FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Bluetooth Garden Speaker

ISSUED TO
PRIMO INTERNATIONAL CO., LTD.

Rm2509 Ginza International Building 7008 Shennan RD., Futian DIstrict
Shenzhen China

Prepared by: Zhang Yanqing
(Reporting Engineer)
Date: Sep 17, 2014

Approved by: Yu Yongbo
(Chief Engineer)
Date: Sep 17, 2014

Report No.:	BL-SZ1490015-601
EUT Type:	Bluetooth Garden Speaker
Model Name:	DP-2100, NV-03345, NV-03346
Brand Name:	N/A
Test Standard:	47 CFR Part 15 Subpart C
FCC ID:	U5WDP2100
Test conclusion:	PASS
Test Date:	Sep 12, 2014 ~ Sep 15, 2014
Date of Issue:	Sep 17, 2014

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Revision History

Version	Issue Date	Revisions
Rev. 01	Sep 17, 2014	Initial Issue

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6683 3402
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588. The 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 L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	15 to 35℃
Ambient Relative Humidity	30 to 60%
Ambient Pressure	86 to106 kPa

1.4 Announce

(1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(2) The test report is invalid if there is any evidence and/or falsification.

(3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	PRIMO INTERNATIONAL CO., LTD.
Address	Rm2509 Ginza International Building 7008 Shennan RD., Futian DIstrict Shenzhen China

2.2 Manufacturer

Manufacturer	PRIMO INTERNATIONAL CO., LTD.
Address	Rm2509 Ginza International Building 7008 Shennan RD., Futian DIstrict Shenzhen China

2.3 General Description for Equipment under Test (EUT)

EUT Type	Bluetooth Garden Speaker
The Under Test Model Name	DP-2100
Series Model Name	DP-2100, NV-03345, NV-03346
Hardware Version	VER:1.2
Software Version	IE286CF8
Network and Wireless connectivity	BT2.1+EDR
Description of Model name differentiation	The equipment model DP-2100 and NV-03345, NV-03346 are Bluetooth Garden Speaker, the electrical parameters and internal structure of circuit are same, only the model is different.
About the Product	The EUT is Bluetooth Garden Speaker, it contains Bluetooth Module operating at 2.4GHz ISM band.

2.4 Technical Information

TX/ RX Operating Range	2400~2483.5MHz band f_c = 2402 MHz + N*1 MHz, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 0 to 78.	
Modulation Type	Carrier	Frequency Hopping Spread Spectrum
	Digital	GFSK, π/4-DQPSK
Antenna Type	PCB Antenna	
Antenna Gain	0dBi	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No	N/A
	Serial No	N/A
	Capacitance	2200mAh
	Rated Voltage	3.7V
	Extreme Voltage	Low: 3.3V / High:4.2V
Ancillary Equipment 2	Audio Line	
Ancillary Equipment 3	USB Cable	
Ancillary Equipment 4	Remote Control	

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (12-30-13 Edition)	Intentional Radiators
3	ANSI C63.4-2009	American National Standard for Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4	ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	--	PASS Note1
2	20dB Bandwidth	15.215(c)	ANNEX A.1	PASS
3	Conducted Emission	15.207	ANNEX A.2	PASS
4	Radiated Spurious Emission	15.249(a)	ANNEX A.3	PASS
5	Band Edge	15.249(a)	ANNEX A.4	PASS
Note 1: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.				

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity (%)	30 -60	
Atmospheric Pressure (kPa)	86-106	
Temperature	NT (Normal Temperature)	+20℃ to +25℃
	LT (Low Temperature)	-20℃
	HT (High Temperature)	+55℃
Working Voltage of the EUT	NV (Normal Voltage)	3.7 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2014.07.07	2015.07.06
Spectrum Analyzer	ROHDE&SCHWARZ	FSL3	103640/003	2014.07.07	2015.07.06
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2014.07.07	2015.07.06
Power Splitter	KMW	DCPD-LDC	1305003215	2014.07.07	2015.07.06
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2014.07.07	2015.07.06
Attenuator (20dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2014.07.07	2015.07.06
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2014.07.07	2015.07.06
Test Antenna-Loop(9kHz-30MHz)	SCHWARZBECK	FMZB 1519	1519-037	2014.07.03	2015.07.02
Test Antenna-Bi-Log(30MHz-3GHz)	SCHWARZBECK	VULB 9163	9163-624	2014.07.02	2015.07.01
Test Antenna-Horn(1-18GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2014.07.02	2015.07.01
Test Antenna-Horn(15-26.5GHz)	SCHWARZBECK	BBHA 9170	9170-305	2014.07.02	2015.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2013.10.07	2014.10.06

4.3 Test Configurations

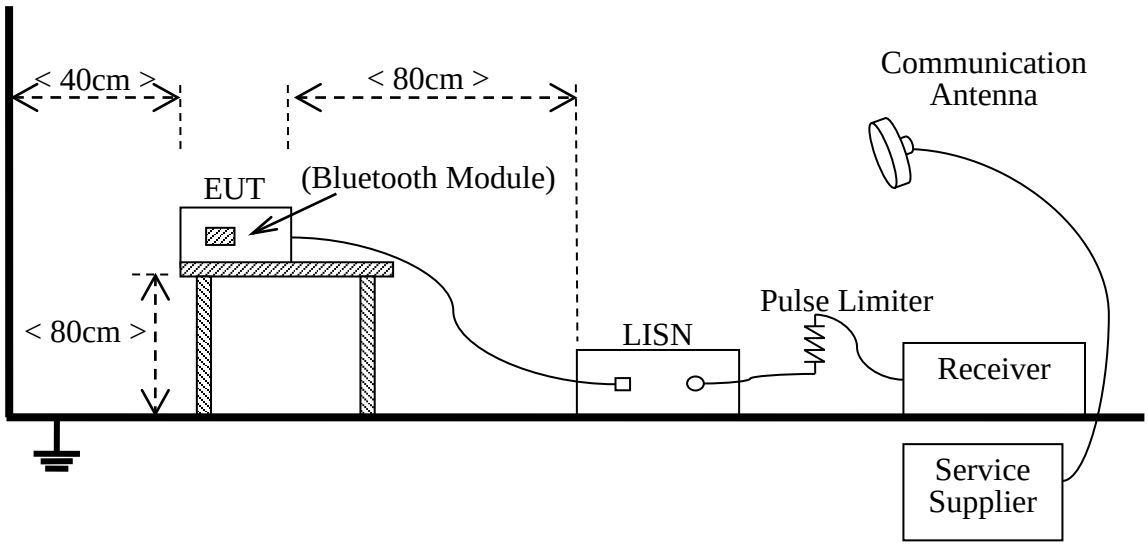
Test Configurations (TC) NO.	Description	
	Signal Description	Operating Frequency
Transmitter		
TC01	GFSK modulation, package type DH5, hopping on	--
TC02	GFSK modulation, package type DH5, hopping off	Ch No. 0/ 2402MHz
TC03	GFSK modulation, package type DH5, hopping off	Ch No. 39/ 2441MHz
TC04	GFSK modulation, package type DH5, hopping off	Ch No. 78/ 2480MHz
TC05	π/4-DQPSK modulation, package type DH5, hopping on	--
TC06	π/4-DQPSK modulation, package type DH5, hopping off	Ch No. 0/ 2402MHz
TC07	π/4-DQPSK modulation, package type DH5, hopping off	Ch No. 39/ 2441MHz
TC08	π/4-DQPSK modulation, package type DH5, hopping off	Ch No. 78/ 2480MHz

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

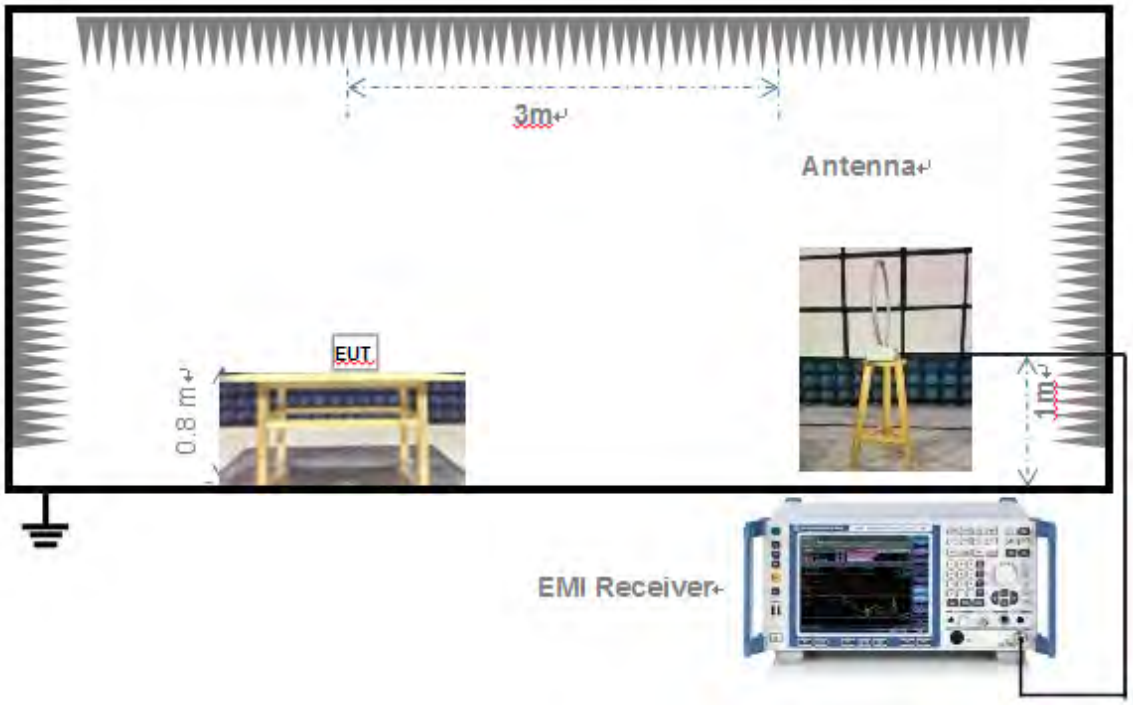
(Diagram 1)

4.4.2 For AC Power Supply Port Test



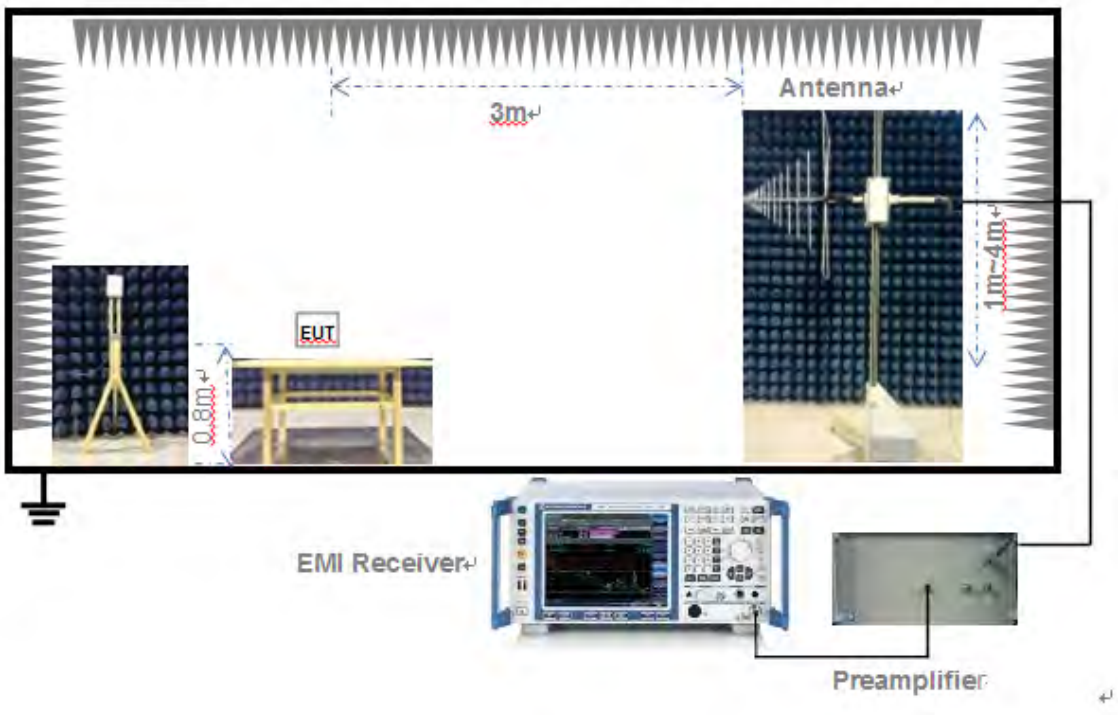
(Diagram 2)

4.4.3 For Radiated Test (Below 30MHz)



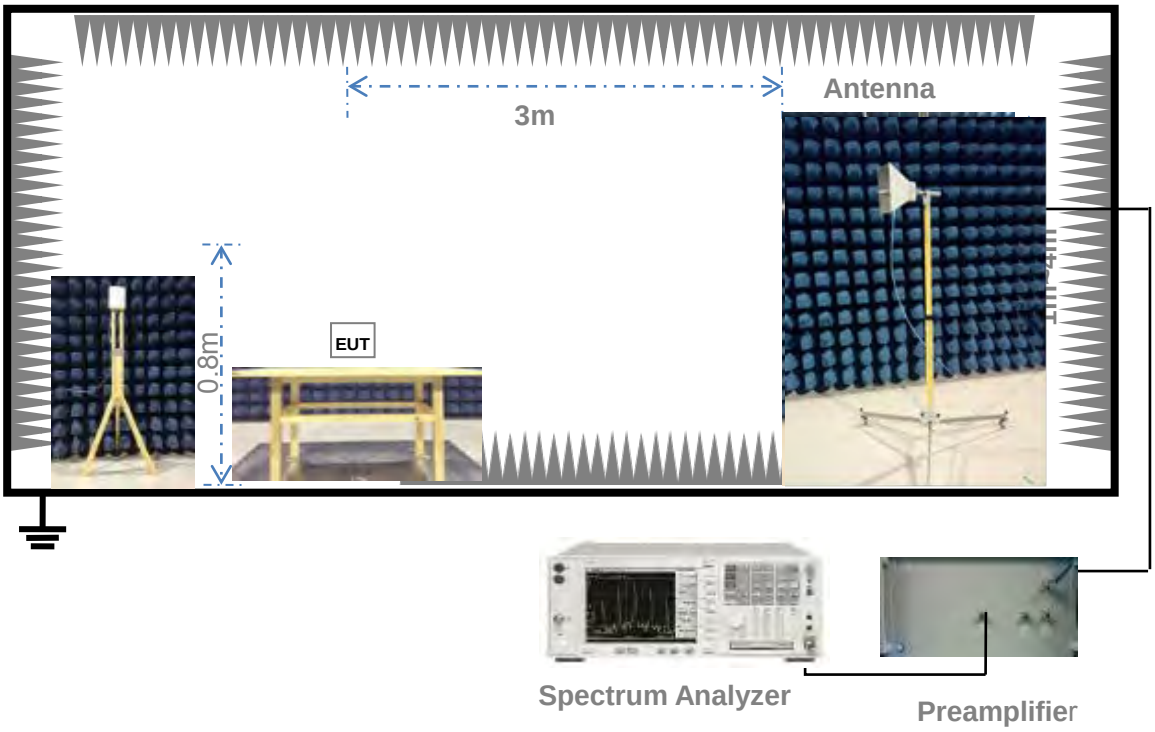
(Diagram 3)

4.4.4 For Radiated Test (30MHz-1GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1GHz)



(Diagram 5)

4.5 Test Conditions

Test Case	Test Conditions		
	Test Env.	Test Setup Note 1	Test Configuration Note 2
20dB Bandwidth	NTNV	Test Setup 1	TC02, TC03, TC04, TC06, TC07, TC08,
Conducted Emission	NTNV	Test Setup 2	TC01
Radiated Emission	NTNV	Test Setup 3 Test Setup 4 Test Setup 5	TC01, TC02, TC03, TC04, TC05, TC06, TC07, TC08
Band Edge	NTNV	Test Setup 5	TC02, TC04, TC06, TV08, TC10, TC12
Note: 1. Please refer to section 4.4 for test setup details. 2. Please refer to section 4.3 for test setup details.			

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Standard Applicable

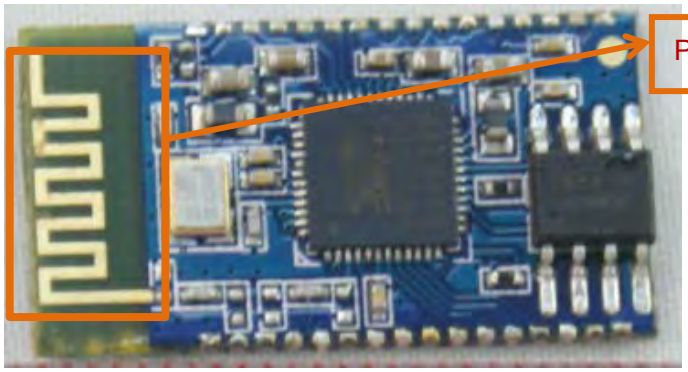
FCC §15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is An embedded-in	An embedded-in antenna design is used.

Reference Documents	Item
Photo	

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 20dB Bandwidth

5.2.1 Limit

FCC §15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.2.2 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW ≥ 1% of the 20 dB bandwidth

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.3 Conducted Emission

5.3.1 Limit

FCC §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

5.3.2 Test Procedure

The maximum conducted interference is searched using Peak (PK), if 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.

5.4 Radiated Spurious Emission

5.4.1 Limit

FCC §15.249(a)

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

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)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.4.2 Test Procedure

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.5 Band Edge

5.5.1 Limit

FCC §15.249(a)

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.

5.5.2 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak /AV

Trace = max hold

Allow the trace to stabilize.

E [dBμV/m] =UR + AT + AFactor [dB]; AT =LCable loss [dB]-Gpreamp [dB]

AT: Total correction Factor except Antenna

UR: Receiver Reading

Gpreamp: Preamplifier Gain

AFactor: Antenna Factor at 3m

ANNEX A TEST RESULT

A.1 20dB bandwidth

Test Data

GFSK Mode:

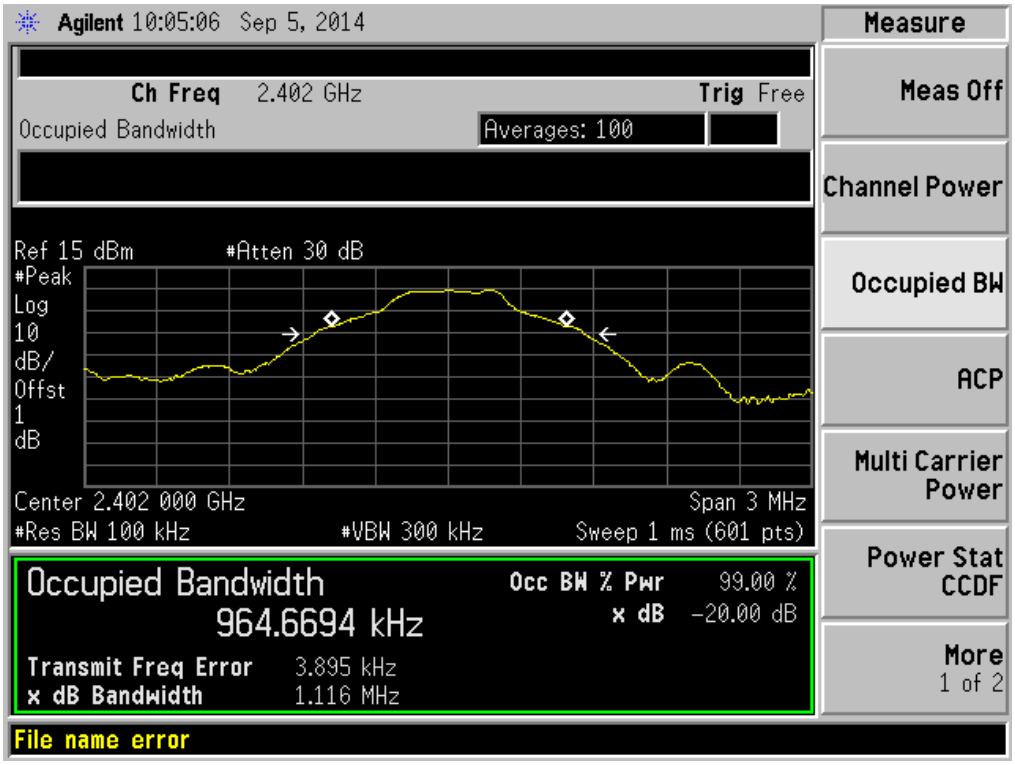
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
LOW	2402	1.116
MIDDLE	2441	1.125
HIGH	2480	1.117

∏/4-DQPSK Mode:

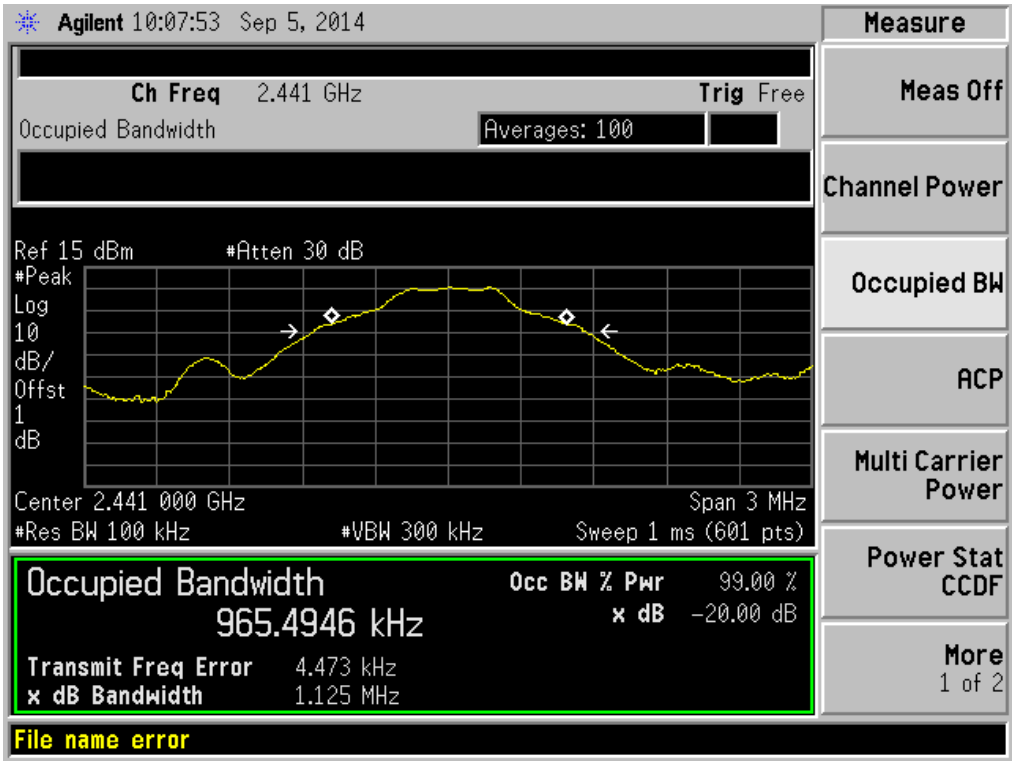
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
LOW	2402	1.398
MIDDLE	2441	1.392
HIGH	2480	1.376

Test plots

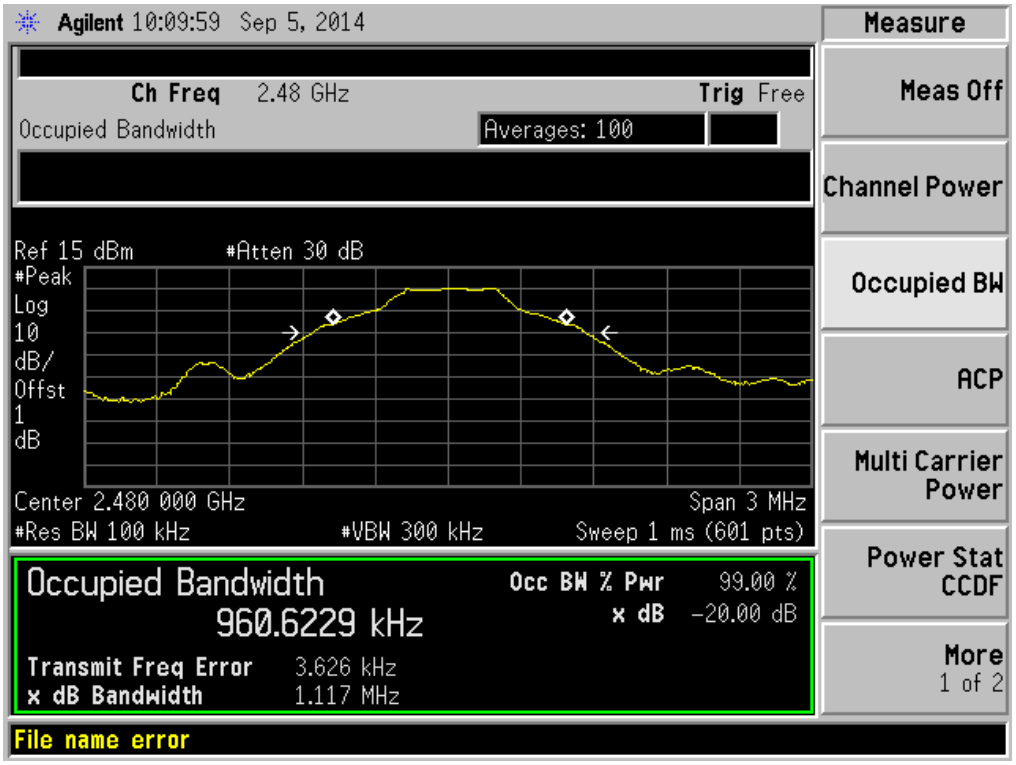
GFSK LOW CHANNEL



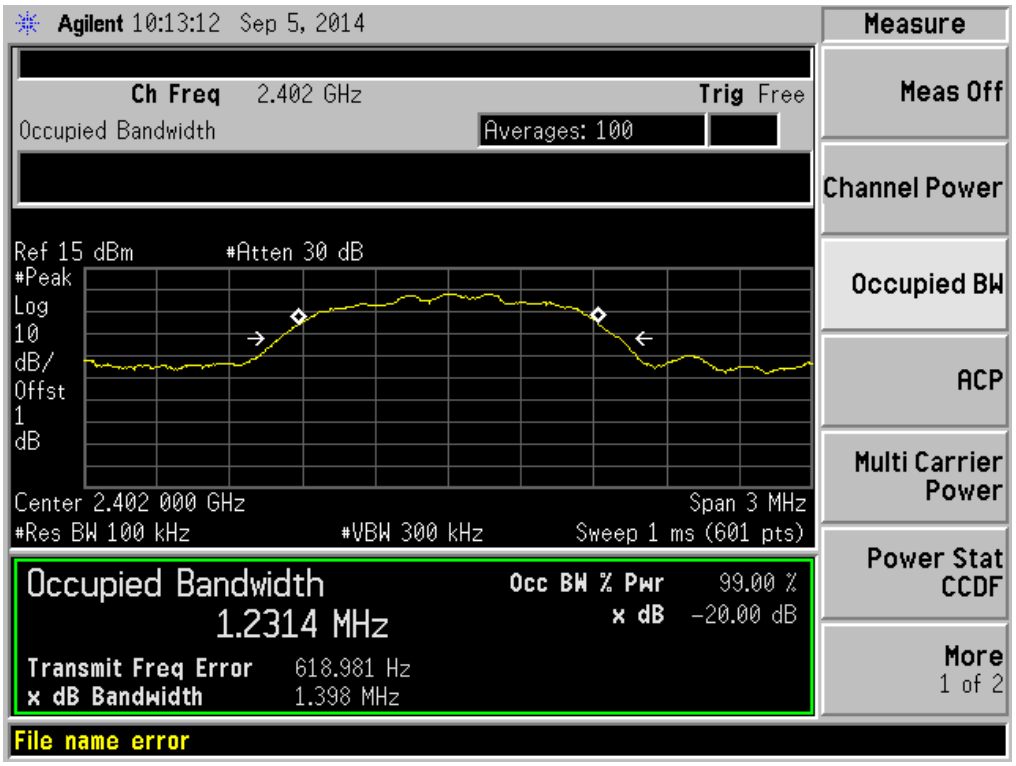
GFSK MID CHANNEL



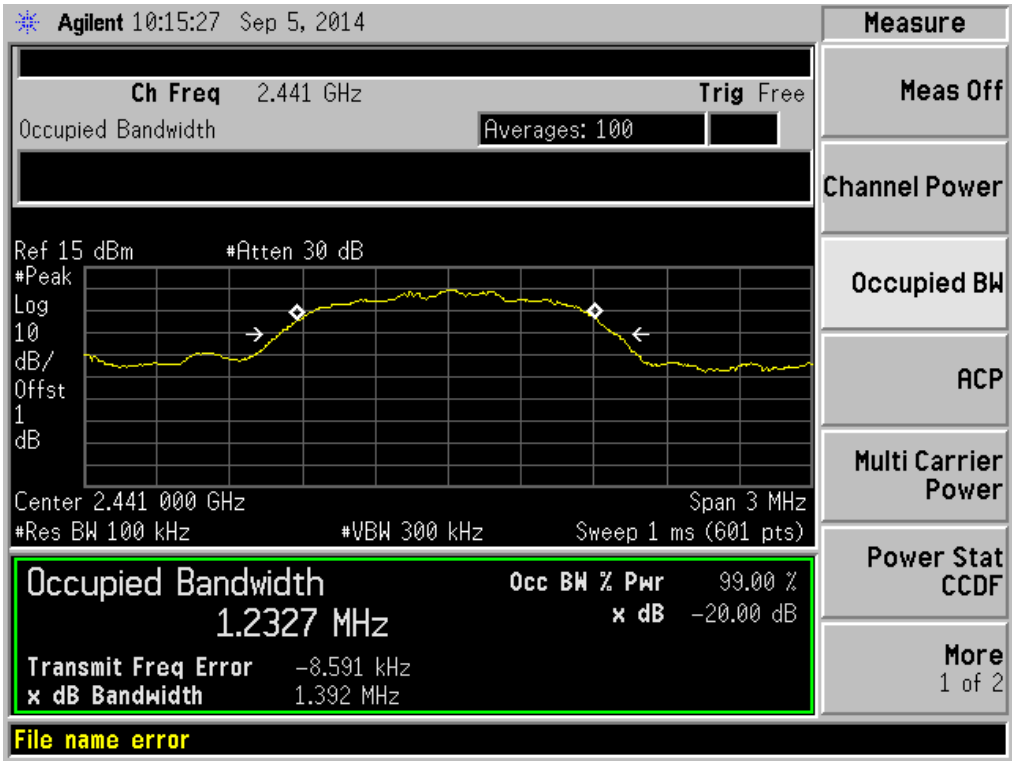
GFSK HIGH CHANNEL



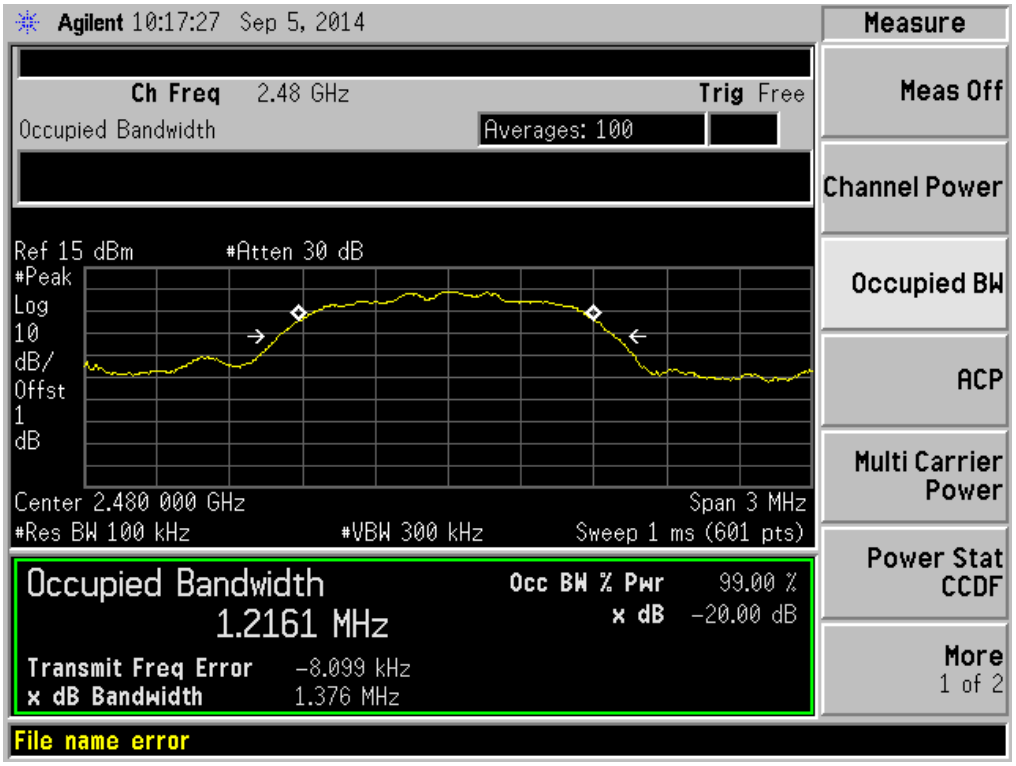
Π/4-DQPSK LOW CHANNEL



Π/4-DQPSK MID CHANAEL

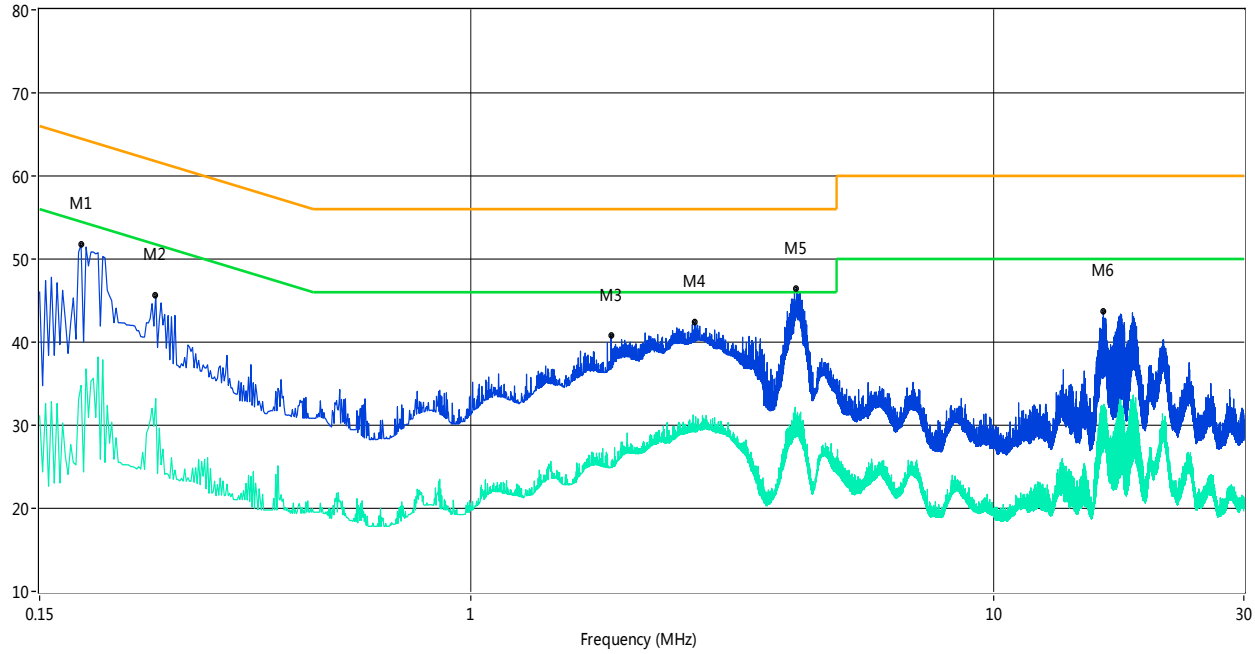


Π/4-DQPSK HIGH CHANNEL

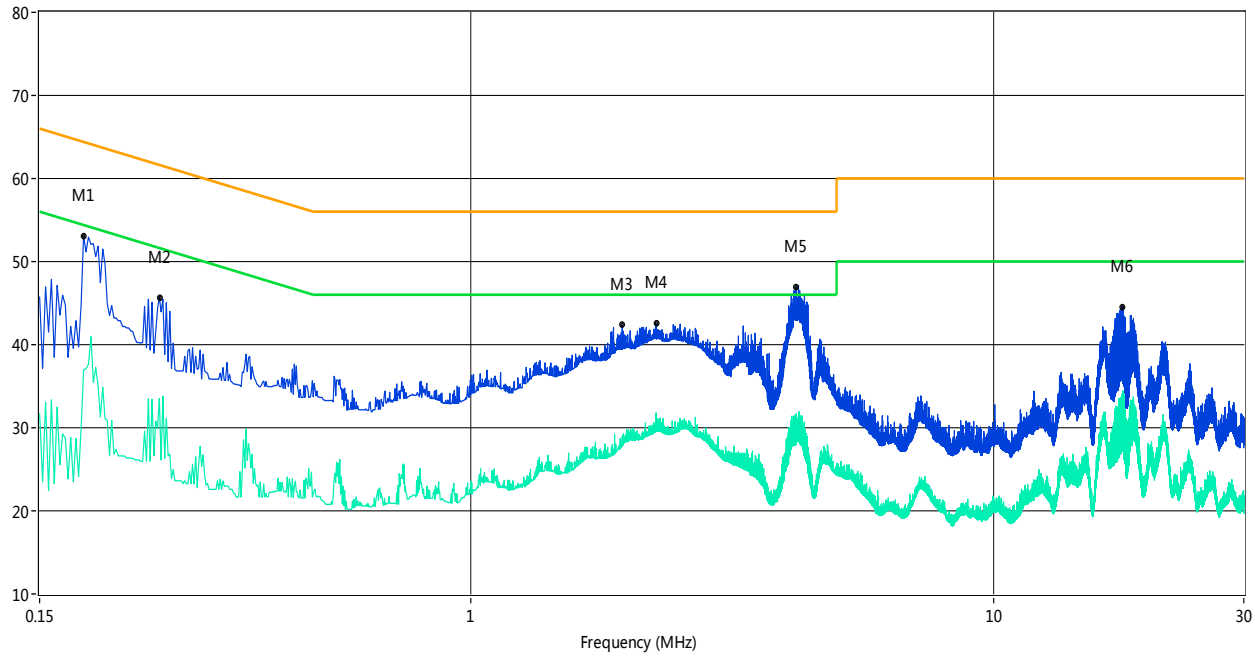


A.2 Conducted Emission

Test Data and Test Plots



Frequency (MHz)	Q-peak (dBuV)	Average (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Q-peak Margin (dB)	AV Margin (dB)	Line	Verdict
0.18	51.7	34.8	10.00	65.1	55.1	13.4	20.30	L Line	PASS
0.25	45.6	33.2	10.00	63.1	53.1	17.5	19.90	L Line	PASS
1.85	40.8	25.0	10.00	56.0	46.0	15.2	21.00	L Line	PASS
2.68	42.3	29.5	10.00	56.0	46.0	13.7	16.50	L Line	PASS
4.19	46.5	30.8	10.00	56.0	46.0	9.5	15.20	L Line	PASS
16.18	43.7	30.7	10.00	60.0	50.0	16.3	19.30	L Line	PASS



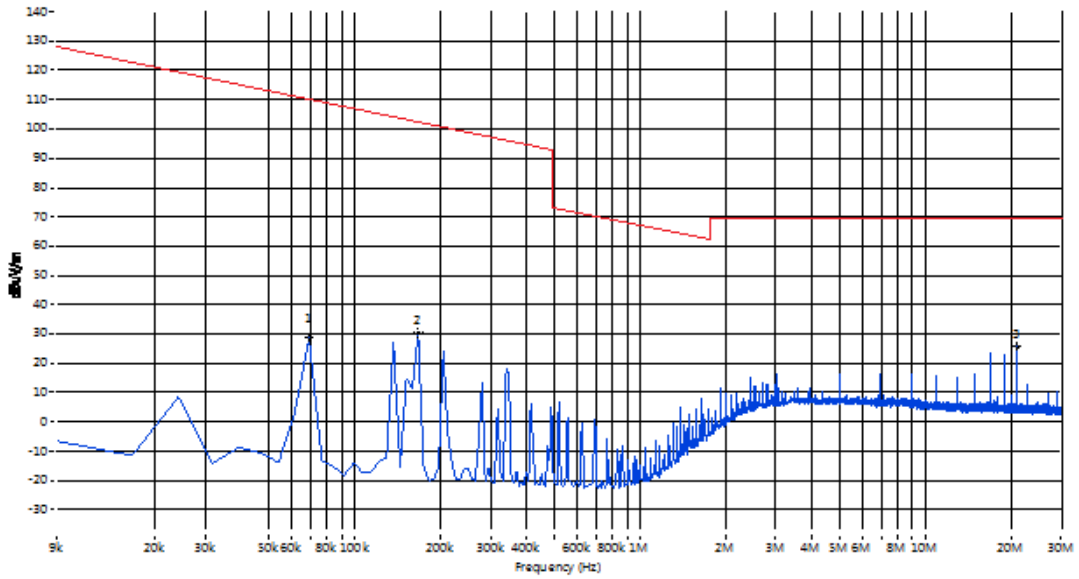
Frequency (MHz)	Q-peak (dBuV)	Average (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Q-peak Margin (dB)	AV Margin (dB)	Line	Verdict
0.18	53.1	36.9	10.00	65.1	55.1	12	18.20	N Line	PASS
0.25	45.7	33.5	10.00	63.0	53.0	17.3	19.50	N Line	PASS
1.95	42.4	29.0	10.00	56.0	46.0	13.6	17.00	N Line	PASS
2.26	42.5	31.8	10.00	56.0	46.0	13.5	14.20	N Line	PASS
4.18	47.0	31.7	10.00	56.0	46.0	9	14.30	N Line	PASS
17.55	44.5	33.9	10.00	60.0	50.0	15.5	16.10	N Line	PASS

A.3 Radiated Emission

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

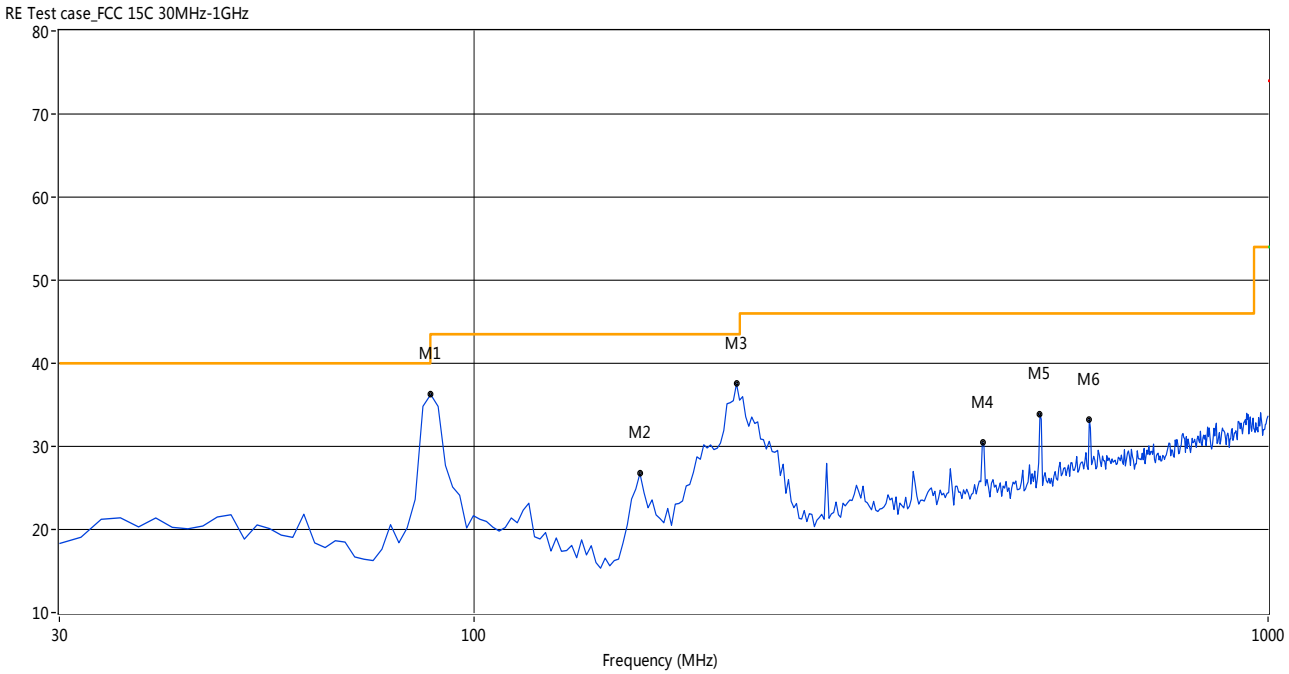
The data of 9 kHz to 1GHz

Below 30MHz



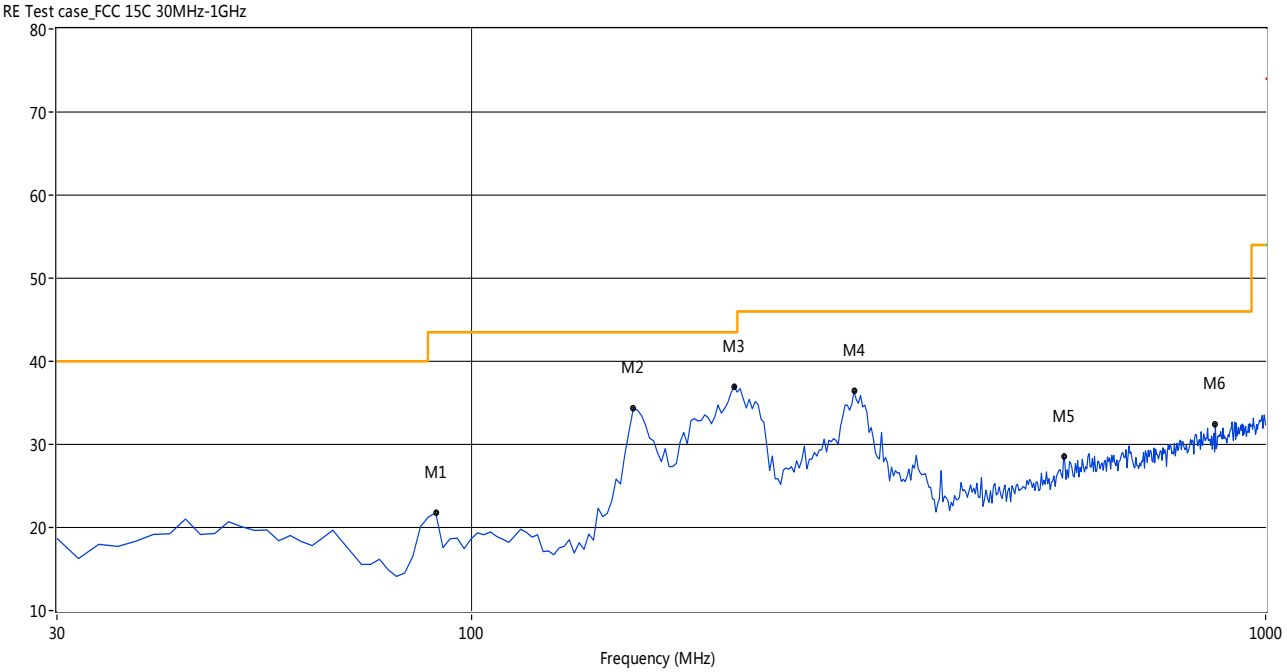
Frequency (MHz)	Peak (dBuV/m)	Q-peak (dBuV/m)	AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-QP (dBuV/m)	Limit-AV (dBuV/m)	Degree	Verdict
0.072	28.79	--	--	--	110.8	--	--	PASS
0.165	29.22	--	--	--	103.2	--	--	PASS
21.056	25.38	--	--	--	69.5	--	--	PASS

30MHz to 1GHz, ANT V



Frequency (MHz)	Q-peak (dBuV/m)	Factor (dB)	QP Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
88.08	36.25	-22.01	43.5	7.25	0.00	100	Vertical	PASS
161.66	26.73	-22.37	43.5	16.77	241.20	100	Vertical	PASS
213.93	37.54	-19.70	43.5	5.96	268.60	100	Vertical	PASS
436.59	30.45	-13.84	46.0	15.55	8.10	100	Vertical	PASS
515.97	33.89	-12.18	46.0	12.11	358.20	100	Vertical	PASS
595.35	33.25	-10.15	46.0	12.75	9.50	100	Vertical	PASS

30MHz to 1GHz, ANT H



Frequency (MHz)	Q-peak (dBuV/m)	Factor (dB)	QP Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
90.02	21.77	-21.38	43.5	21.73	40.30	100	Horizontal	PASS
159.72	34.30	-22.45	43.5	9.20	129.70	100	Horizontal	PASS
213.93	37.01	-19.70	43.5	6.49	87.00	100	Horizontal	PASS
302.99	36.39	-17.13	46.0	9.61	0.30	100	Horizontal	PASS
556.63	28.53	-11.17	46.0	17.47	323.20	100	Horizontal	PASS
864.47	32.38	-5.59	46.0	13.62	59.60	100	Horizontal	PASS

Test Data and Plots (1GHz ~ 10th Harmonic)

Note: Where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

GFSK Mode:

LOW CHANNEL								
Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2402.25	80.48	--	114.0	94.0	320.70	Vertical	PASS
Harmonic and Spurious	1187.62	44.99	--	74.0	54.0	112.00	Vertical	PASS
	1722.55	44.29	--	74.0	54.0	144.50	Vertical	PASS
	2960.08	47.80	--	74.0	54.0	191.00	Vertical	PASS
	3323.35	46.79	--	74.0	54.0	267.80	Vertical	PASS
	4802.40	49.96	--	74.0	54.0	331.80	Vertical	PASS
	7123.13	47.11	--	74.0	54.0	54.80	Vertical	PASS
	9279.53	47.62	--	74.0	54.0	295.80	Vertical	PASS
	11121.46	50.95	--	74.0	54.0	116.60	Vertical	PASS
	14195.51	48.11	--	74.0	54.0	47.70	Vertical	PASS
	16348.17	48.57	--	74.0	54.0	105.70	Vertical	PASS
	19011.20	50.35		74.0	54.0	256.50	Vertical	PASS
Fundamental	2401.25	87.93	--	114.0	94.0	37.20	Horizontal	PASS
Harmonic and Spurious	1355.29	43.17	--	74.0	54.0	125.30	Horizontal	PASS
	1982.04	43.94	--	74.0	54.0	241.40	Horizontal	PASS
	2860.28	47.45	--	74.0	54.0	288.50	Horizontal	PASS
	3323.35	49.08	--	74.0	54.0	276.70	Horizontal	PASS
	4802.40	50.92	--	74.0	54.0	359.70	Horizontal	PASS
	7123.13	46.56	--	74.0	54.0	4.20	Vertical	PASS
	9717.55	48.83	--	74.0	54.0	226.00	Vertical	PASS
	12042.43	52.23	--	74.0	54.0	287.50	Vertical	PASS
	14216.31	47.27	--	74.0	54.0	150.80	Vertical	PASS
	16348.17	48.23	--	74.0	54.0	-0.00	Vertical	PASS
	19009.98	50.29	--	74.0	54.0	360.00	Vertical	PASS
MID CHANNEL								
Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2441.02	82.25	--	114.0	94.0	47.70	Vertical	PASS
Harmonic and Spurious	1387.23	43.28	--	74.0	54.0	359.60	Vertical	PASS
	2197.60	46.23	--	74.0	54.0	279.00	Vertical	PASS
	2860.28	47.42	--	74.0	54.0	47.70	Vertical	PASS
	3323.35	46.66	--	74.0	54.0	349.00	Vertical	PASS
	4874.25	51.93	--	74.0	54.0	273.00	Vertical	PASS
	7123.13	47.40	--	74.0	54.0	14.80	Vertical	PASS
	9717.55	49.35	--	74.0	54.0	8.70	Vertical	PASS
	11570.72	51.12	--	74.0	54.0	296.70	Vertical	PASS
	14205.91	47.77	--	74.0	54.0	273.80	Vertical	PASS

	18147.26	49.03	--	74.0	54.0	0.70	Vertical	PASS
	21915.14	49.55	--	74.0	54.0	322.30	Vertical	PASS
Fundamental	2441.02	89.41	--	114.0	94.0	40.00	Horizontal	PASS
Harmonic and Spurious	1327.35	43.42	--	74.0	54.0	325.40	Horizontal	PASS
	2053.89	45.71	--	74.0	54.0	98.40	Horizontal	PASS
	2868.26	48.00	--	74.0	54.0	325.40	Horizontal	PASS
	3323.35	48.73	--	74.0	54.0	279.00	Horizontal	PASS
	4880.24	54.80	--	74.0	54.0	63.30	Horizontal	PASS
	7123.13	47.03	--	74.0	54.0	1.10	Horizontal	PASS
	9717.55	48.95	--	74.0	54.0	218.40	Horizontal	PASS
	11615.64	51.13	--	74.0	54.0	300.30	Horizontal	PASS
	14216.31	47.98	--	74.0	54.0	190.60	Horizontal	PASS
	18053.66	48.89	--	74.0	54.0	53.00	Horizontal	PASS
	21955.08	48.89	--	74.0	54.0	326.40	Horizontal	PASS
HIGH CHANNEL								
Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2480.11	82.62	--	114.0	94.0	50.80	Vertical	PASS
Harmonic and Spurious	1255.49	44.06	--	74.0	54.0	330.20	Vertical	PASS
	1786.43	44.53	--	74.0	54.0	134.60	Vertical	PASS
	2860.28	47.62	--	74.0	54.0	5.20	Vertical	PASS
	3323.35	47.32	--	74.0	54.0	266.60	Vertical	PASS
	4958.08	54.57	--	74.0	54.0	338.20	Vertical	PASS
	7156.82	46.49	--	74.0	54.0	341.40	Vertical	PASS
	9717.55	48.95	--	74.0	54.0	218.60	Vertical	PASS
	12042.43	51.92	--	74.0	54.0	301.00	Vertical	PASS
	14205.91	47.45	--	74.0	54.0	204.50	Vertical	PASS
	16223.38	48.76	--	74.0	54.0	335.60	Vertical	PASS
	21915.14	49.79	--	74.0	54.0	316.00	Vertical	PASS
Fundamental	2480.11	89.34	--	114.0	94.0	317.60	Horizontal	PASS
Harmonic and Spurious	1391.22	43.77	--	74.0	54.0	45.00	Horizontal	PASS
	2656.69	47.35	--	74.0	54.0	300.70	Horizontal	PASS
	3323.35	48.04	--	74.0	54.0	268.40	Horizontal	PASS
	4958.08	52.75	--	74.0	54.0	65.00	Horizontal	PASS
	5838.32	47.93	--	74.0	54.0	-0.00	Horizontal	PASS
	7123.13	46.61	--	74.0	54.0	4.20	Horizontal	PASS
	9717.55	49.07	--	74.0	54.0	150.50	Horizontal	PASS
	11121.46	50.68	--	74.0	54.0	20.30	Horizontal	PASS
	13665.14	47.52	--	74.0	54.0	301.00	Horizontal	PASS
	19179.70	50.71	--	74.0	54.0	355.90	Horizontal	PASS
	21915.14	49.25	--	74.0	54.0	306.00	Horizontal	PASS

Π/4-DQPSK Mode:

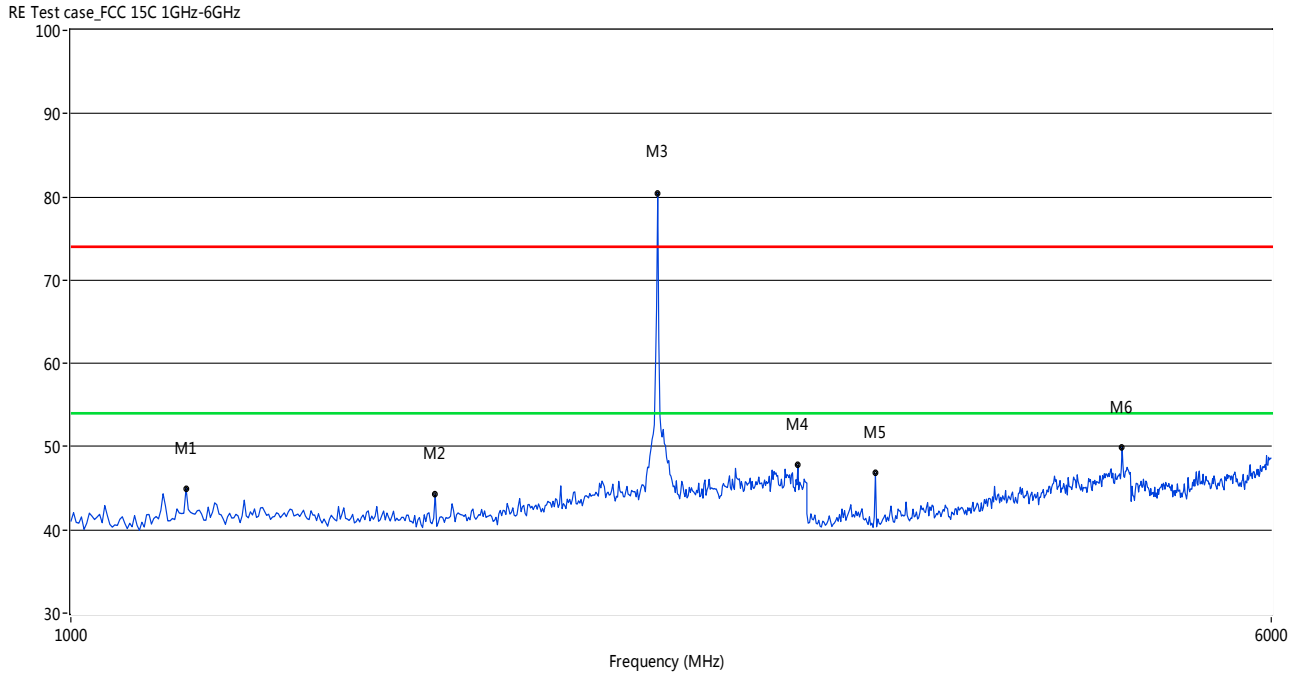
LOW CHANNEL								
Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2402.14	82.27	--	114.0	94.0	321.00	Vertical	PASS
Harmonic and Spurious	1151.70	44.15	--	74.0	54.0	348.70	Vertical	PASS
	2085.83	45.75	--	74.0	54.0	215.10	Vertical	PASS
	2920.16	48.09	--	74.0	54.0	256.70	Vertical	PASS
	3323.35	45.91	--	74.0	54.0	66.60	Vertical	PASS
	4802.40	48.79	--	74.0	54.0	77.90	Vertical	PASS
	7134.36	46.42	--	74.0	54.0	61.10	Vertical	PASS
	9717.55	49.35	--	74.0	54.0	212.90	Vertical	PASS
	11312.40	50.66	--	74.0	54.0	7.80	Vertical	PASS
	13519.55	47.98	--	74.0	54.0	238.10	Vertical	PASS
	19049.92	49.81	--	74.0	54.0	183.70	Vertical	PASS
	21915.14	49.25	--	74.0	54.0	135.20	Vertical	PASS
Fundamental	2402.14	85.38	--	114.0	94.0	39.20	Horizontal	PASS
Harmonic and Spurious	1491.02	42.86	--	74.0	54.0	345.30	Horizontal	PASS
	2037.92	44.41	--	74.0	54.0	345.30	Horizontal	PASS
	2920.16	47.38	--	74.0	54.0	183.40	Horizontal	PASS
	3323.35	48.30	--	74.0	54.0	67.20	Horizontal	PASS
	4802.40	52.18	--	74.0	54.0	45.00	Horizontal	PASS
	7123.13	46.96	--	74.0	54.0	61.90	Horizontal	PASS
	8223.79	46.05	--	74.0	54.0	2.30	Horizontal	PASS
	9987.10	49.20	--	74.0	54.0	7.80	Horizontal	PASS
	12042.43	52.18	--	74.0	54.0	281.80	Horizontal	PASS
	16275.37	48.46	--	74.0	54.0	360.30	Horizontal	PASS
	21875.21	49.52	--	74.0	54.0	194.10	Horizontal	PASS
MID CHANNEL								
Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2441.12	80.01	--	114.0	94.0	49.00	Vertical	PASS
Harmonic and Spurious	1147.70	43.51	--	74.0	54.0	358.50	Vertical	PASS
	2245.51	47.08	--	74.0	54.0	197.60	Vertical	PASS
	2860.28	47.57	--	74.0	54.0	308.70	Vertical	PASS
	3323.35	46.11	--	74.0	54.0	271.80	Vertical	PASS
	4880.24	49.36	--	74.0	54.0	327.70	Vertical	PASS
	7123.13	46.96	--	74.0	54.0	355.90	Vertical	PASS
	8369.80	46.05	--	74.0	54.0	214.80	Vertical	PASS
	9717.55	49.43	--	74.0	54.0	304.30	Vertical	PASS
	12289.52	51.37	--	74.0	54.0	272.70	Vertical	PASS
	16223.38	49.06	--	74.0	54.0	0.00	Vertical	PASS
	21915.14	49.74	--	74.0	54.0	214.20	Vertical	PASS
Fundamental	2441.20	85.60	--	114.0	94.0	38.40	Horizontal	PASS
Harmonic and Spurious	1391.22	43.72	--	74.0	54.0	338.40	Horizontal	PASS
	2916.17	47.77	--	74.0	54.0	327.30	Horizontal	PASS

	3323.35	48.24	--	74.0	54.0	273.60	Horizontal	PASS
	4347.31	47.55	--	74.0	54.0	151.00	Horizontal	PASS
	4880.40	51.40	--	74.0	54.0	51.50	Horizontal	PASS
	7156.82	46.53	--	74.0	54.0	7.50	Horizontal	PASS
	8223.79	46.26	--	74.0	54.0	95.40	Horizontal	PASS
	9717.55	49.49	--	74.0	54.0	301.20	Horizontal	PASS
	11312.40	51.02	--	74.0	54.0	1.10	Horizontal	PASS
	16223.38	47.81	--	74.0	54.0	88.60	Horizontal	PASS
	19409.32	49.92	--	74.0	54.0	93.00	Horizontal	PASS
HIGH CHANNEL								
Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2480.05	80.02	--	114.0	94.0	0.00	Vertical	PASS
Harmonic and Spurious	1147.70	43.93	--	74.0	54.0	224.20	Vertical	PASS
	2161.68	46.77	--	74.0	54.0	47.40	Vertical	PASS
	2708.58	46.63	--	74.0	54.0	205.40	Vertical	PASS
	3323.35	46.52	--	74.0	54.0	77.40	Vertical	PASS
	4958.08	52.73	--	74.0	54.0	337.30	Vertical	PASS
	7123.13	47.01	--	74.0	54.0	360.00	Vertical	PASS
	8549.50	46.35	--	74.0	54.0	150.60	Vertical	PASS
	9717.55	49.49	--	74.0	54.0	7.50	Vertical	PASS
	12042.43	52.01	--	74.0	54.0	82.10	Vertical	PASS
	16223.38	48.78	--	74.0	54.0	126.80	Vertical	PASS
	19179.70	50.30	--	74.0	54.0	48.70	Vertical	PASS
Fundamental	2480.53	86.57	--	114.0	94.0	346.10	Horizontal	PASS
Harmonic and Spurious	1427.15	43.60	--	74.0	54.0	329.50	Horizontal	PASS
	2209.58	46.12	--	74.0	54.0	39.30	Horizontal	PASS
	2864.27	47.45	--	74.0	54.0	184.60	Horizontal	PASS
	3323.35	48.52	--	74.0	54.0	274.60	Horizontal	PASS
	4960.07	52.13	--	74.0	54.0	35.10	Horizontal	PASS
	7123.13	47.01	--	74.0	54.0	0.50	Horizontal	PASS
	8223.79	46.26	--	74.0	54.0	307.30	Horizontal	PASS
	9717.55	49.49	--	74.0	54.0	300.30	Horizontal	PASS
	11166.39	50.55	--	74.0	54.0	88.40	Horizontal	PASS
	16348.17	48.65	--	74.0	54.0	346.40	Horizontal	PASS
	21196.34	48.41	--	74.0	54.0	336.40	Horizontal	PASS

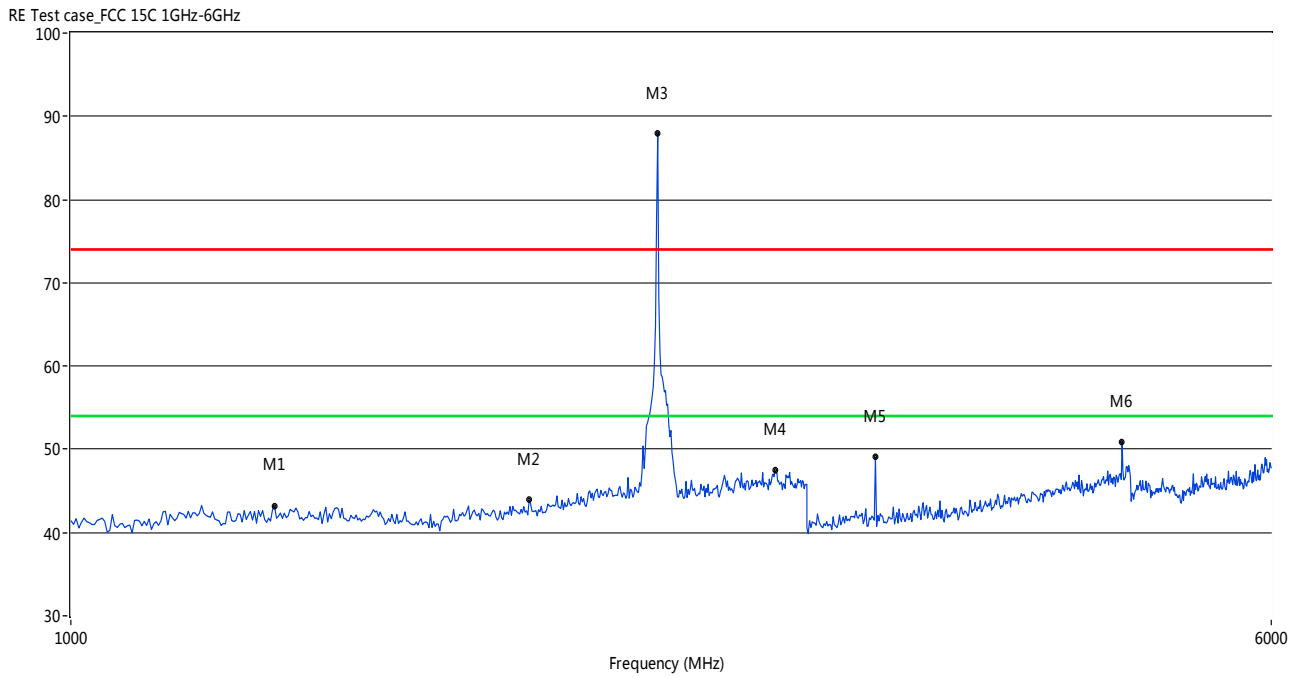
Notes:

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.

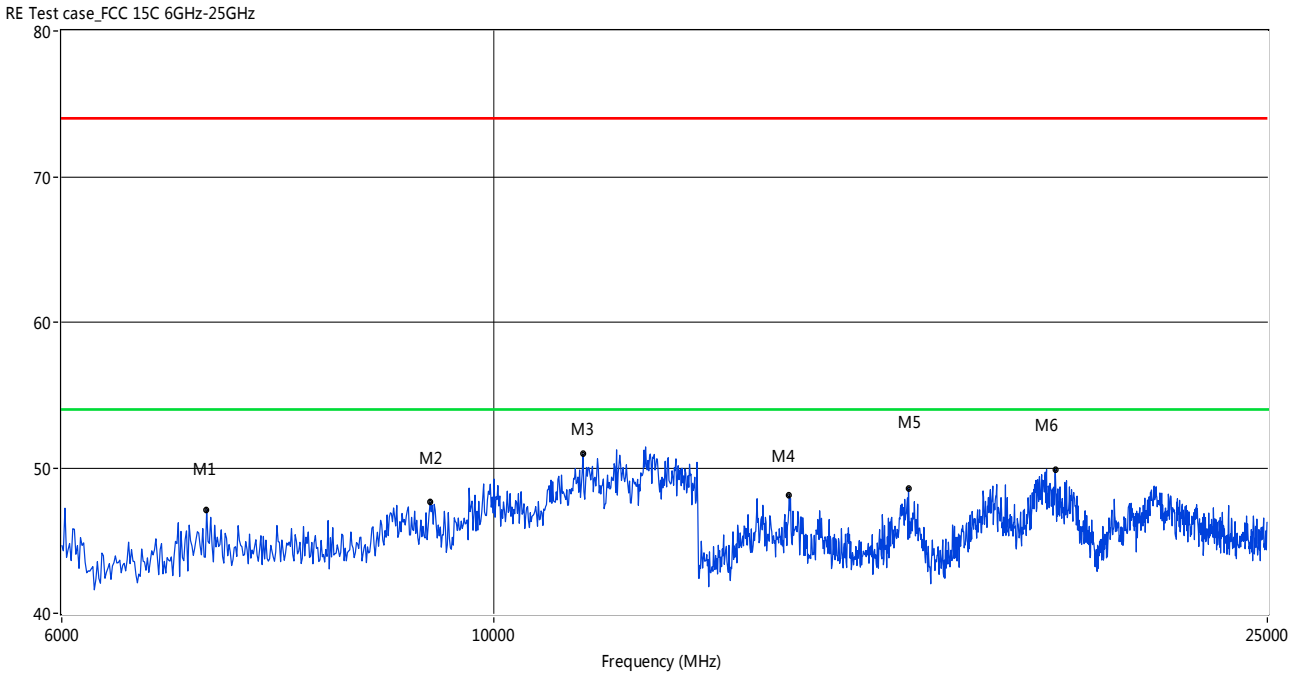
GFSK LOW CHANNEL 1GHz to 6GHz, ANT V



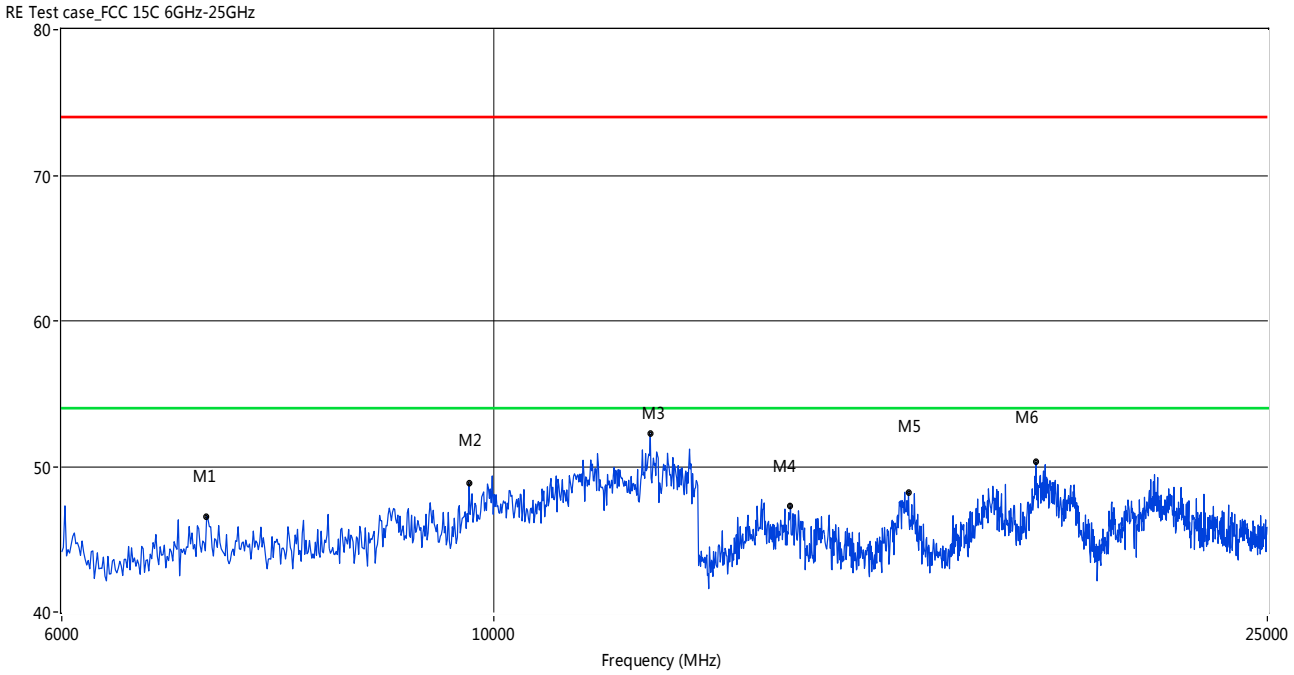
GFSK LOW CHANNEL 1GHz to 6GHz, ANT H



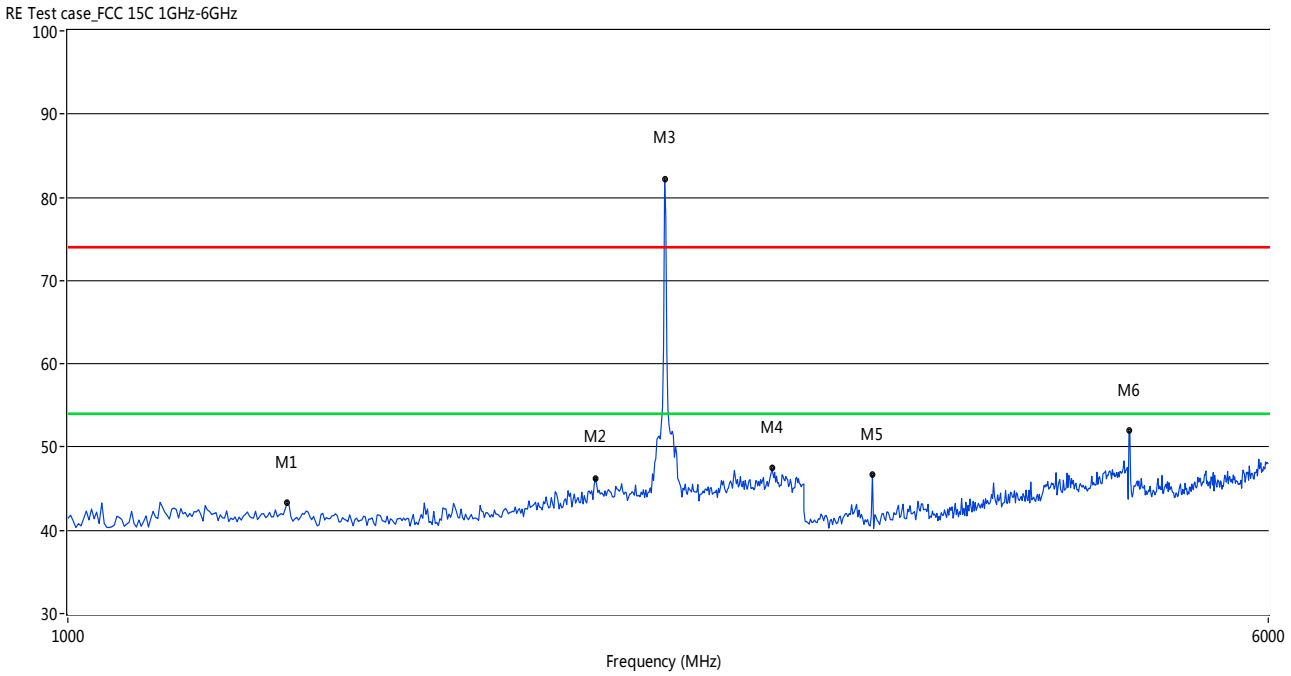
GFSK LOW CHANNEL 6GHz to 25GHz, ANT V



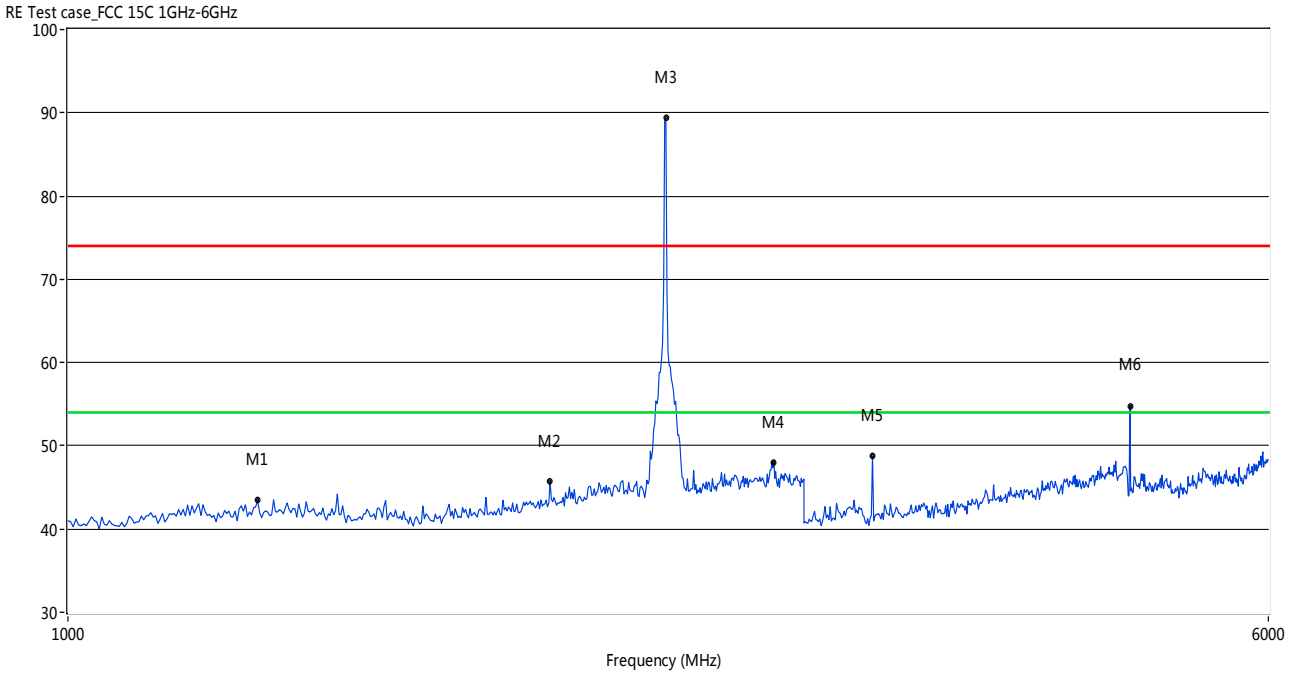
GFSK LOW CHANNEL 6GHz to 25GHz, ANT H



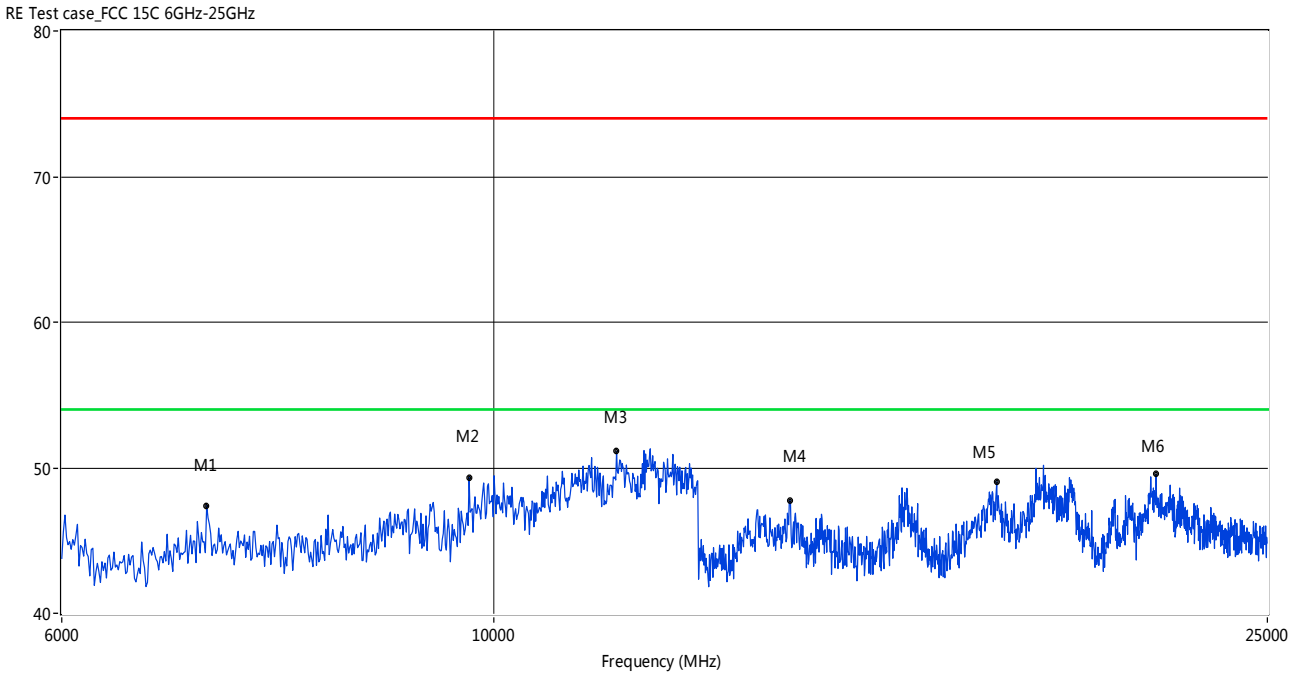
GFSK MID CHANNEL 1GHz to 6GHz, ANT V



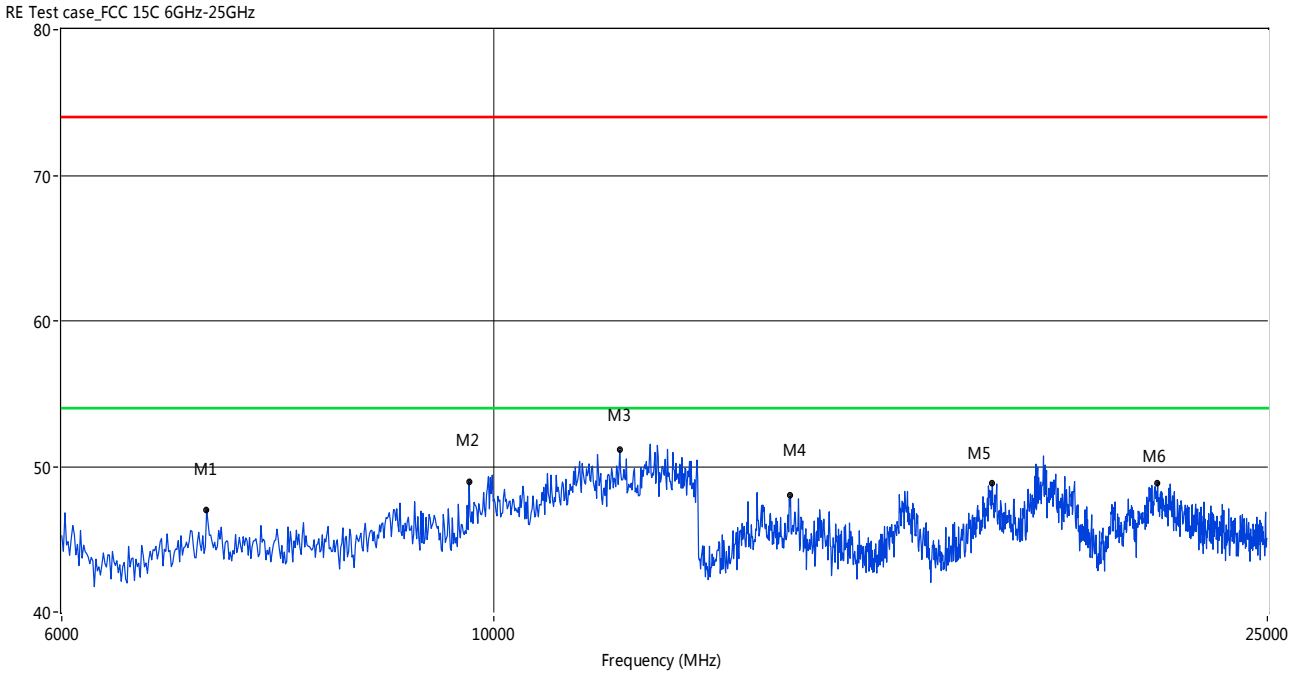
GFSK MID CHANNEL 1GHz to 6GHz, ANT H



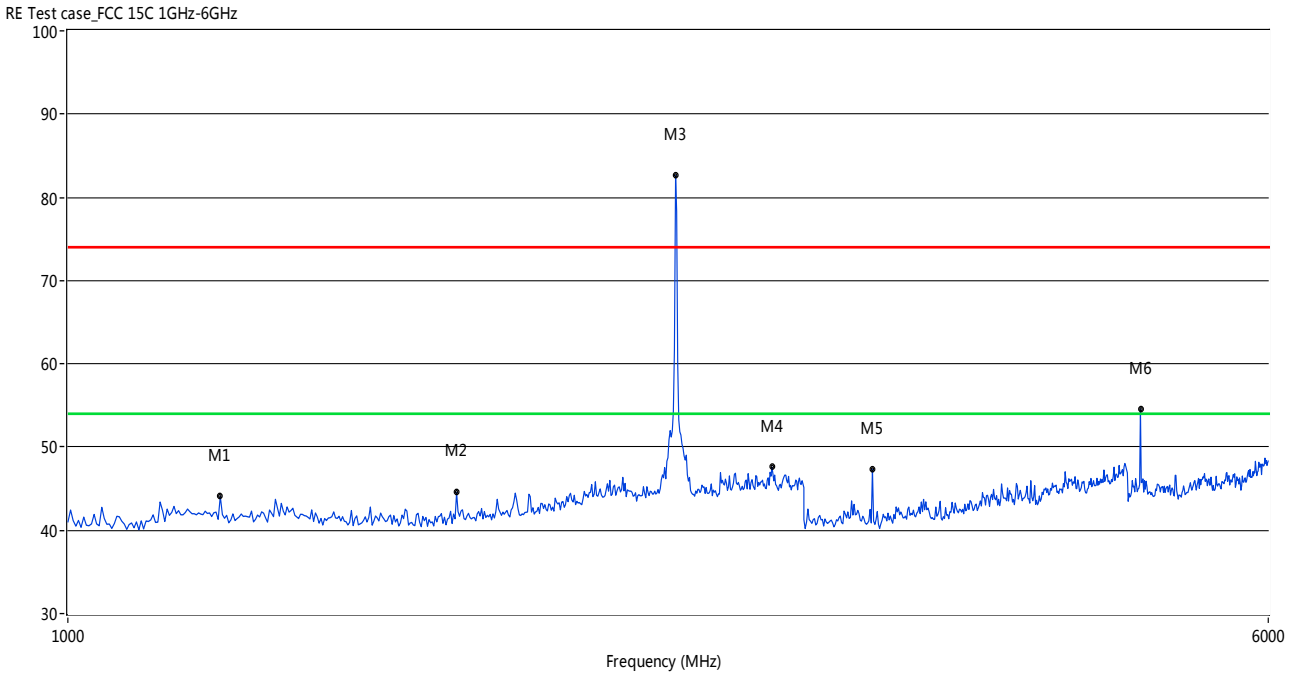
GFSK MID CHANNEL 6GHz to 25GHz, ANT V



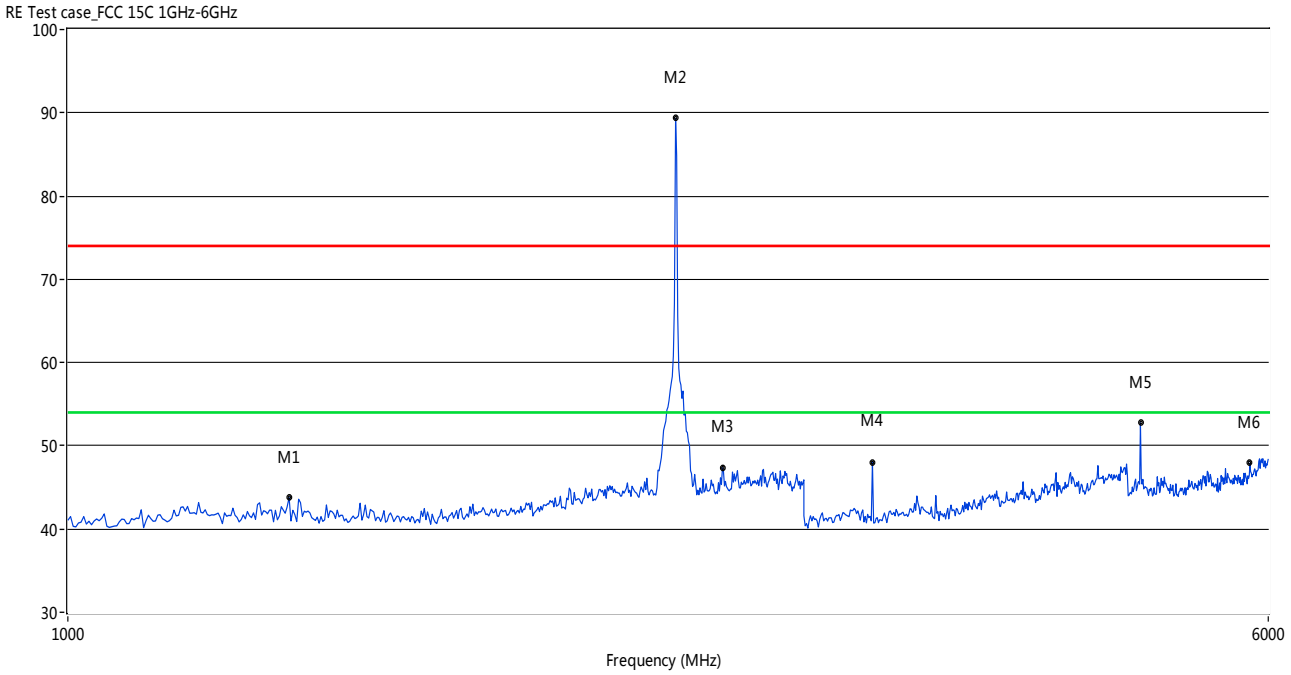
GFSK MID CHANNEL 6GHz to 25GHz, ANT H



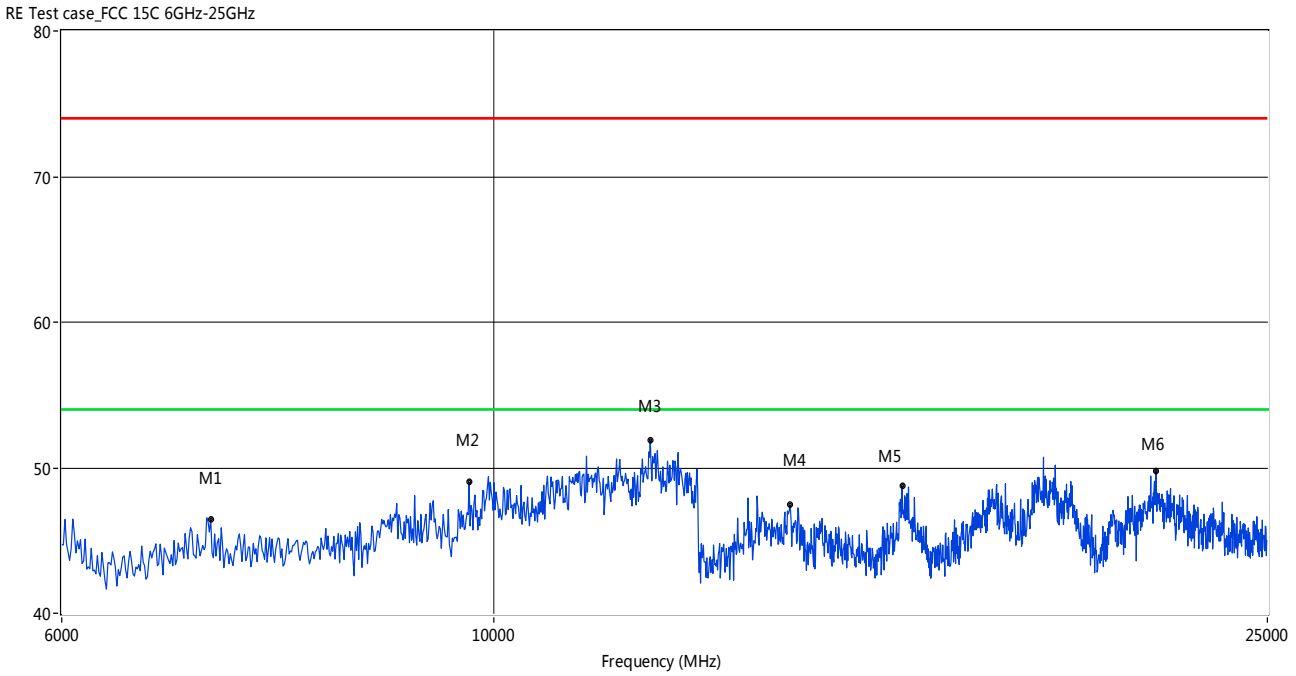
GFSK HIGH CHANNEL 1GHz to 6GHz, ANT V



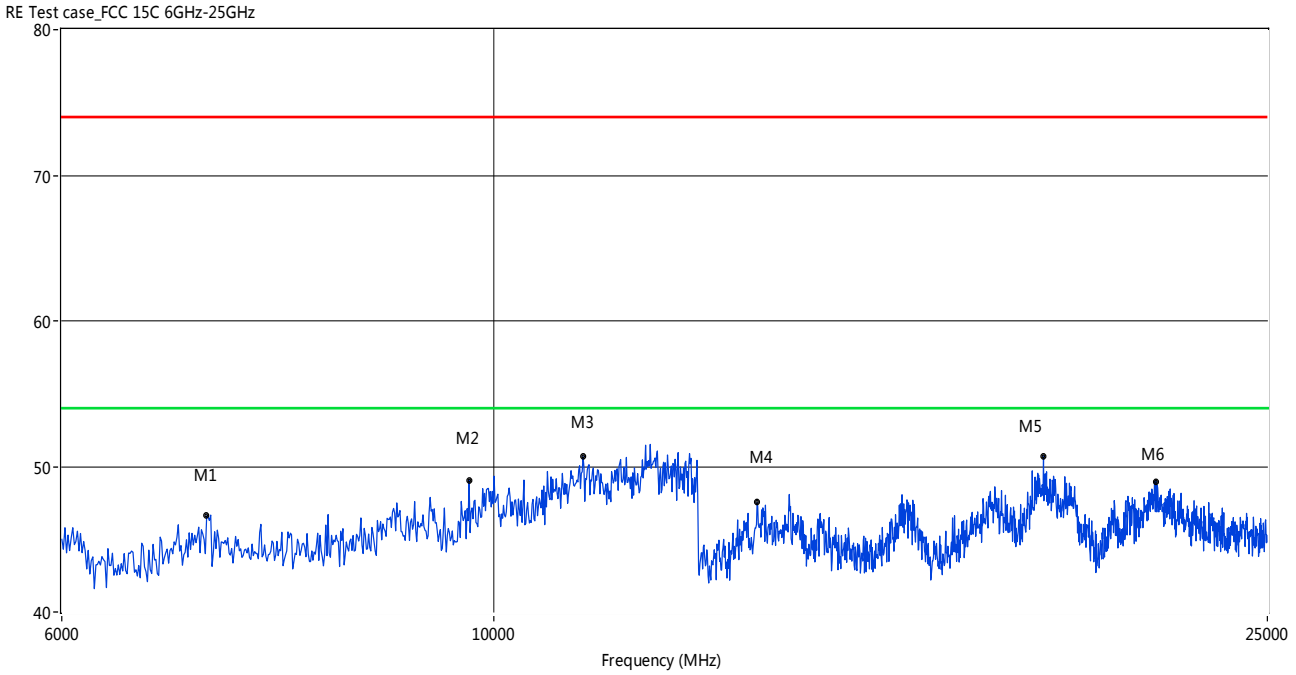
GFSK HIGH CHANNEL 1GHz to 6GHz, ANT H



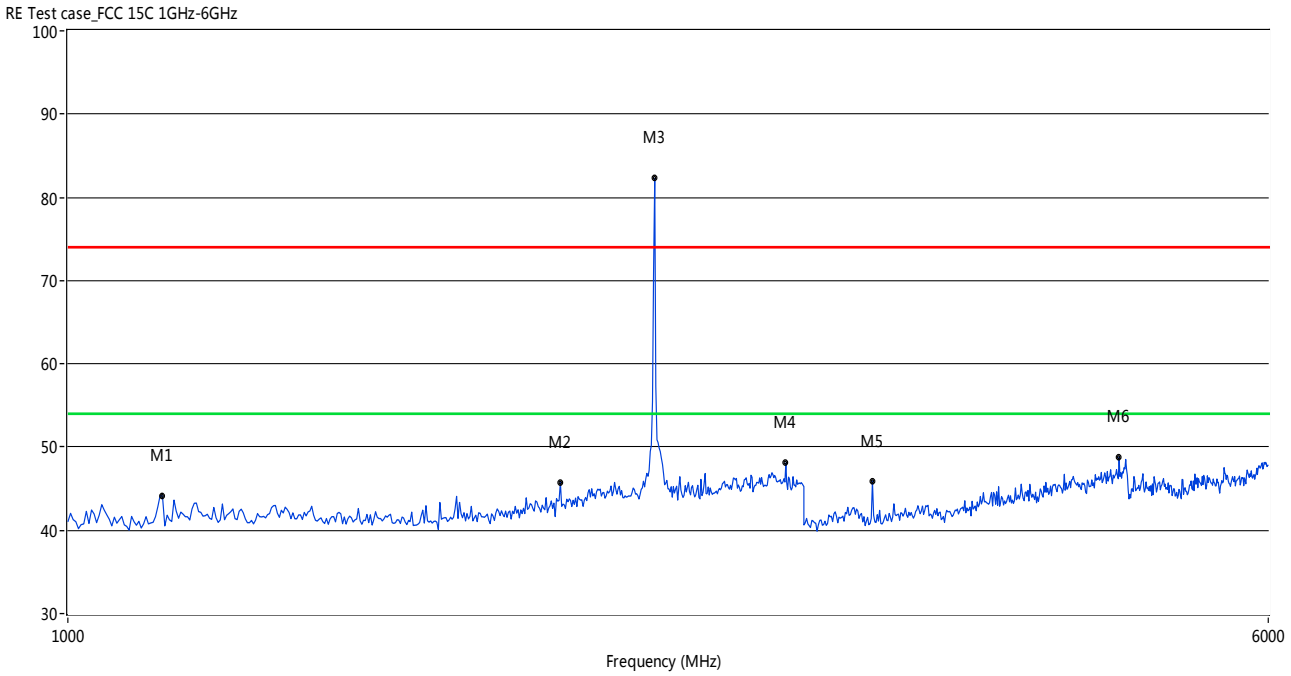
GFSK HIGH CHANNEL 6GHz to 25GHz, ANT V



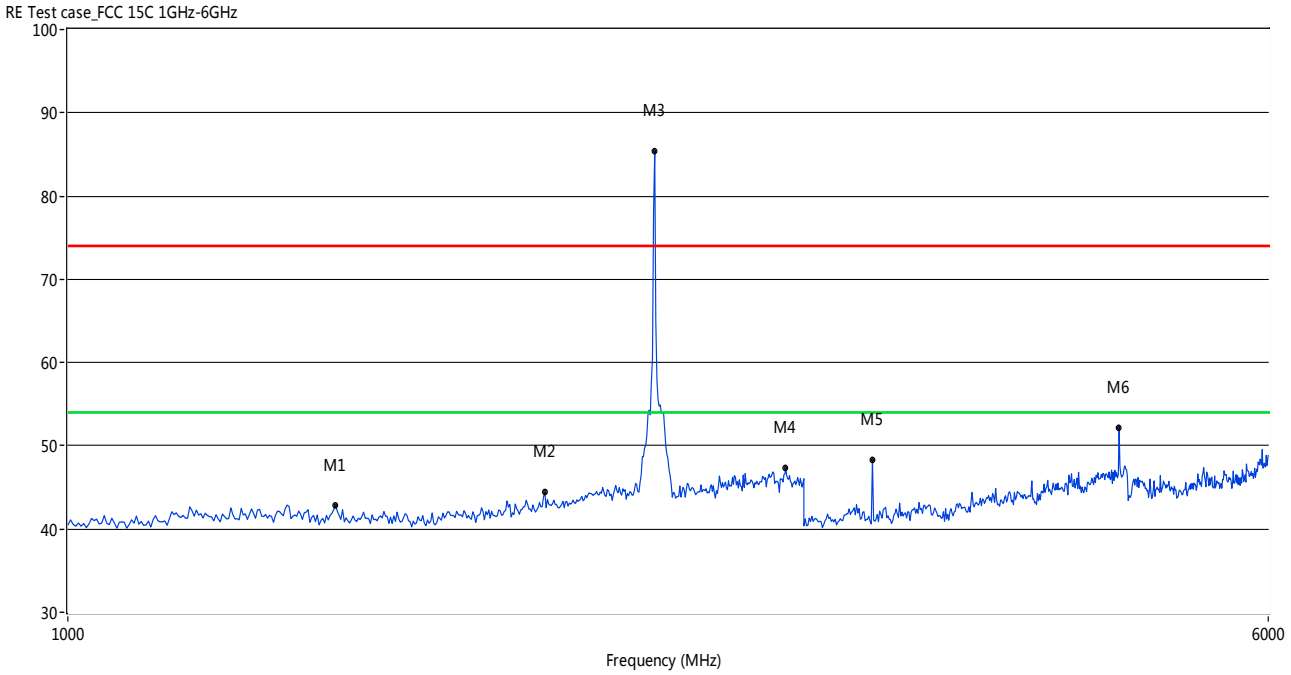
GFSK HIGH CHANNEL 6GHz to 25GHz, ANT H



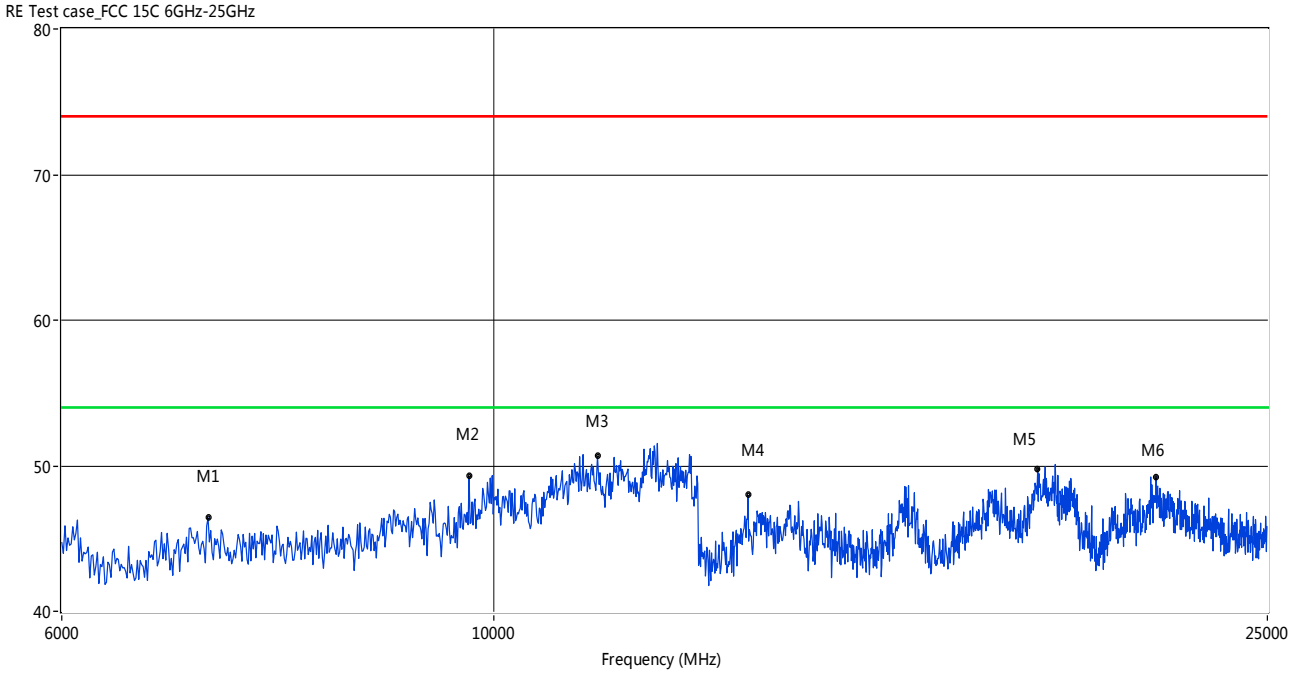
Π/4-DQPSK LOW CHANNEL 1GHz to 6GHz, ANT V



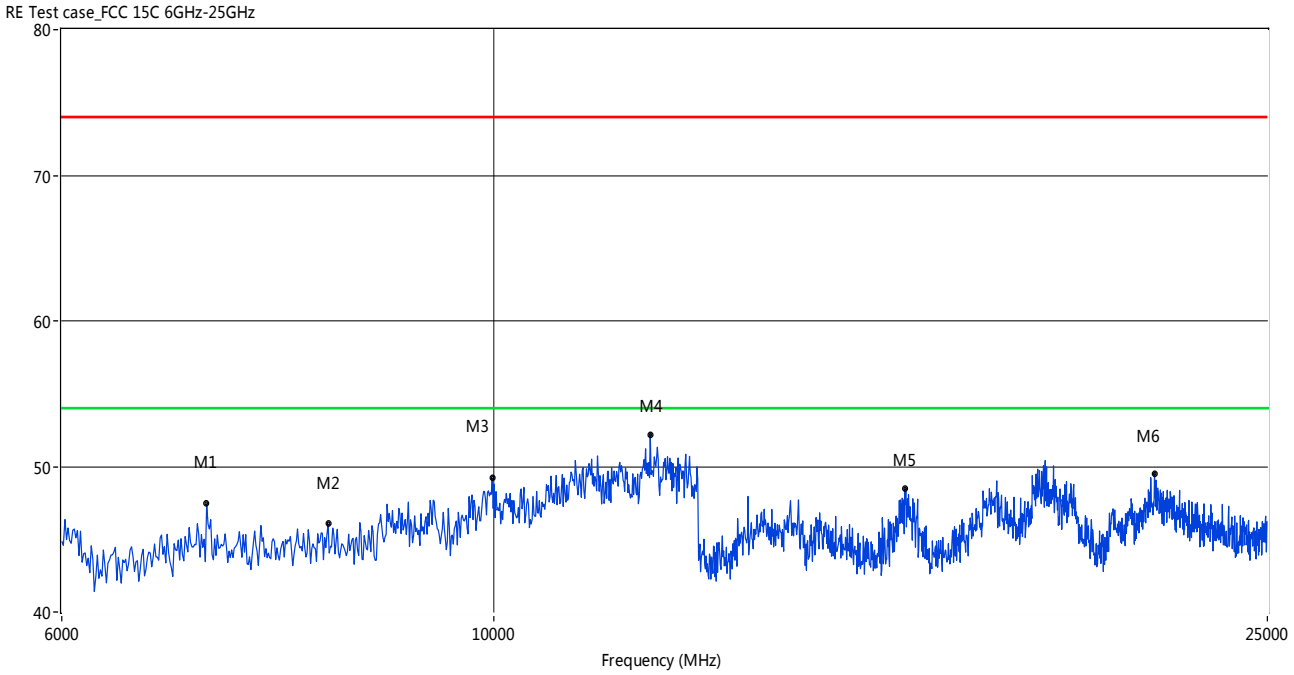
Π/4-DQPSK LOW CHANNEL 1GHz to 6GHz, ANT H



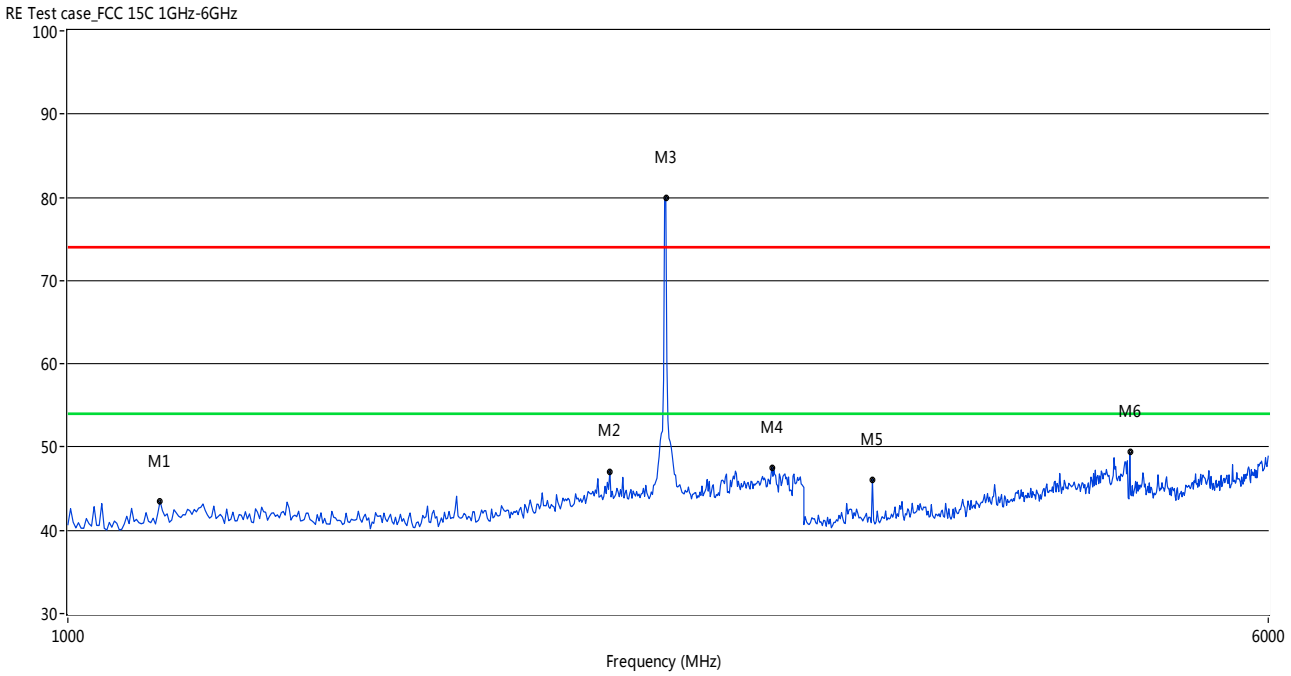
Π/4-DQPSK LOW CHANNEL 6GHz to 25GHz, ANT V



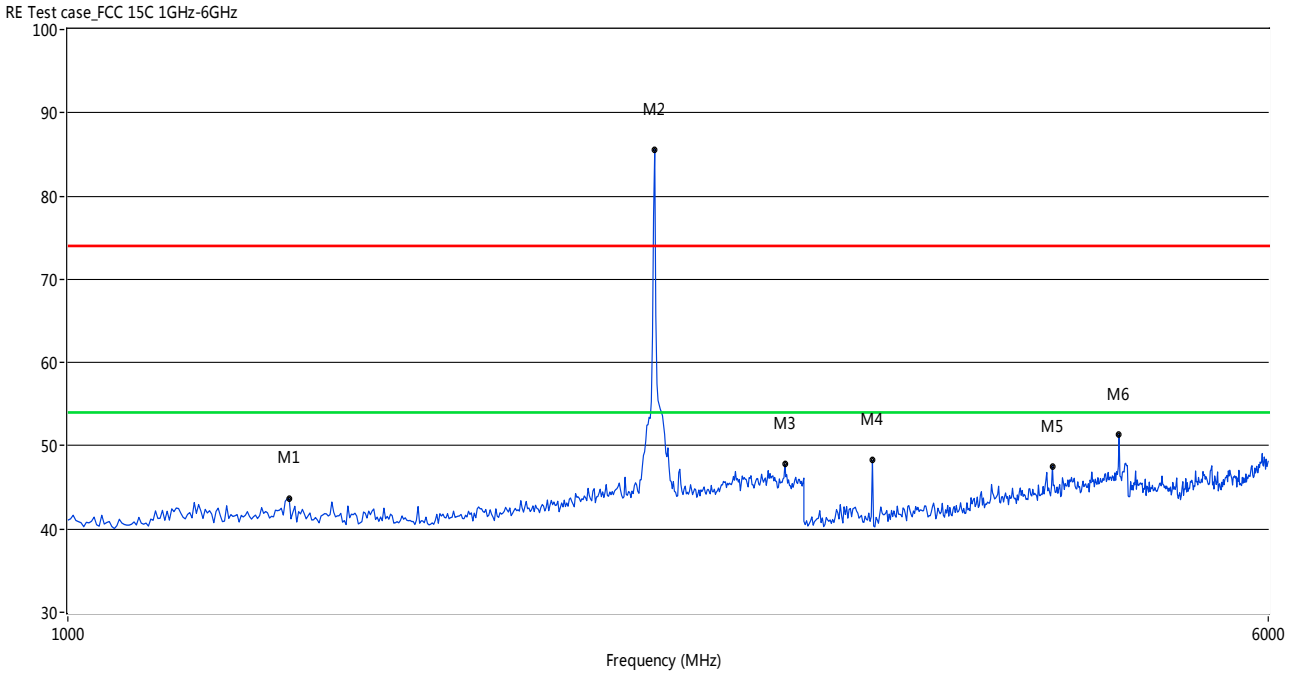
Π/4-DQPSK LOW CHANNEL 6GHz to 25GHz, ANT H



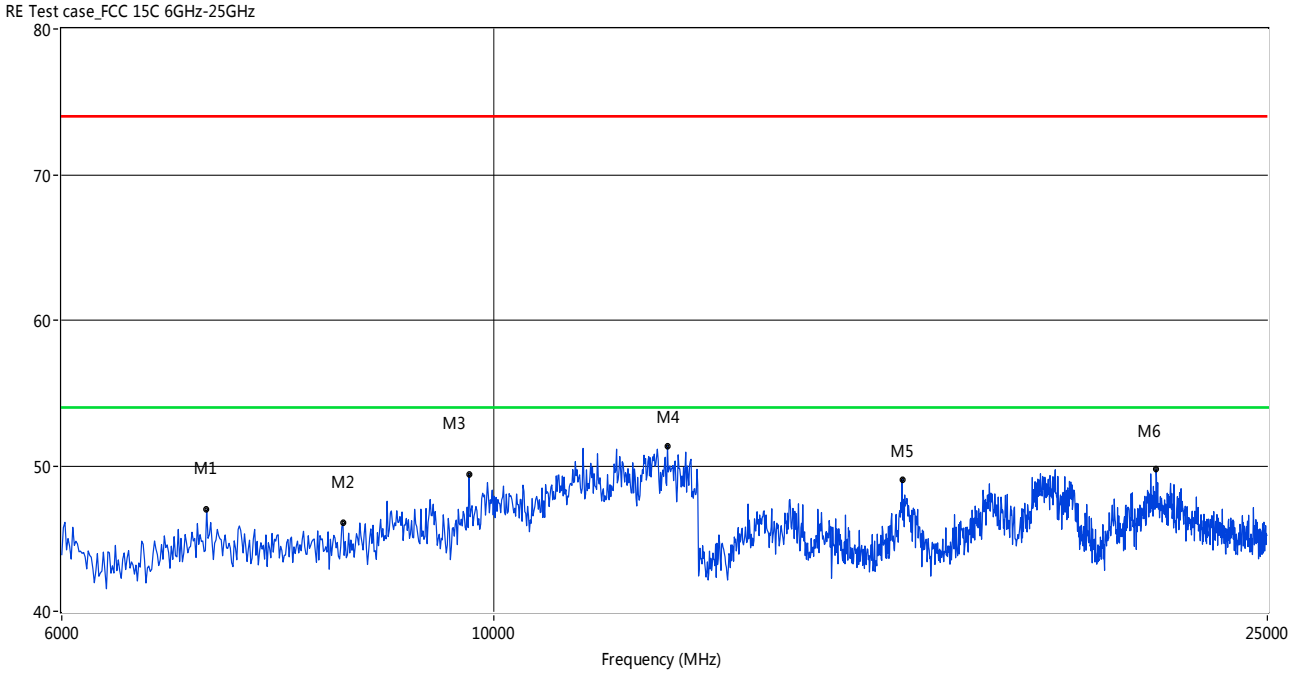
Π/4-DQPSK MID CHANNEL 1GHz to 6GHz, ANT V



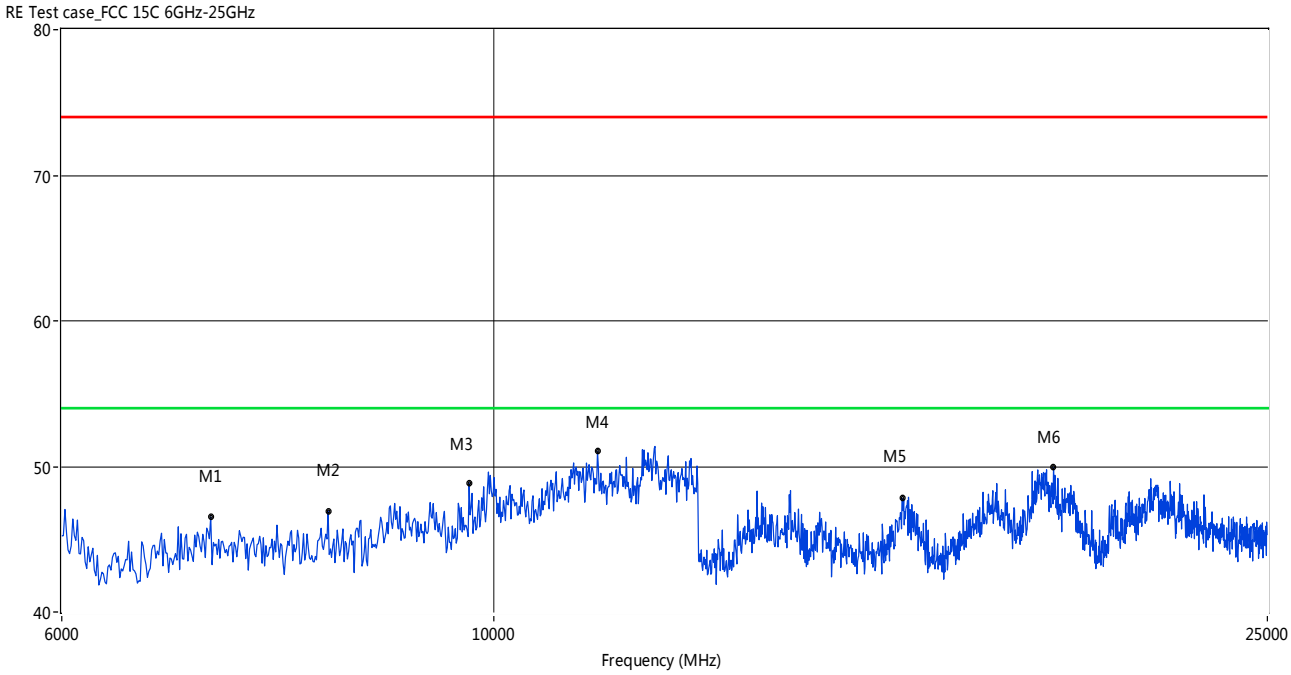
Π/4-DQPSK MID CHANNEL 1GHz to 6GHz, ANT H



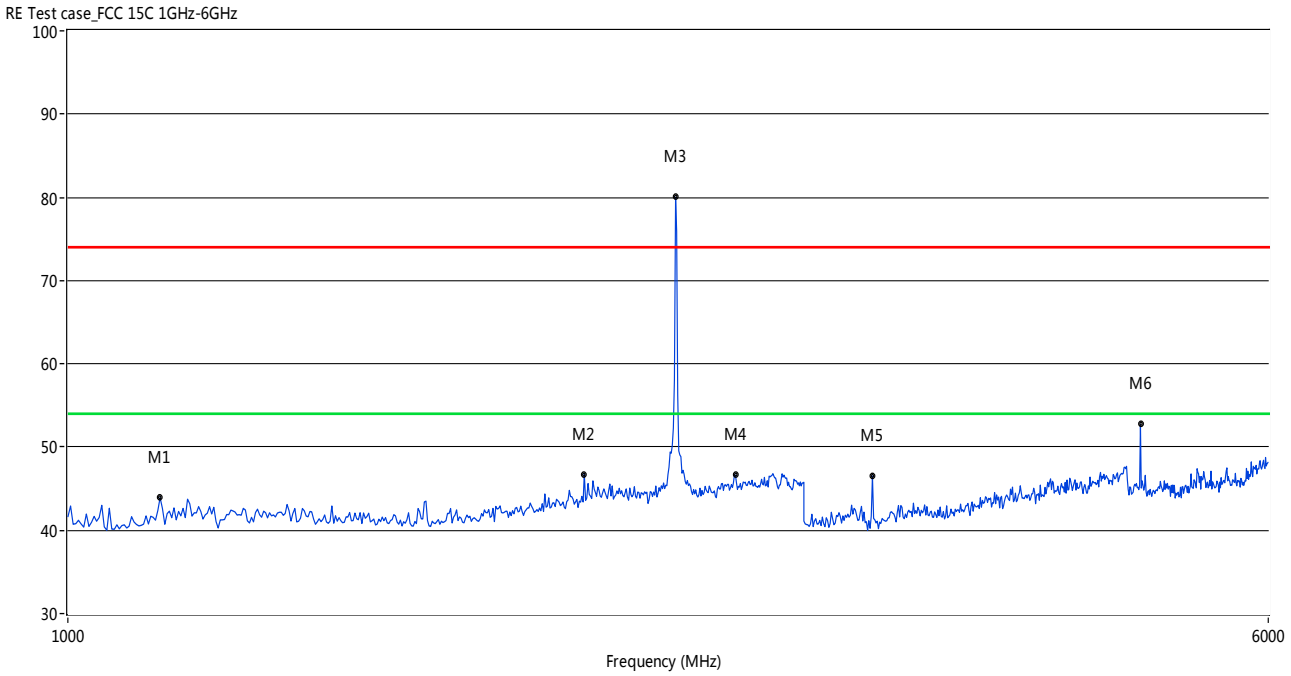
Π/4-DQPSK MID CHANNEL 6GHz to 25GHz, ANT V



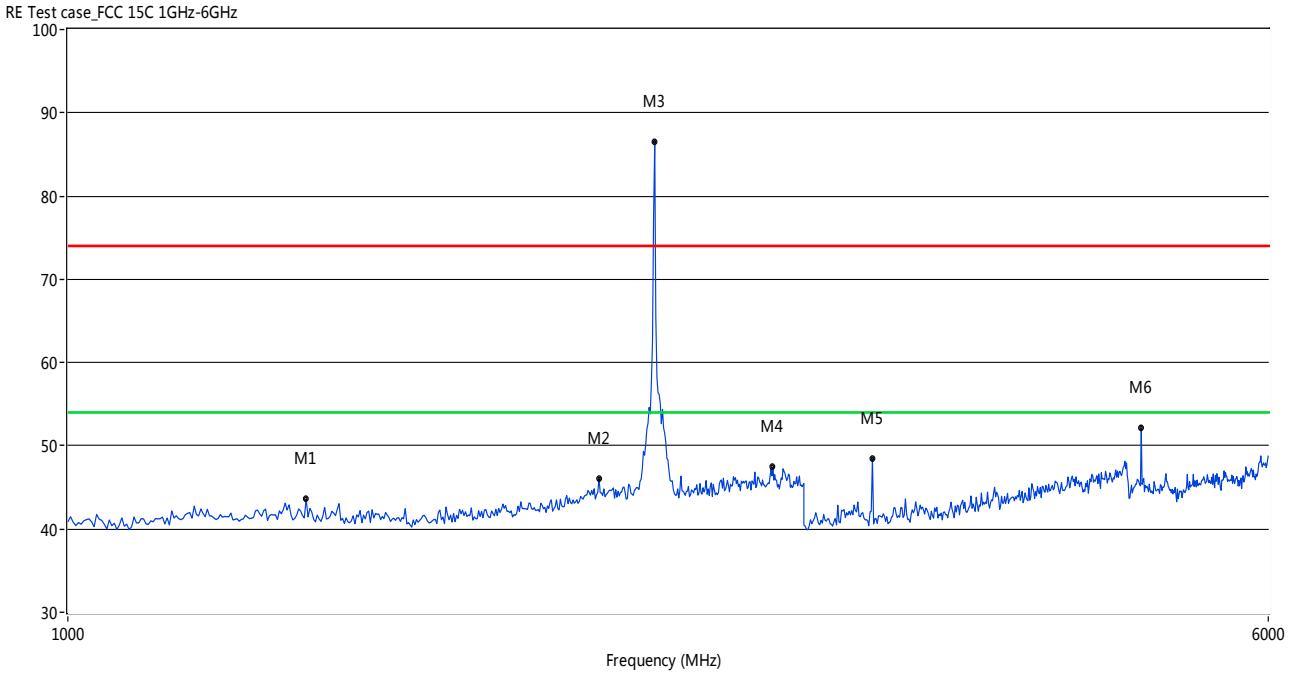
Π/4-DQPSK MID CHANNEL 6GHz to 25GHz, ANT H



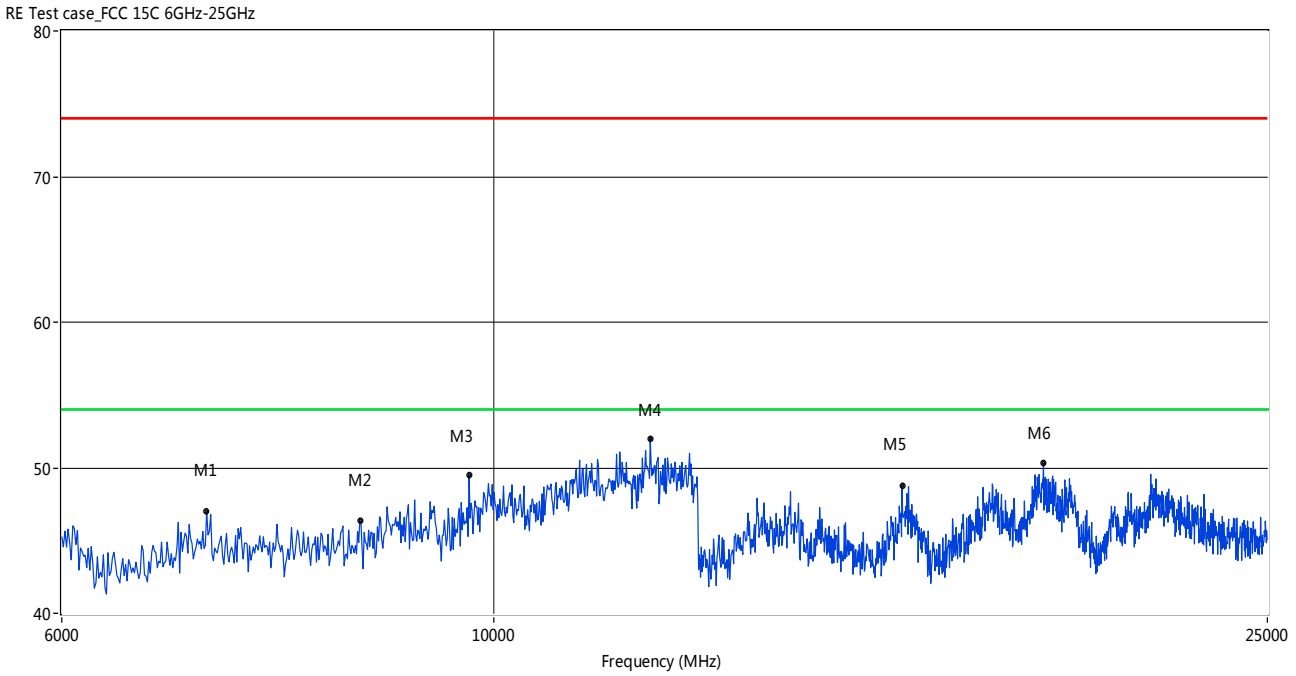
Π/4-DQPSK HIGH CHANNEL 1GHz to 6GHz, ANT V



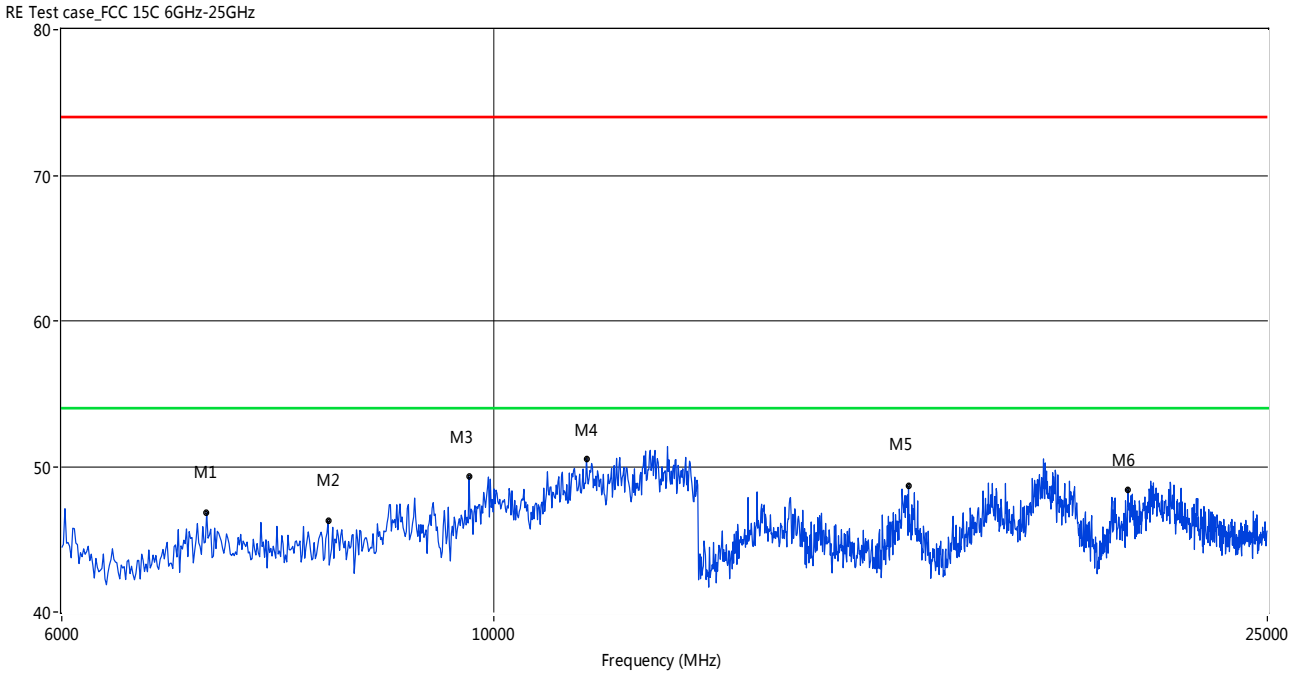
Π/4-DQPSK HIGH CHANNEL 1GHz to 6GHz, ANT H



Π/4-DQPSK HIGH CHANNEL 6GHz to 25GHz, ANT V



Π/4-DQPSK HIGH CHANNEL 6GHz to 25GHz, ANT H



Hopping Mode:

Notes:

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.

Test Data and Plots (1GHz ~ 10th Harmonic)

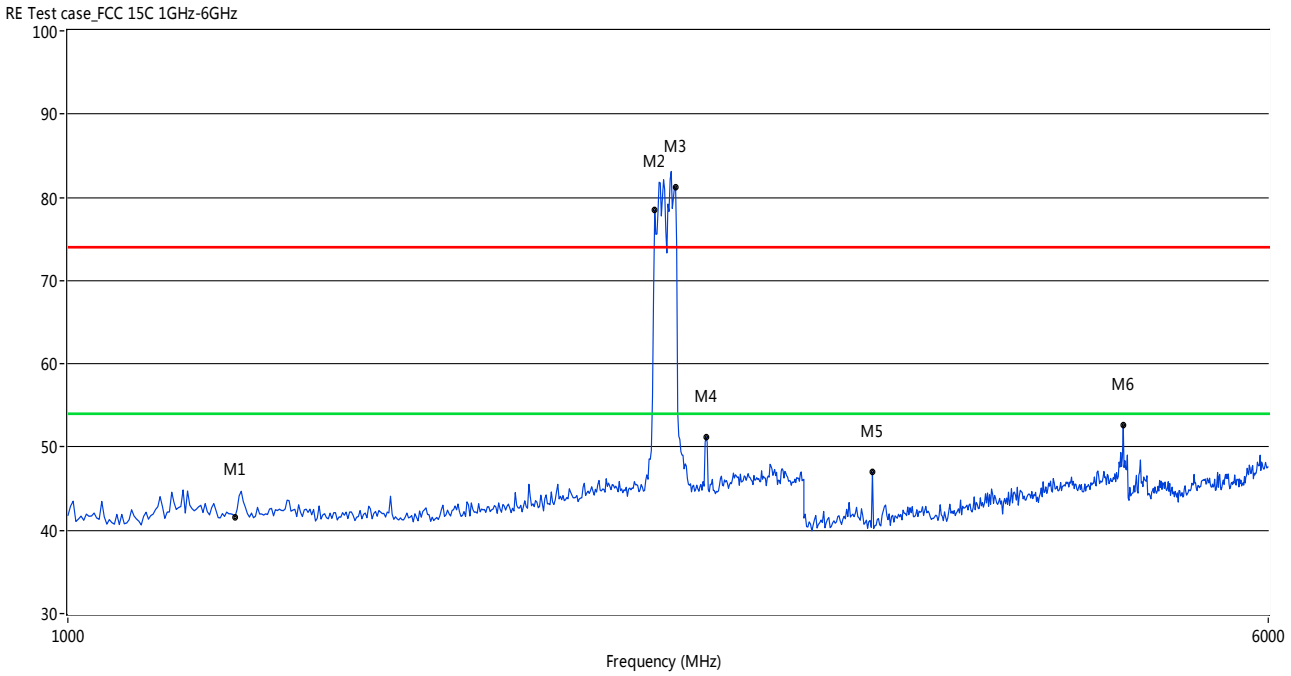
GFSK Mode:

Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2401.20	78.47	--	114.0	94.0	344.40	Vertical	PASS
Harmonic and Spurious	1295.41	44.70	--	74.0	54.0	361.00	Vertical	PASS
	2477.05	81.22	--	74.0	54.0	324.60	Vertical	PASS
	2592.81	51.18	--	74.0	54.0	229.60	Vertical	PASS
	3323.35	46.99	--	74.0	54.0	80.50	Vertical	PASS
	4832.34	52.65	--	74.0	54.0	82.80	Vertical	PASS
	7123.13	47.01	--	74.0	54.0	68.70	Vertical	PASS
	8223.79	46.26	--	74.0	54.0	157.50	Vertical	PASS
	9717.55	49.49	--	74.0	54.0	7.80	Vertical	PASS
	11121.46	50.99	--	74.0	54.0	95.80	Vertical	PASS
	16275.37	48.44	--	74.0	54.0	360.70	Vertical	PASS
Fundamental	2401.20	85.67	--	114.0	94.0	316.90	Horizontal	PASS
Harmonic and Spurious	1215.57	51.79	--	74.0	54.0	54.10	Horizontal	PASS
	2093.81	49.40	--	74.0	54.0	43.00	Horizontal	PASS
	2473.05	84.75	--	74.0	54.0	202.10	Horizontal	PASS
	2688.62	51.59	--	74.0	54.0	344.60	Horizontal	PASS
	4952.10	54.38	49.24	74.0	54.0	73.80	Horizontal	PASS
	7123.13	46.74	--	74.0	54.0	2.60	Horizontal	PASS
	7987.94	45.31	--	74.0	54.0	359.60	Horizontal	PASS
	9717.55	49.55	--	74.0	54.0	296.50	Horizontal	PASS
	13519.55	48.24	--	74.0	54.0	359.50	Horizontal	PASS
	16223.38	49.02	--	74.0	54.0	350.50	Horizontal	PASS

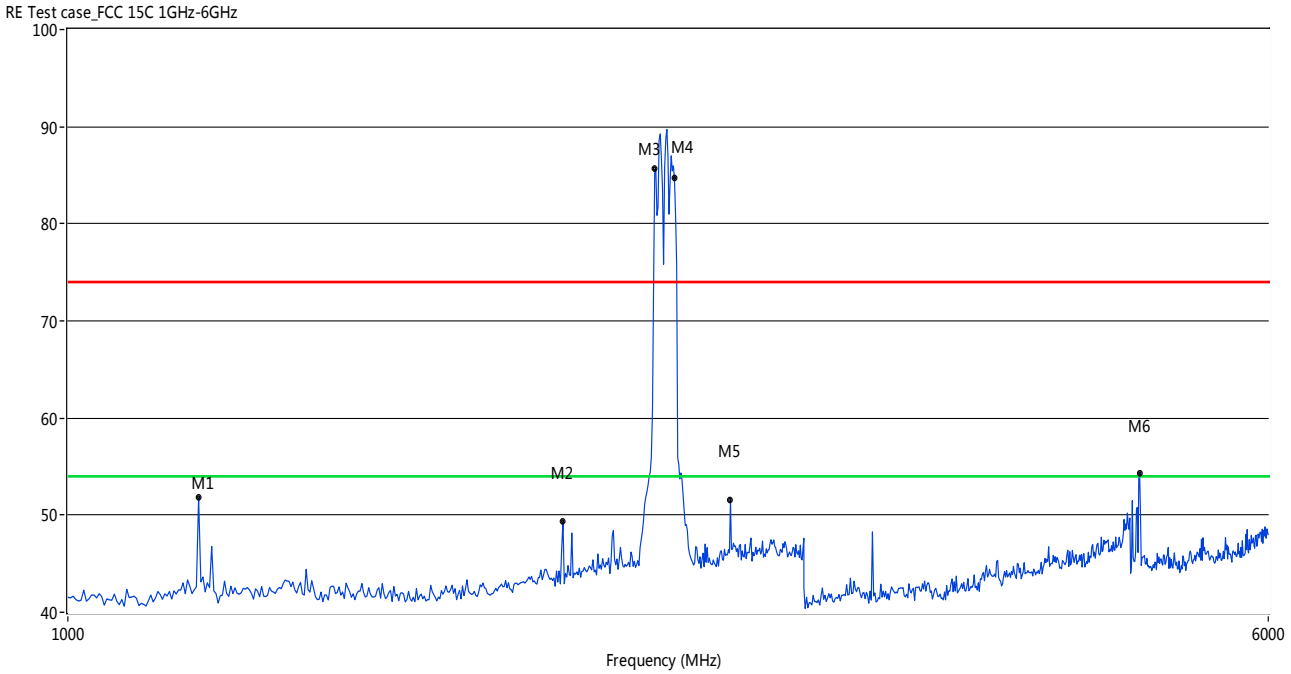
Π/4-DQPSK Mode:

Fre. (MHz)		Pk	AV	Limit-PK	Limit-AV	Degree	Antenna	Verdict
Fundamental	2401.20	80.53	--	114.0	94.0	322.40	Vertical	PASS
Harmonic and Spurious	1327.35	44.79	--	74.0	54.0	318.90	Vertical	PASS
	2209.58	46.96	--	74.0	54.0	277.00	Vertical	PASS
	2469.06	83.41	--	74.0	54.0	49.60	Vertical	PASS
	2596.81	52.05	--	74.0	54.0	222.40	Vertical	PASS
	4808.38	51.14	--	74.0	54.0	332.90	Vertical	PASS
	7123.13	47.28	--	74.0	54.0	294.10	Vertical	PASS
	8223.79	46.26	--	74.0	54.0	1.00	Vertical	PASS
	9987.10	49.36	--	74.0	54.0	0.00	Vertical	PASS
	11312.40	51.02	--	74.0	54.0	41.90	Vertical	PASS
	16316.97	48.52	--	74.0	54.0	247.80	Vertical	PASS
Fundamental	2405.19	82.96	--	114.0	94.0	220.80	Horizontal	PASS
Harmonic and Spurious	1219.56	50.21	--	74.0	54.0	13.60	Horizontal	PASS
	2169.66	50.15	--	74.0	54.0	0.80	Horizontal	PASS
	2477.05	83.76	--	74.0	54.0	314.60	Horizontal	PASS
	4808.38	52.35	--	74.0	54.0	54.50	Horizontal	PASS
	4946.11	52.22	--	74.0	54.0	72.60	Horizontal	PASS
	6887.27	46.37	--	74.0	54.0	288.50	Horizontal	PASS
	7740.85	46.14	--	74.0	54.0	302.20	Horizontal	PASS
	9717.55	49.55	--	74.0	54.0	205.40	Horizontal	PASS
	14216.31	48.06	--	74.0	54.0	322.00	Horizontal	PASS
	17585.69	47.25	--	74.0	54.0	248.40	Horizontal	PASS

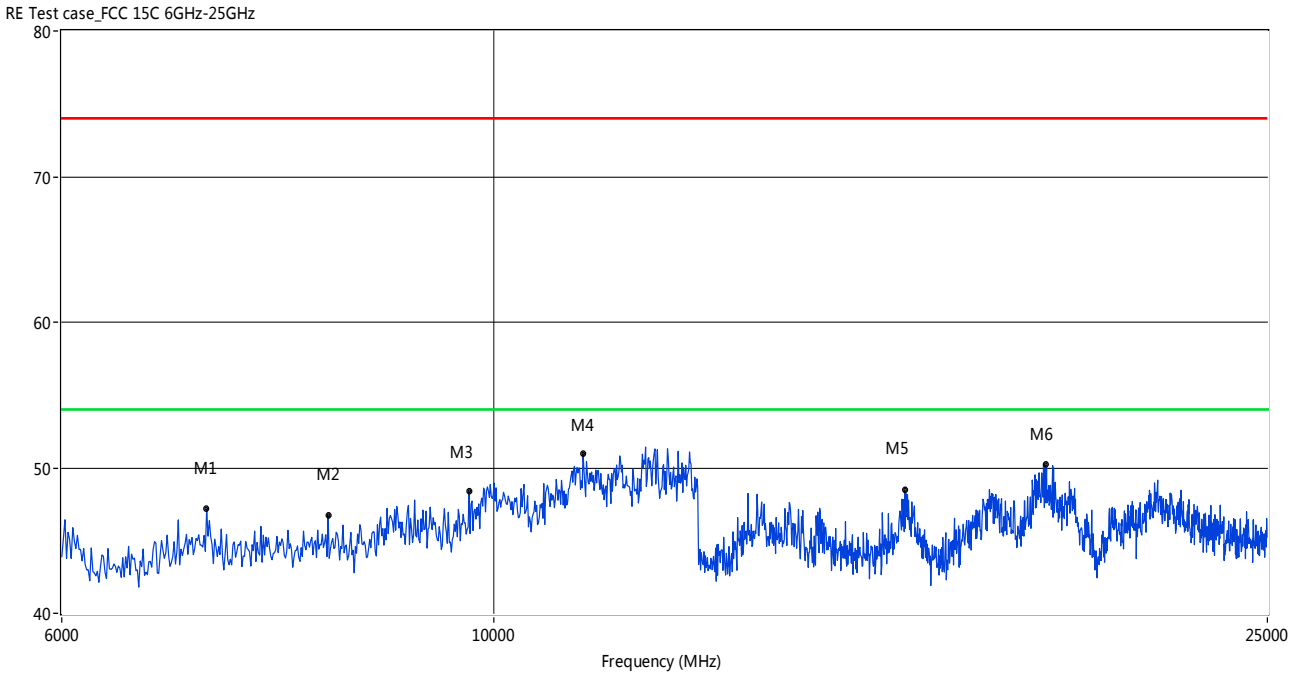
GFSK MODE 1GHz to 6GHz, ANT V



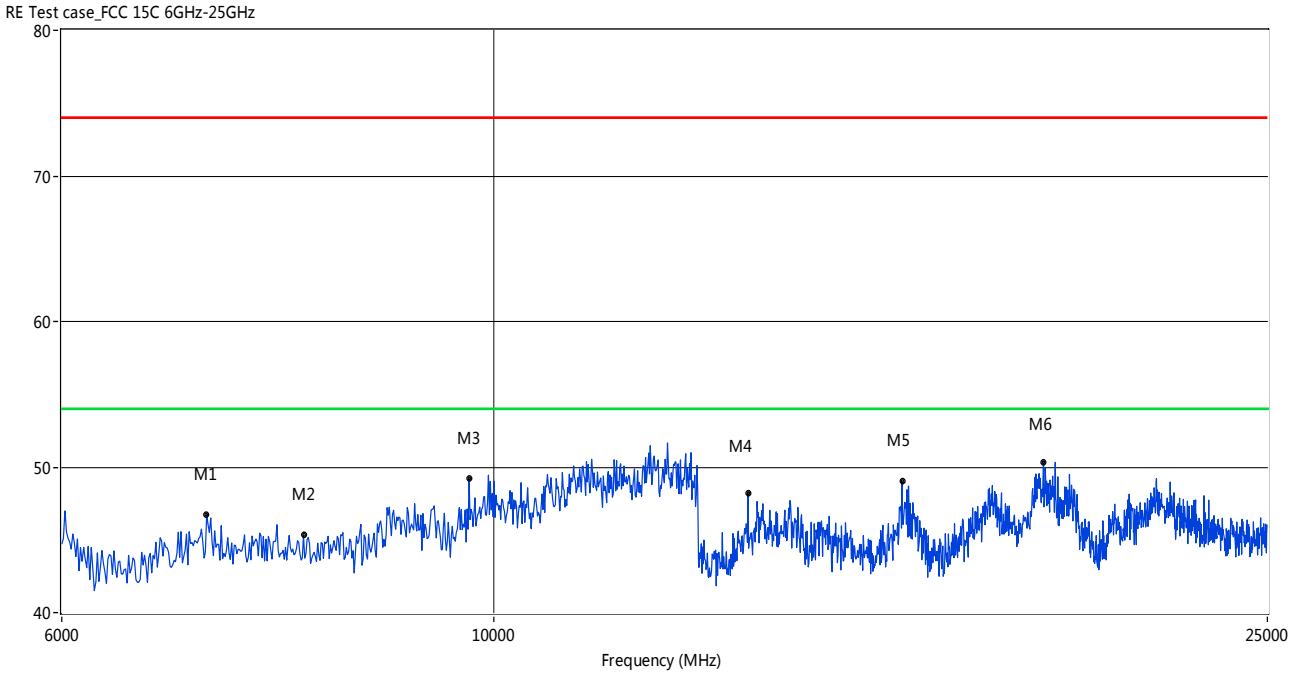
GFSK MODE 1GHz to 6GHz, ANT H



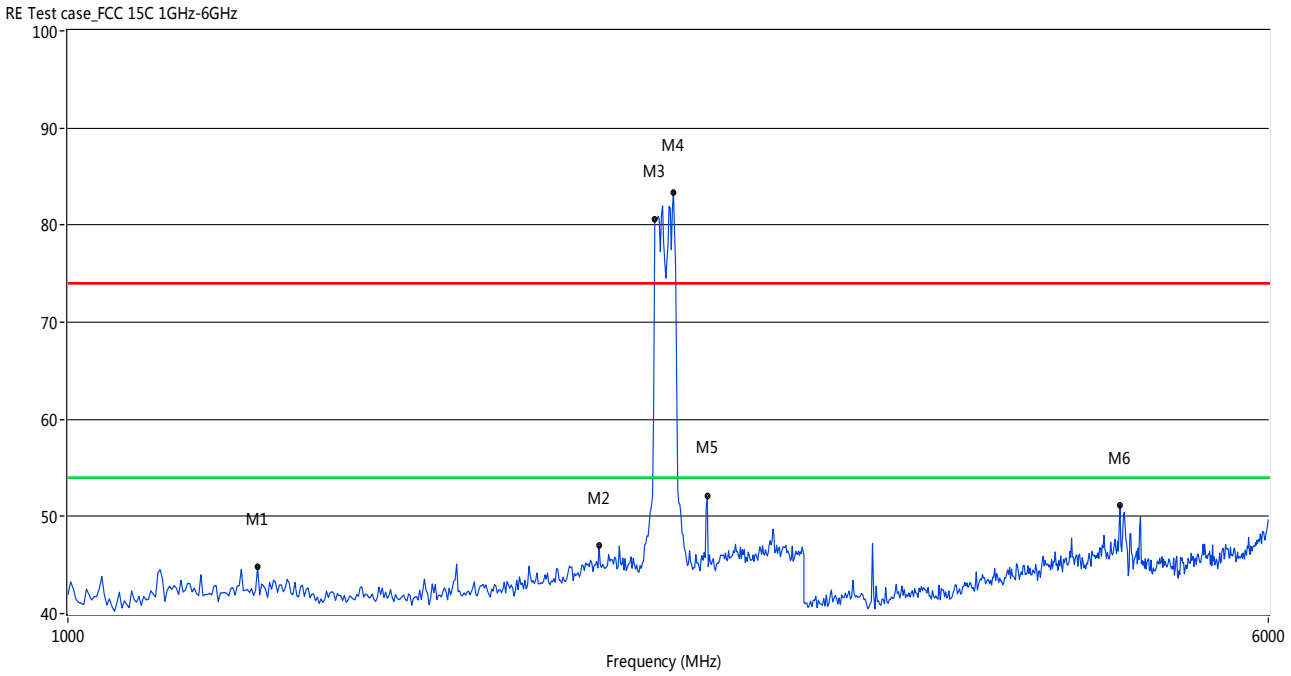
GFSK MODE 6GHz to 25GHz, ANT V



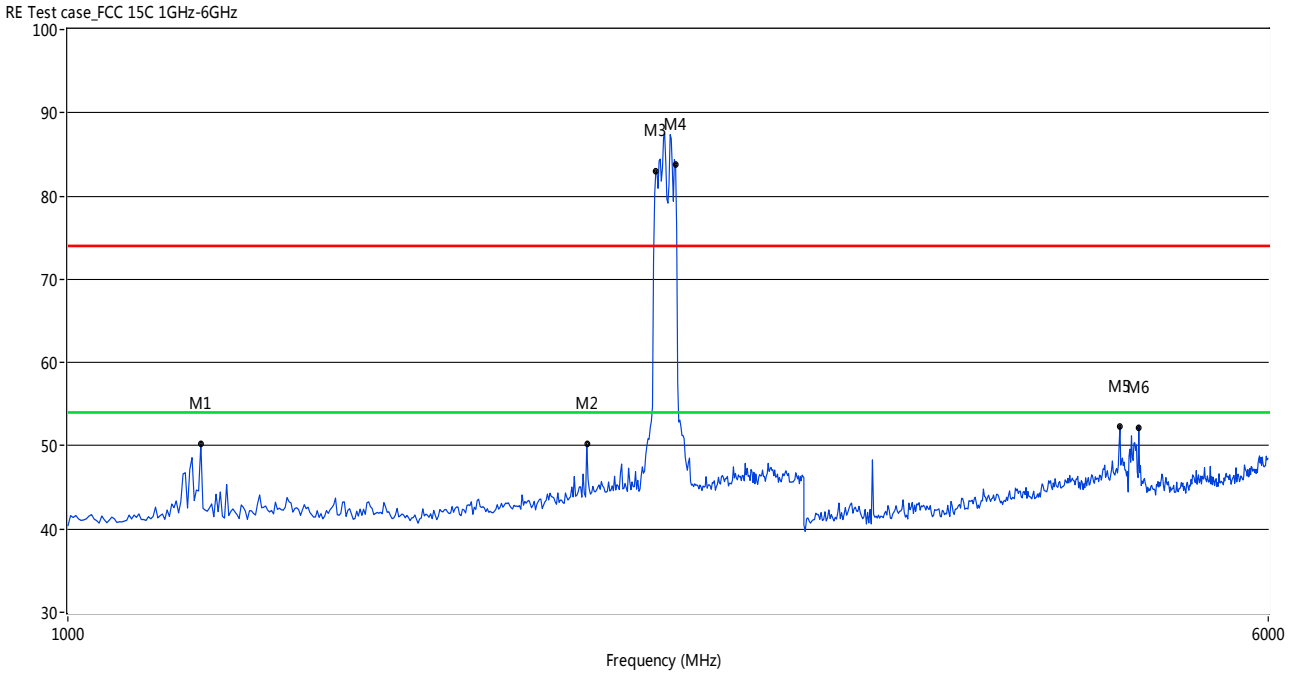
GFSK MODE 6GHz to 25GHz, ANT H



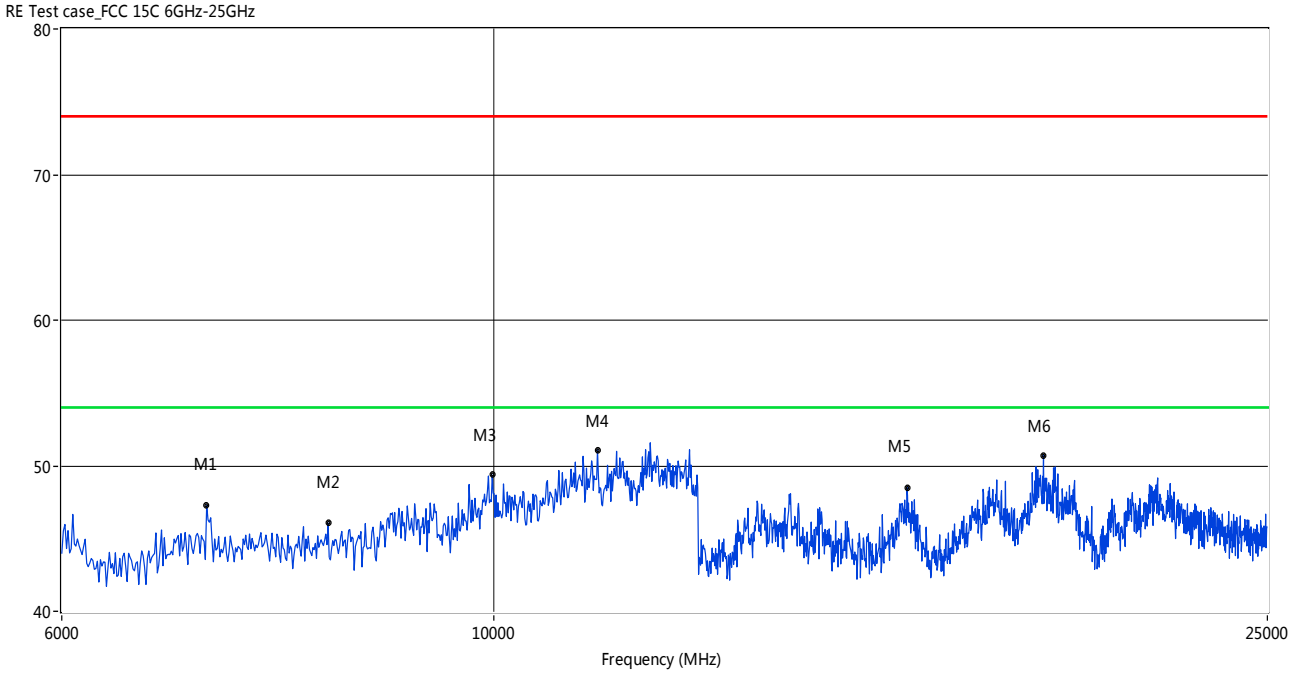
Π/4-DQPSK MODE 1GHz to 6GHz, ANT V



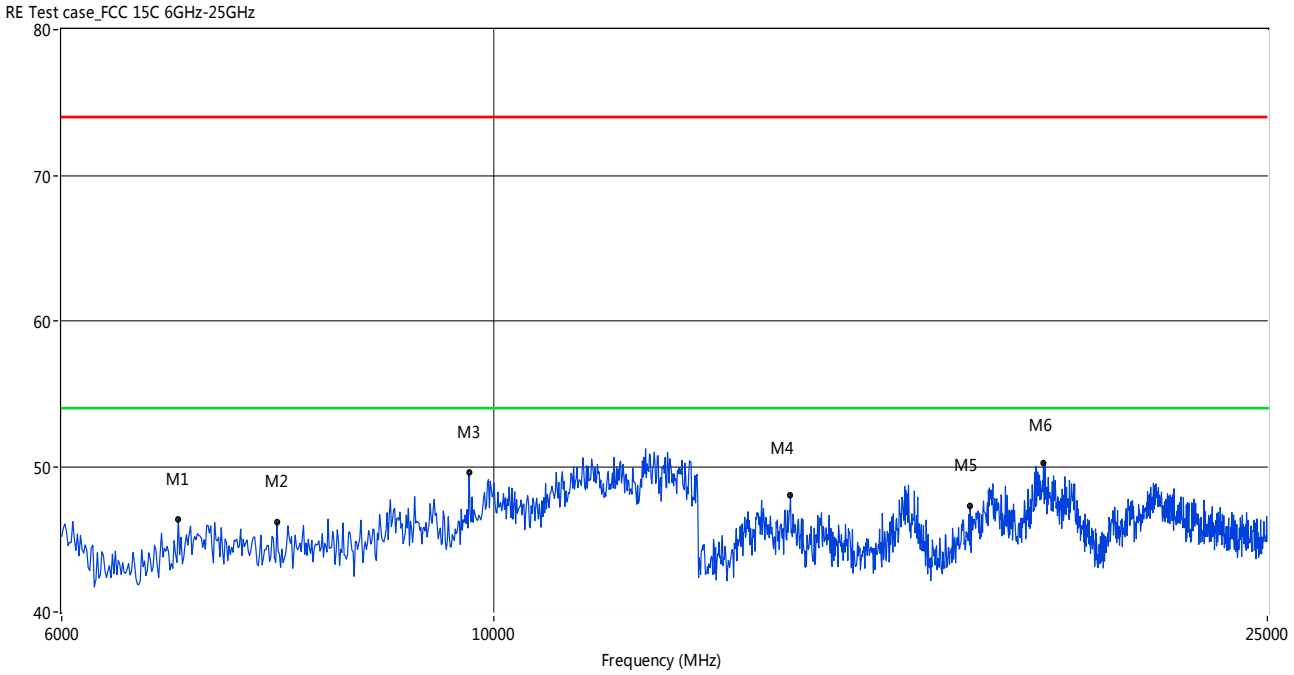
Π/4-DQPSK MODE 1GHz to 6GHz, ANT H



Π/4-DQPSK MODE 6GHz to 25GHz, ANT V



Π/4-DQPSK MODE 6GHz to 25GHz, ANT H



A.4 Band Edge

Test Data

The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

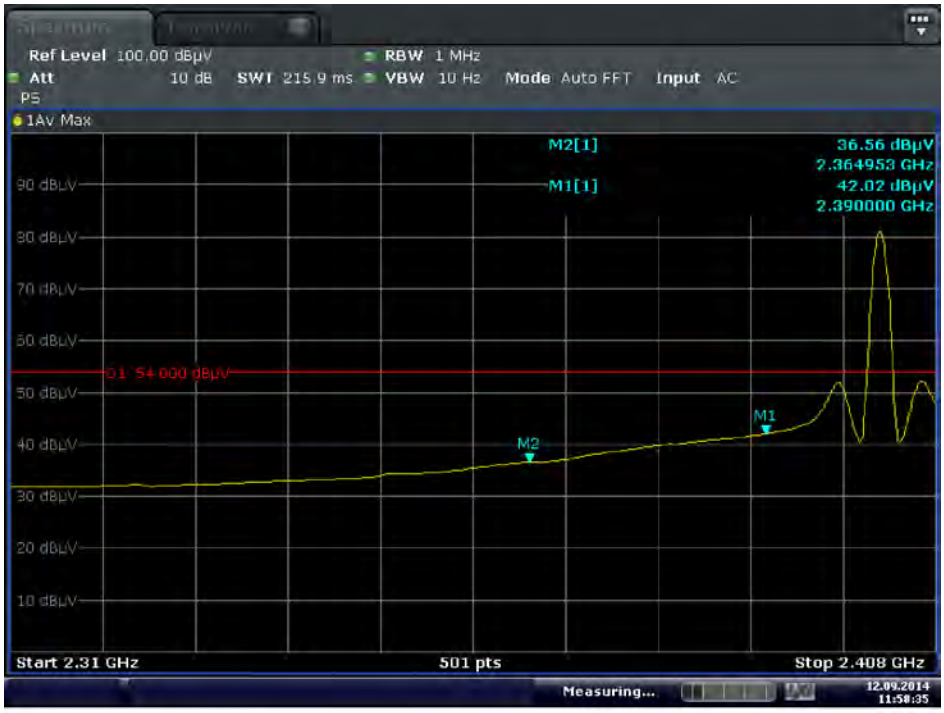
The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.

Test Plots

GFSK LOW CHANNEL , PEAK

Date: 12.SEP.2014 11:57:14

GFSK LOW CHANNEL , AVERAGE

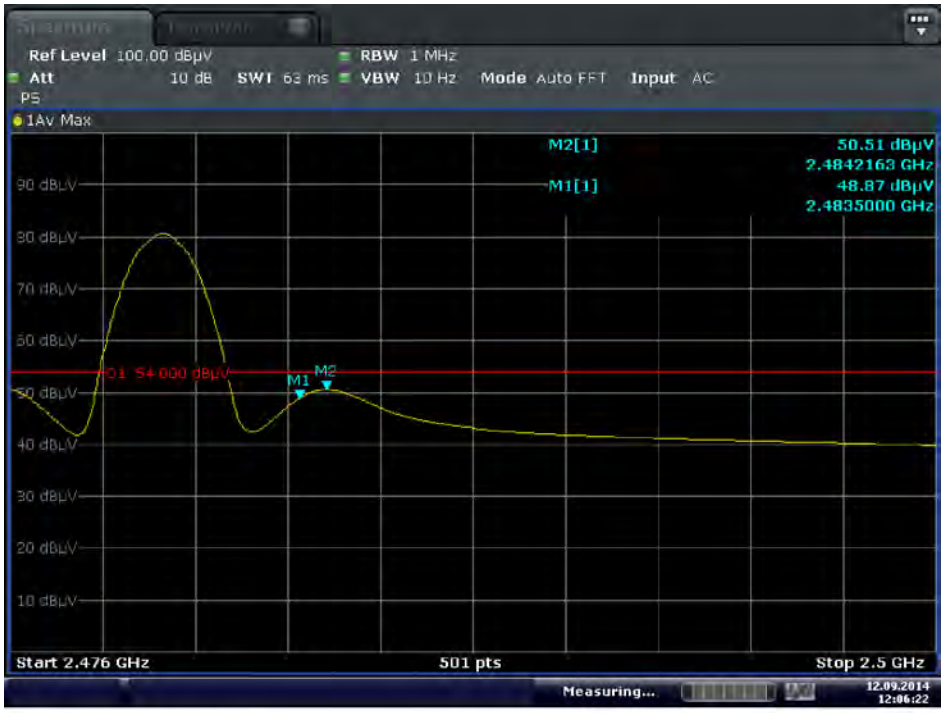


Date: 12.SEP.2014 11:58:35

GFSK HIGH CHANNEL , PEAK

Date: 12.SEP.2014 12:05:20

GFSK HIGH CHANNEL , AVERAGE

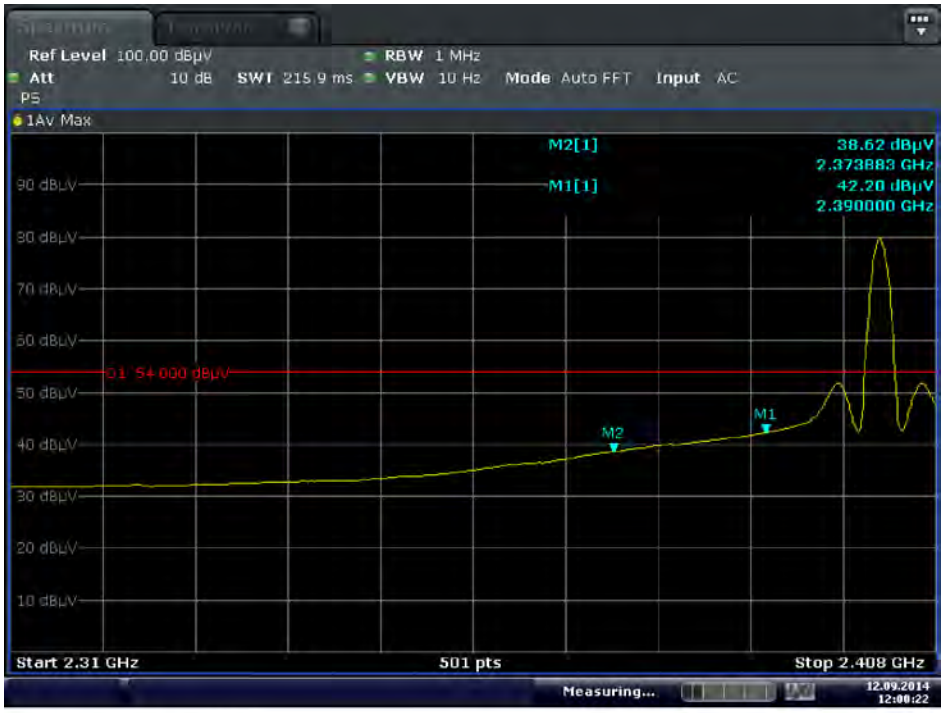


Date: 12.SEP.2014 12:06:22

π /4DQPSK LOW CHANNEL , PEAK

Date: 12.SEP.2014 11:54:41

π /4DQPSK LOW CHANNEL , AVERAGE

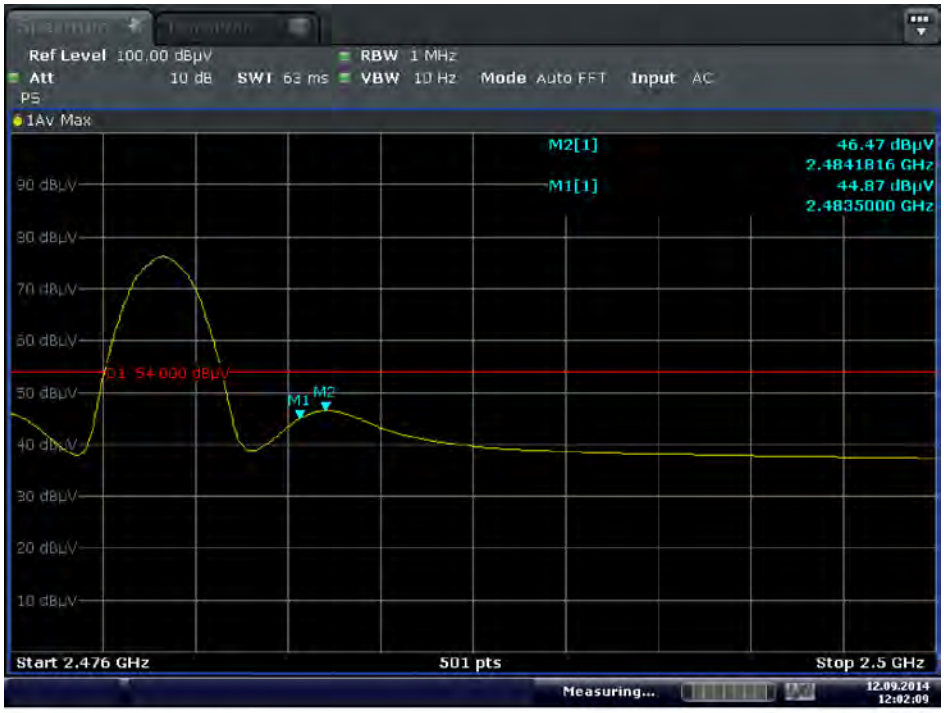


Date: 12.SEP.2014 12:00:23

π /4DQPSK HIGH CHANNEL , PEAK

Date: 12.SEP.2014 12:03:34

π /4DQPSK HIGH CHANNEL , AVERAGE



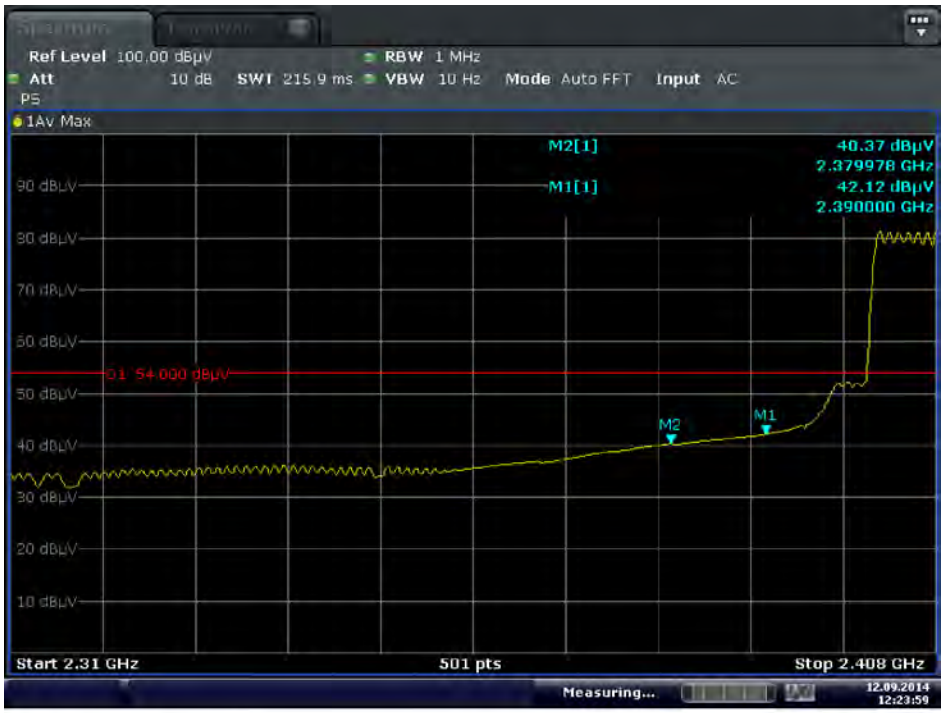
Date: 12.SEP.2014 12:02:09

Hopping Mode:

GFSK LOW FREQUENCY BAND, PEAK

Date: 12.SEP.2014 12:52:53

GFSK LOW FREQUENCY BAND, AVERAGE

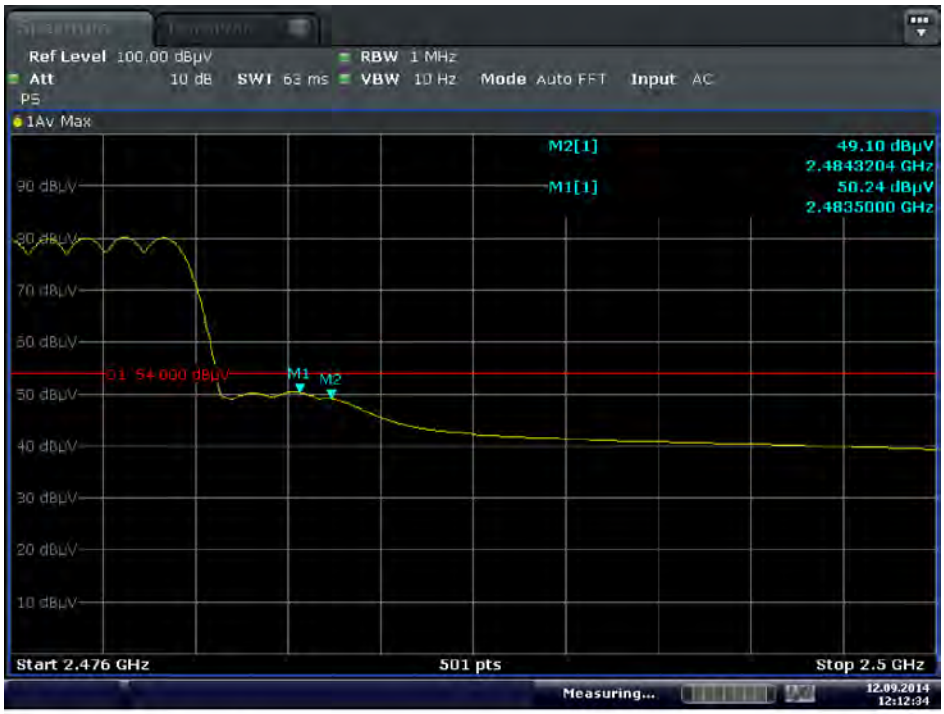


Date: 12.SEP.2014 12:23:59

GFSK HIGH FREQUENCY BAND, PEAK

Date: 12.SEP.2014 14:00:38

GFSK HIGH FREQUENCY BAND, AVERAGE

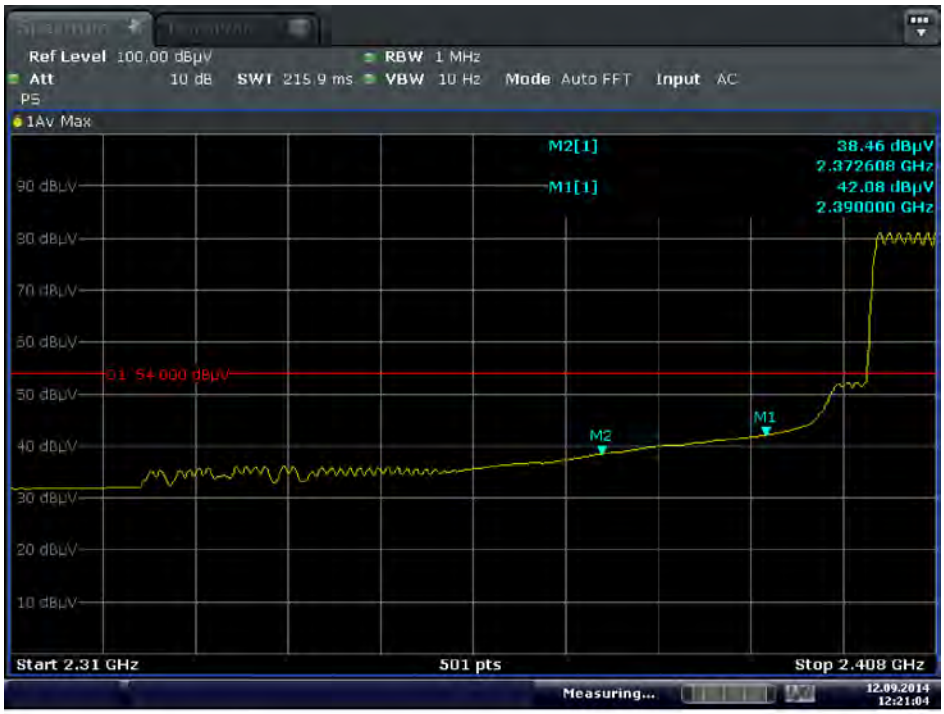


Date: 12.SEP.2014 12:12:35

π /4DQPSK LOW FREQUENCY BAND, PEAK

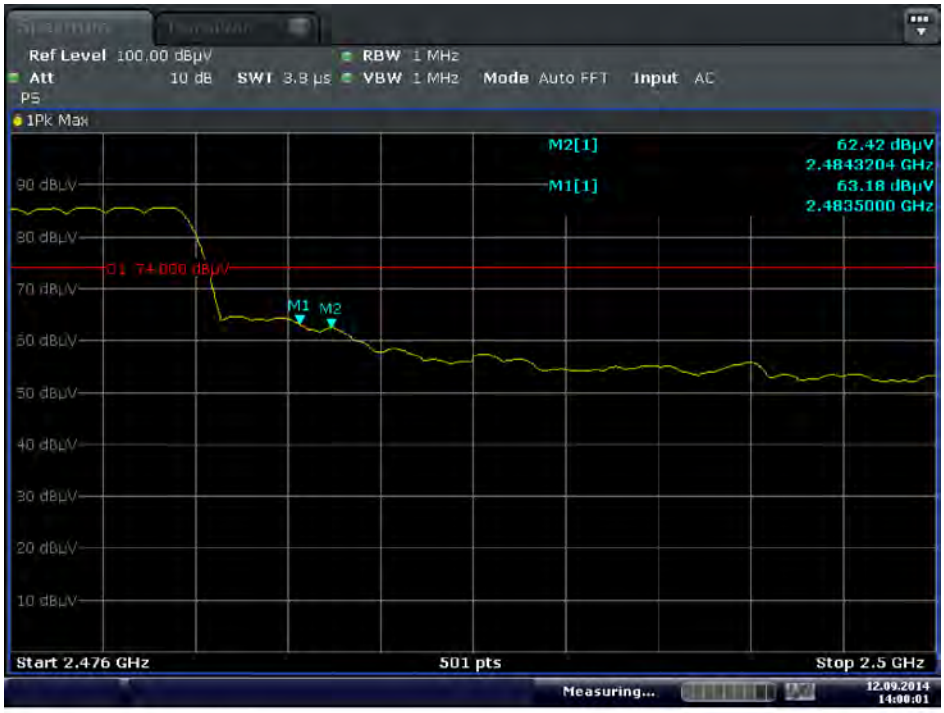
Date: 12.SEP.2014 13:51:47

π /4DQPSK LOW FREQUENCY BAND, AVERAGE



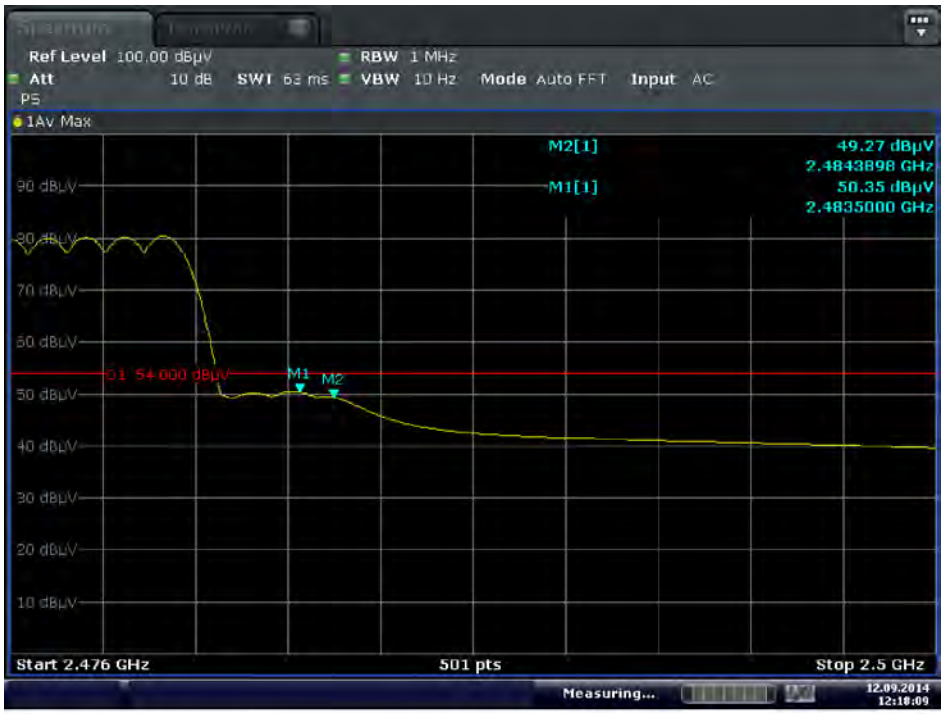
Date: 12.SEP.2014 12:21:05

π /4DQPSK HIGH FREQUENCY BAND, PEAK



Date: 12.SEP.2014 14:00:01

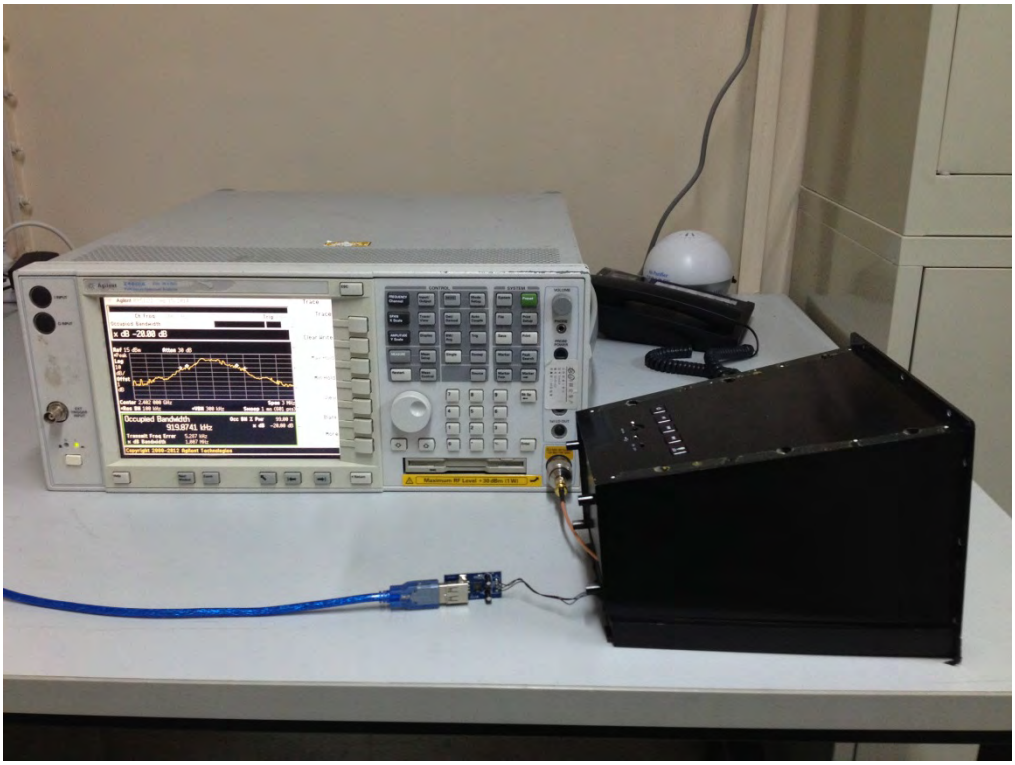
π /4DQPSK HIGH FREQUENCY BAND, AVERAGE



Date: 12.SEP.2014 12:18:09

ANNEX B TEST SETUP PHOTOS

B.1 Conducted Test Photo

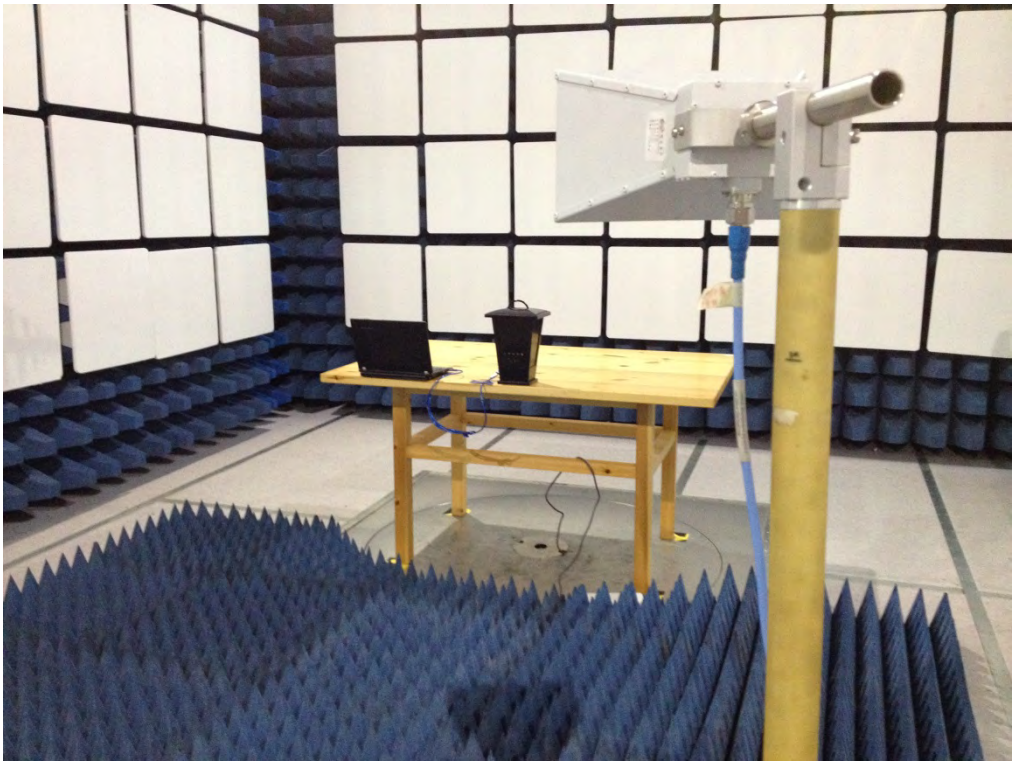


B.2 Conducted Emission Test Photo

B.3 Radiated Test Photo

Below 30MHz

30MHz to 1GHz

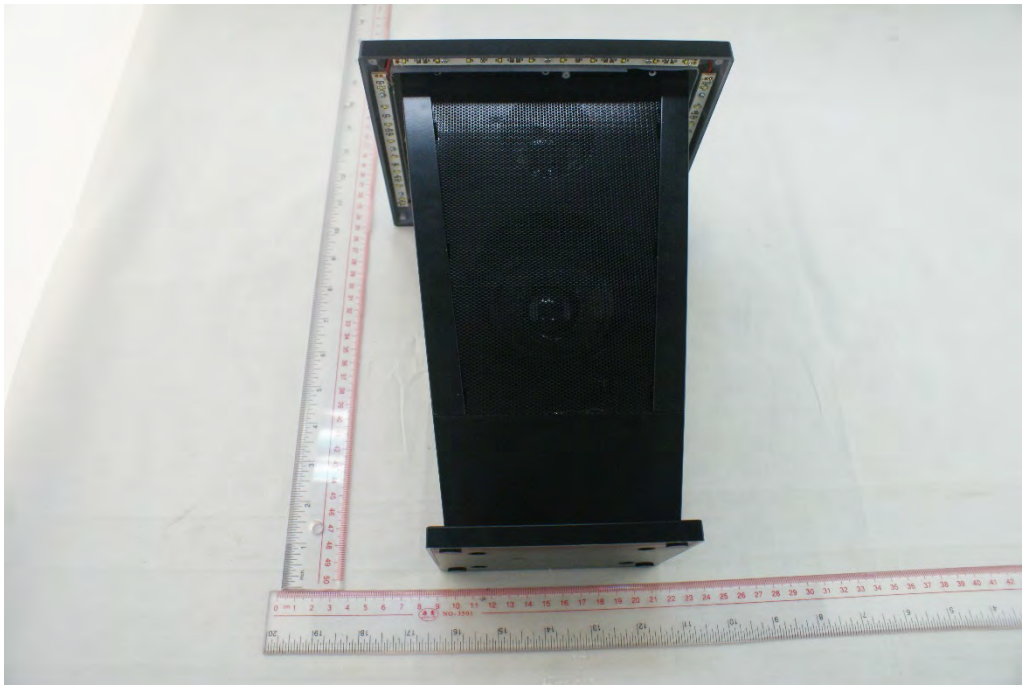


Above 1GHz

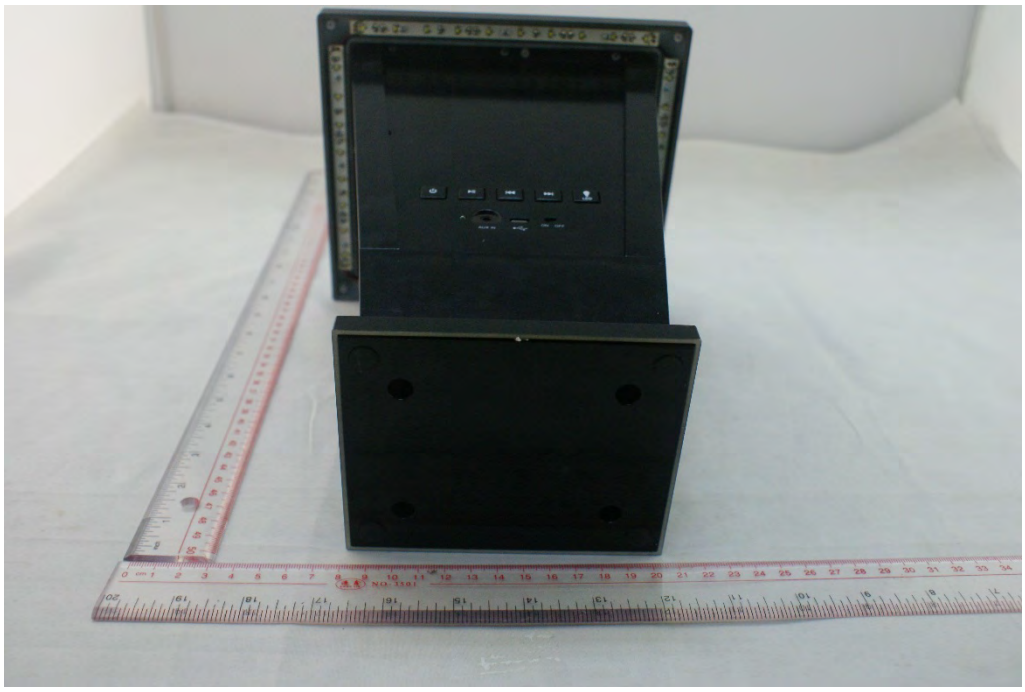
ANNEX C EUT PHOTOS

C.1 Appearance of the EUT

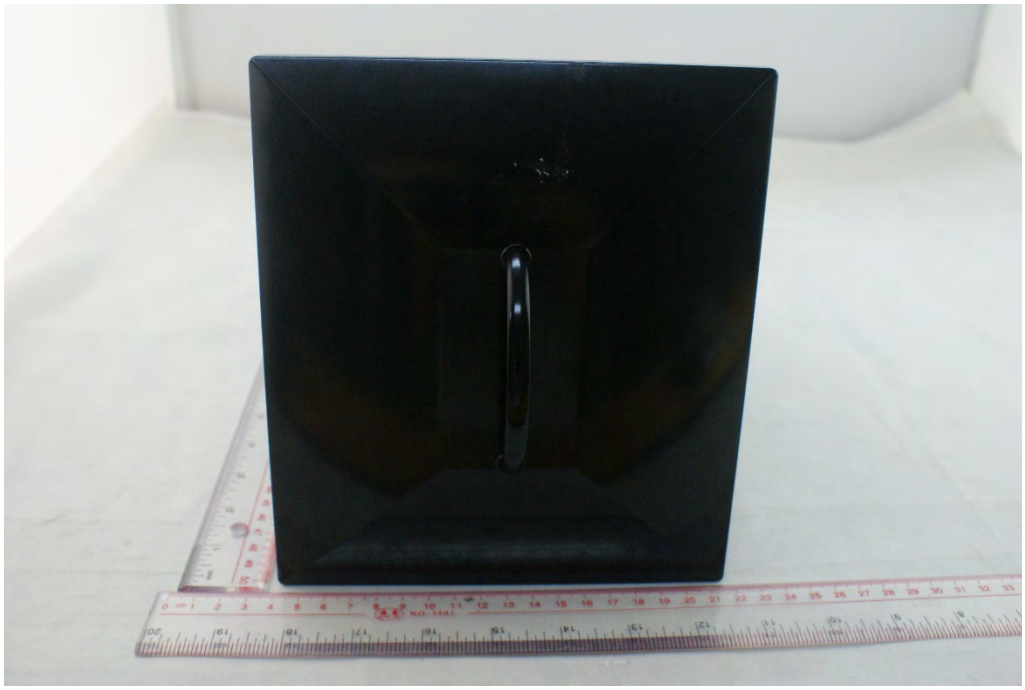
THE FRONT OF EUT



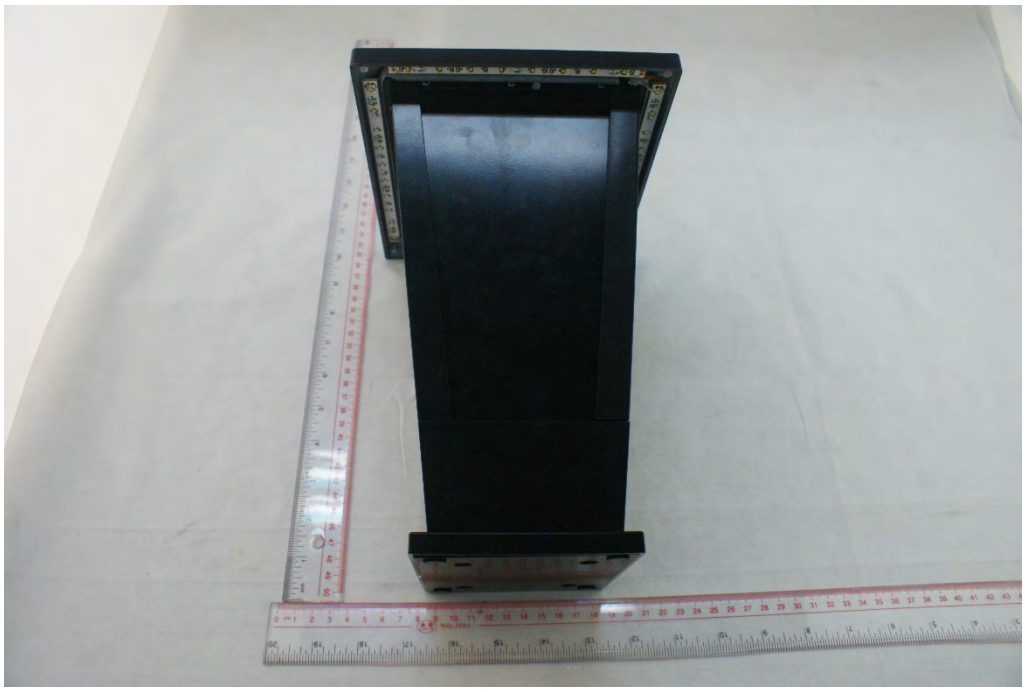
THE BACK OF EUT



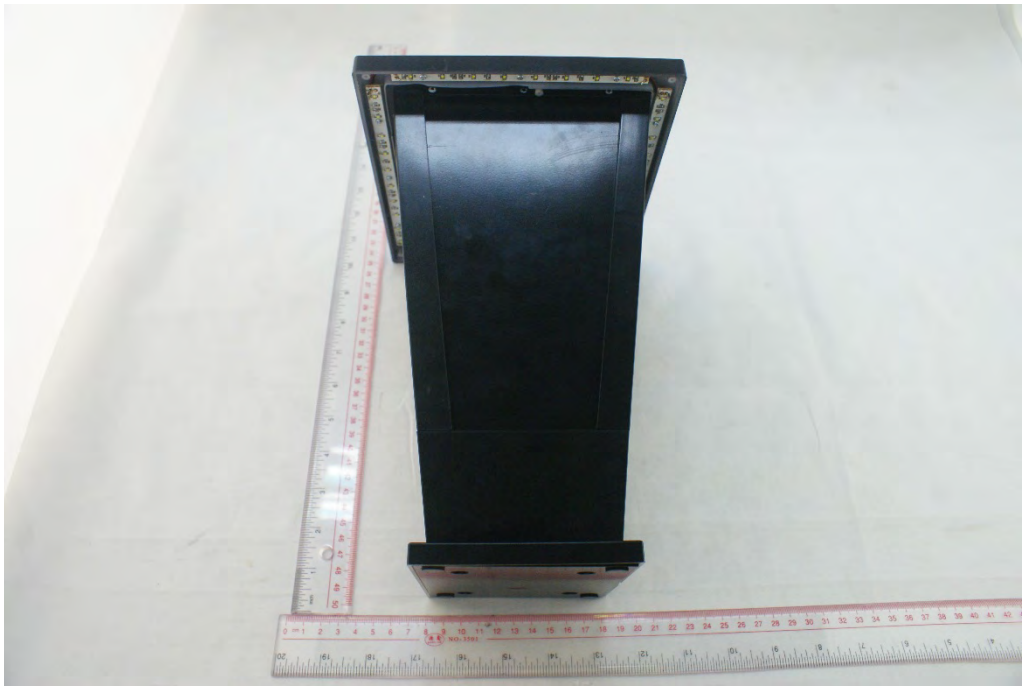
THE DOWN OF EUT



THE UP OF EUT



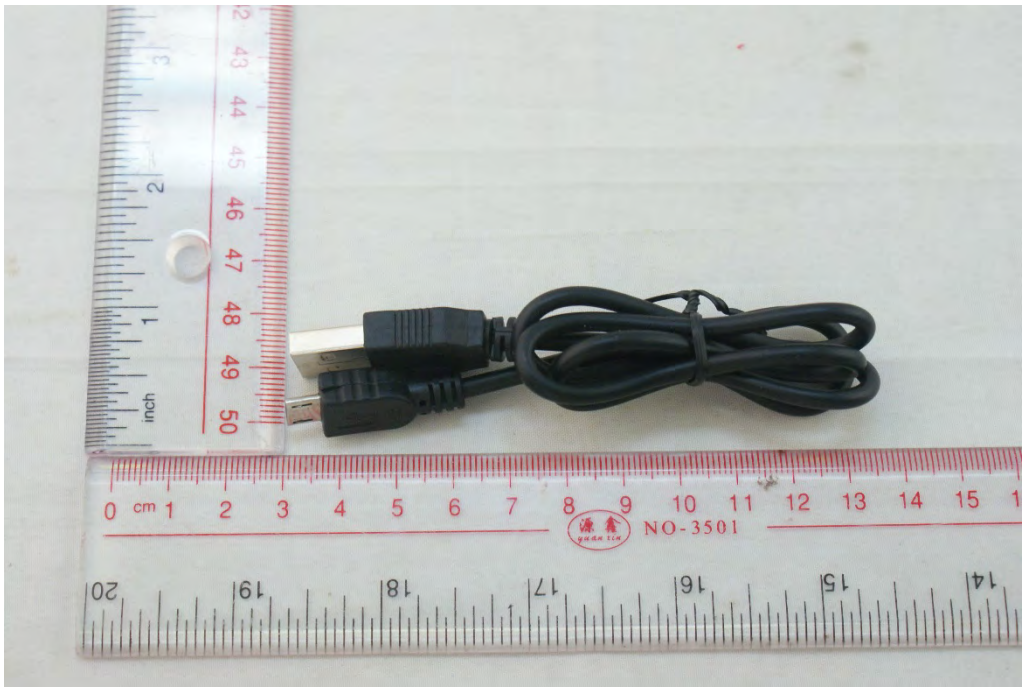
THE LEFT OF EUT



THE RIGHT OF EUT

REMOTE CONTROL 1

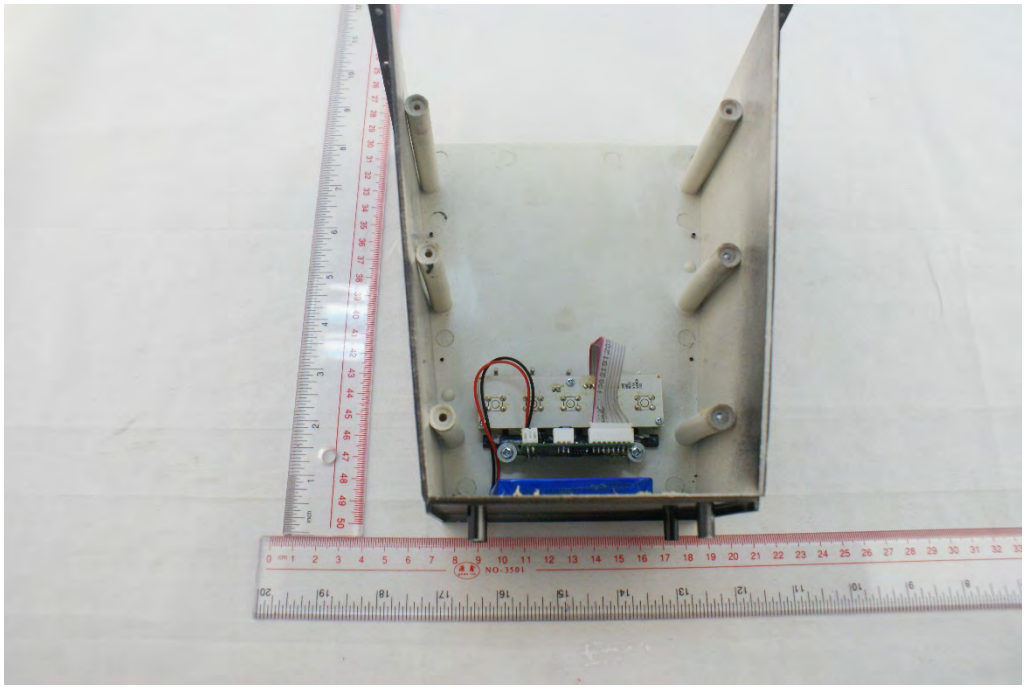
REMOTE CONTROL 2



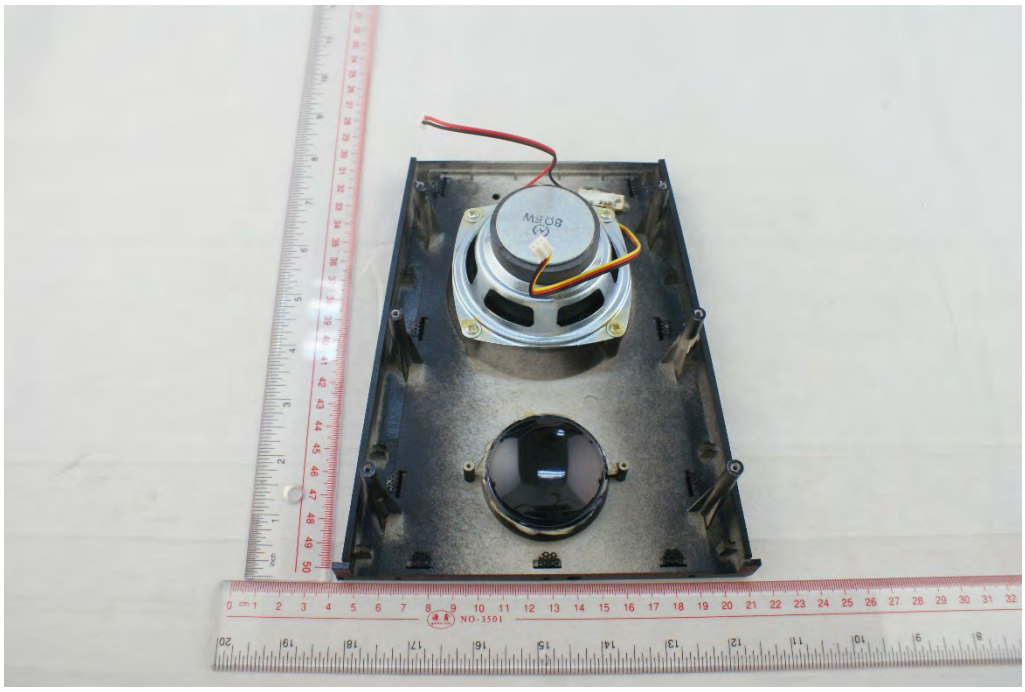
USB CABLE

AUDIO LINE

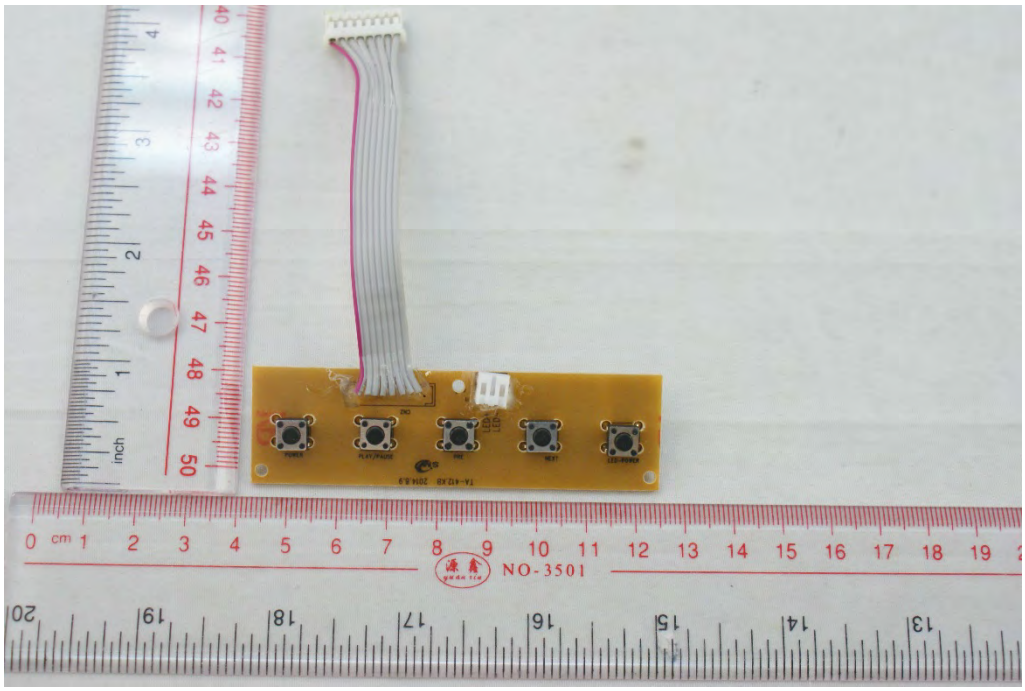
C.2 Inside of the EUT



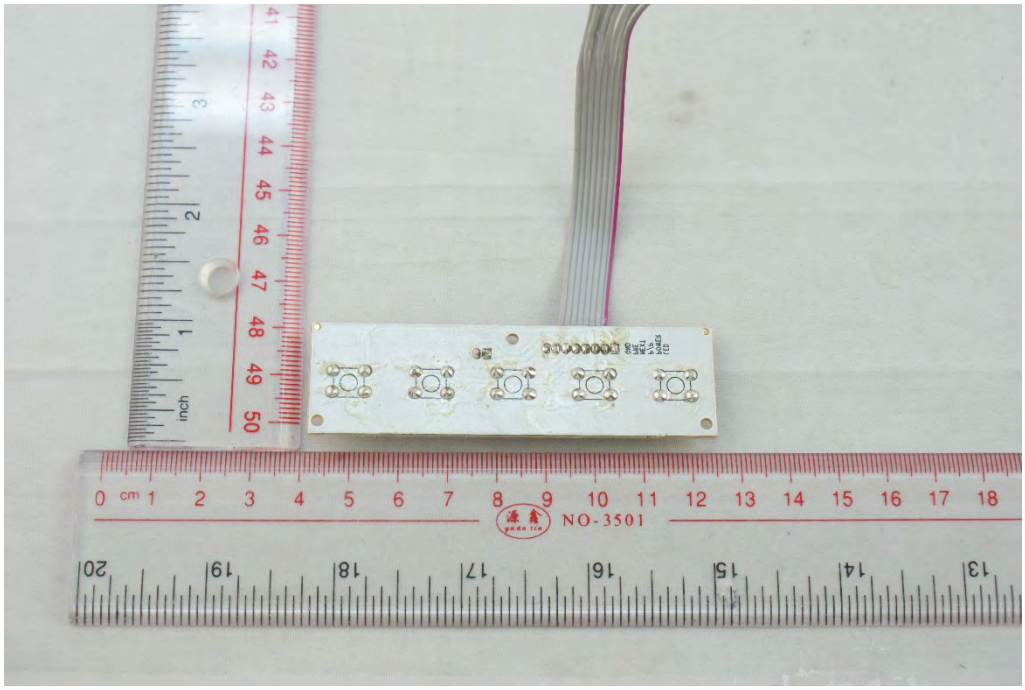
EUT UNCOVER VIEW 1



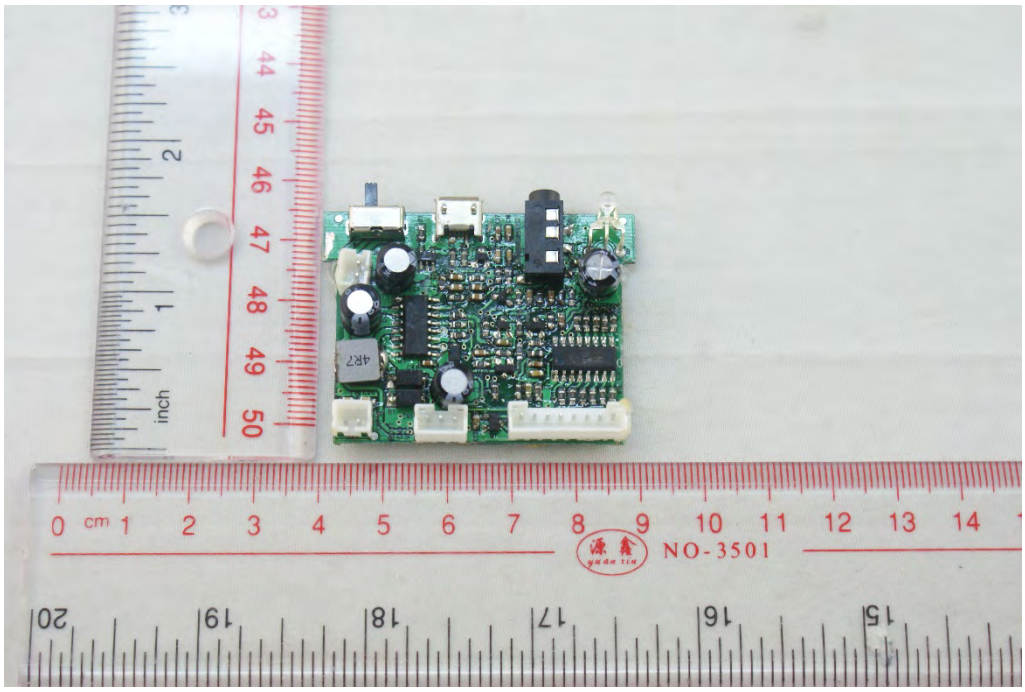
EUT UNCOVER VIEW 2



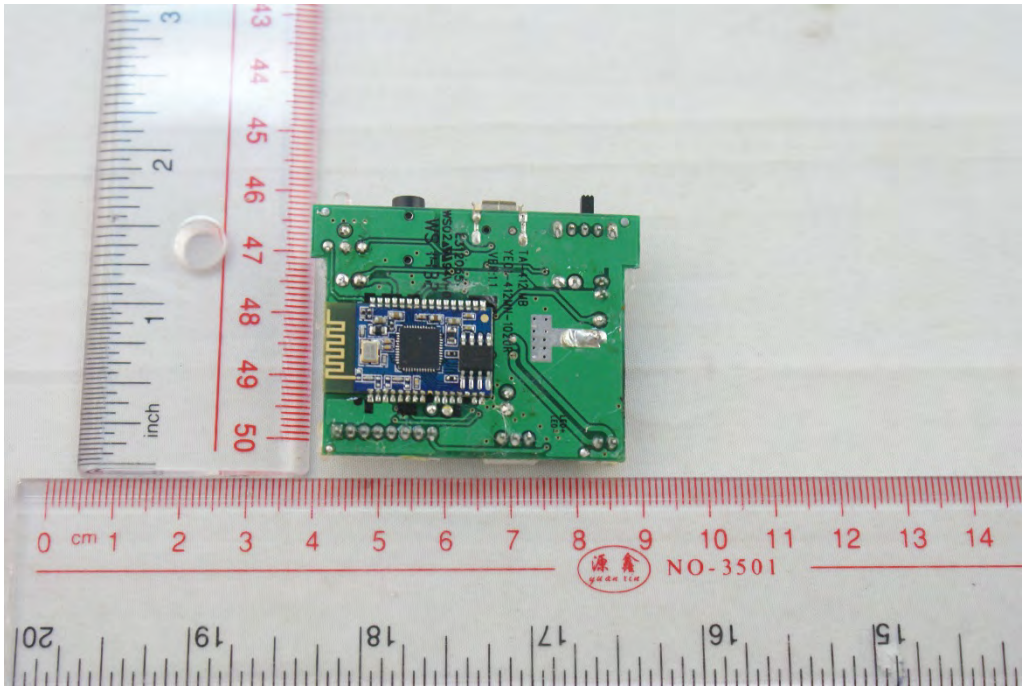
MAIN BOARD VIEW 1



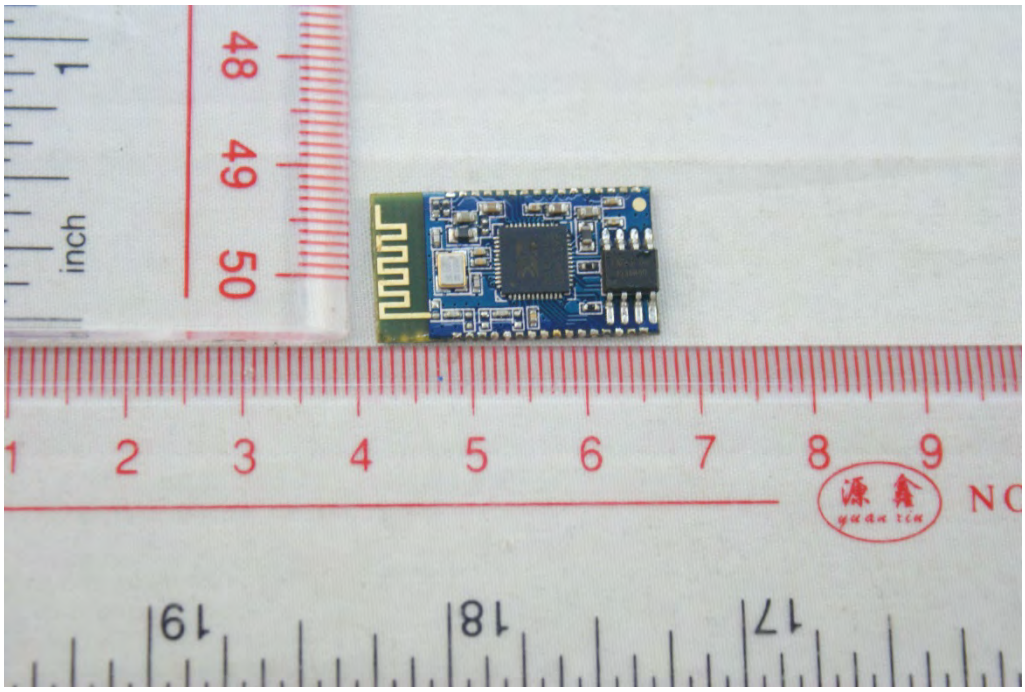
MAIN BOARD VIEW 2



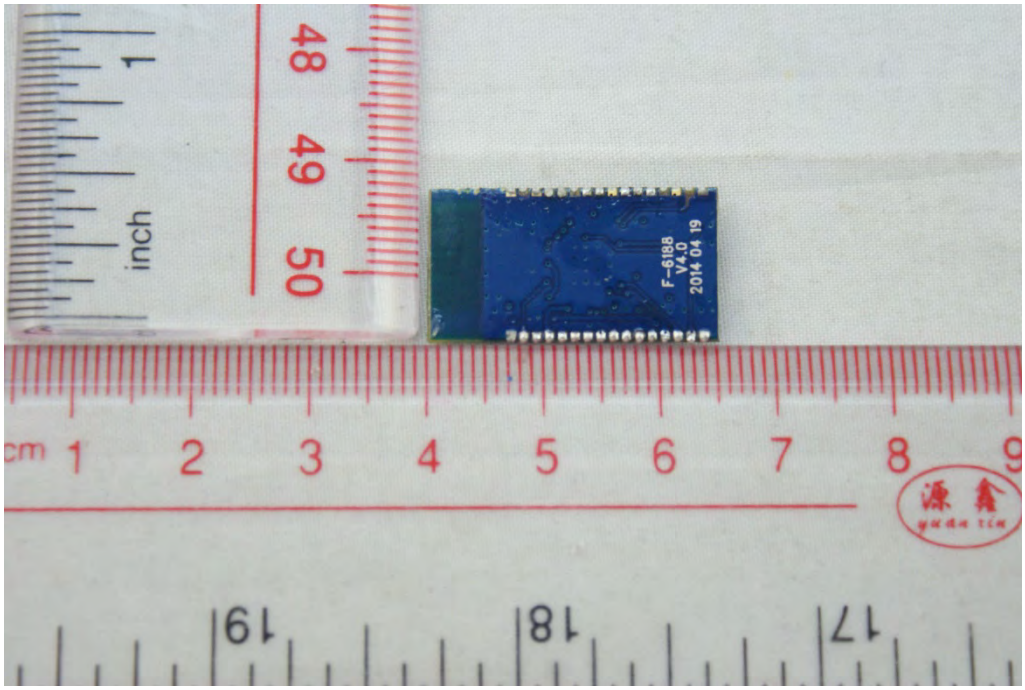
MAIN BOARD VIEW 3



MAIN BOARD VIEW 4



RF MOUDLE 1



RF BOARD 2

--END OF REPORT--