

**Anritsu** Advancing beyond

# Vector Signal Generator

## MG3710E

100 kHz to 2.7 GHz

100 kHz to 4.0 GHz

100 kHz to 6.0 GHz



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## Definitions

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### Typical (typ.)

Performance not warranted. Must products meet typical performance.

### Nominal (nom.)

Values not warranted. Included to facilitate application of product.

### Measured (meas)

Performance not warranted. Data actually measured by randomly selected measuring instruments.

## Conditions of Specifications

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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 MG3710E-034/036, MG3710E-064/066

$f > 4$  GHz: Use MG3710E-036, MG3710E-066

### Modulation Mode only

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

$-3.00 \text{ dB} \leq \text{RMSnom} \leq +3.00 \text{ dB}$

$\text{RMSnom} = 20 \log (\text{RMSw}/4628)$  (16 bit Data)

$\text{RMSnom} = 20 \log (\text{RMSw}/2314)$  (15 bit Data)

$\text{RMSnom} = 20 \log (\text{RMSw}/1157)$  (14 bit Data)

after CAL

\*: Applies to MG3710E-062/064/066

## Frequency

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### Setting Range

1st SG

9 kHz to 2.7 GHz [MG3710E-032]

9 kHz to 4 GHz [MG3710E-034]

9 kHz to 6 GHz [MG3710E-036]

2nd SG

9 kHz to 2.7 GHz [MG3710E-062]

9 kHz to 4 GHz [MG3710E-064]

9 kHz to 6 GHz [MG3710E-066]

Resolution: 0.01 Hz

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### Phase Offset

Range: -180.00 deg. to +180.00 deg.

Resolution: 0.01 deg.

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### 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.)

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### Internal Reference Oscillator

without MG3710E-001/002

Aging rate:  $\pm 1 \times 10^{-6}$ /year

Temperature characteristics:  $\pm 2.5 \times 10^{-6}$  (5°C to 45°C)

with MG3710E-001

Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on  
 $\pm 1 \times 10^{-9}$  (7.5 minutes after power-on)

Aging rate:  $\pm 1 \times 10^{-10}$ /month

Temperature characteristics:  $\pm 2 \times 10^{-9}$  (5°C to 45°C)

with MG3710E-002

Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on  
 $\pm 5 \times 10^{-7}$  (2 minutes after power-on)  
 $\pm 5 \times 10^{-8}$  (5 minutes after power-on)

Aging rate:  $\pm 1 \times 10^{-7}$ /year

Temperature characteristics:  $\pm 2 \times 10^{-8}$  (5°C to 45°C)

## Output Level

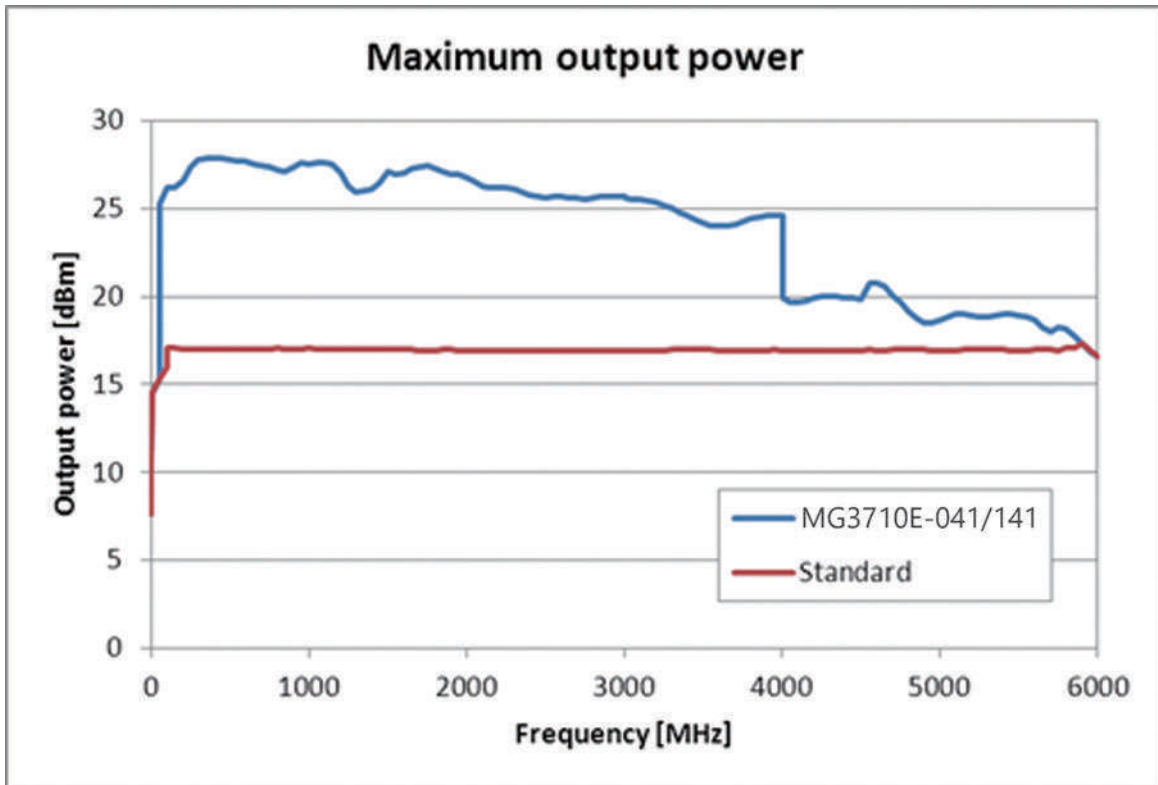
### Setting Range

without MG3710E-043/073

- 110 to +17 dBm [without MG3710E-041/042], [without MG3710E-071/072]
- 110 to +30 dBm [with MG3710E-041, without MG3710E-042], [with MG3710E-071, without MG3710E-072]
- 144 to +17 dBm [without MG3710E-041, with MG3710E-042], [without MG3710E-071, with MG3710E-072]
- 144 to +30 dBm [with MG3710E-041/042], [with MG3710E-071/072]

with MG3710E-043/073

- 110 to +17 dBm [without MG3710E-041/042], [without MG3710E-071/072]
- 110 to +25 dBm [with MG3710E-041, without MG3710E-042], [with MG3710E-071, without MG3710E-072]
- 144 to +17 dBm [without MG3710E-041, with MG3710E-042], [without MG3710E-071, with MG3710E-072]
- 144 to +25 dBm [with MG3710E-041/042], [with MG3710E-071/072]



(meas)

### 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 MG3710E-041 nor MG3710E-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**

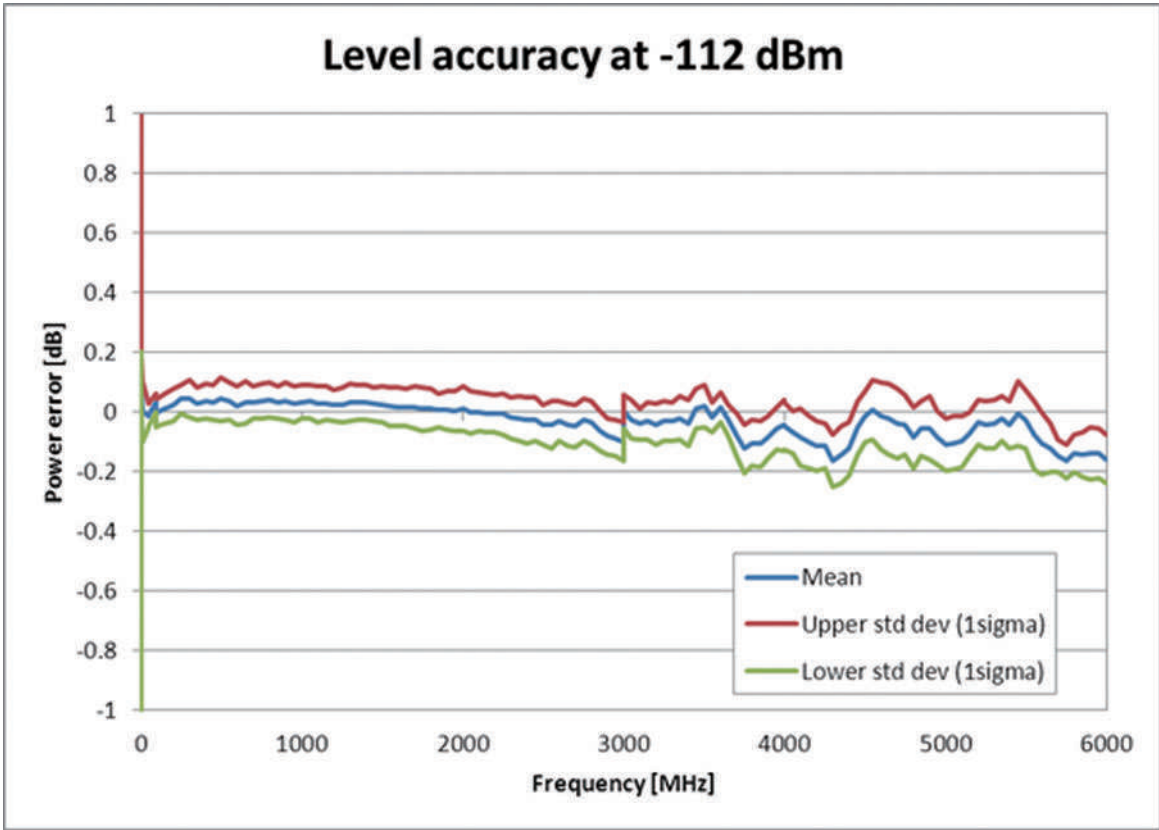
18°C to 28°C, CW

without Reverse Power Protection [without MG3710E-043], [without MG3710E-073]

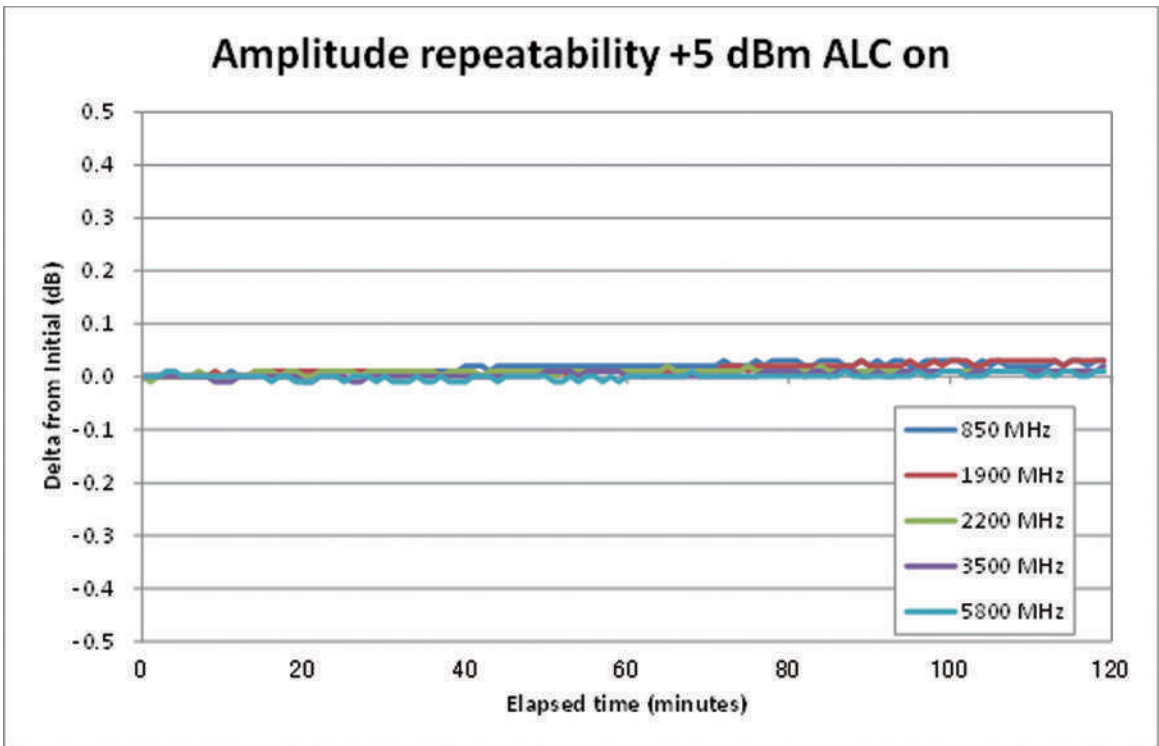
Frequency Range	Low Power Extension MG3710E-042/072		High Power Extension MG3710E-041/071		≤+23 dBm >+20 dBm		≤+20 dBm >+13 dBm		≤+13 dBm >+11 dBm		≤+11 dBm >+10 dBm		≤+10 dBm >+5 dBm		≤+5 dBm >−100 dBm		≤−100 dBm >−110 dBm		≤−110 dBm >−120 dBm		≤−120 dBm >−127 dBm		≤−127 dBm >−136 dBm		
	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	
100 kHz ≤ f < 1 MHz	without	without																							
	without	with																							
	with	without																							
1 MHz ≤ f < 10 MHz	without	without																							
	without	with																							
	with	without																							
10 MHz ≤ f < 50 MHz	without	without																							
	without	with																							
	with	without																							
50 MHz ≤ f < 400 MHz	without	without																							
	without	with																							
	with	without																							
400 MHz ≤ f ≤ 3 GHz	without	without																							
	without	with																							
	with	without																							
3 GHz < f ≤ 4 GHz	without	without																							
	without	with																							
	with	without																							
4 GHz < f ≤ 5 GHz	without	without																							
	without	with																							
	with	without																							
5 GHz < f ≤ 6 GHz	without	without																							
	without	with																							
	with	without																							

with Reverse Power Protection [with MG3710E-043], [with MG3710E-073]

Frequency Range	Low Power Extension MG3710E-042/072		High Power Extension MG3710E-041/071		≤+20 dBm >+17 dBm		≤+17 dBm >+10 dBm		≤+10 dBm >+8 dBm		≤+8 dBm >+7 dBm		≤+7 dBm >+2 dBm		≤+2 dBm >−2 dBm		≤−2 dBm >−100 dBm		≤−100 dBm >−110 dBm		≤−110 dBm >−120 dBm		≤−120 dBm >−127 dBm		≤−127 dBm >−136 dBm	
	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with	without	with
100 kHz ≤ f < 1 MHz	without	without																								
	without	with																								
	with	without																								
1 MHz ≤ f < 10 MHz	without	without																								
	without	with																								
	with	without																								
10 MHz ≤ f < 50 MHz	without	without																								
	without	with																								
	with	without																								
50 MHz ≤ f < 400 MHz	without	without																								
	without	with																								
	with	without																								
400 MHz ≤ f ≤ 3 GHz	without	without																								
	without	with																								
	with	without																								
3 GHz < f ≤ 4 GHz	without	without																								
	without	with																								
	with	without																								
4 GHz < f ≤ 5 GHz	without	without																								
	without	with																								
	with	without																								
5 GHz < f ≤ 6 GHz	without	without																								
	without	with																								
	with	without																								



(meas)



(meas)

## Level Linearity

18°C to 28°C, CW

without Reverse Power Protection [without MG3710E-043], [without MG3710E-073]

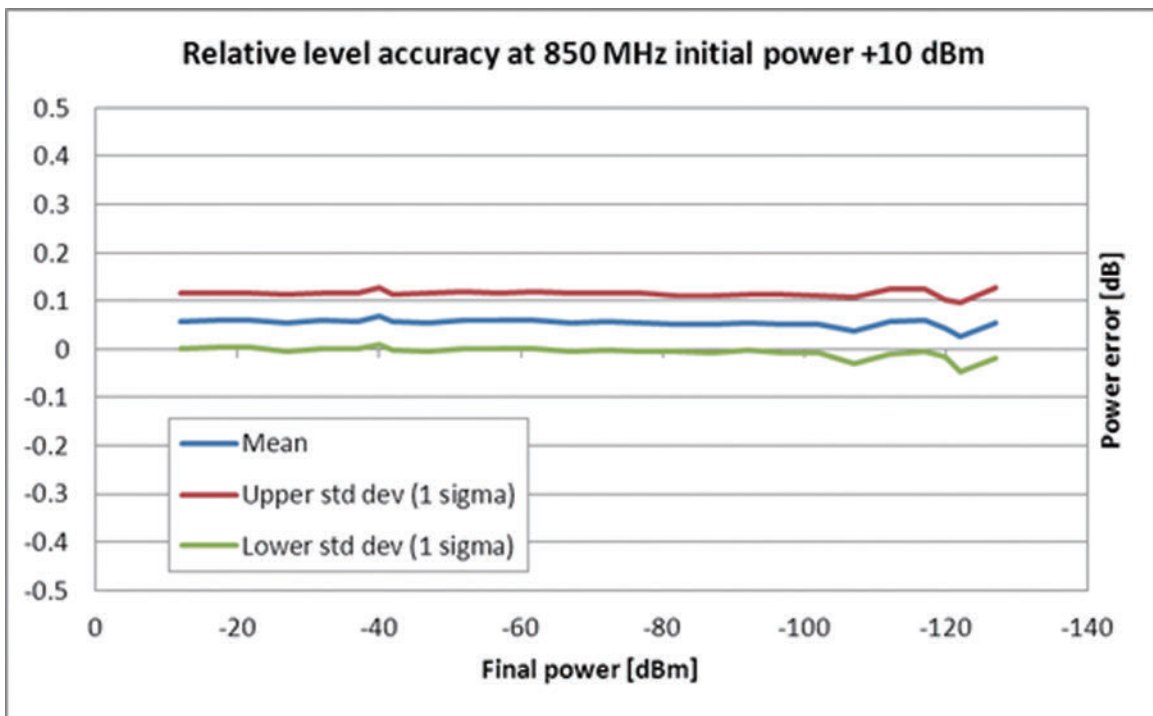
Referenced to level: -7 dBm

Frequency range	Low Power Extension MG3710E-042/072	High Power Extension MG3710E-041/071	< +1 dBm > -110 dBm	≤ -110 dBm > -120 dBm	
50 MHz ≤ f < 400 MHz	without	without/with	±0.2 dB (typ.)		
	with			±0.2 dB (typ.)	
400 MHz ≤ f ≤ 3 GHz	without		±0.2 dB (typ.)		
	with		±0.2 dB (typ.)	±0.2 dB (typ.)	
3 GHz < f ≤ 4 GHz	without		±0.3 dB (typ.)		
	with		±0.3 dB (typ.)	±0.3 dB (typ.)	
4 GHz < f ≤ 6 GHz	without		±0.3 dB (typ.)		
	with				—

with Reverse Power Protection [with MG3710E-043], [with MG3710E-073]

Referenced to level: -10 dBm

Frequency range	Low Power Extension MG3710E-042/072	High Power Extension MG3710E-041/071	< -2 dBm > -100 dBm	≤ -100 dBm > -110 dBm
50 MHz ≤ f < 400 MHz	without/with	without/with	±0.2 dB (typ.)	
400 MHz ≤ f ≤ 3 GHz			±0.2 dB (typ.)	
3 GHz < f ≤ 4 GHz			±0.3 dB (typ.)	±0.4 dB (typ.)
4 GHz < f ≤ 6 GHz			±0.3 dB (typ.)	±0.4 dB (typ.)



(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

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### Connector

N-J Connector, 50Ω (Front panel)

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### VSWR

without MG3710E-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 MG3710E-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 MG3710E-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 MG3710E-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 MG3710E-043

2 W (nom.)

with MG3710E-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 MG3710E-073

2 W (nom.)

with MG3710E-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

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### Harmonic Spurious

(CW, Optimize S/N: Off)

without MG3710E-043, or MG3710E-073

without MG3710E-041

<-30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 3 GHz)

<-30 dBc (Output Level: ≤+4 dBm, f > 3 GHz)

with MG3710E-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 MG3710E-043, or MG3710E-073

without MG3710E-041

<-30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 3 GHz)

<-30 dBc (Output Level: ≤+1 dBm, f > 3 GHz)

with MG3710E-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)

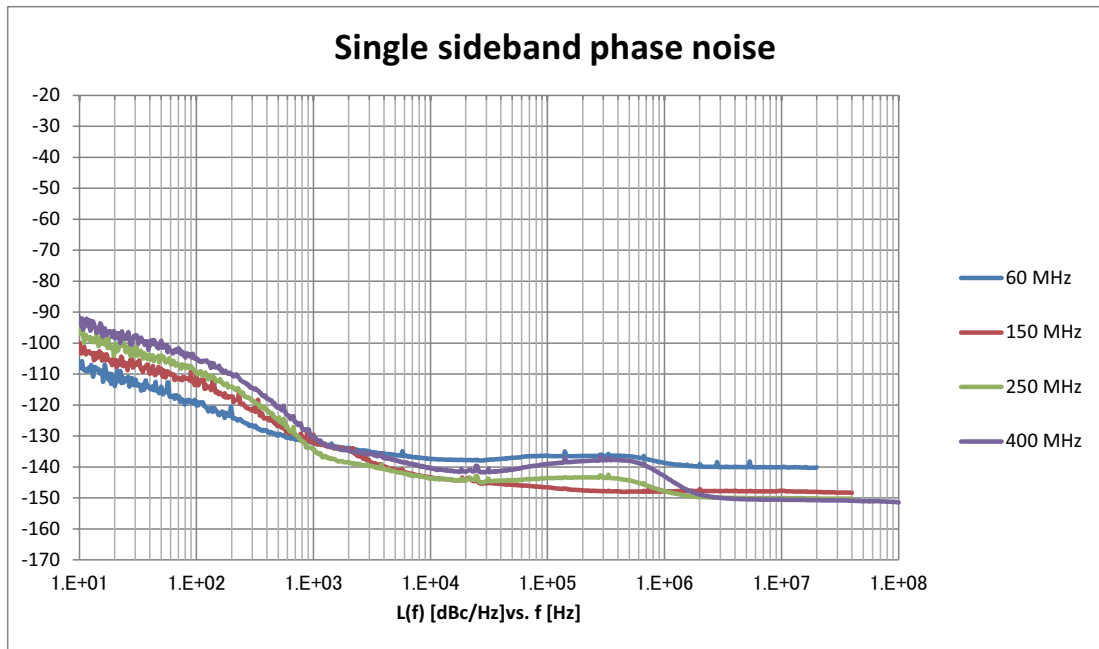
## Non-harmonic Spurious

(CW,  $-30 \text{ dBm} \leq \text{Output Level} \leq +5 \text{ dBm}$ , Offset:  $\geq 10 \text{ kHz}$ )  
<-62 dBc, -70 dBc (typ.) ( $100 \text{ kHz} \leq f \leq 187.5 \text{ MHz}$ )  
<-68 dBc, -76 dBc (typ.) ( $187.5 \text{ MHz} < f \leq 750 \text{ MHz}$ )  
<-62 dBc, -76 dBc (typ.) ( $750 \text{ MHz} < f \leq 1.5 \text{ GHz}$ )  
<-56 dBc, -70 dBc (typ.) ( $1.5 \text{ GHz} < f \leq 3 \text{ GHz}$ )  
<-50 dBc, -64 dBc (typ.) ( $3 \text{ GHz} < f \leq 6 \text{ GHz}$ )

## SSB Phase Noise

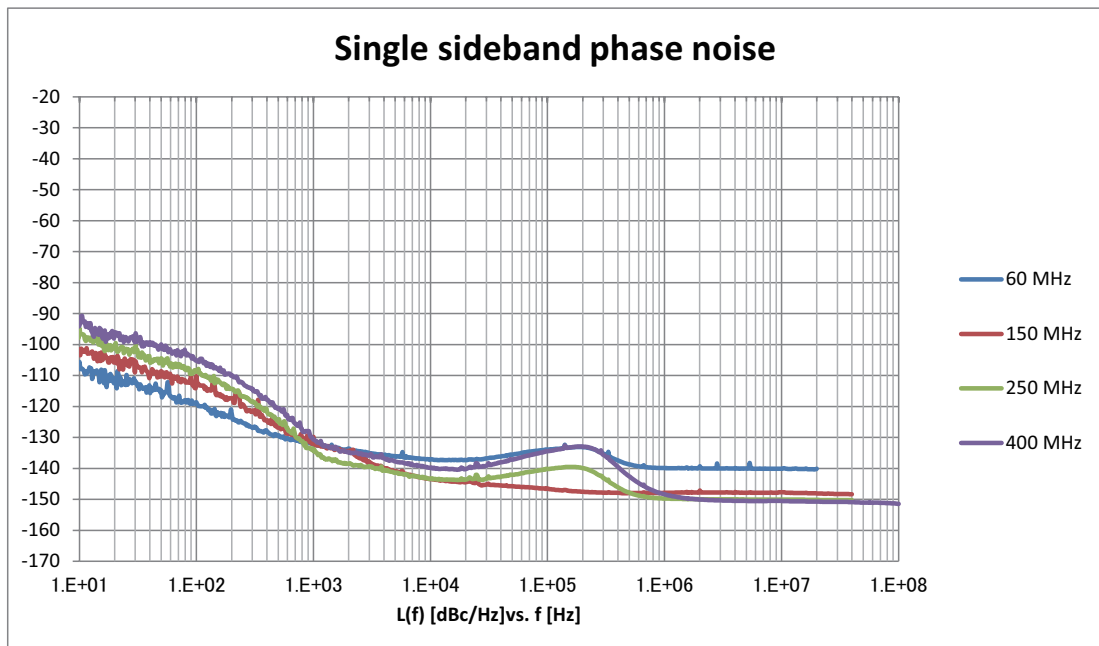
(CW, Phase Noise Optimization:  $< 200 \text{ kHz}$ , Offset:  $20 \text{ kHz}$ )  
<-140 dBc/Hz (nom.) ( $100 \text{ MHz}$ )  
<-131 dBc/Hz (typ.) ( $1 \text{ GHz}$ )  
<-125 dBc/Hz (typ.) ( $2 \text{ GHz}$ )

■ 60/150/260/400 MHz, CW, Optimize S/N: Off, with MG3710E-002



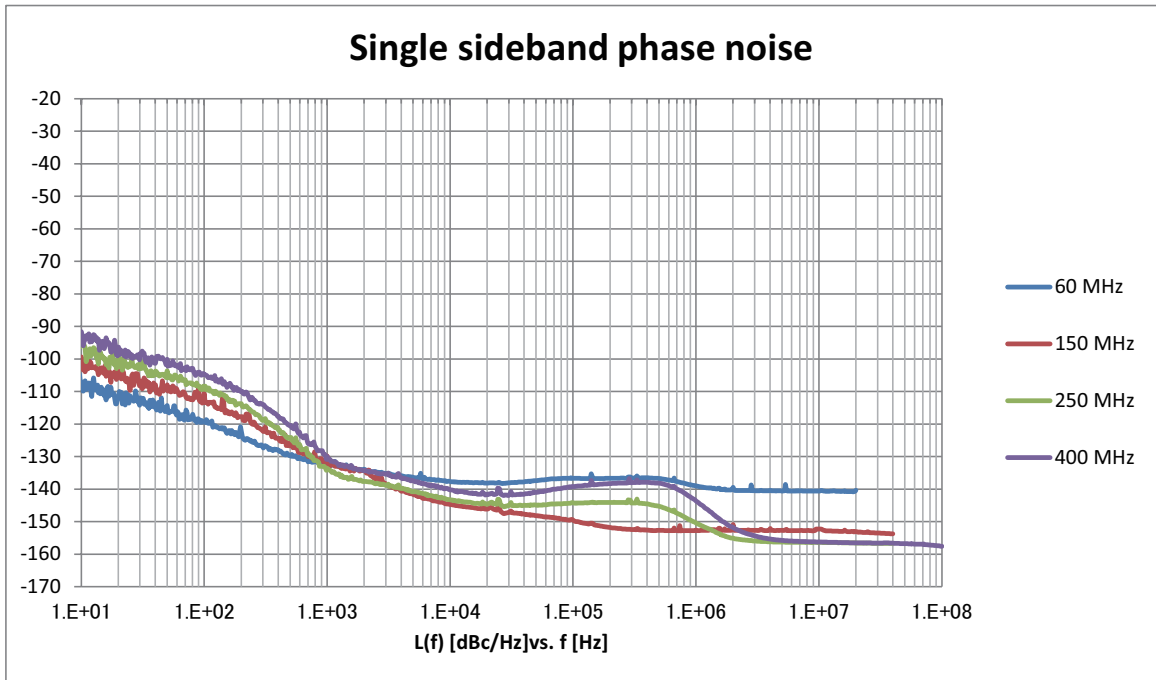
Phase Noise Optimization:  $< 200 \text{ kHz}$

(meas)



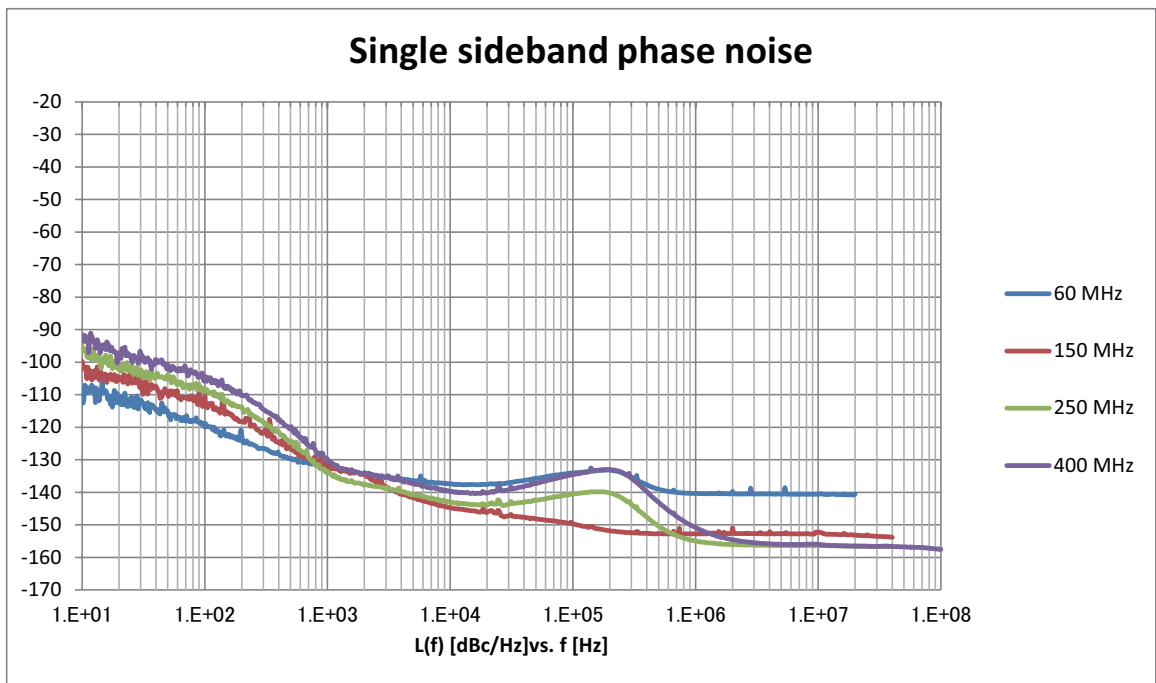
Phase Noise Optimization:  $> 300 \text{ kHz}$

(meas)



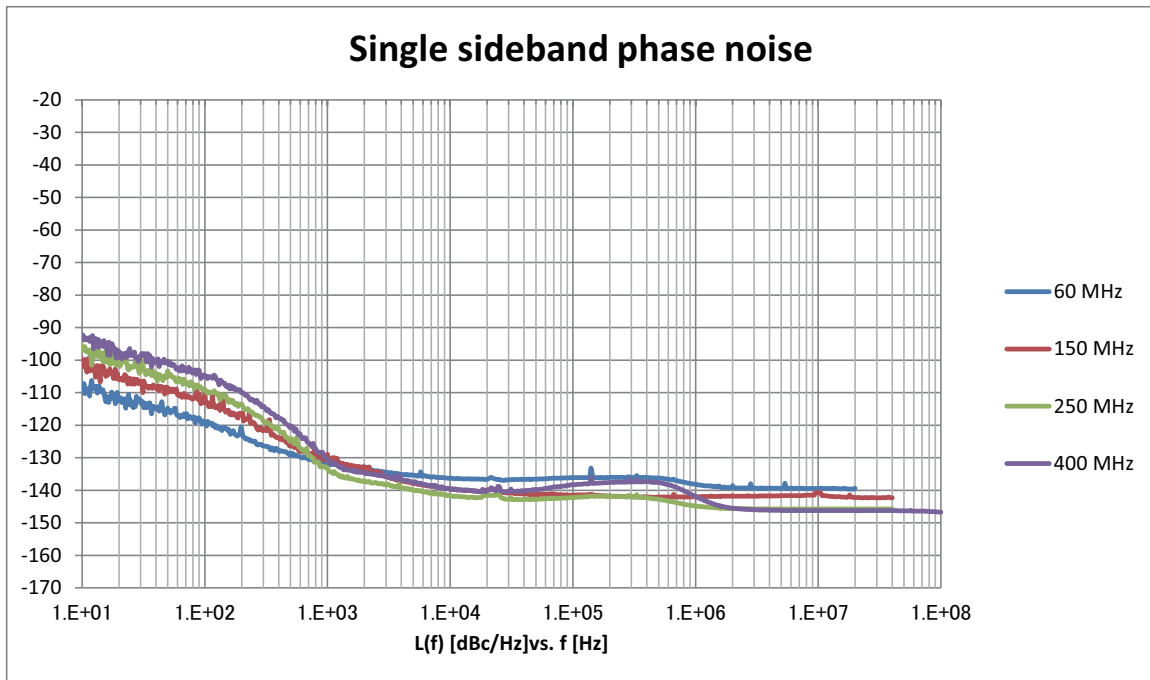
Phase Noise Optimization: < 200 kHz

(meas)



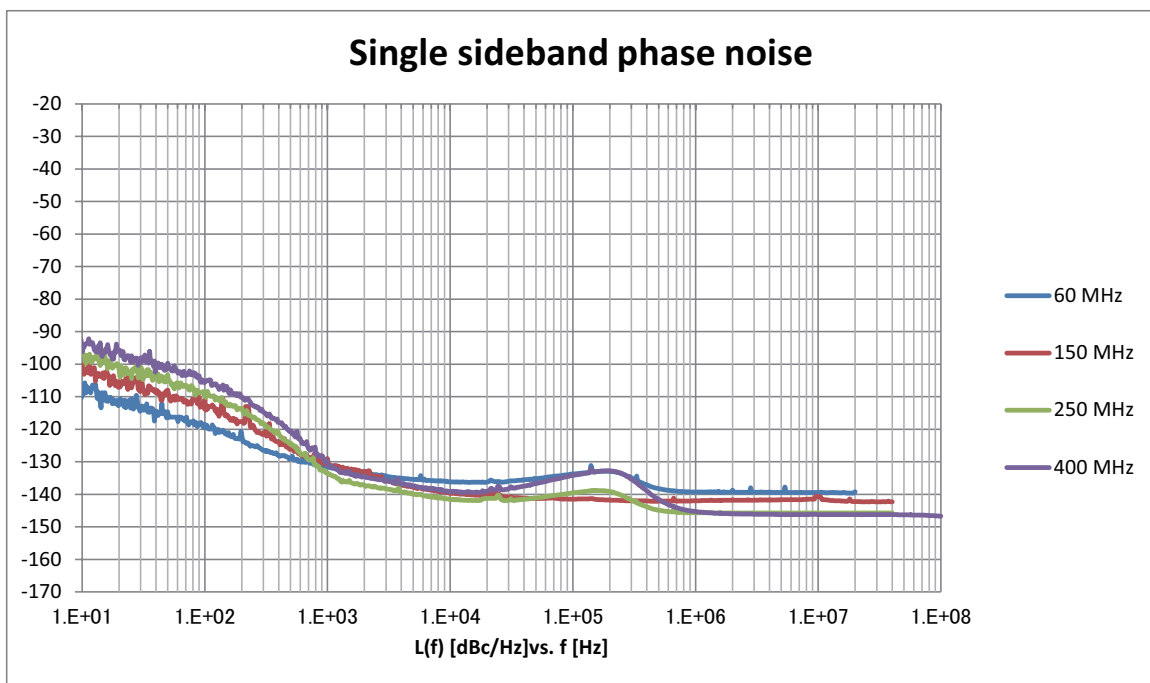
Phase Noise Optimization: > 300 kHz

(meas)



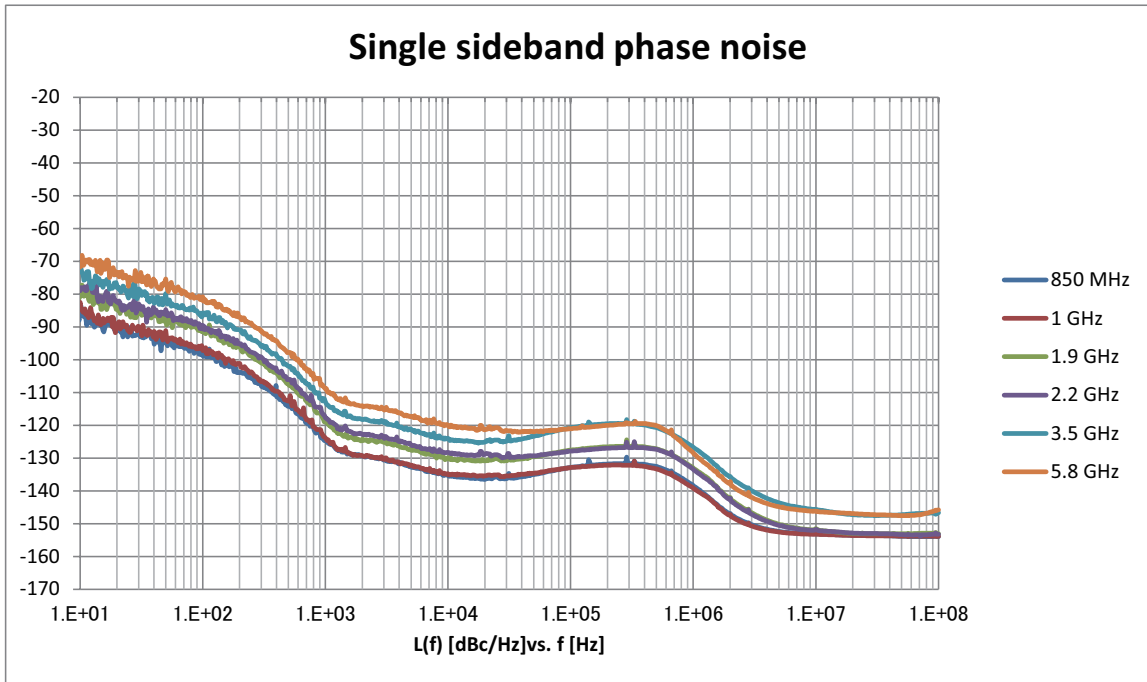
Phase Noise Optimization: <math>< 200\text{ kHz}</math>

(meas)



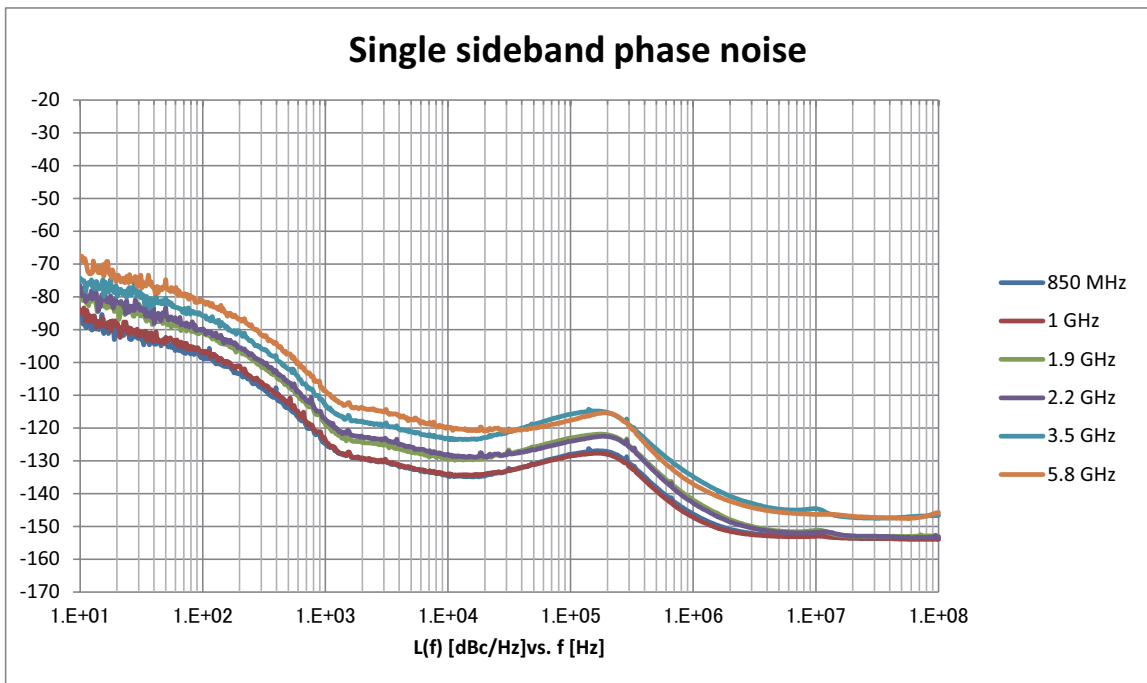
Phase Noise Optimization: <math>> 300\text{ kHz}</math>

(meas)



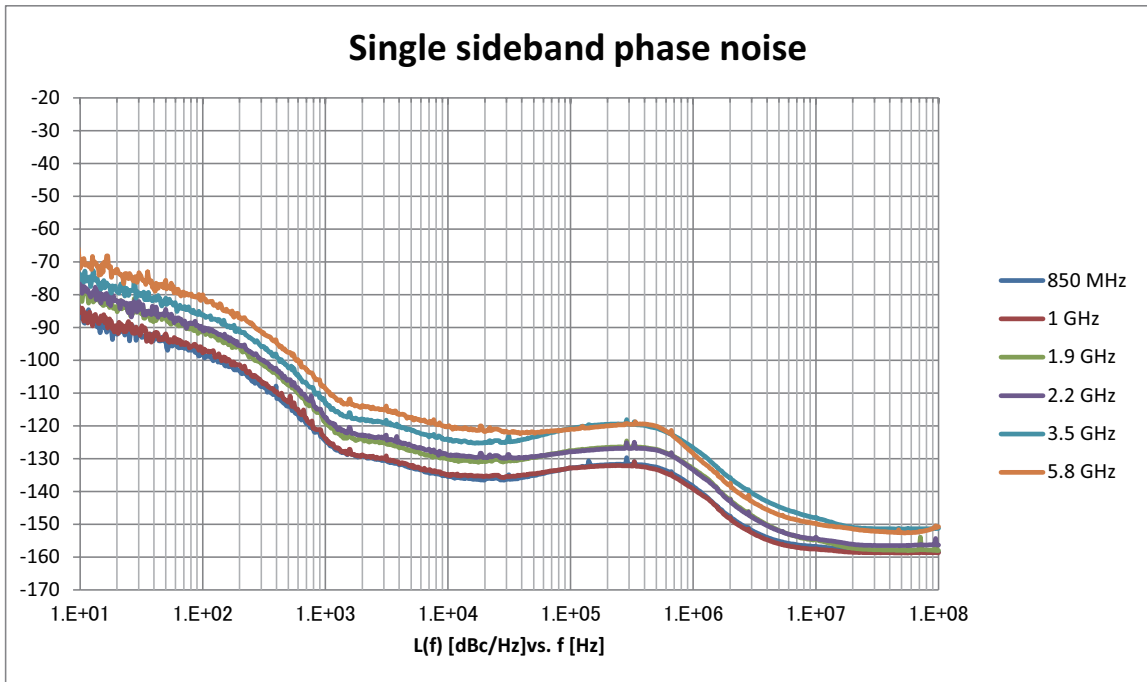
Phase Noise Optimization: < 200 kHz

(meas)



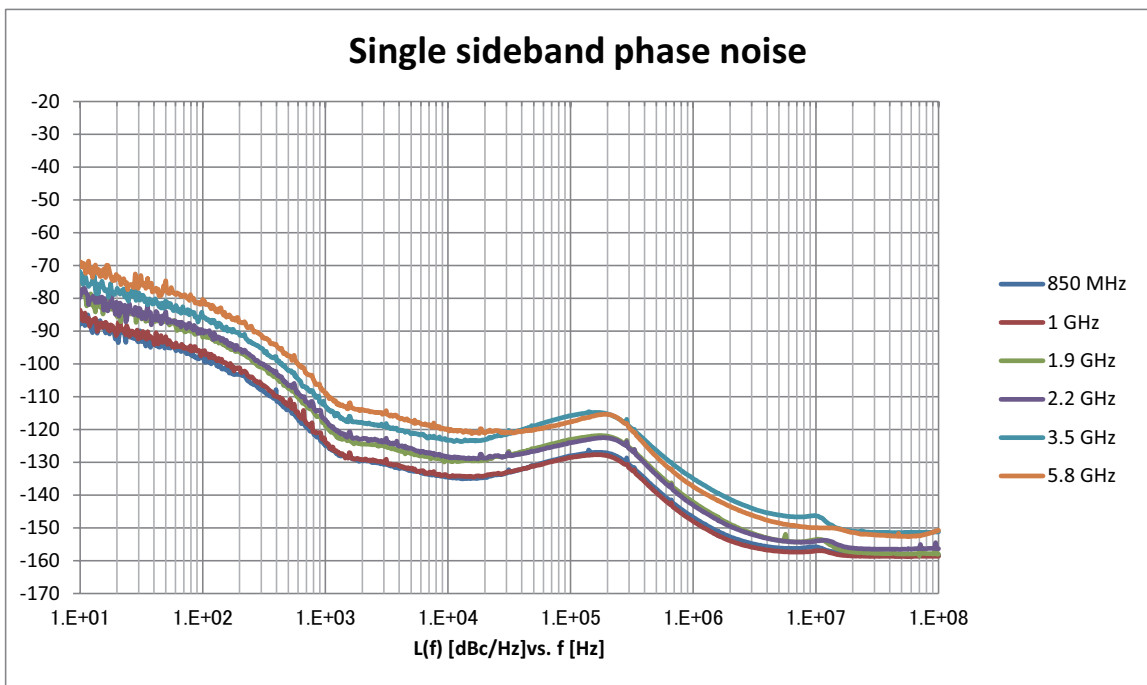
Phase Noise Optimization: > 300 kHz

(meas)



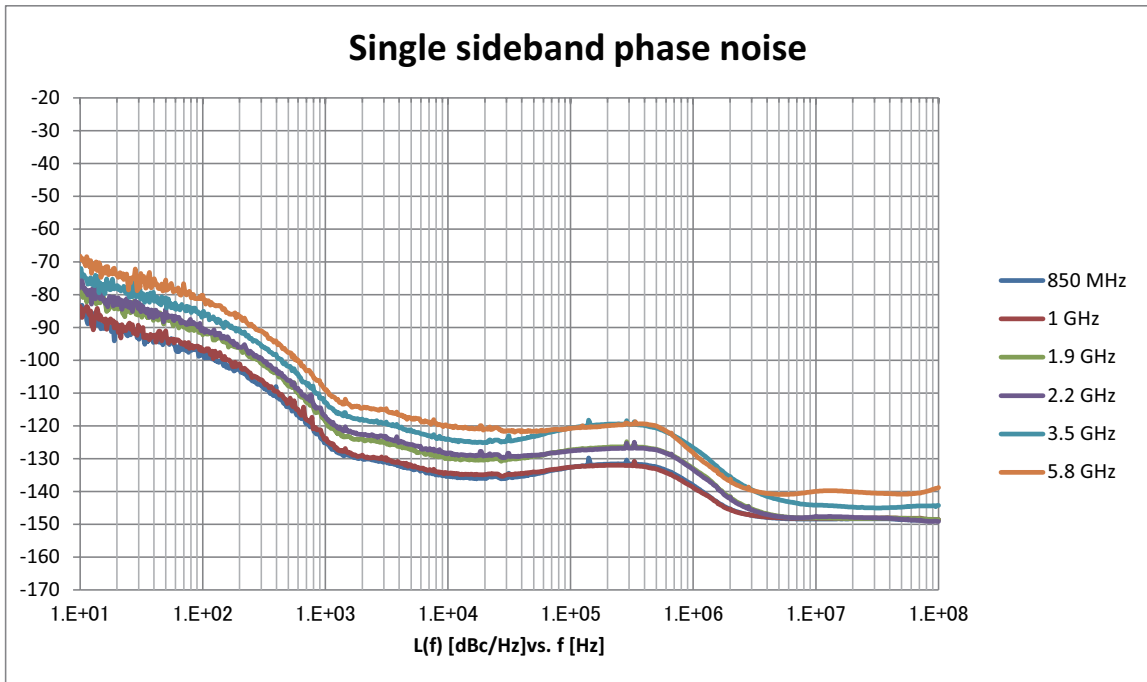
Phase Noise Optimization: < 200 kHz

(meas)



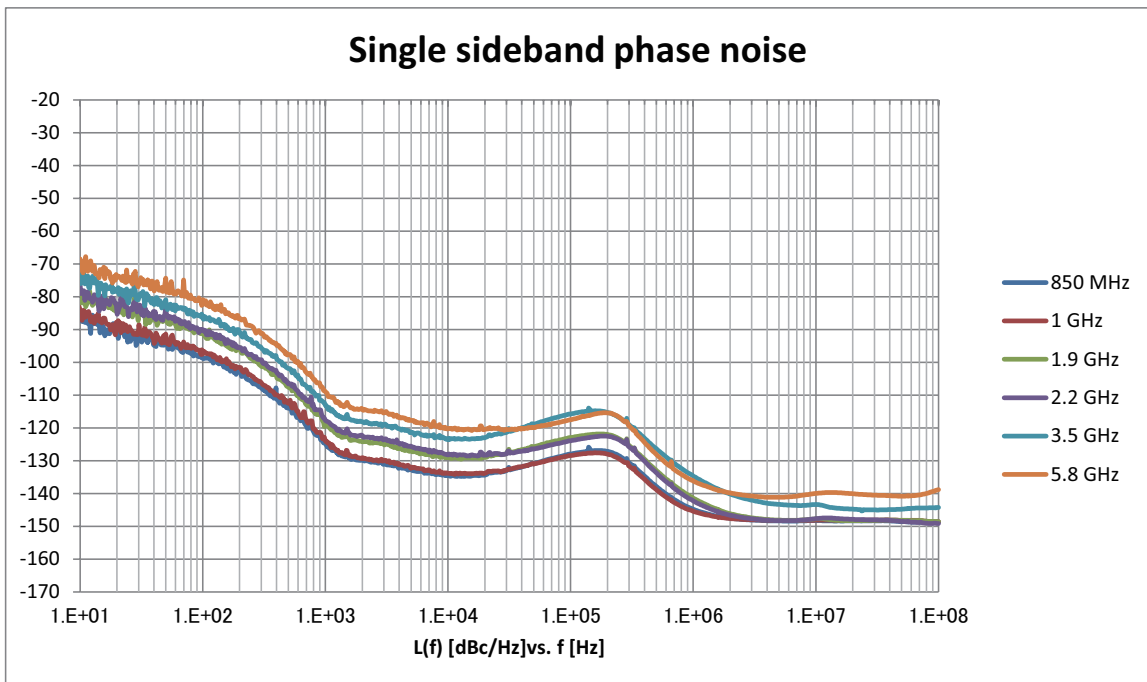
Phase Noise Optimization: > 300 kHz

(meas)



Phase Noise Optimization: < 200 kHz

(meas)



Phase Noise Optimization: > 300 kHz

(meas)

## Analog Modulation

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### 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 .

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### 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:  $\leq +4$  dBm, AM Depth Type: Lin, after CAL)

#### AM Depth Error

$< 3\%$  of setting + 2% (nom.) ( $100 \text{ kHz} \leq f < 98 \text{ MHz}$ , Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m:  $\leq 90\%$ )

$< 2\%$  of setting + 1% (nom.) ( $98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$ , Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m:  $\leq 90\%$ )

#### Distortion

$< 2\%$  (nom.) ( $100 \text{ kHz} \leq f < 98 \text{ MHz}$ , Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)

$< 2.5\%$  (nom.) ( $100 \text{ kHz} \leq f < 98 \text{ MHz}$ , Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)

$< 0.5\%$  (nom.) ( $98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$ , Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)

$< 0.5\%$  (nom.) ( $98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$ , Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)

#### Modulation Frequency Response

$100 \text{ kHz} \leq f < 98 \text{ MHz}$ ,  $\pm 1.5$  dB Bandwidth

Modulation Ratio m: 30%

$0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$  (nom.)

Modulation Ratio m: 90%

$0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$  (nom.)

$98 \text{ MHz} \leq f \leq 2700 \text{ MHz}$ ,  $\pm 1$  dB Bandwidth

Modulation Ratio m: 30%

$0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$  (nom.)

Modulation Ratio m: 90%

$0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$  (nom.)

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### Frequency Modulation (FM)

Internal modulation only; Specifications for modulated CW signal

#### FM Deviation

Range: FM Deviation (FM/ $\Phi$ M1 setup)

0 Hz to (40 MHz-FM Deviation(FM/ $\Phi$ M2 setup)) or [50 MHz – Modulation Rate] (lower value)

FM Deviation (FM/ $\Phi$ M2 setup)

0 Hz to (40 MHz-FM Deviation (FM/ $\Phi$ M1 setup)) or [50 MHz – Modulation Rate] (lower value)

Resolution: 0.1 Hz

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

#### Deviation Accuracy

$< 2\%$  of setting + 20 Hz (nom.) (Modulation Rate: 1 kHz, FM Source: Sine,  $20 \text{ Hz} \leq \text{FM Deviation} \leq 40 \text{ kHz}$ )

#### 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,  $\pm 1$  dB Bandwidth

$20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$  (nom.)



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## Phase Modulation (PM)

Internal modulation only; Specifications for modulated CW signal

PM Deviation

Range: 0 rad. to 160 rad., or  $[40 \text{ MHz} \div \text{Modulation Rate}]$  (smaller value)

Resolution: 0.001 rad.

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

Deviation Accuracy

$< 2\%$  of setting + 0.02 rad. (nom.) (Modulation Rate: 1 kHz,  $\Phi\text{M}$  Source: Sine, PM Deviation:  $\leq 20 \text{ rad.}$ )

Distortion

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

Modulation Frequency Response

Deviation: 2 rad.,  $\pm 1 \text{ dB}$  Bandwidth

$20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$  (nom.)

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## Pulse Modulation

On/Off Ratio

$> 70 \text{ dB}$  ( $50 \text{ MHz} \leq f \leq 3 \text{ GHz}$ )

$> 60 \text{ dB}$  ( $3 \text{ GHz} < f \leq 6 \text{ GHz}$ )

Minimum Pulse width

1  $\mu\text{s}$  (nom.)

Rise/Fall Time

$\leq 50 \text{ ns}$  (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

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## 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

$-180 \text{ deg}$  to  $180 \text{ deg}$

Phase Resolution

0.1 deg

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## Additional Analog Modulation Input

When MG3710E-050/080 is installed and for 1st SG and 2nd SG respectively  
Internal modulation only; Specifications for modulated CW signal

Modulation Type

AM, FM,  $\Phi$ M

Input Impedance

50 $\Omega$ /600 $\Omega$ /Hi-Z (100 k $\Omega$ /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 +  $\Phi$ M

Internal 1 + Internal 2

Internal + External

FM and  $\Phi$ M cannot be enabled simultaneously.

Modulation Frequency Response (AM)

Peak Level:  $\leq +4$  dBm, 100 kHz  $\leq f < 98$  MHz, AM Depth Type: Lin,  $\pm 1.5$  dB Bandwidth, after CAL

Depth m: 30%

DC Coupling: DC  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

AC Coupling: 20 Hz  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

Depth m: 90%

DC Coupling: DC  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

AC Coupling: 20 Hz  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

Peak Level:  $\leq +4$  dBm, 98 MHz  $\leq f \leq 2.7$  GHz, AM Depth Type: Lin,  $\pm 1$  dB Bandwidth, after CAL

Depth m: 30%

DC Coupling: DC  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

AC Coupling: 20 Hz  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

Depth m: 90%

DC Coupling: DC  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

AC Coupling: 20 Hz  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

Modulation Frequency Response (FM)

Output Level:  $\leq +4$  dBm, 100 kHz + 2  $\times$  (Modulation Rate + 2  $\times$  FM Deviation)  $\leq f \leq 2.7$  GHz, FM Deviation: 40 kHz,  
 $\pm 1$  dB Bandwidth, after CAL

DC Coupling: DC  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

AC Coupling: 20 Hz  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

Modulation Frequency Response (PM)

Output Level:  $\leq +4$  dBm, 100 kHz + 2  $\times$  (Modulation Rate + 2  $\times$  PM Deviation  $\times$  Modulation Rate)  $\leq f \leq 2.7$  GHz,  
PM Deviation: 2 rad.,  $\pm 1$  dB Bandwidth, after CAL

DC coupling: DC  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

AC coupling: 20 Hz  $\leq$  Modulation Rate  $\leq 20$  kHz (nom.)

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## Vector Modulation

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### Modulation Frequency Response

Without MG3710E-043

Internal Channel Correction: On, Output Level:  $-7$  dBm, Random Signal of Bandwidth: 160 MHz, Crest Factor: 11 dB, 18°C to 28°C,

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

$\pm 0.6$  dB (At Center Frequency  $\pm 10$  MHz)

$\pm 1.3$  dB (At Center Frequency  $\pm 50$  MHz)

Output Frequency: 3.5 GHz/5.8 GHz

$\pm 0.6$  dB (At Center Frequency  $\pm 10$  MHz)

$\pm 1.9$  dB (At Center Frequency  $\pm 50$  MHz)

With MG3710E-043

Internal Channel Correction: On, Output Level:  $-10$  dBm, Random Signal of Bandwidth: 160 MHz, Crest Factor: 11 dB, 18°C to 28°C,

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

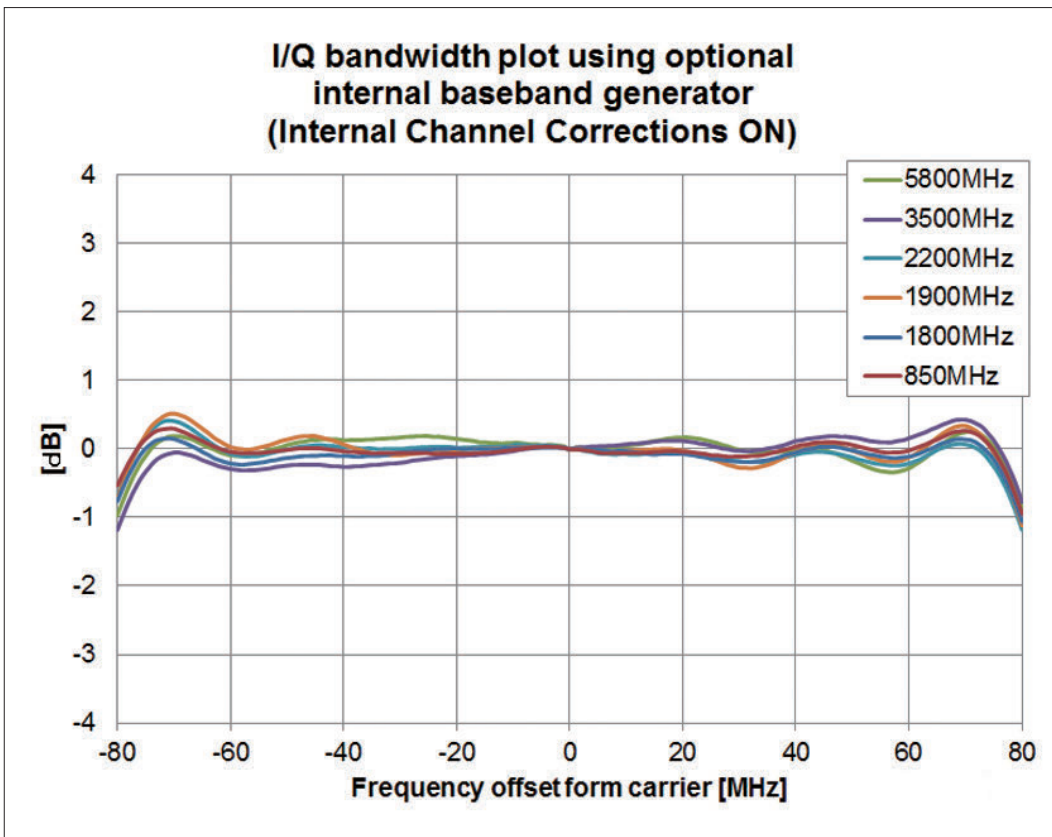
$\pm 0.6$  dB (At Center Frequency  $\pm 10$  MHz)

$\pm 1.8$  dB (At Center Frequency  $\pm 50$  MHz)

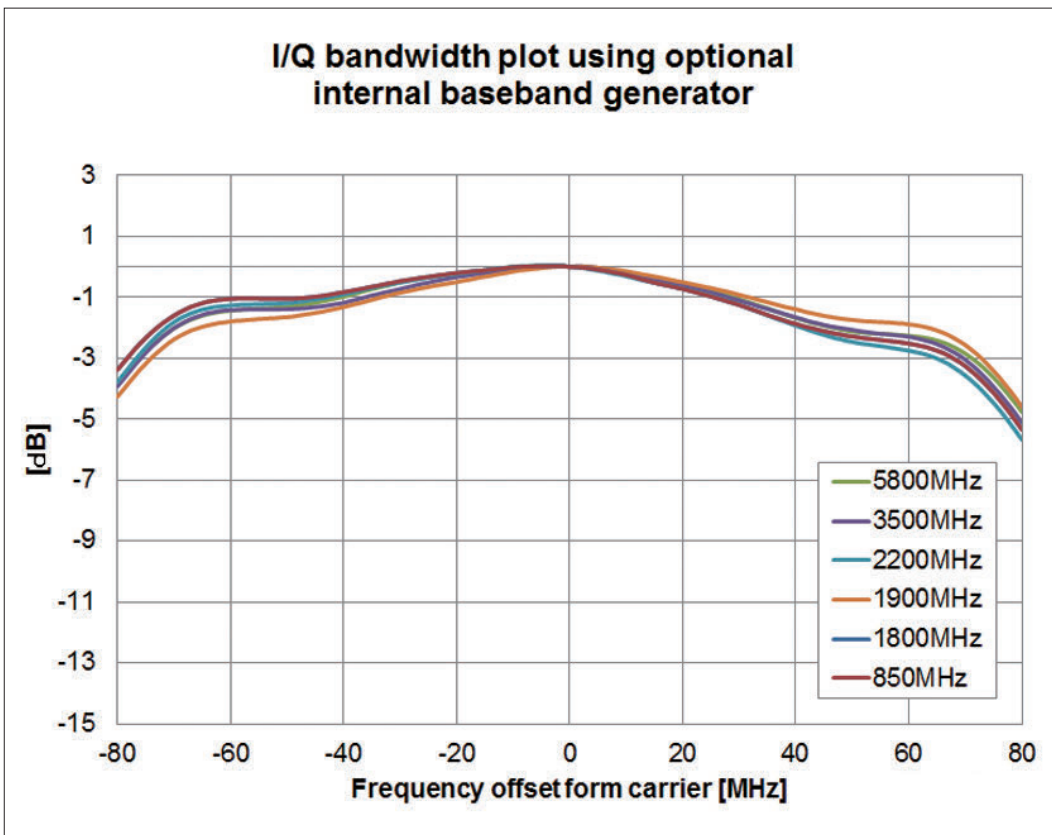
Output Frequency: 3.5 GHz/5.8 GHz

$\pm 0.6$  dB (At Center Frequency  $\pm 10$  MHz)

$\pm 2.4$  dB (At Center Frequency  $\pm 50$  MHz)



(meas)



(meas)

## Vector Accuracy

without MG3710E-043, or MG3710E-073

Output Level:  $\leq +7$  dBm (without MG3710E-041, or MG3710E-071)  
 $\leq +13$  dBm (with MG3710E-041, or MG3710E-071)

with MG3710E-043, or MG3710E-073

Output Level:  $\leq +4$  dBm (without MG3710E-041, or MG3710E-071)  
 $\leq +10$  dBm (with MG3710E-041, or MG3710E-071)

18°C to 28°C, after CAL

W-CDMA (Test Model 4):

Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 2.2 GHz  
 $\leq 0.62\%$  (rms)  
 $\leq 0.6\%$  (rms) typ.

GSM:

Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 1.9 GHz  
 $\leq 0.84^\circ$  (rms)  
 $\leq 0.8^\circ$  (rms) typ.

EDGE:

Output Frequency: 800 MHz to 900 MHz, 1.8 GHz to 1.9 GHz  
 $\leq 0.84\%$  (rms)  
 $\leq 0.8\%$  (rms) typ.

LTE (20 MHz Test Model 3.1):

Output Frequency: 600 MHz to 2.7 GHz  
 $\leq 0.82\%$  (rms)  
 $\leq 0.8\%$  (rms) typ.

without MG3710E-043, or MG3710E-073

Output Level:  $\leq +4$  dBm (without MG3710E-041, or MG3710E-071)  
 $\leq +10$  dBm (with MG3710E-041, or MG3710E-071)

with MG3710E-043, or MG3710E-073

Output Level:  $\leq +1$  dBm (without MG3710E-041, or MG3710E-071)  
 $\leq +7$  dBm (with MG3710E-041, or MG3710E-071)

18°C to 28°C, after CAL

LTE (20 MHz Test Model 3.1):

Output Frequency: 3.4 GHz to 3.8 GHz  
 $\leq 0.82\%$  (rms)  
 $\leq 0.8\%$  (rms) typ.

EVM performance data						
Format	GSM	EDGE	cdma2000 /1xEV-DO	W-CDMA	LTE FDD 3	
Modulation type	GMSK [burst]	3pi/8 8PSK [burst]	QPSK	QPSK	64 QAM	
Modulation rate	270.833 ksps	70.833 ksps	1.2288Mcps	3.84Mcps		
Channel configuration	1 timeslot	1 timeslot	pilot channel	1DPCH		
Frequency <sup>+</sup>	800 to 900 MHz 1800 to 1900 MHz	800 to 900 MHz 1800 to 1900 MHz	800 to 900 MHz 1800 to 1900 MHz	1800 to 2200 MHz	1800 to 2200 MHz	
EVM power level	$\leq 7$ dBm	$\leq 7$ dBm	$\leq 7$ dBm	$\leq 7$ dBm	$\leq 7$ dBm	
EVM power level with MG3710A-041/141	$\leq 13$ dBm	$\leq 13$ dBm	$\leq 13$ dBm	$\leq 13$ dBm	$\leq 13$ dBm	
EVM	Global phase error					
	rms 0.11° [measured]	0.18% [measured]	0.45% [measured]	0.38% [measured]	0.33% [measured]	
	peak 0.37° [measured]					
Format	802.11a/g	802.16e WIMAX 5	QPSK 6	16QAM 6		
Modulation type	64QAM	64QAM	QPSK	16QAM		
Modulation rate	54 Mbps	–	4 MSps	4 MSps		
Frequency 4	2400 to 2484 MHz 5150 to 5825 MHz	2300 to 2690 MHz 3300 to 3800 MHz	$\leq 3$ GHz	$\leq 6$ GHz	$\leq 3$ GHz	$\leq 6$ GHz
EVM power level	$\leq -5$ dBm	$\leq 2$ dBm	$\leq 4$ dBm	$\leq 4$ dBm	$\leq 4$ dBm	$\leq 4$ dBm
EVM power level with MG3710A-041/141	$\leq 2$ dBm	$\leq 8$ dBm	$\leq 10$ dBm	$\leq 10$ dBm	$\leq 10$ dBm	$\leq 10$ dBm
EVM	0.36% [measured]	0.23% [measured]	0.43% [measured]	0.78% [measured]	0.35% [measured]	0.79% [measured]

(meas)

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**Carrier Leak**

18°C to 28°C, RMS Value: 0 dB, after CAL

≤-55 dBc (100 MHz ≤ f < 4 GHz)

≤-45 dBc (f ≥ 4 GHz)

---

**Image Rejection**

18°C 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°C to 28°C, W-CDMA (TestModel1 64DPCH)

without MG3710E-043 or MG3710E-073

Output Level: ≤-2 dBm (without MG3710E-041)

Output Level: ≤+5 dBm (with MG3710E-041)

with MG3710E-043 or MG3710E-073

Output Level: ≤-5 dBm (without MG3710E-041)

Output Level: ≤+2 dBm (with MG3710E-041)

Frequency	Offset	
	5 MHz	10 MHz
300 MHz ≤ f < 800 MHz	≤-68 dBc/3.84 MHz	≤-70 dBc/3.84 MHz
800 MHz ≤ f < 1 GHz	≤-70 dBc/3.84 MHz	≤-71 dBc/3.84 MHz
1 GHz ≤ f < 1.8 GHz	≤-69 dBc/3.84 MHz	≤-71 dBc/3.84 MHz
1.8 GHz ≤ f < 2.2 GHz	≤-68 dBc/3.84 MHz	≤-71 dBc/3.84 MHz
2.2 GHz ≤ f ≤ 3 GHz	≤-65 dBc/3.84 MHz	≤-71 dBc/3.84 MHz
3 GHz < f ≤ 3.8 GHz*	≤-63 dBc/3.84 MHz	≤-67 dBc/3.84 MHz

\* without MG3710E-043 or MG3710E-073

Output Level: ≤-2 dBm

with MG3710E-043 or MG3710E-073

Output Level: ≤-5 dBm

---

## Level Error Compared to CW at Vector Modulation

(18°C to 28°C, AWGN signal, Bandwidth: 5 MHz)

without MG3710E-043, or MG3710E-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 MG3710E-043, or MG3710E-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 MG3710E-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 mV to +100 mV

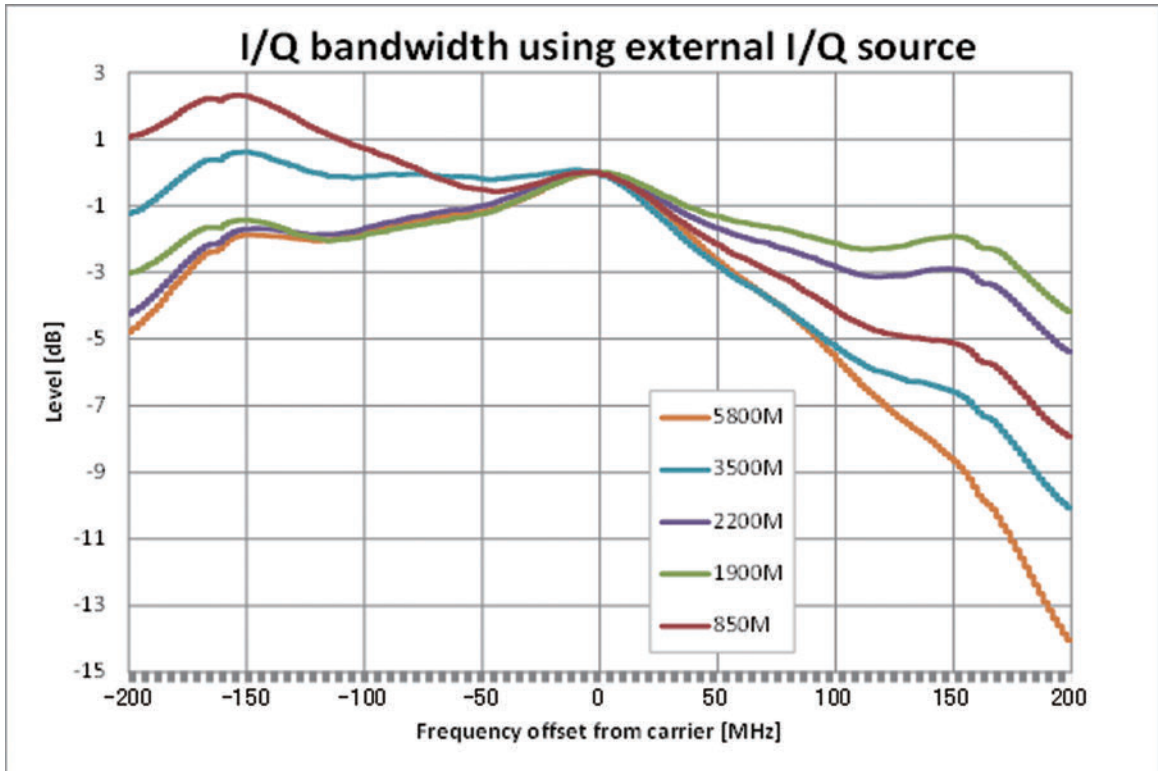
Resolution: 1 mV

Input Connector

BNC-J (Front panel)

Maximum Input Level:  $-1 \text{ V (peak)} \leq I, Q \leq +1 \text{ V (peak)}$

Impedance:  $50 \Omega$  (nom.)



(meas)

## I and Q Output

with MG3710E-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

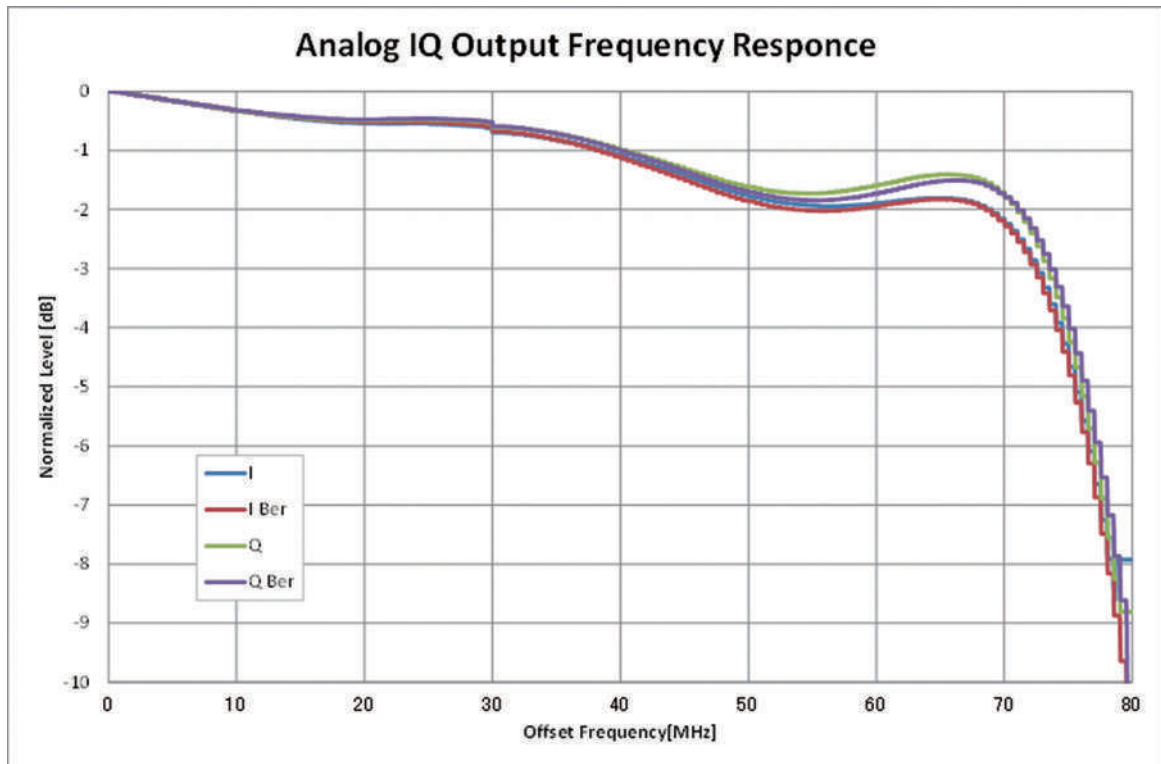
Quadrature Adjustment

Using Baseband I/Q Adjustment Function

Output Connector

BNC-J (Rear panel)

Impedance: 50  $\Omega$  (nom.)



(meas)



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## 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:  $\pm 8$  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 MG3710E-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:  $\geq 0.2$  V<sub>p-p</sub>, 50  $\Omega$  (AC coupled) (nom.)

Selects external input and MIMO connection (BB Ref Sync)

---

## Waveform Memory

1stRF

When MG3710E-048 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.

without MG3710E-045/046

64 Msamples

with MG3710E-045, without MG3710E-046

256 Msamples

without MG3710E-045, with MG3710E-046, or with MG3710E-045/046

1024 Msamples

2ndRF

When MG3710E-078 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.

without MG3710E-075/076

64 Msamples

with MG3710E-075, without MG3710E-076

256 Msamples

without MG3710E-075, with MG3710E-076, or with MG3710E-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 MG3710E-048

This function synthesizes the signals of two memories to generate a baseband waveform.

2nd VSG: with MG3710E-078

This function synthesizes the signals of two memories to generate a baseband waveform.

---

---

## 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 MG3710E-049

2nd VSG: with MG3710E-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

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### 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 MG3710E-021

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### 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  
PN9 fix, PN11 fix, PN15 fix, PN20 fix, PN23 fix, 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

x/y  
x: Number of error bits in y bit (Setting range: 1 to y/2)  
y: Number of measurement bits (select from 500, 5000 and 50000)

---

### Measurable Bit

$\leq 2^{32} - 1$  bit

---

### Measurable Error Bit Count

$\leq 2^{32} - 1$  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

---

**External Reference Input**

Connector: BNC-J (Rear panel), 50  $\Omega$  (nom.)  
 Frequency: 5, 10, 13 MHz  
 Operating Range:  $\pm 1$  ppm  
 Input Level:  $-15$  dBm  $\leq$  Level  $\leq$   $+20$  dBm (AC coupled)

**Reference Signal Output**

Connector: BNC-J (Rear panel), 50  $\Omega$  (nom.)  
 Frequency: 10 MHz  
 Output Level:  $\geq 0$  dBm (AC coupled)

**Sweep Output**

with MG3710E-017  
 Connector: BNC-J (Rear panel),  $< 1$   $\Omega$  (Drive Capacity: 2 k $\Omega$ )  
 Output Level: 0 to 10 V (10 V Sweep Signal Function), 0/5 V (Sweep Status)

**Local Oscillator (LO) Input**

with MG3710E-017  
 Connector: SMA-J (Rear panel), 50  $\Omega$  (nom.)  
 Frequency: 98 MHz to 6 GHz  
 Input Level:  $-10$  dBm  $\leq$  Level  $\leq$   $+1$  dBm (AC coupled) (nom.)

**Local Oscillator (LO) Output**

with MG3710E-017  
 Connector: SMA-J (Rear panel), 50  $\Omega$  (nom.)  
 Frequency: 98 MHz to 6 GHz  
 Output Level:  $\leq +1$  dBm (AC coupled) (nom.) (Internal Lo output)

**Baseband Reference Input**

with MG3710E-017  
 Connector: BNC-J (Rear panel), 50  $\Omega$  (nom.)  
 Frequency: 20 kHz to 50 MHz (External Baseband Reference Clock)\*  
                   560 MHz to 800 MHz (BB Ref Sync)\*  
 Input Level:  $\geq 0.2$  Vp-p (AC coupled) (nom.)

**Baseband Reference Output**

with MG3710E-017  
 Connector: BNC-J (Rear panel), 50  $\Omega$  (nom.)  
 Frequency: 560 MHz to 800 MHz\*  
 Output Level: 0.8 Vp-p (AC coupled) (nom.)

**Additional Analog Modulation Input**

When MG3710E-050/080 is installed:  
 Connector: Rear panel, BNC-J  
 Input Impedance: 50  $\Omega$ , 600  $\Omega$ , or Hi-Z (100 k $\Omega$ /70 pF) (nom.)  
 Input Level: For set value, 2 Vp-p (nom.), Absolute maximum ratings:  $\pm 5$  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 MG3710E-017/021: with AUX-BNC Conversion Cable

## Display

8.4-inch, XGA-color LCD (Diagonal: 213 mm, Resolution: 1024 × 768)

## General

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### Dimensions and Mass

426 (W) × 177 (H) × 390 (D) mm (excluding projections)  
≤ 13.7 kg (MG3710E-032, 034, or 036, excluding other options)  
≤ 17 kg (including all options)

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### 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 MG3710E-032, 034, or 036, with MG3710E-041/042, excluding other options)  
260 VA (nom.)  
(with MG3710E-032, 034, or 036, with MG3710E-041/042, with MG3710E-062, 064, or 066,  
with MG3710E-071/072, excluding other options)  
280 VA (nom.)  
(with MG3710E-032, 034, or 036, with MG3710E-041/042, with MG3710E-062, 064, or 066,  
with MG3710E-071/072, with MG3710E-001/021, excluding other options)

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### Temperature Range

Operating: +5°C to +45°C, Storage: -20°C to +60°C

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### CE Marking

EMC: 2014/30/EU, EN 61326-1, EN 61000-3-2  
LVD: 2014/35/EU, EN 61010-1  
RoHS: 2011/65/EU, (EU) 2015/863, EN IEC 63000: 2018

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### UKCA Marking

EMC: S.I. 2016 No. 1091, EN 61326-1, EN 61000-3-2  
LVD: S.I. 2016 No. 1101, EN 61010-1  
RoHS: S.I. 2012 No. 3032, EN IEC 63000: 2018





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