MG3710A
Vector Signal Generator
100 kHz to 2.7 GHz
100 kHz to 4.0 GHz
100 kHz to 6.0 GHz
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Definitions

Typical (typ.)
Performance not warranted. Must products meet typical performance.

Nominal (nom.)
Values not warranted. Included to facilitate application of product.

Measured (meas)
Performance not warranted. Data actually measured by randomly selected measuring instruments.

Conditions of Specifications
The conditions are as follows unless specified otherwise.

CW/Modulation Mode
After 30-minute warm-up (at constant ambient temperature)
Pulse Modulation: Off
ATT Hold: Off
Optimize S/N Mode: Off
*: f > 2.7 GHz: Use MG3710A-034/036, MG3710A-064/066
f > 4 GHz: Use MG3710A-036, MG3710A-066

Modulation Mode only
Waveform pattern RMS value: At RMSw (Linear value) and each combination less than following ranges:
\[-3.00 \text{ dB} \leq \text{RMSnom} \leq +3.00 \text{ dB}\]
\[
\text{RMSnom} = 20 \cdot \log (\text{RMSw}/4628) \text{ (16-bit Data)} \\
\text{RMSnom} = 20 \cdot \log (\text{RMSw}/2314) \text{ (15-bit Data)} \\
\text{RMSnom} = 20 \cdot \log (\text{RMSw}/1157) \text{ (14-bit Data)}
\]
after CAL

*: Applies to MG3710A-062/064/066
## Frequency

### Setting Range

<table>
<thead>
<tr>
<th>1st SG</th>
<th>9 kHz to 2.7 GHz [MG3710A-032]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 kHz to 4 GHz [MG3710A-034]</td>
</tr>
<tr>
<td></td>
<td>9 kHz to 6 GHz [MG3710A-036]</td>
</tr>
<tr>
<td>2nd SG</td>
<td>9 kHz to 2.7 GHz [MG3710A-062]</td>
</tr>
<tr>
<td></td>
<td>9 kHz to 4 GHz [MG3710A-064]</td>
</tr>
<tr>
<td></td>
<td>9 kHz to 6 GHz [MG3710A-066]</td>
</tr>
</tbody>
</table>

Resolution: 0.01 Hz

### Phase Offset

Range: –180.00 deg. to +180.00 deg.
Resolution: 0.01 deg.

### Switching Speed

≤600 μs
(Time from trigger input to final frequency ±0.1 ppm or within 100 Hz when executing List function at frequency of >187.5 MHz)

### Internal Reference Oscillator

- **without MG3710A-001/002**
  - Aging rate: ±1 × 10⁻⁷/year
  - Temperature characteristics: ±2.5 × 10⁻⁶ (5° to 45°C)

- **with MG3710A-001**
  - Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on
    - ±1 × 10⁻⁴ (7.5 minutes after power-on)
  - Aging rate: ±1 × 10⁻⁷/month
  - Temperature characteristics: ±2 × 10⁻⁸ (5° to 45°C)

- **with MG3710A-002**
  - Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on
    - ±5 × 10⁻⁷ (2 minutes after power-on)
    - ±5 × 10⁻⁸ (5 minutes after power-on)
  - Aging rate: ±1 × 10⁻⁷/year
  - Temperature characteristics: ±2 × 10⁻⁸ (5° to 45°C)
Output Level

Setting Range

without MG3710A-043/073
-110 to +17 dBm [without MG3710A-041/042], [without MG3710A-071/072]
-110 to +30 dBm [with MG3710A-041, without MG3710A-042], [with MG3710A-071, without MG3710A-072]
-144 to +17 dBm [without MG3710A-041, with MG3710A-042], [without MG3710A-071, with MG3710A-072]
-144 to +30 dBm [with MG3710A-041/042], [with MG3710A-071/072]

with MG3710A-043/073
-110 to +17 dBm [without MG3710A-041/042], [without MG3710A-071/072]
-110 to +25 dBm [with MG3710A-041, without MG3710A-042], [with MG3710A-071, without MG3710A-072]
-144 to +17 dBm [without MG3710A-041, with MG3710A-042], [without MG3710A-071, with MG3710A-072]
-144 to +25 dBm [with MG3710A-041/042], [with MG3710A-071/072]

Unit
dBm, dBµV (Terminated, Open)

Resolution
0.01 dB

Switching Speed
≤600 µs
(Time from trigger input to final level ±0.2 dB at frequency of >187.5 MHz)
(Output Level: ≤+7 dBm [without MG3710A-041], [without MG3710A-071])
## Level Accuracy

18° to 28°C, CW

without Reverse Power Protection [without MG3710A-043], [without MG3710A-073]

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension</th>
<th>High Power Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MG3710A-042/072</td>
<td>MG3710A-041/071</td>
</tr>
<tr>
<td>100 kHz ≤ f &lt; 1 MHz</td>
<td>≤+20 dBm &gt;+13 dBm</td>
<td>≤+10 dBm &gt;+5 dBm</td>
</tr>
<tr>
<td></td>
<td>≤+13 dBm &gt;+11 dBm</td>
<td>≤+10 dBm &gt;+5 dBm</td>
</tr>
<tr>
<td></td>
<td>≤+20 dBm &gt;+13 dBm</td>
<td>≤+13 dBm &gt;+11 dBm</td>
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</table>

with Reverse Power Protection [with MG3710A-043], [with MG3710A-073]

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<td>≤+20 dBm &gt;+13 dBm</td>
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<tr>
<td></td>
<td>≤+13 dBm &gt;+11 dBm</td>
<td>≤+10 dBm &gt;+5 dBm</td>
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<tr>
<td></td>
<td>≤+20 dBm &gt;+13 dBm</td>
<td>≤+13 dBm &gt;+11 dBm</td>
</tr>
</tbody>
</table>

* (typ.) — typical value
Level accuracy at -112 dBm

Amplitude repeatability +5 dBm ALC on
**Level Linearity**

18° to 28°C, CW

without Reverse Power Protection [without MG3710A-043, [without MG3710A-073]

Referenced to level: –7 dBm

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension MG3710A-042/072</th>
<th>High Power Extension MG3710A-041/071</th>
<th>≤+2 dBm</th>
<th>&gt;–110 dBm</th>
<th>&gt;–120 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MHz ≤ f &lt; 400 MHz</td>
<td>without</td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>±0.2 dB (typ.)</td>
<td>—</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz</td>
<td>without</td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>±0.2 dB (typ.)</td>
<td>—</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz</td>
<td>without</td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.3 dB (typ.)</td>
<td>—</td>
</tr>
<tr>
<td>4 GHz &lt; f ≤ 6 GHz</td>
<td>without</td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

with Reverse Power Protection [with MG3710A-043], [with MG3710A-073]

Referenced to level: –10 dBm

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension MG3710A-042/072</th>
<th>High Power Extension MG3710A-041/071</th>
<th>≤–1 dBm</th>
<th>&gt;–100 dBm</th>
<th>&gt;–110 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MHz ≤ f &lt; 400 MHz</td>
<td>without</td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz</td>
<td>without</td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz</td>
<td>without</td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.4 dB (typ.)</td>
<td>—</td>
</tr>
<tr>
<td>4 GHz &lt; f ≤ 6 GHz</td>
<td>without</td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.4 dB (typ.)</td>
<td>—</td>
</tr>
</tbody>
</table>

![Relative level accuracy at 850 MHz initial power +10 dBm](image)

(meas)
ATT Hold
At move to ATT Hold, can adjust output level in 0.01-dB steps over ±10 dB range based on output level without stopping output (however, hi/lo limits determined by level setting range)

Output Connector

<table>
<thead>
<tr>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-J Connector, 50Ω (Front panel)</td>
</tr>
</tbody>
</table>

VSWR

<table>
<thead>
<tr>
<th>Without MG3710A-043</th>
<th>With MG3710A-043</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Output Level: ≤–7 dBm)</td>
<td>(Output Level: ≤–10 dBm)</td>
</tr>
<tr>
<td>1.45 (50 MHz ≤ f ≤ 3 GHz)</td>
<td>1.45 (50 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td>1.65 (3 GHz &lt; f ≤ 4 GHz)</td>
<td>1.65 (3 GHz &lt; f ≤ 4 GHz)</td>
</tr>
<tr>
<td>1.9 (4 GHz &lt; f ≤ 6 GHz)</td>
<td>1.9 (4 GHz &lt; f ≤ 6 GHz)</td>
</tr>
</tbody>
</table>

Maximum Reverse Input Power

<table>
<thead>
<tr>
<th>±50 VDC (max.)</th>
<th>Without MG3710A-043</th>
<th>With MG3710A-043</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 W (nom.)</td>
<td>2 W (nom.)</td>
<td>20 W (1 MHz &lt; Frequency of Reverse Input Power ≤ 2 GHz) (nom.)</td>
</tr>
<tr>
<td>10 W (2 GHz &lt; Frequency of Reverse Input Power ≤ 6 GHz) (nom.)</td>
<td>10 W (2 GHz &lt; Frequency of Reverse Input Power ≤ 6 GHz) (nom.)</td>
<td></td>
</tr>
</tbody>
</table>

Signal Purity

<table>
<thead>
<tr>
<th>Harmonic Spurious</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CW, Optimize S/N: Off)</td>
</tr>
<tr>
<td>Without MG3710A-043, or without MG3710A-073</td>
</tr>
<tr>
<td>Without MG3710A-041</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+4 dBm, f &gt;3 GHz)</td>
</tr>
<tr>
<td>With MG3710A-041</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+4 dBm, 10 MHz ≤ f &lt; 50 MHz)</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+12 dBm, 50 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+4 dBm, f &gt;3 GHz)</td>
</tr>
<tr>
<td>With MG3710A-043, or with MG3710A-073</td>
</tr>
<tr>
<td>Without MG3710A-041</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+1 dBm, f &gt;3 GHz)</td>
</tr>
<tr>
<td>With MG3710A-041</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+1 dBm, 10 MHz ≤ f &lt; 50 MHz)</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+9 dBm, 50 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td>&lt;=–30 dBC (Output Level: ≤+4 dBm, f &gt;3 GHz)</td>
</tr>
</tbody>
</table>
Non-harmonic Spurious
(CW, <-30 dBm ≤ Output Level ≤ +5 dBm, Offset: ≥10 kHz)
- ≤-62 dBc, -70 dBc (typ.) (100 kHz ≤ f ≤ 187.5 MHz)
- ≤-68 dBc, -76 dBc (typ.) (187.5 MHz < f ≤ 750 MHz)
- ≤-62 dBc, -76 dBc (typ.) (750 MHz < f ≤ 1.5 GHz)
- ≤-56 dBc, -70 dBc (typ.) (1.5 GHz < f ≤ 3 GHz)
- ≤-50 dBc, -64 dBc (typ.) (3 GHz < f ≤ 6 GHz)

SSB Phase Noise
(CW, Phase Noise Optimization: <200 kHz, Offset: 20 kHz)
- ≤-140 dBc/Hz (nom.) (100 MHz)
- ≤-131 dBc/Hz (typ.) (1 GHz)
- ≤-125 dBc/Hz (typ.) (2 GHz)

60/150/260/400 MHz, CW, Optimize S/N: Off, with MG3710A-002

Phase Noise Optimization: <200 kHz (meas)
Phase Noise Optimization: >300 kHz (meas)
60/150/260/400 MHz, CW, Optimize S/N: On, with MG3710A-002

Phase Noise Optimization: <200 kHz (meas)

Phase Noise Optimization: >300 kHz (meas)
60/150/260/400 MHz, Mod = On, with MG3710A-002

Phase Noise Optimization: <200 kHz

Phase Noise Optimization: >300 kHz
- 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: Off, with MG3710A-002

**Phase Noise Optimization:**

- <200 kHz (meas)
- >300 kHz (meas)
850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: On, with MG3710A-002

Phase Noise Optimization: <200 kHz (meas)

Phase Noise Optimization: >300 kHz (meas)
850 MHz, 1/1.9/2.2/3.5/5.8 GHz, Mod = On, with MG3710A-002

Phase Noise Optimization: <200 kHz (meas)

Phase Noise Optimization: >300 kHz (meas)
Analog Modulation

**Optimize Function**

**Spurious Mode**  
Mode to control spurious problem. Controls spurious generated by the modulator.

**Distortion Mode**  
Mode to control distortion problem. Optimizes the setting automatically to avoid distortions.  
This mode can be used when the output frequency is 7 MHz or higher.

**Amplitude Modulation (AM)**

Internal modulation only; Specifications for modulated CW signal

**AM Depth Type**

- Lin: Displays the AM depth type in linear.
- Exp: Displays the AM depth type into the log format.

**AM Depth**

- Range: 0 to 100%
- Resolution: 0.1%

(Peak Level: ≤+4 dBm, AM Depth Type: Lin, after CAL)

**AM Depth Error**

- <3% of setting + 2% (nom.) (100 kHz ≤ f < 98 MHz, Modulation Rate: 1 kHz, AM Source = Sine, AM Depth m: ≤ 90%)
- <2% of setting + 1% (nom.) (98 MHz ≤ f ≤ 2.7 GHz, Modulation Rate: 1 kHz, AM Source = Sine, AM Depth m: ≤ 90%)

**Distortion**

- <2% (nom.) (100 kHz ≤ f < 98 MHz, Modulation Rate: 1 kHz, AM Source = Sine, AM Depth m: 30%)
- <2.5% (nom.) (100 kHz ≤ f < 98 MHz, Modulation Rate: 1 kHz, AM Source = Sine, AM Depth m: 90%)
- <0.5% (nom.) (98 MHz ≤ f ≤ 2.7 GHz, Modulation Rate: 1 kHz, AM Source = Sine, AM Depth m: 30%)
- <0.5% (nom.) (98 MHz ≤ f ≤ 2.7 GHz, Modulation Rate: 1 kHz, AM Source = Sine, AM Depth m: 90%)

**Modulation Frequency Response**

Applied only to the internal modulation (Int) when MG3710A-050/080 is not installed.

- 100 kHz ≤ f < 98 MHz, Bandwidth: ±1.5 dB
  - Modulation Ratio m = 30%
    - Int: 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext DC coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext AC coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Modulation Ratio m = 90%
    - Int: 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext DC coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext AC coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

- 98 MHz ≤ f ≤ 2700 MHz, Bandwidth: ±1 dB
  - Modulation Ratio m = 30%
    - Int: 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext DC coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext AC coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Modulation Ratio m = 90%
    - Int: 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext DC coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Ext AC coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

**Frequency Modulation (FM)**

Internal modulation only; Specifications for modulated CW signal

**FM Deviation**

- Range: 0 Hz to 40 MHz, or [50 MHz – Modulation Rate] (smaller value)
- Resolution: 0.1 Hz

(Output Level: ≤+4 dBm, 100 kHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f ≤ 2.7 GHz, after CAL)

**Deviation Accuracy**

- <2% of setting + 20 Hz (nom.) (Modulation Rate: 1 kHz, FM Source = Sine, 20 Hz ≤ FM Deviation ≤ 40 kHz)

**Distortion**

- <0.5% (nom.) (Modulation Rate: 1 kHz, FM Source = Sine, FM Deviation: 22.5 kHz)
- <1% (nom.) (Modulation Rate: 1 kHz, FM Source = Sine, FM Deviation: 3.5 kHz)

**Modulation Frequency Response**

Applied only to the internal modulation (Int) when MG3710A-050/080 is not installed.

- Deviation: 40 kHz, Bandwidth: ±1 dB
  - Int: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Ext DC coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Ext AC coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
## Phase Modulation (PM)
Internal modulation only; Specifications for modulated CW signal

**PM Deviation**
- Range: 0 rad. to 160 rad., or [40 MHz + Modulation Rate] (smaller value)
- Resolution: 0.001 rad.

(Output Level: ≤+4 dBm, 100 kHz + 2 × (Modulation Rate + 2 × PM Deviation × Modulation Rate) ≤ f ≤ 2.7 GHz, after CAL)

**Deviation Accuracy**
- <2% of setting + 0.02 rad. (nom.) (Modulation Rate: 1 kHz, ΦM Source = Sine, PM Deviation: ≤20 rad.)

**Distortion**
- <0.2% (nom.) (Modulation Rate: 1 kHz, ΦM Source = Sine, PM Deviation: 20 rad.)

**Modulation Frequency Response**
- Applied only to the internal modulation (Int) when MG3710A-050/080 is not installed.
  - Deviation: 2 rad., Bandwidth: ±1 dB
  - Int: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Ext DC coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Ext AC coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

## Pulse Modulation

**On/Off Ratio**
- >70 dB (50 MHz ≤ f ≤ 3 GHz)
- >60 dB (3 GHz < f ≤ 6 GHz)

**Minimum Pulse width**
- 1 µs (nom.)

**Rise/Fall Time**
- <50 ns (nom.) (10 to 90%)

**Pulse Repetition Frequency**
- DC to 1 MHz (Duty: 50%)

**External Pulse Modulation Input**
- AUX Connector (Rear panel), TTL
  - H: RF On, L: RF Off

## Internal Modulation Signal

**Waveform**
- Sine wave, Triangular wave, Square wave, Ramp wave (Positive or Negative)

**Modulation Rate**
- Sine wave: 0.01 Hz to 40 MHz or (50 MHz – FM Deviation)
- Triangular wave, Square wave, Ramp wave: 0.01 Hz to 4 MHz or (5 MHz – FM Deviation)

**Frequency Resolution**
- 0.1 Hz

**Phase**
- −180 deg to 180 deg

**Phase Resolution**
- 0.1 deg

## Additional Analog Modulation Input
When MG3710A-050/080 is installed and for 1st SG and 2nd SG respectively

**Modulation Type**
- AM, FM, ΦM

**Input Impedance**
- 50Ω/600Ω/Hi-Z (100 kΩ/70 pF) (nom.)

**Coupling**
- DC or AC is alternatively selectable.
- The lower limit frequency for AC is 20 Hz (typ.).

**Input Level**
- For set value, 2 Vp-p (nom.)

**Simultaneous Modulation**
- AM + FM
- AM + ΦM
- Internal 1 + Internal 2
- Internal + External
- FM and ΦM cannot enabled simultaneously.
Vector Modulation

Modulation Frequency Response

I/Q bandwidth plot using optional internal baseband generator (Internal Channel Corrections ON)

I/Q bandwidth plot using optional internal baseband generator

(meas)
Vector Accuracy

without MG3710A-043, or MG3710A-073
Output Level: ≤+7 dBm (without MG3710A-041, or MG3710A-071)
≤+13 dBm (with MG3710A-041, or MG3710A-071)

with MG3710A-043, or MG3710A-073
Output Level: ≤+4 dBm (without MG3710A-041, or MG3710A-071)
≤+10 dBm (with MG3710A-041, or MG3710A-071)

after CAL

W-CDMA (Test Mode 4) :
≤0.6% (rms) (typ.) (Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 2.2 GHz)

GSM:
≤0.8 deg. (rms) (typ.) (Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 1.9 GHz)

EDGE:
≤0.8% (rms) (typ.) (Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 1.9 GHz)

LTE (20 MHz Test Mode 3.1) :
≤0.8% (rms) (typ.) (Output Frequency: 600 MHz to 2.7 GHz)

without MG3710A-043, or MG3710A-073
Output Level: ≤+4 dBm (without MG3710A-041), ≤+10 dBm (with MG3710A-041)

with MG3710A-043, or MG3710A-073
Output Level: ≤+1 dBm (without MG3710A-041), ≤+7 dBm (with MG3710A-041)

after CAL

LTE (20 MHz Test Mode 3.1) :
≤0.8% (rms) (typ.) (Output Frequency: 3.4 GHz to 3.8 GHz)
Carrier Leak
(18° to 28°C, RMS Value: 0 dB, after CAL)
$\leq -55$ dBC (100 MHz $\leq f < 4$ GHz)
$\leq -45$ dBC ($f \geq 4$ GHz)

Image Rejection
(18° to 28°C, RMS Value: 0 dB, Complex CW at 10 MHz or less, after CAL)
$\leq -50$ dBC (200 MHz $\leq f < 4$ GHz)
$\leq -43$ dBC ($f \geq 4$ GHz)

Adjacent Channel Leakage Ratio (ACLR)
[18° to 28°C, W-CDMA (TestModel1 64DPCH)]
without MG3710A-043
Output Level: $\leq -2$ dBm (without MG3710A-041), $\leq +5$ dBm (with MG3710A-041)
*Output Level: $\leq -2$ dBm

with MG3710A-043
Output Level: $\leq -2$ dBm (without MG3710A-041), $\leq +2$ dBm (with MG3710A-041)
*Output Level: $\leq -5$ dBm

without MG3710A-073
Output Level: $\leq -2$ dBm (without MG3710A-071), $\leq +5$ dBm (with MG3710A-071)

with MG3710A-073
Output Level: $\leq -5$ dBm (without MG3710A-071), $\leq +2$ dBm (with MG3710A-071)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>5 MHz</th>
<th>10 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 MHz $\leq f &lt; 800$ MHz</td>
<td>$\leq -68$ dBC/3.84 MHz</td>
<td>$\leq -70$ dBC/3.84 MHz</td>
</tr>
<tr>
<td>800 MHz $\leq f &lt; 1$ GHz</td>
<td>$\leq -71$ dBC/3.84 MHz</td>
<td>$\leq -71$ dBC/3.84 MHz</td>
</tr>
<tr>
<td>1 GHz $\leq f &lt; 1.8$ GHz</td>
<td>$\leq -70$ dBC/3.84 MHz</td>
<td>$\leq -71$ dBC/3.84 MHz</td>
</tr>
<tr>
<td>1.8 GHz $\leq f &lt; 2.2$ GHz</td>
<td>$\leq -71$ dBC/3.84 MHz</td>
<td>$\leq -71$ dBC/3.84 MHz</td>
</tr>
<tr>
<td>2.2 GHz $\leq f \leq 3$ GHz</td>
<td>$\leq -69$ dBC/3.84 MHz</td>
<td>$\leq -71$ dBC/3.84 MHz</td>
</tr>
<tr>
<td>3 GHz $&lt; f \leq 3.8$ GHz $^*$</td>
<td>$\leq -67$ dBC/3.84 MHz</td>
<td>$\leq -67$ dBC/3.84 MHz</td>
</tr>
</tbody>
</table>
W-CDMA, ACLR Performance
ACP/ALT vs. Frequency

(meas)

(meas)

(meas)
W-CDMA, ACLR Performance
ACP/ALT vs. Power level (without MG3710A-041, Frequency: 1.8 GHz)
W-CDMA, ACLR Performance
ACP/ALT vs. Power level (with MG3710A-041, Frequency: 1.8 GHz)
W-CDMA, ACLR Performance
ACP vs. Power level (with MG3710A-041, Frequency: 1.8 GHz)
LTE FDD ACLR Performance
ACP/ALT vs. Power level (without MG3710A-041, Frequency: 2.1 GHz)
LTE FDD EVM Performance
(Frequency: 2.11 GHz, E-TM 3.1)

- Output level +7 dBm
- Performance evaluated at bottom, middle and top of bands shown.

GSM/EDGE ORFS

* ORFS: Output RF Spectrum

1: Output level +7 dBm
2: Performance evaluated at bottom, middle and top of bands shown.
CDMA2000 ACLR Performance

ACLR vs. Frequency (Output level: –7 dBm)

ACLR vs. Power level (without MG3710A-041, Frequency: 850 MHz)

ACLR vs. Power level (with MG3710A-041, Frequency: 850 MHz)
802.16e Mobile WiMAX ACLR Performance
ACP vs. Power level (10 MHz offset, without MG3710A-041)

ACP vs. Power level (10 MHz offset, with MG3710A-041)
Level Error compared to CW at Vector Modulation
(18° to 28°C, AWGN signal, Bandwidth: 5 MHz)

without MG3710A-043, or without MG3710A-073
±0.3 dB (50 MHz ≤ f < 98 MHz, Output Level: ≤–5 dBm)
±0.2 dB (98 MHz ≤ f < 6 GHz, Output Level: <+1 dBm)

with MG3710A-043, or with MG3710A-073
±0.3 dB (50 MHz ≤ f < 98 MHz, Output Level: ≤–5 dBm)
±0.2 dB (98 MHz ≤ f < 6 GHz, Output Level: <-2 dBm)

I and Q Input/Output
Baseband I/Q Adjustment
DC Offset
Range: −20.000% to +20.000%
Resolution: 0.025%

Gain Balance
(Gain adjustment of I-phase for Q-phase)
Range: −1.000 dB to +1.000 dB
Resolution: 0.001 dB

Quadrature Adjustment
Range: −10.00 deg. to +10.00 deg.
Resolution: 0.01 deg.

Phase Adjustment
Range: −360.00 deg. to +360.00 deg.
Resolution: 0.01 deg.

Skew Adjustment
Range: −800.000 ns to +800.000 ns
Resolution: 1 ps

Delay Adjustment
Range: −400.000 ns to +400.000 ns
Resolution: 1 ps
I and Q Input

with MG3710A-018

**Modulation Bandwidth**
- Baseband: 80 MHz (nom.)
- RF: 160 MHz (nom.)

**Input Level**
\[ \sqrt{I^2 + Q^2} = 85 \text{ mV (rms), (Optimum value of level accuracy)} \]

**DC Offset**
- Range: \(-100 \text{ mV to } +100 \text{ mV}\)
- Resolution: 1 mV

**Input Connector**
- BNC-J (Front panel)
- Maximum Input Level: \(-1 \text{ V (peak)} \leq I, Q \leq +1 \text{ V (peak)}\)
- Impedance: 50Ω (nom.)
I and Q Output

with MG3710A-018

Output Voltage Range Level
–2.5 V to +5 V (Output: Open, Output Voltage Amplitude + DC Offset)

DC Offset
(Output: Open)
In-phase DC Offset
Range: –2.5 V to +5 V
Resolution: 2 mV
Differential DC Offset
Range: –50 mV to +50 mV
Resolution: 0.1 mV

Quadrature Adjustment
Using Baseband I/Q Adjustment Function

Output Connector
BNC-J (Rear panel)
Impedance: 50Ω (nom.)
### Arbitrary Waveform Generator

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waveform Resolution</strong></td>
<td>14, 15, 16 bits for each I/Q</td>
</tr>
<tr>
<td><strong>Modulation Bandwidth</strong></td>
<td>160 MHz*/120 MHz</td>
</tr>
<tr>
<td><strong>Reconstruction Filter</strong></td>
<td>80 MHz</td>
</tr>
</tbody>
</table>
| **Baseband Level Adjustment (RMS Value Tuning)** | Adjustable Input Level to Quadrature Modulator  
Decrease level: Decreases distortion  
Increase level: Improves noise floor  
Variable Range: ±8 dB  
Resolution: 0.01 dB |
| **Marker Output**                            | Waveform Resolution  
14 bits: Waveform Pattern: 3 signals, or Internal Generated: 3 signals  
15 bits: Waveform Pattern: 1 signal, or Internal Generated: 3 signals  
16 bits: Internal Generated: 3 signals  
Supports switching Positive/Negative logic pulse outputs |
| **Internal Baseband Reference Clock**       | Range: 20 kHz to 200 MHz*/160 MHz  
Resolution: 0.001 Hz |
| **External Baseband Reference Clock**       | with MG3710A-017  
Range: 20 kHz to 50 MHz*/40 MHz  
Frequency Division, Multiplier Function: Internally Generate 1, 2, 4, 8, 16, 1/2, 1/4, 1/8, 1/16 times input signals, and use as DAC Sampling Clock  
Input Connector: BNC-J (Rear panel, BB REF CLK Input)  
Input Level: ≥0.2 Vp-p, 50Ω (AC coupled) (nom.)  
Selects external input and MIMO connection (BB Ref Sync) |
| **Waveform Memory**                          | 1stRF  
When MG3710A-048 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.  
without MG3710A-045/046  
64 Msamples  
with MG3710A-045, without MG3710A-046  
256 Msamples  
without MG3710A-045, with MG3710A-046, or with MG3710A-045/046  
1024 Msamples  
2ndRF  
When MG3710A-078 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.  
without MG3710A-075/076  
64 Msamples  
with MG3710A-075, without MG3710A-076  
256 Msamples  
without MG3710A-075, with MG3710A-076, or with MG3710A-075/076  
1024 Msamples |
| **Number of loadable files**                 | The following numbers of waveform patterns are available per waveform memory:  
Max. Package Count: 4096  
Max. Patterns per Package: 4096  
The maximum number of patterns in total: 4096/waveform memory  
The minimum number of samples per pattern: 128 |
| **Combination of Baseband Signal Function** | 1st VSG: with MG3710A-048  
This function synthesizes the signals of two memories to generate a baseband waveform.  
2nd VSG: with MG3710A-078  
This function synthesizes the signals of two memories to generate a baseband waveform. |

*: Supports firmware version 2.00.00 and later. Only when using MX370111A WLAN IQproducer and MX370111A-002 802.11ac (160 MHz) option.
Frequency Offset

± (200 MHz × 0.8 – waveform data bandwidth) ÷ 2 (max.)
± (160 MHz × 0.8 – waveform data bandwidth) ÷ 2 (max.)

Sequences Function

Selecting combination file supports following functions:
- Pattern switching method (manual, auto)
- Pattern switching position (frame end, pattern end)
- External trigger signal switches pattern at manual pattern switching
- Sequence restart function
- Maximum element: 200
- Lowest number of point by pattern: 1000

Level Ratio Setting Range: Two signal level ratio <80 dB or Off
Level Setting Resolution: 0.01 dB

Frequency Offset
Frequency Setting Resolution: 1 Hz

Pattern Trigger
External trigger switches pattern when using waveform pattern for sequence

Input Connector
Connector: Either of BNC-J connector (Start Frame TRIG Input, Pattern TRIG1 Input) or AUX connector can be used
Input Level: TTL
Logic: Select Rise/Fall Polarity

Trigger Input
Function: Synchronizes with trigger signals and starts waveform pattern output; Switches start Trigger/Frame trigger

Start Trigger
Starts waveform output

Frame Trigger
Outputs signals at burst timing
Outputs data for burst length at frame trigger timing and waits for next frame trigger

Trigger Event
The following trigger events can be detected
No Retrigger, Buffered Trigger, Restart on Trigger

Input Connector
Function switching: Start trigger or frame trigger can be selected
Connector: Either of BNC-J connector (Start Frame TRIG Input, Pattern TRIG1 Input) or AUX connector can be used
Input Level: TTL
Logic: Select Rise/Fall Polarity

AWGN Generation Function
1st VSG: with MG3710A-049
2nd VSG: with MG3710A-079

C/N Ratio Absolute Value

≤40 dB

Bandwidth Limit Filter
Sets AWGN bandwidth limit as follows:
From 20% to 80% of waveform sampling rate

Sweep/List Function

Sweep Function
Function: Sets frequency and level sweep with 1000-point resolution

List Function
Function: Individually sets frequency and level with 500-point resolution

*: Supports firmware version 2.00.00 and later. Only when using MX370111A WLAN IQproducer and MX370111A-002 802.11ac (160 MHz) option.
## BER Measurement Function

with MG3710A-021

<table>
<thead>
<tr>
<th>Connector</th>
<th>Connector: AUX Connector (Rear panel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>TTL</td>
</tr>
</tbody>
</table>

| Input Signal               | Data, Clock, Enable                   |

| Input Bit Rate             | 100 bps to 40 Mbps                   |

| Measurable Pattern         | Repeat PN9, PN11, PN15, PN20, ALL0, ALL1, 01  |
|                            | PN9fix, PN11fix, PN15fix, PN20fix, PN23fix, User Define  |

| Synchronization Establishing Condition | PN Signal: PN order × 2-bit error free  |
|                                        | PNfix Signal: Syncs with PN signal at PN order × 2-bit error free;  |
|                                        | Syncs with PNfix signal at PN order error free from PNfix signal header bit  |
|                                        | Repeat ALL0, ALL1, 01: 10-bit Error Free  |
|                                        | UserDefine: 8-bit to 1024-bit (variable) error free; can select header bit for Sync detection  |

<table>
<thead>
<tr>
<th>Re-synchronization Judgment</th>
<th>x/y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x: Number of error bits in y bit (Setting range: 1 to y/2)</td>
</tr>
<tr>
<td></td>
<td>y: Number of measurement bits (select from 500, 5000 and 50000)</td>
</tr>
</tbody>
</table>

| Measurable Bit             | ≤ 2^{32} – 1 bit                        |

| Measurable Error Bit Count | ≤ 2^{32} – 1 bit                        |

| Measurement End            | Number of measurement bits, Number of measurement error bits  |

| Automatic Re-synchronization | Can be toggled on and off  |

| Re-synchronization          | Count Clear, Count Keep  |

| Measurement Mode            | Single, Endless, Continuous  |

| Display                     | Status, Error, Error Rate, Error Count, SyncLoss Count, Measurement Bit Number  |

| Polarity Reversal Function  | Supports polarity reversal for Data, Clock, Enable  |

| Measured Result Reset Function | At BER measurement, hold sync status, clears measured value and measures from 0  |
Connector

External Reference Input
Connector: BNC-J (Rear panel), 50Ω (nom.)
Frequency: 5, 10, 13 MHz
Operating Range: ±1 ppm
Input Level: −15 dBm ≤ Level ≤ +20 dBm (AC coupled)

Reference Signal Output
Connector: BNC-J (Rear panel), 50Ω (nom.)
Frequency: 10 MHz
Output Level: ≥0 dBm (AC coupled)

Sweep Output
with MG3710A-017
Connector: BNC-J (Rear panel), <1Ω (Drive Capacity: 2 kΩ)
Output Level: 0 to 10 V (10 V Sweep Signal Function), 0 to 5 V (Sweep Status)

Local Oscillator (LO) Input
with MG3710A-017
Connector: SMA-J (Rear panel), 50Ω (nom.)
Frequency: 98 MHz to 6 GHz
Input Level: −10 dBm ≤ Level ≤ +1 dBm (AC coupled) (nom.)

Local Oscillator (LO) Output
with MG3710A-017
Connector: SMA-J (Rear panel), 50Ω (nom.)
Frequency: 98 MHz to 6 GHz
Output Level: ≤+1 dBm (AC coupled) (nom.) (Internal Lo output)

Baseband Reference Input
with MG3710A-017
Connector: BNC-J (Rear panel), 50Ω (nom.)
Frequency: 20 kHz to 50 MHz (External Baseband Reference Clock)∗
560 MHz to 800 MHz (BB Ref Sync)∗
Input Level: ≥0.2 Vp-p (AC coupled) (nom.)

Baseband Reference Output
with MG3710A-017
Connector: BNC-J (Rear panel), 50Ω (nom.)
Frequency: 560 MHz to 800 MHz
Output Level: 0.8 Vp-p (AC coupled) (nom.)

Additional Analog Modulation Input
When MG3710A-050/080 is installed:
Connector: Rear panel, BNC-J
Input Impedance: 50Ω, 600Ω, or Hi-Z (100 kΩ/70 pF) (nom.)
Input Level: For set value, 2 Vp-p (nom.), Absolute maximum ratings: ±5 V

External Controller
Control from external controller (excluding power-on/off)
Ethernet (10/100/1000Base-T): RJ-45 (Rear panel)
GPIB: IEEE488 Bus connector (IEEE488.2, Rear panel)
Interface Function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2
USB (B): USB-B connector (USB2.0, Rear panel)

USB
Hard copies waveform to external device and saves main-frame basic parameters
USB-A connector (USB2.0, Front panel: 2 ports, Rear panel: 2 ports)

Monitor Output
Mini D-Sub connector (compatible with VGA, Rear panel)

AUX
50-pin (for DX10A-50S) (Rear panel)
Input/Output Level: TTL
with MG3710A-017/021: with AUX-BNC Conversion Cable
### Display
- 8.4-inch, XGA-color LCD (Diagonal: 213 mm, Resolution: 1024 × 768)

### General

#### Dimensions and Mass
- 426 (W) × 177 (H) × 390 (D) mm (excluding projections)
- ≤13.7 kg (MG3710A-032, 034, or 036, excluding other options)
- ≤17 kg (including all options)

#### Power Supply
- Power Voltage: 100 V(ac) to 120 V(ac), 200 V(ac) to 240 V(ac)
- Frequency: 50 Hz/60 Hz
- Power Consumption:
  - ≤350 VA (including all options)
  - 180 VA (nom.) (with MG3710A-032, 034, or 036, with MG3710A-041/042, excluding other options)
  - 260 VA (nom.) (with MG3710A-032, 034, or 036, with MG3710A-041/042, with MG3710A-062, 064, or 066, with MG3710A-071/072, excluding other options)
  - 280 VA (nom.) (with MG3710A-032, 034, or 036, with MG3710A-041/042, with MG3710A-062, 064, or 066, with MG3710A-071/072, with MG3710A-001/021, excluding other options)

#### Temperature Range
- Operating: +5° to +45°C, Storage: –20° to +60°C

#### EMC
- EN61326-1, EN61000-3-2

#### LVD
- EN61010-1

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**Specifications are subject to change without notice.**