



FCC 47 CFR PART 15 SUBPART C TEST REPORT

For

Product Name: MOBILE PHONE

Brand Name: ALVO

Model No.: ALVO XERO

Series Model: N/A

Test Report Number:

KS120424A01-RPB

Issued for

DELTA NETWORK PTE. LTD.

21 Bukit Batok Crescent #23-72, Wcega Tower Singapore 658065

Issued by

Compliance Certification Services Inc.

Kun shan Laboratory

**No.10 Weiye Rd., Innovation park, Eco&Tec,
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TESTING CERT #2541.01

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1 TEST RESULT CERTIFICATION

Product Name:	MOBILE PHONE
Trade Name:	ALVO
Model Name.:	ALVO XERO
Series Model:	N/A
Applicant Discrepancy:	Initial
Device Category:	PORTABLE DEVICES
Exposure Category:	GENERAL POPULATION/UNCONTROLLED EXPOSURE
Date of Test:	April 27, 2012
Applicant:	DELTA NETWORK PTE. LTD. 21 Bukit Batok Crescent #23-72, Wcega Tower Singapore 658065
Manufacturer:	SHENZHEN UNITED TIME TECHNOLOGY CO.,LTD. Room 1001 Microprofit Building,6 Gaoxin south Road, High-Tech Park, Nanshan district ,Shenzhen, P.R. China
Application Type:	Certification

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Hadiif Hoo

Tested by:

Sean Yu

Hadiif Hoo
RF Manager
Compliance Certification Services Inc.

Sean Yu
Test Engineer
Compliance Certification Services Inc.



2 EUT DESCRIPTION

Product Name:	MOBILE PHONE
Brand Name:	ALVO
Model Name:	ALVO XERO
Series Model:	N/A
Model Discrepancy:	N/A
Power Adapter Power Rating :	Power supply and ADP (rating) : Model:COOL Input:100-240V-50/60HZ Output:DC5V 500mA Battery (rating): Capacidad :XERO 3.7Vcc 1100mAh
Frequency Range :	Bluetooth :2402 ~ 2480 MHz Wifi b/g: 2412 ~ 2462 MHz GSM/GPRS 850: 824.20 ~ 848.80 MHz GSM/GPRS 1900: 1850.20 ~ 1909.80 MHz
Transmit Power :	1.20 dBm
Modulation Technique :	FHSS
Transmit Data Rate :	GFSK(1 Mbps), $\pi/4$ -DQPSK(2 Mbps),8-DPSK(3 Mbps)
Number of Channels :	79 Channels
Antenna Specification :	Max Gain: -1 dBi

Remark: This submittal(s) (test report) is intended for **FCC ID: Z6PALVOXERO** to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EXERCISE EUT

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

3.4 MODIFICATION

N/A



3.5 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.0900 - 0.1100	16.420 - 16.423	399.9 - 410.0	4.50 - 5.15
0.4950 - 0.505 ⁽¹⁾	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960.0 - 1240	7.25 - 7.75
4.1250 - 4.1280	25.50 - 25.67	1300 - 1427	8.025 - 8.500
4.17725 - 4.17775	37.50 - 38.25	1435.0 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73.0 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.2150 - 6.2180	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108.00 - 121.94	1718.8 - 1722.2	13.25 - 13.40
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.50
8.2910 - 8.2940	149.90 - 150.05	2310 - 2390	15.35 - 16.20
8.3620 - 8.3660	156.52475 - 156.52525	2483.5 - 2500.0	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.1700	3260 - 3267	23.6 - 24.0
12.2900 - 12.2930	167.72 - 173.20	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345 - 3358	36.43 - 36.5 ⁽²⁾
12.57675 - 12.57725	322.0 - 335.4	3600 - 4400	
13.3600 - 13.4100			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.6 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below GFSK(1M) and 8-DPSK(3 Mbps) Channel Low (2402MHz) · Mid (2441MHz) and High (2480MHz), these were chosen for full testing.



4 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards, facilities and accreditations

5 FACILITIES AND ACCREDITATIONS

5.1 FACILTIES

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC5743 for 10m chamber 10m, IC5743 for 10m chamber 3m.



5.4 TABLE OF ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF
USA	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site,
<http://www.ccsrf.com>

**5.5 LIST OF MEASURING EQUIPMENT**

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2012-5-13
DETECTOR NEGATIVE	Agilent	8473B	MY42240176	2012-5-13
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2013-3-25
Peak and Avg Power Sensor	Agilent	E9327A	US40441788	2013-3-25
EPM-P Series Power Meter	Agilent	E4416A	GB41292714	2012-5-13
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	2012-5-13
DC POWER SUPPLY	GW instek	GPS-3303C	E903131	2012-5-13
Temp. / Humidity Chamber	Kingson	THS-M1	242	2013-3-13
Test Software	EZ-EMC			

977 Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2012-5-13
EMI Test Receiver	R&S	ESPI3	101026	2013-3-15
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	2013-6-30
Pre-Amplifier	Miteq	NSP4000-NF	870629	2013-6-30
Bilog Antenna	Sunol	JB1	A110204-2	2013-6-24
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2012-5-13
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Test Software	EZ-EMC			

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER	R&S	ESCI3	100781	2013-3-15
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	2013-3-15
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	2013-3-15
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	2013-4-9
Test Software	EZ-EMC			

Remark: Each piece of equipment is scheduled for calibration once a year.



5.6 SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

5.7 SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Remark:

- 1.All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2.Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



6 FCC PART 15.247 REQUIREMENTS

6.1 PEAK POWER

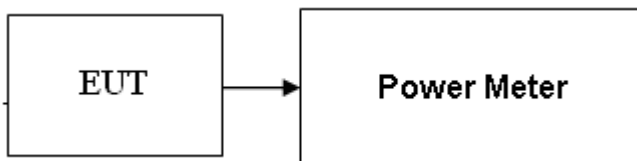
LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
3. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Power Meter.



TEST RESULTS

No non-compliance noted

Test Data

1M

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (mW)	Limit (mW)	Result
Low	2402	0.20	1.00	1.20	1.318	125	PASS
Mid	2441	0.04	1.00	1.04	1.270		PASS
High	2480	-0.55	1.00	0.45	1.109		PASS

3M

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (mW)	Limit (mW)	Result
Low	2402	-0.22	1.00	0.78	1.197	125	PASS
Mid	2441	-0.57	1.00	0.43	1.104		PASS
High	2480	-0.90	1.00	0.10	1.023		PASS



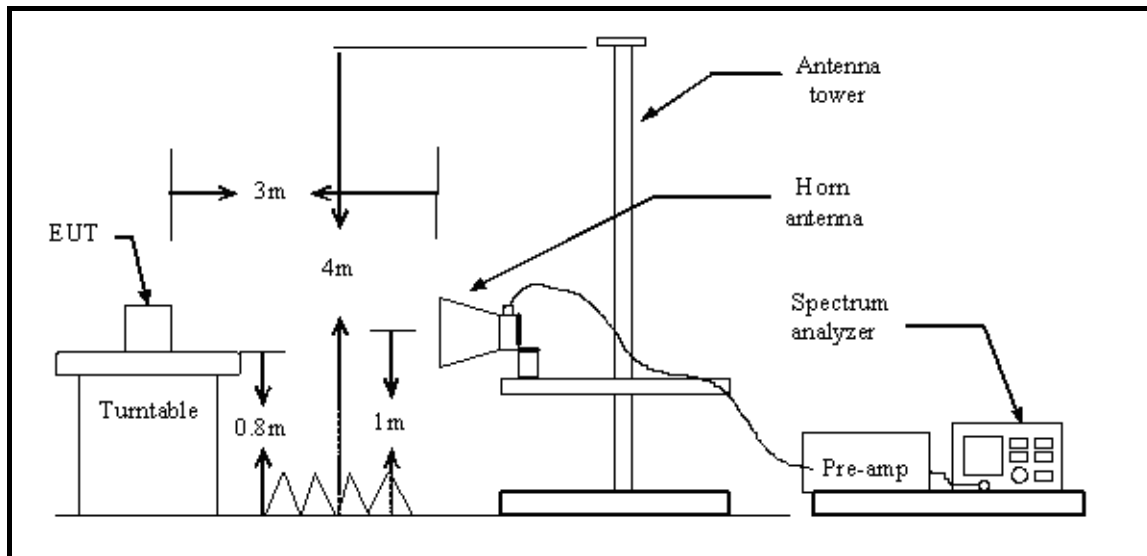
6.2 BAND EDGES MEASUREMENT

LIMIT

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

Test Configuration

Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.



TEST RESULTS

1M

CH LOW

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	51.34	44.37	3.00	54.34	47.37	74	54	-19.66	-6.63
2390.00	H	51.44	44.47	3.00	54.44	47.47	74	54	-19.56	-6.53

CH HIGH

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	59.92	49.29	3.00	62.92	52.29	74	54	-11.08	-1.71
2483.50	H	61.76	49.22	3.00	64.76	52.22	74	54	-9.24	-1.78



Refer to attach spectrum analyzer data chart. **Band Edges (CH Low)**

Detector mode: Peak Polarity: Vertical

Agilent

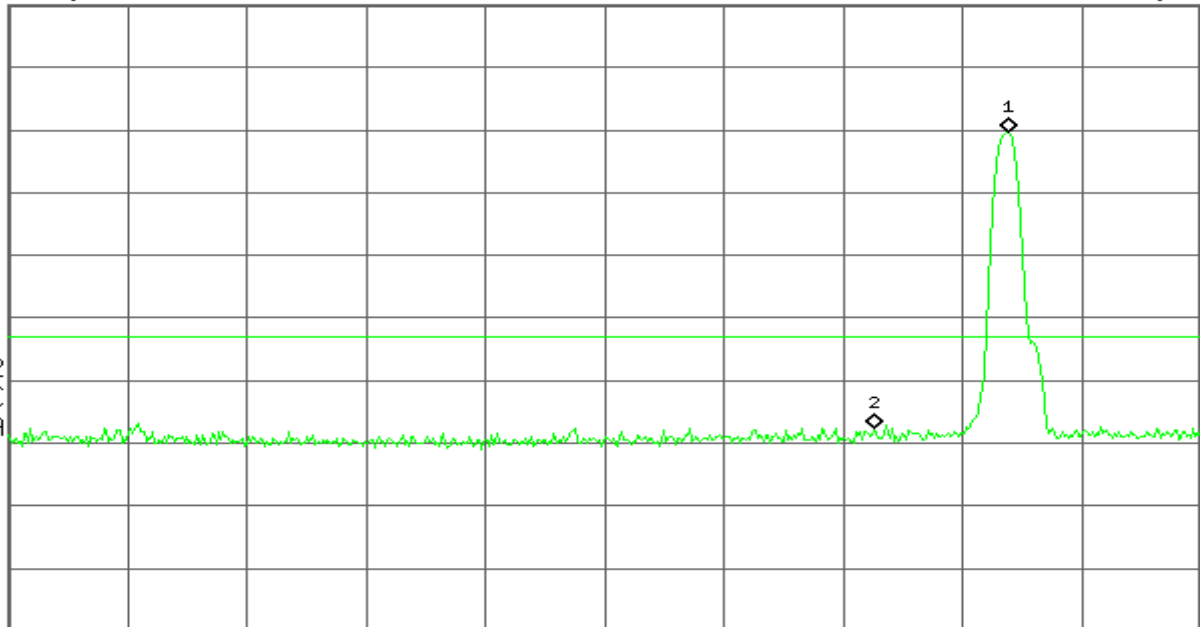
R T

Mkr2 2.390 00 GHz
54.34 dB μ V

Ref 127 dB μ V

Atten 30 dB

Peak
Log
10
dB/
Offst
3.0
dB
DI
74.0
dB μ V
LgAv
M1 S2
S3 FC
AA
E(f):
FTun
Swp



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average Polarity: Vertical

Agilent

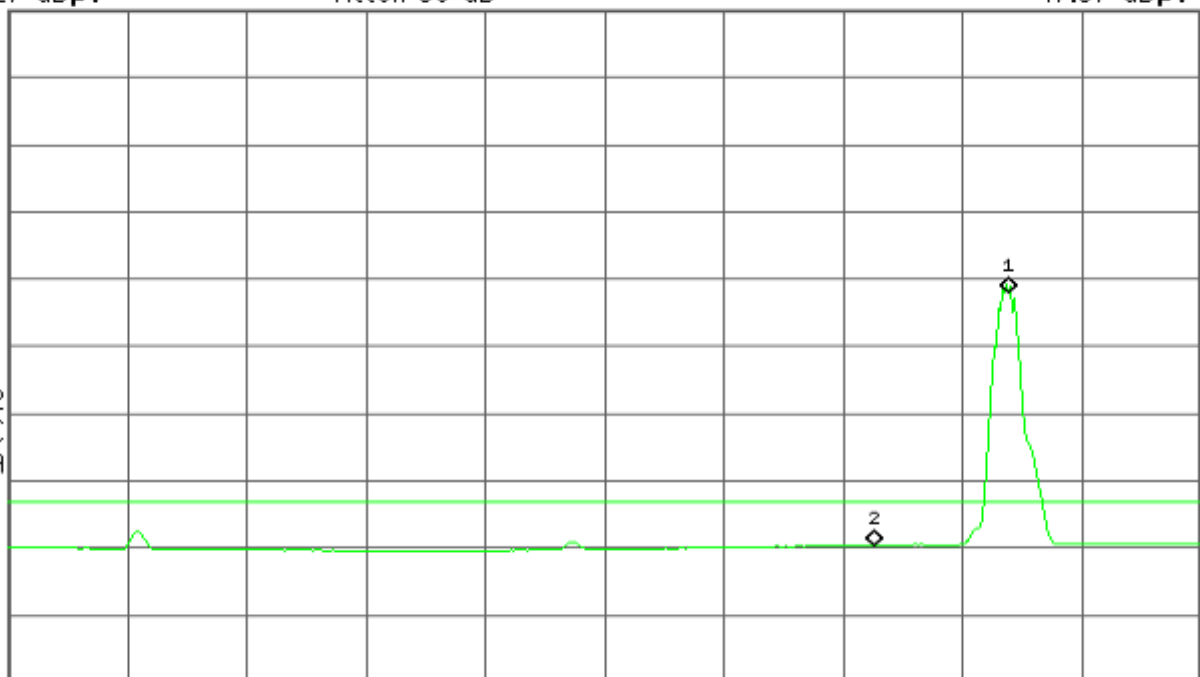
R T

Mkr2 2.390 00 GHz
47.37 dB μ V

Ref 127 dB μ V

Atten 30 dB

Norm
Log
10
dB/
Offst
3.0
dB
DI
54.0
dB μ V
LgAv
W1 S2
S3 FC
AA
E(f):
FTun
Swp



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 8.577 s (601 pts)

**Detector mode: Peak****Polarity: Horizontal**

* Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.390 00 GHz
54.44 dB μ VPeak
Log
10
dB/
Offst
3.0
dB
DI
74.0
dB μ V
LgAv
M1 S2
S3 FC
AA
 $\mathcal{E}(f)$:
FTun
Swp

Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

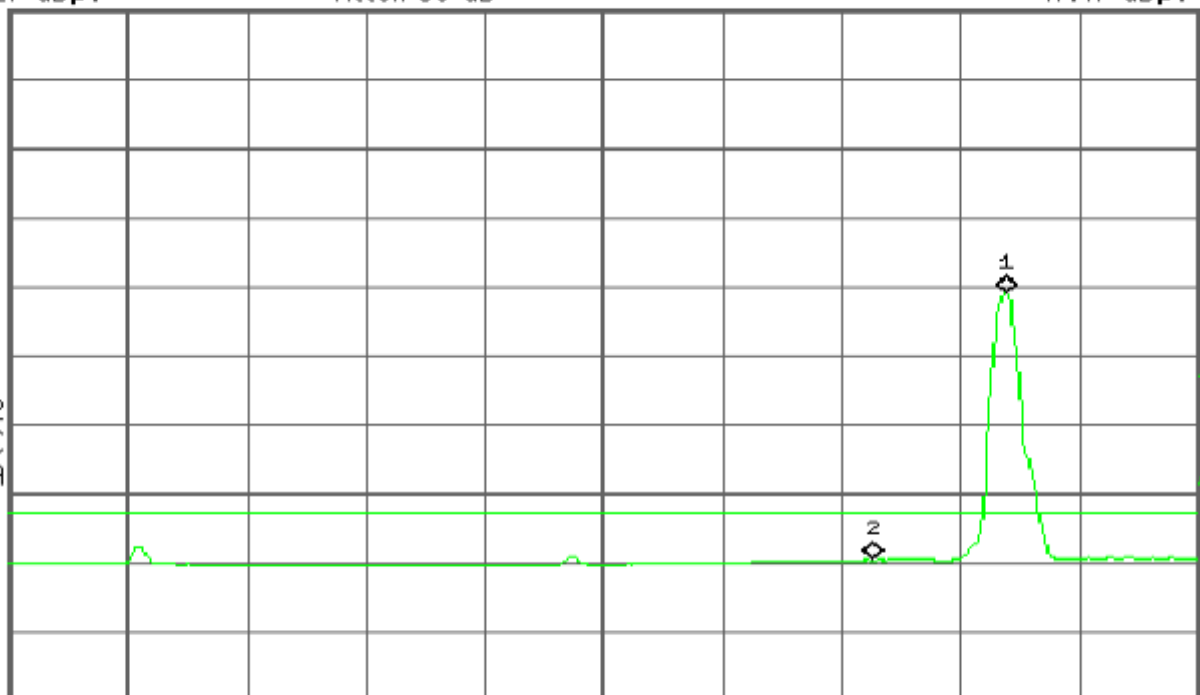
Detector mode: Average**Polarity: Horizontal**

* Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.390 00 GHz
47.47 dB μ VPeak
Log
10
dB/
Offst
3.0
dB
DI
54.0
dB μ V
LgAv
M1 S2
S3 FC
AA
 $\mathcal{E}(f)$:
FTun
Swp

Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)



Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent

R T

Mkr2 2.483 50 GHz
62.92 dB μ VRef 127 dB μ V

Atten 30 dB

Peak

Log

10

dB/

Offst

3.0

dB

DI

74.0

dB μ V

LgAv

M1 S2

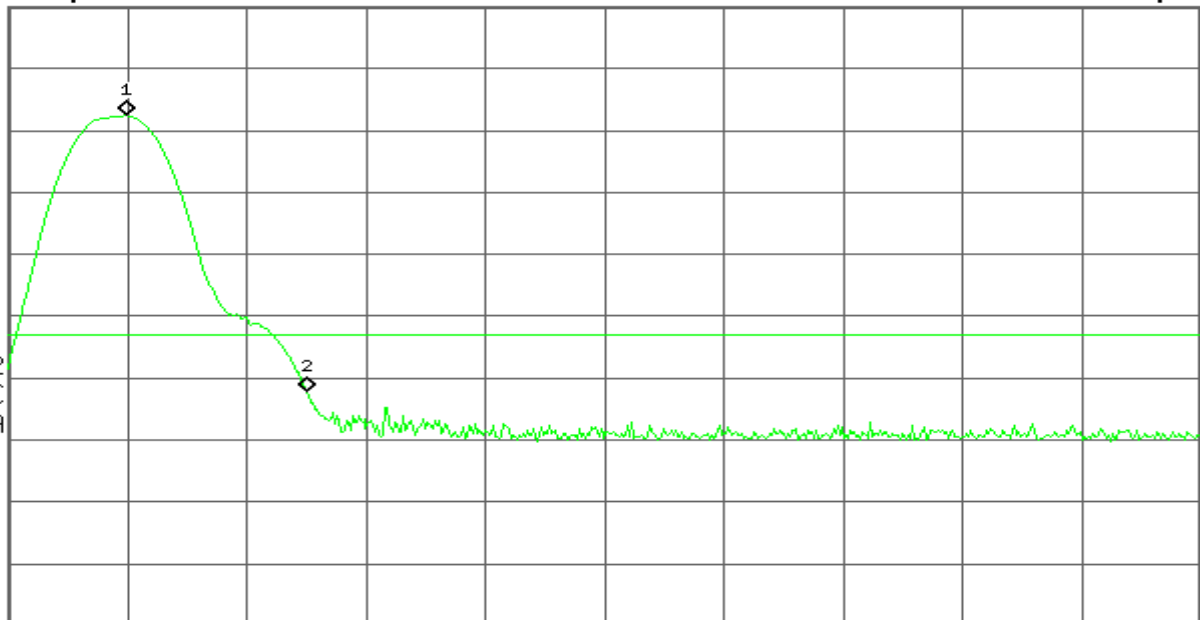
S3 FC

AA

E(f):

FTun

#Swp



Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

Sweep 1 ms (601 pts)

Detector mode: Average

Polarity: Vertical

Agilent

R T

Mkr2 2.483 50 GHz
52.29 dB μ VRef 127 dB μ V

Atten 30 dB

Peak

Log

10

dB/

Offst

3.0

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

AA

E(f):

FTun

Swp



Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 1.715 s (601 pts)

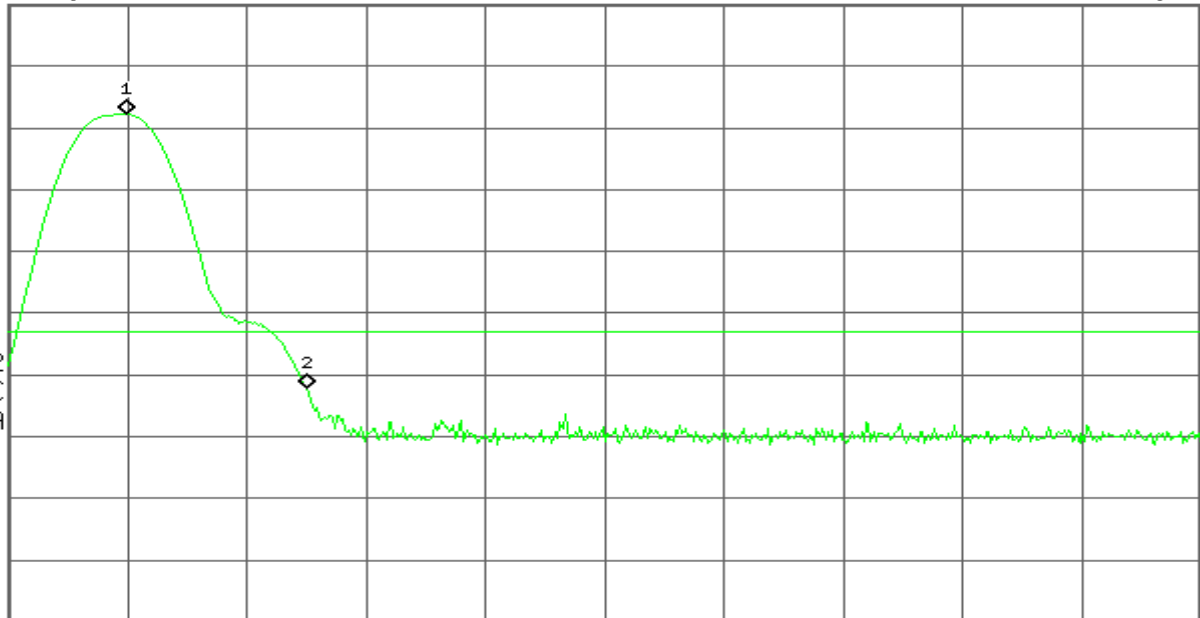
**Detector mode: Peak****Polarity: Horizontal**

* Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.483 50 GHz
64.76 dB μ VPeak
Log
10
dB/
Offset
3.0
dB
DI
74.0
dB μ V
LgAv
M1 S2
S3 FC
AA
E(f):
FTun
#Swp

Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

Sweep 1 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.483 50 GHz
52.22 dB μ VPeak
Log
10
dB/
Offset
3.0
dB
DI
54.0
dB μ V
LgAv
M1 S2
S3 FC
AA
E(f):
FTun
Swp

Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 1.715 s (601 pts)



Compliance Certification Services Inc.

Report No: KS120424A01-RPB

FCC ID: Z6PALVOXERO

Date of Issue : May 10, 2012

3M

CH LOW

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	54.44	44.43	3.00	57.44	47.43	74	54	-16.56	-6.57
2390.00	H	54.90	44.4	3.00	57.90	47.4	74	54	-16.10	-6.6

CH HIGH

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	60.20	47.8	3.00	63.20	50.8	74	54	-10.80	-3.2
2483.50	H	60.1	47.8	3.00	63.1	50.8	74	54	-10.9	-3.2



Refer to attach spectrum analyzer data chart. **Band Edges (CH Low)**

Detector mode: Peak **Polarity: Vertical**

✱ Agilent

R T

Mkr2 2.390 00 GHz
57.44 dB μ V

Ref 127 dB μ V

Atten 30 dB

Peak

Log

10

dB/

Offst

3.0

dB

DI

74.0

dB μ V

LgAv

M1 S2

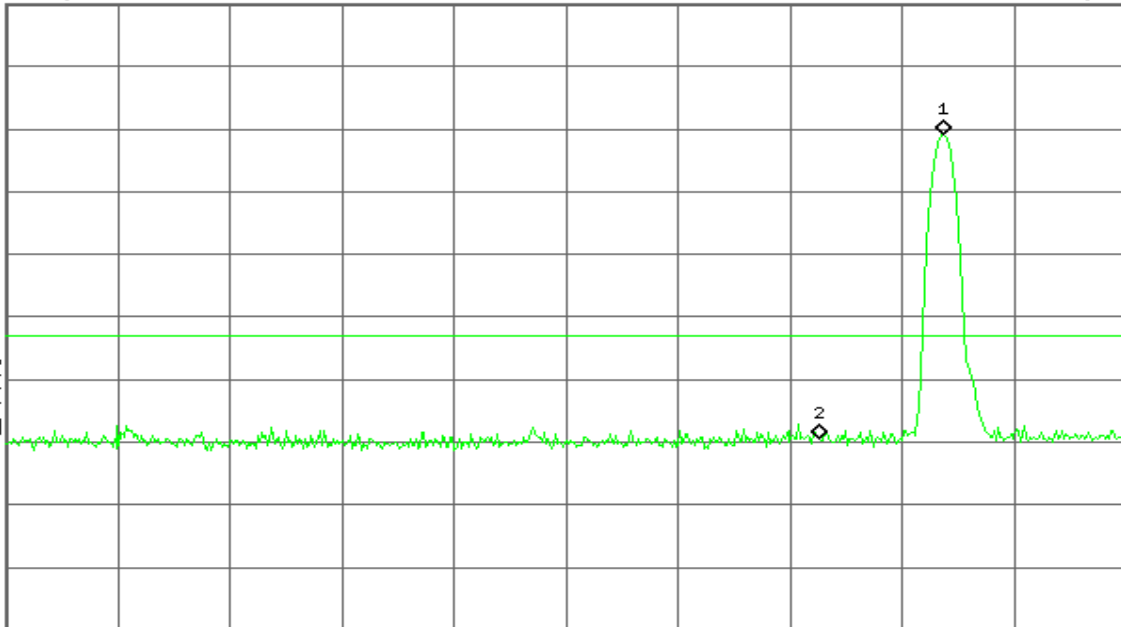
S3 FC

AA

$\mathcal{E}(f)$:

FTun

#Swp



Center 2.365 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Span 100 MHz
Sweep 1 ms (601 pts)

Detector mode: Average **Polarity: Vertical**

✱ Agilent

R T

Mkr2 2.390 00 GHz
47.43 dB μ V

Ref 127 dB μ V

Atten 30 dB

Peak

Log

10

dB/

Offst

3.0

dB

DI

54.0

dB μ V

LgAv

M1 S2

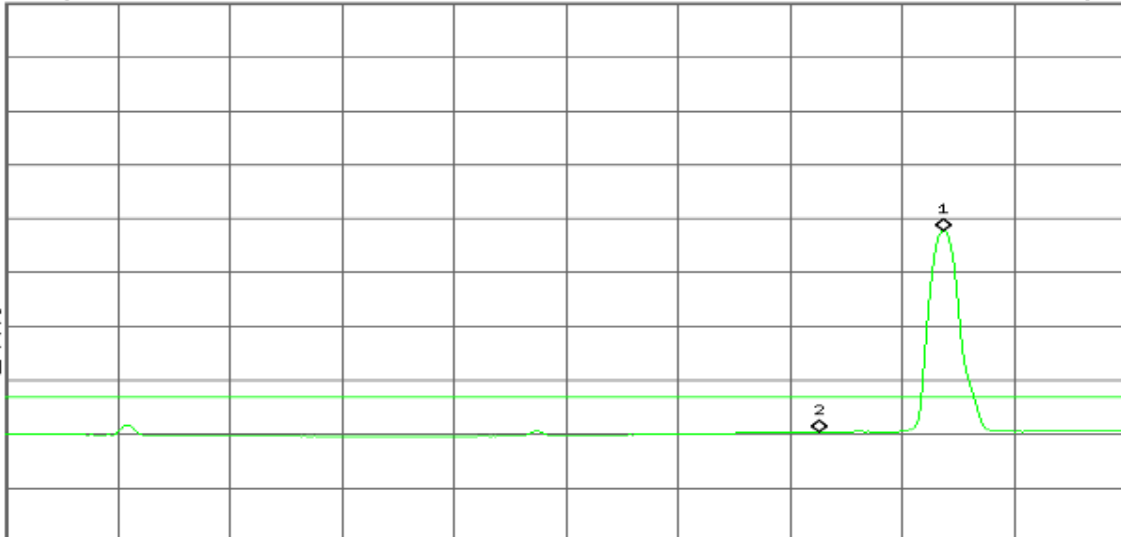
S3 FC

AA

$\mathcal{E}(f)$:

FTun

#Swp



Center 2.365 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Span 100 MHz
Sweep 8.577 s (601 pts)

**Detector mode: Peak****Polarity: Horizontal**

* Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.390 00 GHz

57.90 dB μ V

Peak

Log

10

dB/

Offst

3.0

dB

DI

74.0

dB μ V

LgAv

M1 S2

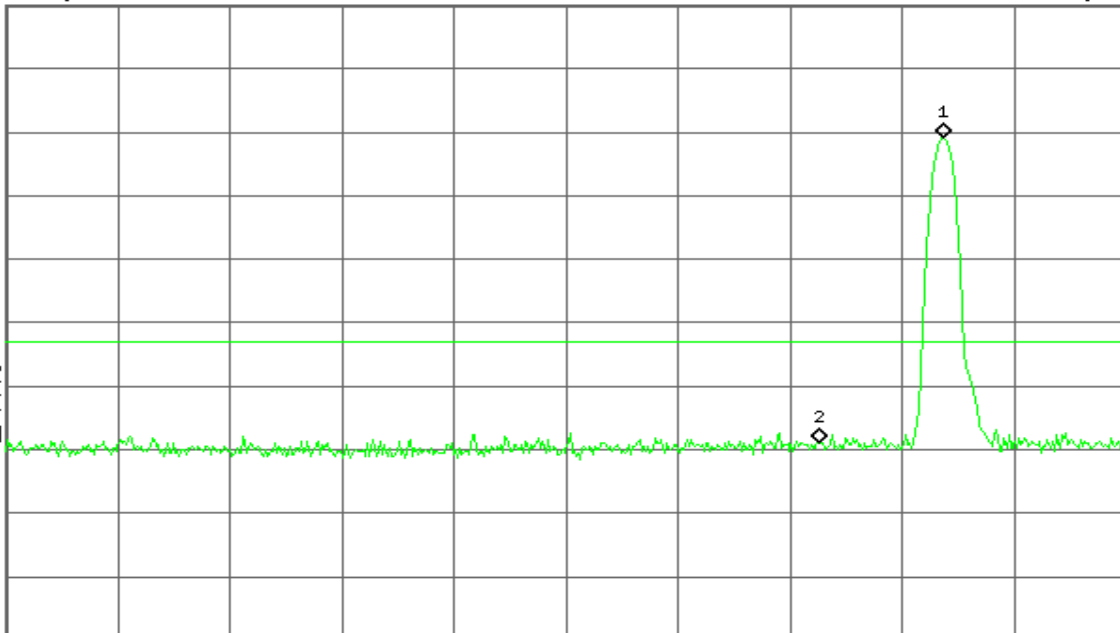
S3 FC

AA

f(f):

FTun

#Swp



Center 2.365 00 GHz

Span 100 MHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.390 00 GHz

47.40 dB μ V

Peak

Log

10

dB/

Offst

3.0

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

AA

f(f):

FTun

#Swp



Center 2.365 00 GHz

Span 100 MHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 8.577 s (601 pts)



Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent

R T

Mkr2 2.483 50 GHz
63.20 dB μ VRef 127 dB μ V

Atten 30 dB

Peak

Log

10

dB/

Offst

3.0

dB

DI

74.0

dB μ V

LgAv

M1 S2

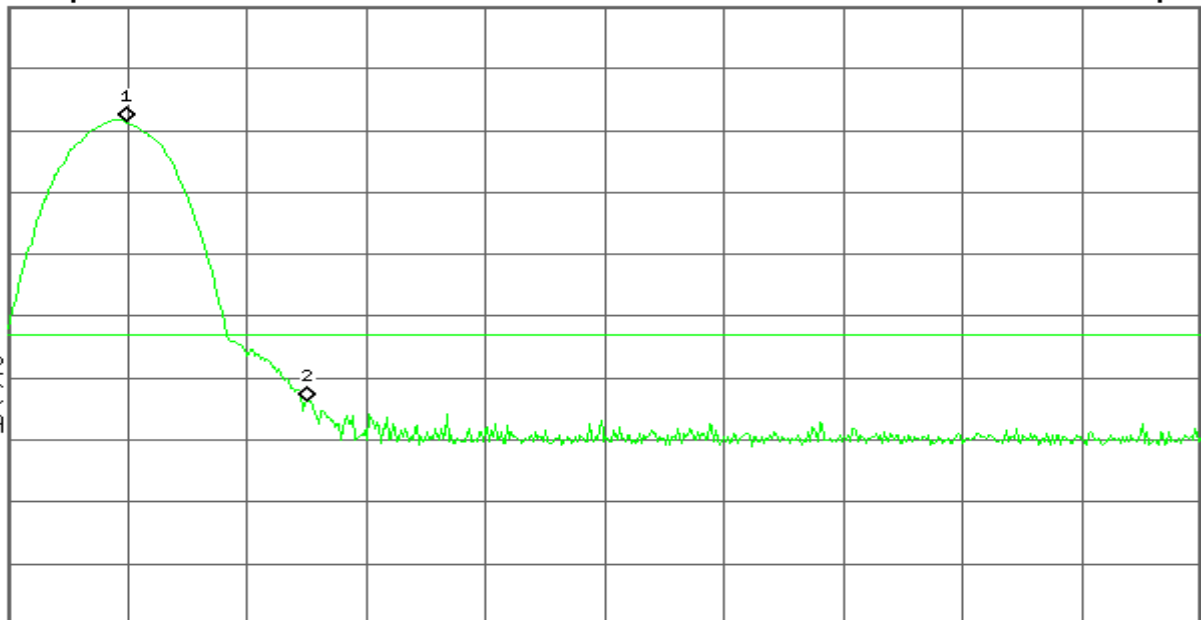
S3 FC

AA

E(f):

FTun

#Swp



Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

Sweep 1 ms (601 pts)

Detector mode: Average

Polarity: Vertical

Agilent

R T

Mkr2 2.483 50 GHz
50.80 dB μ VRef 127 dB μ V

Atten 30 dB

Peak

Log

10

dB/

Offst

3.0

dB

DI

54.0

dB μ V

LgAv

M1 S2

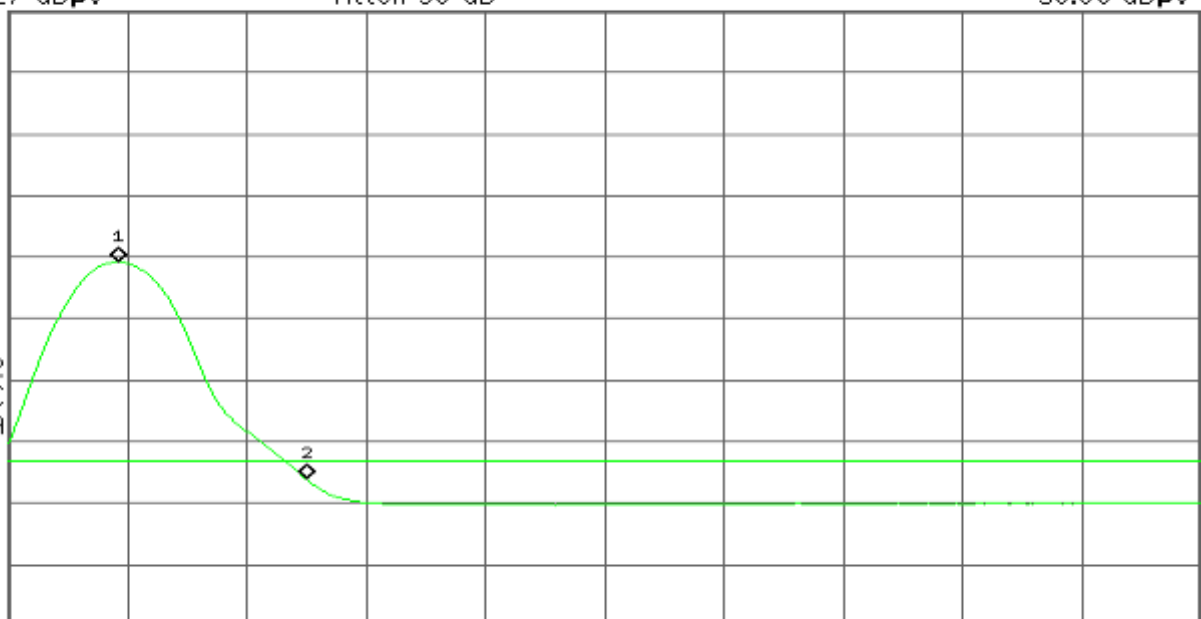
S3 FC

AA

E(f):

FTun

#Swp



Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 1.715 s (601 pts)

**Detector mode: Peak****Polarity: Horizontal**

Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.483 50 GHz
63.10 dB μ V

Peak

Log

10

dB/

Offst

3.0

dB

DI

74.0

dB μ V

LgAv

M1 S2

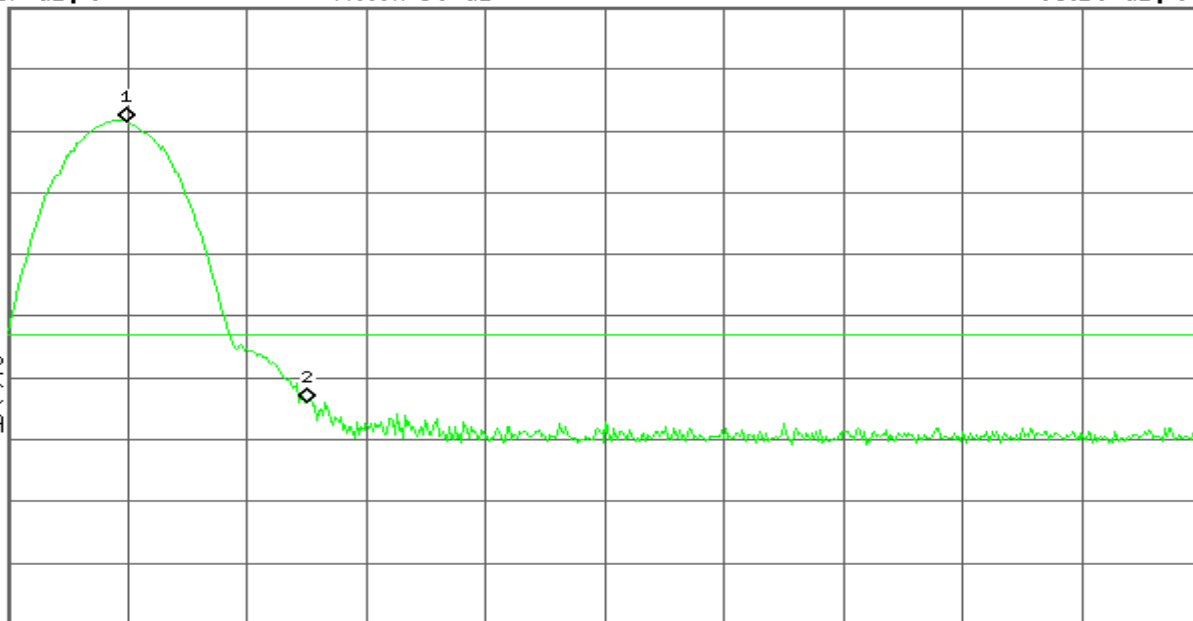
S3 FC

AA

 $\mathcal{E}(f)$:

FTun

#Swp



Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

Sweep 1 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

Agilent

R T

Ref 127 dB μ V

Atten 30 dB

Mkr2 2.483 50 GHz
50.80 dB μ V

Peak

Log

10

dB/

Offst

3.0

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

AA

 $\mathcal{E}(f)$:

FTun

#Swp



Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 1.715 s (601 pts)

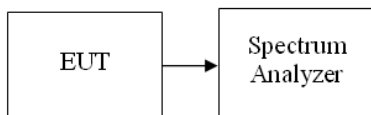


6.3 PEAK POWER SPECTRAL DENSITY

LIMIT

1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

NA (this test item is not required for FHSS modulation technical)

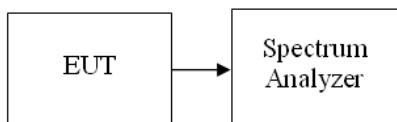


6.4 HOPPING CHANNEL BANDWIDTH

LIMIT

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 30kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
4. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

TEST RESULTS

No non-compliance noted

Test Data **1M**

Channel	Frequency	20dB Bandwidth
	(MHz)	(kHz)
00	2402	830.510
39	2441	827.236
78	2480	924.932

Test Data **3M**

Channel	Frequency	20dB Bandwidth
	(MHz)	(kHz)
00	2402	1163.00
39	2441	1149.00
78	2480	1168.00



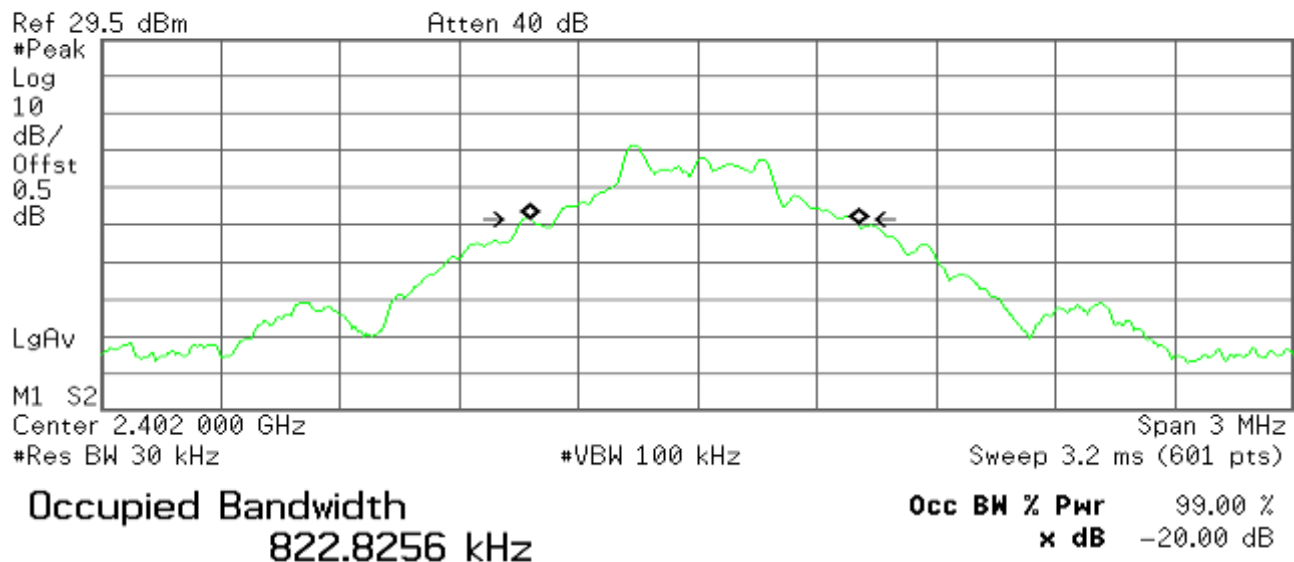
Test Plot

Measurement of 20dB Bandwidth

Channel low

Agilent

R T

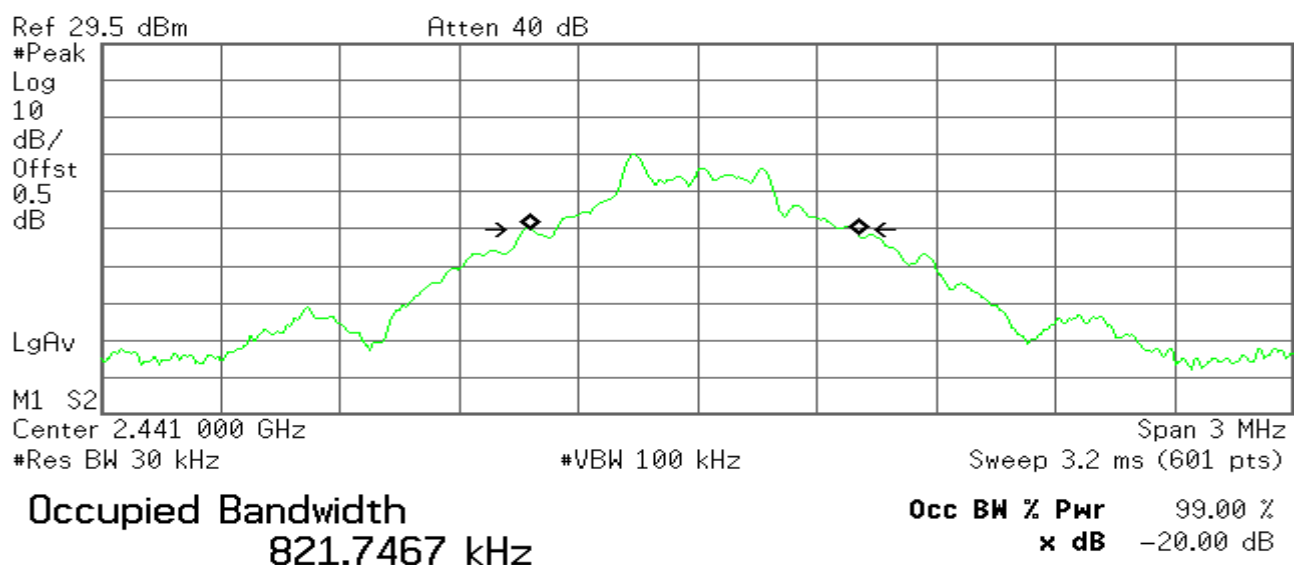


Transmit Freq Error -8.219 kHz
x dB Bandwidth 830.510 kHz

Channel middle

Agilent

R T



Transmit Freq Error -7.020 kHz
x dB Bandwidth 827.236 kHz



Channel high

* Agilent

R T

Ref 29.5 dBm

Atten 40 dB

#Peak
Log
10
dB/
Offst
0.5
dB

LgAv

M1 S2

Center 2.480 000 GHz

#Res BW 30 kHz

#VBW 100 kHz

Span 3 MHz
Sweep 3.2 ms (601 pts)**Occupied Bandwidth****824.3552 kHz****Occ BW % Pwr** 99.00 %
x dB -20.00 dB**Transmit Freq Error**

-5.972 kHz

x dB Bandwidth

824.932 kHz



3M

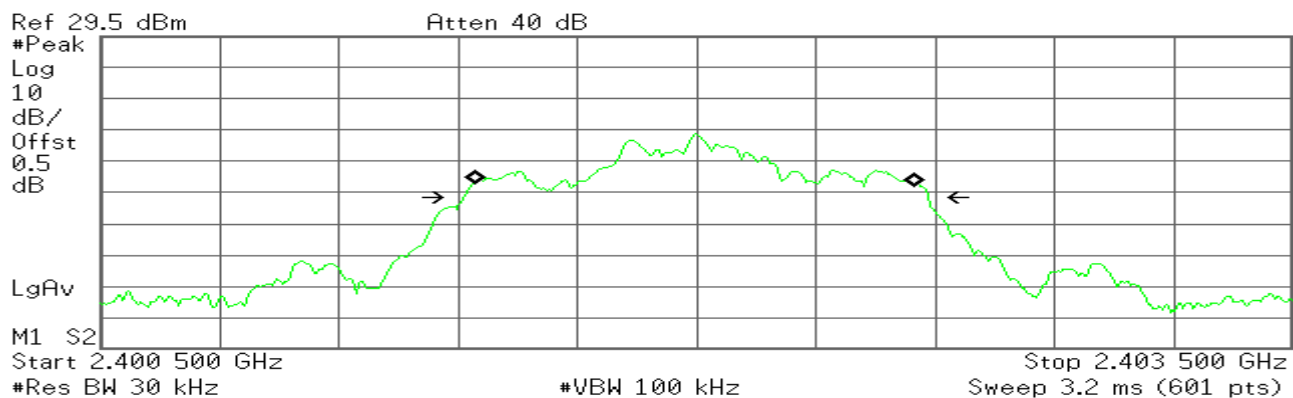
Test Plot

Measurement of 20dB Bandwidth

Channel low

Agilent

R T



Occupied Bandwidth
1.1022 MHz

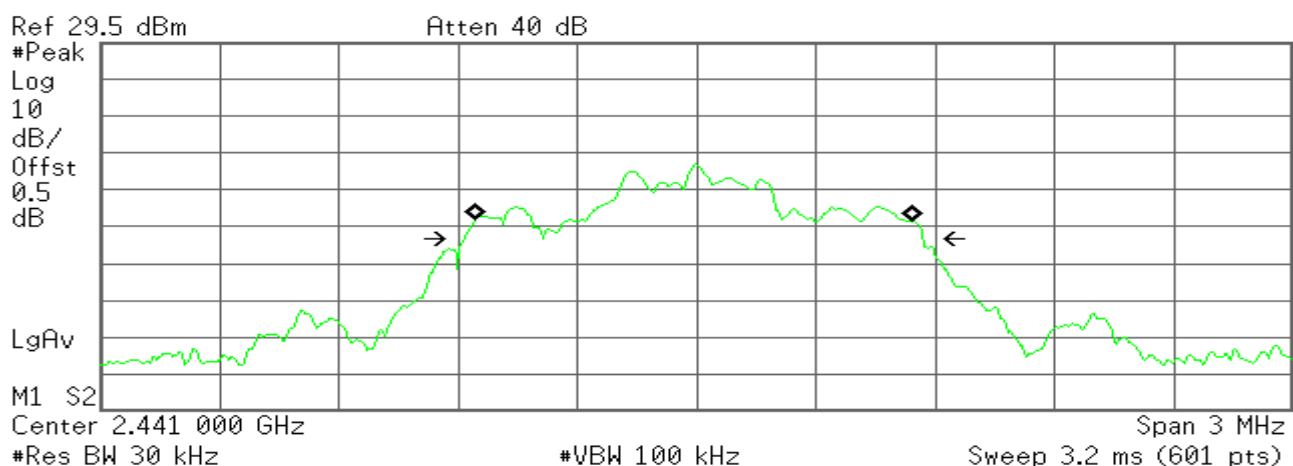
Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -4.989 kHz
x dB Bandwidth 1.163 MHz

Channel middle

Agilent

R T



Occupied Bandwidth
1.0930 MHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -7.211 kHz
x dB Bandwidth 1.149 MHz



Channel high

Agilent

R T

Ref 29.5 dBm

Atten 40 dB

#Peak

Log

10

dB/

Offst

0.5

dB

LgAv

M1 S2

Center 2.480 000 GHz

#Res BW 30 kHz

#VBW 100 kHz

Span 3 MHz

Sweep 3.2 ms (601 pts)

Occupied Bandwidth

1.1015 MHz

Occ BW % Pwr 99.00 %

x dB -20.00 dB

Transmit Freq Error -4.139 kHz

x dB Bandwidth 1.168 MHz

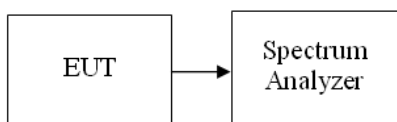


6.5 HOPPING CHANNEL SEPARATION

LIMIT

According to §15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW = 100kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
5. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

TEST RESULTS

No non-compliance noted

Test Data **1M**

Channel	Frequency	Separation	Limits	Result
	(MHz)	(MHz)	(MHz)	
40	2441	1.000	0.551	Pass

3M

Channel	Frequency	Separation	Limits	Result
	(MHz)	(MHz)	(MHz)	
40	2441	1.000	0.758	Pass

Note: Hopping channel separation shall be greater 2/3 of 20dB bandwidth. Refer the result of 20dB bandwidth to Section 6.4



Measurement of Channel Separation

Agilent

R T

▲ Mkr1 1.000 MHz
-0.05 dB

Ref 29.5 dBm

Atten 40 dB

Peak
Log
10
dB/
Offst
0.5
dB

LgAv

M1 S2

Center 2.441 475 GHz

Span 3 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	2.441 005 GHz	-0.20 dBm
1Δ	(1)	Freq	1.000 MHz	-0.05 dB

Test Data 3M

Measurement of Channel Separation

Agilent

R T

▲ Mkr1 1.000 MHz
-0.02 dB

Ref 29.5 dBm

Atten 40 dB

Peak
Log
10
dB/
Offst
0.5
dB

LgAv

M1 S2

Center 2.441 475 GHz

Span 3 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	2.441 000 GHz	-2.71 dBm
1Δ	(1)	Freq	1.000 MHz	-0.02 dB

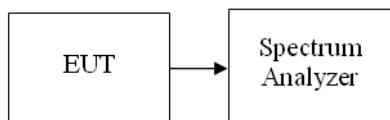


6.6 NUMBER OF HOPPING FREQUENCY

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2441.5MHz, Sweep = auto and Start=2441.5MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=100kHz.
5. Max hold, view and count how many channel in the band.

TEST RESULTS

No non-compliance noted

Test Data

1M

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

3M

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS



Test Plot

Channel Number

2.4 GHz – 2.4415 GHz

Agilent

R T

Mkr1 2.440 81 GHz
-0.69 dBm

Ref 29.5 dBm

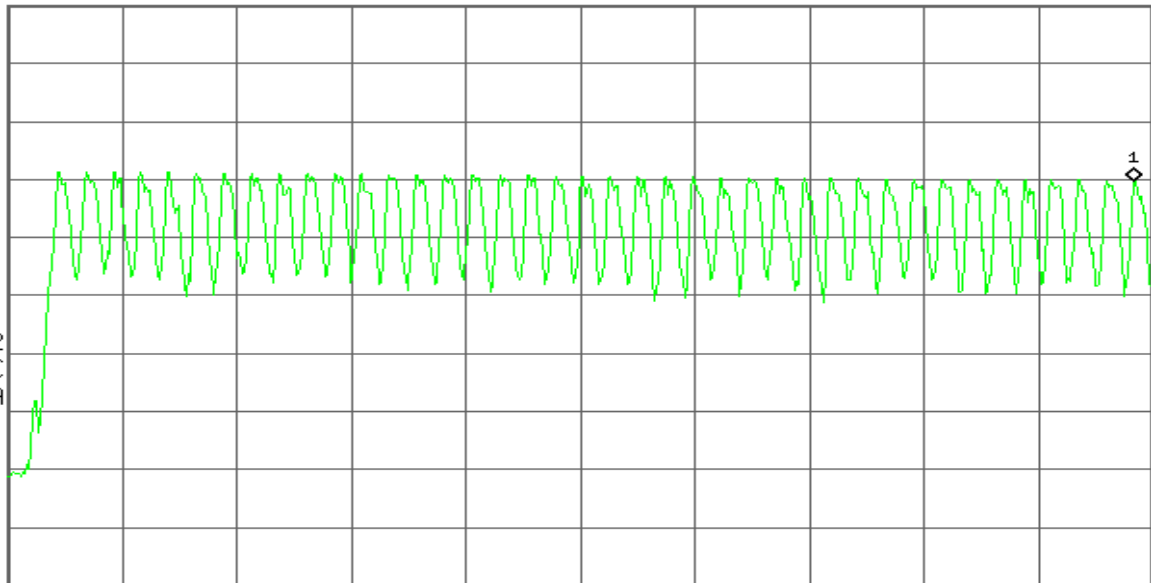
Atten 40 dB

Peak
Log
10
dB/
Offst
0.5
dB

LgAv

M1 S2
S3 FC
RA

E(f):
FTun
Swp



Start 2.400 00 GHz

Stop 2.441 50 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 5.04 ms (601 pts)

2.4415 GHz – 2.4835 GHz

Agilent

R T

Mkr1 2.441 85 GHz
-0.76 dBm

Ref 29.5 dBm

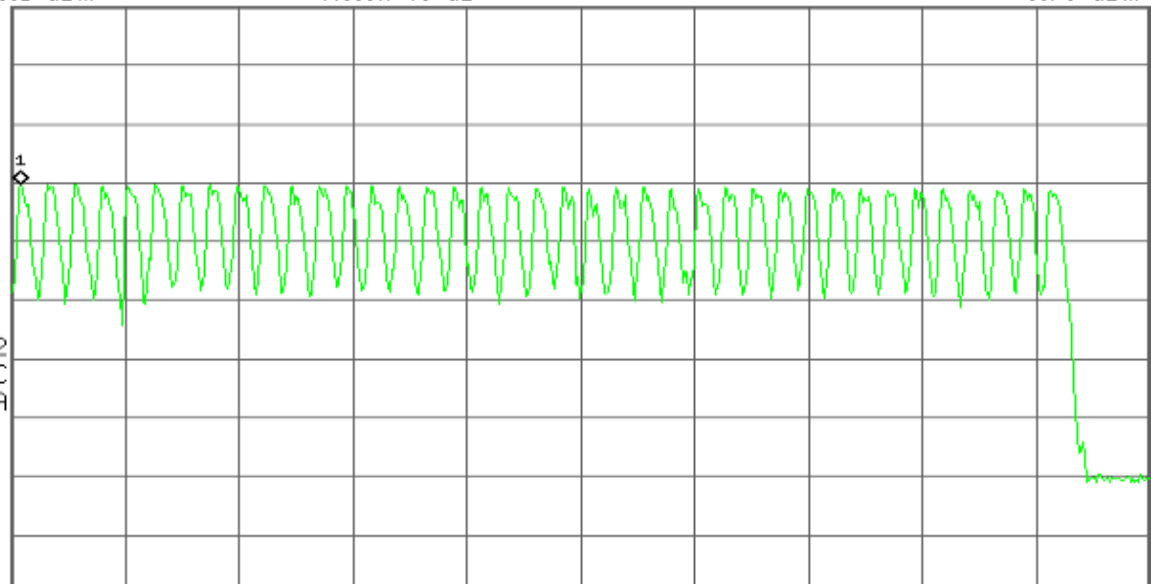
Atten 40 dB

Peak
Log
10
dB/
Offst
0.5
dB

LgAv

M1 S2
S3 FC
RA

E(f):
FTun
Swp



Start 2.441 50 GHz

Stop 2.483 50 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 5.08 ms (601 pts)

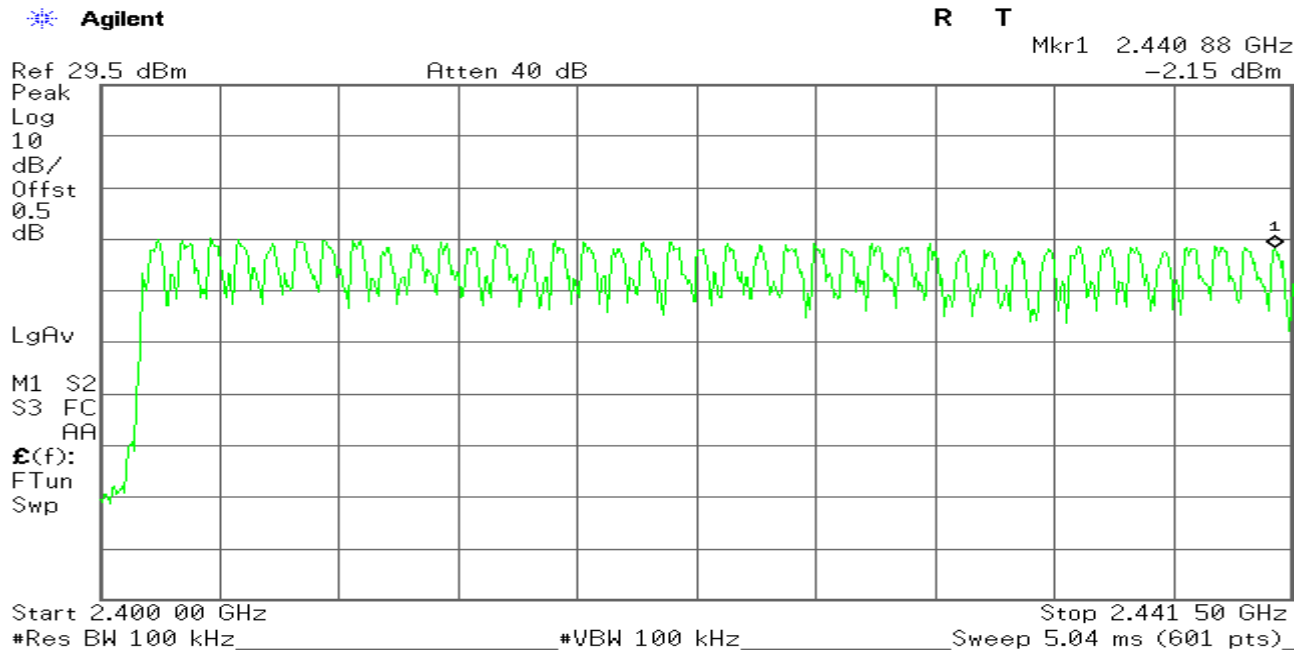


3M

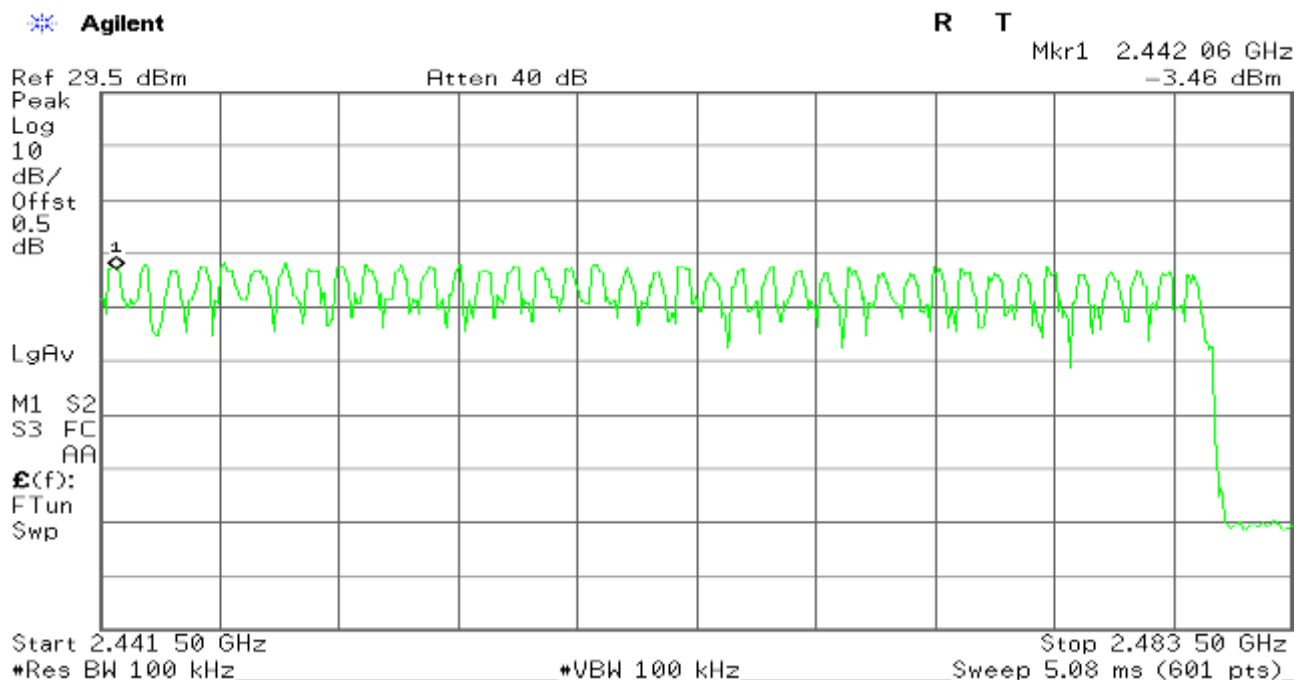
Test Plot

Channel Number

2.4 GHz – 2.4415 GHz



2.4415 GHz – 2.4835 GHz



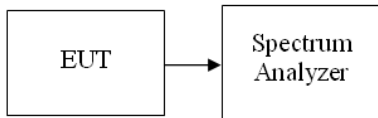


6.7 TIME OF OCCUPANCY (DWELL TIME)

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

No non-compliance noted

Test Data

**1 M****DH 1**

$$0.364 * (1600/2)/79 * 31.6 = 116.48 \text{ (ms)}$$

Pulse Time(ms)	Total of Dwell(ms)	Period Time (s)	Limit (ms)	Result
0.364	116.48	31.60	400	PASS

DH 3

$$1.600 * (1600/4)/79 * 31.6 = 256.00 \text{ (ms)}$$

Pulse Time(ms)	Total of Dwell(ms)	Period Time (s)	Limit (ms)	Result
1.600	256.00	31.60	400	PASS

DH 5

$$0.800 * (1600/6)/79 * 31.6 = 85.33 \text{ (ms)}$$

Pulse Time(ms)	Total of Dwell(ms)	Period Time (s)	Limit (ms)	Result
0.800	85.33	31.60	400	PASS

3 M**DH 1**

$$0.40 * (1600/2)/79 * 31.6 = 128.00 \text{ (ms)}$$

Pulse Time(ms)	Total of Dwell(ms)	Period Time (s)	Limit (ms)	Result
0.400	128.00	31.60	400	PASS

DH 3

$$0.266 * (1600/4)/79 * 31.6 = 42.56 \text{ (ms)}$$

Pulse Time(ms)	Total of Dwell(ms)	Period Time (s)	Limit (ms)	Result
0.266	42.56	31.60	400	PASS

DH 5

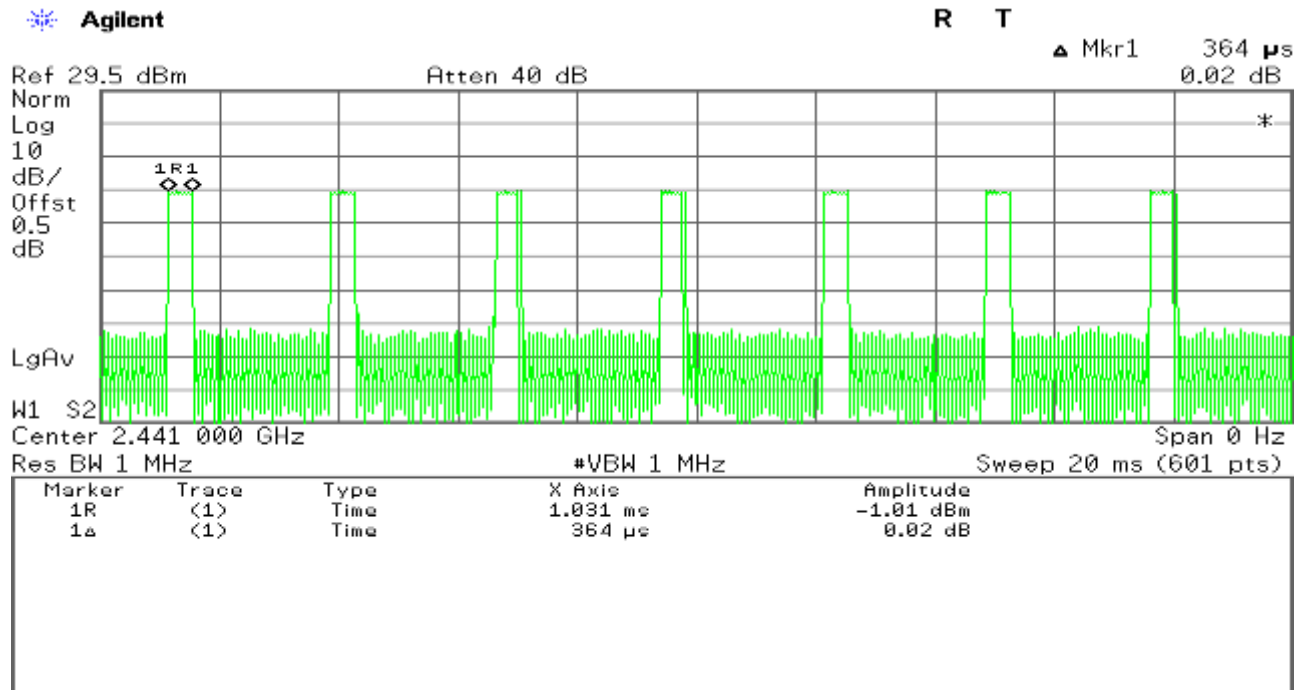
$$0.800 * (1600/6)/79 * 31.6 = 85.33 \text{ (ms)}$$

Pulse Time(ms)	Total of Dwell(ms)	Period Time (s)	Limit (ms)	Result
0.800	85.33	31.60	400	PASS

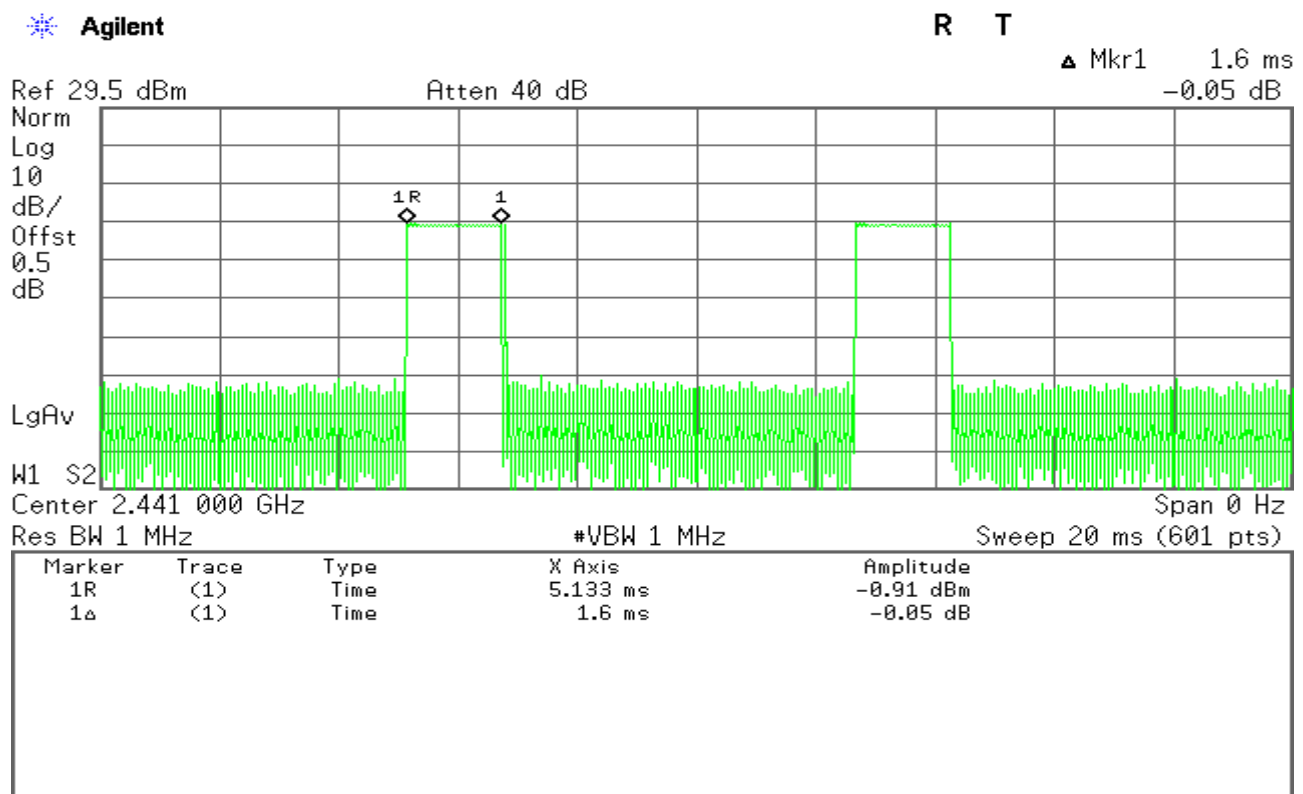


Test Plot

DH 1



DH 3





DH 5

* Agilent

R T

▲ Mkr1 800 μ s
-0.03 dB

Ref 29.5 dBm

Atten 40 dB

Norm
Log
10
dB/
Offst
0.5
dB

LgAv

W1 S2
Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

*VBW 1 MHz

Sweep 20 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	14.33 ms	-1.28 dBm
1Δ	(1)	Time	800 μ s	-0.03 dB



3M

Test Plot

DH 1

Agilent

R T

▲ Mkr1 400 μ s
-0.46 dB

Ref 29.5 dBm

Atten 40 dB

Norm
Log
10
dB/
Offst
0.5
dB

LgAv

W1 S2

Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 20 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	11.2 ms	-2.02 dBm
1a	(1)	Time	400 μ s	-0.46 dB

DH 3

Agilent

R T

▲ Mkr1 266.7 μ s
-0.36 dB

Ref 29.5 dBm

Atten 40 dB

Norm
Log
10
dB/
Offst
0.5
dB

LgAv

W1 S2

Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 20 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	9.133 ms	-2.05 dBm
1a	(1)	Time	266.7 μ s	-0.36 dB



DH 5

Agilent

R T

▲ Mkr1 800 μ s
-1.82 dB

Ref 29.5 dBm

Atten 40 dB

Norm
Log
10
dB/
Offst
0.5
dB

LgAv

W1 S2

Center 2.441 000 GHz

Res BW 1 MHz

#VBW 1 MHz

Sweep 20 ms (601 pts)

Span 0 Hz

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	5.2 ms	-1.66 dBm
1Δ	(1)	Time	800 μ s	-1.82 dB

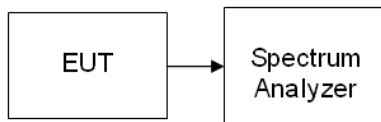


6.8 SPURIOUS EMISSION CONDUCTED MEASUREMENT

LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 100 KHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted

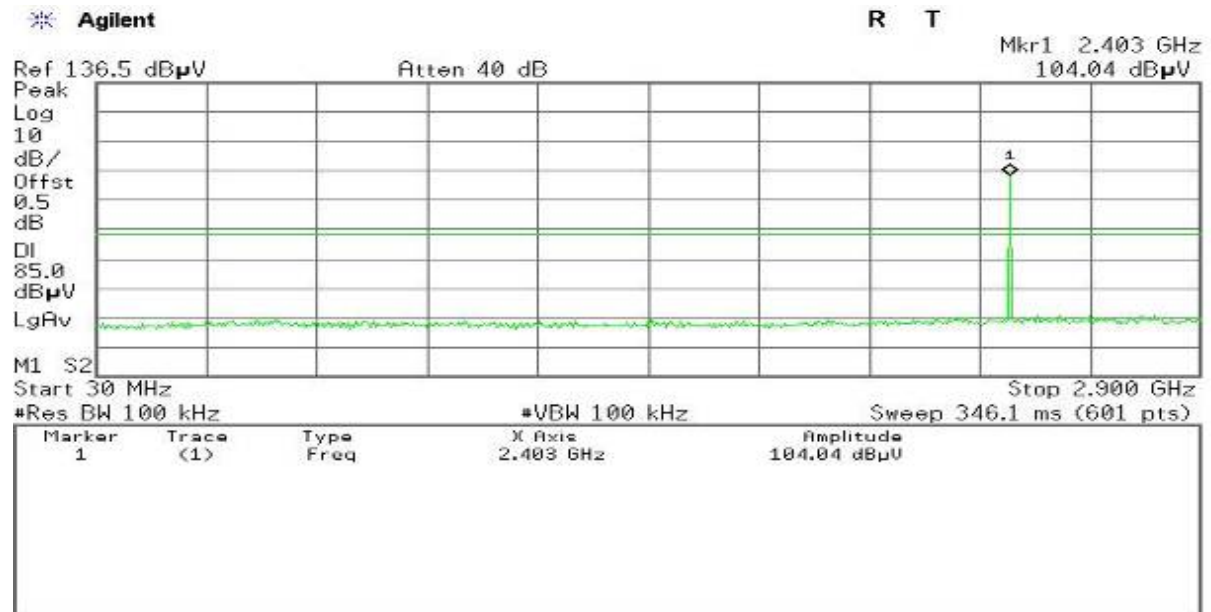


Test Plot

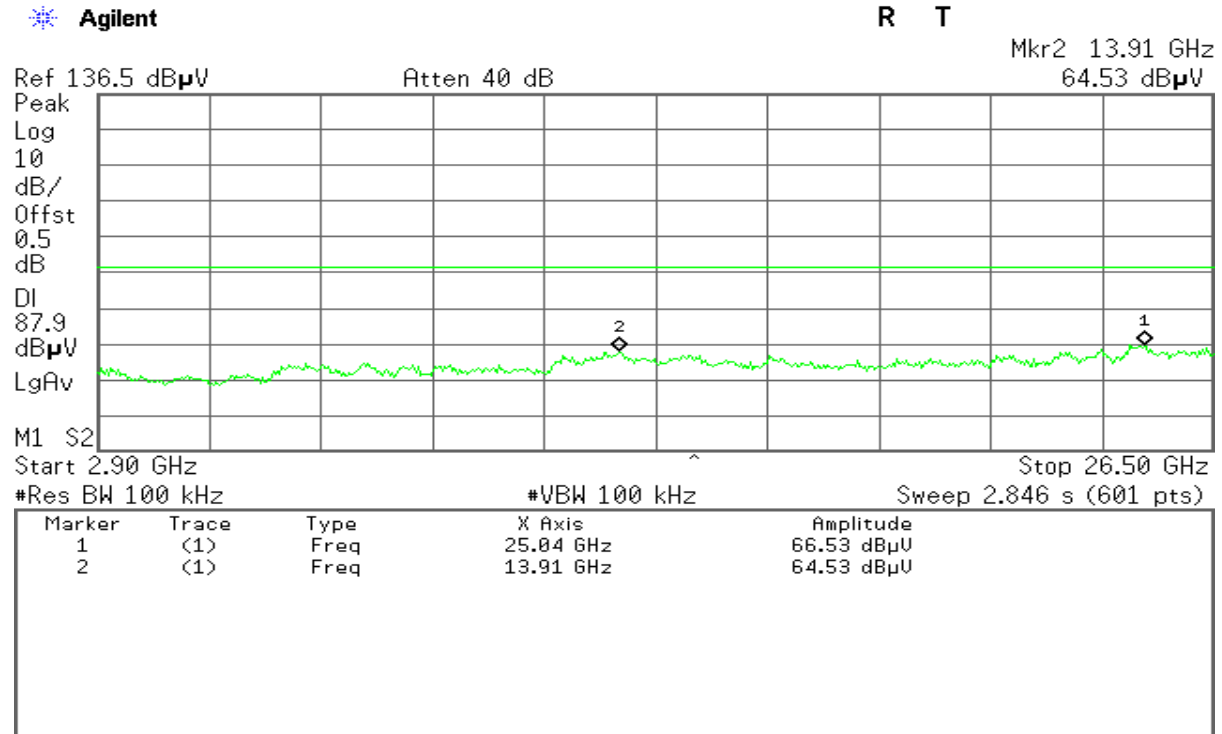
1M

CH Low

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz



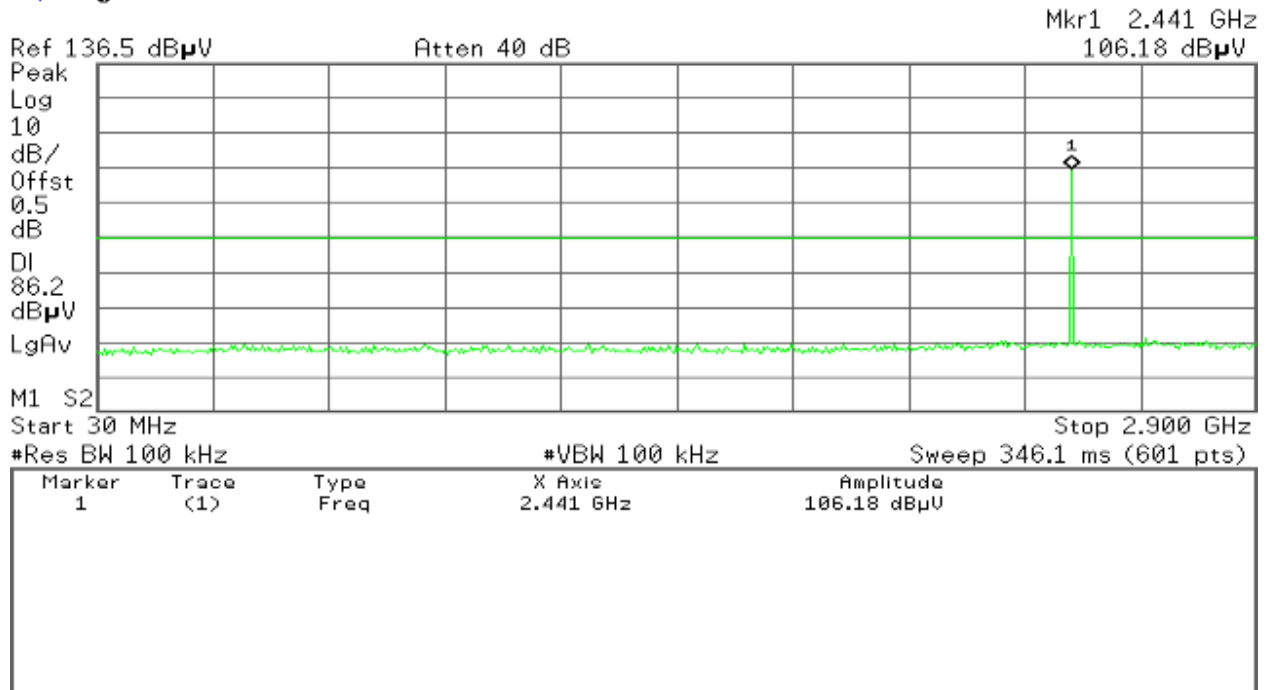


CH Mid

30MHz ~ 2.9GHz

Agilent

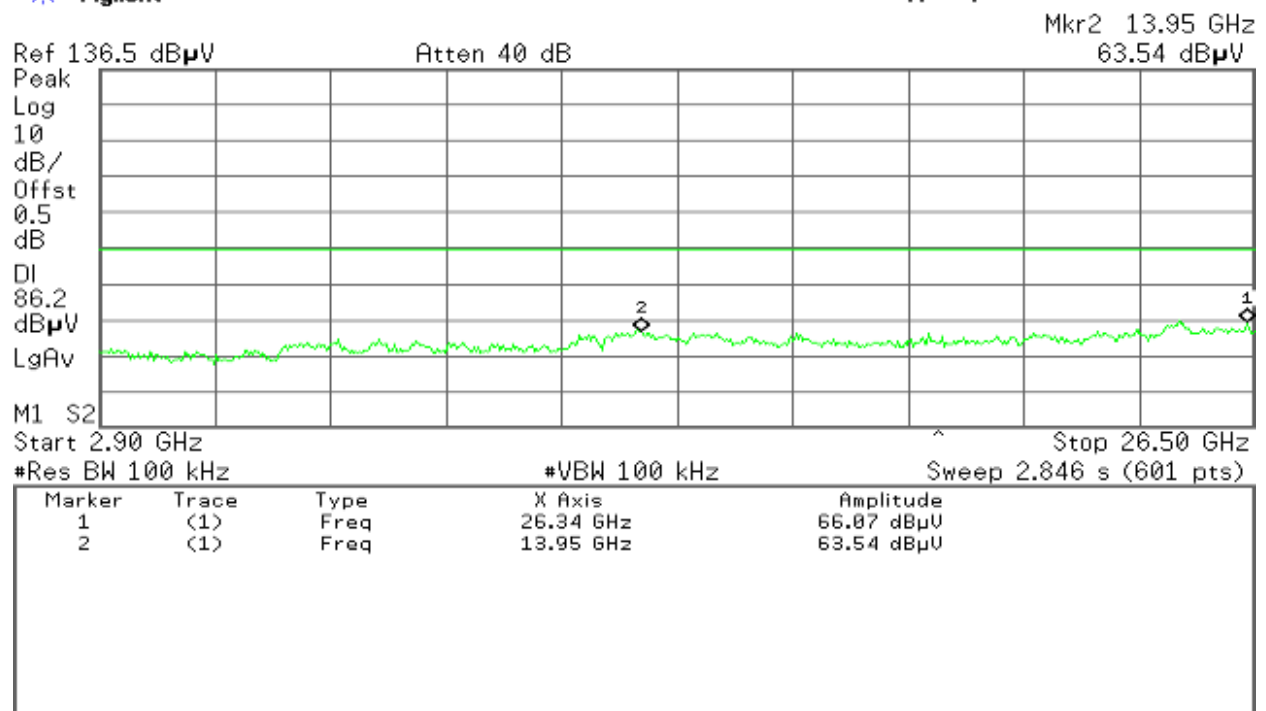
R T



2.9GHz ~ 26.5GHz

Agilent

R T



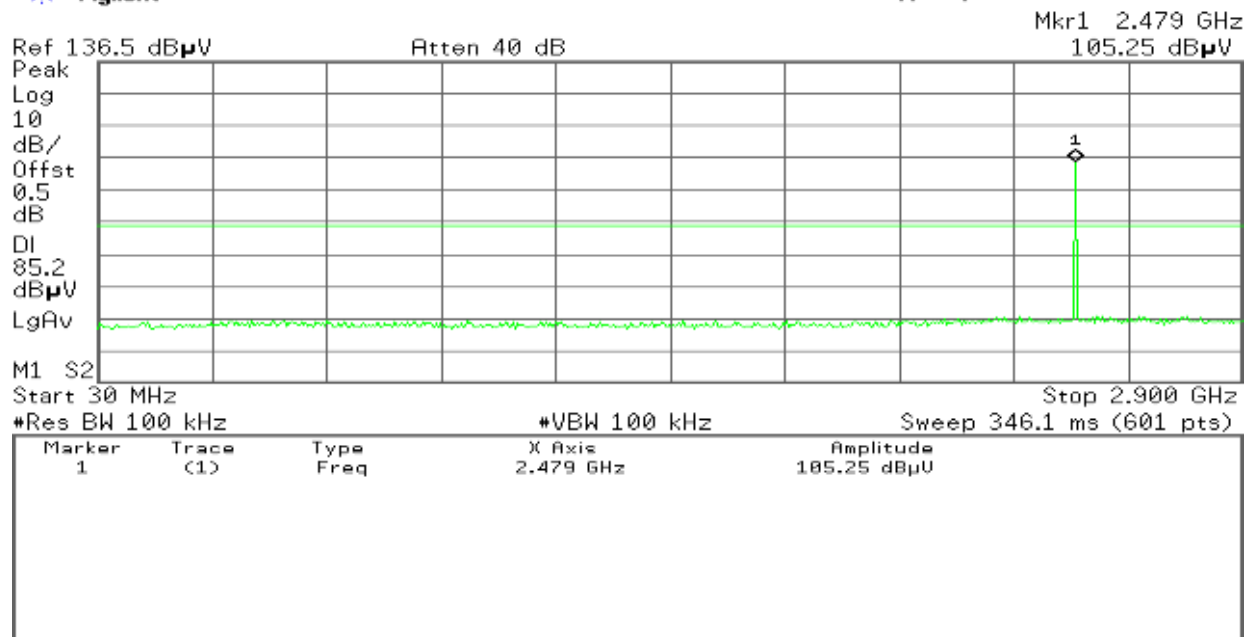


CH High

30MHz ~ 2.9GHz

Agilent

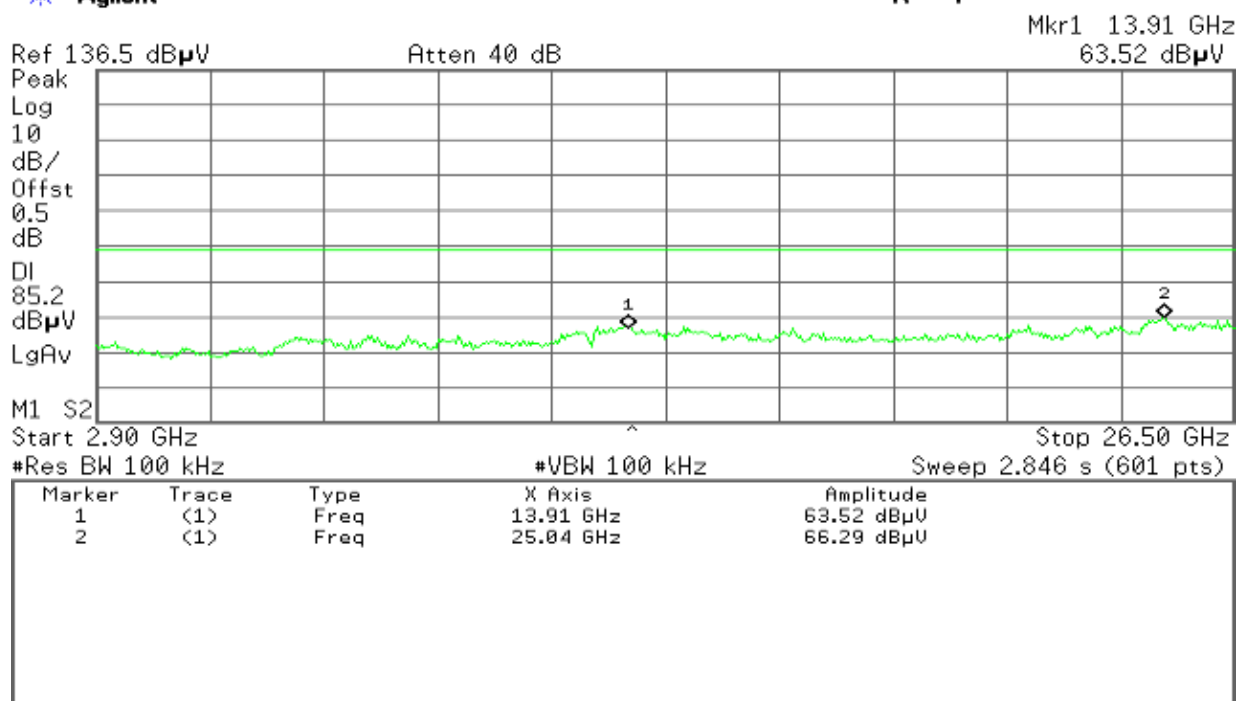
R T



2.9GHz ~ 26.5GHz

Agilent

R T





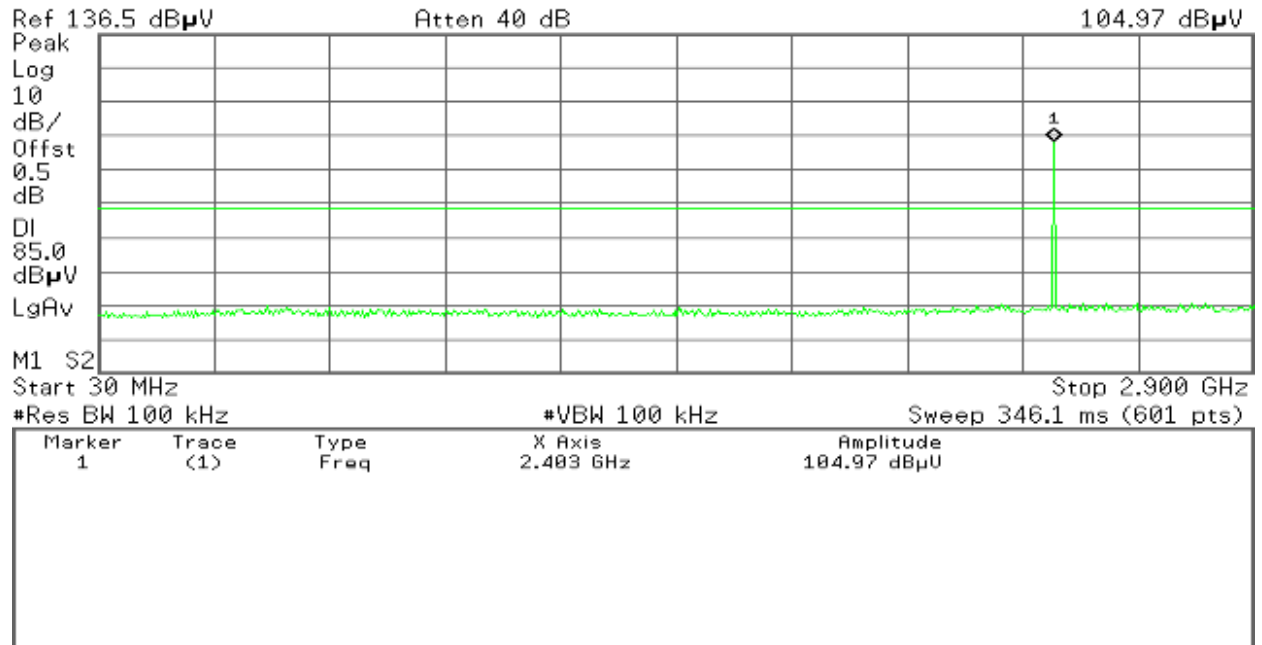
3M

CH Low

30MHz ~ 2.9GHz

* Agilent

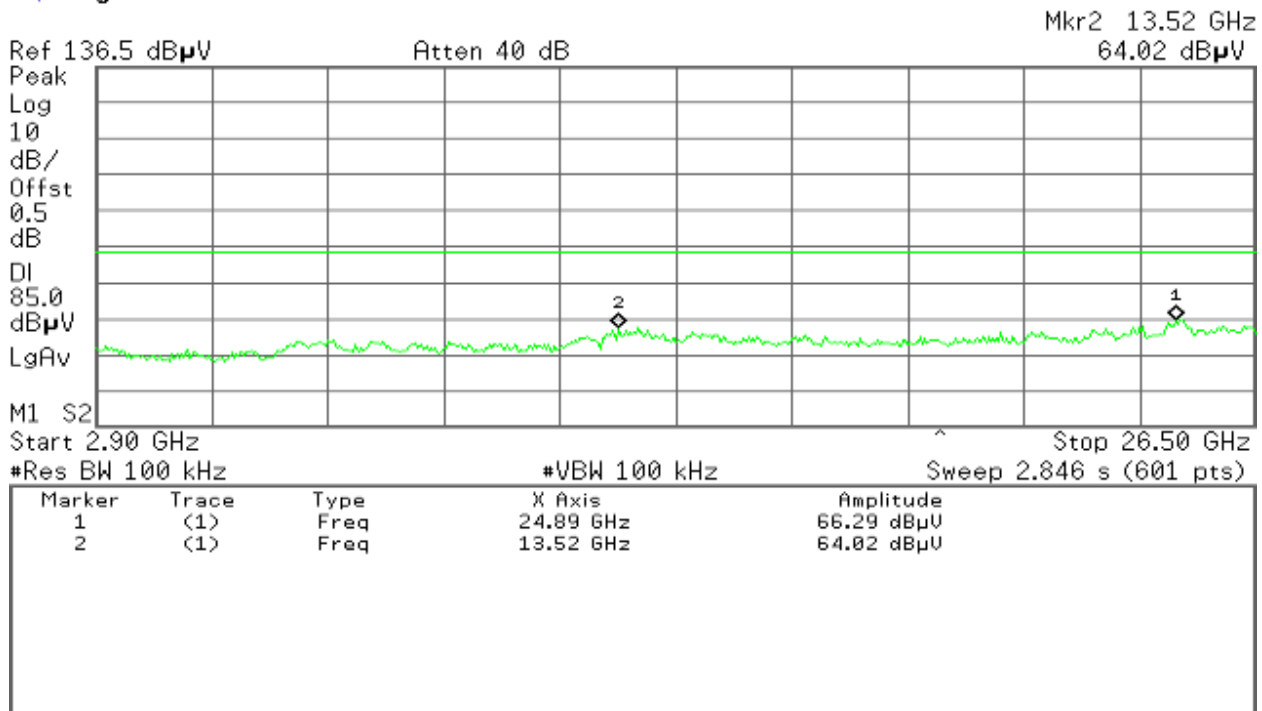
R T



2.9GHz ~ 26.5GHz

* Agilent

R T



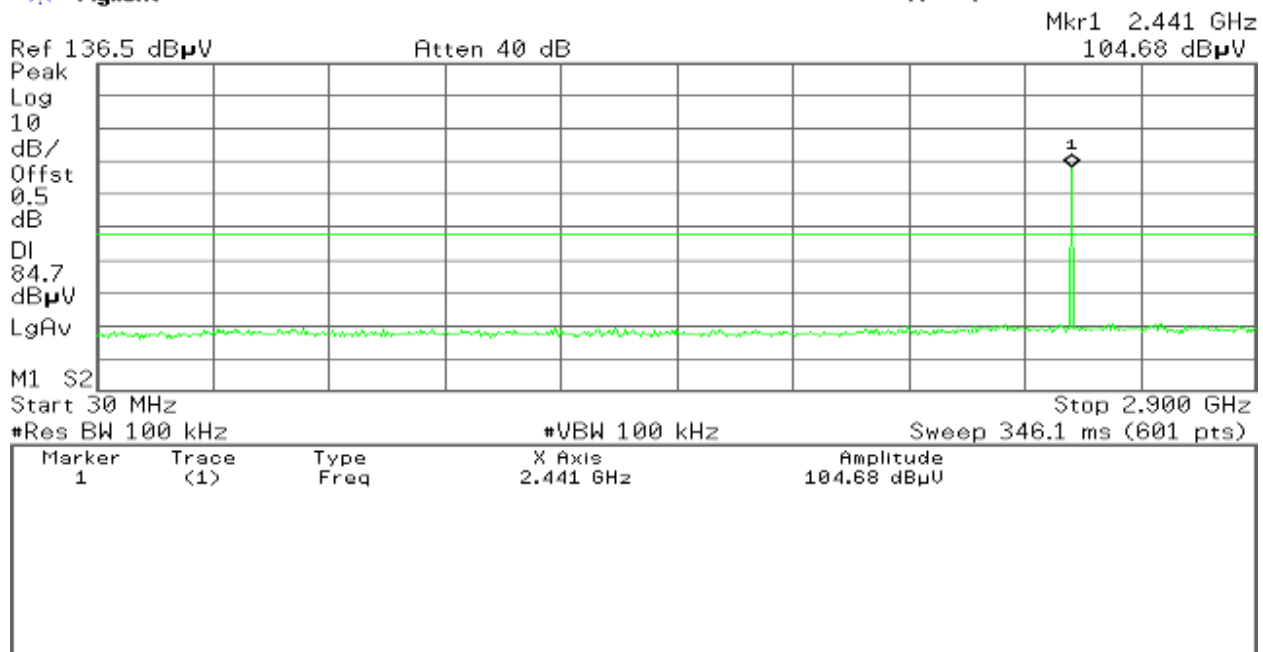


CH Mid

30MHz ~ 2.9GHz

Agilent

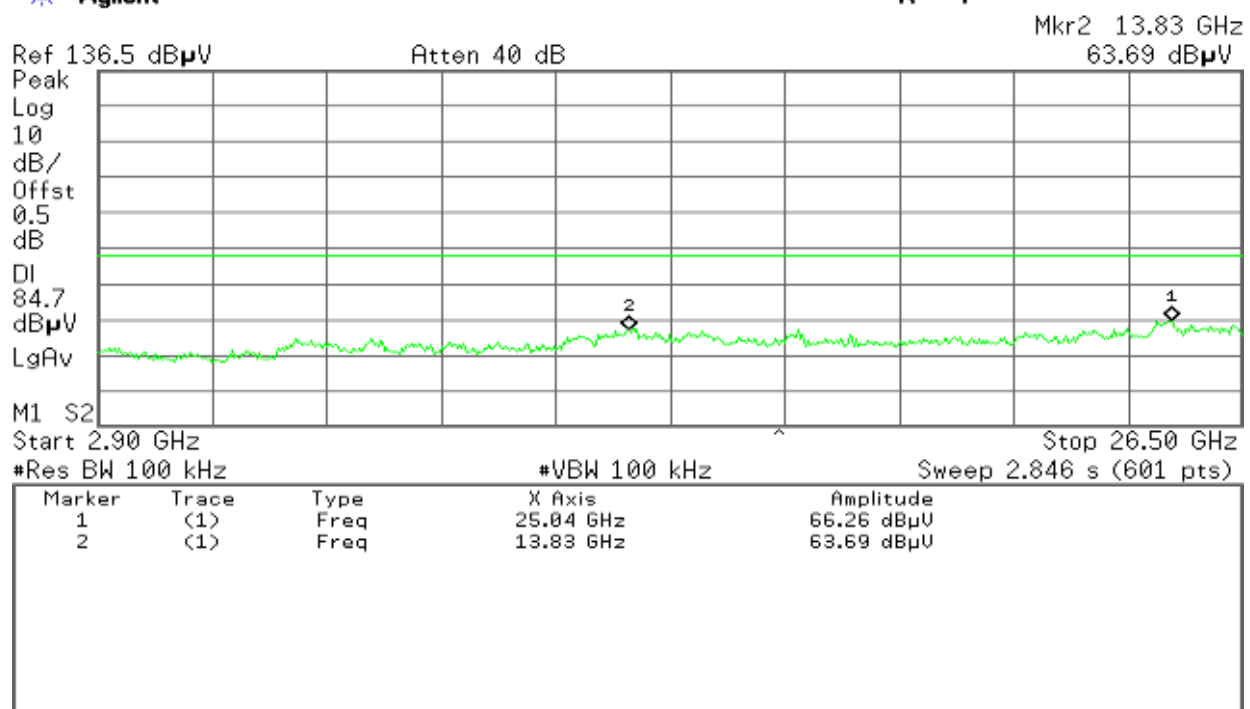
R T



2.9GHz ~ 26.5GHz

Agilent

R T



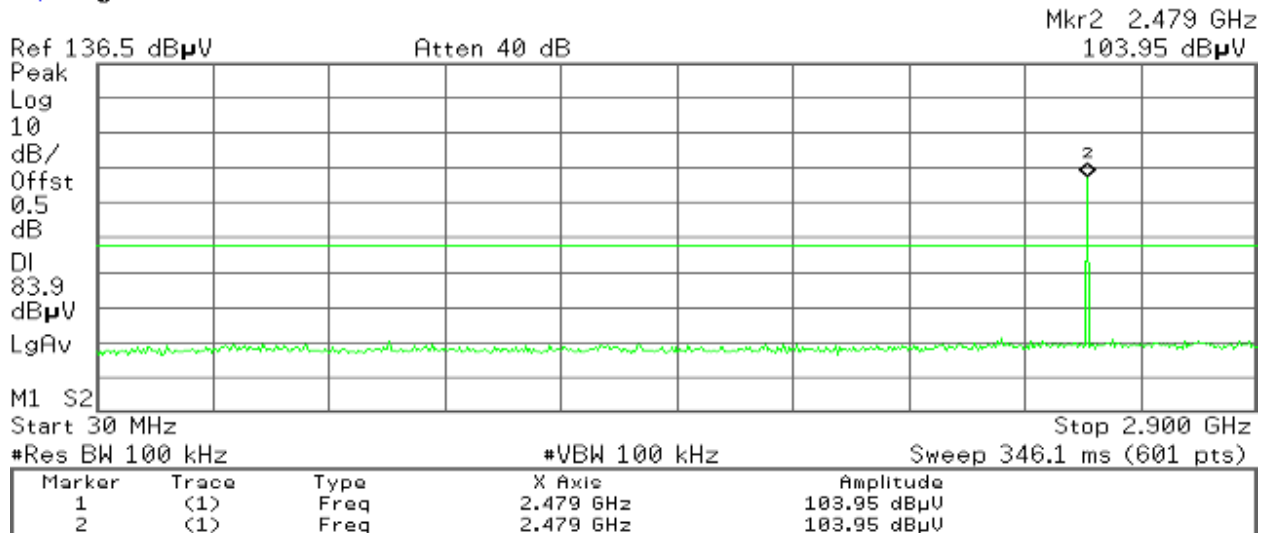


CH High

30MHz ~ 2.9GHz

Agilent

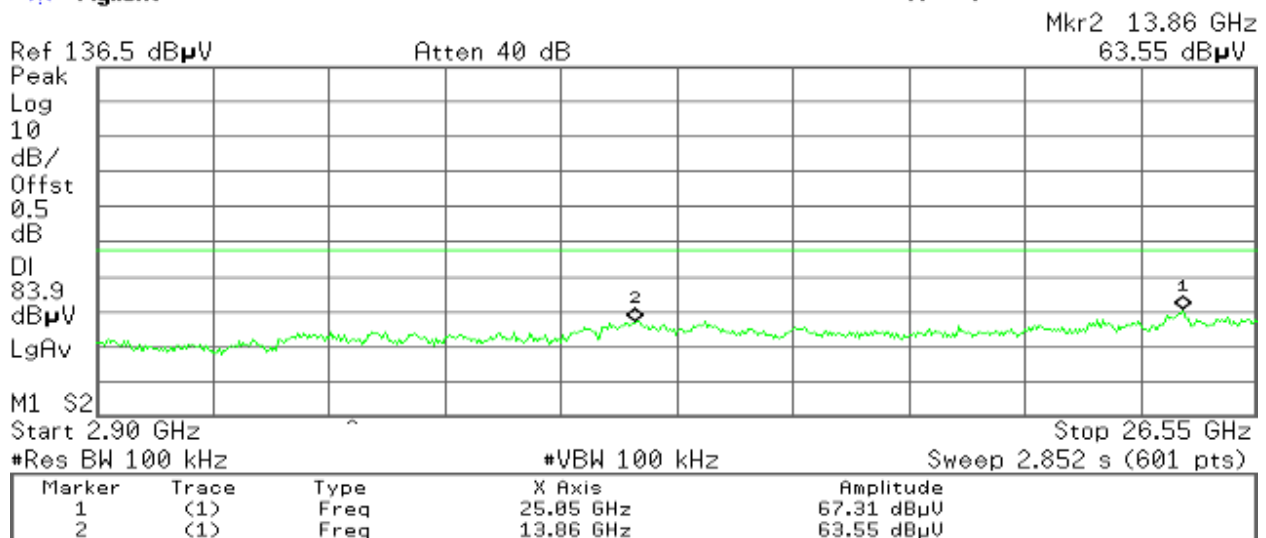
R T



2.9GHz ~ 26.5GHz

Agilent

R T





6.9 RADIATED EMISSIONS

LIMIT

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

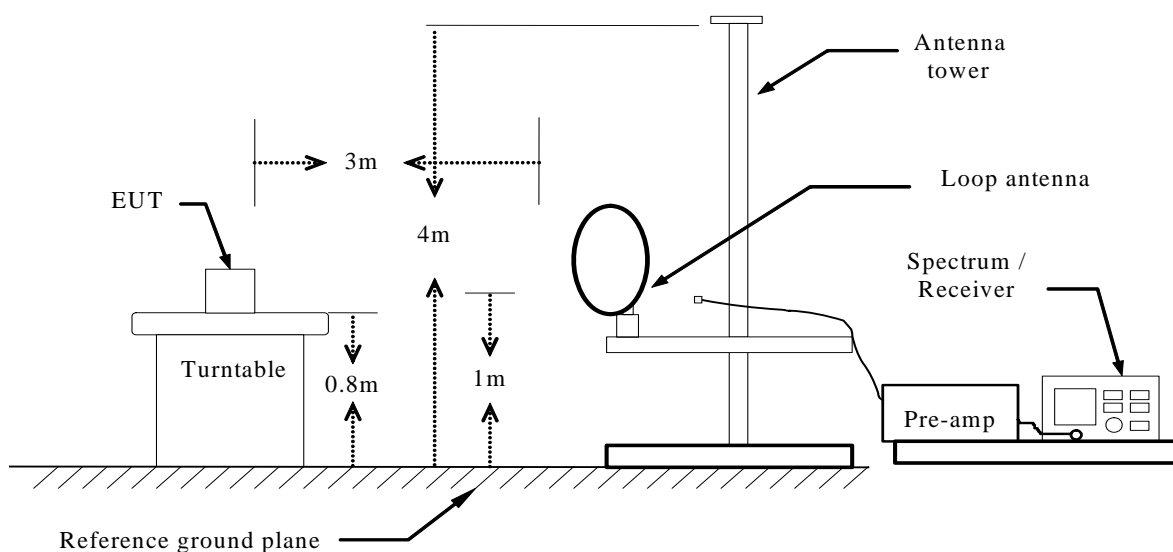
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

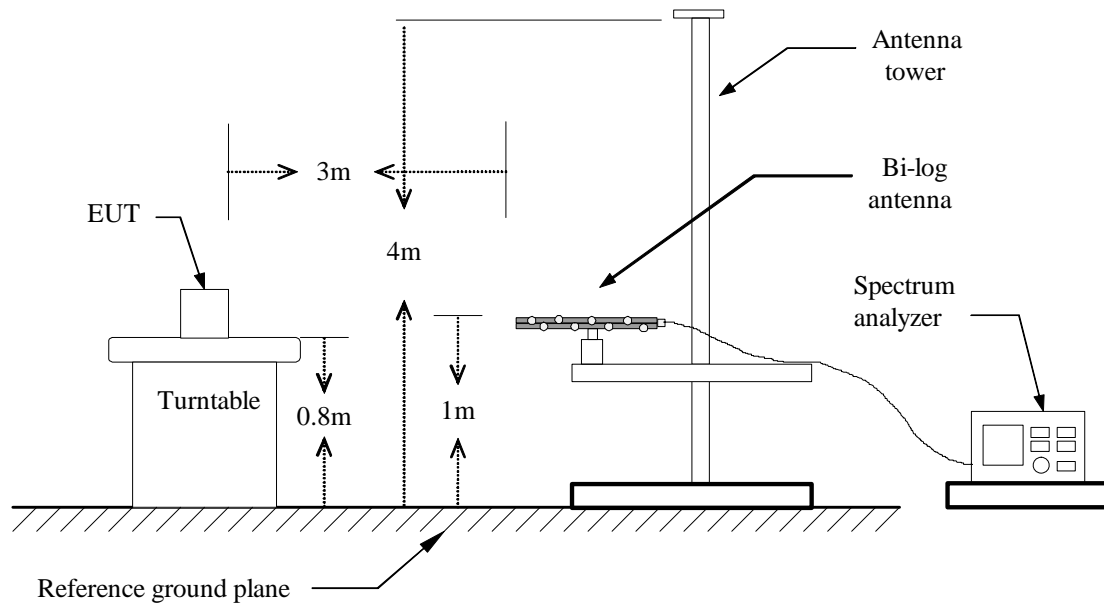
Test Configuration

Below 30MHz

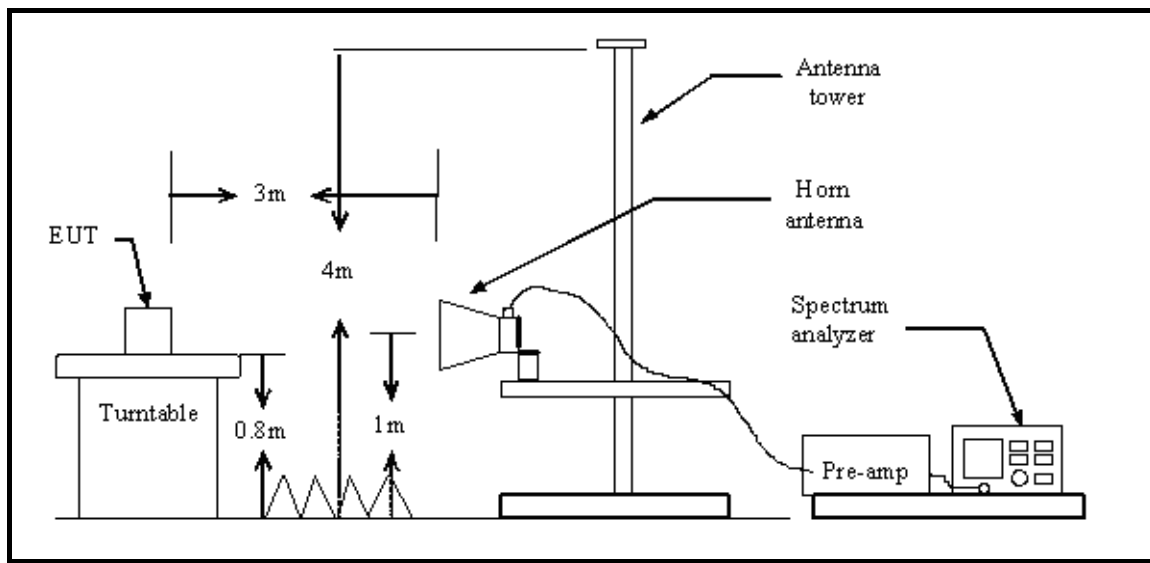




Below 1 GHz



Above 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.



TEST RESULTS

Below 1 GHz

Operation Mode:	Normal Link	Test Date:	April 27,2012
Temperature:	24°C	Tested by:	Sean Yu
Humidity:	52 % RH	Polarity:	Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
40.36	V	Peak	34.33	-8.2	26.13	40.0	-13.87
72.45	V	Peak	39.46	-13.7	25.76	40.0	-14.24
132.59	V	Peak	30.26	-7.03	23.23	43.5	-20.27
265.26	V	Peak	30.26	-7.19	23.07	46.0	-22.93
667.29	V	Peak	25.75	2.18	27.93	46.0	-18.07
731.16	V	Peak	25.99	2.95	28.94	46.0	-17.06
71.35	H	Peak	31.26	-13.67	17.59	43.5	-25.91
136.59	H	Peak	25.16	-7.13	18.03	43.5	-25.47
221.19	H	Peak	29.46	-8.73	20.73	46.0	-25.27
825.42	H	Peak	25.47	4.12	29.59	46.0	-16.41
934.69	H	Peak	24.76	6.42	31.18	46.0	-14.82
980.26	H	Peak	24.55	6.98	31.53	54.0	-22.47

Notes:

1. Measuring frequencies from 9 KHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9 KHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.



Above 1 GHz

1M

Operation Mode:	TX/ CH Low	Test Date:	April 27, 2012
Temperature:	24°C	Tested by:	Sean Yu
Humidity:	52 % RH	Polarity:	Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4804.33	V	45.66	32.36	10.85	56.51	43.21	74	54	-10.79	average
7204.26	V	42.22	26.26	18.37	60.59	44.63	74	54	-9.37	average
4804.11	H	46.68	33.36	10.85	57.53	44.21	74	54	-9.79	average
7205.14	H	41.46	26.16	18.37	59.83	44.53	74	54	-9.47	average

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

Operation Mode:	TX/ CH Mid	Test Date:	April 27,2012
Temperature:	24°C	Tested by:	Sean Yu
Humidity:	52 % RH	Polarity:	Ver. / Hor.

[illegible]

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

Operation Mode:	TX/ CH High	Test Date:	April 27,2012
Temperature:	24°C	Tested by:	Sean Yu
Humidity:	52 % RH	Polarity:	Ver. / Hor.

[illegible]

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

3M

Operation Mode:	TX/ CH Low	Test Date:	April 27,2012
Temperature:	24°C	Tested by:	Sean Yu
Humidity:	52 % RH	Polarity:	Ver. / Hor.

[illegible]

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Date of Issue : May 10, 2012



Date of Issue : May 10, 2012



6.10 POWERLINE CONDUCTED EMISSIONS

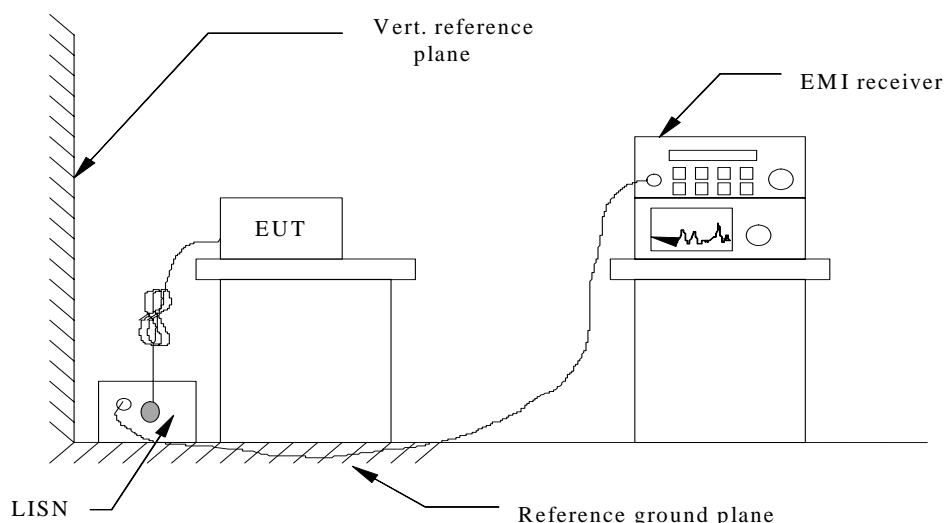
LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration



See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

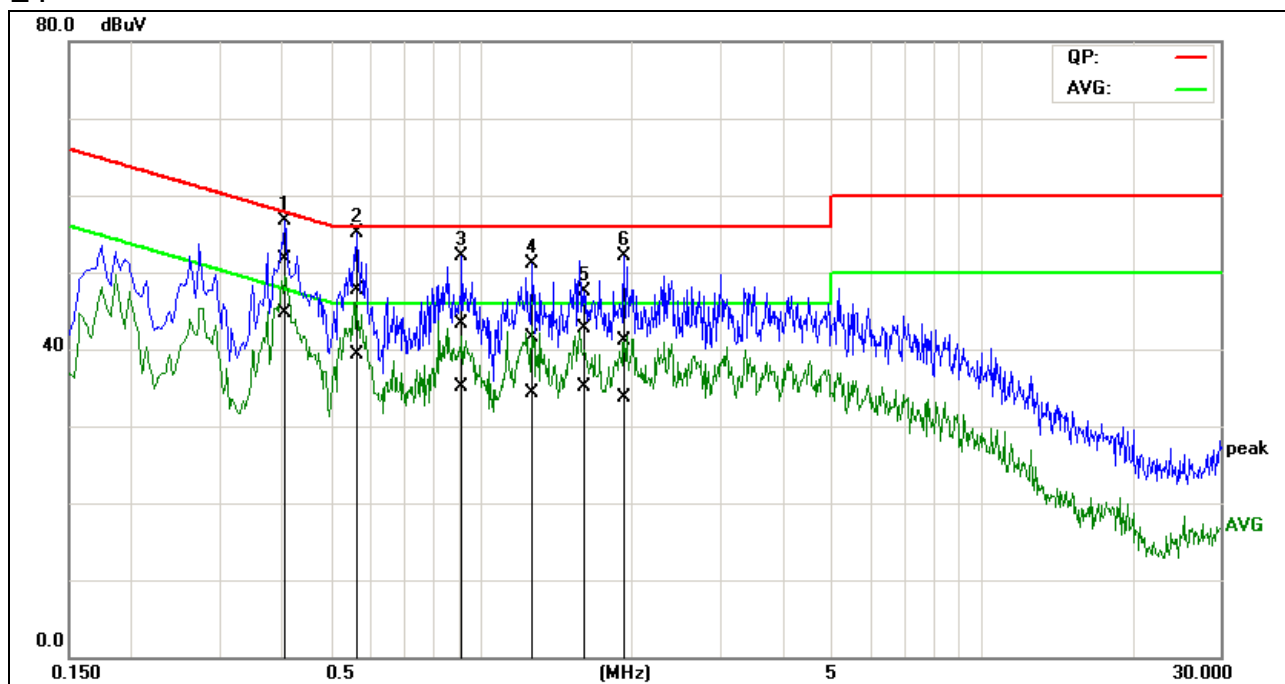
The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.



Test Data

Model: ALVO XERO	Test Mode: Normal Link
Temperature: 23°C	Humidity: 51% RH
Tested by: Sean Yu	Test Results: Pass

L1



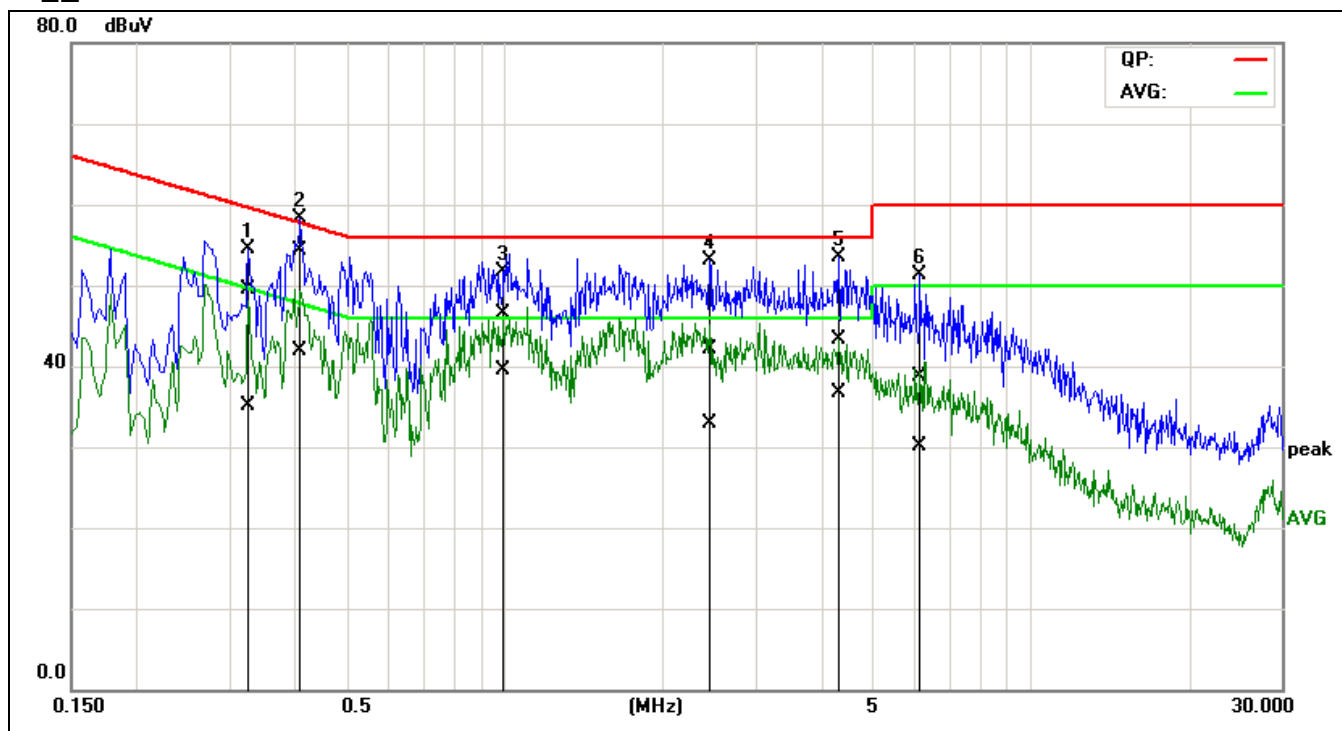
No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.4068	41.48	34.56	10.13	51.61	44.69	57.71	47.71	-6.10	-3.02	Pass
2	0.5589	37.56	29.09	10.14	47.70	39.23	56.00	46.00	-8.30	-6.77	Pass
3	0.9131	33.11	25.02	10.18	43.29	35.20	56.00	46.00	-12.71	-10.80	Pass
4	1.2591	31.30	23.92	10.30	41.60	34.22	56.00	46.00	-14.40	-11.78	Pass
5	1.5861	32.25	24.71	10.42	42.67	35.13	56.00	46.00	-13.33	-10.87	Pass
6	1.9275	30.58	23.16	10.54	41.12	33.70	56.00	46.00	-14.88	-12.30	Pass

Remark:

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
3. "---" denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.



L2



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.3256	39.31	24.88	10.15	49.46	35.03	59.56	49.56	-10.10	-14.53	Pass
2*	0.4055	44.20	31.74	10.13	54.33	41.87	57.74	47.74	-3.41	-5.87	Pass
3	0.9823	36.24	29.27	10.20	46.44	39.47	56.00	46.00	-9.56	-6.53	Pass
4	2.4541	31.49	22.30	10.66	42.15	32.96	56.00	46.00	-13.85	-13.04	Pass
5	4.3204	32.42	25.86	10.87	43.29	36.73	56.00	46.00	-12.71	-9.27	Pass
6	6.1555	27.62	19.19	10.99	38.61	30.18	60.00	50.00	-21.39	-19.82	Pass

Remark:

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
3. "---" denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.



APPENDIX I RADIO FREQUENCY EXPOSURE

LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §15.247(b)(4) and §1.1307(b)(1) of this chapter.

EUT Specification

EUT	Mobile Phone
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input checked="" type="checkbox"/> Others: <u>Bluetooth: 2.402GHz ~ 2.480GHz</u>
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 5mW/cm^2$) <input type="checkbox"/> General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	1.20dBm (1.318mW)
Antenna gain (Max)	-1.5dBi (Numeric gain: 0.708)
Evaluation applied	<input type="checkbox"/> MPE Evaluation <input checked="" type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A
Remark: Reference SAR test Report	

TEST RESULTS

No Non-compliance

END OF REPORT