Vector Signal Generator

MG3710A

100 kHz to 2.7 GHz
100 kHz to 4.0 GHz
100 kHz to 6.0 GHz
## Contents

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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 dB ≤ RMSnom ≤ +3.00 dB
RMSnom = 20 log (RMSw/4628) (16 bit Data)
RMSnom = 20 log (RMSw/2314) (15 bit Data)
RMSnom = 20 log (RMSw/1157) (14 bit Data)

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

#### Setting Range
- **1st SG**
  - 9 kHz to 2.7 GHz [MG3710A-032]
  - 9 kHz to 4 GHz [MG3710A-034]
  - 9 kHz to 6 GHz [MG3710A-036]
- **2nd SG**
  - 9 kHz to 2.7 GHz [MG3710A-062]
  - 9 kHz to 4 GHz [MG3710A-064]
  - 9 kHz to 6 GHz [MG3710A-066]

Resolution: 0.01 Hz

#### Phase Offset
- Range: –180.00 deg. to +180.00 deg.
- Resolution: 0.01 deg.

#### Switching Speed
- ≤600 µs
  (Frequency: >187.5 MHz, Phase Noise Optimization: offset <200 kHz, Time from trigger input to final frequency ±0.1 ppm or within 100 Hz when executing List function.)

#### Internal Reference Oscillator
- **without MG3710A-001/002**
  - Aging rate: ±1 × 10⁻⁶/year
  - Temperature characteristics: ±2.5 × 10⁻⁶ (5°C to 45°C)
- **with MG3710A-001**
  - Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on
    - ±1 × 10⁻⁹ (7.5 minutes after power-on)
  - Aging rate: ±1 × 10⁻¹⁰/month
  - Temperature characteristics: ±2 × 10⁻⁹ (5°C 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°C 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
  (When frequency is >187.5 MHz within output level accuracy specification range).
  However, the output level is ≤+7 dBm when neither the MG3710A-041 nor MG3710A-071 is installed.
  This is defined as the period from detection of the List function execution trigger until the time when the frequency is within ±0.2 dB of the final output level.

(meas)
### 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 MG3710A-042/072</th>
<th>High Power Extension MG3710A-041/071</th>
<th>≤+23 dBm</th>
<th>&gt;+20 dBm</th>
<th>≤+13 dBm</th>
<th>&gt;+10 dBm</th>
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<th>&gt;–50 dBm</th>
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<th>&gt;–120 dBm</th>
<th>≤–127 dBm</th>
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<tbody>
<tr>
<td>100 kHz ≤ f &lt; 1 MHz</td>
<td>without without</td>
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<td>±0.5 dB</td>
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<td>1 MHz ≤ f &lt; 10 MHz</td>
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<td>±0.7 dB</td>
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With Reverse Power Protection [with MG3710A-043], [with MG3710A-073]

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### Frequency Range

- **Low Power Extension**: MG3710A-042/072
- **High Power Extension**: MG3710A-041/071

### Frequency Ranges

- **100 kHz ≤ f < 1 MHz**
- **1 MHz ≤ f < 10 MHz**
- **10 MHz ≤ f < 50 MHz**
- **50 MHz ≤ f < 400 MHz**
- **400 MHz ≤ f ≤ 3 GHz**
- **3 GHz < f ≤ 4 GHz**
- **4 GHz < f ≤ 5 GHz**
- **5 GHz < f ≤ 6 GHz**

### Frequency Specifications

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Level Linearity

18°C 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>≤+1 dBm</th>
<th>&gt;-110 dBm</th>
<th>&gt;-120 dBm</th>
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<td>50 MHz ≤ f &lt; 400 MHz</td>
<td>without with</td>
<td>without with</td>
<td>≤±0.2 dB (typ.)</td>
<td>≤±0.2 dB (typ.)</td>
<td>≤±0.2 dB (typ.)</td>
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<tr>
<td>400 MHz ≤ f ≤ 3 GHz</td>
<td>without with</td>
<td>without with</td>
<td>≤±0.2 dB (typ.)</td>
<td>≤±0.2 dB (typ.)</td>
<td>≤±0.2 dB (typ.)</td>
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<tr>
<td>3 GHz &lt; f ≤ 4 GHz</td>
<td>without with</td>
<td>without with</td>
<td>≤±0.3 dB (typ.)</td>
<td>≤±0.3 dB (typ.)</td>
<td>≤±0.3 dB (typ.)</td>
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<td>4 GHz &lt; f ≤ 6 GHz</td>
<td>without with</td>
<td>without with</td>
<td>≤±0.3 dB (typ.)</td>
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with Reverse Power Protection [with MG3710A-043], [with MG3710A-073]

Referenced to level: –10 dBm

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

Relative level accuracy at 850 MHz initial power +10 dBm

![Relative level accuracy graph](meas)
ATT Hold Function
When ATT Hold is set to ON, level adjustment is supported for continuous signal generation.
Setting Range: –10 to +10 dB (However, each upper and lower limit of the adjustment range is restricted by the signal output range.)
Resolution: 0.01 dB

Output Connector

Connector
N-J Connector, 50Ω (Front panel)

VSQR

without MG3710A-043
(Output Level: ≤–7 dBm)
≤1.45 (50 MHz ≤ f ≤ 3 GHz)
≤1.65 (3 GHz < f ≤ 4 GHz)
≤1.9 (4 GHz < f ≤ 6 GHz)

with MG3710A-043
(Output Level: ≤–10 dBm)
≤1.45 (50 MHz ≤ f ≤ 3 GHz)
≤1.65 (3 GHz < f ≤ 4 GHz)
≤1.9 (4 GHz < f ≤ 6 GHz)

without MG3710A-073
(Output Level: ≤–7 dBm)
≤1.45 (50 MHz ≤ f ≤ 3 GHz)
≤1.65 (3 GHz < f ≤ 4 GHz)
≤1.9 (4 GHz < f ≤ 6 GHz)

with MG3710A-073
(Output Level: ≤–10 dBm)
≤1.45 (50 MHz ≤ f ≤ 3 GHz)
≤1.65 (3 GHz < f ≤ 4 GHz)
≤1.9 (4 GHz < f ≤ 6 GHz)

Maximum Reverse Input Power
±50 VDC (max.)

without MG3710A-043
2 W (nom.)

with MG3710A-043
20 W (1 MHz < Frequency of Reverse Input Power ≤ 2 GHz) (nom.)
10 W (2 GHz < Frequency of Reverse Input Power ≤ 6 GHz) (nom.)

without MG3710A-073
2 W (nom.)

with MG3710A-073
20 W (1 MHz < Frequency of Reverse Input Power ≤ 2 GHz) (nom.)
10 W (2 GHz < Frequency of Reverse Input Power ≤ 6 GHz) (nom.)

Signal Purity

Harmonic Spurious
(CW, Optimize S/N: Off)

without MG3710A-043, or MG3710A-073
without MG3710A-041
<–30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 3 GHz)
<–30 dBc (Output Level: ≤+4 dBm, f >3 GHz)

with MG3710A-041
<–30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 50 MHz)
<–30 dBc (Output Level: ≤+12 dBm, 50 MHz ≤ f ≤ 3 GHz)
<–30 dBc (Output Level: ≤+4 dBm, f >3 GHz)

with MG3710A-043, or MG3710A-073
without MG3710A-041
<–30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 3 GHz)
<–30 dBc (Output Level: ≤+1 dBm, f >3 GHz)

with MG3710A-041
<–30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 50 MHz)
<–30 dBc (Output Level: ≤+9 dBm, 50 MHz ≤ f ≤ 3 GHz)
<–30 dBc (Output Level: ≤+1 dBm, f >3 GHz)
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
Single sideband phase noise

Phase Noise Optimization: <200 kHz

Phase Noise Optimization: >300 kHz

60/150/260/400 MHz, CW, Optimize S/N: On, with MG3710A-002
Single sideband phase noise

Phase Noise Optimization: <200 kHz

Phase Noise Optimization: >300 kHz
Single sideband phase noise

Phase Noise Optimization: <200 kHz (meas)

Phase Noise Optimization: >300 kHz (meas)
Phase Noise Optimization: <200 kHz

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

**Single sideband phase noise**

- Phase Noise Optimization: <200 kHz
- Phase Noise Optimization: >300 kHz
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**
  - 100 kHz ≤ f < 98 MHz, ±1.5 dB Bandwidth
    - Modulation Ratio m: 30%
      - 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Modulation Ratio m: 90%
      - 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - 98 MHz ≤ f ≤ 2700 MHz, ±1 dB Bandwidth
    - Modulation Ratio m: 30%
      - 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
    - Modulation Ratio m: 90%
      - 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

**Frequency Modulation (FM)**

Internal modulation only; Specifications for modulated CW signal

- **FM Deviation**
  - Range: FM Deviation (FM/ΦM1 setup)
    - 0 Hz to (40 MHz-FM Deviation(FM/ΦM1 setup)) or [50 MHz – Modulation Rate] (lower value)
  - FM Deviation (FM/ΦM2 setup)
    - 0 Hz to (40 MHz-FM Deviation (FM/ΦM2 setup)) or [50 MHz – Modulation Rate] (lower 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**
  - Deviation: 40 kHz, ±1 dB Bandwidth
    - 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 \([40 \text{ MHz} + \text{Modulation Rate}]\) (smaller value)
Resolution: 0.001 rad.

(Output Level: \(\leq+4 \text{ dBm}, 100 \text{ kHz} + 2 \times \text{Modulation Rate} + 2 \times \text{PM Deviation} \times \text{Modulation Rate} \leq f \leq 2.7 \text{ GHz}, \text{after CAL}\)

Deviation Accuracy
<2% of setting + 0.02 rad. (nom.) (Modulation Rate: 1 kHz, \(\Phi M\) Source: Sine, PM Deviation: \(\leq20\) rad.)

Distortion
<0.2% (nom.) (Modulation Rate: 1 kHz, \(\Phi M\) Source: Sine, PM Deviation: 20 rad.)

Modulation Frequency Response
Deviation: 2 rad., \(\pm1\) dB Bandwidth
20 Hz \(\leq\) Modulation Rate \(\leq\) 20 kHz (nom.)

Pulse Modulation

On/Off Ratio
>70 dB (50 MHz \(\leq f \leq 3\) GHz)
>60 dB (3 GHz < \(f \leq 6\) GHz)

Minimum Pulse width
1 µs (nom.)

Rise/Fall Time
\(\leq50\) 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
\(\pm180\) 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

Internal modulation only; Specifications for modulated CW signal

<table>
<thead>
<tr>
<th>Modulation Type</th>
<th>AM, FM, ΦM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Impedance</strong></td>
<td>50Ω/600Ω/Hi-Z (100 kΩ/70 pF) (nom.)</td>
</tr>
<tr>
<td><strong>Coupling</strong></td>
<td>DC or AC is alternatively selectable.</td>
</tr>
<tr>
<td><strong>Input Level</strong></td>
<td>For set value, 2 Vp-p (nom.)</td>
</tr>
<tr>
<td><strong>Input Frequency</strong></td>
<td>DC Coupling: DC to 1 MHz (nom.)</td>
</tr>
<tr>
<td></td>
<td>AC Coupling: 20 Hz (typ.) to 1 MHz (nom.)</td>
</tr>
</tbody>
</table>

**Simultaneous Modulation**

- AM + FM
- AM + ΦM
- Internal 1 + Internal 2
- Internal + External

FM and ΦM cannot enabled simultaneously.

**Modulation Frequency Response (AM)**

- **Peak Level**: ≤ +4 dBm, 100 kHz ≤ f < 98 MHz, AM Depth Type: Lin, ±1.5 dB Bandwidth, after CAL
  - **Depth**: 30%
  - **DC Coupling**: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
  - **AC Coupling**: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - **Depth**: 90%
  - **DC Coupling**: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
  - **AC Coupling**: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

**Output Frequency**: 850 MHz/1.8 GHz/1.9 GHz/2.2 GHz

**Output Frequency**: 3.5 GHz/5.8 GHz

<table>
<thead>
<tr>
<th>Modulation Frequency Response (FM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Level: ≤ +4 dBm, 100 kHz ≤ f ≤ 2.7 GHz, FM Deviation: 40 kHz, ±1 dB Bandwidth, after CAL</td>
</tr>
<tr>
<td>DC Coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)</td>
</tr>
<tr>
<td>AC Coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)</td>
</tr>
</tbody>
</table>

**Modulation Frequency Response (PM)**

- **Output Level**: ≤ +4 dBm, 100 kHz + 2 × (Modulation Rate + 2 × PM Deviation) ≤ f ≤ 2.7 GHz, PM Deviation: 2 rad., ±1 dB Bandwidth, after CAL
  - **Output Frequency**: 2 rad., ±1 dB Bandwidth, after CAL
  - **DC coupling**: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
  - **AC coupling**: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

**Vector Modulation**

**Modulation Frequency Response**

Without MG3710A-043

- **Internal Channel Correction**: On, Output Level: -7 dBm, Random Signal of Bandwidth: 160 MHz, Crest Factor: 11 dB, 18° to 28°C,
- **Output Frequency**: 850 MHz/1.8 GHz/1.9 GHz/2.2 GHz
  - ±0.6 dB (At Center Frequency ±10 MHz)
  - ±1.3 dB (At Center Frequency ±50 MHz)
- **Output Frequency**: 3.5 GHz/5.8 GHz
  - ±0.6 dB (At Center Frequency ±10 MHz)
  - ±1.9 dB (At Center Frequency ±50 MHz)

With MG3710A-043

- **Internal Channel Correction**: On, Output Level: -10 dBm, Random Signal of Bandwidth: 160 MHz, Crest Factor: 11 dB, 18° to 28°C,
- **Output Frequency**: 850 MHz/1.8 GHz/1.9 GHz/2.2 GHz
  - ±0.6 dB (At Center Frequency ±10 MHz)
  - ±1.8 dB (At Center Frequency ±50 MHz)
- **Output Frequency**: 3.5 GHz/5.8 GHz
  - ±0.6 dB (At Center Frequency ±10 MHz)
  - ±2.4 dB (At Center Frequency ±50 MHz)
I/Q bandwidth plot using optional internal baseband generator (Internal Channel Corrections ON)

Frequency offset from carrier [MHz]

[dB]

I/Q bandwidth plot using optional internal baseband generator

Frequency offset from carrier [MHz]

[dB]
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)

18° to 28°C, after CAL
W-CDMA (Test Model 4):
- Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 2.2 GHz
  ≤0.62% (rms)
  ≤0.6% (rms) typ.

GSM:
- Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 1.9 GHz
  ≤0.84° (rms)
  ≤0.8° (rms) typ.

EDGE:
- Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 1.9 GHz
  ≤0.84% (rms)
  ≤0.8% (rms) typ.

LTE (20 MHz Test Model 3.1):
- Output Frequency: 600 MHz to 2.7 GHz
  ≤0.82% (rms)
  ≤0.8% (rms) typ.

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)

18° to 28°C, after CAL
LTE (20 MHz Test Model 3.1):
- Output Frequency: 3.4 GHz to 3.8 GHz
  ≤0.82% (rms)
  ≤0.8% (rms) typ.

---

<table>
<thead>
<tr>
<th>EVM performance data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
</tr>
<tr>
<td>Modulation type</td>
</tr>
<tr>
<td>Modulation rate</td>
</tr>
<tr>
<td>Channel configuration</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>EVM power level</td>
</tr>
<tr>
<td>EVM power level with MG3710A-041/141</td>
</tr>
<tr>
<td>EVM</td>
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<tr>
<td>Frequency</td>
</tr>
<tr>
<td>EVM power level</td>
</tr>
<tr>
<td>EVM power level with MG3710A-041/141</td>
</tr>
<tr>
<td>EVM</td>
</tr>
</tbody>
</table>
Carrier Leak
18° to 28°C, RMS Value: 0 dB, after CAL
≤–55 dBC (100 MHz ≤ f < 4 GHz)
≤–45 dBC (f ≥ 4 GHz)

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

Adjacent Channel Leakage Ratio (ACLR)
18° to 28°C, W-CDMA (TestModel1 64DPCH)
without MG3710A-043 or MG3710A-073
Output Level: ≤–2 dBm (without MG3710A-041)
Output Level: ≤+5 dBm (with MG3710A-041)
with MG3710A-043 or MG3710A-073
Output Level: ≤–5 dBm (without MG3710A-041)
Output Level: ≤+2 dBm (with MG3710A-041)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Offset</th>
<th>Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 MHz ≤ f &lt; 800 MHz</td>
<td>≤–68 dBC/3.84 MHz</td>
<td>≤–70 dBC/3.84 MHz</td>
</tr>
<tr>
<td>800 MHz ≤ f &lt; 1 GHz</td>
<td>≤–71 dBC/3.84 MHz</td>
<td>≤–71 dBC/3.84 MHz</td>
</tr>
<tr>
<td>1 GHz ≤ f &lt; 1.8 GHz</td>
<td>≤–70 dBC/3.84 MHz</td>
<td>≤–71 dBC/3.84 MHz</td>
</tr>
<tr>
<td>1.8 GHz ≤ f &lt; 2 GHz</td>
<td>≤–71 dBC/3.84 MHz</td>
<td>≤–71 dBC/3.84 MHz</td>
</tr>
<tr>
<td>2.2 GHz ≤ f ≤ 3 GHz</td>
<td>≤–69 dBC/3.84 MHz</td>
<td>≤–71 dBC/3.84 MHz</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 3.8 GHz**</td>
<td>≤–67 dBC/3.84 MHz</td>
<td>≤–67 dBC/3.84 MHz</td>
</tr>
</tbody>
</table>

* without MG3710A-043 or MG3710A-073
Output Level: ≤–2 dBm
with MG3710A-043 or MG3710A-073
Output Level: ≤–5 dBm
W-CDMA, ACLR Performance
ACP/ALT vs. Frequency

vs Frequency (1 DPCH)

vs Frequency (64 DPCH)

vs Frequency (64 DPCH, 4 carriers)
W-CDMA, ACLR Performance
ACP/ALT vs. Power level (without MG3710A-041, Frequency: 1.8 GHz)

(meas)
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)

ACP/ALT vs. Power level (with MG3710A-041, Frequency: 2.1 GHz)
LTE FDD EVM Performance
(Frequency: 2.11 GHz, E-TM 3.1)

- **LTE FDD EVM Performance**
- **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 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 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
- $\sqrt{(I^2 + Q^2)} = 85$ mV (rms), (Optimum value of level accuracy)

DC Offset
- Range: –100 mV to +100 mV
- Resolution: 1 mV

Input Connector
- BNC-J (Front panel)
- Maximum Input Level: –1 V (peak) ≤ I, Q ≤ +1 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

Waveform Resolution
14, 15, 16 bits for each I/Q

Modulation Bandwidth
160 MHz*/120 MHz

Reconstruction Filter
80 MHz

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 WLAN IQproducer MX370111A and 802.11ac (160 MHz) option MX370111A-002.
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 at 1000-point resolution

List Function
Function: Sets sweep points for both frequency and level individually to 500 points
BER Measurement Function
with MG3710A-021

Connector
Connector: AUX Connector (Rear panel)
Level: TTL

Input Signal
Data, Clock, Enable

Input Bit Rate
100 bps to 40 Mbps

Measurable Pattern
Repeat PN9, PN11, PN15, PN20, PN23, 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

Re-synchronization Judgment
\[ \frac{x}{y} \]
\[ x: \text{Number of error bits in } y \text{ bit (Setting range: 1 to } y/2) \]
\[ y: \text{Number of measurement bits (select from 500, 5000 and 50000)} \]

Measurable Bit
\[ \leq 2^{32} - 1 \text{ bit} \]

Measurable Error Bit Count
\[ \leq 2^{32} - 1 \text{ bit} \]

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), 0/5 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

*: Supports firmware Version 2.00.00 and later.
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