TEST DATA OF JMA-5322

Type	JMA-5322	Ser. No. LB00421
Scanner Unit	NKE-2254	
Display Unit	NCD-4530	
Ship's Main	+24VDC −10/+50%	

Date July.17.2008

Section Chief W. Washimoto

Inspector M. Ito

1 Mechanical Tests

Appearance and Structure

Scanner Unit	Good
Display Unit	Good

2 Electrical Tests

2.1 Working of each operation unit

Scanner Unit	Good
Keyboard Unit	Good
STBY Key	Good
TX/PRF Key	Good
EBL1/EBL2 key	Good
VRM1/VRM2 key	Good
ALARM ACK key	Good
ACQ key	Good
TGT CNCL key	Good
PANEL key	Good
USER KEY1 key	Good
USER KEY2 key	Good
MOB key	Good
ENT key	Good
CLR/INFO key	Good
FUNC key	Good
OFF CENT/5 key	Good
RR/HL/8 key	Good
TM/RM/4 key	Good
AZI MODE/1 key	Good
MAP2 key	Good
VECT/3 key	Good
MARK/6 key	Good
DAY/NIGHT/7	Good
AZ/9 key	Good
TT MENU key	Good
TGT DATA key	Good
TRAILS/0 key	Good
+/-RANGE key	Good
ACQ/ENT key	Good
RADAR MENU key	Good
MULTI Control	Good
AUTO-RAIN Control	Good
AUTO-SEA Control	Good
GAIN/PL Control	Good
Electronic bearing line dial	Good
Variable range marker dial	Good
Track ball	Good

2.2 Scanner

VSWR	frequency (MHz)	VSWR
	9380	1.04
	9410	1.04
	9440	1.07

Scanner Rotation Speed 24 /48 rpm

2.3 Transmitter

Magnetron Ser. No.	A0279A
Operating Frequency	
(at 0.07 μs pulse 0.5 NM-SP1)	9418.3 MHz
(at 0.2 μs pulse 3NM -MP1)	9415.8 MHz
(at 0.3 μs pulse 3NM -MP2)	9414.7 MHz
(at 0.4 μs pulse 3NM -MP3)	9414.7 MHz
(at 0.8 μs pulse 3NM -LP1)	9414.2 MHz
(at 1.0 μs pulse 24NM -LP2)	9413.7 MHz
(at 1.2 μs pulse 24NM -LP3)	9413.7 MHz
Peak Output Power	
(at 0.07 μs pulse 0.5 NM-SP1)	17.6 kw
(at 0.2 μs pulse 3NM -MP1)	19.5 kw
(at 0.3 μs pulse 3NM -MP2)	19.4 kw
(at 0.4 μs pulse 3NM -MP3)	19.4 kw
(at 0.8 μs pulse 3NM -LP1)	19.5 kw
(at 1.0 μs pulse 24NM -LP2)	19.5 kw
(at 1.2 μs pulse 24NM -LP3)	19.6 kw
Pulse Length	
(at 0.07 μs pulse 0.5 NM-SP1)	0.086 μS
(at 0.2 μs pulse 3NM -MP1)	0.151 μS
(at 0.3 μs pulse 3NM -MP2)	0.260 μS
(at 0.4 μs pulse 3NM -MP3)	0.354 μS
(at 0.8 μs pulse 3NM -LP1)	0.740 μS
(at 1.0 μs pulse 24NM -LP2)	0.948 μS
(at 1.2 μs pulse 24NM -LP3)	1.11 μS

2.4 Receiver

MIC Front-end Ser. No.	0001
Diode limiter Ser. No.	A8939A
IF Center Frequency	60 MHz
IF Bandwidth	20/6/3 MHz

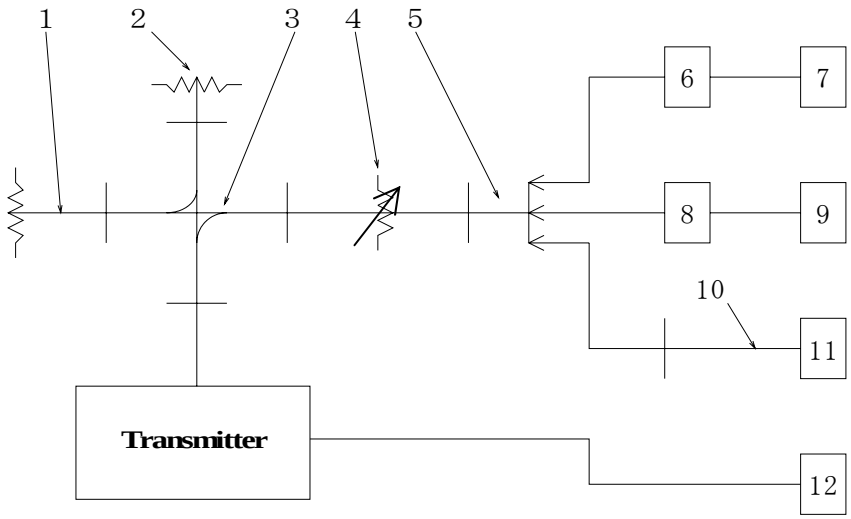
2.5 Display

Input Voltage and Current(at 24NM-LP2)	DC.24V 9.93A(238W)
Repetition Frequency	
(0.07 μ s)	2249 Hz
(0.2 μ s)	2249 Hz
(0.3 μ s)	1901 Hz
(0.4 μ s)	1401 Hz
(0.8 μ s)	750 Hz
(1.0 μ s)	650 Hz
(1.2 μ s)	510 Hz

3 Overall Tests

Working Time of Timer	3min
Input Variation (21.6Vdc – 42Vdc)	Good
Overall Sensitivity	Good
Minimum Range	Good
Bearing Accuracy	Good
Mechanical Noise	Good

(Sec. 2.1046) 1.0 RF Power Output
(Sec. 2.1049) 2.0 Occupied Bandwidth



1:Dummy Load	PE6815	PASTERNACK
2:High Power Dummy Load	PE6824	PASTERNACK
3:Direction Coupler	5D363	SHIMADARIKA
Coupling 30dB		
Directivity 30dB		
4:Attenuator	8495B	HP
5:Adaptor	X281A	HP
6:Power Sensor	N1921A	Agilent
7:Power Meter	N1911A	Agilent
8:Crystal Detector	423B	HP
9:Oscilloscope	TDS3034B	Tektronix
10:Coaxial Cable	JUNFLON DGM024	JUNKOSHA
11:Spectrum Analyzer	E4448A	Agilent
12:Frequency Counter	5302A	HP

Measurement Point : Transmitter Output

FCC Submittal Material Data

(Sec. 2.1046) 1.0 RF Power Output

1.1 Peak Power

(at 0.07 μs pulse 0.5 NM-SP1)	17.6 kw
(at 0.2 μs pulse 3NM -MP1)	19.5 kw
(at 0.3 μs pulse 3NM -MP2)	19.4 kw
(at 0.4 μs pulse 3NM -MP3)	19.4 kw
(at 0.8 μs pulse 3NM -LP1)	19.5 kw
(at 1.0 μs pulse 24NM -LP2)	19.5 kw
(at 1.2 μs pulse 24NM -LP3)	19.6 kw

1.2 Average Power

(at 0.07 μs pulse 0.5 NM-SP1)	3.49 w
(at 0.2 μs pulse 3NM -MP1)	6.62 w
(at 0.3 μs pulse 3NM -MP2)	9.59 w
(at 0.4 μs pulse 3NM -MP3)	9.62 w
(at 0.8 μs pulse 3NM -LP1)	10.8 w
(at 1.0 μs pulse 24NM -LP2)	12.0 w
(at 1.2 μs pulse 24NM -LP3)	11.1 w

1.3 Load Impedance

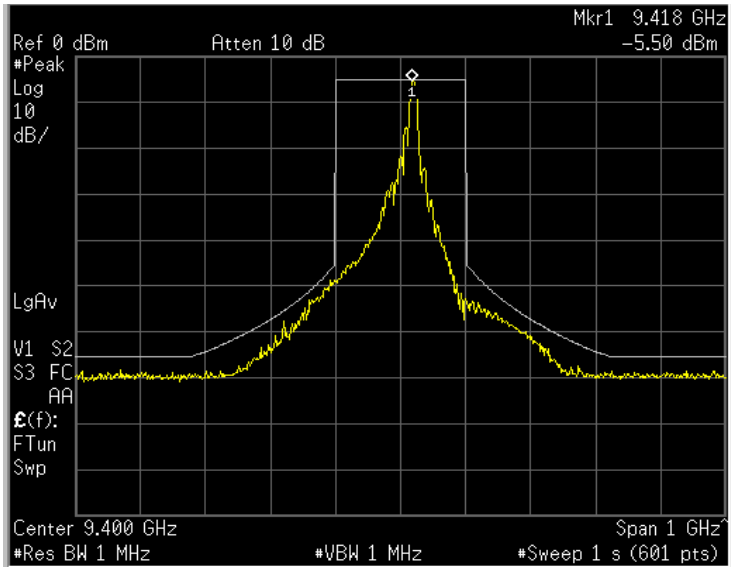
VSWR 1.05 at 9.36 – 9.46 GHz

(Sec. 2.1049) 2.0 Occupied Bandwidth

2.1 0.07 μ S Pulse PRF 2249Hz

0.07 μ S Pulse Length 0.0856 μ S

Scale
10dB/Div

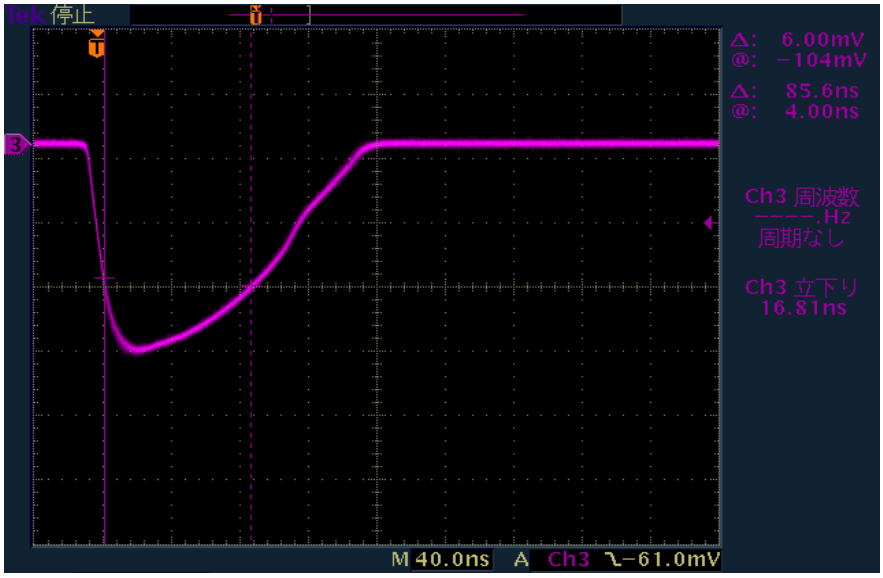


RF Spectrum
0.07 μ S Pulse

OBW=54.3 MHz

Scale 100MHz/Div
Center Frequency 9400MHz

Scale
50mV/Div



← - 3 dB

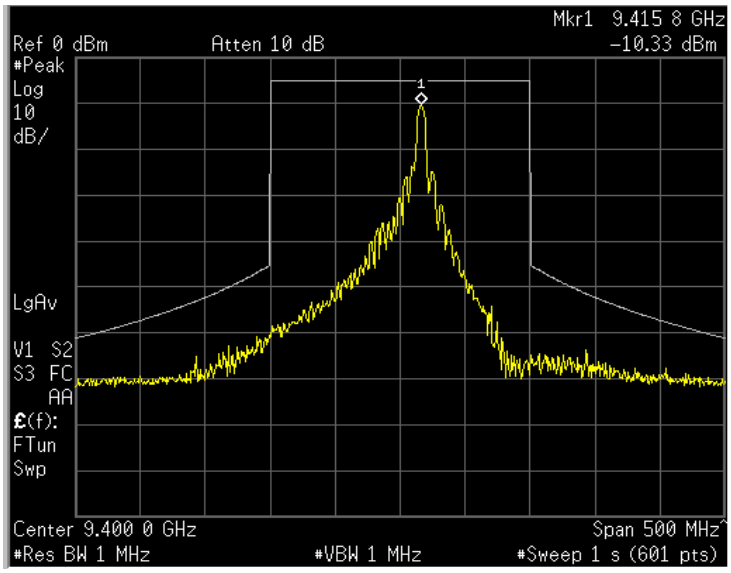
Detected RF
Pulse
0.07 μ S Pulse

Scale 0.04 μ S/Div

(Sec. 2.1049)

2.2　0.2 μ S Pulse PRF　　2249Hz

0.2 μ S Pulse Length　0.151 μ S

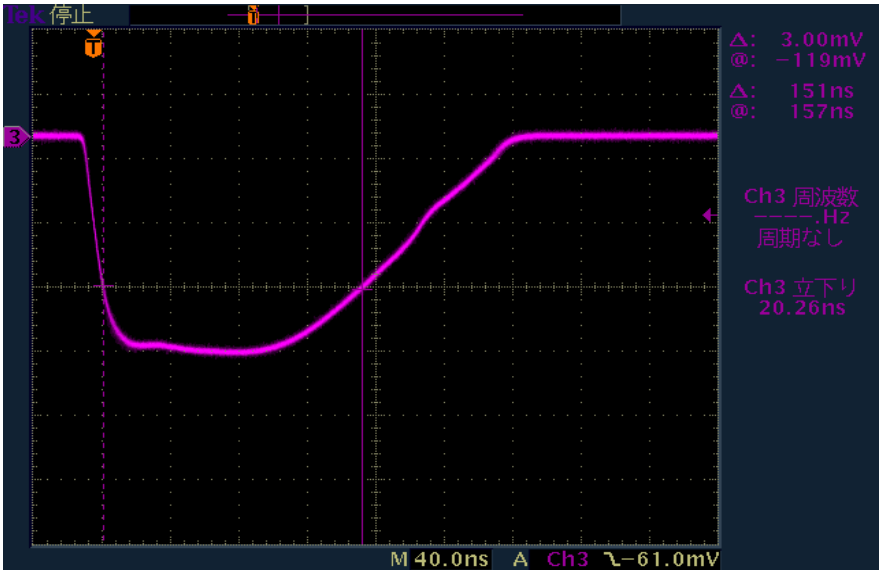


Scale
10dB/Div

RF　Spectrum
0.2 μ S Pulse

OBW=41.1MHz

Scale 50MHz/Div
Center Frequency 9400MHz



Scale
50mV/Div

← - 3 dB

Detected RF
Pulse
0.2 μ S Pulse

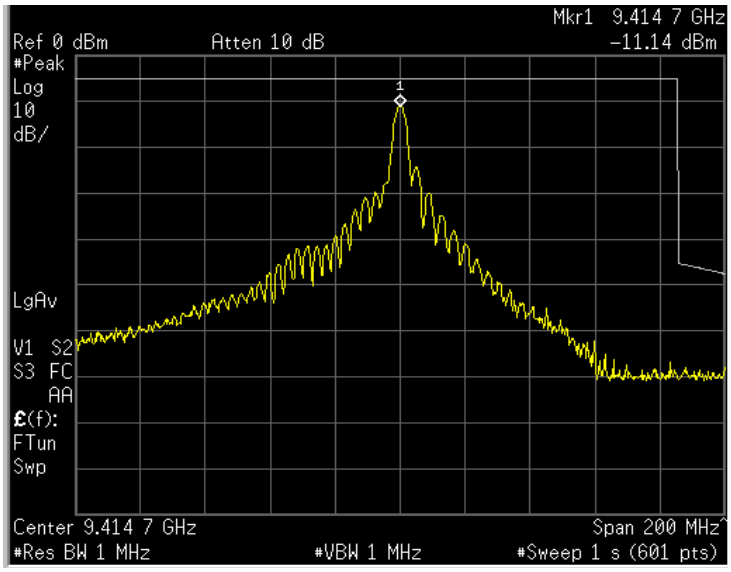
Scale 0.04 μ S/Div

(Sec. 2.1049)

2.3　0.3 μ S Pulse PRF　1901Hz

0.3 μ S Pulse Length　0.26 μ S

Scale
10dB/Div

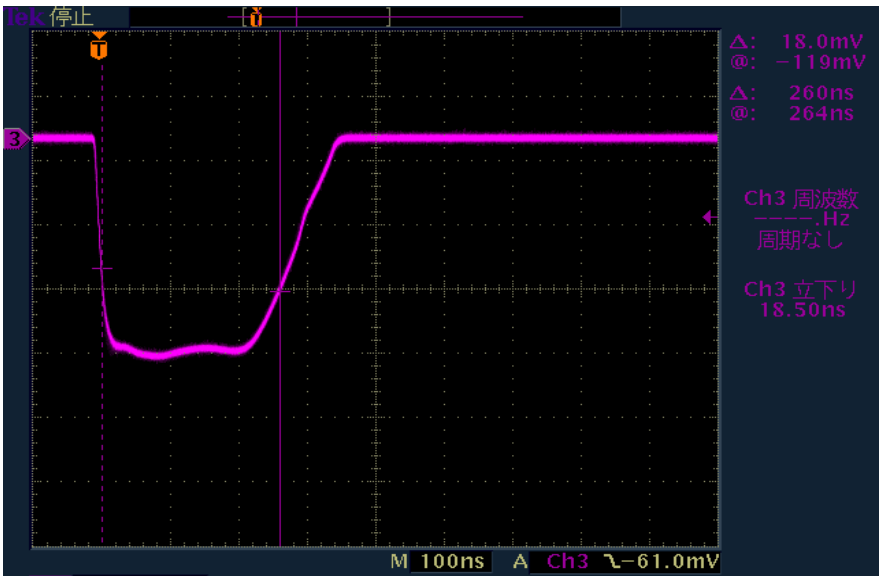


RF　Spectrum
0.3 μ S Pulse

OBW=29.7MHz

Scale 20MHz/Div
Center Frequency 9414.7MHz

Scale
50mV/Div



← - 3 dB

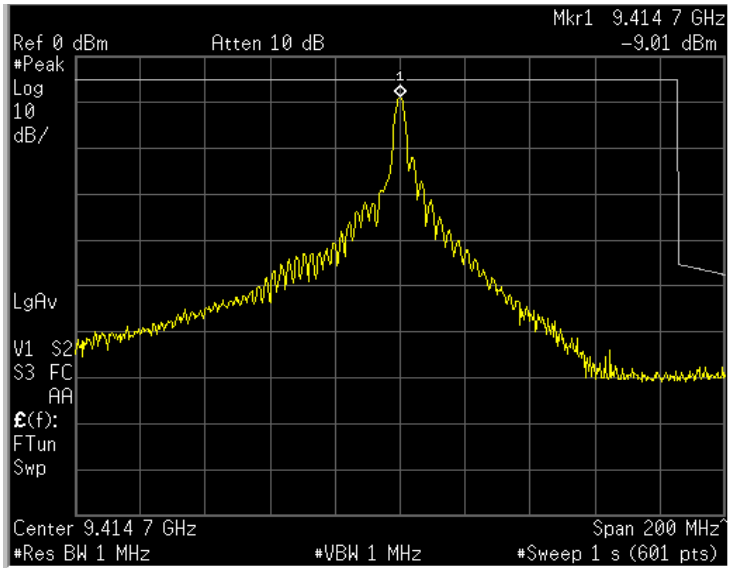
Detected RF
Pulse
0.3 μ S Pulse

Scale 0.1 μ S/Div

(Sec. 2.1049)

2.4　0.4 μ S Pulse PRF　1401Hz

0.4 μ S Pulse Length　0.354 μ S

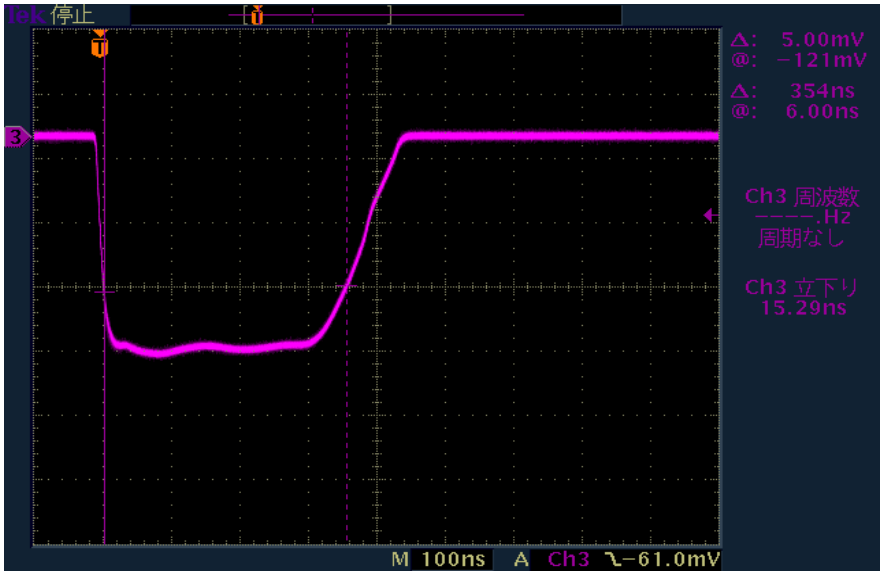


Scale
10dB/Div

RF　Spectrum
0.4 μ S Pulse

OBW=24.0MHz

Scale 20MHz/Div
Center Frequency 9414.7MHz



Scale
50mV/Div

← - 3 dB

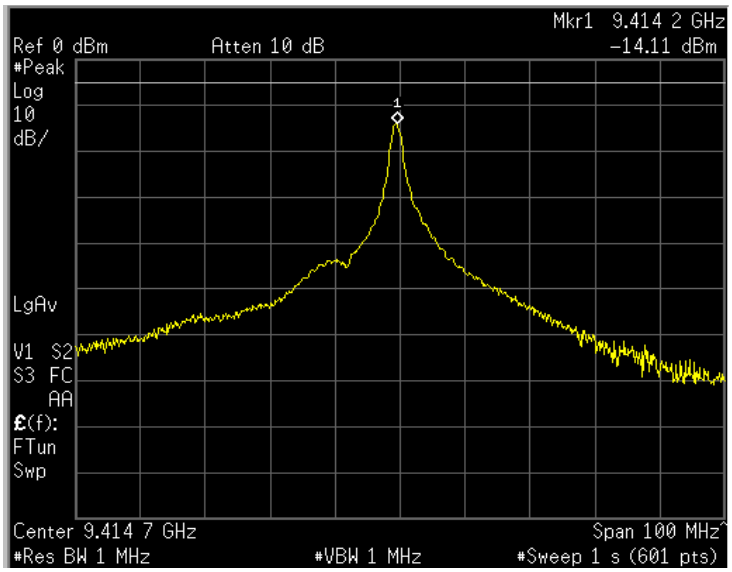
Detected RF
Pulse
0.4 μ S Pulse

Scale 0.1 μ S/Div

(Sec. 2.1049)

2.5　0.8 μ S Pulse PRF　749.8Hz

0.8 μ S Pulse Length　0.740 μ S



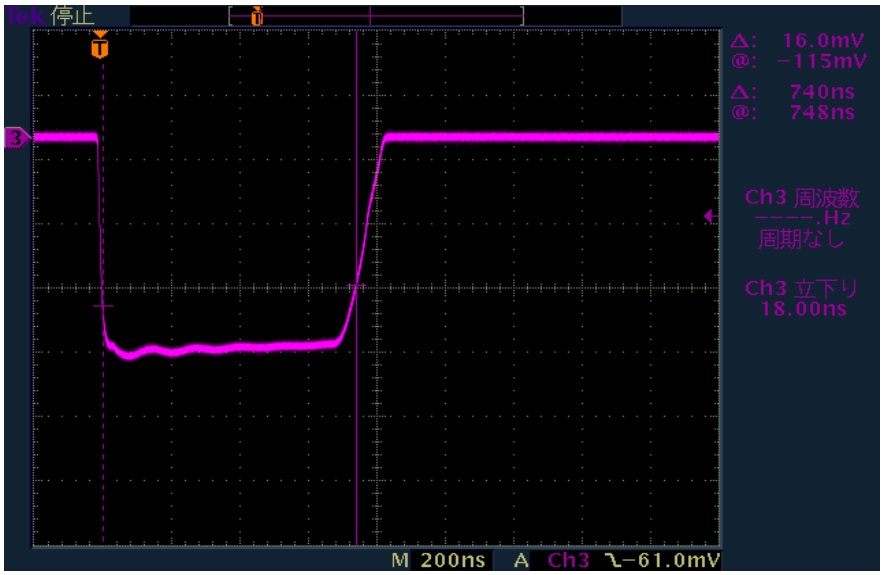
Scale
10dB/Div

RF Spectrum
0.8 μ S Pulse

OBW=13.9MHz

Scale 10MHz/Div
Center Frequency 9414.7MHz

(Sec. 2.987)



Scale
50mV/Div

← - 3 dB

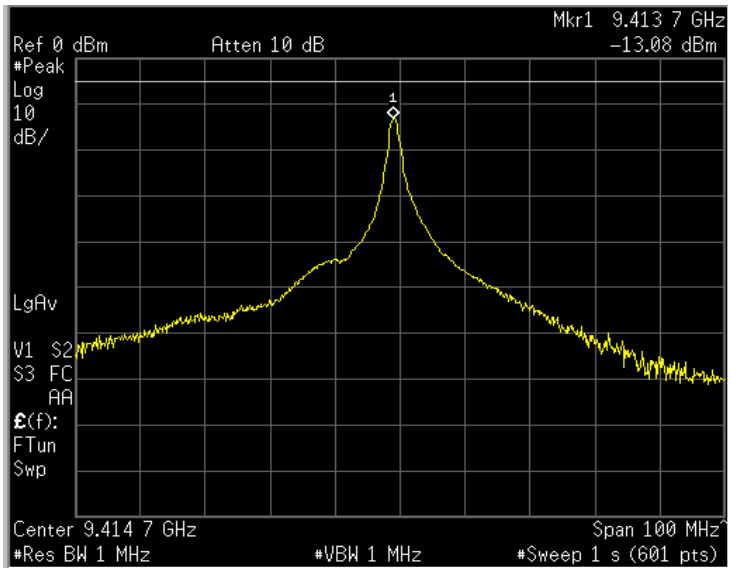
Detected RF
Pulse
0.8 μ S Pulse

Scale 0.2 μ S/Div

(Sec. 2.1049)

2.5　1.0 μ S Pulse PRF　650.2Hz

1.0 μ S Pulse Length　1.11 μ S

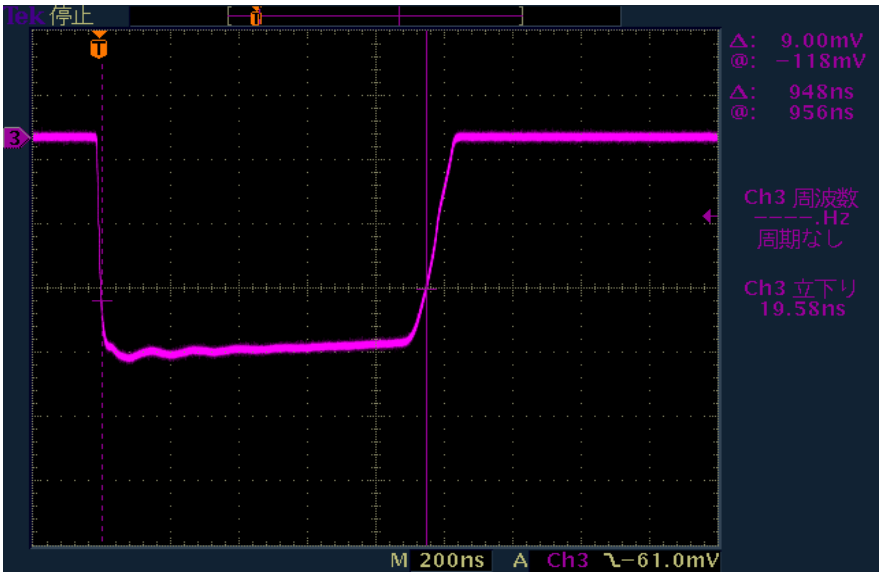


Scale
10dB/Div

RF　Spectrum
1.0 μ S Pulse

OBW=12.2MHz

Scale 10MHz/Div
Center Frequency 9414.7MHz



Scale
50mV/Div

← - 3 dB

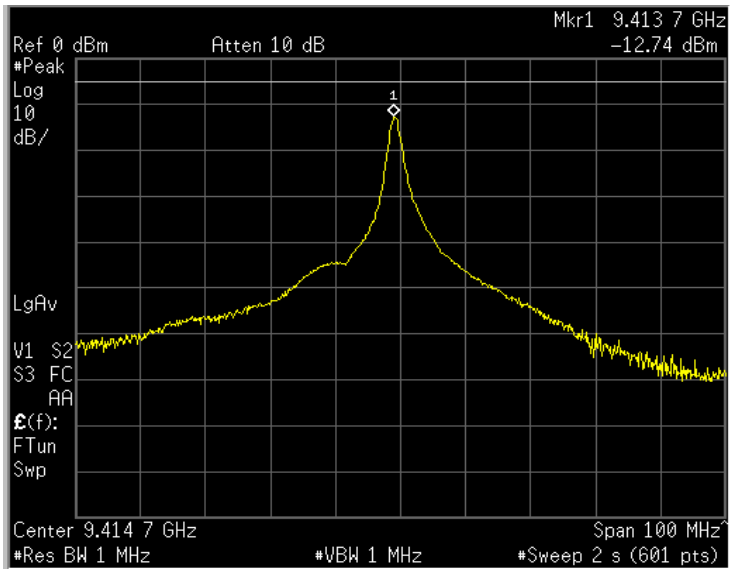
Detected RF
Pulse
1.0 μ S Pulse

Scale 0.2 μ S/Div

(Sec. 2.1049)

2.5　1.2 μ S Pulse PRF　509.9Hz

1.2 μ S Pulse Length　1.11 μ S

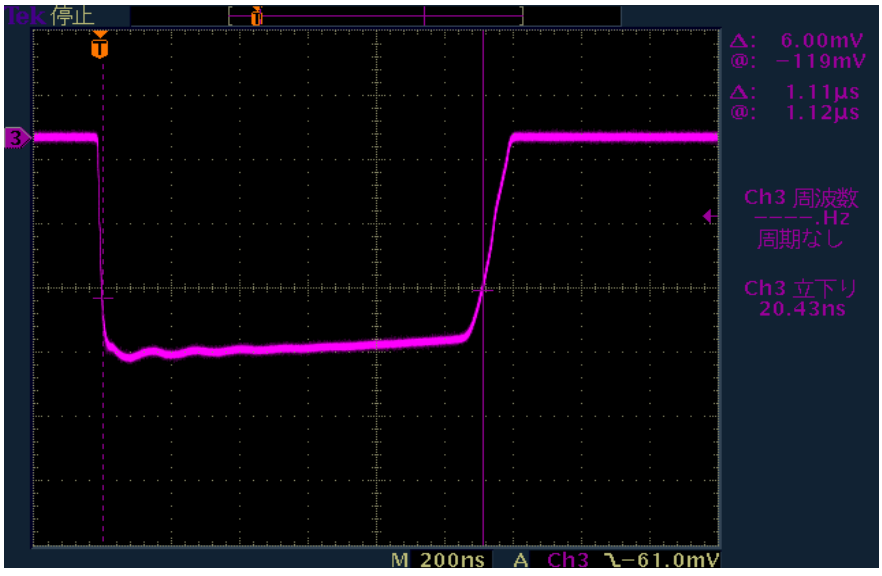


Scale
10dB/Div

RF Spectrum
1.2 μ S Pulse

OBW=11.1MHz

Scale 10MHz/Div
Center Frequency 9414.7MHz



Scale
50mV/Div

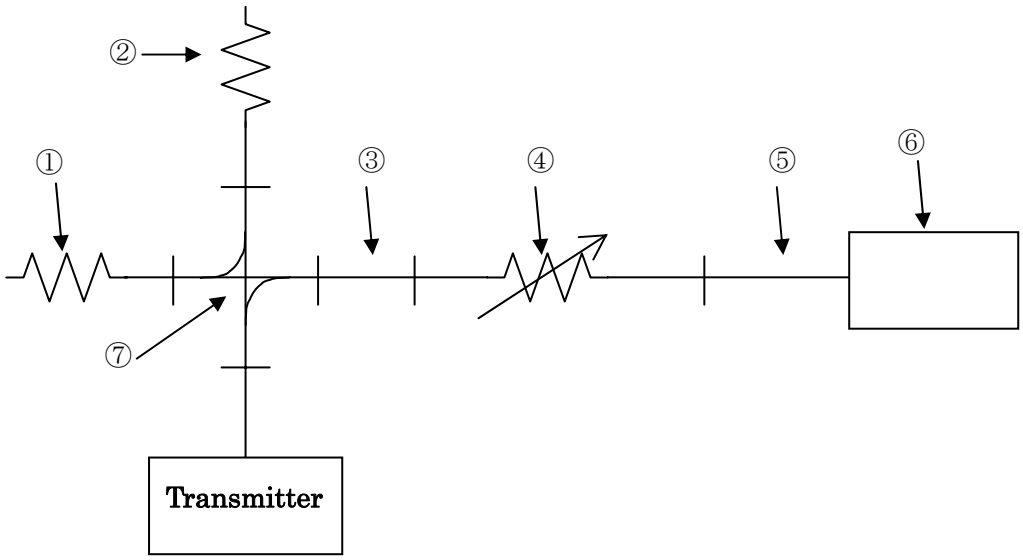
← - 3 dB

Detected RF
Pulse
1.2 μ S Pulse

Scale 0.2 μ S/Div

(Sec.2.1051) Spurious emission at antenna terminals

Condition 1: 0 to 20GHz



①Dummy Load	PE6815	PASTERNACK
②High Power Dummy Load	PE6824	PASTERNACK
③Adaptor	X281A	HP
④Attenuator	8495B	HP
⑤Coaxial Cable	JUNFLON DGM024	JUNKOSHA
⑥Spectrum Analyzer	E4448A	Agilent
⑦Direction Coupler	5D363	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 30dB	

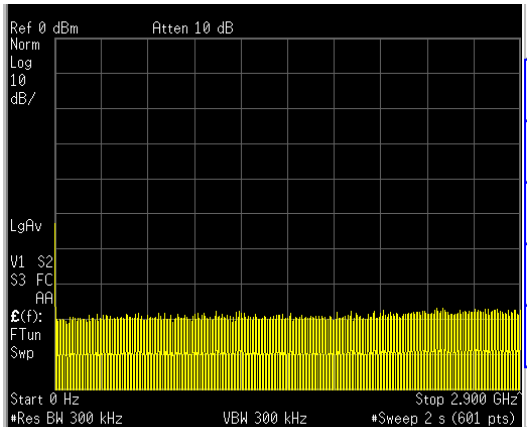
Attenuation 4 : 40dB

Measurement Point : Transmitter Output

(2.1051)

Scale
↑ 10dB/Div

→290MHz/Div



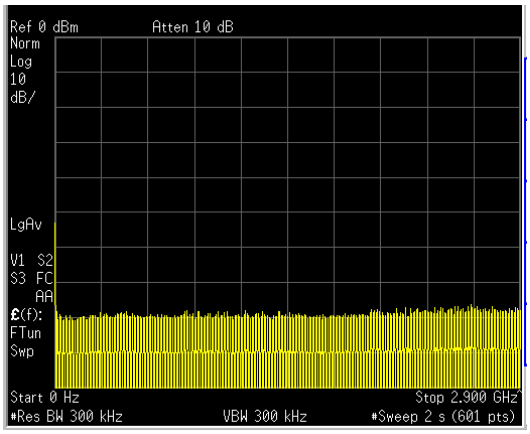
Spurious signal

OFF

0 to 2.9GHz

Scale
↑ 10dB/Div

→290MHz/Div



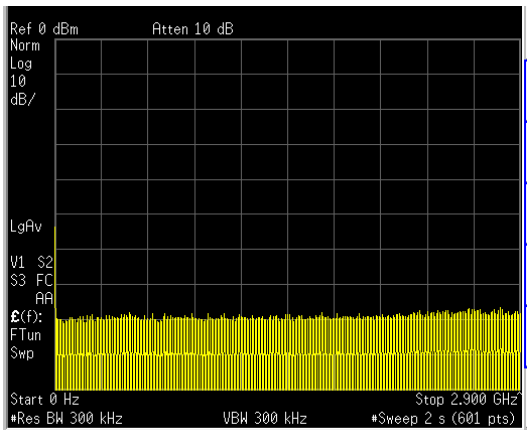
Spurious signal

Stand-By

0 to 2.9GHz

Scale
↑ 10dB/Div

→290MHz/Div

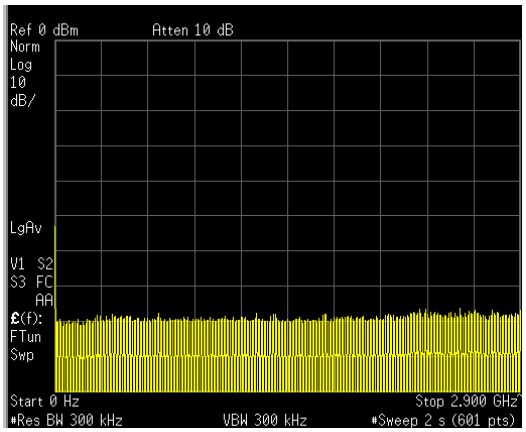


Spurious signal

0.070 μ s Pulse

0 to 2.9GHz

(2.1051)



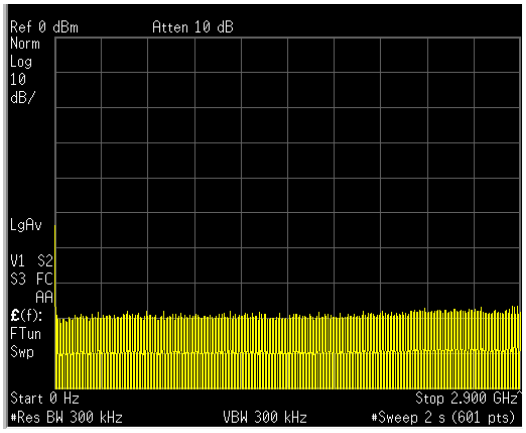
Scale
↑ 10dB/Div

→290MHz/Div

Spurious signal

0.20 μ s Pulse

0 to 2.9GHz



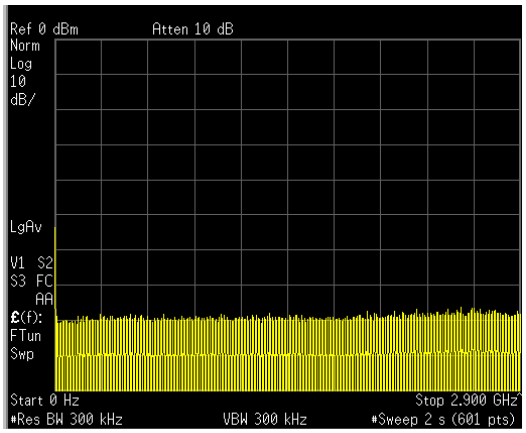
Scale
↑ 10dB/Div

→290MHz/Div

Spurious signal

0.30 μ s Pulse

0 to 2.9GHz



Scale
↑ 10dB/Div

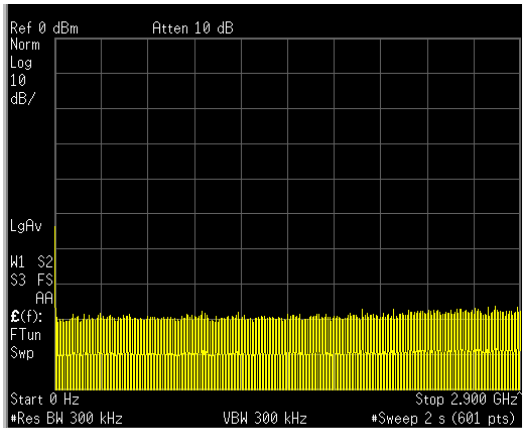
→290MHz/Div

Spurious signal

0.40 μ s Pulse

0 to 2.9GHz

(2.1051)



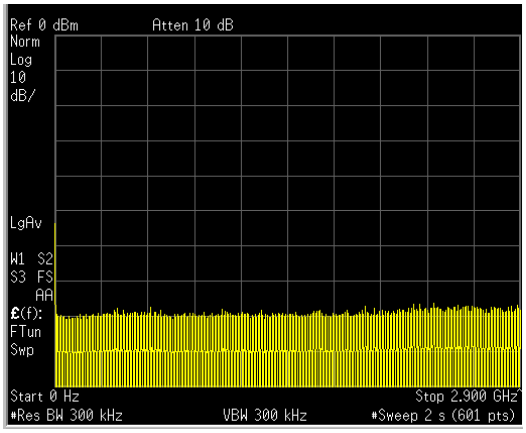
Scale
↑ 10dB/Div

→290MHz/Div

Spurious signal

0.80 μ s Pulse

0 to 2.9GHz



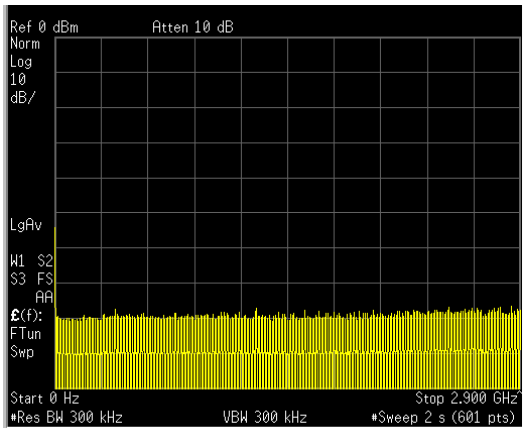
Scale
↑ 10dB/Div

→290MHz/Div

Spurious signal

1.0 μ s Pulse

0 to 2.9GHz



Scale
↑ 10dB/Div

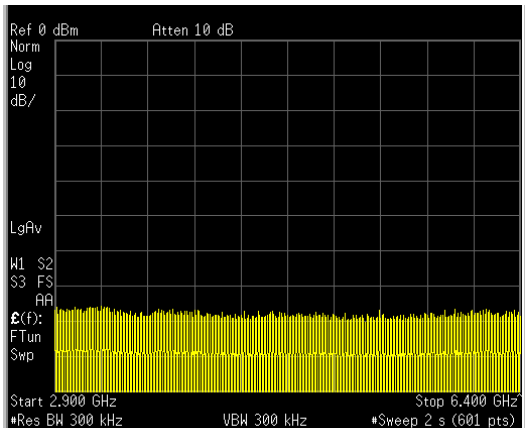
→290MHz/Div

Spurious signal

1.2 μ s Pulse

0 to 2.9GHz

(2.1051)



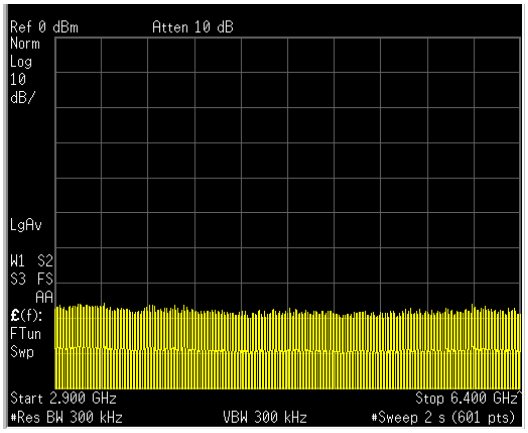
Scale
↑ 10dB/Div

→350MHz/Div

Spurious signal

OFF

2.9 to 6.4GHz



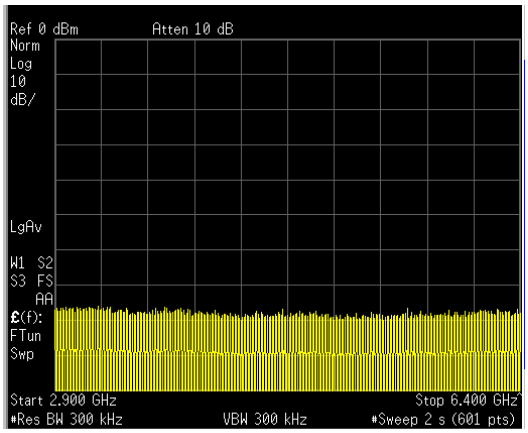
Scale
↑ 10dB/Div

→350MHz/Div

Spurious signal

Stand-By

2.9 to 6.4GHz



Scale
↑ 10dB/Div

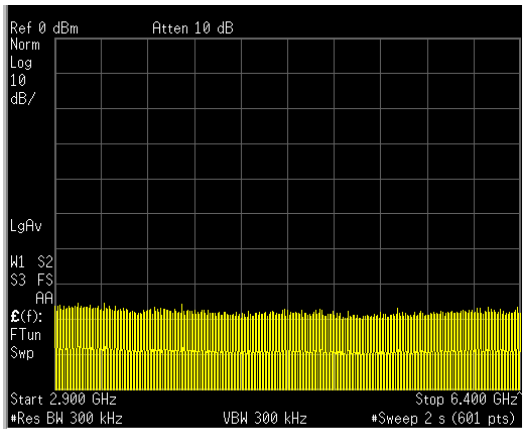
→350MHz/Div

Spurious signal

0.070 μ s Pulse

2.9 to 6.4GHz

(2.1051)



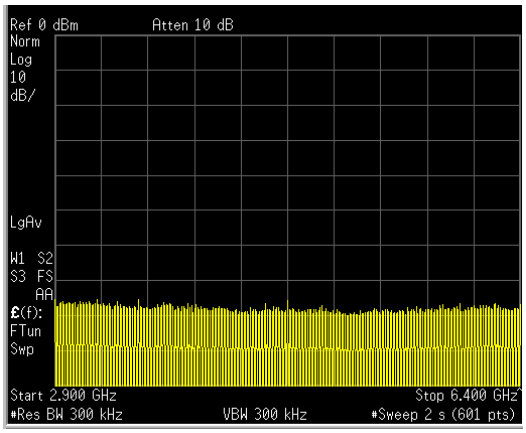
Scale
↑ 10dB/Div

→350MHz/Div

Spurious signal

0.20 μ s Pulse

2.9 to 6.4GHz



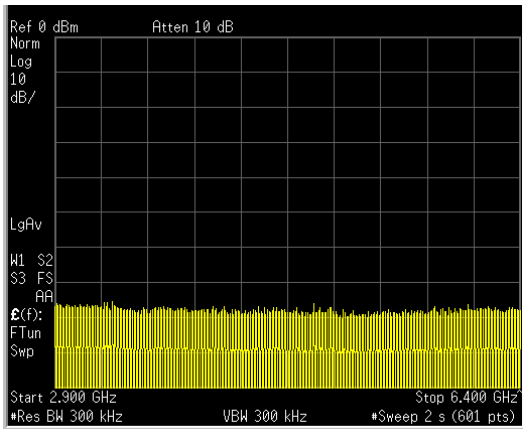
Scale
↑ 10dB/Div

→350MHz/Div

Spurious signal

0. 30 μ s Pulse

2.9 to 6.4GHz



Scale
↑ 10dB/Div

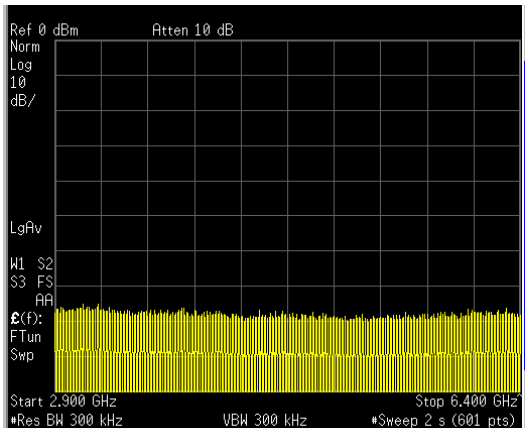
→350MHz/Div

Spurious signal

0.40 μ s Pulse

2.9 to 6.4GHz

(2.1051)



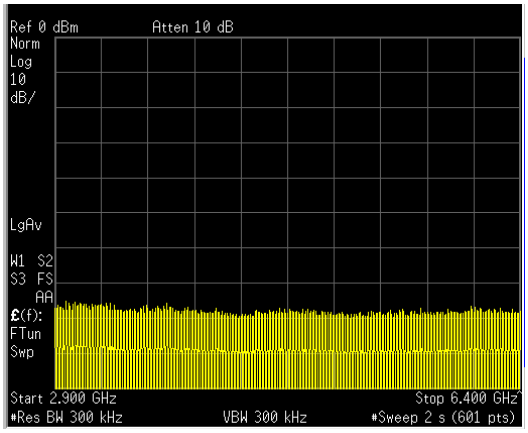
Scale
↑ 10dB/Div

→350MHz/Div

Spurious signal

0.80 μ s Pulse

2.9 to 6.4GHz



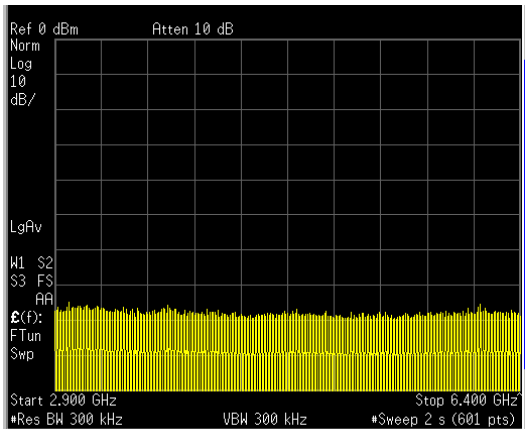
Scale
↑ 10dB/Div

→350MHz/Div

Spurious signal

1.0 μ s Pulse

2.9 to 6.4GHz



Scale
↑ 10dB/Div

→350MHz/Div

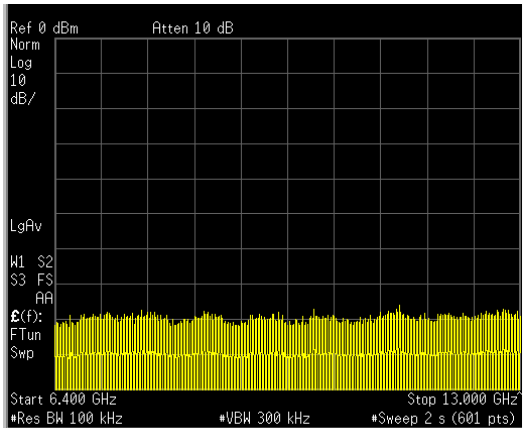
Spurious signal

1.2 μ s Pulse

2.9 to 6.4GHz

(2.1051)

Scale
↑ 10dB/Div
→60MHz/Div

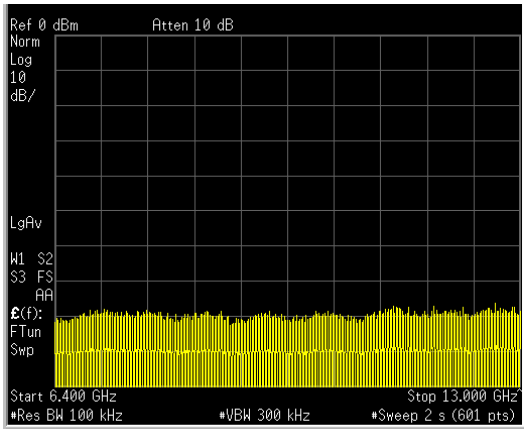


Spurious signal

OFF

6.4 to 13GHz

Scale
↑ 10dB/Div
→60MHz/Div

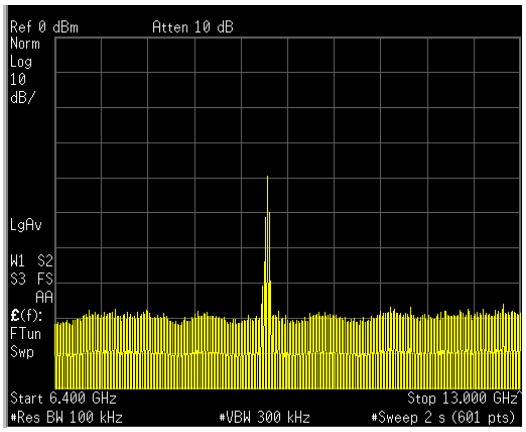


Spurious signal

Stand-By

6.4 to 13GHz

Scale
↑ 10dB/Div
→60MHz/Div

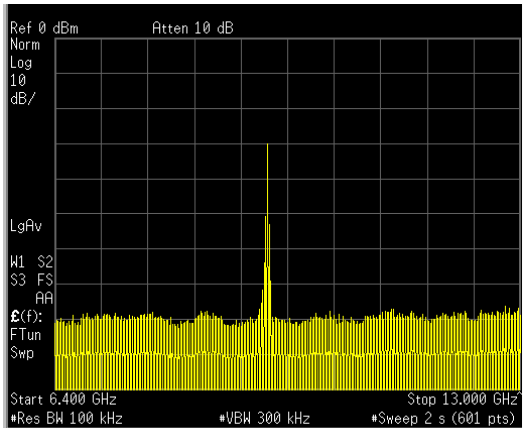


Spurious signal

0.070 μ s Pulse

6.4 to 13GHz

(2.1051)



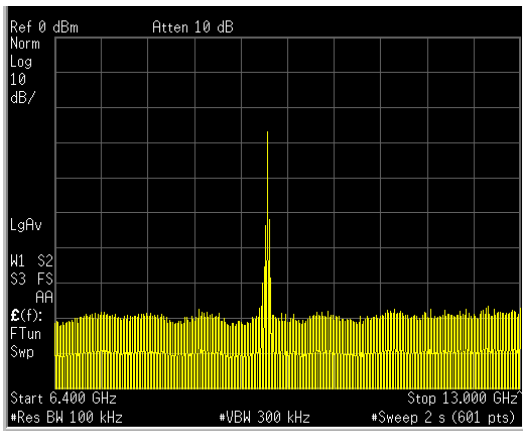
Scale
↑ 10dB/Div

→660MHz/Div

Spurious signal

0.20 μ s Pulse

6.4 to 13GHz



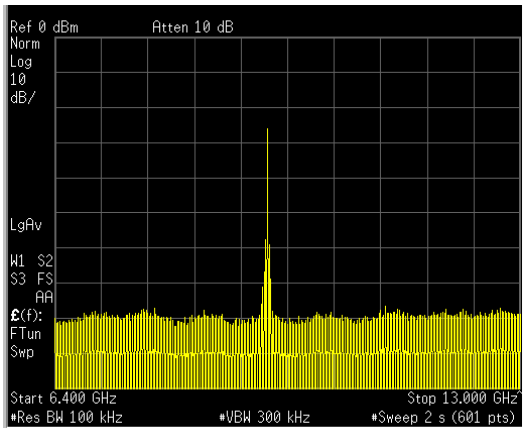
Scale
↑ 10dB/Div

→660MHz/Div

Spurious signal

0. 30 μ s Pulse

6.4 to 13GHz



Scale
↑ 10dB/Div

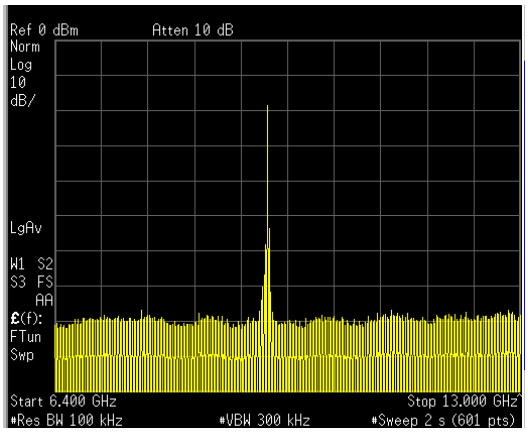
→660MHz/Div

Spurious signal

0.40 μ s Pulse

6.4 to 13GHz

(2.1051)



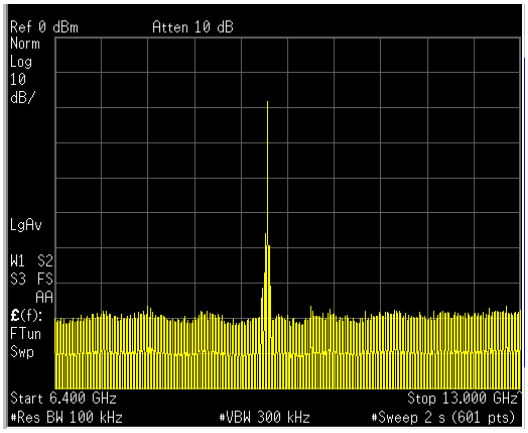
Scale
↑ 10dB/Div

→660MHz/Div

Spurious signal

0.80 μ s Pulse

6.4 to 13GHz



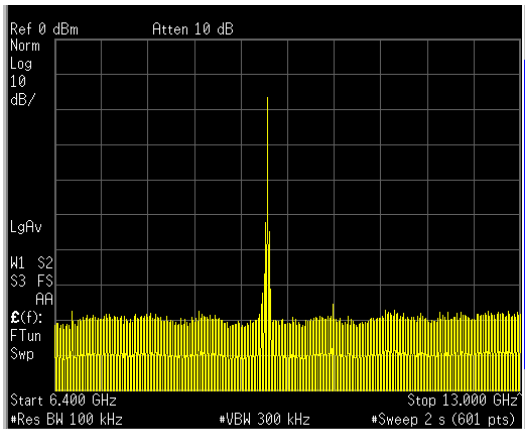
Scale
↑ 10dB/Div

→660MHz/Div

Spurious signal

1.0 μ s Pulse

6.4 to 13GHz



Scale
↑ 10dB/Div

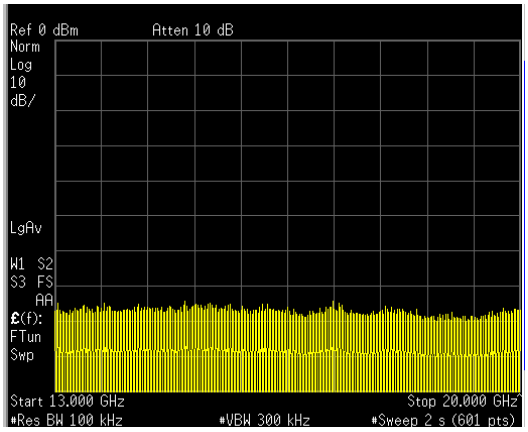
→660MHz/Div

Spurious signal

1.2 μ s Pulse

6.4 to 13GHz

(2.1051)



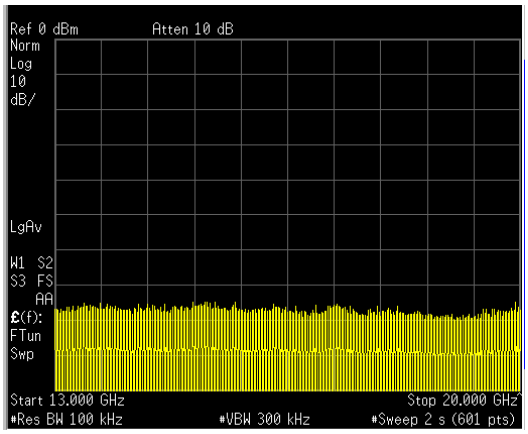
Scale
↑ 10dB/Div

→700MHz/Div

Spurious signal

OFF

13 to 20GHz



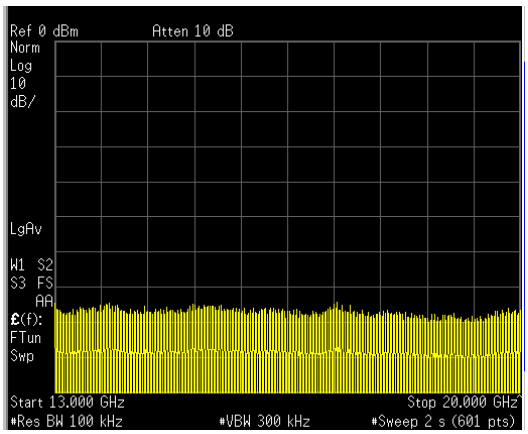
Scale
↑ 10dB/Div

→700MHz/Div

Spurious signal

Stand-By

13 to 20GHz



Scale
↑ 10dB/Div

→700MHz/Div

Spurious signal

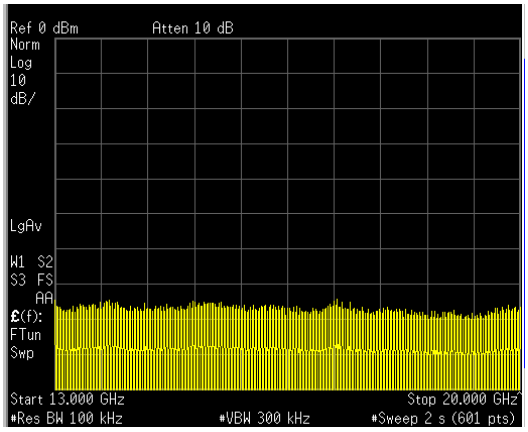
0.070 μ s Pulse

13 to 20GHz

(2.1051)

Scale
↑ 10dB/Div

→700MHz/Div



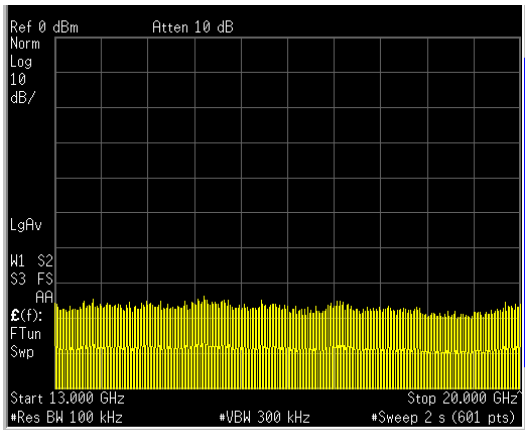
Spurious signal

0.20 μ s Pulse

13 to 20GHz

Scale
↑ 10dB/Div

→700MHz/Div



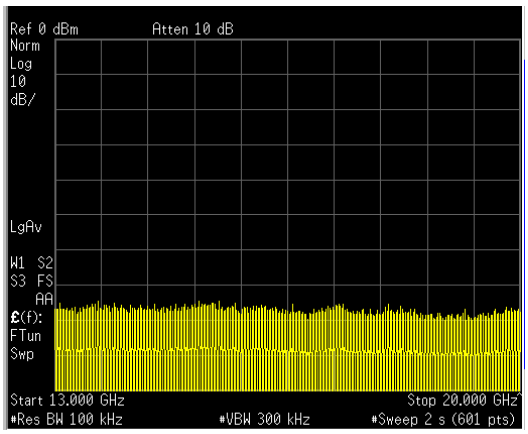
Spurious signal

0. 30 μ s Pulse

13 to 20GHz

Scale
↑ 10dB/Div

→700MHz/Div

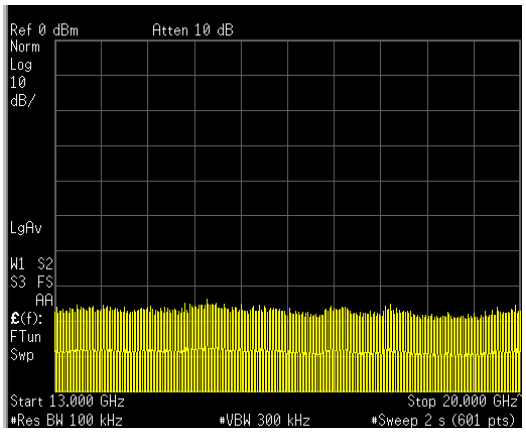


Spurious signal

0.40 μ s Pulse

13 to 20GHz

(2.1051)



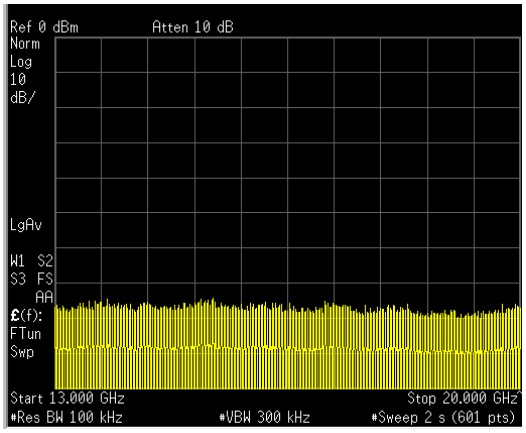
Scale
↑ 10dB/Div

→700MHz/Div

Spurious signal

0.80 μ s Pulse

13 to 20GHz



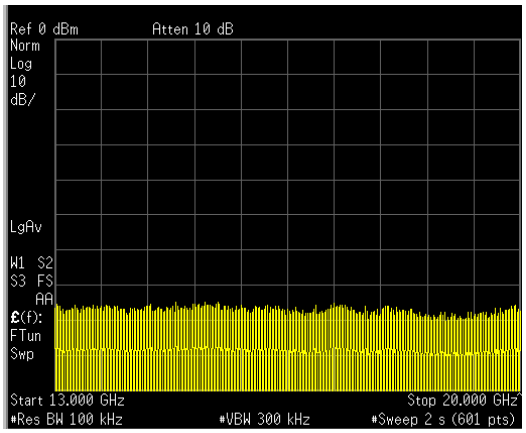
Scale
↑ 10dB/Div

→700MHz/Div

Spurious signal

1.0 μ s Pulse

13 to 20GHz



Scale
↑ 10dB/Div

→700MHz/Div

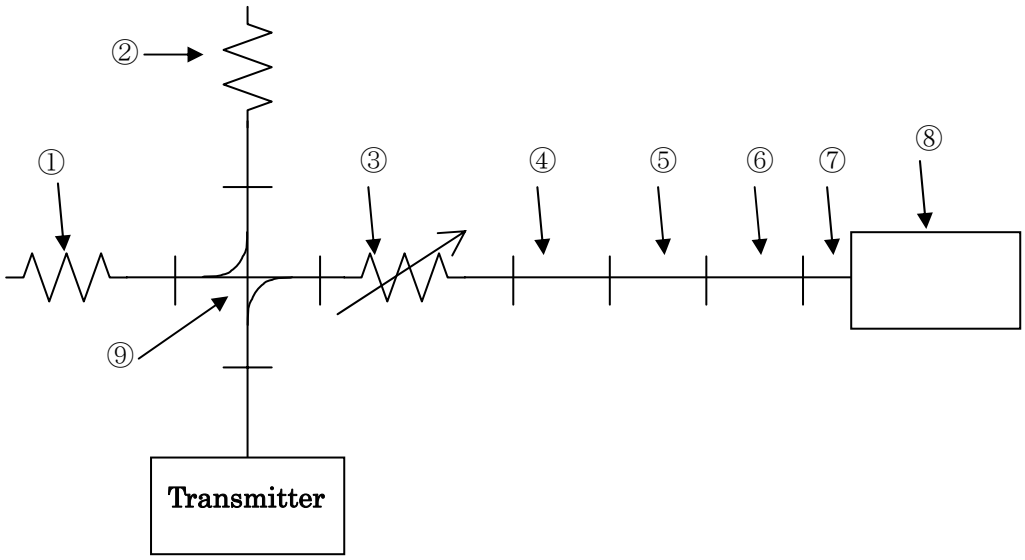
Spurious signal

1.2 μ s Pulse

13 to 20GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 2: 12 to 28GHz

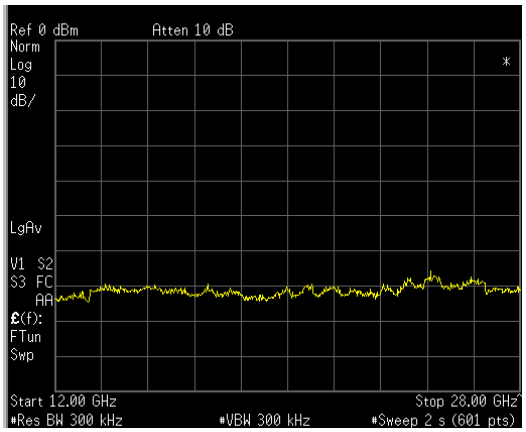


①Dummy Load	PE6815	PASTERNACK
②High Power Dummy Load	PE6824	PASTERNACK
③Attenuator	X382A	HP
④Tapered W/G	195-XV KU	AIRCOM
⑤Tapered W/G	11518A	HP
⑥Adaptor	22093-KF20	FLANN
⑦Coaxial Cable	SUCOFLEX101	HUBER+SUHNER
⑧Spectrum Analyzer	E4448A	Agilent
⑨Direction Coupler	5D363	SHIMADARIKA

Coupling : 30dB
Directivity : 30dB

Attenuation 3 : 40dB
Measurement Point : Transmitter Output

(2.1051)



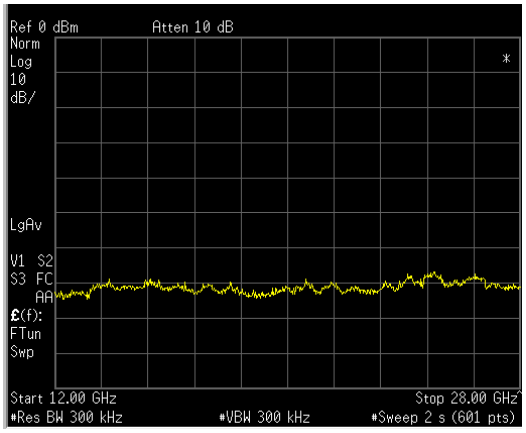
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious signal

OFF

12 to 28GHz



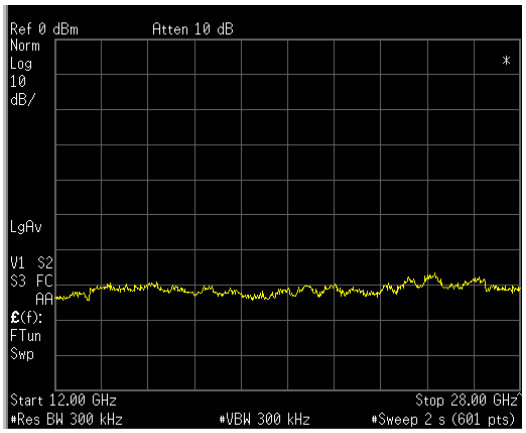
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious signal

Stand-By

12 to 28GHz



Scale
↑ 10dB/Div

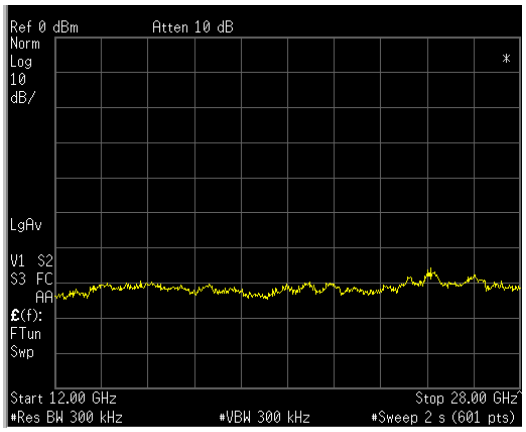
→1.6GHz/Div

Spurious signal

0.070 μ s Pulse

12 to 28GHz

(2.1051)



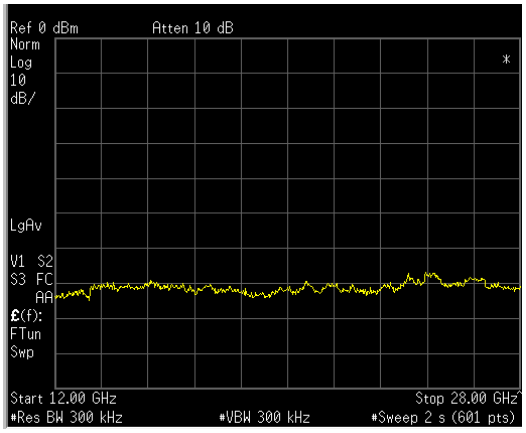
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious signal

0.20 μ s Pulse

12 to 28GHz



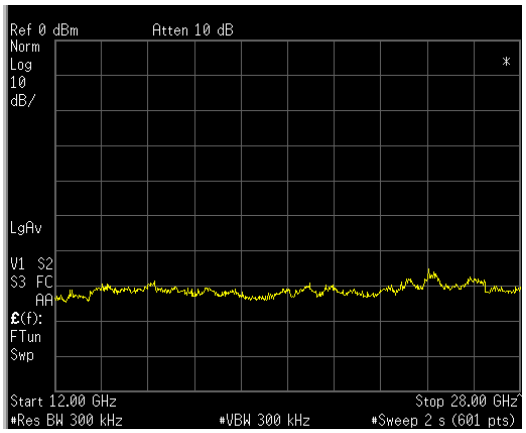
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious signal

0. 30 μ s Pulse

12 to 28GHz



Scale
↑ 10dB/Div

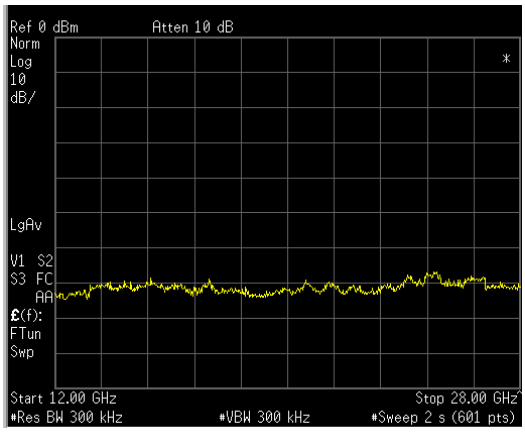
→1.6GHz/Div

Spurious signal

0.40 μ s Pulse

12 to 28GHz

(2.1051)



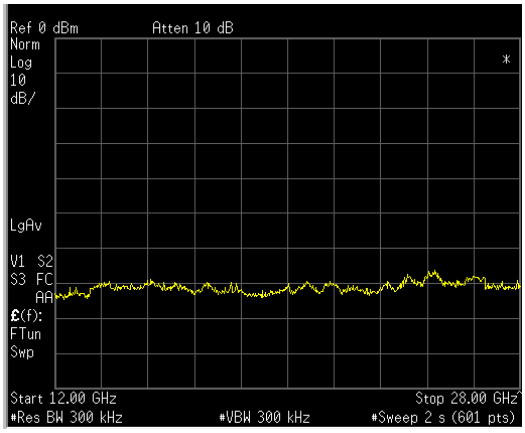
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious signal

0.80 μ s Pulse

12 to 28GHz



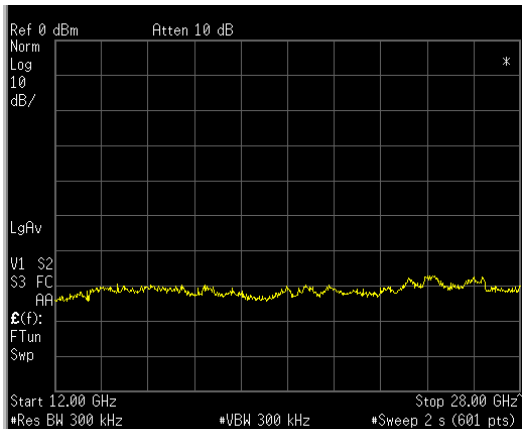
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious signal

1.0 μ s Pulse

12 to 28GHz



Scale
↑ 10dB/Div

→1.6GHz/Div

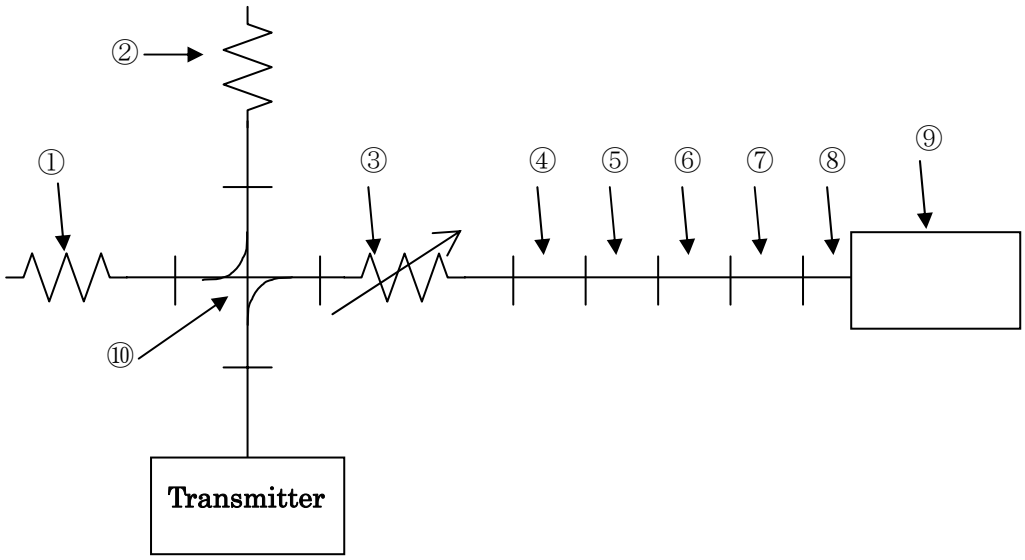
Spurious signal

1.2 μ s Pulse

12 to 28GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 3: 28 to 50GHz

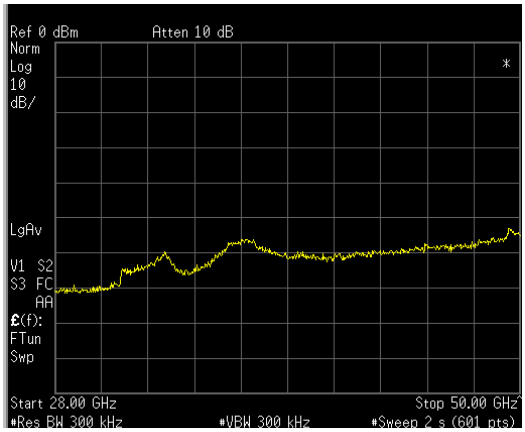


①Dummy Load	PE6815	PASTERNACK
②High Power Dummy Load	PE6824	PASTERNACK
③Attenuator	X382A	HP
④Tapered W/G	195-XV KU	AIRCOM
⑤Tapered W/G	11518A	HP
⑥Tapered W/G	11520A	HP
⑦Adaptor	22093-KF20	FLANN
⑧Coaxial Cable	SUCOFLEX101	HUBER+SUHNER
⑨Spectrum Analyzer	E4448A	Agilent
⑩Direction Coupler	5D363	SHIMADARIKA

Coupling : 30dB
Directivity : 30dB

Attenuation 3 : 40dB
Measurement Point : Transmitter Output

(2.1051)



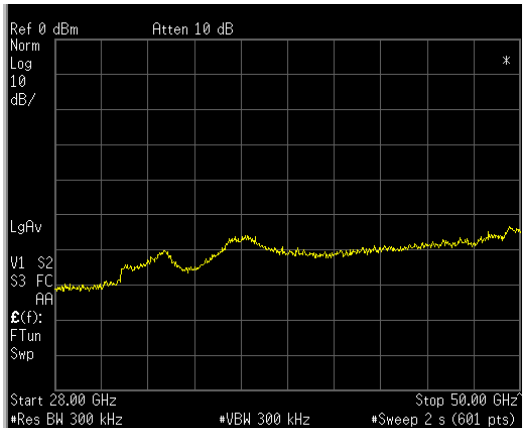
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious signal

OFF

28 to 50GHz



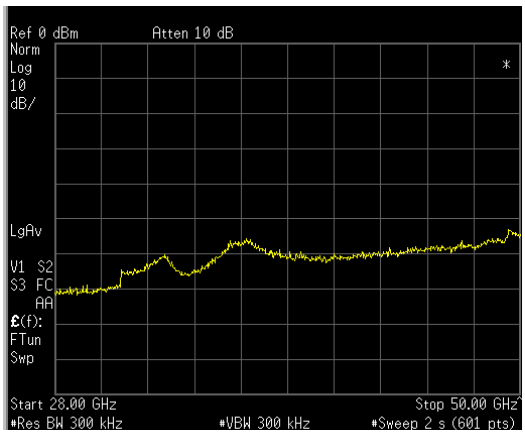
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious signal

Stand-By

28 to 50GHz



Scale
↑ 10dB/Div

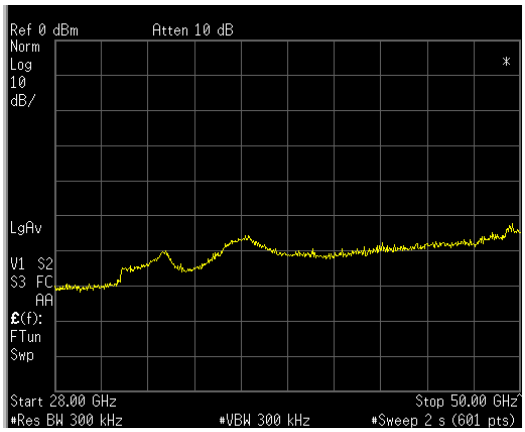
→2.2GHz/Div

Spurious signal

0.070 μ s Pulse

28 to 50GHz

(2.1051)



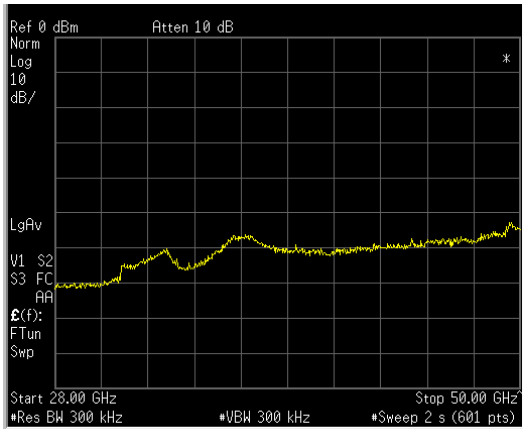
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious signal

0.20 μ s Pulse

28 to 50GHz



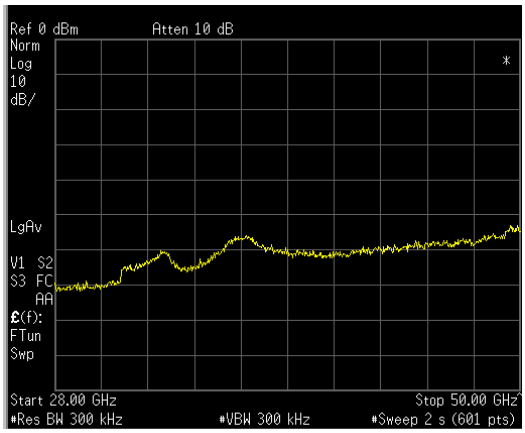
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious signal

0. 30 μ s Pulse

28 to 50GHz



Scale
↑ 10dB/Div

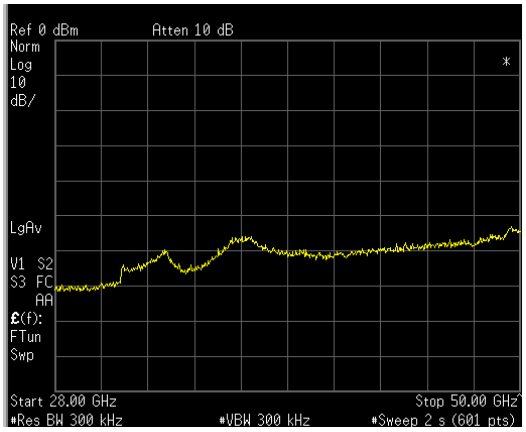
→2.2GHz/Div

Spurious signal

0.40 μ s Pulse

28 to 50GHz

(2.1051)



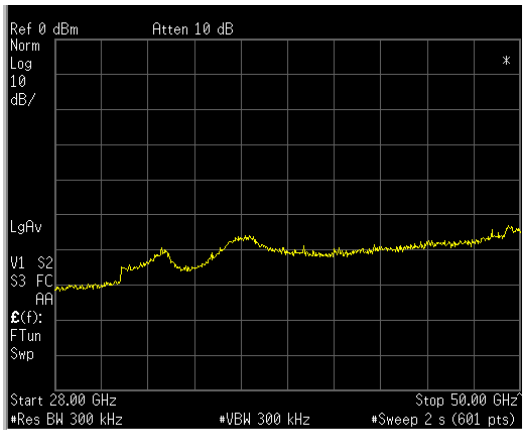
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious signal

0.80 μ s Pulse

28 to 50GHz



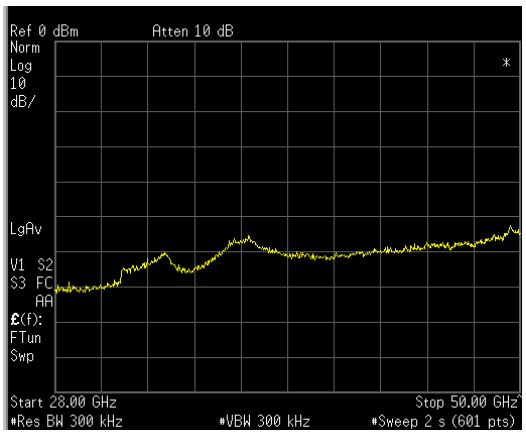
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious signal

1.0 μ s Pulse

28 to 50GHz



Scale
↑ 10dB/Div

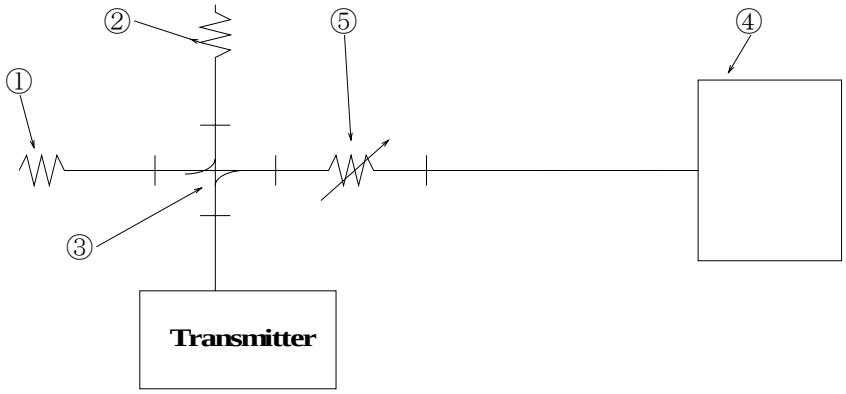
→2.2GHz/Div

Spurious signal

1.2 μ s Pulse

28 to 50GHz

(Sec.2.1055)　4.0 Frequency Stability



1.	Dummy Load	PE6815	PASTERNACK
2.	High Power Dummy Load	PE6824	PASTERNACK
3.	Directional Coupler	5D363	SHIMADARIKA
	Coupling 30dB		
	Directivity 30dB		
4.	Spectrum Analyzer	E4448A	Agilent
5.	Attenuator	8495B	HP
	Temperature Chamber	T-15S	TABAI

Measurement Procedure

1 The antenna pedestal, Transceiver and display unit were set up in the temperature chamber and the measurement equipment were set outside the temperature chamber.

2 With power removed , the temperature was decreased to – 30 ℃ and permitted to stabilize for three hours. Power was applied and measured warm-up time. After 30 minutes place the radar in X-MIT, measured frequency at DC +20.4V (24V-15%), DC +27.6V (24V+15%).

3 With power off , the temperature was raised in 10 ℃ steps. The sample was permitted to stabilize at each step for at least three hours. Power was applied and measured warm-up time. After 30 minutes place the radar in X-MIT, measured frequency at DC +20.4V (24V-15%), DC +27.6V (24V+15%).

Temperature [℃]	Operating Frequency [MHz]						Warm-Up Time (min) <X-MIT>
	0.07 μS Pulse		0.2 μS Pulse		0.3 μS Pulse		
	20.4	27.6	20.4	27.6	20.4	27.6	
- 25	9427	9426	9424	9424	9423	9423	30
- 20	9426	9426	9423	9423	9423	9423	30
- 10	9423	9424	9423	9423	9423	9424	30
0	9421	9422	9420	9420	9420	9421	30
+10	9420	9420	9418	9419	9417	9417	30
+20	9418	9417	9416	9416	9415	9415	30
+30	9416	9416	9414	9414	9413	9413	30
+40	9415	9415	9413	9413	9413	9413	30
+50	9415	9415	9413	9413	9413	9413	30
+55	9415	9415	9413	9413	9413	9413	30

Temperature [℃]	Operating Frequency [MHz]						Warm-Up Time (m) <X-MIT>
	0.4 μS Pulse		0.8 μS Pulse		1.0 μS Pulse		
	20.4	27.6	20.4	27.6	20.4	27.6	
- 25	9422	9422	9422	9421	9420	9419	30
- 20	9421	9422	9421	9420	9420	9419	30
- 10	9421	9421	9420	9420	9419	9419	30
0	9418	9419	9417	9417	9417	9417	30
+10	9416	9416	9415	9416	9415	9415	30
+20	9415	9415	9414	9415	9414	9414	30
+30	9412	9412	9411	9311	9412	9412	30
+40	9411	9411	9410	9310	9411	9411	30
+50	9410	9410	9408	9408	9411	9411	30
+55	9410	9410	9408	9408	9411	9410	30

Temperature [℃]	Operating Frequency [MHz]						Warm-Up Time (m) <X-MIT>
	1.2 μS Pulse						
	20.4	27.6					
- 25	9420	9420					30
- 20	9420	9420					30
- 10	9420	9419					30
0	9417	9416					30
+10	9415	9414					30
+20	9414	9414					30
+30	9411	9411					30
+40	9410	9411					30
+50	9409	9409					30
+55	9409	9409					30

SECTION 5

TEST: Spurious Emissions Field Strength

EQUIPMENT: JMA-5322 S/N LB00421

FCC SPECIFICATION: Sections 2.1053.

MINIMUM STANDARD: Mean power of emissions originating in equipment lowest generated frequency to at least 40 GHz shall be attenuated below the mean power of the transmitter by at least 43 plus 10 log (mean power in watts) decibels. Since transmitter mean power is 11.1 watts maximum (long pulse) or 40.5 dBm:

Emissions $\leqq$ 40.5 dBm – [43 + 10 log(11.1)] dBm
$\leqq$ -13.0 dBm

TEST RESULTS: No spurious emissions observed above minimum standard.

TEST CONDITIONS: Tamb = 20℃ to 25℃ RHamb = 40% ～ 60%
Eut input = 24 VDC

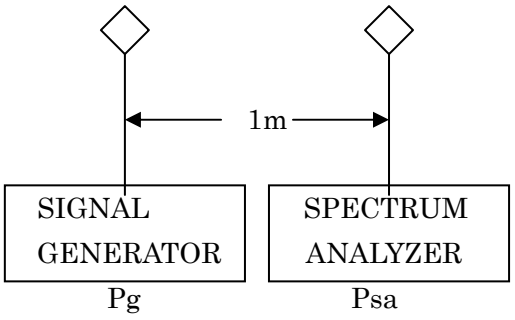
STABILLIZATION: EUT energized for 10 minutes minimum.

TEST EQUIPMENT: JRC Original – Shielded Room
Other equipment – see test set-ups.

DATE: July,25.2008

TEST ENGINEER: M.ITOH

CALIBRATION OF TESTS 1～5 (0～1GHz)



A signal source of known amplitude was used as a calibrating signal with identical antenna on the generator and the spectrum analyzer.
From previous testing in the shielded room, the antenna factors are considered much greater than path loss.
Hence half of the difference in signals Pg and Psa is due to each antenna.

The calibrating signal on the analyzer is therefore:

$$Pcal = Psa - (Psa - Pg) / 2 = (Psa + Pg) / 2 \text{ dBm.}$$

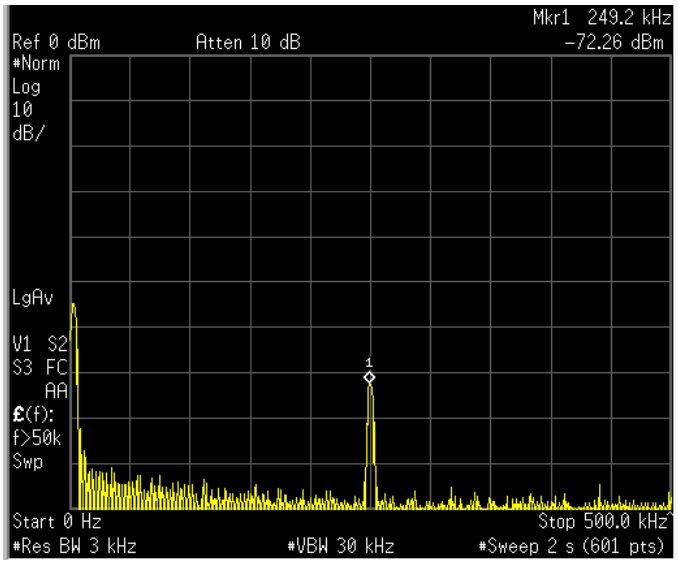
The log ref level on the analyzer is adjusted so as to read other signals diretly:

$$LRL\ (adjusted) = LRL(set) + Pcal - Psa \text{ dBm.}$$

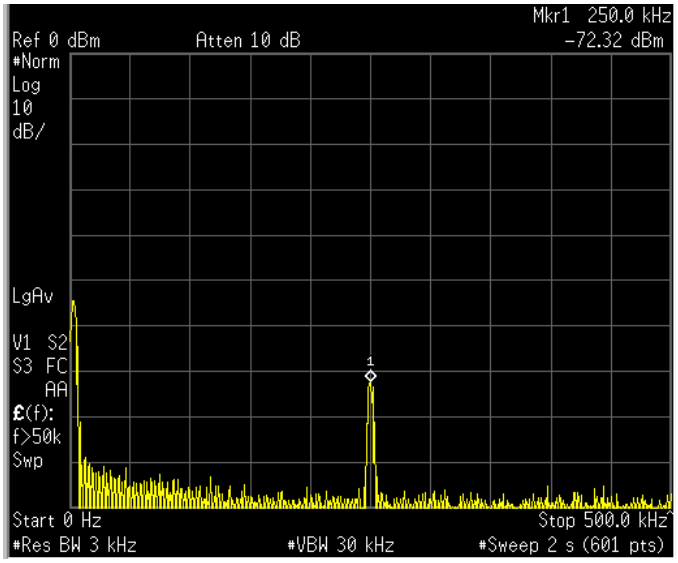
The calibrating signal used was selected on the basis of best average amplitude over the frequency range of interest.

TEST	CAL sig	Psa	Pg	Pcal	LRL(set)	LRL(adj)
1	250 kHz	-72	0	-36.0	0	36.0
2	2.5 MHz	-54	0	-27.0	0	27.0
3	25 MHz	-30	0	-15.0	0	15.0
4	250 MHz	-33	0	-16.5	0	16.5
5	500 MHz	-28	0	-14.0	0	14.0

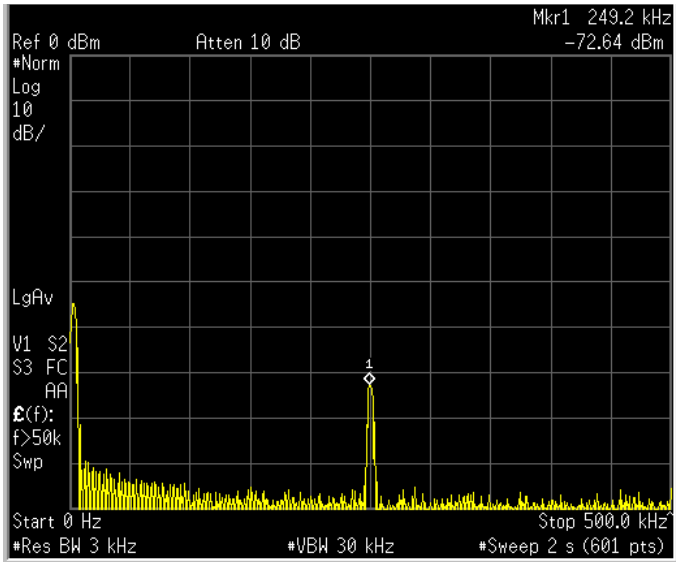
TEST #1 Frequency Band: 0～500KHz Log Ref. Level:36.0 dBm



Ambient

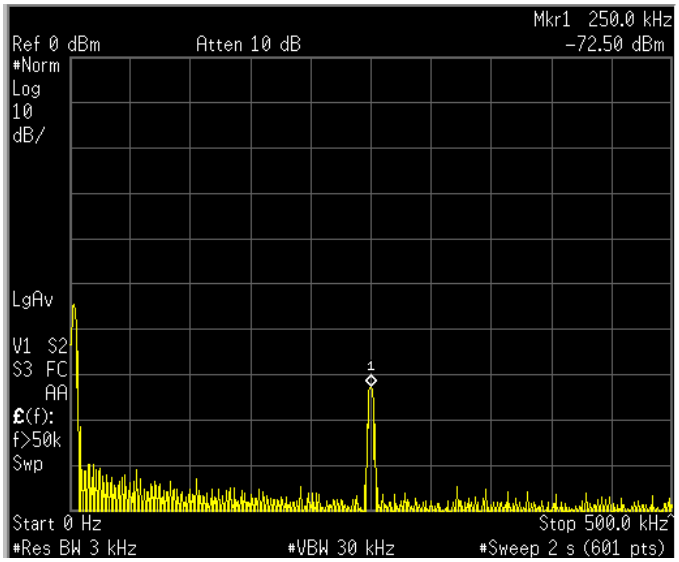


Stand-By

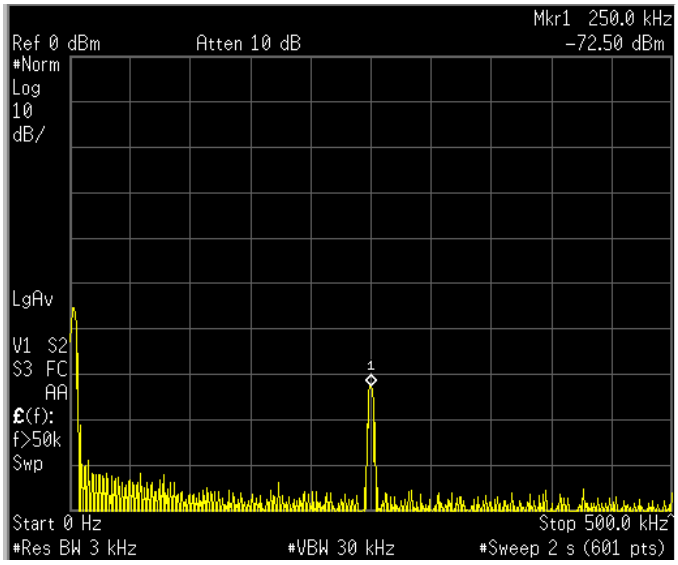


0.07 μ S Pulse

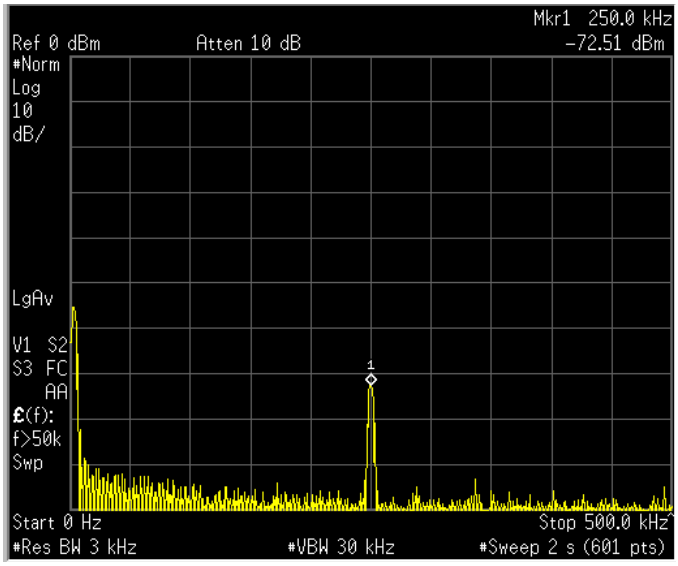
TEST #1 Frequency Band: 0～500KHz Log Ref. Level:36.0 dBm



0.2 μ S Pulse

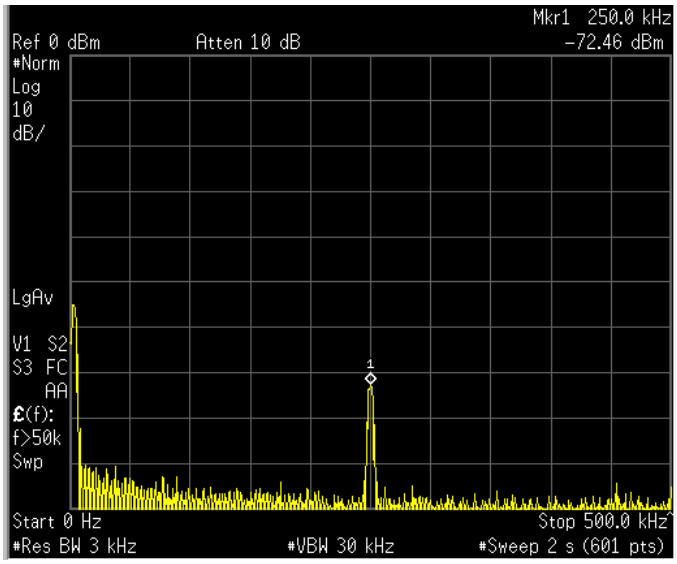


0.3 μ S Pulse

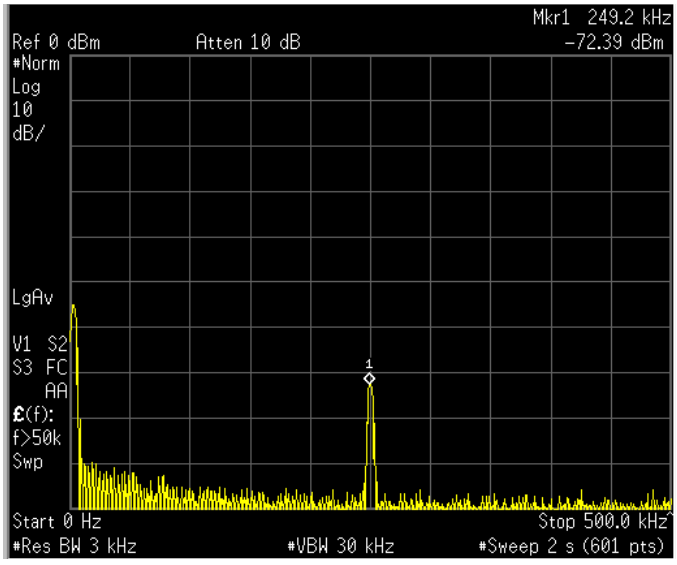


0.4 μ S Pulse

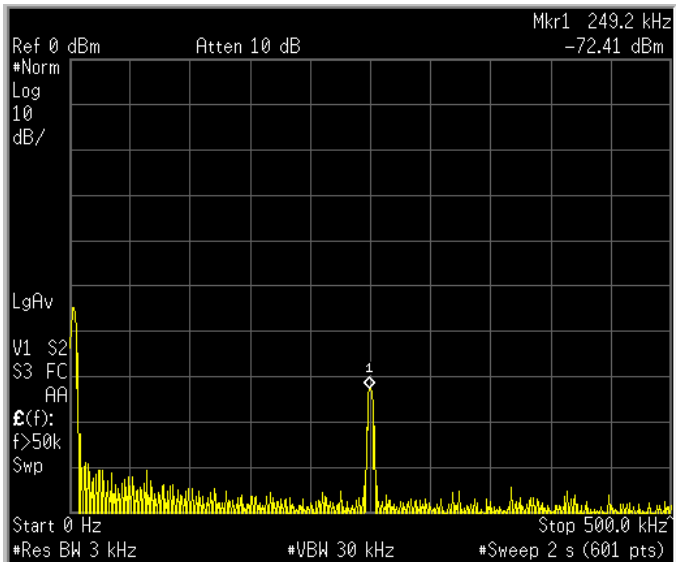
TEST #1 Frequency Band: 0～500KHz Log Ref. Level:36.0 dBm



0.8 μ S Pulse

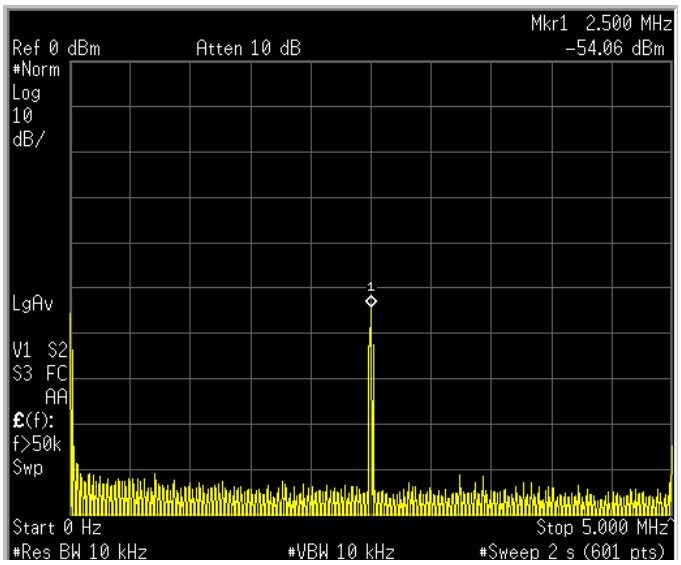


1.0 μ S Pulse

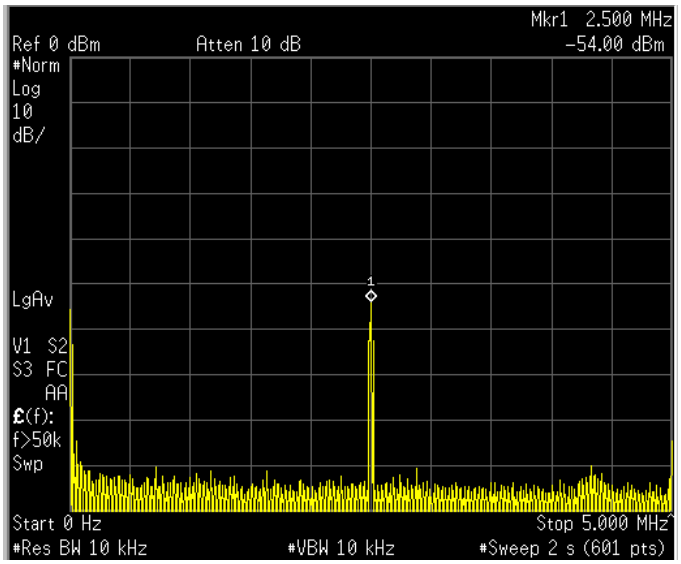


1.2 μ S Pulse

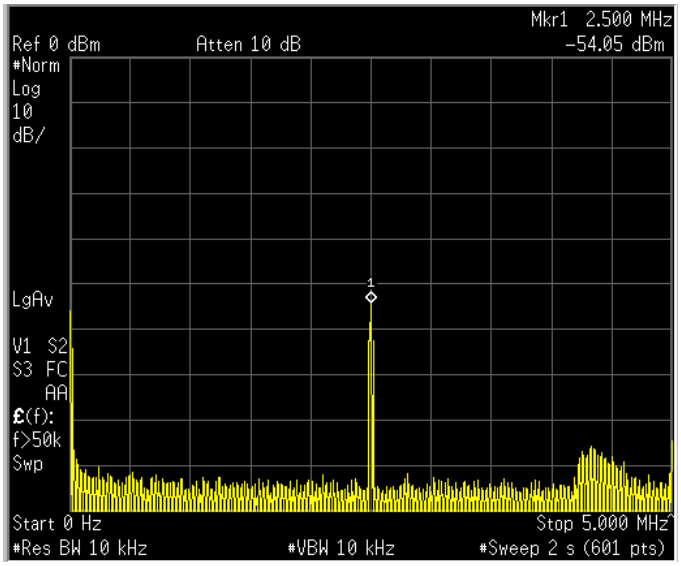
TEST #2 Frequency Band: 0～5MHz Log Ref. Level:27.0 dBm



Ambient

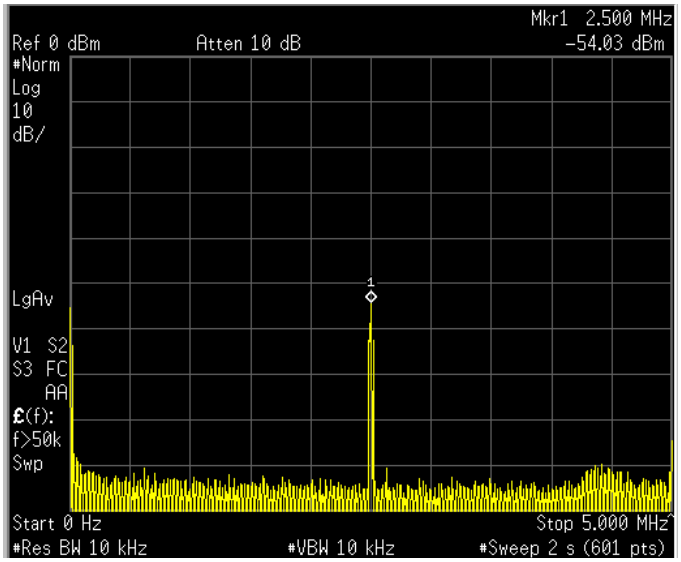


Stand-By

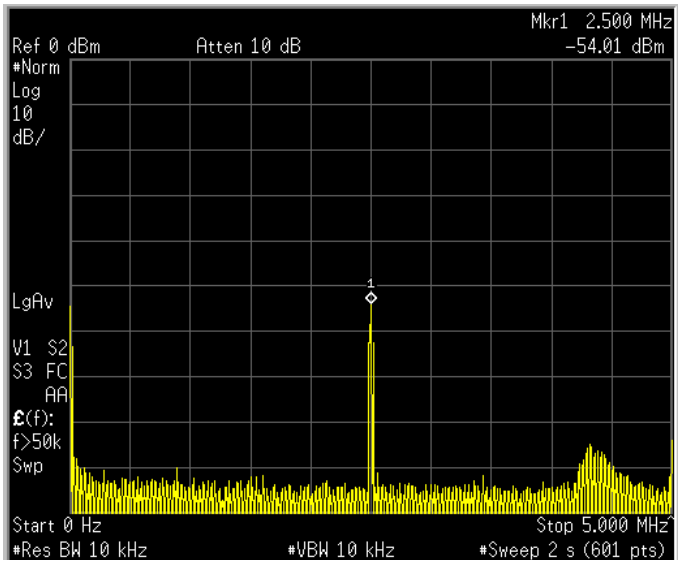


0.07 μ S Pulse

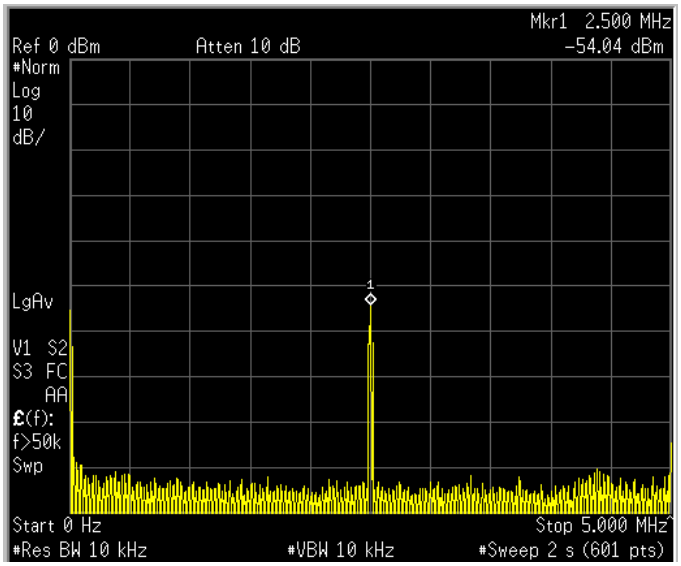
TEST #2 Frequency Band: 0～5MHz Log Ref. Level:27.0 dBm



0.2 μ S Pulse

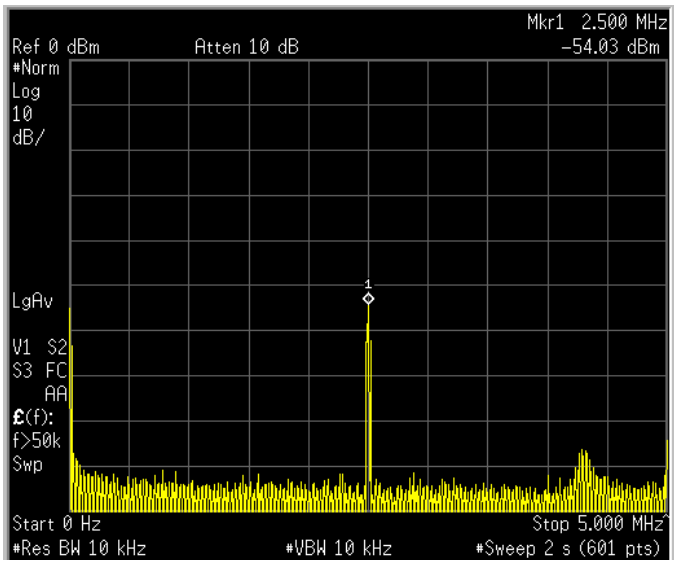


0.3 μ S Pulse

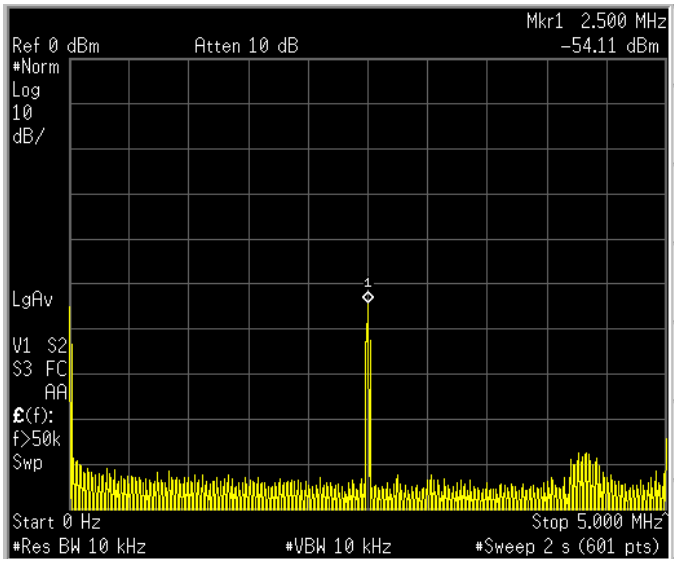


0.4 μ S Pulse

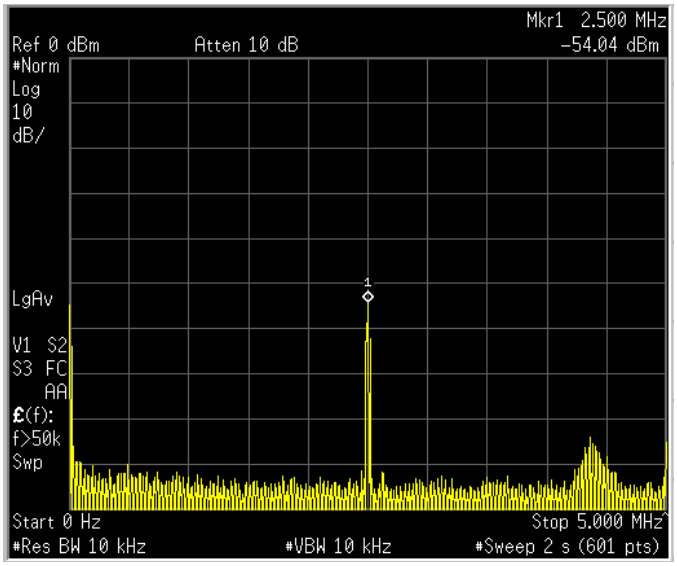
TEST #2 Frequency Band: 0～5MHz Log Ref. Level:27.0 dBm



0.8 μ S Pulse

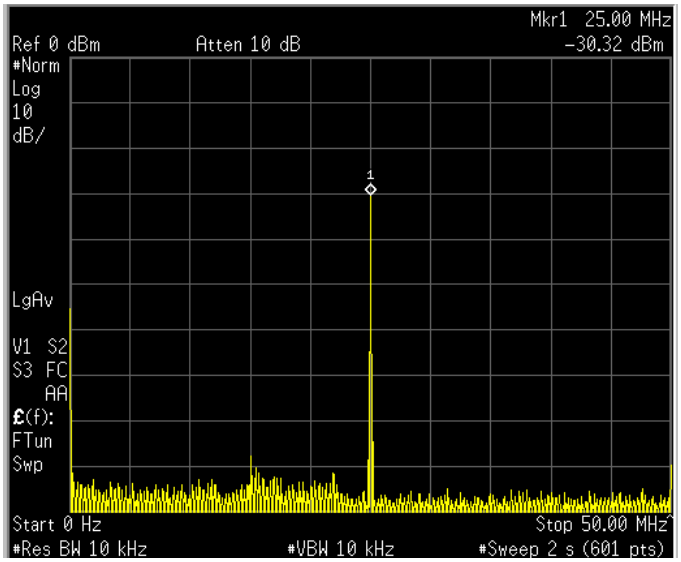


1.0 μ S Pulse

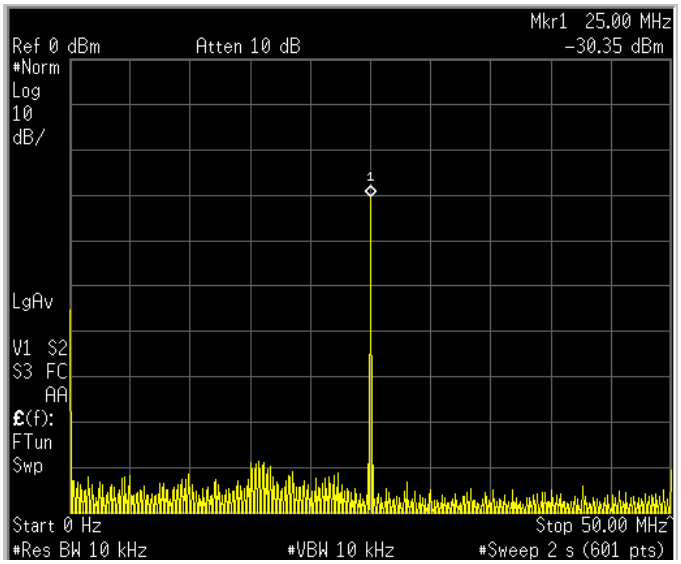


1.2 μ S Pulse

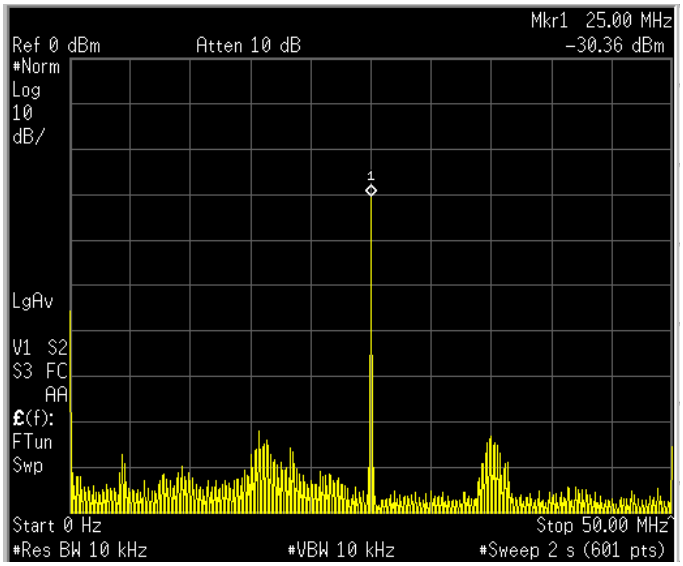
TEST #3 Frequency Band: 0～50MHz Log Ref. Level:15.0 dBm



Ambient

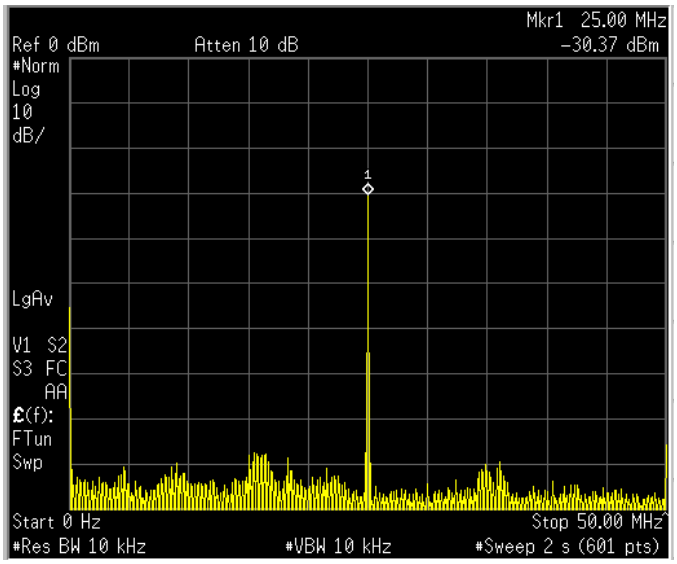


Stand-By

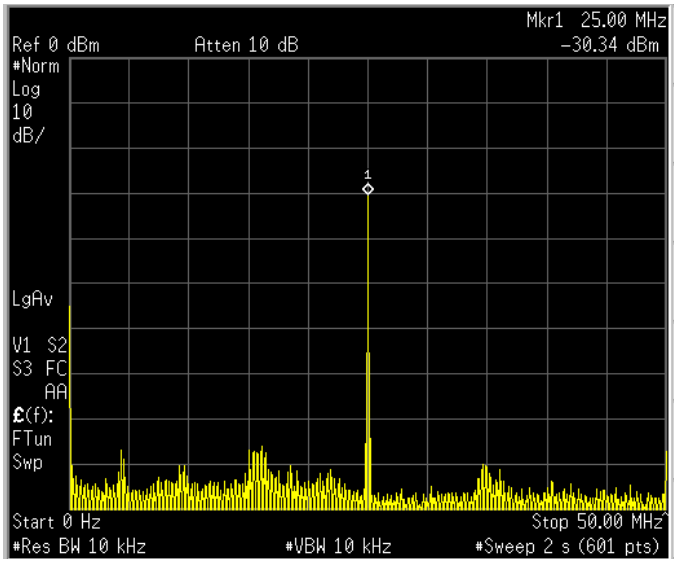


0.07 μ S Pulse

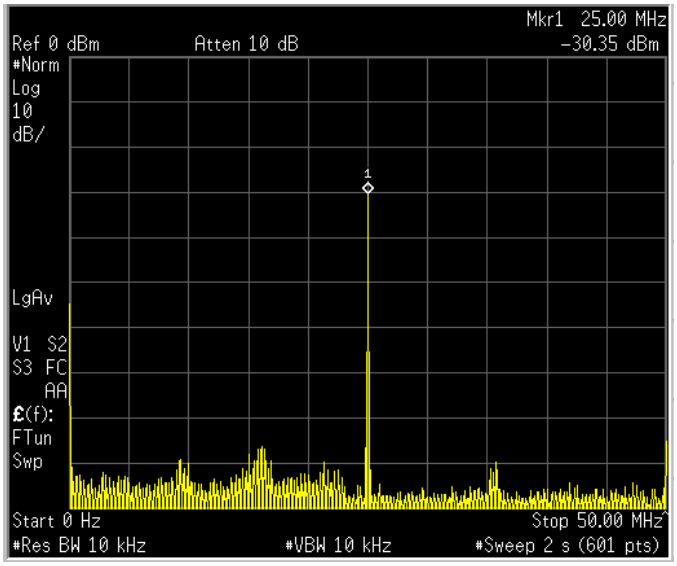
TEST #3 Frequency Band: 0～50MHz Log Ref. Level:15.0 dBm



0.2 μ S Pulse

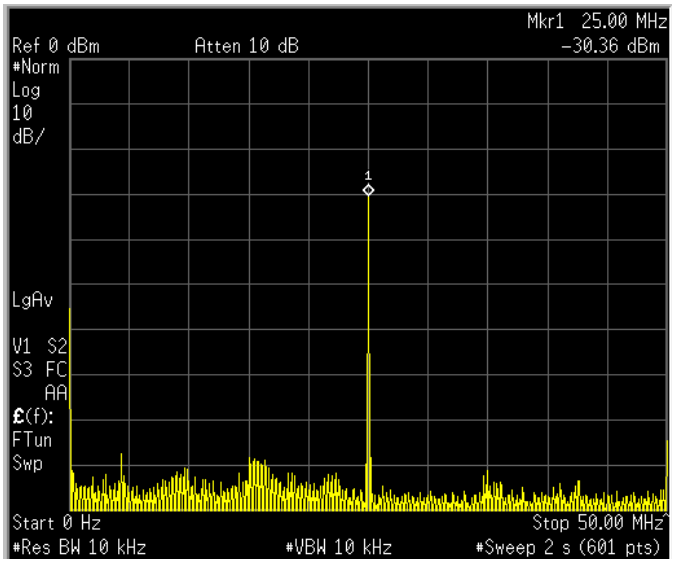


0.3 μ S Pulse

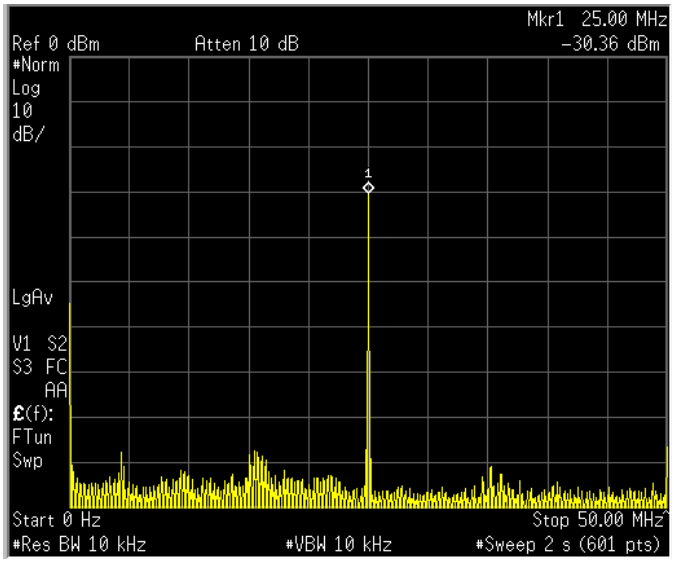


0.4 μ S Pulse

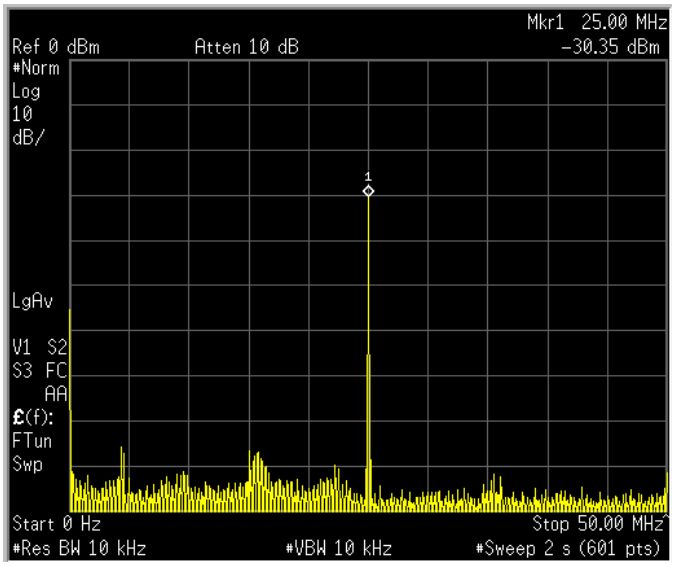
TEST #3 Frequency Band: 0～50MHz Log Ref. Level:15.0 dBm



0.8 μ S Pulse

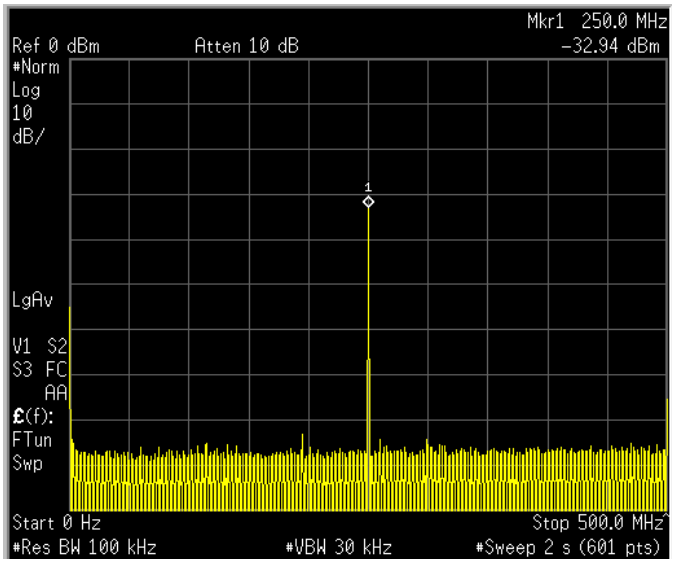


1.0 μ S Pulse

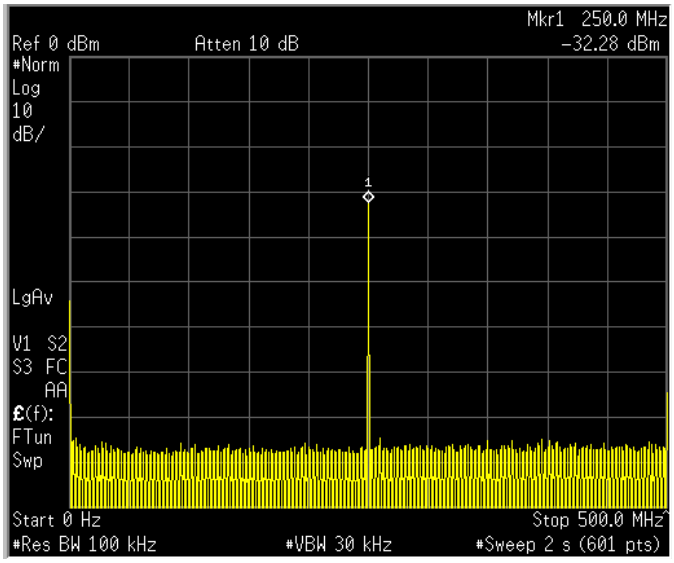


1.2 μ S Pulse

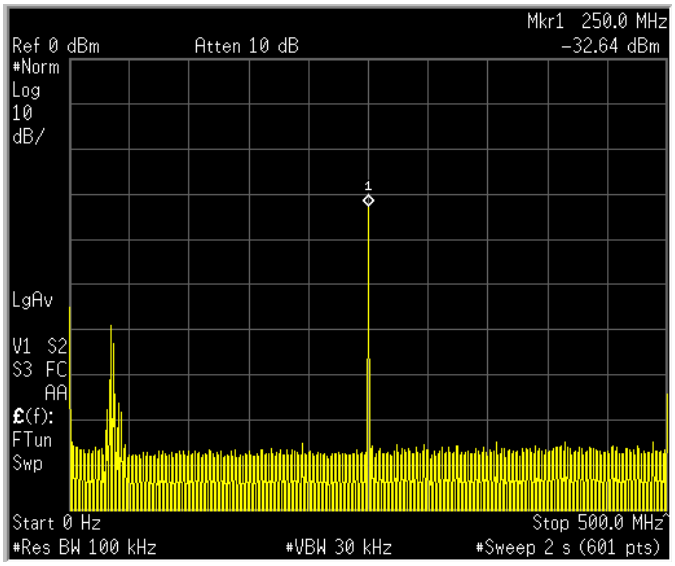
TEST #4 Frequency Band: 0～500MHz Log Ref. Level:16.5 dBm



Ambient

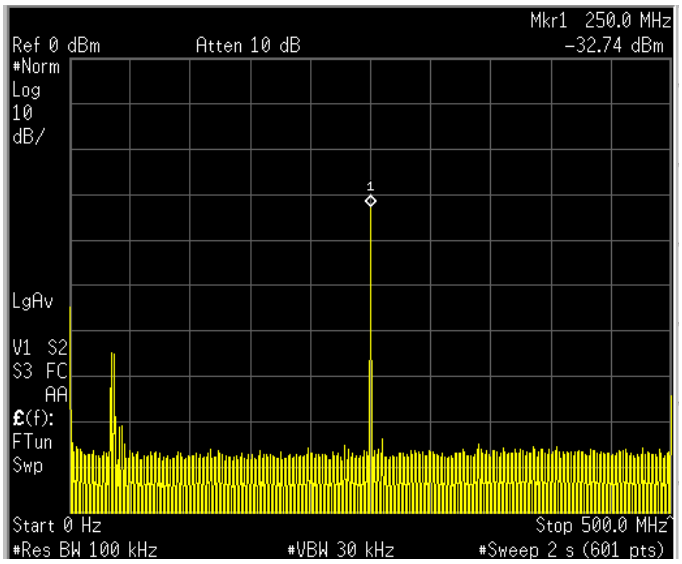


Stand-By

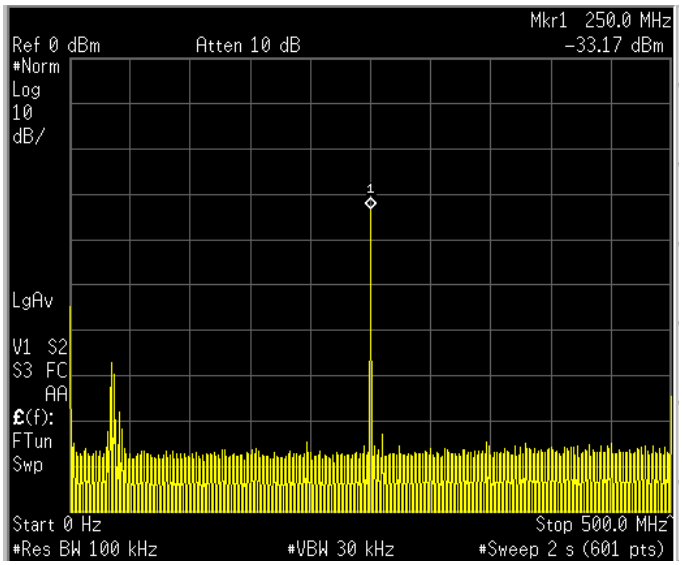


0.07 μ S Pulse

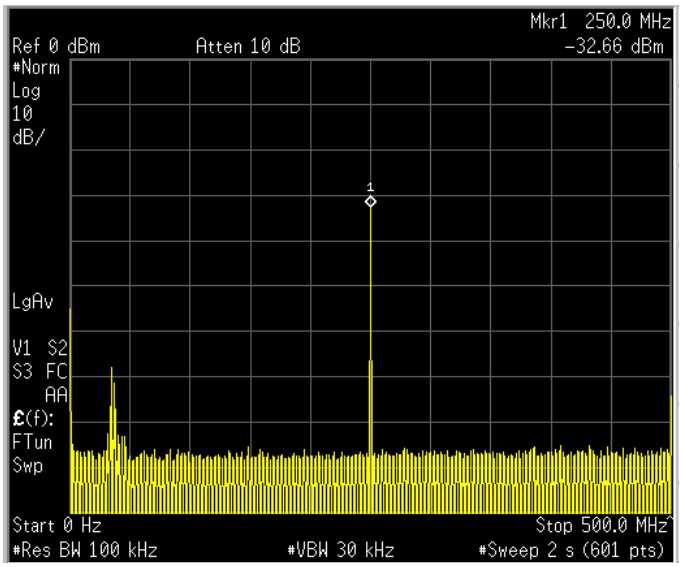
TEST #4 Frequency Band: 0～500MHz Log Ref. Level:16.5 dBm



0.2 μ S Pulse

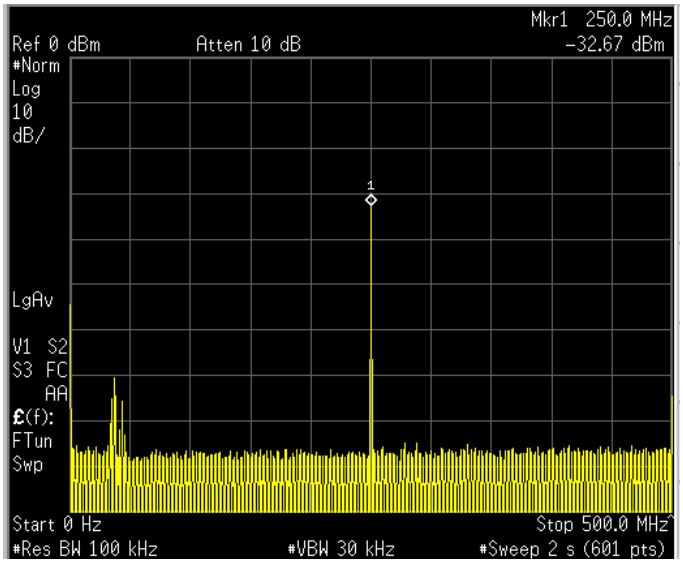


0.3 μ S Pulse

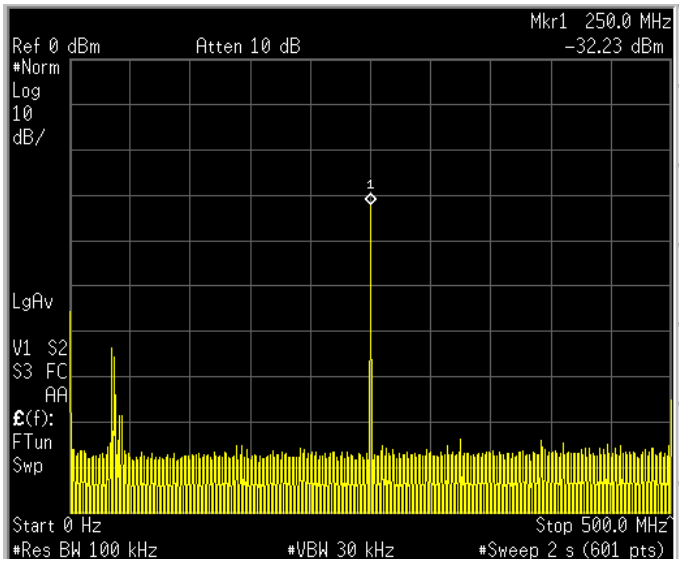


0.4 μ S Pulse

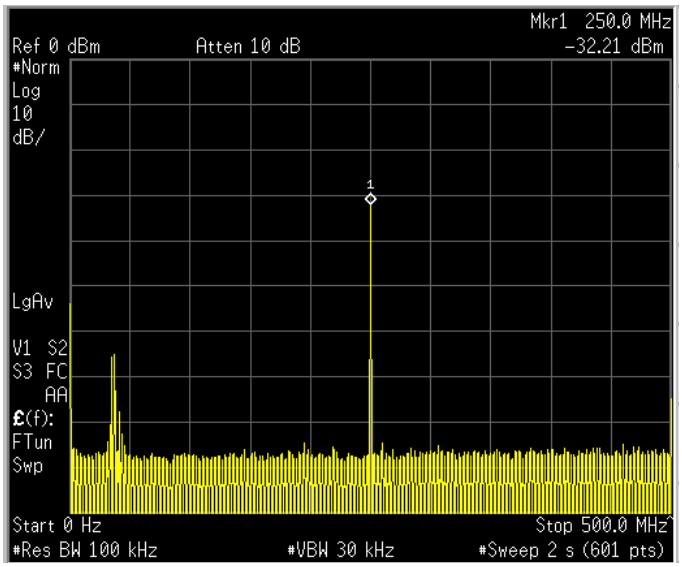
TEST #4 Frequency Band: 0～500MHz Log Ref. Level:16.5 dBm



0.8 μ S Pulse

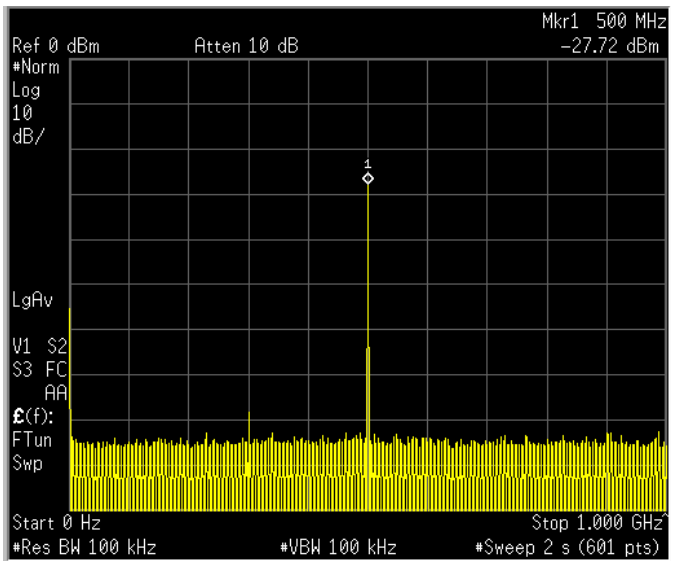


1.0 μ S Pulse

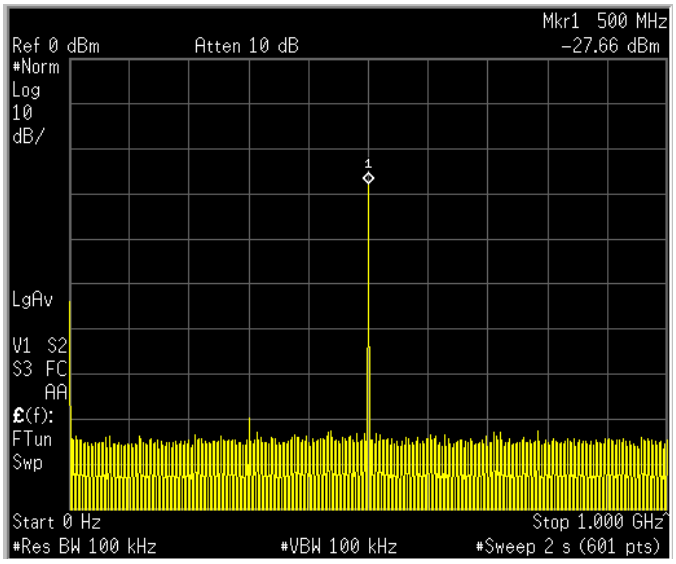


1.2 μ S Pulse

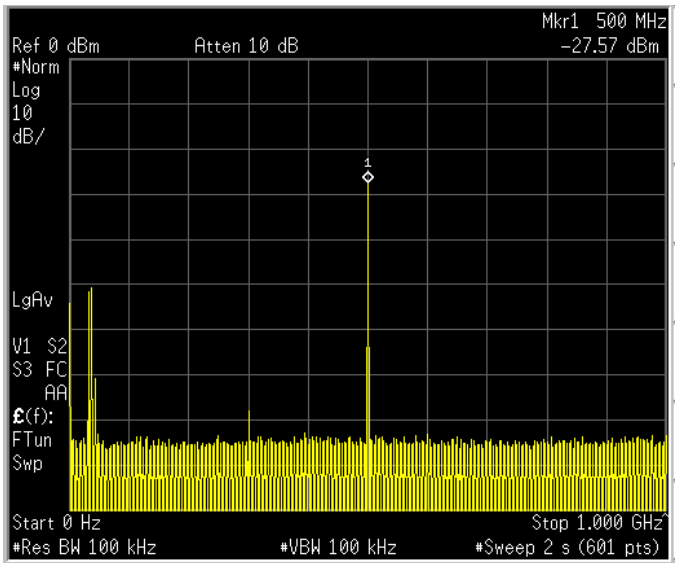
TEST #5 Frequency Band: 0～1GHz Log Ref. Level:14.0 dBm



Ambient

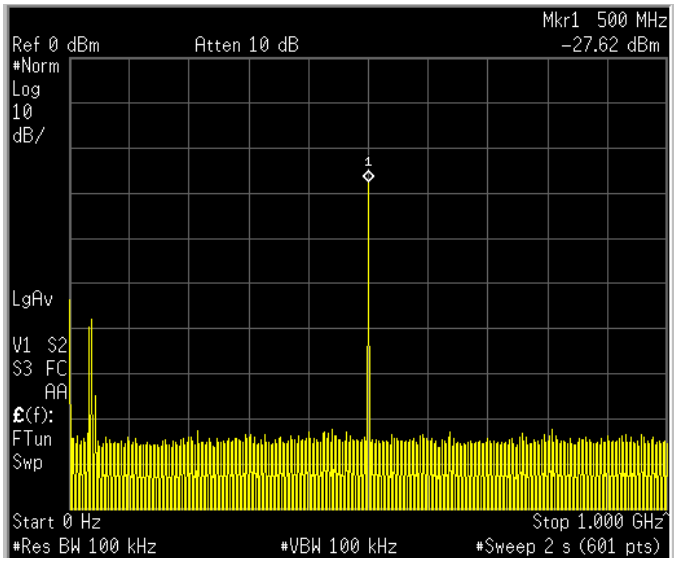


Stand-By

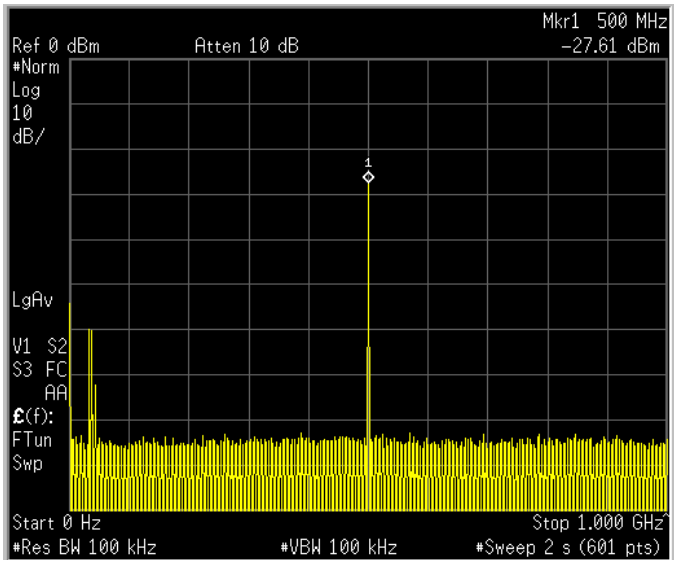


0.07 μ S Pulse

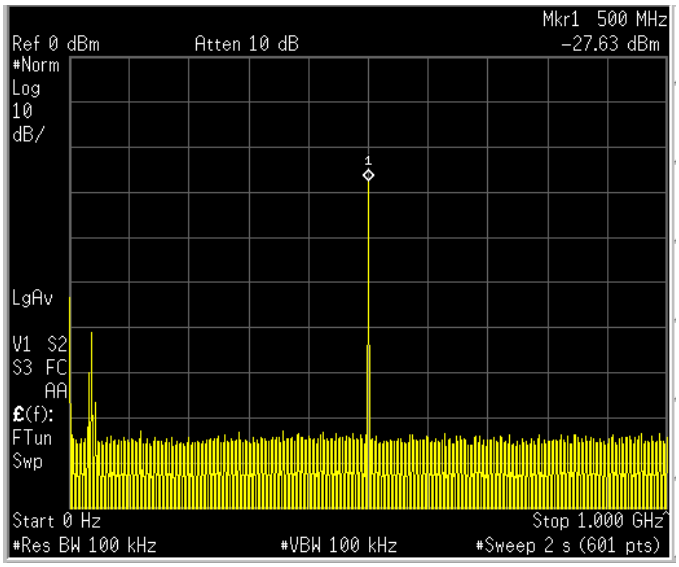
TEST #5 Frequency Band: 0～1GHz Log Ref. Level:14.0 dBm



0.2 μ S Pulse

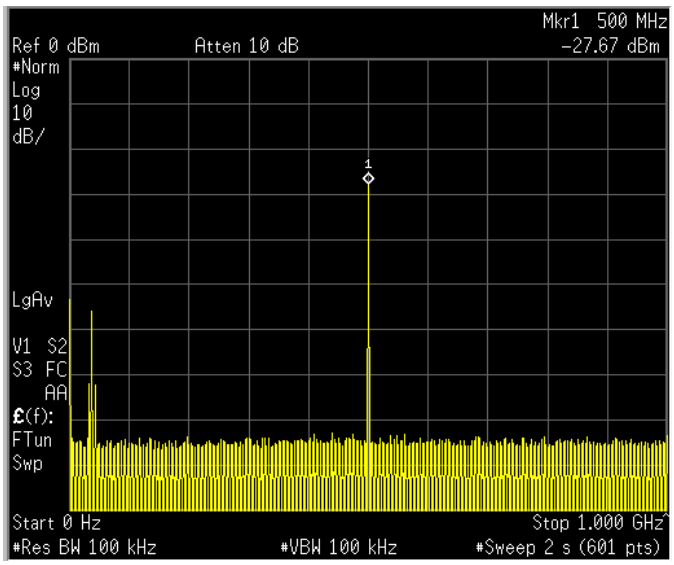


0.3 μ S Pulse

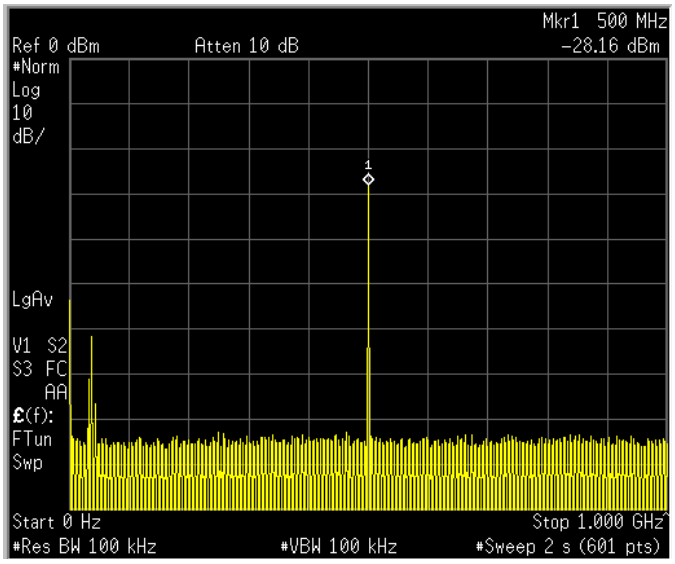


0.4 μ S Pulse

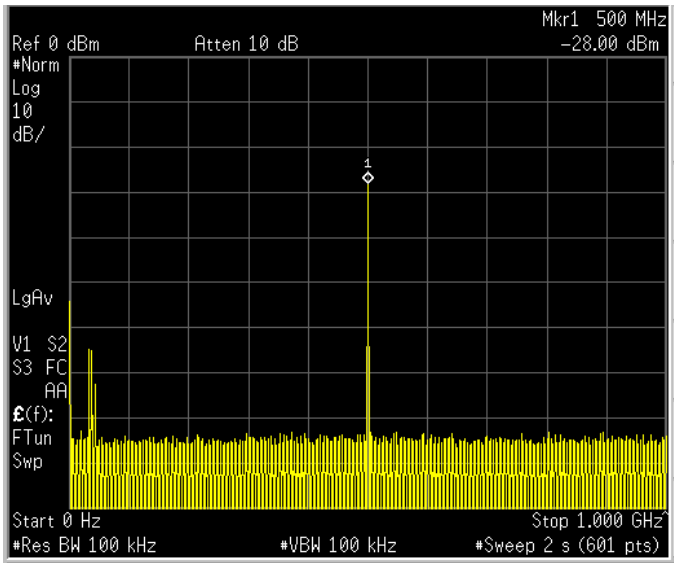
TEST #5 Frequency Band: 0～1GHz Log Ref. Level:14.0 dBm



0.8 μ S Pulse



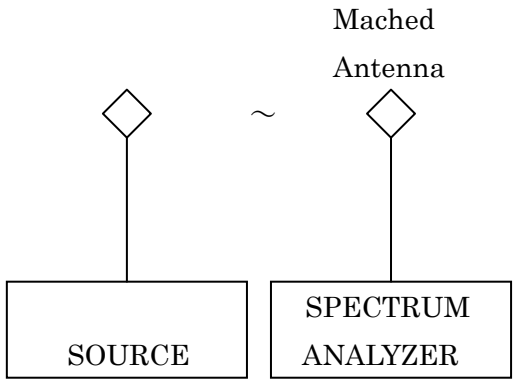
1.0 μ S Pulse



1.2 μ S Pulse

CALIBRATION OF TESTS 6～11 (1～50 GHz)

Instead of using a signal source of known amplitude to calibrate the receiving system, the path and antenna characteristics were computed.



The power density at distance R is : $P = \frac{1.64\ Pt}{4\pi R2}$

Where Pt is power transmitted.

The power to the analyzer is : $Psa = PAr = \frac{PG\lambda 2}{4\pi}$

Where G is the receiving antenna gain and Ar is the effective area of the receiving antenna

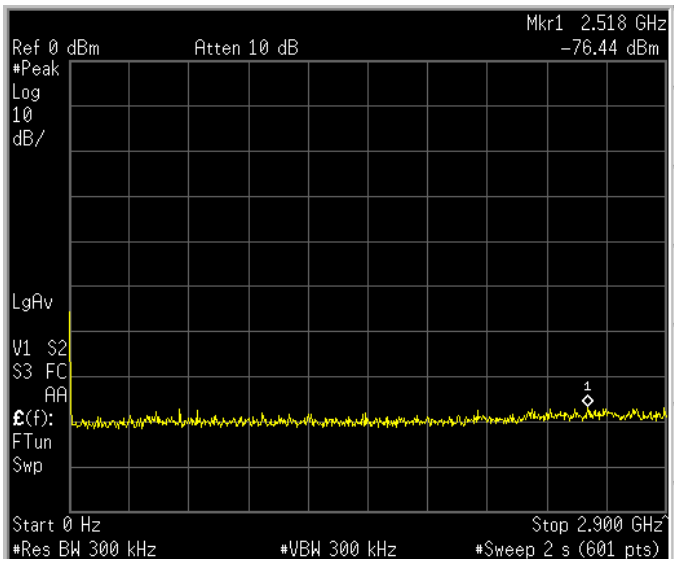
Hence $Psa = \frac{1.64\ Pt}{4\pi R2} \times \frac{PG\lambda 2}{4\pi} = \frac{1.6\ G\lambda 2}{16\pi 2} \times$ Pt at 1 meter

and $Pt = \frac{16\pi 2Psa}{1.64G\lambda 2} = \frac{96.3\ Psa}{G\lambda 2}$

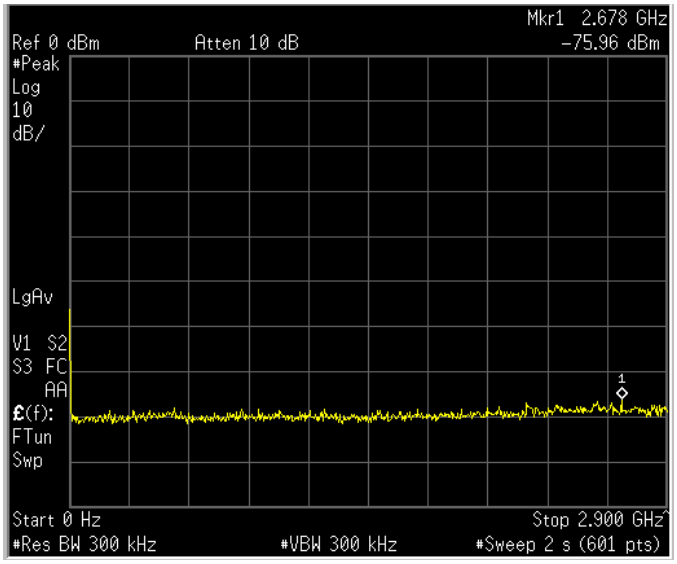
$= Psa\ (dBm) + 19.8\ (dB) - G\ (dB) - 20 \log \lambda\ (dB)$

TEST	HORN GAIN (AVG) dB		WAVELENGTH (dB)		Pt - Psa		LOG REF LEVEL	
	LO	HI	LO	HI	LO	HI		
6	6		-10.5	-21.6	24.3	35.4	0 dBm	0 – 2.9 G
7	6		-21.3	-28.0	35.1	41.8	0 dBm	2.9 – 6.4 G
8	6		-27.6	-34.1	41.4	47.9	0 dBm	6.4 – 12.5G
9	6		-31.2	-35.6	45.0	49.4	0 dBm	12.5 – 20 G
10	23.3	24.9	-35.6	-38.8	32.1	33.7	0 dBm	12.4 – 28 G
11	23.6	25.1	-39.4	-42.5	35.6	37.2	0 dBm	28 – 50 G

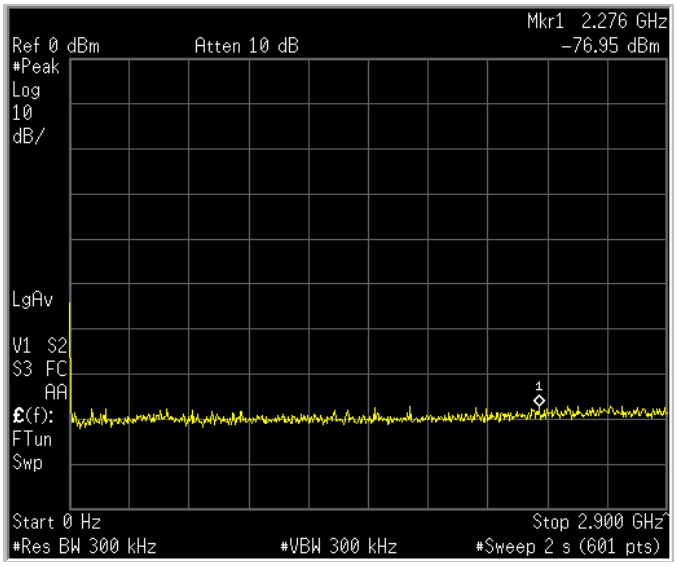
TEST #6 Frequency Band: 0～2.9 GHz Log Ref. Level:0 dBm



Ambient

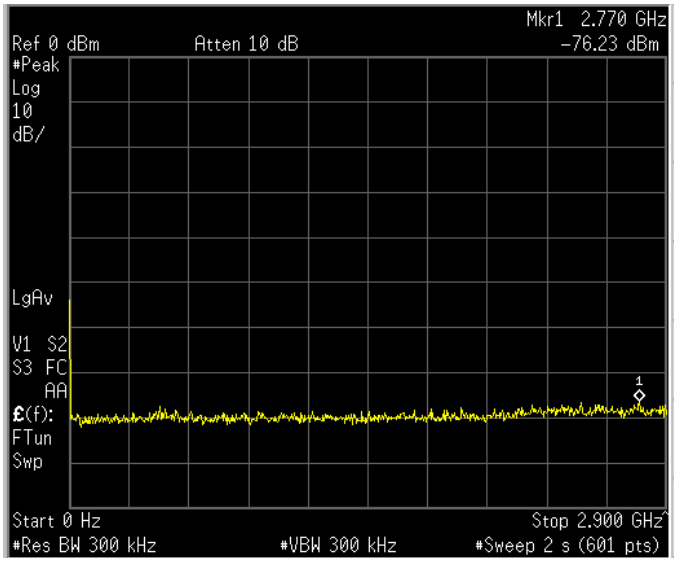


Stand-By

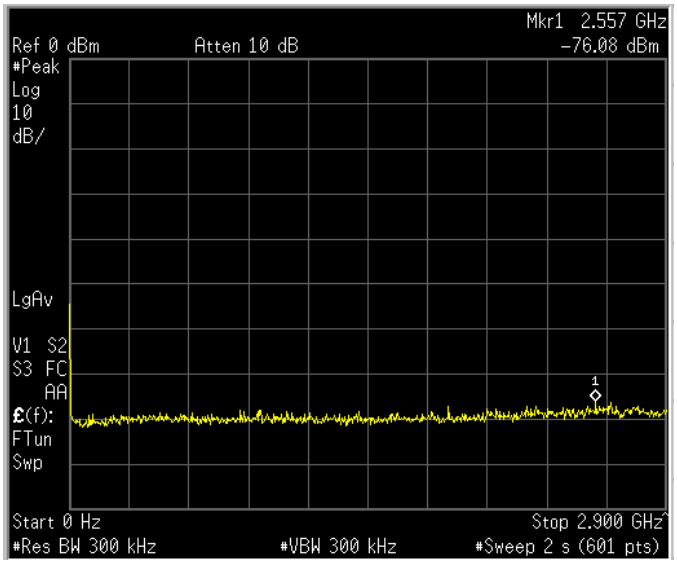


0.07 μ S Pulse

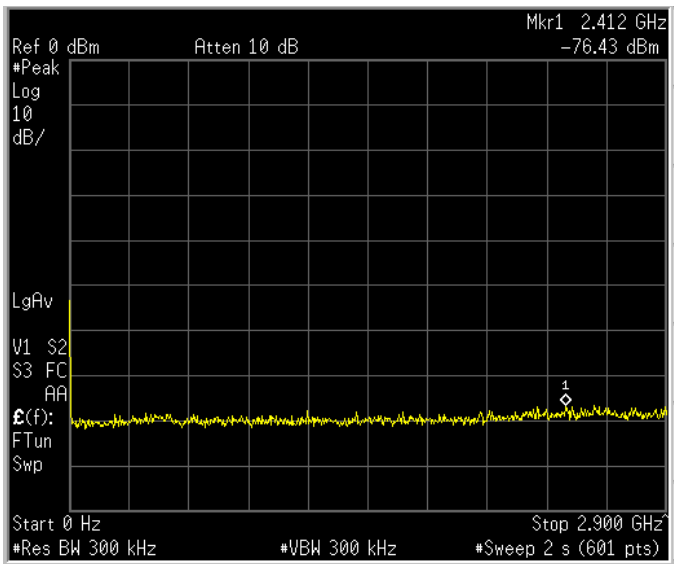
TEST #6 Frequency Band: 0～2.9 GHz Log Ref. Level:0 dBm



0.2 μ S Pulse

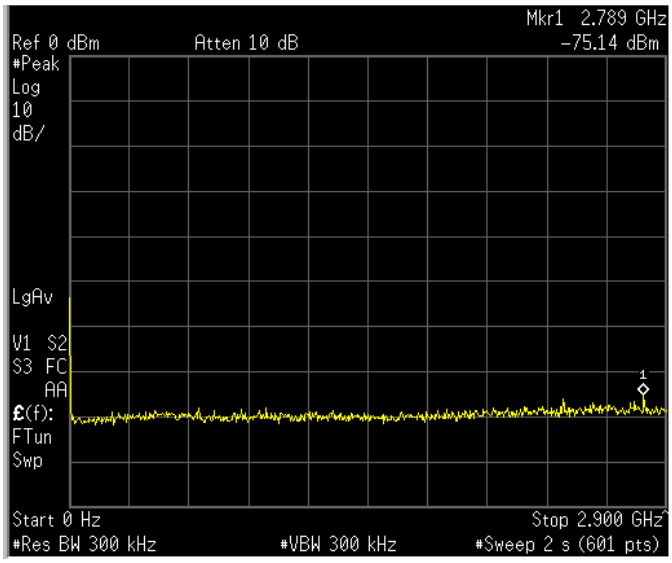


0.3 μ S Pulse

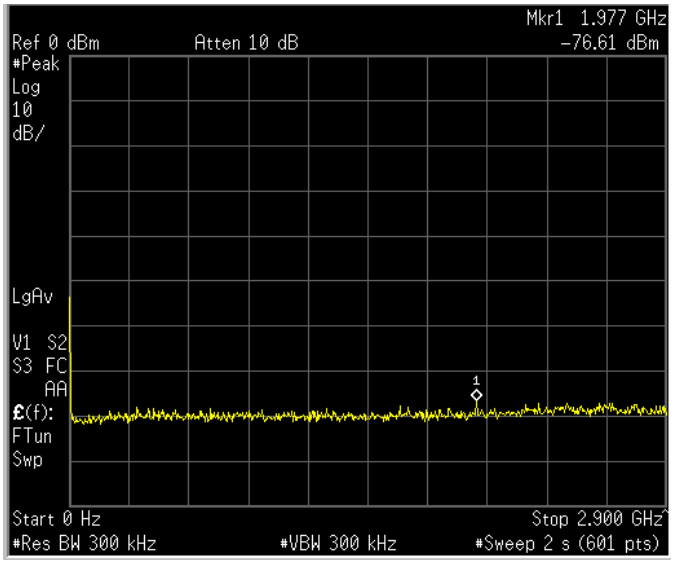


0.4 μ S Pulse

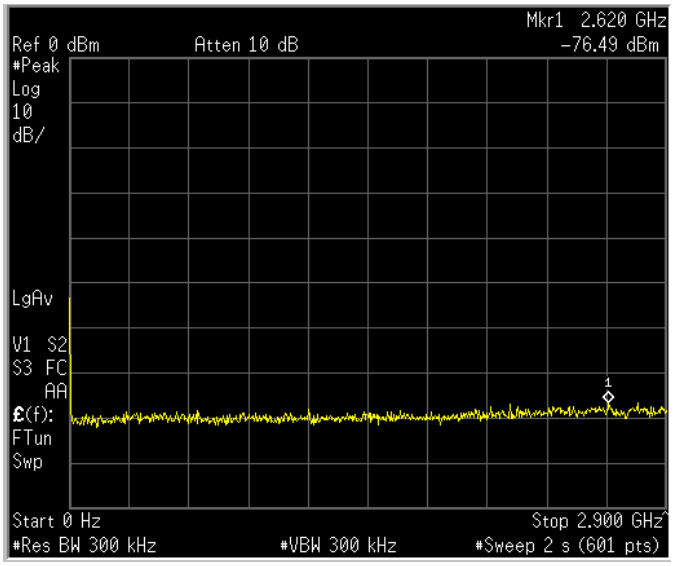
TEST #6 Frequency Band: 0～2.9 GHz Log Ref. Level:0 dBm



0.8 μ S Pulse

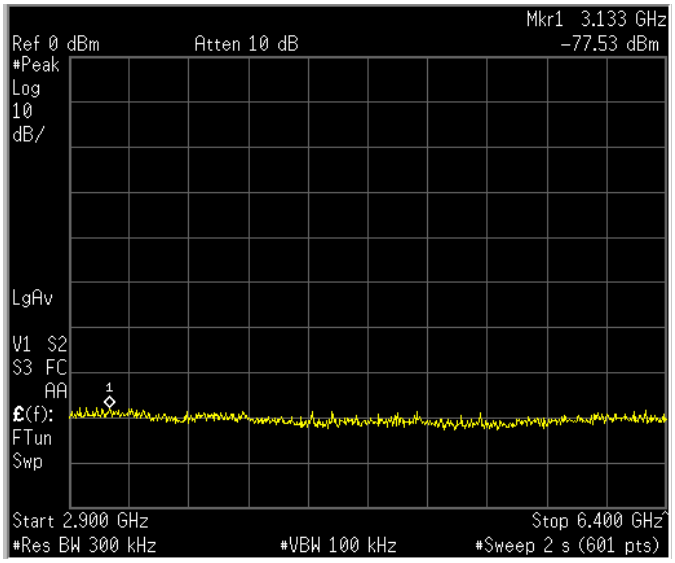


1.0 μ S Pulse

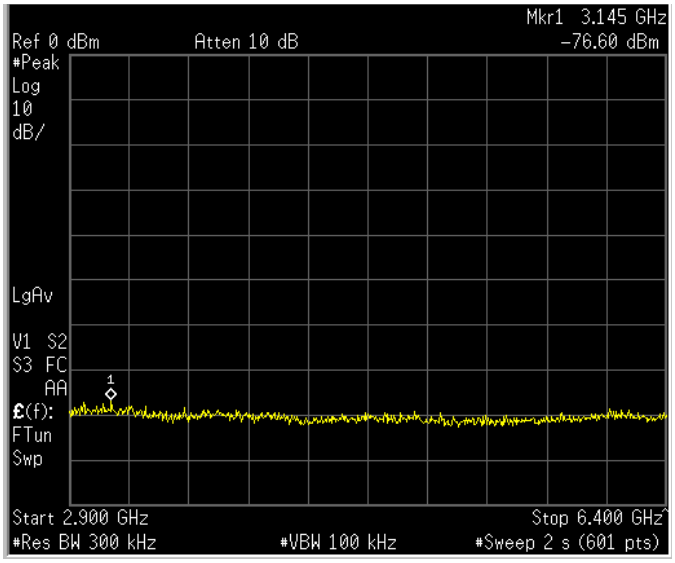


1.2 μ S Pulse

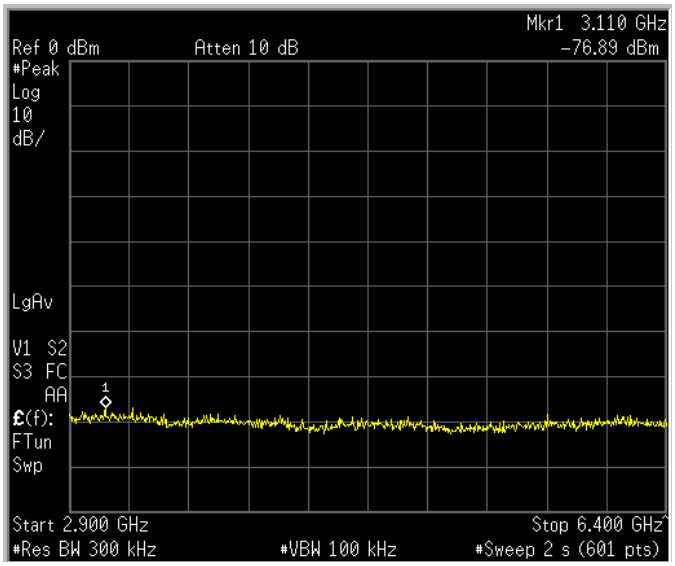
TEST #7 Frequency Band: 2.9～6.4GHz Log Ref. Level:0 dBm



Ambient

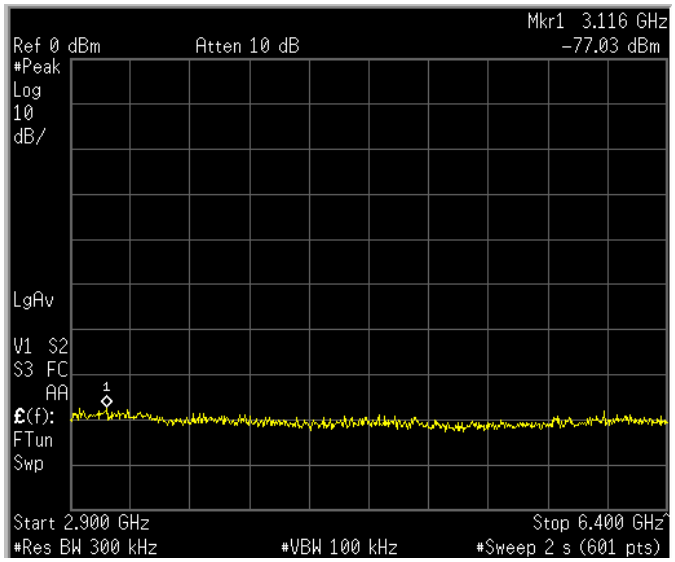


Stand-By

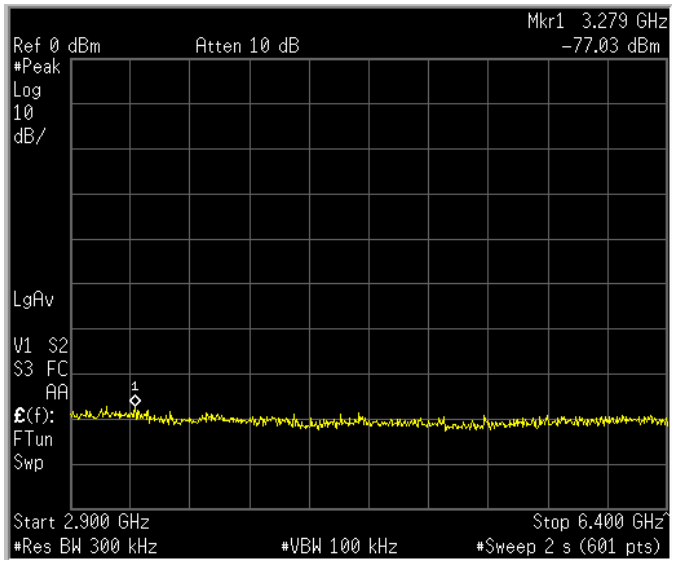


0.07 μ S Pulse

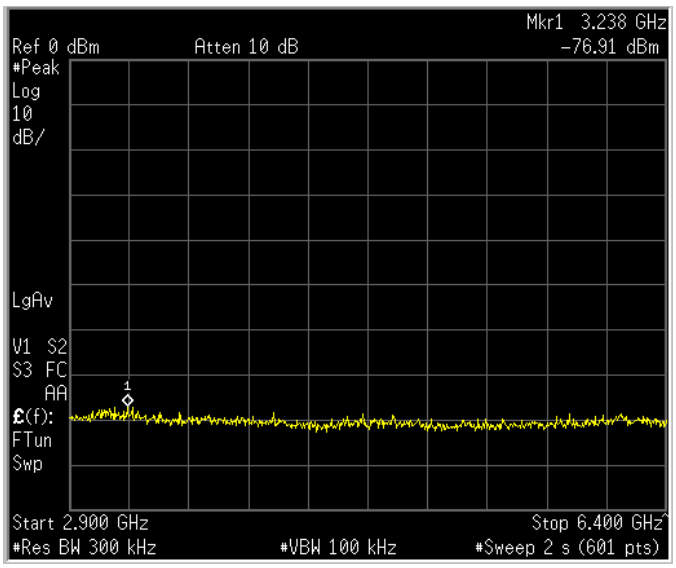
TEST #7 Frequency Band: 2.9～6.4GHz Log Ref. Level:0 dBm



0.2 μ S Pulse

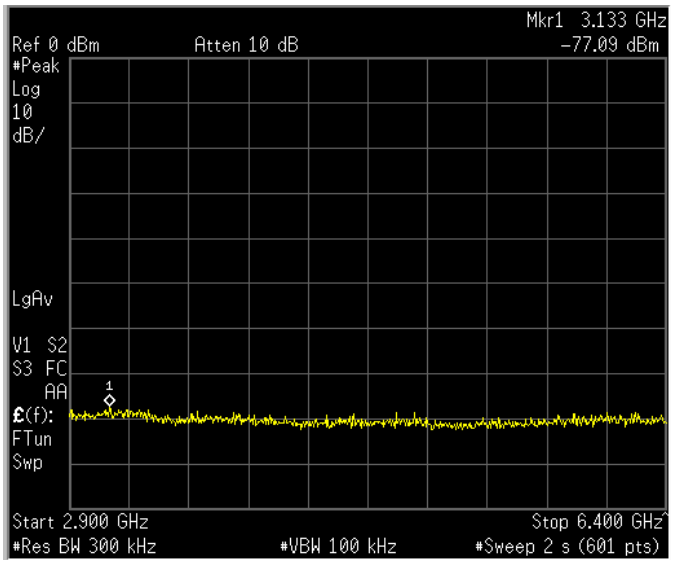


0.3 μ S Pulse

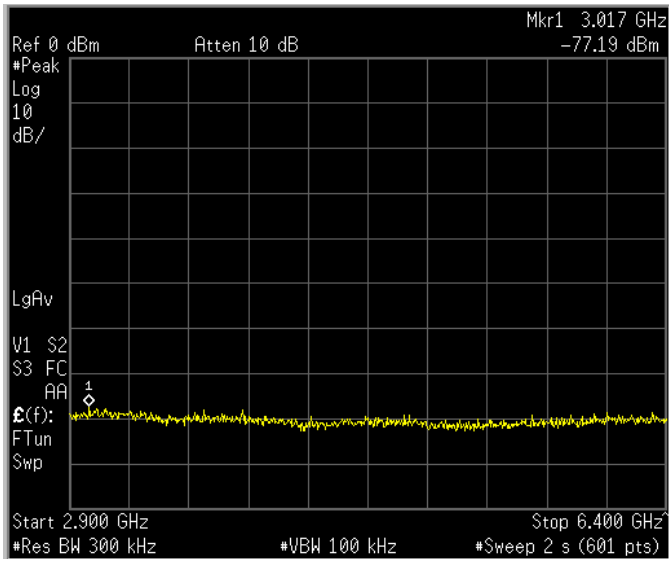


0.4 μ S Pulse

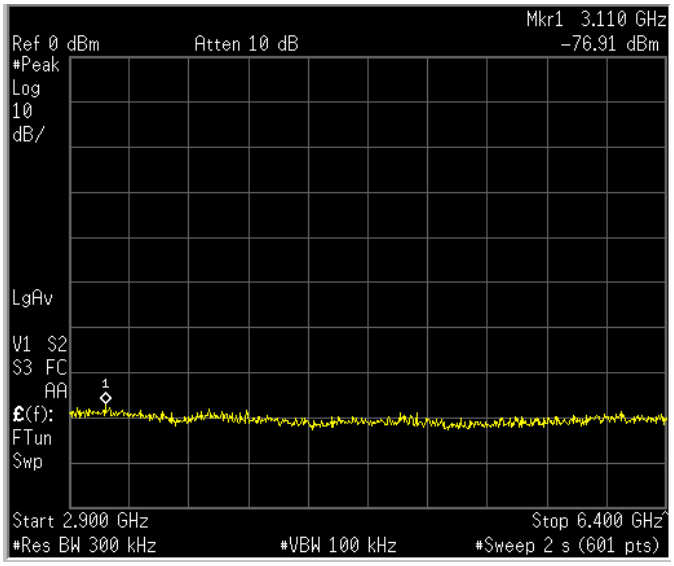
TEST #7 Frequency Band: 2.9～6.4GHz Log Ref. Level:0 dBm



0.8 μ S Pulse

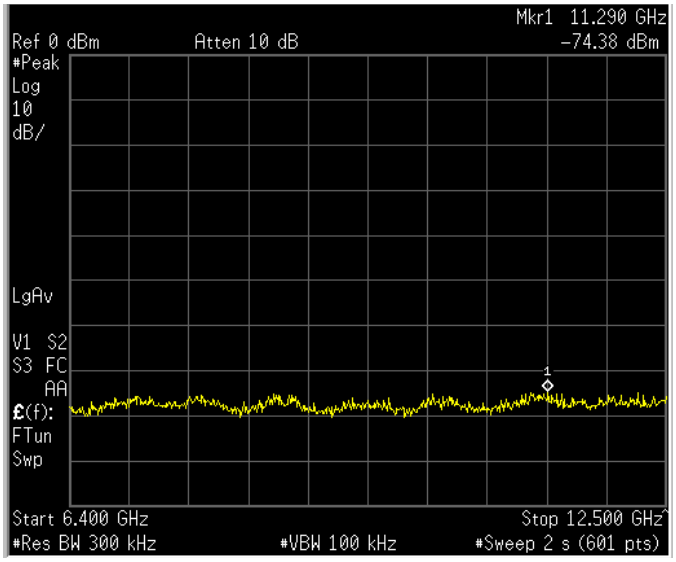


1.0 μ S Pulse

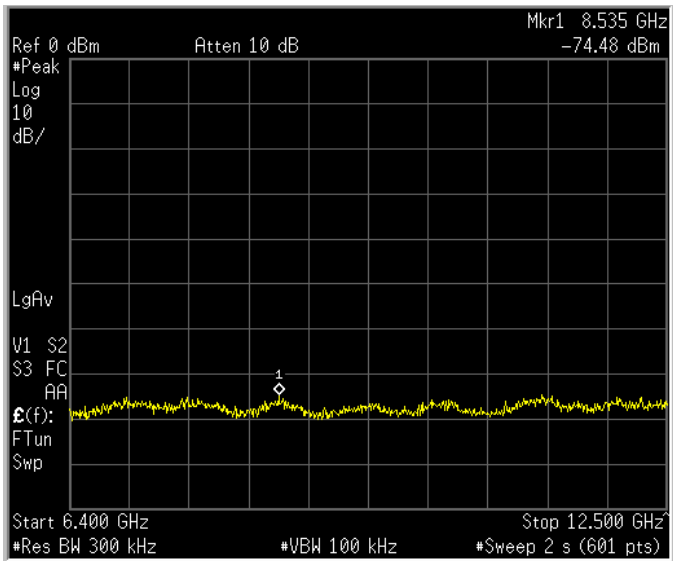


1.2 μ S Pulse

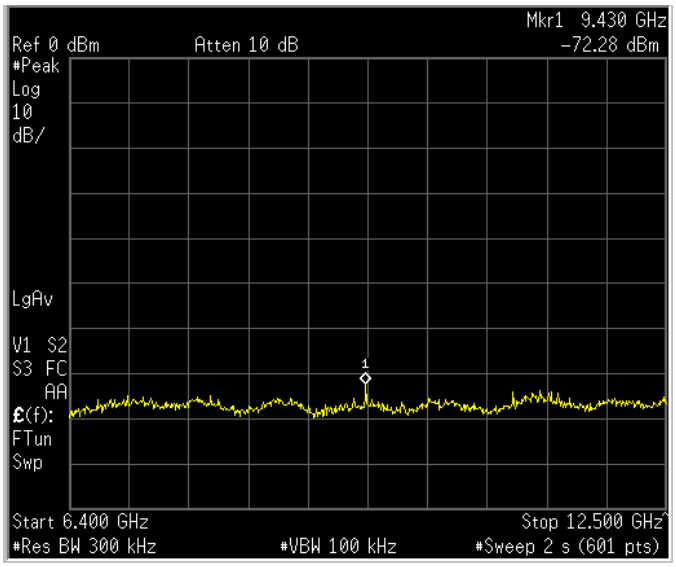
TEST #8 Frequency Band: 6.4～12.5GHz Log Ref. Level:0 dBm



Ambient

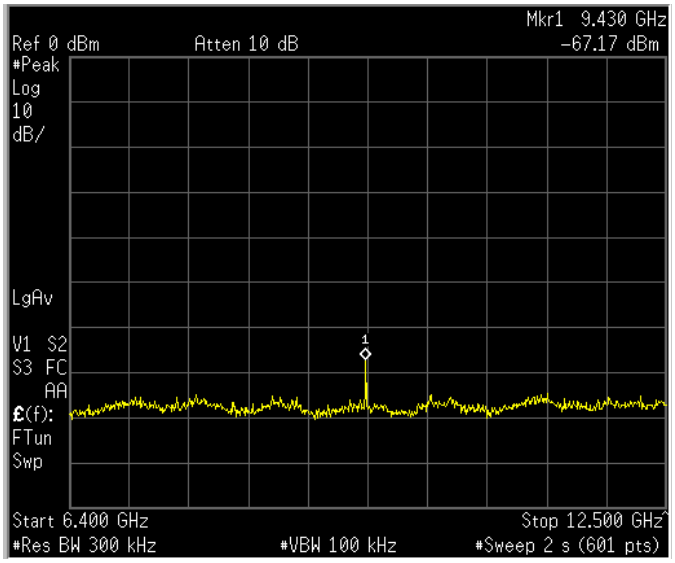


Stand-By

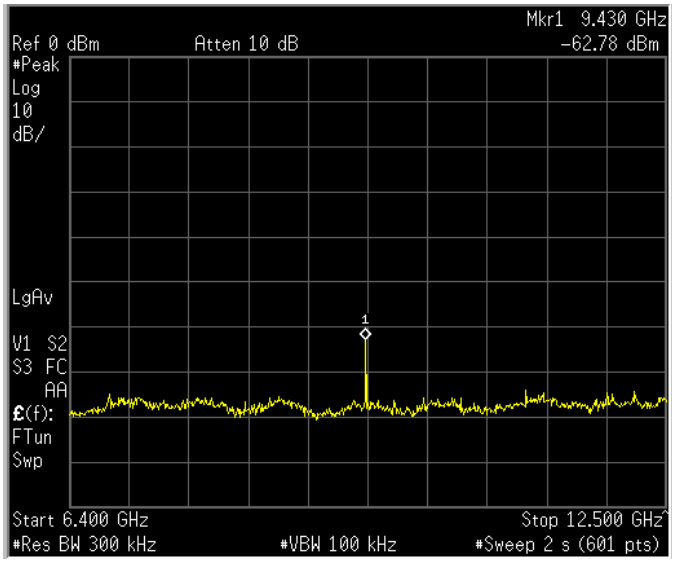


0.07 μ S Pulse

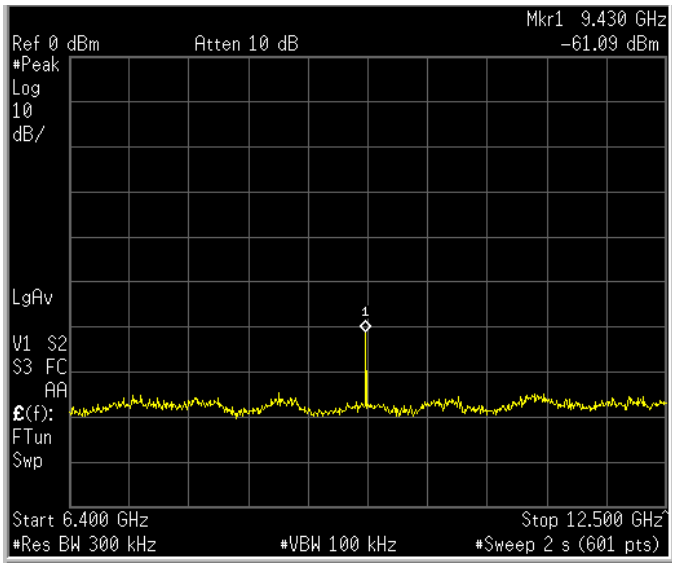
TEST #8 Frequency Band: 6.4～12.5GHz Log Ref. Level:0 dBm



0.2 μ S Pulse

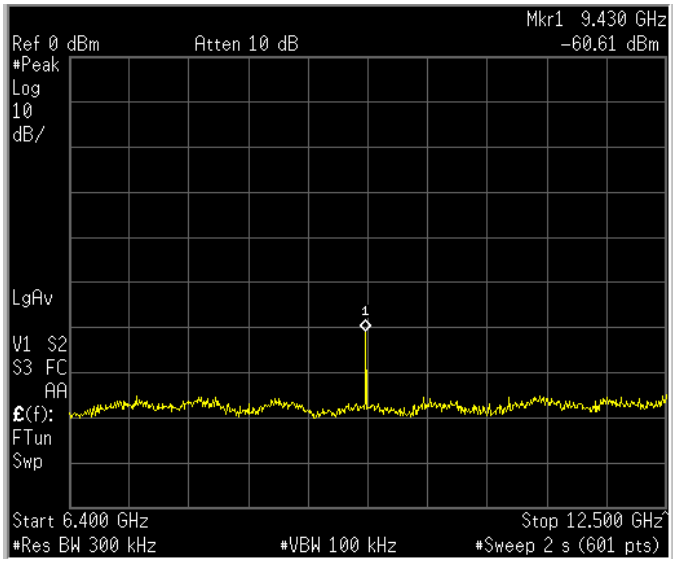


0.3 μ S Pulse

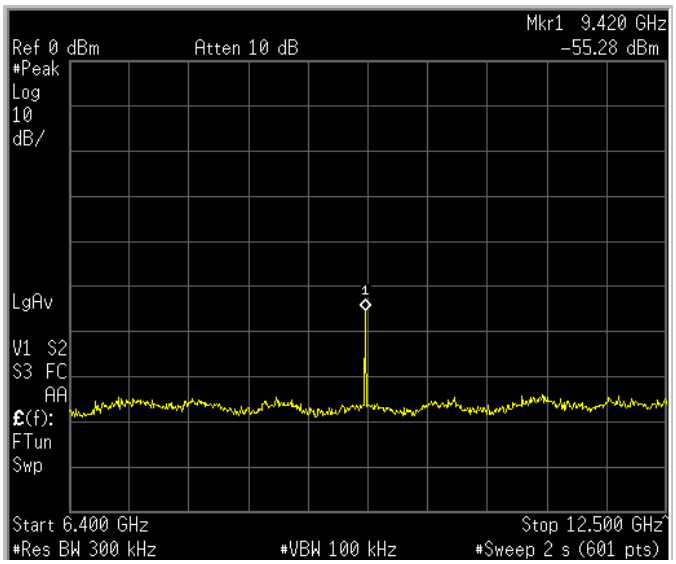


0.4 μ S Pulse

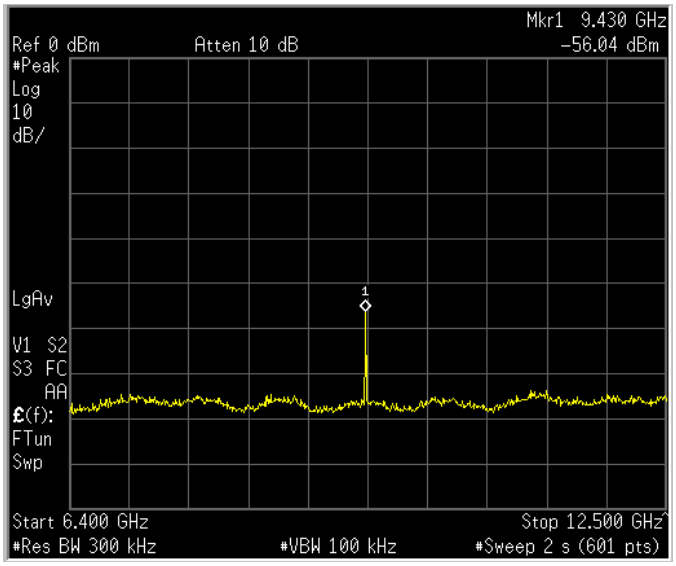
TEST #8 Frequency Band: 6.4～12.5GHz Log Ref. Level:0 dBm



0.8 μ S Pulse

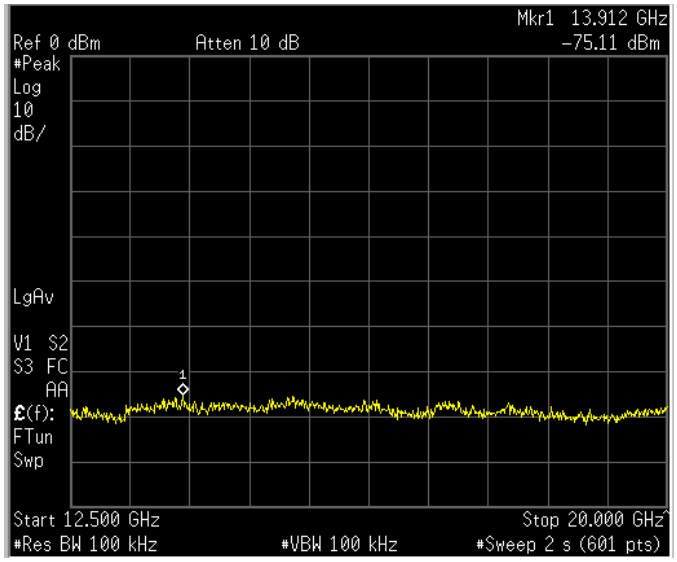


1.0 μ S Pulse

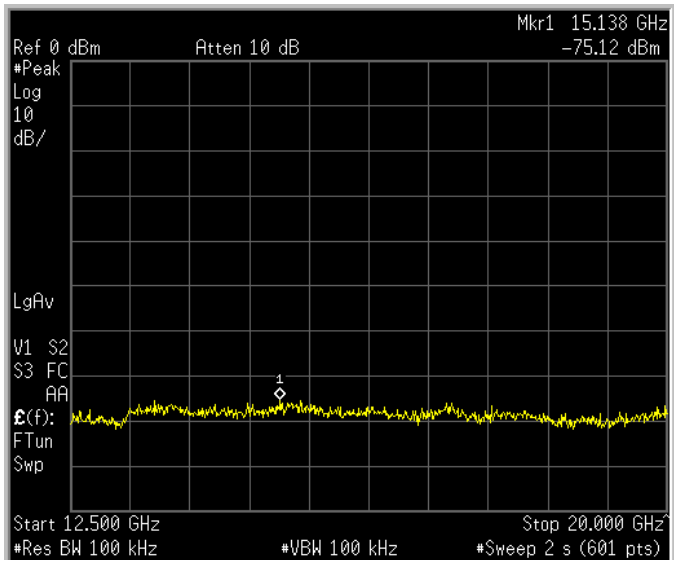


1.2 μ S Pulse

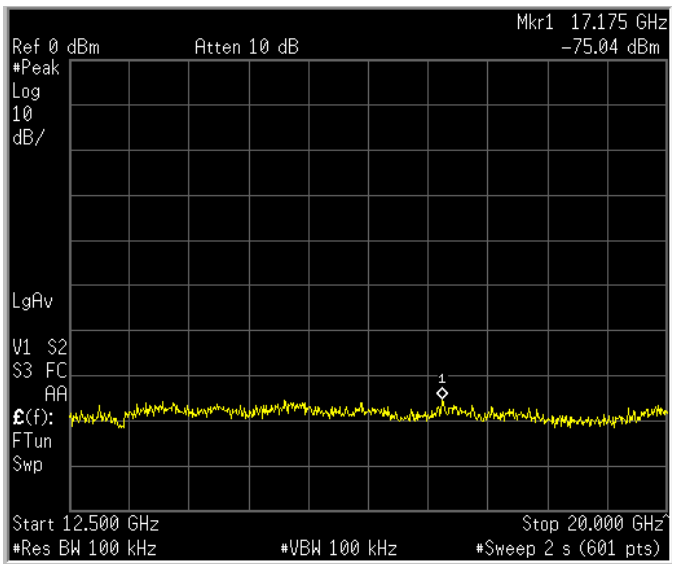
TEST #9 Frequency Band: 12.5～20GHz Log Ref. Level:0 dBm



Ambient

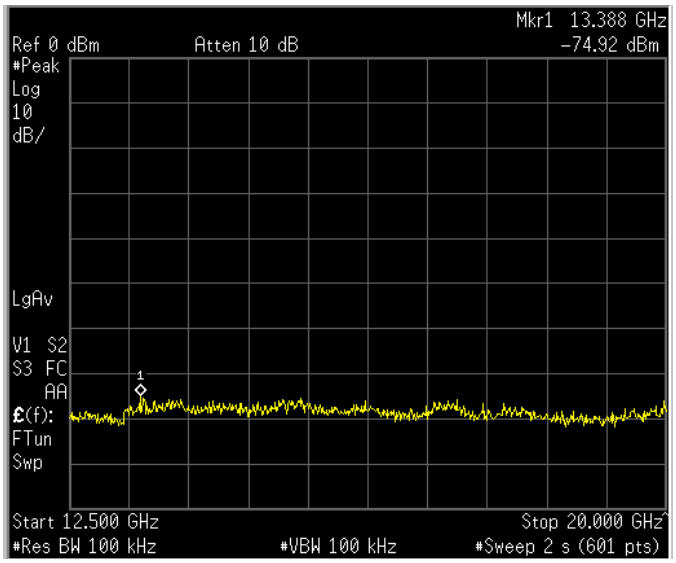


Stand-By

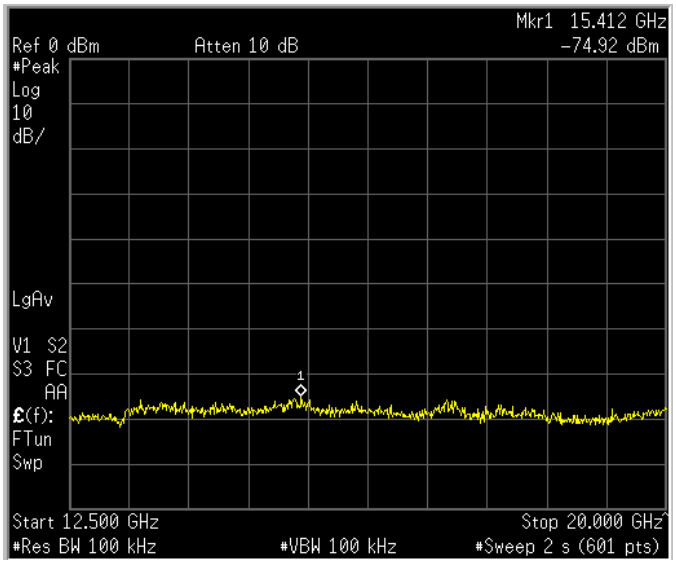


0.07 μ S Pulse

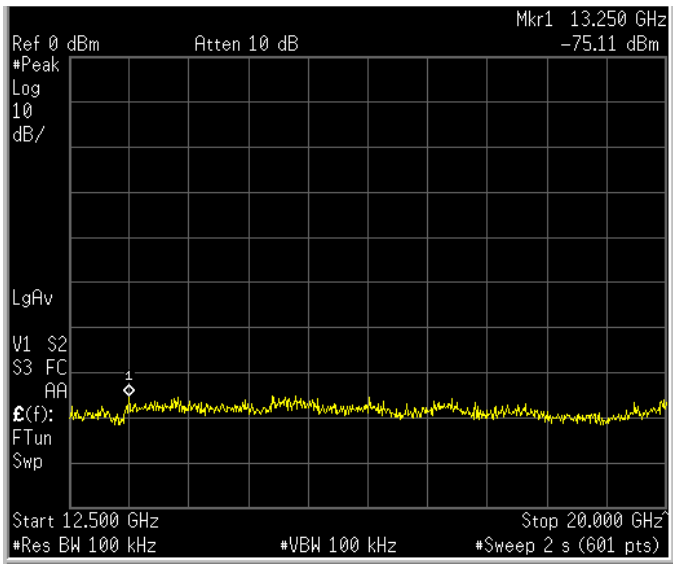
TEST #9 Frequency Band: 12.5～20GHz Log Ref. Level:0 dBm



0.2 μ S Pulse

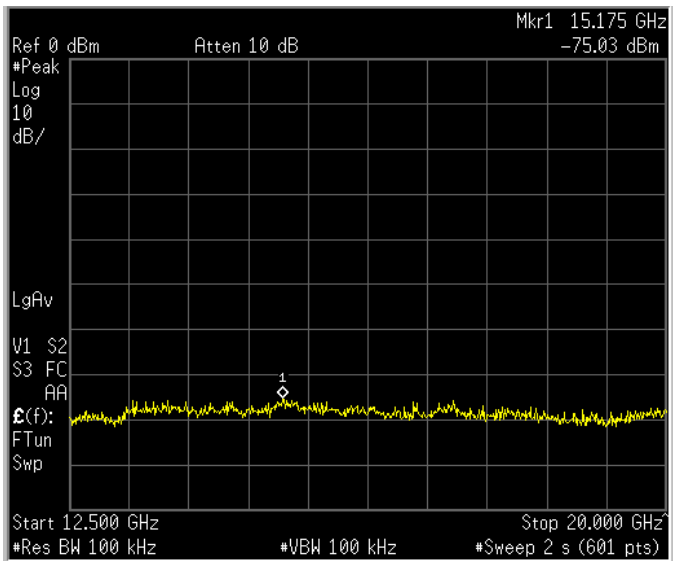


0.3 μ S Pulse

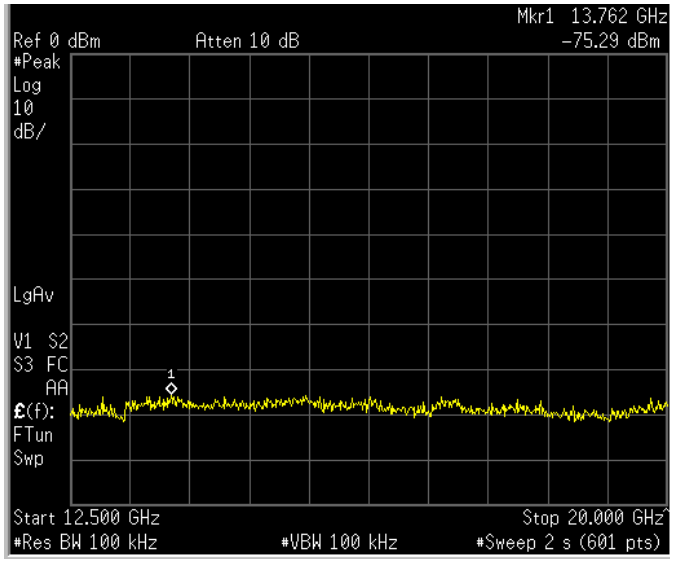


0.4 μ S Pulse

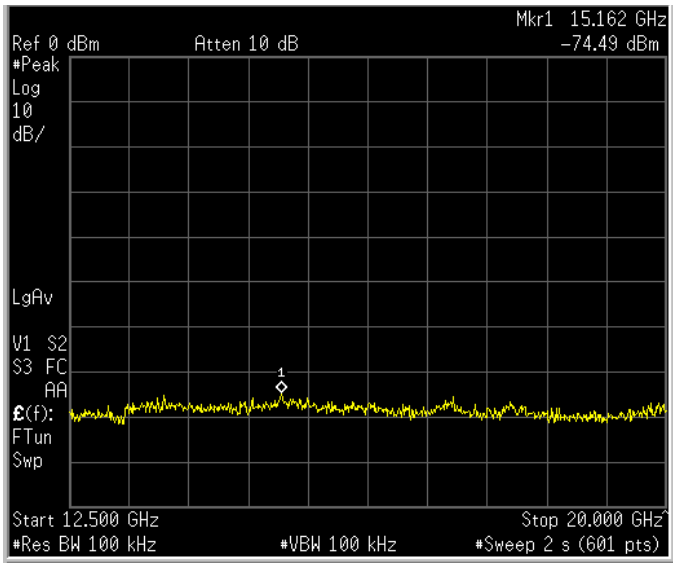
TEST #9 Frequency Band: 12.5～20GHz Log Ref. Level:0 dBm



0.8 μ S Pulse

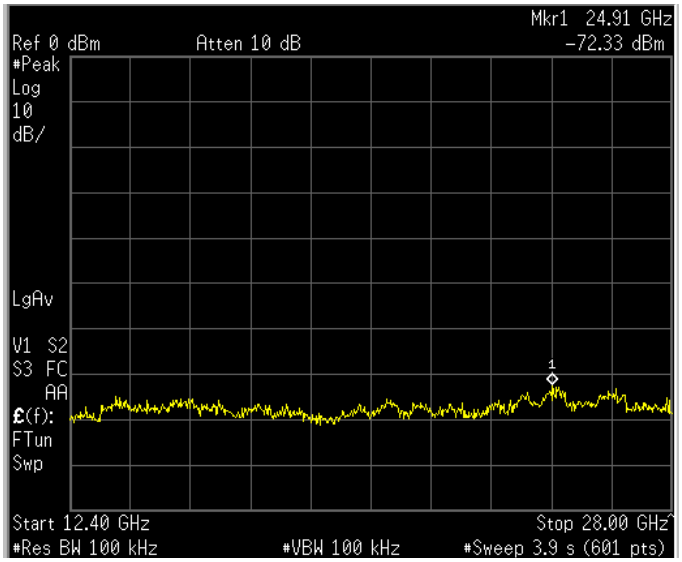


1.0 μ S Pulse

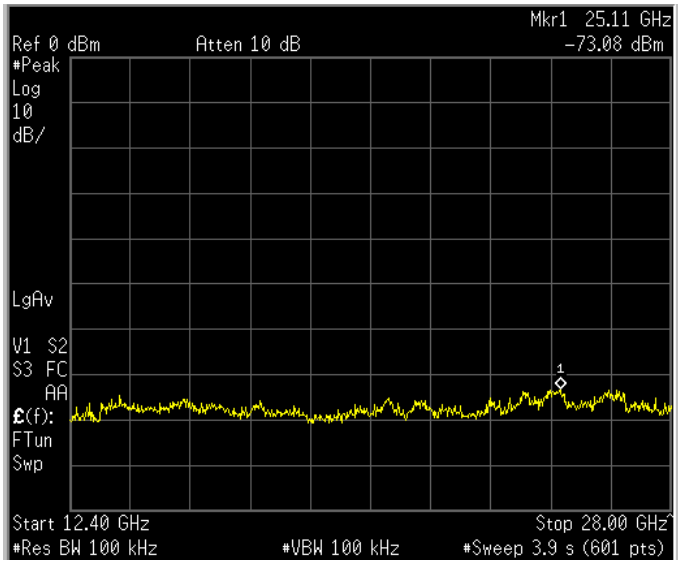


1.2 μ S Pulse

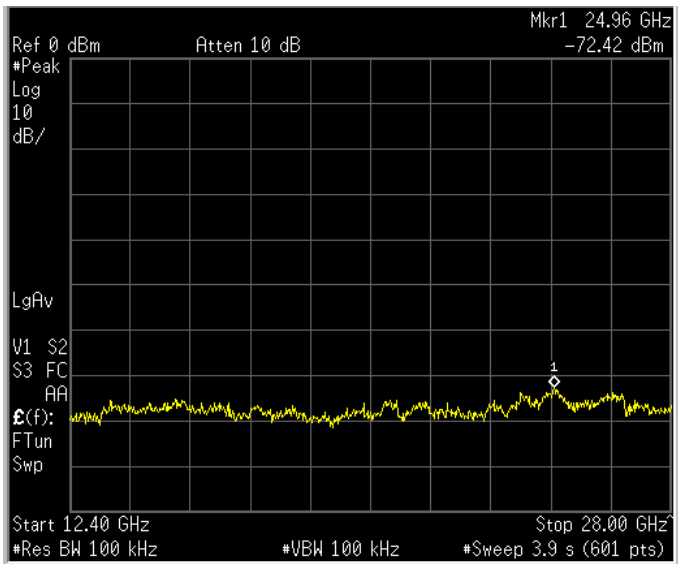
TEST #10 Frequency Band: 12.4～28GHz Log Ref. Level:0 dBm



Ambient

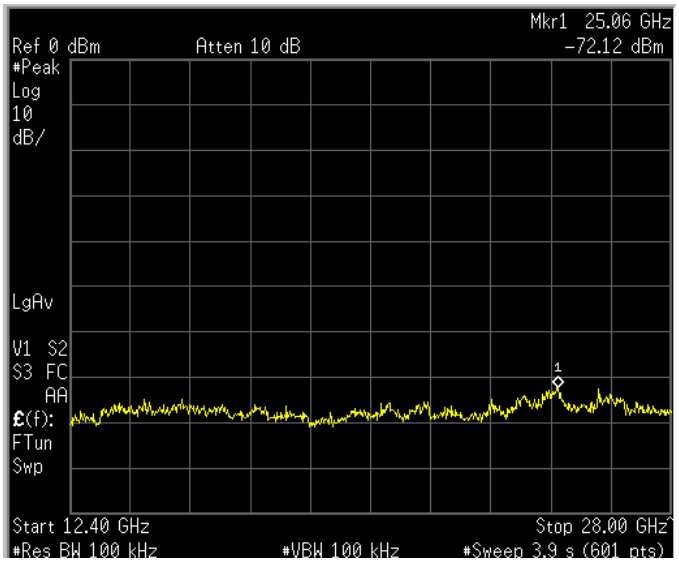


Stand-By

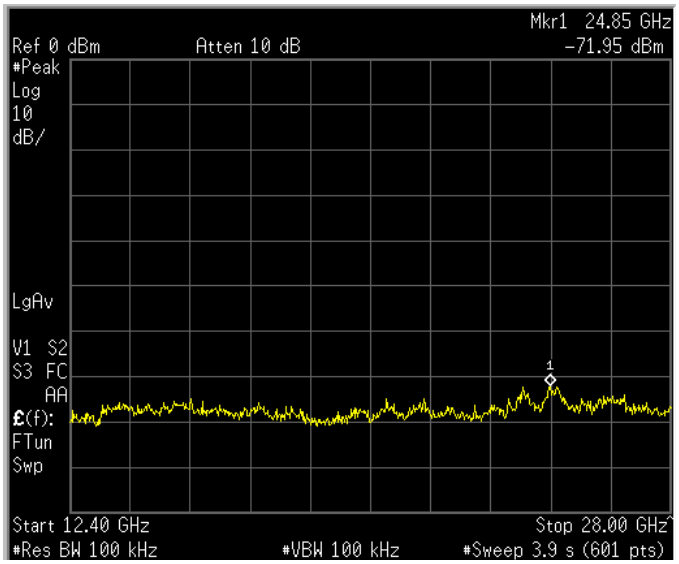


0.07 μ S Pulse

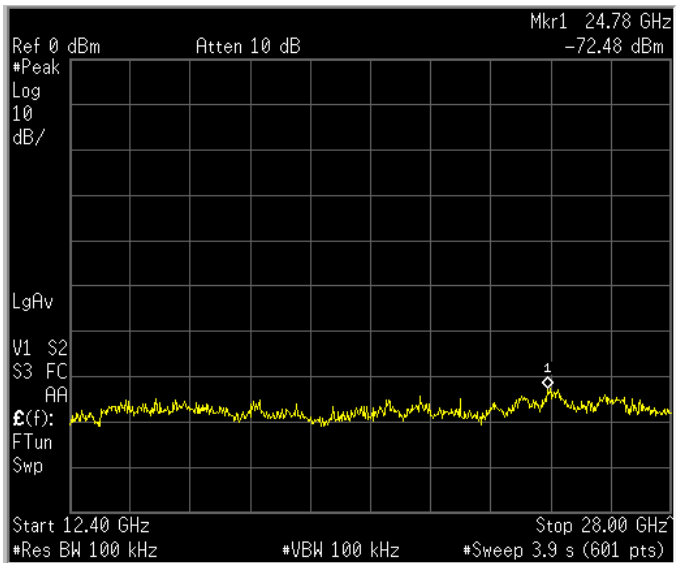
TEST #10 Frequency Band: 12.4～28GHz Log Ref. Level:0 dBm



0.2 μ S Pulse

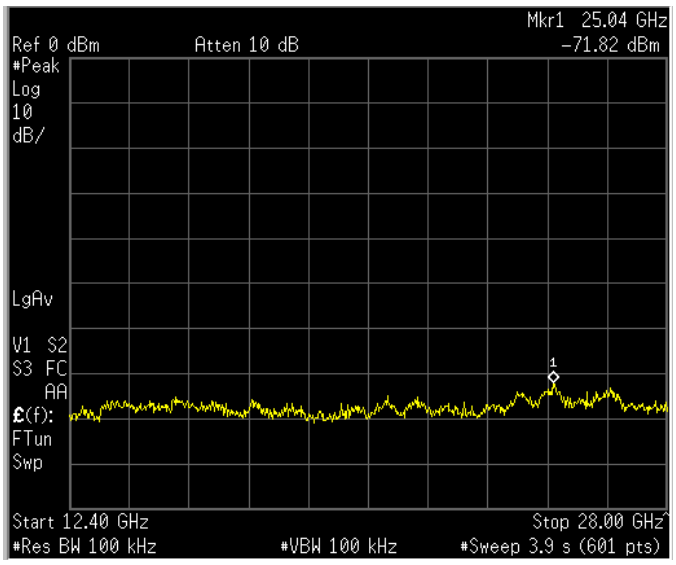


0.3 μ S Pulse

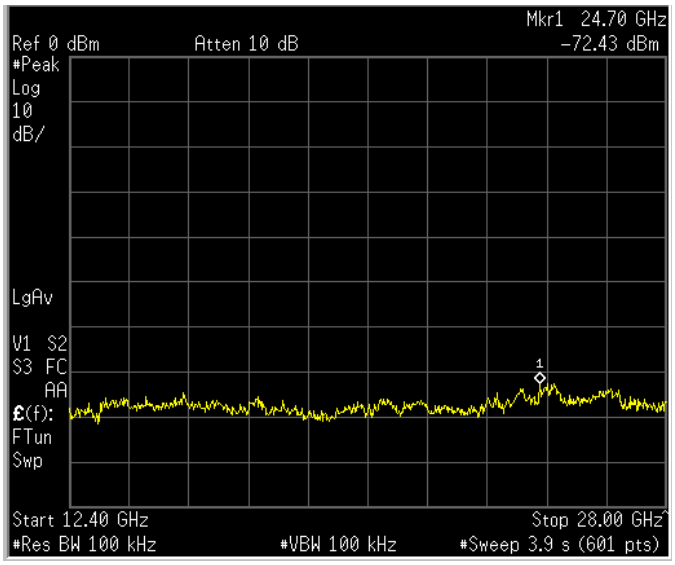


0.4 μ S Pulse

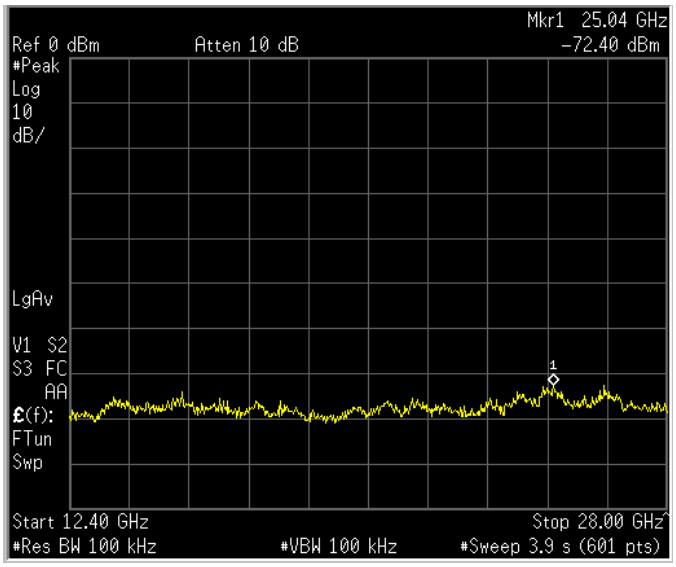
TEST #10 Frequency Band: 12.4～28GHz Log Ref. Level:0 dBm



0.8 μ S Pulse

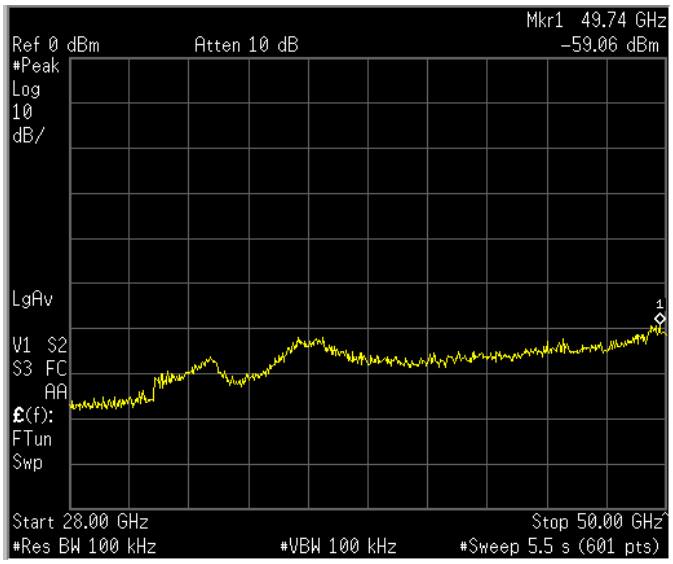


1.0 μ S Pulse

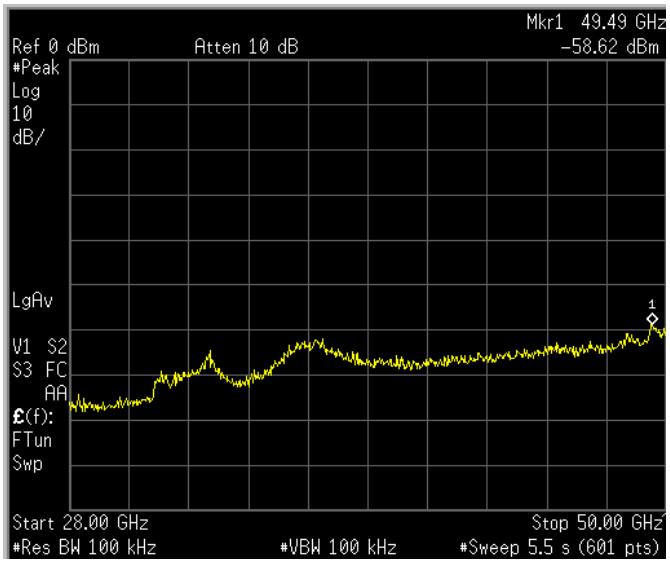


1.2 μ S Pulse

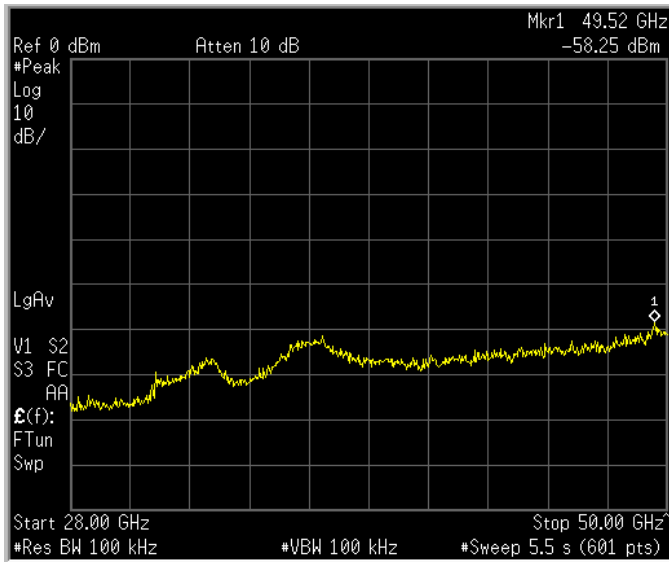
TEST #11 Frequency Band: 28～50GHz Log Ref. Level:0 dBm



Ambient

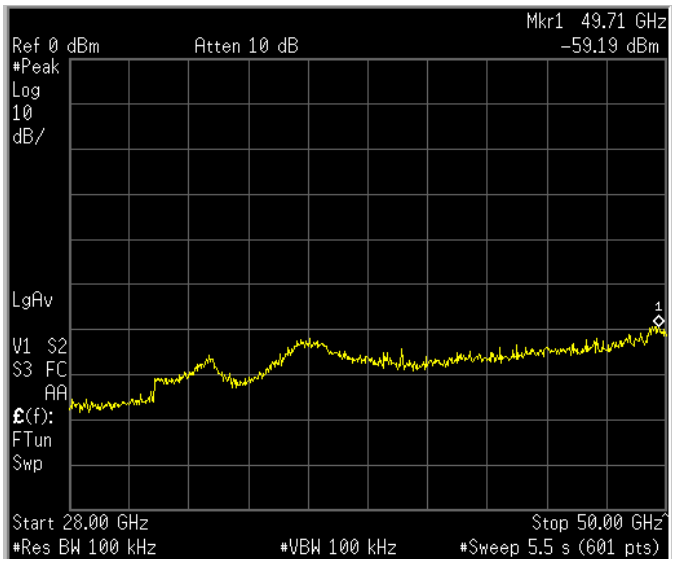


Stand-By

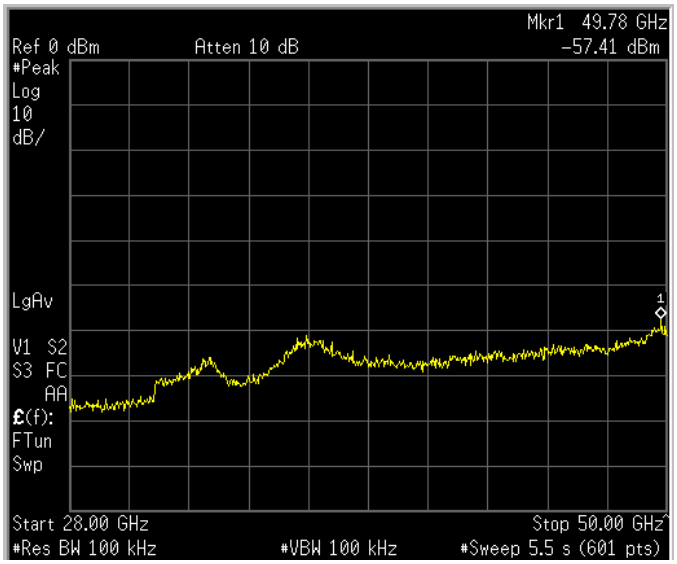


0.07 μ S Pulse

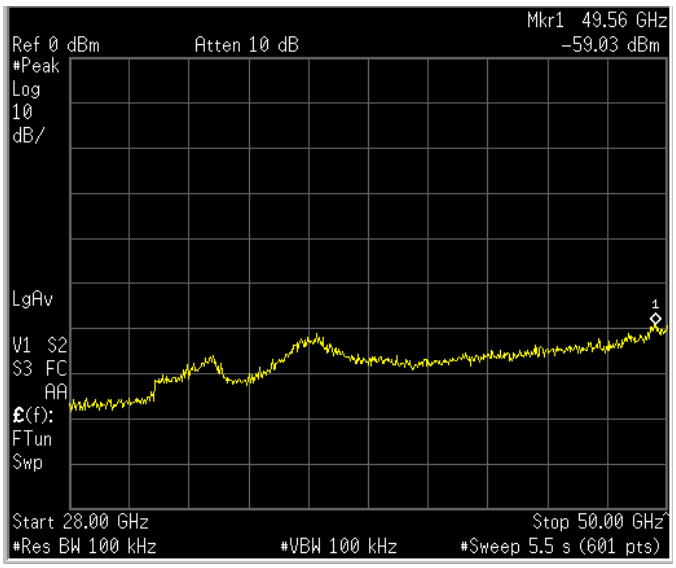
TEST #11 Frequency Band: 28～50GHz Log Ref. Level:0 dBm



0.2 μ S Pulse

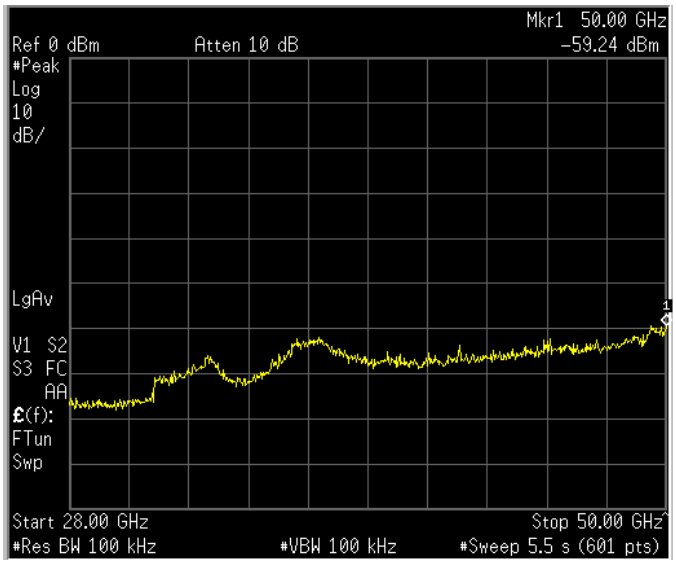


0.3 μ S Pulse

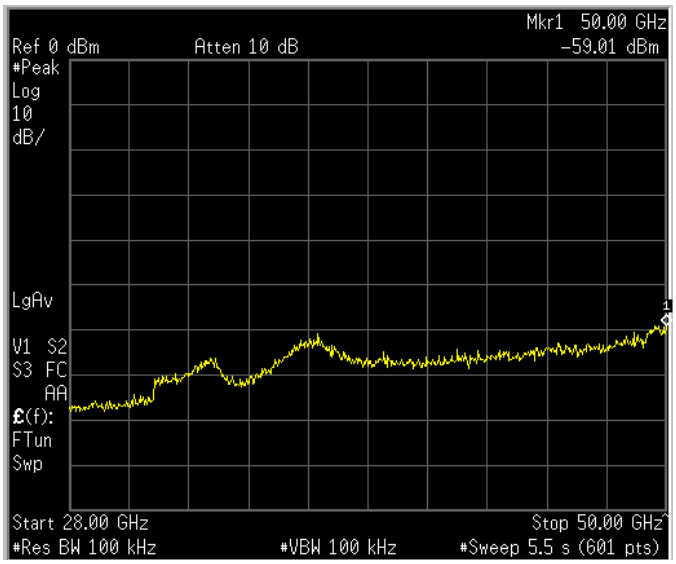


0.4 μ S Pulse

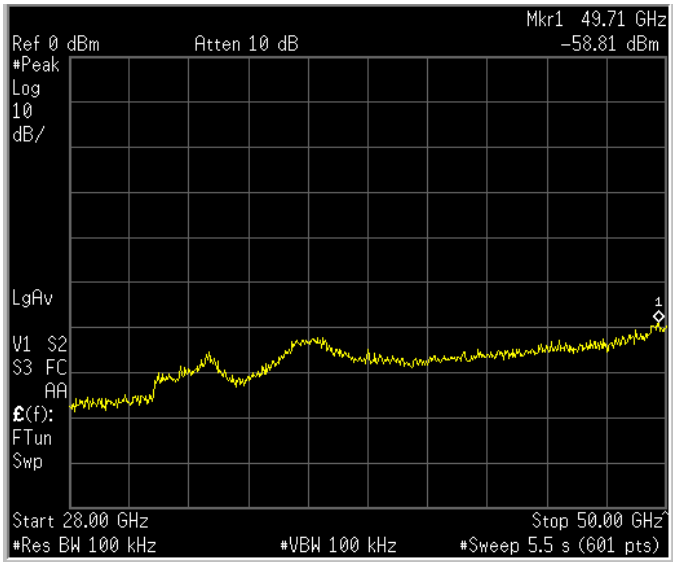
TEST #11 Frequency Band: 28～50GHz Log Ref. Level:0 dBm



0.8 μ S Pulse



1.0 μ S Pulse



1.2 μ S Pulse