

**Anritsu** envision : ensure

# 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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| Noise Floor Reduction .....  | 45 |

## Definitions

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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.

## 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] |  |                      |   |
| Activation characteristics                    | —   | Based on frequency 24 hours after power application, at 23°C<br>±5 × 10 <sup>-7</sup> (2 minutes after power application)<br>±5 × 10 <sup>-8</sup> (5 minutes after power application) |                      | Based on frequency 24 hours after power application, at 23°C<br>±1 × 10 <sup>-9</sup> (7 minutes after power application) |
| Aging rate                                    | ±1 × 10 <sup>-6</sup> /year   | ±1 × 10 <sup>-7</sup> /year  |                      | ±1 × 10 <sup>-10</sup> /month<br>±1 × 10 <sup>-9</sup> /year  |
| Temperature characteristics                   | ±2.5 × 10 <sup>-6</sup> (0° to 50°C)  | ±2 × 10 <sup>-8</sup> (0° to 50°C)   |                      | ±1 × 10 <sup>-9</sup> (0° to 50°C)  |
| Frequency accuracy at the initial calibration | ±1 × 10 <sup>-6</sup> (18° to 28°C, 1 hour after power application)   | ±2.2 × 10 <sup>-8</sup> (18° to 28°C, 1 hour after power application)  |                      | ±1 × 10 <sup>-10</sup> (18° to 28°C, 1 hour after power application)  |

## Single side band noise (SSB phase noise)

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

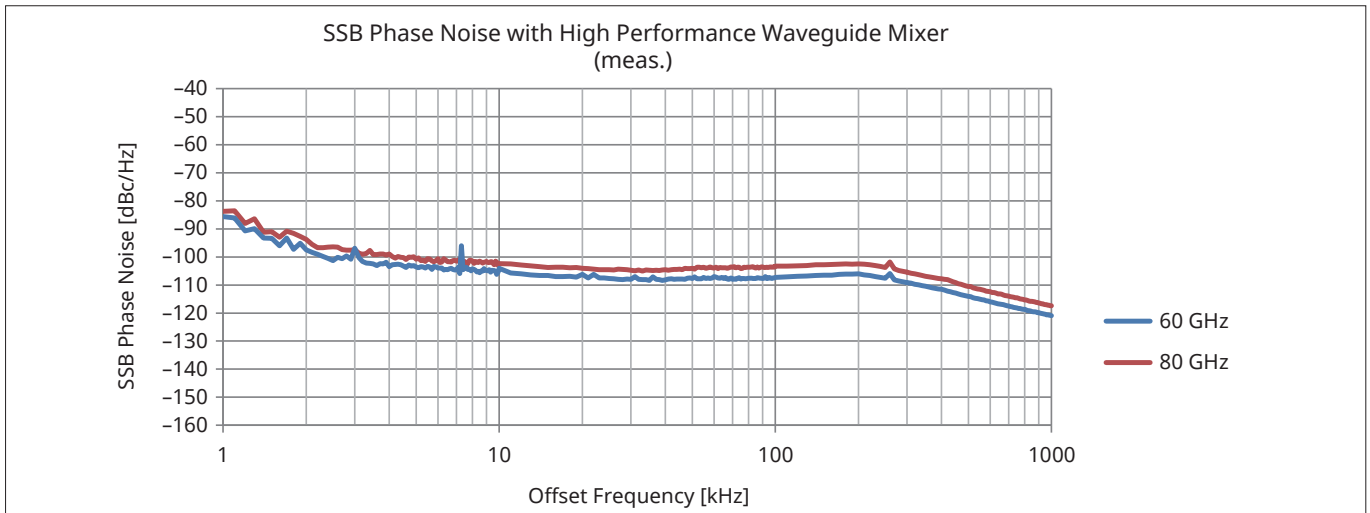
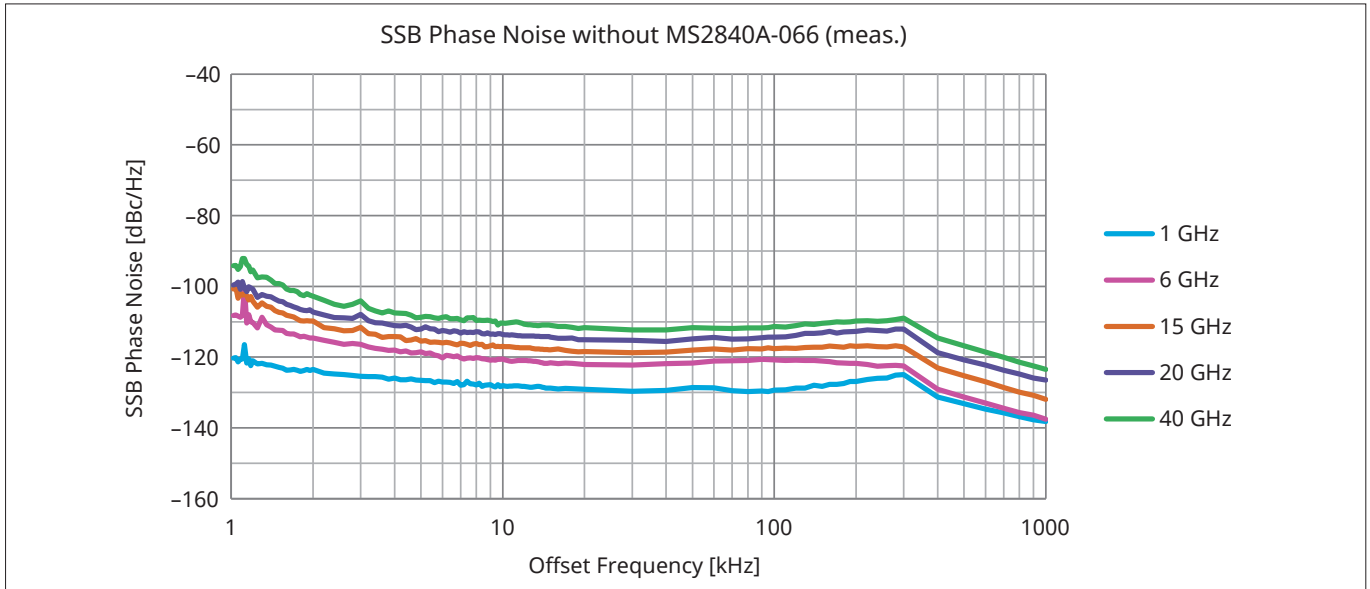
| Offset  | Specification       |
|---------|---------------------|
| 10 Hz   | -80 dBc/Hz (nom.)*  |
| 100 Hz  | -92 dBc/Hz (nom.)*  |
| 1 kHz   | -117 dBc/Hz (nom.)* |
| 10 kHz  | -123 dBc/Hz         |
| 100 kHz | -123 dBc/Hz         |
| 1 MHz   | -135 dBc/Hz         |
| 10 MHz  | -148 dBc/Hz (nom.)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

\*: Without MS2840A-001 and with MS2840A-002

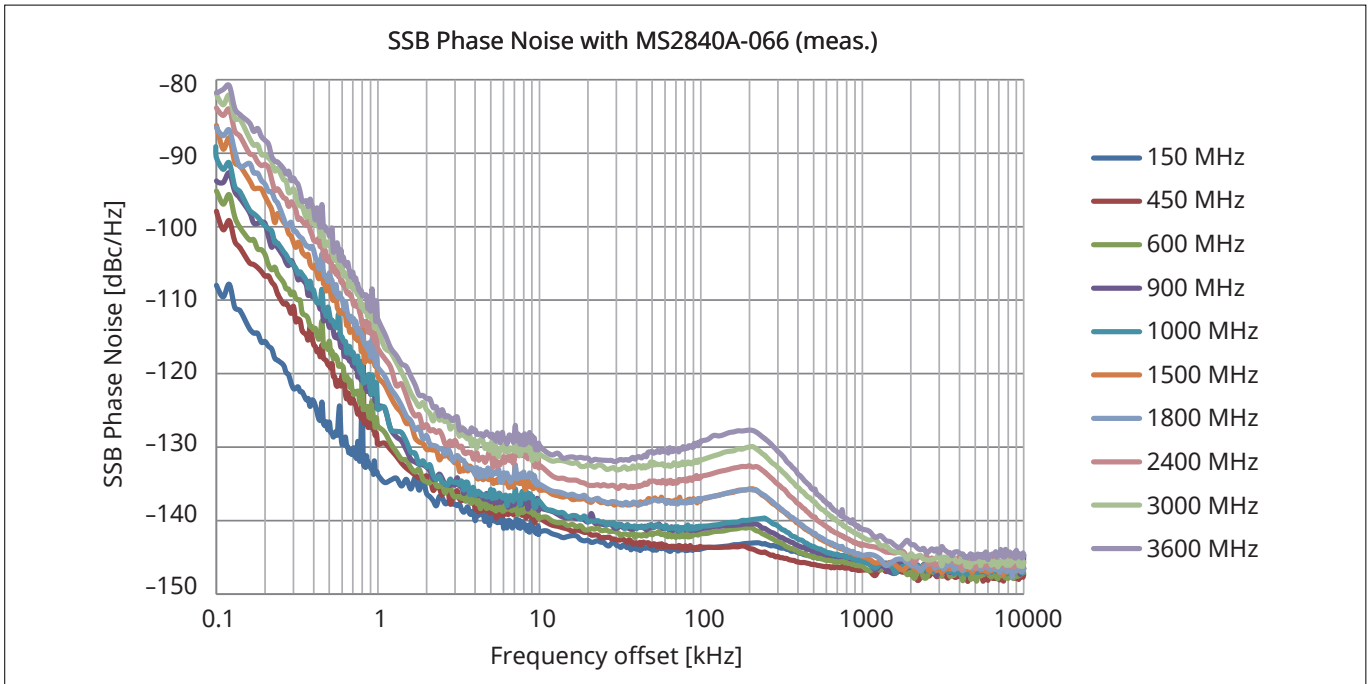
With MS2840A-066 installed and operating

(MS2840A-066: Enabled, Center frequency: 500 MHz, and SPAN ≤ 1 MHz as spectrum analyzer)  
at the temperature of 18° 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)<br>+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)<br>+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,<br>Frequency Band Mode: Normal, Stop frequency $\leq$ 6 GHz   | 0 to 60 dB, 2 dB Steps  |
| Attenuator Mode: E-ATT Combined Mode,<br>Frequency Band Mode: Spurious, Stop frequency $\leq$ 4 GHz |                         |
| Attenuator Mode: M-ATT Only   | 0 to 60 dB, 10 dB Steps |
| Attenuator Mode: E-ATT Combined Mode,<br>Frequency Band Mode: Normal, Stop frequency $>$ 6 GHz      |                         |
| Attenuator Mode: E-ATT Combined Mode,<br>Frequency Band Mode: Spurious, Stop frequency $>$ 4 GHz    |                         |

## Input attenuator switching uncertainty

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

| Frequency Range, Frequency Band Mode                                    | Specification                   |
|---|---------------------------------|
| 300 kHz $\leq$ frequency $<$ 4 GHz, Frequency Band Mode: Normal         | $\pm 0.20$ dB (10 to 60 dB)     |
| 300 kHz $\leq$ frequency $<$ 3.5 GHz, Frequency Band Mode: Spurious     |                                 |
| 4 GHz $\leq$ frequency $\leq$ 13.8 GHz, Frequency Band Mode: Normal     | $\pm 0.75$ dB (10 to 60 dB)     |
| 3.5 GHz $\leq$ frequency $\leq$ 13.8 GHz, Frequency Band Mode: Spurious |                                 |
| 13.8 GHz $<$ frequency $\leq$ 26.5 GHz                                  | $\pm 0.80$ dB (10 to 60 dB)     |
| 26.5 GHz $<$ frequency $\leq$ 40 GHz                                    | $\pm 1.0$ dB (10 to 60 dB)      |
| 40 GHz $<$ frequency $\leq$ 44.5 GHz                                    | $\pm 1.0$ 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  $\mu$ V 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, dB $\mu$ V, dBmV, dB $\mu$ V (emf), dB $\mu$ V/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 $\leq$ -20 dBm  | $\pm 0.07$ dB        |
|   | Mixer input level $\leq$ -10 dBm  | $\pm 0.10$ dB        |
| With MS2840A-008/068/069 and Preamp On                                      | Preamplifier input level $\leq$ -40 dBm   | $\pm 0.07$ dB        |
|   | Preamplifier input level $\leq$ -30 dBm   | $\pm 0.10$ dB        |
| Attenuator Mode: E-ATT Combined, without MS2840A-008/068/069, or Preamp Off | Mixer input level $\leq$ -20 dBm, RF input level $\leq$ -10 dBm                                       | $\pm 0.07$ dB        |
|   | Mixer input level $\leq$ -10 dBm, RF input level $\leq$ -10 dBm                                       | $\pm 0.10$ dB        |
|   | Mixer input level $\leq$ -20 dBm, 9 kHz $\leq$ frequency $\leq$ 300 MHz, RF input level $\leq$ +5 dBm | $\pm 0.07$ dB (nom.) |
|   | Mixer input level $\leq$ -20 dBm, 300 MHz $<$ frequency $\leq$ 6 GHz, RF input level $\leq$ +20 dBm   |                      |
|   | Mixer input level $\leq$ -10 dBm, 9 kHz $\leq$ frequency $\leq$ 300 MHz, RF input level $\leq$ +5 dBm | $\pm 0.10$ dB (nom.) |
|   | Mixer input level $\leq$ -10 dBm, 300 MHz $<$ frequency $\leq$ 6 GHz, RF input level $\leq$ +20 dBm   |                      |

## RF frequency characteristics

18° 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<br>50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious | ±0.35 dB                                 | —                              |
| 4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal<br>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<br>300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious | ±0.65 dB                              | —                              |
| 4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal<br>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<br>50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious   | ±0.35 dB   |
| 4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal<br>3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious     | ±1.50 dB   |
| 6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal<br>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<br>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<br>3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious       | ±1.8 dB                               | —   |
| 4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal<br>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<br>300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious | ≥+3 dBm |
| 4 GHz < frequency ≤ 6 GHz, Frequency Band Mode: Normal<br>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<br>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<br>Frequency Band Mode: Normal      | ≤-80 dBc  | ≥+60 dBm |
| 1.75 GHz ≤ Input frequency ≤ 3 GHz<br>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.) |

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## Residual responses

Frequency  $\geq 1$  MHz, Input attenuator 0 dB, 50 $\Omega$  terminated  
(With MS2840A-077/078, excluding Bandwidth  $> 31.25$  MHz.)

|  | Specification         |
|--|-----------------------|
| 1 MHz $\leq$ frequency $\leq$ 1 GHz    | $\leq -100$ dBm       |
| 1 GHz $<$ frequency $\leq$ 6 GHz       | $\leq -90$ dBm (typ.) |
| 6 GHz $<$ frequency $\leq$ 13.6 GHz    | $\leq -90$ dBm (nom.) |
| 13.6 GHz $<$ frequency $\leq$ 26.5 GHz | $\leq -90$ dBm (nom.) |
| 26.5 GHz $<$ frequency $\leq$ 44.5 GHz | $\leq -80$ dBm (nom.) |

## 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:  $\pm 0.2\%$  (Trace Point 10,001)

### Display frequency accuracy

$\pm (\text{Display frequency} \times \text{Frequency reference accuracy} + \text{Span frequency} \times \text{Span accuracy} + \text{RBW} \times 0.05 + 2 \times N + \text{Span frequency}/(\text{Trace points} - 1)) \text{ Hz}$   
 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<br>1 Hz to 10 Hz: Can not be set when Span 0 Hz<br>31.25 MHz: Can be set when Span 0 Hz only<br>When MS2840A-046 is installed, 20 MHz and 31.25 MHz are not available.<br>20 MHz and 31.25 MHz cannot be set when using the External Mixer MA2740C/MA2750C series and High Performance Waveguide Mixer MA2806A/MA2808A. |
| 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° 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 $\leq$ frequency < 100 kHz        | -120 dBm/Hz                              | -120 dBm/Hz      |
| 100 kHz $\leq$ frequency < 1 MHz        | -134 dBm/Hz                              | -133 dBm/Hz      |
| 1 MHz $\leq$ frequency < 10 MHz         | -144 dBm/Hz                              | -143 dBm/Hz      |
| 10 MHz $\leq$ frequency < 30 MHz        | -150 dBm/Hz                              | -149 dBm/Hz      |
| 30 MHz $\leq$ frequency < 1 GHz         | -153 dBm/Hz                              | -152 dBm/Hz      |
| 1 GHz $\leq$ frequency < 2.4 GHz        | -151 dBm/Hz                              | -150 dBm/Hz      |
| 2.4 GHz $\leq$ frequency $\leq$ 3.6 GHz | -149 dBm/Hz                              | -147 dBm/Hz      |
| MS2840A-041                             |  |                  |
| 3.5 GHz < frequency $\leq$ 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<br>MS2840A-019 | MS2840A-044/046                            | With MS2840A-046<br>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,<br>with MS2840A-068/069 and Preamp turned on |                                 |
|---------------------------------|--|---------------------------------|
|                                 | MS2840A-044/046  | With MS2840A-046<br>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<br>MS2840A-019 | MS2840A-044/046                            | With MS2840A-046<br>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<br>With MS2840A-068/069 and Preamp turned on |                   |                                 |
|---------------------------------|--|-------------------|---------------------------------|
|                                 | MS2840A-044  | MS2840A-046       | With MS2840A-046<br>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<br>With MS2840A-068/069 and Preamp turned on |                   |                                 |
|---------------------------------|--|-------------------|---------------------------------|
|                                 | MS2840A-044  | MS2840A-046       | With MS2840A-046<br>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° 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<br>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<br>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 |   |
|--|--|---|
|  | 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<br>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<br>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<br>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° 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<br>300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious | ≤-62 dBc  | +16 dBm |
| 4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal<br>3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious     | ≤-60 dBc  | +15 dBm |

With MS2840A-008 and with Preamplifier turned on

At 18° 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<br>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<br>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° 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<br>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<br>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° 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° 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<br>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<br>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<br>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° 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<br>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     | -5 dBm < RF input level ≤ +15 dBm | ≤-62 dBc (nom.) | +16 dBm (nom.) |
| 300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious |                                   |                 |                |
| 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<br>(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)

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## 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)

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### Burst average

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

---

### Channel power

Absolute value measurement: dBm, dBm/Hz

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### 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<br>Bandwidth $\leq$ 31.25 MHz        | With MS2840A-077 and<br>Bandwidth $>$ 31.25 MHz | With MS2840A-078 and<br>Bandwidth $>$ 31.25 MHz                  |
|----------------------|---|---|--|
| Capture Time Length  | Sets the capture time length                                    |   |  |
| Minimum capture time | 2 $\mu$ s to 50 ms (determined depending on analysis bandwidth) | 1 $\mu$ s                                       | 500 ns to 1 $\mu$ s (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  $\leq$  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

$$\pm (\text{Indicator frequency} \times \text{reference frequency accuracy} + \text{SPAN frequency} \times \text{reference frequency accuracy} + \text{RBW} \times 0.05 + 2 \times N + \text{Span frequency}/(\text{Trace points} - 1)) \text{ Hz}$$

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° 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<br>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<br>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 Pre-amplifier turned off | With MS2840A-068/069 and Pre-amplifier turned on |
|--|---|--|
| 300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal<br>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<br>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<br>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° 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<br>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<br>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° to 28°C in center frequency ± 10 MHz

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

### Displayed average noise level (DANL)

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

With MS2840A-040/041

|                               | Without MS2840A-008 or Pre-amplifier 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 Pre-amplifier 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<br>3.5 GHz < frequency ≤ 4 GHz   | -158.5 dBm/Hz                               | -155.5 dBm/Hz                             | —  |
| Frequency Band Mode: Spurious<br>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<br>MS2840A-019 | MS2840A-044/046                            | With MS2840A-046<br>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,<br>With MS2840A-068/069 and Preamp turned on |                                 |
|---------------------------------|--|---------------------------------|
|                                 | MS2840A-044/046  | With MS2840A-046<br>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<br>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<br>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<br>MS2840A-019 | MS2840A-044/046                            | With MS2840A-046<br>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<br>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,  $SPAN \leq 31.25 \text{ MHz}$ , Scale =  $SPAN/25$ , CW  
 $\pm$  (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° 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.)<br>Bias current: Range 0 to 20.0 mA/Resolution 0.1 mA |
| Input     | IF signal: frequency 1.875 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 | 1.875 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

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### Ethernet (10/100/1000 Base-T)

Connector: Rear Panel, RJ-45

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### GPIB

IEEE 488.2 compatible

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

---

### USB (B)

USB 2.0 compatible

Connector: Rear panel, USB-B Connector

### USB

USB 2.0 compatible

Enables waveform hard copy to USB compatible external device and saving mainframe 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. 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

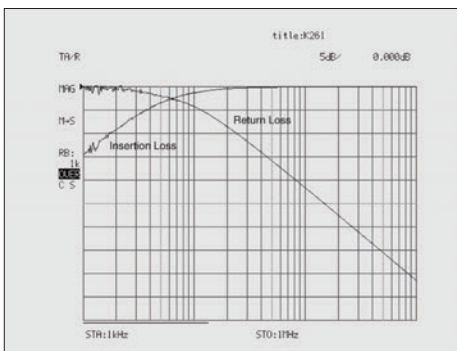
\*2: Compatible with SMA and APC3.5

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

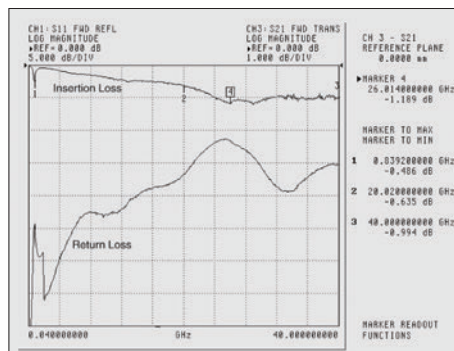
### Specifications outlines of recommended DC Blocks and Adapters

|          | 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)   |
|          | J1554A   | DC Block, SMA type (MODEL 7006)   | SMA (M)-SMA (F) | 9 kHz to 26.5 GHz | 1.50 (9 kHz to 20 kHz), 1.35 (20 kHz to 20 GHz), 1.70 (20 GHz to 26.5 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 MS2840A/MS2830A/MS269xA series signal analyzer

|                | Model       | Frequency Range   | RF connector | Recommended DC Block Order Name | Recommended Adapter Order Name |
|----------------|-------------|-------------------|--------------|---------------------------------|--------------------------------|
| MS2840A series | MS2840A-046 | 9 kHz to 44.5 GHz | K (F)        | K261                            | 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)        | J1554A                          | J1398A                         |
|                | MS2830A-045 | 9 kHz to 43 GHz   | K (F)        | K261                            | Not required                   |
| MS269xA series | MS2690A     | 50 Hz to 6 GHz    | N (F)        | J1555A                          | J0004                          |
|                | MS2691A     | 50 Hz to 13.5 GHz | N (F)        | J1555A                          | J1398A                         |
|                | MS2692A     | 50 Hz to 26.5 GHz | N (F)        | J1554A                          | J1398A                         |

## Display

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

## External Mixer

This is available when MS2840A-044/046 is installed.

## Frequency

Frequency range: 26.5 GHz to 325 GHz

## Frequency bands

| Band     | Frequency range        | Mixer harmonics order (N) |
|----------|------------------------|---------------------------|
| Band VHP | 50.0 GHz to 75.0 GHz   | 8+                        |
| Band EHP | 60.0 GHz to 90.0 GHz   | 12-                       |
| Band A   | 26.5 GHz to 40.0 GHz   | 4+                        |
| Band Q   | 33.0 GHz to 50.0 GHz   | 5+                        |
| Band U   | 40.0 GHz to 60.0 GHz   | 6+                        |
| Band V   | 50.0 GHz to 75.0 GHz   | 8+                        |
| Band E   | 60.0 GHz to 90.0 GHz   | 9+                        |
| Band W   | 75.0 GHz to 110.0 GHz  | 11+                       |
| Band F   | 90.0 GHz to 140.0 GHz  | 14+                       |
| Band D   | 110.0 GHz to 170.0 GHz | 17+                       |
| Band G   | 140.0 GHz to 220.0 GHz | 22+                       |
| Band Y   | 170.0 GHz to 260.0 GHz | 26+                       |
| Band J   | 220.0 GHz to 325.0 GHz | 33+                       |

## Amplitude

|                       |                           |
|-----------------------|---------------------------|
| Mixer conversion loss | 0 to 99.9 dB              |
| Maximum input level   | Depends on external mixer |
| Average noise level   | Depends on external mixer |
| Frequency response    | Depends on external mixer |

## Input/Output

|                  |                   |
|------------------|-------------------|
| Applicable mixer | 2-port mixer only |
| Local frequency  | 5 GHz to 10 GHz   |
| IF frequency     | 1.875 GHz         |

# High Performance Waveguide Mixer MA2806A/MA2808A

## Electrical Characteristics

|                               |                      |             |                  |
|-------------------------------|----------------------|-------------|------------------|
| Model No.                     | MA2806A              |             | MA2808A          |
| Frequency Range               | 50 GHz to 75 GHz     |             | 60 GHz to 90 GHz |
| LO Amplitude Range            | >+10 dBm             |             |                  |
| Multiplier                    | 8                    |             | 12               |
| Conversion Loss*              | <15 dB (typ.)        |             |                  |
| 1 dB Gain Compression (P1dB)* | >0 dBm (typ.)        |             |                  |
| LO Leakage                    | <-30 dBm (nom.)      |             |                  |
| RF Input VSWR                 | ≤1.5 (nom.)          |             |                  |
| IF/LO Port VSWR               | 1.875 GHz (IF)       | ≤2.0 (nom.) |                  |
|                               | 5 GHz to 10 GHz (LO) | ≤2.4 (nom.) | ≤2.0 (nom.)      |
| Maximum Input Level (CW)      | +10 dBm              |             |                  |

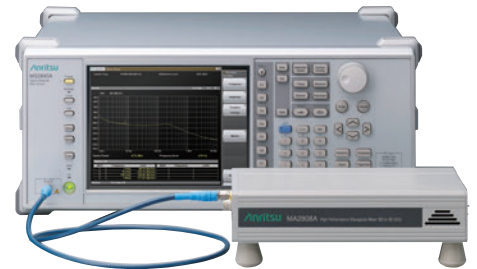
\*: At assured performance temperature range

## Interface

|           |                                    |  |                                    |
|-----------|------------------------------------|--|------------------------------------|
| Model No. | MA2806A                            |  | MA2808A                            |
| RF        | Waveguide, Flange (WR15, UG-385/U) |  | Waveguide, Flange (WR12, UG-387/U) |
| IF/LO     | SMA-J                              |  |                                    |

## General

|                     |   |
|---------------------|---|
| Power Supply        | 100 V(ac) to 120 V(ac)/200 V(ac) to 240 V(ac), 50 Hz/60 Hz, 40 VA   |
| Dimensions and Mass | 134 (W) × 51 (H) × 229 (D) mm (excluding projections), <2 kg  |
| Temperature Range   | Assured performance range: +18° to +28°C<br>Operating: +5° to +45°C (no condensation)<br>Storage: -20° to +60°C (no condensation) |
| EMC                 | 2014/30/EU, EN61326-1, EN61000-3-2  |

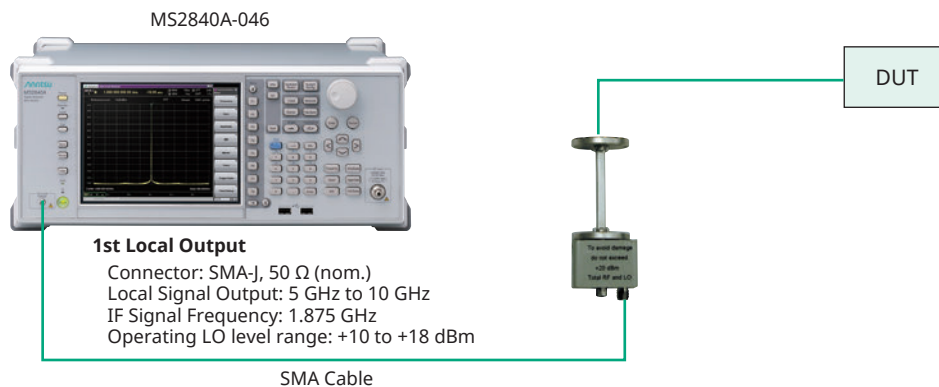


## External Mixer MA2740C/MA2750C Series

The MA2740C/MA2750C series of External Mixers (Harmonic Mixers) supports spectrum measurements up to 325 GHz with high sensitivity and fewer LO harmonic order because these mixers output 1st local signals from 5 GHz to 10 GHz.

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

\*: The Conversion loss is a typical value near the center frequency of each band but is not a guaranteed specification.



## 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)<br>≤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)<br>140 VA (nom.) (With MS2840A-040/041 installed, excluding other options)<br>220 VA (nom.) (With MS2840A-040/041, -020/021 and -022 installed, excluding other options)<br>220 VA (nom.) (With MS2840A-044/046 installed, excluding other options) |

### Temperature

|                       |               |
|-----------------------|---------------|
| Operating temperature | 0° to +50°C   |
| Storage temperature   | -20° 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            |

### CPU, OS

|             |                              |
|-------------|------------------------------|
| CPU         | Intel Core i5-4400E, 2.7 GHz |
| 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 removable 2ndary SDD is installed in the SDD Option Slot of the MS2840A main frame to expand the user data storage space. It does not have the Windows OS installed. The MS2840A ships with it installed. Only one expansion SDD can be installed in the MS2840A. It is useful when taking the instrument for calibration but the security of saved user data, such as measurement results, must be protected.

## 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<br>PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix<br>UserDefine (4096 bits max.)   |
| Synchronization establishing condition | PN signal: No error has been detected for (PN stage count × 2) bits<br>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.<br>ALL0, ALL1, repetition of 01: No error has been detected for 10 bits.<br>UserDefine: No error has been detected for 8 to 1024 bits (variable).<br>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.)<br>y (Measurement bit count): Selected from 500 bits, 5000 bits, and 50000 bits<br>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<br>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° 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 $\leq$ 25 MHz                 | -110 dBm $\leq$ Output level $\leq$ -3 dBm | $\pm$ 1.0 dB (typ.) |
| 25 MHz < frequency < 100 MHz            | -110 dBm $\leq$ Output level $\leq$ +4 dBm | $\pm$ 1.0 dB (typ.) |
| 100 MHz $\leq$ frequency < 375 MHz      | -110 dBm $\leq$ Output level $\leq$ +4 dBm | $\pm$ 0.5 dB (typ.) |
| 375 MHz $\leq$ frequency $\leq$ 3.6 GHz | -110 dBm $\leq$ Output level $\leq$ +4 dBm | $\pm$ 0.5 dB        |
| Frequency > 3.6 GHz                     | -110 dBm $\leq$ Output level $\leq$ -1 dBm | $\pm$ 0.8 dB        |
| 100 MHz $\leq$ frequency $\leq$ 3.6 GHz | -120 dBm $\leq$ Output level < -110 dBm    | $\pm$ 1 dB          |
| 100 MHz $\leq$ frequency $\leq$ 3.6 GHz | -127 dBm $\leq$ Output level < -120 dBm    | $\pm$ 1 dB (typ.)   |
| Frequency > 3.6 GHz                     | -127 dBm $\leq$ Output level < -110 dBm    | $\pm$ 2.5 dB (typ.) |

Output level linearity

In CW mode, at 18° to 28°C:

Without MS2840A-022

With -10 dBm as the output reference

|                          |  |                     |
|--------------------------|--|---------------------|
| Frequency $\leq$ 3.6 GHz | -40 dBm $\leq$ Output level $\leq$ -10 dBm | $\pm$ 0.2 dB (typ.) |
| Frequency > 3.6 GHz      | -40 dBm $\leq$ Output level $\leq$ -10 dBm | $\pm$ 0.3 dB (typ.) |

With MS2840A-022

With -15 dBm as the output reference

|                          |   |                     |
|--------------------------|---|---------------------|
| Frequency $\leq$ 3.6 GHz | -110 dBm $\leq$ Output level $\leq$ -15 dBm | $\pm$ 0.2 dB (typ.) |
| Frequency > 3.6 GHz      | -110 dBm $\leq$ Output level $\leq$ -15 dBm | $\pm$ 0.3 dB (typ.) |

## Output connector

N-J connector, 50  $\Omega$  (front panel, SG Output (Opt))

VSWR

at 18° to 28°C:

|                          | Without MS2840A-022<br>Output level: -10 dBm or less | With MS2840A-022<br>Output level: -15 dBm or less |
|--------------------------|--|---|
| Frequency $\leq$ 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 $\geq$ 20 MHz | +24 dBm             | +30 dBm          |

## Signal Purity

Harmonic spurious

Output level  $\leq$  +0 dBm, (Without MS2840A-022)

Output level  $\leq$  -5 dBm, (With MS2840A-022)

in CW mode

|                                       |          |
|---------------------------------------|----------|
| 1 MHz $\leq$ frequency $\leq$ 3.6 GHz | <-30 dBc |
| 3.6 GHz < frequency                   | <-30 dBc |

Non-harmonic spurious

Output level  $\leq$  +0 dBm, (Without MS2840A-022)

Output level  $\leq$  -5 dBm, (With MS2840A-022)

in CW mode, and when the offset from the output frequency: 15 kHz or more

|                                       |          |
|---------------------------------------|----------|
| 100 MHz $\leq$ frequency $\leq$ 3 GHz | <-46 dBc |
| 3 GHz < frequency $\leq$ 6 GHz        | <-40 dBc |

---

## Vector modulation

### Vector Accuracy

W-CDMA (DL 1 code),  
Output level  $\leq 0$  dBm, (Without MS2840A-022)  
Output level  $\leq -5$  dBm, (With MS2840A-022)  
output frequency: 800 MHz to 2700 MHz, and at 18° to 28°C  
 $\leq 1.4\%$  (rms)

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

### Carrier leak

When RMS Value: 0 dB, 18° to 28°C, 375 MHz  $\leq$  frequency  $\leq$  2.4 GHz  
 $\leq -40$  dBc

### Image rejection

At 18° to 28°C and when a sinusoidal wave of 10 MHz or less is used  
 $\leq -40$  dBc

### ACLR

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

|  | 5 MHz offset            | 10 MHz offset           |
|--|-------------------------|-------------------------|
| 375 MHz $\leq$ output frequency $\leq$ 2.4 GHz | $\leq -64$ dBc/3.84 MHz | $\leq -67$ dBc/3.84 MHz |
| 2.4 GHz < output frequency $\leq$ 3.6 GHz      | $\leq -59$ dBc/3.84 MHz | $\leq -63$ dBc/3.84 MHz |
| 3.6 GHz < output frequency $\leq$ 6 GHz        | $\leq -56$ dBc/3.84 MHz | $\leq -60$ dBc/3.84 MHz |

### Level error from CW during vector modulation

With an AWGN signal with a bandwidth of 5 MHz and at 18° to 28°C  
At 100 MHz  $\leq$  frequency  
When Output level  $\leq 0$  dBm (Without MS2840A-022)  
or Output level  $\leq -5$  dBm (With MS2840A-022)  
 $\pm 0.2$  dB

---

## Pulse modulation

### On/Off ratio

|                                       |        |
|---------------------------------------|--------|
| Output frequency $\leq 3$ GHz         | >60 dB |
| 3 GHz < Output frequency $\leq 6$ GHz | >40 dB |

### Rising/falling time

$\leq 90$  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<br>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<br>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<br>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<br>9 kHz to 3.5 GHz (Frequency Band Mode: Spurious)                          |
| SPAN                                     | 1 kHz to 31.25 MHz (Signal Analyzer function)<br>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 28°C, 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<br>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 |
|--|

## 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.<br>0 dBc (nom.) (300 MHz < frequency ≤ 44.5 GHz)    |
| With MS2840A-077/078 and MS2840A-067 | To be generated at a frequency that is 1875 MHz × 2 away.<br>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)<br>-136 to -3 dBm (Rx frequency: ≤25 MHz)  |
| Level accuracy | 18° to 28°C, CW<br>100 kHz ≤ frequency < 250 kHz<br>-110 dBm ≤ output level ≤ -3 dBm<br>±3.0 dB (typ.)<br><br>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 or by connecting an external mixer to the MS2840A, this option estimates the impact of the noise floor of these measuring instruments 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° 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 +  $\pi \times 1,000,000$ ) 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.)                               |

MS2840A-044/046

With MS2840A-051, External Mixer: On,

When using external mixer

After executing Analyze External Mixer Noise Floor and setting Span as each frequency bandwidth/100 with external mixer,

| Noise Floor Reduction |
|-----------------------|
| 11 dB (nom.)          |

However, the Noise Floor attenuation depends on the external mixer being used.



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