

MG3710A

Vector Signal Generator

100 kHz to 2.7 GHz

100 kHz to 4.0 GHz

100 kHz to 6.0 GHz



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Definitions

Typical (typ.)

Performance not warranted. Must products meet typical performance.

Nominal (nom.)

Values not warranted. Included to facilitate application of product.

Measured (meas)

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

Conditions of Specifications

The conditions are as follows unless specified otherwise.

CW/Modulation Mode

After 30-minute warm-up (at constant ambient temperature)

Pulse Modulation: Off

ATT Hold: Off

Optimize S/N Mode: Off

*: f > 2.7 GHz: Use MG3710A-034/036, MG3710A-064/066

f > 4 GHz: Use MG3710A-036, MG3710A-066

Modulation Mode only

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

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

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

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

$\text{RMSnom} = 20 \cdot \log(\text{RMSw}/1157)$ (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

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

Internal Reference Oscillator

without MG3710A-001/002

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

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

with MG3710A-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° to 45°C)

with MG3710A-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° to 45°C)

Output Level

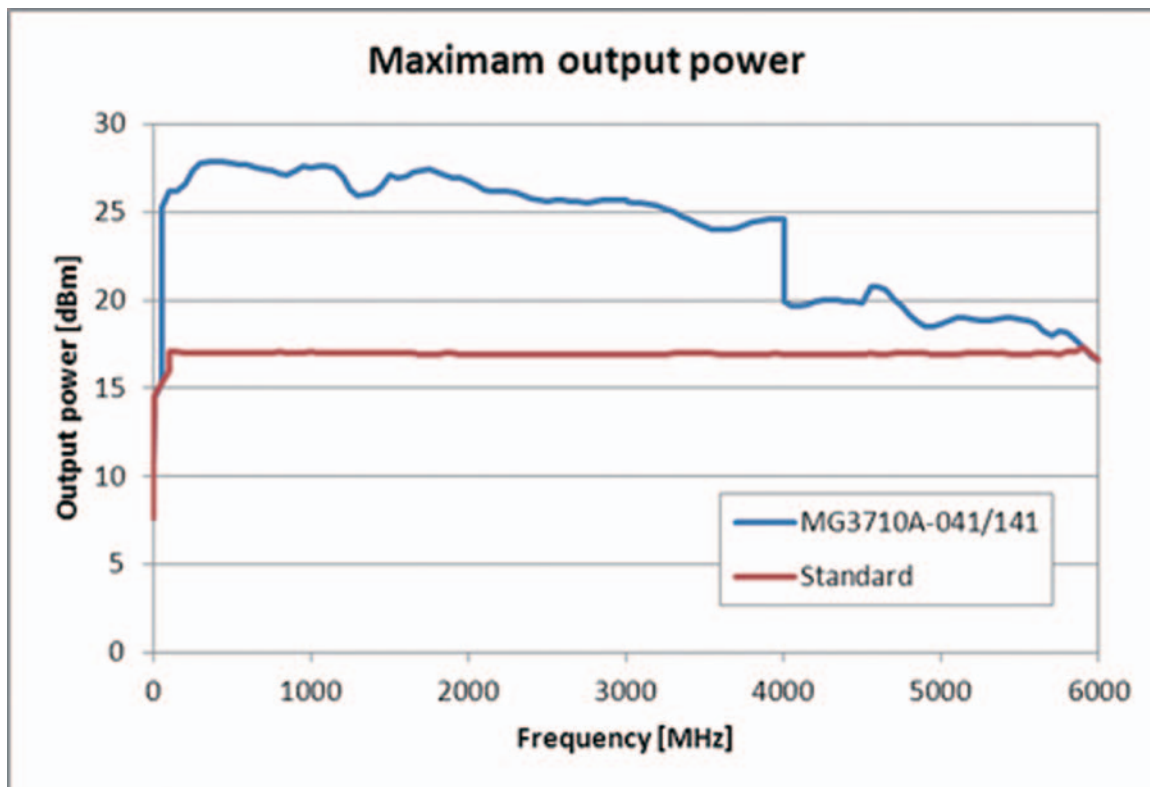
Setting Range

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]



(meas)

Unit

dBm, dB μ V (Terminated, Open)

Resolution

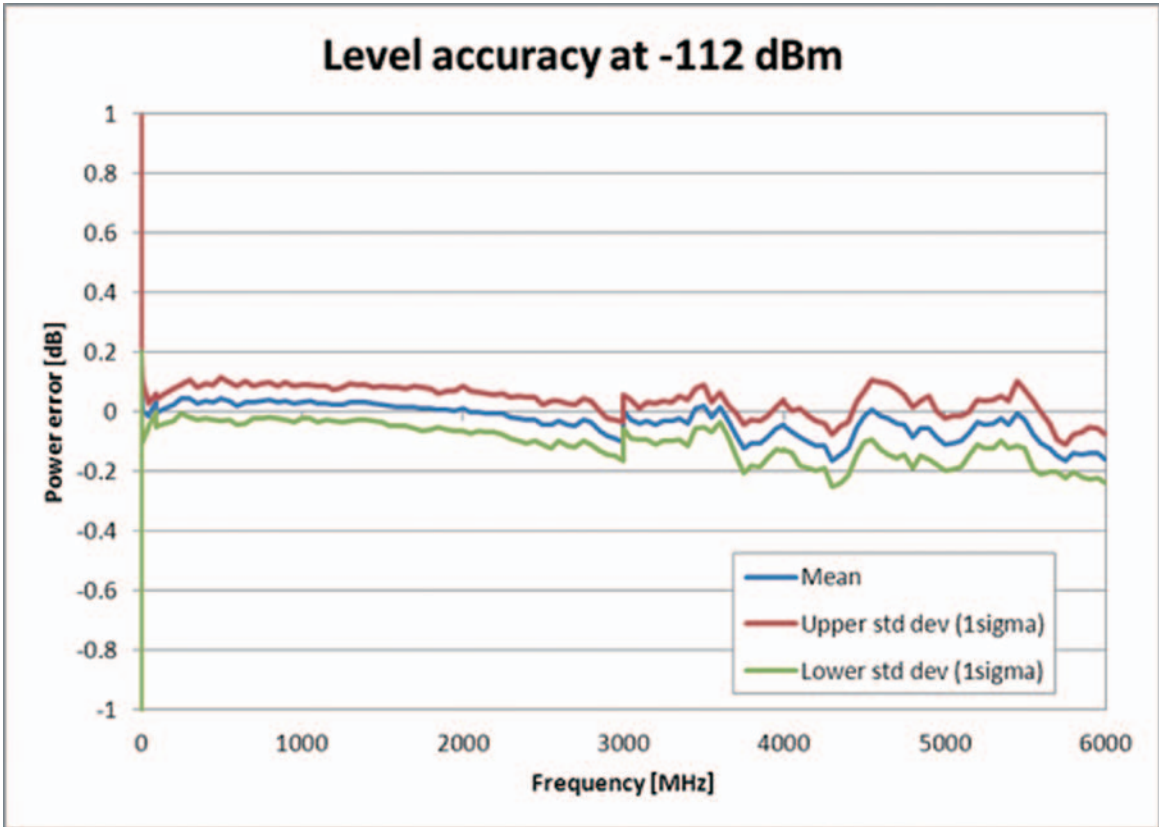
0.01 dB

Switching Speed

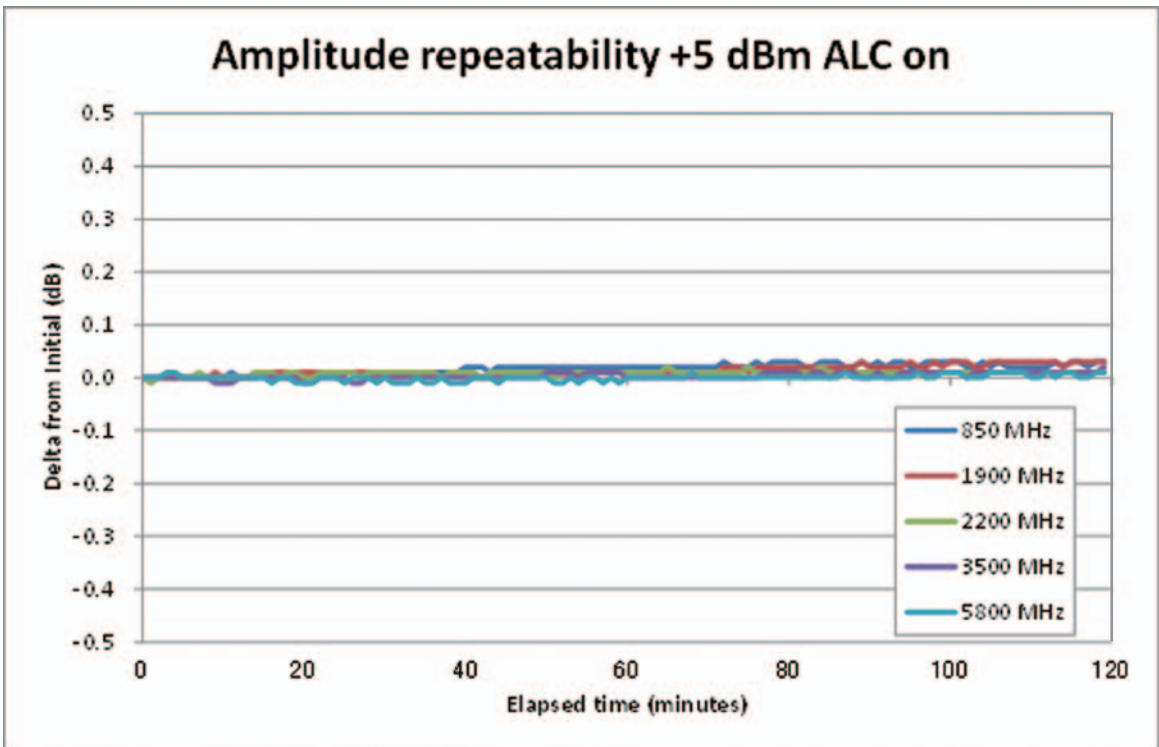
$\leq 600 \mu$ s

(Time from trigger input to final level ± 0.2 dB at frequency of > 187.5 MHz)

(Output Level: $\leq +7$ dBm [without MG3710A-041], [without MG3710A-071])



(meas)



(meas)

Level Linearity

18° to 28°C, CW

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

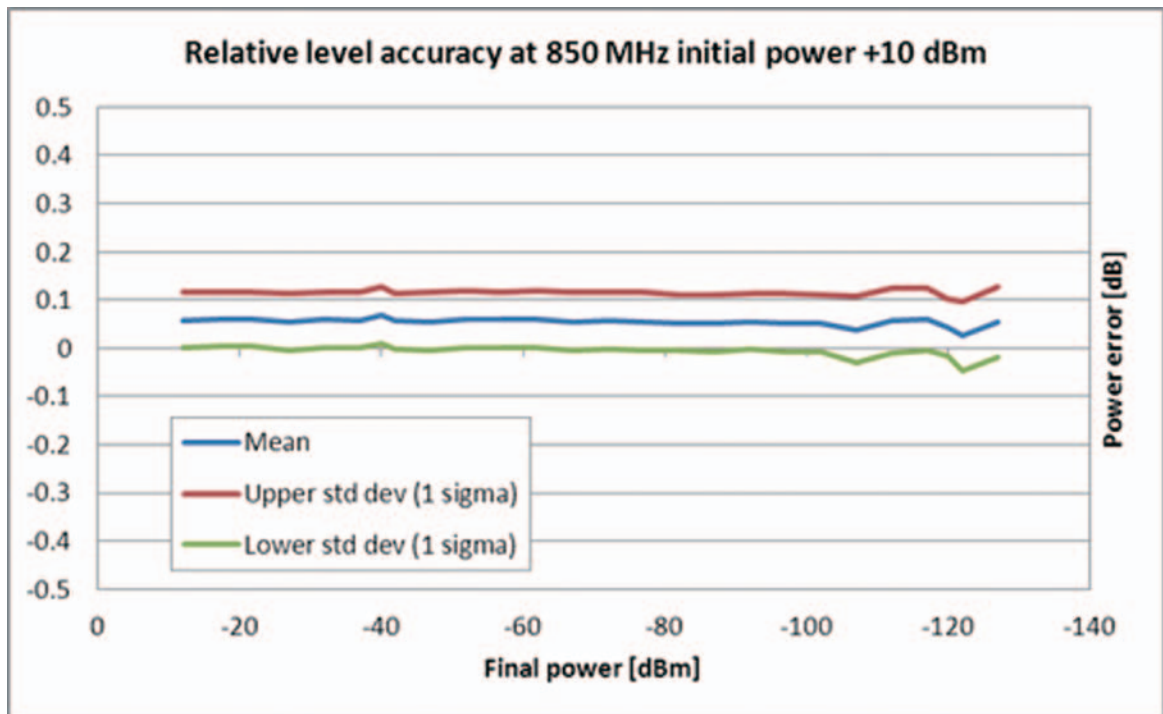
Referenced to level: -7 dBm

Frequency range	Low Power Extension MG3710A-042/072	High Power Extension MG3710A-041/071	$\leq +2$ dBm > -110 dBm	≤ -110 dBm > -120 dBm
50 MHz \leq f < 400 MHz	without	without/with	± 0.2 dB (typ.)	
	with			± 0.2 dB (typ.)
400 MHz \leq f \leq 3 GHz	without		± 0.2 dB (typ.)	
	with		± 0.2 dB (typ.)	± 0.2 dB (typ.)
3 GHz < f \leq 4 GHz	without		± 0.3 dB (typ.)	
	with		± 0.3 dB (typ.)	± 0.3 dB (typ.)
4 GHz < f \leq 6 GHz	without	± 0.3 dB (typ.)		
	with	± 0.3 dB (typ.)	—	

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

Referenced to level: -10 dBm

Frequency range	Low Power Extension MG3710A-042/072	High Power Extension MG3710A-041/071	≤ -1 dBm > -100 dBm	≤ -100 dBm > -110 dBm
50 MHz \leq f < 400 MHz	without	without/with	± 0.2 dB (typ.)	
	with			
400 MHz \leq f \leq 3 GHz	without		± 0.2 dB (typ.)	
	with			
3 GHz < f \leq 4 GHz	without	without	± 0.3 dB (typ.)	± 0.4 dB (typ.)
	with	with		
4 GHz < f \leq 6 GHz	without	without/with	± 0.3 dB (typ.)	± 0.4 dB (typ.)
	with	without		
		with		



(meas)

ATT Hold

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

Output Connector

Connector

N-J Connector, 50 Ω (Front panel)

VSWR

without MG3710A-043

(Output Level: ≤ -7 dBm)

1.45 (50 MHz $\leq f \leq 3$ GHz)

1.65 (3 GHz $< f \leq 4$ GHz)

1.9 (4 GHz $< f \leq 6$ GHz)

with MG3710A-043

(Output Level: ≤ -10 dBm)

1.45 (50 MHz $\leq f \leq 3$ GHz)

1.65 (3 GHz $< f \leq 4$ GHz)

1.9 (4 GHz $< f \leq 6$ GHz)

without MG3710A-073

(Output Level: ≤ -7 dBm)

1.45 (50 MHz $\leq f \leq 3$ GHz)

1.65 (3 GHz $< f \leq 4$ GHz)

1.9 (4 GHz $< f \leq 6$ GHz)

with MG3710A-073

(Output Level: ≤ -10 dBm)

1.45 (50 MHz $\leq f \leq 3$ GHz)

1.65 (3 GHz $< f \leq 4$ GHz)

1.9 (4 GHz $< f \leq 6$ 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 without MG3710A-073

without MG3710A-041

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

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

with MG3710A-041

< -30 dBc (Output Level: $\leq +4$ dBm, 10 MHz $\leq f < 50$ MHz)

< -30 dBc (Output Level: $\leq +12$ dBm, 50 MHz $\leq f \leq 3$ GHz)

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

with MG3710A-043, or with MG3710A-073

without MG3710A-041

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

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

with MG3710A-041

< -30 dBc (Output Level: $\leq +1$ dBm, 10 MHz $\leq f < 50$ MHz)

< -30 dBc (Output Level: $\leq +9$ dBm, 50 MHz $\leq f \leq 3$ GHz)

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

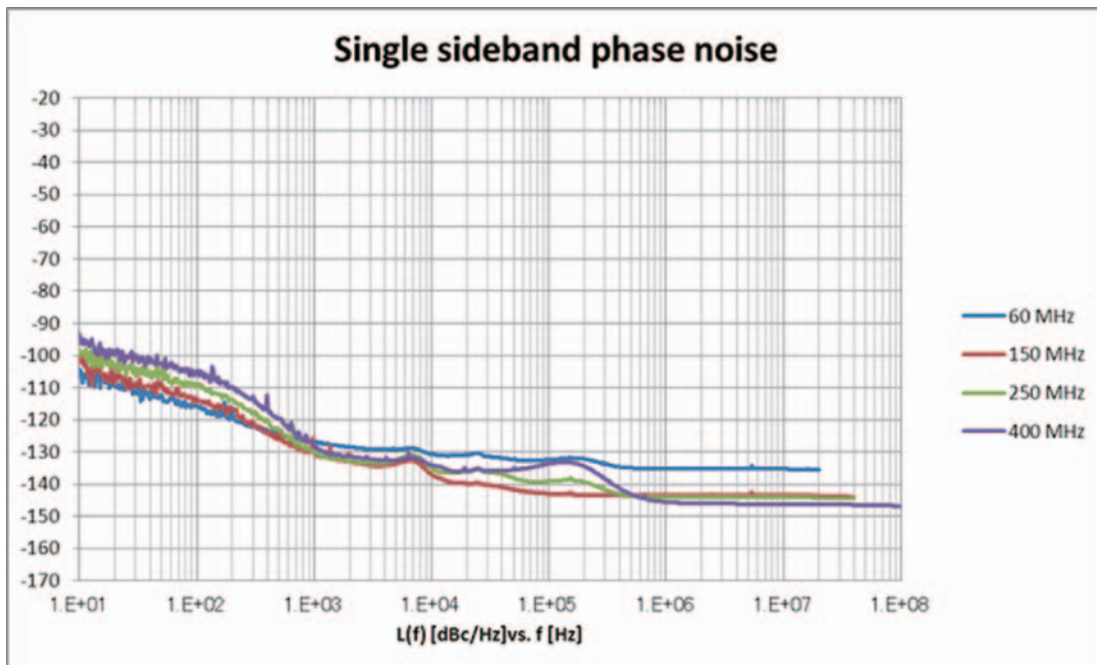
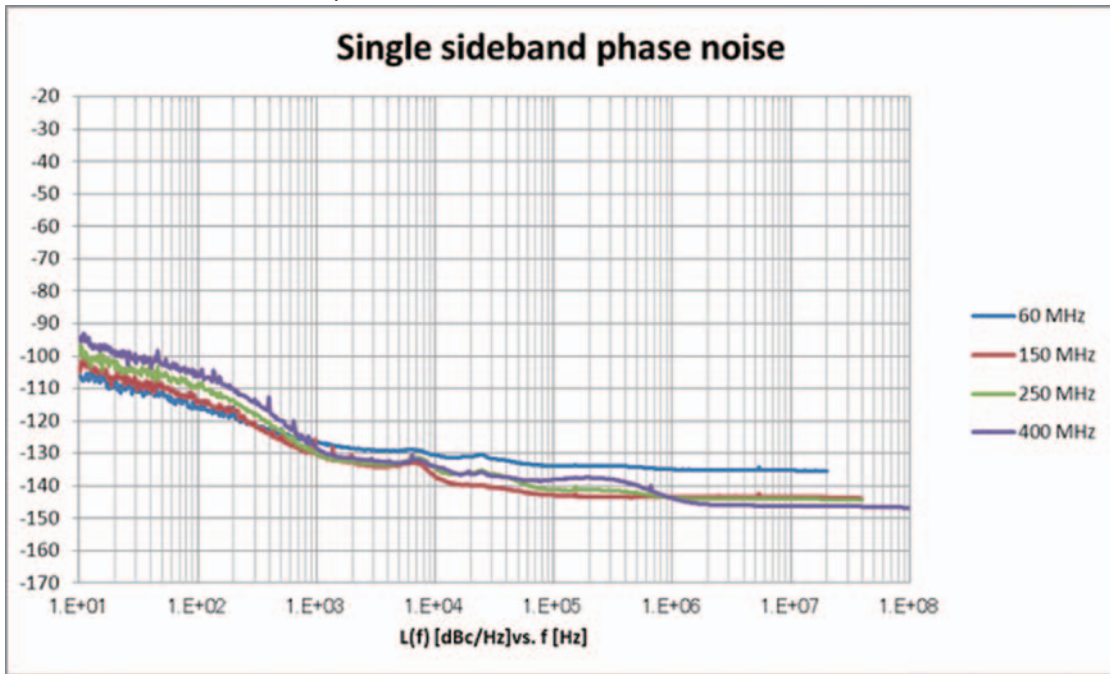
Non-harmonic Spurious

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

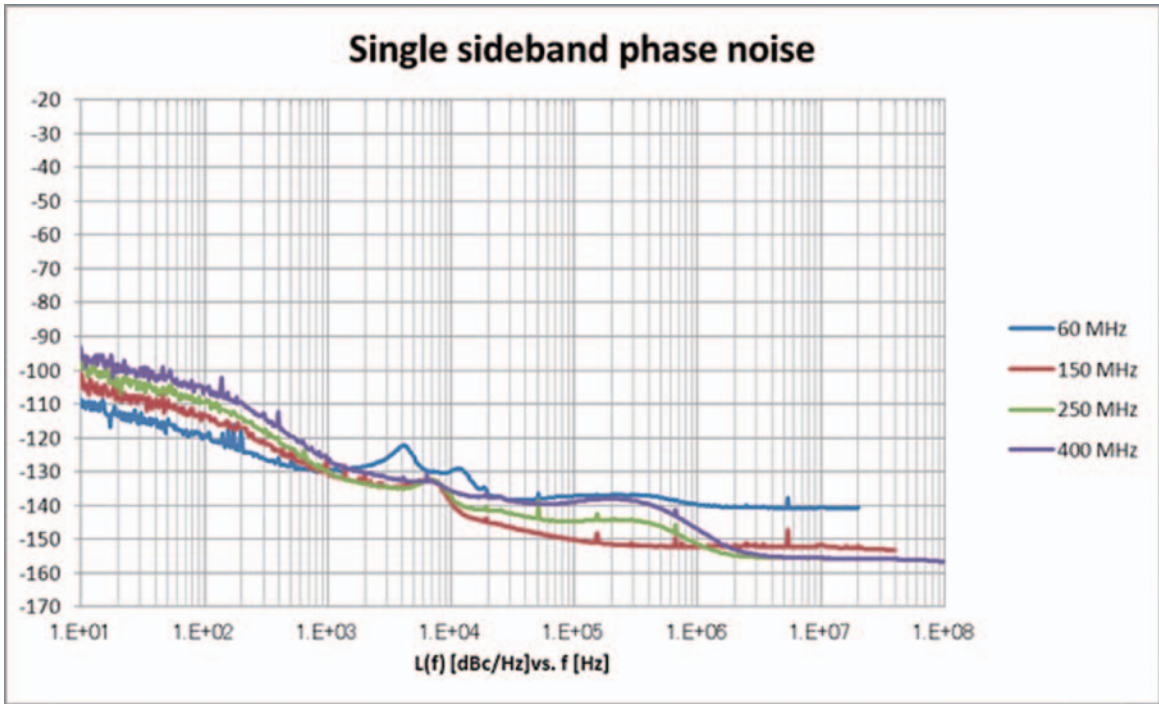
SSB Phase Noise

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

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

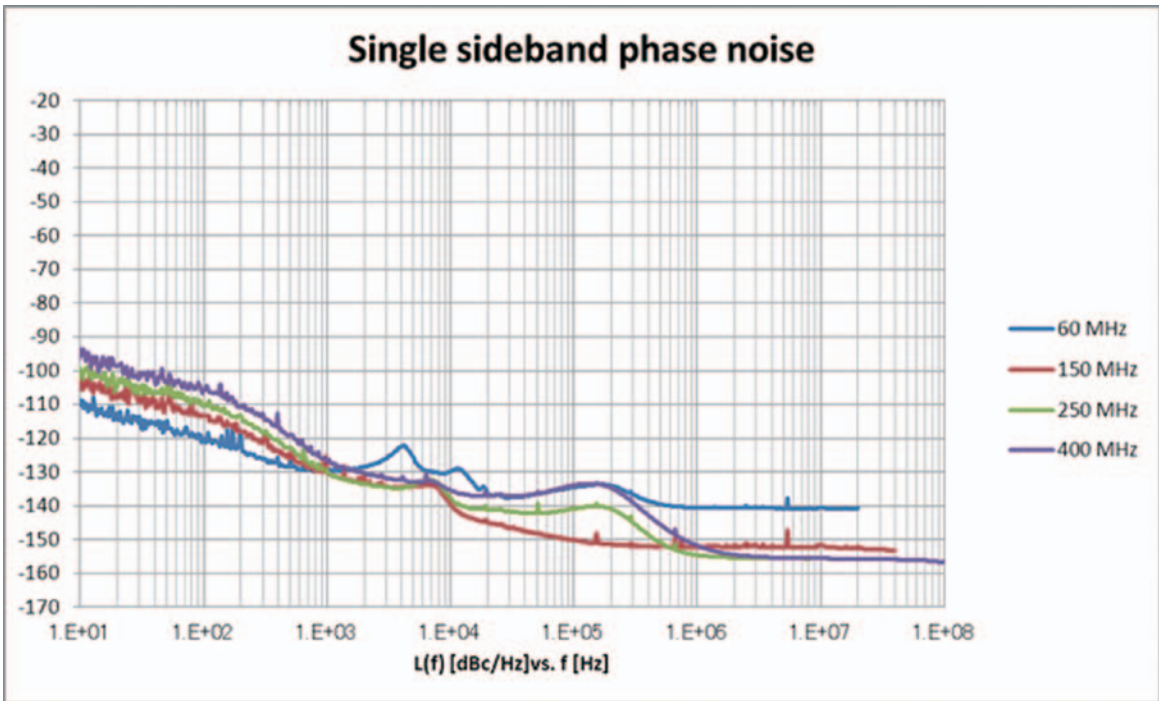


- 60/150/260/400 MHz, CW, Optimize S/N: On, with MG3710A-002



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

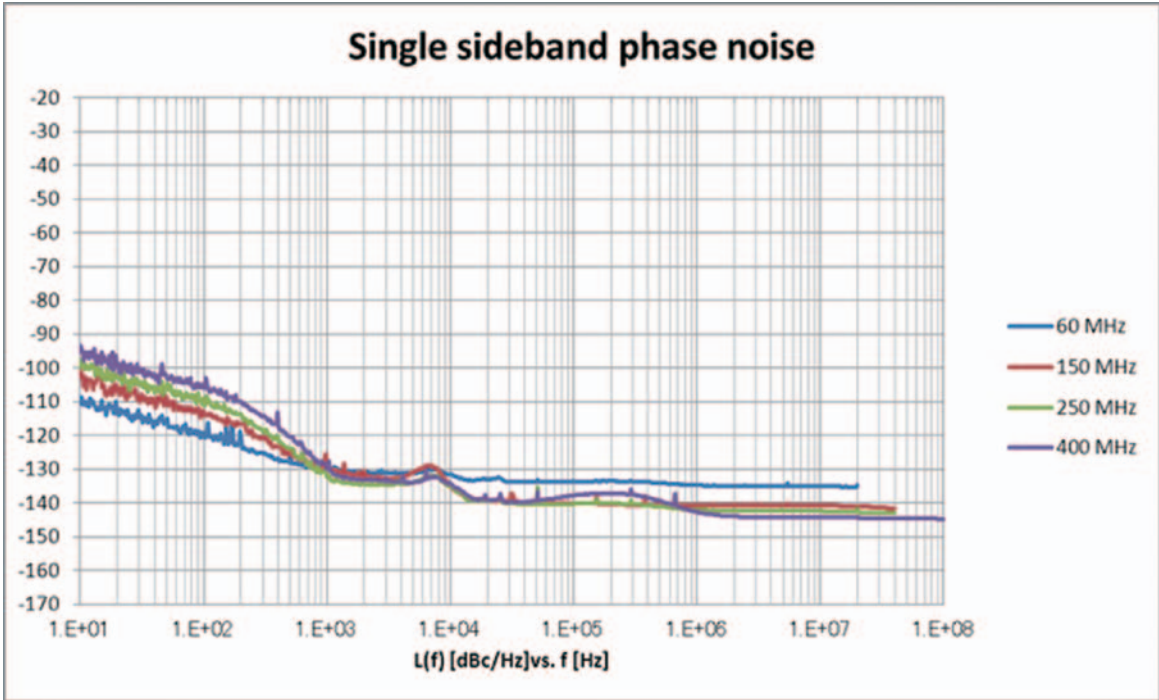
(meas)



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

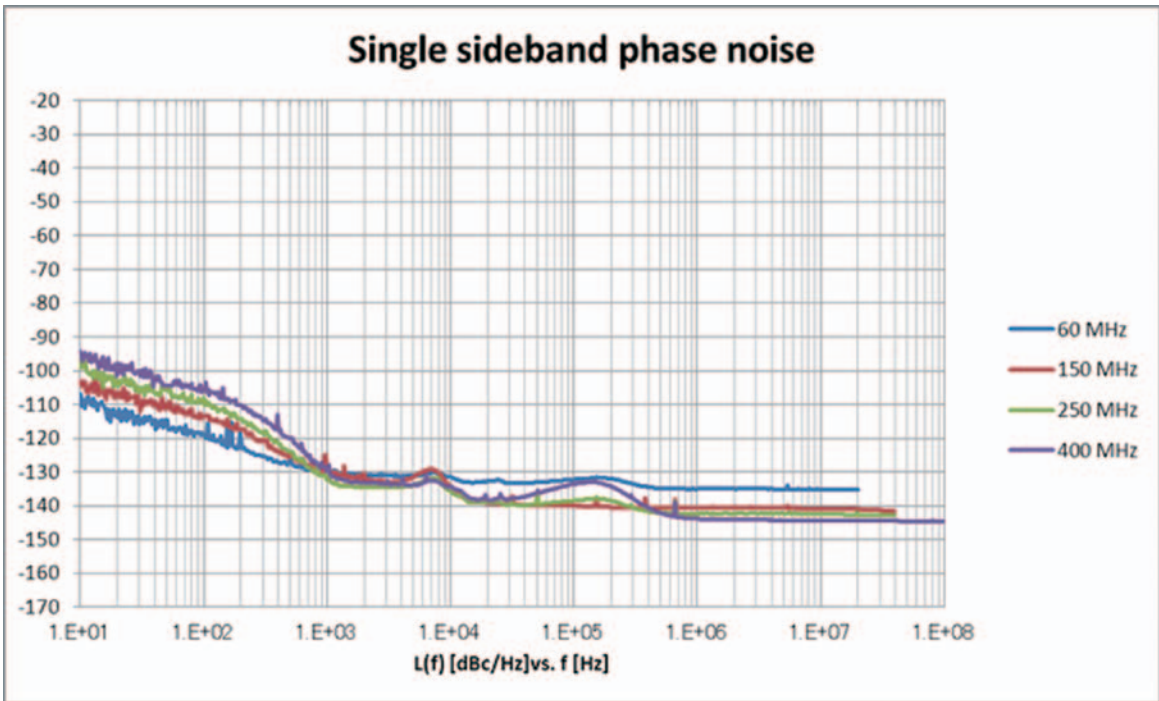
(meas)

■ 60/150/260/400 MHz, Mod = On, with MG3710A-002



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

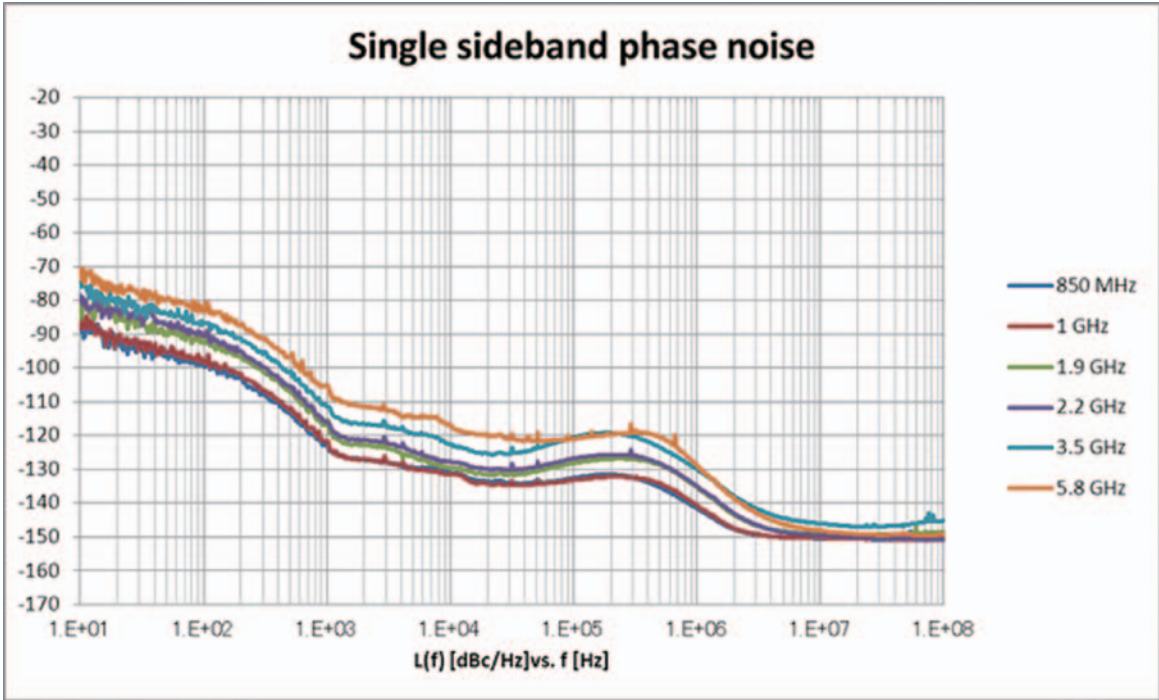
(meas)



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

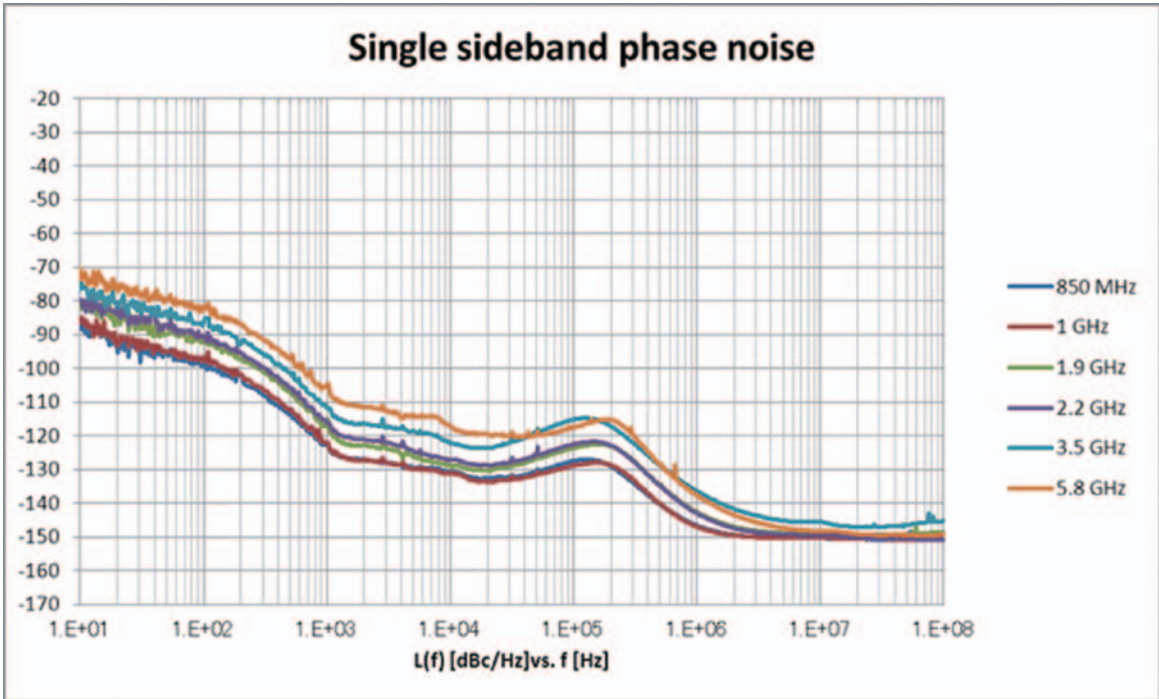
(meas)

- 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: Off, with MG3710A-002



Phase Noise Optimization: <200 kHz

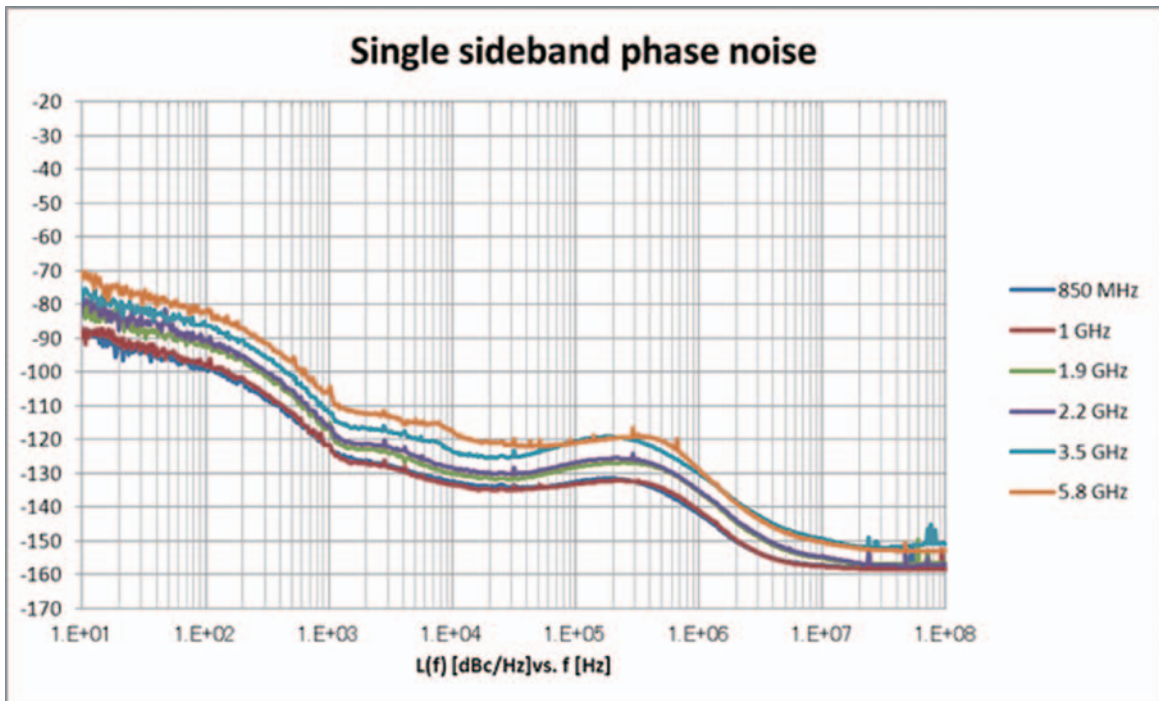
(meas)



Phase Noise Optimization: >300 kHz

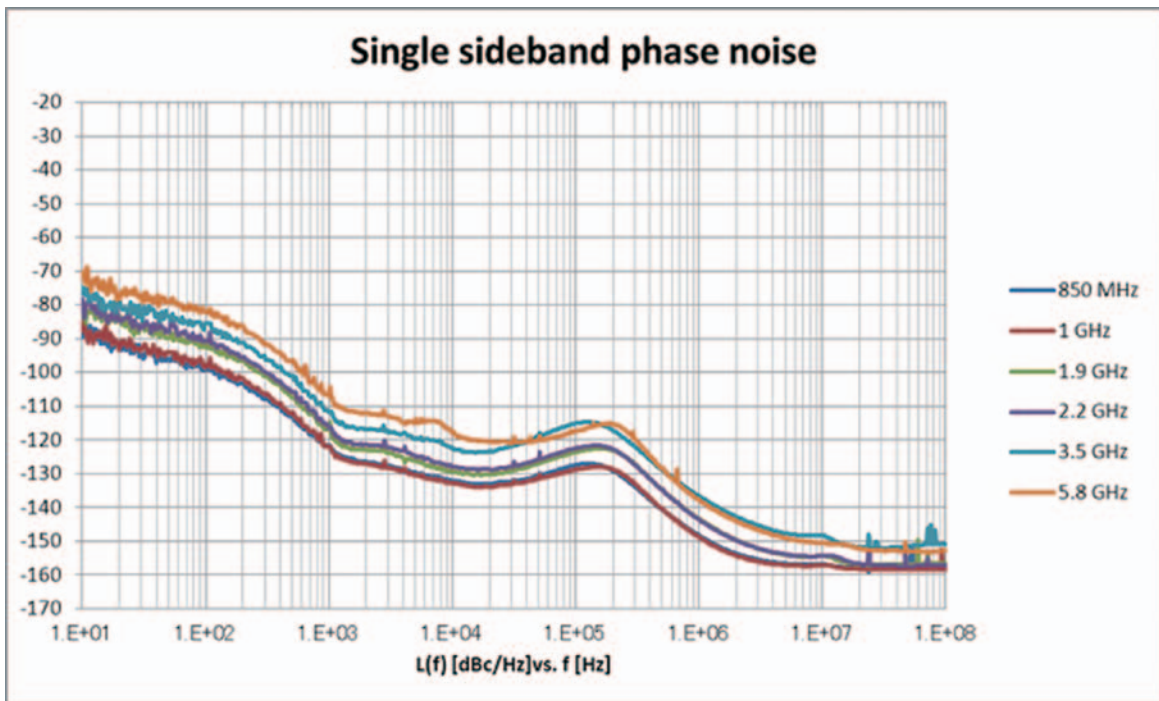
(meas)

- 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: On, with MG3710A-002



Phase Noise Optimization: <200 kHz

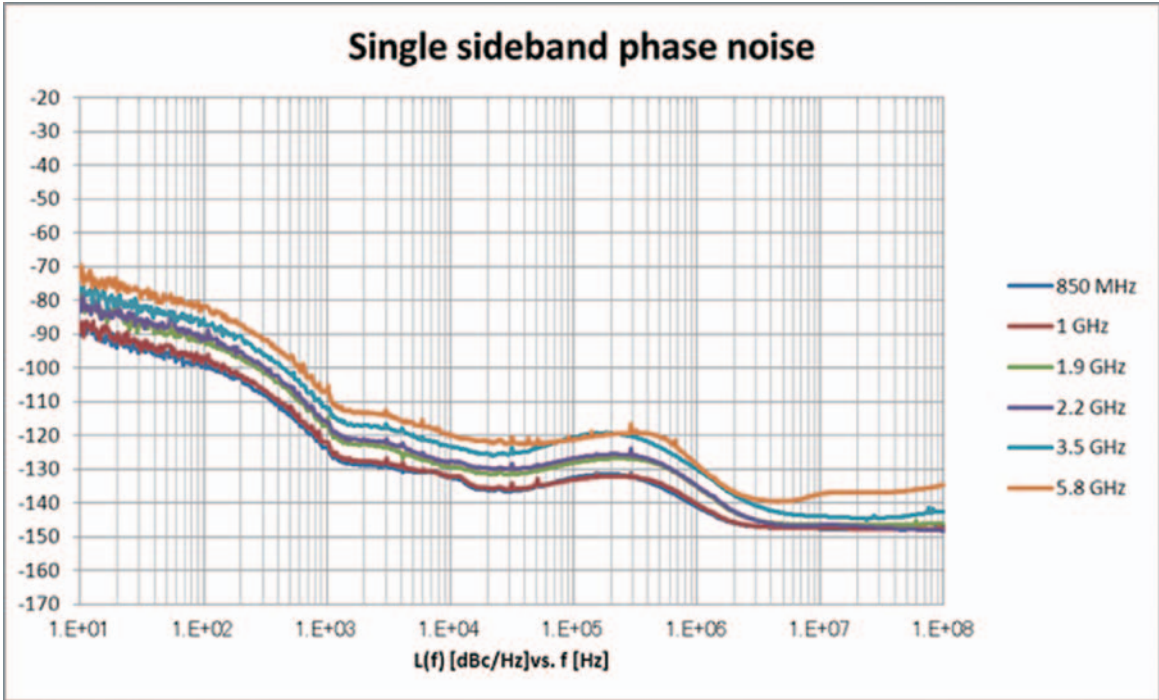
(meas)



Phase Noise Optimization: >300 kHz

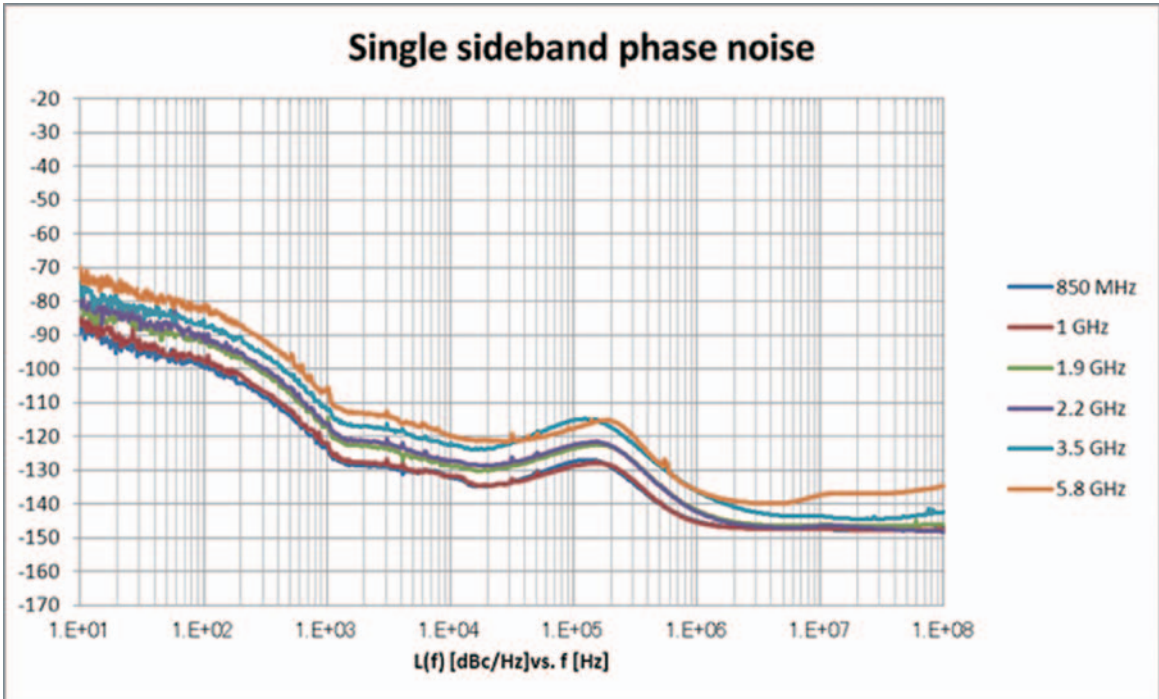
(meas)

- 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, Mod = On, with MG3710A-002



Phase Noise Optimization: <200 kHz

(meas)



Phase Noise Optimization: >300 kHz

(meas)

Analog Modulation

Optimize Function

Spurious Mode

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

Distortion Mode

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

Amplitude Modulation (AM)

Internal modulation only; Specifications for modulated CW signal

AM Depth Type

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

AM Depth

Range: 0 to 100%
Resolution: 0.1%

(Peak Level: $\leq +4$ 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

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

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

Modulation Ratio m = 30%

Int: $0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext DC coupling: $\text{DC} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext AC coupling: $20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)

Modulation Ratio m = 90%

Int: $0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext DC coupling: $\text{DC} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext AC coupling: $20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)

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

Modulation Ratio m = 30%

Int: $0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext DC coupling: $\text{DC} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext AC coupling: $20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)

Modulation Ratio m = 90%

Int: $0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext DC coupling: $\text{DC} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext AC coupling: $20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)

Frequency Modulation (FM)

Internal modulation only; Specifications for modulated CW signal

FM Deviation

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

(Output Level: $\leq +4$ 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

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

Deviation: 40 kHz, Bandwidth: ± 1 dB

Int: $20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext DC coupling: $\text{DC} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Ext AC coupling: $20 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)

Phase Modulation (PM)

Internal modulation only; Specifications for modulated CW signal

PM Deviation

Range: 0 rad. to 160 rad., or [40 MHz ÷ Modulation Rate] (smaller value)
Resolution: 0.001 rad.

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

Deviation Accuracy

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

Distortion

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

Modulation Frequency Response

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

Deviation: 2 rad., Bandwidth: ± 1 dB

Int: 20 Hz \leq Modulation Rate \leq 20 kHz (nom.)

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

Ext AC coupling: 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 ≤ 6 GHz)

Minimum Pulse width

1 μ s (nom.)

Rise/Fall Time

≤ 50 ns (nom.) (10 to 90%)

Pulse Repetition Frequency

DC to 1 MHz (Duty: 50%)

External Pulse Modulation Input

AUX Connector (Rear panel), TTL

H: RF On, L: RF Off

Internal Modulation Signal

Waveform

Sine wave, Triangular wave, Square wave, Ramp wave (Positive or Negative)

Modulation Rate

Sine wave: 0.01 Hz to 40 MHz or (50 MHz – FM Deviation)

Triangular wave, Square wave, Ramp wave: 0.01 Hz to 4 MHz or (5 MHz – FM Deviation)

Frequency Resolution

0.1 Hz

Phase

-180 deg to 180 deg

Phase Resolution

0.1 deg

Additional Analog Modulation Input

When MG3710A-050/080 is installed and for 1st SG and 2nd SG respectively

Modulation Type

AM, FM, Φ M

Input Impedance

50 Ω /600 Ω /Hi-Z (100 k Ω /70 pF) (nom.)

Coupling

DC or AC is alternatively selectable.

The lower limit frequency for AC is 20 Hz (typ.).

Input Level

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

Simultaneous Modulation

AM + FM

AM + Φ M

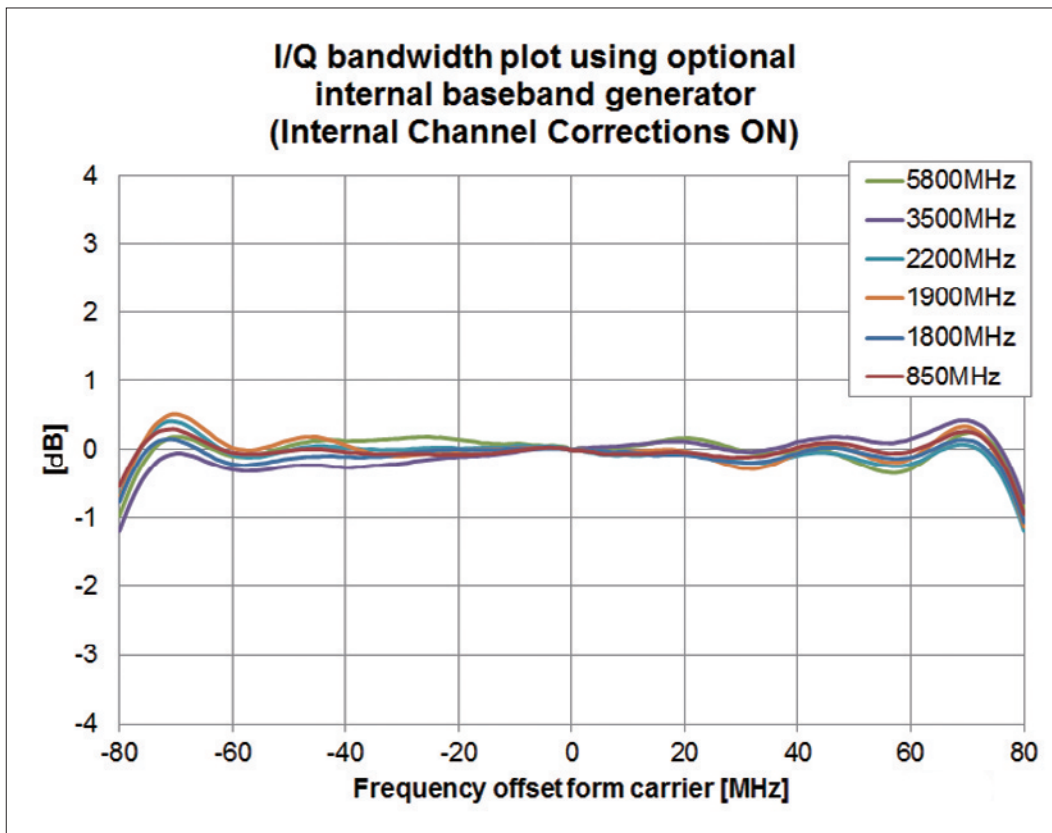
Internal 1 + Internal 2

Internal + External

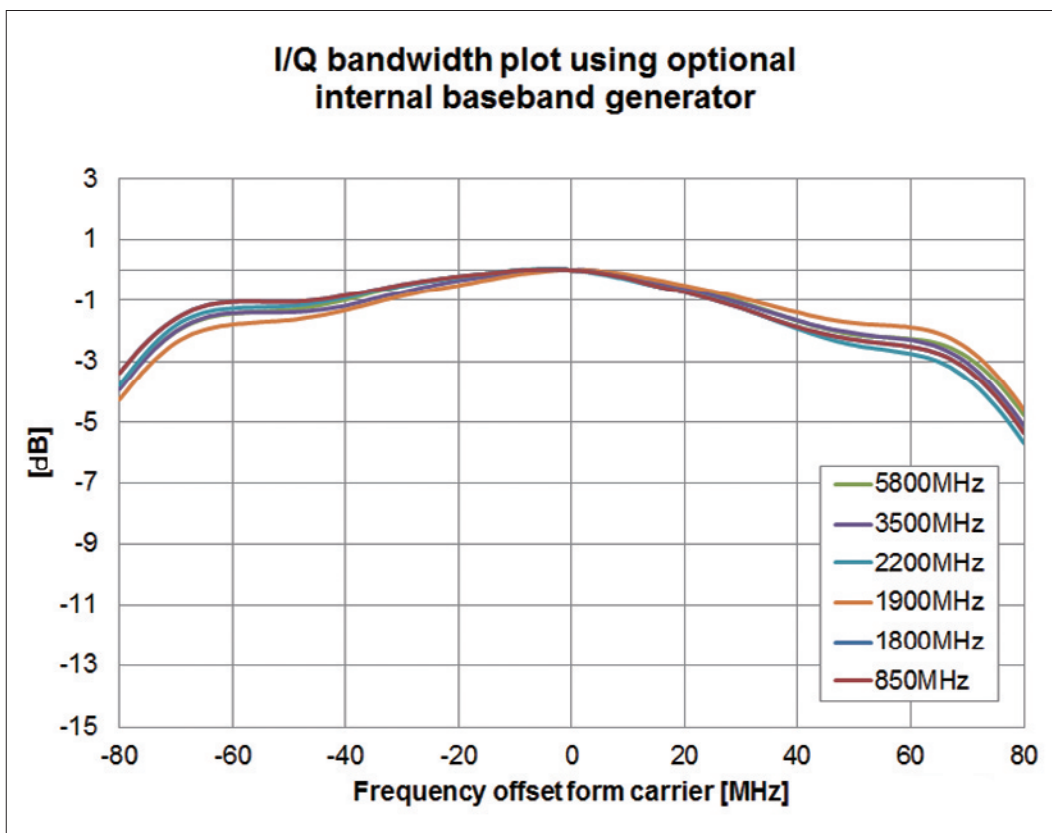
FM and Φ M cannot be enabled simultaneously.

Vector Modulation

Modulation Frequency Response



(meas)



(meas)

Vector Accuracy

without MG3710A-043, or MG3710A-073

Output Level: $\leq +7$ dBm (without MG3710A-041, or MG3710A-071)
 $\leq +13$ dBm (with MG3710A-041, or MG3710A-071)

with MG3710A-043, or MG3710A-073

Output Level: $\leq +4$ dBm (without MG3710A-041, or MG3710A-071)
 $\leq +10$ dBm (with MG3710A-041, or MG3710A-071)

after CAL

W-CDMA (Test Mode 4) :

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

GSM:

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

EDGE:

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

LTE (20 MHz Test Mode 3.1) :

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

without MG3710A-043, or MG3710A-073

Output Level: $\leq +4$ dBm (without MG3710A-041), $\leq +10$ dBm (with MG3710A-041)

with MG3710A-043, or MG3710A-073

Output Level: $\leq +1$ dBm (without MG3710A-041), $\leq +7$ dBm (with MG3710A-041)

after CAL

LTE (20 MHz Test Mode 3.1) :

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

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 *	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	≤ 7 dBm	≤ 7 dBm	≤ 7 dBm	≤ 7 dBm	≤ 7 dBm	
EVM power level with MG3710A-041/141	≤ 13 dBm	≤ 13 dBm	≤ 13 dBm	≤ 13 dBm	≤ 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 †	2400 to 2484 MHz 5150 to 5825 MHz	2300 to 2690 MHz 3300 to 3800 MHz	≤ 3 GHz	≤ 6 GHz	≤ 3 GHz	≤ 6 GHz
EVM power level	≤ -5 dBm	≤ 2 dBm	≤ 4 dBm	≤ 4 dBm	≤ 4 dBm	≤ 4 dBm
EVM power level with MG3710A-041/141	≤ 2 dBm	≤ 8 dBm	≤ 10 dBm	≤ 10 dBm	≤ 10 dBm	≤ 10 dBm
EVM	0.36% [measured]	0.23% [measured]	0.43% [measured]	0.78% [measured]	0.35% [measured]	0.79% [measured]

(meas)

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

Output Level: ≤-2 dBm (without MG3710A-041), ≤+5 dBm (with MG3710A-041)

*Output Level: ≤-2 dBm

with MG3710A-043

Output Level: ≤-2 dBm (without MG3710A-041), ≤+2 dBm (with MG3710A-041)

*Output Level: ≤-5 dBm

without MG3710A-073

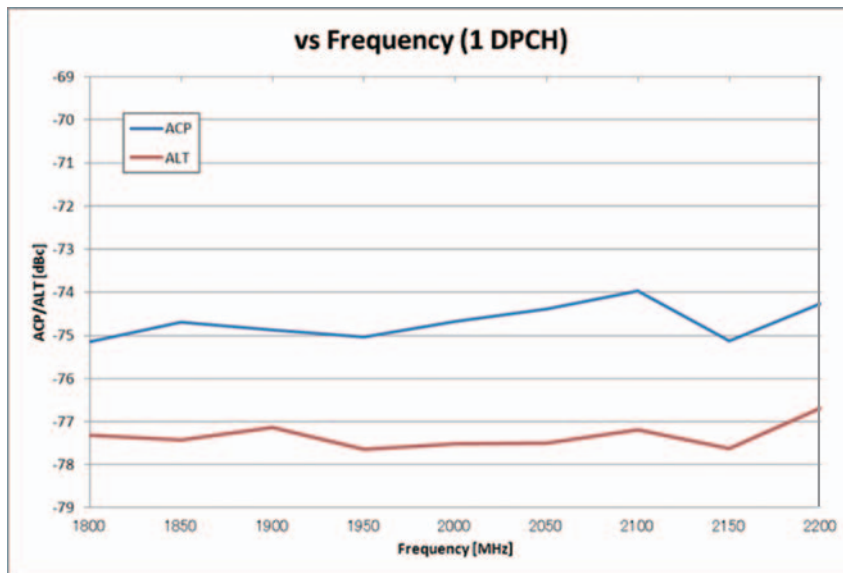
Output Level: ≤-2 dBm (without MG3710A-071), ≤+5 dBm (with MG3710A-071)

with MG3710A-073

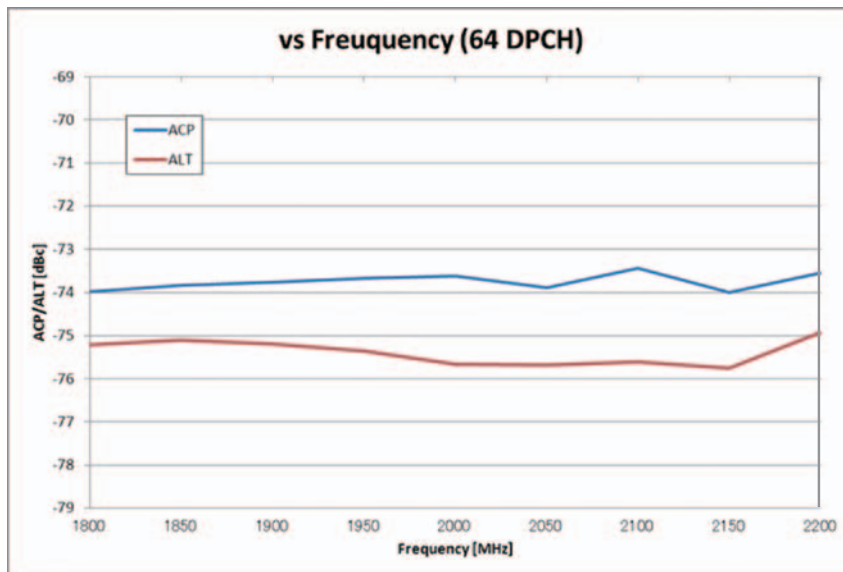
Output Level: ≤-5 dBm (without MG3710A-071), ≤+2 dBm (with MG3710A-071)

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	≤ -71 dBc/3.84 MHz	≤ -71 dBc/3.84 MHz
1 GHz ≤ f < 1.8 GHz	≤ -70 dBc/3.84 MHz	≤ -71 dBc/3.84 MHz
1.8 GHz ≤ f < 2.2 GHz	≤ -71 dBc/3.84 MHz	≤ -71 dBc/3.84 MHz
2.2 GHz ≤ f ≤ 3 GHz	≤ -69 dBc/3.84 MHz	≤ -71 dBc/3.84 MHz
3 GHz < f ≤ 3.8 GHz*	≤ -67 dBc/3.84 MHz	≤ -67 dBc/3.84 MHz

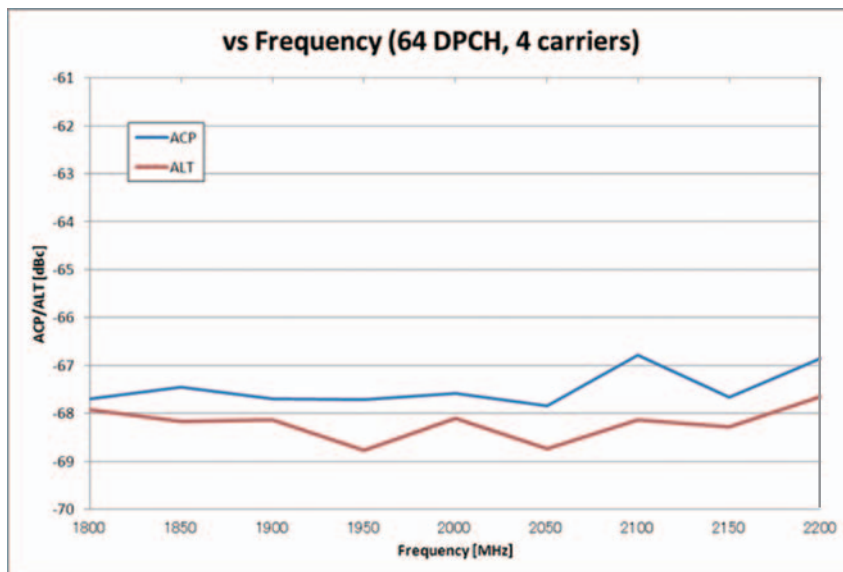
- W-CDMA, ACLR Performance
ACP/ALT vs. Frequency



(meas)

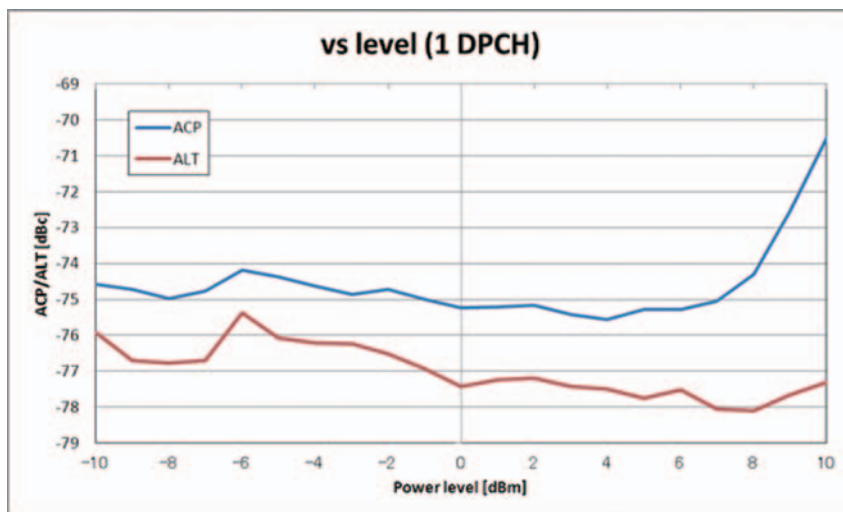


(meas)

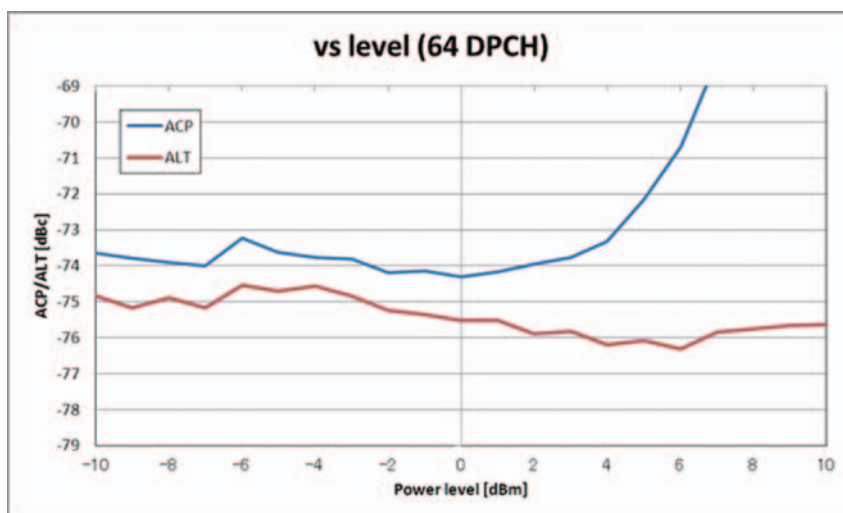


(meas)

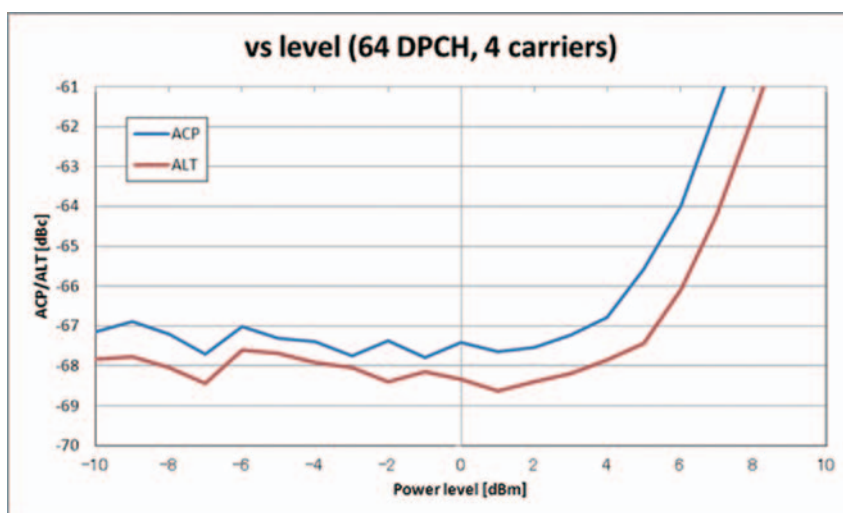
- W-CDMA, ACLR Performance
 ACP/ALT vs. Power level (without MG3710A-041, Frequency: 1.8 GHz)



(meas)

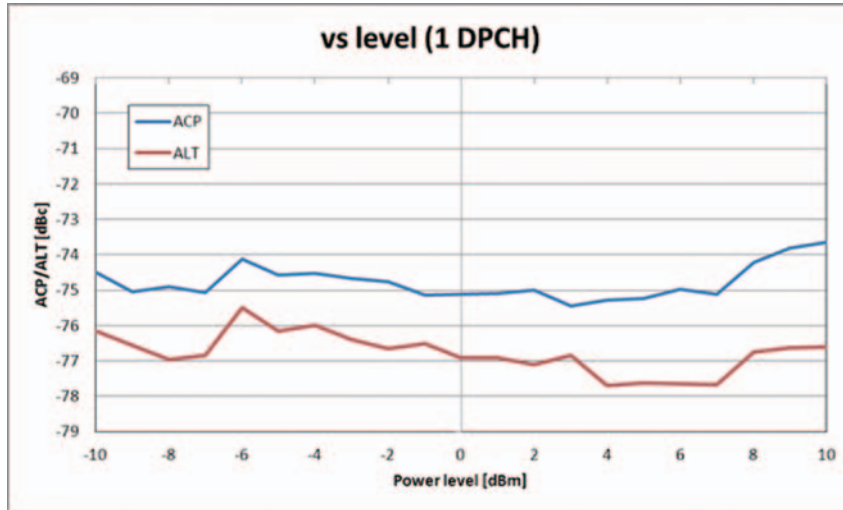


(meas)

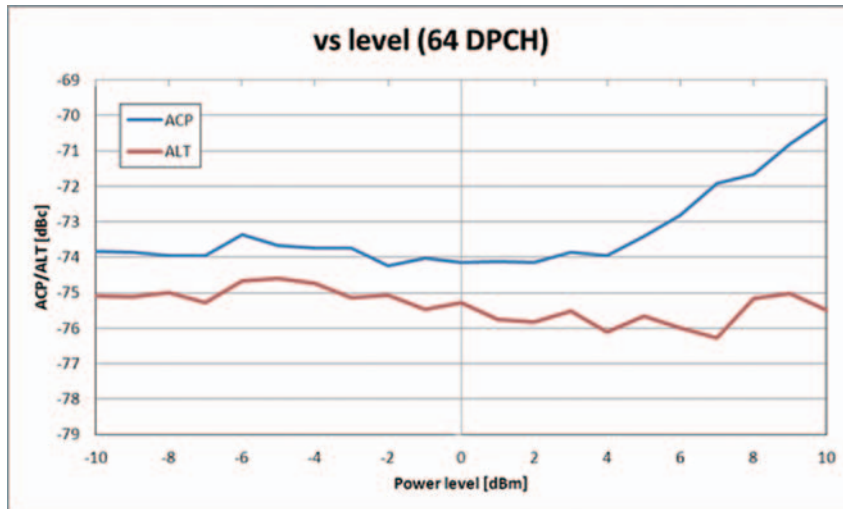


(meas)

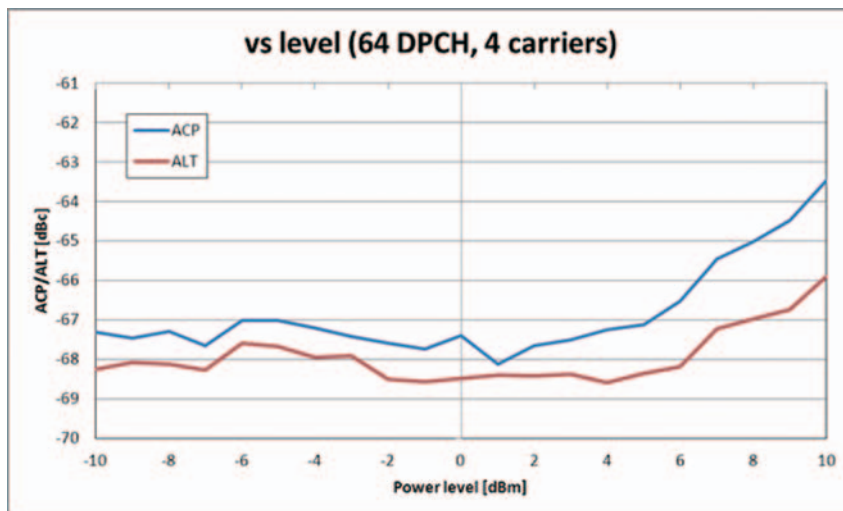
- W-CDMA, ACLR Performance
 ACP/ALT vs. Power level (with MG3710A-041, Frequency: 1.8 GHz)



(meas)

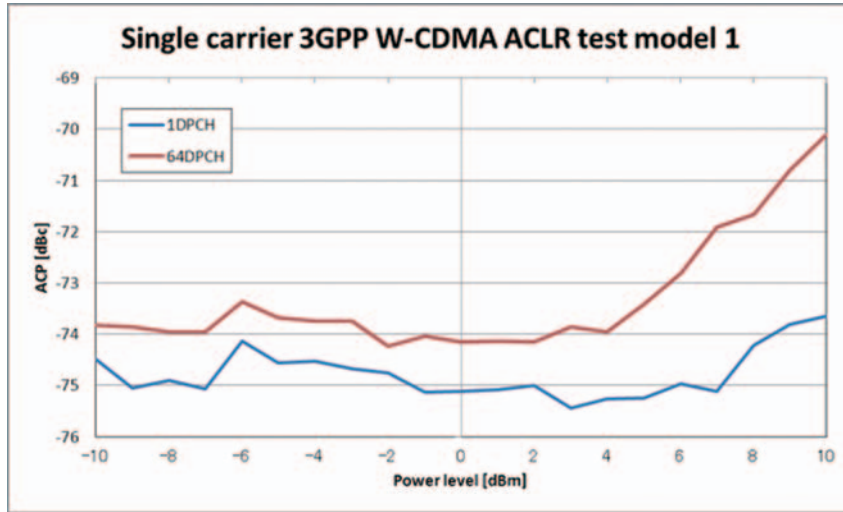


(meas)

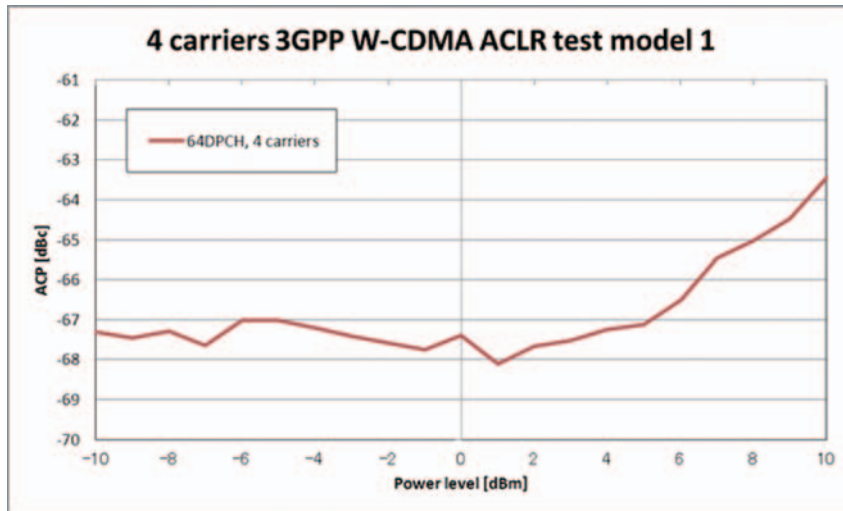


(meas)

- W-CDMA, ACLR Performance
ACP vs. Power level (with MG3710A-041, Frequency: 1.8 GHz)



(meas)



(meas)

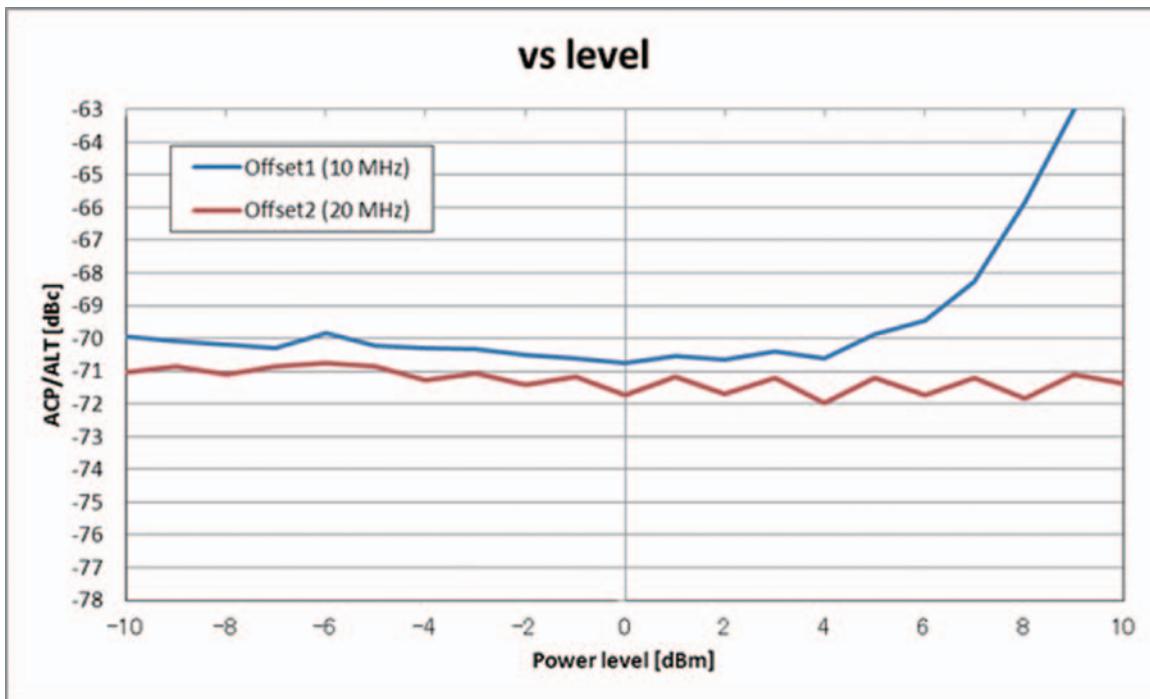


(meas)



(meas)

- LTE FDD ACLR Performance
 ACP/ALT vs. Power level (without MG3710A-041, Frequency: 2.1 GHz)

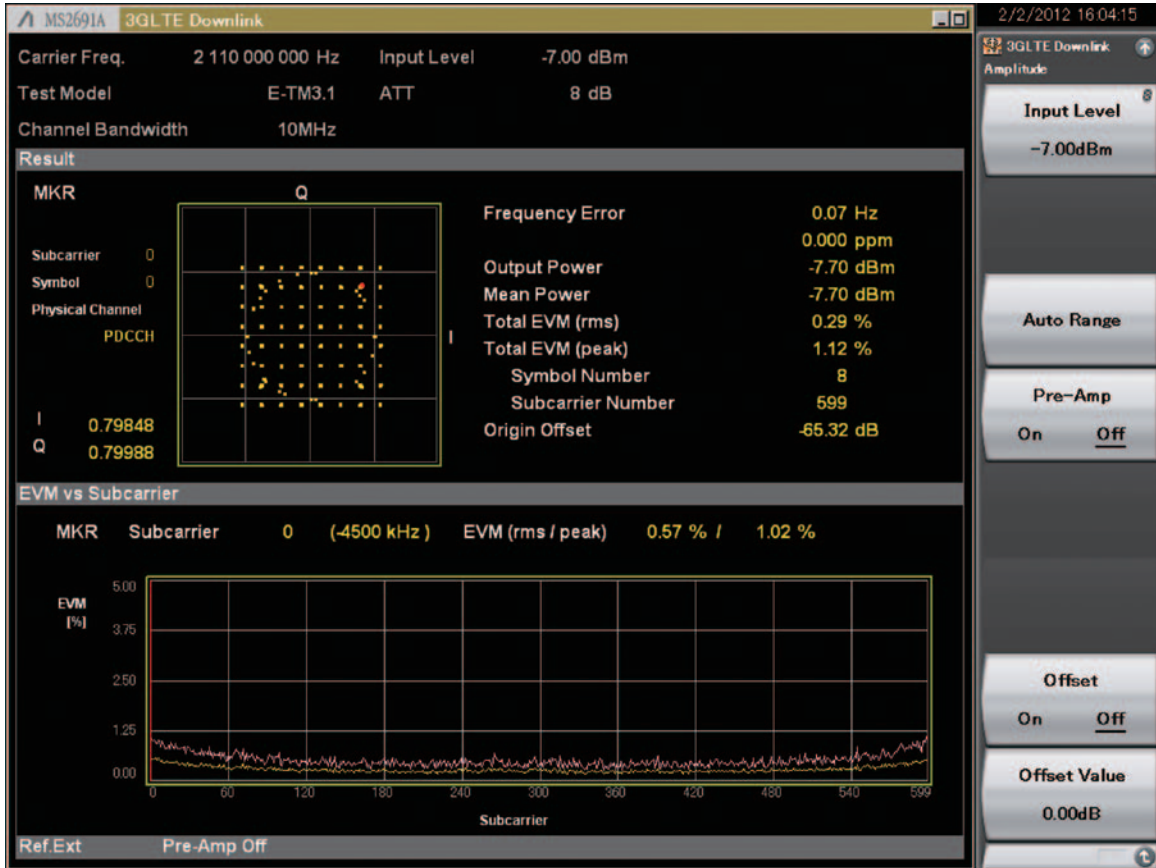


(meas)



(meas)

■ LTE FDD EVM Performance
(Frequency: 2.11 GHz, E-TM 3.1)



(meas)

■ GSM/EDGE ORFS*

* ORFS: Output RF Spectrum

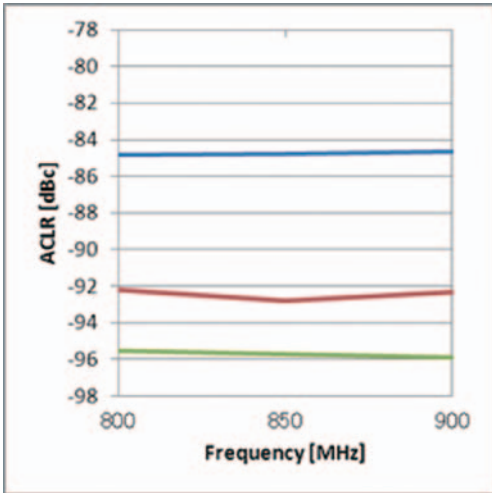
GSM / EDGE output RF spectrum [ORFS] ¹				
Offset [typical]	Configuration	Frequency ²	GSM [measured]	EDGE [measured]
200 kHz	1 normal timeslot, bursted	800 MHz to 900 MHz	-36.0 dBc	-38.2 dBc
400 kHz			-70.9 dBc	-71.0 dBc
600 kHz		-81.1 dBc	-81.3 dBc	
800 kHz		-83.2 dBc	-83.4 dBc	
1200 kHz		1800 MHz to 1900 MHz	-85.4 dBc	-85.4 dBc

1: Output level +7 dBm

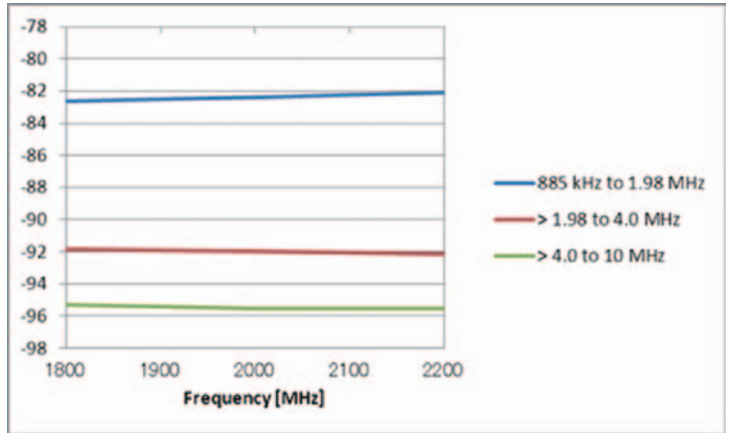
2: Performance evaluated at bottom, middle and top of bands shown.

(meas)

■ CDMA2000 ACLR Performance
 ACLR vs. Frequency (Output level: -7 dBm)

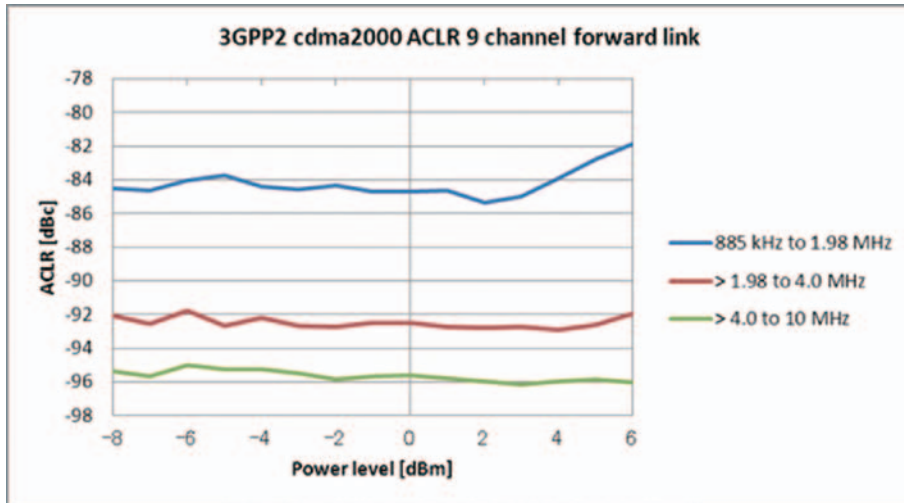


(meas)



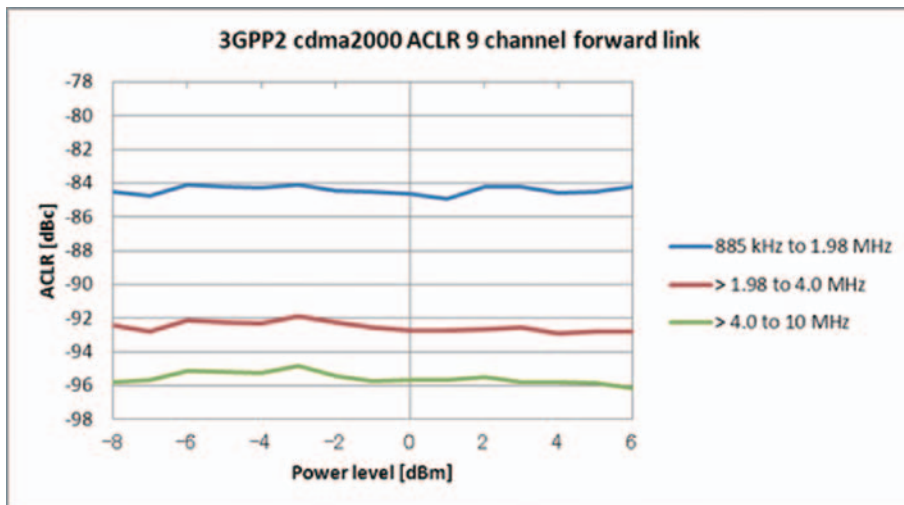
(meas)

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



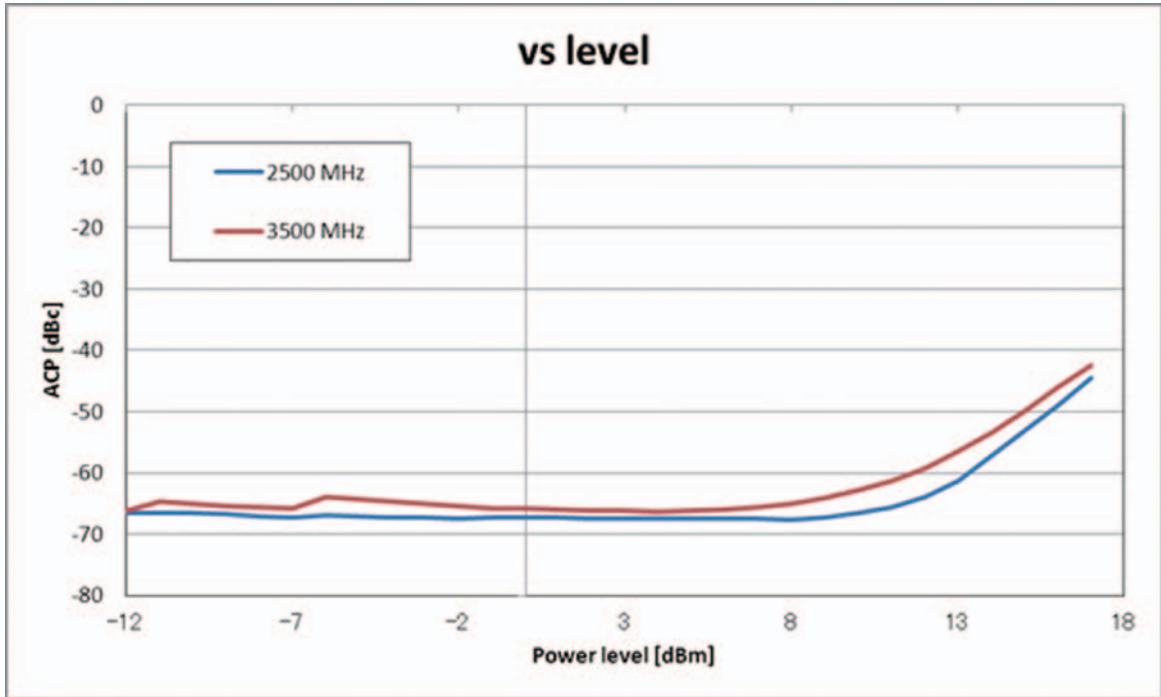
(meas)

ACLR vs. Power level (with MG3710A-041, Frequency: 850 MHz)



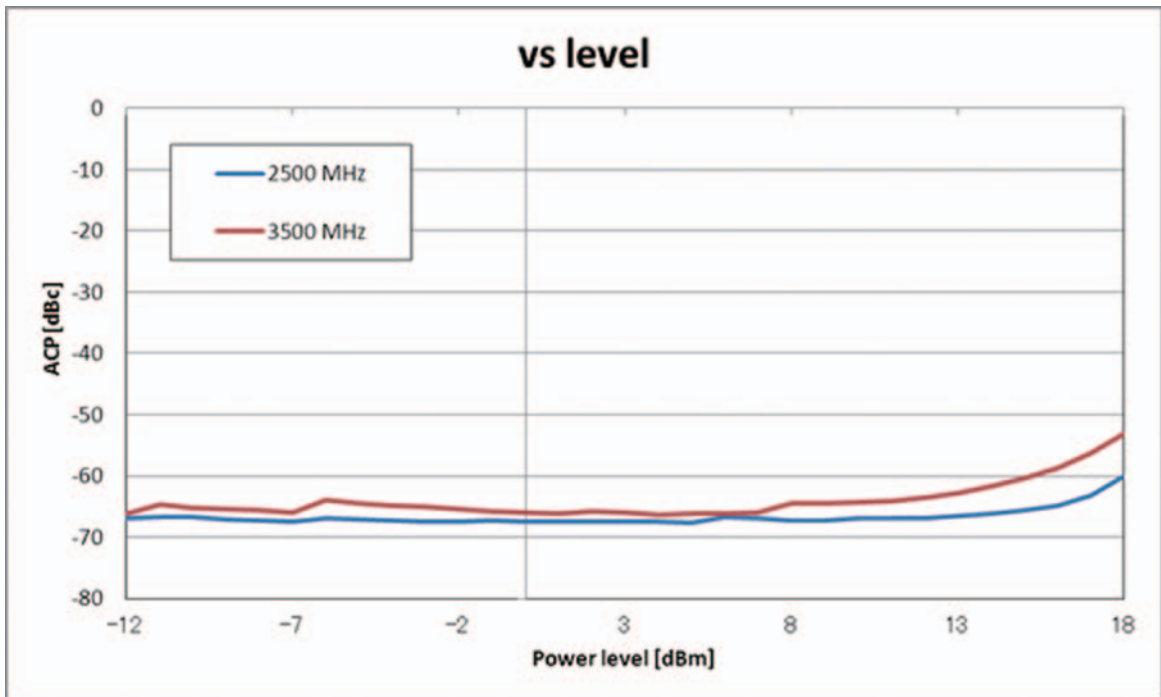
(meas)

- 802.16e Mobile WiMAX ACLR Performance
ACF vs. Power level (10 MHz offset, without MG3710A-041)



(meas)

ACF vs. Power level (10 MHz offset, with MG3710A-041)



(meas)

■ 802.16e Mobile WiMAX EVM Performance
(Frequency: 2.5 GHz)



(meas)

Level Error compared to CW at Vector Modulation

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

without MG3710A-043, or without MG3710A-073

±0.3 dB (50 MHz ≤ f < 98 MHz, Output Level: ≤ -5 dBm)

±0.2 dB (98 MHz ≤ f < 6 GHz, Output Level: < +1 dBm)

with MG3710A-043, or with MG3710A-073

±0.3 dB (50 MHz ≤ f < 98 MHz, Output Level: ≤ -5 dBm)

±0.2 dB (98 MHz ≤ f < 6 GHz, Output Level: < -2 dBm)

I and Q Input/Output

Baseband I/Q Adjustment

DC Offset

Range: -20.000% to +20.000%

Resolution: 0.025%

Gain Balance

(Gain adjustment of I-phase for Q-phase)

Range: -1.000 dB to +1.000 dB

Resolution: 0.001 dB

Quadrature Adjustment

Range: -10.00 deg. to +10.00 deg.

Resolution: 0.01 deg.

Phase Adjustment

Range: -360.00 deg. to +360.00 deg.

Resolution: 0.01 deg.

Skew Adjustment

Range: -800.000 ns to +800.000 ns

Resolution: 1 ps

Delay Adjustment

Range: -400.000 ns to +400.000 ns

Resolution: 1 ps

I and Q Input

with MG3710A-018

Modulation Bandwidth

Baseband: 80 MHz (nom.)

RF: 160 MHz (nom.)

Input Level

$\sqrt{I^2 + Q^2} = 85 \text{ mV (rms)}$, (Optimum value of level accuracy)

DC Offset

Range: -100 mV to +100 mV

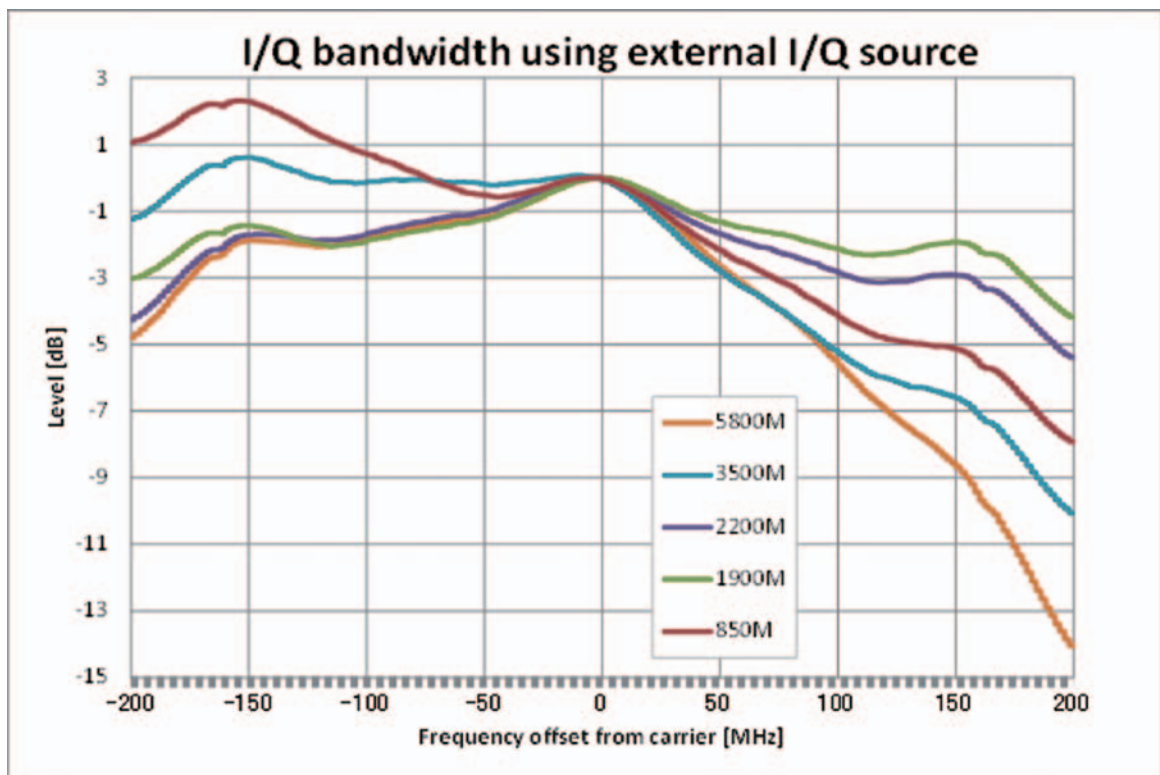
Resolution: 1 mV

Input Connector

BNC-J (Front panel)

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

Impedance: 50Ω (nom.)



(meas)

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

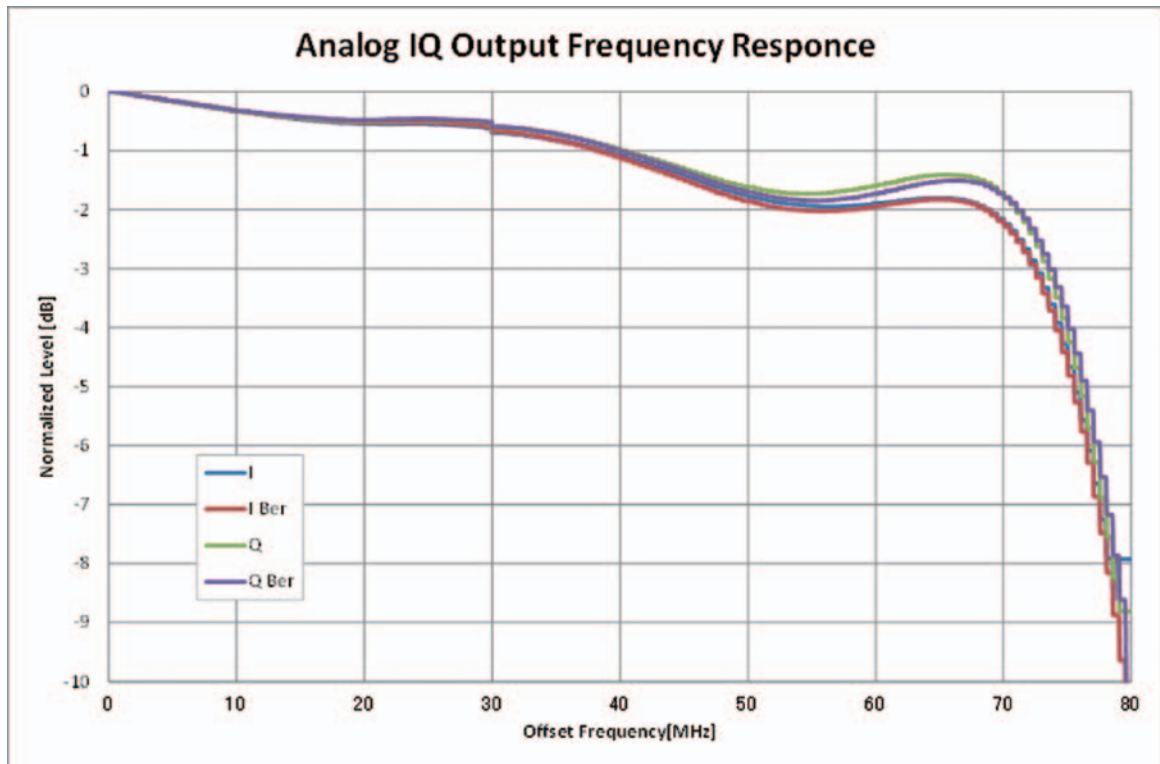
Quadrature Adjustment

Using Baseband I/Q Adjustment Function

Output Connector

BNC-J (Rear panel)

Impedance: 50Ω (nom.)



(meas)

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, 50 Ω (AC coupled) (nom.)

Selects external input and MIMO connection (BB Ref Sync)

Waveform Memory

1stRF

When MG3710A-048 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.

without MG3710A-045/046

64 Msamples

with MG3710A-045, without MG3710A-046

256 Msamples

without MG3710A-045, with MG3710A-046, or with MG3710A-045/046

1024 Msamples

2ndRF

When MG3710A-078 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.

without MG3710A-075/076

64 Msamples

with MG3710A-075, without MG3710A-076

256 Msamples

without MG3710A-075, with MG3710A-076, or with MG3710A-075/076

1024 Msamples

Number of loadable files

The following numbers of waveform patterns are available per waveform memory:

Max. Package Count: 4096

Max. Patterns per Package: 4096

The maximum number of patterns in total: 4096/waveform memory

The minimum number of samples per pattern: 128

Combination of Baseband Signal Function

1st VSG: with MG3710A-048

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

2nd VSG: with MG3710A-078

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

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

Frequency Offset

$\pm (200 \text{ MHz} \times 0.8 - \text{waveform data bandwidth}) \div 2 \text{ (max.)}^* /$
 $\pm (160 \text{ MHz} \times 0.8 - \text{waveform data bandwidth}) \div 2 \text{ (max.)}$

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

AWGN Generation Function

1st VSG: with MG3710A-049

2nd VSG: with MG3710A-079

C/N Ratio Absolute Value

≤40 dB

Bandwidth Limit Filter

Sets AWGN bandwidth limit as follows:

From 20% to 80% of waveform sampling rate

Sweep/List Function

Sweep Function

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

List Function

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

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

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

Connector

*: Supports firmware Version 2.00.00 and later.

External Reference Input

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

Reference Signal Output

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

Sweep Output

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

Local Oscillator (LO) Input

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

Local Oscillator (LO) Output

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

Baseband Reference Input

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

Baseband Reference Output

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

Additional Analog Modulation Input

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

External Controller

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

USB

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

Monitor Output

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

AUX

50-pin (for DX10A-50S) (Rear panel)
Input/Output Level: TTL
with MG3710A-017/021: with AUX-BNC Conversion Cable

Display

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

General

Dimensions and Mass

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

Power Supply

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

Temperature Range

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

EMC

EN61326-1, EN61000-3-2

LVD

EN61010-1



Specifications are subject to change without notice.

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