Report No.:SZ11030089E02

47 CFR PART 15 C - BLUETOOTH

TEST REPORT

Issued to

Cellon Communications Technology (ShenZhen)Co., Ltd.

For

GSM Mobile Phone

Model Name:	C2053, PCD1401, PCD1401PE, PCD1401AL, PCD1401CL, PCD1401PO, PCD1401MV, PCD1401OM, PCD1401MX, PCD1401CA, PCD1401AR, CL1401, CL1401CL, CL1401PO, CL1401CA, CL1401EN, TE1401, TE1401PE, TE1401MX, TE1401CA, AL1401AL, MV1401MV, TE1401SV, TE1401GT
Brand Name:	PCD
FCC ID:	T38PCD2053
Test Rule:	47 CFR Part 15 Subpart C
Test date:	March 11, 2011 – March 18, 2011

by

Shenzhen Morlab Communications Technology Co., Ltd.

Tested by	Tu Lang	*Approved by*	Shu Luan	*Review by*	Huang Pulong
Date	2011.3.22	*Date*	2011.3.22	*Date*	2011.3.22

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Change History		
Issue	Date	Reason for change
1.0	March 18, 2011	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type ..... :	GSM Mobile Phone
Serial No. ..... :	(n.a, marked #1 by test site)
Hardware Version ..... :	C2053_MB_P1
Software Version ..... :	PCD1401_1.00_PCD_PCD_US
Applicant ..... :	Cellon Communications Technology (ShenZhen)Co., Ltd. 13/F, Skyworth Building C Gaoxin S. Ave. 1st, High-Tech industrial Park NanShan, ShenZhen
Manufacturer ..... :	Cellon Communications Technology (ShenZhen)Co., Ltd. 13/F, Skyworth Building C Gaoxin S. Ave. 1st, High-Tech industrial Park NanShan, ShenZhen
Frequency Range ..... :	The frequency range used is 2402MHz - 2480MHz (79 channels, at intervals of 1MHz); The frequency block is 2400MHz to 2483.5MHz.
Modulation Type..... :	FHSS
Power Supply ..... :	Battery Model Name: BTR381 Brand name: PCD Capacitance: 980mAh Rated voltage: 3.7V Manufacturer: Sunwoda Electronic Co., Ltd Manufacturer Address: Building C, Tong Fu Kang Industrial Area, Shi Yan, Bao An district, Shenzhen
Ancillary Equipments..... :	AC Adapter (Charger for Battery) Model Name: CNR380 Brand Name: PCD Serial No.: (n.a. marked #1 by test site) Rated Input: ~ 100-240V, 50- 60Hz, 300mA Rated Output: ⎓ 5.0V, 650mA Manufacturer: DEE VAN ENTERPRISE CO., LTD. Manufacturer Address: 4020 CLIPPER COURT FREMONT,CA 94538,U.S.A.

Note 1: The EUT is a GSM Mobile Phone, it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is F(MHz)=2402+1*n (0<=n<=78). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-09 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC/IC rules and results are as below:

No.	Section in CFR 47	Description	Result
1	15.247(a)	Number of Hopping Frequency	PASS
2	15.247(b)	Peak Output Power	PASS
3	15.247(a)	20dB Bandwidth	PASS
4	15.247(a)	Carrier Frequency Separation	PASS
5	15.247(a)	Time of Occupancy (Dwell time)	PASS
6	15.247(c)	Conducted Spurious Emission	PASS
7	15.247(c)	Band Edge	PASS
8	15.207	Conducted Emission	N.A
9	15.209 15.247(c)	Radiated Emission	PASS

NOTE:

The tests were performed according to the method of measurements prescribed in DA-00-705.

1.3 Facilities and Accreditations

1.3.1 Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR PART 15C REQUIREMENTS

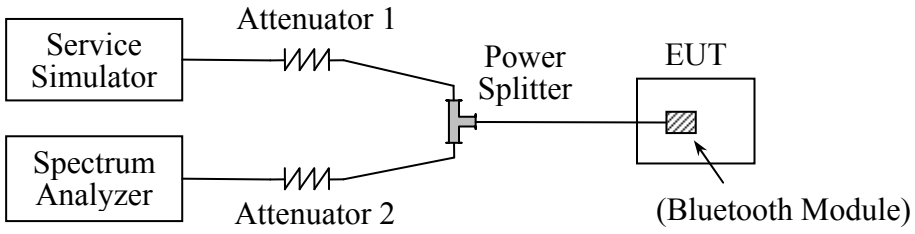
2.1 Number of Hopping Frequency

2.1.1 Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 75 hopping frequencies.

2.1.2 Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
Service Simulator	Agilent	E5515C	GB43130131	2010.09
Spectrum Analyzer	Agilent	E7405A	US44210471	2010.09
Power Splitter	Weinschel	1506A	NW521	(n.a.)
Attenuator 1	Resnet	20dB	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)

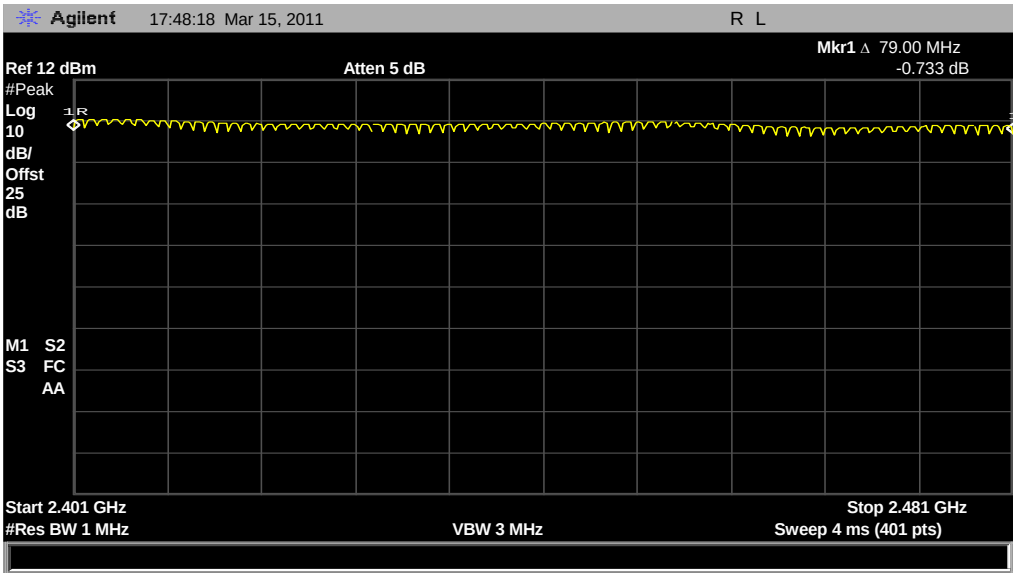
2.1.3 Test Result

The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

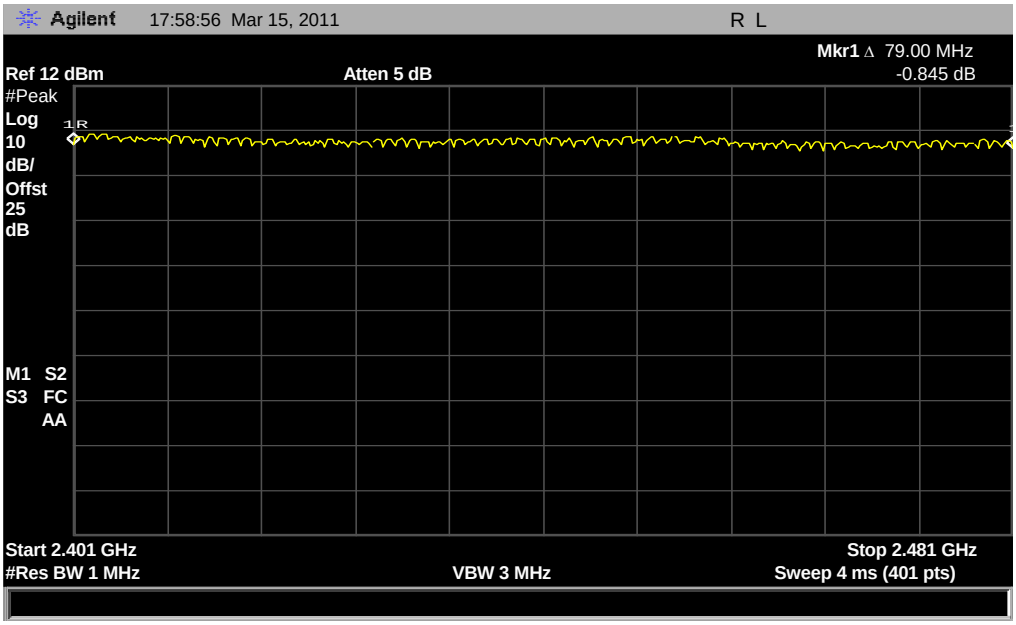
A. Test Verdict:

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
GFSK	2400 - 2483.5	79	75	Plot A	PASS
π/4-DQPSK	2400 - 2483.5	79	75	Plot B	PASS
8-DPSK	2400 - 2483.5	79	75	Plot C	PASS

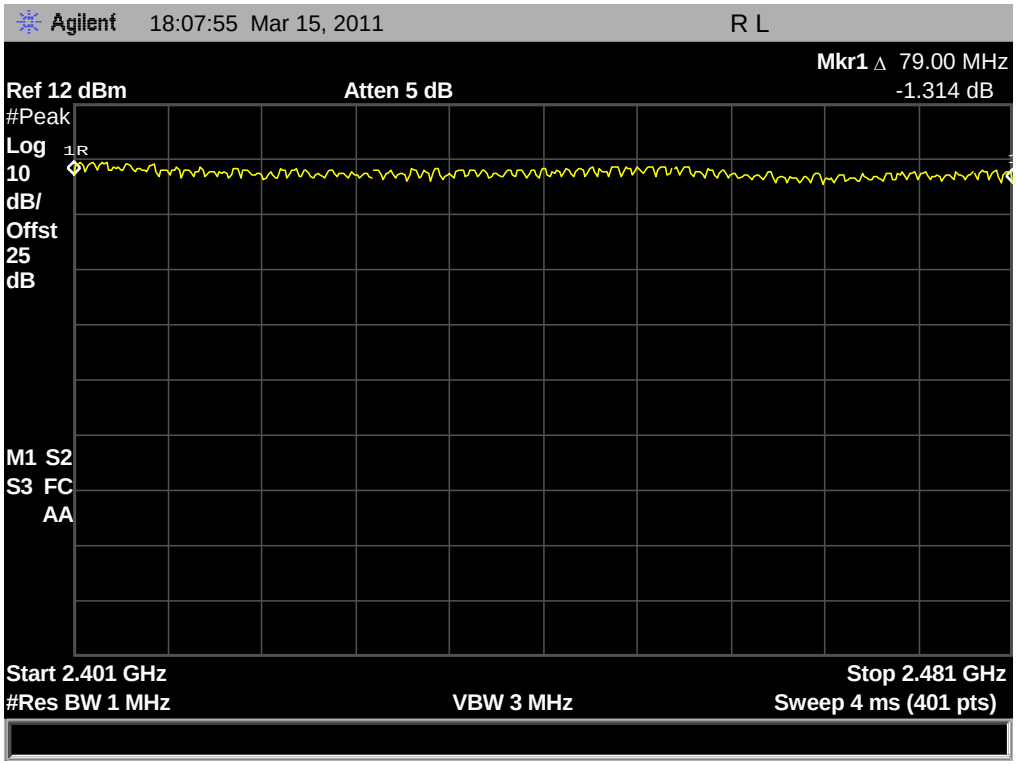
B. Test Plot:



(Plot A: GFSK)



(Plot B: π/4-DQPSK)


Agilent 18:07:55 Mar 15, 2011
R L
Mkr1 Δ 79.00 MHz
-1.314 dB
Ref 12 dBm
Atten 5 dB
#Peak
Log
10
dB/
Offst
25
dB
1R
M1 S2
S3 FC
AA
Start 2.401 GHz
#Res BW 1 MHz
VBW 3 MHz
Stop 2.481 GHz
Sweep 4 ms (401 pts)

(Plot C: 8- DPSK)

2.2 Peak Output Power

2.2.1 Requirement

According to FCC §15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.2.2 Test Description

See section 2.1.2 of this report.

2.2.3 Test Result

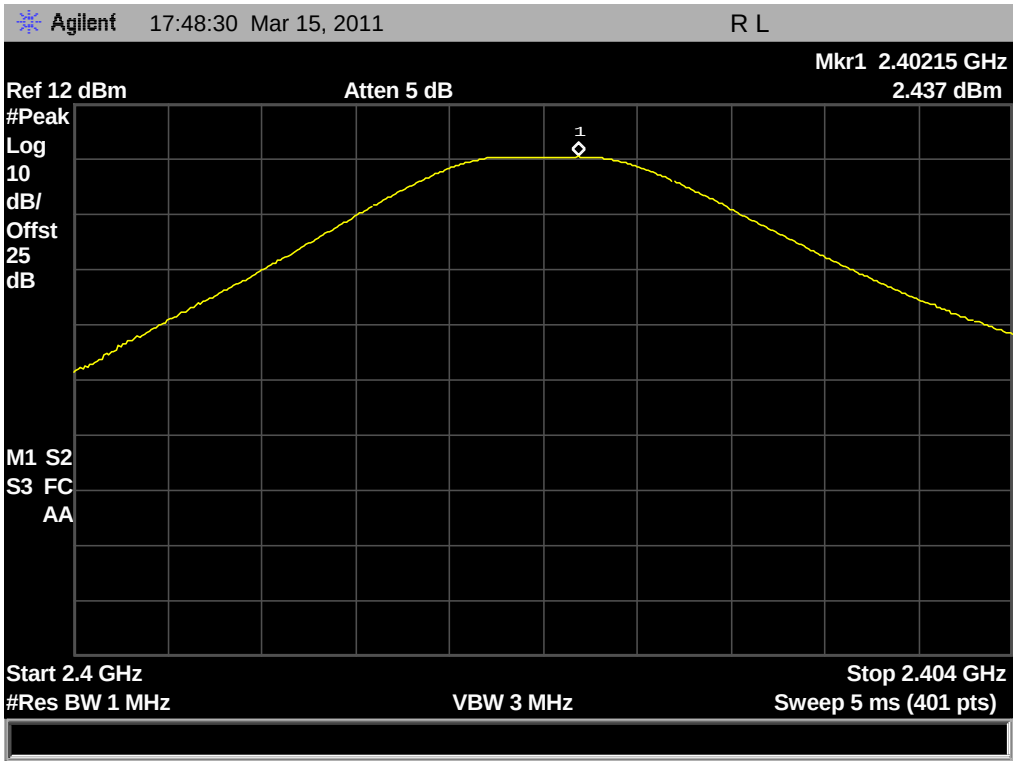
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

A. Test Verdict:

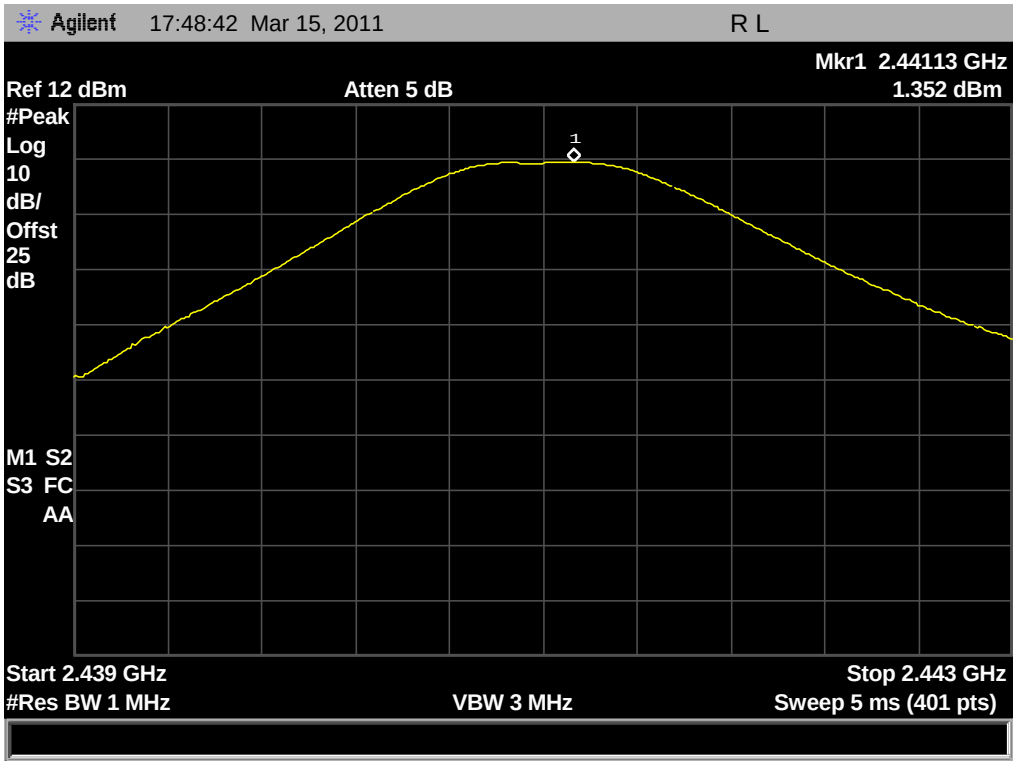
GFSK Mode

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	2.44	0.001754	Plot A	30	1	PASS
39	2441	1.35	0.001365	Plot B			PASS
78	2480	0.84	0.001213	Plot C			PASS

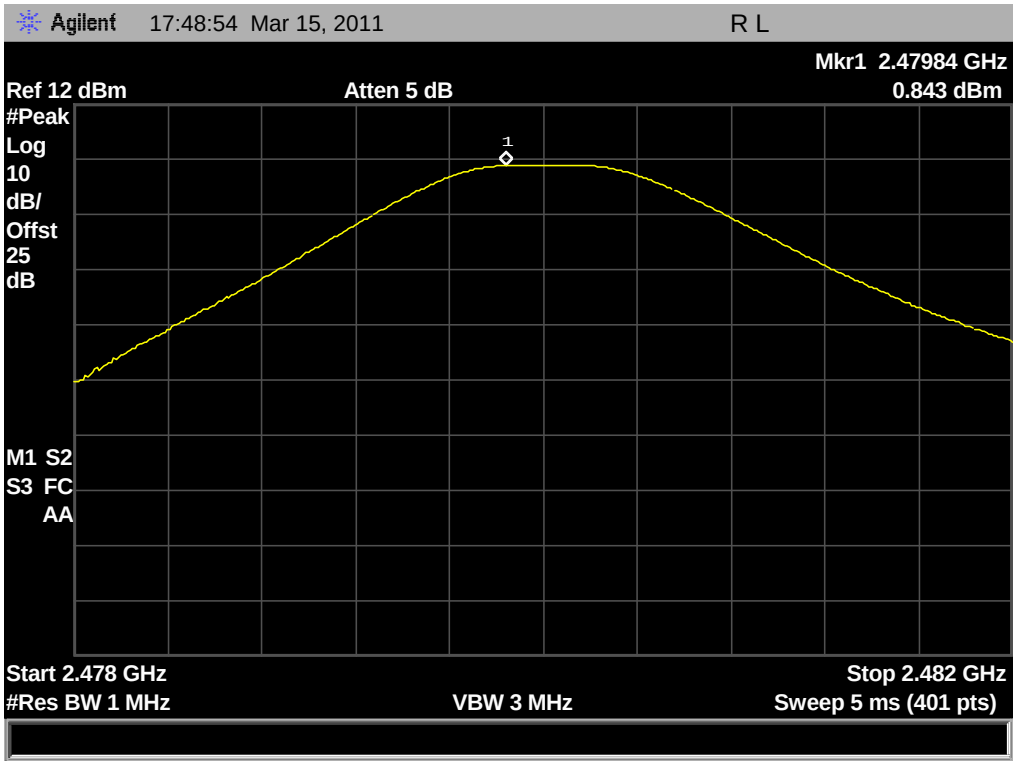
B. Test Plot:



(Plot A: Channel = 2402)



(Plot B: Channel = 2441)



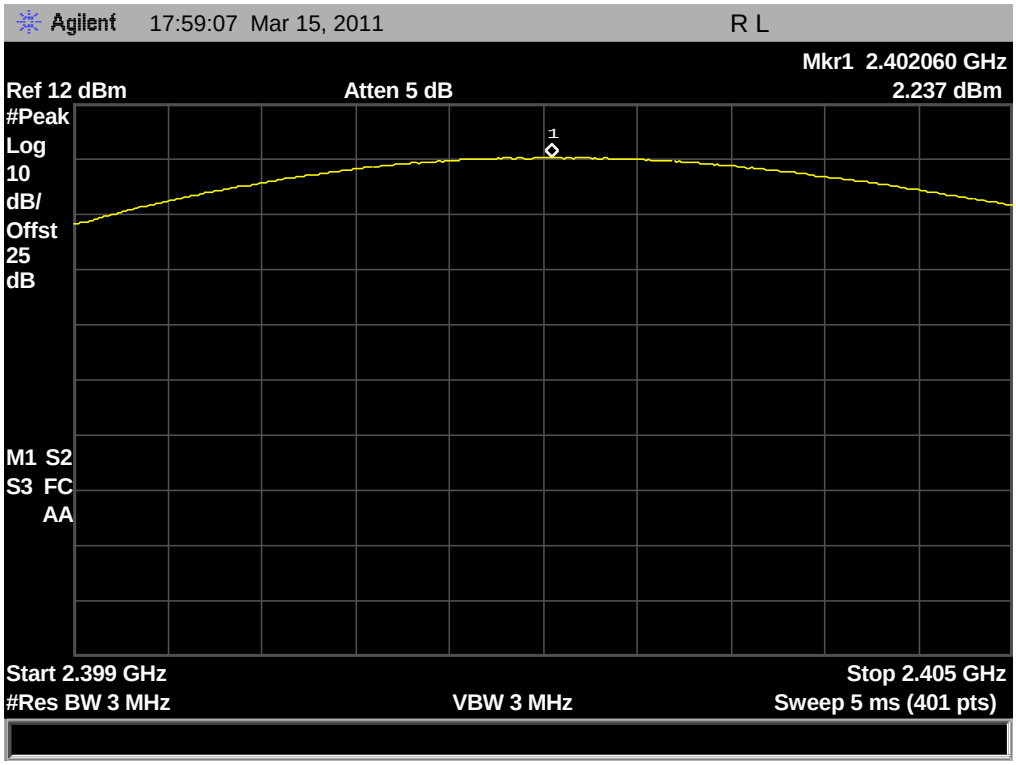
(Plot C: Channel = 2480)

C. Test Verdict:

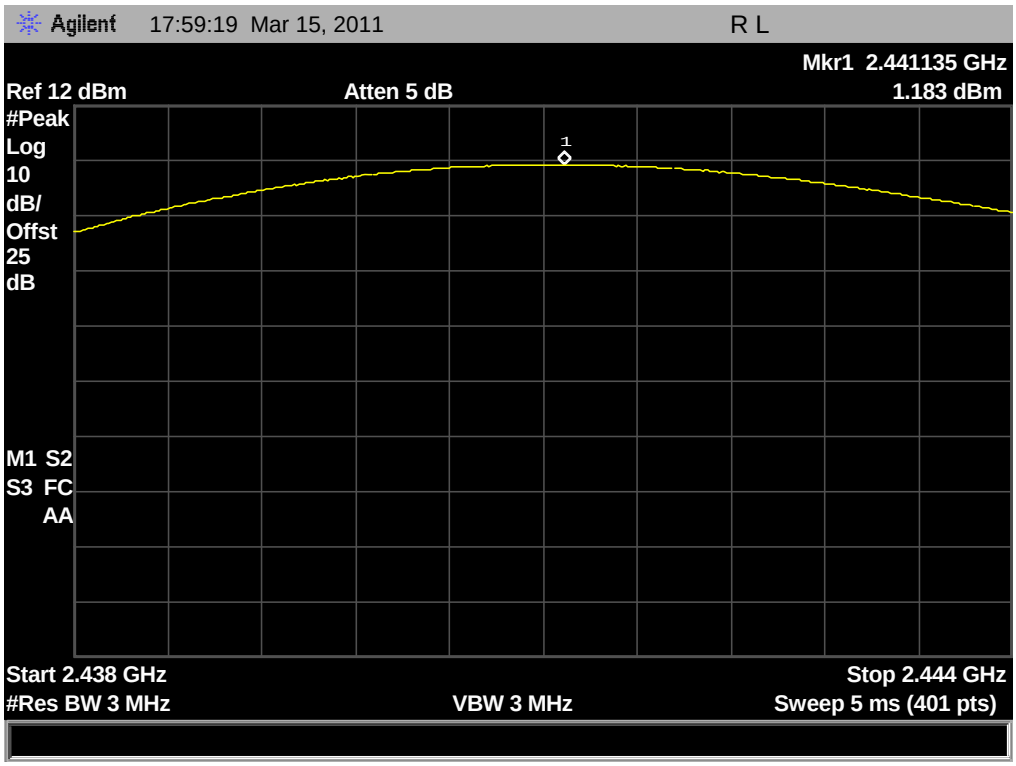
π/4-DQPSK Mode

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	2.24	0.001675	Plot D	30	1	PASS
39	2441	0.18	0.001042	Plot E			PASS
78	2480	0.72	0.001180	Plot F			PASS

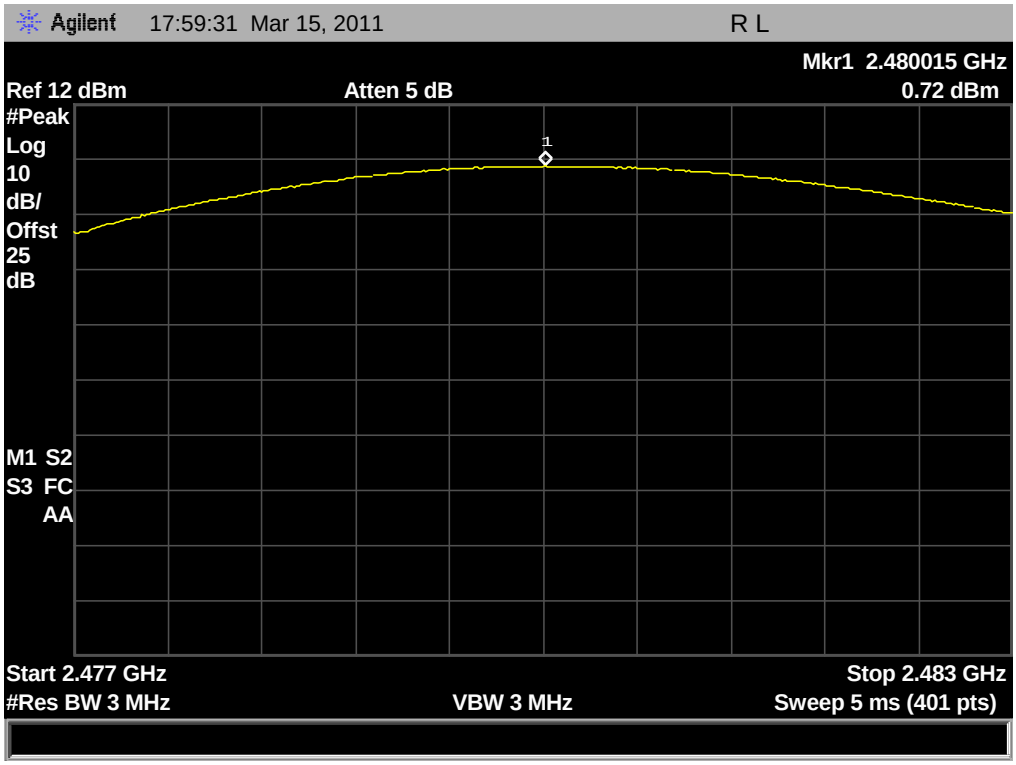
D. Test Plot:



(Plot D: Channel = 2402)



(Plot E: Channel = 2441)



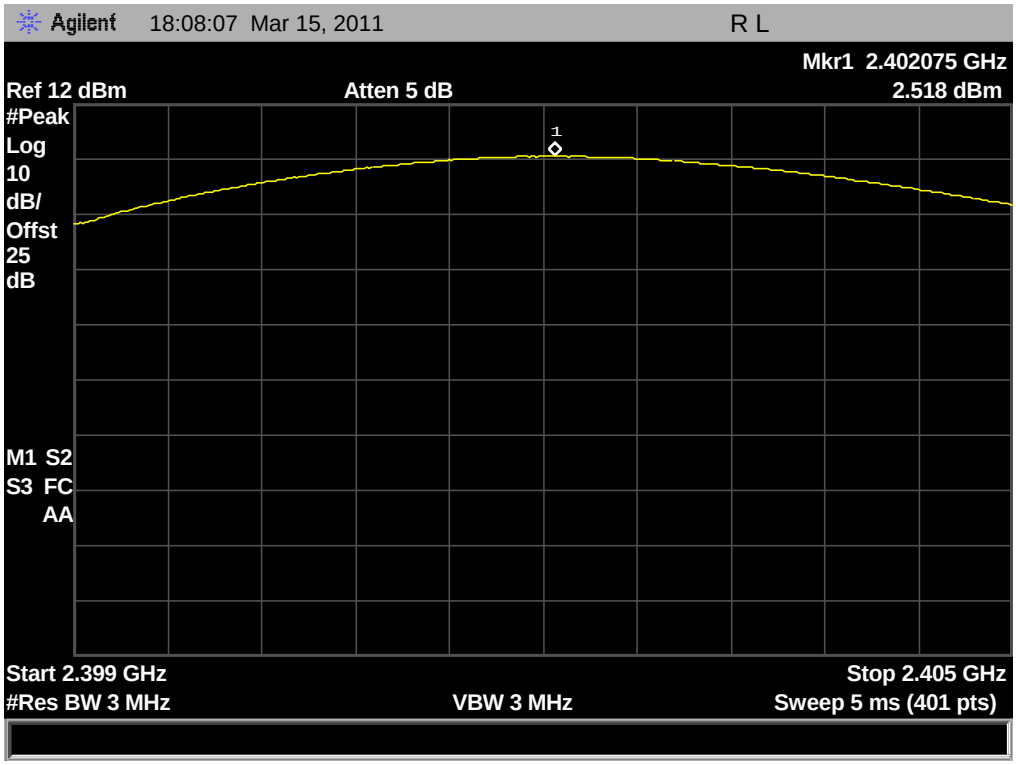
(Plot F: Channel = 2480)

E. Test Verdict:

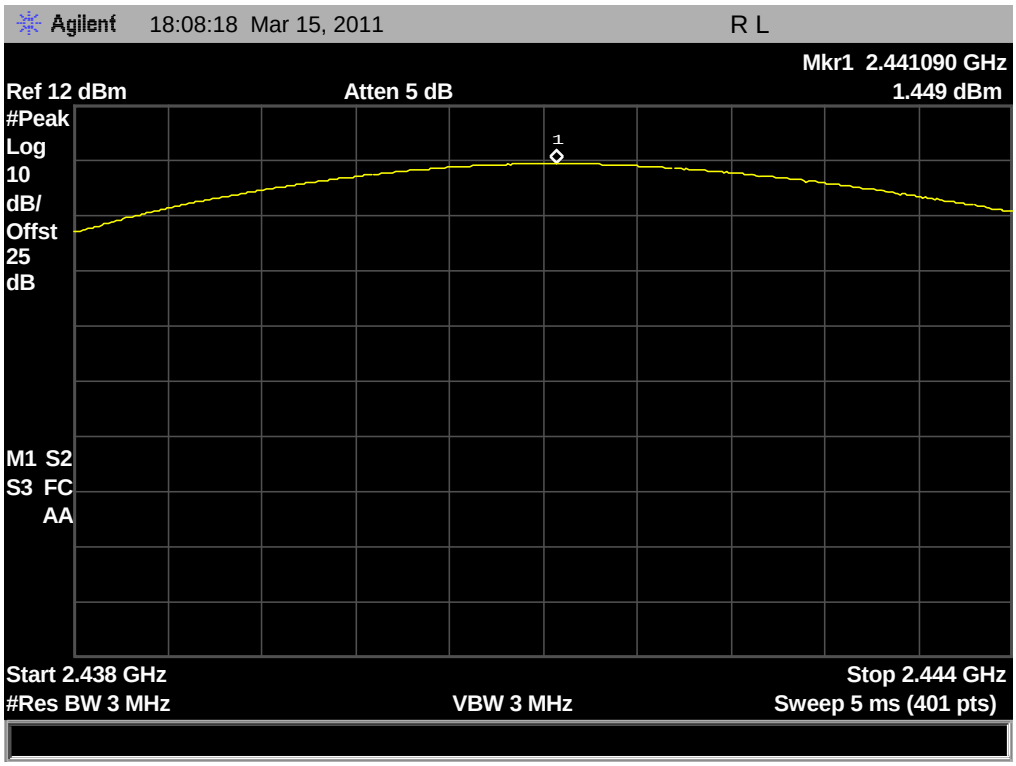
8-DPSK Mode

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	2.52	0.001786	Plot G	30	1	PASS
39	2441	1.45	0.001396	Plot H			PASS
78	2480	0.94	0.001242	Plot I			PASS

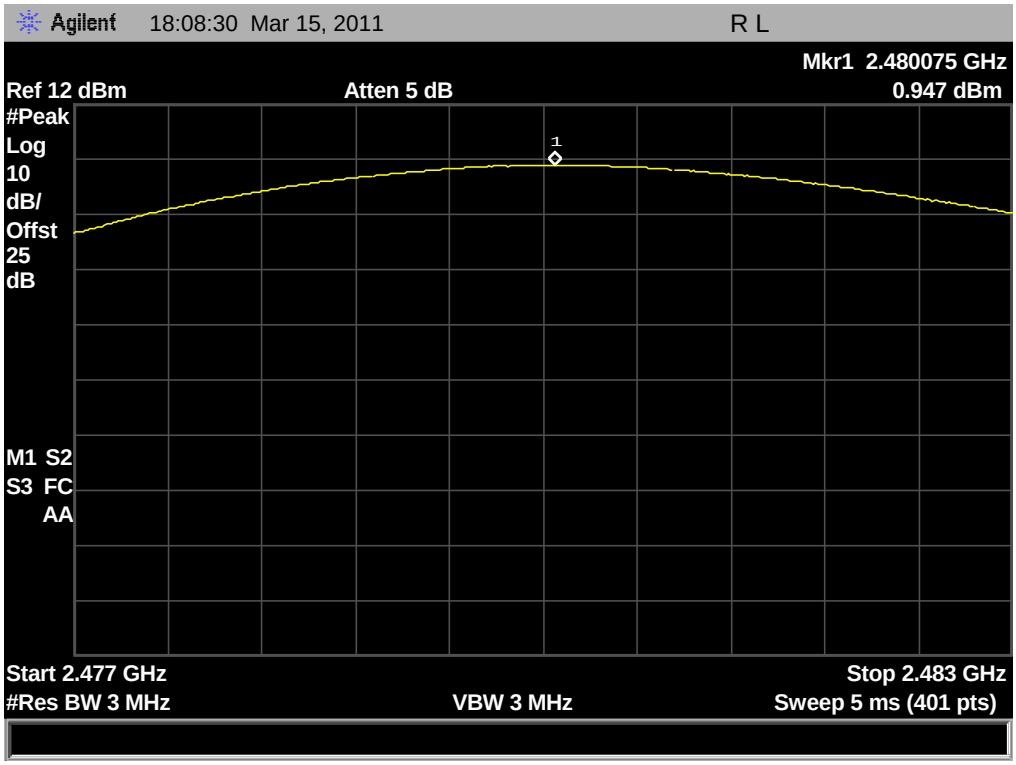
F. Test Plot:



(Plot G: Channel = 2402)



(Plot H: Channel = 2441)



(Plot I: Channel = 2480)

2.3 20dB Bandwidth

2.3.1 Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

2.3.2 Test Description

See section 2.1.2 of this report.

2.3.3 Test Result

The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

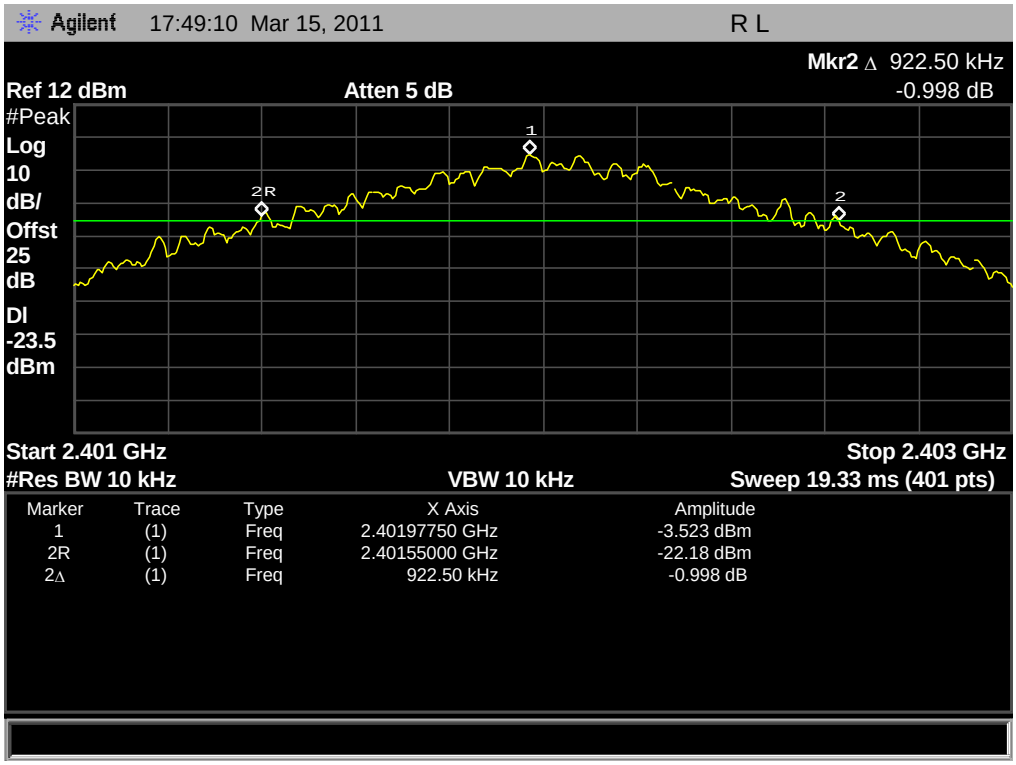
A. Test Verdict:

GFSK Mode

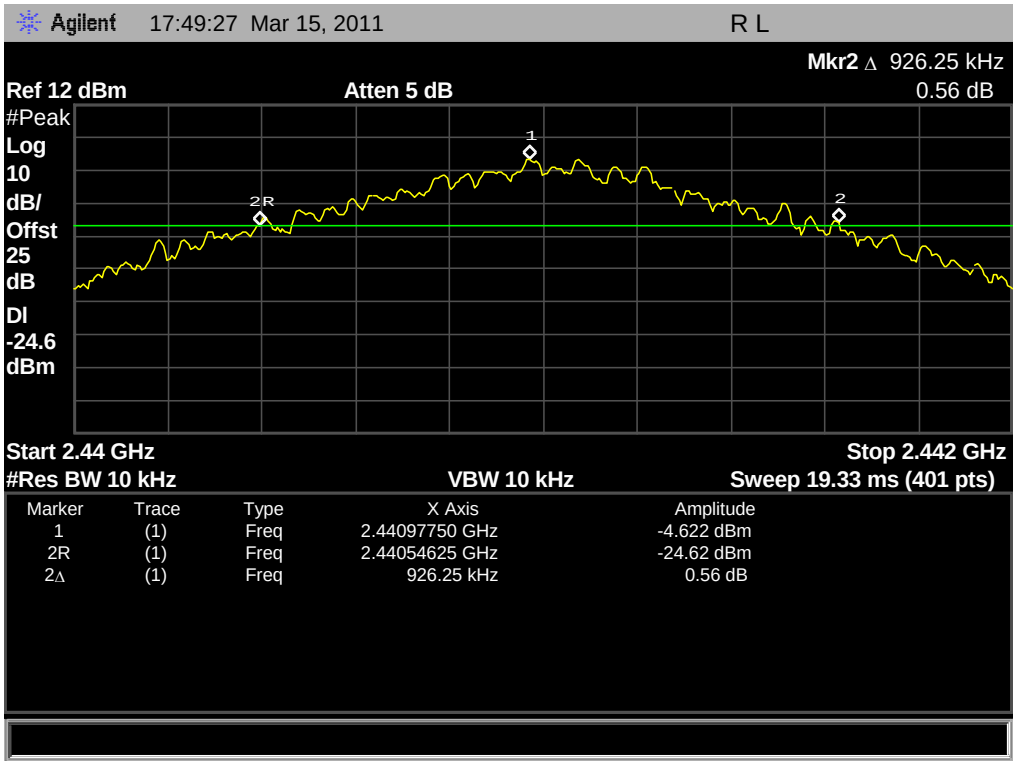
The maximum 20dB bandwidth measured is 922.50KHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (KHz)	Refer to Plot
0	2402	922.50	Plot A
39	2441	926.25	Plot B
78	2480	922.50	Plot C

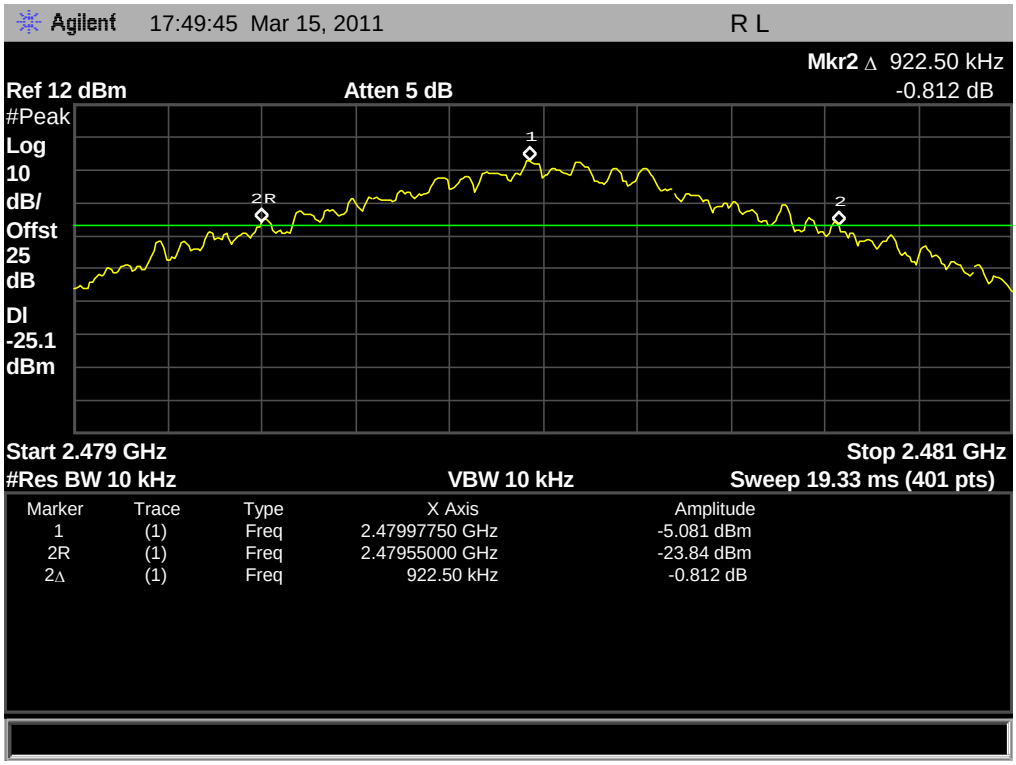
B. Test Plot:



(Plot A: Channel = 2402)



(Plot B: Channel = 2441)



(Plot C: Channel = 2480)

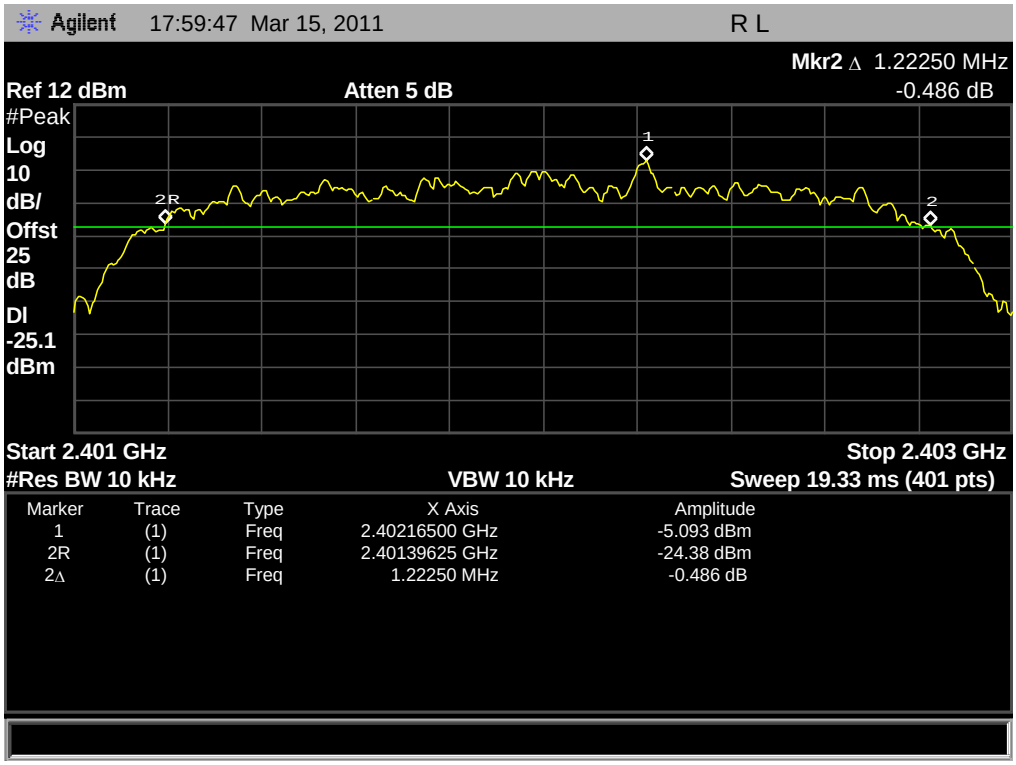
C. Test Verdict:

π/4-DQPSK Mode

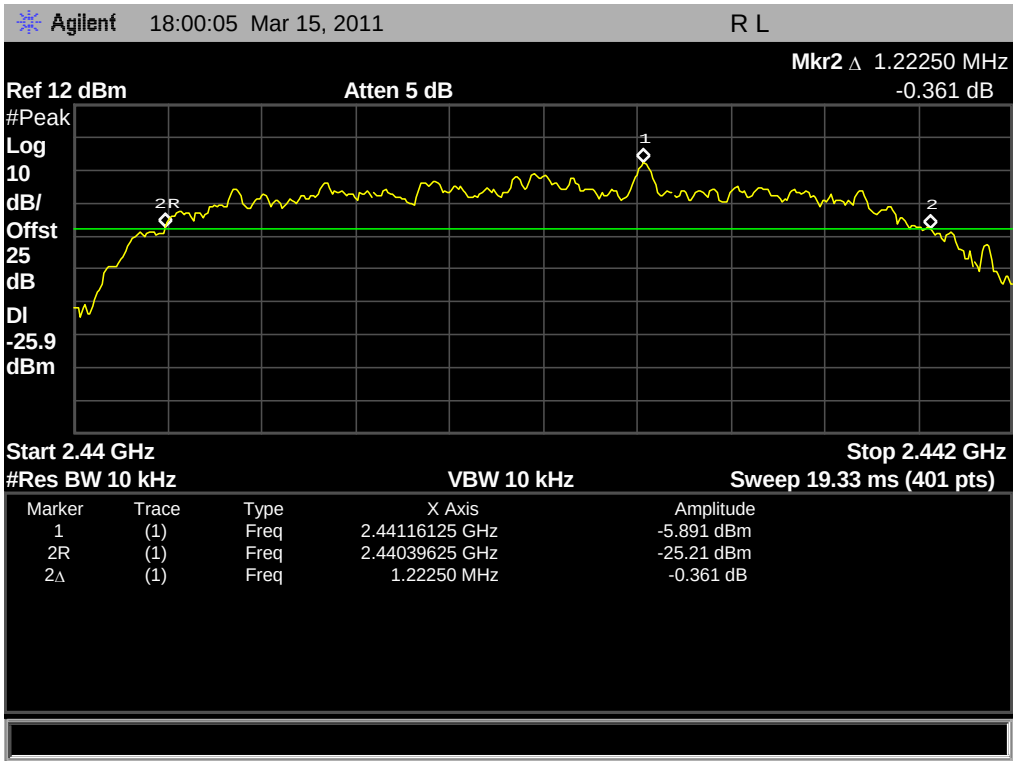
The maximum 20dB bandwidth measured is 1.264MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.223	Plot D
39	2441	1.223	Plot E
78	2480	1.223	Plot F

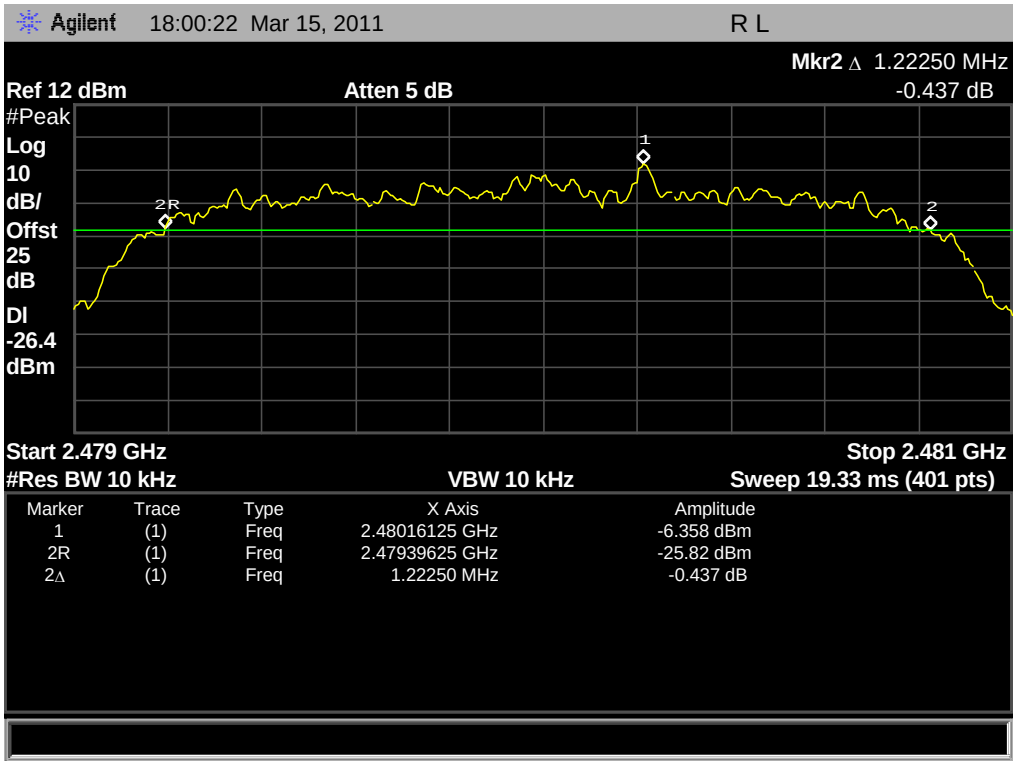
D. Test Plot:



(Plot D: Channel = 2402)



(Plot E: Channel = 2441)



(Plot F: Channel = 2480)

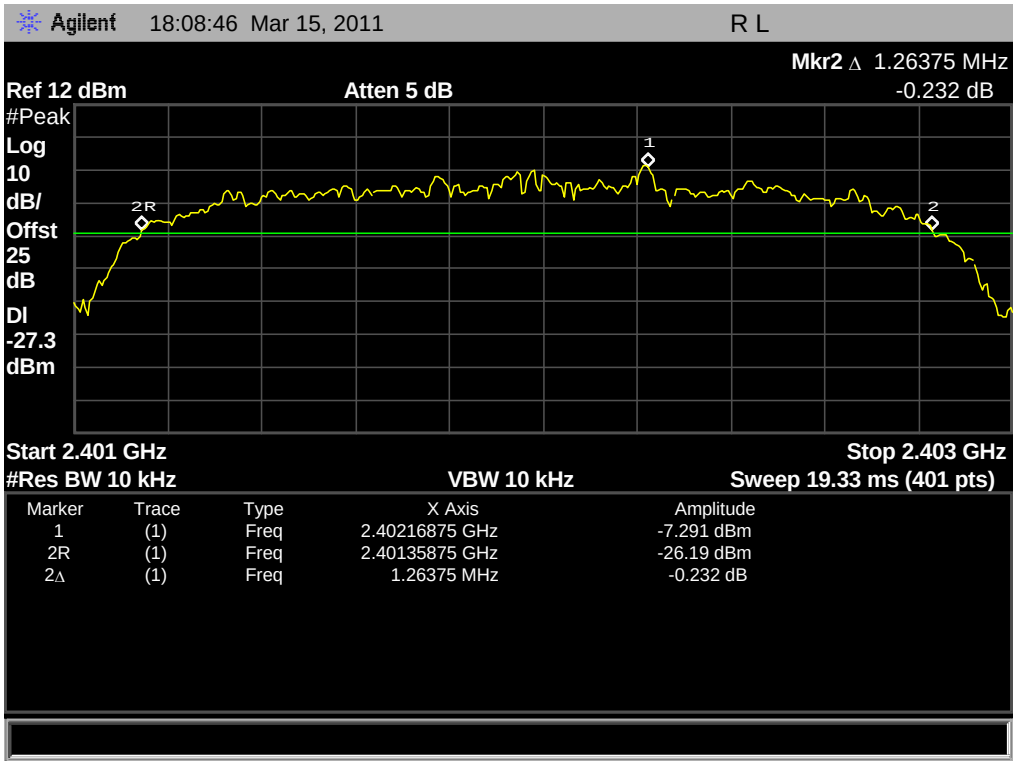
E. Test Verdict:

8-DPSK Mode

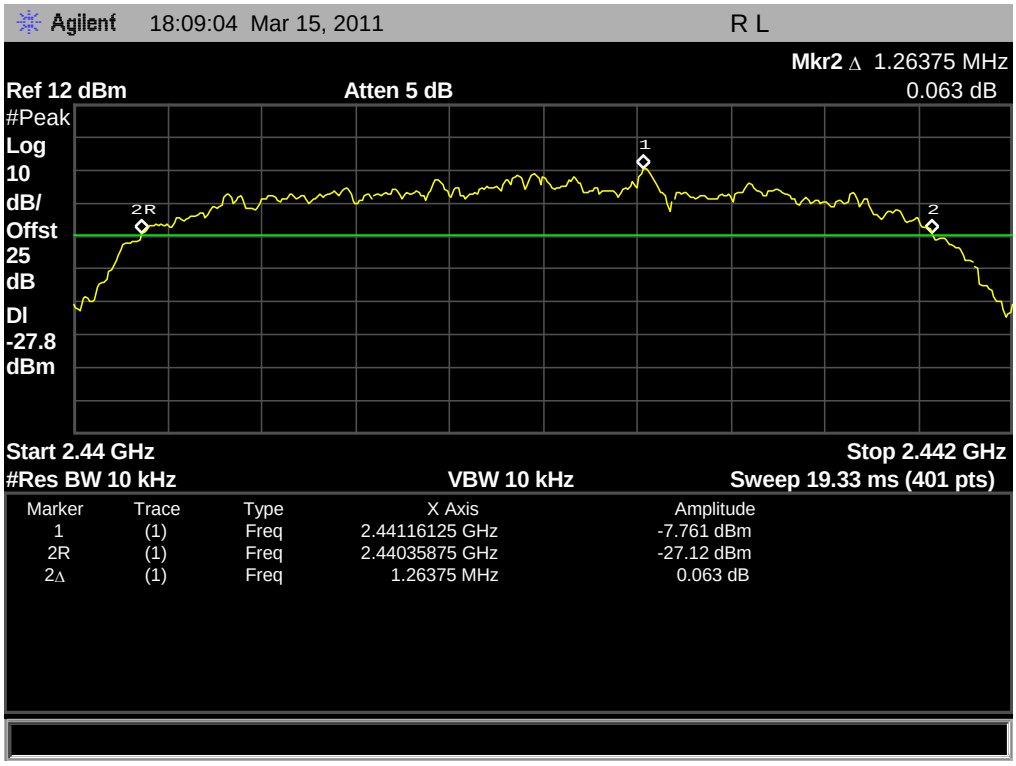
The maximum 20dB bandwidth measured is 1.223MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.263	Plot G
39	2441	1.263	Plot H
78	2480	1.263	Plot I

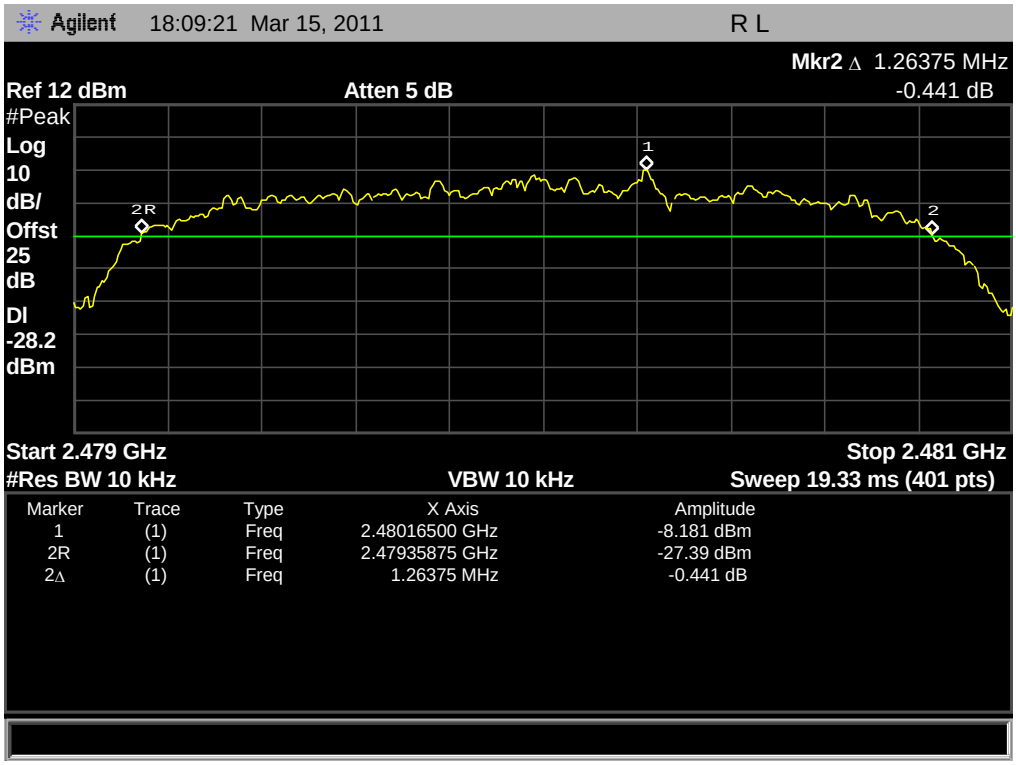
F. Test Plot:



(Plot G: Channel = 2402)



(Plot H: Channel = 2441)



(Plot I: Channel = 2480)

2.4 Carried Frequency Separation

2.4.1 Definition

According to FCC §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

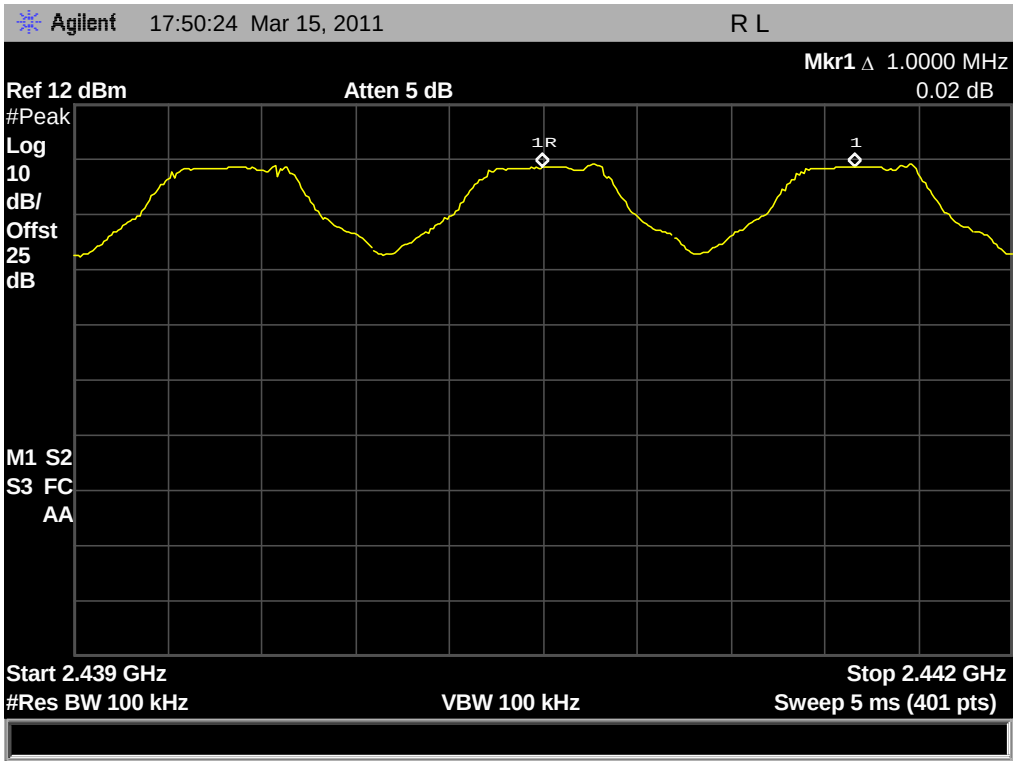
2.4.2 Test Description

See section 2.1.2 of this report.

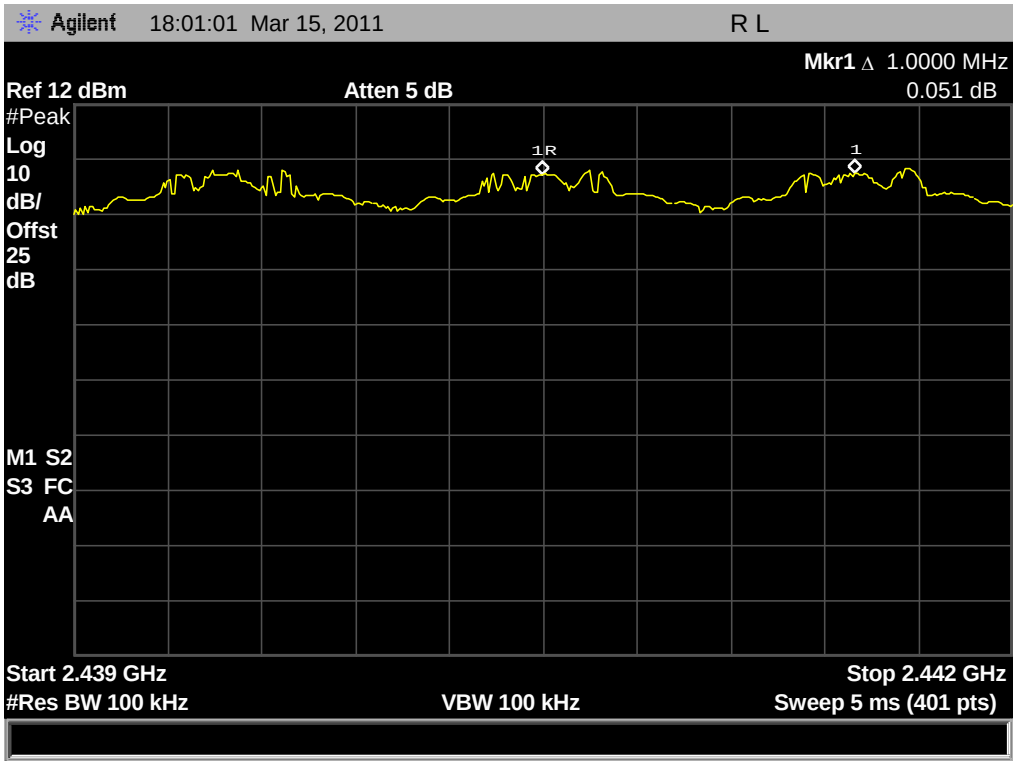
2.4.3 Test Result

The Bluetooth Module operates at hopping-on test mode.

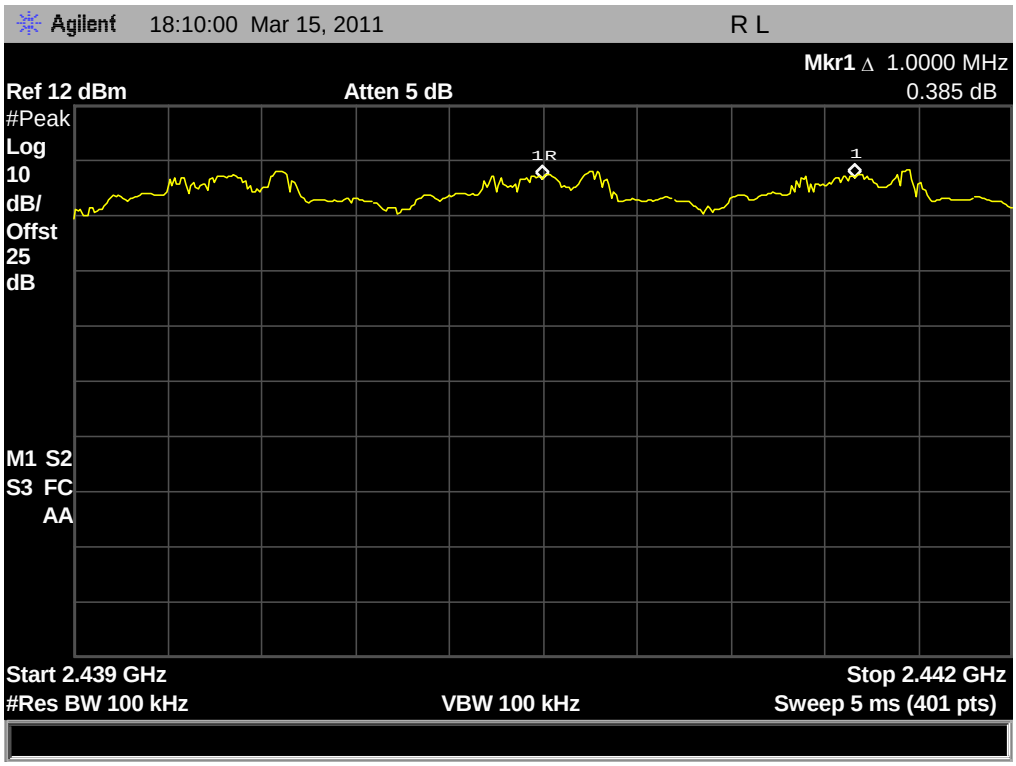
For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (922.50KHz for GFSK mode, 1.263MHz for π/4-DQPSK mode and 1.263MHz for 8-DPSK mode, refer to section 2.3.3), whichever is greater. So, the verdict is PASS.



(Plot A: GFSK)



(Plot B: π/4-DQPSK)



(Plot C: 8-DPSK)

2.5 Time of Occupancy (Dwell time)

2.5.1 Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.5.2 Test Description

See section 2.1.2 of this report.

2.5.3 Test Result

The average time of occupancy on any channel within the Period can be calculated with formulas (for DH5 package type):

{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4s * {Number of Hopping Frequency}

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

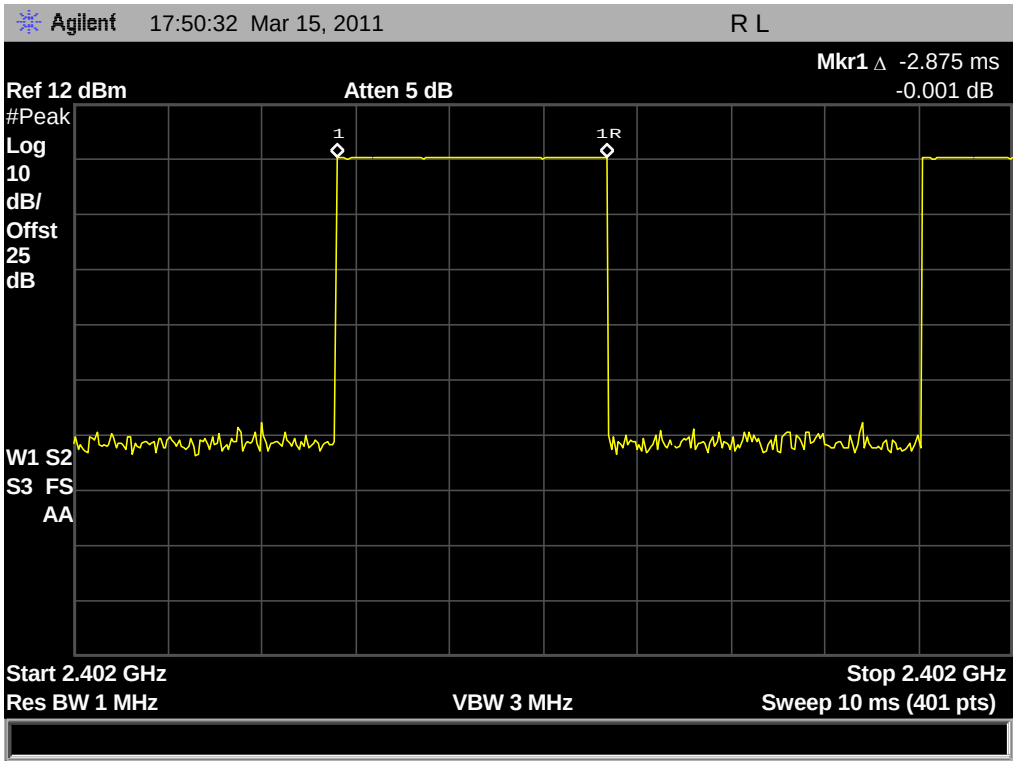
A. Test Verdict:

GFSK Mode

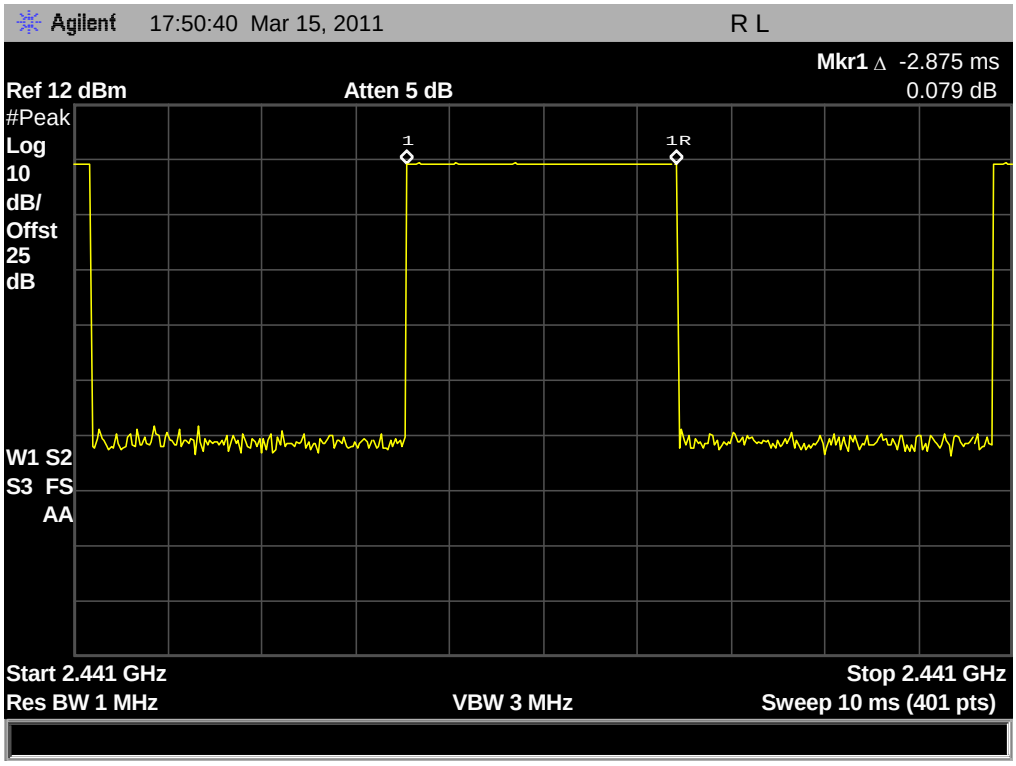
Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		ms	Refer to Plot			
0	2402	2.875	Plot A	306.667	400	PASS
39	2441	2.875	Plot B	306.667		PASS
78	2480	2.875	Plot C	306.667		PASS

B. Test Plot:

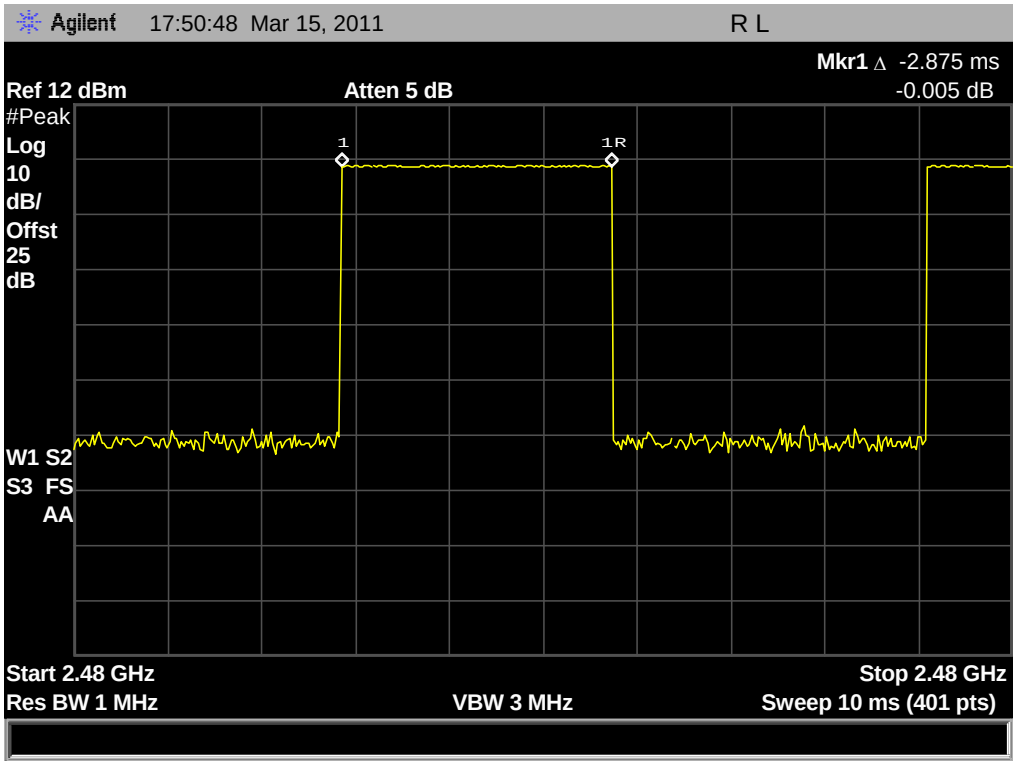
Note: the following plots record the Pulse Time of the Module carrier.



(Plot A: Channel = 2402)



(Plot B: Channel = 2441)



(Plot C: Channel = 2480)

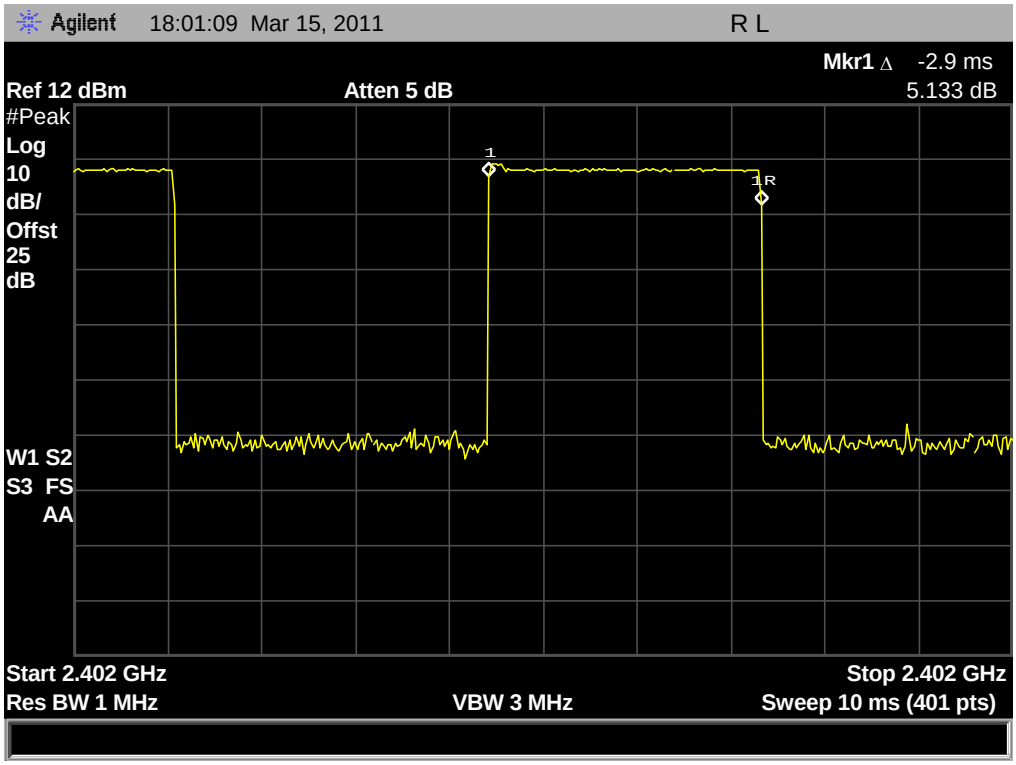
C. Test Verdict:

π/4-DQPSK Mode

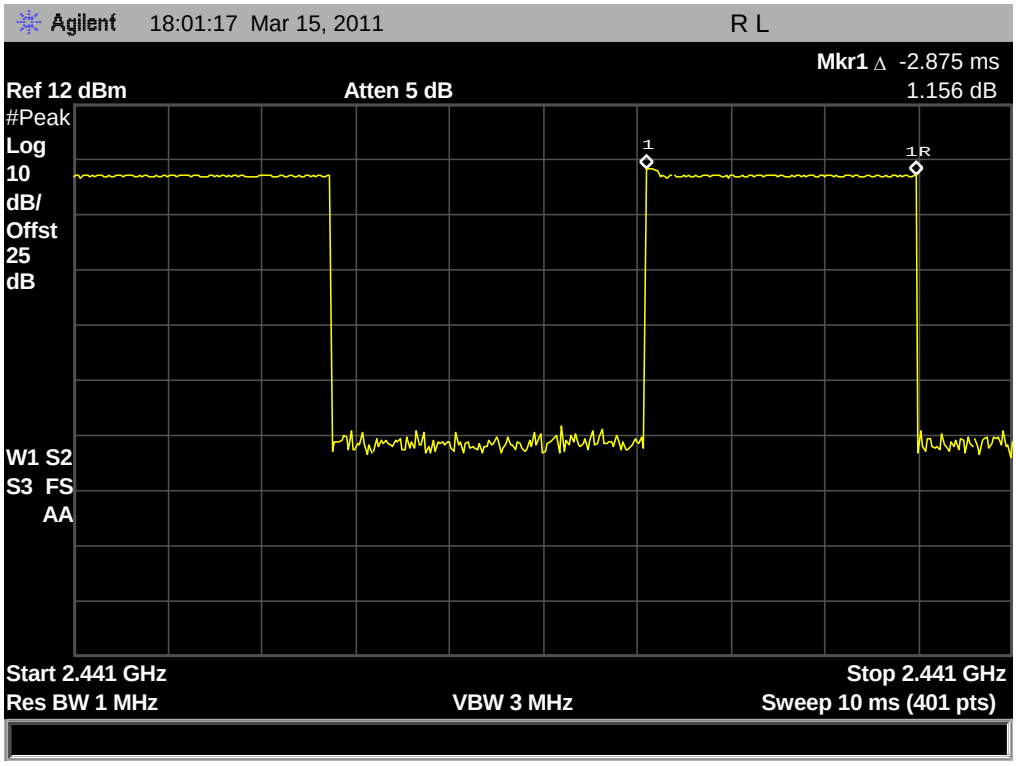
Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		ms	Refer to Plot			
0	2402	2.900	Plot D	309.333	400	PASS
39	2441	2.875	Plot E	306.667		PASS
78	2480	2.875	Plot F	306.667		PASS

D. Test Plot:

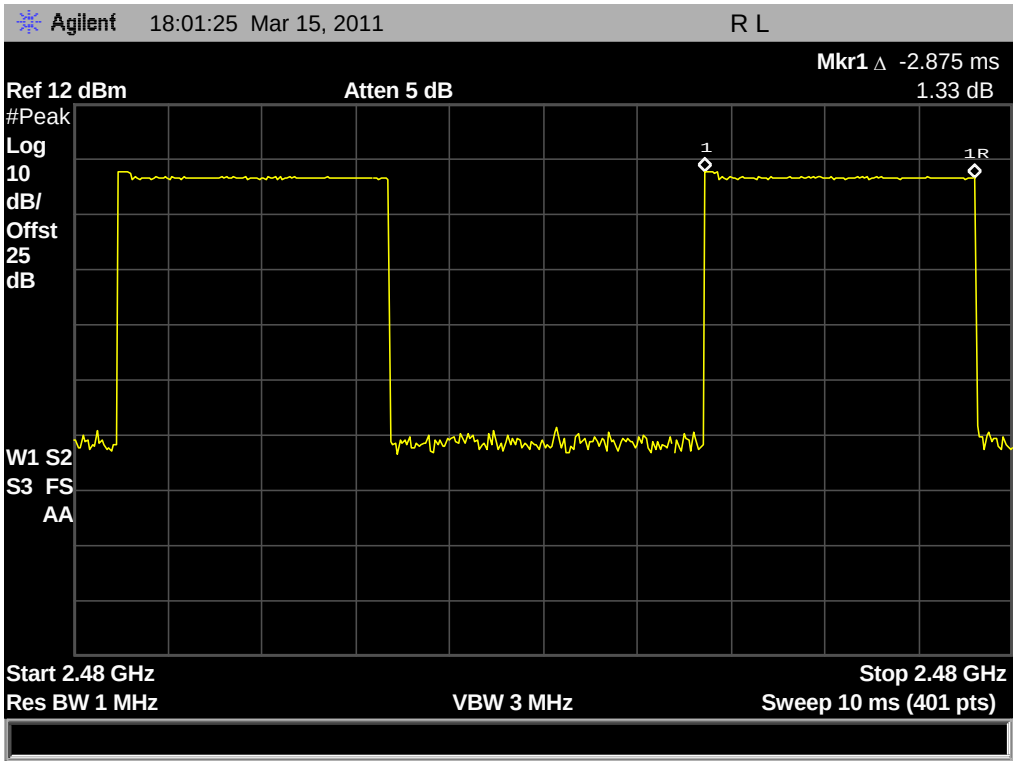
Note: the following plots record the Pulse Time of the Module carrier.



(Plot D: Channel = 2402)



(Plot E: Channel = 2441)



(Plot F: Channel = 2480)

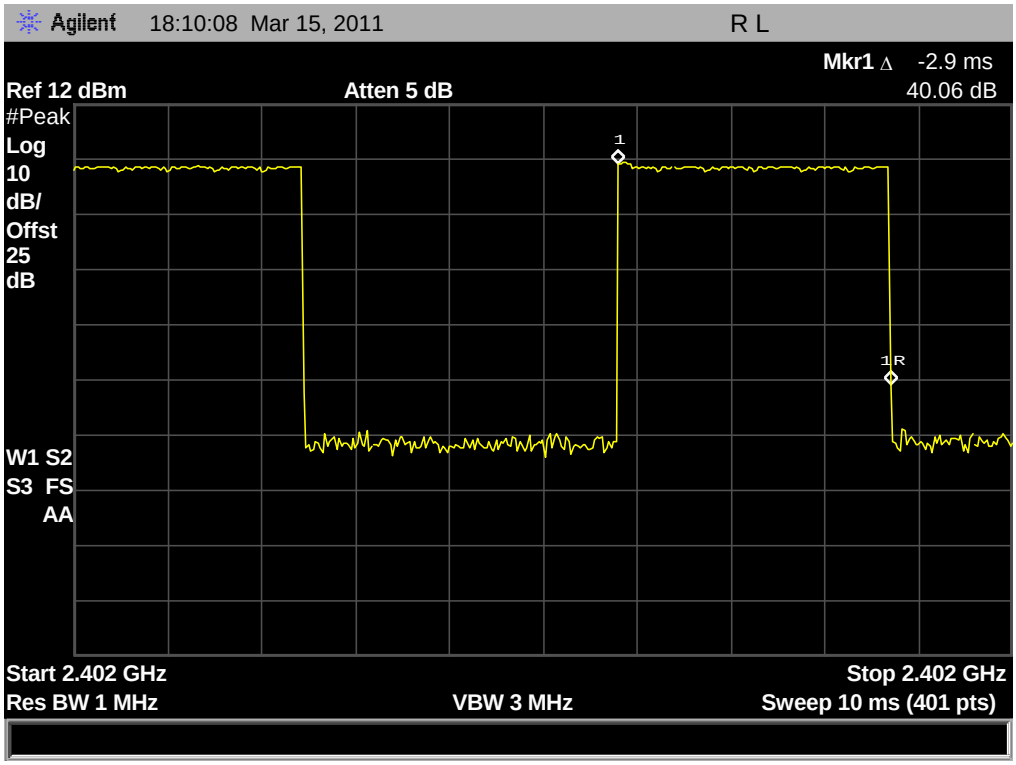
E. Test Verdict (8-DPSK mode):

8-DPSK Mode

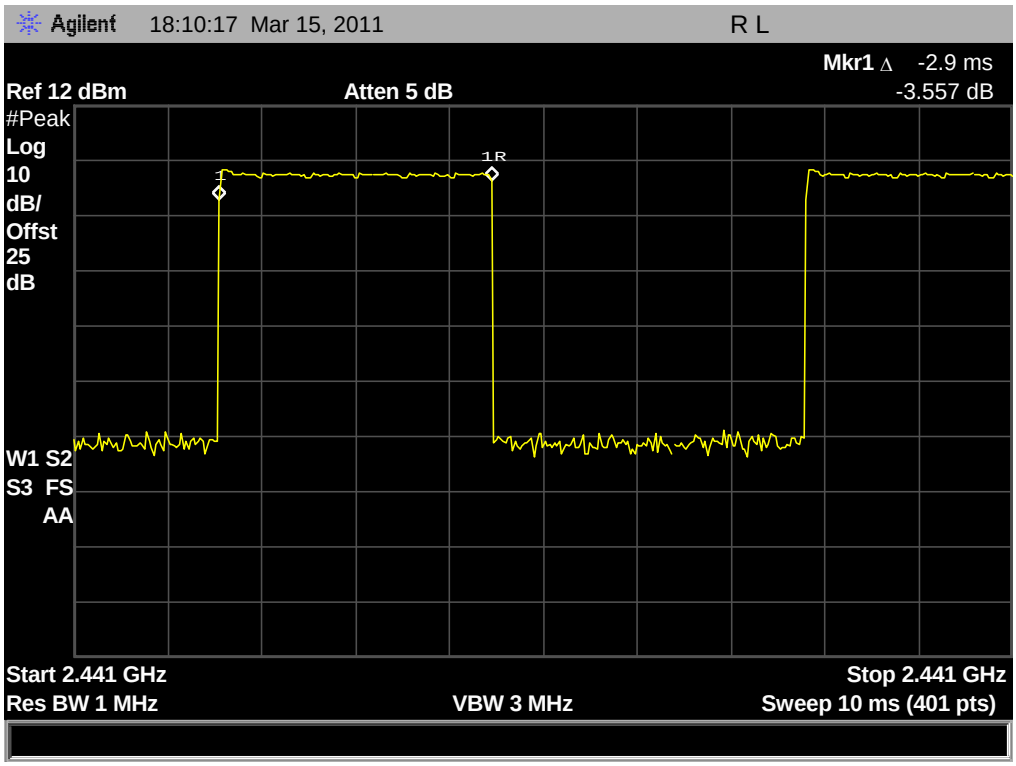
Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		ms	Refer to Plot			
0	2402	2.900	Plot G	309.333	400	PASS
39	2441	2.900	Plot H	309.333		PASS
78	2480	2.875	Plot I	306.667		PASS

F. Test Plot:

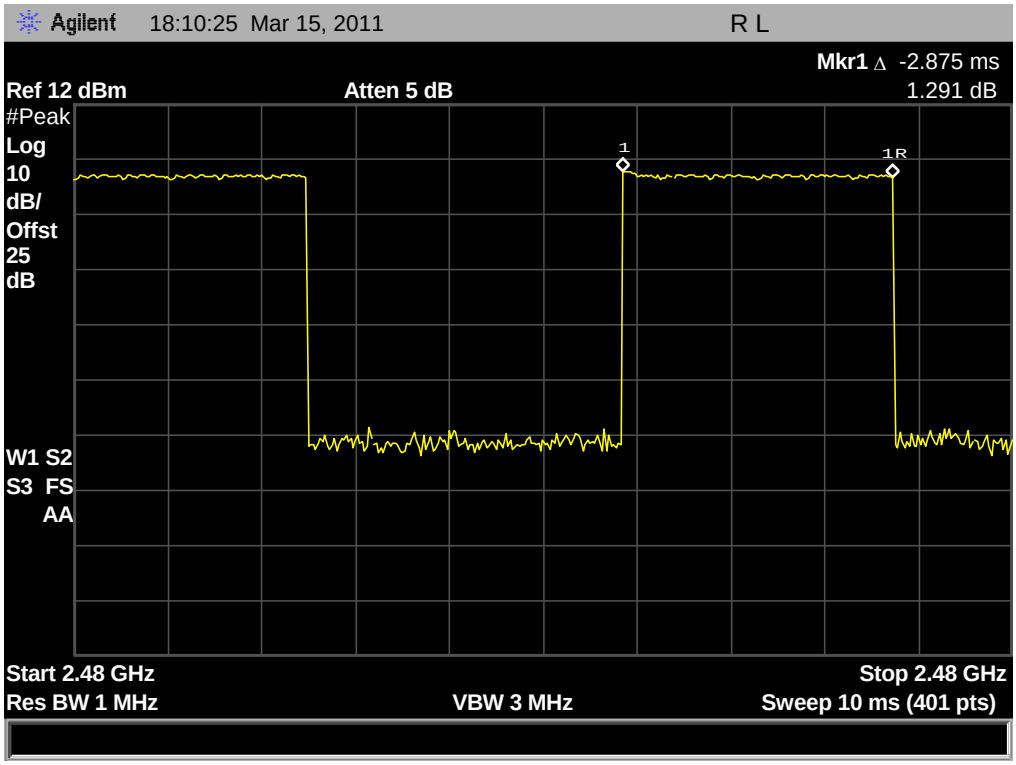
Note: the following plots record the Pulse Time of the Module carrier.



(Plot G: Channel = 2402)



(Plot H: Channel = 2441)



(Plot I: Channel = 2480)

2.6 Conducted Spurious Emissions

2.6.1 Requirement

According to FCC §15.247(c), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.6.2 Test Description

See section 2.1.2 of this report.

2.6.3 Test Result

The Bluetooth Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

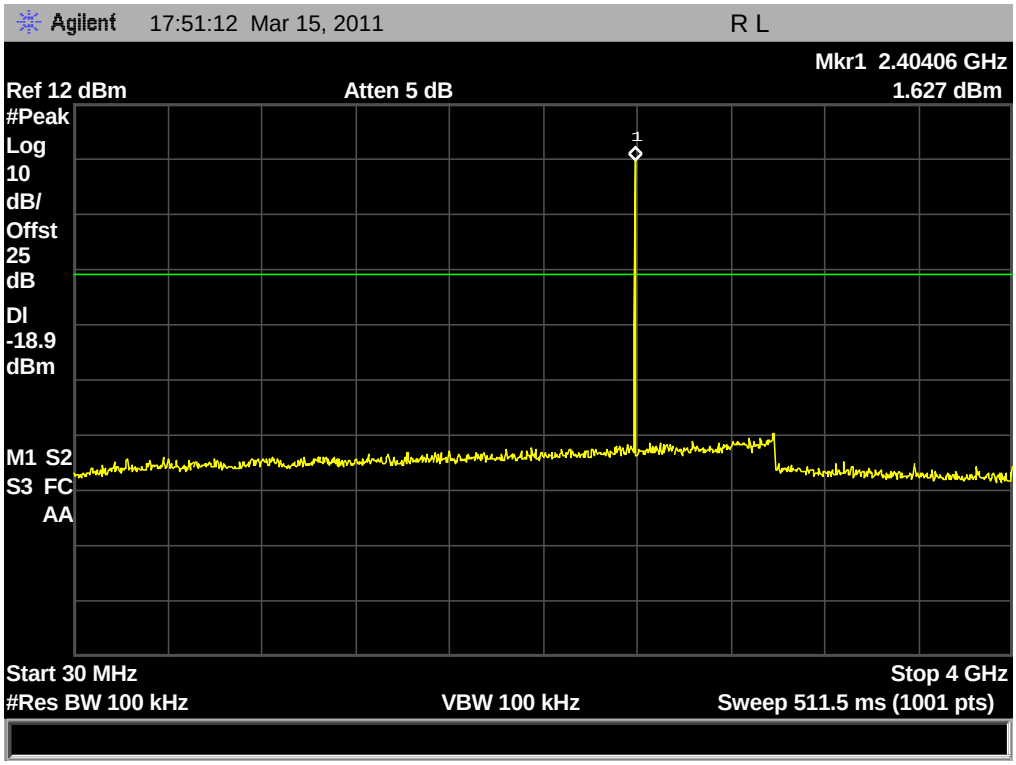
A. Test Verdict:

GFSK Mode

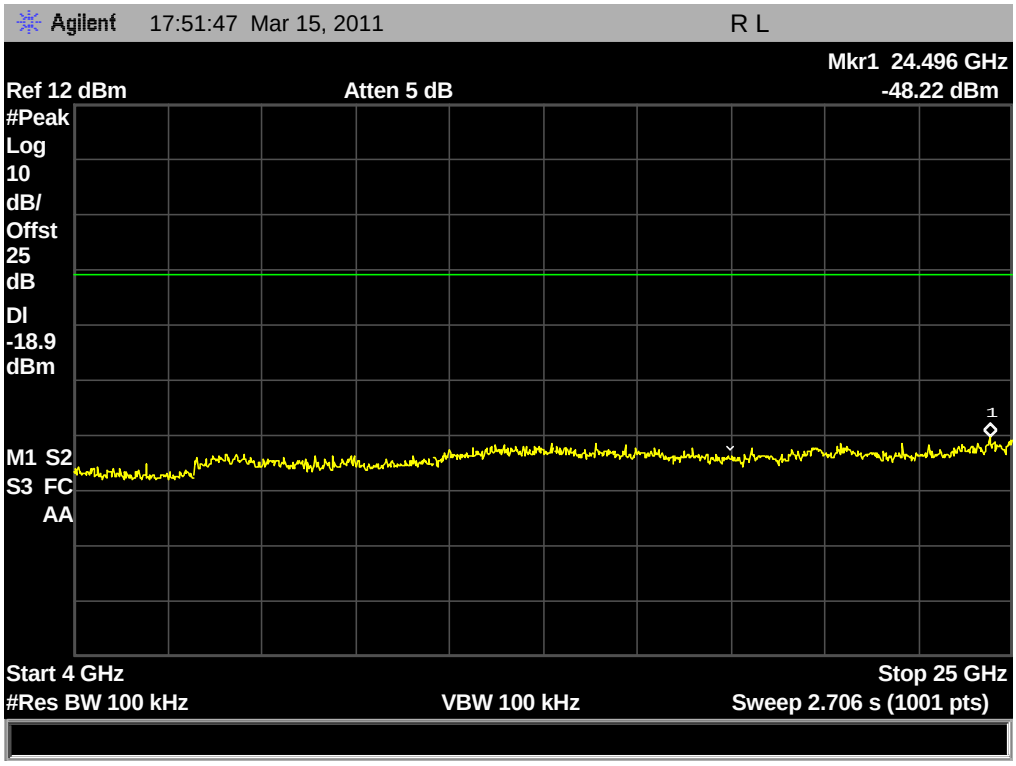
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-48.22	Plot A.1/A.2	1.627	-18.9	PASS
39	2441	-49.00	Plot B.1/B.2	1.057	-18.9	PASS
78	2480	-48.85	Plot C.1/C.2	0.456	-19.5	PASS

B. Test Plot:

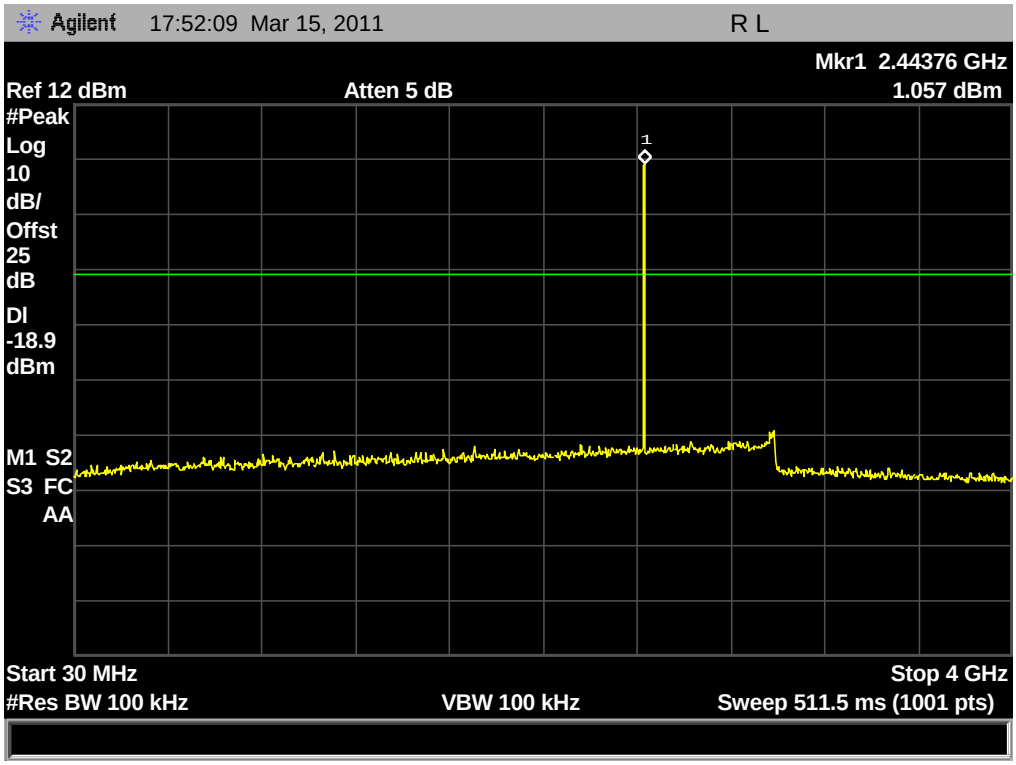
Note: the power of the Module transmitting frequency should be ignored.



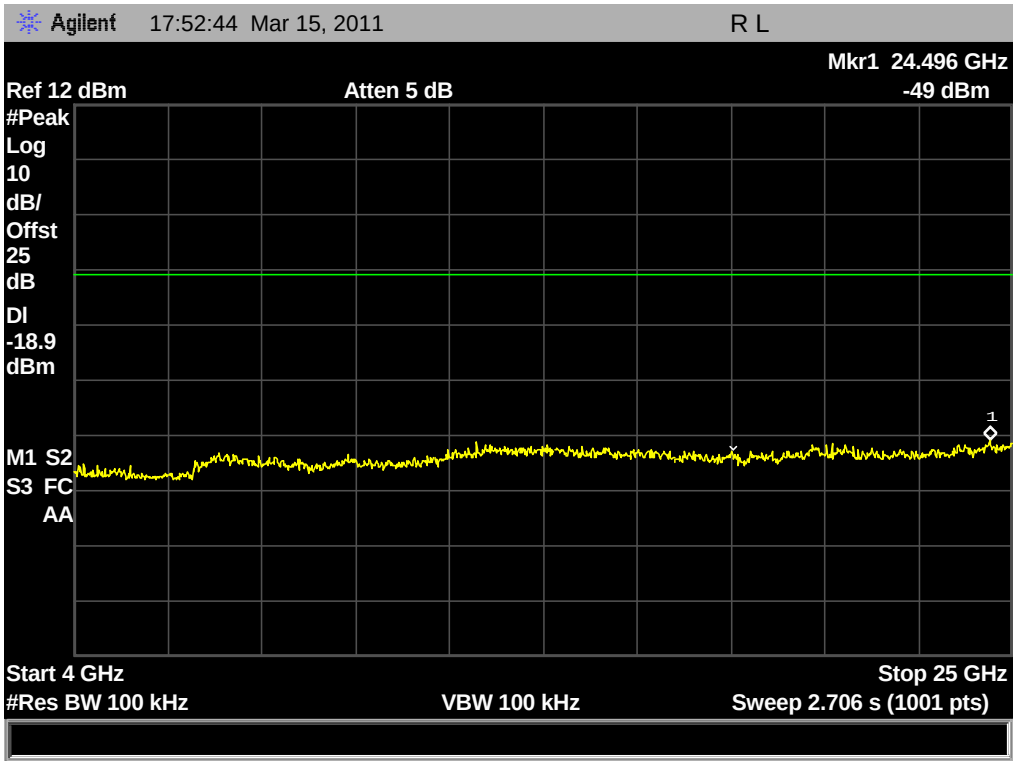
(Plot A.1: Channel = 0, 30MHz to 4GHz)



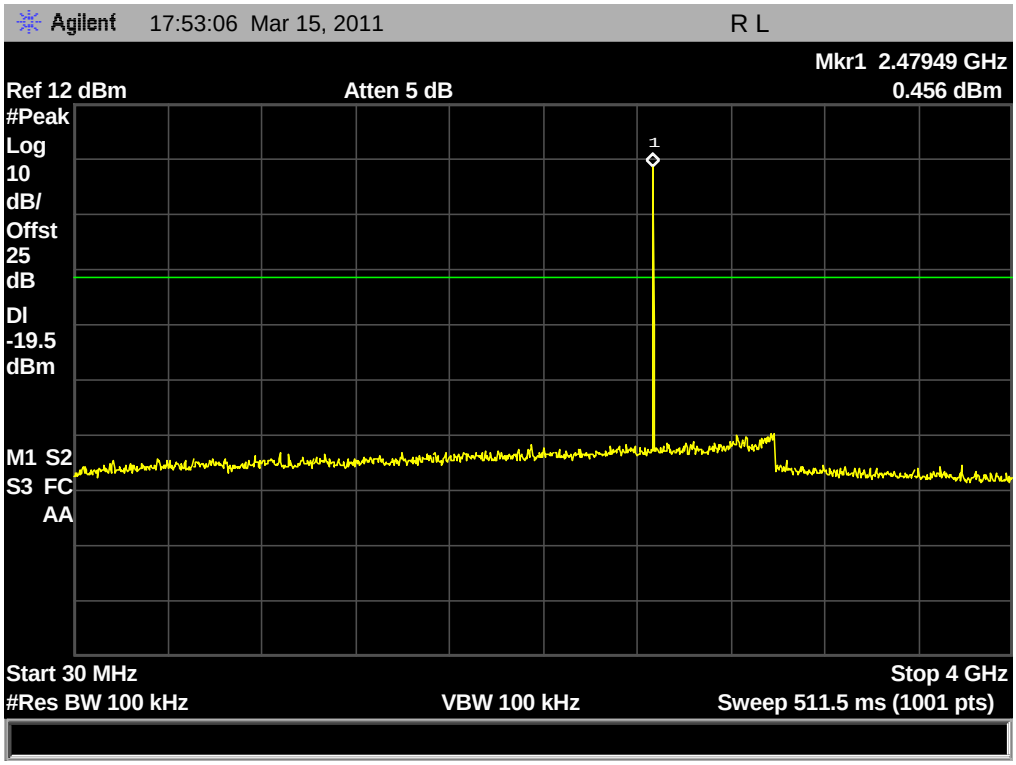
(Plot A.2: Channel = 0, 4GHz to 25GHz)



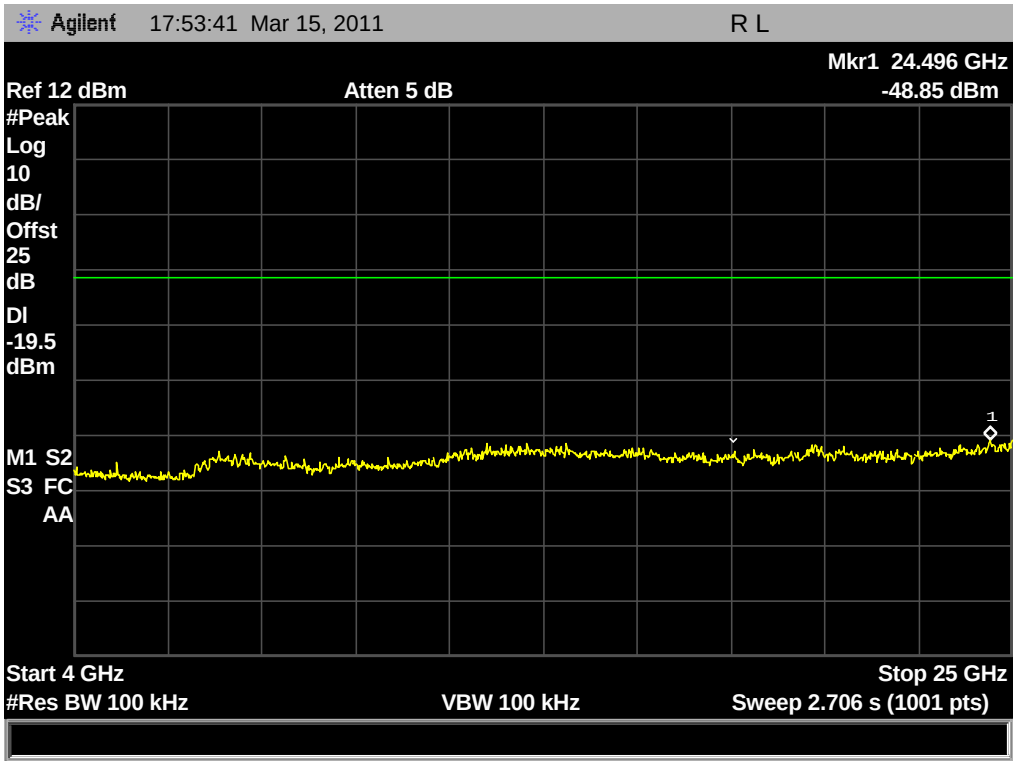
(Plot B.1: Channel = 39, 30MHz to 4GHz)



(Plot B.2: Channel = 39, 4GHz to 25GHz)



(Plot C.1: Channel = 78, 30MHz to 4GHz)



(Plot C.2: Channel = 78, 4GHz to 25GHz)

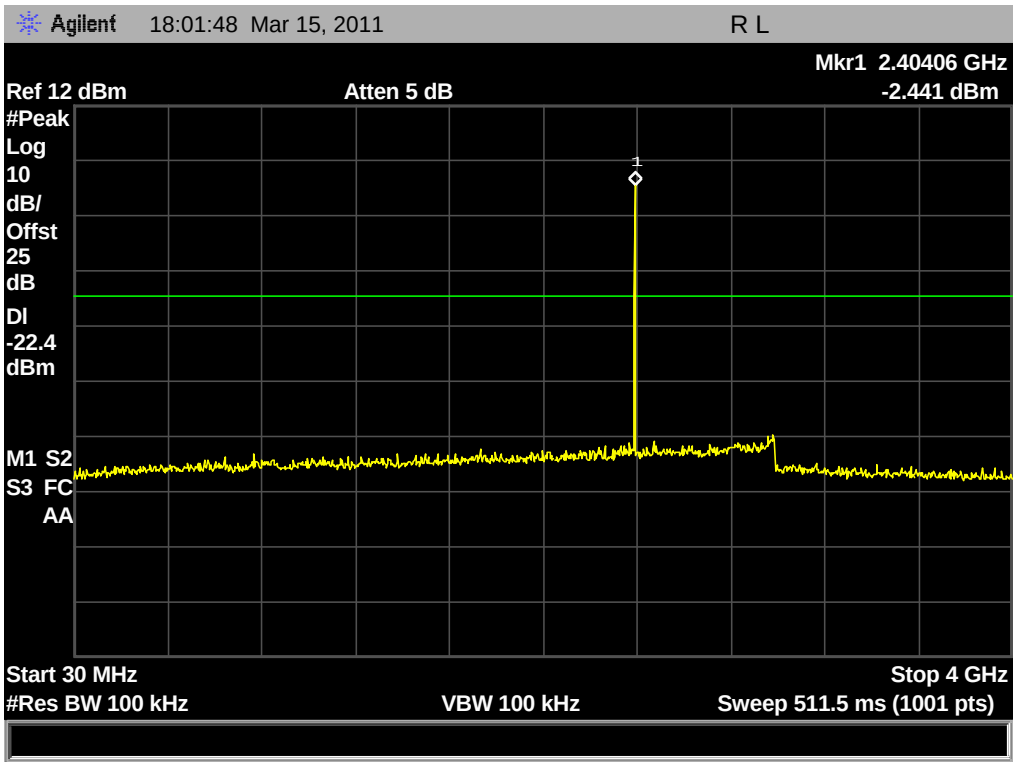
C. Test Verdict:

π/4-DQPSK Mode

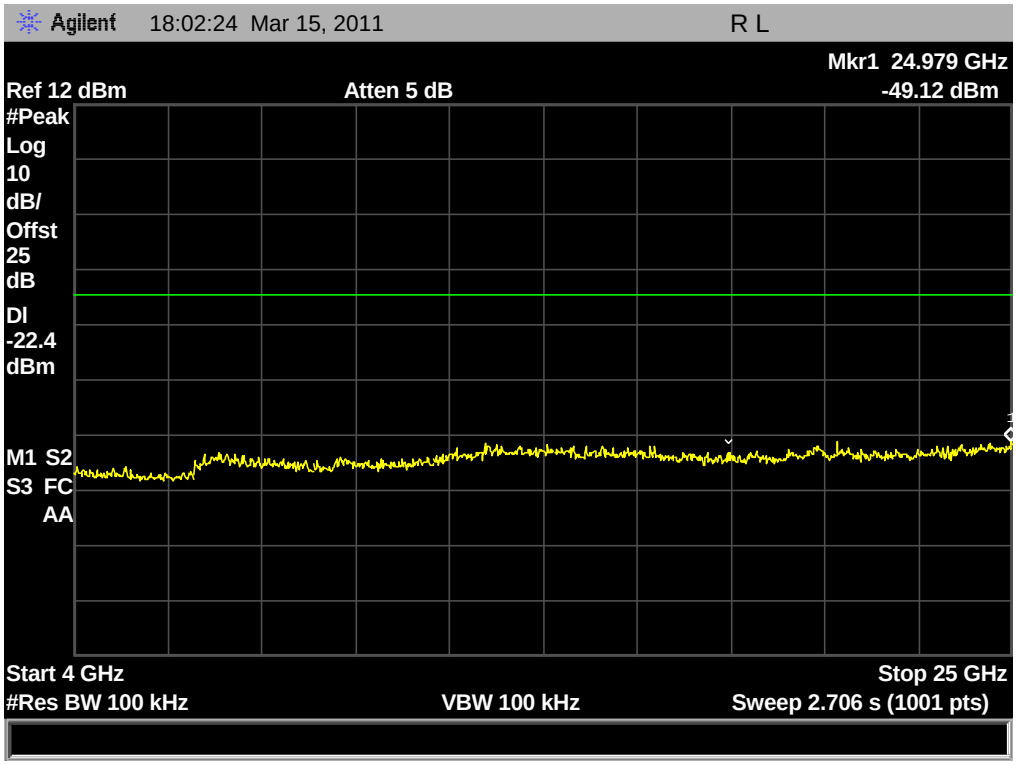
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-49.12	Plot D.1/D.2	-2.441	-22.4	PASS
39	2441	-48.18	Plot E.1/E.2	-1.182	-21.2	PASS
78	2480	-49.18	Plot F.1/F.2	-3.742	-23.7	PASS

D. Test Plot:

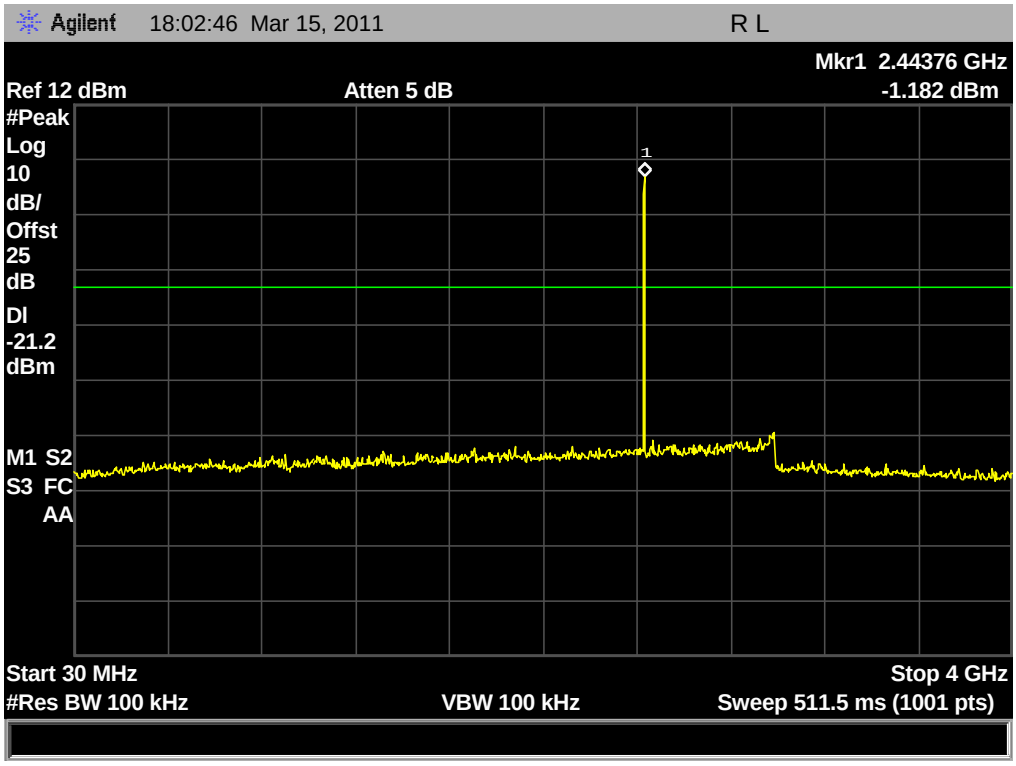
Note: the power of the Module transmitting frequency should be ignored.



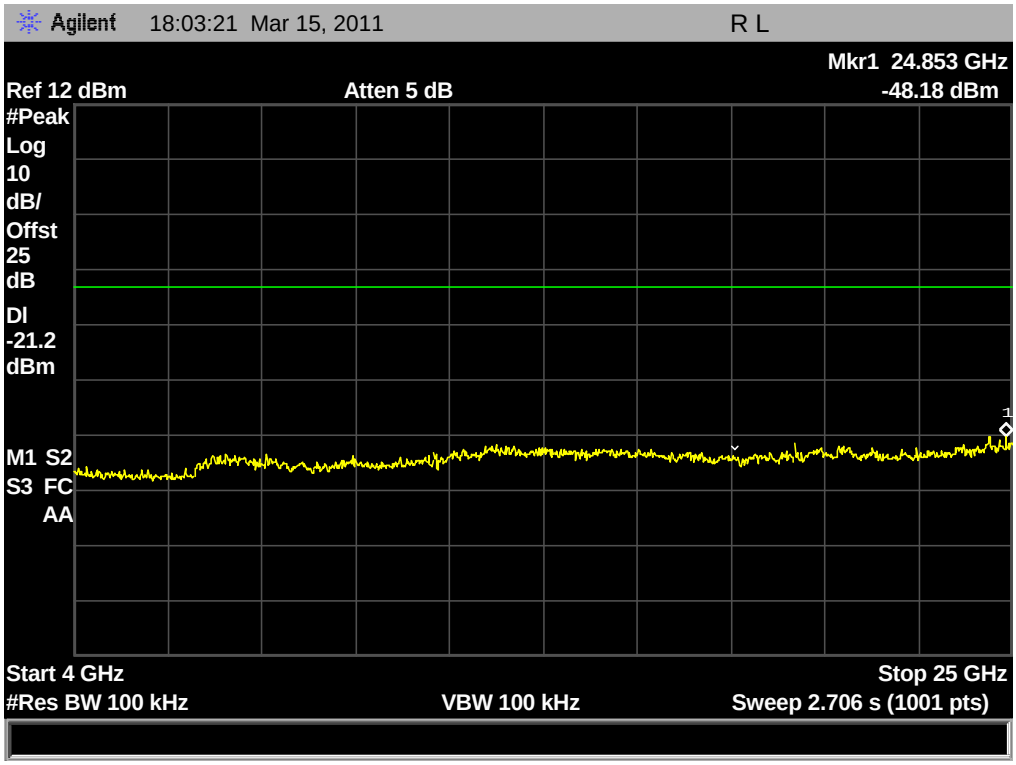
(Plot D.1: Channel = 0, 30MHz to 4GHz)



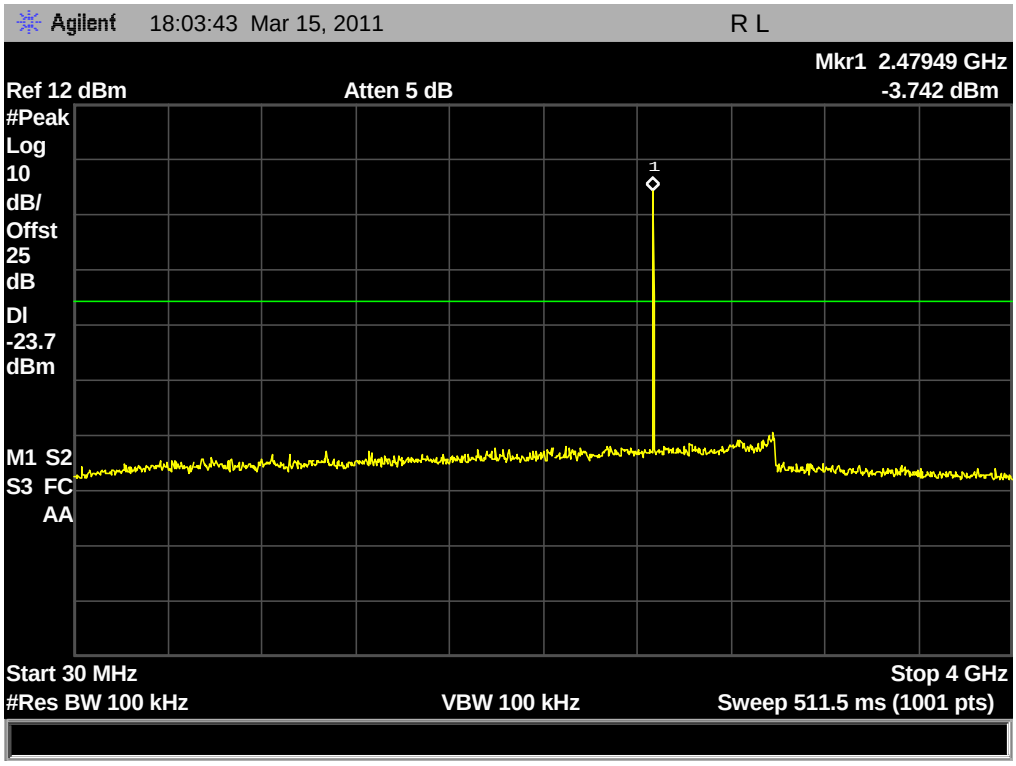
(Plot D.2: Channel = 0, 4GHz to 25GHz)



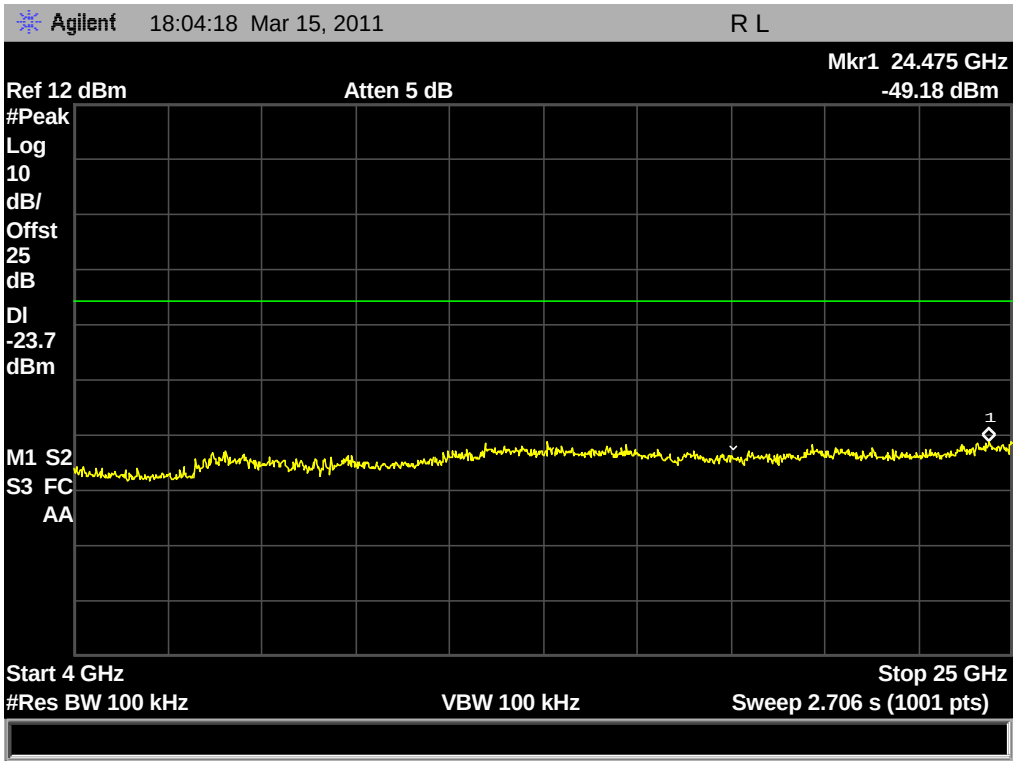
(Plot E.1: Channel = 39, 30MHz to 4GHz)



(Plot E.2: Channel = 39, 4GHz to 25GHz)



(Plot F.1: Channel = 78, 30MHz to 4GHz)



(Plot F.2: Channel = 78, 4GHz to 25GHz)

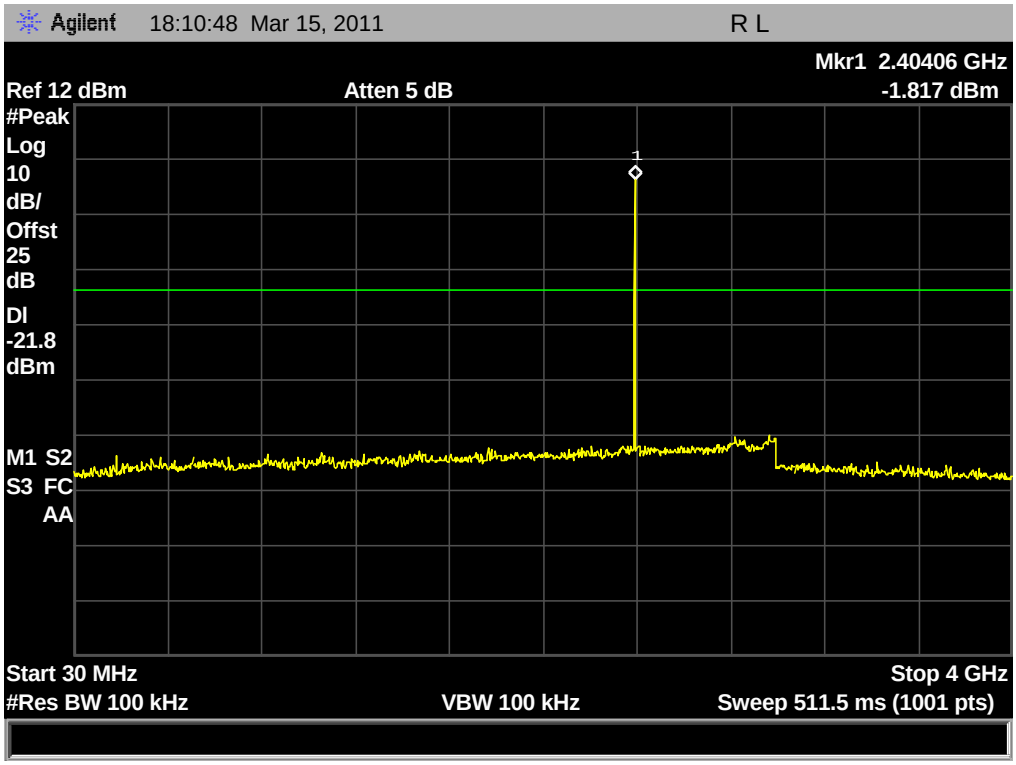
E. Test Verdict:

8-DPSK Mode

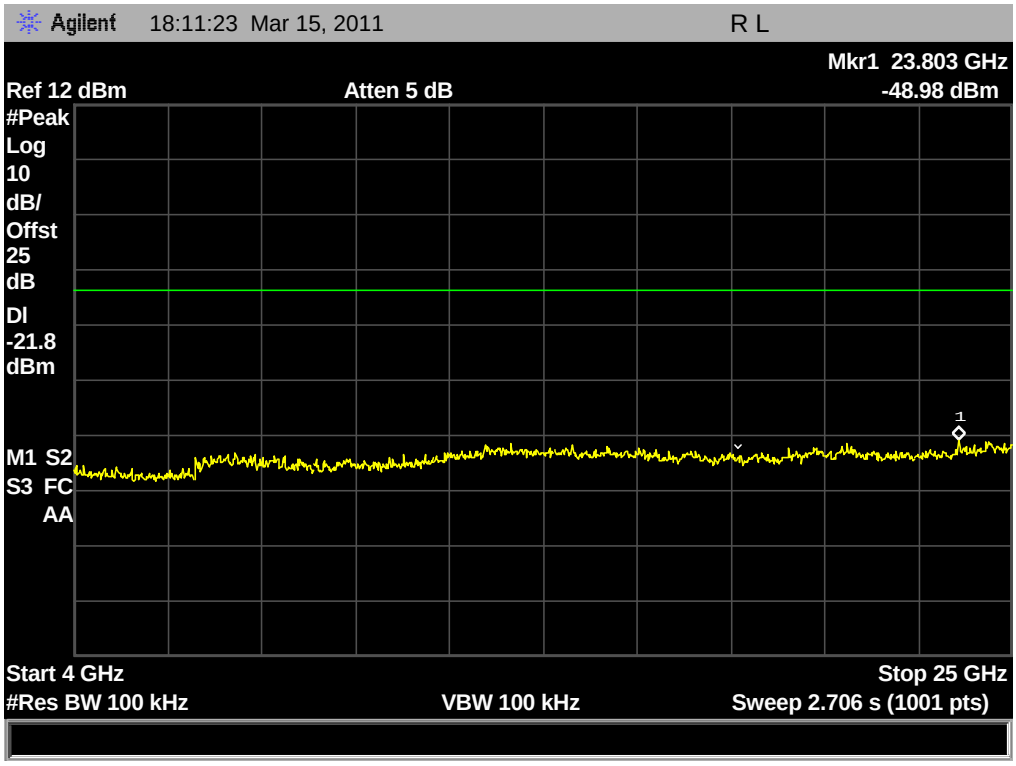
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-48.98	Plot G.1/G.2	-1.817	-21.8	PASS
39	2441	-48.75	Plot H.1/H.2	-2.575	-22.6	PASS
78	2480	-48.92	Plot I.1/I.2	-3.492	-23.5	PASS

F. Test Plot:

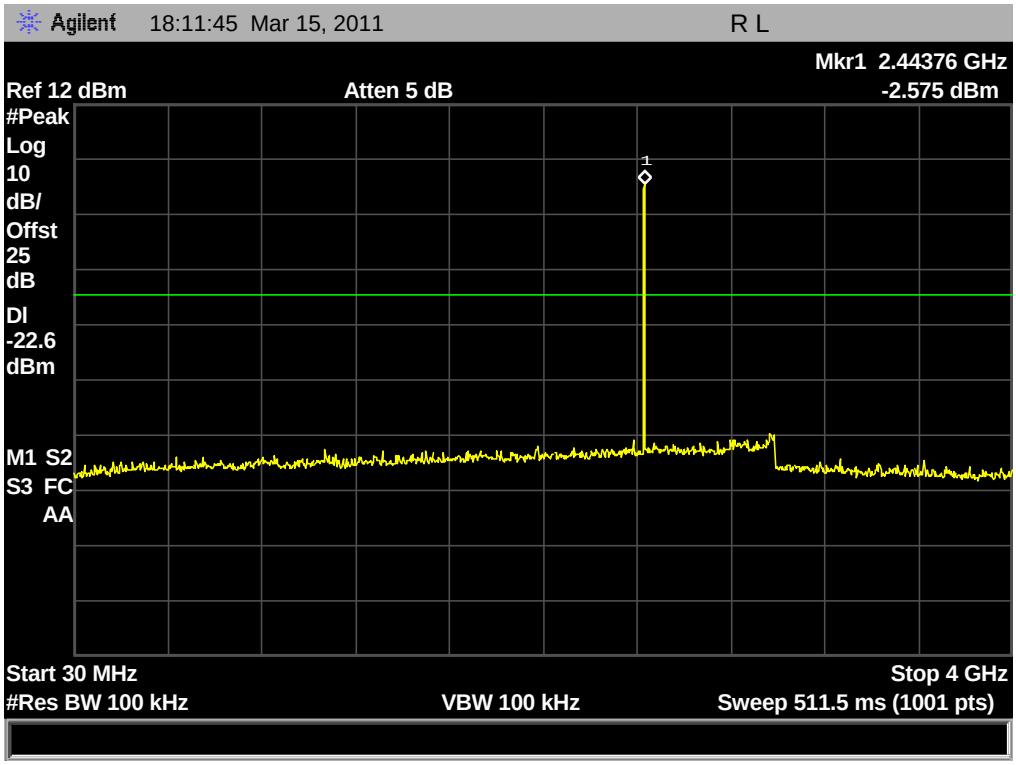
Note: the power of the Module transmitting frequency should be ignored.



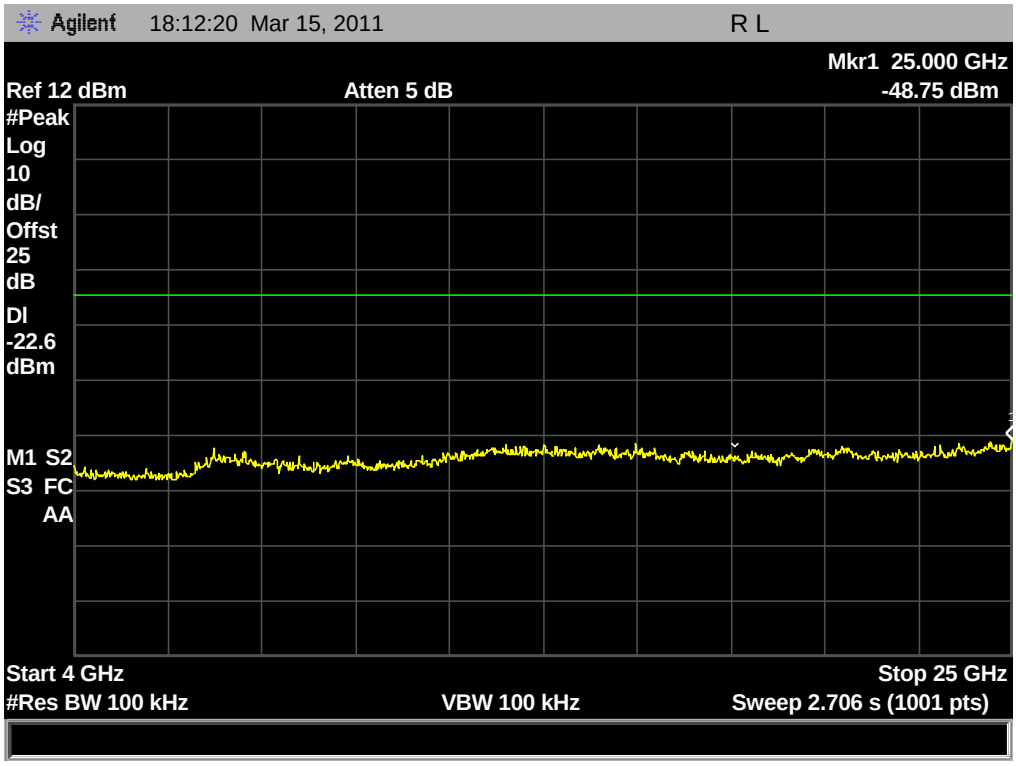
(Plot G.1: Channel = 0, 30MHz to 4GHz)



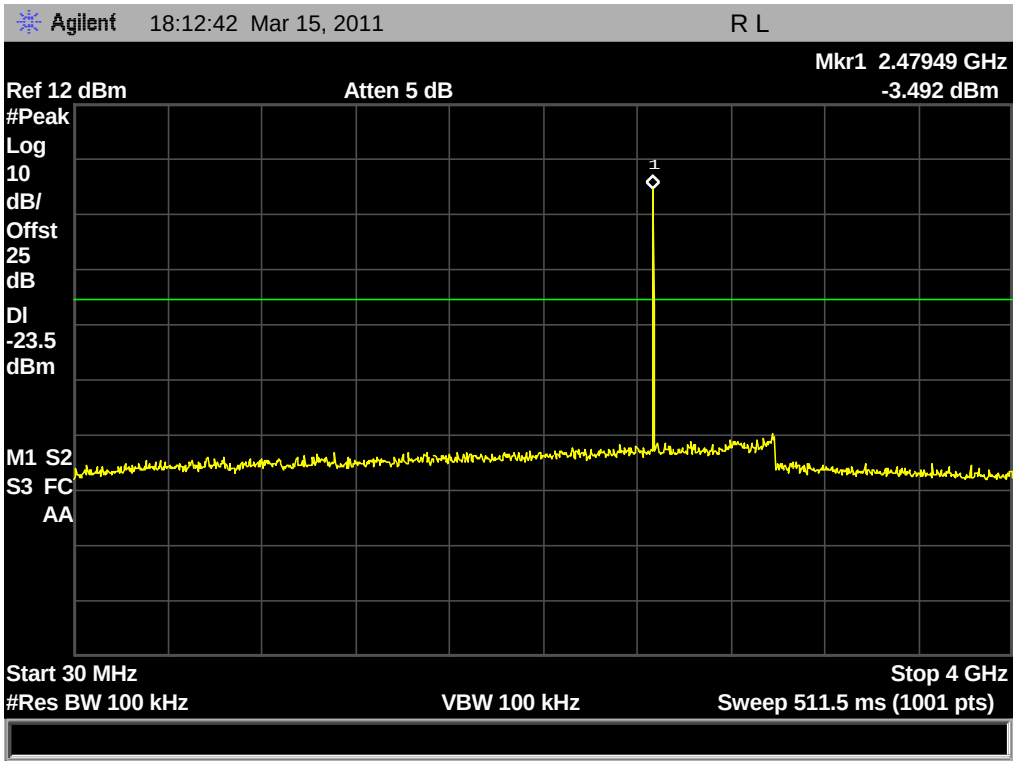
(Plot G.2: Channel = 0, 4GHz to 25GHz)



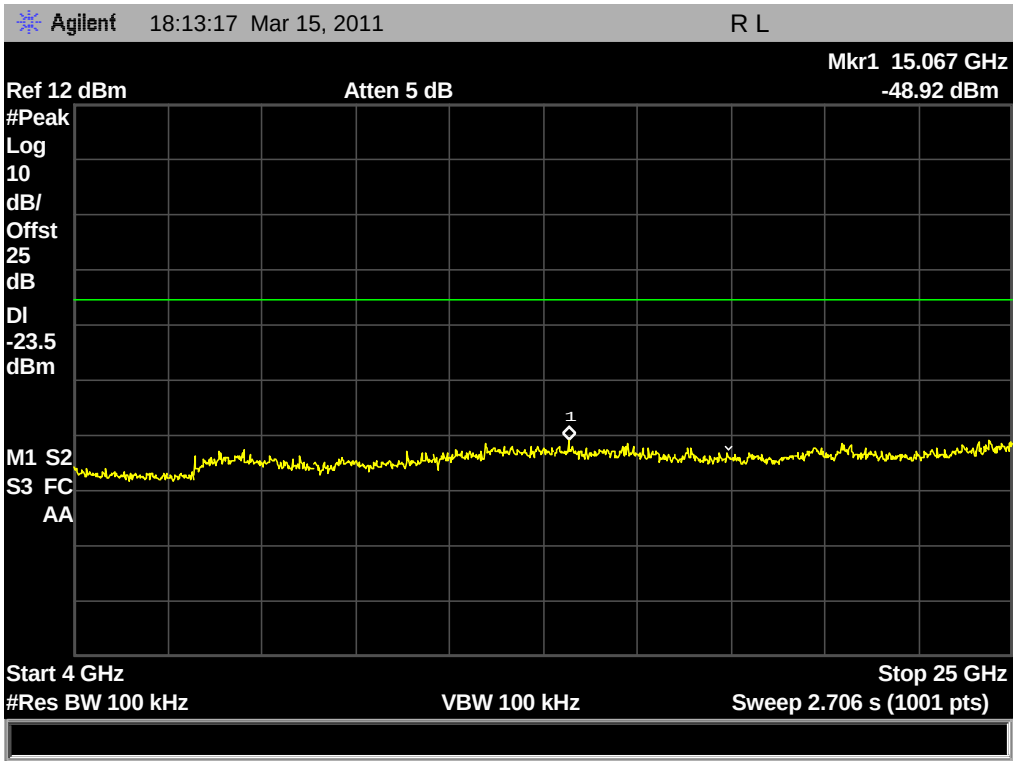
(Plot H.1: Channel = 39, 30MHz to 4GHz)



(Plot H.2: Channel = 39, 4GHz to 25GHz)



(Plot I.1: Channel = 78, 30MHz to 4GHz)



(Plot I.2: Channel = 78, 4GHz to 25GHz)

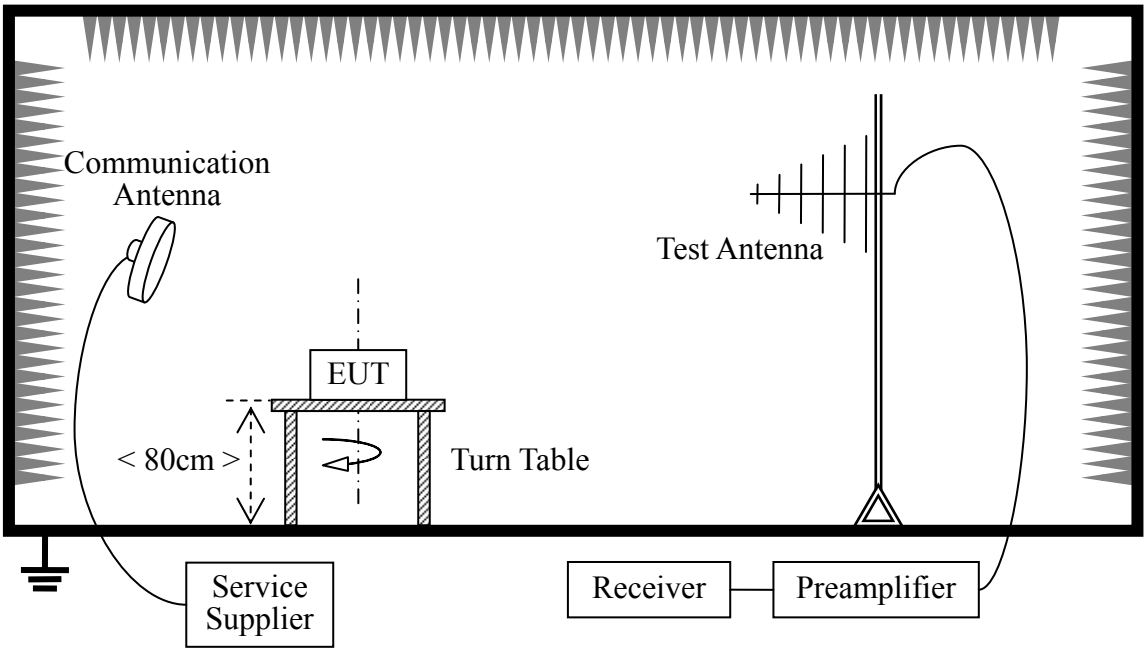
2.7 Band Edge

2.7.1 Requirement

According to FCC section 15.247(c), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.7.2 Test Description

A. Test Setup:



The Bluetooth Module of the EUT is powered by the Battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength..

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	R&S	CMU200	100448	2010.9
Receiver	Agilent	E7405A	US44210471	2010.9
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2010.9
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2010.9

2.7.3 Test Result

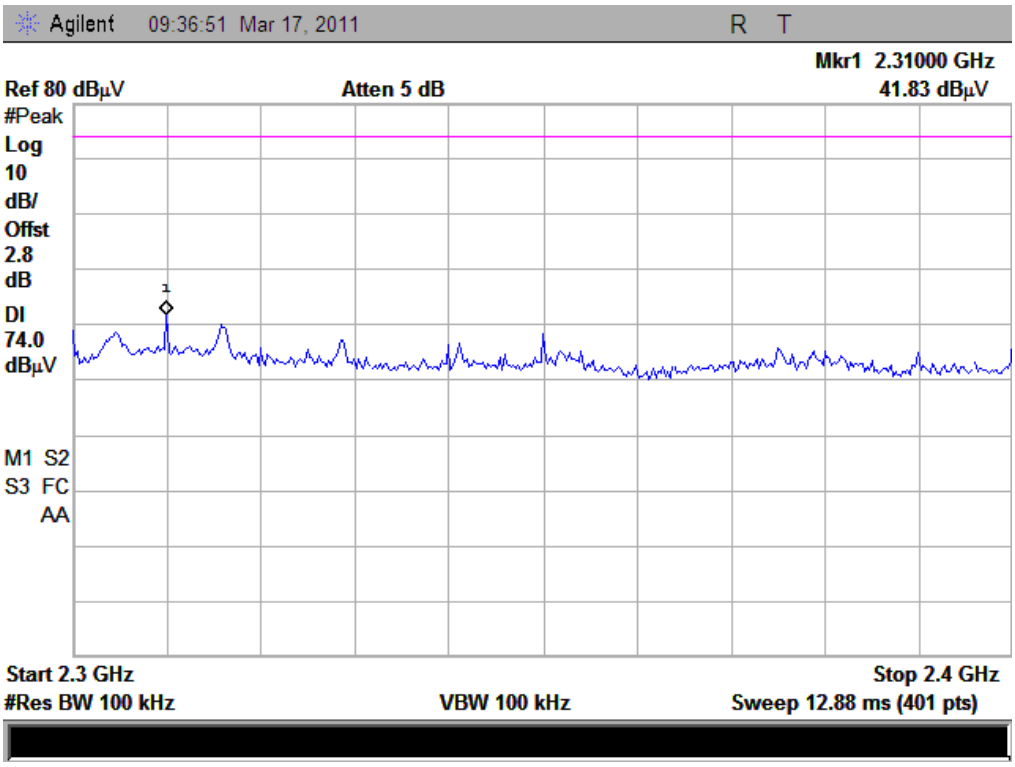
The Bluetooth Module operates at hopping-off test mode. The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

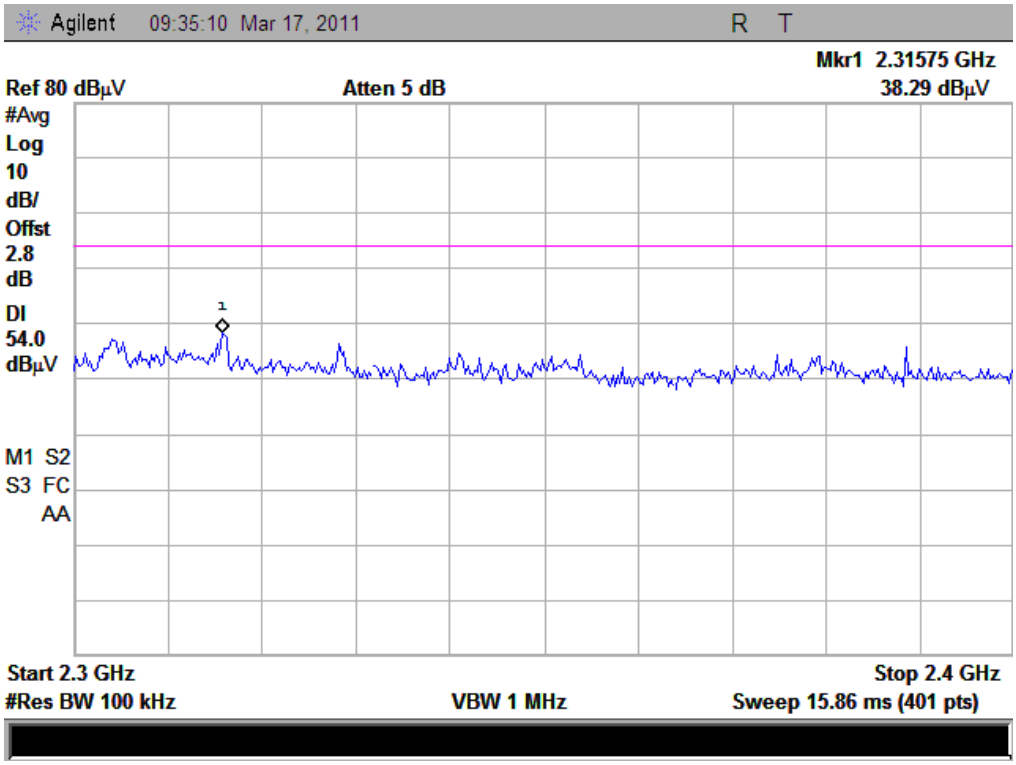
GFSK Mode

Channel	Frequency (MHz)	Max. Emission in the Restricted Bands (dBμV/m)		Limit (dBμV/m)		Verdict
		PK	AV	PK	AV	
0	2402	41.83	38.29	74	54	PASS
78	2480	34.43	33.97	74	54	PASS

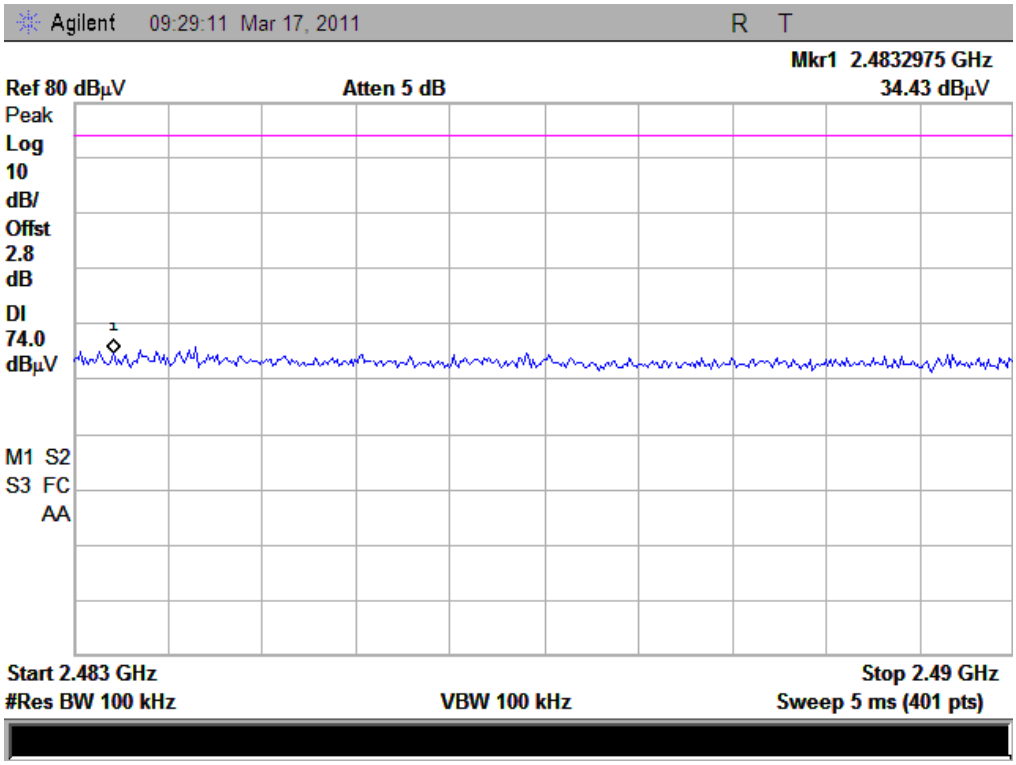
B. Test Plot:



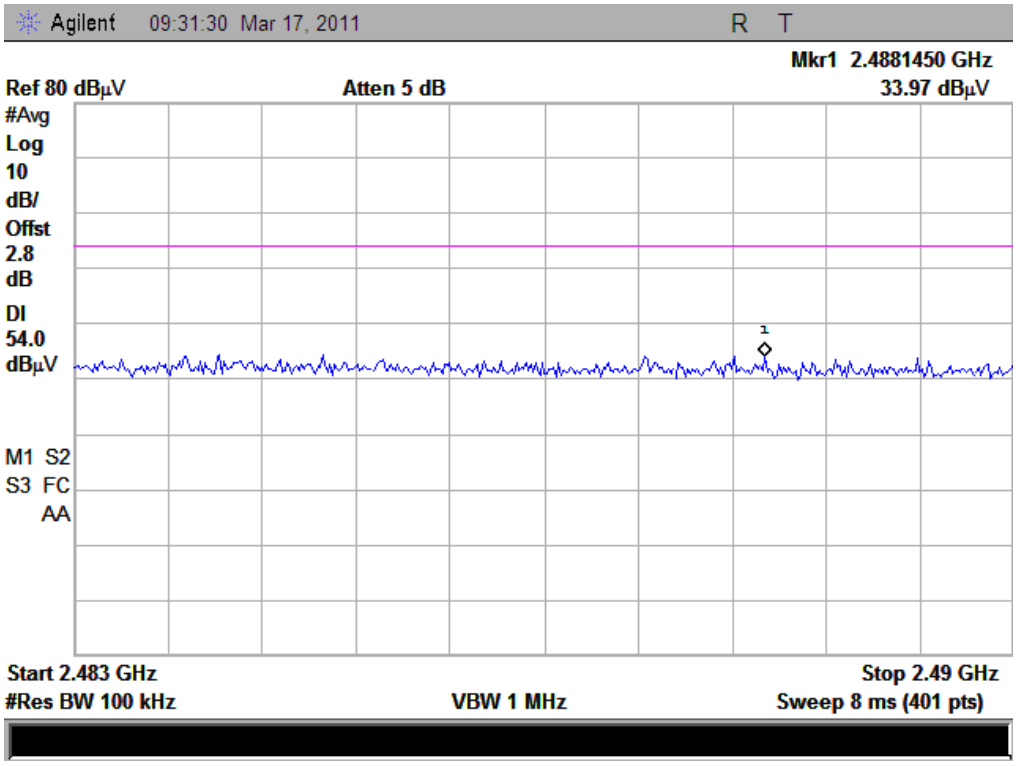
(Plot A1: Channel = 0 PEAK)



(Plot A2: Channel = 0 AVERAGE)



(Plot B1: Channel = 78 PEAK)



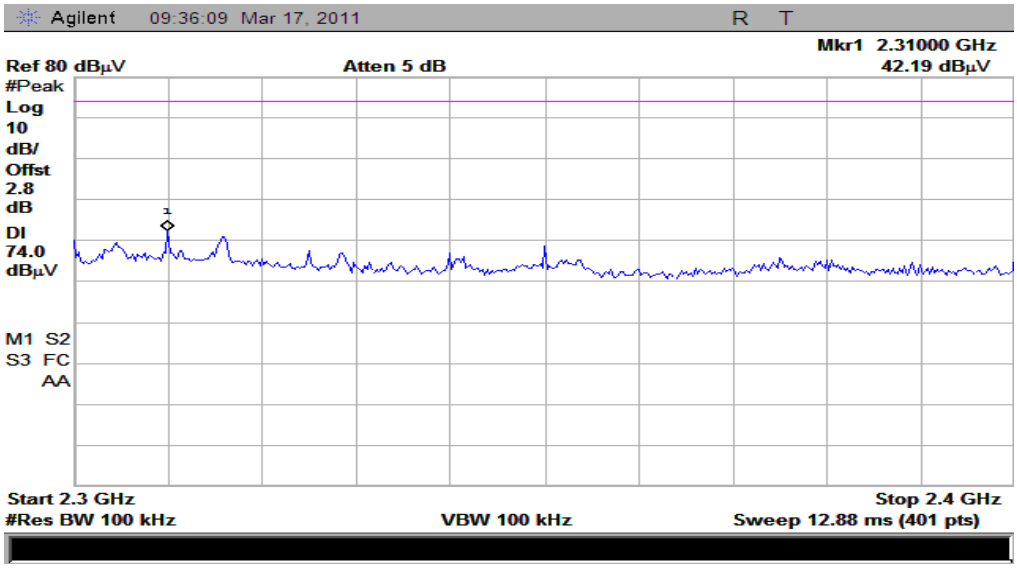
(Plot B2: Channel = 78 AVERAGE)

A. Test Verdict:

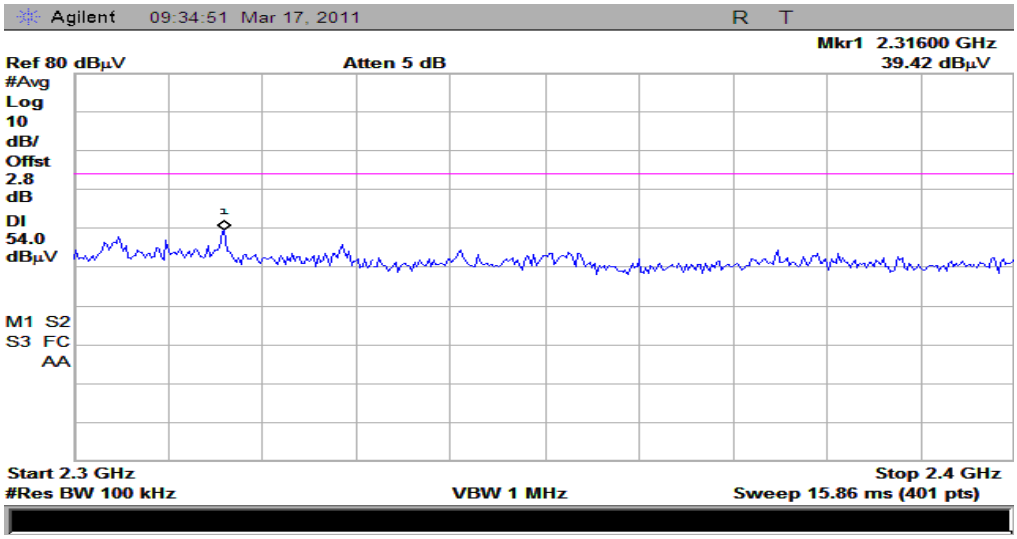
π/4-DQPSK Mode

Channel	Frequency (MHz)	Max. Emission in the Restricted Bands (dBμV/m)		Limit (dBμV/m)		Verdict
		PK	AV	PK	AV	
0	2402	42.19	39.42	74	54	PASS
78	2480	34.33	33.97	74	54	PASS

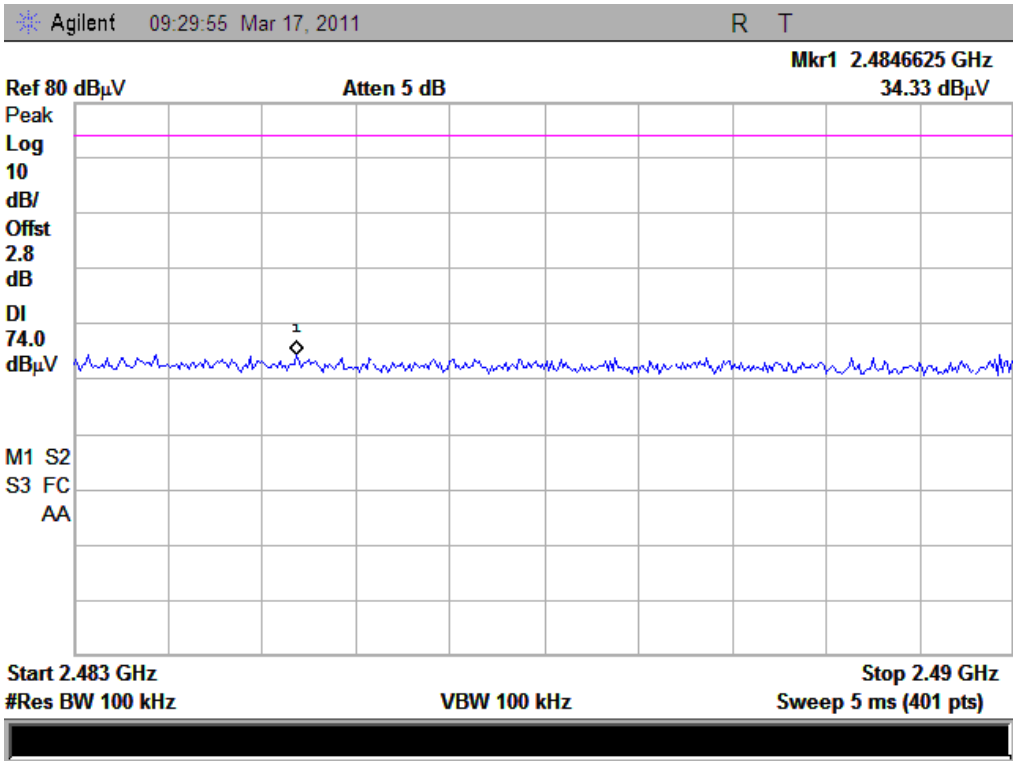
B. Test Plot:



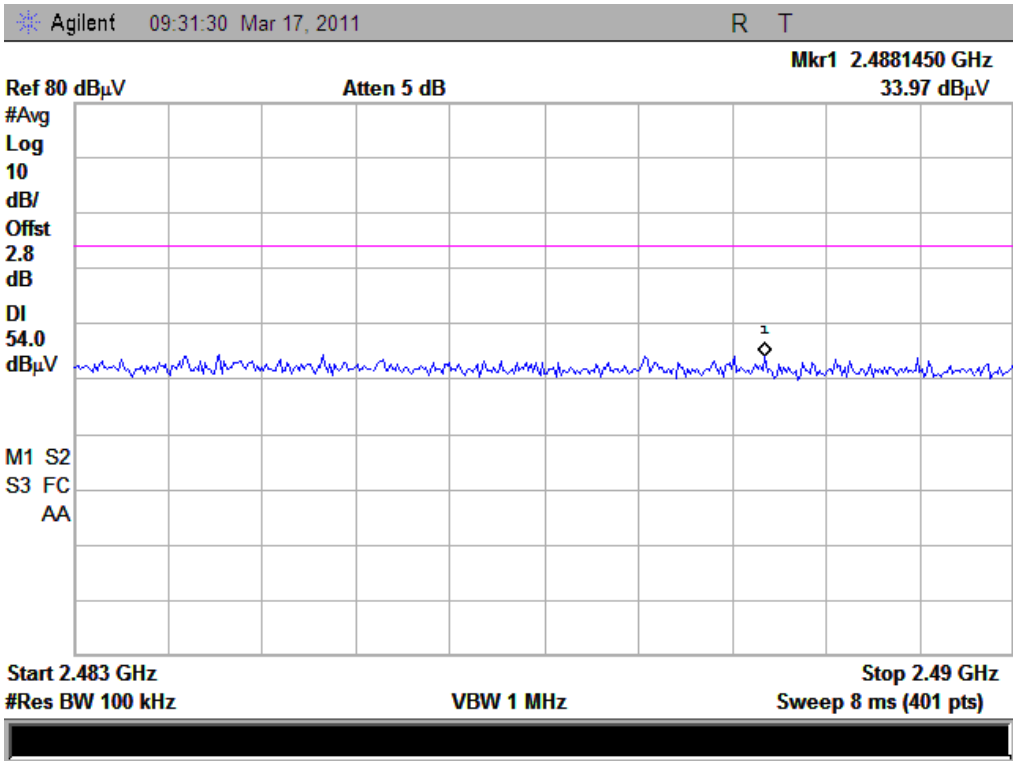
(Plot A1: Channel = 0 PEAK)



(Plot A2: Channel = 0 AVERAGE)



(Plot B1: Channel = 78 PEAK)



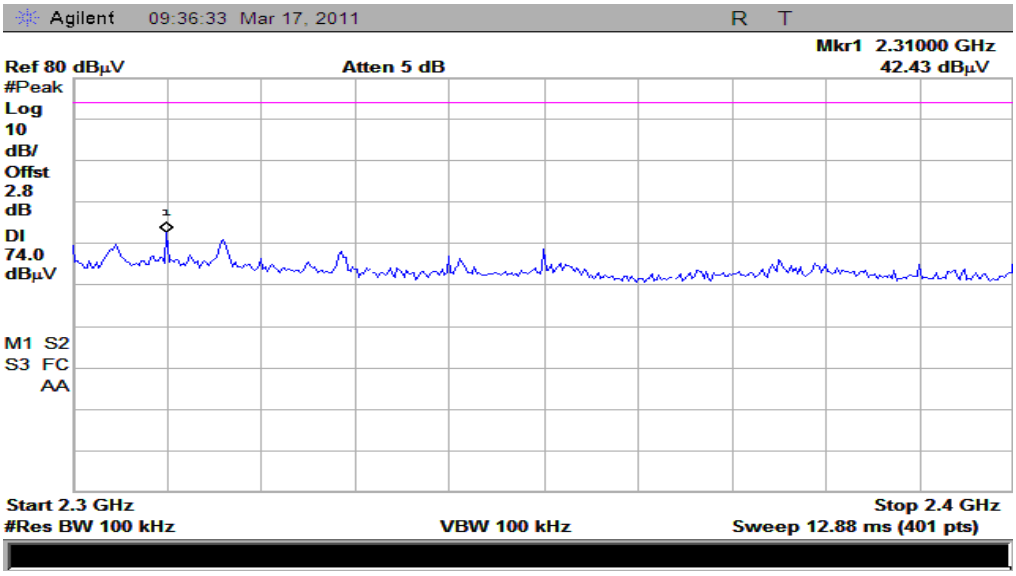
(Plot B2: Channel = 78 AVERAGE)

A. Test Verdict:

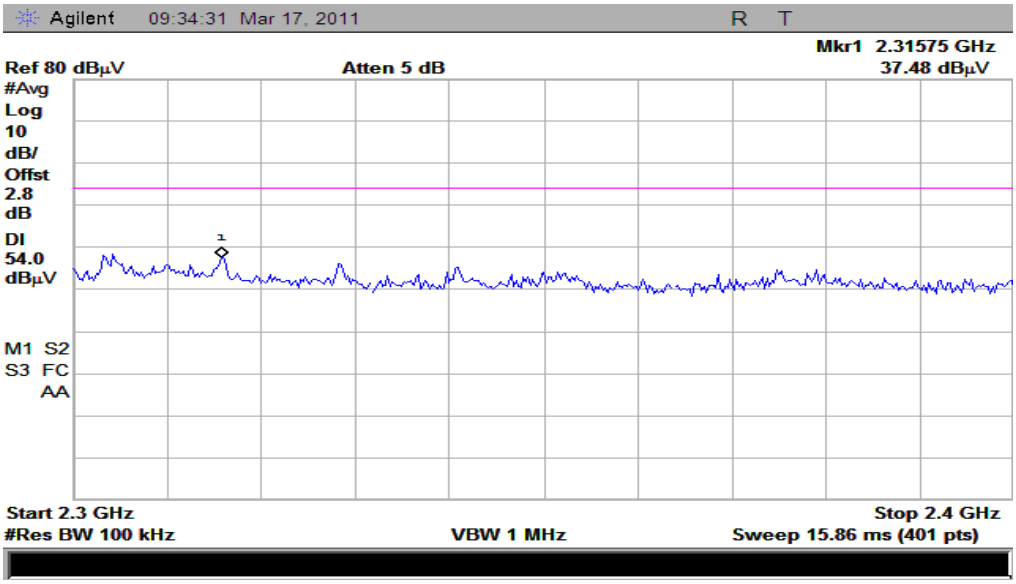
8-DPSK Mode

Channel	Frequency (MHz)	Max. Emission in the Restricted Bands (dBμV/m)		Limit (dBμV/m)		Verdict
		PK	AV	PK	AV	
0	2402	42.23	37.48	74	54	PASS
78	2480	34.86	32.87	74	54	PASS

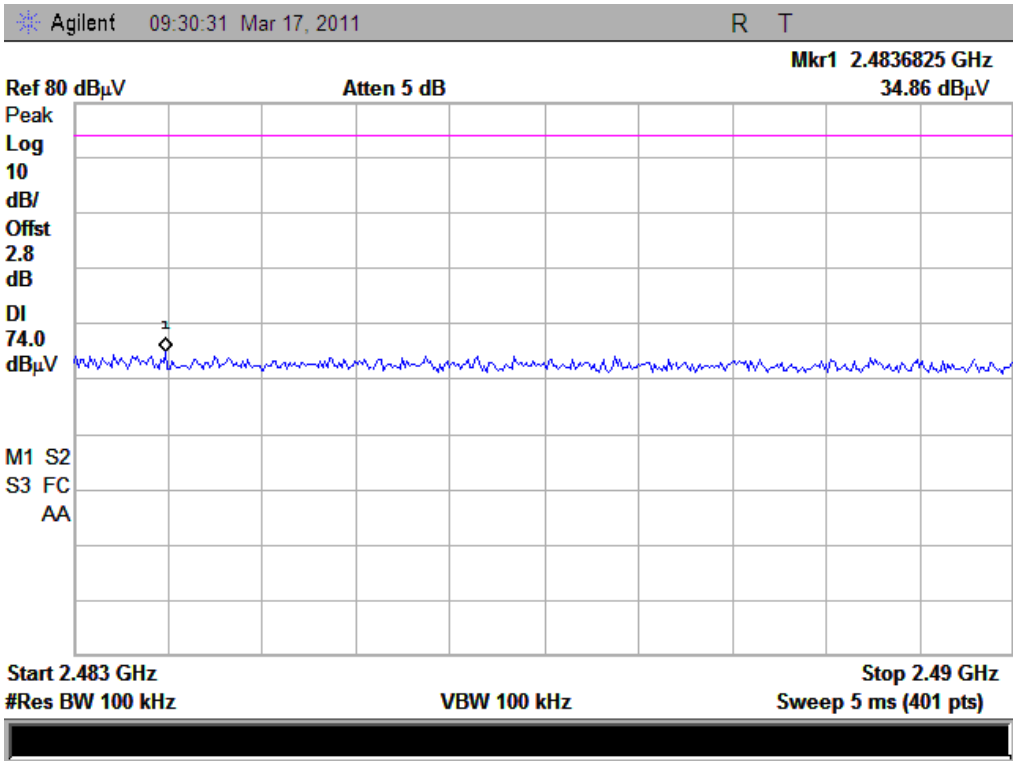
B. Test Plot:



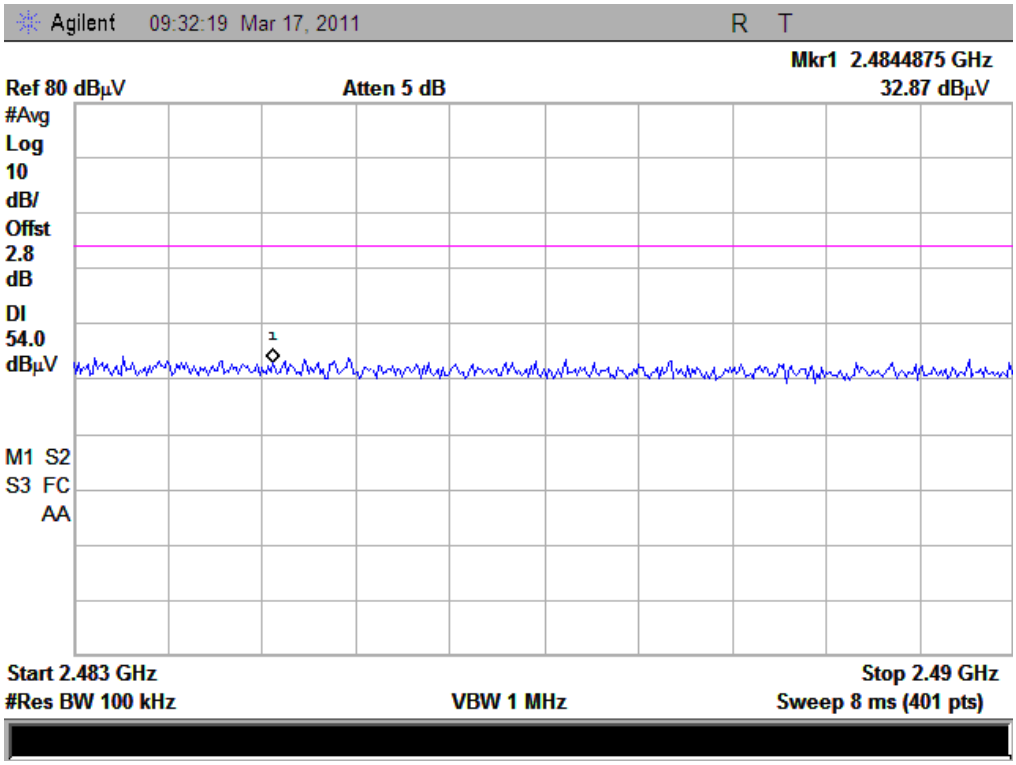
(Plot A1: Channel = 0 PEAK)



(Plot A2: Channel = 0 AVERAGE)



(Plot B1: Channel = 78 PEAK)



(Plot B2: Channel = 78 AVERAGE)

2.8 Conducted Emission

2.8.1 Requirement

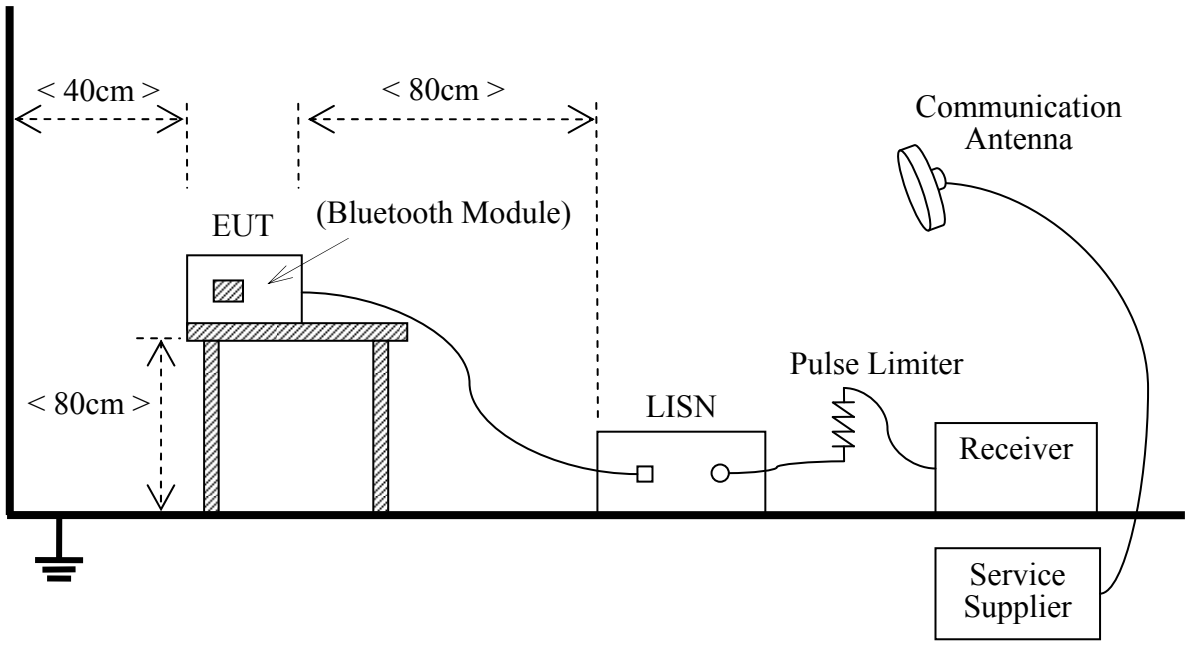
According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

NOTE:
(a) The lower limit shall apply at the band edges.
(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.8.2 Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2003

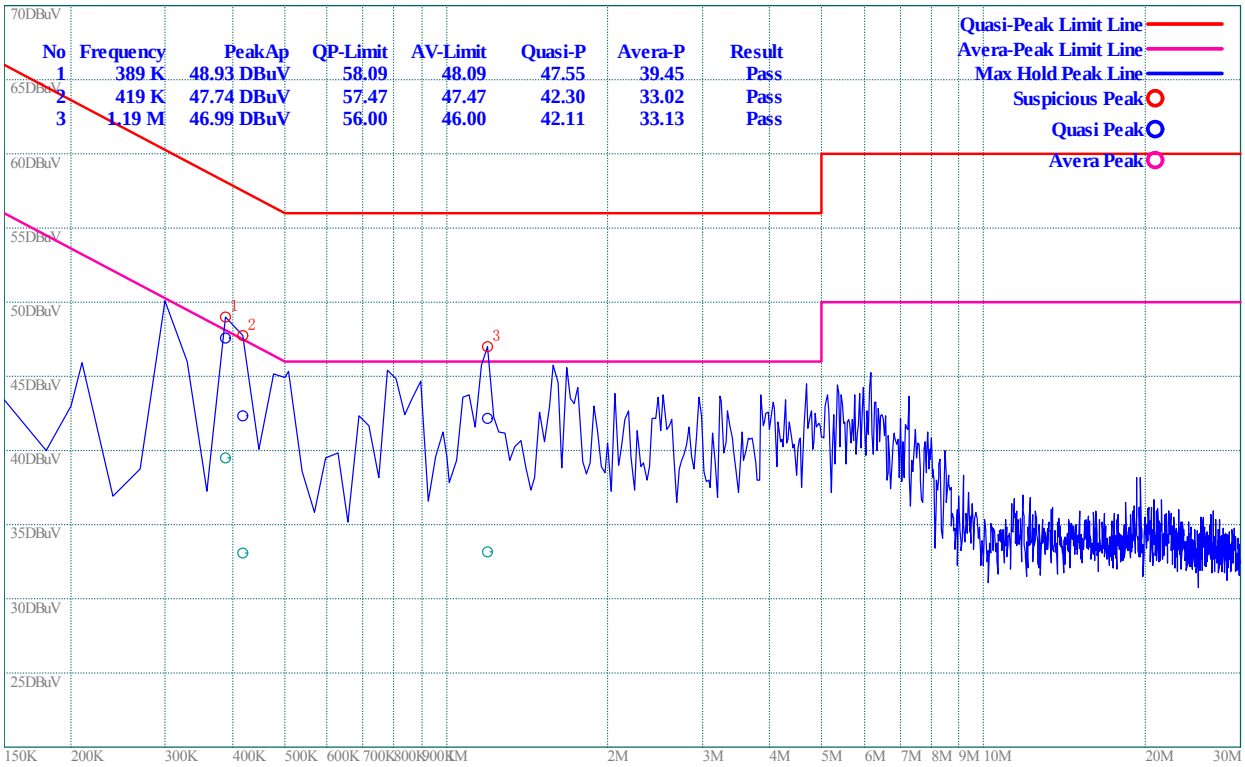
The Bluetooth Module of the EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

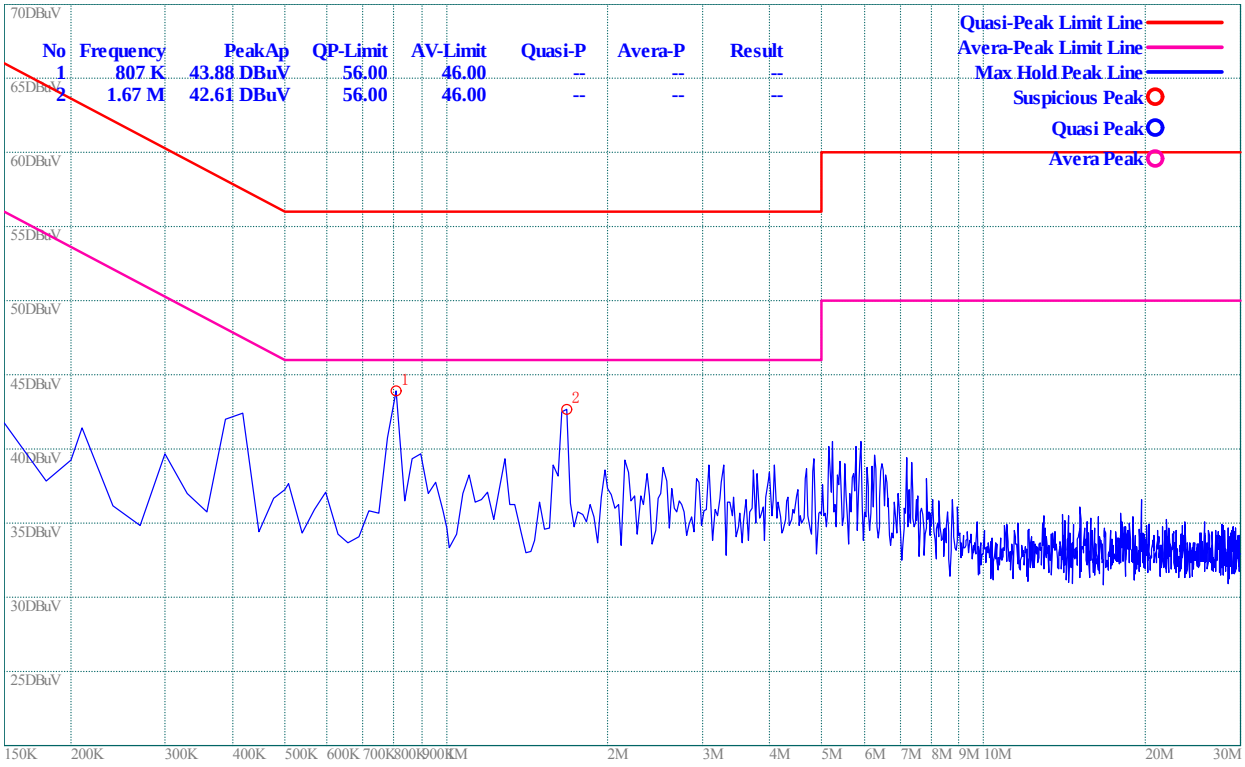
Description	Manufacturer	Model	Serial No.	Cal. Date
Receiver	Agilent	E7405A	US44210471	2010.09
LISN	Schwarzbeck	NSLK 8127	812744	2010.09
Service Supplier	R&S	CMU200	100448	2010.09
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)

2.8.3 Test Result

The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.



(Plot A: L Phase)



(Plot B: N Phase)

2.9 Radiated Emission

2.9.1 Requirement

According to FCC section 15.247(c) and RSS-A8.5, radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

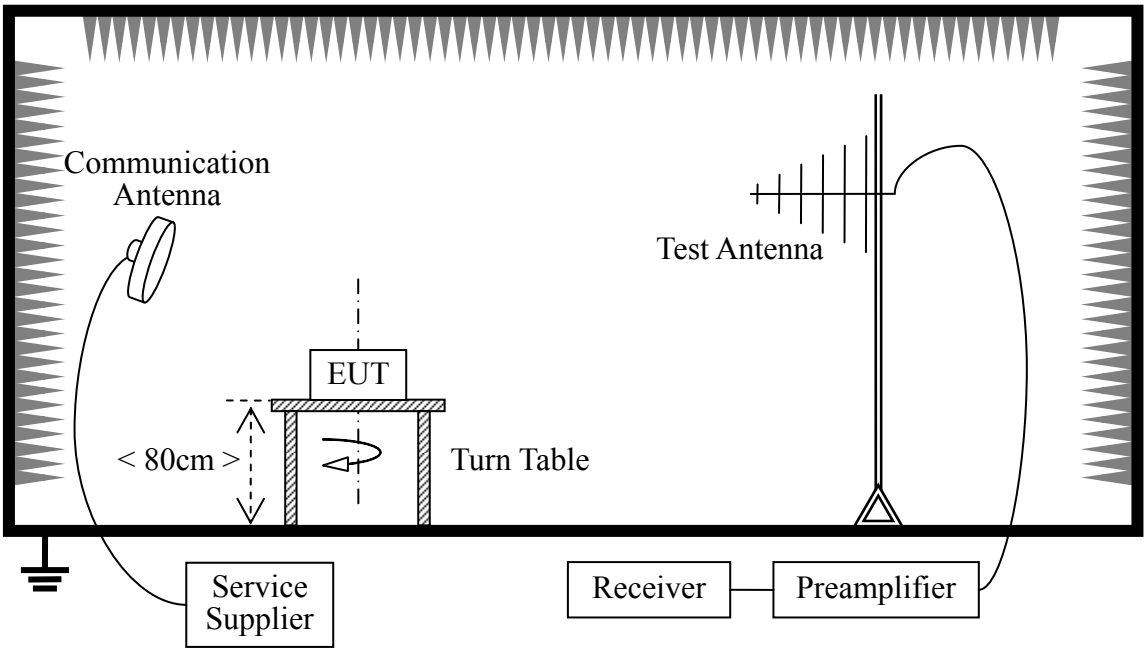
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Detector
30 - 88	100	3	QP
88 - 216	150	3	QP
216 - 960	200	3	QP
960 - 1000	500	3	QP
Above 1000	500	3	AV

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

2.9.2 Test Description

A. Test Setup:



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The Bluetooth Module of the EUT is powered by the Battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

For the Test Antenna: In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0^{o} to 360^{o}, the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in 3 orthogonal positions as recommended in ANSI C63.4 for Radiated Emissions and the worst-case data was presented.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	R&S	CMU200	100448	2010.9
Receiver	Agilent	E7405A	US44210471	2010.9
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2010.9
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2010.9
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2010.9
Test Antenna - circular	R&S	AC004R1	0749.3000.03	2010.9

2.9.3 Test Result

GFSK Mode:

C. Test Verdict for Harmonics:

The Fundamental Emissions

The field strength of {Fundamental Emission} listed below is recorded, and used in the next table.

Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
0	2402	--	--	Horizontal	Plot A.1
		--	--	Vertical	Plot A.2
39	2441	--	--	Horizontal	Plot B.1
		--	--	Vertical	Plot B.2
78	2480	--	--	Horizontal	Plot C.1

Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
		89.97	83.74	Vertical	Plot C.2

The un-wanted Emissions:

Test result of channel: 0 (2402MHz)

Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
240.5 M	28.79	46	-17.21	100	77	Horizontel
448.1 M	27.82	46	-18.18	100	55	Horizontel
1603 M	40.04	54	-13.96	100	74	Horizontel
2500 M	48.59	54	-5.41	100	340	Horizontel
3715 M	46.92	54	-7.08	100	292	Horizontel
7990 M	44.91	54	-9.09	100	360	Horizontel
66.9 M	29.78	40	-10.22	100	2	Vertical
240.5 M	28.05	46	-17.95	100	35	Vertical
960.2 M	36	54	-18	100	0	Vertical
1603 M	38.57	54	-15.43	100	116	Vertical
2928 M	48.1	54	-5.9	100	316	Vertical
8125 M	44.05	54	-9.95	100	360	Vertical

Test result of channel: 39 (2442MHz)

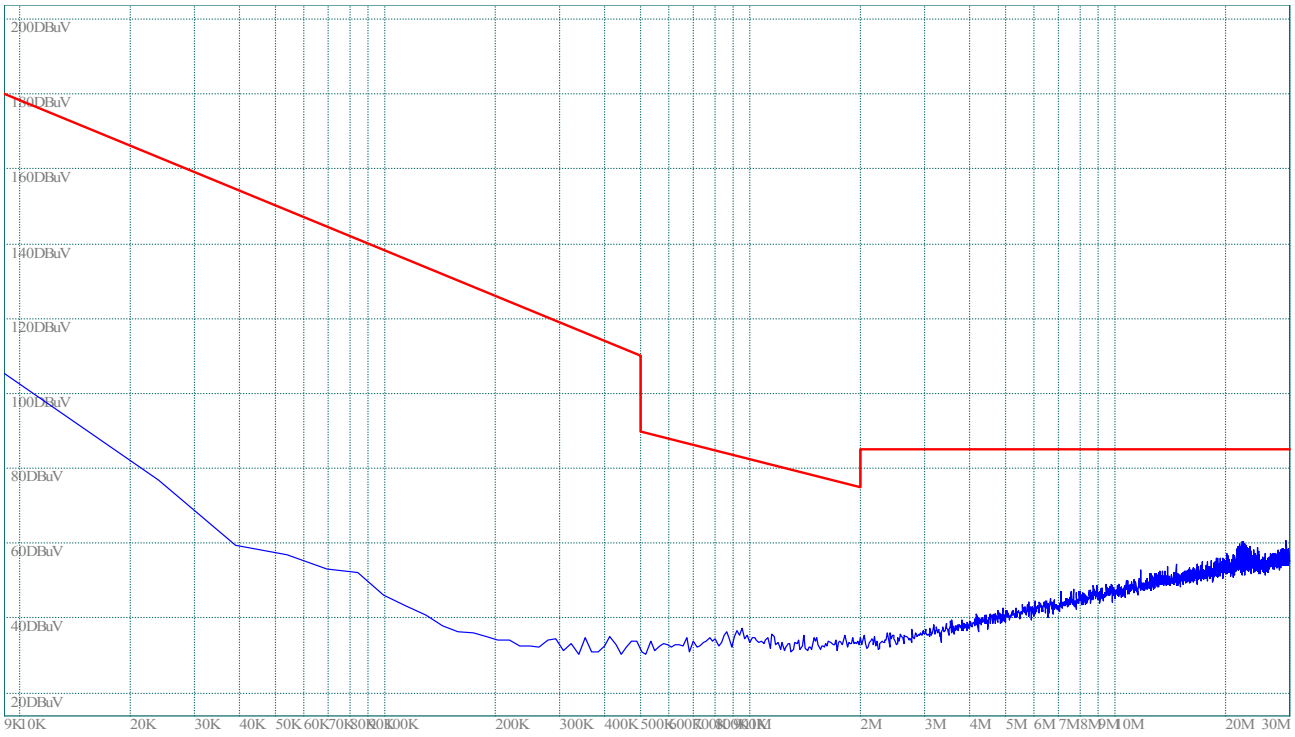
Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
66.9 M	24.23	40	-15.77	100	57	Horizontel
240.5 M	27.9	46	-18.1	100	18	Horizontel
379.2 M	31.62	46	-14.38	100	2	Horizontel
720.6 M	29.92	46	-16.08	100	40	Horizontel
2793 M	48.97	54	-5.03	100	70	Horizontel
6572 M	44.7	54	-9.3	100	0	Horizontel
66.9 M	29.41	40	-10.59	100	2	Vertical
240.5 M	27.53	46	-18.47	100	10	Vertical
960.2 M	35.1	54	-18.9	100	21	Vertical
1627 M	37.82	54	-16.18	100	22	Vertical
2590 M	48.72	54	-5.28	100	44	Vertical
7945 M	44.81	54	-9.19	100	19	Vertical

Test result of channel: 78 (2480MHz)

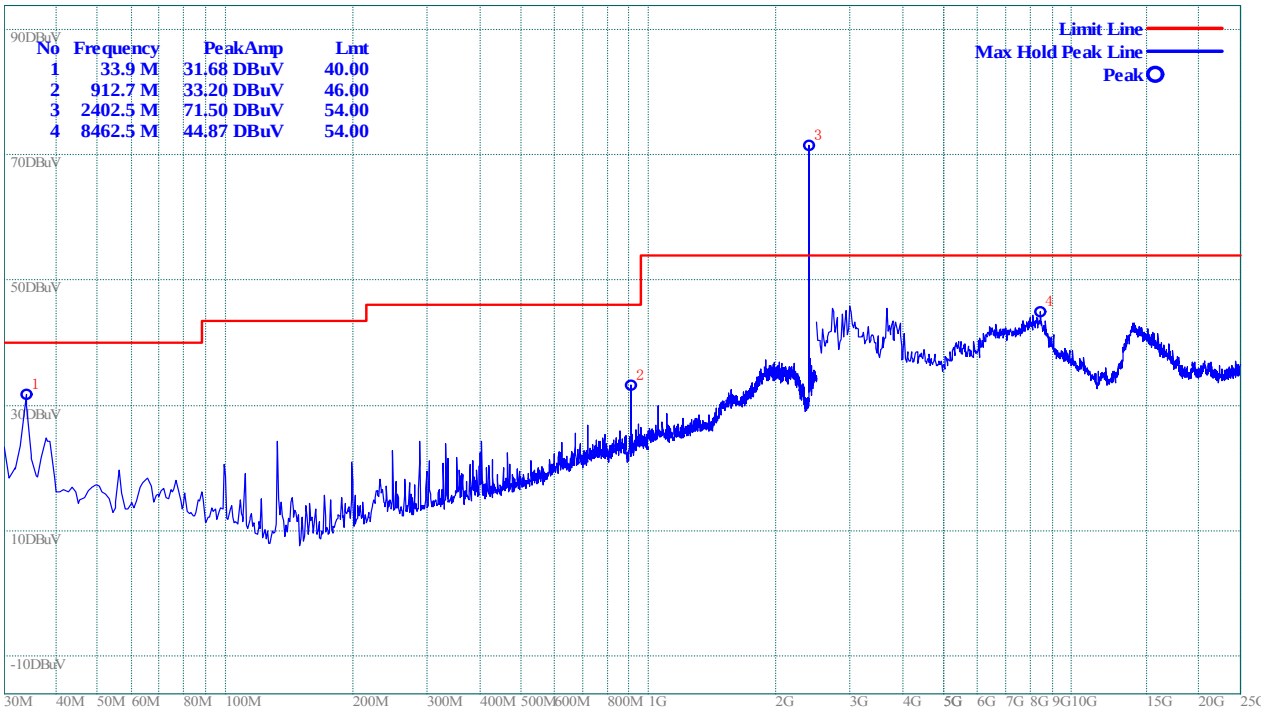
Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
36.8 M	25.22	40	-14.78	100	308	Horizontel
240.5 M	30.37	46	-15.63	100	268	Horizontel
598.4 M	36.58	46	-9.42	100	207	Horizontel
2793 M	46.13	54	-7.87	100	315	Horizontel
8777 M	44.24	54	-9.76	100	315	Horizontel
36.8 M	25.44	40	-14.56	100	11	Vertical
66.9 M	30.9	40	-9.1	100	0	Vertical
240.5 M	27.12	46	-18.88	100	0	Vertical
960.2 M	35.09	54	-18.91	100	2	Vertical
2928 M	45.6	54	-8.4	100	19	Vertical
8035 M	44.05	54	-9.95	94	94	Vertical

D. Test Plots for the Whole Measurement Frequency Range:

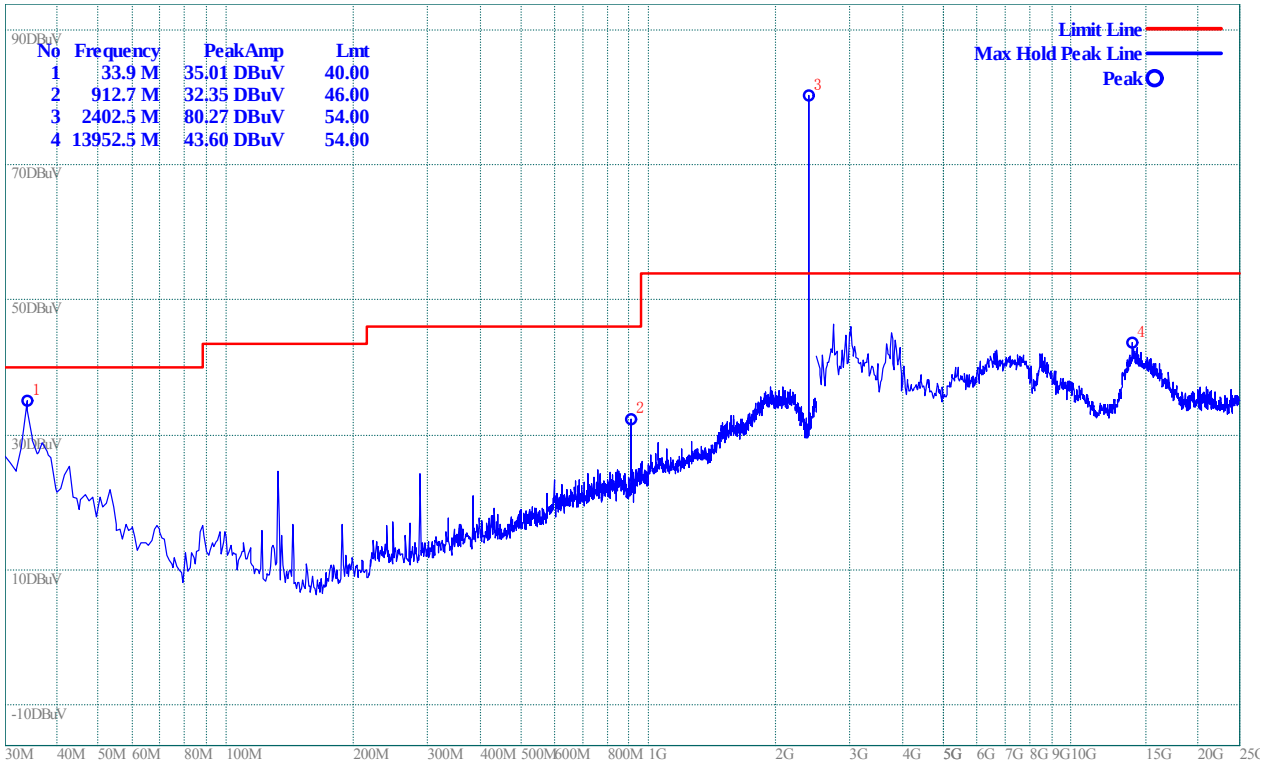
Plots for Channel = 0



(Plot A.0: 9kHz to 30MHz)

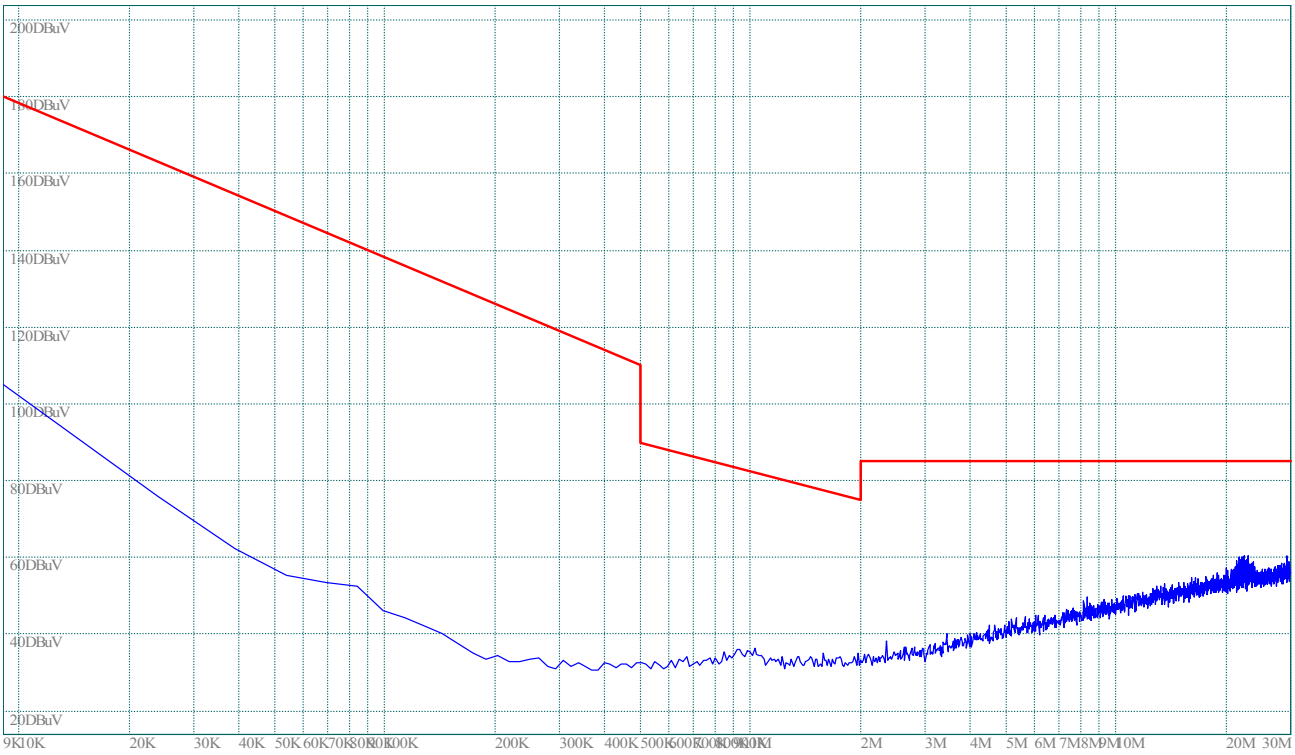


(Plot A.1: Antenna Horizonta)

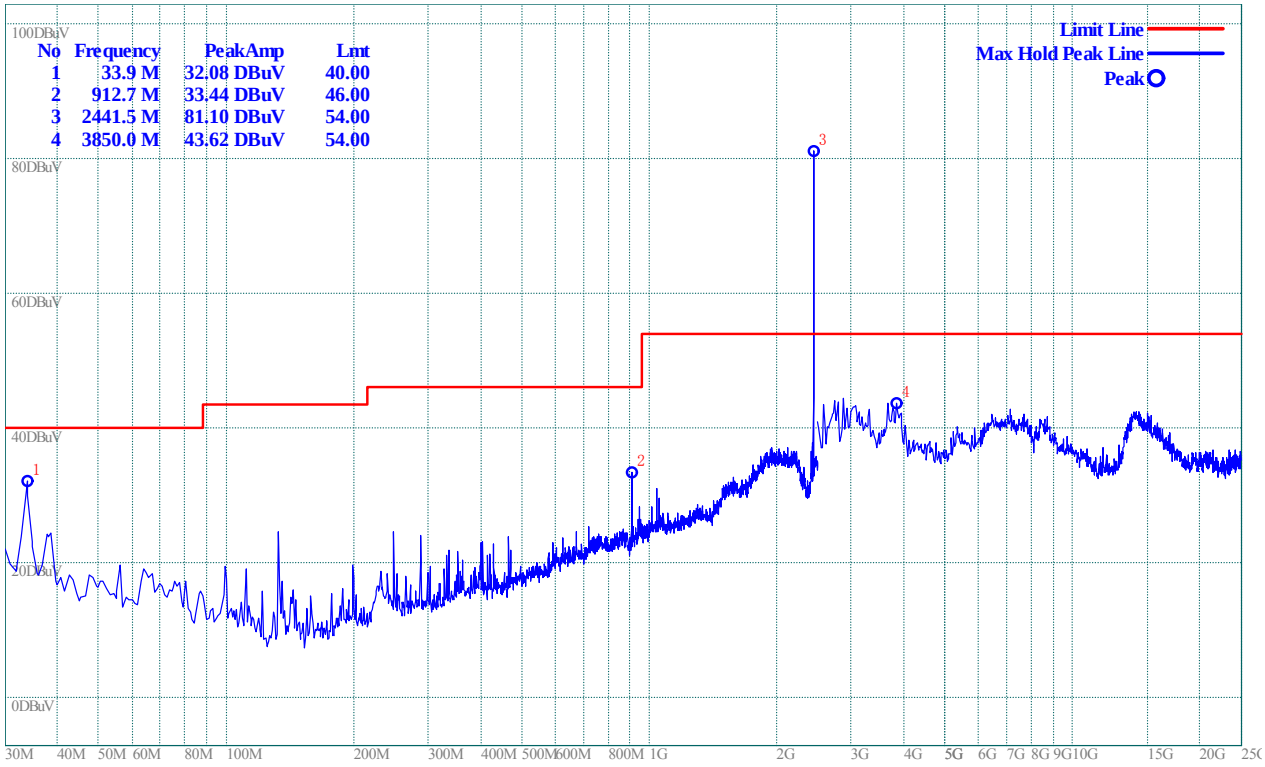


(Plot A.2: Antenna Vertical)

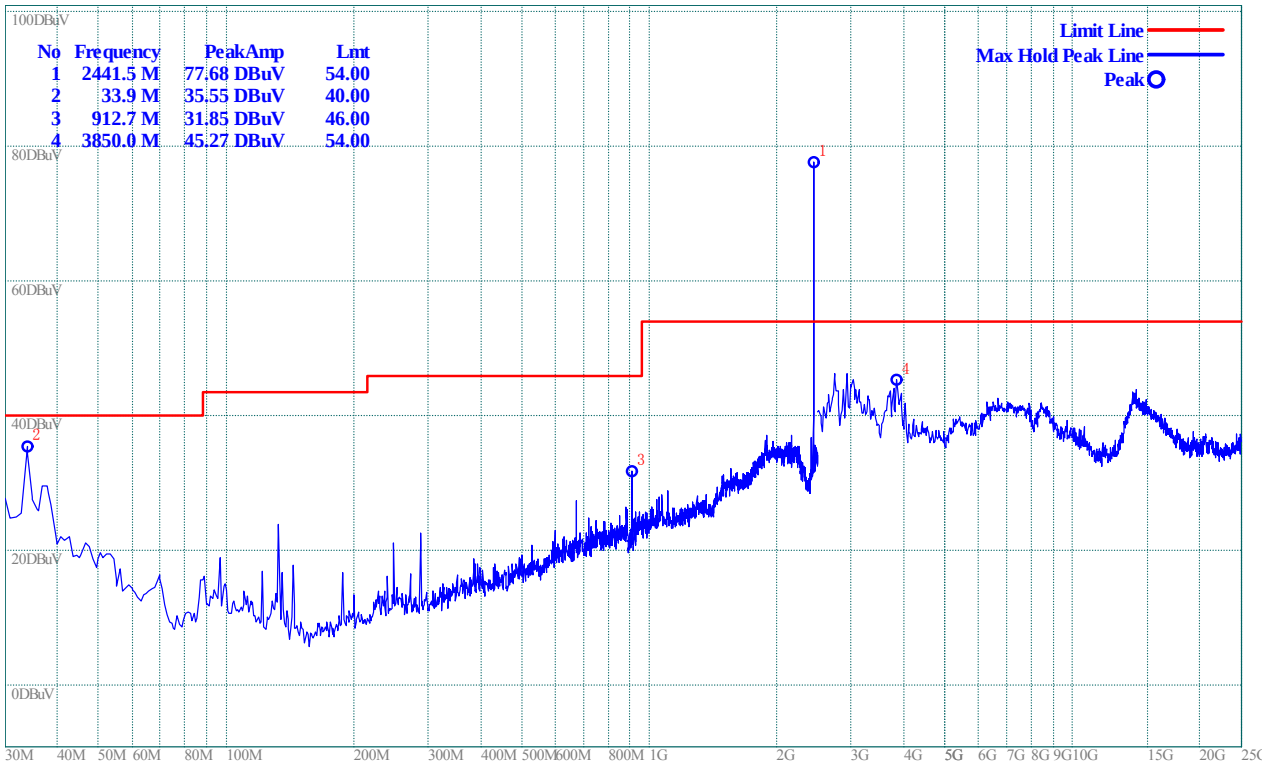
Plot for Channel = 39



(Plot B.0: 9kHz to 30MHz)

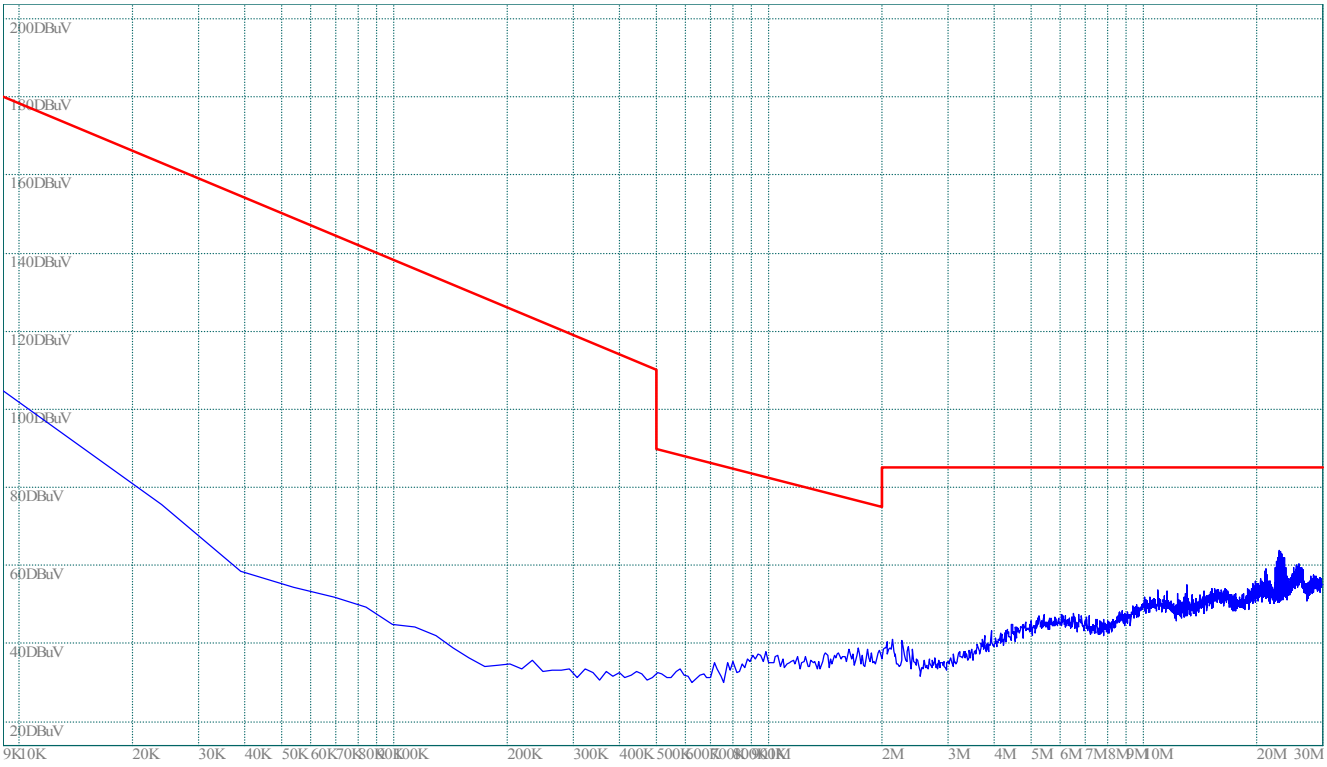


(Plot B.1: Antenna Horizontal)

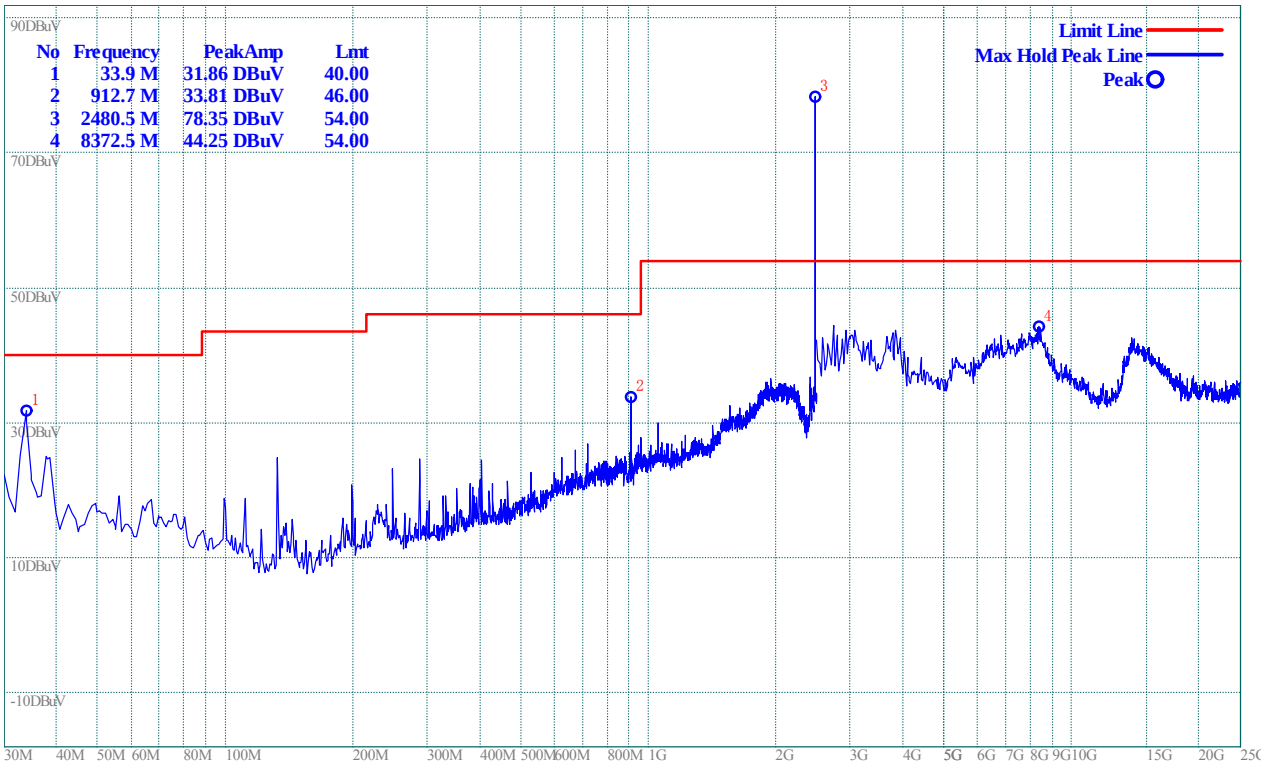


(Plot B.2: Antenna Vertical)

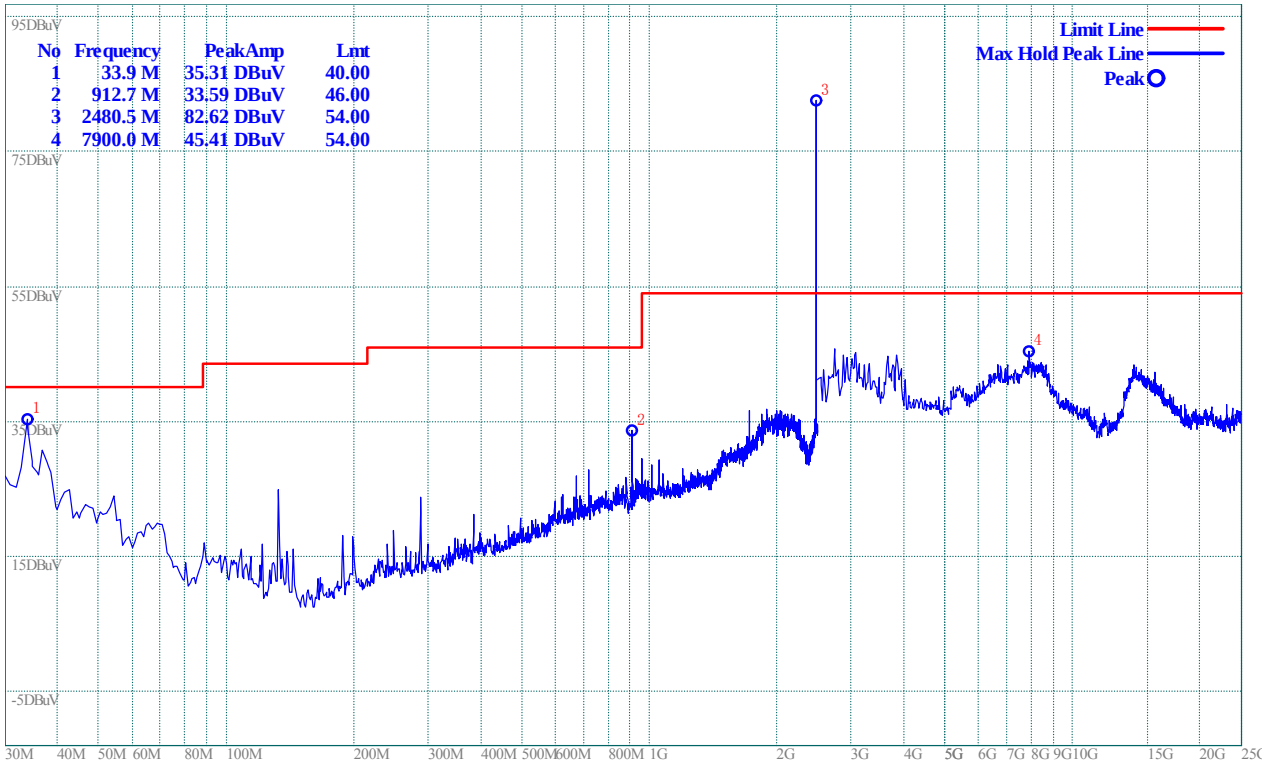
Plot for Channel = 78



(Plot C.0: 9kHz to 30MHz)



(Plot C.1: Antenna Horizontal)



(Plot C.2: Antenna Vertical)

π/4-DQPSK Mode:

A. Test Verdict for Harmonics:

The Fundamental Emissions

The field strength of {Fundamental Emission} listed below is recorded, and used in the next table.

Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
0	2402	--	--	Horizontal	Plot A.1
		--	--	Vertical	Plot A.2
39	2441	--	--	Horizontal	Plot B.1
		--	--	Vertical	Plot B.2
78	2480	--	--	Horizontal	Plot C.1
		--	--	Vertical	Plot C.2

The un-wanted Emissions:

Test result of channel: 0 (2402MHz)

Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
208.5 M	31.6	43.5	-11.9	100	206	Horizontel
912.7 M	34.94	46	-11.06	100	94	Horizontel
52.3 M	32.11	40	-7.89	100	73	Vertical
912.7 M	33.93	46	-12.07	100	359	Vertical

Test result of channel: 39 (2442MHz)

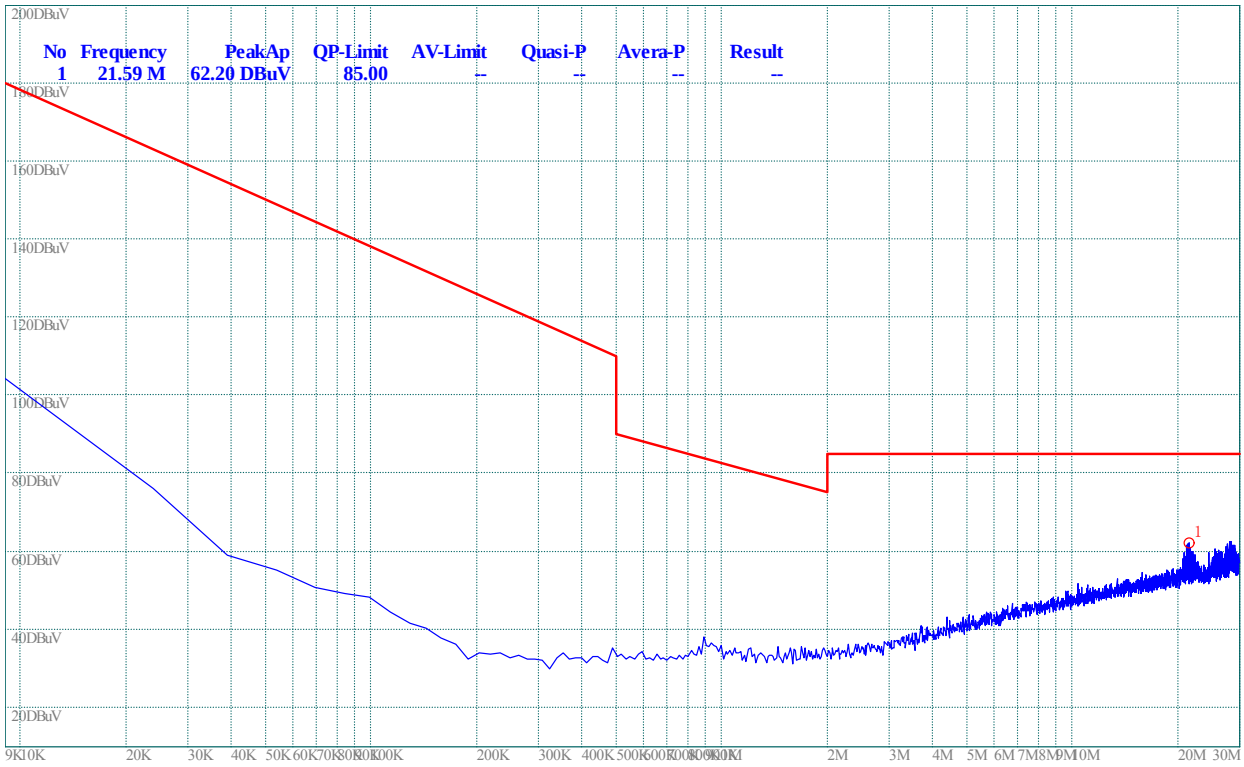
Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
208.5 M	24.5	43.5	-19	100	0	Horizontel
912.7 M	32.49	46	-13.51	100	34	Horizontel
208.5 M	23.41	43.5	-20.09	100	111	Vertical
912.7 M	32.97	46	-13.03	100	325	Vertical

Test result of channel: 78 (2480MHz)

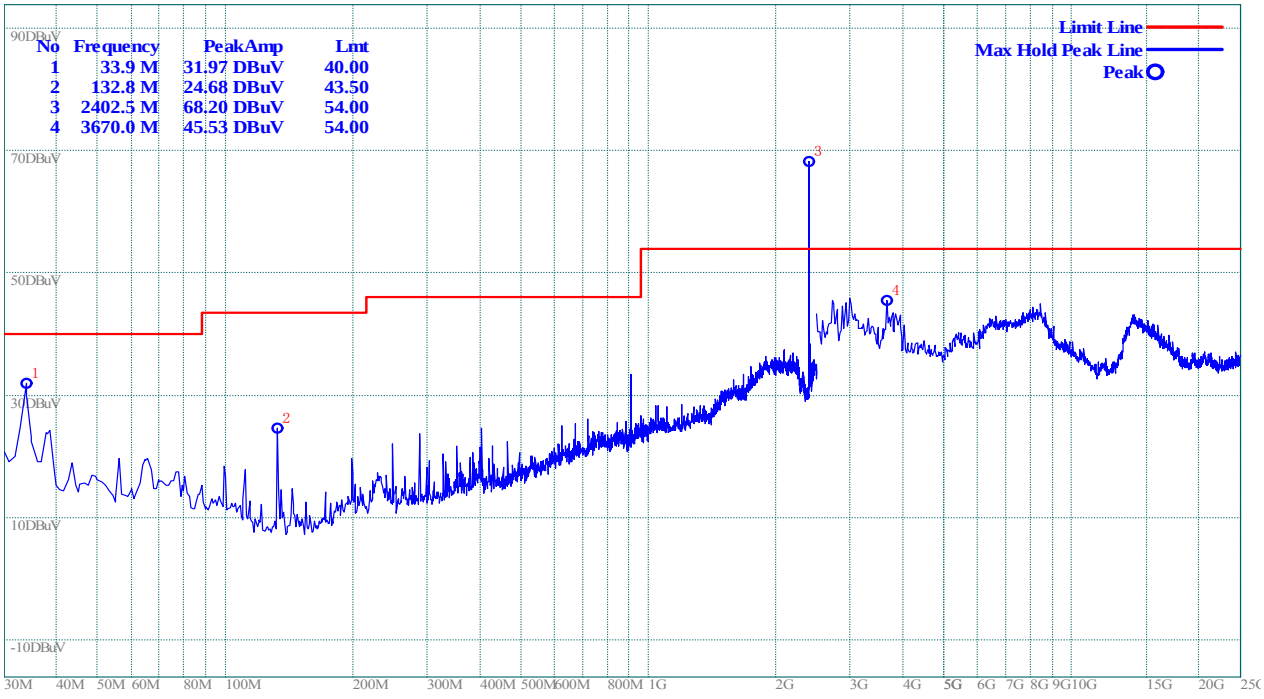
Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
208.5 M	30.38	43.5	-13.12	100	203	Horizontel
912.7 M	34.18	46	-11.82	100	152	Horizontel
31.0 M	35.96	40	-4.04	100	357	Vertical
240.5 M	23.34	46	-22.66	100	306	Vertical
624.6 M	30.8	46	-15.2	100	306	Vertical
2.793 G	47.89	54	-6.11	100	271	Vertical

B. Test Plots for the Whole Measurement Frequency Range:

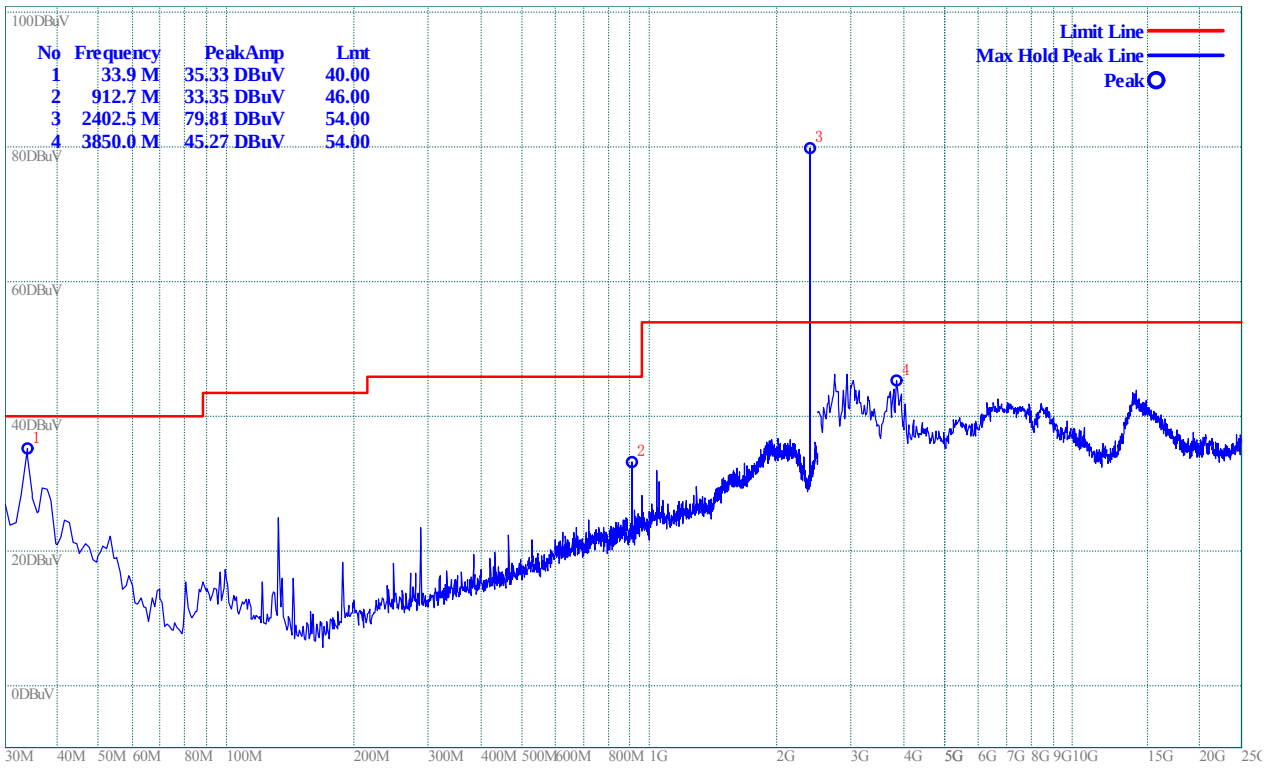
Plots for Channel = 0



(Plot A.0: 9kHz to 30MHz)

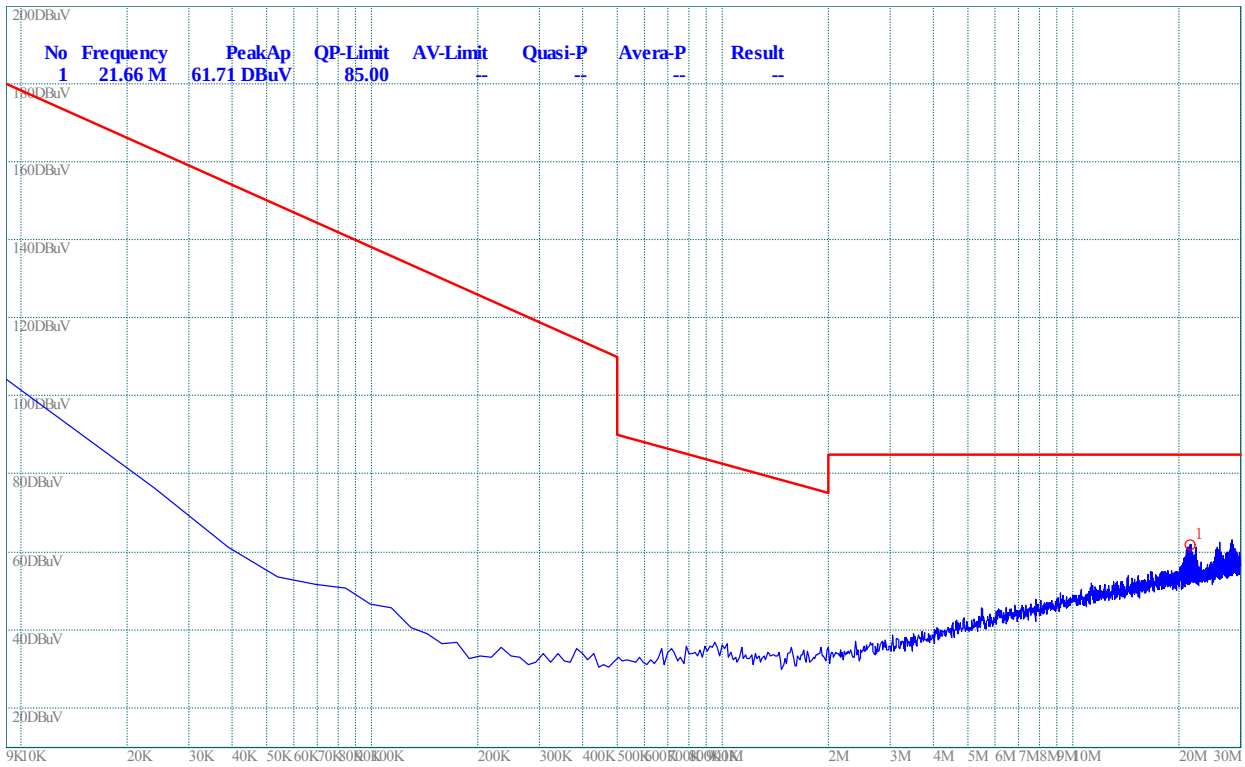


(Plot A.1: Antenna Horizonta)

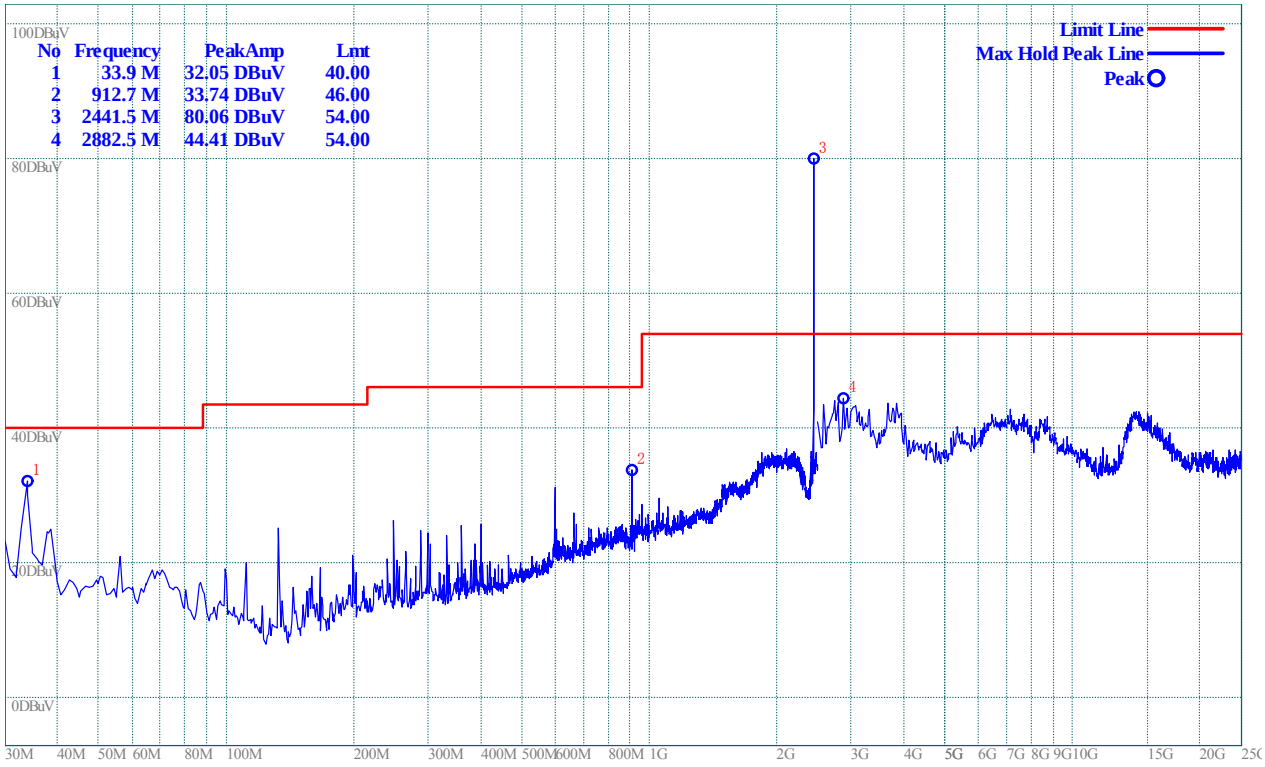


(Plot A.2: Antenna Vertical)

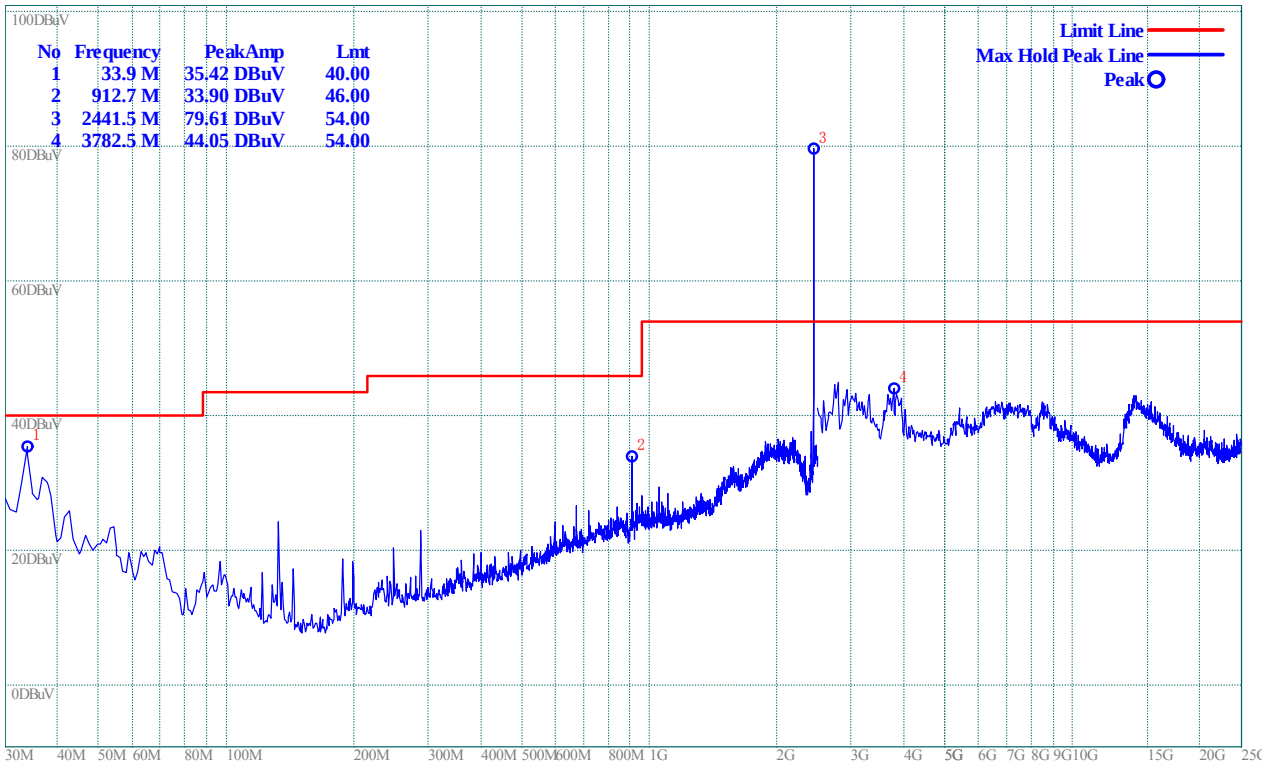
Plot for Channel = 39



(Plot B.0: 9kHz to 30MHz)

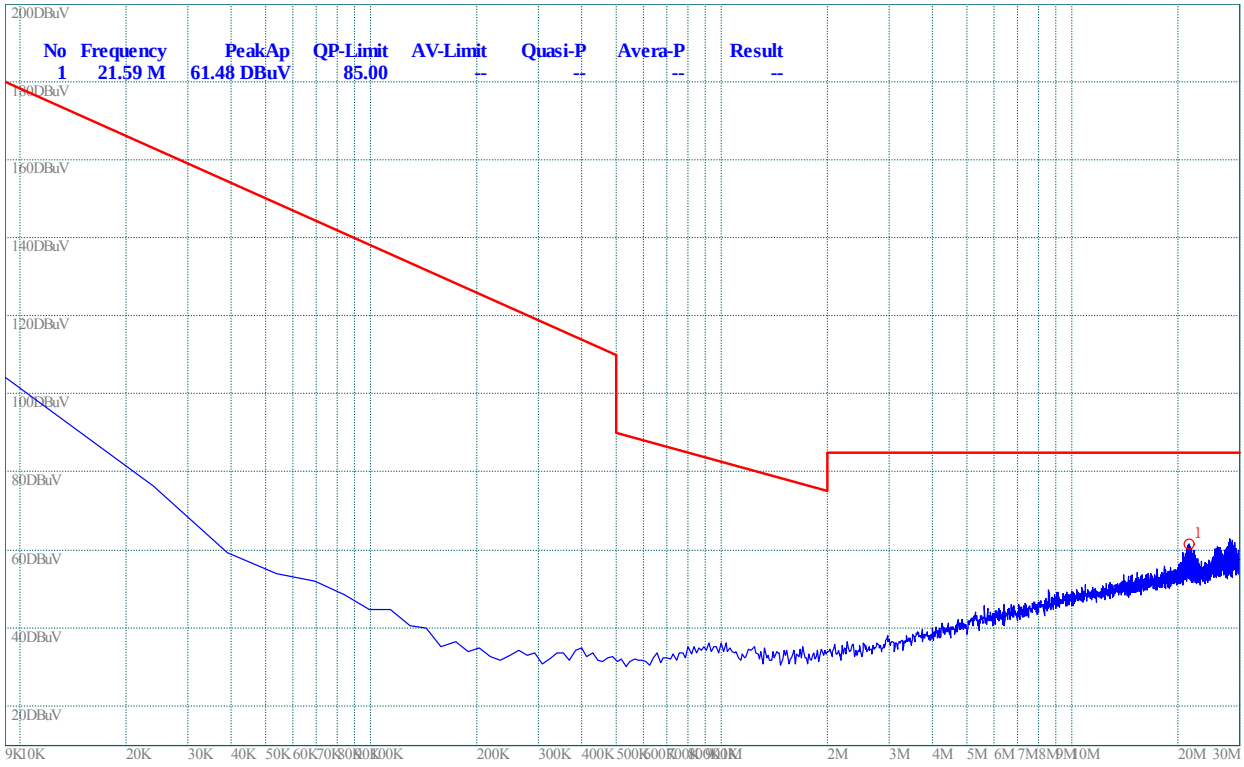


(Plot B.1: Antenna Horizontal)

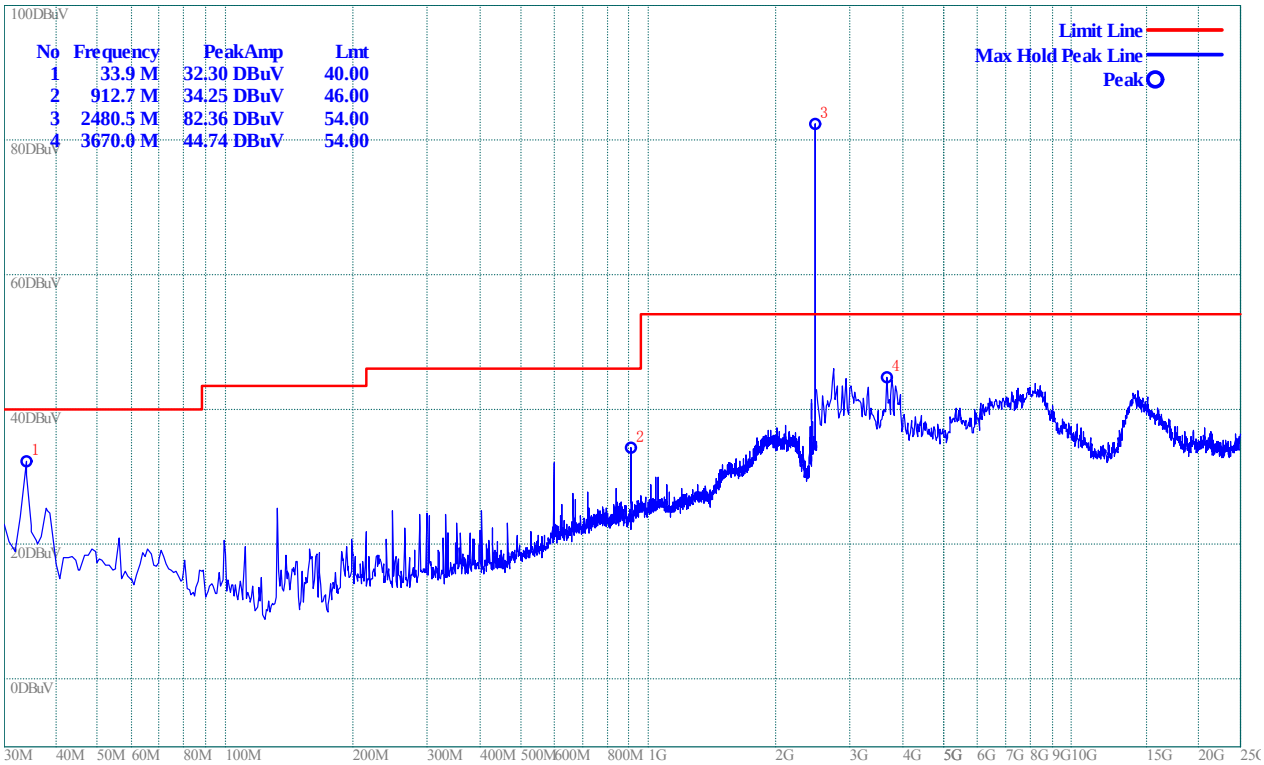


(Plot B.2: Antenna Vertical)

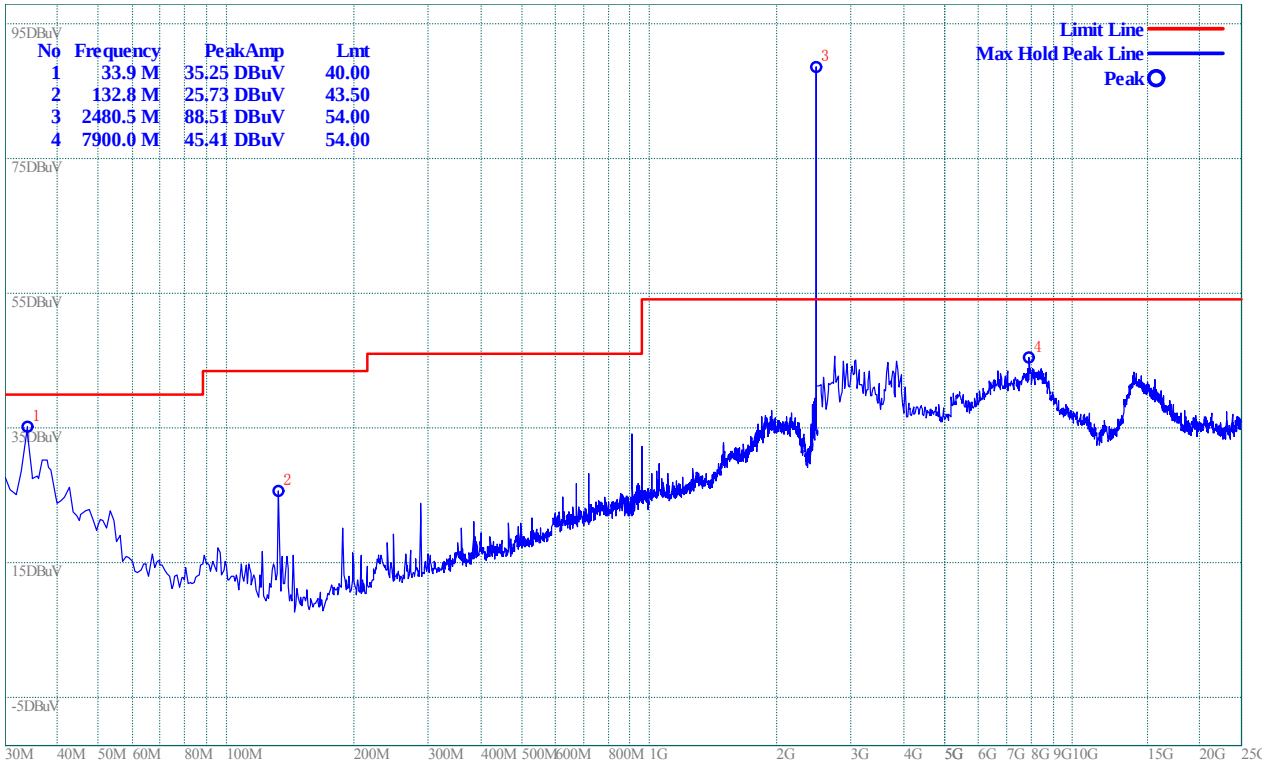
Plot for Channel = 78



(Plot C.0: 9kHz to 30MHz)



(Plot C.1: Antenna Horizontal)



(Plot C.2: Antenna Vertical)

8-DPSK Mode:

A. Test Verdict for Harmonics:

The Fundamental Emissions

The field strength of {Fundamental Emission} listed below is recorded, and used in the next table.

Channel	Frequency (MHz)	Fundamental Emission (dBμV/m)		Antenna Polarization	Refer to Plot
		PK	AV		
0	2402	--	--	Horizontal	Plot A.1
		--	--	Vertical	Plot A.2
39	2441	--	--	Horizontal	Plot B.1
		--	--	Vertical	Plot B.2
78	2480	--	--	Horizontal	Plot C.1
		--	--	Vertical	Plot C.2

The un-wanted Emissions:

Test result of channel: 0 (2402MHz)

Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
208.5 M	31.6	43.5	-11.9	100	206	Horizontel
912.7 M	34.94	46	-11.06	100	94	Horizontel
52.3 M	32.11	40	-7.89	100	73	Vertical
912.7 M	33.93	46	-12.07	100	359	Vertical

Test result of channel: 39 (2442MHz)

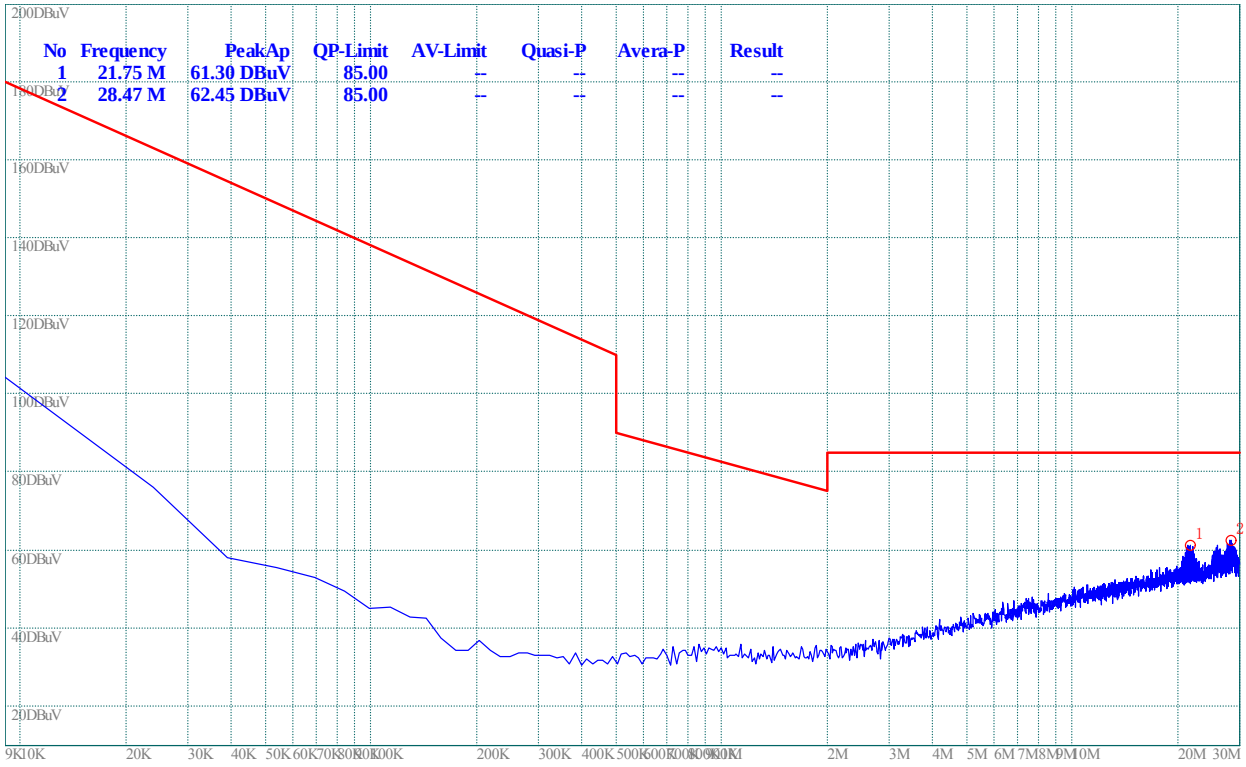
Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
208.5 M	24.5	43.5	-19	100	0	Horizontel
912.7 M	32.49	46	-13.51	100	34	Horizontel
208.5 M	23.41	43.5	-20.09	100	111	Vertical
912.7 M	32.97	46	-13.03	100	325	Vertical

Test result of channel: 78 (2480MHz)

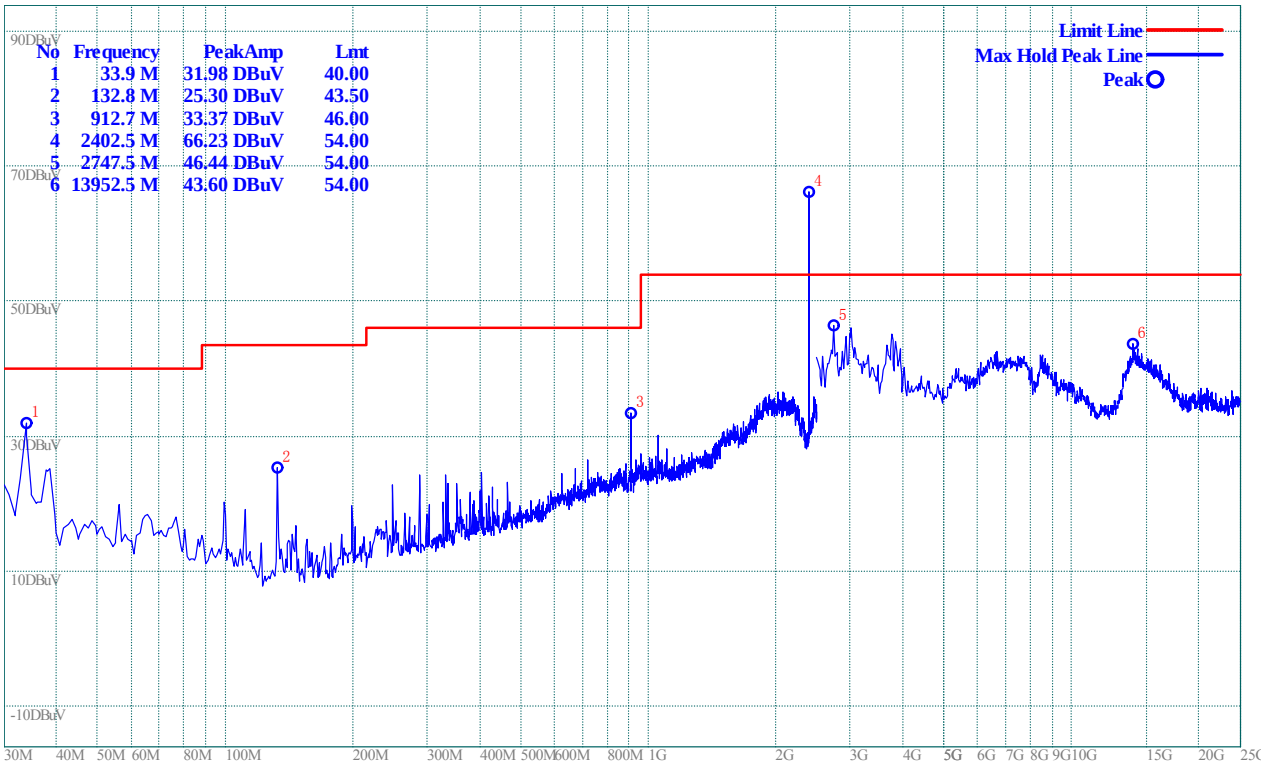
Frequency (MHz)	PK Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Antenna Polarization
208.5 M	30.38	43.5	-13.12	100	203	Horizontel
912.7 M	34.18	46	-11.82	100	152	Horizontel
31.0 M	35.96	40	-4.04	100	357	Vertical
240.5 M	23.34	46	-22.66	100	306	Vertical
624.6 M	30.8	46	-15.2	100	306	Vertical
2.793 G	47.89	54	-6.11	100	271	Vertical

B. Test Plots for the Whole Measurement Frequency Range:

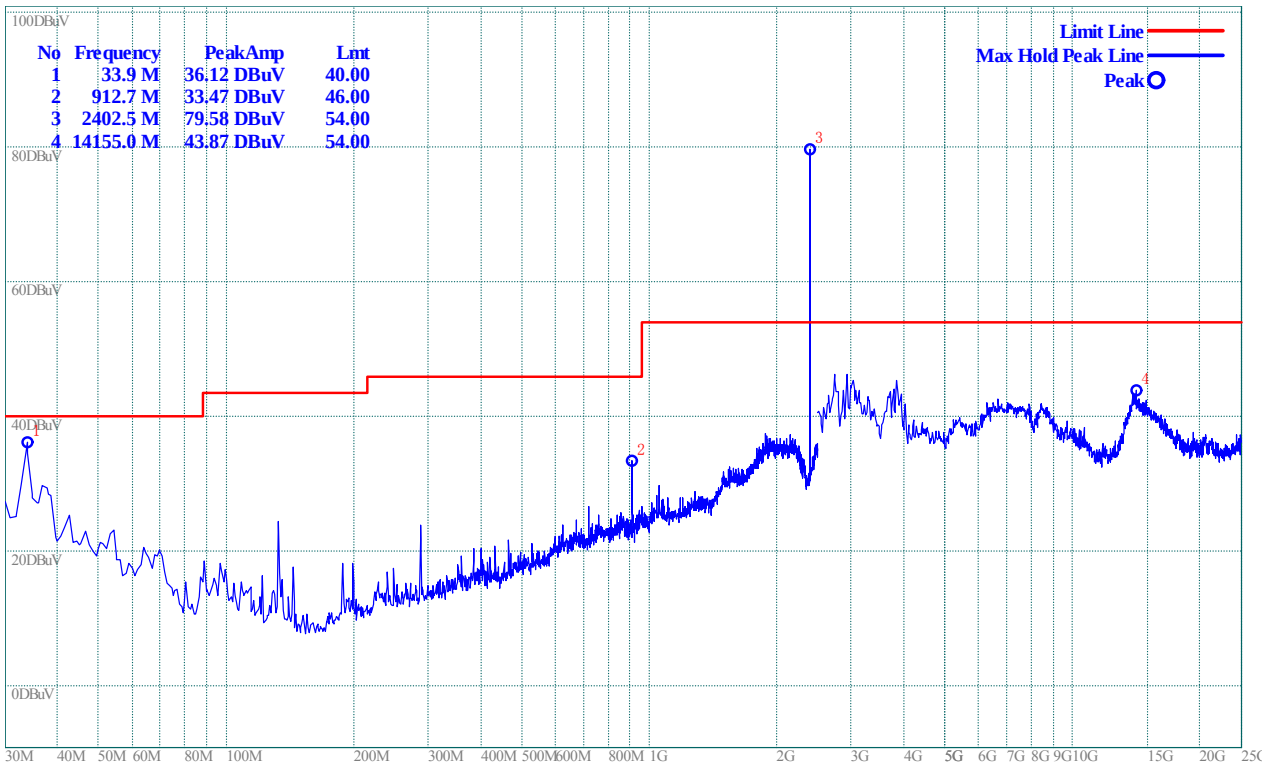
Plots for Channel = 0



(Plot A.0: 9kHz to 30MHz)

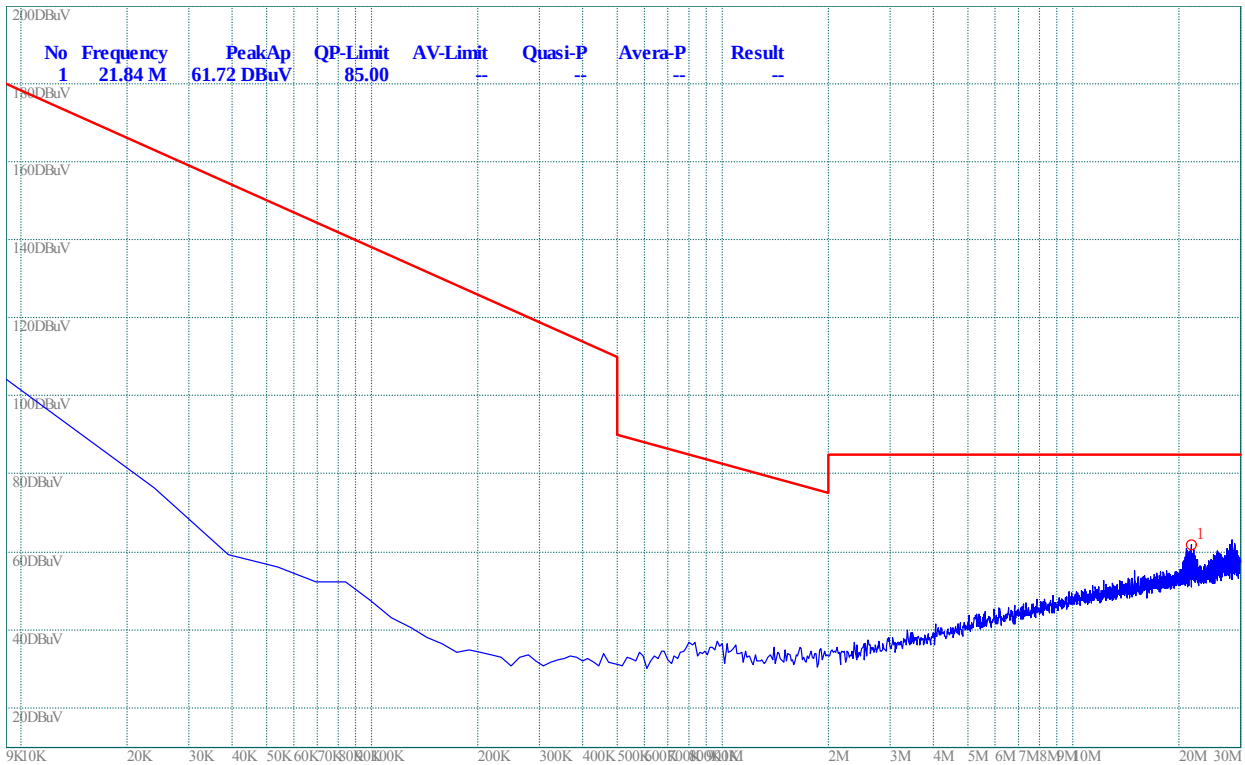


(Plot A.1: Antenna Horizonta)

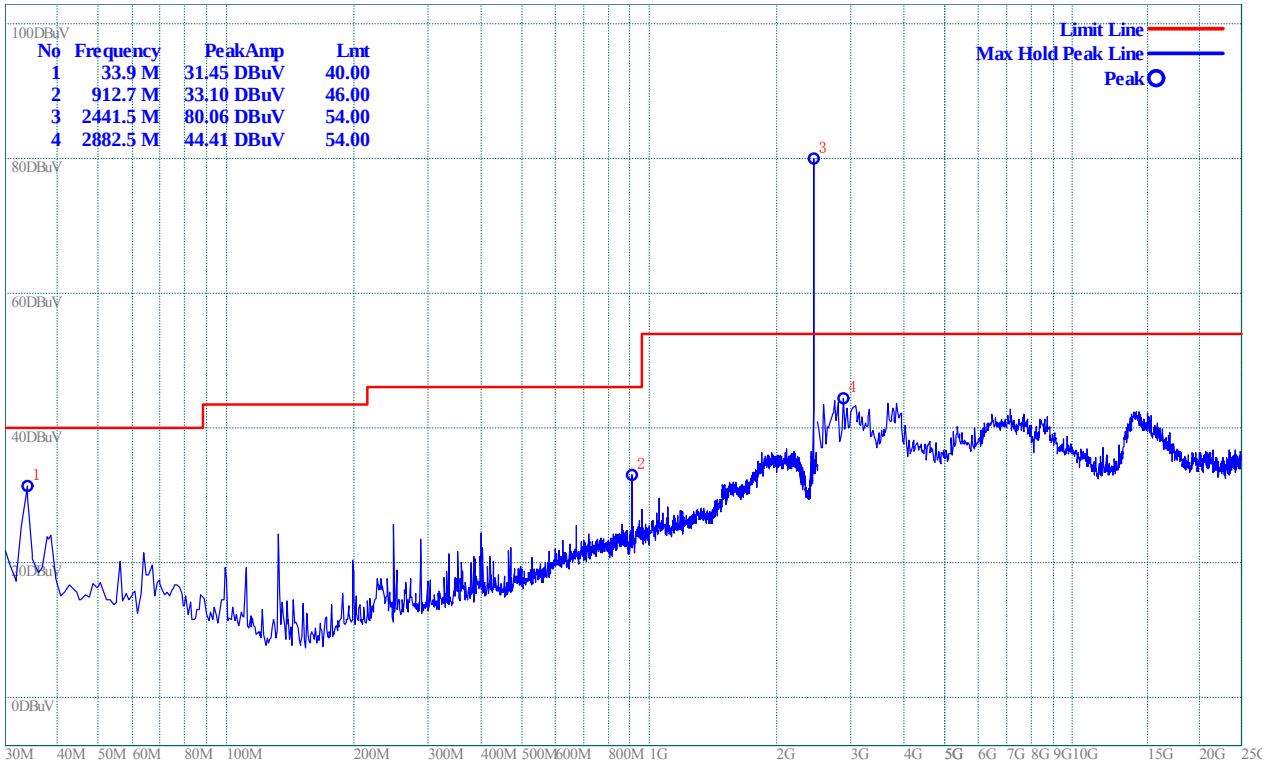


(Plot A.2: Antenna Vertical)

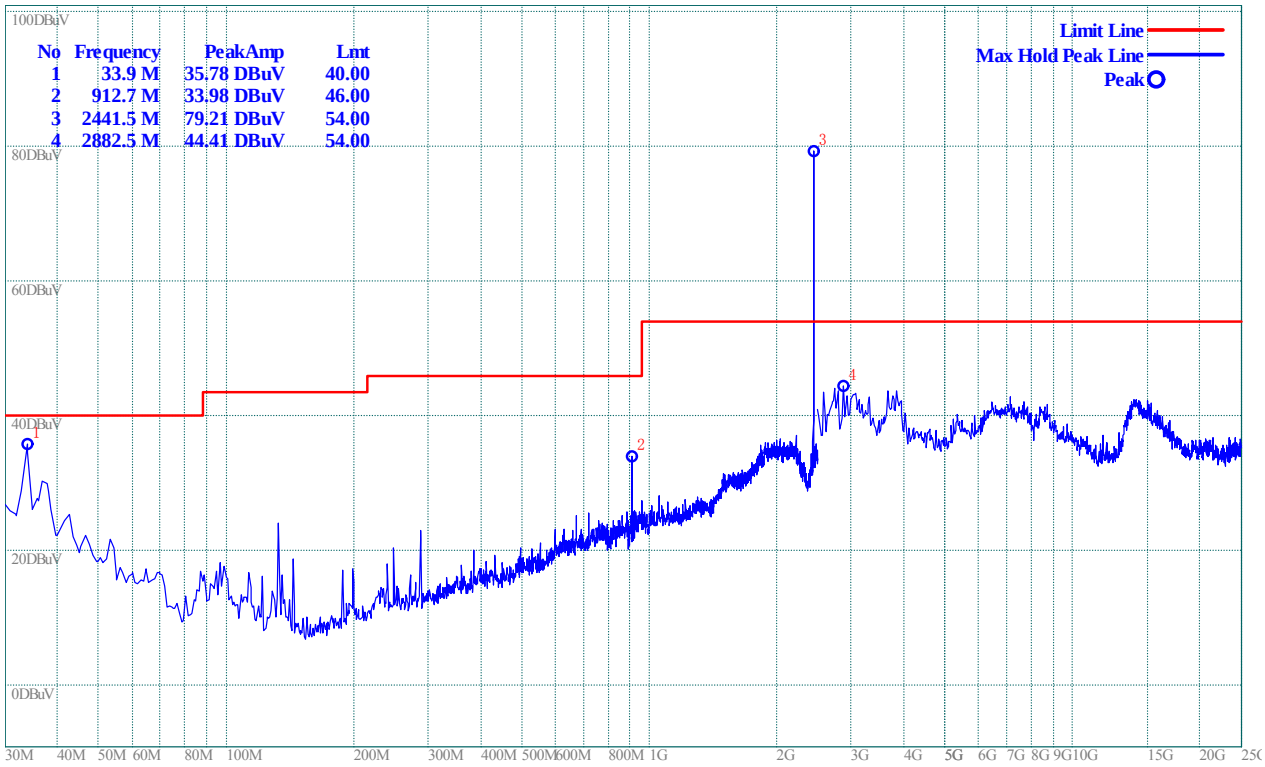
Plot for Channel = 39



(Plot B.0: 9kHz to 30MHz)

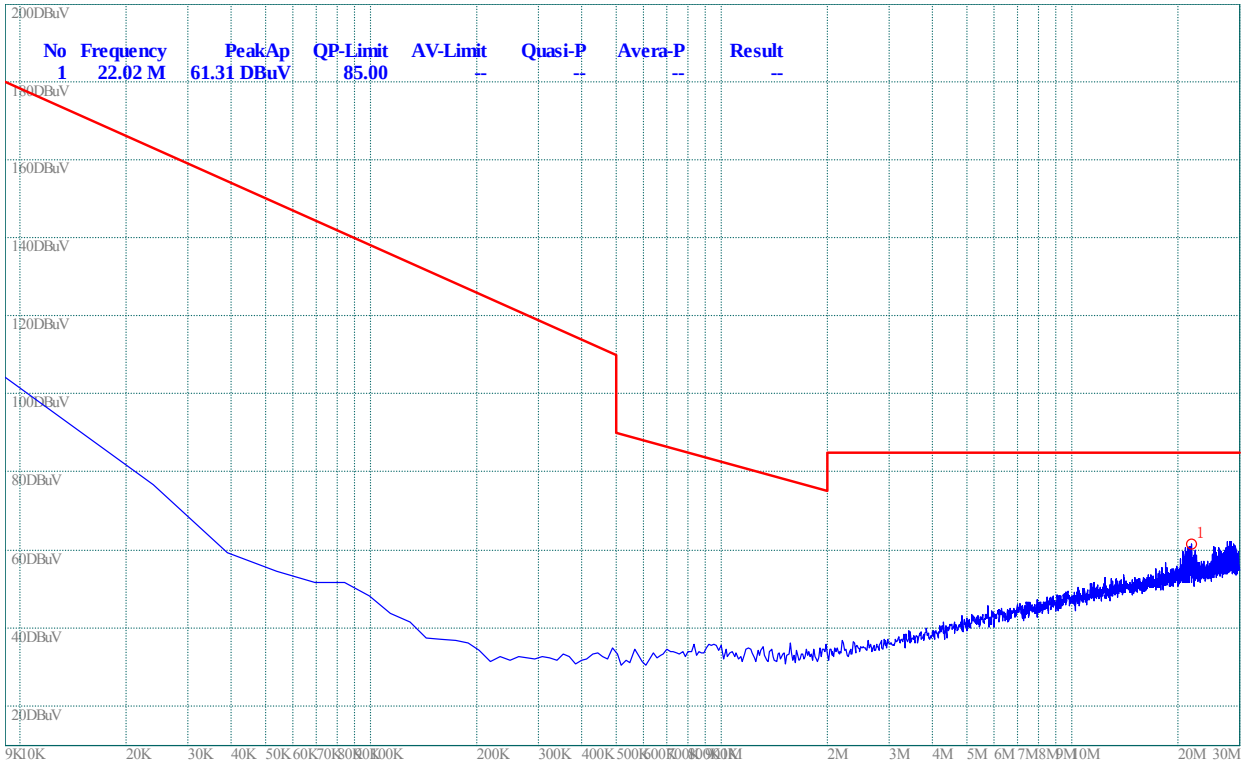


(Plot B.1: Antenna Horizontal)

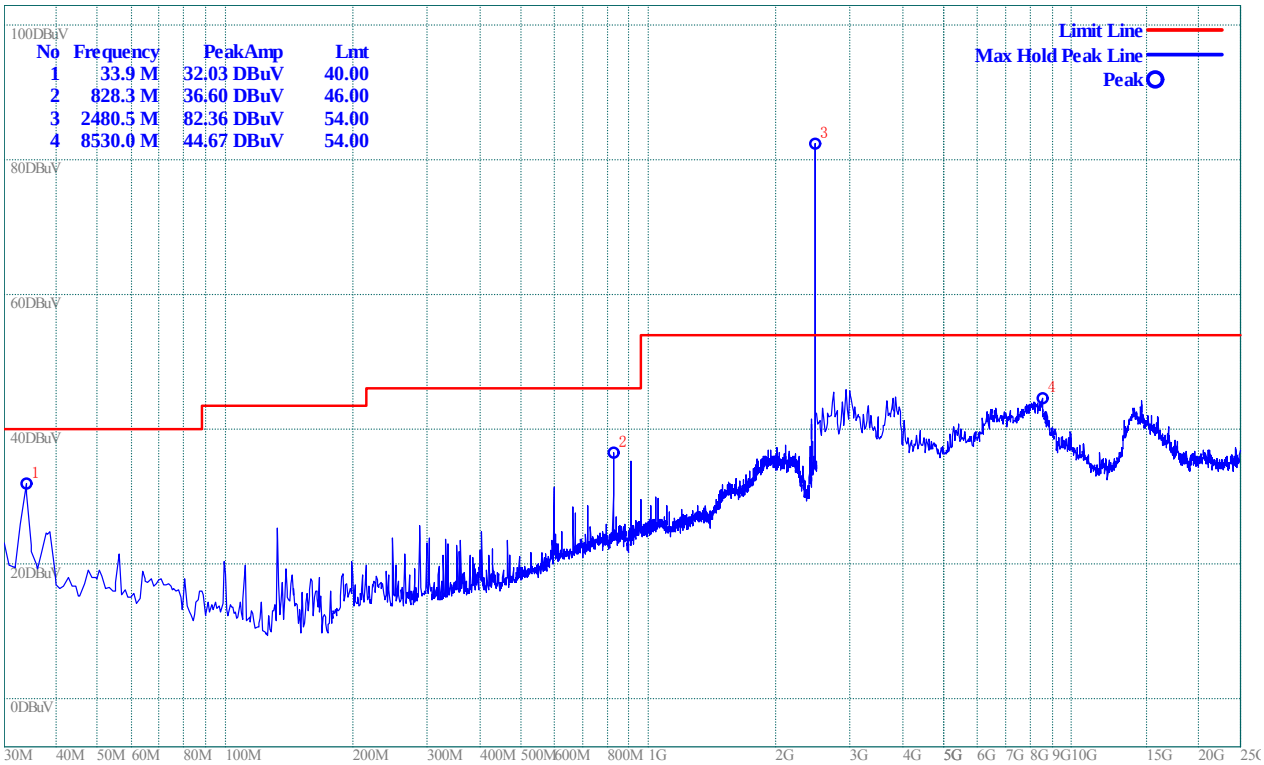


(Plot B.2: Antenna Vertical)

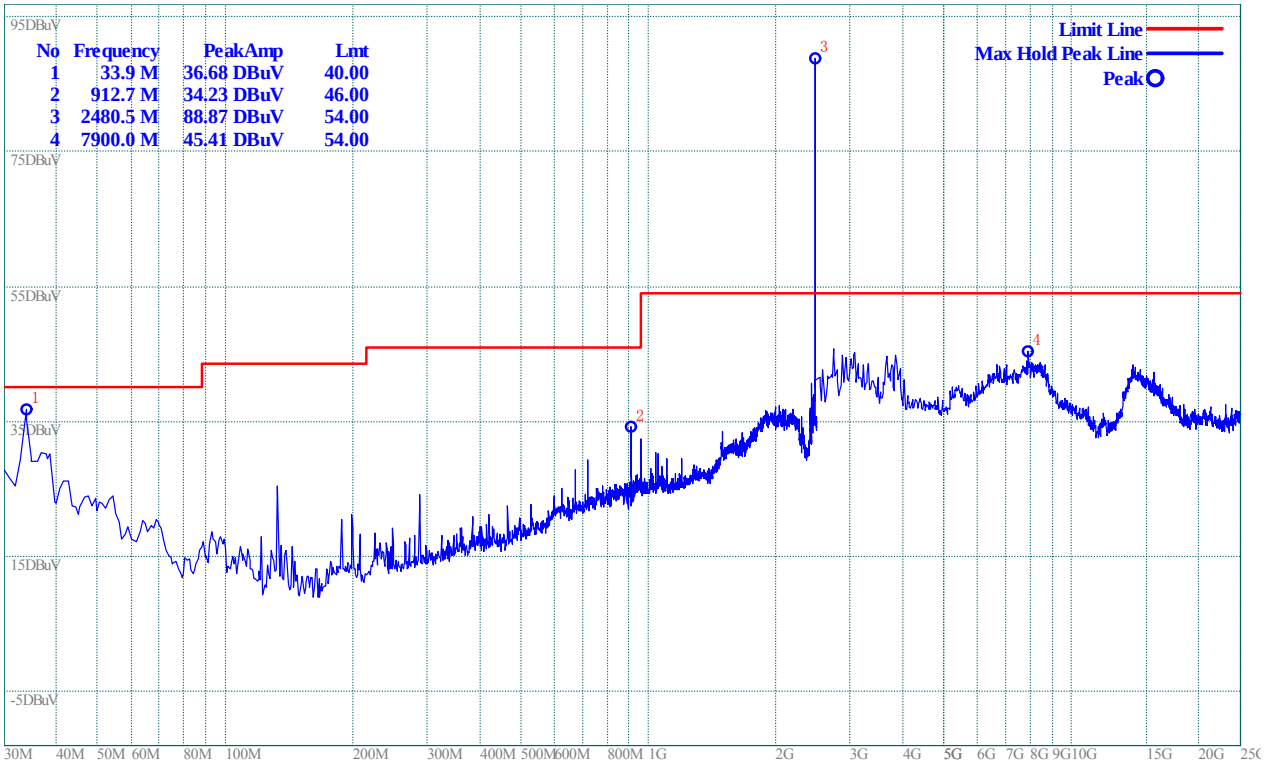
Plot for Channel = 78



(Plot C.0: 9kHz to 30MHz)



(Plot C.1: Antenna Horizontal)



(Plot C.2: Antenna Vertical)

** END OF REPORT **