



## 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
POWER key	Good
PWR ACK key	Good
TX/STBY key	Good
EBL1/EBL2 key	Good
VRM1/VRM2 key	Good
ALARM ACK key	Good
ACQ MANUAL key	Good
ACQ CANCEL key	Good
TGT DATA key	Good
PANEL key	Good
USER key	Good
OPTION1/2 key	Good
T/R / VECT key	Good
DAY/NIGHT	Good
AIS/AR PA key	Good
HL OFF key	Good
DATA OFF key	Good
+/-RANGE key	Good
ACQ/ENT key	Good
TUNE Control	Good
RAIN Control	Good
SEA Control	Good
GAIN Control	Good
EBL dial	Good
VRM dial	Good
Track ball	Good
Track ballL/R button	Good

### 2.2 Scanner

VSWR	frequency (MHz)	VSWR
	3030	1.07
	3050	1.07
	3070	1.15
Scanner Rotation Speed		24 rpm

### 2.3 Transmitter

Magnetron Ser. No.	A0029A
Operating Frequency	
(at 0.07 $\mu$ s pulse 0.5 NM-SP1)	3043.0 MHz
(at 0.2 $\mu$ s pulse 3NM -MP1)	3041.7 MHz
(at 0.3 $\mu$ s pulse 3NM -MP2)	3042.2 MHz
(at 0.4 $\mu$ s pulse 3NM -MP3)	3042.2 MHz
(at 0.8 $\mu$ s pulse 3NM -LP1)	3042.2 MHz
(at 1.0 $\mu$ s pulse 24NM -LP2)	3042.2 MHz
(at 1.2 $\mu$ s pulse 24NM -LP3)	3041.8 MHz
Peak Output Power	
(at 0.07 $\mu$ s pulse 0.5 NM-SP1)	32.7 kw
(at 0.2 $\mu$ s pulse 3NM -MP1)	31.4 kw
(at 0.3 $\mu$ s pulse 3NM -MP2)	31.6 kw
(at 0.4 $\mu$ s pulse 3NM -MP3)	31.3 kw
(at 0.8 $\mu$ s pulse 3NM -LP1)	30.1 kw
(at 1.0 $\mu$ s pulse 24NM -LP2)	29.4 kw
(at 1.2 $\mu$ s pulse 24NM -LP3)	29.7 kw
Pulse Length	
(at 0.07 $\mu$ s pulse 0.5 NM-SP1)	0.082 $\mu$ S
(at 0.2 $\mu$ s pulse 3NM -MP1)	0.206 $\mu$ S
(at 0.3 $\mu$ s pulse 3NM -MP2)	0.292 $\mu$ S
(at 0.4 $\mu$ s pulse 3NM -MP3)	0.390 $\mu$ S
(at 0.8 $\mu$ s pulse 3NM -LP1)	0.792 $\mu$ S
(at 1.0 $\mu$ s pulse 24NM -LP2)	0.992 $\mu$ S
(at 1.2 $\mu$ s pulse 24NM -LP3)	1.150 $\mu$ S

### 2.4 Receiver

MIC Front-end Ser. No.	0001
Diode limiter Ser. No.	A2822A
IF Center Frequency	60 MHz
IF Bandwidth	20/6/3 MHz

## 2.5 Display

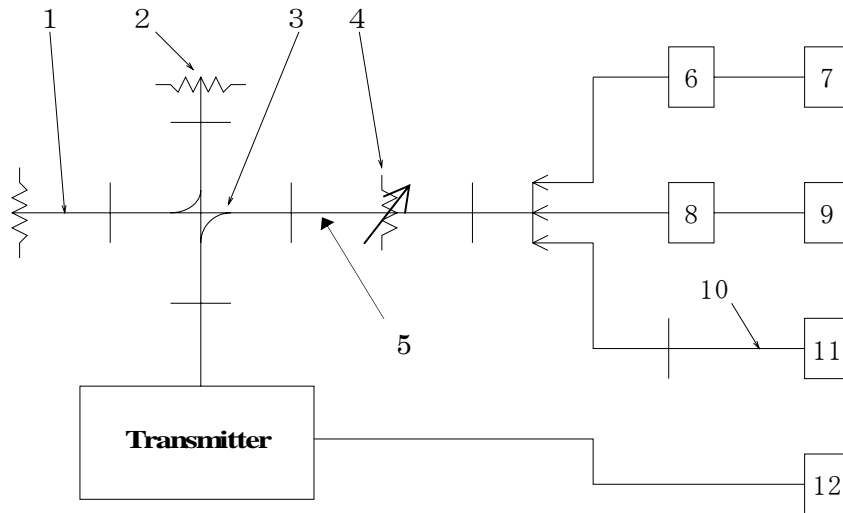
Input Voltage and Current(at 48NM)	AC.100V 5.1A
Repetition Frequency	
(0.07 $\mu$ s)	2250 Hz
(0.2 $\mu$ s)	2250 Hz
(0.3 $\mu$ s)	1901 Hz
(0.4 $\mu$ s)	1401 Hz
(0.8 $\mu$ s)	750 Hz
(1.0 $\mu$ s)	650 Hz
(1.2 $\mu$ s)	510 Hz

## 3 Overall Tests

Working Time of Timer	3min
Input Variation (AC 90 V – 126.5 V )	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	4D102A	SHIMADARIKA
2:high power Dummy Load	284-745-7M6	ATM
3:Directional Coupler	5D102	SHIMADARIKA
Coupling 30dB		
Directivity 20dB		
4:Attenuator	8495B	HP
5:Adaptor	284AC106-E-CPRF	MDL
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 $\mu$ s pulse 0.5 NM-SP1)	32.7 kw
(at 0.2 $\mu$ s pulse 3NM -MP1)	31.4 kw
(at 0.3 $\mu$ s pulse 3NM -MP2)	31.6 kw
(at 0.4 $\mu$ s pulse 3NM -MP3)	31.3 kw
(at 0.8 $\mu$ s pulse 3NM -LP1)	30.1 kw
(at 1.0 $\mu$ s pulse 24NM -LP2)	29.4 kw
(at 1.2 $\mu$ s pulse 24NM -LP3)	29.7 kw

#### 1.2 Average Power

(at 0.07 $\mu$ s pulse 0.5 NM-SP1)	6.01 w
(at 0.2 $\mu$ s pulse 3NM -MP1)	14.6 w
(at 0.3 $\mu$ s pulse 3NM -MP2)	17.6 w
(at 0.4 $\mu$ s pulse 3NM -MP3)	17.1 w
(at 0.8 $\mu$ s pulse 3NM -LP1)	17.9 w
(at 1.0 $\mu$ s pulse 24NM -LP2)	19.0 w
(at 1.2 $\mu$ s pulse 24NM -LP3)	17.4 w

#### 1.3 Load Impedance

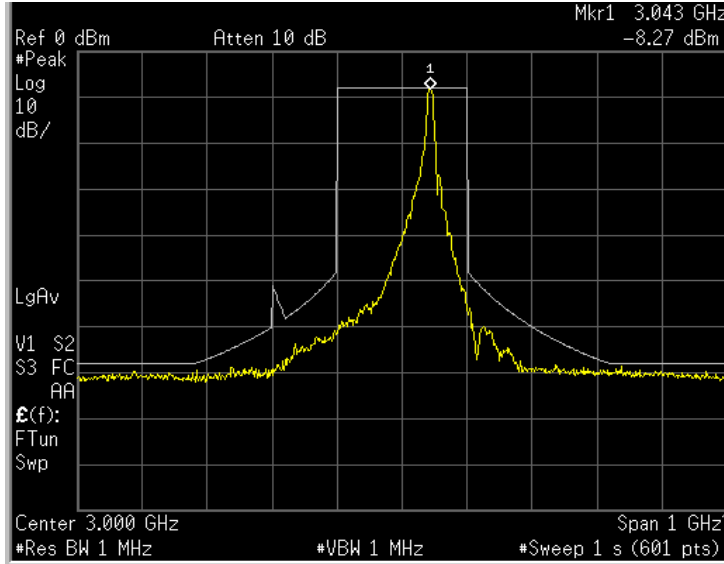
VSWR 1.10 at 2.60 – 3.95 GHz

(Sec. 2.1049) 2.0 Occupied Bandwidth

2.1 0.07  $\mu$  S Pulse PRF 2250Hz

0.07  $\mu$  S Pulse Length 0.0816  $\mu$  S

Scale  
10dB/Div

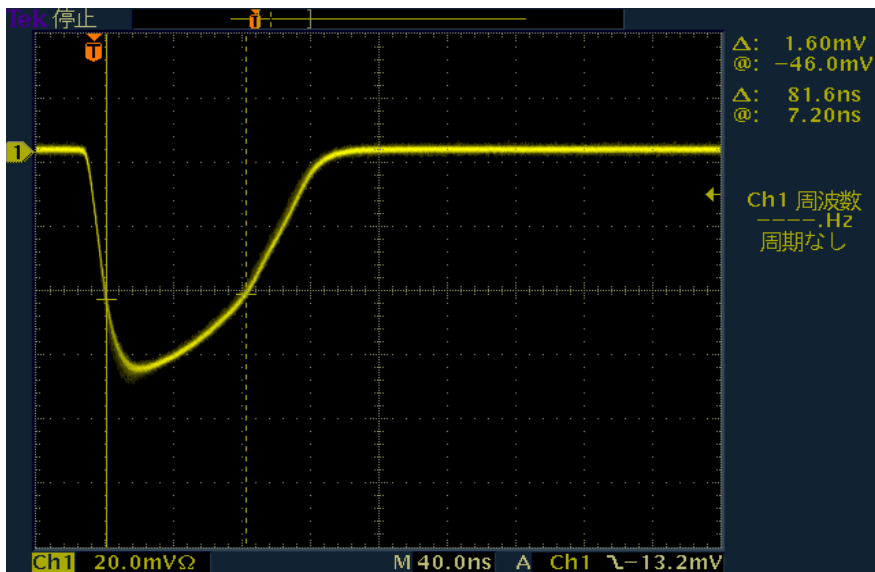


RF Spectrum  
0.07  $\mu$  S Pulse

OBW=38.5 MHz

Scale 100MHz/Div  
Center Frequency 3000MHz

Scale  
20mV/Div



$\leftarrow$  - 3 dB

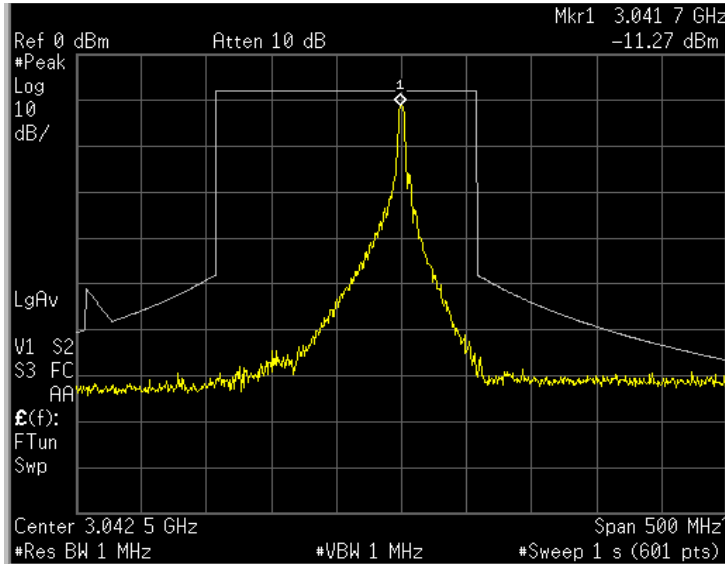
Detected RF  
Pulse  
0.07  $\mu$  S Pulse

Scale 0.04  $\mu$  S/Div

(Sec. 2.1049)

2.2 0.2  $\mu$  S Pulse PRF 2250Hz  
0.2  $\mu$  S Pulse Length 0.206  $\mu$  S

Scale  
10dB/Div

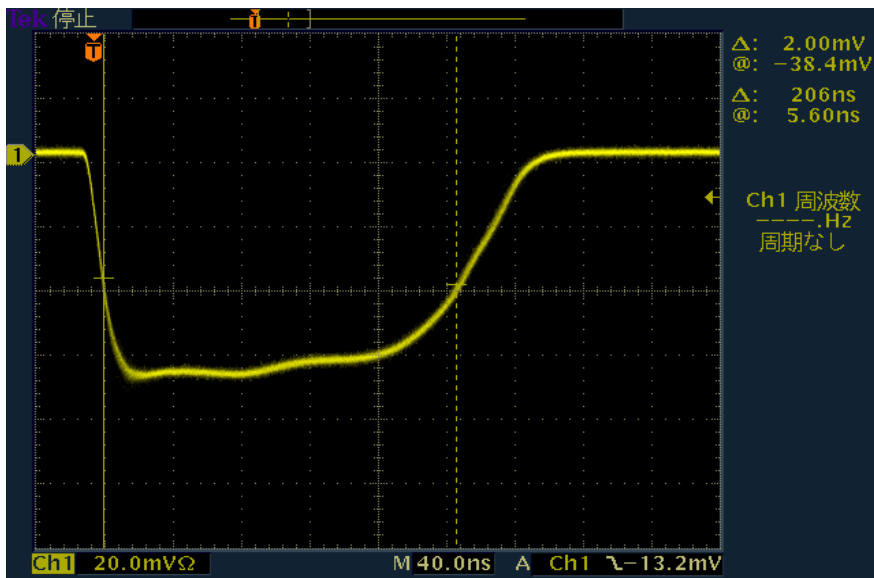


RF Spectrum  
0.2  $\mu$  S Pulse

OBW=25.0MHz

Scale 50MHz/Div  
Center Frequency 3042.5MHz

Scale  
20mV/Div



← -3 dB

Detected RF  
Pulse  
0.2  $\mu$  S Pulse

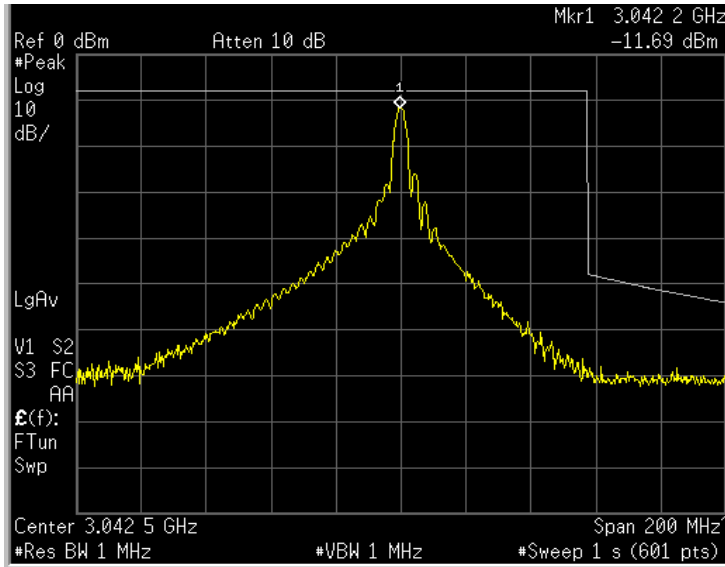
Scale 0.04  $\mu$  S/Div



(Sec. 2.1049)

2.3 0.3  $\mu$  S Pulse PRF 1901Hz  
0.3  $\mu$  S Pulse Length 0.292  $\mu$  S

Scale  
10dB/Div

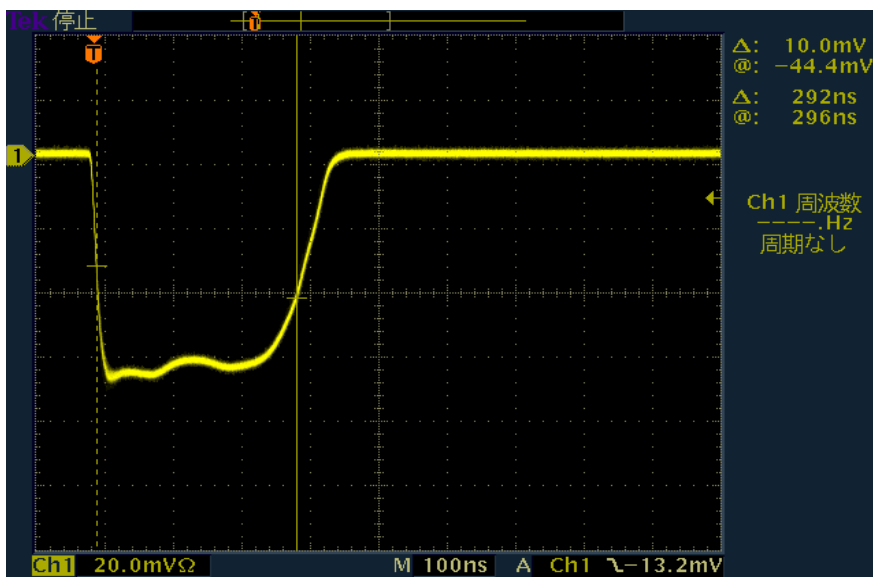


RF Spectrum  
0.3  $\mu$  S Pulse

OBW=19.5MHz

Scale 20MHz/Div  
Center Frequency 3042.5MHz

Scale  
20mV/Div



← - 3 dB

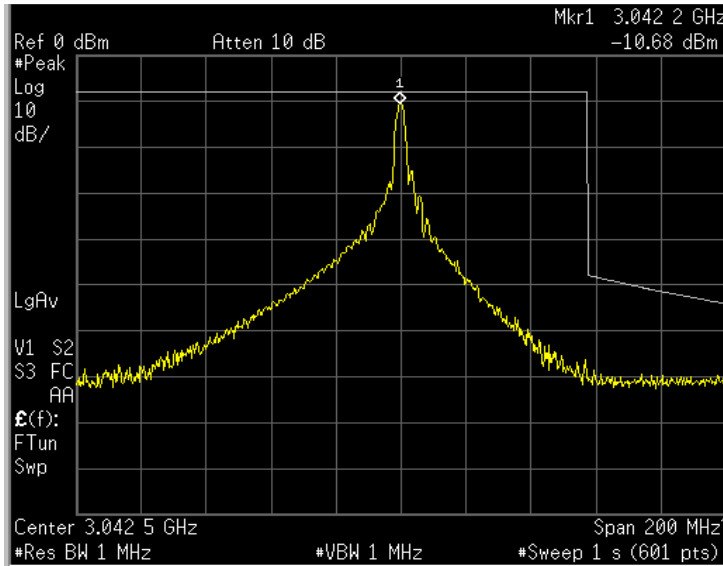
Detected RF  
Pulse  
0.3  $\mu$  S Pulse

Scale 0.1  $\mu$  S/Div

(Sec. 2.1049)

2.4 0.4  $\mu$  S Pulse PRF 1401Hz  
0.4  $\mu$  S Pulse Length 0.390  $\mu$  S

Scale  
10dB/Div

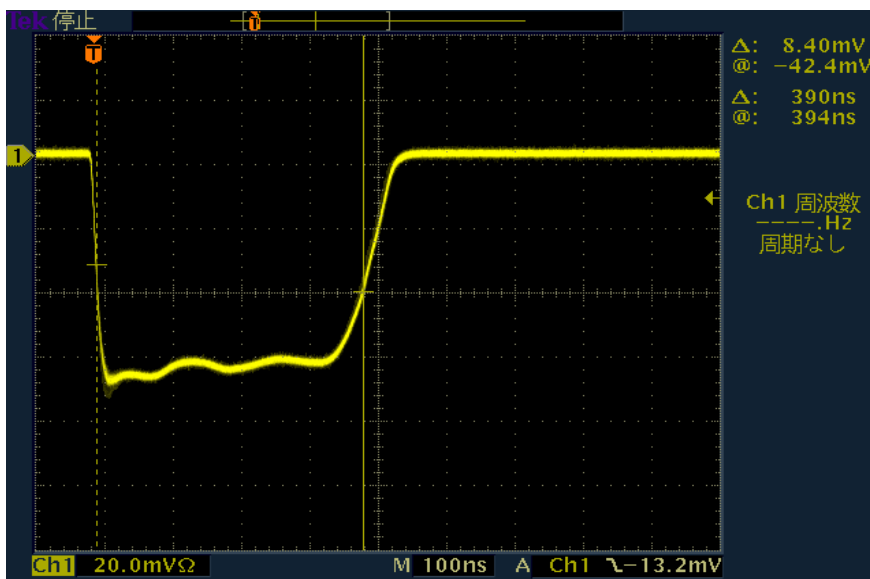


RF Spectrum  
0.4  $\mu$  S Pulse

OBW=15.5MHz

Scale 20MHz/Div  
Center Frequency 3042.5MHz

Scale  
20mV/Div



← - 3 dB

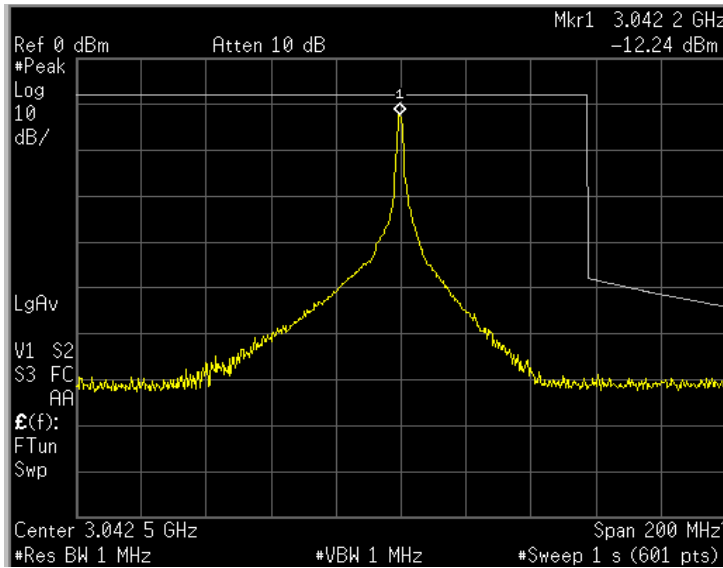
Detected RF  
Pulse  
0.4  $\mu$  S Pulse

Scale 0.1  $\mu$  S/Div

(Sec. 2.1049)

2.5 0.8  $\mu$  S Pulse PRF 749.9Hz  
0.8  $\mu$  S Pulse Length 0.792  $\mu$  S

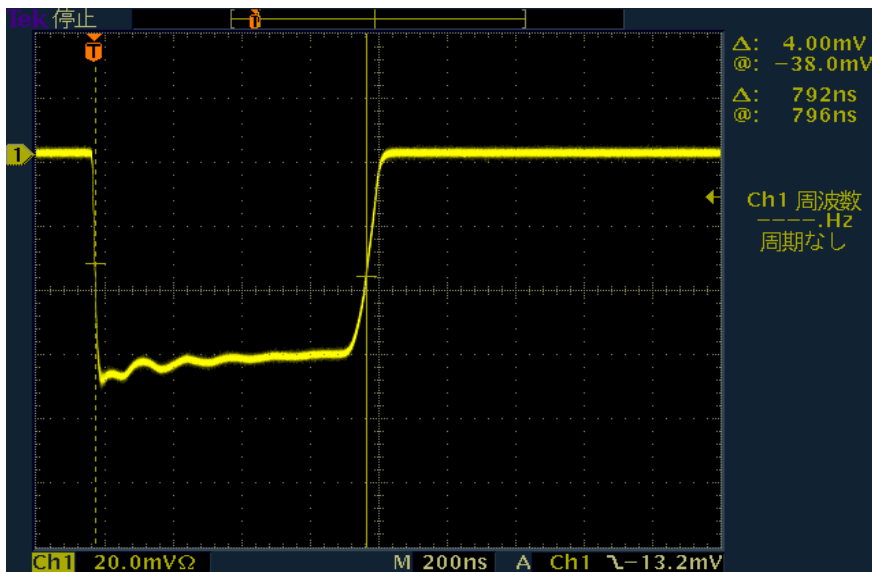
Scale  
10dB/Div



RF Spectrum  
0.8  $\mu$  S Pulse  
OBW=9.5MHz

Scale 20MHz/Div  
Center Frequency 3042.5MHz

Scale  
20mV/Div



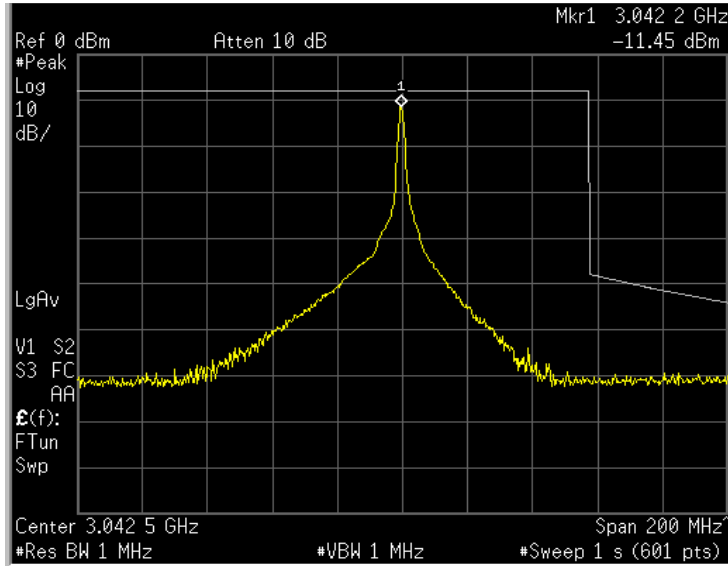
← - 3 dB  
Detected RF  
Pulse  
0.8  $\mu$  S Pulse

Scale 0.2  $\mu$  S/Div

(Sec. 2.1049)

2.5 1.0  $\mu$  S Pulse PRF 650.2Hz  
1.0  $\mu$  S Pulse Length 0.992  $\mu$  S

Scale  
10dB/Div

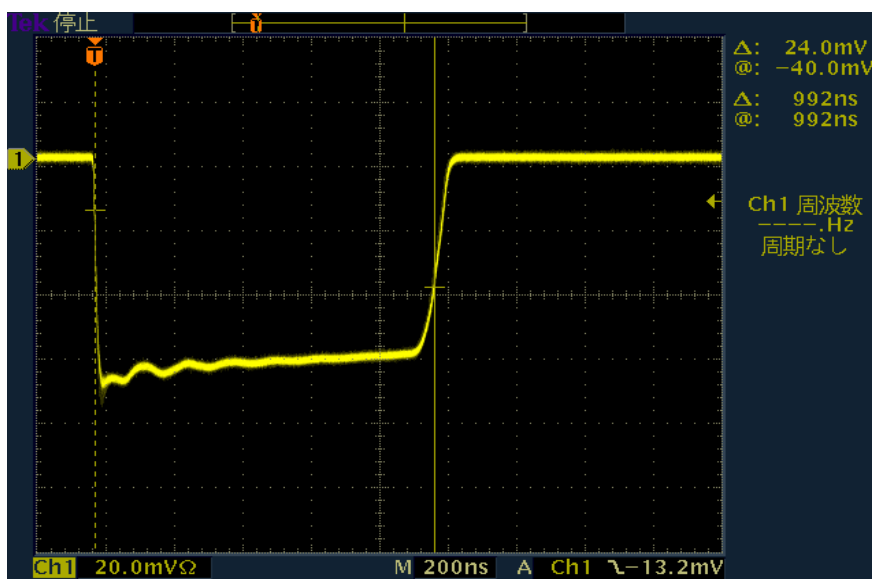


RF Spectrum  
1.0  $\mu$  S Pulse

OBW=8.5MHz

Scale 20MHz/Div  
Center Frequency 3042.5MHz

Scale  
50mV/Div



← - 3 dB

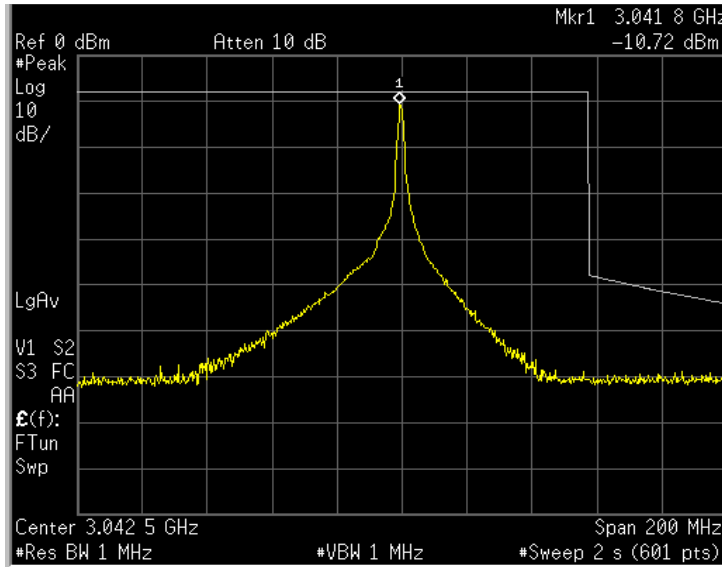
Detected RF  
Pulse  
1.0  $\mu$  S Pulse

Scale 0.2  $\mu$  S/Div

(Sec. 2.1049)

2.5    1.2  $\mu$  S Pulse PRF    509.9Hz  
      1.2  $\mu$  S Pulse Length    1.15  $\mu$  S

Scale  
10dB/Div

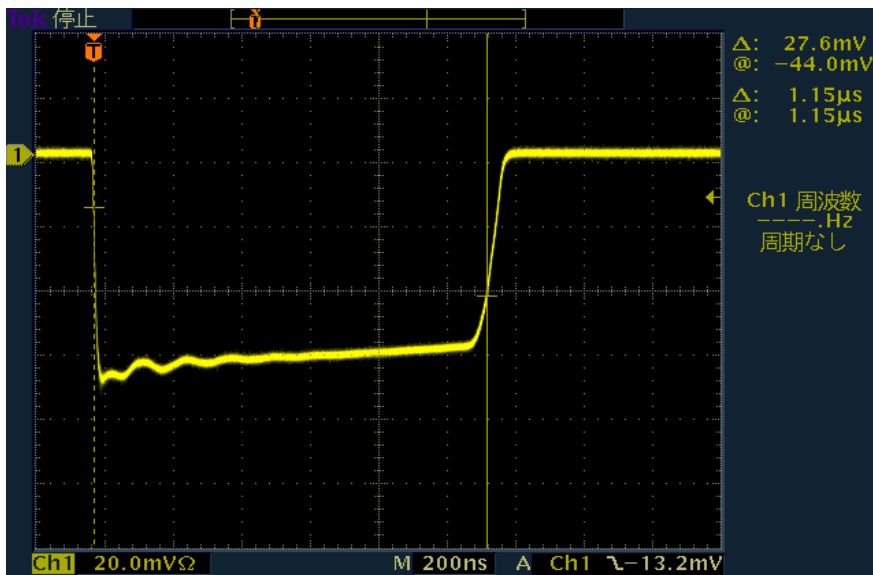


RF Spectrum  
1.2  $\mu$  S Pulse

OBW=8.1MHz

Scale 20MHz/Div  
Center Frequency 3042.5MHz

Scale  
50mV/Div



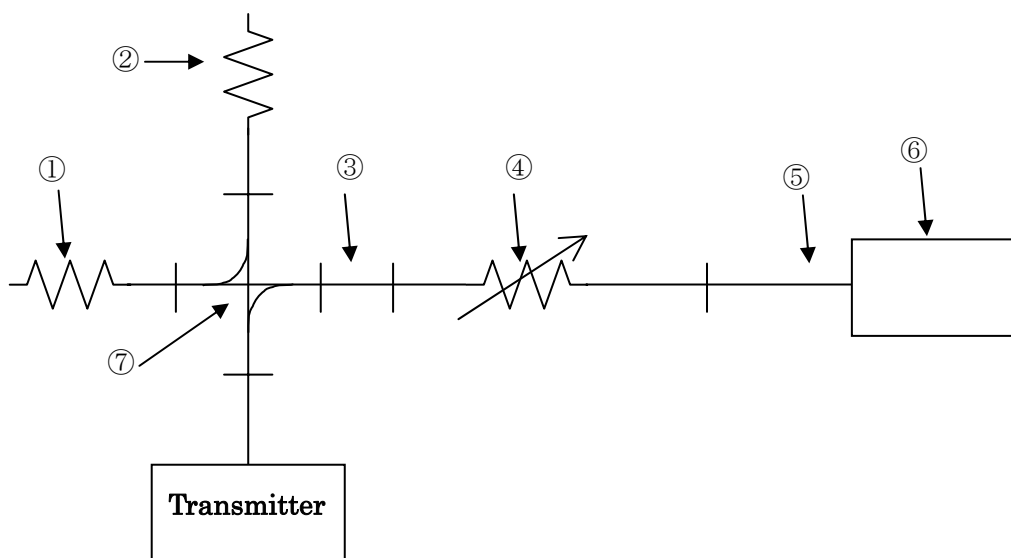
← - 3 dB

Detected RF  
Pulse  
1.2  $\mu$  S Pulse

Scale 0.2  $\mu$  S/Div

(Sec.2.1051) Spurious emission at antenna terminals

Condition 1: 0 to 3.95GHz

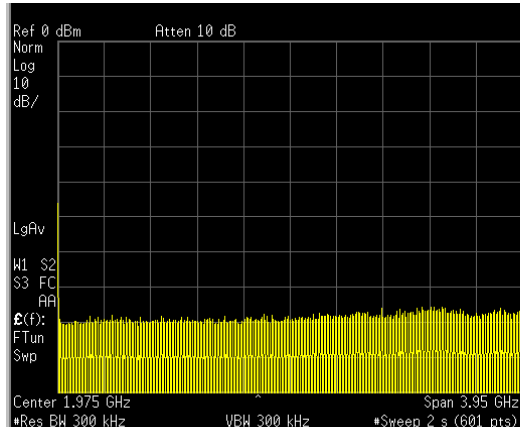


①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Adaptor	284AC106-E-CPRF	MDL
④Attenuator	8495B	HP
⑤Coaxial Cable	JUNFLON DGM024	JUNKOSHA
⑥Spectrum Analyzer	E4448A	Agilent
⑦Direction Coupler	5D102	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 20dB	

Attenuation 4 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale  
↑ 10dB/Div  
→ 395MHz/Div

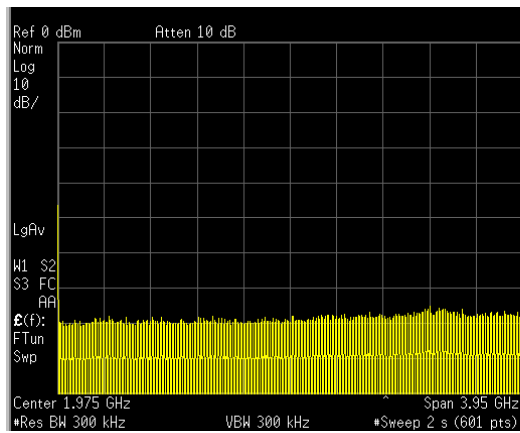


Spurious signal

OFF

0 to 3.95GHz

Scale  
↑ 10dB/Div  
→ 395MHz/Div

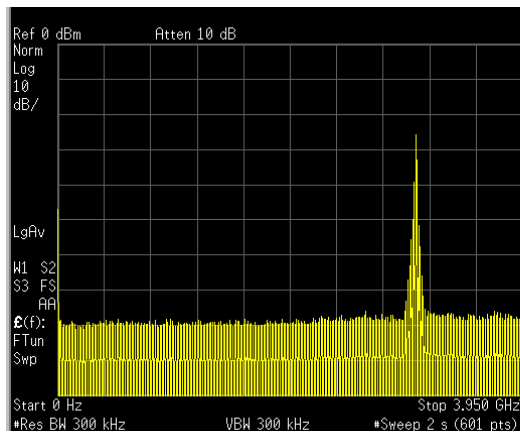


Spurious signal

Stand-By

0 to 3.95GHz

Scale  
↑ 10dB/Div  
→ 395MHz/Div



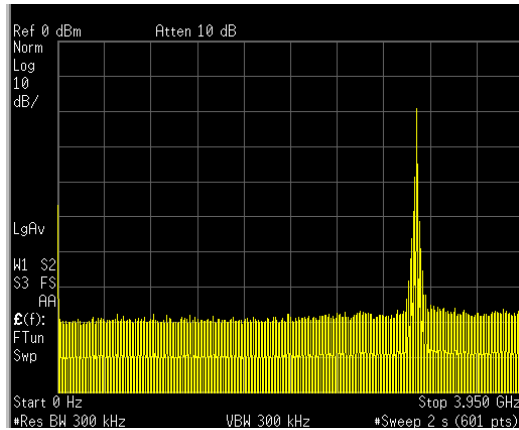
Spurious signal

0.070  $\mu$  s Pulse

0 to 3.95GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 395MHz/Div

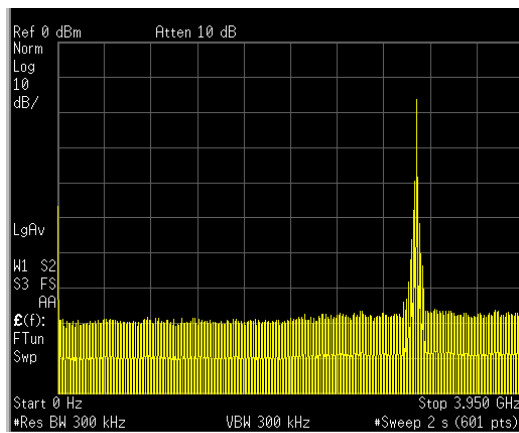


Spurious signal

0.20  $\mu$  s Pulse

0 to 3.95GHz

Scale  
↑ 10dB/Div  
→ 395MHz/Div

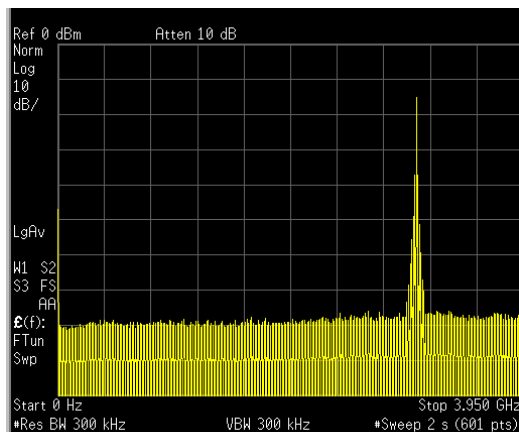


Spurious signal

0.30  $\mu$  s Pulse

0 to 3.95GHz

Scale  
↑ 10dB/Div  
→ 395MHz/Div



Spurious signal

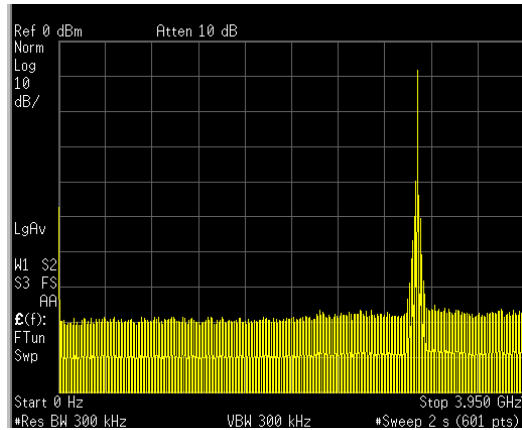
0.40  $\mu$  s Pulse

0 to 3.95GHz



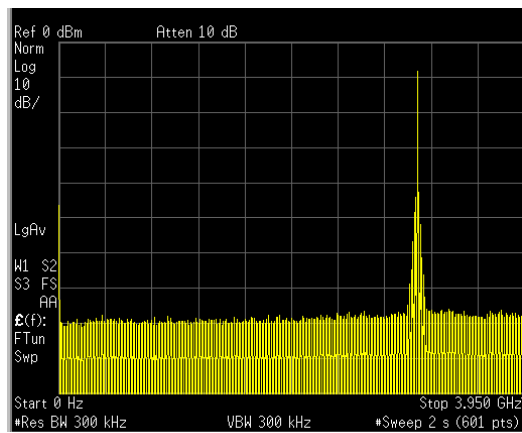
(2.1051)

Scale  
↑ 10dB/Div  
→ 395MHz/Div



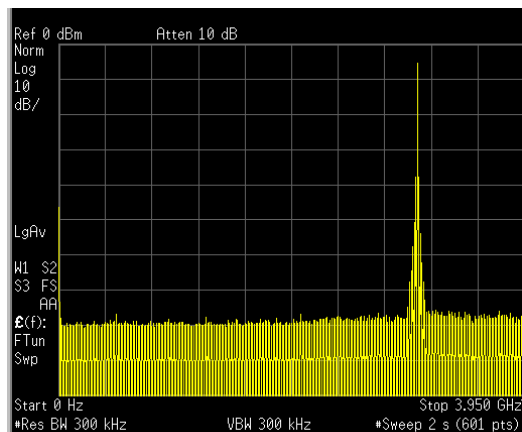
Spurious signal  
0.80  $\mu$  s Pulse  
0 to 3.95GHz

Scale  
↑ 10dB/Div  
→ 395MHz/Div



Spurious signal  
1.0  $\mu$  s Pulse  
0 to 3.95GHz

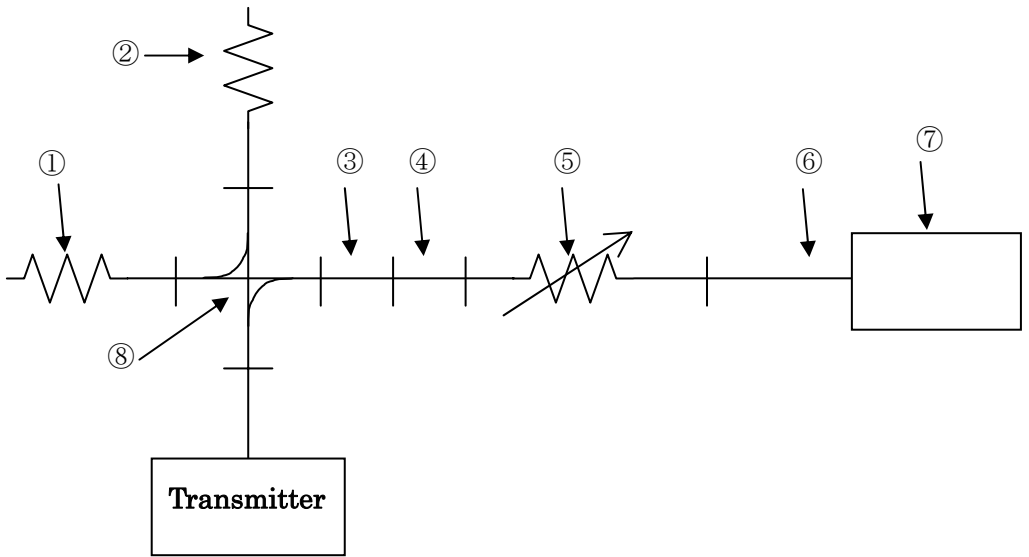
Scale  
↑ 10dB/Div  
→ 395MHz/Div



Spurious signal  
1.2  $\mu$  s Pulse  
0 to 3.95GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 2: 3.95 to 5.85GHz

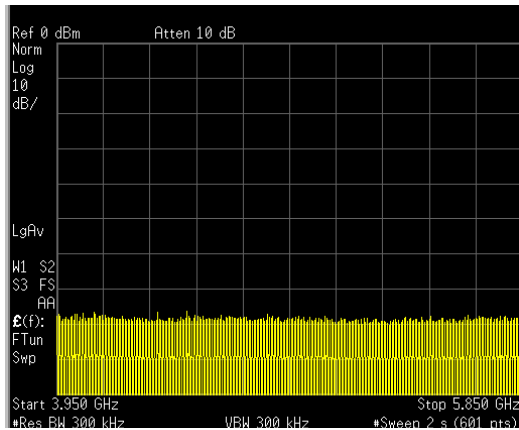


①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Taper W/G	187/284-12-2-2	ATM
④Adaptor	187AC106-CPRF-E	MDL
⑤Attenuator	8495B	HP
⑥Coaxial Cable	JUNFLON DGM024	JUNKOSHA
⑦Spectrum Analyzer	E4448A	Agilent
⑧Direction Coupler	5D102	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 20dB	

Attenuation 5 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale  
↑ 10dB/Div  
→ 190MHz/Div

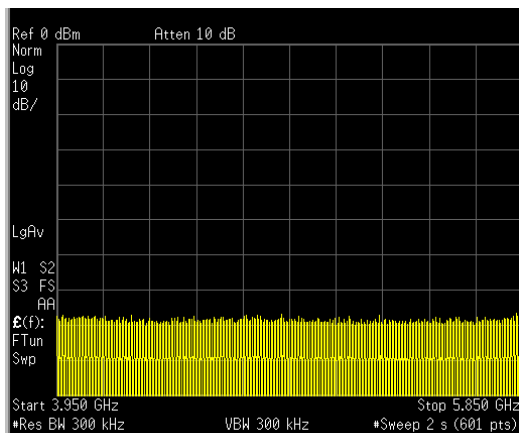


Spurious signal

OFF

3.95 to 5.85GHz

Scale  
↑ 10dB/Div  
→ 190MHz/Div

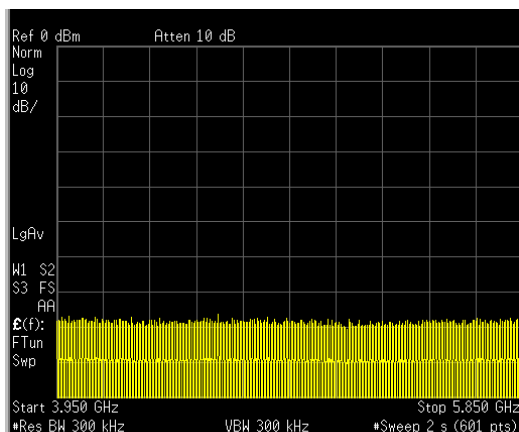


Spurious signal

Stand-By

3.95 to 5.85GHz

Scale  
↑ 10dB/Div  
→ 190MHz/Div



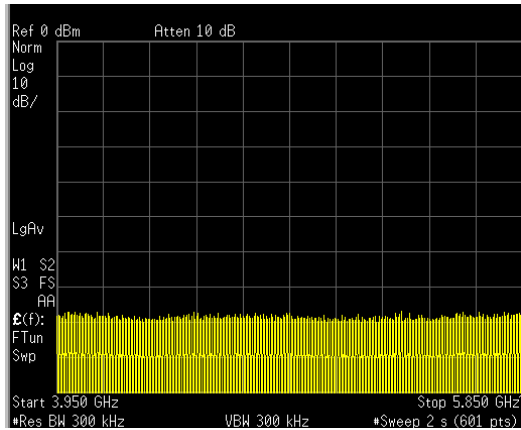
Spurious signal

0.070  $\mu$  s Pulse

3.95 to 5.85GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 190MHz/Div

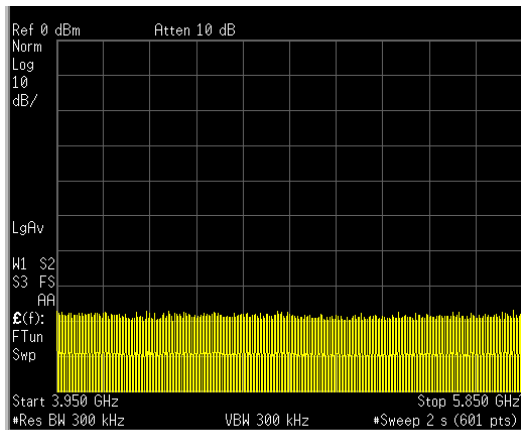


Spurious signal

0.20  $\mu$  s Pulse

3.95 to 5.85GHz

Scale  
↑ 10dB/Div  
→ 190MHz/Div

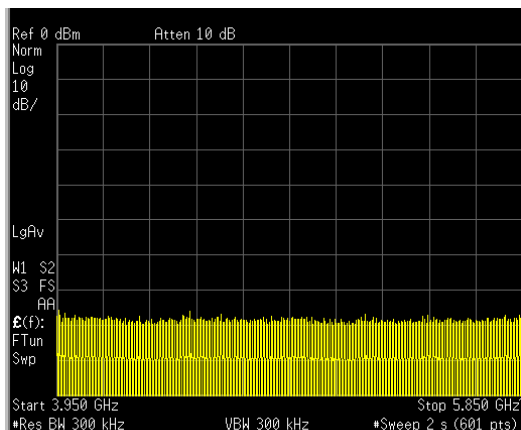


Spurious signal

0.30  $\mu$  s Pulse

3.95 to 5.85GHz

Scale  
↑ 10dB/Div  
→ 190MHz/Div



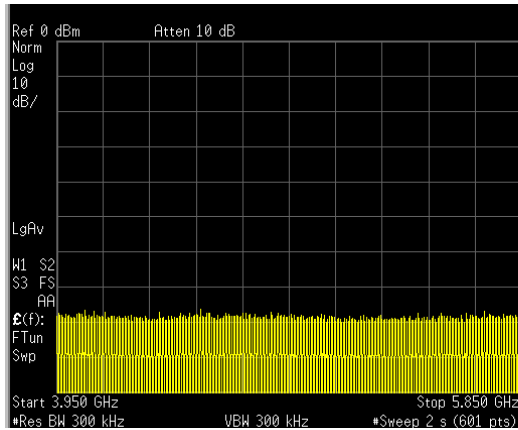
Spurious signal

0.40  $\mu$  s Pulse

3.95 to 5.85GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 190MHz/Div

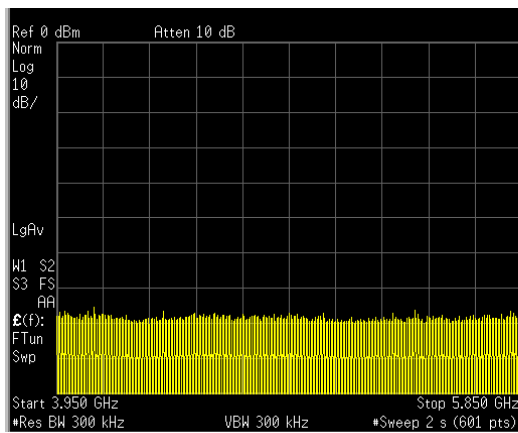


Spurious signal

0.80  $\mu$  s Pulse

3.95 to 5.85GHz

Scale  
↑ 10dB/Div  
→ 190MHz/Div

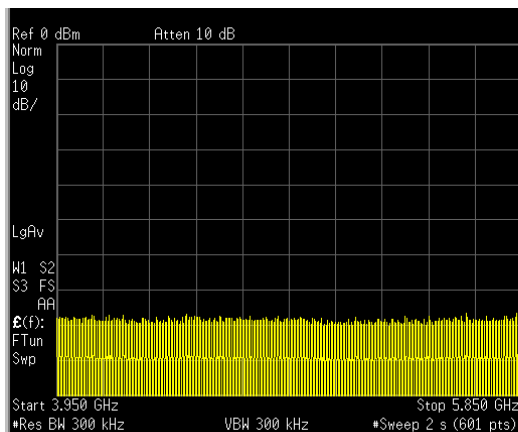


Spurious signal

1.0  $\mu$  s Pulse

3.95 to 5.85GHz

Scale  
↑ 10dB/Div  
→ 190MHz/Div



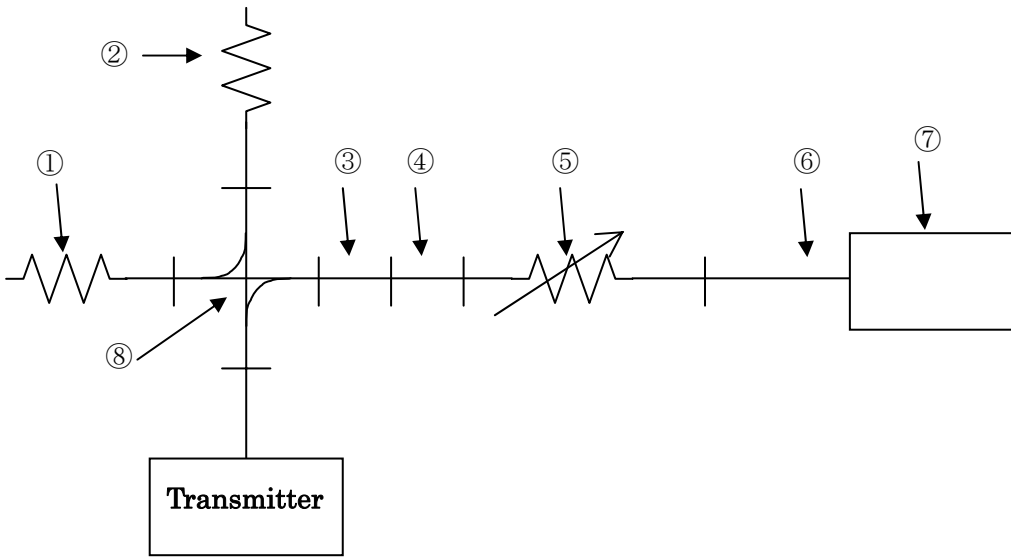
Spurious signal

1.2  $\mu$  s Pulse

3.95 to 5.85GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 3: 5.85 to 8.2GHz

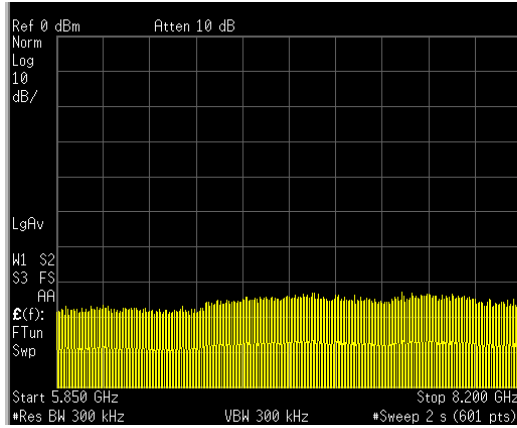


①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Taper W/G	137/284-10-2-2	ATM
④Adaptor	137AC106-CPRF-E	MDL
⑤Attenuator	8495B	HP
⑥Coaxial Cable	JUNFLON DGM024	JUNKOSHA
⑦Spectrum Analyzer	E4448A	Agilent
⑧Direction Coupler	5D102	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 20dB	

Attenuation 5 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale  
↑ 10dB/Div  
→ 235MHz/Div

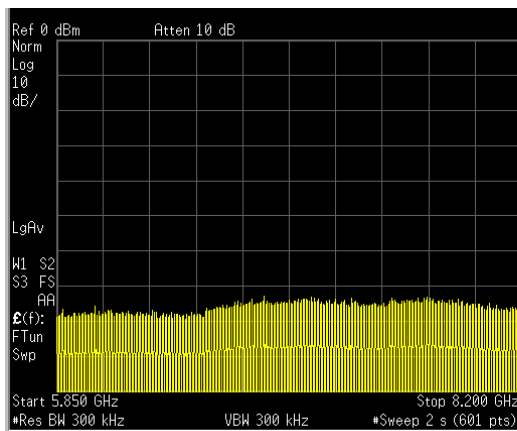


Spurious signal

OFF

0 to 2.9GHz

Scale  
↑ 10dB/Div  
→ 235MHz/Div

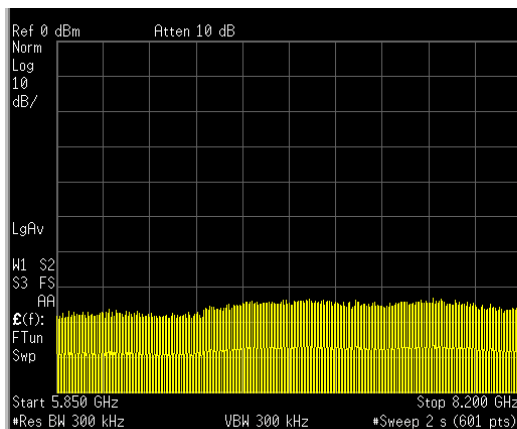


Spurious signal

Stand-By

5.85 to 8.2GHz

Scale  
↑ 10dB/Div  
→ 235MHz/Div



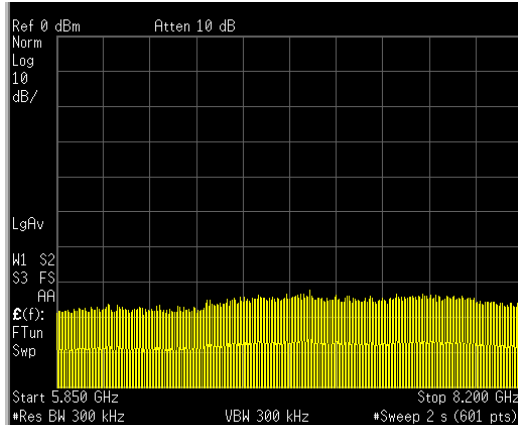
Spurious signal

0.070  $\mu$  s Pulse

5.85 to 8.2GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 235MHz/Div

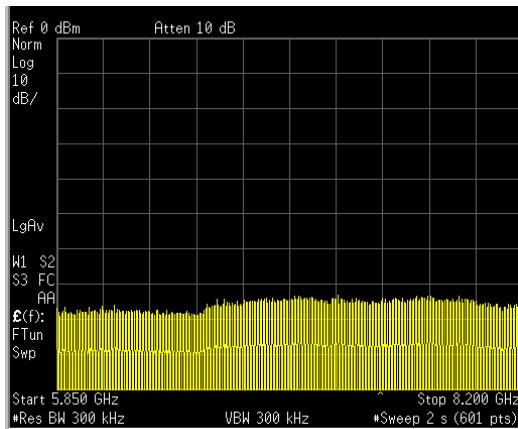


Spurious signal

0.20  $\mu$  s Pulse

5.85 to 8.2GHz

Scale  
↑ 10dB/Div  
→ 235MHz/Div

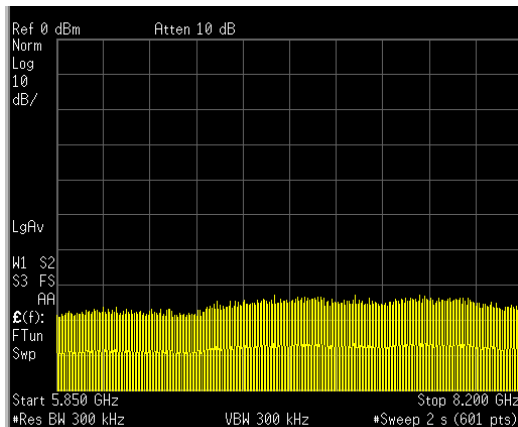


Spurious signal

0.30  $\mu$  s Pulse

5.85 to 8.2GHz

Scale  
↑ 10dB/Div  
→ 235MHz/Div



Spurious signal

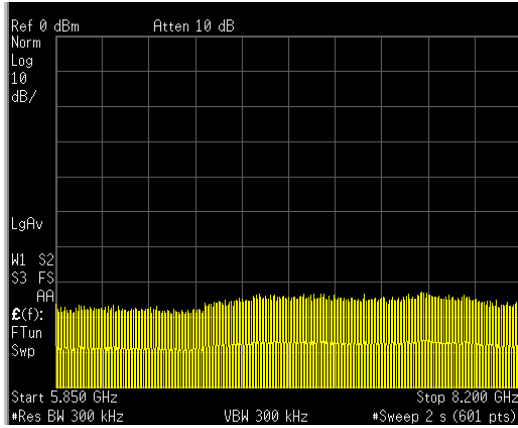
0.40  $\mu$  s Pulse

5.85 to 8.2GHz



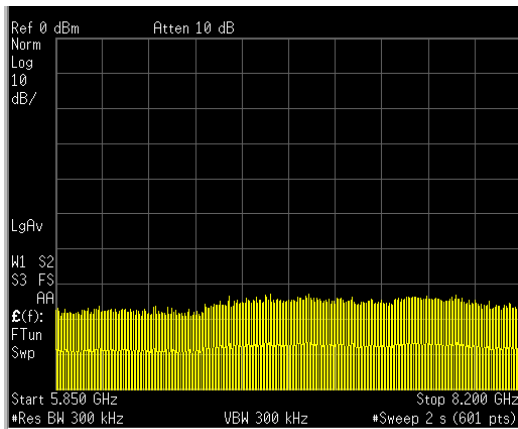
(2.1051)

Scale  
↑ 10dB/Div  
→ 235MHz/Div



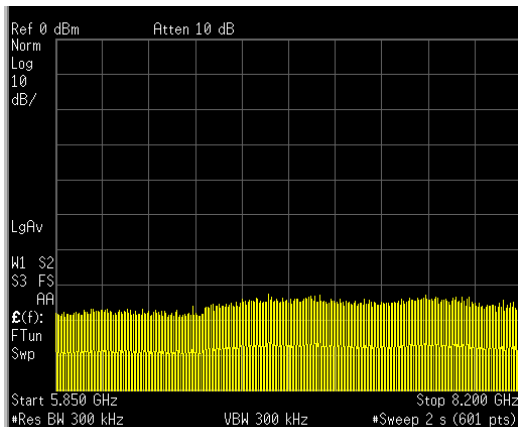
Spurious signal  
0.80  $\mu$  s Pulse  
5.85 to 8.2GHz

Scale  
↑ 10dB/Div  
→ 235MHz/Div



Spurious signal  
1.0  $\mu$  s Pulse  
5.85 to 8.2GHz

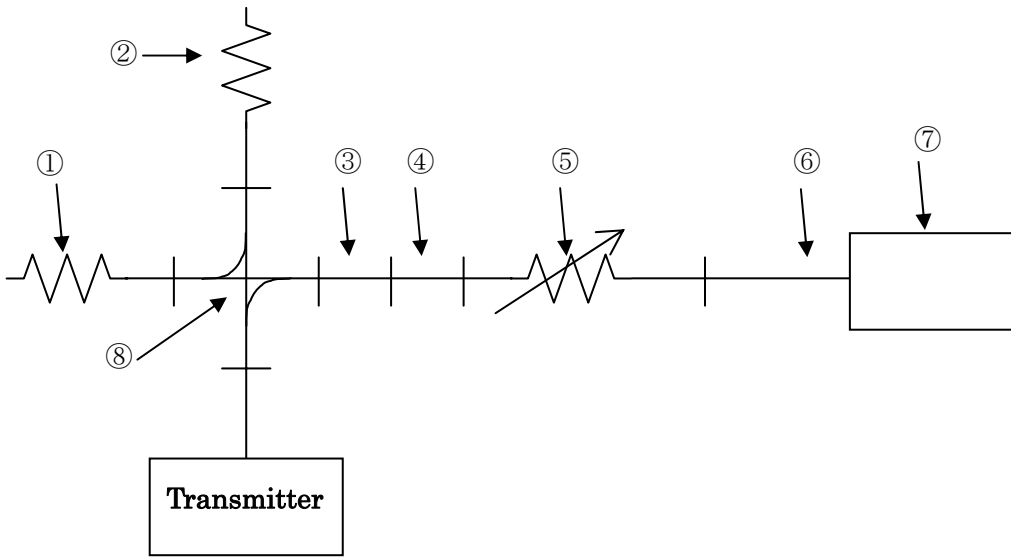
Scale  
↑ 10dB/Div  
→ 235MHz/Div



Spurious signal  
1.2  $\mu$  s Pulse  
5.85 to 8.2GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 4: 8.2 to 12.4GHz

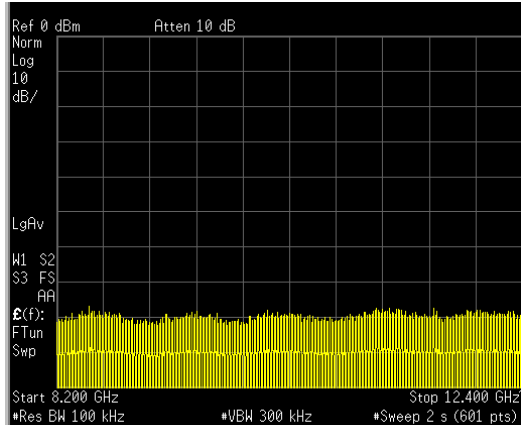


①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Taper W/G	90/284-12-6-2	ATM
④Adaptor	90AC106-1E	MDL
⑤Attenuator	8495B	HP
⑥Coaxial Cable	JUNFLON DGM024	JUNKOSHA
⑦Spectrum Analyzer	E4448A	Agilent
⑧Direction Coupler	5D102	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 20dB	

Attenuation 4 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale  
↑ 10dB/Div  
→ 420MHz/Div

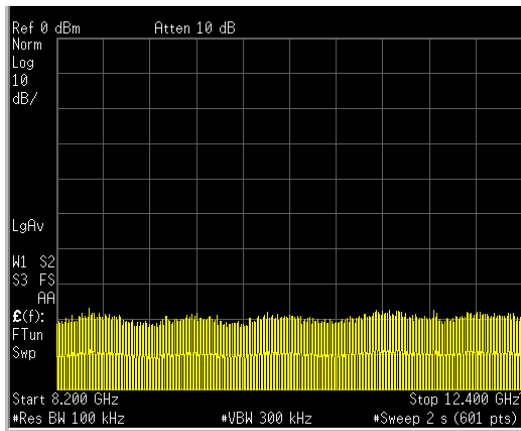


Spurious signal

OFF

8.2 to 12.4GHz

Scale  
↑ 10dB/Div  
→ 420MHz/Div

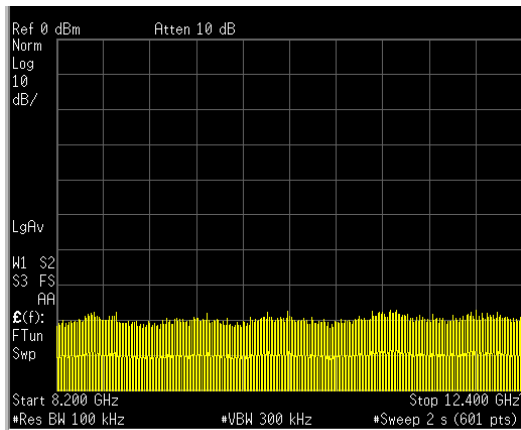


Spurious signal

Stand-By

8.2 to 12.4GHz

Scale  
↑ 10dB/Div  
→ 420MHz/Div



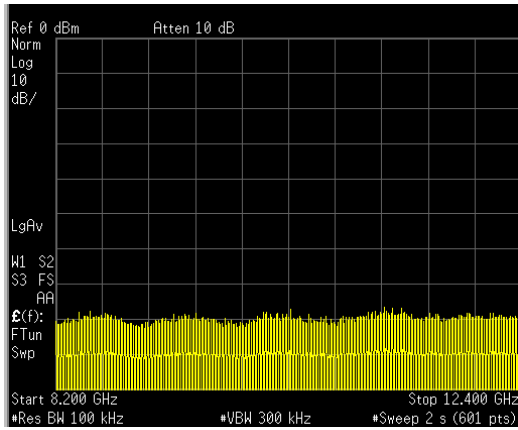
Spurious signal

0.070  $\mu$  s Pulse

8.2 to 12.4GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 420MHz/Div

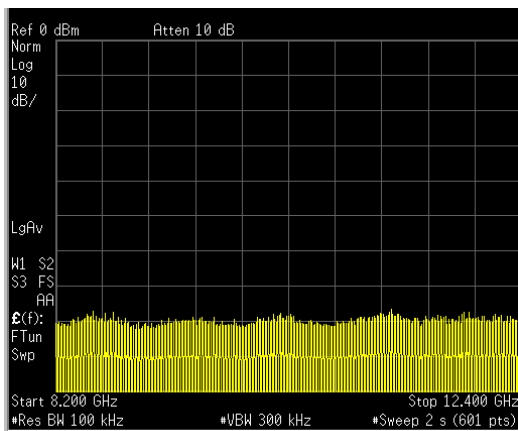


Spurious signal

0.20  $\mu$  s Pulse

8.2 to 12.4GHz

Scale  
↑ 10dB/Div  
→ 420MHz/Div

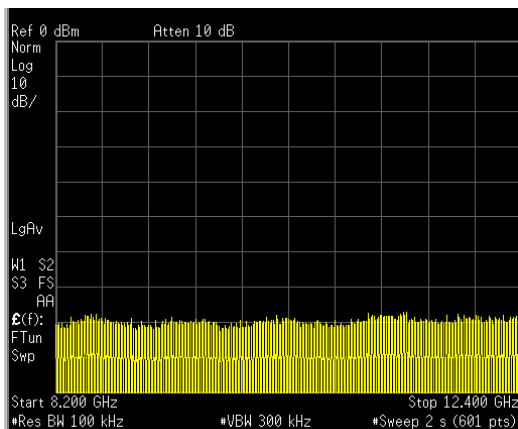


Spurious signal

0.30  $\mu$  s Pulse

8.2 to 12.4GHz

Scale  
↑ 10dB/Div  
→ 420MHz/Div



Spurious signal

0.40  $\mu$  s Pulse

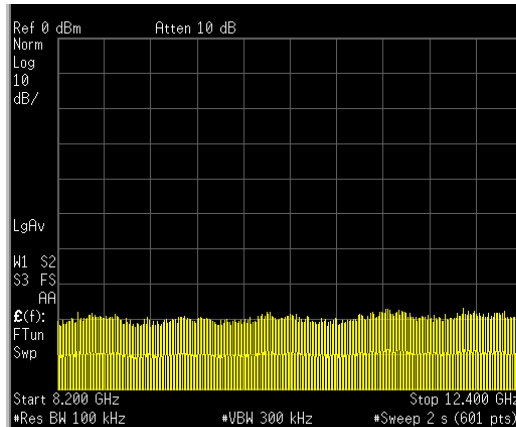
8.2 to 12.4GHz

(2.1051)

Scale

↑ 10dB/Div

→ 420MHz/Div



Spurious signal

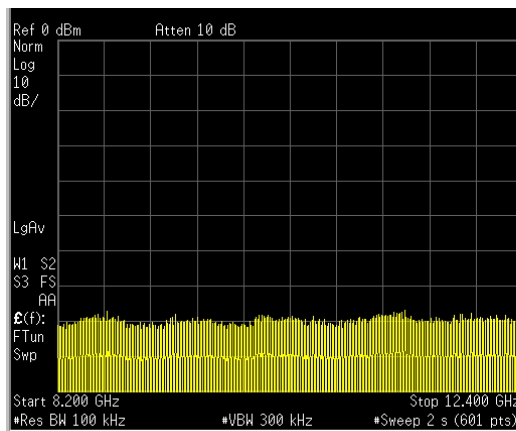
0.80  $\mu$  s Pulse

8.2 to 12.4GHz

Scale

↑ 10dB/Div

→ 420MHz/Div



Spurious signal

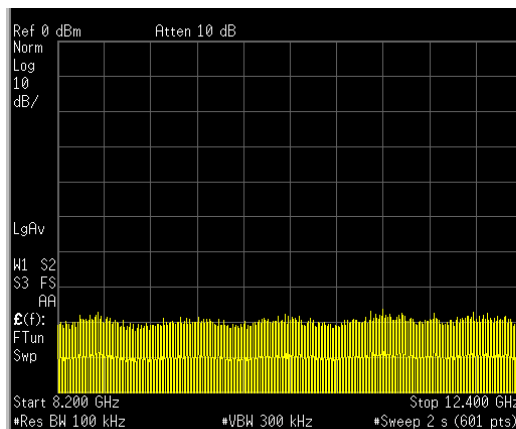
1.0  $\mu$  s Pulse

8.2 to 12.4GHz

Scale

↑ 10dB/Div

→ 420MHz/Div



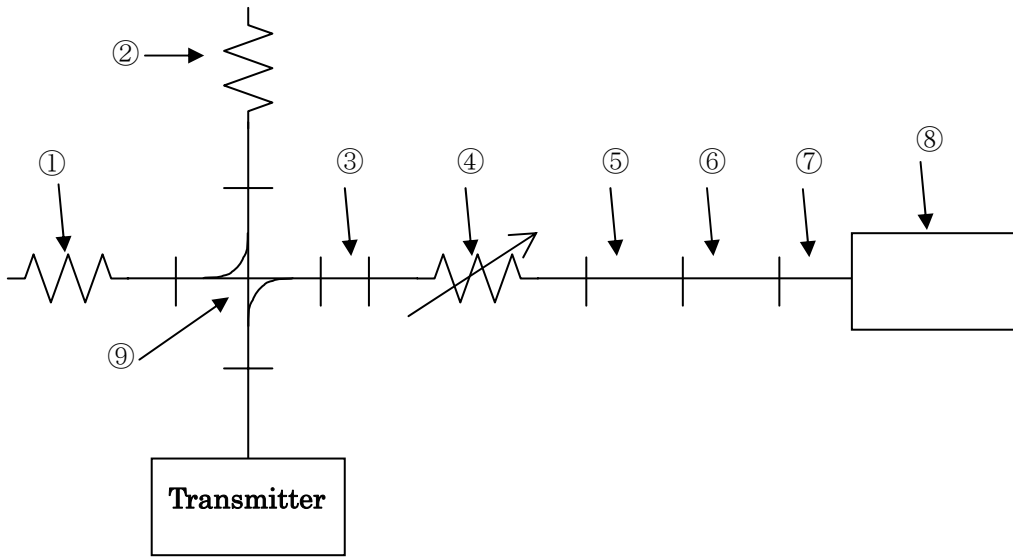
Spurious signal

1.2  $\mu$  s Pulse

8.2 to 12.4GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 5: 11.9 to 18.0GHz

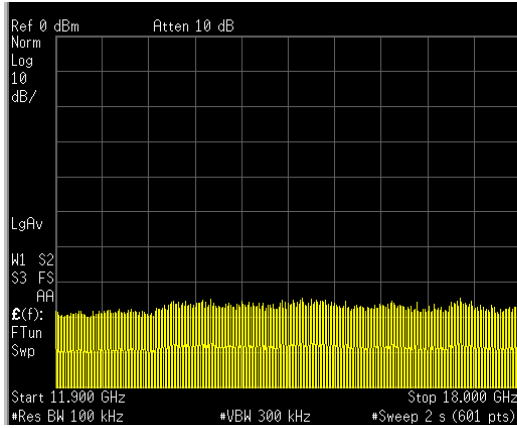


①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Taper W/G	90/284-12-6-2	ATM
④Attenuator	X382A	HP
⑤Taper W/G	62/90-6-6-6	ATM
⑥Adaptor	62AC126-E	MDL
⑦Coaxial Cable	JUNFLON DGM024	JUNKOSHA
⑧Spectrum Analyzer	E4448A	Agilent
⑨Direction Coupler	5D102	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 20dB	

Attenuation 4 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale  
↑ 10dB/Div  
→ 610MHz/Div

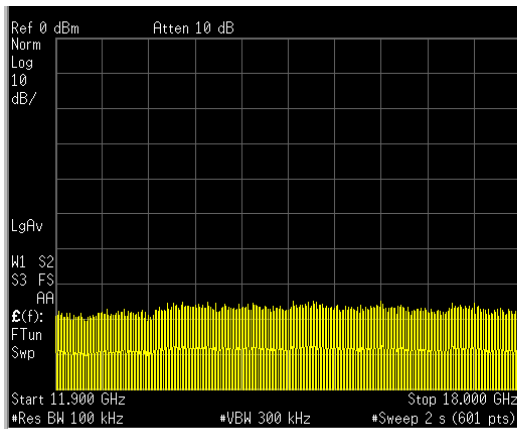


Spurious signal

OFF

11.9 to 18.0GHz

Scale  
↑ 10dB/Div  
→ 610MHz/Div

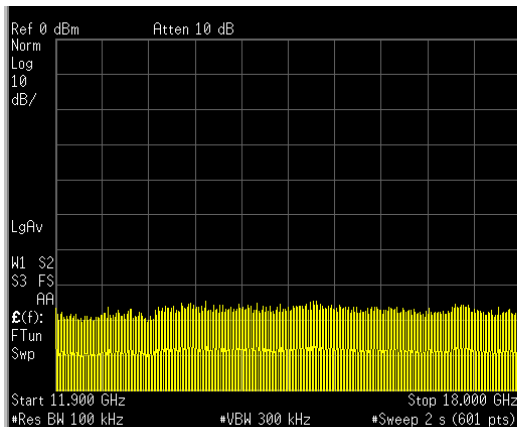


Spurious signal

Stand-By

11.9 to 18.0GHz

Scale  
↑ 10dB/Div  
→ 610MHz/Div



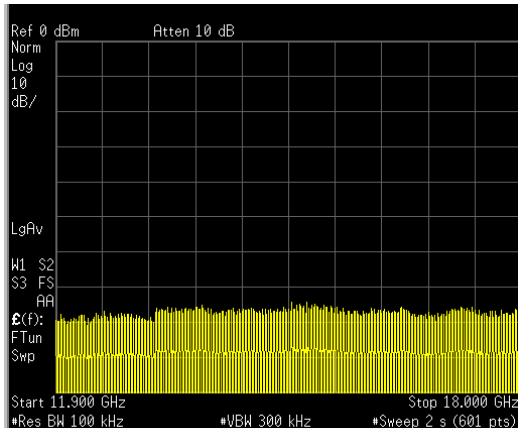
Spurious signal

0.070  $\mu$  s Pulse

11.9 to 18.0GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 610MHz/Div

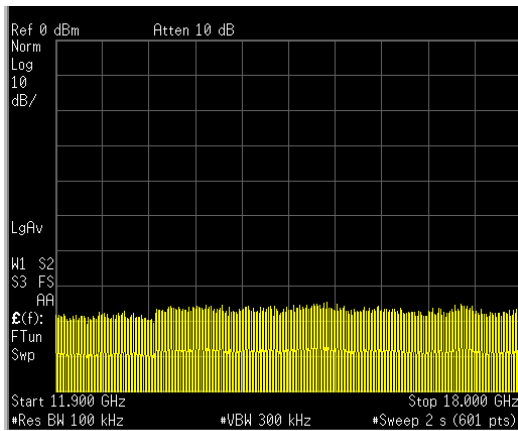


Spurious signal

0.20  $\mu$  s Pulse

11.9 to 18.0GHz

Scale  
↑ 10dB/Div  
→ 610MHz/Div

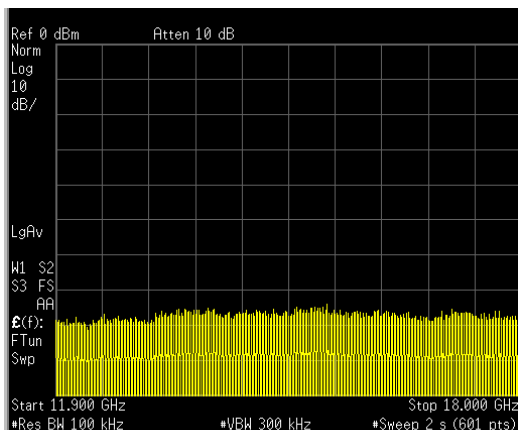


Spurious signal

0.30  $\mu$  s Pulse

11.9 to 18.0GHz

Scale  
↑ 10dB/Div  
→ 610MHz/Div



Spurious signal

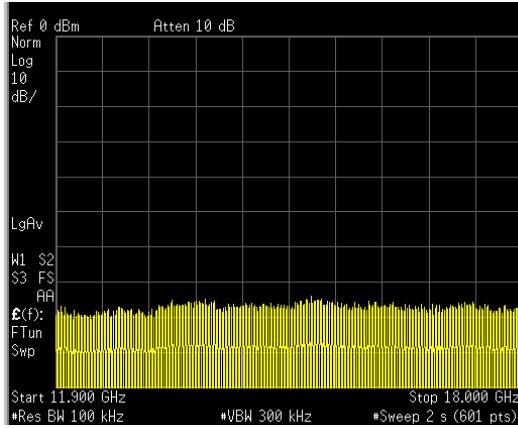
0.40  $\mu$  s Pulse

11.9 to 18.0GHz



(2.1051)

Scale  
↑ 10dB/Div  
→ 610MHz/Div

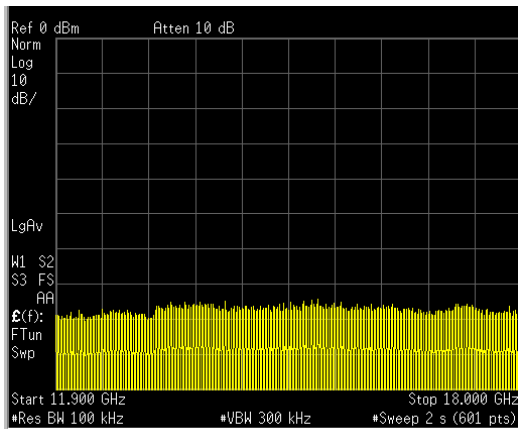


Spurious signal

0.80  $\mu$  s Pulse

11.9 to 18.0GHz

Scale  
↑ 10dB/Div  
→ 610MHz/Div

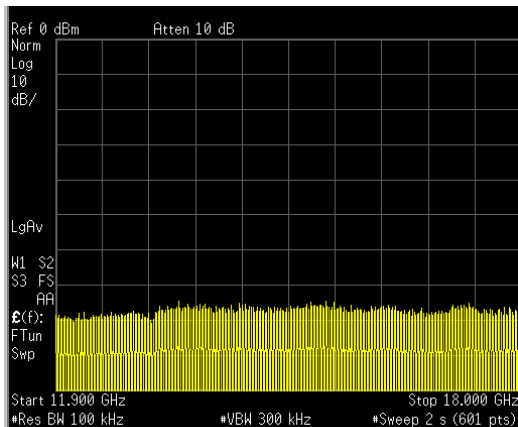


Spurious signal

1.0  $\mu$  s Pulse

11.9 to 18.0GHz

Scale  
↑ 10dB/Div  
→ 610MHz/Div



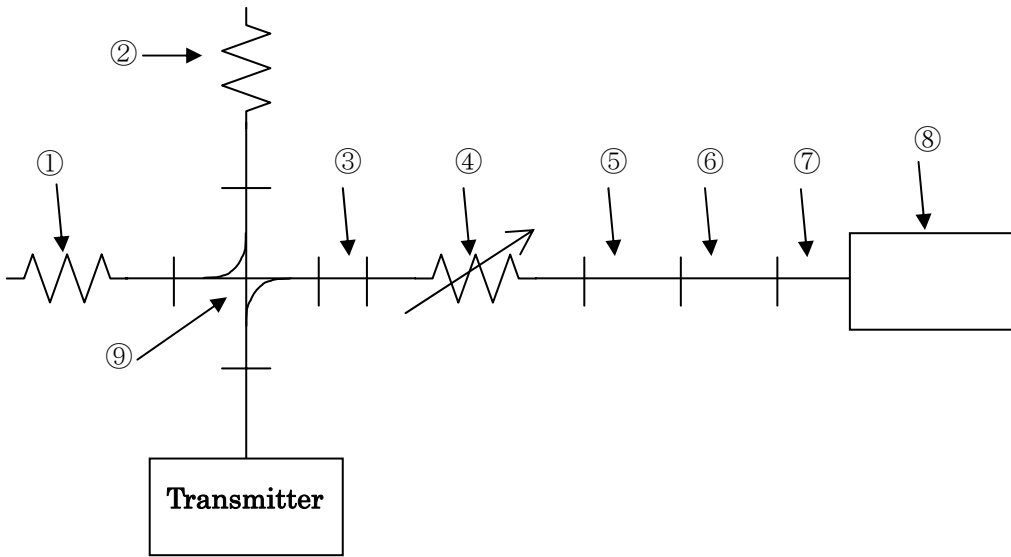
Spurious signal

1.2  $\mu$  s Pulse

11.9 to 18.0GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 6: 17.6 to 26.7GHz

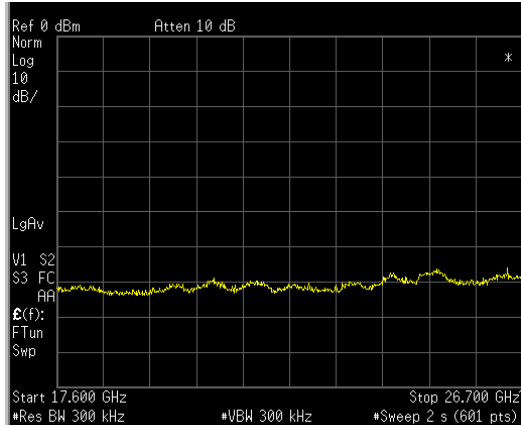


①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Taper W/G	90/284-12-6-2	ATM
④Attenuator	X382A	HP
⑤Taper W/G	42/90-6-6-6	ATM
⑥Adaptor	42AC206	MDL
⑦Coaxial Cable	SCOFLEX 100	HUBER+SUHNER
⑧Spectrum Analyzer	E4448A	Agilent
⑨Direction Coupler	5D102	SHIMADARIKA
Coupling	: 30dB	
Directivity	: 20dB	

Attenuation 4 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale  
↑ 10dB/Div  
→ 910MHz/Div

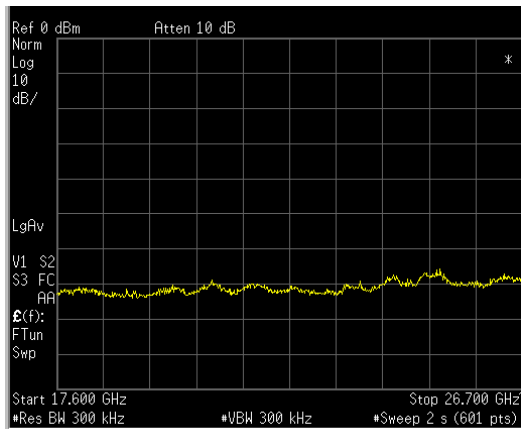


Spurious signal

OFF

17.6 to 26.7GHz

Scale  
↑ 10dB/Div  
→ 910MHz/Div

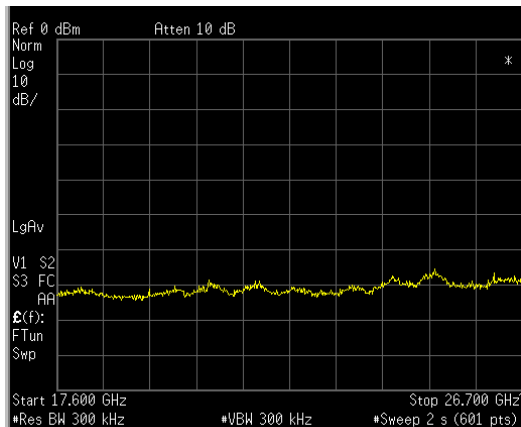


Spurious signal

Stand-By

17.6 to 26.7GHz

Scale  
↑ 10dB/Div  
→ 910MHz/Div



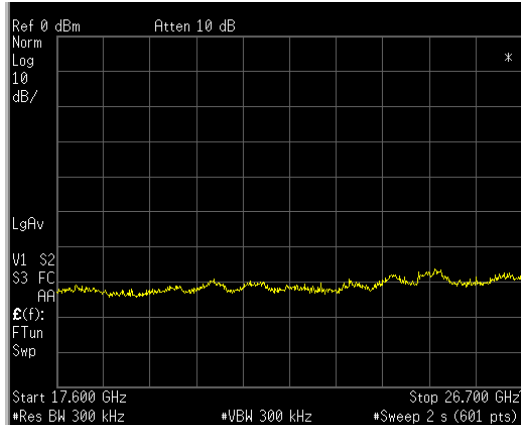
Spurious signal

0.070  $\mu$  s Pulse

17.6 to 26.7GHz

(2.1051)

Scale  
↑ 10dB/Div  
→ 910MHz/Div

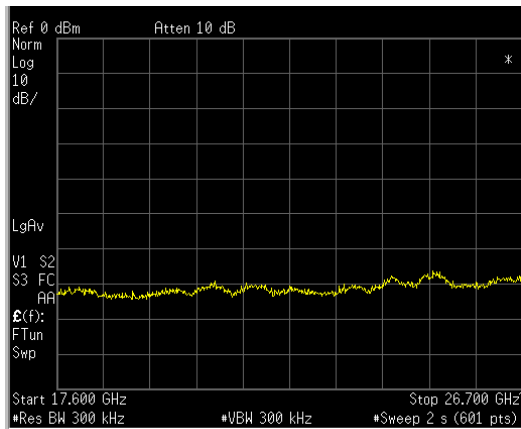


Spurious signal

0.20  $\mu$  s Pulse

17.6 to 26.7GHz

Scale  
↑ 10dB/Div  
→ 910MHz/Div

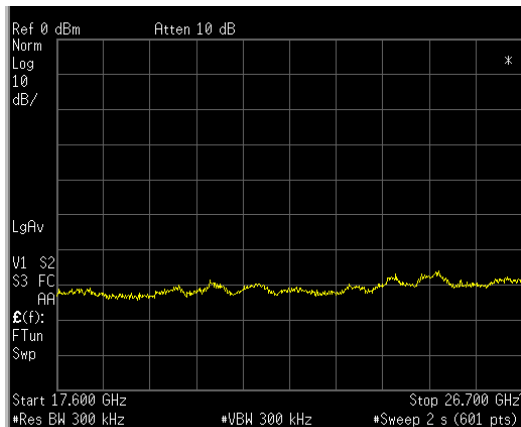


Spurious signal

0.30  $\mu$  s Pulse

17.6 to 26.7GHz

Scale  
↑ 10dB/Div  
→ 910MHz/Div



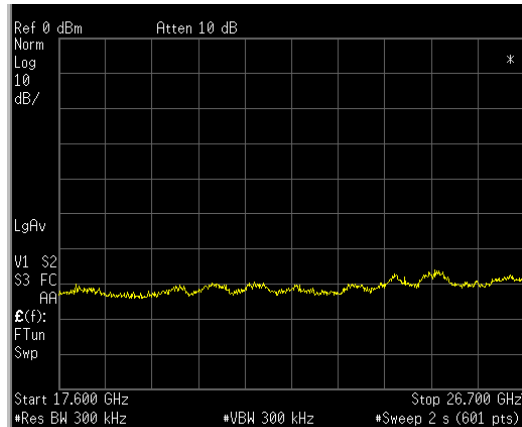
Spurious signal

0.40  $\mu$  s Pulse

17.6 to 26.7GHz

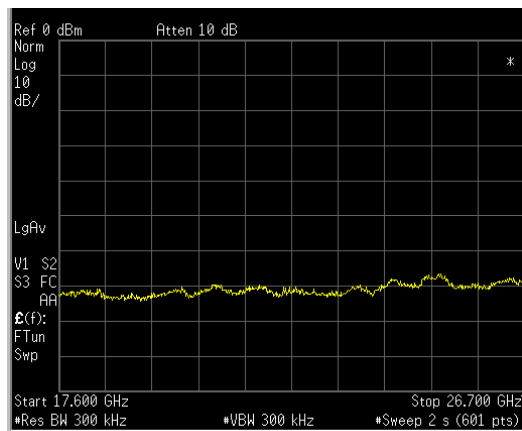
(2.1051)

Scale  
↑ 10dB/Div  
→ 910MHz/Div



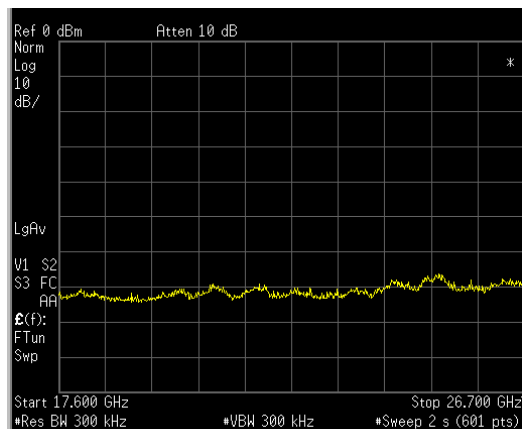
Spurious signal  
0.80  $\mu$  s Pulse  
17.6 to 26.7GHz

Scale  
↑ 10dB/Div  
→ 910MHz/Div



Spurious signal  
1.0  $\mu$  s Pulse  
17.6 to 26.7GHz

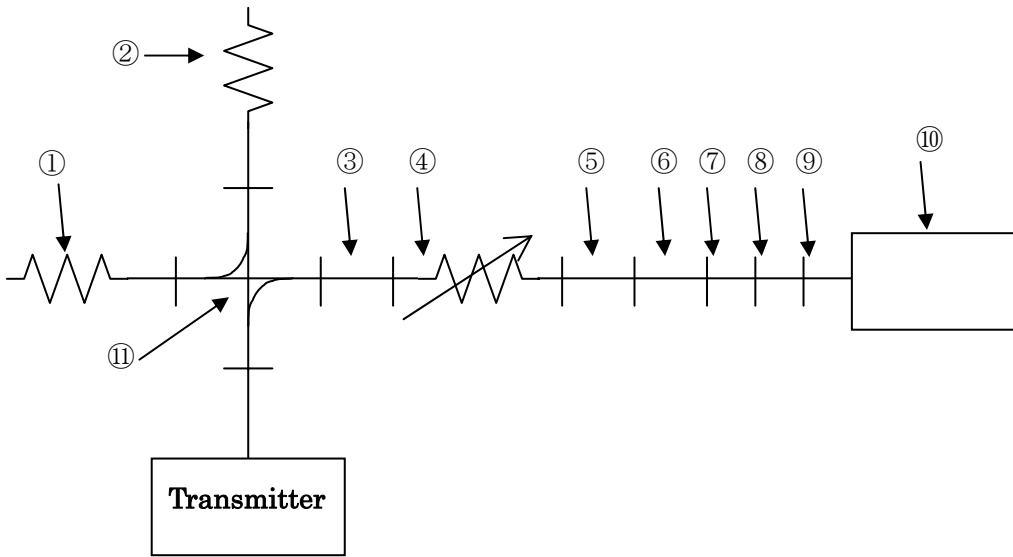
Scale  
↑ 10dB/Div  
→ 910MHz/Div



Spurious signal  
1.2  $\mu$  s Pulse  
17.6 to 26.7GHz

(Sec.2.1051) Spurious emission at antenna terminals

Condition 7: 26.5 to 50.0GHz



①Dummy Load	4D102A	SHIMADARIKA
②High Power Dummy Load	284-745-7M6	ATM
③Taper W/G	90/284-12-6-2	ATM
④Attenuator	X382A	HP
⑤Tapered W/G	195-XV KU	AIRCOM
⑥Tapered W/G	11518A	HP
⑦Tapered W/G	11520A	HP
⑧Adaptor	22093-KF20	FLANN
⑨Coaxial Cable	SCOFLEX 100	HUBER+SUHNER
⑩Spectrum Analyzer	Agilent	E4448A
⑪Direction Coupler	5D102	SHIMADARIKA
	Coupling : 30dB	
	Directivity : 20dB	

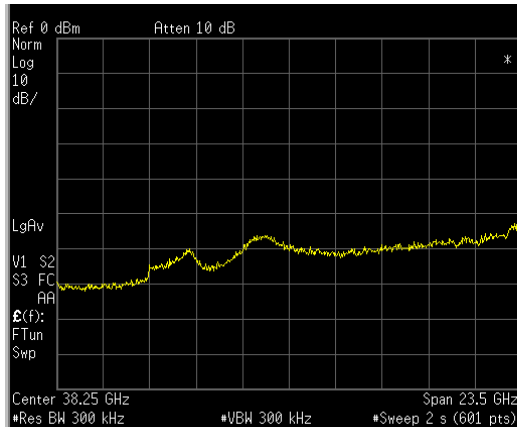
Attenuation 4 : 40dB  
 Measurement Point : Transmitter Output

(2.1051)

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

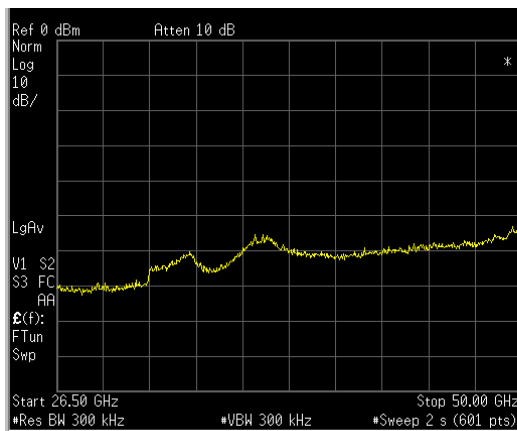
OFF

26.5 to 50.0GHz

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

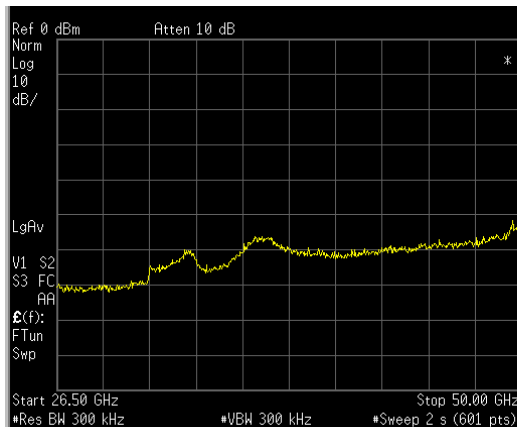
Stand-By

26.5 to 50.0GHz

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

0.070  $\mu$  s Pulse

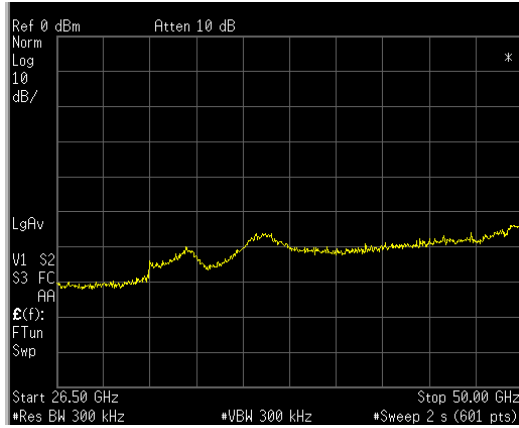
26.5 to 50.0GHz

(2.1051)

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

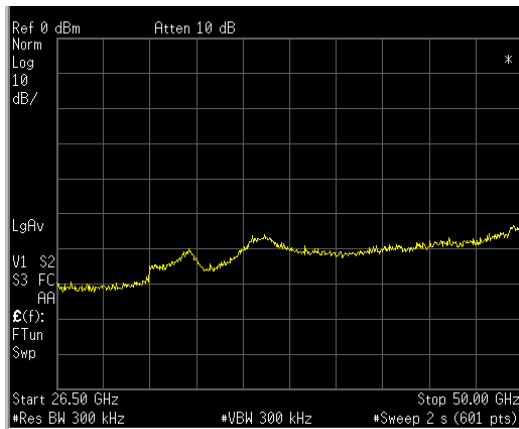
0.20  $\mu$  s Pulse

26.5 to 50.0GHz

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

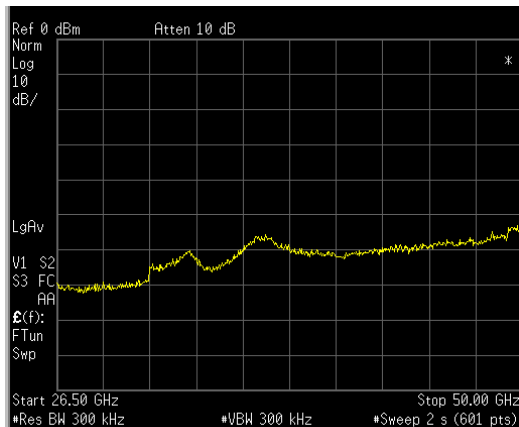
0.30  $\mu$  s Pulse

26.5 to 50.0GHz

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

0.40  $\mu$  s Pulse

26.5 to 50.0GHz

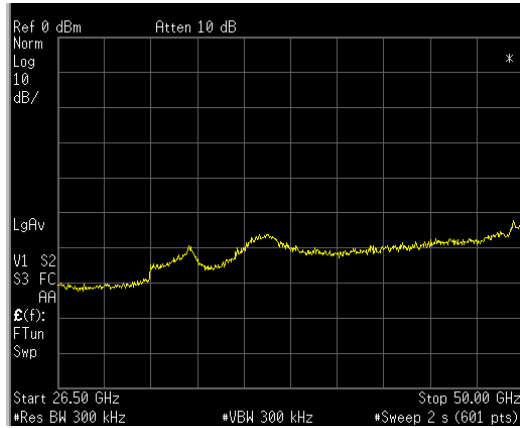


(2.1051)

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

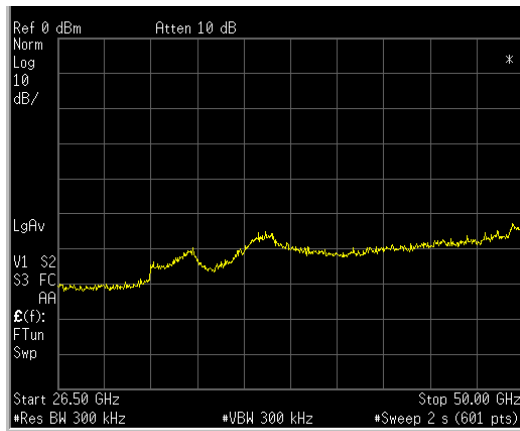
0.80  $\mu$  s Pulse

26.5 to 50.0GHz

Scale

↑ 10dB/Div

→ 2350MHz/Div



Spurious signal

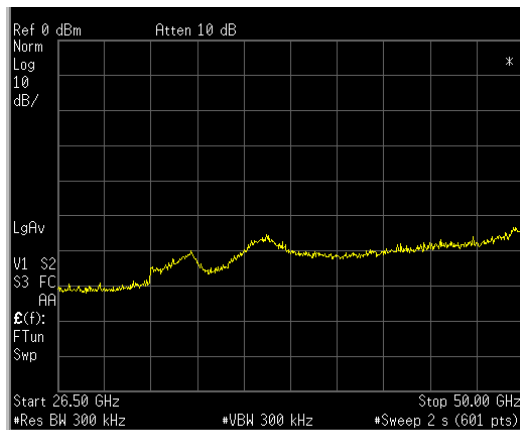
1.0  $\mu$  s Pulse

26.5 to 50.0GHz

Scale

↑ 10dB/Div

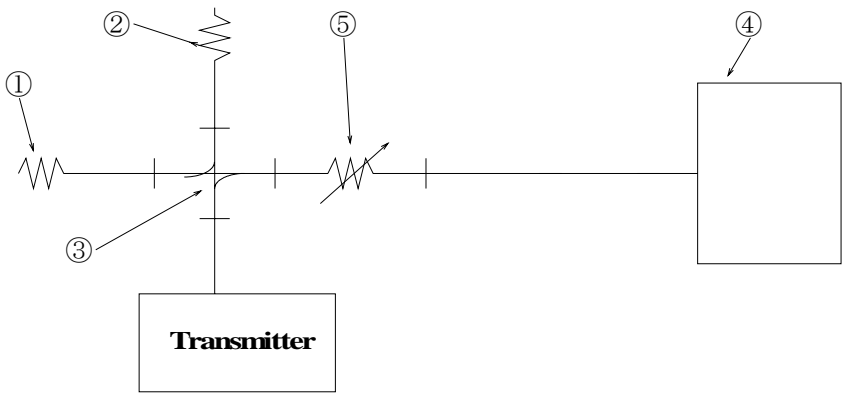
→ 2350MHz/Div



Spurious signal

1.2  $\mu$  s Pulse

26.5 to 50.0GHz



1. Dummy Load		4D102A	HP
2. High Power Dummy Load		284-745-7M6	ATM
3. Directional Coupler		5D102	SHIMADARIKA
	Coupling	30dB	
	Directivity	20dB	
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 °C 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 AC85V (AC100V-15%), AC132.25V (AC115V+15%).
- 3 With power off , the temperature was raised in 10 °C 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 AC85V (AC100V-15%), AC132.25V (AC115V+15%).

Temperature [ °C ]	Operating Frequency [ MHz ]						Warm-Up Time (min) <X-MIT>
	0.07 $\mu$ S Pulse		0.2 $\mu$ S Pulse		0.3 $\mu$ S Pulse		
	AC85V	AC132.25V	AC85V	AC132.25V	AC85V	AC132.25V	
- 25	3046	3046	3046	3046	3045	3045	30
- 20	3045	3045	3045	3045	3045	3045	30
- 10	3044	3045	3043	3044	3044	3045	30
0	3044	3044	3043	3044	3043	3044	30
+10	3043	3043	3042	3042	3042	3042	30
+20	3043	3043	3042	3042	3042	3042	30
+30	3042	3042	3041	3041	3042	3042	30
+40	3041	3041	3040	3040	3041	3041	30
+50	3040	3040	3039	3039	3040	3040	30
+55	3040	3040	3039	3039	3040	3040	30

Temperature [ °C ]	Operating Frequency [ MHz ]						Warm-Up Time (min) <X-MIT>
	0.4 $\mu$ S Pulse		0.8 $\mu$ S Pulse		1.0 $\mu$ S Pulse		
	AC85V	AC132.25V	AC85V	AC132.25V	AC85V	AC132.25V	
- 25	3045	3045	3044	3043	3045	3044	30
- 20	3045	3045	3044	3043	3045	3044	30
- 10	3043	3044	3043	3043	3044	3044	30
0	3041	3042	3042	3042	3043	3043	30
+10	3042	3042	3042	3042	3042	3042	30
+20	3042	3042	3042	3042	3042	3042	30
+30	3042	3042	3042	3042	3042	3042	30
+40	3041	3041	3041	3041	3041	3041	30
+50	3040	3040	3040	3040	3040	3040	30
+55	3040	3040	3039	3039	3040	3039	30

Temperature [ °C ]	Operating Frequency [ MHz ]						Warm-Up Time (min) <X-MIT>
	1.2 $\mu$ S Pulse						
	AC85V	AC132.25V					
- 25	3045	3044					30
- 20	3045	3044					30
- 10	3044	3044					30
0	3043	3043					30
+10	3042	3042					30
+20	3042	3042					30
+30	3042	3042					30
+40	3041	3041					30
+50	3040	3040					30
+55	3040	3039					30

SECTION 5

TEST: Spurious Emissions Field Strength

EQUIPMENT: JMA-9132 S/N LB00521

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 17.4 watts maximum (long pulse) or 42.4 dBm:

$$\begin{aligned} \text{Emissions} &\leq 42.4 \text{ dBm} - [43 + 10 \log(17.4)] \text{ dBm} \\ &\leq -13.0 \text{ dBm} \end{aligned}$$

TEST RESULTS: No spurious emissions observed above minimum standard.

TEST CONDITIONS: Tamb = 20°C to 25°C RHamb = 40% ~ 60%  
Eut input = 48 VDC

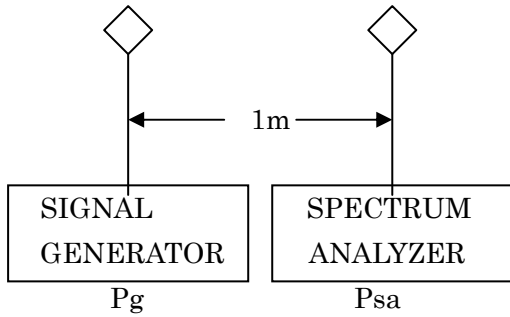
STABILIZATION: EUT energized for 10 minutes minimum.

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  $P_g$  and  $P_{sa}$  is due to each antenna.

The calibrating signal on the analyzer is therefore:

$$P_{cal} = P_{sa} - (P_{sa} - P_g) / 2 = (P_{sa} + P_g) / 2 \text{ dBm.}$$

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

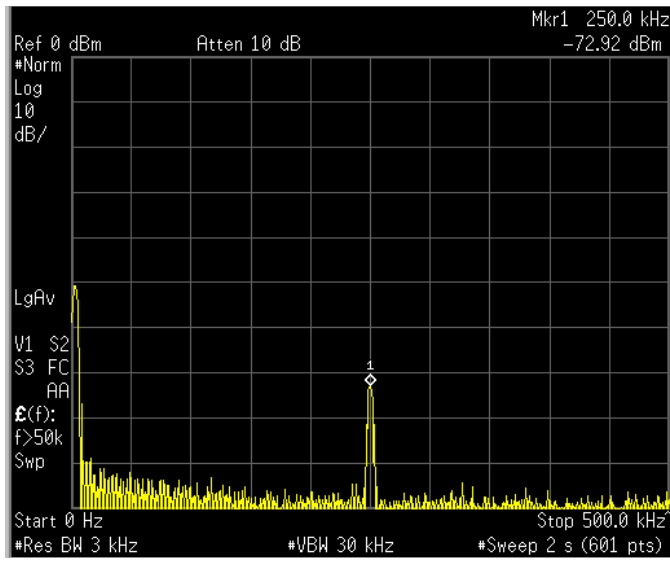
$$\text{LRL (adjusted)} = \text{LRL(set)} + P_{cal} - P_{sa} \text{ dBm.}$$

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

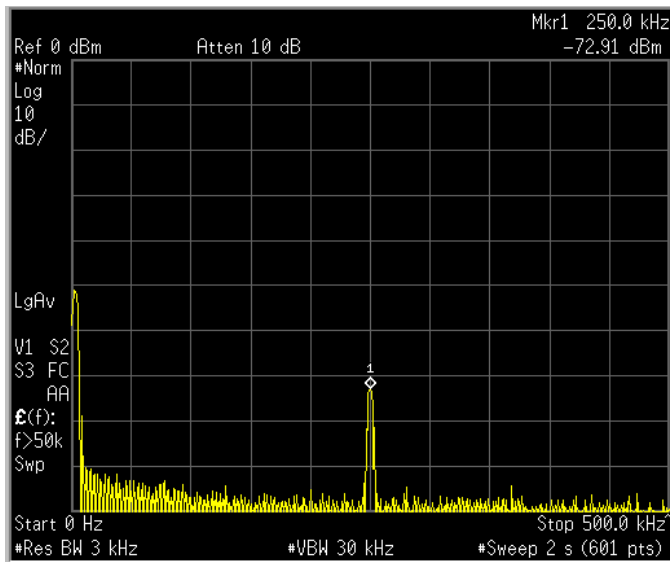
TEST	CAL sig	$P_{sa}$	$P_g$	$P_{cal}$	LRL(set)	LRL(adj)
1	250 kHz	-73	0	-36.5	0	36.5
2	2.5 MHz	-55	0	-27.5	0	27.5
3	25 MHz	-29	0	-14.5	0	14.5
4	250 MHz	-33	0	-16.5	0	16.5
5	500 MHz	-29	0	-14.5	0	14.5

TEST #1 Frequency Band: 0~500KHz

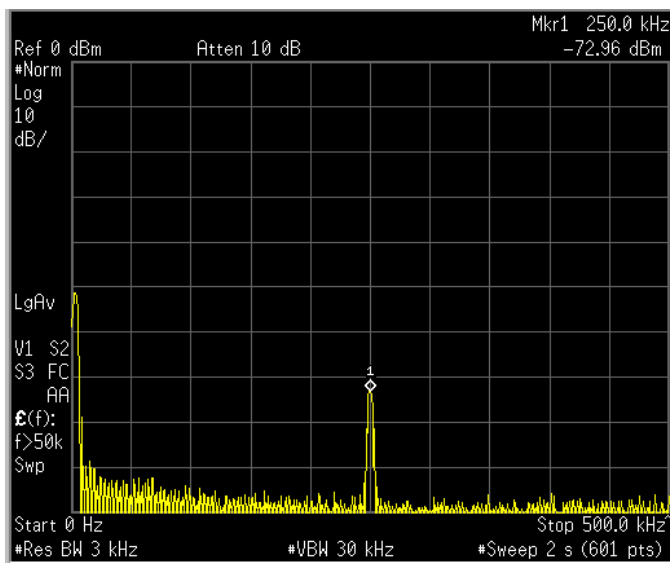
Log Ref. Level:36.5 dBm



Ambient



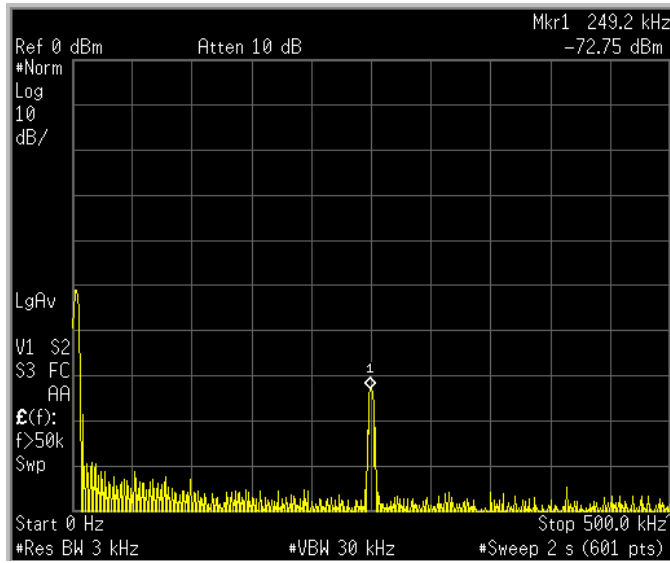
Stand-By



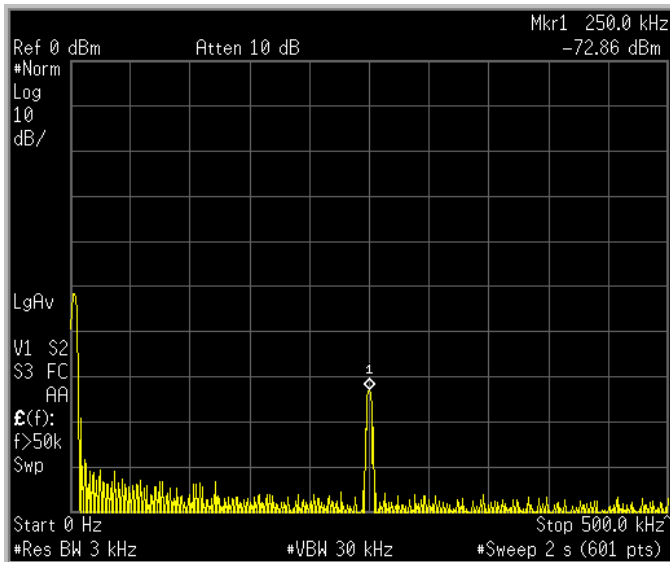
0.07  $\mu$  S Pulse

TEST #1 Frequency Band: 0~500KHz

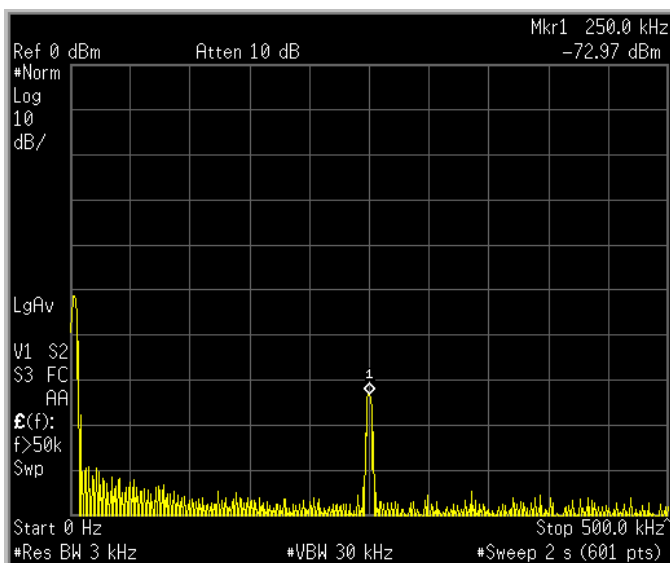
Log Ref. Level:36.5 dBm



0.2  $\mu$  S Pulse



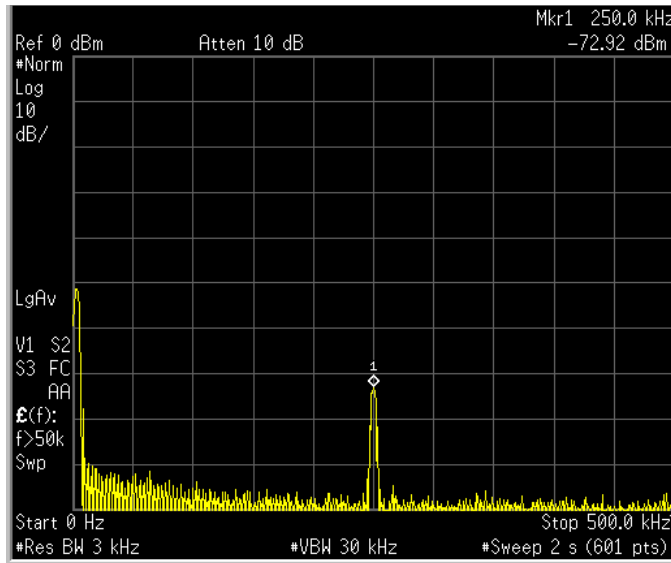
0.3  $\mu$  S Pulse



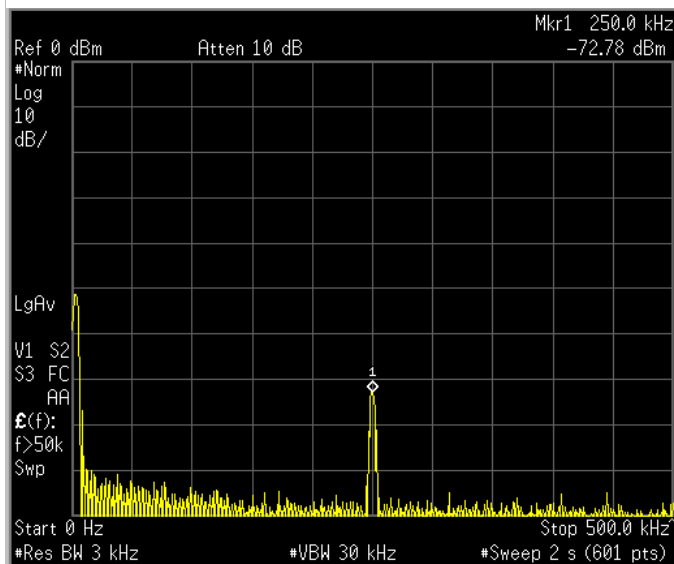
0.4  $\mu$  S Pulse

TEST #1 Frequency Band: 0~500KHz

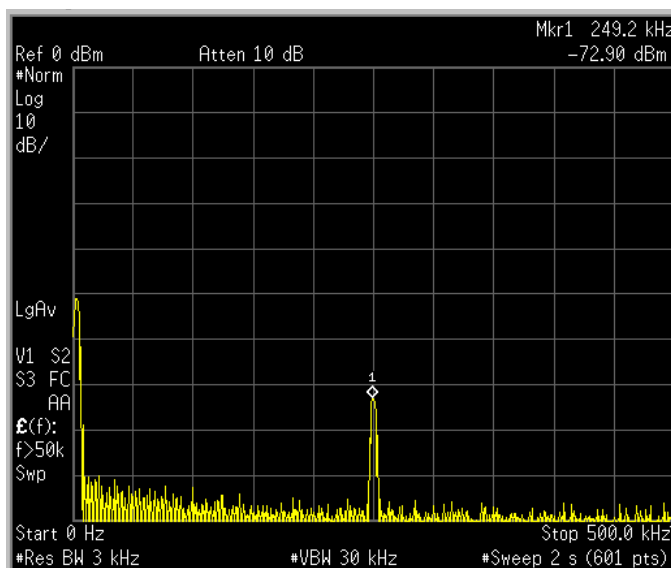
Log Ref. Level:36.5 dBm



0.8  $\mu$  S Pulse

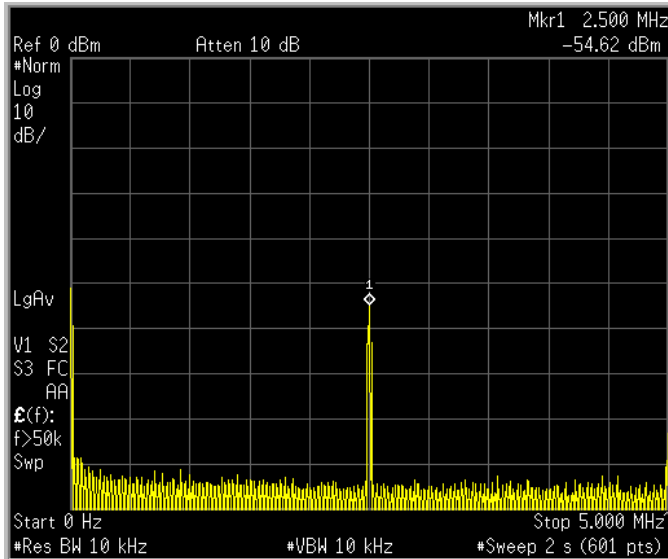


1.0  $\mu$  S Pulse

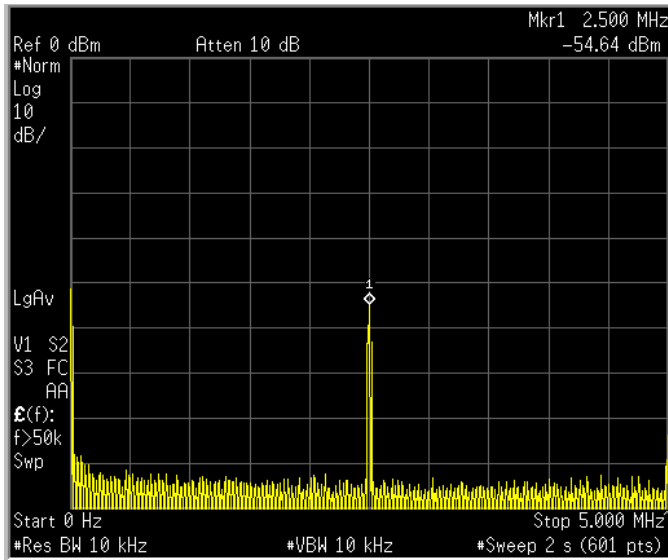


1.2  $\mu$  S Pulse

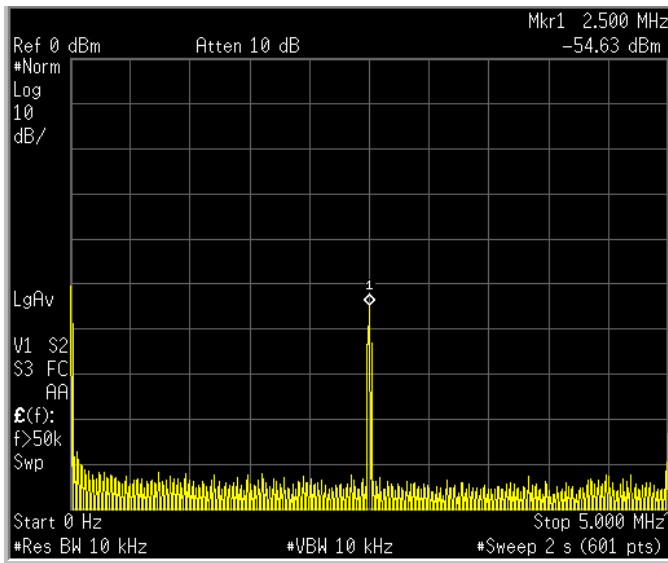




Ambient



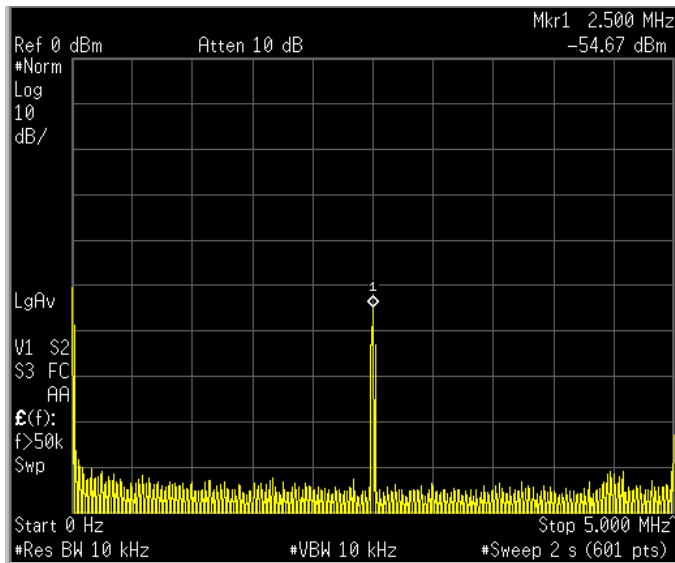
Stand-By



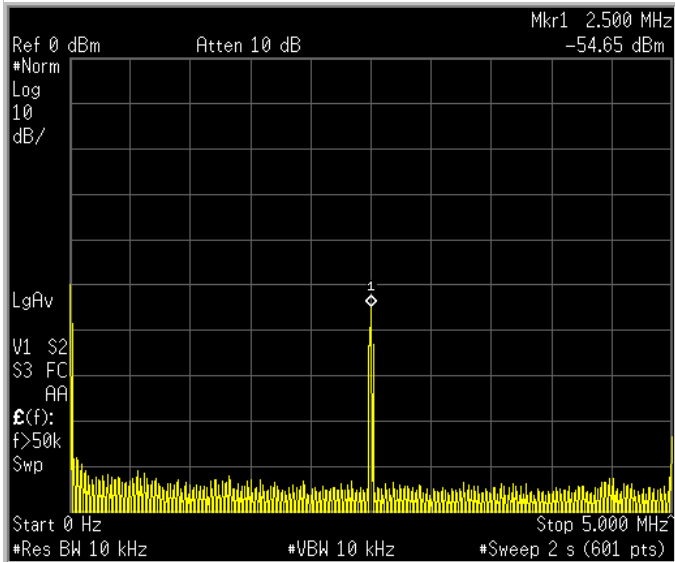
0.07  $\mu$  S Pulse

TEST #2 Frequency Band: 0~5MHz

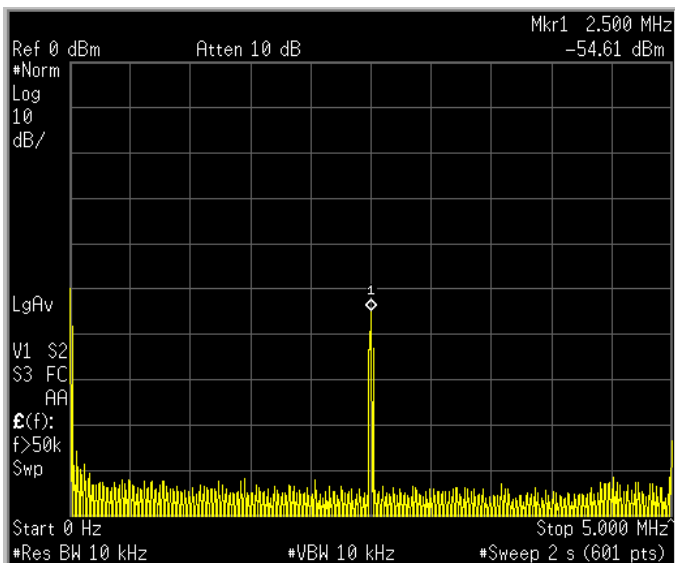
Log Ref. Level:27.5 dBm



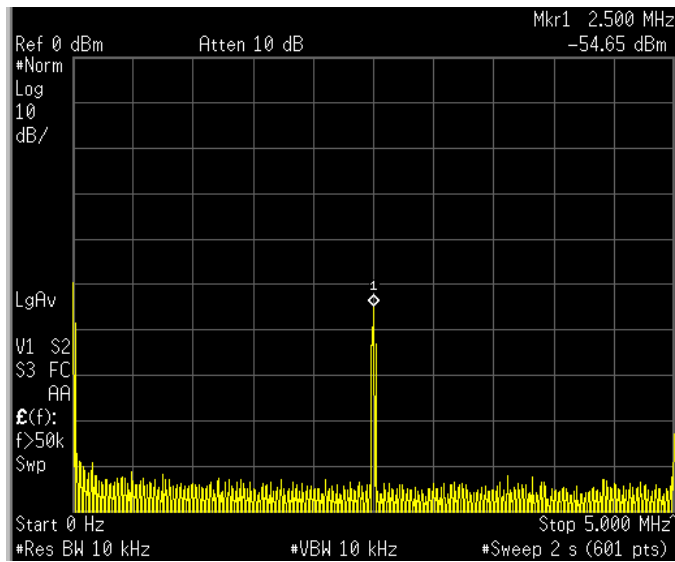
0.2  $\mu$  S Pulse



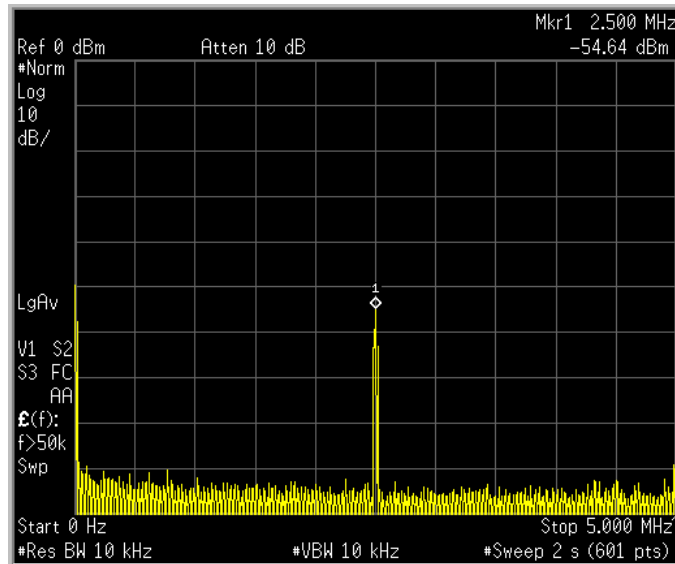
0.3  $\mu$  S Pulse



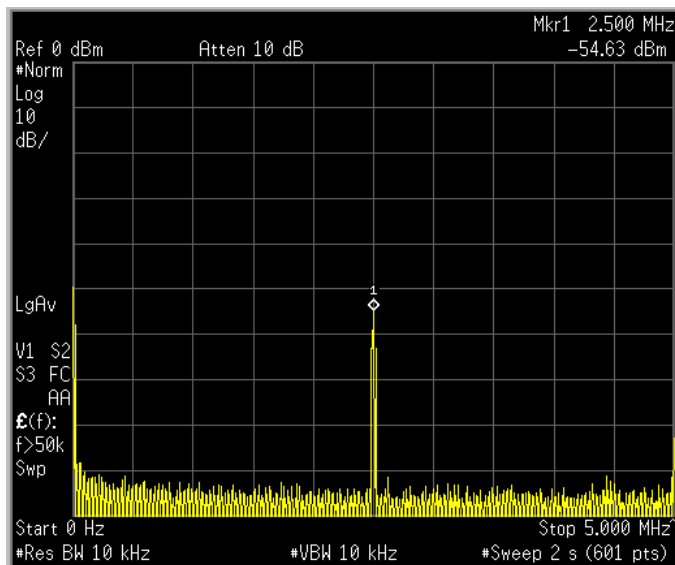
0.4  $\mu$  S Pulse



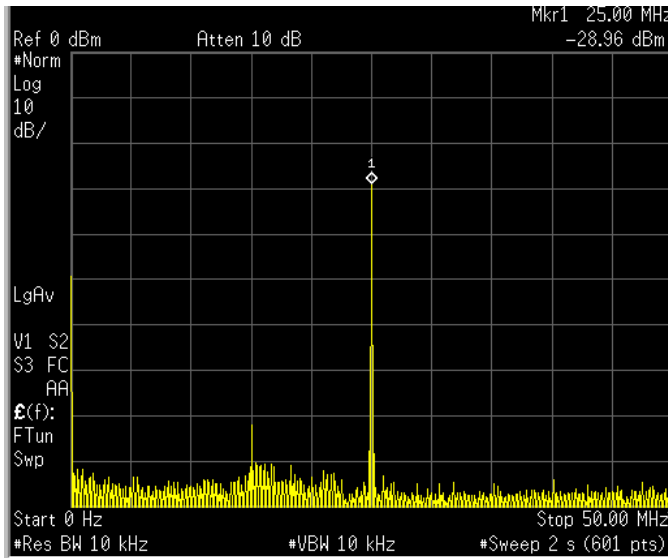
0.8  $\mu$  S Pulse



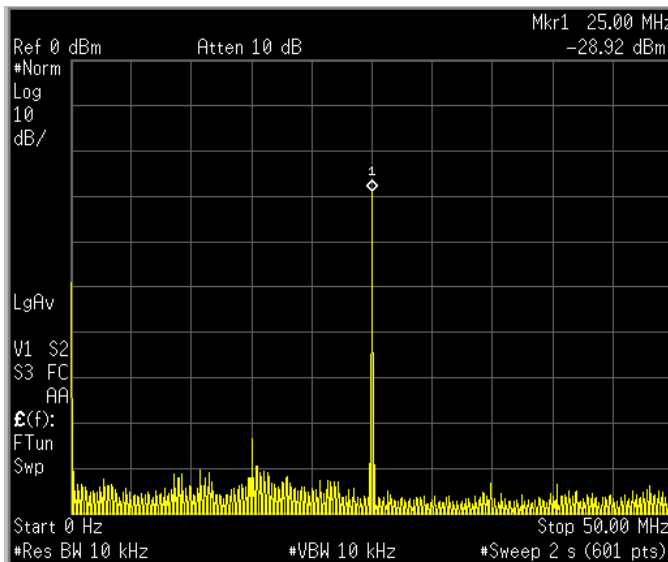
1.0  $\mu$  S Pulse



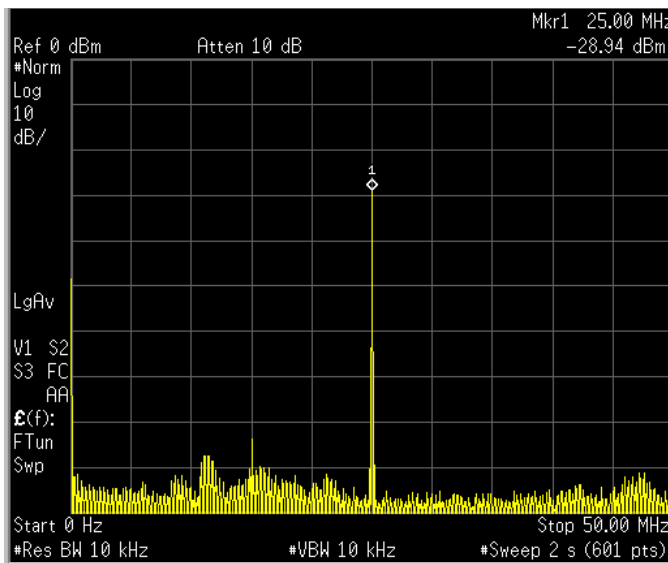
1.2  $\mu$  S Pulse



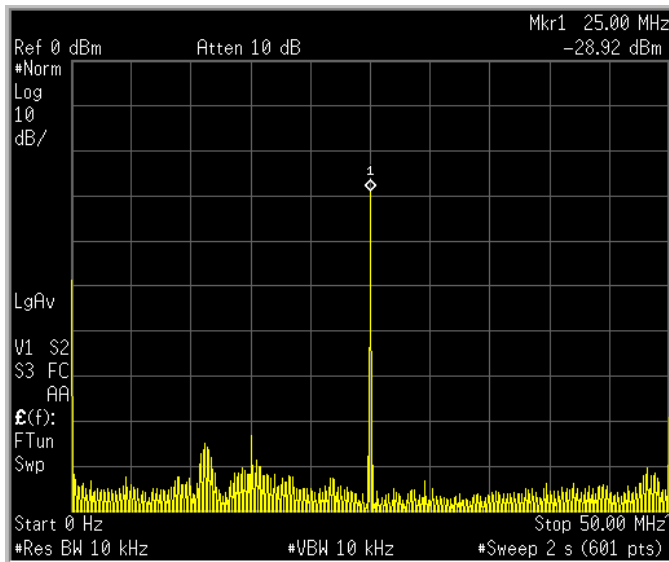
Ambient



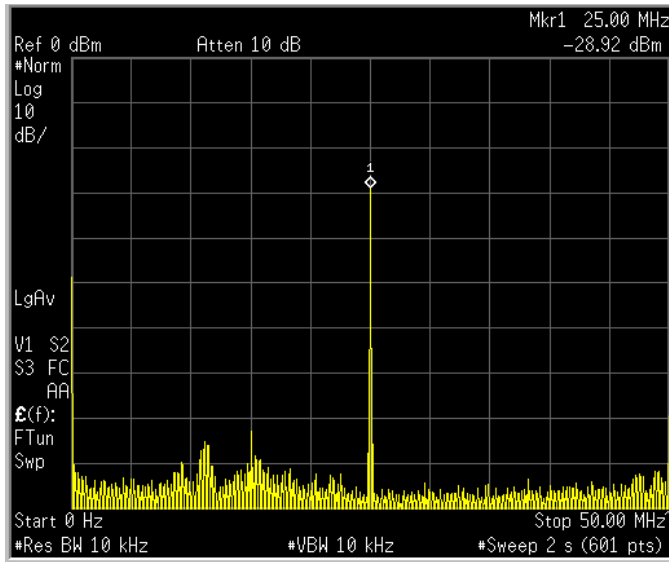
Stand-By



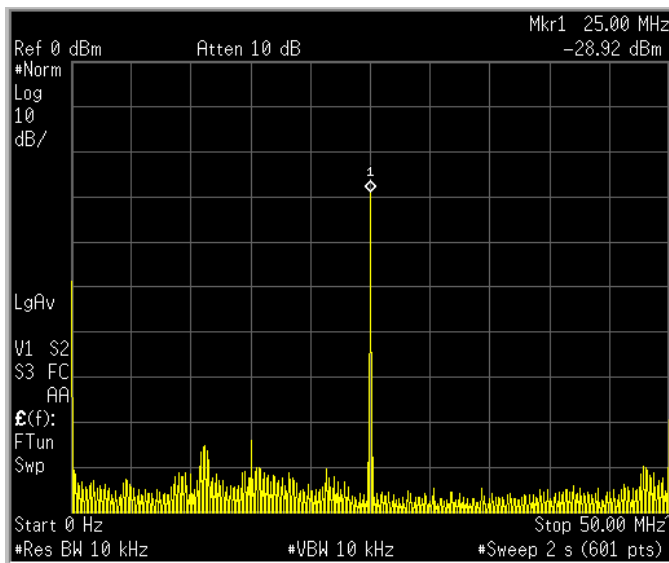
0.07  $\mu$  S Pulse



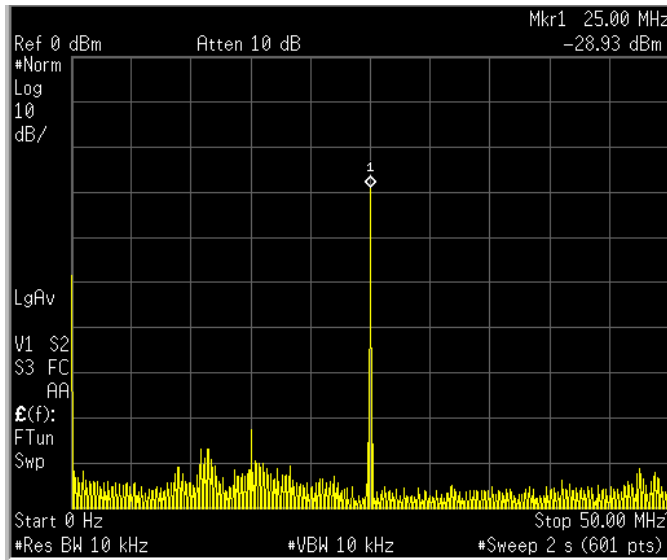
0.2  $\mu$  S Pulse



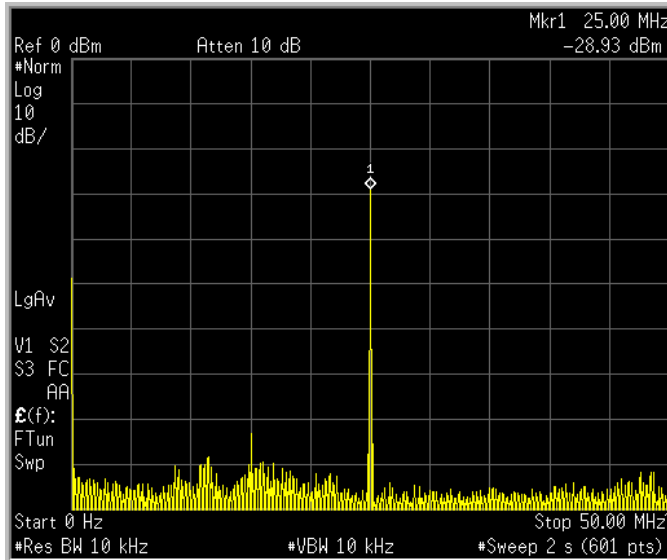
0.3  $\mu$  S Pulse



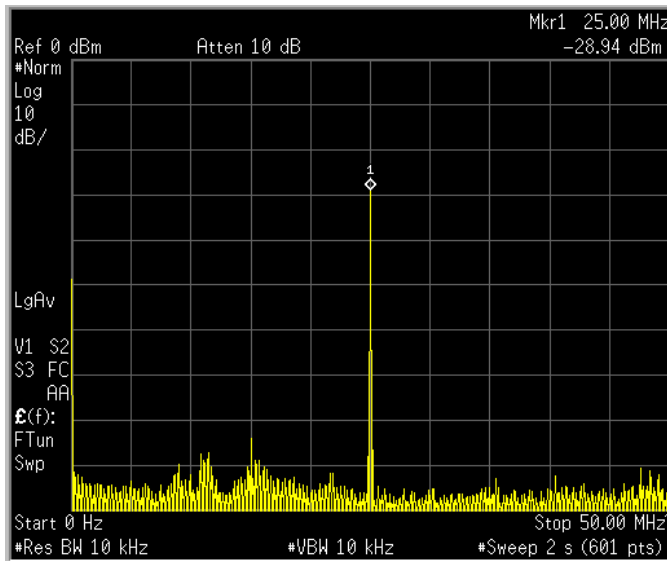
0.4  $\mu$  S Pulse



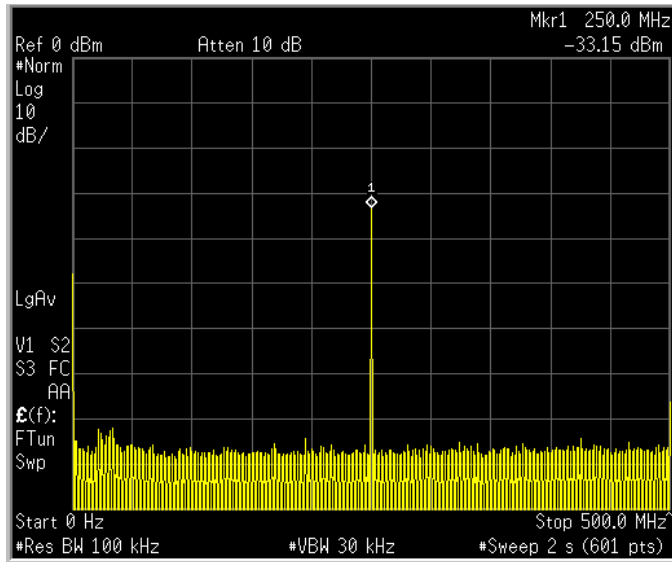
0.8  $\mu$  S Pulse



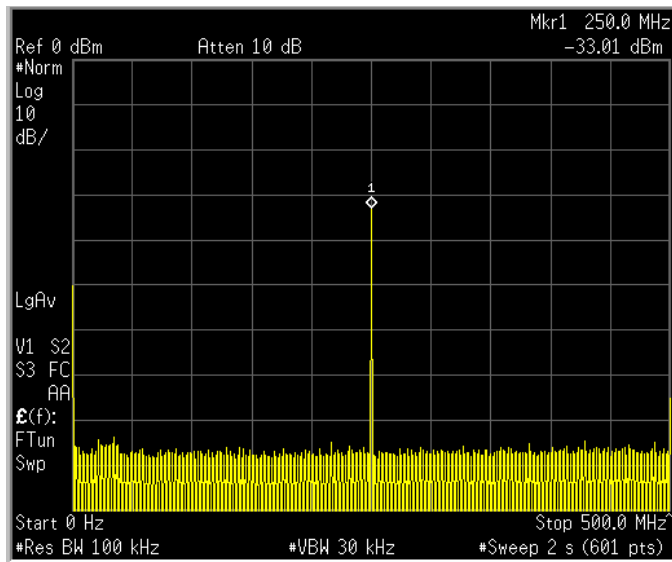
1.0  $\mu$  S Pulse



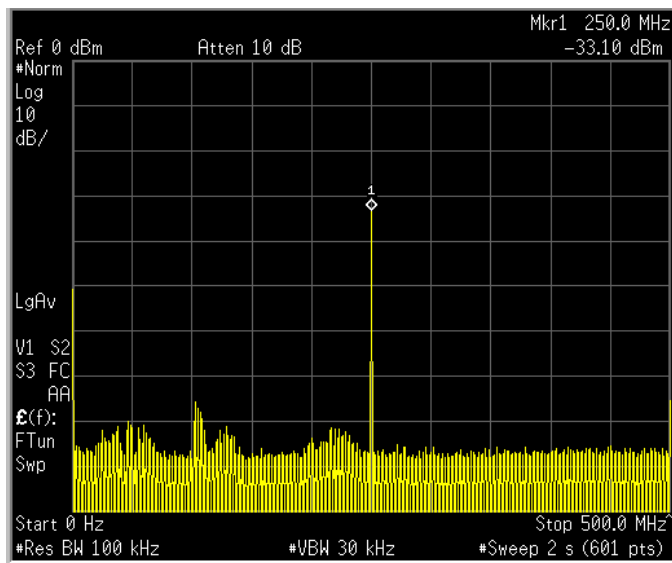
1.2  $\mu$  S Pulse



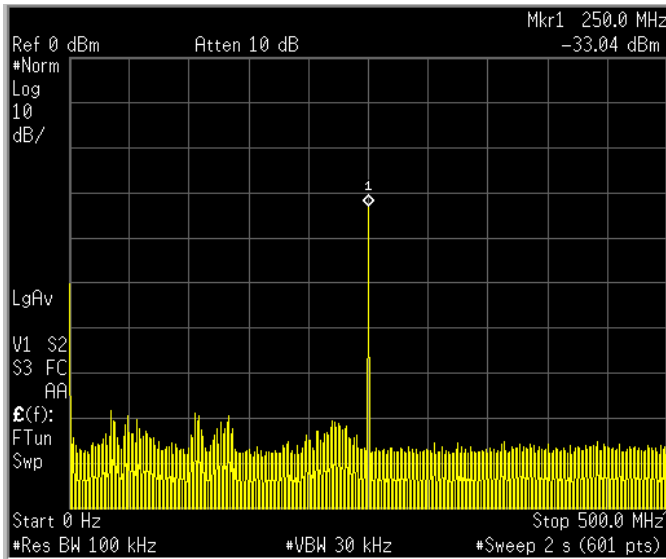
Ambient



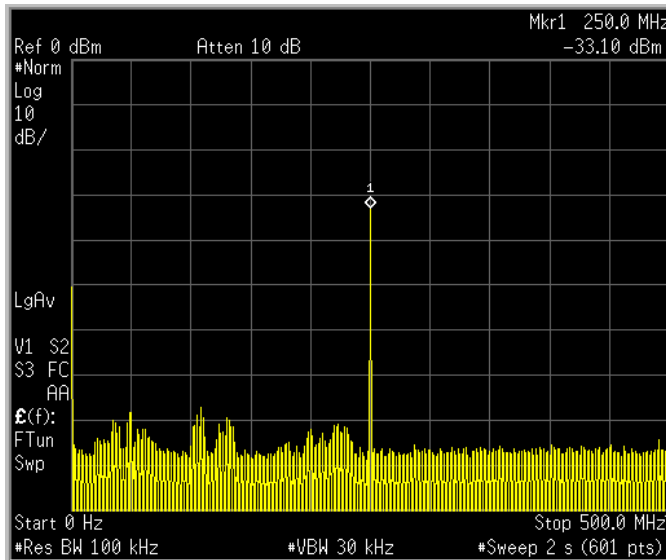
Stand-By



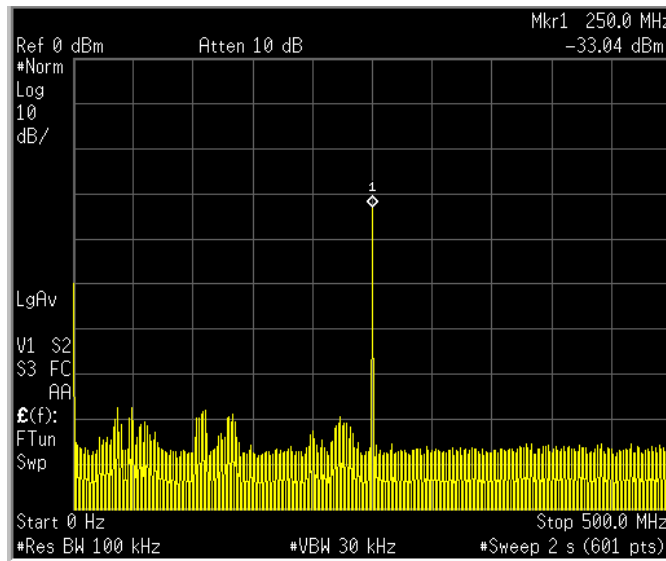
0.07  $\mu$  S Pulse



0.2  $\mu$  S Pulse

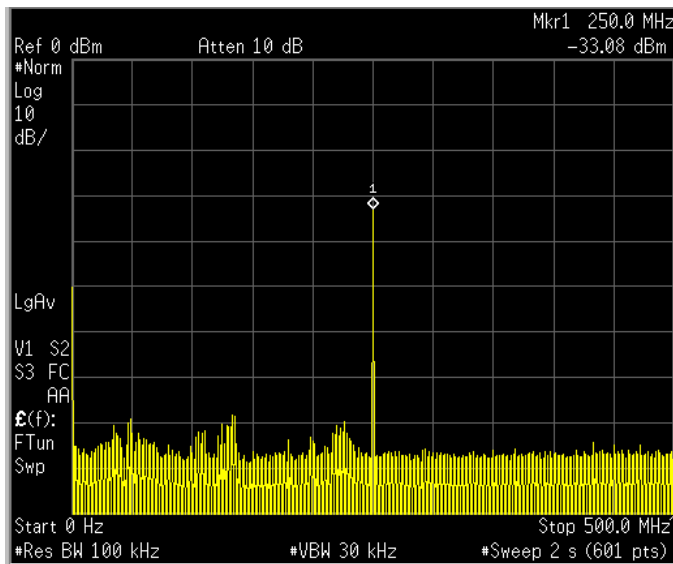


0.3  $\mu$  S Pulse

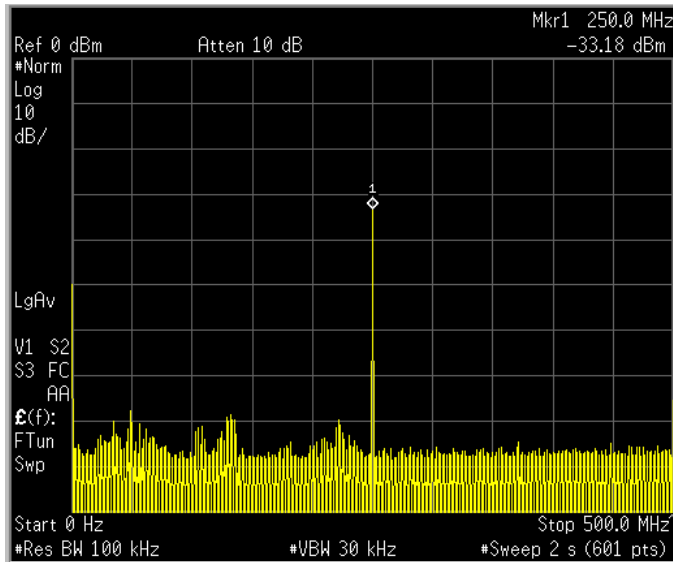


0.4  $\mu$  S Pulse

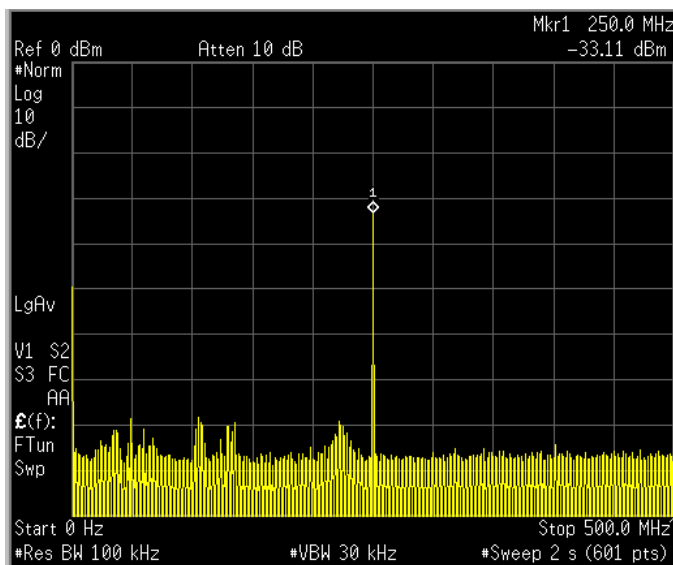




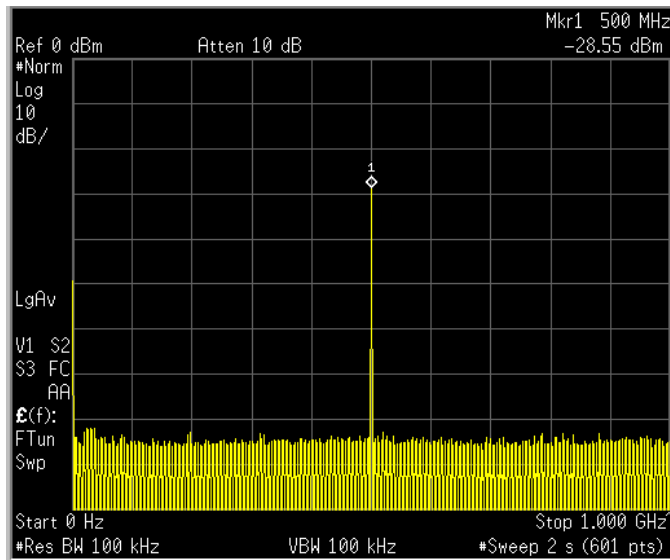
0.8  $\mu$  S Pulse



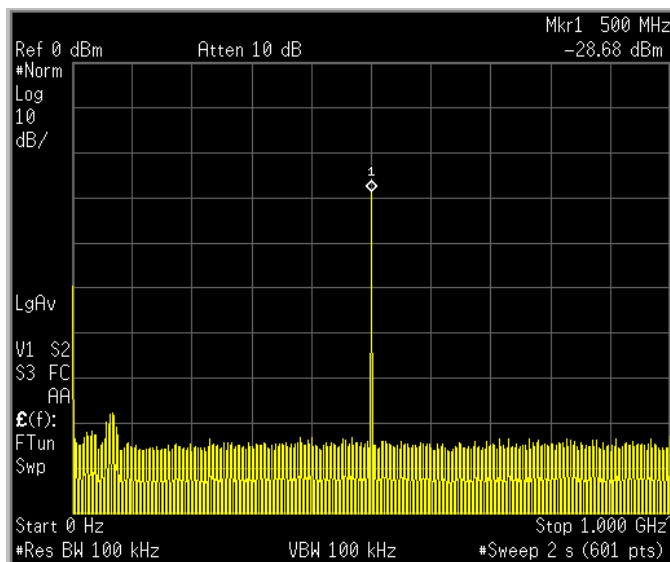
1.0  $\mu$  S Pulse



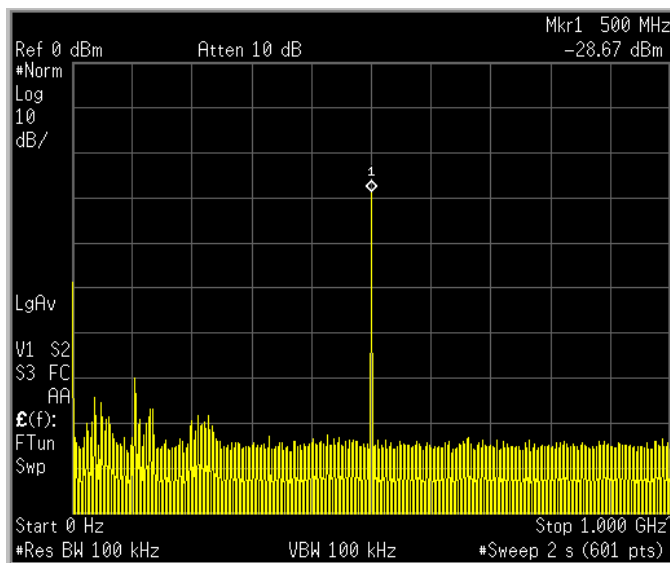
1.2  $\mu$  S Pulse



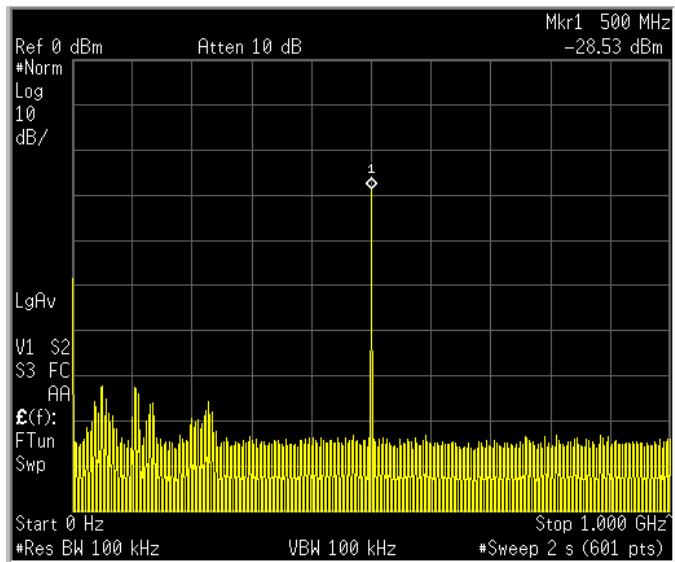
Ambient



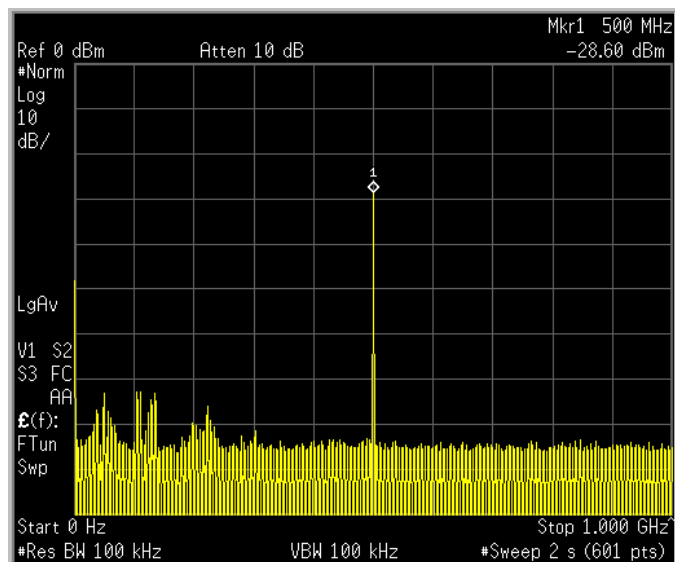
Stand-By



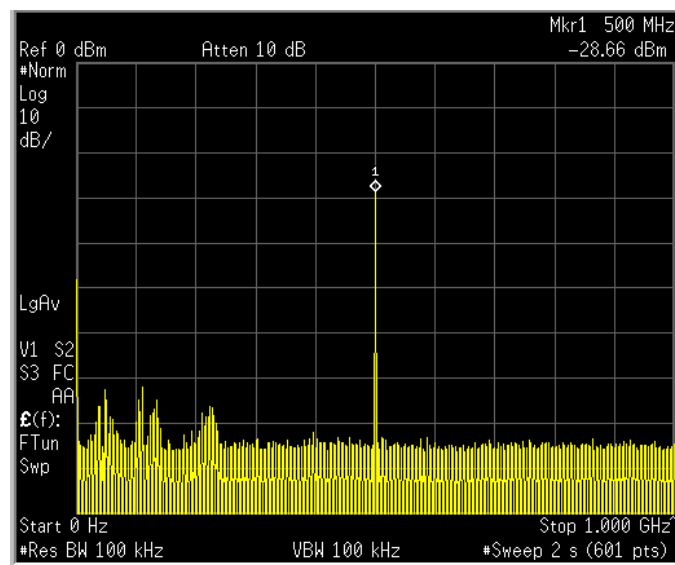
0.07  $\mu$  S Pulse



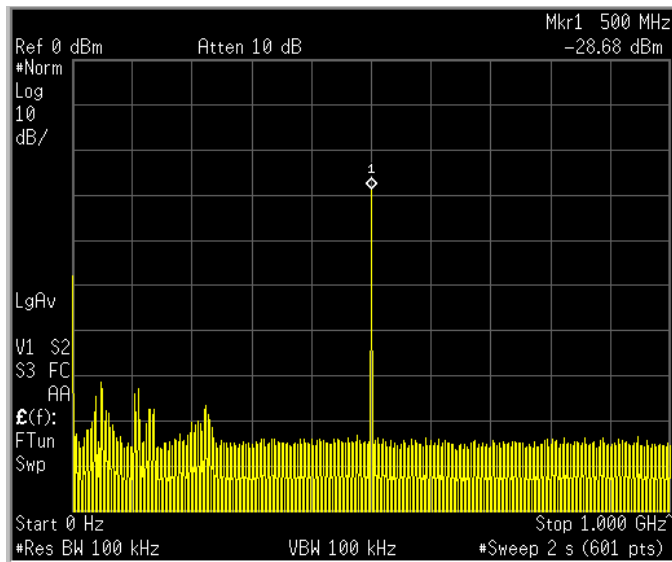
0.2  $\mu$  S Pulse



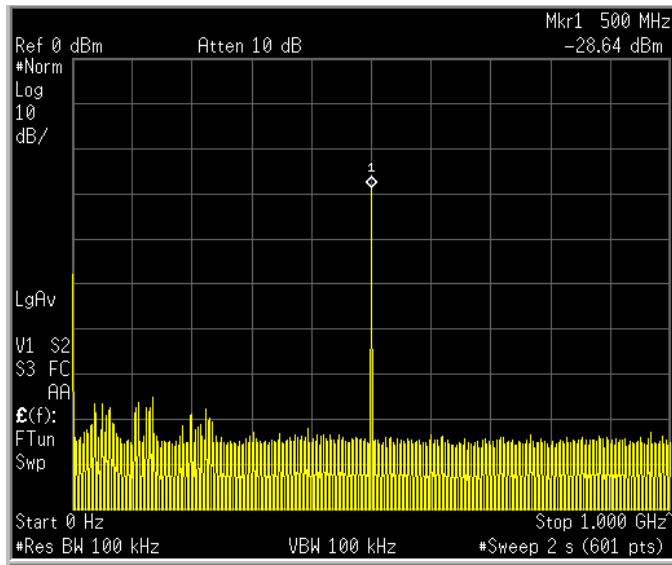
0.3  $\mu$  S Pulse



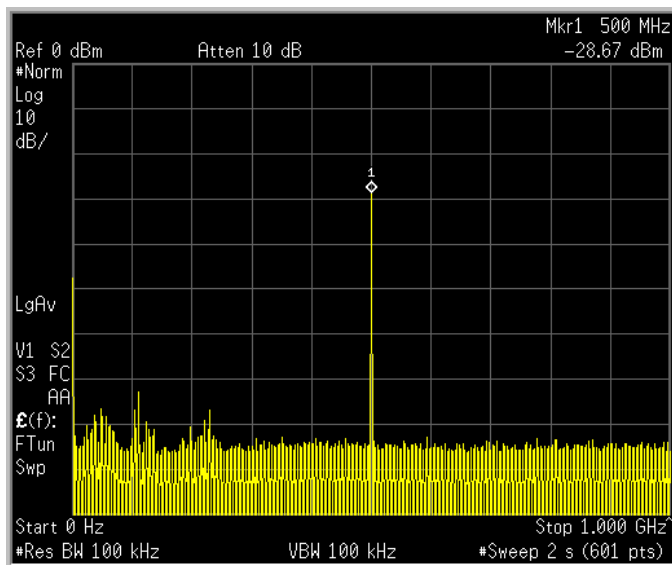
0.4  $\mu$  S Pulse



0.8  $\mu$  S Pulse



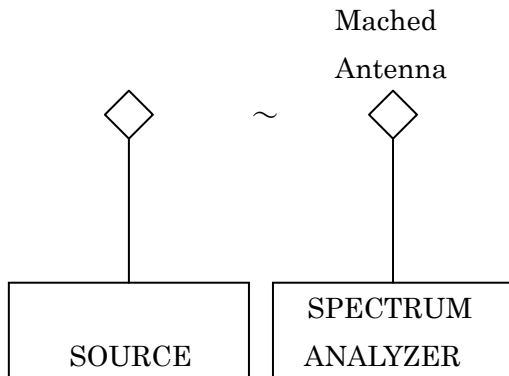
1.0  $\mu$  S Pulse



1.2  $\mu$  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 : 
$$P = \frac{1.64 P_t}{4 \pi R^2}$$

Where  $P_t$  is power transmitted.  
 The power to the analyzer is : 
$$P_{sa} = P_{Ar} = \frac{PG \lambda^2}{4 \pi}$$

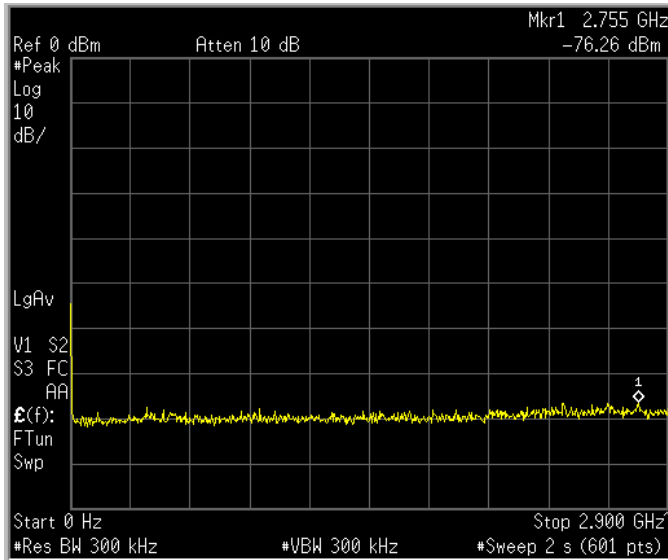
Where G is the receiving antenna gain and  $A_r$  is the effective area of the receiving antenna

Hence 
$$P_{sa} = \frac{1.64 P_t}{4 \pi R^2} \times \frac{PG \lambda^2}{4 \pi} = \frac{1.6 G \lambda^2}{16 \pi^2} \times P_t \text{ at 1 meter}$$

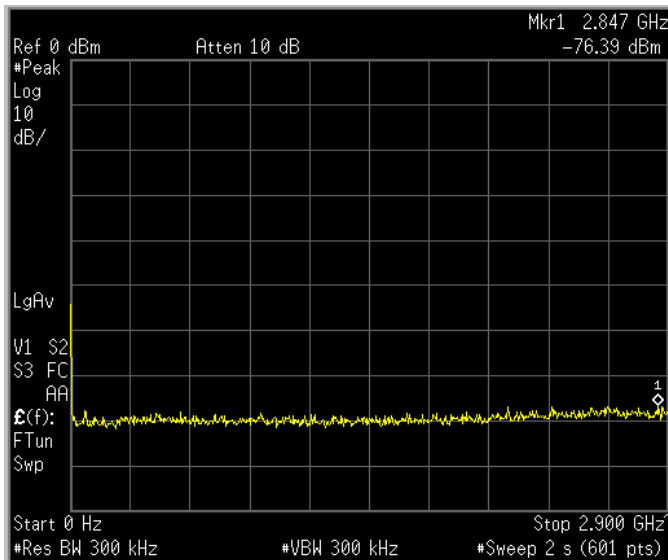
and 
$$P_t = \frac{16 \pi^2 P_{sa}}{1.64 G \lambda^2} = \frac{96.3 P_{sa}}{G \lambda^2}$$

$= P_{sa} \text{ (dBm)} + 19.8 \text{ (dB)} - G \text{ (dB)} - 20 \log \lambda \text{ (dB)}$

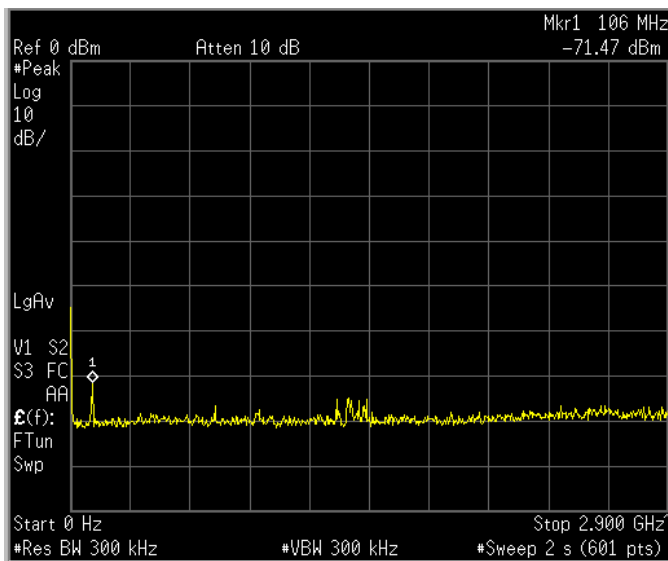
TEST	HORN GAIN		WAVELENGTH		Pt - Psa		LOG REF LEVEL	
	(AVG)	dB	(dB)		LO	HI		
	LO	HI	LO	HI				
6		6	-10.5	-21.6	24.3	35.4	0 dBm	0 – 2.9 G
7		6	-21.3	-28.0	35.1	41.8	0 dBm	2.9 – 6.4 G
8		6	-27.6	-34.1	41.4	47.9	0 dBm	6.4 – 12.5G
9		6	-31.2	-35.6	45.0	49.4	0 dBm	12.5 – 20 G
10	23.3	24.9	-35.6	-38.8	32.1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



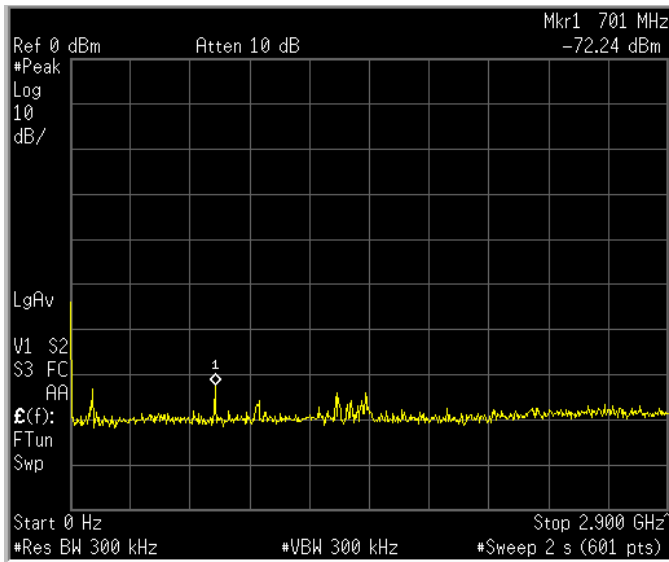
Ambient



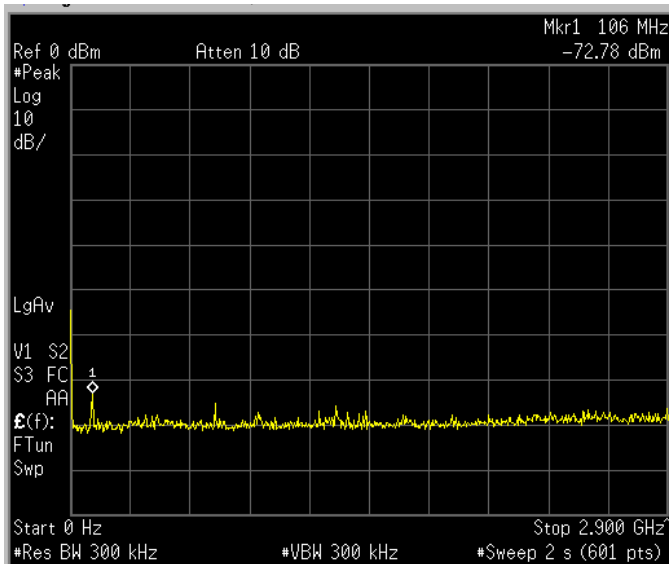
Stand-By



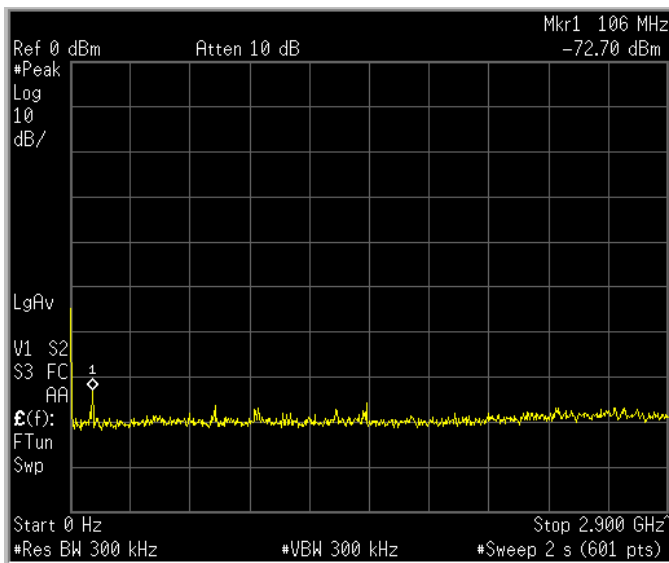
0.07  $\mu$  S Pulse



0.2  $\mu$  S Pulse

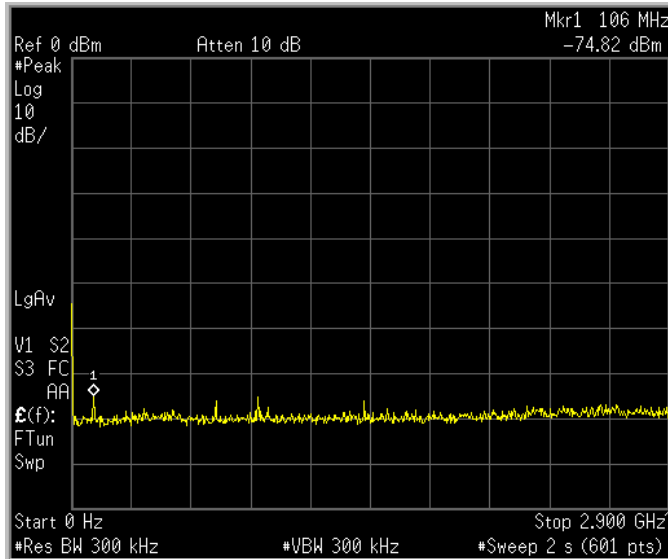


0.3  $\mu$  S Pulse

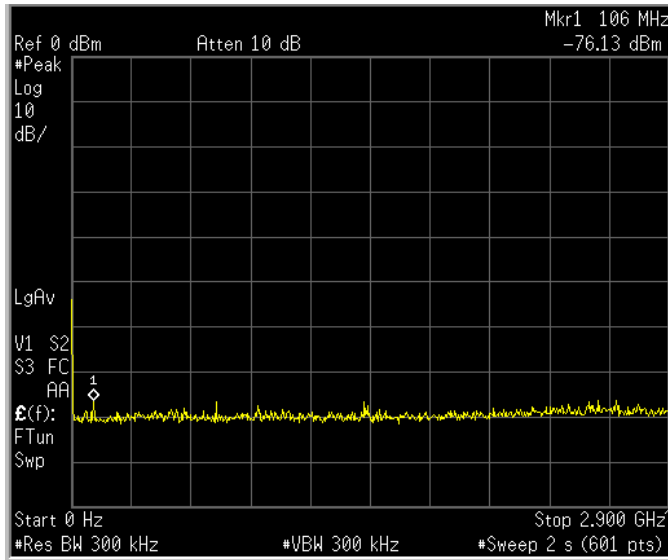


0.4  $\mu$  S Pulse

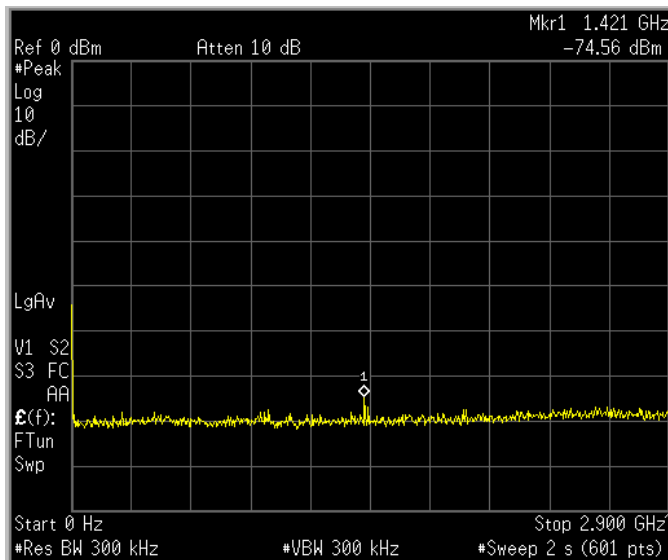




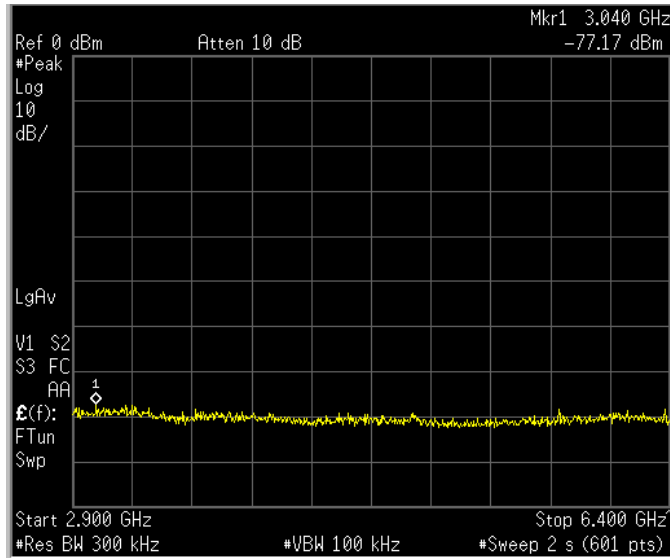
0.8  $\mu$  S Pulse



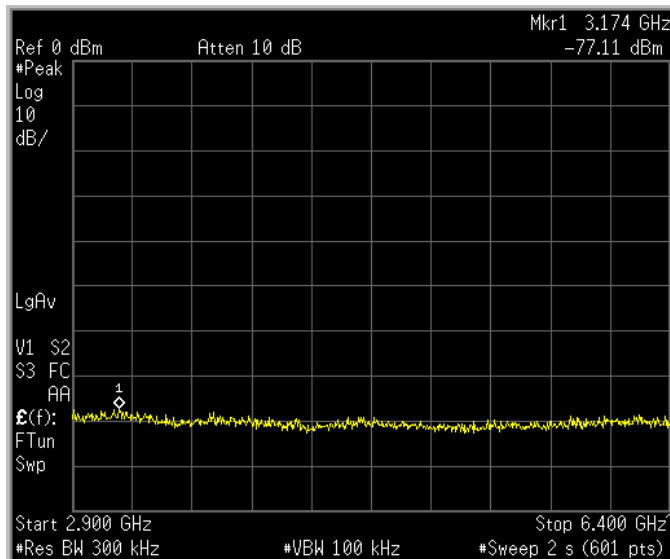
1.0  $\mu$  S Pulse



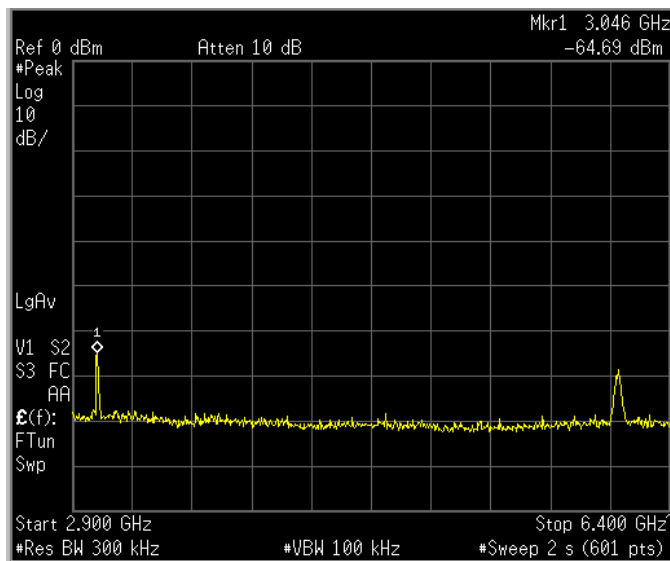
1.2  $\mu$  S Pulse



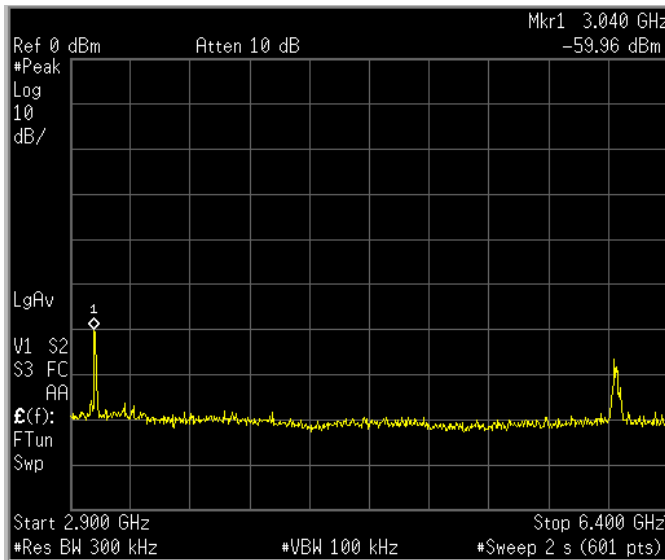
Ambient



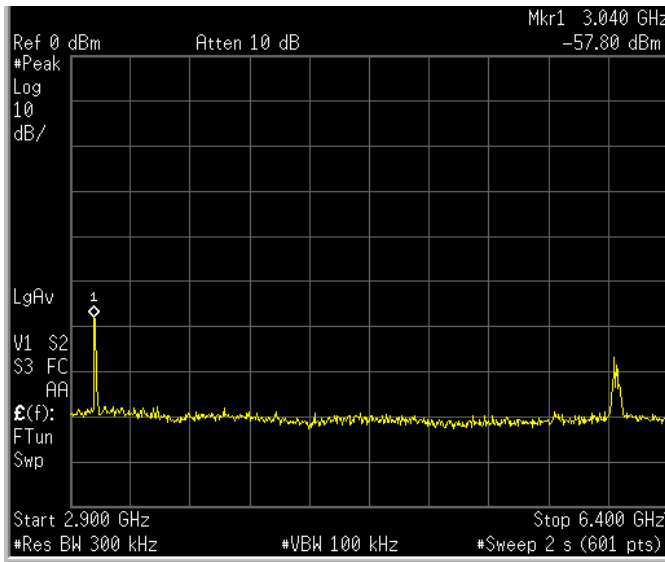
Stand-By



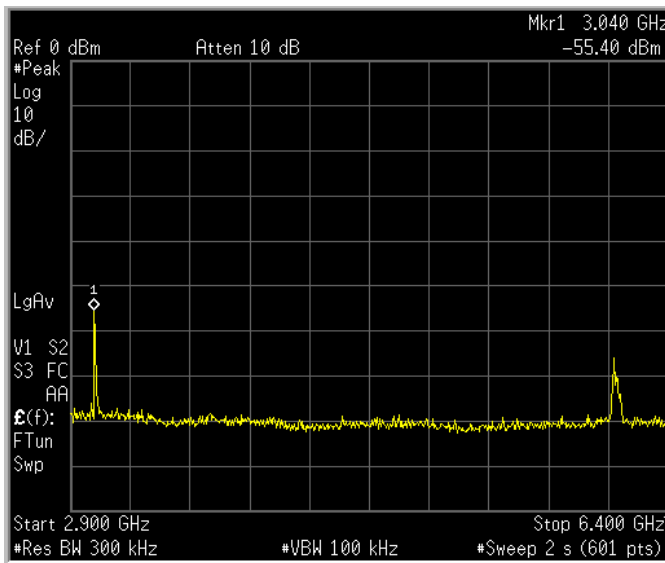
0.07 μ S Pulse



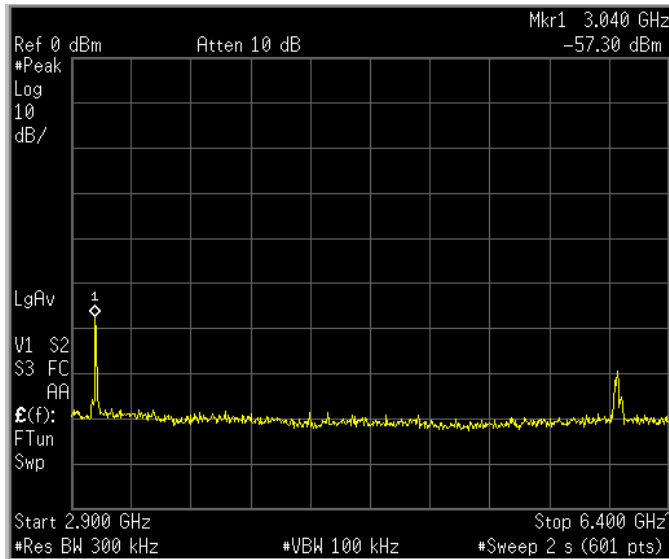
0.2  $\mu$  S Pulse



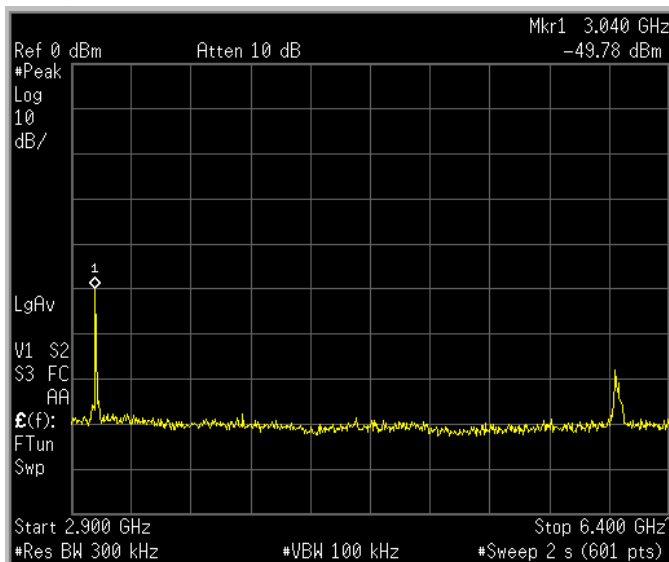
0.3  $\mu$  S Pulse



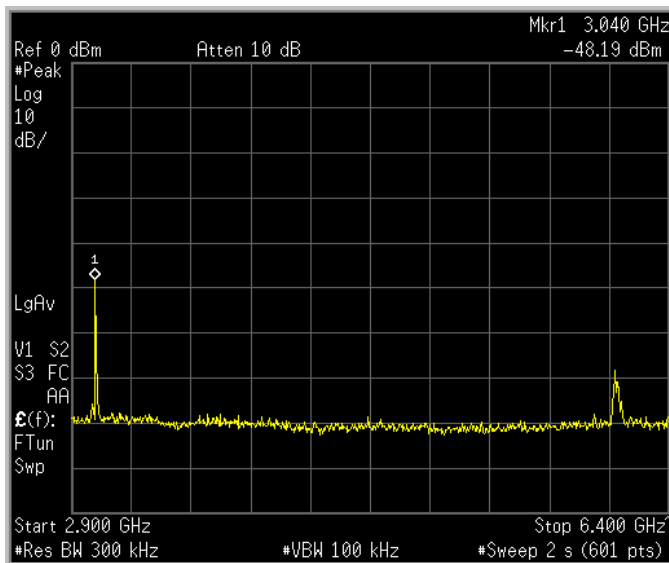
0.4  $\mu$  S Pulse



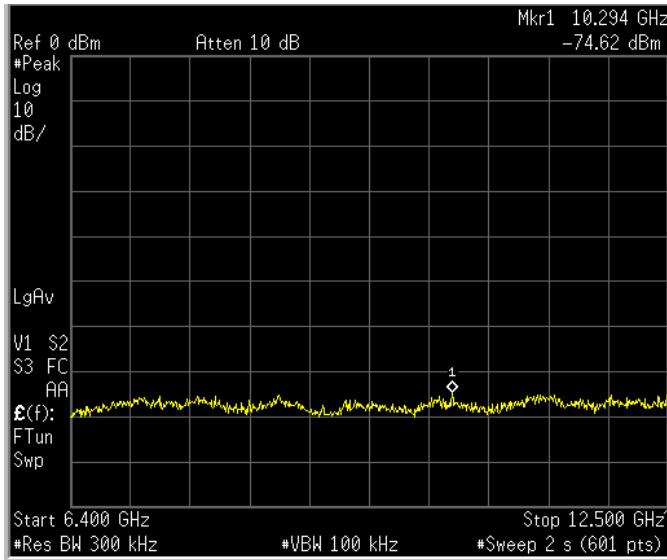
0.8 μ S Pulse



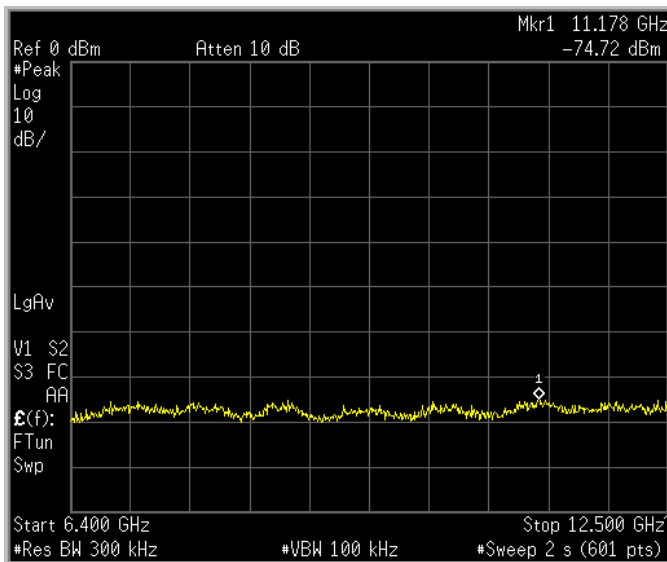
1.0 μ S Pulse



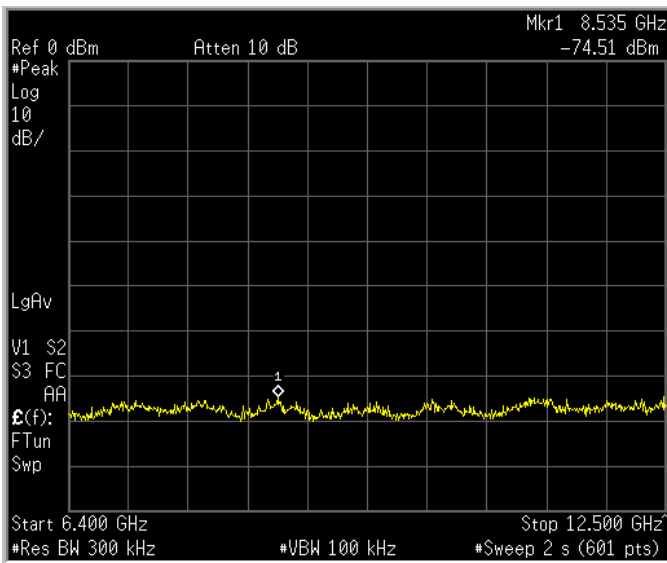
1.2 μ S Pulse



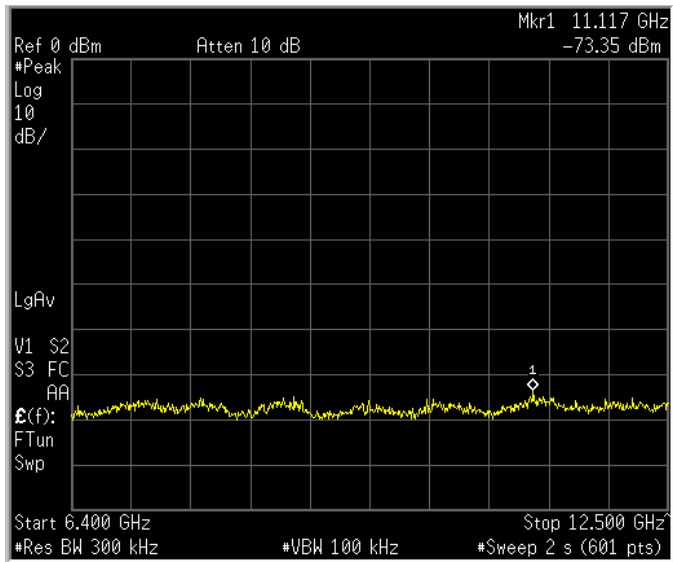
Ambient



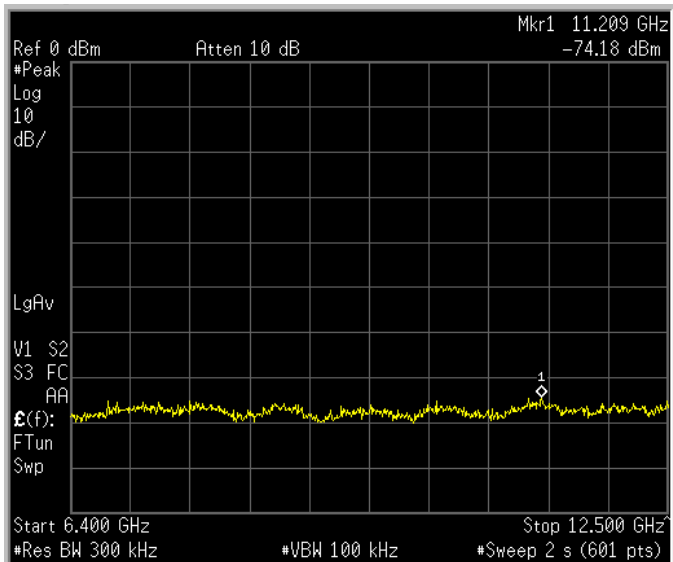
Stand-By



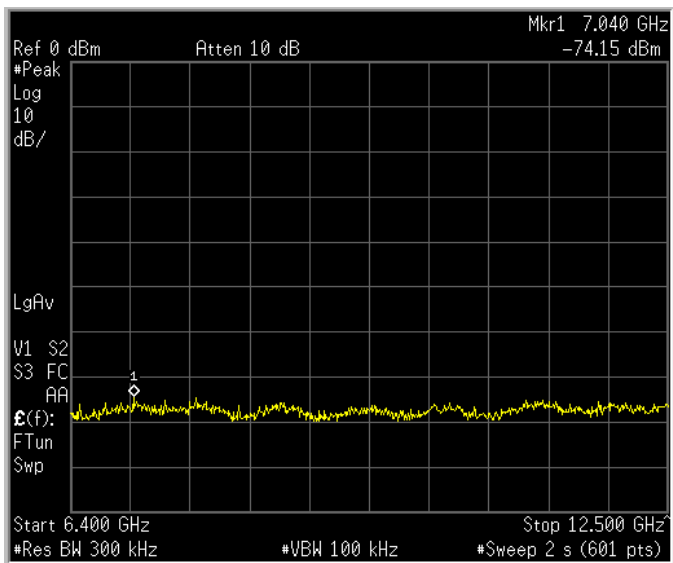
0.07  $\mu$  S Pulse



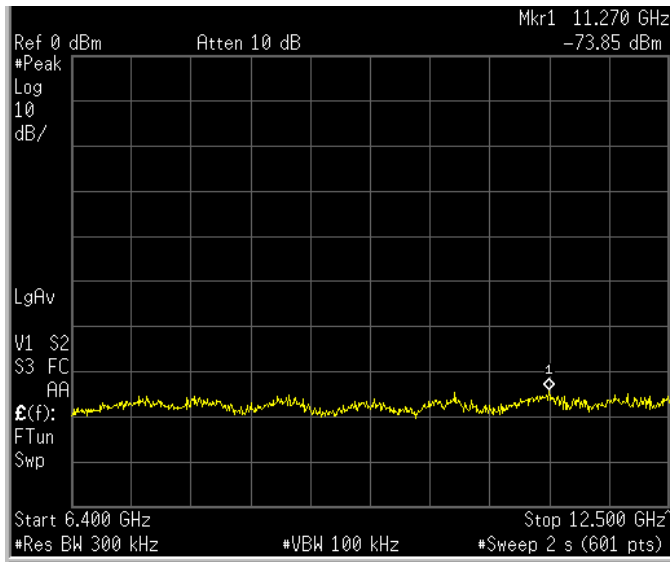
0.2  $\mu$  S Pulse



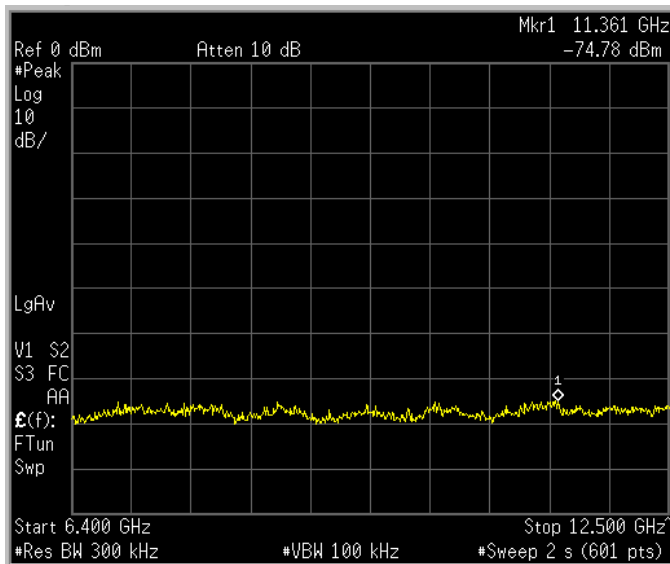
0.3  $\mu$  S Pulse



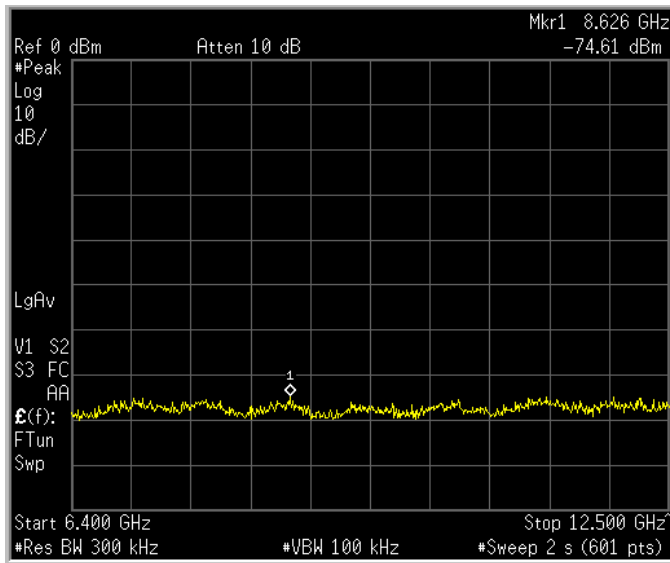
0.4  $\mu$  S Pulse



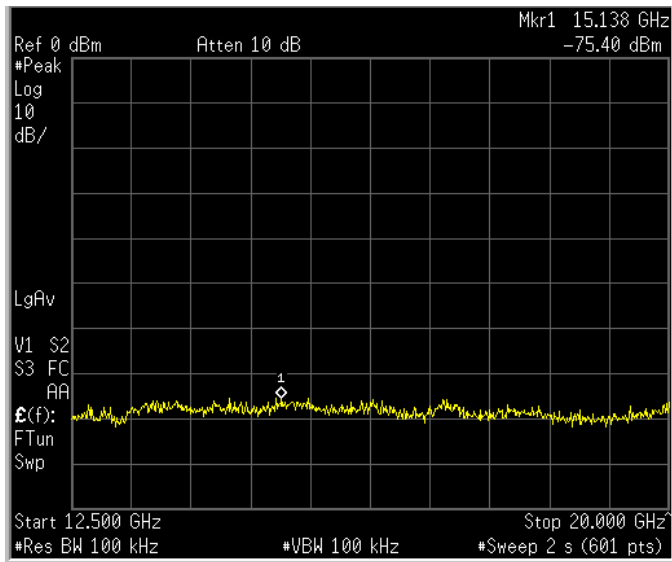
0.8  $\mu$  S Pulse



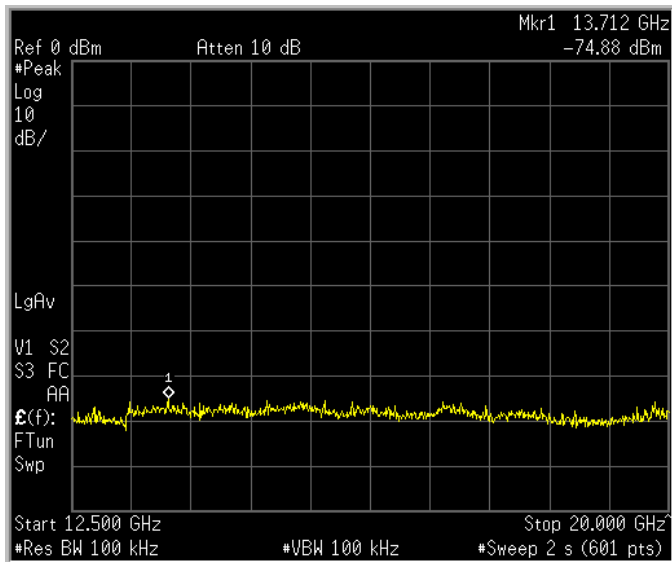
1.0  $\mu$  S Pulse



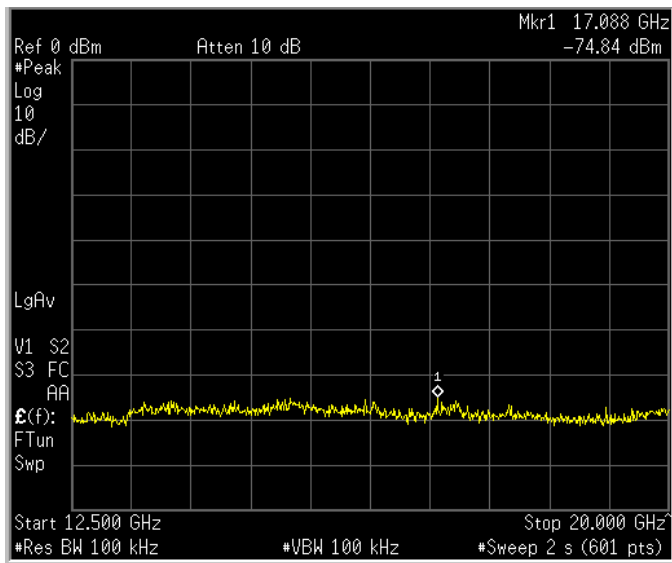
1.2  $\mu$  S Pulse



Ambient

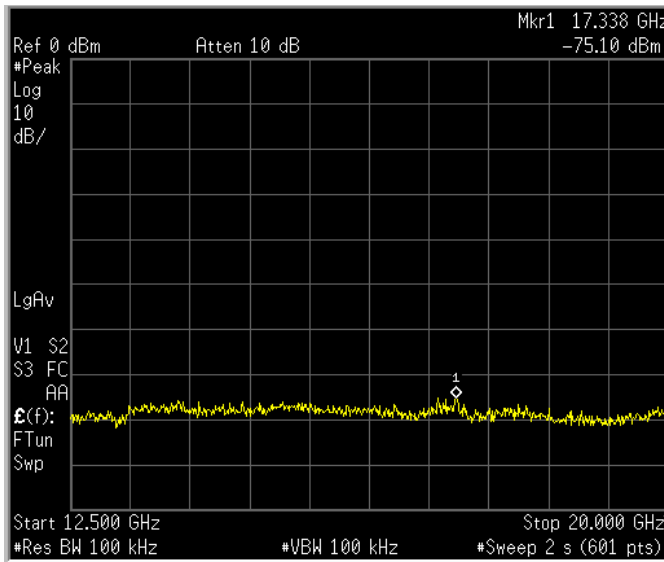


Stand-By

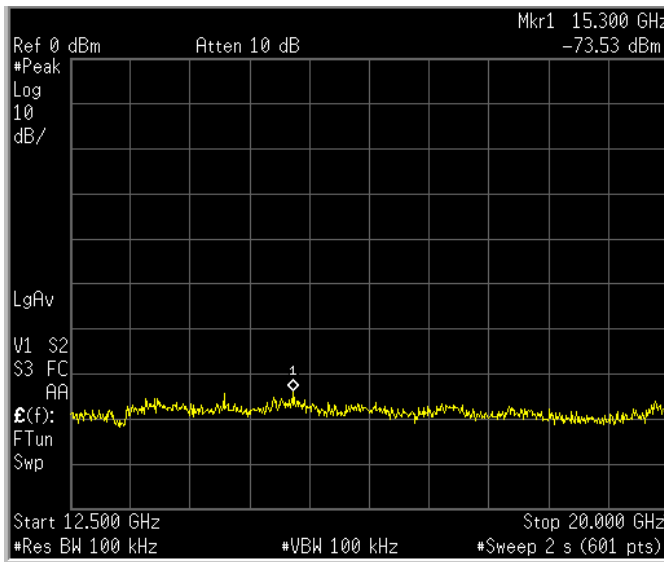


0.07  $\mu$  S Pulse

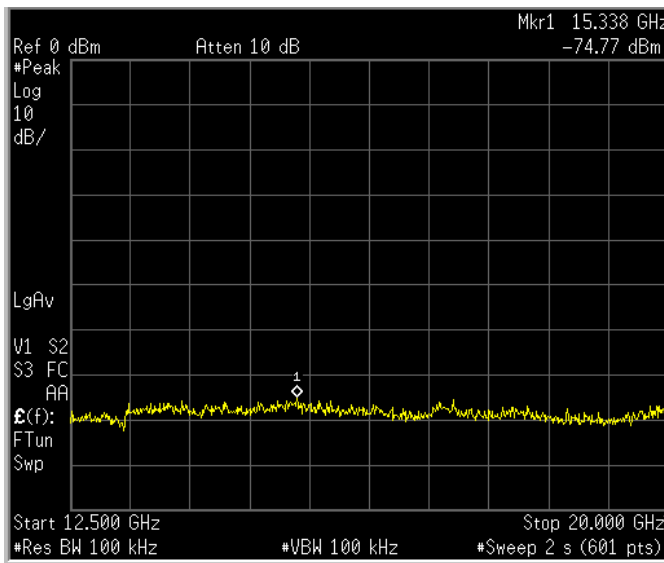




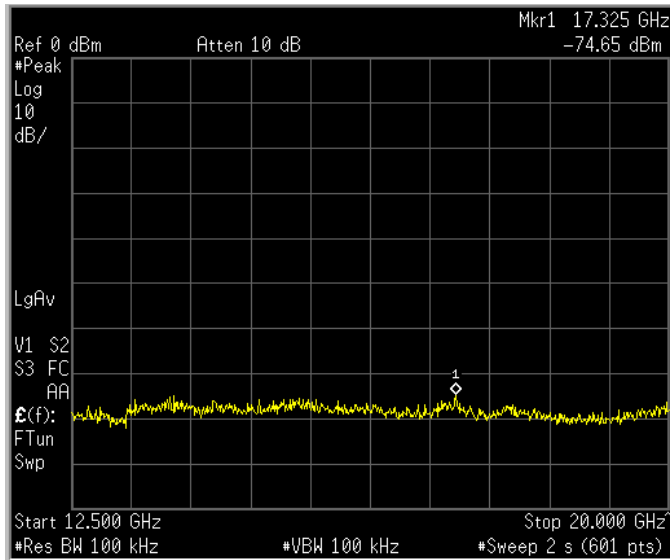
0.2  $\mu$  S Pulse



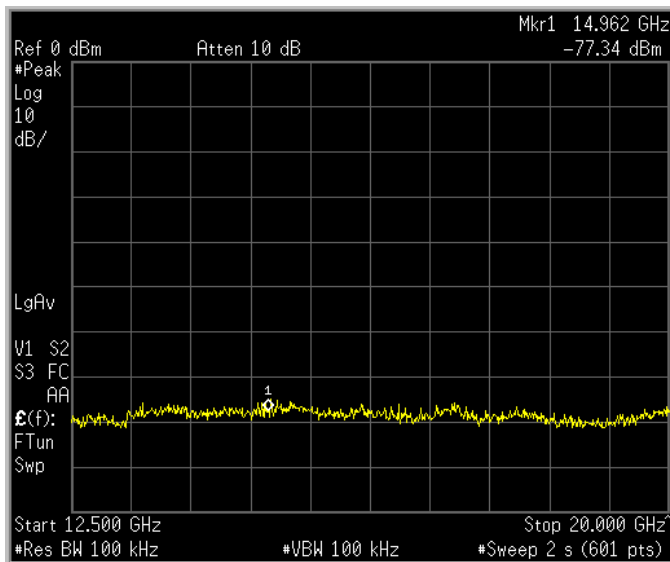
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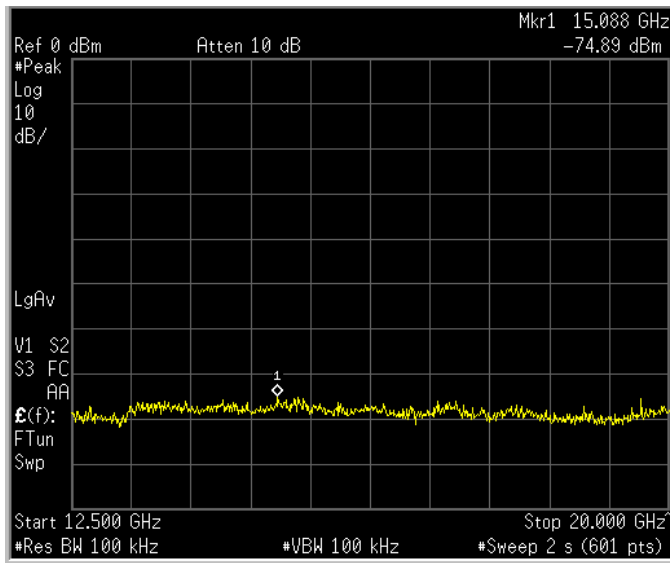
0.4  $\mu$  S Pulse



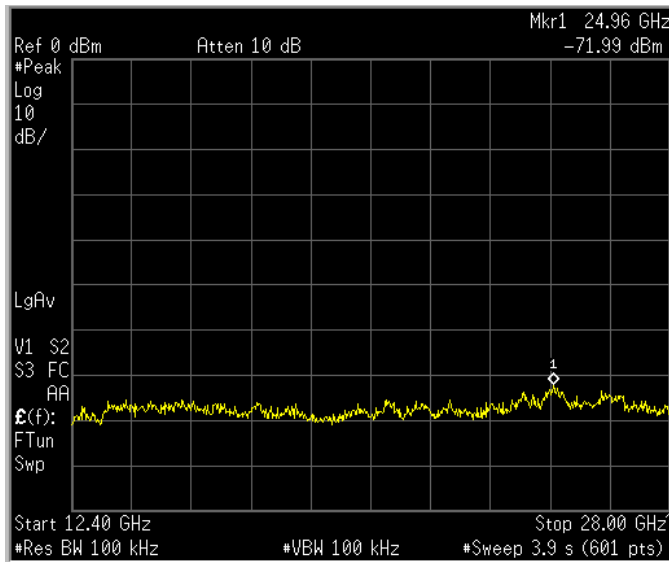
0.8  $\mu$  S Pulse



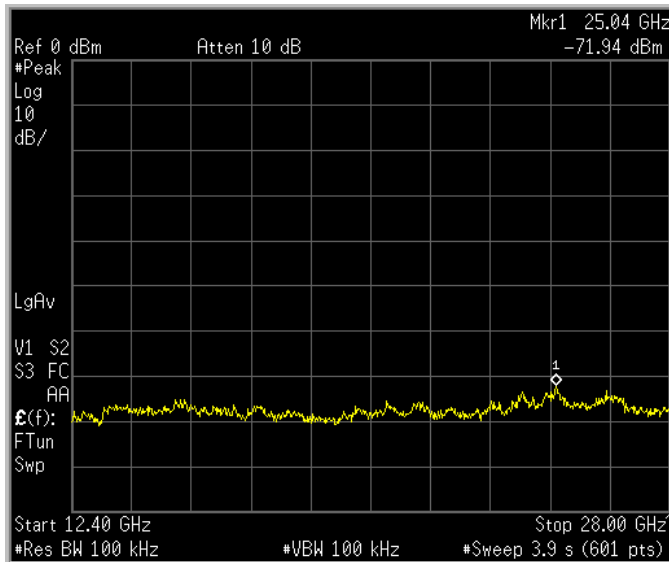
1.0  $\mu$  S Pulse



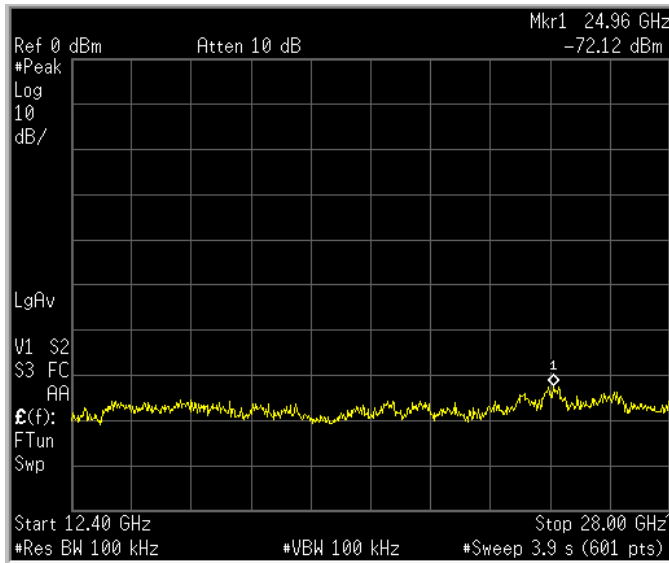
1.2  $\mu$  S Pulse



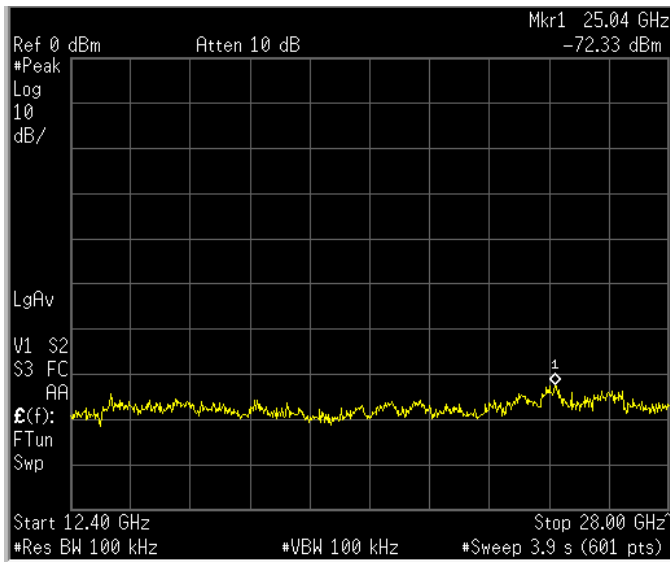
Ambient



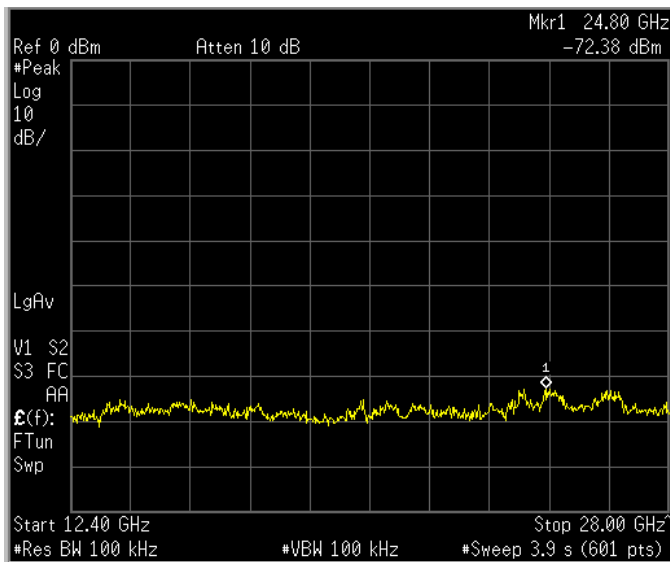
Stand-By



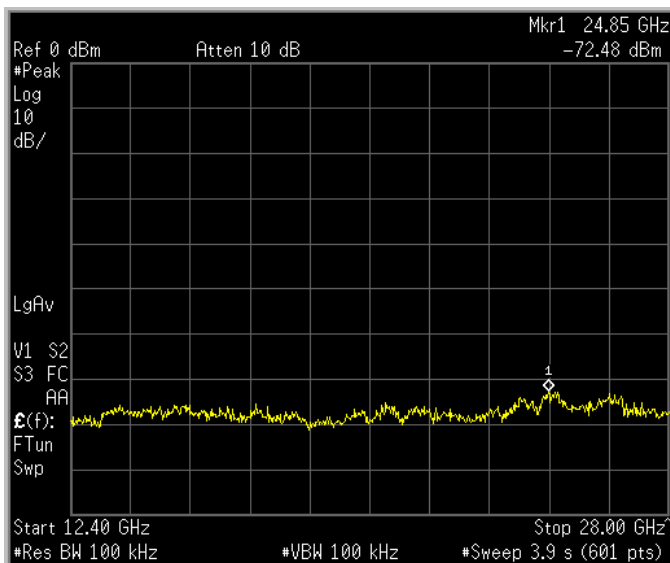
0.07  $\mu$  S Pulse



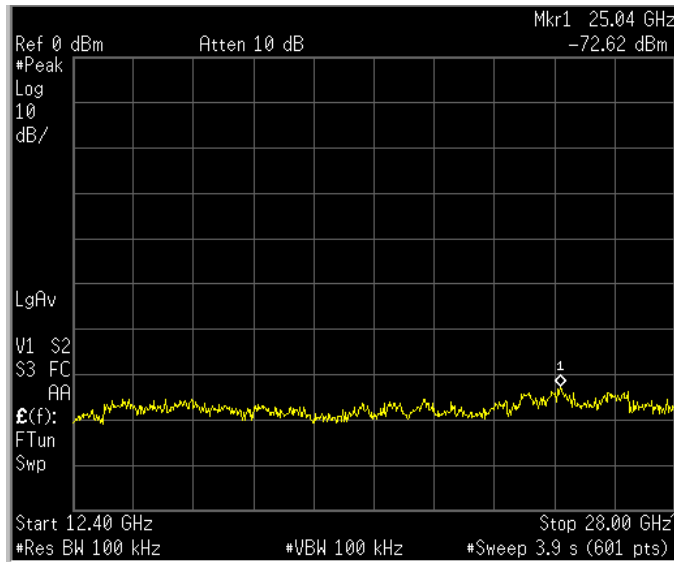
0.2  $\mu$  S Pulse



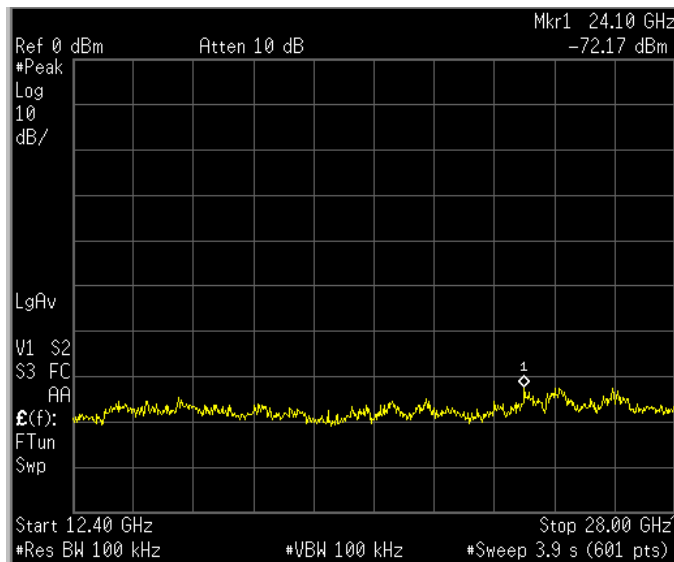
0.3  $\mu$  S Pulse



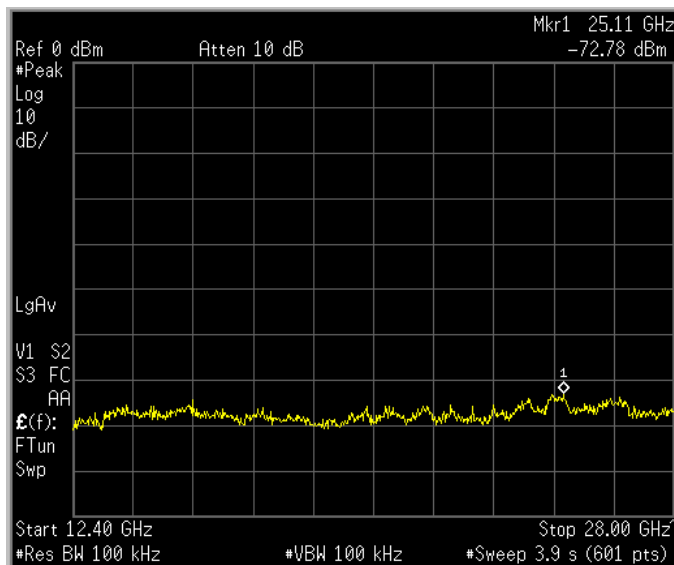
0.4  $\mu$  S Pulse



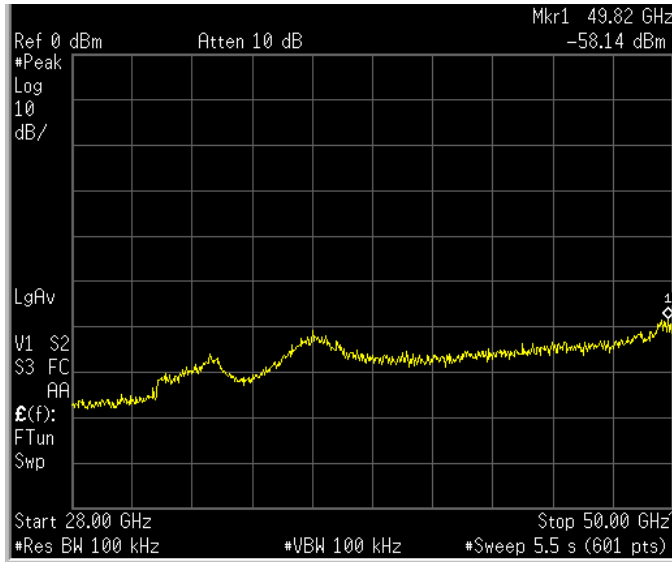
0.8  $\mu$  S Pulse



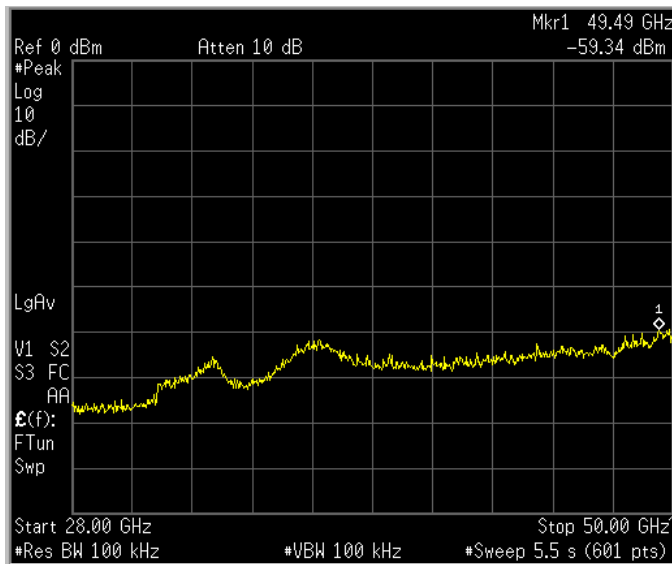
1.0  $\mu$  S Pulse



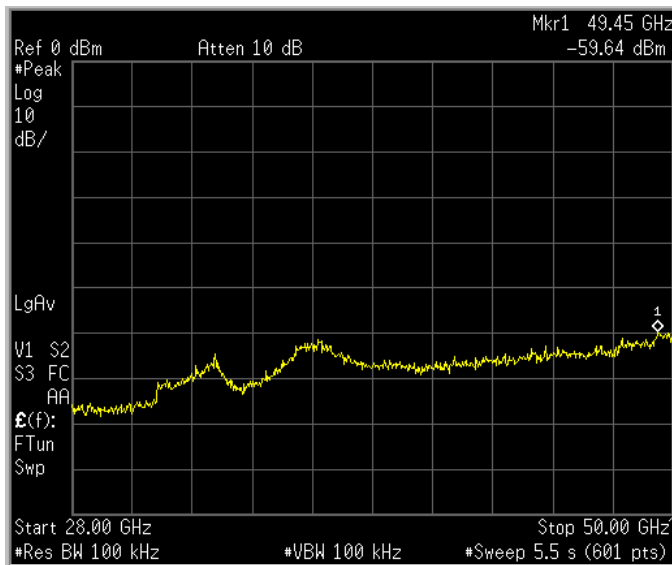
1.2  $\mu$  S Pulse



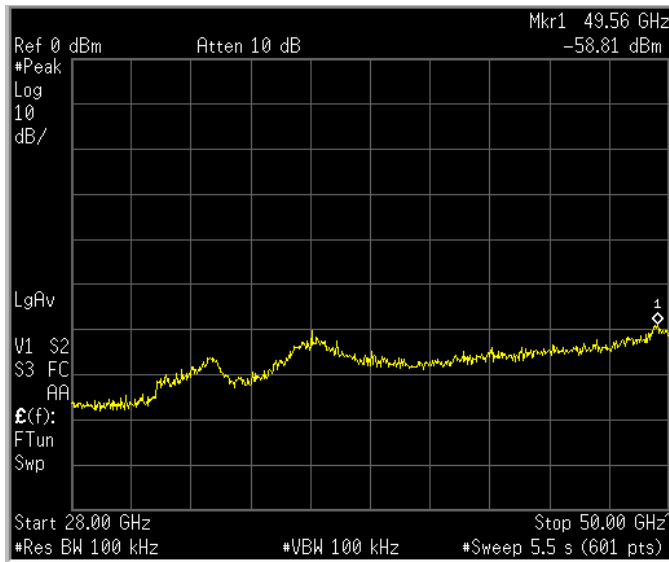
Ambient



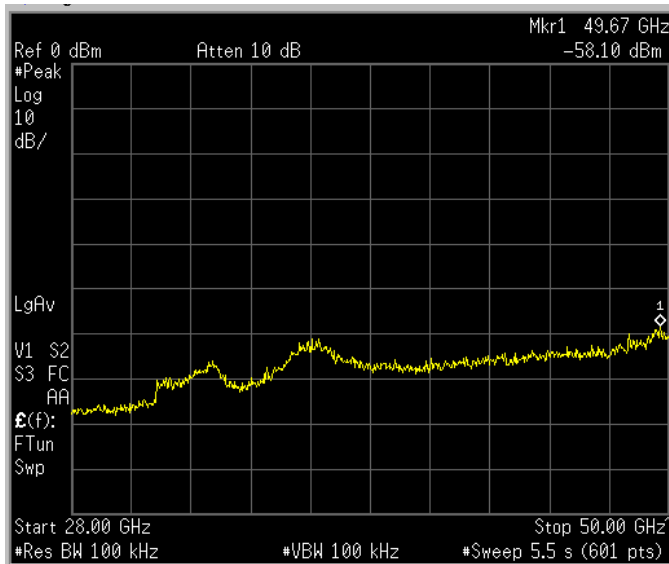
Stand-By



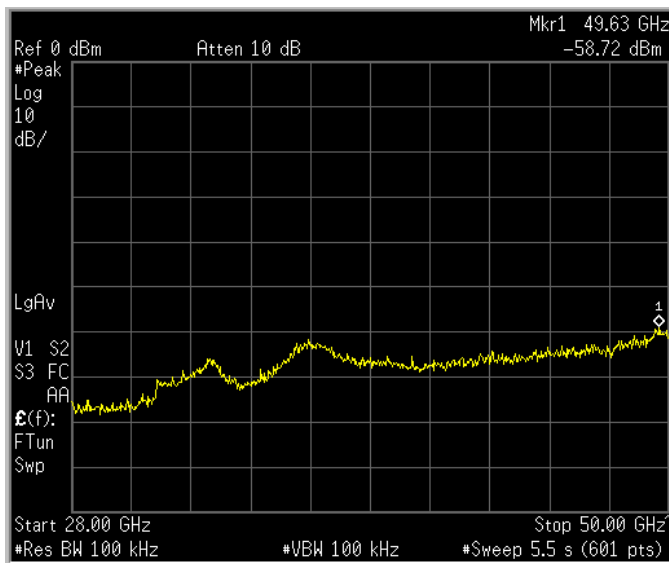
0.07  $\mu$  S Pulse



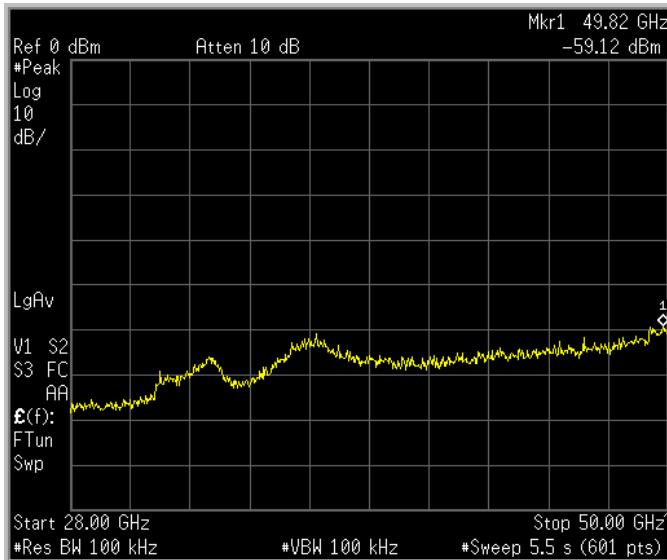
0.2  $\mu$  S Pulse



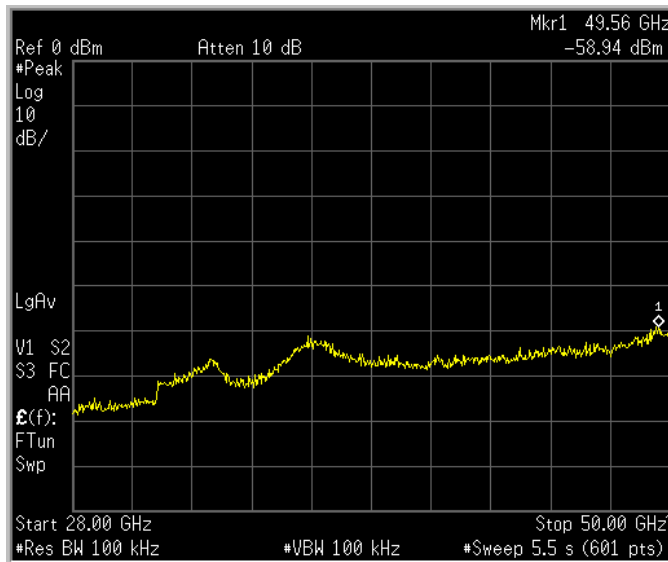
0.3  $\mu$  S Pulse



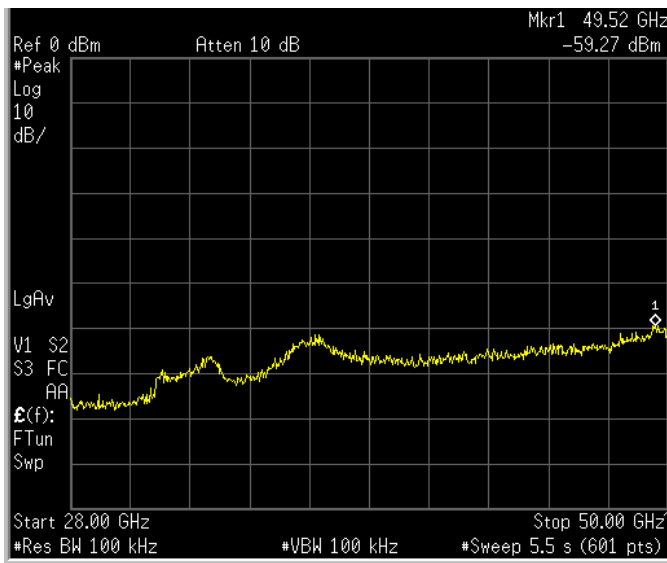
0.4  $\mu$  S Pulse



0.8  $\mu$  S Pulse



1.0  $\mu$  S Pulse



1.2  $\mu$  S Pulse