Anritsu Advancing beyond

Signal Analyzer

MS2840A

MS2840A-040: 9 kHz to 3.6 GHz
MS2840A-041: 9 kHz to 6 GHz
MS2840A-044: 9 kHz to 26.5 GHz
MS2840A-046: 9 kHz to 44.5 GHz

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Definitions

Typical (typ.)
Performance not warranted. Must products meet typical performance.
Nominal (nom.)
Values not warranted. Included to facilitate application of product.
Measured (meas.)
Performance not warranted. Data actually measured by randomly selected measuring instruments.

Conditions of Specifications

The conditions are as follows unless specified otherwise.
After 30-minute warm-up (at constant ambient temperature)
Auto Sweep Time Select: Normal
Auto Swp Type Rules: Swept Only
Switching Speed mode: Normal
Attenuator Mode: Mechanical Atten Only
After CAL operation
The specifications of the Signal Analyzer function are values at the center frequency if not specified.

Signal Analyzer/Spectrum Analyzer

Frequency

Frequency range

MS2840A-040: 9 kHz to 3.6 GHz
MS2840A-041: 9 kHz to 6 GHz
MS2840A-044: 9 kHz to 26.5 GHz
MS2840A-046: 9 kHz to 44.5 GHz

Frequency bands

With MS2840A-040/041

Frequency range	Band	Mixer harmonics order (N)
9 kHz to 4000 MHz	0	1
3500 MHz to 4400 MHz	1	1/2
4300 MHz to 6100 MHz	1	1

With MS2840A-044/046

Frequency range	Band	Mixer harmonics order (N)
9 kHz to 4000 MHz	0	1
3500 MHz to 4400 MHz	1	1/2
4300 MHz to 6000 MHz	1	1
3900 MHz to 8000 MHz	3	1
7900 MHz to 10575 MHz	4	1
10475 MHz to 12200 MHz	5	2
12100 MHz to 18400 MHz	6	2
18300 MHz to 26600 MHz	7	4
26500 MHz to 42100 MHz	8	4
42000 MHz to 44500 MHz	9	8

Pre-selector range

Model	Frequency Band Mode	
	Normal	Spurious
MS2840A-041	4 GHz to 6 GHz	3 .5 GHz to 6 GHz
MS2840A-044	4 GHz to 26.5 GHz	3 .5 GHz to 26.5 GHz
MS2840A-046	4 GHz to 44 .5 GHz	3 .5 GHz to 44 .5 GHz

Frequency setting range

Model	Range	Resolution
MS2840A-040	–100 MHz to 3.7 GHz	1 Hz
MS2840A-041	–100 MHz to 6.1 GHz	
MS2840A-044	–100 MHz to 27 GHz	
MS2840A-046	–100 MHz to 45 GHz	

Internal reference oscillator

	With MS2840A-040/041		With MS2840A-044/046	With MS2840A-040/041/044/046
	Without MS2840A-001/002	With MS2840A-002	MS2840A-002 standard	With MS2840A-001
Accuracy	± [(Time from the previous calibration × Aging rate) + Temperature characteristics + The initial calibration before shipment]			
Start-up characteristics	—	Based on frequency 24 hours after power-on, at 23°C $\pm 5 \times 10^{-7}$ (2 minutes after power-on) $\pm 5 \times 10^{-8}$ (5 minutes after power-on)		Based on frequency 24 hours after power-on, at 23°C $\pm 1 \times 10^{-9}$ (7 minutes after power-on)
Aging rate	$\pm 1 \times 10^{-6}$/year	$\pm 1 \times 10^{-7}$/year		$\pm 1 \times 10^{-10}$/month $\pm 1 \times 10^{-9}$/year
Temperature characteristics	$\pm 2.5 \times 10^{-6}$ (0°C to 50°C)	$\pm 2 \times 10^{-8}$ (0°C to 50°C)		$\pm 1 \times 10^{-9}$ (0°C to 50°C)
Frequency accuracy at the initial calibration	$\pm 1 \times 10^{-6}$ (18°C to 28°C, 1 hour after power-on)	$\pm 2.2 \times 10^{-8}$ (18°C to 28°C, 1 hour after power-on)		$\pm 1 \times 10^{-10}$ (18°C to 28°C, 1 hour after power-on)

Single side band noise (SSB phase noise)

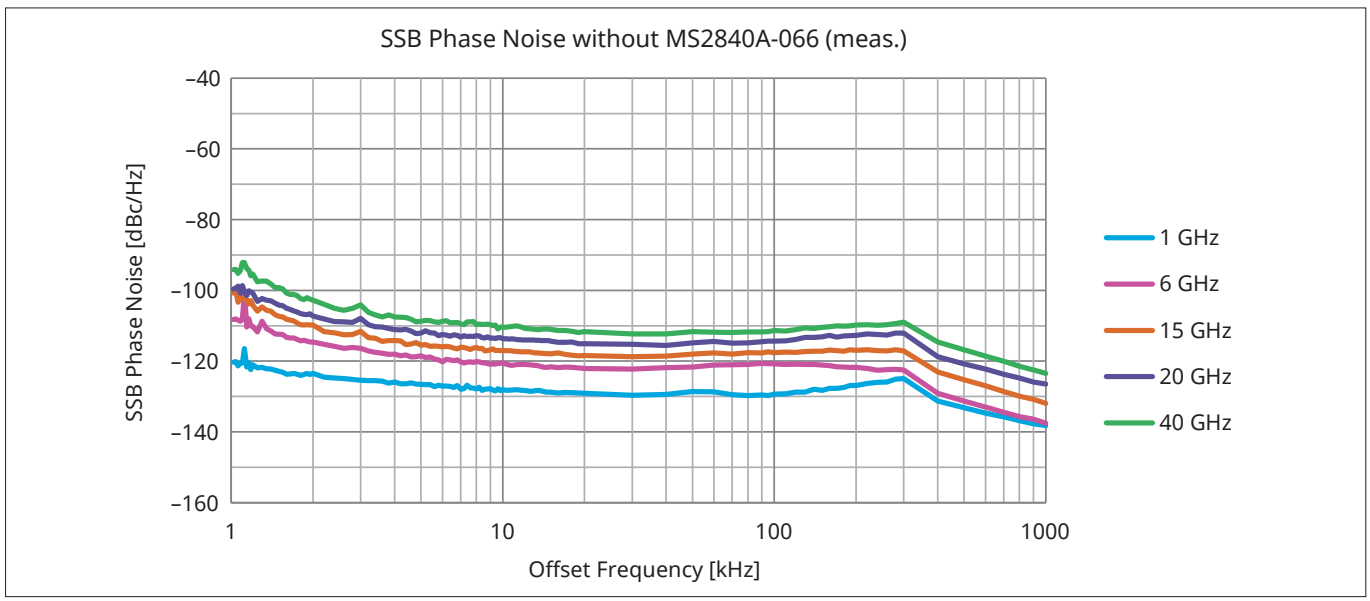
18° to 28°C, 1000 MHz, Spectrum Analyzer mode

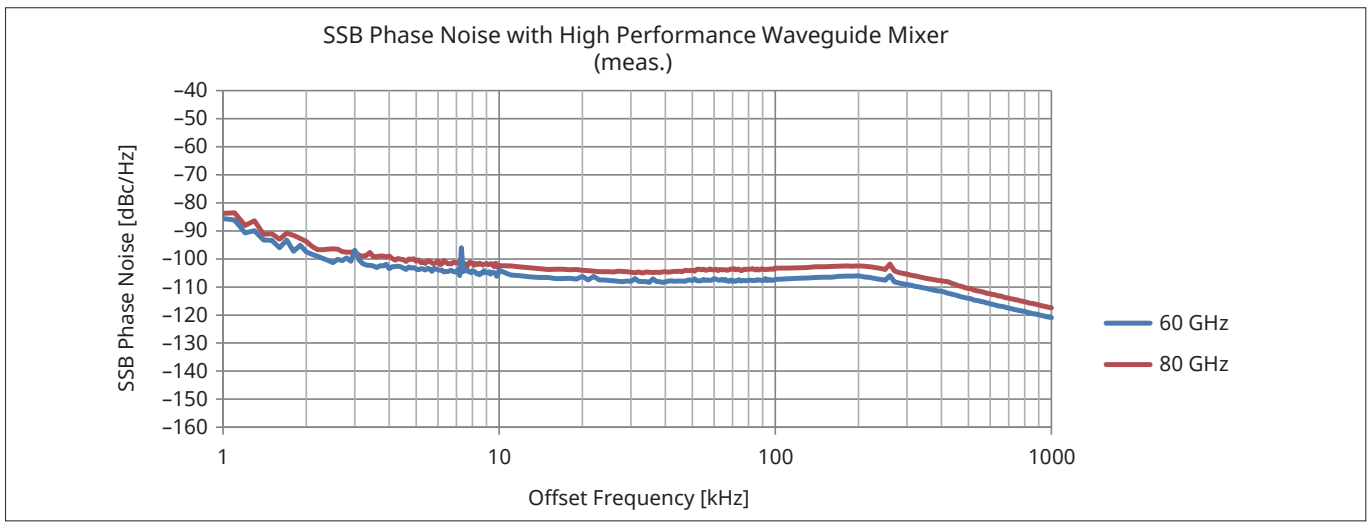
Offset	Specification
10 Hz	–80 dBc/Hz (nom.)*
100 Hz	–92 dBc/Hz (nom.)*
1 kHz	–117 dBc/Hz (nom.)*
10 kHz	–123 dBc/Hz
100 kHz	–123 dBc/Hz
1 MHz	–135 dBc/Hz
10 MHz	–148 dBc/Hz (nom.)

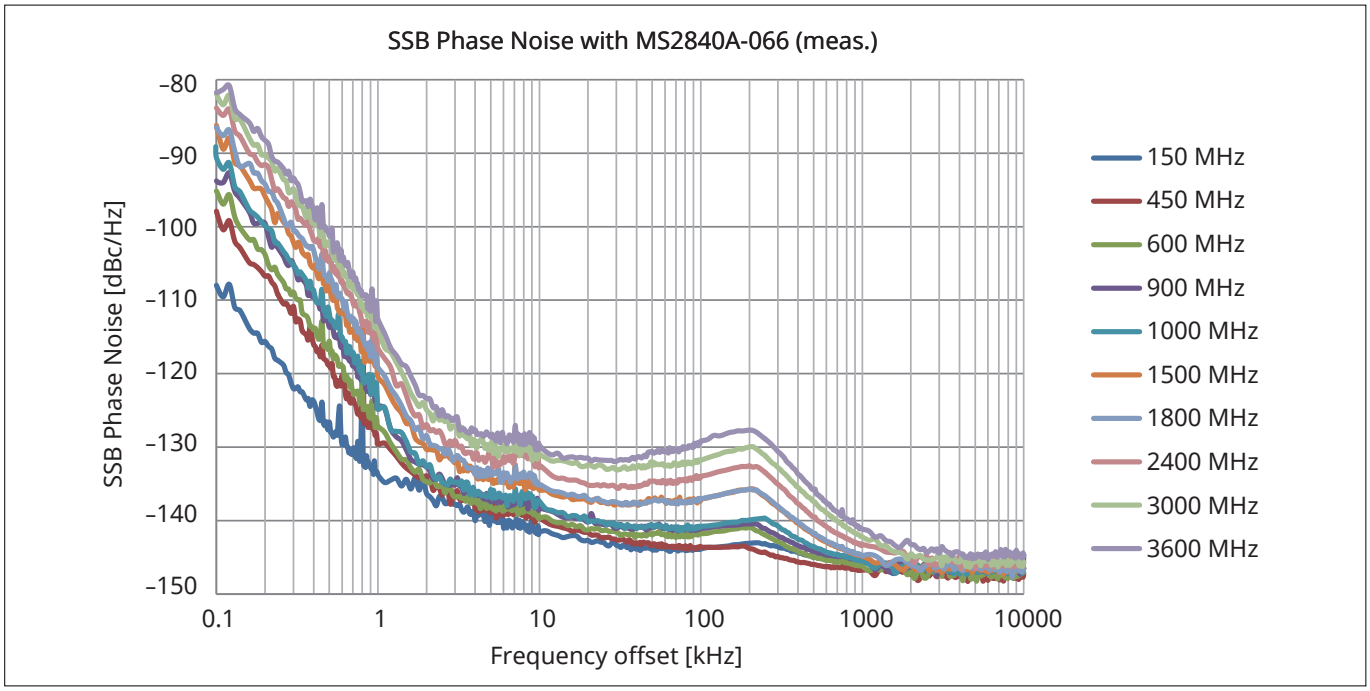
*: Without MS2840A-001 and with MS2840A-002

With MS2840A-066 installed and operating
(MS2840A-066: Enabled, Center frequency: 500 MHz, and SPAN ≤ 1 MHz as spectrum analyzer)
at the temperature of 18°C to 28°C.

Offset	Specification
100 Hz	–98 dBc/Hz (nom.)
1 kHz	–122 dBc/Hz
10 kHz	–133 dBc/Hz
100 kHz	–133 dBc/Hz
1 MHz	–148 dBc/Hz (nom.)







Spurious caused by the local signal

10 MHz < frequency ≤ 1 GHz

3 kHz ≤ offset frequency < 100 kHz	−70 dBc (nom.)
100 kHz ≤ offset frequency < 10 MHz	−75 dBc (nom.)

Frequency > 1 GHz

3 kHz ≤ offset frequency < 100 kHz	−70 + 20 × log(f) dBc (nom.)
100 kHz ≤ offset frequency < 10 MHz	−75 + 20 × log(N) dBc (nom.)

f: Receiving frequency [GHz] N: Mixing order

Amplitude

Level measurement range

Without MS2840A-008/068/069 or Preamp OFF	DANL to +30 dBm
With MS2840A-008/068/069 and Preamp ON	DANL to +10 dBm

Maximum input level

With MS2840A-040/041

	Average total power	DC voltage
Without MS2840A-008 or Preamp OFF	+30 dBm (Input attenuator: ≥10 dB) +20 dBm (Input attenuator: 0 dB)	±10 Vdc
With MS2840A-008 and Preamp ON	+10 dBm (Input attenuator: 0 dB)	±10 Vdc

With MS2840A-044/046

	Average total power	DC voltage
Without MS2840A-008/068/069 or Preamp OFF	+30 dBm (Input attenuator: ≥10 dB) +20 dBm (Input attenuator: 0 dB)	±0 Vdc
With MS2840A-008/068/069 and Preamp ON	+10 dBm (Input attenuator: 0 dB)	±0 Vdc

Input attenuator range

With MS2840A-040/041/044

With MS2840A-046 which is installed MS2840A-019

0 to 60 dB, 2 dB Steps

With MS2840A-046 and without MS2840A-019

Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Normal, Stop frequency ≤ 6 GHz	0 to 60 dB, 2 dB Steps
Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Spurious, Stop frequency ≤ 4 GHz	
Attenuator Mode: M-ATT Only	0 to 60 dB, 10 dB Steps
Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Normal, Stop frequency > 6 GHz	
Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Spurious, Stop frequency > 4 GHz	

Input attenuator switching uncertainty

18°C to 28°C, Referenced to 10 dB, without MS2840A-008/068/069 or Preamp Off

Frequency Range, Frequency Band Mode	Specification
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal	±0.20 dB (10 to 60 dB)
300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	
4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal	±0.75 dB (10 to 60 dB)
3.5 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious	
13.8 GHz < frequency ≤ 26.5 GHz	±0.80 dB (10 to 60 dB)
26.5 GHz < frequency ≤ 40 GHz	±1.0 dB (10 to 60 dB)
40 GHz < frequency ≤ 44.5 GHz	±1.0 dB typ. (10 to 60 dB)

Reference level

Setting range

Log scale: –120 to +50 dBm, or Equivalent level (Signal Analyzer function)
–130 to +50 dBm, or Equivalent level (Spectrum Analyzer function)

Linear scale: 22.4 µV to 70.7 V, or Equivalent level (Signal Analyzer function)
70.7 nV to 70.7 V, or Equivalent level (Spectrum Analyzer function)

Setting resolution: 0.01 dB, or Equivalent level

Scale units

Log scale: dBm, dBµV, dBmV, dBµV (emf), dBµV/m, V, W

Linear scale: V

Linearity error

Without MS2840A-051/151 or Noise Floor Reduction: Off,
Excluding the noise floor effect

		Specification
without MS2840A-008/068/069, or Preamp Off	Mixer input level ≤–20 dBm	±0.07 dB
	Mixer input level ≤–10 dBm	±0.10 dB
With MS2840A-008/068/069 and Preamp On	Preamplifier input level ≤–40 dBm	±0.07 dB
	Preamplifier input level ≤–30 dBm	±0.10 dB
Attenuator Mode: E-ATT Combined, without MS2840A-008/068/069, or Preamp Off	Mixer input level ≤–20 dBm, RF input level ≤–10 dBm	±0.07 dB
	Mixer input level ≤–10 dBm, RF input level ≤–10 dBm	±0.10 dB
	Mixer input level ≤–20 dBm, 9 kHz ≤ frequency ≤ 300 MHz, RF input level ≤+5 dBm	±0.07 dB (nom.)
	Mixer input level ≤–20 dBm, 300 MHz < frequency ≤ 6 GHz, RF input level ≤+20 dBm	
	Mixer input level ≤–10 dBm, 9 kHz ≤ frequency ≤ 300 MHz, RF input level ≤+5 dBm	±0.10 dB (nom.)
	Mixer input level ≤–10 dBm, 300 MHz < frequency ≤ 6 GHz, RF input level ≤+20 dBm	

RF frequency characteristics

18°C to 28°C, Input attenuator: 10 dB
With MS2840A-040/041

	Without MS2840A-008 or Preamp turned off	
	Without MS2840A-066 or turned off	With MS2840A-066 and turned on
9 kHz ≤ frequency < 300 kHz	±1.0 dB	±1.0 dB
300 kHz ≤ frequency < 50 MHz	±0.35 dB	±0.35 dB
50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.35 dB	—
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3 .5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	±1.50 dB	—
50 MHz ≤ frequency < 3 GHz	—	±0.35 dB
3 GHz ≤ frequency ≤ 3.7 GHz	—	±1.50 dB

	With MS2840A-008 and Preamp turned on	
	Without MS2840A-066 or turned off	With MS2840A-066 and turned on
100 kHz ≤ frequency < 300 kHz	±1.0 dB	±1.0 dB
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.65 dB	—
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3 .5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	±1.8 dB	—
300 kHz ≤ frequency < 3 GHz	—	±0.65 dB
3 GHz ≤ frequency ≤ 3.7 GHz	—	±1.8 dB

With MS2840A-044/046

	Without MS2840A-008/068/069 or Preamp turned off, and without MS2840A-067 or Microwave Preselector Bypass turned off and after Preselector Auto Tune is done
9 kHz ≤ frequency < 300 kHz	±1.0 dB
300 kHz ≤ frequency < 50 MHz	±0.35 dB
50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 50 MHz ≤ frequency < 3 .5 GHz, Frequency Band Mode: Spurious	±0.35 dB
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3 .5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious	±1.50 dB
6 GHz < frequency ≤ 13 .8 GHz, Frequency Band Mode: Normal 4 GHz < frequency ≤ 13 .8 GHz, Frequency Band Mode: Spurious	±1.50 dB
13 .8 GHz < frequency ≤ 26 .5 GHz	±2.50 dB
26 .5 GHz < frequency ≤ 40 GHz	±2.50 dB
40 GHz < frequency ≤ 44 .5 GHz	±2.50 dB (typ.)

	With MS2840A-008 and Preamp turned on	With MS2840A-068/069 and Preamp turned on, and without MS2840A-067 or Microwave Preselector Bypass turned off and after Preselector Auto Tune is done
100 kHz ≤ frequency < 300 kHz	±1.0 dB	±1.0 dB
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 kHz ≤ frequency < 3 .5 GHz, Frequency Band Mode: Spurious	±0.65 dB	±0.65 dB
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3 .5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	±1.8 dB	—
4 GHz ≤ frequency ≤ 13 .8 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 13 .8 GHz, Frequency Band Mode: Spurious	—	±1.8 dB
13 .8 GHz < frequency ≤ 26 .5 GHz	—	±2.50 dB
26 .5 GHz < frequency ≤ 40 GHz	—	±3.50 dB
40 GHz < frequency ≤ 44 .5 GHz	—	±3.50 dB (nom.)

1 dB gain compression

With MS2840A-040/041

Without MS2840A-008 or Preamp turned off: At mixer input level

300 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal 300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	≥+3 dBm
4 GHz < frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	≥+3 dBm

With MS2840A-008 and Preamp turned on: At mixer input level

300 MHz ≤ frequency ≤ 6 GHz	≥–15 dBm (nom.)

With MS2840A-044/046

Without MS2840A-008/068/069 or Preamp turned off: At mixer input level

300 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal 300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	≥+3 dBm
3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious	≥+3 dBm
4 GHz < frequency ≤ 13.5 GHz	≥0 dBm
13.5 GHz < frequency ≤ 26.5 GHz	≥–1 dBm
26.5 GHz < frequency ≤ 40 GHz	≥–1 dBm (nom.)

With MS2840A-008/068/069 and Preamp turned on: At mixer input level

300 MHz ≤ frequency ≤ 4 GHz	≥–15 dBm (nom.)
4 GHz < frequency ≤ 13.5 GHz	≥–21 dBm (nom.)
13.5 GHz < frequency ≤ 26.5 GHz	≥–21 dBm (nom.)
26.5 GHz < frequency ≤ 40 GHz	≥–21 dBm (nom.)

Second harmonic distortion

With MS2840A-040/041

Without MS2840A-008 or Preamp turned off: At mixer input level: –30 dBm

	Harmonics	SHI
10 MHz ≤ Input frequency ≤ 300 MHz	≤–60 dBc	≥+30 dBm
300 MHz < Input frequency ≤ 1 GHz	≤–65 dBc	≥+35 dBm
1 GHz < Input frequency ≤ 2 GHz	≤–65 dBc	≥+35 dBm

Without MS2840A-008 or Preamp turned off: At mixer input level: –20 dBm

	Harmonics	SHI
2 GHz < Input frequency ≤ 3 GHz Frequency Band Mode: Normal	≤–80 dBc	≥+60 dBm
1.75 GHz ≤ Input frequency ≤ 3 GHz Frequency Band Mode: Spurious	≤–80 dBc	≥+60 dBm

With MS2840A-008 and Preamp turned on: At preamplifier input level: –45 dBm

	Harmonics	SHI
10 MHz ≤ Input frequency ≤ 300 MHz	≤–50 dBc (nom.)	≥+5 dBm (nom.)
300 MHz < Input frequency ≤ 3 GHz	≤–55 dBc (nom.)	≥+10 dBm (nom.)

With MS2840A-044/046

Without MS2840A-008/068/069 and without MS2840A-067, At mixer input level –30 dBm

	Harmonics	SHI
10 MHz ≤ Input frequency ≤ 300 MHz	≤–60 dBc	≥+30 dBm
300 MHz < Input frequency ≤ 1 GHz	≤–65 dBc	≥+35 dBm
1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal	≤–65 dBc	≥+35 dBm
1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious	≤–65 dBc	≥+35 dBm

Without MS2840A-008/068/069 and without MS2840A-067, At mixer input level –20 dBm

	Harmonics	SHI
2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal	≤–80 dBc	≥+60 dBm
1.75 GHz ≤ Input frequency ≤ 2 GHz, Frequency Band Mode: Spurious	≤–80 dBc	≥+60 dBm

Without MS2840A-008/068/069 and without MS2840A-067, At mixer input level –10 dBm

	Harmonics	SHI
2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious	≤–80 dBc	≥+70 dBm
3 GHz < Input frequency ≤ 13.25 GHz	≤–90 dBc	≥+80 dBm
13.25 GHz < Input frequency ≤ 22.25 GHz	≤–90 dBc (nom.)	≥+80 dBm (nom.)

With MS2840A-008/068/069 and Preamp turned off, or with MS2840A-067 and Microwave Preselector Bypass turned off, At mixer input level –30 dBm

	Harmonics	SHI
10 MHz ≤ Input frequency ≤ 300 MHz	≤–60 dBc	≥+30 dBm
300 MHz < Input frequency ≤ 1 GHz	≤–65 dBc	≥+35 dBm
1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal	≤–65 dBc	≥+35 dBm
1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious	≤–65 dBc	≥+35 dBm

With MS2840A-008/068/069 and Preamp turned off, or with MS2840A-067 and Microwave Preselector Bypass turned off, At mixer input level –20 dBm

	Harmonics	SHI
2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal	≤–80 dBc	≥+60 dBm
1.75 GHz ≤ Input frequency ≤ 2 GHz, Frequency Band Mode: Spurious	≤–80 dBc	≥+60 dBm

With MS2840A-008/068/069 and Preamp turned off, or with MS2840A-067 and Microwave Preselector Bypass turned off, At mixer input level –10 dBm

	Harmonics	SHI
2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious	≤–70 dBc	≥+60 dBm
3 GHz < Input frequency ≤ 13.25 GHz	≤–70 dBc	≥+60 dBm
13.25 GHz < Input frequency ≤ 22.25 GHz	≤–70 dBc (nom.)	≥+60 dBm (nom.)

With MS2840A-008/068/069 and Preamp turned on, or with MS2840A-067 and Microwave Preselector Bypass turned off, At mixer input level –45 dBm

	Harmonics	SHI
10 MHz ≤ Input frequency ≤ 300 MHz	≤–50 dBc (nom.)	≥+5 dBm (nom.)
300 MHz < Input frequency ≤ 2 GHz	≤–55 dBc (nom.)	≥+10 dBm (nom.)
2 GHz < Input frequency ≤ 13.25 GHz	≤–45 dBc (nom.)	≥0 dBm (nom.)
13.25 GHz < Input frequency ≤ 22.25 GHz	≤–40 dBc (nom.)	≥–5 dBm (nom.)

When Attenuator Mode is E-ATT Combined: Without MS2840A-008/068/069 or Preamp turned off:
At mixer input level: –30 dBm

	RF input level ≤ –5 dBm		RF input level ≤ 0 dBm		RF input level ≤ +5 dBm		RF input level ≤ +15 dBm	
	Harmonics	SHI	Harmonics	SHI	Harmonics	SHI	Harmonics	SHI
10 MHz ≤ Input frequency ≤ 300 MHz	≤–60 dBc	≥+30 dBm	≤–60 dBc (nom.)	≥+30 dBm (nom.)	—	—	—	—
300 MHz < Input frequency ≤ 1 GHz	≤–65 dBc	≥+35 dBm	—	—	—	—	≤–65 dBc (nom.)	≥+35 dBm (nom.)
1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal	—	—	—	—	≤–65 dBc	≥+35 dBm	≤–65 dBc (nom.)	≥+35 dBm (nom.)
1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious	—	—	—	—	≤–65 dBc	≥+35 dBm	≤–65 dBc (nom.)	≥+35 dBm (nom.)

When Attenuator Mode is E-ATT Combined: Without MS2840A-008/068/069 and Preamp turned off:
At mixer input level: –20 dBm

	RF input level ≤ +5 dBm		–5 dBm < RF input level ≤ +15 dBm	
	Harmonics	SHI	Harmonics	SHI
2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal	≤–80 dBc	≥+60 dBm	≤–80 dBc (nom.)	≥+60 dBm (nom.)
1.75 GHz ≤ Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious	≤–80 dBc	≥+60 dBm	≤–80 dBc (nom.)	≥+60 dBm (nom.)

Residual responses

Frequency ≥1 MHz, Input attenuator 0 dB, 50Ω terminated
(With MS2840A-077/078, excluding Bandwidth > 31.25 MHz.)

	Specification
1 MHz ≤ frequency ≤ 1 GHz	≤–100 dBm
1 GHz < frequency ≤ 6 GHz	≤–90 dBm (typ.)
6 GHz < frequency ≤ 13.6 GHz	≤–90 dBm (nom.)
13.6 GHz < frequency ≤ 26.5 GHz	≤–90 dBm (nom.)
26.5 GHz < frequency ≤ 44.5 GHz	≤–80 dBm (nom.)

Spectrum Analyzer

Frequency

Span

Model	Range
MS2840A-040	0 Hz, 300 Hz to 3.6 GHz
MS2840A-041	0 Hz, 300 Hz to 6 GHz
MS2840A-066 turned on	0 Hz, 300 Hz to 1 MHz
MS2840A-044	0 Hz, 300 Hz to 26.5 GHz
MS2840A-046	0 Hz, 300 Hz to 44.5 GHz

Resolution: 2 Hz
SPAN accuracy: ±0.2% (Trace Point 10,001)

Display frequency accuracy

± (Display frequency × Frequency reference accuracy + Span frequency × Span accuracy + RBW × 0.05 + 2 × N + Span frequency/(Trace points – 1)) Hz
N: Mixer harmonic order

Resolution bandwidth (RBW)

Setting range	1 Hz to 3 MHz (1-3 sequence), 500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz, 31.25 MHz 1 Hz to 10 Hz: Can not be set when Span 0 Hz 31.25 MHz: Can be set when Span 0 Hz only
Selectivity	(–60 dB/–3 dB) 4.5: 1 (Nominal, 1 Hz to 10 MHz)

Video bandwidth (VBW)

Setting range: 1 Hz to 10 MHz (1-3 sequence), 5 kHz, Off
VBW mode: Video Average/Power Average

Amplitude

Display average noise level (DANL)

At 18°C to 28°C, Detector: Sample, VBW: 1 Hz (Video Average), Input attenuator: 0 dB,

With MS2840A-040/041

Frequency range	Without MS2840A-008 or Preamp turned off	
	Without MS2840A-066	With MS2840A-066
MS2840A-040/041		
9 kHz ≤ frequency < 100 kHz	–120 dBm/Hz	–120 dBm/Hz
100 kHz ≤ frequency < 1 MHz	–134 dBm/Hz	–133 dBm/Hz
1 MHz ≤ frequency < 10 MHz	–144 dBm/Hz	–143 dBm/Hz
10 MHz ≤ frequency < 30 MHz	–150 dBm/Hz	–149 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–153 dBm/Hz	–152 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–151 dBm/Hz	–150 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.6 GHz	–149 dBm/Hz	–147 dBm/Hz
MS2840A-041		
3.5 GHz < frequency ≤ 6 GHz	–146 dBm/Hz	–144 dBm/Hz

With MS2840A-040/041

Frequency range	With MS2840A-008 and Preamp turned on		
	Without MS2840A-066	With MS2840A-066 and turned off	With MS2840A-066 and turned on
MS2840A-040/041			
100 kHz	–147 dBm/Hz (nom.)	–146 dBm/Hz (nom.)	–146 dBm/Hz (nom.)
1 MHz	–156 dBm/Hz	–155 dBm/Hz	–155 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–166 dBm/Hz	–165 dBm/Hz	–162 dBm/Hz
1 GHz ≤ frequency < 2 GHz	–165 dBm/Hz	–164 dBm/Hz	–161 dBm/Hz
2 GHz ≤ frequency ≤ 3.5 GHz	–164 dBm/Hz	–162 dBm/Hz	–158 dBm/Hz
3.5 GHz < frequency ≤ 3.6 GHz	–161 dBm/Hz	–158 dBm/Hz	–154 dBm/Hz*
MS2840A-041			
3.5 GHz < frequency ≤ 4 GHz	–161 dBm/Hz	–158 dBm/Hz	—
4 GHz < frequency ≤ 6 GHz	–161 dBm/Hz	–158 dBm/Hz	—

*: Up to 3.7 GHz

MS2840A-044/046

Frequency range	Without MS2840A-067, Frequency Band Mode: Normal			
	Without MS2840A-068/069		With MS2840A-068/069 and Preamp turned off	
	MS2840A-044/046	With MS2840A-046 MS2840A-019	MS2840A-044/046	With MS2840A-046 MS2840A-019
MS2840A-044/046				
9 kHz ≤ frequency < 100 kHz	–120 dBm/Hz	–120 dBm/Hz	–120 dBm/Hz	–120 dBm/Hz
100 kHz ≤ frequency < 1 MHz	–134 dBm/Hz	–134 dBm/Hz	–134 dBm/Hz	–134 dBm/Hz
1 MHz ≤ frequency < 10 MHz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
10 MHz ≤ frequency < 30 MHz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–147 dBm/Hz	–147 dBm/Hz	–147 dBm/Hz	–147 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–151 dBm/Hz	–150 dBm/Hz	–147 dBm/Hz	–146 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–149 dBm/Hz	–149 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–146 dBm/Hz	–146 dBm/Hz	–141 dBm/Hz	–141 dBm/Hz
MS2840A-046				
26.5 GHz < frequency ≤ 34 GHz	–146 dBm/Hz	–146 dBm/Hz	–141 dBm/Hz	–140 dBm/Hz
34 GHz < frequency ≤ 40 GHz	–144 dBm/Hz	–142 dBm/Hz	–135 dBm/Hz	–135 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	–140 dBm/Hz	–137 dBm/Hz	–132 dBm/Hz	–130 dBm/Hz

MS2840A-044/046

Frequency range	Without MS2840A-067, Frequency Band Mode: Normal, with MS2840A-068/069 and Preamp turned on	
	MS2840A-044/046	With MS2840A-046 MS2840A-019
MS2840A-044/046		
100 kHz	–147 dBm/Hz(nom.)	–147 dBm/Hz(nom.)
1 MHz	–156 dBm/Hz	–156 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–166 dBm/Hz	–166 dBm/Hz
1 GHz ≤ frequency < 2 GHz	–164 dBm/Hz	–164 dBm/Hz
2 GHz ≤ frequency ≤ 3.5 GHz	–163 dBm/Hz	–163 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–160 dBm/Hz	–160 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–160 dBm/Hz	–160 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–163 dBm/Hz	–163 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–163 dBm/Hz	–163 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–157 dBm/Hz	—
MS2840A-046		
18.3 GHz < frequency ≤ 26.5 GHz	–160 dBm/Hz	–160 dBm/Hz
26.5 GHz < frequency ≤ 34 GHz	–160 dBm/Hz	–159 dBm/Hz
34 GHz < frequency ≤ 40 GHz	–157 dBm/Hz	–156 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	–149 dBm/Hz	–149 dBm/Hz

MS2840A-044/046
Microwave Preselector Bypass: ON/OFF Common

Frequency range	With MS2840A-067, Frequency Band Mode: Normal			
	Without MS2840A-068/069		With MS2840A-068/069 and Preamp turned off	
	MS2840A-044/046	With MS2840A-046 MS2840A-019	MS2840A-044/046	With MS2840A-046 MS2840A-019
MS2840A-044/046				
9 kHz ≤ frequency < 100 kHz	–120 dBm/Hz	–120 dBm/Hz	–120 dBm/Hz	–120 dBm/Hz
100 kHz ≤ frequency < 1 MHz	–134 dBm/Hz	–134 dBm/Hz	–134 dBm/Hz	–134 dBm/Hz
1 MHz ≤ frequency < 10 MHz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
10 MHz ≤ frequency < 30 MHz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–147 dBm/Hz	–147 dBm/Hz	–147 dBm/Hz	–147 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–147 dBm/Hz	–147 dBm/Hz	–142 dBm/Hz	–142 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–145 dBm/Hz	–145 dBm/Hz	–140 dBm/Hz	–140 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–141 dBm/Hz	–141 dBm/Hz	–136 dBm/Hz	–136 dBm/Hz
MS2840A-046				
26.5 GHz < frequency ≤ 34 GHz	–141 dBm/Hz	–140 dBm/Hz	–136 dBm/Hz	–135 dBm/Hz
34 GHz < frequency ≤ 40 GHz	–135 dBm/Hz	–135 dBm/Hz	–131 dBm/Hz	–131 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	–132 dBm/Hz	–129 dBm/Hz	–128 dBm/Hz	–125 dBm/Hz

MS2840A-044/046
Microwave Preselector Bypass: ON

Frequency range	With MS2840A-067, Frequency Band Mode: Normal With MS2840A-068/069 and Preamp turned on		
	MS2840A-044	MS2840A-046	With MS2840A-046 MS2840A-019
100 kHz	–147 dBm/Hz(nom.)	–147 dBm/Hz(nom.)	–147 dBm/Hz(nom.)
1 MHz	–156 dBm/Hz	–156 dBm/Hz	–156 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–166 dBm/Hz	–166 dBm/Hz	–166 dBm/Hz
1 GHz ≤ frequency < 2 GHz	–164 dBm/Hz	–164 dBm/Hz	–164 dBm/Hz
2 GHz ≤ frequency ≤ 3.5 GHz	–163 dBm/Hz	–163 dBm/Hz	–163 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–160 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–160 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–158 dBm/Hz	–161 dBm/Hz	–161 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–157 dBm/Hz	–161 dBm/Hz	–161 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–152 dBm/Hz	–156 dBm/Hz	–156 dBm/Hz
26.5 GHz < frequency ≤ 34 GHz	—	–152 dBm/Hz	–152 dBm/Hz
34 GHz < frequency ≤ 40 GHz	—	–151 dBm/Hz	–151 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	—	–143 dBm/Hz	–143 dBm/Hz

MS2840A-044/046
Microwave Preselector Bypass: OFF

Frequency range	With MS2840A-067, Frequency Band Mode: Normal With MS2840A-068/069 and Preamp turned on		
	MS2840A-044	MS2840A-046	With MS2840A-046 MS2840A-019
100 kHz	–147 dBm/Hz(nom.)	–147 dBm/Hz(nom.)	–147 dBm/Hz(nom.)
1 MHz	–156 dBm/Hz	–156 dBm/Hz	–156 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–166 dBm/Hz	–166 dBm/Hz	–166 dBm/Hz
1 GHz ≤ frequency < 2 GHz	–164 dBm/Hz	–164 dBm/Hz	–164 dBm/Hz
2 GHz ≤ frequency ≤ 3.5 GHz	–163 dBm/Hz	–163 dBm/Hz	–163 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–160 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–160 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–162 dBm/Hz	–164 dBm/Hz	–164 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–160 dBm/Hz	–164 dBm/Hz	–164 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–159 dBm/Hz	–159 dBm/Hz	–159 dBm/Hz
26.5 GHz < frequency ≤ 34 GHz	—	–157 dBm/Hz	–157 dBm/Hz
34 GHz < frequency ≤ 40 GHz	—	–155 dBm/Hz	–155 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	—	–146 dBm/Hz	–146 dBm/Hz

Total level accuracy

18°C to 28°C, Without MS2840A-051/151 or Noise Floor Reduction = Off,
Auto Sweep Time Select: Normal, 30 Hz ≤ RBW ≤ 1 MHz, Detection: Positive, CW,
Excluding the noise floor effect and FFT runtime (Display: On)
Preamp Off: Input Attenuator≥10 dB, Mixer input level ≤–10 dBm,
Preamp On: Input Attenuator =10 dB, Preamplifier input level ≤–30 dBm,
The total level accuracy is calculated from an RSS (root summed square) error of the RF frequency characteristics, linearity error and input attenuator switching error.

With MS2840A-040/041

Frequency range	Without MS2840A-066 or turned off	
	Without MS2840A-008 or Preamp turned off	With MS2840A-008 and Preamp turned on
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.5 dB	±1.0 dB
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	±1.8 dB	±1.8 dB

Frequency range	With MS2840A-066 and turned on	
	Without MS2840A-008 or Preamp turned off	With MS2840A-008 and Preamp turned on
300 kHz ≤ frequency < 3 GHz	±0.5 dB	±1.0 dB
3 GHz ≤ frequency ≤ 3.7 GHz	±1.8 dB	±1.8 dB

With MS2840A-044/046

Frequency range	Without MS2840A-068/069 or Preamp turned off	With MS2840A-068/069 and Preamp turned on
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.5 dB	±1.0 dB
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious	±1.8 dB	±1.8 dB
6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal 4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious	±1.8 dB	±2.0 dB
13.8 GHz < frequency ≤ 26.5 GHz	±3.0 dB	±3.0 dB
26.5 GHz < frequency ≤ 40 GHz	±3.0 dB	±4.0 dB
40 GHz < frequency ≤ 44.5 GHz	±3.5 dB (nom.)	±4.0 dB (nom.)

2-tone 3rd-order intermodulation distortion

With MS2840A-040/041
Without MS2840A-008 or with Preamplifier turned off:
At 18°C to 28°C, with mixer input level: –15 dBm (per wave) and using ≥300 kHz separation, at RBW ≤30 kHz:

Frequency range	Two-tone third-order intermodulation distortion	TOI
30 MHz ≤ frequency < 300 MHz	≤–54 dBc	+12 dBm
300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	≤–62 dBc	+16 dBm
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	≤–60 dBc	+15 dBm

With MS2840A-008 and with Preamplifier turned on
At 18°C to 28°C, with Preamplifier input level: –45 dBm (per wave) and using ≥300 kHz separation, at RBW ≤30 kHz:

Frequency range	Two-tone third-order intermodulation distortion	TOI
30 MHz ≤ frequency < 300 MHz	≤–74 dBc (nom.)	–8 dBm (nom.)
300 MHz ≤ frequency ≤ 700 MHz	≤–79 dBc (nom.)	–5.5 dBm (nom.)
700 MHz < frequency < 4 GHz, Frequency Band Mode: Normal 700 MHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious	≤–82 dBc (nom.)	–4 dBm (nom.)
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	≤–79 dBc (nom.)	–5.5 dBm (nom.)

Attenuator Mode: E-ATT Combined,
Without MS2840A-008, or with Preamplifier turned off:
At 18°C to 28°C, with mixer input level: –15 dBm (per wave) and using ≥300 kHz separation, at RBW ≤30 kHz:

Frequency range	RF input level	Two-tone third-order intermodulation distortion	TOI
30 MHz ≤ frequency < 300 MHz	RF input level ≤ –5 dBm	≤ –54 dBc	+12 dBm
300 MHz ≤ frequency ≤ 1 GHz		≤ –62 dBc	+16 dBm
1 GHz < frequency < 4 GHz, Frequency Band Mode: Normal 1 GHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious	RF input level ≤ +5 dBm	≤ –62 dBc	+16 dBm
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious		≤ –60 dBc	+15 dBm
30 MHz ≤ frequency < 300 MHz	–5 dBm < RF input level ≤ 0 dBm	≤–54 dBc (nom.)	+12 dBm (nom.)
300 MHz ≤ frequency < 3.5 GHz	–5 dBm < RF input level ≤ +15 dBm	≤–62 dBc (nom.)	+16 dBm (nom.)
3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal		≤ –60 dBc (nom.)	+15 dBm (nom.)

With MS2840A-044/046
Without MS2840A-068/069 or with Preamplifier turned off,
At 18°C to 28°C , with mixer input level: –15 dBm (per wave) and using ≥300 kHz separation, at RBW ≤30 kHz:

Frequency range	Two-tone third-order intermodulation distortion	TOI
30 MHz ≤ frequency < 300 MHz	≤–54 dBc	+12 dBm
300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal	≤–62 dBc	+16 dBm
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal	≤–60 dBc	+15 dBm
3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	≤–56 dBc	+13 dBm
6 GHz < frequency ≤ 13.5 GHz	≤–56 dBc	+13 dBm
13.5 GHz < frequency ≤ 26.5 GHz	≤–56 dBc	+13 dBm
With MS2840A-046: 26.5 GHz < frequency ≤ 40 GHz	≤–56 dBc (nom.)	+13 dBm (nom.)

With MS2840A-067 and with Microwave Preselector Bypass turned off, and with MS2840A-068/069 and with Preamplifier turned on, At 18°C to 28°C, with Preamplifier input level: –45 dBm (per wave) and using ≥300 kHz separation, at RBW ≤30 kHz:

Frequency range	Two-tone third-order intermodulation distortion	TOI
30 MHz ≤ frequency < 300 MHz	≤–73 dBc (nom.)	–8.5 dBm (nom.)
300 MHz ≤ frequency ≤ 700 MHz	≤–78 dBc (nom.)	–6 dBm (nom.)
700 MHz < frequency < 4 GHz, Frequency Band Mode: Normal 700 MHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious	≤–81 dBc (nom.)	–4.5 dBm (nom.)
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious	≤–78 dBc (nom.)	–6 dBm (nom.)
6 GHz < frequency ≤ 13.5 GHz, Frequency Band Mode: Normal 4 GHz < frequency ≤ 13.5 GHz, Frequency Band Mode: Spurious	≤–70 dBc (nom.)	–10 dBm (nom.)
13.5 GHz < frequency ≤ 26.5 GHz	≤–70 dBc (nom.)	–10 dBm (nom.)
With MS2840A-046: 26.5 GHz < frequency ≤ 40 GHz	≤–70 dBc (nom.)	–10 dBm (nom.)

When Attenuator Mode is E-ATT Combined
Without MS2840A-008/068/069 and with Preamplifier turned off, 18°C to 28°C,
with mixer input level: –15 dBm (per wave) and using ≥300 kHz separation, at RBW ≤30 kHz:

Frequency range	RF input level	Two-tone third-order intermodulation distortion	TOI
30 MHz ≤ frequency < 300 MHz	RF input level ≤ –5 dBm	≤–54 dBc	+12 dBm
300 MHz ≤ frequency ≤ 1 GHz		≤–62 dBc	+16 dBm
1 GHz < frequency < 4 GHz, Frequency Band Mode: Normal 1 GHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious	RF input level ≤ +5 dBm	≤–62 dBc	+16 dBm
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal		≤–60 dBc	+15 dBm
3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious		≤–56 dBc	+13 dBm
30 MHz ≤ frequency < 300 MHz	–5 dBm < RF input level ≤ +15 dBm	≤–54 dBc (nom.)	+12 dBm (nom.)
300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	–5 dBm < RF input level ≤ +15 dBm	≤–62 dBc (nom.)	+16 dBm (nom.)
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal		≤–60 dBc (nom.)	+15 dBm (nom.)
3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious		≤–56 dBc (nom.)	+13 dBm (nom.)

Image response

With MS2840A-040/041
Frequency Band Mode: Normal

10 MHz ≤ frequency < 4 GHz	≤–70 dBc
4 GHz ≤ frequency ≤ 6 GHz	≤–55 dBc

With MS2840A-066 and operating (MS2840A-066: Enabled, Center frequency: 3.6 GHz or less, and SPAN ≤1 MHz as spectrum analyzer).

110 MHz ≤ frequency < 3.7 GHz	≤–10 dBc (This is generated at "input signal + 150 MHz".)

With MS2840A-044/046
Frequency Band Mode: Normal: When MS2840A-067 is NOT installed

10 MHz ≤ frequency < 4 GHz	≤–70 dBc
4 GHz ≤ frequency ≤ 6 GHz	≤–55 dBc
6 GHz < frequency ≤ 13.5 GHz	≤–70 dBc
13.5 GHz < frequency ≤ 26.5 GHz	≤–70 dBc
26.5 GHz < frequency ≤ 44.5 GHz	≤–70 dBc (nom.)

Multiple Response

With MS2840A-040/041
With MS2840A-066 installed and operating (MS2840A-066: Enabled, Center frequency: 3.7 GHz or less, and SPAN ≤ 1 MHz as spectrum analyzer), and Mixer input level: –15 dBm.

110 MHz ≤ frequency < 3.7 GHz	≤–10 dBc (nom.)

Sweep

Sweep mode

Continuous, Single

Sweep time

SPAN	Range
≥300 Hz	1 ms to 1000 s
0 Hz	1 µs to 1000 s

Waveform display

Detector

Pos&Neg, Positive Peak, Sample, Negative Peak, RMS

Trace points

SPAN	
> 30 GHz	5001, 10001, 30001
500 MHz < SPAN ≤ 30 GHz	1001, 2001, 5001, 10001, 30001
100 MHz < SPAN ≤ 500 MHz	101, 201, 251, 401, 501, 1001, 2001, 5001, 10001, 30001
300 Hz ≤ SPAN ≤ 100 MHz and Sweep Time > 10 s	101, 201, 251, 401, 501, 1001, 2001, 5001, 10001, 30001
300 Hz ≤ SPAN ≤ 100 MHz and Sweep Time ≤ 10 s	11, 21, 41, 51, 101, 201, 251, 401, 501, 1001, 2001, 5001, 10001, 30001
0 Hz	11, 21, 41, 51, 101, 201, 251, 401, 501, 1001, 2001, 5001, 10001, 30001

Scale

Log scale
10 div/12 div: 0.1 to 20 dB/div, 1-2-5 sequence
Lin scale
10 div: 1 to 10%/div, 1-2-5 sequence

Trigger function

Trigger Mode: Free Run (Trig Off), Video, Wide IF Video, External, Frame, SG Marker (With MS2840A-020/021)

Gate function

Gate Mode: Off, Wide IF Video, External, Frame, SG Marker (With MS2840A-020/021)

Measure function

Adjust channel power (ACP)

Reference: Span Total, Carrier Total, Both Sides of Carriers or Carrier Select
Adjust channel specifications: 3 channels × 2 (Normal Mode), 8 channels × 2 (Advanced Mode)

Burst average

Indicates average power of specified time in the time domain mode.

Channel power

Absolute value measurement: dBm, dBm/Hz

Occupied bandwidth (OBW)

N% of Power, X dB Down

Spectrum emission mask (SEM)

Peak/Margin measurement: Pass/fail judgment is performed by Peak/Margin measurement.

Spurious emission

Worst/Peaks measurement: Pass/fail judgment is performed by Worst/Peaks measurement

Frequency counter

Counter accuracy
SPAN ≤ 1 MHz, RBW = 1 kHz, S/N ≥ 50 dB, Gate Time ≥ 100 ms
± (marker frequency × reference frequency accuracy + (0.1 × N/Gate Time [s])) Hz
N: Mixer harmonic order

Two-tone third-order intermodulation distortion

Measures IM3 and TOI from two-tone signal.

Signal Analyzer

Displays the waveforms of Spectrum, Power vs. Time, and others from the data obtained for certain amount of time.

Common

Trace mode

Spectrum, Power vs. Time, Frequency vs. Time, CCDF, Spectrogram, Phase vs. Time, No Trace

Bandwidth

Specifies the capture analysis bandwidth from the center frequency

Standard	1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz
With MS2840A-077	1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz, 50 MHz, 62.5 MHz
With MS2840A-078	1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz, 50 MHz, 62.5 MHz, 100 MHz, 125 MHz

Sampling rate

Auto setting depending on analysis bandwidth

Standard	2 kHz to 50 MHz (1-2-5 sequence)
With MS2840A-077	2 kHz to 100 MHz (1-2-5 sequence)
With MS2840A-078	2 kHz to 200 MHz (1-2-5 sequence)

Capture time

	Without MS2840A-077/078 or Bandwidth ≤ 31.25 MHz	With MS2840A-077 and Bandwidth > 31.25 MHz	With MS2840A-078 and Bandwidth > 31.25 MHz
Capture Time Length	Sets the capture time length		
Minimum capture time	2 µs to 50 ms (determined depending on analysis bandwidth)	1 µs	500 ns to 1 µs (determined depending on analysis bandwidth)
Maximum capture time	2 s to 2000 s (determined depending on analysis bandwidth)	500 ms	500 ms
Setting mode	Auto, Manual		

The frequency span determines the sampling rate.
The following chart shows the maximum capture time per frequency span.

Span	Sampling Rate	Capture Time	Max. 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

Trigger

Trigger mode: Free Run (Trig Off), Video, Wide IF Video, Frame, External (TTL), SG Marker (With MS2840A-020/021)

ADC resolution

16 bits (Without MS2840A-077/078 or Bandwidth ≤ 31.25 MHz.)

Spectrum displayed function

Displays the spectrum for arbitrary time length and frequency range in the acquired waveform data.

Analysis time length

Analysis start time	Sets analysis start time point from waveform data header
Analysis time length	Sets analysis time length
Setting mode	Auto, Manual

Frequency

Center frequency and SPAN can be set within the frequency range in waveform data.

Frequency setting

	Without MS2840A-077/078 or Bandwidth ≤ 31.25 MHz	With MS2840A-077/078 and Bandwidth > 31.25 MHz	With MS2840A-077/078 and Bandwidth > 31.25 MHz	
			Without MS2840A-067	With MS2840A-067
MS2840A-040	0 MHz to 3.6 GHz	300 MHz to 3.6 GHz	—	—
MS2840A-041	0 MHz to 6 GHz	300 MHz to 6 GHz	—	—
MS2840A-044	0 MHz to 26.5 GHz	—	300 MHz to 6 GHz	300 MHz to 26.5 GHz
MS2840A-046	0 MHz to 44.5 GHz	—	300 MHz to 6 GHz	300 MHz to 44.5 GHz

Display frequency accuracy

± (Indicator frequency × reference frequency accuracy + SPAN frequency × reference frequency accuracy + RBW × 0.05 + 2 × N + Span frequency/(Trace points – 1)) Hz

N: Mixer harmonic order

Resolution bandwidth (RBW)

	Without MS2840A-077/078 or Bandwidth ≤ 31.25 MHz	With MS2840A-077 and Bandwidth > 31.25 MHz	With MS2840A-078 and Bandwidth > 31.25 MHz
Setting range	1 Hz to 1 MHz (1-3 sequence)	3 kHz to 3 MHz (1-3 sequence)	3 kHz to 10 MHz (1-3 sequence)
Selectivity	(–60 dB/–3 dB) 4.5: 1, (nom.)	(–60 dB/–3 dB) 4.5: 1, (nom.)	(–60 dB/–3 dB) 4.5: 1, (nom.)

Amplitude

Total level accuracy

18°C to 28°C, RBW: Auto, Time Detection: Average, Marker Result: Integration or Peak (Accuracy), Center frequency, CW, excluding the noise floor effect

Preamp Off: Input attenuator ≥10 dB, Mixer Input Level ≤ –10 dBm,

Preamp On: Input attenuator = 10 dB, Preamp Input Level ≤ –30 dBm,

The total level accuracy is calculated from an RSS (root summed square) error of the RF frequency characteristics, linear error and input attenuator switching error.

With MS2840A-040/041

	Without MS2840A-066 installed or turned off	
	Without MS2840A-008 or Preamplifier turned off	With MS2840A-008 and Preamplifier turned on
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.5 dB	±1.0 dB
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious	±1.8 dB	±1.8 dB

	With MS2840A-066 installed and turned on	
	Without MS2840A-008 or Preamplifier turned off	With MS2840A-008 and Preamplifier turned on
300 kHz ≤ frequency < 3 GHz	±0.5 dB	±1.0 dB
3 GHz ≤ frequency ≤ 3.7 GHz	±1.8 dB	±1.8 dB

With MS2840A-044/046

	Without MS2840A-068/069 or Preamplifier turned off	With MS2840A-068/069 and Preamplifier turned on
300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal 300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.5 dB	±1.0 dB
4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal 3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious	±1.8 dB	±1.8 dB
6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal 4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious	±1.8 dB	±2.0 dB
13.8 GHz < frequency ≤ 26.5 GHz	±3.0 dB	±3.0 dB
26.5 GHz < frequency ≤ 40 GHz	±3.0 dB	±4.0 dB
40 GHz < frequency ≤ 44.5 GHz	±3.5 dB (nom.)	±4.0 dB (nom.)

In-band frequency characteristics

With MS2840A-040/041

Without MS2840A-077/078 or Bandwidth ≤31.25 MHz, On the basis of a level of the center frequency, at 18°C to 28°C in center frequency ±10 MHz

With MS2840A-066 NOT installed or turned off

30 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal 30 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.31 dB

With MS2840A-066 installed and operating

30 MHz ≤ frequency ≤ 3.7 GHz, Frequency Band Mode: Normal 30 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.31 dB

With MS2840A-044/046

Without MS2840A-067/068/077/078 or Bandwidth ≤31.25 MHz, On the basis of a level of the center frequency, at 18°C to 28°C in center frequency ±10 MHz

30 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal 30 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious	±0.31 dB

Displayed average noise level (DANL)

At 18°C to 28°C, Time Detection: Average, input attenuator: 0 dB

With MS2840A-040/041

	Without MS2840A-008 or Preamplifier turned off	
	Without MS2840A-066	With MS2840A-066
MS2840A-040/041		
100 kHz	–131.5 dBm/Hz	–130.5 dBm/Hz
1 MHz	–141.5 dBm/Hz	–140.5 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–150.5 dBm/Hz	–149.5 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–148.5 dBm/Hz	–147.5 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.6 GHz	–146.5 dBm/Hz	–144.5 dBm/Hz
MS2840A-041		
3.5 GHz < frequency ≤ 6 GHz	–143.5 dBm/Hz	–141.5 dBm/Hz

With MS2840A-040/041

	With MS2840A-008 or Preamplifier turned on		
	Without MS2840A-066	With MS2840A-066 installed and turned off	With MS2840A-066 installed and turned on
MS2840A-040/041			
100 kHz	–144.5 dBm/Hz (nom.)	–143.5 dBm/Hz (nom.)	–143.5 dBm/Hz (nom.)
1 MHz	–153.5 dBm/Hz	–152.5 dBm/Hz	–152.5 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–163.5 dBm/Hz	–162.5 dBm/Hz	–159.5 dBm/Hz
1 GHz ≤ frequency < 2 GHz	–162.5 dBm/Hz	–161.5 dBm/Hz	–158.5 dBm/Hz
2 GHz ≤ frequency ≤ 3.5 GHz	–161.5 dBm/Hz	–159.5 dBm/Hz	–155.5 dBm/Hz
3.5 GHz < frequency ≤ 3.6 GHz	–158.5 dBm/Hz	–155.5 dBm/Hz	–151.5 dBm/Hz*
MS2840A-041			
Frequency Band Mode: Normal 3.5 GHz < frequency ≤ 4 GHz	–158.5 dBm/Hz	–155.5 dBm/Hz	—
Frequency Band Mode: Spurious 3.5 GHz < frequency ≤ 4 GHz	–158.5 dBm/Hz	–155.5 dBm/Hz	—
4 GHz < frequency ≤ 6 GHz	–158.5 dBm/Hz	–155.5 dBm/Hz	—

*: Up to 3.7 GHz

MS2840A-044/046

	Without MS2840A-067, Frequency Band Mode: Normal			
	Without MS2840A-068/069		With MS2840A-068/069 and Preamp turned off	
	MS2840A-044/046	With MS2840A-046 MS2840A-019	MS2840A-044/046	With MS2840A-046 MS2840A-019
MS2840A-044/046				
100 kHz	–131.5 dBm/Hz	–131.5 dBm/Hz	–131.5 dBm/Hz	–131.5 dBm/Hz
1 MHz	–141.5 dBm/Hz	–141.5 dBm/Hz	–141.5 dBm/Hz	–141.5 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–150.5 dBm/Hz	–150.5 dBm/Hz	–150.5 dBm/Hz	–150.5 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–147.5 dBm/Hz	–147.5 dBm/Hz	–147.5 dBm/Hz	–147.5 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–144.5 dBm/Hz	–144.5 dBm/Hz	–144.5 dBm/Hz	–144.5 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–141.5 dBm/Hz	–141.5 dBm/Hz	–141.5 dBm/Hz	–141.5 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–141.5 dBm/Hz	–141.5 dBm/Hz	–141.5 dBm/Hz	–141.5 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–148.5 dBm/Hz	–147.5 dBm/Hz	–144.5 dBm/Hz	–144.5 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–146.5 dBm/Hz	–146.5 dBm/Hz	–142.5 dBm/Hz	–142.5 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–143.5 dBm/Hz	–143.5 dBm/Hz	–138.5 dBm/Hz	–138.5 dBm/Hz
MS2840A-046				
26.5 GHz < frequency ≤ 34 GHz	–143.5 dBm/Hz	–143.5 dBm/Hz	–138.5 dBm/Hz	–137.5 dBm/Hz
34 GHz < frequency ≤ 40 GHz	–141.5 dBm/Hz	–139.5 dBm/Hz	–132.5 dBm/Hz	–132.5 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	–137.5 dBm/Hz	–134.5 dBm/Hz	–129.5 dBm/Hz	–127.5 dBm/Hz

MS2840A-044/046

	Without MS2840A-067, Frequency Band Mode: Normal, With MS2840A-068/069 and Preamp turned on	
	MS2840A-044/046	With MS2840A-046 MS2840A-019
MS2840A-044/046		
100 kHz	–144.5 dBm/Hz (nom.)	–144.5 dBm/Hz (nom.)
1 MHz	–153.5 dBm/Hz	–153.5 dBm/Hz
30 MHz ≤ frequency < 1 GHz	–163.5 dBm/Hz	–163.5 dBm/Hz
1 GHz ≤ frequency < 2 GHz	–161.5 dBm/Hz	–161.5 dBm/Hz
2 GHz ≤ frequency ≤ 3.5 GHz	–160.5 dBm/Hz	–160.5 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–157.5 dBm/Hz	–157.5 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–157.5 dBm/Hz	–157.5 dBm/Hz
6 GHz < frequency ≤ 13.5 GHz	–160.5 dBm/Hz	–160.5 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–160.5 dBm/Hz	–160.5 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–154.5 dBm/Hz	—
MS2840A-046		
18.3 GHz < frequency ≤ 26.5 GHz	–157.5 dBm/Hz	–157.5 dBm/Hz
26.5 GHz < frequency ≤ 34 GHz	–157.5 dBm/Hz	–156.5 dBm/Hz
34 GHz < frequency ≤ 40 GHz	–154.5 dBm/Hz	–153.5 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	–146.5 dBm/Hz	–146.5 dBm/Hz

MS2840A-040/041
With MS2840A-077/078, Bandwidth: >31.25 MHz

	Without MS2840A-008 and Preamp turned off	
	Without MS2840A-066	With MS2840A-066
MS2840A-040/041		
300 MHz ≤ frequency < 1 GHz	–146.5 dBm/Hz	–143.5 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–144.5 dBm/Hz	–141.5 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–142.5 dBm/Hz	–138.5 dBm/Hz
MS2840A-041		
3.5 GHz < frequency ≤ 6 GHz	–139.5 dBm/Hz	–135.5 dBm/Hz

MS2840A-040/041
With MS2840A-077/078, Bandwidth: >31.25 MHz

	With MS2840A-008 and Preamp turned on	
	Without MS2840A-066	With MS2840A-066
MS2840A-040/041		
300 MHz ≤ frequency < 1 GHz	–160 dBm/Hz	–157 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–159 dBm/Hz	–156 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–157 dBm/Hz	–153 dBm/Hz
MS2840A-041		
3.5 GHz < frequency ≤ 6 GHz	–153 dBm/Hz	–148 dBm/Hz

MS2840A-044/046
With MS2840A-077/078, Bandwidth: >31.25 MHz

	Without MS2840A-008/068/069 or Preamp turned off	
	MS2840A-044/046	With MS2840A-046 MS2840A-019
300 MHz ≤ frequency < 1 GHz	–146.5 dBm/Hz	–145.5 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–143.5 dBm/Hz	–142.5 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–140.5 dBm/Hz	–140.5 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–137.5 dBm/Hz	–137.5 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–137.5 dBm/Hz	–137.5 dBm/Hz

MS2840A-044/046
With MS2840A-077/078, Bandwidth: >31.25 MHz

	With MS2840A-008/068/069 and Preamp turned on	
	MS2840A-044/046	With MS2840A-046 MS2840A-019
300 MHz ≤ frequency < 1 GHz	–160 dBm/Hz	–160 dBm/Hz
1 GHz ≤ frequency < 2.4 GHz	–158 dBm/Hz	–158 dBm/Hz
2.4 GHz ≤ frequency ≤ 3.5 GHz	–156 dBm/Hz	–156 dBm/Hz
3.5 GHz < frequency ≤ 4 GHz	–151 dBm/Hz	–151 dBm/Hz
4 GHz < frequency ≤ 6 GHz	–151 dBm/Hz	–151 dBm/Hz

MS2840A-044/046
With MS2840A-077/078, with MS2840A-067, Bandwidth: >31.25 MHz

	Without MS2840A-068/069		With MS2840A-068/069 and Preamp turned off	
	MS2840A-044/046	With MS2840A-046 MS2840A-019	MS2840A-044/046	With MS2840A-046 MS2840A-019
MS2840A-044/046				
6 GHz < frequency ≤ 13.5 GHz	–137.5 dBm/Hz	–137.5 dBm/Hz	–132.5 dBm/Hz	–132.5 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–135.5 dBm/Hz	–135.5 dBm/Hz	–130.5 dBm/Hz	–130.5 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–131.5 dBm/Hz	–131.5 dBm/Hz	–126.5 dBm/Hz	–126.5 dBm/Hz
MS2840A-046				
26.5 GHz < frequency ≤ 34 GHz	–131.5 dBm/Hz	–130.5 dBm/Hz	–126.5 dBm/Hz	–125.5 dBm/Hz
34 GHz < frequency ≤ 40 GHz	–125.5 dBm/Hz	–125.5 dBm/Hz	–121.5 dBm/Hz	–121.5 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	–122.5 dBm/Hz	–119.5 dBm/Hz	–118.5 dBm/Hz	–115.5 dBm/Hz

MS2840A-044/046
With MS2840A-077/078, with MS2840A-067 Bandwidth: >31.25 MHz

	With MS2840A-068/069 and Preamp turned on		
	MS2840A-044	MS2840A-046	With MS2840A-046 MS2840A-019
6 GHz < frequency ≤ 13.5 GHz	–151 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
13.5 GHz < frequency ≤ 18.3 GHz	–150 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
18.3 GHz < frequency ≤ 26.5 GHz	–146 dBm/Hz	–149 dBm/Hz	–149 dBm/Hz
26.5 GHz < frequency ≤ 34 GHz	—	–149 dBm/Hz	–148 dBm/Hz
34 GHz < frequency ≤ 40 GHz	—	–140 dBm/Hz	–140 dBm/Hz
40 GHz < frequency ≤ 44.5 GHz	—	–140 dBm/Hz	–137 dBm/Hz

Measure function

Adjacent channel power (ACP)
Reference: Span Total, Carrier Total, Both Sides of Carriers, or Carrier Select
Adjacent channel specification: 3 channels × 2

Channel power
Absolute value measurement: dBm, dBm/Hz

Occupied Bandwidth (OBW)
N% of Power, X dB Down

Power vs. Time

Indicates time changes of power for captured waveform data.

Analysis time range

Analysis start time	Sets analysis start time position from beginning of waveform data
Analysis time length	Sets analysis time length
Setting mode	Auto, Manual

Resolution bandwidth

Filter type	Rect, Gaussian, Nyquist, Root Nyquist, Off (default Off)
Roll-off ratio	0.01 to 1 (set for Nyquist, Root Nyquist)
Filter frequency offset	Set center frequency of filter in wavelength data frequency band

Measure function

Peak to Peak measurement
with AM Depth or marker function
+Peak, –Peak, (P-P)/2, Average

Burst Average Power
Measures average power of burst signal.

Frequency vs. Time

Displays frequency time fluctuations of input signal from captured waveform data.

Analysis time range

Analysis start time	Sets analysis start time point from waveform data header
Analysis time length	Sets analysis time length
Setting mode	Auto, Manual

Operating level range

–17 to +30 dBm (Input attenuator ≥10 dB)

Frequency (vertical axis)

Center frequency and SPAN can be set within the frequency range in waveform data
Display frequency range: Selectable from 1/25, 1/10, 1/5 and 1/2 of analysis bandwidth
Input frequency range: 10 MHz to 6 GHz
Displayed frequency accuracy
Input level –17 to +30 dBm, SPAN ≤ 31.25 MHz, Scale = SPAN/25, CW
± (reference oscillator accuracy × center frequency + indicator frequency range × 0.01) Hz

Peak to Peak measurement
Measured using FM Deviation or marker function.
+Peak, –Peak, (P-P)/2, Average

FMCW measurement
FM Error Peak, FM Error RMS, Chirp Deviation, Chirp Rate, Chirp Length
The measurement range can be set by automatic detection or marker.

Phase vs. Time

Displayed phase time fluctuation of input signal from captured waveform data

Analysis time range

Analysis start time	Sets analysis start time point from waveform data header
Analysis time length	Sets analysis time length
Setting mode	Auto, Manual

Phase (vertical axis)

Display mode	Wrap, Unwrap
Displayed phase range	0.01 deg./div to 200 G deg./div
Offset	–100 to +100 Mdeg.

CCDF

Displays CCDF and APD of waveform data captured at specific time.

Analysis time range

Analysis start time	Sets analysis start time point from waveform data header
Analysis time length	Sets analysis time length
Setting mode	Auto, Manual

Display

Graphically displays CCDF and APD.
Histogram resolution: 0.01 dB
Numerical value: Average Power, Max Power, Crest Factor

Resolution bandwidth

Filter type: Rectangle, Off (Default Off)
Filter frequency offset: Sets filter center frequency in frequency band of waveform data

Spectrogram

Displayed spectrogram for arbitrary time length in captured waveform data

Analysis time range

Analysis start time	Sets analysis start time point from waveform data header
Analysis time length	Sets analysis time length
Setting mode	Auto, Manual

Frequency

Center frequency and SPAN can be set within the frequency range in waveform data.

Resolution bandwidth (RBW)

Setting range	1 Hz to 1 MHz (1-3 sequence)
Selectivity	(–60 dB/–3 dB) 4.5: 1 (nom.)

Digitize function

Output captured waveform data to internal SSD or external device

Waveform data

Format	I, Q (each 32 bit Float Binary)
Level	0 dBm input is $\sqrt{(I^2 + Q^2)} = 1$
Level accuracy	Same as signal analyzer total level accuracy

External output

Can be output to external PC via Ethernet

Replay function

Analyzes traces of saved waveform data

Conditions for measurable waveform data: I, Q (Binary)

Combination of Span, Sampling rate, and Minimum capture sample

SPAN	Sampling rate	Minimum capture sample (time)
1 kHz	2 kHz	74000 (37 s)
2.5 kHz	5 kHz	160000 (32 s)
5 kHz	10 kHz	310000 (31 s)
10 kHz	20 kHz	610000 (30.5 s)
25 kHz	50 kHz	730000 (14.6 s)
50 kHz	100 kHz	730000 (7.3 s)
100 kHz	200 kHz	730000 (3.65 s)
250 kHz	500 kHz	730000 (1.46 s)
500 kHz	1 MHz	730000 (730 ms)
1 MHz	2 MHz	730000 (365 ms)
2.5 MHz	5 MHz	730000 (146 ms)
5 MHz	10 MHz	730000 (73 ms)
10 MHz	20 MHz	730000 (36.5 ms)
18.6 MHz	20 MHz	730000 (36.5 ms)
20 MHz	25 MHz	730000 (29.2 ms)
25 MHz	50 MHz	730000 (14.6 ms)
31.25 MHz	50 MHz	730000 (14.6 ms)
50 MHz	100 MHz	730000 (7.3 ms)
62.5 MHz	100 MHz	730000 (7.3 ms)
100 MHz	200 MHz	730000 (3.65 ms)
125 MHz	200 MHz	730000 (3.65 ms)

Connector

RF input

With MS2840A-040/041/044
Front panel, N-J, 50Ω
VSWR: Input attenuator ≥10 dB, 18° to 28°C

40 MHz ≤ frequency ≤ 3 GHz	≤1.2 (nom.)
3 GHz ≤ frequency ≤ 4 GHz	≤1.3 (nom.)
4 GHz < frequency ≤ 6 GHz	≤1.5 (nom.)
6 GHz < frequency ≤ 13.6 GHz	≤1.6 (nom.)
13.6 GHz < frequency ≤ 26.5 GHz	≤1.9 (nom.)

With MS2840A-046
Connector: Front panel, K-J, 50Ω
VSWR: 18°C to 28°C, Input attenuator ≥10 dB

40 MHz ≤ frequency ≤ 3 GHz	≤1.2 (nom.)
3 GHz < frequency ≤ 6 GHz	≤1.3 (nom.)
6 GHz < frequency ≤ 13.6 GHz	≤1.3 (nom.)
13.6 GHz < frequency ≤ 26.5 GHz	≤1.4 (nom.)
26.5 GHz < frequency ≤ 40 GHz	≤1.6 (nom.)
40 GHz < frequency ≤ 44.5 GHz	≤1.6 (V-K converter mounted and included)

1st local output

Connector for External Mixer
This is available when MS2840A-044/046 is installed.

Connector	Front panel, SMA-J, 50Ω (nom.)
Output	Local signal: frequency 5 GHz to 10 GHz, Output level≥10 dBm (typ.) Bias current: Range 0 to 20.0 mA/Resolution 0.1 mA
Input	IF signal: frequency 1.8755 GHz

IF output

Connector for the 1st IF output, Outputs the signal before band filtering.
This is available when MS2840A-044/046 is installed.

Connector	Rear panel, SMA-J, 50Ω (nom.)
Output frequency	1.8755 GHz
Gain	–10 dB ((nom.) (ATT 0 dB, at input frequency 10 GHz)

External reference input

Connector	Rear panel, BNC-J, 50Ω (nom.)
Frequency	5 MHz/10 MHz/13 MHz
Operating range	±1 ppm
Input level	–15 dBm ≤ level ≤ +20 dBm, 50Ω (AC coupling)

Reference signal output

Connector	Rear panel, BNC-J, 50Ω (nom.)
Frequency	10 MHz
Output level	≥0 dBm (AC coupling)

Sweep status output

Connector	Rear panel, BNC-J
Output level	TTL level (High level at sweep or capture)

SA trigger input

Connector	Rear panel, BNC-J
Input level	TTL level

SG trigger input

Available with MS2840A-020/021 installed.

Connector	Rear panel, BNC-J
Input level	TTL level

External controls

Ethernet (10/100/1000Base-T)

Connector: Rear Panel, RJ-45

GPIB

IEEE488.2 compatible

Connector	Rear panel, IEEE488 bus
Interface function	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2

USB (B)

USB2.0 compatible
Connector: Rear panel, USB-B Connector

USB

USB2.0 compatible
Enables waveform hard copy to USB compatible external device and saving main unit setting parameters
Connector: USB-A Connector (front panel 2 port, rear panel 2 port)

Monitor output

Connector: Rear panel, VGA compatible, mini D-SUB 15 pin

AUX

Used for the input/output of an auxiliary device.
Connector: Rear panel, 50 pin (Correspond to DX10A-50S)

Noise source

This is available when the Option 017 is installed.

Connector	Rear panel, BNC-J
Output voltage range	+28 V ± 0.5 V, Pulsed

Supports noise sources from Noisecom NC346 series. NC346 series models and summary specifications are listed below.
Operation is not guaranteed when using other noise sources.
See the NC346 series catalog and datasheet for detailed specifications.

NC346 series summary specifications

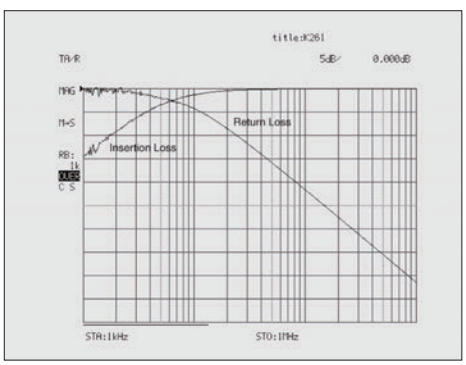
Model	RF Connector	Frequency [GHz]	Output ENR [dB]	VSWR (maximum @ on/off) [GHz]				DC Offset	DC Block
				0.01 to 5	5 to 18	18 to 26.5	26.5 to 40		
NC346A	SMA (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Precision	APC3.5 (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A 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

*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.

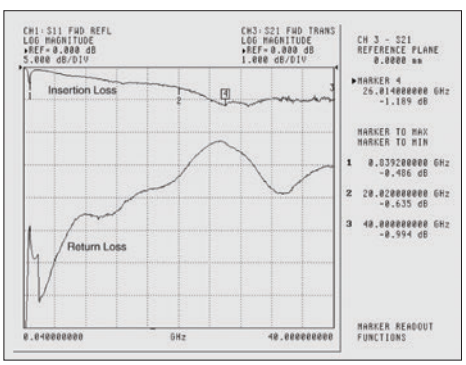
Specifications outlines of recommended DC Blocks and Adapters

	Ordering		RF Connector	Frequency Range	VSWR
	Model	Name			
DC Block	J0805	DC Block, N type (MODEL 7003)	N (M)-N (F)	10 kHz to 18 GHz	1.35 (max.)
	J1555A	DC Block, SMA type (MODEL 7006-1)	SMA (M)-SMA (F)	9 kHz to 20 GHz	1.50 (9 kHz to 10 kHz), 1.50 (11 kHz to 20 kHz), 1.30 (20 kHz to 20 GHz)
	K261	DC Block	K (M)-K (F)	10 kHz to 40 GHz	See figure (return loss) below
Adapter	J0004	Coaxial Adapter	N (M)-SMA (F)	DC to 12.4 GHz	≤1.08 (DC to 3 GHz), ≤1.11 (3 GHz to 6 GHz), ≤1.18 (6 GHz to 12.4 GHz)
	J1398A	N-SMA Adapter	N (M)-SMA (F)	DC to 26.5 GHz	≤1.05 (DC to 3 GHz), ≤1.07 (3 GHz to 6 GHz), ≤1.2 (6 GHz to 13.5 GHz), ≤1.3 (13.5 GHz to 20 GHz), ≤1.45 (20 GHz to 26.5 GHz)

DC Block K261 Return Loss



Typical Low Frequency Insertion Loss measured on K261 over the range of 1 kHz to 1 MHz.



Insertion Loss and Return Loss measured on K261 over the range of 40 MHz to 40 GHz.

Recommended DC blocks/Adaptor combinations for MS2850A/MS2840A/MS2830A/MS269xA series signal analyzer

	Model	Frequency Range	RF connector	Recommended DC Block Order Name	Recommended Adapter Order Name
MS2850A series	MS2850A-047	9 kHz to 32 GHz	K (F)	K261 (from 10 kHz)	Not required
	MS2850A-046	9 kHz to 44.5 GHz	K (F)	K261 (10 kHz to 40 GHz)	Not required
MS2840A series	MS2840A-040	9 kHz to 3.6 GHz	N (F)	Not required	Not required
	MS2840A-041	9 kHz to 6 GHz	N (F)	Not required	Not required
	MS2840A-044	9 kHz to 26.5 GHz	N (F)	J1555A (9 kHz to 20 GHz)	J1398A
	MS2840A-046	9 kHz to 44.5 GHz	K (F)	K261 (10 kHz to 40 GHz)	Not required
MS2830A series	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-043	9 kHz to 13.5 GHz	N (F)	Not required	Not required
	MS2830A-044	9 kHz to 26.5 GHz	N (F)	J1555A (9 kHz to 20 GHz)	J1398A
	MS2830A-045	9 kHz to 43 GHz	K (F)	K261 (10 kHz to 40 GHz)	Not required
MS269xA series	MS2690A	50 Hz to 6 GHz	N (F)	J1555A (from 9 kHz)	J0004
	MS2691A	50 Hz to 13.5 GHz	N (F)	J1555A (from 9 kHz)	J1398A
	MS2692A	50 Hz to 26.5 GHz	N (F)	J1555A (9 kHz to 20 GHz)	J1398A

Display

XGA color LCD (Resolution: 1024 × 768)
Size: 8.4″ (213 mm diagonal)

General

Dimensions and mass

Dimensions	177 (H) × 426 (W) × 390 (D) mm (excluding projections)
Mass	≤14.5 kg (with MS2840A-040/041 and MS2840A-020/021 options installed; excludes all other options) ≤15.3 kg (with MS2840A-044/046 installed; excludes all other options)

Power supply

Power voltage	Rated voltage: 100 V(ac) to 120 V(ac) or 200 V(ac) to 240 V(ac)
Frequency	50 Hz to 60 Hz
Power consumption	≤350 VA (including all options, maximum value) 140 VA (nom.) (With MS2840A-040/041 installed, excluding other options) 220 VA (nom.) (With MS2840A-040/041, -020/021 and -022 installed, excluding other options) 220 VA (nom.) (With MS2840A-044/046 installed, excluding other options)

Temperature

Operating temperature	0°C to +50°C
Storage temperature	–20°C to +60°C

Environment performance

Conducted emission	Conforms to EN 61326-1
Radiated emission	Conforms to EN 61326-1
Harmonic current emission	Conforms to EN 61000-3-2: +A1: A2
Electrostatic discharge	Conforms to EN 61326-1
Electromagnetic field immunity	Conforms to EN 61326-1
Fast transient/burst	Conforms to EN 61326-1
Surge	Conforms to EN 61326-1
Conducted RF	Conforms to EN 61326-1
Power frequency magnetic field	Conforms to EN 61326-1
Voltage dips/short interruption	Conforms to EN 61326-1

CE Marking

EMC: 2014/30/EU, EN61326-1, EN61000-3-2
LVD: 2014/35/EU, EN61010-1
RoHS: 2011/65/EU, (EU) 2015/863, EN IEC 63000: 2018

UKCA Marking

EMC: S.I. 2016 No.1091, EN 61326-1, EN61000-3-2
LVD: S.I. 2016 No.1101, EN 61010-1
RoHS: S.I. 2012 No.3032, EN IEC 63000:2018

CPU, OS

Orders from September 2020

CPU	Corei5-7440EQ 2.9 GHz Quad Core
Main memory	8 GB
OS	Windows 10 (64 bits)

Orders before August 2020

CPU	Corei5-4400E 2.7 GHz Dual Core
Main memory	8 GB
OS	Windows 7 (64 bit)

Options

Rubidium Reference Oscillator Option MS2840A-001

This option is a 10 MHz reference crystal oscillator with excellent frequency stability startup characteristics.
Others　See "Internal reference oscillator".

High Stability Reference Oscillator Option MS2840A-002

The 10 MHz reference oscillator improving frequency stability up.
Others　See "Internal reference oscillator".
This option is not available when MS2840A-044/046 is installed. (With equivalent function to standard)

Analysis Bandwidth Extension to 31.25 MHz Option MS2840A-005

Bandwidth　Function to analyze 31.25 MHz bandwidth (Standard with MS2840A-040/041/044)

Analysis Bandwidth 10 MHz MS2840A-006

This option is a function to analyze 10 MHz bandwidth. (Standard)

Preamplifier Option MS2840A-008

This option increases the sensitivity of the spectrum/signal analyzer functions and is used for examining low-level signals such as interference waveforms.

Frequency

	Frequency range
With MS2840A-040	100 kHz to 3.6 GHz
With MS2840A-041/044/046	100 kHz to 6 GHz

Amplitude

Measurement range	Refer to "Level measurement range" of Signal Analyzer/Spectrum Analyzer.
Maximum input level	Refer to "Maximum input level" of Signal Analyzer/Spectrum Analyzer.
Display average noise level (Signal Analyzer function)	Refer to "Display average noise level (DANL)" of Signal Analyzer.
Display average noise level (Spectrum analyzer function)	Refer to "Display average noise level (DANL)" of Spectrum Analyzer.
RF Frequency Characteristics	Refer to "RF frequency characteristics" of Signal Analyzer/Spectrum Analyzer.
Input attenuator switching error	Refer to "Input attenuator switching uncertainty" of Signal Analyzer/Spectrum Analyzer.
Linearity error	Refer to "Linearity error" of Signal Analyzer/Spectrum Analyzer.
Secondary harmonic wave distortion	Refer to "Secondary harmonic distortion" of Signal Analyzer/Spectrum Analyzer.
1 dB gain compression	Refer to "1 dB gain compression" of Signal Analyzer/Spectrum Analyzer.
Two-tone third-order intermodulation distortion	Refer to "2-tone 3rd-order intermodulation distortion" of Signal Analyzer.

Analysis Bandwidth Extension to 31.25 MHz MS2840A-009

This option is a function to analyze 31.25 MHz bandwidth. (Standard with MS2840A-046)

Phase Noise Measurement Function MS2840A-010

Displays the phase noise characteristics on a logarithmic scale

Frequency

Range	10 MHz to Upper frequency limit
Offset Frequency Range	10 Hz to 10 MHz
Marker Mode	Normal, Integral Noise, RMS Noise, Jitter, Residual FM, Off

Secondary SSD Option MS2840A-011

This is removable SSD (Solid State Drive) for user data storage.
This can be installed to Secondary SSD slot on rear panel.

Removable SSD, Win10 MS2840A-014

This is removable SSD (Solid State Drive) contains the same Windows OS (Windows 10) and programs as the factory installed system SSD.
This removable SSD option is used to replace the SSD containing user data installed in the Primary SSD slot at the back panel when performing repair and calibration to prevent risks of user-data leaks when user data must not be taken offsite.

Precompliance EMI Function Option MS2840A-016

Adds the Detection Mode and the Resolution Bandwidth for EMI measurement to the Spectrum Analyzer function.

Detection Mode (CISPR Detector)	Quasi-Peak, CISPR-AVG, RMS-AVG
Resolution Bandwidth (CISPR RBW)	200 Hz (6 dB BW), 9 kHz (6 dB BW), 120 kHz (6 dB BW), 1 MHz (Impulse)

BER Measurement Function Option MS2840A-026

Adds BER measurement function.

Connector	Rear panel Aux connector
Input level	TTL level
Input signal	Data, Clock, Enable
Input bit rate	100 bps to 10 Mbps
Measurable patterns	PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, 01 repeat PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix UserDefine (4096 bits max.)
Synchronization establishing condition	PN signal: No error has been detected for (PN stage count × 2) bits PNFix signal: Synchronization with the PN signal is established if no error has been detected for (PN stage count × 2) bits. Next, the cycle and synchronization of the PNFix signal are established if no error has been detected for PN stage count bits beginning with the start bit of the PNFix signal. ALL0, ALL1, repetition of 01: No error has been detected for 10 bits. UserDefine: No error has been detected for 8 to 1024 bits (variable). The start bit used for synchronization detection can also be selected.
Re-synchronization judgment condition	x/y (Resynchronization is executed if x bits out of y bits are errors.) y (Measurement bit count): Selected from 500 bits, 5000 bits, and 50000 bits x (Error bit count out of y bits): 1 to y/2 bits
Measurable bit count	$\leq 2^{32} - 1$ bits
Measurable error bit count	$\leq 2^{31} - 1$ bits
Measurement termination condition	Measurement bit count, measurement error bit count
Auto Resync function	Can be switched between enable/disable.
Count operation at resynchronization	Can be selected from Count Clear and Count Keep.
Measurement mode	Continuous, Single, Endless
Display	Status, Error, Error Rate, Error Count, SyncLoss Count Measurement bit count
Polarity reversal function	Data, Clock, and Enable polarities can be reversed.
Measured value clear function	It is possible to clear the measured values to 0 while retaining synchronization during BER measurement, and start the measurement again from 0.

Vector Signal Generator Option MS2840A-020/021

See the MS2840A Product Brochure for Vector Signal Generator basic performance.

Frequency

Range		Resolution
MS2840A-020	250 kHz to 3.6 GHz	0.01 Hz
MS2840A-021	250 kHz to 6 GHz	

Output Level

Setting range

	Without MS2840A-022	With MS2840A-022
Frequency > 25 MHz	–40 to +20 dBm	–136 to +15 dBm
Frequency ≤ 25 MHz	–40 to +2 dBm	–136 to –3 dBm

Unit dBm, dBµV (terminated, open)
Resolution 0.01 dB

Output level accuracy
In CW mode, at 18°C to 28°C:
Without MS2840A-022

Frequency ≤ 25 MHz	–40 dBm ≤ Output level ≤ +2 dBm	±0.5 dB (typ.)
25 MHz < frequency < 375 MHz	–40 dBm ≤ Output level ≤ +9 dBm	±0.5 dB (typ.)
375 MHz ≤ frequency ≤ 3.6 GHz	–40 dBm ≤ Output level ≤ +9 dBm	±0.5 dB
Frequency > 3.6 GHz	–40 dBm ≤ Output level ≤ +4 dBm	±0.8 dB

With MS2840A-022

Frequency ≤ 25 MHz	–110 dBm ≤ Output level ≤ –3 dBm	±1.0 dB (typ.)
25 MHz < frequency < 100 MHz	–110 dBm ≤ Output level ≤ +4 dBm	±1.0 dB (typ.)
100 MHz ≤ frequency < 375 MHz	–110 dBm ≤ Output level ≤ +4 dBm	±0.5 dB (typ.)
375 MHz ≤ frequency ≤ 3.6 GHz	–110 dBm ≤ Output level ≤ +4 dBm	±0.5 dB
Frequency > 3.6 GHz	–110 dBm ≤ Output level ≤ –1 dBm	±0.8 dB
100 MHz ≤ frequency ≤ 3.6 GHz	–120 dBm ≤ Output level < –110 dBm	±1 dB
100 MHz ≤ frequency ≤ 3.6 GHz	–127 dBm ≤ Output level < –120 dBm	±1 dB (typ.)
Frequency > 3.6 GHz	–127 dBm ≤ Output level < –110 dBm	±2.5 dB (typ.)

Output level linearity
In CW mode, at 18°C to 28°C:
Without MS2840A-022
With –10 dBm as the output reference

Frequency ≤ 3.6 GHz	–40 dBm ≤ Output level ≤ –10 dBm	±0.2 dB (typ.)
Frequency > 3.6 GHz	–40 dBm ≤ Output level ≤ –10 dBm	±0.3 dB (typ.)

With MS2840A-022
With –15 dBm as the output reference

Frequency ≤ 3.6 GHz	–110 dBm ≤ Output level ≤ –15 dBm	±0.2 dB (typ.)
Frequency > 3.6 GHz	–110 dBm ≤ Output level ≤ –15 dBm	±0.3 dB (typ.)

Output connector

N-J connector, 50Ω (front panel, SG Output (Opt))
VSWR
at 18°C to 28°C:

	Without MS2840A-022 Output level: –10 dBm or less	With MS2840A-022 Output level: –15 dBm or less
Frequency ≤ 3.6 GHz	1.5	1.3
Frequency > 3.6 GHz	2.0	1.9

Maximum reverse input

Reverse input power 0 V DC Max

	Without MS2840A-022	With MS2840A-022
Frequency < 20 MHz	+12 dBm	+18 dBm
Frequency ≥ 20 MHz	+24 dBm	+30 dBm

Signal Purity

Harmonic spurious
Output level ≤+0 dBm, (Without MS2840A-022)
Output level ≤–5 dBm, (With MS2840A-022)
in CW mode

1 MHz ≤ frequency ≤ 3.6 GHz	<–30 dBc
3.6 GHz < frequency	<–30 dBc

Non-harmonic spurious
Output level ≤+0 dBm, (Without MS2840A-022)
Output level ≤–5 dBm, (With MS2840A-022)
in CW mode, and when the offset from the output frequency: 15 kHz or more

100 MHz ≤ frequency ≤ 3 GHz	<–46 dBc
3 GHz < frequency ≤ 6 GHz	<–40 dBc

Vector modulation

Vector Accuracy

W-CDMA (DL1code),
Output level ≤0 dBm, (Without MS2840A-022)
Output level ≤–5 dBm, (With MS2840A-022)
output frequency: 800 MHz to 2700 MHz, and at 18°C to 28°C
≤1.4% (rms)

LTE-DL (20 MHz),
Output level ≤0 dBm, (Without MS2840A-022)
Output level ≤–5 dBm, (With MS2840A-022)
output frequency: 600 MHz to 2700 MHz, and at 18°C to 28°C
≤1.4% (rms)

Carrier leak

When RMS Value: 0 dB, 18°C to 28°C, 375 MHz ≤ frequency ≤ 2.4 GHz
≤–40 dBc

Image rejection

At 18°C to 28°C and when a sinusoidal wave of 10 MHz or less is used
≤–40 dBc

ACLR
At 18°C to 28°C, when
Output level ≤0 dBm, (Without MS2840A-022)
Output level ≤–5 dBm, (With MS2840A-022)
and when a W-CDMA (Test Model 1 64DPCH) signal is used

	5 MHz offset	10 MHz offset
375 MHz ≤ output frequency ≤ 2.4 GHz	≤–64 dBc/3.84 MHz	≤–67 dBc/3.84 MHz
2.4 GHz < output frequency ≤ 3.6 GHz	≤–59 dBc/3.84 MHz	≤–63 dBc/3.84 MHz
3.6 GHz < output frequency ≤ 6 GHz	≤–56 dBc/3.84 MHz	≤–60 dBc/3.84 MHz

Level error from CW during vector modulation
With an AWGN signal with a bandwidth of 5 MHz and at 18°C to 28°C
At 100 MHz ≤ frequency
When Output level ≤0 dBm (Without MS2840A-022)
or Output level ≤–5 dBm (With MS2840A-022)
±0.2 dB

Pulse modulation

On/Off ratio

Output frequency ≤ 3 GHz	>60 dB
3 GHz < Output frequency ≤ 6 GHz	>40 dB

Rising/falling time
≤90 ns (10 to 90%)

Pulse repetition frequency
DC to 1 MHz (Duty 50%)

External pulse modulation signal input
Rear panel Aux connector
TTL
H: Signal output On
L: Signal output Off

Waveform generator

Waveform resolution
I/Q is 14, 15, or 16 bits

Marker Output

When waveform resolution is 14 bits:	3 signals in the waveform pattern or 3 signals generated in real time
When waveform resolution is 15 bits:	1 signal in the waveform pattern or 3 signals generated in real time
When waveform resolution is 16 bits:	3 signals generated in real time

Can be toggled between positive and negative logic pulse output.

Internal baseband reference clock

Range	20 kHz to 160 MHz
Resolution	0.001 Hz

External baseband reference clock

Rang	20 kHz to 40 MHz
Divisional and multiplication function	A clock that is generated internally by multiplying the input signal by 1, 2, 4, 8, 16, 1/2, 1/4, 1/8, and 1/16 can be used as the DAC sampling clock.
Input connector	Rear AUX Connector
Input level	≥0.7 Vp-p/50Ω (AC coupling)

Waveform memory

Memory capacity	Without MS2840A-027 64 Msamples With MS2840A-027 256 Msamples
Number of loadable files	Up to 1,000 waveform patterns can be loaded per package and up to 100 packages can be loaded in the waveform memory. However, the total number of patterns must not exceed 4096, and there must be at least 128 samples per pattern.

SG Trigger Input: Starts outputting waveform pattern in sync with trigger signal.

Trigger type	Start trigger: Used to start waveform output Frame trigger: When executing burst output, this trigger is used to output signals at the burst timing. Burst length data is output when the frame trigger occurs and the system then waits for the next trigger.
Input connector	Rear panel, BNC-J connector Used to switch between start trigger and frame trigger
Input level	Can be selected from TTL, rising edge, or falling edge

AWGN generation function
Absolute value of CN ratio With MS2840A-028 ≤ 40 dB

Analog Function Extension for Vector Signal Generator Option MS2840A-029

Adds the analog signal generator function to MS2840A-020/021 vector signal generator option (with 022)

Low Phase Noise Performance Option MS2840A-066

The SSB phase noise is improved for RF input signals by provision of an internal dedicated frequency converter.

Precautions when Low Phase Noise option enabled (On)

The operation principle of the frequency converter is generation of a spurious response at a specific frequency. As a result, sometimes it is better not to use, such as when measuring spurious.

When the DUT signal frequency is known, when the MS2840A Rx frequency is set to 35 MHz beyond that frequency, measurement can be made as if the Low Phase Noise Function is Off (disabled) because the spurious response cannot be observed.

However, even if the DUT signal frequency is unknown, measurement can be made after setting the Low Phase Noise Function to Off (disabled) and verifying the presence of a response at about the same level (in other words, confirming that the observed signal has the correct response).

The spurious responses are as follows:

(1) Image Response

This response is generated when a signal with frequency *fin* is input to the MS2840A RF input connector and the MS2840A Rx frequency is set to *fin* –150 MHz, and more than 110 MHz (with MS2840A-066). The generated level is about –20 dBc.

(2) Multiple Response

This response is generated when a signal with frequency *fin* is input to the MS2840A RF input connector and the MS2840A Rx frequency is set to (*fin* ±75 MHz)/N–75 MHz (N: 1,2,3 ...), and more than 110 MHz (with MS2840A-066/166). The generated level is about –10 dBc.

Frequency

Frequency Range	9 kHz to 3.7 GHz 9 kHz to 3.5 GHz (Frequency Band Mode: Spurious)
SPAN	1 kHz to 31.25 MHz (Signal Analyzer function) 300 Hz to 1 MHz (Spectrum Analyzer function)
Single side band noise (SSB phase noise)	Refer to “Single side band noise (SSB phase noise)” of Signal Analyzer/Spectrum Analyzer.
Resolution bandwidth (RBW)	Refer to “Resolution bandwidth (RBW)” of Spectrum Analyzer.

Amplitude

Display average noise level (Signal Analyzer function)	Refer to “Display average noise level (DANL)” of Signal Analyzer.
Display average noise level (Spectrum analyzer function)	Refer to “Display average noise level (DANL)” of Spectrum Analyzer.

Spurious Response

Image response	Refer to “Image response” of Spectrum Analyzer.
Multiple response	Refer to “Multiple Response” of Spectrum Analyzer.

Others

This option is not available when MS2840A-044/046 is installed.

Microwave Preselector Bypass Option MS2840A-067

Summary:

By bypassing the preselector (image response elimination filter), the RF frequency characteristics and the in-band frequency characteristics are improved, and level accuracy improvement can be achieved.

Notes on default values when this option is installed:

To improve the in-band frequency characteristics, the default value is set to On for the Signal Analyzer function, and is always set to On for all other applications.

To avoid measuring the image signals generated internally, the default value is set to Off for the Spectrum Analyzer function.

Frequency

	Frequency range
MS2840A-044	4 GHz to 26.5 GHz
MS2840A-046	4 GHz to 44.5 GHz

Amplitude

RF frequency characteristics
At 18 to 28ºC, input attenuator: 10 dB,

	Microwave Preselector Bypass: ON	
	Without MS2840A-068/069 or Preamplifier turned off	With MS2840A-068/069 or Preamplifier turned on
6 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal 4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious	±1.00 dB	±1.8 dB
13.8 GHz < frequency ≤ 26.5 GHz	±1.50 dB	±2.50 dB
26.5 GHz < frequency ≤ 40 GHz	±2.00 dB	±3.00 dB
40 GHz < frequency ≤ 44.5 GHz	±2.00 dB (typ.)	±3.00 dB (nom.)

Display average noise level

Refer to "Display average noise level (DANL)" of Spectrum Analyzer

Image Response
MS2840A-067 installed and Microwave Preselector Bypass: OFF

6 GHz < frequency ≤ 13.5 GHz	–60 dBc
13.5 GHz < frequency ≤ 26.5 GHz	–60 dBc

MS2840A-067 installed and Microwave Preselector Bypass: ON
This is generated at "1.8755 GHz × 2".

4 GHz ≤ frequency ≤ 26.5 GHz	0 dBc (nom.)
26.5 GHz < frequency ≤ 44.5 GHz	0 dBc (nom.)

Noise Figure Measurement Function MS2840A-017

Frequency

Frequency setting range

MS2840A-040	10 MHz to 3.6 GHz
MS2840A-041	10 MHz to 6 GHz
MS2840A-044	10 MHz to 26.5 GHz
MS2840A-046	10 MHz to 44.5 GHz

Frequency range

MS2840A-040	30 MHz to 3.6 GHz
MS2840A-041	30 MHz to 6 GHz
MS2840A-044	30 MHz to 26.5 GHz
MS2840A-046	30 MHz to 40 GHz

NF measurement

Within the frequency range
Attenuator: 0 dB*

Range	–20 to +40 dB

*: Recommend to use Pre Amp

ENR	Instrument Uncertainty
4 to 7 dB	±0 .02 dB
12 to 17 dB	±0 .025 dB
20 to 22 dB	±0 .03 dB

Gain measurement

Range	–20 to +40 dB
Instrument Uncertainty	≤0.07 dB

Resolution bandwidth

Setting range: 100 kHz to 8 MHz

Microwave Preamplifier MS2840A-068

This option amplifies signal prior to 1st mixer to enhance sensitivity.

Frequency

Frequency range

MS2840A-046	100 kHz to 44.5 GHz

Amplitude

Measurement range	Refer to "Level measurement range" of Signal Analyzer/Spectrum Analyzer
Maximum input level	Refer to " Maximum input level" of Signal Analyzer/Spectrum Analyzer
Displayed average noise level (Signal Analyzer function)	Refer to " Displayed average noise level (DANL)" of Signal Analyzer
Displayed average noise level (Spectrum analyzer function)	Refer to "Display average noise level (DANL)" of Spectrum Analyzer
RF frequency characteristics	Refer to "RF Frequency Characteristics" of Signal Analyzer/Spectrum Analyzer
Input attenuator switching error	Refer to "Input attenuator switching uncertainty" of Signal Analyzer/Spectrum Analyzer
Linearity error	Refer to "Linearity error" of Signal Analyzer/Spectrum Analyzer
Secondary harmonic wave distortion	Refer to "Second harmonic distortion" of Signal Analyzer/Spectrum Analyzer
1 dB gain compression	Refer to "1 dB gain compression" of Signal Analyzer/Spectrum Analyzer
Two-tone third-order intermodulation distortion	Refer to "2-tone 3rd-order intermodulation distortion" of Spectrum Analyzer

Others

Dedicated option for MS2840A-046. Cannot be installed to MS2840A-040/041/044.

26.5 GHz Microwave Preamplifier Option MS2840A-069

Frequency

Frequency range	100 kHz to 26.5 GHz

Amplitude

Measurement range	Refer to “Level measurement range” of Signal Analyzer/Spectrum Analyzer.
Maximum input level	Refer to “Maximum input level” of Signal Analyzer/Spectrum Analyzer.
Display average noise level (Signal Analyzer function)	Refer to “Display average noise level (DANL)” of Signal Analyzer.
Display average noise level (Spectrum analyzer function)	Refer to “Display average noise level (DANL)” of Spectrum Analyzer.
RF Frequency Characteristics	Refer to “RF frequency characteristics” of Signal Analyzer/Spectrum Analyzer.
Input attenuator switching error	Refer to “Input attenuator switching uncertainty” of Signal Analyzer/Spectrum Analyzer.
Linearity error	Refer to “Linearity error” of Signal Analyzer/Spectrum Analyzer.
Secondary harmonic wave distortion	Refer to “Second harmonic distortion” of Signal Analyzer/Spectrum Analyzer.
1 dB gain compression	Refer to “1 dB gain compression” of Signal Analyzer/Spectrum Analyzer.
Two-tone third-order intermodulation distortion	Refer to “2-tone 3rd-order intermodulation distortion” of Spectrum Analyzer.

Others

Dedicated option for MS2840A-044. Cannot be installed to MS2840A-040/041/046.

Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option MS2840A-077/078

Extends the analysis bandwidth to 62.5 MHz/125 MHz in single analyzer function by bypassing a bandwidth-limiting filter such as a preselector and performing fast sampling.
On the other hand, because an image response is received due to bypassing the image response elimination filter, this is not adequate for measuring spurious or out-of-analysis-band signals and analyzing signals.

Functions

Model, Name	MS2840A-077 Analysis Bandwidth Extension to 62.5 MHz
	MS2840A-078 Analysis Bandwidth Extension to 125 MHz
Bandwidth	Refer to “Bandwidth” of Signal Analyzer.
Sampling rate	Refer to “Sampling rate” of Signal Analyzer.
Capture time	Refer to “Capture time” of Signal Analyzer.
Resolution bandwidth	Refer to “Resolution bandwidth” of Signal Analyzer.
ADC resolution	14 bit

Frequency

Frequency settings	Refer to “Frequency settings” of Signal Analyzer.

Amplitude

Refer to "Display average noise level (DANL)" of Signal Analyzer

Image response
Bandwidth >31.25 MHz.

With MS2840A-077	To be generated at a frequency that is 200 MHz away. 0 dBc (nom.) (300 MHz < frequency ≤ 44.5 GHz)
With MS2840A-077/078 and MS2840A-067	To be generated at a frequency that is 1.8755 GHz × 2 away. 0 dBc (nom.) (6 GHz < frequency ≤ 44.5 GHz)

RF frequency characteristics	Refer to “RF frequency characteristics” of Signal Analyzer/Spectrum Analyzer.
Linearity error	Refer to “Linearity error” of Signal Analyzer/Spectrum Analyzer.

3.6 GHz Analog Signal Generator Option MS2840A-088

Adds the analog signal generator function to MS2840A.
The Analog Signal Generator is used in combination with the MX269018A Analog Measurement Software.
See the MX2690xxA series Measurement Software for functions and specifications.
This option is not available when MS2840A-020/021 is installed.

Frequency

Setting range	100 kHz to 3000 MHz
Resolution	1 Hz

Output level

Setting range	–136 to +15 dBm (Rx frequency: >25 MHz) –136 to –3 dBm (Rx frequency: ≤25 MHz)
Level accuracy	18° to 28°C, CW 100 kHz ≤ frequency < 250 kHz –110 dBm ≤ output level ≤ –3 dBm ±3.0 dB (typ.) Refer to the MS2840A-020/021 and MS2840A-022 for the output level accuracy for other frequency ranges.

Vector Function Extension for Analog Signal Generator Option MS2840A-189

Adds the vector modulation function to MS2840A-088.

2 dB Step Attenuator for Millimeter-wave MS2840A-019

Expands step attenuator (mechanical) resolution from 10 dB (standard) to 2 dB on 44.5 GHz model.

Amplitude

Input attenuator

Refer to "Input attenuator range" of Signal Analyzer/Spectrum Analyzer

Input attenuator switching uncertainty

Refer to "Input attenuator switching uncertainty" of Signal Analyzer/Spectrum Analyzer

Displayed average noise level (DANL)

Refer to "Display average noise level (DANL)" of Spectrum Analyzer
Refer to "Display average noise level (DANL)" of Signal Analyzer

Noise Floor Reduction MS2840A-051

When measuring signals using the MS2840A, this option estimates the impact of the noise floor of the MS2840A to reduce the estimated impact on the measurement results.
The functions of this option can be used only by the spectrum analyzer function.

Noise Floor Reduction

If nothing is specified, the following conditions are assumed.
The in-band power per Hz is measured at each frequency band using the following settings assuming a temperature of 18°C to 28°C, Detector = Sample, RBW = 1 MHz, VBW = 1 Hz (Power Average), Input Attenuator = 0 dB, and termination at 50Ω.
Preselector Manual Tune = 0 Hz and after Analyze Noise Floor is done,
Center Frequency: (Center frequency of each frequency band + π × 1,000,000) Hz
Span: Bandwidth of each frequency band/10

MS2840A-040/041
With MS2840A-051, Span: 1 MHz

Center Frequency	Noise Floor Reduction	
	With MS2840A-066 and turned on	
	Without MS2840A-008 or Preamp turned off	With MS2840A-008 and Preamp turned on
2003.591593 MHz	11 dB (nom.)	11 dB (nom.)

MS2840A-040/041
With MS2840A-051

Frequency Range	Noise Floor Reduction	
	With MS2840A-066 and turned off or Without MS2840A-066	
	Without MS2840A-008 or Preamp turned off	With MS2840A-008 and Preamp turned on
9 kHz to 4000 MHz	11 dB (nom.)	11 dB (nom.)
3500 MHz to 4400 MHz	11 dB (nom.)	11 dB (nom.)
4300 MHz to 6100 MHz	11 dB (nom.)	11 dB (nom.)

MS2840A-044/046
With MS2840A-051, External Mixer: Off

Frequency Range	Noise Floor Reduction	
	With MS2840A-067 and Microwave Preselector Bypass turned on	
	Without MS2840A-068/069 or Preamp turned off	With MS2840A-068/069 and Preamp turned on
9 kHz to 4000 MHz	11 dB (nom.)	11 dB (nom.)
3500 MHz to 4400 MHz	11 dB (nom.)	11 dB (nom.)
4300 MHz to 6000 MHz	11 dB (nom.)	11 dB (nom.)
3900 MHz to 8000 MHz	7 dB (nom.)	7 dB (nom.)
7900 MHz to 10575 MHz	7 dB (nom.)	7 dB (nom.)
10475 MHz to 12200 MHz	7 dB (nom.)	7 dB (nom.)
12100 MHz to 18400 MHz	7 dB (nom.)	7 dB (nom.)
18300 MHz to 26600 MHz	7 dB (nom.)	7 dB (nom.)
26500 MHz to 42100 MHz	7 dB (nom.)	7 dB (nom.)
42000 MHz to 44500 MHz	7 dB (nom.)	7 dB (nom.)

MS2840A-044/046
With MS2840A-051, External Mixer: Off

Center Frequency	Noise Floor Reduction	
	With MS2840A-067 and Microwave Preselector Bypass turned off or Without MS2840A-067	
	Without MS2840A-068/069 or Preamp turned off	With MS2840A-068/069 and Preamp turned on
9 kHz to 4000 MHz	11 dB (nom.)	11 dB (nom.)
3500 MHz to 4400 MHz	11 dB (nom.)	11 dB (nom.)
4300 MHz to 6000 MHz	11 dB (nom.)	11 dB (nom.)
3900 MHz to 8000 MHz	7 dB (nom.)	7 dB (nom.)
7900 MHz to 10575 MHz	7 dB (nom.)	7 dB (nom.)
10475 MHz to 12200 MHz	7 dB (nom.)	7 dB (nom.)
12100 MHz to 18400 MHz	7 dB (nom.)	7 dB (nom.)
18300 MHz to 26600 MHz	7 dB (nom.)	7 dB (nom.)
26500 MHz to 42100 MHz	7 dB (nom.)	7 dB (nom.)
42000 MHz to 44500 MHz	7 dB (nom.)	7 dB (nom.)

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