel Power Error by subtracting the MT822xB “Channel Power” reading from the power meter reading in [Step 6](#). Record the result in the **750 MHz, -10 dBm** row, **Error** column of [Table A-60](#).

11. Verify that the error is within specification.
12. Adjust the MG3700A Level setting to approximately  $-33$  dBm so that the power meter reads  $-50.0$  dBm  $\pm 0.5$  dB.
13. Record the MT822xB Channel Power reading in the **750 MHz,  $-50$  dBm** row, **Measured Channel Power** column of [Table A-60](#).
14. Calculate the Channel Power Error by subtracting the MT822xB “Channel Power” reading from the power meter reading that was recorded in [Step 13](#). Record the result in the **750 MHz,  $-50$  dBm** row, **Error** column of [Table A-60](#).
15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 2150 MHz.
17. Set the MG3700A frequency to 2150 MHz. Press the **Set** key.
18. Change the MT822xB center frequency to 2150 MHz.
19. Measure the Channel Power for  $-10$  dBm and  $-50$  dBm and then record the measured result in the **Measured Channel Power** column and the calculated error in the **Error** column of [Table A-60](#).
20. For units with Option 543, repeat [Step 5](#) Substep [g](#) through [Step 19](#) using the E-TM\_1-1\_20M pattern for [Step 5](#) Substep [i](#). Record the readings and results in [Table A-61](#), “Option 543, LTE Channel Power Accuracy” on page A-32.

## LTE Residual EVM and Frequency Error Tests (Option 542 and Option 543)

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MT822xB BTS Master.

### Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in [Figure 5-11](#).

**Note** The LTE pattern requires a Waveform Data license MX370108A that must be purchased.

5. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key.

**Note** Both **Set** keys on the MG3700A perform the same function.

- c. Press the (F1) soft key to select Load File to Memory.
- d. Press the (F1) soft key again to select Select Package.
- e. Using the **Down Arrow** key step through the selection list until LTE\_DL\_E-TM is highlighted.
- f. Press the **Set** key.
- g. Press the (F6) soft key Return.
- h. Press the **Set** key. The Select Package list box is displayed. Again select LTE\_DL\_E-TM and press **Set**.



- i. Another file list is displayed. Select (highlight) E-TM\_3-1\_10M.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 750 MHz.
  - m. Press the **Level** key, then enter 2 dBm.
  - n. Turn On the output.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads  $-10.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
7. Set the MT822xB to LTE Signal Analyzer mode and preset the unit.
8. Set the MT822xB as follows:
  - a. Press the Freq soft key and set the Center Freq to 750 MHz.
  - b. Press the Measurements soft key and select Modulation Measurements.
  - c. Press the Constellation soft key.
9. Record the MT822xB Residual EVM and Frequency Error reading in the **750 MHz, -10 dBm** section of [Table A-62, “Option 542 LTE Residual EVM and Frequency Accuracy” on page A-33](#).
10. Verify that the values are within specification.
11. Adjust the MG3700A Level setting to approximately  $-33 \text{ dBm}$  so that the power meter reads  $-50.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
12. Record the MT822xB Residual EVM and Frequency Error reading into the **750 MHz, -50 dBm** section of [Table A-62](#).
13. Verify that the values are within specification.
14. Set the calibration factor frequency of the power sensor to 2150 MHz.
15. Set the MG3700A frequency to 2150 MHz. Press the **Set** key.
16. Adjust the MG3700A Level setting with the knob so that the power meter reads  $-10.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
17. Change the MT822xB center frequency to 2150 MHz.
18. Record the MT822xB Residual EVM and Frequency Error reading into the **2150 MHz, -10 dBm** section of [Table A-62](#).
19. Verify that the values are within specification.
20. Adjust the MG3700A Level setting to approximately  $-33 \text{ dBm}$  so that the power meter reads  $-50.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
21. Record the MT822xB Residual EVM and Frequency Error reading in the **2150 MHz, -50 dBm** section of [Table A-62](#).
22. Verify that the values are within specification.
23. For units with Option 543, repeat [Step 5](#) Substep [g](#) through [Step 19](#) using the E-TM\_3-1\_20M pattern for [Step 5](#) Substep [i](#). Record the readings and results in [Table A-63, “Option 543, LTE Residual EVM and Frequency Accuracy” on page A-34](#)

## 5-15 Option 551 and/or 552 and/or 543, TD-LTE Signal Analyzer Verification

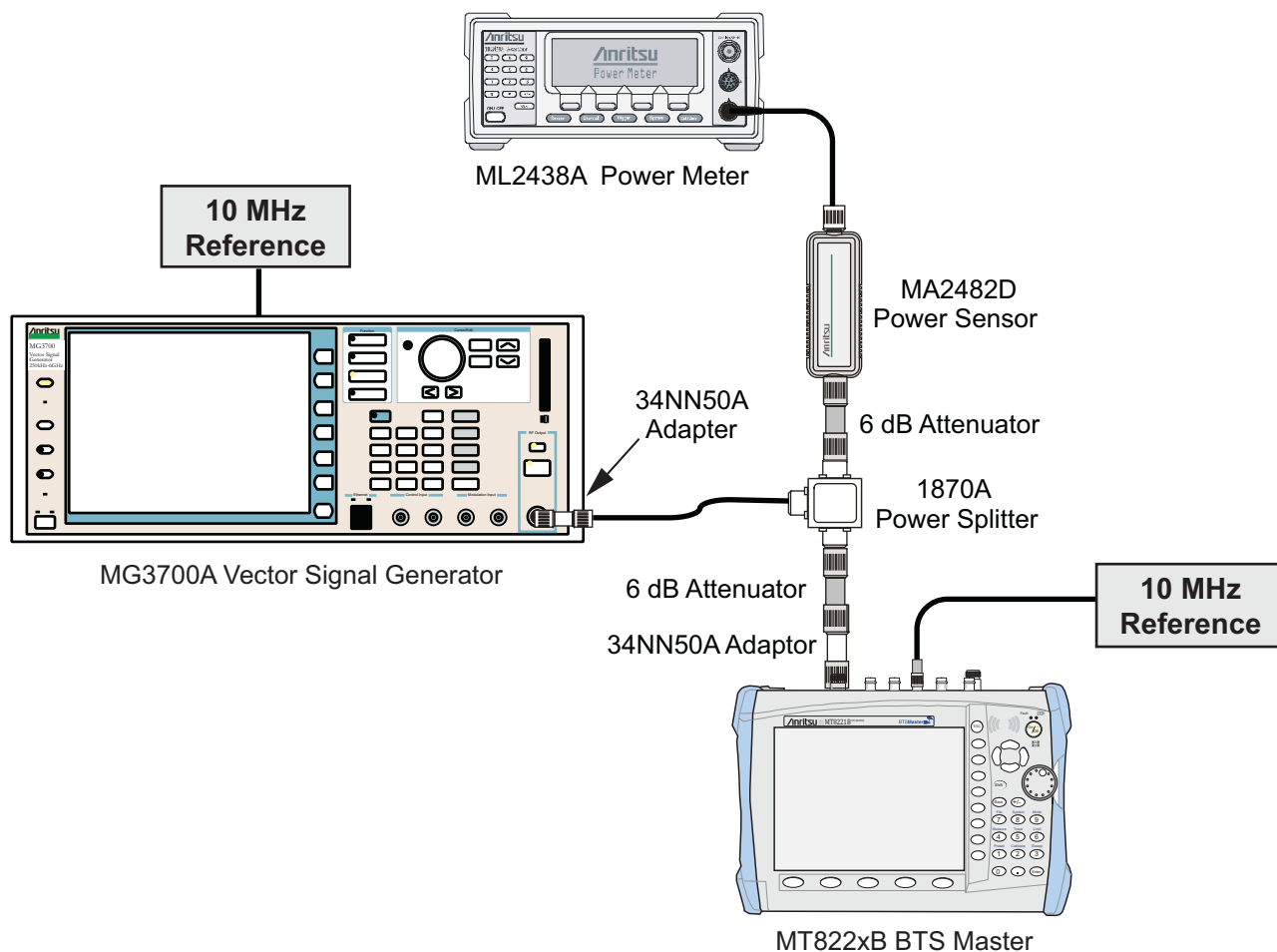
The tests in this section verify the functionality of the TD-LTE Signal Analyzer of the MS272xC Spectrum Master. Tests are established for TD-LTE Channel Power Accuracy Tests (Option 551 and Option 543) and TD-LTE Residual EVM and Frequency Error Tests (Option 552 and Option 543). Tests are established for the following:

- [“TD-LTE Channel Power Accuracy Tests \(Option 551 and Option 543\)”](#)
- [“TD-LTE Residual EVM and Frequency Error Tests \(Option 552 and Option 543\)”](#) on page 5-65

### Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 44-6 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

## Procedure



**Figure 5-12.** TD-LTE Signal Analyzer Option Verification

## TD-LTE Channel Power Accuracy Tests (Option 551 and Option 543)

The tests in this section verify the function of the optional TD-LTE Signal Analyzer in Model MT822xB BTS Master.

### Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 6 dB attenuators (quantity 2), as shown in [Figure 5-12, "TD-LTE Signal Analyzer Option Verification"](#).

**Note** The LTE pattern requires a Waveform Data license MX370110A that must be purchased.

5. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key.

<b>Note</b>	Both <b>Set</b> keys on the MG3700A perform the same function.
-------------	--

- c. Press the (F1) submenu key to select “Load File to Memory”
  - d. Press the (F1) submenu key again to select “Select Package”
  - e. Using the **Down Arrow** key, step through the selection list until LTE\_TDD is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) submenu key “Return”
  - h. Press the **Set** key. The “Select Package” list box is displayed. Again select LTE\_TDD and then the **Set** key.
  - i. Another file list is displayed. Select (highlight) TDLTE-E-TM-1-1\_10M.
  - j. Press the **Set** key.
  - k. Press the MOD On/Off key and verify that the LED is on. Ensure that the “Playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 750 MHz.
  - m. Press the **Level** key, then enter 2 dBm.
  - n. Turn on the output.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads  $-12.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
7. Set the MT822xB to TD-LTE Signal Analyzer mode and Preset the unit.
8. Set the MT822xB as follows:
  - a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
  - b. Press the **Measurements** main menu key and select RF, then select Channel Spectrum.
9. Record the MT822xB Channel Power reading into the column labeled “Measured Channel Power” (row labeled 750 MHz,  $-12 \text{ dBm}$ ) in [Table A-64, “Option 551 and 543, Channel Power Accuracy” on page A-35](#).
10. Calculate the Channel Power Error by subtracting the MT822xB “Channel Power” reading from the power meter reading in [Step 6](#). Record the result into the test record in the column labeled “Error” (row labeled 750 MHz,  $-12 \text{ dBm}$ ) in [Table A-64](#).
11. Verify that the error is within specification.
12. Adjust the MG3700A Level setting to approximately  $-18 \text{ dBm}$  so that the power meter reads  $-30.0 \text{ dBm} \pm 0.5 \text{ dB}$ .
13. Record the MT822xB Channel Power reading into the test record in the column labeled “Measured Channel Power” (row labeled 750 MHz,  $-30 \text{ dBm}$ ) in [Table A-64](#).
14. Calculate the Channel Power Error by subtracting the MT822xB “Channel Power” reading from the power meter reading that was recorded in [Step 12](#). Record the result into the test record in the column labeled “Error” (row labeled 750 MHz,  $-30 \text{ dBm}$ ) in [Table A-64](#).
15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 2350 MHz.
17. Set the MG3700A frequency to 2350 MHz. Press the **Set** key.
18. Change the MT822xB center frequency to 2350 MHz.

19. Measure the Channel Power for –12 dBm and –30 dBm, and then record the measured result in the **Measured Channel Power** column and the calculated error in the **Error** column of [Table A-64](#).
20. For units with Option 543, press the **Setup** main menu key and set the BW to 20 MHz, then repeat [Step 5](#) Substep [a](#) through [Step 19](#) using the TDLTE-E-TM-1-1\_20M pattern for [Step 5](#) Substep [i](#).

## TD-LTE Residual EVM and Frequency Error Tests (Option 552 and Option 543)

The tests in this section verify the function of the optional TD-LTE Signal Analyzer in Model MT822xB BTS Master.

### Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 6 dB attenuators (quantity 2), as shown in [Figure 5-12](#).

<b>Note</b>	The LTE pattern requires a Waveform Data license MX370110A that must be purchased.
-------------	--

5. Set the MG3700A as follows:
  - a. Press the yellow **Preset** button (answer yes to the question).
  - b. Press the **Set** key.

<b>Note</b>	Both <b>Set</b> keys on the MG3700A perform the same function.
-------------	--

- c. Press the (F1) soft key to select Load File to Memory.
  - d. Press the (F1) soft key again to select Select Package.
  - e. Using the **Down Arrow** key step through the selection list until LTE\_TDD is highlighted.
  - f. Press the **Set** key.
  - g. Press the (F6) soft key Return.
  - h. Press the **Set** key. The Select Package list box is displayed. Again select LTE\_TDD and press **Set**.
  - i. Another file list is displayed. Select (highlight) TDLTE-E-TM-3-3\_10M.
  - j. Press the **Set** key.
  - k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the “playing” indicator is displaying the moving pattern.
  - l. Press the **Frequency** key, then enter 750 MHz.
  - m. Press the **Level** key, then enter 2 dBm.
  - n. Turn On the output.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –12.0 dBm ± 0.5 dB.
7. Set the MT822xB to TD-LTE Signal Analyzer mode and preset the unit.
8. Set the MT822xB as follows:
  - a. Press the Freq soft key and set the Center Freq to 750 MHz.
  - b. Press the Measurements soft key and select Modulation Measurements.
  - c. Press the Constellation soft key.

9. Record the MT822xB Residual EVM and Frequency Error reading in the **750 MHz, –12 dBm** section of [Table A-65, “Option 552 and 543, TD-LTE Residual EVM and Frequency Accuracy”](#) on page A-36.
10. Verify that the values are within specification.
11. Adjust the MG3700A Level setting to approximately –18 dBm so that the power meter reads –30.0 dBm  $\pm$  0.5 dB.
12. Record the MT822xB Residual EVM and Frequency Error reading into the **750 MHz, –30 dBm** section of [Table A-65](#).
13. Verify that the values are within specification.
14. Set the calibration factor frequency of the power sensor to 2350 MHz.
15. Set the MG3700A frequency to 2350 MHz. Press the **Set** key.
16. Adjust the MG3700A Level setting with the knob so that the power meter reads –12.0 dBm  $\pm$  0.5 dB.
17. Change the MT822xB center frequency to 2350 MHz.
18. Record the MT822xB Residual EVM and Frequency Error reading into the **2350 MHz, –12 dBm** section of [Table A-65](#).
19. Verify that the values are within specification.
20. Adjust the MG3700A Level setting to approximately –18 dBm so that the power meter reads –30.0 dBm  $\pm$  0.5 dB.
21. Record the MT822xB Residual EVM and Frequency Error reading in the **2350 MHz, –30 dBm** section of [Table A-65](#).
22. Verify that the values are within specification.
23. For units with Option 543, press the **Setup** main menu key and set the BW to 20 MHz, then repeat [Step 5](#) Substep [a](#) through [Step 22](#) using the TDLTE-E-TM-3-3\_20M pattern for [Step 5](#) Substep [i](#).

# Chapter 6 — Battery Information

## 6-1 General Information

The following information relates to the care and handling of the Anritsu battery packs and Lithium-Ion batteries.

- The battery supplied with the BTS Master may need charging before use. Before using the BTS Master, the internal battery may be charged either in the unit using the AC-DC Adapter (40-168-R) or the 12-Volt DC adapter (806-62), or separately in the optional Dual Battery Charger (2000-1374).
- Use only Anritsu approved battery packs.
- Recharge the battery only in the BTS Master or in an Anritsu approved charger.
- When the BTS Master or the charger is not in use, disconnect it from the power source.
- Do not charge batteries for longer than 24 hours; overcharging may shorten battery life.
- If left unused, a fully charged battery will discharge itself over time.
- Temperature extremes affect the ability of the battery to charge: allow the battery to cool down or warm up as necessary before use or charging.
- Discharge the battery from time to time to improve battery performance and battery life.
- The battery can be charged and discharged hundreds of times, but it will eventually wear out.
- The battery may need to be replaced when the operating time between charging becomes noticeably shorter than normal.
- Never use a damaged or worn out charger or battery.
- Storing the battery in extreme hot or cold places will reduce the capacity and lifetime of the battery.
- Never short-circuit the battery terminals.
- Do not drop, mutilate or attempt to disassemble the battery.
- Do not dispose of batteries in a fire!
- Batteries must be recycled or disposed of properly. Do not place batteries in household garbage.
- Always use the battery for its intended purpose only.

### **Warning**

This BTS Master is supplied with a rechargeable battery that could potentially leak hazardous compounds into the environment. These hazardous compounds present a risk of injury or loss due to exposure. Anritsu Company recommends removing the battery for long-term storage of the instrument and storing the battery in a leak-proof, plastic container. Follow the environmental storage requirements specified in the product data sheet.

## 6-2 Battery Pack Removal and Replacement

This section provides instructions for the removal and replacement of the BTS Master battery pack.

**Note** Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the BTS Master.

1. Locate the battery access door illustrated in [Figure 6-1](#).



**Figure 6-1.** Battery Access Door Location and Finger Notch

2. With the BTS Master laying flat and face up on a stable surface, grab the battery access door notch and pull the battery door down towards the bottom of the instrument as shown in [Figure 6-2](#).



**Figure 6-2.** Opening the Battery Access Door



3. Remove the battery access door as shown [Figure 6-3](#).



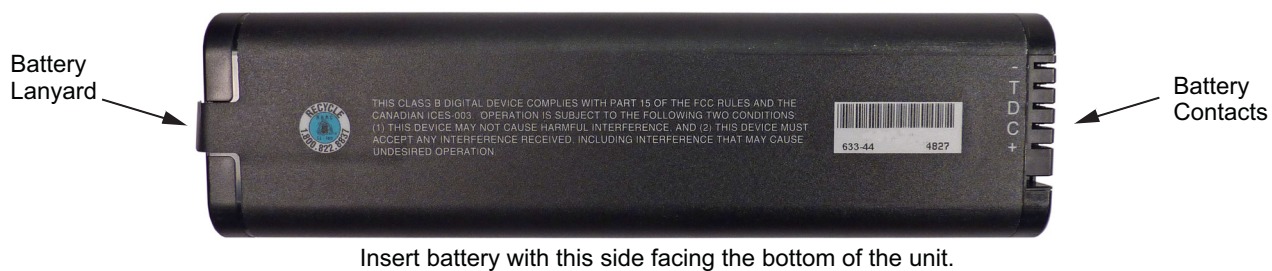
**Figure 6-3.** Removing the Battery Access Door

4. With the battery access door completely removed, grasp the battery lanyard and pull the battery straight out of the unit, as illustrated in [Figure 6-4](#).



**Figure 6-4.** Removing the Battery

5. Replacement is the opposite of removal. Note the orientation of the battery contacts, and be sure to insert the battery with the contacts facing the bottom of the unit, refer to [Figure 6-5](#).



**Figure 6-5.** Battery Contacts and Orientation

# Chapter 7 — Assembly Replacement

## 7-1 Replaceable Parts List

Refer to [Table 1-5, “List of Replaceable Parts” on page 1-6](#) for the list of replaceable parts. Refer to the following sections for basic replacement instructions.

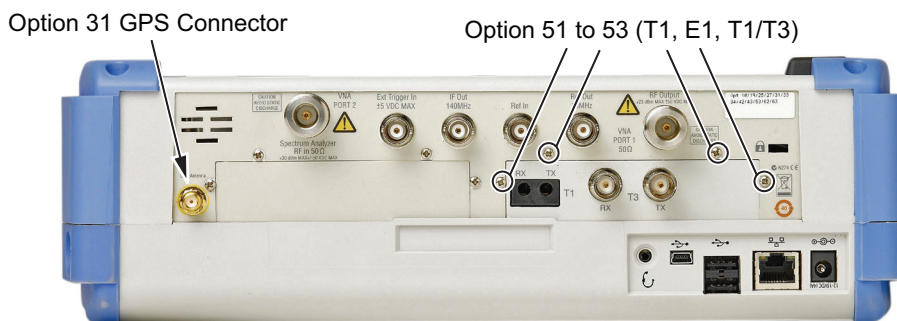
## 7-2 Opening the BTS Master Case

### Caution

Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

This procedure provides instructions for opening the BTS Master case. With the case opened, the internal assemblies can be removed and replaced, as detailed in the following sections.

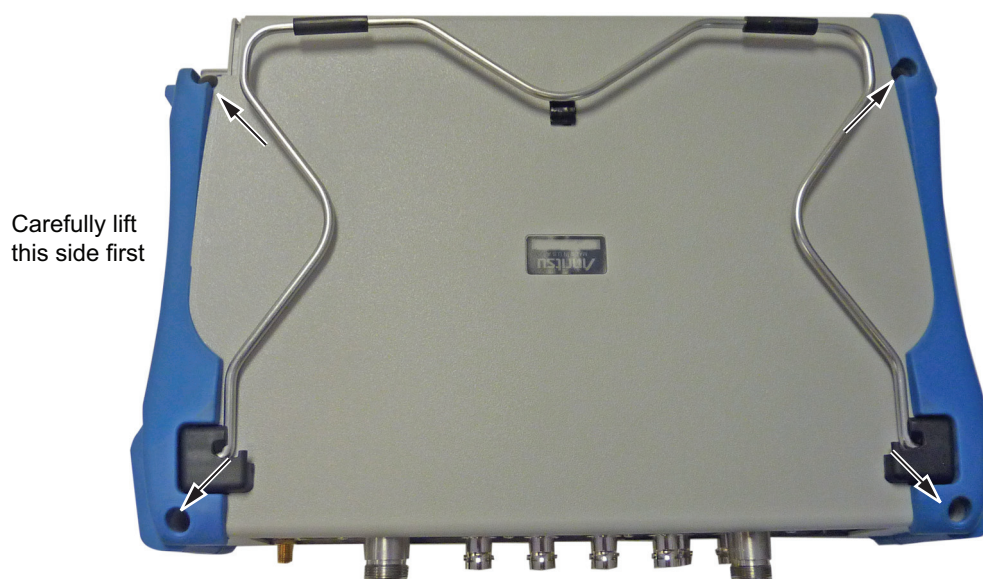
1. Remove the battery door and battery as shown in [Section 6-2 “Battery Pack Removal and Replacement” on page 6-2](#).
2. **Units with Option 31:** Carefully loosen and remove the lock nut and washer from the GPS SMA connector. Carefully push the SMA into the case ([Figure 7-1](#)).
3. **Units with Option 51, 52, or 53:** Use a Phillips screwdriver to remove the four screws securing the option face plate to the top of the instrument ([Figure 7-1](#)).



**Figure 7-1.** Option 31 or Option 51 to 53

4. Place the BTS Master face down on a stable work surface that will not scratch the display.

5. Use a Phillips screwdriver to remove the four screws securing the two halves of the BTS Master case together ([Figure 7-2](#)).



Location of the 4 screws to remove.

**Figure 7-2.** Remove the Four Screws

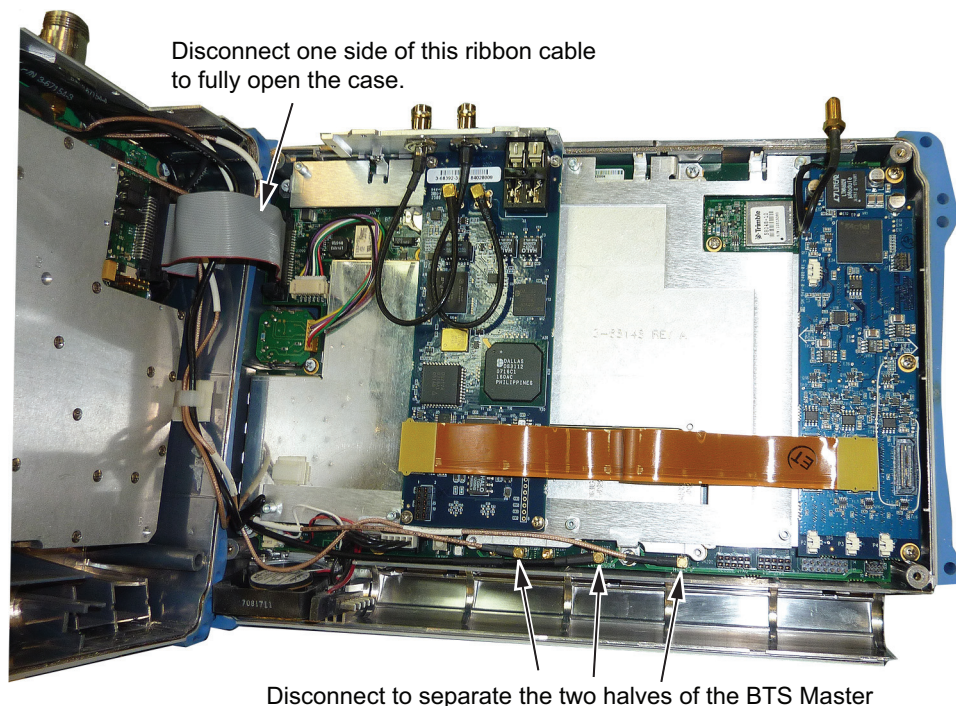
6. Carefully lift up on the side of the case shown and begin to separate the two halves.

**Caution**

Do not force or pull the two halves of the case apart completely, there are delicate cables attached between the two halves that must be disconnected first. Refer to [Figure 7-3](#) and [Figure 7-4](#). Note the position and routing of the cables, they should be similarly routed when the unit is reassembled.



7. Open the case 90 degrees and carefully disconnect the ribbon cable that connects the Spectrum Analyzer module to the main PCB assembly at connector J3000. The cable is attached between the two sides of the BTS Master.

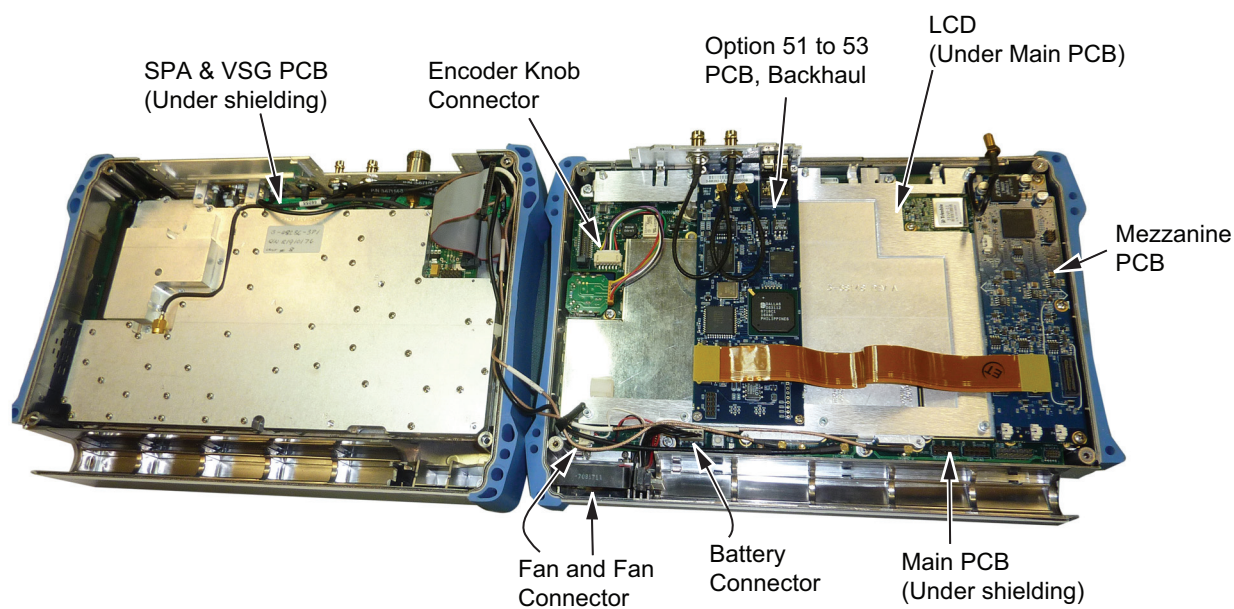


**Figure 7-3.** Disconnect the Ribbon Cable

8. The BTS Master can now be fully opened and laid flat.
9. Carefully disconnect the cable that comes from J9007 of the Spectrum Analyzer module from the connector marked 100M SPA on the main PCB assembly.
10. Carefully disconnect the cable that comes from J3008 of the Spectrum Analyzer module from the connector marked 37.8M IN on the main PCB assembly.
11. The two halves of the instrument can now be safely separated ([Figure 7-4](#)). Refer to the following sections to remove and replace specific components of the instrument.

<b>Note</b>	Proper routing of the cables is important for instrument performance. Note the cable routing.
-------------	---

12. Reverse the above steps to reassemble the case.

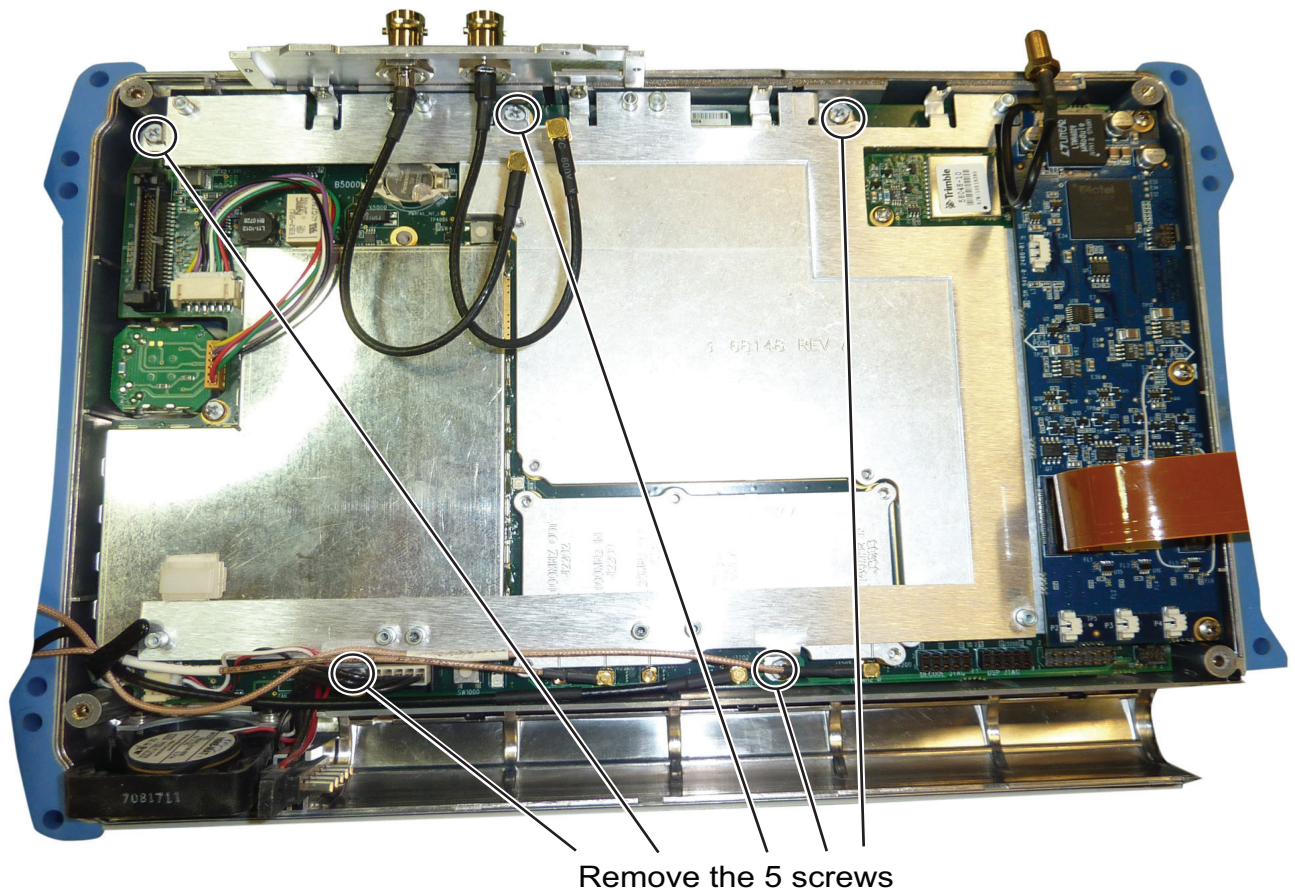


**Figure 7-4.** BTS Master Opened 180 Degrees

## 7-3 Main PCB Assembly Replacement

This procedure provides instructions for replacing the Main PCB assembly. The Main PCB assembly is located in the front panel half of the instrument ([Figure 7-4](#)).

1. Open the case as described in [Section 7-2 “Opening the BTS Master Case”](#).
2. Disconnect the Fan connector at J1002 on the Main PCB assembly.
3. Disconnect the Encoder Knob connector at J501 on the Main PCB assembly.
4. Remove the 5 screws retaining the Main PCB board assembly to the BTS Master case.



**Figure 7-5.** Main PCB with Shielding

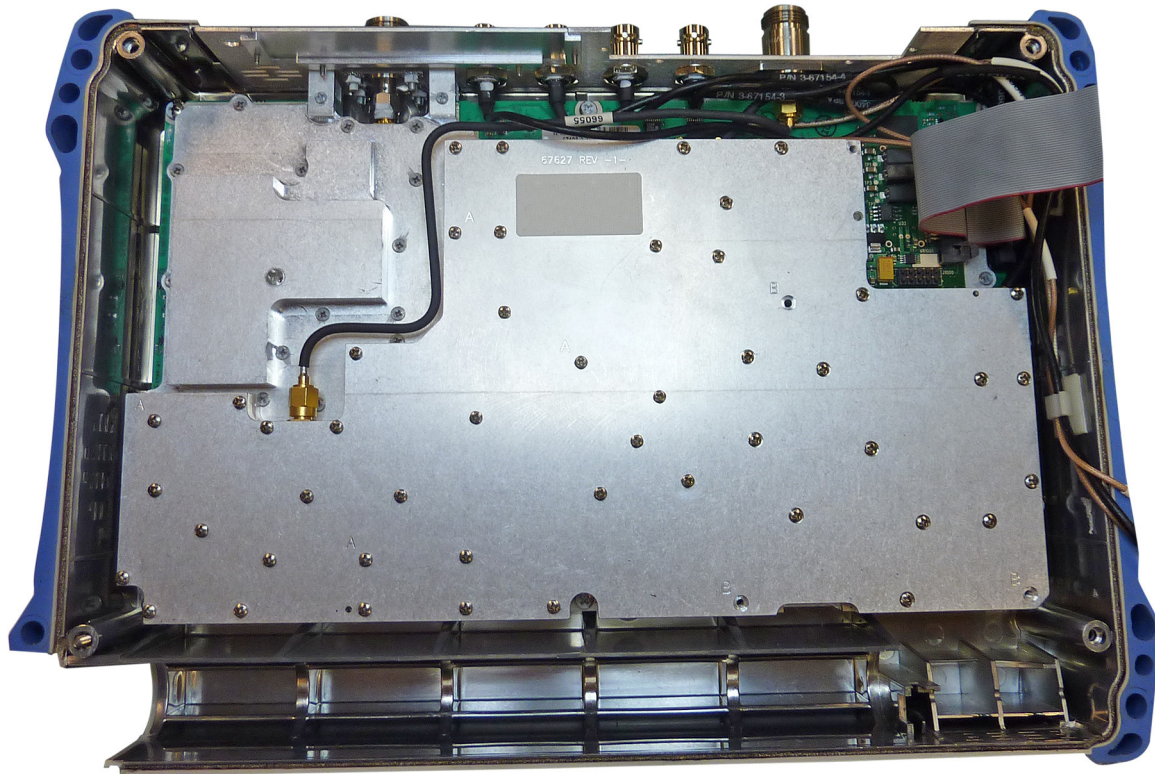
5. Use a Phillips screwdriver to remove the 9 screws securing the main PCB assembly to the Front Panel section.
6. Lift the bottom edge of the Main PCB assembly and disconnect the battery connector from J1001 on the main PCB.
7. Pull the Main PCB assembly out of the Front Panel section.
8. Replacement is the reverse of removal. Confirm that the connector on the Main PCB aligns with the connector on the Keypad PCB coming through the front panel.



## 7-4 Spectrum Analyzer Module Assembly Replacement

This procedure provides instructions for removing and replacing the Spectrum Analyzer Module. The Spectrum Analyzer Module Assembly is located in the back half of the case and includes the connector panel.

1. Open the case as described in [Section 7-2 “Opening the BTS Master Case”](#).
2. Use a Phillips screwdriver to remove the six screws securing the Spectrum Analyzer Module Assembly to the back half of the instrument case.



**Figure 7-6.** SPA Module and Shielding

3. Carefully lift the Spectrum Analyzer Module Assembly and connector panel out of the case.
4. Installation is the reverse of removal. Take care to properly fit the connector panel into the grooves in the top of the case.

**Note**

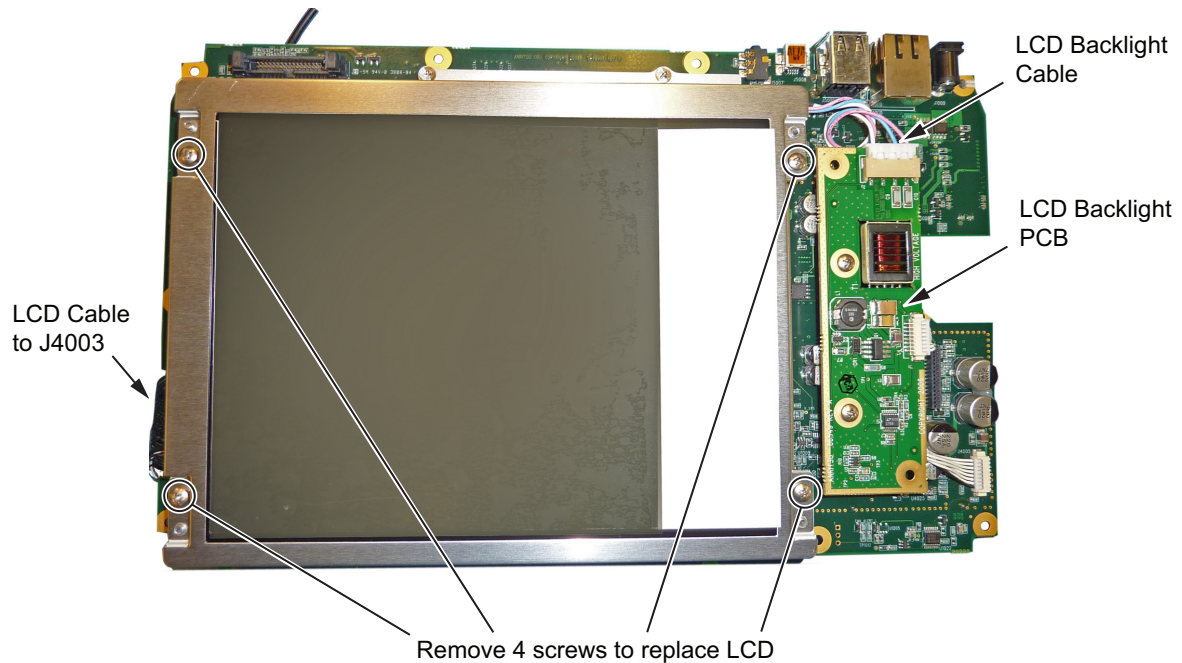
There is an RF gasket material between the two halves of the case, and in the connector panel grooves. Take care not to remove or damage this material when removing or replacing the Spectrum Analyzer Module and connector panel assembly.



## 7-5 LCD Assembly Replacement

This procedure provides instructions for removing and replacing the Liquid Crystal Display (LCD) once the Main PCB assembly has been separated from the BTS Master.

1. Open the case as described in [Section 7-2 “Opening the BTS Master Case”](#).
2. Remove the Main PCB assembly from the front panel as described in [Section 7-3 “Main PCB Assembly Replacement”](#).
3. Use a Phillips screw driver to remove the four screws securing the LCD to the Main PCB assembly ([Figure 7-7](#)).



**Figure 7-7.** Replacing the LCD

4. Disconnect the LCD backlight cable from the LCD backlight PCB.
5. Disconnect the LCD cable from J4003 on the back side of the Main PCB.
6. Carefully remove the LCD.
7. Reverse the above steps to install the replacement LCD.

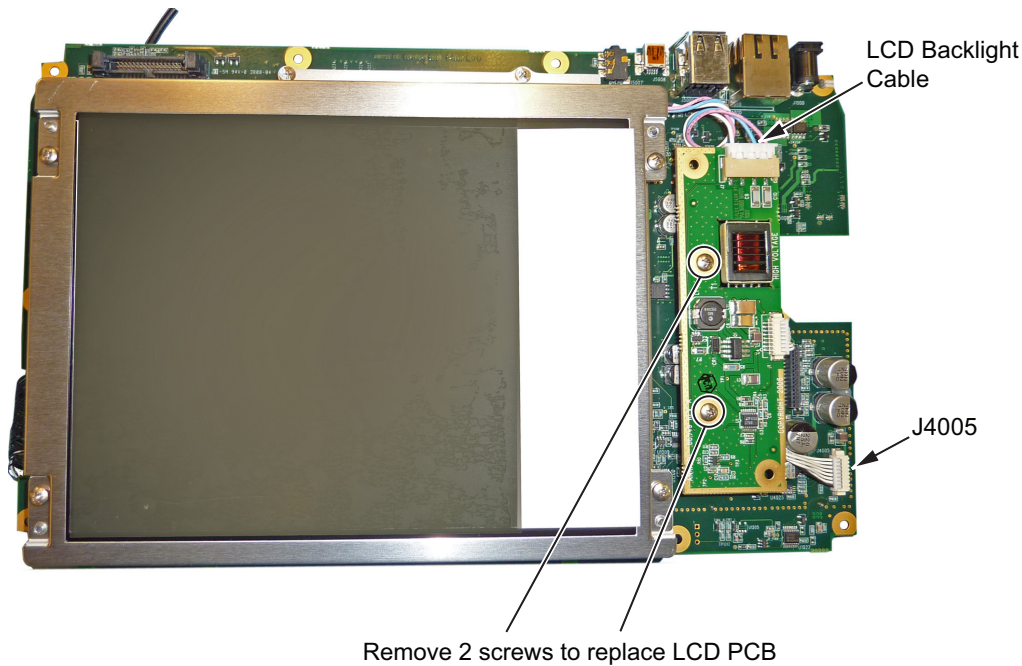
**Note**

Pay attention to the routing of the LCD Backlight Cable. The cable must be positioned so that it is not pinched when the assembly is reattached to the front panel.

## 7-6 LCD Backlight PCB Removal and Replacement

This procedure provides instructions for removing and replacing the BTS Master LCD backlight PCB.

1. Open the case as described in [Section 7-2 “Opening the BTS Master Case”](#).
2. Remove the Main PCB assembly from the front panel as described in [Section 7-3 “Main PCB Assembly Replacement”](#).
3. Disconnect the LCD backlight cable from the LCD backlight PCB.
4. Use a Phillips screw driver to remove the two screws securing the LCD backlight PCB to the Main PCB assembly ([Figure 7-8](#)).



**Figure 7-8.** Replacing the LCD

5. Lift the LCD Backlight PCB and disconnect the backlight control cable from J4005 on the Main PCB.
6. Carefully remove the LCD Backlight PCB.
7. Reverse the above steps to install the replacement LCD backlight PCB.

**Note**

Pay attention to the routing of the LCD Backlight Cable. The cable must be positioned so that it is not pinched when the assembly is reattached to the front panel.

## 7-7 Main Numeric Keypad Membrane and PCB Replacement

This procedure provides instructions for removing and replacing the main numeric keypad membrane and PCB.

**Note**

The main numeric keypad membrane and PCB can be replaced without opening the BTS Master case.

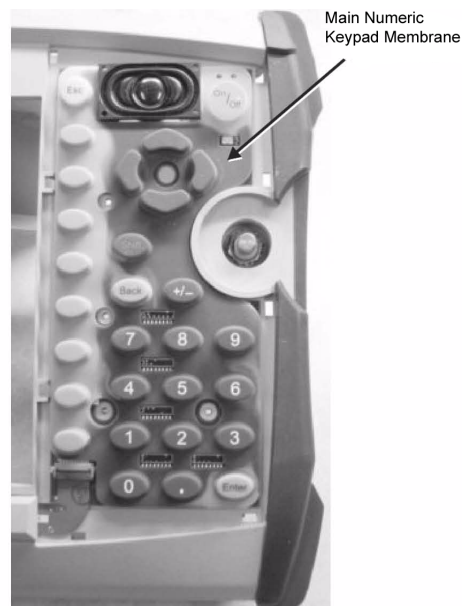
1. Place the instrument face up on a protected work surface.
2. Carefully remove the rotary knob.
3. There are eight locking tabs holding the main numeric keypad bezel to the case. Using a small flat-blade screwdriver, carefully pry the main numeric keypad bezel locking tabs free of the main body of the case. This will expose the main numeric keypad membrane ([Figure 7-9](#)).



Location of the 8 tabs holding the keypad bezel

**Figure 7-9.** Front Bezel Locking Tabs

4. Remove the main numeric keypad membrane by carefully lifting the speaker and pulling the membrane off of the keypad PCB (Figure 7-10).

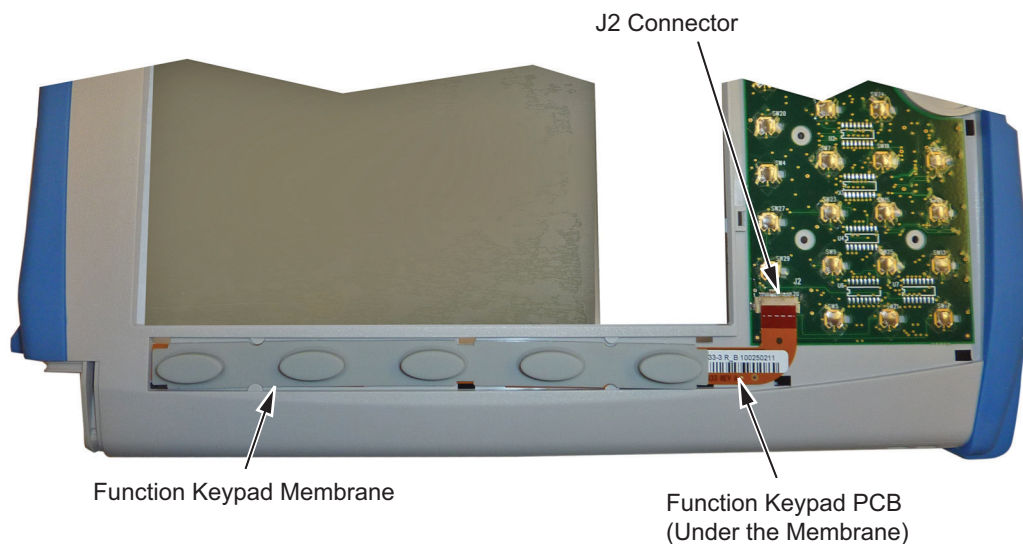


**Figure 7-10.** Main Numeric Keypad Membrane

**Caution**

The speaker is held in place by four locating pins on the inside of the main numeric keypad bezel. When the main numeric keypad bezel is removed, the speaker is held only by the fragile connecting wires. Use care not to damage the speaker wires when removing or replacing the main numeric keypad membrane or PCB.

5. Disconnect the function keypad PCB from J2 of the main numeric keypad PCB by carefully lifting the locking tab on connector J2 to release the function keypad PCB (Figure 7-11).



**Figure 7-11.** Main Numeric Keypad PCB

6. Remove the main numeric keypad PCB, taking care not to damage the speaker wires.

7. Reverse the above steps to install the replacement assembly, with the following cautions:

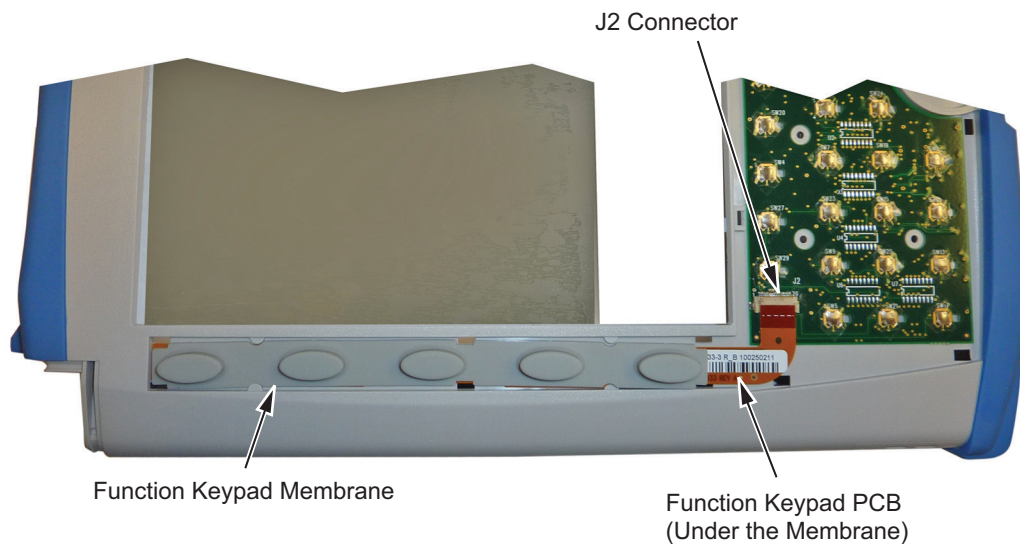
- Carefully close the locking tab on connector J2 to secure the function keypad PCB connection. The tab should “snap” into position when fully closed.
- Insert the main numeric keypad membrane over the main numeric keypad PCB, and under the speaker. Take care to properly orient the main numeric keypad membrane so that the rubber pins are aligned with the keypad switches on the PCB.
- The speaker is held in place by four locating pins on the inside of the main numeric keypad bezel. Verify that the four locating pins are properly seated into the four corner holes of the speaker when reinstalling the bezel.
- Verify that all locking tabs are fully seated into the main body of the case when reinstalling the main numeric keypad bezel.

## 7-8 Function Keypad Membrane and Function Keypad PCB Replacement

This procedure provides instructions for replacing the function keypad membrane and function keypad PCB.

<b>Note</b>	The function keypad membrane and function keypad PCB can be replaced without opening the BTS Master.
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1. Place the instrument face up on a protected work surface.
2. Remove the main numeric keypad bezel and membrane as described in [Section 7-7 “Main Numeric Keypad Membrane and PCB Replacement”](#).
3. There are six locking tabs holding the function keypad bezel to the case. Using a small flat blade screwdriver, carefully pry the function keypad bezel locking tabs free of the main body of the case. This will expose the function keypad membrane.
4. Remove the function keypad membrane by gently pulling the membrane up and away from the front panel ([Figure 7-12](#)).



**Figure 7-12.** Function Keypad Membrane and Function Keypad PCB

5. Disconnect the function keypad PCB from J2 of the main numeric keypad PCB by carefully lifting the locking tab on connector J2 to release the function keypad PCB ([Figure 7-12](#)).
6. Reverse the above steps to install the replacement function keypad PCB or function keypad membrane.
  - Carefully close the locking tab on connector J2 to secure the function keypad connection. The tab should “snap” into position when fully closed.



## 7-9 CPRI Option 750, 751, or 759 Assembly Removal

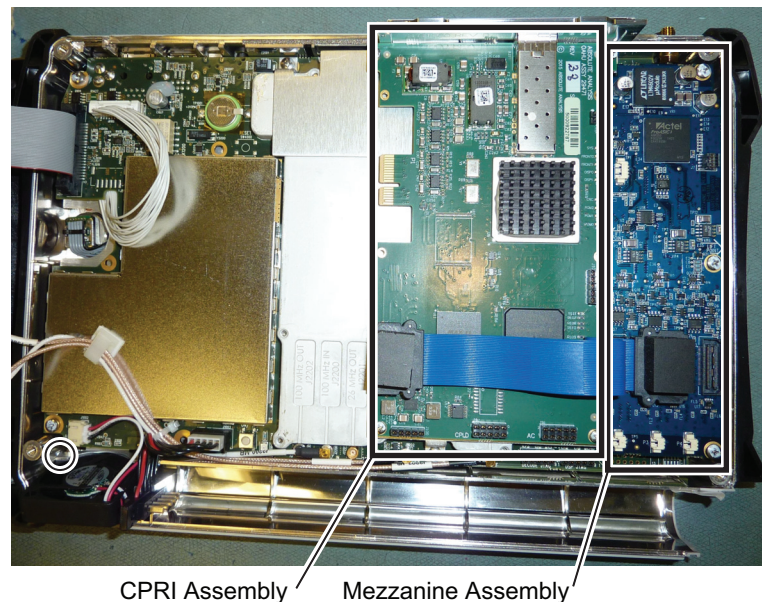
1. Open the instrument case as described in [Section 7-2 “Opening the BTS Master Case”](#).

**Note**

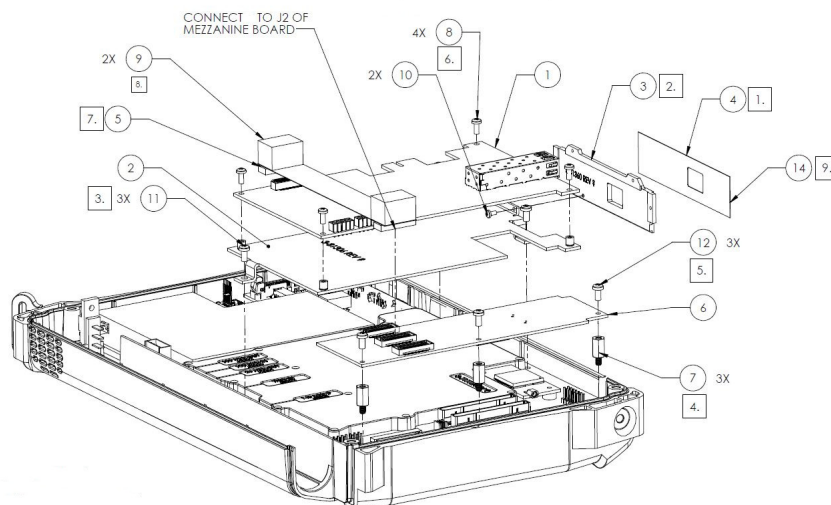
The CPRI module shown in the photos in this procedure may vary in appearance from the module installed in your instrument; however, the procedure applies to Options 750, 751, and 759.

2. See [Figure 7-13](#) and [Figure 7-14](#) for the following key items:

- CPRI Assembly (1)
- Mezzanine Assembly (6)
- High speed cable (5) that is connected from the CPRI Assembly (1) to the middle connector of the Mezzanine Assembly (6).



**Figure 7-13.** CPRI and Mezzanine Assemblies

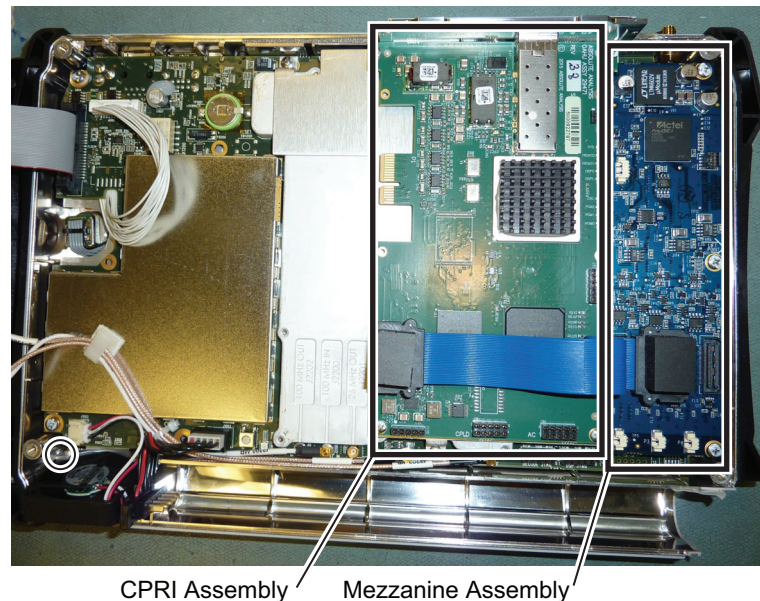


**Figure 7-14.** CPRI Assembly (1) and Mezzanine Assemblies (6)

3. Remove the CPRI to Mezzanine ribbon cable (make sure to save the foam pads (9)).
4. Remove the four screws (8) holding the CPRI assembly to the bracket.
5. Reverse the above steps to install the replacement assembly, ensuring to install the cable foam pads (9).

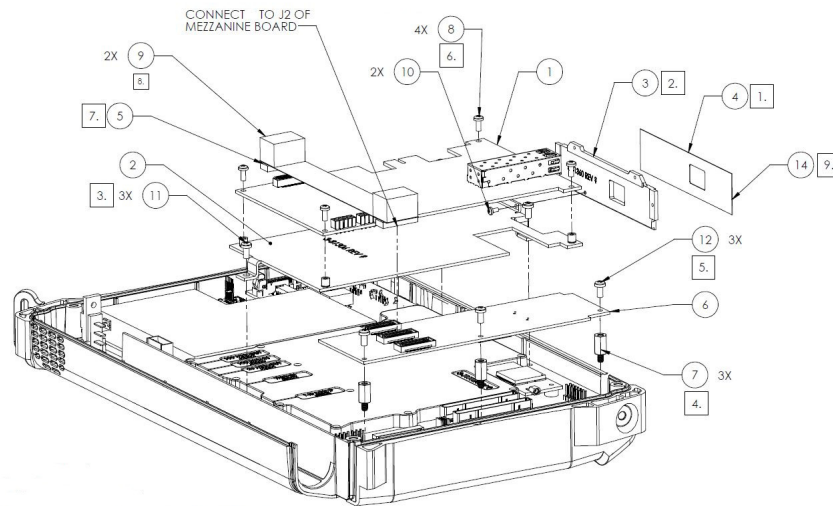
## 7-10 Mezzanine Assembly Removal

1. Open the instrument case as described in [Section 7-2 “Opening the BTS Master Case”](#).
2. See [Figure 7-15](#) and [Figure 7-16](#) for the following key items:
  - CPRI Assembly (1)
  - Mezzanine Assembly (6)
  - High speed cable (5) that is connected from the CPRI Assembly (1) to the middle connector of the Mezzanine Assembly (6).



**Figure 7-15.** CPRI and Mezzanine Assemblies





**Figure 7-16.** CPRI Assembly (1) and Mezzanine Assemblies (6)

3. Remove CPRI to Mezzanine cable (make sure to save the foam pads (9)).
4. Remove the three screws (12) holding the Mezzanine assembly (6) to the top panel.
5. Reverse the above steps to install the replacement assembly, ensuring to install the cable foam pads (9).



# Chapter 8 — Troubleshooting

## 8-1 Introduction

This chapter describes the primary troubleshooting operations that can be performed by all Anritsu Service Centers. Perform the troubleshooting suggestions in the order that they are listed. Operators of the MT822xB should refer to the User Guide for troubleshooting help.

Only qualified Anritsu personnel should replace internal assemblies. Major subassemblies shown in [Table 1-5, “List of Replaceable Parts” on page 1-6](#) are typically the items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without special training. Removal of RF shields from PC boards or adjustment of screws on or near the shields will detune sensitive RF circuits and will result in degraded instrument performance.

## 8-2 Turn-on Problems

### **Unit cannot boot-up, no activity occurs when the On/Off key is pressed:**

1. Battery may be fully discharged. Use an external charger (Anritsu part number 2000-1374) to charge a completely discharged battery.
2. Battery may be the wrong type. Use only Anritsu approved battery packs. Some non-approved battery packs will fit into the MT822xB, but are electrically incompatible and will not charge correctly.
3. External power supply may have failed or be the wrong type. Replace the external power supply.
4. On/Off switch is damaged. Replace the keypad PCB or rubber keypad.
5. Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly.

### **Unit begins the boot process, but does not complete boot-up:**

1. Using Master Software Tools, perform the Emergency Repair procedure, then update the system software (via the Tools menu).
2. Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly.

### **Unit makes normal boot-up sounds, but the display has a problem:**

1. If the display is dim, then check the brightness setting under the System Menu / System Options.
2. Replace the Backlight Driver PCB.
3. Replace the LCD assembly.
4. The Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly.

### **Boot-up Self Test fails:**

1. Perform a Master Reset.

If the message relates to the RTC battery, then replace the RTC battery on the Main PCB.

2. The Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly

## 8-3 Other Problems

### Lock Error messages:

1. This message normally appears for 2 to 3 seconds when an external 10 MHz Reference is applied.
2. Spectrum Analyzer PCB has failed. Replace the Main/Spectrum Analyzer assembly.

### Option 5, Power Monitor Problems:

1. Verify correct operation of RF detector (refer to User Guide for a list of suitable detectors).
2. Replace the Option 5 PCB. No recalibration is required.

### Spectrum Analyzer Problems:

1. Inspect the Spectrum Analyzer RF In connector for damage.
2. Refer to the User Guide.
3. Update system software using Master Software Tools (via Tools menu).
4. Spectrum Analyzer PCB has failed. Replace the Main/Spectrum Analyzer assembly.

### Cable and Antenna Analyzer Problems:

1. Inspect the VNA RF In and VNA Reflection connectors for damage.
2. Inspect the Open, Short, Load, and cables for damage. Verify their operation on a suitable measurement instrument.
3. Refer to the User Guide.
4. Update system software using Master Software Tools (via Tools menu).
5. VNA module has failed. Replace the VNA module. No recalibration is required.

### Option 50 Problems:

Replace the VNA Module with Option 50 assembly. This assembly has been calibrated at the factory.

### Option 51, Option 52, or Option 53 Problems:

Replace the Option 51, Option 52, or Option 53 PCB (refer to [Table 1-5, “List of Replaceable Parts”](#) on page 1-6). No recalibration is required.

## 8-4 Other Issues

1. Perform a Master Reset.
2. Refer to the User Guide.
3. Update system software using Master Software Tools (via Tools menu).
4. Replace the Main PCB/Spectrum Analyzer assembly.
5. **Battery Pack Charging Problems:** refer to [Chapter 6, “Battery Information”](#).

# Appendix A — Test Records

This appendix provides test records that can be used to record the performance of the MT822xB. Anritsu recommends that you make a copy of the following test record pages and document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which can allow you to observe trends.

## A-1 Test Records for Spectrum Analyzer Verification

MT822\_B Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

### A-1 Test Records for Spectrum Analyzer Verification

#### Frequency Accuracy Verification

**Table A-1.** Spectrum Analyzer Frequency Accuracy

Frequency	Measured Value	Specification (Typical)
1 GHz	GHz	$\pm 1300$ Hz ( $\pm 1.3$ ppm)
7 GHz	GHz	$\pm 9.1$ kHz ( $\pm 1.3$ ppm)

#### Single Side Band (SSB) Phase Noise Verification

**Table A-2.** Spectrum Analyzer SSB Phase Noise Verification

Frequency	Measured Value	Calculated Value	Specification
10 kHz	dBc/Hz	dBc/Hz	$\leq -100$ dBc/Hz
20 kHz	dBc/Hz	dBc/Hz	$\leq -100$ dBc/Hz
30 kHz	dBc/Hz	dBc/Hz	$\leq -100$ dBc/Hz
100 kHz	dBc/Hz	dBc/Hz	$\leq -102$ dBc/Hz

#### Spurious Response (Second Harmonic Distortion) Verification

**Table A-3.** Spectrum Analyzer Spurious Response (Second Harmonic Distortion)

Frequency	Measured Value	2nd Harmonic Distortion	Specification
50.1 MHz			
100.2 MHz		dBc	$\leq -50$ dBc

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### Input Related Spurious (IRS) Signals Verification

**Table A-4.** Spectrum Analyzer Input Related Spurious (IRS) Signals

Amplitude Reading at 1672 MHz _____ dBm			
Frequency	Measured Values	Calculated IRS	Specification
100 kHz to 1671 MHz	dBm	dBc	$\leq -40$ dBc
1673 MHz to 2800 MHz	dBm	dBc	$\leq -40$ dBc
Amplitude Reading at 1675 MHz _____ dBm			
Frequency	Measured Values	Calculated IRS	Specification
2 MHz to 4 MHz	dBm	dBc	$\leq -60$ dBc
Amplitude Reading at 3608 MHz _____ dBm			
Frequency	Measured Values	Calculated IRS	Specification
5489 MHz to 5491 MHz	dBm	dBc	$\leq -60$ dBc
Amplitude Reading at 5208 MHz _____ dBm			
Frequency	Measured Values	Calculated IRS	Specification
7089 MHz to 7091 MHz	dBm	dBc	$\leq -60$ dBc

Exceptions:  $-40$  dBc at 1672 MHz

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### Resolution Bandwidth Accuracy Verification

**Table A-5.** Spectrum Analyzer Resolution Bandwidth Accuracy

BW Setting	Span	VBW	Lower Limit	Measured Values	Upper Limit
3 MHz	4.5 MHz	Auto	2.7 MHz	Hz	3.3 MHz
1 MHz	1.5 MHz	Auto	900 kHz	Hz	1.1 MHz
300 kHz	450 kHz	Auto	270 kHz	Hz	330 kHz
100 kHz	150 kHz	Auto	90 kHz	Hz	110 kHz
30 kHz	45 kHz	Auto	27 kHz	Hz	33 kHz
10 kHz	15 kHz	Auto	9 kHz	Hz	11 kHz
3 kHz	4.5 kHz	Auto	2.7 kHz	Hz	3.3 kHz
1 kHz	2 kHz	Auto	900 Hz	Hz	1.1 kHz
300 Hz	450 Hz	Auto	270 Hz	Hz	330 Hz
100 Hz	150 Hz	Auto	90 Hz	Hz	110 Hz
30 Hz	50 Hz	3 Hz	27 Hz	Hz	33 Hz
10 Hz	30 Hz	3 Hz	9 Hz	Hz	11 Hz



MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### 50 MHz Absolute Amplitude Accuracy **Test Setup Components Characterization**

**Table A-6.** Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy Setup Table

Test Power Level at 50 MHz	Required Sensor B Reading
0 dBm	dBm
-4 dBm	dBm
-10 dBm	dBm
-14 dBm	dBm
-20 dBm	dBm
-24 dBm	dBm
-30 dBm	dBm
-34 dBm	dBm
-40 dBm	dBm
-44 dBm	dBm
-50 dBm	dBm

### Measuring 50 MHz Amplitude Accuracy

**Table A-7.** Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy

Input Power Level	Reference Level	Input Atten. Level	Measured Reading	Specification
0 dBm	10 dBm	30 dB	dBm	±1.25 dB
-4 dBm	10 dBm	30 dB	dBm	±1.25 dB
-10 dBm	0 dBm	20 dB	dBm	±1.25 dB
-14 dBm	0 dBm	20 dB	dBm	±1.25 dB
-20 dBm	-10 dBm	10 dB	dBm	±1.25 dB
-24 dBm	-10 dBm	10 dB	dBm	±1.25 dB
-30 dBm	-20 dBm	0 dB	dBm	±1.25 dB
-34 dBm	-20 dBm	0 dB	dBm	±1.25 dB
-40 dBm	-30 dBm	0 dB	dBm	±1.25 dB
-44 dBm	-30 dBm	0 dB	dBm	±1.25 dB
-50 dBm	-40 dBm	0 dB	dBm	±1.25 dB

## Absolute Amplitude Accuracy Across Frequency Test Setup Component Characterization

Frequency	Required Sensor B reading for –2dBm at Attenuator output	Required Sensor B reading for –30 dBm at Attenuator output
10.1 MHz	dBm	dBm
50 MHz	dBm	dBm
100 MHz	dBm	dBm
500 MHz	dBm	dBm
1000 MHz	dBm	dBm
2000 MHz	dBm	dBm
3000 MHz	dBm	dBm
4000 MHz	dBm	dBm
5000 MHz	dBm	dBm
6000 MHz	dBm	dBm
7000 MHz	dBm	dBm

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### Measuring Amplitude Accuracy Across Frequency

**Table A-9.** Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency (1 of 2)

Freq (MHZ)	Input Power (dBm)	Attn. Level	Marker 1 Reading (dB)	Spec (dB)	Freq (MHZ)	Input Power (dBm)	Attn. Level	Marker 1 Reading (dB)	Spec (dB)
10.1	-30	0		±1.25	50	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	60		±1.25		-2	60		±1.25
100	-30	0		±1.25	500	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	60		±1.25		-2	60		±1.25
1000	-30	0		±1.25	2000	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	60		±1.25		-2	60		±1.25

## A-1 Test Records for Spectrum Analyzer Verification

**Table A-9.** Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency (2 of 2)

Freq (MHZ)	Input Power (dBm)	Attn. Level	Marker 1 Reading (dB)	Spec (dB)	Freq (MHZ)	Input Power (dBm)	Attn. Level	Marker 1 Reading (dB)	Spec (dB)
3000	-30	0		±1.25	4000	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	60		±1.25		-2	60		±1.25
5000	-30	0		±1.25	6000	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	60		±1.25		-2	55		±1.25
7000	-30	0		±1.25					
	-30	5		±1.25					
	-30	10		±1.25					
	-30	20		±1.25					
	-2	30		±1.25					
	-2	40		±1.25					
	-2	50		±1.25					
	-2	60		±1.25					

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### Residual Spurious Response Test with Preamp Off

**Table A-10.** Spectrum Analyzer Residual Spurious with Preamp Off

Start Freq.	Stop Freq.	RBW	VBW	Measured Values	Specification
150 kHz	10 MHz	3 kHz	300 Hz	dBm	$\leq -90$ dBm
10 MHz	1.0 GHz	30 kHz	1 kHz	dBm	$\leq -90$ dBm
1 GHz	2.2 GHz	10 kHz	300 Hz	dBm	$\leq -90$ dBm
2.2 GHz	2.7 GHz	1 kHz	300 Hz	dBm	$\leq -90$ dBm
2.7 GHz	2.8 GHz	1 kHz	100 Hz	dBm	$\leq -90$ dBm
2.8 GHz	3.199 GHz	10 kHz	300 Hz	dBm	$\leq -90$ dBm
3.2 GHz	4.009 GHz	30 kHz	1 kHz	dBm	$\leq -84$ dBm
4.009 GHz	5.083 GHz	10 kHz	300 Hz	dBm	$\leq -84$ dBm
5.083 GHz	5.895 GHz	10 kHz	100 Hz	dBm	$\leq -84$ dBm
5.895 GHz	7.1 GHz	10 kHz	100 Hz	dBm	$\leq -84$ dBm

**Exceptions:**  $-70$  dBm max at 3200 MHz

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### Residual Spurious Response Test with Preamp On

**Table A-11.** Spectrum Analyzer Residual Spurious with Preamp On

Start Freq.	Stop Freq.	Measured Values	Specification
3 MHz	10 MHz	dBm	$\leq -100$ dBm
10 MHz	1.0 GHz	dBm	$\leq -100$ dBm
1.0 GHz	2.0 GHz	dBm	$\leq -100$ dBm
2.0 GHz	3.0 GHz	dBm	$\leq -100$ dBm
3.0 GHz	4.0 GHz	dBm	$\leq -100$ dBm
4.0 GHz	5.0 GHz	dBm	$\leq -100$ dBm
5.0 GHz	6.0 GHz	dBm	$\leq -100$ dBm
6.0 GHz	7.1 GHz	dBm	$\leq -100$ dBm

**Exceptions:**  $-95$  dBm max at 50 MHz, 100 MHz, and 150 MHz

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Spectrum Analyzer Verification (continued)

### Displayed Average Noise Level (DANL) with Pre Amp Off

**Table A-12.** Spectrum Analyzer DANL with Pre Amp Off

Start Freq	Stop Freq	RBW	VBW	Measured Value at 100 kHz RBW	Calculated for 1 Hz RBW	Specification
10 MHz	1.0 GHz	100 kHz	1 kHz	dBm	dBm	$\leq -137$ dBm
1 GHz	2.2 GHz	100 kHz	1 kHz	dBm	dBm	$\leq -133$ dBm
2.2 GHz	2.8 GHz	100 kHz	300 kHz	dBm	dBm	$\leq -133$ dBm
2.8 GHz	4.0 GHz	100 kHz	1 kHz	dBm	dBm	$\leq -133$ dBm
4.0 GHz	7.1 GHz	100 kHz	300 kHz	dBm	dBm	$\leq -130$ dBm

### Displayed Average Noise Level (DANL) with Pre Amp On

**Table A-13.** Spectrum Analyzer DANL with Pre Amp On

Start Freq	Stop Freq	RBW	VBW	Measured Value at 100 kHz RBW	Calculated for 1 Hz RBW	Specification
10 MHz	1.0 GHz	100 kHz	1 kHz	dBm	dBm	$\leq -161$ dBm
1 GHz	2.2 GHz	100 kHz	1 kHz	dBm	dBm	$\leq -159$ dBm
2.2 GHz	2.8 GHz	100 kHz	300 kHz	dBm	dBm	$\leq -156$ dBm
2.8 GHz	4.0 GHz	100 kHz	1 kHz	dBm	dBm	$\leq -156$ dBm
4.0 GHz	7.1 GHz	100 kHz	300 kHz	dBm	dBm	$\leq -154$ dBm

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## **A-2 Test Records for Cable and Antenna Analyzer Verification**

### **VNA Frequency Accuracy Verification**

**Table A-14.** VNA Frequency Accuracy

Frequency	Measured Value	Specification
2 GHz (2000 MHz)	MHz	$\pm 2.6 \text{ kHz } (\pm 1.3 \text{ ppm})$

### **VNA Return Loss Accuracy Verification**

**Table A-15.** VNA Return Loss Accuracy Verification

Frequency	Measured Value	Specification
6 dB	dB	$5 \text{ dB} \leq x \leq 7 \text{ dB}$
20 dB	dB	$18.4 \text{ dB} \leq x \leq 21.6 \text{ dB}$

### **VNA System Dynamic Range Verification**

**Table A-16.** VNA System Dynamic Range Verification

Frequency	Measured Value	Specification
400 MHz to 3 GHz	dB	$\leq -80 \text{ dB}$
> 3 GHz to 4 GHz	dB	$\leq -70 \text{ dB}$
> 4 GHz to 5.5 GHz	dB	$\leq -70 \text{ dB}$
> 5.5 GHz to 6 GHz	dB	$\leq -65 \text{ dB}$



MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## A-3 Test Records for Power Meter Verification

### Procedure Component Characterization: Chart for Power Meter Verification

**Table A-17.** Characterization Chart for Power Meter Verification

Test Power Level at 50 MHz	Required Sensor B Reading
0 dBm	dBm
–50 dBm	dBm
Test Power Level at 7000 MHz	Required Sensor B Reading
0 dBm	dBm
–50 dBm	dBm

### Internal Power Meter Measurement Accuracy Procedure Verification

**Table A-18.** Internal Power Meter Accuracy Verification

Frequency	Input Power	Measured Values	Specification
50 MHz	0 dBm	dBm	$\pm -1.25$ dB
	–50 dBm	dBm	$\pm -1.50$ dB
7.0 GHz	0 dBm	dBm	$\pm -1.75$ dB
	–50 dBm	dBm	$\pm -1.75$ dB

## A-4 Test Records for Options Verification

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## A-4 Test Records for Options Verification

### Option 10, Bias Tee Verification

Table A-19. Option 10 Bias-Tee

Voltage Setting	Measured Values		Voltage Specification	Current Specification
105 ohm Load, Low Current				
12 V	V	mA	11.0 V to 12.75 V	85 mA to 145 mA
18 V	V	mA	17.3 V to 18.7 V	142 mA to 202 mA
24 V	V	mA	23.0 V to 25.0 V	199 mA to 259 mA
105 ohm Load, High Current				
15 V	V	mA	14.0 V to 15.6 V	113 mA to 173 mA
40 ohm Load, High Current				
15 V	V	mA	14.0 V to 15.6 V	325 mA to 425 mA
78 ohm Load, High Current				
32 V	V	mA	30.5 V to 33.5 V	375 mA to 445 mA

### Option 31 GPS Receiver Frequency Accuracy Verification

Table A-20. Option 31 GPS Receiver

Frequency	Measured Value	Error	Specification
<b>Spectrum Analyzer Frequency Accuracy with GPS High Frequency Accuracy</b>			
7.0 GHz	GHz	Hz	± 175 Hz (± 25 ppb)
<b>Spectrum Analyzer Frequency Accuracy with Internal High Frequency Accuracy</b>			
7.0 GHz	GHz	Hz	± 350 Hz (± 50 ppb)

### Option 31 GPS Antenna Bias-Tee Verification

Table A-21. Option 31 GPS Receiver Bias-Tee Verification

Voltage Setting	Measured Value	Specification
3.3 V	mA	32 mA ± 15% (27.2 mA to 36.8 mA)
5.0 V	mA	55.6 mA ± 15% (47.3 mA to 63.9 mA)

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 40 and/or 41, GSM/GPRS/EDGE Signal Analyzer Verification RF Measurements

**Table A-22.** Option 40 GSM/GPRS/EDGE RF Measurements

Error Type	Measured Value	Specification
<b>At 850 MHz, –10 dBm Level, TCH Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 850 MHz, –50 dBm Level, TCH ALL Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 1800 MHz, –10 dBm Level, TCH ALL Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 1800 MHz, –50 dBm Level, TCH Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
<b>At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern</b>		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 40 and/or 41, GSM/GPRS/EDGE Signal Analyzer Verification Demodulator

**Table A-23.** Option 41 GSM/GPRS/EDGE Demodulator

Measurement	Measured Value	Specification
<b>At 850 MHz, –10 dBm Level, TCH Pattern</b>		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
<b>At 850 MHz, –50 dBm Level, TCH ALL Pattern</b>		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
<b>At 1800 MHz, –10 dBm Level, TCH ALL Pattern</b>		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
<b>At 1800 MHz, –50 dBm Level, TCH Pattern</b>		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
<b>At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern</b>		
EVM RMS	%	≤ 2.5%
<b>At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern</b>		
EVM RMS	%	≤ 2.5%
<b>At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern</b>		
EVM RMS	%	≤ 2.5%
<b>At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern</b>		
EVM RMS	%	≤ 2.5%

MT822\_\_B    Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 42 and/or 43, CDMA Signal Analyzer Verification RF Measurements

**Table A-24.** Option 42 CDMA RF Measurements

Measurement	Measured Value	Specification
<b>At 870.03 MHz, –30 dBm Level, cdmaOne</b>		
<b>EVM RMS</b>	dB	$\pm 1.5$ dB
<b>At 1930.05 MHz, –30 dBm Level, cdmaOne</b>		
<b>EVM RMS</b>	dB	$\pm 1.5$ dB
<b>At 870.03 MHz, –30 dBm Level, CDMA2000</b>		
<b>EVM RMS</b>	dB	$\pm 1.5$ dB
<b>At 1930.05 MHz, –30 dBm Level, CDMA2000</b>		
<b>EVM RMS</b>	dB	$\pm 1.5$ dB

MT822\_\_B Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 42 and/or 43, CDMA Signal Analyzer Verification Demodulator

**Table A-25.** Option 43 cdmaOne and CDMA2000 1xRTT Demodulator

Measurement	Measured Value	Specification
<b>At 870.03 MHz, –30 dBm Level, cdmaOne</b>		
Frequency Error	Hz	$\pm 10 \text{ Hz}$
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1 \mu\text{s}$
<b>At 1930.05 MHz, –30 dBm Level, cdmaOne</b>		
Frequency Error	Hz	$\pm 10 \text{ Hz}$
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1 \mu\text{s}$
<b>At 870.03 MHz, –30 dBm Level, CDMA2000</b>		
Frequency Error	Hz	$\pm 10 \text{ Hz}$
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1 \mu\text{s}$
<b>At 1930.05 MHz, –30 dBm Level, CDMA2000</b>		
Frequency Error	Hz	$\pm 10 \text{ Hz}$
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1 \mu\text{s}$

MT822\_\_B Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 44, Sensor A and B Reading Components Characterization Table

#### WCDMA Absolute Power Accuracy Verification (Option 44)

**Table A-26.** Option 44, Sensor A and B Reading Components Characterization Table

Frequency	PMA.10 (dBm)	PMB.10 (dBm)	D1 (dBm)	PMA.10C (dBm)	PMA.18 (dBm)	ATT.18 (dB)
881.5 MHz						

### Option 44, Power Level Setting Components Characterization Table

#### WCDMA Absolute Power Accuracy Verification (Option 44)

**Table A-27.** Option 44, Power Level Setting Components Characterization Table

Frequency	MG3700A.10 Setting (dBm)	MG3700A.28 Setting (dBm)	PMA.10 (dBm)	PMA.20 (dBm)
881.5 MHz				

### Option 44, WCDMA Absolute Power Accuracy

#### WCDMA Absolute Power Accuracy Verification (Option 44)

**Table A-28.** Option 44, WCDMA Absolute Power Accuracy

Test Level	Measured Power	Error	Specification
+28 dBm	dBm	dB	$\pm 1.25$ dB
+10 dBm	dBm	dB	$\pm 1.25$ dB
-10 dBm	dBm	dB	$\pm 1.25$ dB
-20 dBm	dBm	dB	$\pm 1.25$ dB

### WCDMA Occupied Bandwidth (OBW) Verification

**Table A-29.** Option 44, WCDMA Occupied Bandwidth (OBW)

Frequency	Power Meter Reading	OBW	Specification
881.5 MHz	dBm		4.2 MHz $\pm$ 100 kHz
1962.5 MHz	dBm		4.2 MHz $\pm$ 100 kHz
2680.5 MHz	dBm		4.2 MHz $\pm$ 100 kHz

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 44, WCDMA RF Channel Power Accuracy****WCDMA RF Channel Power Accuracy and ACLR Verification****Table A-30.** Option 44, WCDMA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF Channel Power Error	Specification
881.5 MHz				±1.25 dB max
1962.5 MHz				±1.25 dB max
2680.5 MHz				±1.25 dB max

**Option 44, WCDMA ACLR Accuracy****WCDMA RF Channel Power Accuracy and ACLR Verification****Table A-31.** Option 44, WCDMA ACLR Accuracy

Frequency/Offset (MHz)	Measured ACLR	Calculated ACLR Error	Specification
881.5 / -10			±0.8 dB
881.5 / -5			±0.8 dB
881.5 / 5			±0.8 dB
881.5 / 10			±0.8 dB
1962.5 / -10			±0.8 dB
1962.5 / -5			±0.8 dB
1962.5 / 5			±0.8 dB
1962.5 / 10			±0.8 dB
2680.5 / -10			±1.0 dB
2680.5 / -5			±1.0 dB
2680.5 / 5			±1.0 dB
2680.5 / 10			±1.0 dB



MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 44, HSDPA RF Channel Power Accuracy****HSDPA RF Channel Power Accuracy and ACLR Verification****Table A-32.** Option 44, HSDPA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF Channel Power Accuracy	Specification
2680.5 MHz				±1.25 dB max

**Option 44, HSDPA ACLR Accuracy****HSDPA RF Channel Power Accuracy and ACLR Verification****Table A-33.** Option 44, HSDPA ACLR Accuracy

Frequency/Offset (MHz)	Measured ACLR	Calculated ACLR Error	Specification
2680.5 / -10			±1.0 dB
2680.5 / -5			±1.0 dB
2680.5 / 5			±1.0 dB
2680.5 / 10			±1.0 dB

**Option 45 WCDMA Demodulator****Option 44, 45 and/or 65, WCDMA/HSDPA Signal Analyzer Verification****Table A-34.** WCDMA Error Vector Magnitude (Test Model 4; Option 45 or 65)

Frequency (MHz)	Measured Value for EVM	Specification
1962.5	%	≤ 2.5%

**Option 65 WCDMA/HSDPA Demodulator****Option 44, 45 and/or 65, WCDMA/HSDPA Signal Analyzer Verification****Table A-35.** HSDPA Error Vector Magnitude (Test Model 5; Option 65)

Frequency (MHz)	Measured Value for EVM	Specification
1962.5	%	≤ 2.5%

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 46 Fixed WiMAX RF Measurements****Option 46 and/or 47, Fixed WiMAX Signal Analyzer Verification****Table A-36.** Option 46, Fixed WiMAX Channel Power Accuracy

Frequency	Input Power	Measured Channel Power (RSSI)	Error	Specification
2600.5 MHz	–15 dBm	dBm	dB	$\pm 1.5$ dB
2600.5 MHz	–50 dBm	dBm	dB	$\pm 1.5$ dB
3600.5 MHz	–15 dBm	dBm	dB	$\pm 1.5$ dB
3600.5 MHz	–50 dBm	dBm	dB	$\pm 1.5$ dB
5600.5 MHz	–15 dBm	dBm	dB	$\pm 1.5$ dB
5600.5 MHz	–50 dBm	dBm	dB	$\pm 1.5$ dB

**Option 47 Fixed WiMAX Demodulator****Option 46 and/or 47, Fixed WiMAX Signal Analyzer Verification****Table A-37.** Option 47, Fixed WiMAX Residual EVM

Frequency	Power	BW	EVM (RMS)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	$\leq 3.5\%$
2600.5 MHz	–50 dBm	10 MHz	%	$\leq 3.5\%$
3600.5 MHz	–15 dBm	10 MHz	%	$\leq 3.5\%$
3600.5 MHz	–50 dBm	10 MHz	%	$\leq 3.5\%$
5600.5 MHz	–15 dBm	10 MHz	%	$\leq 3.5\%$
5600.5 MHz	–50 dBm	10 MHz	%	$\leq 3.5\%$

**Option 47, Fixed WiMAX Frequency Error****Option 46 and/or 47, Fixed WiMAX Signal Analyzer Verification****Table A-38.** Option 47, Fixed WiMAX Frequency Error

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	$\pm 182.03$ Hz
5600.5 MHz	–50 dBm	Hz	$\pm 392.03$ Hz

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 51, T1 Analyzer Verification

#### T1 Clock Frequency Test Verification

**Table A-39.** Option 51, T1 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		±5 ppm
Recovered Clock Frequency		1543992 Hz to 1544008 Hz

#### T1 Transmit Level Test Verification Transmitted Level Voltage

**Table A-40.** T1 Transmitted Level Voltage

Measurement	Measured Value	Specification
Tx LBO: 0 dB		4.8 Vp-p to 7.6 Vp-p
Tx LBO: -7.5 dB		1.9 Vp-p to 31 Vp-p
Tx LBO: -15 dB		0.5 Vp-p to 1.7 Vp-p

#### T1 Transmit Level Test Verification Transmitted Level Vpp Reading

**Table A-41.** T1 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
Tx LBO: 0 dB		4.8 Vp-p to 7.6 Vp-p
Tx LBO: -7.5 dB		1.9 Vp-p to 3.1 Vp-p
Tx LBO: -15 dB		0.5 Vp-p to 1.7 Vp-p

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****E1 Clock Frequency Test Verification Option 52****Table A-42.** Option 52, E1 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		±5 ppm
Recovered Clock Frequency		204790 Hz to 2048010 Hz

**E1 Transmit Level Test Verification Option 52, Transmitted Level Voltage****Table A-43.** Option 52, E1 Transmitted Level Voltage

Measurement	Measured Value	Specification
120 ohm (RJ48 Interface)		5.4 Vp-p to 6.6 Vp-p
75 ohm (BNC Interface)		4.2 Vp-p to 5.2 Vp-p

**E1 Transmit Level Test Verification Option 52, Transmitted Level Vpp Reading****Table A-44.** Option 52, E1 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
120 ohm (RJ48 Interface)		5.4 Vp-p to 6.6 Vp-p
75 ohm (BNC Interface)		4.2 Vp-p to 5.2 Vp-p

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****T1 Clock Frequency Test Verification Option 53****Table A-45.** Option 53, T1/T3 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		±5 ppm
Recovered Clock Frequency		1543992 Hz to 1544008 Hz

**T1 Transmit Level Test Verification Option 53, Transmitted Level Voltage****Table A-46.** Option 53, T1 Transmitted Level Voltage

Measurement	Measured Value	Specification
Tx LBO: 0 dB		4.8 to 7.6 Vp-p
Tx LBO: -7.5 dB		2.4 to 3.6 Vp-p
Tx LBO: -15 dB		0.5 to 1.7 Vp-p

**T1 Transmit Level Test Verification Option 53, Transmitted Level Vpp Reading****Table A-47.** Option 53, T1 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
Tx LBO: -15 dB		0.5 to 1.7 Vp-p
Tx LBO: -7.5 dB		2.4 to 3.6 Vp-p
Tx LBO: 0 dB		4.8 to 7.6 Vp-p

**T3 Clock Frequency Test Verification Option 53****Table A-48.** Option 53, T3 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		±5 ppm
Recovered Clock Frequency		44735776 Hz to 44736224 Hz

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****T3 Transmit Level Test Verification Option 53, Transmitted Level Voltage****Table A-49.** Option 53, T3 Transmitted Level Voltage

Measurement	Measured Value	Specification
DSX		0.72 Vp-p to 1.7 Vp-p
LOW		0.72 Vp-p to 1.7 Vp-p

**T3 Transmit Level Test Verification Option 53, Transmitted Level Vpp Reading****Table A-50.** Option 53, T3 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
LOW		0.72 Vp-p to 1.7 Vp-p
DSX		0.72 Vp-p to 1.7 Vp-p

**Option 60 and/or 61, TD-SCDMA Signal Analyzer Verification****Table A-51.** Option 60, 61 TD-SCDMA Verification (at 2010 MHz, -45 dBm Level, TD-SCDMA)

Measurement	Measured Value	Specification
Channel Power (Error)		$\pm 1.5$ dB
EVM		< 3% typical
Frequency Error		$\pm 20$ Hz
Tau		$\pm 0.2$ $\mu$ s

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 62 EVDO RF Measurements****Option 62 and/or 63, EVDO Signal Analyzer Verification****Table A-52.** Option 62 EVDO RF Measurements

Measurement	Measured Value	Specification
<b>At 870.03 MHz, –50 dBm Level, 921.6kps 8-PSK Modulation</b>		
Channel Power Error	dB	±1.5 dB
<b>At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation</b>		
Channel Power Error	dB	±1.5 dB
<b>At 1930.05 MHz, –50 dBm Level, 2457.6kps 16-QAM Modulation</b>		
Channel Power Error	dB	±1.5 dB
<b>At 1930.05 MHz, –50 dBm Level, Idle Slot</b>		
Channel Power Error	dB	±1.5 dB
<b>At 870.03 MHz, –10 dBm Level, Idle Slot</b>		
Channel Power Error	dB	±1.5 dB

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

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**Test Records for Options Verification (continued)****Option 63 EVDO Demodulator****Option 62 and/or 63, EVDO Signal Analyzer Verification****Table A-53.** Option 63 EVDO Demodulator

Measurement	Measured Value	Specification
<b>At 870.03 MHz, –50 dBm Level, 921.6kps 8-PSK Modulation</b>		
Frequency Error	Hz	$\pm 10$ Hz
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1$ $\mu\text{s}$
<b>At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation</b>		
Frequency Error	Hz	$\pm 10$ Hz
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1$ $\mu\text{s}$
<b>At 1930.05 MHz, –50 dBm Level, 2457.6kps 16-QAM Modulation</b>		
Frequency Error	Hz	$\pm 10$ Hz
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1$ $\mu\text{s}$
<b>At 1930.05 MHz, –50 dBm Level, Idle Slot</b>		
Frequency Error	Hz	$\pm 10$ Hz
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1$ $\mu\text{s}$
<b>At 870.03 MHz, –10 dBm Level, Idle Slot</b>		
Frequency Error	Hz	$\pm 10$ Hz
Rho		$0.99 \leq x \leq 1$
Tau	$\mu\text{s}$	$\pm 1$ $\mu\text{s}$



MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 66 Mobile WiMAX RF Measurements****Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification****Table A-54.** Option 66 Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

Frequency (MHz)	Input Power (dBm )	Measured Channel Power (RSSI)	Error	Specification dB
2600.5	–15	dBm	dB	±1.5 dB
2600.5	–50	dBm	dB	±1.5 dB
3600.5	–15	dBm	dB	±1.5 dB
3600.5	–50	dBm	dB	±1.5 dB

**Option 66 Mobile WiMAX Channel Power Accuracy****Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification****Table A-55.** Option 66 Mobile WiMAX Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

Frequency (MHz)	Input Power (dBm )	Measured Channel Power (RSSI)	Error	Specification dB
2600.5	–15	dBm	dB	±1.5 dB
2600.5	–50	dBm	dB	±1.5 dB
3600.5	–15	dBm	dB	±1.5 dB
3600.5	–50	dBm	dB	±1.5 dB

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### Option 67 Mobile WiMAX Demodulator

#### Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification

**Table A-56.** Option 67, Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)

Frequency (MHz)	Power (dBm)	BW (MHz)	EVM (rms)	Specification
2600.5	–15	10	%	$\leq 3.0\%$
2600.5	–50	10	%	$\leq 3.0\%$
3600.5	–15	10	%	$\leq 3.0\%$
3600.5	–50	10	%	$\leq 3.0\%$

### Option 67, Mobile WiMAX Frequency Error

#### Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification

**Table A-57.** Option 67, Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

Frequency (MHz)	Power (dBm)	Freq Error	Specification
2600.5	–50	Hz	$\pm 52.01$ Hz (0.02 ppm)
3600.5	–50	Hz	$\pm 72.01$ Hz (0.02 ppm)

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 67, Mobile WiMAX Residual EVM****Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification****Table A-58.** Option 67, Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)

Frequency (MHz)	Power (dBm)	BW (MHz)	EVM (rms)	Specification
2600.5	–15	10	%	$\leq 3.0\%$
2600.5	–50	10	%	$\leq 3.0\%$
3600.5	–15	10	%	$\leq 3.0\%$
3600.5	–50	10	%	$\leq 3.0\%$

**Option 67, Mobile WiMAX Frequency Error****Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification****Table A-59.** Option 67, Mobile WiMAX Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

Frequency (MHz)	Power (dBm)	Freq Error	Specification
2600.5	–50	Hz	$\pm 52.01$ Hz (0.02 ppm)
3600.5	–50	Hz	$\pm 72.01$ Hz (0.02 ppm)

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 541 LTE Measurements**[Option 541 and/or 542 and/or 543, LTE Signal Analyzer Verification](#)**Table A-60.** Option 541 LTE Channel Power Accuracy

Frequency (MHz)	Input Power (dBm)	Measured Channel Power	Error	Specification
<b>For Units with Option 541 Installed, Pattern E-TM_1-1_10M)</b>				
750	–10	dBm	dB	±1.5 dB
750	–50	dBm	dB	±1.5 dB
2150	–10	dBm	dB	±1.5 dB
2150	–50	dBm	dB	±1.5 dB

**Option 543 LTE Measurements**[Option 541 and/or 542 and/or 543, LTE Signal Analyzer Verification](#)**Table A-61.** Option 543, LTE Channel Power Accuracy

Frequency (MHz)	Input Power (dBm)	Measured Channel Power	Error	Specification
<b>For Units with Option 543 Installed, Pattern E-TM_1-1_20M)</b>				
750	–10	dBm	dB	±1.5 dB
750	–50	dBm	dB	±1.5 dB
2150	–10	dBm	dB	±1.5 dB
2150	–50	dBm	dB	±1.5 dB

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 542 LTE Measurements****Option 541 and/or 542 and/or 543, LTE Signal Analyzer Verification****Table A-62.** Option 542 LTE Residual EVM and Frequency Accuracy

Measurement	Measured Value	Specification
<b>For Units with Option 542 Installed, Pattern E-TM_3-1_10M</b>		
<b>750 MHz at –10 dBm</b>		
Frequency Error	Hz	±10 Hz
EVM (rms)	%	< 2.0% typical
<b>750 MHz at –50 dBm</b>		
Frequency Error	Hz	±10 Hz
EVM (rms)	%	< 2.0% typical
<b>2150 MHz at –10 dBm</b>		
Frequency Error	Hz	±10 Hz
EVM (rms)	%	< 2.0% typical
<b>2150 MHz at –50 dBm</b>		
Frequency Error	Hz	±10 Hz
EVM (rms)	%	< 2.0% typical

MT822\_B Firmware Revision: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

**Test Records for Options Verification (continued)****Option 543 LTE Measurements**[Option 541 and/or 542 and/or 543, LTE Signal Analyzer Verification](#)**Table A-63.** Option 543, LTE Residual EVM and Frequency Accuracy

Measurement	Measured Value	Specification
<b>For Units with Option 543 Installed, Pattern E-TM_3-1_20M</b>		
<b>750 MHz at –10 dBm</b>		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.0% typical
<b>750 MHz at –50 dBm</b>		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.0% typical
<b>2150 MHz at –10 dBm</b>		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.0% typical
<b>2150 MHz at –50 dBm</b>		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.0 % typical

MT822\_B Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### TD-LTE Channel Power Accuracy Tests (Option 551 and Option 543)

**Table A-64.** Option 551 and 543, Channel Power Accuracy

Frequency (MHz)	Input Power (dBm)	Measured Channel Power	Error	Specification
<b>For Units with Option 551 Installed, Pattern TDLTE-E-TM-1-1_10M</b>				
750	-12	dBm	dB	$\pm 1.5$ dB
750	-30	dBm	dB	$\pm 1.5$ dB
2350	-12	dBm	dB	$\pm 1.5$ dB
2350	-30	dBm	dB	$\pm 1.5$ dB
<b>For Units with Option 543 Installed, Pattern TDLTE-E-TM-1-1_20M</b>				
750	-12	dBm	dB	$\pm 1.5$ dB
750	-30	dBm	dB	$\pm 1.5$ dB
2350	-12	dBm	dB	$\pm 1.5$ dB
2350	-30	dBm	dB	$\pm 1.5$ dB

MT822\_B Firmware Rev: \_\_\_\_\_ Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Options: \_\_\_\_\_

## Test Records for Options Verification (continued)

### TD-LTE Residual EVM and Frequency Error Tests (Option 552 and Option 543)

**Table A-65.** Option 552 and 543, TD-LTE Residual EVM and Frequency Accuracy

Measurement	Measured Value	Specification
<b>For Units with Option 552 Installed, Pattern TDLTE-E-TM-3-3_10M</b>		
<b>750 MHz at –12 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>750 MHz at –30 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>2350 MHz at –12 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>2350 MHz at –30 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>For Units with Option 543 Installed, Pattern TDLTE-E-TM-3-3_20M</b>		
<b>750 MHz at –12 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>750 MHz at –30 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>2350 MHz at –12 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical
<b>2350 MHz at –30 dBm</b>		
Frequency Error	Hz	$\pm 10$ Hz
EVM (rms)	%	< 2.0 % typical







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