MG3740A
Analog Signal Generator
100 kHz to 2.7 GHz
100 kHz to 4.0 GHz
100 kHz to 6.0 GHz
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</tbody>
</table>
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 MG3740A-034/036, MG3740A-064/066
- f > 4 GHz: Use MG3740A-036, MG3740A-066

**Modulation Mode only**
Waveform pattern RMS value: At RMSw (Linear value) and each combination less than following ranges:

\[ -3.00 \text{ dB} \leq \text{RMS}_{\text{nom}} \leq +3.00 \text{ dB} \]

\[ \text{RMS}_{\text{nom}} = 20 \log \left( \frac{\text{RMS}_{\text{w}}}{4628} \right) \quad (16\text{-bit Data}) \]

\[ \text{RMS}_{\text{nom}} = 20 \log \left( \frac{\text{RMS}_{\text{w}}}{2314} \right) \quad (15\text{-bit Data}) \]

\[ \text{RMS}_{\text{nom}} = 20 \log \left( \frac{\text{RMS}_{\text{w}}}{1157} \right) \quad (14\text{-bit Data}) \]

after CAL

- Applies to MG3740A-062/064/066
# Frequency

## Setting Range

<table>
<thead>
<tr>
<th>1st SG</th>
<th>9 kHz to 2.7 GHz [MG3740A-032]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 kHz to 4 GHz [MG3740A-034]</td>
</tr>
<tr>
<td></td>
<td>9 kHz to 6 GHz [MG3740A-036]</td>
</tr>
<tr>
<td>2nd SG</td>
<td>9 kHz to 2.7 GHz [MG3740A-062]</td>
</tr>
<tr>
<td></td>
<td>9 kHz to 4 GHz [MG3740A-064]</td>
</tr>
<tr>
<td></td>
<td>9 kHz to 6 GHz [MG3740A-066]</td>
</tr>
</tbody>
</table>

Resolution: 0.01 Hz

## 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 MG3740A-001/002

- Aging rate: ±1 × 10⁻⁶/year
- Temperature characteristics: ±2.5 × 10⁻⁶ (5° to 45°C)

With MG3740A-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 × 10⁻⁶/month
- Temperature characteristics: ±2 × 10⁻⁹ (5° to 45°C)

With MG3740A-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 MG3740A-043/073
-110 to +17 dBm [without MG3740A-041/042], [without MG3740A-071/072]
-110 to +30 dBm [with MG3740A-041, without MG3740A-042], [with MG3740A-071, without MG3740A-072]
-144 to +17 dBm [without MG3740A-041, with MG3740A-042], [without MG3740A-071, with MG3740A-072]
-144 to +30 dBm [with MG3740A-041/042], [with MG3740A-071/072]

with MG3740A-043/073
-110 to +17 dBm [without MG3740A-041/042], [without MG3740A-071/072]
-110 to +25 dBm [with MG3740A-041, without MG3740A-042], [with MG3740A-071, without MG3740A-072]
-144 to +17 dBm [without MG3740A-041, with MG3740A-042], [without MG3740A-071, with MG3740A-072]
-144 to +25 dBm [with MG3740A-041/042], [with MG3740A-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 MG3740A-041 nor MG3740A-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.
**Level Accuracy**

18° to 28°C, CW

without Reverse Power Protection [without MG3740A-043], [without MG3740A-073]

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension MG3740A-042/072</th>
<th>High Power Extension MG3740A-041/071</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
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<th>±0.5 dB (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 kHz ≤ f &lt; 1 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>1 MHz ≤ f &lt; 10 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
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<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>10 MHz ≤ f &lt; 50 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>50 MHz ≤ f ≤ 400 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>4 GHz &lt; f ≤ 5 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>5 GHz &lt; f ≤ 6 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
</tbody>
</table>

with Reverse Power Protection [with MG3740A-043], [with MG3740A-073]

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension MG3740A-042/072</th>
<th>High Power Extension MG3740A-041/071</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
<th>±0.5 dB (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 kHz ≤ f &lt; 1 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>1 MHz ≤ f &lt; 10 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>10 MHz ≤ f &lt; 50 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>50 MHz ≤ f &lt; 400 MHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>4 GHz &lt; f ≤ 5 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
<tr>
<td>5 GHz &lt; f ≤ 6 GHz</td>
<td>without without</td>
<td>without without</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
<td>±0.5 dB (typ.)</td>
</tr>
</tbody>
</table>
**Level accuracy at -112 dBm**

- **Frequency [MHz]**
- **Power error [dB]**
- **Graph legend**:
  - Mean
  - Upper std dev (1sigma)
  - Lower std dev (1sigma)

**Amplitude repeatability +5 dBm ALC on**

- **Delta from Initial [dB]**
- **Frequency [MHz]**
- **Elapsed time (minutes)**
- **Graph legend**:
  - 850 MHz
  - 1900 MHz
  - 2200 MHz
  - 3500 MHz
  - 5800 MHz
Level Linearity

18°C to 28°C, CW

without Reverse Power Protection [without MG3740A-043], [without MG3740A-073]
Referenced to level: −7 dBm

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension MG3740A-042/072</th>
<th>High Power Extension MG3740A-041/071</th>
<th>&lt;+1 dBm</th>
<th>≤−10 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MHz ≤ f &lt; 400 MHz without</td>
<td></td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>±0.2 dB (typ.)</td>
</tr>
<tr>
<td>50 MHz ≤ f &lt; 400 MHz with with</td>
<td></td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>±0.2 dB (typ.)</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz without</td>
<td></td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.3 dB (typ.)</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz with</td>
<td></td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.3 dB (typ.)</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz without</td>
<td></td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>—</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz with</td>
<td></td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>—</td>
</tr>
<tr>
<td>4 GHz &lt; f ≤ 6 GHz without</td>
<td></td>
<td>without</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

with Reverse Power Protection [with MG3740A-043], [with MG3740A-073]
Referenced to level: −10 dBm

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Low Power Extension MG3740A-042/072</th>
<th>High Power Extension MG3740A-041/071</th>
<th>≤−2 dBm</th>
<th>≤−100 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MHz ≤ f &lt; 400 MHz without/with</td>
<td></td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>±0.2 dB (typ.)</td>
</tr>
<tr>
<td>400 MHz ≤ f ≤ 3 GHz without/with</td>
<td></td>
<td>without</td>
<td>±0.2 dB (typ.)</td>
<td>±0.2 dB (typ.)</td>
</tr>
<tr>
<td>3 GHz &lt; f ≤ 4 GHz without/with</td>
<td></td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.3 dB (typ.)</td>
</tr>
<tr>
<td>4 GHz &lt; f ≤ 6 GHz without/with</td>
<td></td>
<td>without</td>
<td>±0.3 dB (typ.)</td>
<td>±0.3 dB (typ.)</td>
</tr>
</tbody>
</table>

Relative level accuracy at 850 MHz initial power +10 dBm
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) |

VSWR

<table>
<thead>
<tr>
<th>without MG3740A-043</th>
<th>(Output Level: ≤–7 dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1.45 (50 MHz ≤ f ≤ 3 GHz)</td>
<td></td>
</tr>
<tr>
<td>≤1.65 (3 GHz &lt; f ≤ 4 GHz)</td>
<td></td>
</tr>
<tr>
<td>≤1.9 (4 GHz &lt; f ≤ 6 GHz)</td>
<td></td>
</tr>
</tbody>
</table>

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<th>with MG3740A-043</th>
<th>(Output Level: ≤–10 dBm)</th>
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<td>≤1.9 (4 GHz &lt; f ≤ 6 GHz)</td>
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<table>
<thead>
<tr>
<th>without MG3740A-073</th>
<th>(Output Level: ≤–7 dBm)</th>
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<td>≤1.45 (50 MHz ≤ f ≤ 3 GHz)</td>
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<td>≤1.9 (4 GHz &lt; f ≤ 6 GHz)</td>
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<tr>
<th>with MG3740A-073</th>
<th>(Output Level: ≤–10 dBm)</th>
</tr>
</thead>
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<tr>
<td>≤1.45 (50 MHz ≤ f ≤ 3 GHz)</td>
<td></td>
</tr>
<tr>
<td>≤1.65 (3 GHz &lt; f ≤ 4 GHz)</td>
<td></td>
</tr>
<tr>
<td>≤1.9 (4 GHz &lt; f ≤ 6 GHz)</td>
<td></td>
</tr>
</tbody>
</table>

Maximum Reverse Input Power

<table>
<thead>
<tr>
<th>±50 VDC (max.)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>without MG3740A-043</th>
<th>2 W (nom.)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>with MG3740A-043</th>
<th>20 W (1 MHz &lt; Frequency of Reverse Input Power ≤ 2 GHz) (nom.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 W (2 GHz &lt; Frequency of Reverse Input Power ≤ 6 GHz) (nom.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>without MG3740A-073</th>
<th>2 W (nom.)</th>
</tr>
</thead>
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<thead>
<tr>
<th>with MG3740A-073</th>
<th>20 W (1 MHz &lt; Frequency of Reverse Input Power ≤ 2 GHz) (nom.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 W (2 GHz &lt; Frequency of Reverse Input Power ≤ 6 GHz) (nom.)</td>
<td></td>
</tr>
</tbody>
</table>

Signal Purity

Harmonic Spurious

(CW, Optimize S/N: Off)

<table>
<thead>
<tr>
<th>without MG3740A-043, or MG3740A-073</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>without MG3740A-041</th>
<th>≤–30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 3 GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤–30 dBc (Output Level: ≤+4 dBm, f &gt;3 GHz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>with MG3740A-041</th>
<th>≤–30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 50 MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤–30 dBc (Output Level: ≤+12 dBm, 50 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td></td>
<td>≤–30 dBc (Output Level: ≤+4 dBm, f &gt;3 GHz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>with MG3740A-043, or MG3740A-073</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>without MG3740A-041</th>
<th>≤–30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 3 GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤–30 dBc (Output Level: ≤+1 dBm, f &gt;3 GHz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>with MG3740A-041</th>
<th>≤–30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 50 MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤–30 dBc (Output Level: ≤+9 dBm, 50 MHz ≤ f ≤ 3 GHz)</td>
</tr>
<tr>
<td></td>
<td>≤–30 dBc (Output Level: ≤+1 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 MG3740A-002

*Single sideband phase noise*

![Graph showing SSB phase noise](image)

Phase Noise Optimization: <200 kHz (meas)

![Graph showing SSB phase noise](image)

Phase Noise Optimization: >300 kHz (meas)
■ 60/150/260/400 MHz, CW, Optimize S/N: On, with MG3740A-002

**Single sideband phase noise**

Phase Noise Optimization: <200 kHz

(meas)

**Single sideband phase noise**

Phase Noise Optimization: >300 kHz

(meas)
- 60/150/260/400 MHz, Mod = On, with MG3740A-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 MG3740A-002

**Single sideband phase noise**

![Graph showing phase noise for different frequencies](image)

- Phase Noise Optimization: <200 kHz (meas)
- Phase Noise Optimization: >300 kHz (meas)
850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: On, with MG3740A-002

Phase Noise Optimization: <200 kHz
\[ \text{(meas)} \]

Phase Noise Optimization: >300 kHz
\[ \text{(meas)} \]
850 MHz, 1/1.9/2.2/3.5/5.8 GHz, Mod = On, with MG3740A-002

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, Optimization mode: Distortion

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: < 20%)
- <2% of setting + 1% (98 MHz ≤ f ≤ 2.7 GHz, Modulation Rate: 1 kHz, AM Source: Sine, 20% ≤ AM Depth m: ≤ 90%)

Distortion
- <2% (nom.) (100 kHz ≤ f < 7 MHz, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)
- <2.5% (nom.) (100 kHz ≤ f < 7 MHz, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)
- <2% (7 MHz ≤ f ≤ 98 MHz, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)
- <2.5% (7 MHz ≤ f < 98 MHz, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)
- <1% (98 MHz ≤ f ≤ 2.7 GHz, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)
- <1% (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
- 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
- 0.1 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
98 MHz ≤ f ≤ 2.7 GHz, ±1 dB Bandwidth
- 0.1 Hz ≤ Modulation Rate ≤ 50 Hz (nom.), 50 Hz ≤ Modulation Rate ≤ 100 kHz (typ.)
- 0.1 Hz ≤ Modulation Rate ≤ 50 Hz (nom.), 50 Hz ≤ Modulation Rate ≤ 100 kHz (typ.)

Frequency Modulation (FM)
Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

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

Output Level: ≤+4 dBm, after CAL

Deviation Accuracy
- <2% of setting + 20 Hz (nom.) (Modulation Rate: 1 kHz, FM Source: Sine, 100 kHz ≤ f ≤ 2.7 GHz, 20 Hz ≤ FM Deviation ≤ 200 Hz)
- <3% of setting + 20 Hz, <1.26% of setting + 20 Hz (typ.) (Modulation Rate: 1 kHz, FM Source: Sine, 250 kHz + 2 × Modulation Rate) ≤ f ≤ 2.7 GHz, 200 Hz ≤ FM Deviation ≤ 40 kHz, (Deviation + modulation rate) > 0.2)
- <3% of setting + 20 Hz, <1.84% of setting + 20 Hz (typ.) (Modulation Rate: 1 kHz, FM Source: Sine, 250 kHz + 2 × (Modulation Rate) ≤ f ≤ 2.7 GHz, 200 Hz ≤ FM Deviation ≤ 40 kHz, (Deviation + modulation rate) > 1.2)
Distortion
<0.5% (nom.) (Modulation Rate: 1 kHz, FM Source: Sine, 100 kHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f < 1 MHz, FM Deviation: 22.5 kHz)
<0.4% (Modulation Rate: 1 kHz, FM Source: Sine, 1 MHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f ≤ 2.7 GHz, FM Deviation: 22.5 kHz)
<1% (nom.) (Modulation Rate: 1 kHz, FM Source: Sine, 100 kHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f < 1 MHz, FM Deviation: 3.5 kHz)
<0.5% (Modulation Rate: 1 kHz, FM Source: Sine, 1 MHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f ≤ 2.7 GHz, FM Deviation: 3.5 kHz)

Modulation Frequency Response
100 kHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f < 1 MHz, Deviation: 40 kHz, ±1 dB Bandwidth
20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
10 MHz ≤ f ≤ 2.7 GHz, Deviation: 40 kHz, ±1 dB Bandwidth
20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)

Phase Modulation (PM)
Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

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, FM Source: Sine, 0 rad. < PM Deviation: ≤0.7 rad.)
<3% of setting + 0.02 rad., <1.84% of setting + 0.02 rad. (typ.) (Modulation Rate: 1 kHz, FM Source: Sine, 0.7 rad. < PM Deviation: ≤20 rad.)

Distortion
<0.2% (typ.) (Modulation Rate: 1 kHz, FM Source: Sine, PM Deviation: 20 rad.)

Modulation Frequency Response
Deviation: 2 rad., ±1 dB Bandwidth
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 (10 to 90%) (nom.)

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 MG3740A-050/080 is installed and for 1st SG and 2nd SG respectively
Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

**Modulation Type**
AM, FM, PM

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

**Coupling**
- DC or AC is alternatively selectable.

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

**Input Frequency**
- DC Coupling: DC to 1 MHz (nom.)
- AC Coupling: 20 Hz (typ.) to 1 MHz (nom.)

**Simultaneous Modulation**
- AM + FM
- AM + PM
- Internal 1 + Internal 2
- Internal + External
- FM and PM 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 m: 30%
    - DC Coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
    - AC Coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
  - Depth m: 90%
    - DC Coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
    - AC Coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
- Peak Level: ≤+4 dBm, 98 MHz ≤ f ≤ 2.7 GHz, AM Depth Type: Lin, ±1 dB Bandwidth, after CAL
  - Depth m: 30%
    - DC Coupling: DC ≤ Modulation Rate < 50 Hz (nom.)
    - 50 Hz ≤ Modulation Rate ≤ 100 kHz (typ.)
    - AC Coupling: 20 Hz ≤ Modulation Rate < 50 Hz (nom.)
    - 50 Hz ≤ Modulation Rate ≤ 100 kHz (typ.)
  - Depth m: 90%
    - DC Coupling: DC ≤ Modulation Rate < 50 Hz (nom.)
    - 50 Hz ≤ Modulation Rate ≤ 100 kHz (typ.)
    - AC Coupling: 20 Hz ≤ Modulation Rate < 50 Hz (nom.)
    - 50 Hz ≤ Modulation Rate ≤ 100 kHz (typ.)

**Modulation Frequency Response (FM)**
- Output Level: ≤+4 dBm, 100 kHz + 2 × (Modulation Rate + 2 × FM Deviation) ≤ f ≤ 10 MHz, FM Deviation: 40 kHz, ±1 dB Bandwidth, after CAL
  - DC Coupling: DC ≤ Modulation Rate ≤ 20 kHz (nom.)
  - AC Coupling: 20 Hz ≤ Modulation Rate ≤ 20 kHz (nom.)
- Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 10 MHz, FM Deviation: 40 kHz, ±1 dB Bandwidth, after CAL
  - DC Coupling: DC ≤ Modulation Rate < 50 Hz (nom.)
    - 50 Hz ≤ Modulation Rate ≤ 200 kHz (typ.)
  - AC Coupling: 20 Hz ≤ Modulation Rate < 50 Hz (nom.)
    - 50 Hz ≤ Modulation Rate ≤ 200 kHz (typ.)

**Modulation Frequency Response (PM)**
- Output Level: ≤+4 dBm, 100 kHz + 2 × (Modulation Rate + 2 × PM Deviation × Modulation Rate) ≤ f ≤ 2.7 GHz,
  PM Deviation: 2 rad., ±1 dB Bandwidth, after CAL
  - DC Coupling: DC ≤ Modulation Rate < 200 Hz (nom.)
  - 200 Hz ≤ Modulation Rate ≤ 20 kHz (typ.)
  - AC Coupling: 20 Hz ≤ Modulation Rate < 200 Hz (nom.)
    - 200 Hz ≤ Modulation Rate ≤ 20 kHz (typ.)

**Carrier Leak**
with MG3740A-020
(18° to 28°C, RMS Value: 0 dB, after CAL)
- ≤–55 dBc (100 MHz ≤ f < 4 GHz)
- ≤–45 dBc (f ≥ 4 GHz)
Image Rejection
with MG3740A-020
(18° to 28°C, RMS Value: 0 dB, Complex CW at 1 MHz or less, after CAL)
\[ \leq -50 \text{ dBc} \ (200 \text{ MHz} \leq f < 4 \text{ GHz}) \]
\[ \leq -43 \text{ dBc} \ (f \geq 4 \text{ GHz}) \]

I and Q Input/Output

Baseband I/Q Adjustment
with MG3740A-020

DC Offset
- Range: \(-20.000\% \text{ to } +20.000\%\)
- Resolution: 0.025\%

Gain Balance
- (Gain adjustment of I-phase for Q-phase)
- Range: \(-1.000 \text{ dB} \text{ to } +1.000 \text{ dB}\)
- Resolution: 0.001 dB

Quadrature Adjustment
- Range: \(-10.00 \text{ deg. to } +10.00 \text{ deg.}\)
- Resolution: 0.01 deg.

Phase Adjustment
- Range: \(-360.00 \text{ deg. to } +360.00 \text{ deg.}\)
- Resolution: 0.01 deg.

Skew Adjustment
- Range: \(-800.000 \text{ ns to } +800.000 \text{ ns}\)
- Resolution: 1 ps

Delay Adjustment
- Range: \(-400.000 \text{ ns to } +400.000 \text{ ns}\)
- Resolution: 1 ps

Arbitrary Waveform Generator
with MG3740A-020

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

Modulation Bandwidth
- 2 MHz
- (When Over sampling rate = 4. The maximum number of Sampling rate = 8 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: \(\pm 8 \text{ dB}\)
- 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
- Resolution: 0.001 Hz
Waveform Memory

1stRF
When MG3740A-048 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.
- without MG3740A-045
  - 64 Msamples
- with MG3740A-045
  - 256 Msamples

2ndRF
When MG3740A-078 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.
- without MG3740A-075
  - 64 Msamples
- with MG3740A-075
  - 256 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 MG3740A-048
This function synthesizes the signals of two memories to generate a baseband waveform.
2nd VSG: with MG3740A-078
This function synthesizes the signals of two memories to generate a baseband waveform.

Frequency Offset
\[ \pm (8 \text{ MHz} \times 0.8 - \text{waveform data bandwidth}) \div 2 \text{ (max.)} \]

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
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 MG3740A-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: Synchrons 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
\[ x/y \]
\[ x: \text{Number of error bits in } y \text{ bit (Setting range: 1 to } y/2) \]
\[ y: \text{Number of measurement bits (select from 500, 5000 and 50000)} \]

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 MG3740A-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)

### Additional Analog Modulation Input
When MG3740A-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 MG3740A-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 (MG3740A-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 MG3740A-032, 034, or 036, with MG3740A-041/042, excluding other options)
260 VA (nom.)
(with MG3740A-032, 034, or 036, with MG3740A-041/042, with MG3740A-062, 064, or 066,
with MG3740A-071/072, excluding other options)
280 VA (nom.)
(with MG3740A-032, 034, or 036, with MG3740A-041/042, with MG3740A-062, 064, or 066,
with MG3740A-071/072, with MG3740A-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