

MS2830A-044 26.5 GHz Signal Analyzer MS2830A-045 43 GHz Signal Analyzer

MS2830A Signal Analyzer

MS2830A Signal Analyzer series

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Product Introduction



MS2830A-040: 9 kHz to 3.6 GHz* MS2830A-041: 9 kHz to 6.0 GHz* MS2830A-043: 9 kHz to 13.5 GHz* MS2830A-044: 9 kHz to 26.5 GHz MS2830A-045: 9 kHz to 43 GHz

*: See MS2830A Product Introduction.

Version 9.01

ANRITSU CORPORATION

	Expandabi	lity of MS2830A	-044/045	
Frequency	9 kHz 3.6 GHz 6 GI	Hz 13.5 GHz	26.5 GHz 43	GHz 325 GHz
um zer	Any one of five spectrum analyzers The MS2830A-044/045 supports up t MS2830	supporting different freque o 325 GHz using an extern A-044	encies can be selected. al mixer. External	Mixer
oecti naly	MS2830A-008 Preamp	MS2830A-045		External Mixer
A S	MS2830A-068 Microwa	ave Band Preamp (for MS28	330A-044/045)	
cer	Installing the Analysis Bandwidth o Moreover, installing the microwave	ption supports the signal a Preselector Bypass expand	analyzer function. ds the bandwidth up to 32	5 GHz.
alyz	MS2830A-006 Analysis Bandwidth 10 MHz			
ial Ana	MS2830A-005 Analysis Bandwidth Extension 31.25 MHz (requires MS2830A-006, cannot be installed to MS2830A-045)			
Sign	MS2830A-009 Bandwidth Extension 31.25 MHz for Millimeter-wave (requires MS2830A-006, Dedicated option for MS2830A-045)	MS2830A-067 Microwav (for MS2830A-044/045, requires MS2830A-000 Pre-selector range 4 GHz (Fre	Requires External Mixer	
	MS2830A-077 Analysis Bandwidth Extension 62.5 MHz (requires MS2830A-006,005/009)	Pre-selector range 3.5 GHz (Fi		
-	MS2830A-078 Analysis Bandwidth Extension 125 MHz (requires MS2830A-006,005/009,078)			
lulation alysis	Installing measurement software in modulation analysis for each system	the main frame with signal n.	analyzer function support	s
Mod An	Example: MX26901	TA Vector Modulation Anal	ysis Software	

MS2830A Series Comparison Chart (1/2)

Frequency option	MS2830A-040*1	MS2830A-040*1 MS2830A-041*1 MS2830A-043*1		MS2830A-044	MS2830A-045	
Frequency range	9 kHz to 3.6 GHz	9 kHz to 6 GHz 9 kHz to 13.5 GHz		9 kHz to 26.5 GHz	9 kHz to 43 GHz	
Aging rate	±1 × 10 ⁻⁷ /day (Standard ±1 × 10 ⁻⁸ /day (Opt. 002 ±1 × 10 ⁻¹⁰ /month (Opt. 0	d) () DO1)	±1 × 10 ^{-s} /day (Standard) ±1 × 10 ⁻¹ /month (Opt. 001)			
Start time/Characteristics	5 minutes, ±5 × 10-7 (Si 5 minutes, ±5 × 10-8 (O 7 minutes, ±1 × 10-9 (O	tandard) pt. 002) pt. 001)	5 minutes, ±5 × 10- ^a (Standard) 7 minutes, ±1 × 10- ^a (Opt. 001)			
Phase noise	Frequency: 500 MHz, S	pectrum Analyzer mode				
1 kHz offset	-109 dBc/Hz (Opt. 066)	-109 dBc/Hz (Opt. 066) -				
10 kHz offset	-118 dBc/Hz (Opt. 066) -				_	
100 kHz offset	-115 dBc/Hz (Standard) -1 -133 dBc/Hz (Opt. 066) -1			–115 dBc/Hz (Standard)		
1 MHz offset	-133 dBc/Hz (Standard -148 dBc/Hz (Opt. 066)	l)), nominal	–133 dBc/Hz (Standard)		
Displayed average noise level (DANL)	Spectrum Analyzer mode without options					
Frequency: 500 MHz	-153 dBm/Hz					
Frequency: 2 GHz		-151 dBm/Hz	-150 dBm/Hz			
Frequency: 5 GHz	-146 dBm/Hz -144 d			Bm/Hz		
Frequency: 12 GHz	-142 dBm/Hz			-151 dBm/Hz		
Frequency: 25 GHz			-146 dBm/Hz			
Frequency: 40 GHz		-144 dBm/Hz				
Attenuator range/step		0 to 60 dB/10 dB step				

MS2830A Series Comparison Chart (2/2)

Frequency option	MS2830A-040*1 MS2830A-041*1 MS2830A-043*1		MS2830A-044	MS2830A-045			
Frequency range	9 kHz to 3.6 GHz 9 kHz to 6 GHz 9 kHz to 13.5 GHz			9 kHz to 26.5 GHz	9 kHz to 43 GHz		
Total absolute amplitude accuracy	Unlike normal Total Level Accuracy, this includes frequency characteristics, attenuator switching error and linearity error. Since it gives an instinctive impression of measurement instrument error, it lowers the risk of measurement errors.						
Frequency :500 MHz, 2 GHz			±0.5 dB				
Frequency: 5 GHz, 12 GHz			±1.8 dB				
Frequency: 25 GHz				±3.0) dB		
Frequency: 40 GHz					±3.0 dB		
Resolution bandwidth	1 Hz to 3 MHz (1-3 seq	uence), 5, 10, 20*8, 31.25	5 MHz ^{*8} , 50 kHz [Spectru	m Analyzer mode]			
Analysis bandwidth	10 MHz (Opt. 006) 31.25 MHz (Opt. 005) 62.5 MHz (Opt. 077)*9 125 MHz (Opt. 078)*9				10 MHz (Opt. 006) 31.25 MHz (Opt. 009) 62.5 MHz (Opt. 077)* ⁹ 125 MHz (Opt. 078) ^{*9}		
Additional functions							
Vector signal generator		✓ (Opt. 020/021)		_			
Low phase noise performance*2		✓ (Opt. 066)		-	_		
Phase noise measurement function	✓ (Opt. 010)						
Noise figure measurement function	✓ (Opt. 017)						
BER measurement function	✓ (Opt. 026)						
Preamplifier*3	✓ (Opt. 008)						
Microwave preamplifier ^{*4} —		√ (O	pt. 068)				
Microwave preselector bypass*5	_			√ (O	(Opt. 067)		
External mixer 1st local signal output*6				√ (S	Standard)		
1st IF signal output*7	— √ (Standard)			tandard)			

*1: See catalog for MS2830A-040/041/043.

- *2: Phase noise improved for <3.6 GHz.
- *3: Frequency range: 100 kHz to 3.6 GHz (MS2830A-040) 100 kHz to 6 GHz (excluding MS2830A-040) *4: Frequency range: 100 kHz to 26.5 GHz (MS2830A-044),
 - 100 kHz to 43 GHz (MS2830A-044)
- *5: Frequency range: 4 GHz to 26.5 GHz (MS2830A-044), 4 GHz to 43 GHz (MS2830A-045)
- *6: Connector: SMA-J, 50Ω, Local signal: 5 GHz to 10 GHz
- *7: Connector: SMA-J, 50Ω, Frequency: 1875 MHz
- *8: Can be set when with MS2830A-005. Can not be set when with MS2830A-009.
- *9: Signal Analyzer Mode Frequency Setting Range With Opt. 077/078, With Opt. 067, >31.25 MHz bandwidth 300 MHz to 26.5 GHz [MS2830A-044] 300 MHz to 43 GHz [MS2830A-045]
 With Opt. 077/078, Without Opt. 067, >31.25 MHz bandwidth 300 MHz to 3.6 GHz [MS2830A-040] 300 MHz to 6 GHz [MS2830A-041] 300 MHz to 13.5 GHz [MS2830A-043] 300 MHz to 6 GHz [MS2830A-044] 300 MHz to 6 GHz [MS2830A-045]

26.5/43 GHz Signal Analyzer Features

Performance

♦ Wide Dynamic Range (< 13.5 GHz)

Preamp up to 43 GHz

DANL: -156 dBm/Hz^{*3} (18.3 < f < 34 GHz)

Excellent total level accuracy

 $\begin{array}{l} \pm 0.5 \ dB^{*5} & (300 \ \text{kHz} \leq \text{f} < 4 \ \text{GHz}) \\ \pm 3.0 \ dB^{*5} & (13.8 \ \text{GHz} < \text{f} \leq 40 \ \text{GHz}) \end{array}$

♦ Measures up to 325 GHz with external mixer

Supports use as down-converter

Connector: SMA-J, 50Ω IF output frequency: 1875 MHz IF output bandwidth: 1 GHz (3 dB bandwidth) nominal

*1: Without Opt-067/068.

*2: Without Opt-068 or preamp OFF.

*3: Without Opt-067 or Preselector Bypass OFF, and with Opt-068 and preamp ON.

*4: With Opt-068 and preamp ON, and with Opt-067 and Preselector Bypass OFF.

- *5: Without Opt-068 or preamp ON. Attenuator = 10 dB to 60 dB
- *6: MS2830A-044/045 only. Excludes other options.

*7: With Opt-067.



MS2830A-044: 9 kHz to 26.5 GHz MS2830A-045: 9 kHz to 43 GHz

Function <Modulation Analysis> <Signal Analyzer>

 125 MHz analysis bandwidth^{*7} supporting up to 43 GHz^{*8}

Vector Modulation Analysis Software

 Full line of built-in measurement functions

Low cost

Low power consumption for saving costs!

190 VA nominal^{*6}

^{*8:} With Opt-006, 005/009, 077, 078

26.5/43 GHz Signal Analyzer Outline





*: When using external mixer bands, or using internal micro frequency bands (Band; 3 to 9) with Microwave Preselector Bypass option: On

Performance: Wide Dynamic Range(1/2)

Wide C/N measurement for Spurious, Mask and Occupied Bandwidth tests

MS2830A-045 (43 GHz) TOI-DANL with preamplifier, without preselector bypass



Dynamic range is a key specification for spectrum analyzers. Low displayed average noise level (DANL) as well as thirdorder intermodulation distortion (TOI) are important too. Sometimes, distortion may occur in the mixer when inputting a carrier signal with low TOI and high level. In this case, the input level to the mixer can be reduced using an attenuator but, at the same time, the level of fine spurious also drops, making it impossible to find the noise floor. The MS2830xA has an excellent dynamic range, supporting accurate measurements for checking the spectrum, such as spurious tests, mask and occupied bandwidth with wide dynamic range.

Performance: Wide Dynamic Range(2/2)

Excellent performance with >6 GHz! For spurious tests!

DANL comparison 26.5 GHz model without Preamplifier and Preselector Bypass price image -120 Product A (26GHz) -125 --- Product B (26GHz) -130 DANL [dBm/Hz] \$ \$ \$ \$ -135 Product C (43GHz) High performance s s s s s s s -140 Product D (50GHz) -145 5555555 -150 Product E (40GHz) \$ \$ \$ \$ \$ \$ \$ \$ \$ -155 Product F (40GHz) -160 s s s s 10 20 30 40 0 - MS2830A(43G) Frequency [GHz] S S S !

The basic configuration for DANL with >6 GHz supports best-of-class performance. The above performance is assured without preamp option.

Performance: Preamp Up to 43 GHz(1/2)

Built-in preamp option expands DANL for 10 dB

MS2830A 43 GHz version DANL change by pre-amp Opt.068 w/preamp, Opt.067 w/o pre-selector bypass



A built-in preamp option supports measurement of weak signals.

Performance: Preamp Up to 43 GHz(2/2)

	–163 dBm (30 MHz ≤ f < 1 GHz)
	–161 dBm (1 GHz ≤ f < 2 GHz)
Displayed Avg. Noise	–159 dBm (2 GHz ≤ f ≤ 3.5 GHz)
Level	–155 dBm (3.5 GHz < f ≤ 6 GHz)
(MS2830A-044,	–160 dBm (6 GHz < f ≤ 13.5 GHz)
MS2830A-045)	–158 dBm (13.5 GHz < f ≤ 18.3 GHz)
	–156 dBm (18.3 GHz < f ≤ 26.5 GHz)
	(w/o MS2830A-067/167 or OFF)
Displayed Avg. Noise	–156 dBm (26.5 GHz < f ≤ 34 GHz)
Lovol	–150 dBm (34 GHz < f ≤ 40 GHz)
(MS2830A-045)	–147 dBm (40 GHz < f ≤ 43 GHz)
	(w/o MS2830A-067/167 or OFF)

Performance: Excellent Total Level Accuracy

Reliable catalog specification



Most spectrum analyser catalog specifications do not include attenuator switching error in the absolute level accuracy, frequency characteristics, and linearity values.

However, the total level of accuracy of the MA2830A in the catalog includes the above three errors. Stable measurement is assured in the prescribed error range even when changing the frequency/attenuator.

Performance: Measures Up to 325 GHz with External Mixer(1/2)

Standard local output (LO) for external mixer!



Combination with an external mixer supports spectrum measurements up to 325 GHz.

This supports high-sensitivity measurements with local signal outputs at high frequencies from 5 GHz to 10 GHz to minimize the required LO harmonic order.

Performance: Measures Up to 325 GHz with External Mixer(2/2)

Anritsu supports external mixers for the MA2740/50C series. Using these external mixers enables monitoring up to 325 GHz.

Band Name	Freq. Range	Model Name	LO Harmonic Order	Mixing Mode	Conversion Loss* (dB)	Waveguide flange	Waveguide size
A Band	26.5 to 40 GHz	MA2741C	4	+	23	MIL-DTL-3922/54-003	WR28
Q Band	33 to 50 GHz	MA2742C	5	+	26	MIL-DTL-3922/67D-006	WR22
U Band	40 to 60 GHz	MA2743C	6	+	28	MIL-DTL-3922/67D-007	WR19
V Band	50 to 75 GHz	MA2744C	8	+	32	MIL-DTL-3922/67D-008	WR15
E Band	60 to 90 GHz	MA2745C	9	+	36	MIL-DTL-3922/67D-009	WR12
W Band	75 to 110 GHz	MA2746C	11	+	39	MIL-DTL-3922/67D-010	WR10
F Band	90 to 140 GHz	MA2747C	14	+	40	MIL-DTL-3922/67D-M08	WR08
D Band	110 to 170 GHz	MA2748C	17	+	45	MIL-DTL-3922/67D-M06	WR06
G Band	140 to 220 GHz	MA2749C	22	+	50	MIL-DTL-3922/67D-M05	WR05
Y Band	170 to 260 GHz	MA2750C	26	+	65	MIL-DTL-3922/67D-M04	WR04
J Band	220 to 325 GHz	MA2751C	33	+	70	MIL-DTL-3922/67D-M03	WR03

Chart: MS2830A-044/045 External Mixer Band List

Name	1st Local Output
Purpose	Local signal output for external mixer connection
Connector	Front panel, SMA-J, 50 Ω nominal
Frequency	Local signal output: 5 to 10 GHz
Frequency	IF signal frequency: 1875 MHz
Level	Operating LO level range: +10 to +18 dBm

*: Conversion Loss value is a typical value near the center frequency of each band and it doesn't guarantee.

Performance: Use as Wideband Down-Converter(1/2)

IF output frequency 1.875 GHz, IF bandwidth 1 GHz nominal



Measurement image: Down-convert signals with 80 GHz center frequency and 1 GHz* bandwidth to 1.875 GHz

Harmonic mixing internal band and IF signals from the external mixer can be output from the backpanel IF Output connector. Because the IF frequency is 1.875 GHz, this can be used as a down-converter for millimeter-wave wideband modulation signal analysis, such as the 1-GHz* modulation bandwidth.

Name	IF Output
Purpose	Output signals before 1st IF band control
Connector	Back panel, SMA-J, 50 Ω nominal
Frequency	Frequency: 1875 MHz
Bandwidth	1 GHz* nominal (3-dB bandwidth)
Coin	–10 dBm nominal
Gain	(input attenuator = 0 dB, input frequency at 10 GHz)

*: When using external mixer bands, or using internal micro frequency bands (Band; 3 to 9) with Microwave Preselector Bypass option: On

Performance: Use as Wideband Down-Converter(2/2)



Figure 9. IF Output frequency characteristics reference values (internal MS2830A-044/045 only)

The graph shows the IF output (1.875 GHz) frequency reference characteristics. The characteristics are approx. +1/-2 dB within the 1 GHz band.

These frequency characteristics are for the internal MS2830A-044/045. Actual results include the frequency characteristics for accessories, such as the external mixer, and cables between the external mixer, MS2830A-044/045 and IF output terminal.

*: When using external mixer bands, or using internal micro frequency bands (Band; 3 to 9) with Microwave Preselector Bypass option: On

Performance: Supports 125 MHz and 43 GHz Analysis Bandwidth(1/2)

MS2830A-067 Microwave Preselector Bypass supports 125 MHz wideband measurements up to 43 GHz



MX269017A Vector Modulation Analysis Software

Modulation method
BPSK, QPSK, O-QPSK, Pai/4 DQPSK, 8PSK,
16QAM, 64QAM, 2FSK, 4FSK, 256QAM *1
Filter (Depends on Modulation method)
Root Nyquist, Nyquist, Gaussian,
ARIB STD-T98, Half-sine, Inverse Rect, Inverse
Gaussian, None, User Defined
Symbol rate
(Upper limit depends on analysis bandwidth
0.1 k to 1.25/3.125/6.25/12.5 Msymbol/s ^{*2}
0.1 k to 2.5/6.25/12.5/25 Msymbol/s ^{*3}
0.1 k to 5/12.5/25/50 Msymbol/s ^{*4}
0.1 k to 5/35/70/140 Msymbol/s*5
*1: 256QAM available with Non-Format
*2: When O-QPSK

- *3: When 2FSK and 4FSK
- *4: When Frame Formatted and xxPSK, xxQAM
- *5: When Non-Formatted and xxPSK, xxQAM

Wideband analysis with high frequencies is supported for microwave links.

Modulation analysis and various VSA functions improve design verification efficiency.

Performance: Supports 125 MHz and 43 GHz Analysis Bandwidth(2/2)

	MS2830A-006 Analysis Bandwidth 10 MHz					
Model/Name	MS2830A-106 Analysis Bandwidth 10 MHz Retrofit					
Purpose	Adds 10 MHz bandwidth analysis function					
Model/Name	MS2830A-005 Analysis Bandwidth 31.25 MHz					
Model/Marrie	MS2830A-105 Analysis Bandwidth 31.25 MHz Retrofit					
Purpose Adds 31.25 MHz bandwidth analysis function						
Installation	Requires MS2830A-006/106					
Installation	Cannot be installed in MS2830A-045					
	MS2830A-009 Analysis Bandwidth 31.25 MHz for					
Model/Name	Millimeter-wave					
Nouel/Name	MS2830A-109 Analysis Bandwidth 31.25 MHz for					
	Millimeter-wave Retrofit					
Purpose	Adds 31.25 MHz bandwidth analysis function					
	Requires MS2830A-006/106					
Installation	Dedicated option for MS2830A-045					
Installation	Cannot be set the RBW to more than 10MHz in					
	spectrum analyzer function.					
Model/Name	MS2830A-077 Analysis Bandwidth 62.5 MHz					
Purpose	Adds 62.5 MHz bandwidth analysis function					
Installation	Retrofit not supported					
	Requires MS2830A-006, 005/009					
Model/Name	MS2830A-078 Analysis Bandwidth 125 MHz					
Purpose	Adds 125 MHz bandwidth analysis function					
Installation	Retrofit not supported					
	Requires MS2830A-006, 005/009, 077					

Note) MS2830A-077/078:

An image response is received when setting the bandwidth to more than 31.25 MHz. This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.). The MS2690A/91A/92A Signal Analyzer series is recommended for other measurement purposes.

Model/Name	MS2830A-067 Microwave Preselector Bypass				
MOUEI/Martie	MS2830A-167 Microwave Preselector Bypass Retrofit				
Durness	Bypass preselector to improve RF frequency				
Pulpose	characteristics and in-band frequency characteristics				
Eroquonov rango	4 to 26.5 GHz (MS2830A-044)				
Frequency range	4 to 43 GHz (MS2830A-045)				
	MS2830A-044/045 can be installed.				
Installation	Add MS2830A-067 when using the signal analyzer				
Installation	measurement functions at bandwidth: > 31.25 MHz and				
	frequency: > 6 GHz.				

Require options by the combination of preselector bypass and analysis bandwidth

\sim	Preselector	Analysis	Require Options			_		
	Bypass	Bandwidth	005	006	009	077	078	067
		10 MHz		\checkmark				\checkmark
		31.25 MHz	\checkmark	\checkmark				\checkmark
M62020A 044	VVIUI	62.5 MHz	\checkmark	\checkmark		\checkmark		\checkmark
0 kUz to		125 MHz	\checkmark	✓		\checkmark	\checkmark	\checkmark
		10 MHz		\checkmark				
20.3 GHZ	Without	31.25 MHz	\checkmark	\checkmark				
		62.5 MHz	\checkmark	\checkmark		\checkmark		
		125 MHz	\checkmark	\checkmark		\checkmark	\checkmark	
		10 MHz		✓				\checkmark
	10/:+b	31.25 MHz		\checkmark	\checkmark			\checkmark
M62020A 045	VVIUI	62.5 MHz		\checkmark	\checkmark	\checkmark		\checkmark
1VI32030A-043		125 MHz		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
		10 MHz		\checkmark				
43 GHZ	\\/ithout	31.25 MHz		✓	\checkmark			
	vvitnout	62.5 MHz		\checkmark	\checkmark	\checkmark		
		125 MHz		\checkmark	\checkmark	\checkmark	\checkmark	

Performance: Built-in Versatile Measurement Functions(1/2)

Supports simple operation measurement functions

Measure Function	SPA ^{*1}	VSA *2	
Channel Power	✓	✓	
Occupied Bandwidth	✓	✓	
Adjacent Channel Leakage Power	✓	\checkmark	
Spectrum Emission Mask	 ✓ 		
Burst Average Power	 ✓ 	\checkmark	
Spurious Emission	✓		
AM Depth		✓	
FM Deviation		\checkmark	
Multi-marker & Marker List	✓	\checkmark	
Highest 10 Markers	✓	\checkmark	
Limit Line	✓		
Frequency Counter	✓		
2-tone 3rd-order Intermodulation Distortion	✓		
Annotation Display (On/Off)	✓		
Power Meter	Independent function ^{*3}		
Phase Noise	Opt. 010		
Noise Figure	Opt. 017 ^{*4}		



Adjacent Channel Leakage Power



Spurious Emission



Occupied Bandwidth

*1: SPA (Spectrum Analyzer)

- *2: VSA (Vector Signal Analyzer), Requires Opt. 005/006/077/078
- *3: Use USB Power Sensors
- *4: Use Noise Sources (Noisecom, NC346 series)

Performance: Built-in Versatile Measurement Functions(2/2)

Signal Analyzer (VSA) Display Mode



Displays waveform of wideband SPAN up to 125 MHz without interruption Supports wideband CCDF analysis up to 31.25 MHz; useful for evaluating power amplifiers in wideband communications systems

Phase vs. Time



Monitors time fluctuations of phase to check sudden phase shift

Spectrogram



CCDF/APD



Displays spectrum variations with time; useful for understanding waveform transients because supports visual monitoring of frequency and level time variations

Supports wideband CCDF analysis up to 125 MHz and ideal for evaluating power amps for wideband communication systems

Low Cost: Low Power Consumption to Save Running Costs(1/2)

Excellent Eco Product

Eco-friendly products

After a global assessment, the Anritsu group has been recognized as manufacturing ecofriendly products.

- Excellent echo product: Products receiving score or 80 or more
- Eco product: Products receiving score or 60 or more
- Assessed product: Product meeting assessment conditions



Reduce raw materials/production costs Reduce toxic materials Reduce distribution costs Reduce usage costs Reduce waste at disposal



Low Cost: Low Power Consumption to Save Running Costs(2/2)

Low Power Consumption



*: With MS2830A-044/045 and excluding other options

**: With full options; example only and not guaranteed

Most faults during the stabilization period are due to heat-deteriorated parts. Restricted airflow causing overheating causes parts deterioration and increases fault rates.

Lower power consumption reduces heat production, helping cut both fault rates and running costs.

Useful Measurement Functions for Evaluating Tx Characteristics (1/21)

The MS2830A has all the versatile built-in measurement functions needed for evaluating Tx characteristics. Using functions matching measurements supports simple tests according to specifications.

Measure Function	SPA ^{*1}	VSA *2	
Channel Power	\checkmark	\checkmark	
Occupied Bandwidth	 ✓ 	✓	
Adjacent Channel Leakage Power	\checkmark	\checkmark	
Spectrum Emission Mask	✓		
Burst Average Power	✓	\checkmark	
Spurious Emission	\checkmark		
AM Depth		✓	
FM Deviation		\checkmark	
Multi-marker & Marker List	\checkmark	\checkmark	
Highest 10 Markers	\checkmark	\checkmark	
Limit Line	\checkmark		
Frequency Counter	\checkmark		
2-tone 3rd-order Intermodulation Distortion	✓		
Annotation Display (On/Off)	\checkmark		
Power Meter	Power Meter Independent func		
Phase Noise Opt. 010			
Noise Figure	Opt.	017 ^{*4}	

*1: SPA (Spectrum Analyzer)

*2: VSA (Vector Signal Analyzer), Requires Opt. 005/006/077/078

*3: Use USB Power Sensors

*4: Use Noise Sources (Noisecom, NC346 series)

Useful Measurement Functions for Evaluating Tx Characteristics (2/21)

Channel Power



Channel power measurement using three types of filter (Rectangular, Nyquist, Root Nyquist) is supported.

2/26/2008 17:41:07 Spectrum Analyzer - 0 30kHz | M ATT 6dB Spectrum Analyzer RBW Channel Powe SWT 38ms Channel Power Reference Level 0.00dBm RMS Measurement function ON/OFF Off On Channel Center Bandwidth Channel center frequency 2.000GHz Channel Width Channel bandwidth 5.000MHz -40 Filter Type -50 Rect Filter: -60 Rectangular, Nyguist, Root Roll-off Factor Nyquist Load Standard Results display pan 10.00 MHz Center 2.000 00GHz Parameter Channel Power Mean Power Absolute Power Channel Center 2.000 000 000 GHz -77.97 dBm / Hz Channel Width 5.000 000 MHz -10.98 dBm / 5.000MHz Trace Awrite W-CDMA Downlink Channel Center: Set value for channel center frequency Absolute Power: Power per Hz (Density) Channel Width: Set value for channel bandwidth In-zone power (Integration)

Channel Power Measurement

Useful Measurement Functions for Evaluating Tx Characteristics (3/21)

Occupied Bandwidth



Occupied bandwidth is measured in two modes—N% and X dB.

Occupied Bandwidth Measurement



Useful Measurement Functions for Evaluating Tx Characteristics (4/21)

Adjacent Channel Leakage Power (ACLR)



This function measures adjacent channel leakage power.

Adjacent Channel Leakage Power Measurement



Useful Measurement Functions for Evaluating Tx Characteristics (5/21)

Adjacent Channel Leakage Power (ACLR)

In Band can be set from 1 to 12 carriers and switched instantaneously on the screen. Moreover, true ACLR performance is measured using the noise cancellation function to subtract main-frame noise from the measurement result.



SPA

VSA

Useful Measurement Functions for Evaluating Tx Characteristics (6/21)

Adjacent Channel Leakage Power (ACLR)



Offset Channel can be set from 1 to 8 and switched instantaneously on the screen.



Useful Measurement Functions for Evaluating Tx Characteristics (7/21)

Spectrum Emission Mask (SEM)



Offset limit lines can be set for up to 12 segments. The peak frequency and level in each segment are displayed and parts exceeding the limit line are indicated in red. Also, when a limit line is exceeded at just one part, Fail is displayed in red at the Result displays at the bottom left of the screen.



Spectrum Emission Mask Measurement

Useful Measurement Functions for Evaluating Tx Characteristics (8/21)

Limit Lines

Up to six types of Limit line can be set on the spectrum display (frequency domain). In addition to setting the frequency and level of crossover points manually in sequence from the low frequency, after creating the right half of a line, the left half can be created by reversing and copying the right half, to set a symmetric limit line. Additionally, a Limit line that traces the measured waveform can be created using the Limit Envelope function. A margin can be set on the Limit line in the amplitude direction.

When the waveform is above or below the Limit line, it is evaluated automatically as PASS or FAIL. Evaluation is also possible with an added margin. The target evaluation line can be chosen from any of six types.

When the waveform matches the evaluation conditions (Event), it can be saved automatically as a csv format file. Any one of the following five Event types can be selected. (Save on Event Function)

- (1) Limit Fail: Saves waveform file when evaluation result is Fail
- (2) Limit Pass: Saves waveform file when evaluation result is Pass
- (3) Margin Fail: Saves waveform file when evaluation result including Margin is Fail
- (4) Margin Pass: Saves waveform file when evaluation result including Margin is Pass
- (5) Sweep Complete: Saves waveform file at every measurement regardless of evaluation result





PASS/FAIL evaluation is performed by changing the input signal level. The evaluation results for the five line types can be displayed simultaneously on one screen.

Useful Measurement Functions for Evaluating Tx Characteristics (9/21)

Average In-burst Power Measurement



The average power of specified burst segments is displayed in the time domain. Measurement only requires setting the measurement start and end positions on the screen.



Average In-burst Power Measurement

Useful Measurement Functions for Evaluating Tx Characteristics (10/21)

Spurious Emission



The peak frequency and level in each segment and the standard margin are displayed; parts exceeding the limit line are indicated in red. Also, Fail is displayed in red at the bottom left of the Results display even when the limit line is exceeded at only one part. A maximum of 20 segments can be set.

Spurious Emission Measurement 🖊 Spectrum Analyze 1/27/2010 13:24 Spectrum Anal M RBW 1MHz ATT 10dB VBW 1MHz SWT Spurious Limit Line^{Segment 5} 0.00dBm Positive Reference Level 10001 points Emission On Off -10.0 Time Domain Measurement: -20.0 Segment Setup Spurious can be swept (detected) for up to 20 -30.0 Spurious 40.0 segments using the Zero Span measurement Limit Setup -50.0 function. -60.0 Displayed Different parameters (RBW/VBW) from segment -70.0 Segment فلنجرج والمربية والمربية ألمانية أنفا فأنفا فأعرب أنشار والمربية المتحد والمراجع sweeping can be set. a la construction de la construction -90.0 Page of Summary Time domain measurements can switched ON/OFF. Auto Manual Displa esults Start 2.000 0GHz Stop 3.000 0GHz Spurious List by Worst Method Previous Page Peak Margin Limit No. Segment Frequency 70.39 dE -13.00 d Result 293 280 00 kHz 86.21 dBn 73.21 dB -13.00 dBm 83 19 dBn 70 19 dB -13.00 dBm Next Page 1 259 400 000 00 GHz 60 45 dF -13.00 dBn 73 45 dBm 2,189,900,000,00 GHz -71.65 dB 11 4 Avg 1 / 1

Detected spurious: Segment number, frequency, level (Peak/Margin), limit line

No Standard Parameter

1 of 2

D

Useful Measurement Functions for Evaluating Tx Characteristics (11/21)

AM: Power vs. Time

This function measures the amplitude modulation.

FM Shift Measurement Function: Frequency vs. Time

This function measures frequency shift.



AM Measurement



VSA

FM Shift Measurement

Useful Measurement Functions for Evaluating Tx Characteristics (12/21)

Phase Fluctuation Display Function: Phase vs. Time

This function displays phase time fluctuations.

Phase Fluctuation Display



VS/

Useful Measurement Functions for Evaluating Tx Characteristics (13/21)

Zone Marker Function

This displays the Peak value within the specified range. It is useful for measuring unstable signals with fluctuating frequency and noise.

Multi-Marker/Highest 10 Function

This automatically searches for the ten highest peaks sorted from highest level (Sort Y) or lowest frequency (Sort X). In addition, setting a threshold eliminates unnecessary searching. This can be used for IM and harmonic, etc., measurements.

Slide34



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IM Measurement



Harmonic Measurement





SPA

VSA

Useful Measurement Functions for Evaluating Tx Characteristics (14/21)

Gate Sweeping

This function performs sweeping at the specified gate timing. The spectrum of the burst-on signal is easily displayed, etc., because sub-screens can be displayed simultaneously in the time domain.

Frequency Counter

Set [Freq. Count] to ON to use the frequency counter function. [Gate Time] sets the frequency counter measurement time.







Useful Measurement Functions for Evaluating Tx Characteristics (15/21)

2-tone 3rd-order Intermodulation Distortion



By inputting two different frequency CW signals (desired waves), two-tone third order intermodulation distortion is generated close to the desired waves according to non-linear characteristics of DUT. Then, TOI (Third Order Intercept) is calculated from the two-tone third order intermodulation distortion.

Spectrum Analyzer	Results Dis	play
RBW 3kHz ATT 10dB VBW 3kHz SWT 27ms	ltem	Description
Reference Level 0.00dBm Pos & Neg 10001 points 0.0 Wanted Signal Wanted Signal On	TOI (dBm)	Displays the calculated TOI. The Worst value (lower) between two calculated values (lower and upper) is displayed.
-20.0 -40.0 -40.0 -20.0 -40.0 -2	Amplitude (dBc)	Displays the level ratio of two-tone third-order intermodulation distortion to the desired wave. The Worst value (larger) between two calculated values (lower and upper) is displayed.
-50.0 -60.0 -70.0 -80.0 -80.0 -90.0 -90.0 -50.0 -70.0 -70.0 -80.0 -90.0 -70.0 -90.0 -70.0 -90.0 -70.0 -90.0 -70.0 -90.0 -70.0 -90.0 -7	Lower 3rd	Two-tone third-order intermodulation distortion that occurs at the lower frequency of the desired wave. Frequency, signal level, level ratio to the desired wave, and calculated TOI are displayed.
-100.0 Image: Center 0.999 999 98GHz 1.000 050 000GHz Center 0.999 999 98GHz Span 400.160kHz Image: Image: Center 0.999 999 98GHz	Lower Tone	Desired wave that includes the lower frequency component. Frequency and signal level are displayed.
TOI End of the second sec	Upper Tone	Desired wave that includes the upper frequency component. Frequency and signal level are displayed.
Amplitude (dBc) Lower Tone 0.999 949 960 -13.28 -29.94 Upper Tone 1.000 050 000 -13.27 -29.94 Upper 3rd 1.000 149 999 -43.30 -30.02 1.74	Unner 3rd	Two-tone third-order intermodulation distortion that occurs at the upper frequency of the desired wave.
A₩off B- D- E- F- Ref.Int Pre-Amp Off 1 of 2 • •	opper oru	Frequency, signal level, level ratio to the desired wave, and calculated TOI are displayed.

Useful Measurement Functions for Evaluating Tx Characteristics (16/21)

Annotation Display (On/Off)



Screen annotations can be set to On or Off. Annotations about frequency, amplitude, etc., are not displayed at the Off setting.



Useful Measurement Functions for Evaluating Tx Characteristics (17/21)

Power Meter Function

Power meter function can connect a USB power sensor to the MS269xA and read the measurement values.



Compatible USB power sensors.

Model	Frequency	Resolution	Dynamic Range
MA24104A*	600 MHz to 4 GHz	1 kHz	+3 to +51.76 dBm
MA24105A	350 MHz to 4GHz	100kHz	+3 to +51.76 dBm
MA24106A	50 MHz to 6 GHz	1 kHz	-40 to +23 dBm
MA24108A	10 MHz to 8 GHz	100 kHz	–40 to +20 dBm
MA24118A	10 MHz to 18 GHz	100 kHz	-40 to +20 dBm
MA24126A	10 MHz to 26 GHz	100 kHz	-40 to +20 dBm

*: MA24104A has been discontinued.

Useful Measurement Functions for Evaluating Tx Characteristics (18/21)

Phase Noise Measurement Function [Opt-010]

This function measures the phase noise over a frequency offset range of 10 Hz to 10 MHz.



Useful Measurement Functions for Evaluating Tx Characteristics (19/21)

Noise Figure Measurement Function [Opt.017]

Noise Figure is measured with the measurement method of Y-factor method which uses a Noise Source.]

Frequency Mode: Fixed/List/Sweep

DUT Mode: Amplifier/Down Converter/Up Converter

Screen Layout: Graph/Table

Measurement Results Display

Graph/List/Spot

Displays measurement results for each trace (Trace1/Trace2).

- Noise Figure (NF) [dB]
- Noise Factor (F) [Linear]
- ♦ Gain
- Y-Factor: Power ratio when Noise Source is turned ON/OFF
- T effective: Effective noise temperature
- P Hot: Power measured when Noise Source is On.
- ♦ P Cold: Power measured when Noise Source is Off.



Measurement Result: Example of Graph display (Frequency Mode: Sweep, Screen Layout: Graph)



Measurement Result: Example of List display (Frequency Mode: List, Screen Layout: List)

∕1 MS2830A	Noise Figure						_0	10/24/2012 1	9.36.38
вw	4 0	00 000Hz	ATT		0dB	Loss Status	Before:Off	Para Noise Figure	4
			DUT	An	nplifier		After:Off		
			T cold	29	96.50K	CAL Status	ок	Trace Se	lect
						ENR Status	Table	1	2
Result						Average	10/ 10		-
	Fred	Hency		Noise Figure		Gain		Result T	ype
	incq	acticy		Noise rigure		Ouiii		Noise Fig	gure
	1 000 000		7	2 002684B	1	4 55470	10		
	1 000 000	0000	2	2.09200uB	1	4.334700			
Nois	e Figure —								
						0 400			
				NF	Max	2.120	2508		
NF	Current	2.0828	37dB	NF	Min	2.0624	44dB		
	Avorago	2 0026	D N OS	NE Max to	Min	0.057			
	Average	2.0920	Joub	NF Max to	WIIII	0.057			
								Referer	ice
								3.00d	3
									_
								Scale/I	Div
								1.000d	в
Ref.Int	Pre-Amp On								- 6

Measurement Result: Example of Spot display (Frequency Mode: Fixed)

Noise Figure Measurement Function [Opt.017]

Noise Source

Supports noise sources from Noisecom NC346 series. NC346 series models and summary specifications are listed below. See the NC346 series catalog and datasheet for detailed specifications.

Model	PE Connector	Frequency	Output ENR	VS	VSWR (maximum @ on/off) [GHz]				DC Block
Model	KF Connector	[GHz]	[dB]	0.01 to 5	5 to 18	18 to 26.5	26.5 to 40	DC Oliset	DC DIOCK
NC346A	SMA (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Precision	APC3.5 (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Option 1	N (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	_	_	No	Not required
NC346A Option 2	APC7	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	_	No	Not required
NC346A Option 4	N (F)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	_	_	No	Not required
NC346B	SMA (M)	0.01 to 18.0	14 to 16	1.15:1	1.25:1	_	—	No	Not required
NC346B Precision	APC3.5 (M)	0.01 to 18.0	14 to 16	1.15:1	1.25:1	—	—	No	Not required
NC346B Option 1	N (M)	0.01 to 18.0	14 to 16	1.15:1	1.35:1	—	_	No	Not required
NC346B Option 2	APC7	0.01 to 18.0	14 to 16	1.15:1	1.25:1	—	_	No	Not required
NC346B Option 4	N (F)	0.01 to 18.0	14 to 16	1.15:1	1.35:1	—	_	No	Not required
NC346D	SMA (M)	0.01 to 18.0	19 to 25*1	1.50:1	1.50:1	_	_	No	Not required
NC346D Precision	APC3.5 (M)	0.01 to 18.0	19 to 25 ^{*1}	1.50:1	1.50:1	_	_	No	Not required
NC346D Option 1	N (M)	0.01 to 18.0	19 to 25*1	1.50:1	1.75:1	—	_	No	Not required
NC346D Option 2	APC7	0.01 to 18.0	19 to 25*1	1.50:1	1.50:1	—	—	No	Not required
NC346D Option 3	N (F)	0.01 to 18.0	19 to 25 ^{*1}	1.50:1	1.75:1	_	—	No	Not required
NC346C	APC3.5 (M)	0.01 to 26.5	13 to 17	1.15:1	1.25:1	1.35:1	_	Yes ^{*3}	Required ^{*3}
NC346E	APC3.5 (M)	0.01 to 26.5	19 to 25 ^{*1}	1.50:1	1.50:1	1.50:1	_	Yes ^{*3}	Required ^{*3}
NC346Ka	K (M)*2	0.10 to 40.0	10 to 17	1.25:1	1.30:1	1.40:1	1.50:1	Yes ^{*3}	Required ^{*3}

NC346 series summary specifications

*1: Flatness better than ±2 dB

*2: Compatible with SMA and APC3.5

*3: When using noise sources output by DC, always use in combination with a DC block.

Useful Measurement Functions for Evaluating Tx Characteristics (21/21)

Noise Figure Measurement Function [Opt.017]

Specifications outlines of recommended DC Blocks and Adapters

	Ordaring Model Name		PE Connector	Frequency Range	
			RF Connector		
	J0805	DC Block, N type (MODEL 7003)	N (M)-N (F)	10 kHz to 18 GHz	
DC Block	J1555A	DC Block, SMA type (MODEL 7006-1)	SMA (M)-SMA (F)	9 kHz to 20 GHz	
	J1554A	DC Block, SMA type (MODEL 7006)	SMA (M)-SMA (F)	9 kHz to 26.5 GHz	
	K261	DC Block	K (M)-K (F)	10 kHz to 40 GHz	
Adapter	J0004	Coaxial Adapter	N (M)-SMA (F)	DC to 12.4 GHz	
	J1398A	N-SMA Adapter	N (M)-SMA (F)	DC to 26.5 GHz	

Recommended DC blocks / Adaptor combinations for MS269xA/MS2830A series signal analyzer

	Model	Frequency Range	RF connector	Recommended DC Block Order Name	Recommended Adapter Order Name
	MS2690A	50 Hz to 6 GHz	N (F)	J1555A	J0004
MS269XA series	MS2691A	50 Hz to 13.5 GHz	N (F)	J1555A	J1398A
301103	MS2692A	50 Hz to 26.5 GHz	N (F)	J1554A	J1398A
	MS2830A-040	9 kHz to 3.6 GHz	N (F)	Not required	Not required
	MS2830A-041	9 kHz to 6 GHz	N (F)	Not required	Not required
MS2830A series	MS2830A-043	9 kHz to 13.5 GHz	N (F)	Not required	Not required
series	MS2830A-044	9 kHz to 26.5 GHz	N (F)	J1554A	J1398A
	MS2830A-045	9 kHz to 43 GHz	K (F)	K261	Not required

VSA Function: Wideband and High Accuracy Waveform Capture

Captures wideband waveforms up to 125 MHz with accuracy of ±0.3 dB typ.

Based on the excellent level accuracy and wide dynamic range of the MS2830A, a signal with an FFT analysis bandwidth of up to 125 MHz can be captured with a level accuracy of ± 0.3 dB typ.

Max. Capture Time: 0.5 s to 2000 s Max. Number of Samples: 100 Msamples

Spap*	Sampling Pate	Conturo Timo	Max.
opan	Sampling Rate	Capture nine	Sampling Data
1 kHz	2 kHz	2000 s	4M
2.5 kHz	5 kHz	2000 s	10M
5 kHz	10 kHz	2000 s	20M
10 kHz	20 kHz	2000 s	40M
25 kHz	50 kHz	2000 s	100M
50 kHz	100 kHz	1000 s	100M
100 kHz	200 kHz	500 s	100M
250 kHz	500 kHz	200 s	100M
500 kHz	1 MHz	100 s	100M
1 MHz	2 MHz	50 s	100M
2.5 MHz	5 MHz	20 s	100M
5 MHz	10 MHz	10 s	100M
10 MHz	20 MHz	5 s	100M
25 MHz	50 MHz	2 s	100M
31.25 MHz	50 MHz	2 s	100M
50 MHz	100 MHz	500 ms	50M
62.5 MHz	100 MHz	500 ms	50M
100 MHz	200 MHz	500 ms	100M
125 MHz	200 MHz	500 ms	100M

*: With Opt. 006: 1 kHz to 10 MHz With Opt. 006, 005/009: 1 kHz to 31.25 MHz With Opt. 006, 005/009, 077: 1 kHz to 62.5 MHz With Opt. 006, 005/009, 077, 078: 1 kHz to 125 MHz



Opt. 006: 10 MHz max.

(20 MHz max. sampling rate = 50 ns resolution, ADC resolution 16 bits) Opt. $005^{*1}/Opt.009^{*1*2}$: 31.25 MHz max.

(50 MHz max. sampling rate = 20 ns resolution, ADC resolution 16 bits) Opt. 077^{*2} : 62.5 MHz max.

(100 MHz max. sampling rate = 10 ns resolution, ADC resolution 14 bits) Opt. 078^{*3} : 125 MHz max.

(200 MHz max. sampling rate = 5 ns resolution, ADC resolution 14 bits)

Note) Opt.077/078: An image response is received when setting the bandwidth to more than 31.25 MHz. This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.). The MS2690A/91A/92A Signal Analyzer series is recommended for other measurement purposes.

- *1: Requires Opt. 006.
- *2: Dedicated option for MS2830A-045.

Cannot be set the RBW to more than 10 MHz in spectrum analyzer function. *3: Requires Opt. 006 and Opt. 005/009.

- *4: Requires Opt. 006, Opt. 005/009 and Opt. 077.
- *5: 300 kHz \leq f < 4 GHz, Frequency band mode Normal.
- *6: Excluding Guard Band.

VSA Function: Calibration-Free Waveform Capture

No need for calibration block at analysis tool side

The MS2830A has built-in amplitude/phase calibration circuits to automatically calibrate internal errors. Captured waveform data are saved to the built-in hard disk and can be output to an external PC via 1000BASE-T.



VSA Function: Intuitive Split-Screen Display

Various VSA analyses can be performed on the main trace by specifying analysis segments on the sub-trace. Intuitive analysis focusing on signal-on/rising/falling, etc., parts is made easy by observing signal distributions on the sub-trace.



VSA Function: One-Step Observation of Rising/Falling Signals

Changing the analysis segment at the sub-trace permits frame-by-frame replay of the spectrum at the main trace.

This function supports troubleshooting by frame-by-frame replay of transient burst responses and generation of unwanted spurious in captured RF signals.



VSA Function: Useful Replay Function for Comparative Verification

Captured waveforms can be replayed again by using the VSA function to read saved digitize data. This is convenient for comparing performance of each DUT test phase using digitized data as well as for troubleshooting post- shipment product faults



VSA Function: File Saving Function

Captured data can be saved to a file by specifying the Analysis Time range (display range of main trace) or any time. The amount of saved data and later workload are cut because only required segments are captured and saved to a file.



VSA Function: FFT Analysis Advantages Ultra High Speed

Supports measurements <u>many times faster</u> than a sweep spectrum analyzer by using the signal analyzer mode, which performs FFT analysis.



envision:ensure

VSA Function: No Trace mode

No Trace mode does not execute signal analysis. Therefore, "IQ data output" and "IQ data readout using remote commands" can be executed quickly without the need to wait for completion of analysis.



Useful Measurement Functions for Evaluating Rx Characteristics (1/4)

BER Measurement Function [Opt.026]

Returns Data/Clock/Enable demodulated by DUT to MS2830A BER function

- ♦ Input Bit Rate: 100 bps to 10 Mbps
- Input Signal: Data, Clock, Enable (Polarity reversal supported)
- ♦ Input Level: TTL 3.3V
- Measured Patterns: PN9/11/15/20/23, ALL1, ALL0, Alternate(0101...), User Data(4,096 bit Max.), PN9fix/11fix/15fix/20fix/23fix
- Count Mode:

Data: Measures until specified Data count Error: Measures until specified Error count

- Measurable Bit Count: 1000 to 2³²-1 (4,294,967,295 bit)
- Measurable Error Bit Count: 1 to 2³¹-1 (2,147,483,647 bit)

Count Mode:

Single: Measures specified measurement bit count once

Continuous: Repeats Single measurement

Endless: Continues measurement to upper limit of measurement bits



BER Measurement Setup Example (using external vector signal generator)

This option installs a BER measurement function for measuring error rates between 100 bps and 10 Mbps using the DUT demodulated Data/Clock/Enable signals. The results are displayed on the MS2830A screen.

Useful Measurement Functions for Evaluating Rx Characteristics (2/4)

BER Measurement Function [Opt.026]

	↑ MS2830A BER Test				1/24/2013 11 28:09	
	Data Type Pattern File Bit Length Sync Positio Sync Positio	PN9	Count Mode I Data Error	Data 10000 Bit Bit	BER Test Start or Stop	
Error Rate —	Measure Mode Measure Inform Status Error SvncLoss Co	Single ation Stop Synchronizing BitError SyncLoss unt 0	Measuring ClockError Enable	Error	Clears measurement result	
Error Bit-	Error Ra Error Co	ate 1.008E ount	97,	1.008% 9620	Data Type PN9 Measure Mode Single Count Mode Data Type PN9/11/15/20/23, ALL1, ALL0 Alternate(0101), User Data PN9fix/11fix/15fix/20fix/23fix Measure Mode	0, a,
	BER	Measureme	ent Exar	nple 🛛	Measured Bit	

Measure Mode

Single: Measures selected data patterns until result reaches specified number of bits or specified number of error bits

Continuous: Repeats single measurements (default) Endless: Measures data until result reaches upper limit of measurement count bit

Count Mode

Data: Specifies number of measurement bits (default) Error: Specifies number of measurement error bits

Useful Measurement Functions for Evaluating Rx Characteristics (3/4)

BER Measurement Function [Opt.026]

[PN Fix pattern]

At BER measurement, special PN patterns called PN_Fix patterns can be used. A PN Fix pattern consists of repeated parts of PN patterns, and PN patterns with a shorter length than 1 cycle.

Even when the PN data part of the waveform pattern output from vector signal generator has no periodicity, BER measurement is supported by selecting PN Fix at the BER measurement function.



x: PN order N: Repetition count of PNx

Initial Pattern

Dete Ture	Initial Pattern Setting Range	Resolu-	Default	
Data Type	Binary	Hex	tion	Delault
PN9Fix	00000000	000	1	1FF
	to 111111111 (9 bits)	to 1FF		
PN11FIx	0000000000	000	1	7FF
	to 1111111111 (11 bits)	to 7FF		
PN15Fix	0000000000000	0000	1	7FFF
	to 11111111111111 (15 bits)	to 7FFF		
PN20Fix	000000000000000000	00000	1	FFFFF
	to 111111111111111111111(20 bits)	to FFFFF		
PN23Fix	000000000000000000000000000000000000000	000000	1	7FFFFF
	to 11111111111111111111111(23 bits)	to 7FFFFF		

Pattern Length

Setting Range: 96 to 134217728 bit (0 x 8000000) Resolution: 1 bit

Useful Measurement Functions for Evaluating Rx Characteristics (4/4)

BER Measurement Function [Opt.026]

[User Defined Pattern]

The BER measurement can use a user-defined pattern, which is an arbitrary binary string that is 8- to 4096 bits long and consists of a data bit string to determine whether synchronization is established plus a data bit string used as measurement data. A PC can be used to create a user-defined pattern in text file format. Load the file from USB memory or MS2830A internal hard disk.

Length: 8 to 4096 (Binary)

Extension: *****.bpn

Saved Folder: the root directory of the USB memory or internal hard disk (Example: D:¥)



Example of User-Defined Pattern

MS2830A BER Test					1/24/2013 14:31:4 BER Test	1
Data Type	serDefine	Count Mod	de Data		User Pattern	8
Pattern File		Data	10000	Bit	User Pattern	
Bit Length		Error	1	Bit	Detail	
Svnc Position S	tart					
Sync Position L	enath					
Measure Mode Er	vilace					
	iuicoo					
Measure Information	on				Load	8
Status	Stop Synchronizing	Measuring			User Pattern	
Error			EnableError		Device	8
SyncLoss Count					(E)	
Error Rate Error Cou	e 10.000E Int 224	-003 4302	1.00 224302	61		

Loads user-defined patterns from the USB memory or the internal hard disk of the MS2830A.

Selects the media among the USB memory and internal hard disk from which user-defined patterns are to be loaded.

User-Defined Pattern function menu

Software Download Service

Software download service

This service, which provides updated versions of firmware and software for downloading by product customers, is available on Anritsu's website.

Firmware / Software	Contents	Available version
MS2830A Software Installer	 MX269000A Standard Software This software is installed as standard when shipping the main frame. Spectrum Analyzer function, Signal Analyzer function, etc. MX2690xxA series Measurement Software Measurement software for various communication systems. 	The latest version is available on the website.

Download software list

User registration is required for using the software download service.

User registration can be performed on the Anritsu website: https://www1.anritsu.co.jp/Download/MService/Login.asp

Note

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