FCC RF TEST REPORT

Issued to

E3 Enterprise

For

Smart Home Products

Model Name	:	E3PHONE
Trade Name	:	E3
Brand Name	:	E3
Standard	:	47 CFR Part 15,Subpart C ANSI C63.10-2013
FCC ID	:	2AD9UE3PHONE
Test date	:	Nov.1,2016 to Nov.2,2016
Issue date	:	Nov.3,2016

by

Shanghai Skylabs Co., Ltd.

Tested by Wu Hongfei *Approved by* Gu Yeqing *Review by* Jin Peng

DIRECTORY

Change History

Issue	Date	Reason for change
1.0	Nov.3,2016	First edition

1. General Information

1.1 Applicant

E3 Enterprise
32F, Shinjuku Nonura Building, 1-26-2 NishiShinjuku, Shinjuku-Ku, Tokyo, Japan 163-0532

1.2 Manufacturer

E3 Enterprise
32F, Shinjuku Nonura Building, 1-26-2 NishiShinjuku, Shinjuku-Ku, Tokyo, Japan 163-0532

1.3 Description of EUT

EUT Name..... :	Smart Home Products
Model Name..... :	E3PHONE
Brand Name..... :	E3
Trade Name ..... :	E3
Hardware Version ..... :	E3P_PCB_V1.0
Software Version ..... :	V1.0
Bluetooth Version ..... :	4.0 BR/EDR
Modulation Type ..... :	FHSS (GFSK(1Mbps), ∏/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)
Frequency Range..... :	2.402GHz - 2.480GHz (at interval of 1MHz)
Channel Number..... :	79
EUT Stage ..... :	Production Unit
Antenna Type..... :	FPC antenna
Antenna Gain..... :	1.74 dBi

Charger

Brand Name.....	UNIFIVE
Mode No.....	UB310-0520
Electrical Rating [Input].....	100-240V, 0.25A
Electrical Rating [Output]	5V, 2A
Manufacturer	Unifive Technology CO.,LTD
Manufacturer Address	5F,No.42,Keya Road,Daya District,Taichuang City 428,Taiwan

NOTE 1:
*The EUT is a phone box, 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 manufacture.

2. Facilities and Accreditations

2.1 Test Facility

Shanghai Skylabs Co., Ltd. Skylabs Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 15~35°C
Relative humidity: 30~60%
Atmosphere pressure: 86-106kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.
Uncertainty of Conducted Emission: ±1.76dB
Uncertainty of Radiated Emission:±3.16dB

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Service Simulator	Anritsu	MT8852A	6K00002788	2016.9.21	1year
Spectrum Analyzer	R&S	FSU26	200880	2016.2.25	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Power Splitter	Mini-Circuits	ZFRSC-183-S+	765001016	(n.a.)	(n.a.)
Attenuator 1	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)
Power supplier	NF	ES2000S	9087735	2016.9.24	1year
Full/Semi-Anechoie Chamber	CHENGYU	9.2×6.25×6.15m	SAR	2015.9.14	3year
EMI Test Receiver	R&S	ESCI7	100787	2016.2.55	1year
LISN	TESEQ	NNB 51	33285	2016.2.25	1year
Personal Computer	HP	6300P	CNG24296YW	(n.a.)	(n.a.)
Test Antenna-Horn	Schwarzbeck	BBHA9170	BBHA91970171	2016.9.21	1year
Test Antenna-Horn	Schwarzbeck	BBHA 9120D	9120D-1033	2016.7.24	1year
Test Antenna-Log	Schwarzbeck	VULB 9163	9163-561	2016.9.24	1year
Test Antenna-Loop	Rohde&Schwarz	FMZB 1519	1519-025	2016.9.21	1year
Temporary Antenna Connector	Farpu	SMA-K	(n.a.)	(n.a.)	(n.a.)
RF Cable	(n.a.)	0-25GHz	(n.a.)	(n.a.)	(n.a.)

NOTE:
Equipments listed above have been calibrated and are in the period of validation.

3. Test Standards and Results

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

Test items and the results are as bellow:

№	FCC Rules	Test Type	Limits	Result
1	15.247(a)(1)	Number of Hopping Frequency	≥ 75Chs	PASS
2	15.247(b)(1)	Peak Output Power	≤ 0.125W	PASS
3	15.247(a)(1)	20dB Bandwidth	NA	PASS
4	15.247(a)(1)	Carrier Frequency Separation	≥ 2/3 of 20dB BW	PASS
5	15.247(a)(1)	Time of Occupancy (Dwell time)	≤ 0.4sec in 31.6sec period	PASS
6	15.247(d)	Conducted Spurious Emission	< 20 dB	PASS
7	15.247(d)	Band Edge	≤ 20dB	PASS
8	15.207	Conducted Emission	15.207(a)	PASS
9	15.247(d)	Radiated Emission	15.209(a) & 15.247(d)	PASS
10	15.203 &15.247(b)	Antenna Requirement	N/A	PASS

4. Test Conditions Setting

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.
Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases and recorded in this report.

TEST MODE			
BT Data Rate / Modulation	**Conducted Mode**	**Radiated Mode**	**AC Conducted Emission**
Bluetooth 1Mbps GFSK	Channel 00_2402 MHz	Channel 00_2402 MHz	NA
	Channel 39_2441 MHz	Channel 39_2441 MHz	
	Channel 78_2480 MHz	Channel 78_2480 MHz	
Bluetooth EDR 2Mbps π /4-DQPSK	Channel 00_2402 MHz	Channel 00_2402 MHz	
	Channel 39_2441 MHz	Channel 39_2441 MHz	
	Channel 78_2480 MHz	Channel 78_2480 MHz	
Bluetooth EDR 3Mbps 8-DPSK	Channel 00_2402 MHz	Channel 00_2402 MHz	
	Channel 39_2441 MHz	Channel 39_2441 MHz	
	Channel 78_2480 MHz	Channel 78_2480 MHz	

5. 47 CFR Part 15C requirements

5.1 Antenna requirement

5.1.1 Applicable standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by 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.

5.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

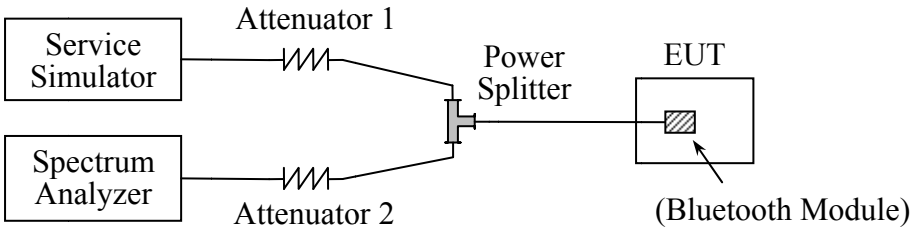
6. Test Result

6.1 Number of Hopping Frequency

6.1.1 Requirement

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

6.1.2 Test Setup



The Bluetooth Module of the EUT, 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.

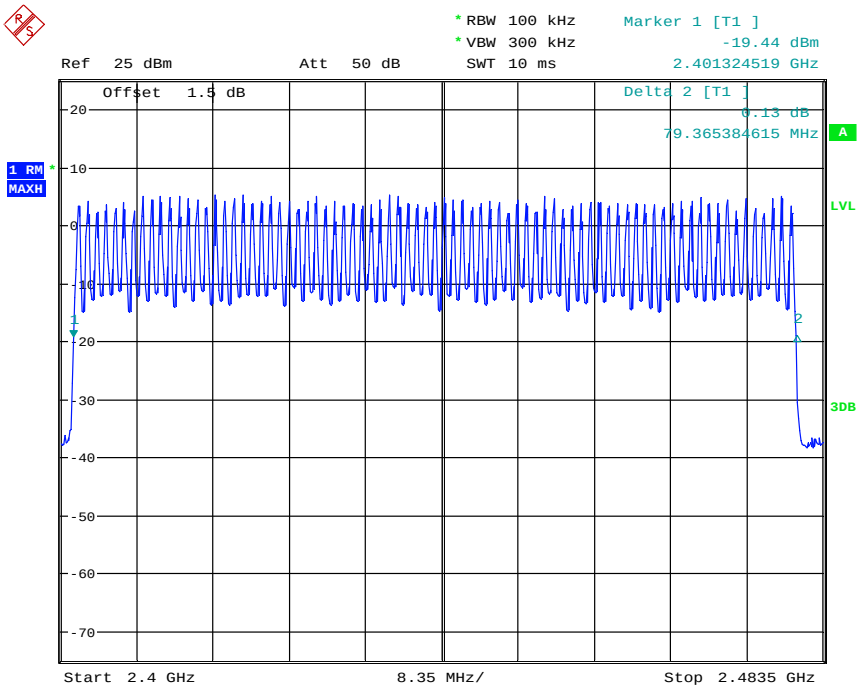
6.1.3 Test Result

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 compliance to Hopping Sequence and Equal Usage of the channels

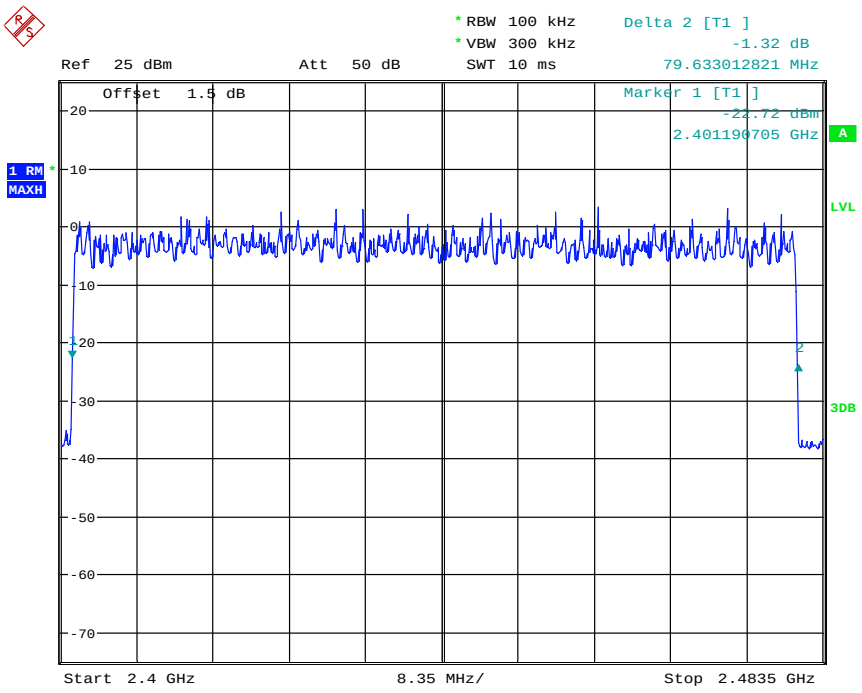
A. Test Verdict:

Modulation	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
GFSK	2400 - 2483.5	79	15	Plot A	PASS
π /4-DQPSK	2400 - 2483.5	79	15	Plot B	PASS
8-DPSK	2400 - 2483.5	79	15	Plot C	PASS

B. Test Plot:



Plot A



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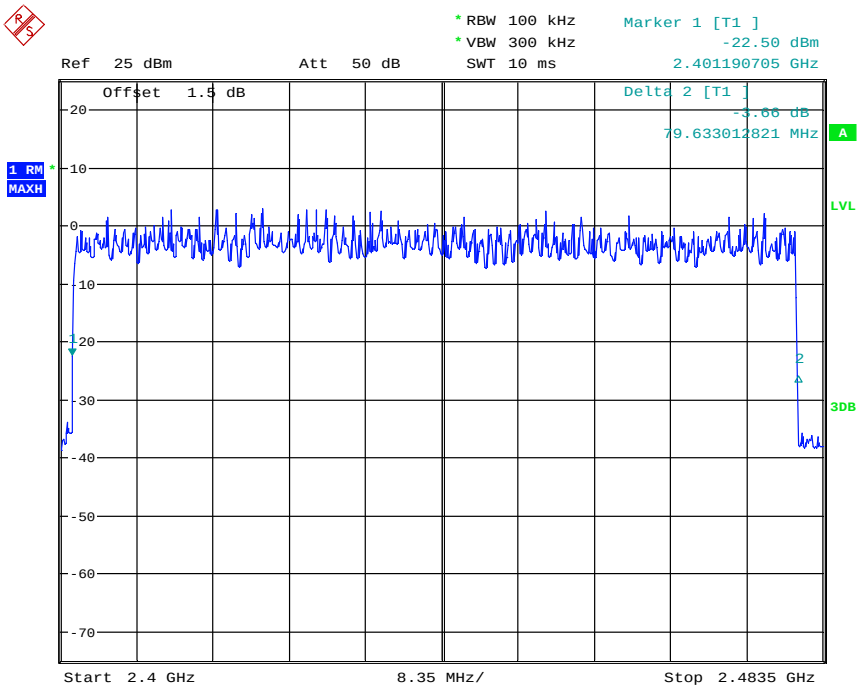
Plot B



Date: 31.OCT.2016 13:12:55

Plot C

6.2 Peak Output Power

6.2.1 Requirement

According to FCC section 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.

6.2.2 Test Setup

See section 6.1.2 of this report.

6.2.3 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 (1Mbps)

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	6.65	0.00462	Plot A	30	1	PASS
39	2441	6.95	0.00495	Plot B			PASS
78	2480	6.57	0.00454	Plot C			PASS

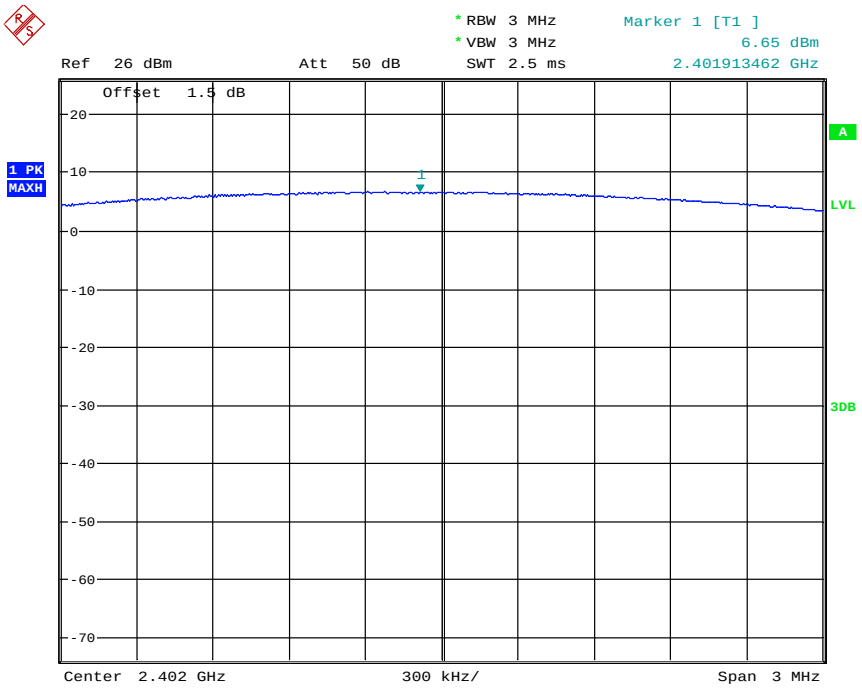
π /4-DQPSK (2Mbps)

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	6.16	0.00413	Plot D	21	0.125	PASS
39	2441	6.47	0.00444	Plot E			PASS
78	2480	6.08	0.00406	Plot F			PASS

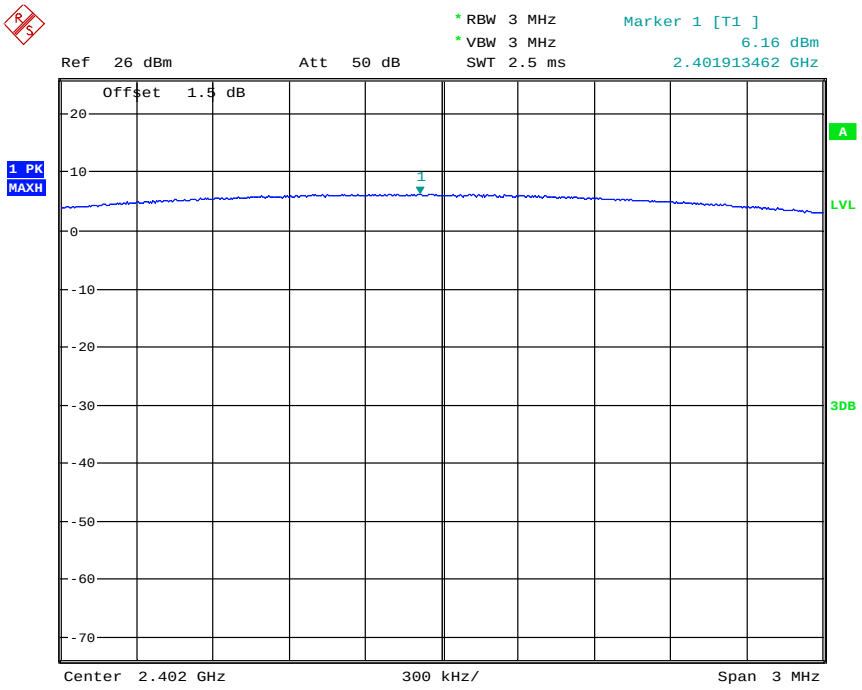
8-DPSK (3Mbps)

Channel	Frequency (MHz)	Measured Output Peak Power			Limit		Verdict
		dBm	W	Refer to Plot	dBm	W	
0	2402	6.28	0.00425	Plot G	21	0.125	PASS
39	2441	6.66	0.00463	Plot H			PASS
78	2480	6.20	0.00417	Plot I			PASS

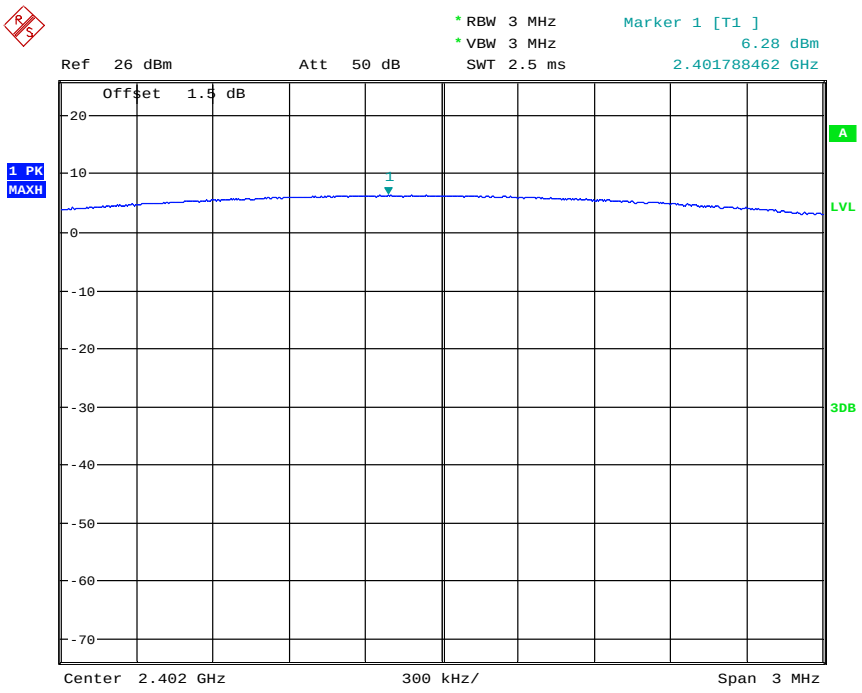
B. Test Plot:



(Plot A: GFSK Channel = 2402)



(Plot B: GFSK Channel = 2441)



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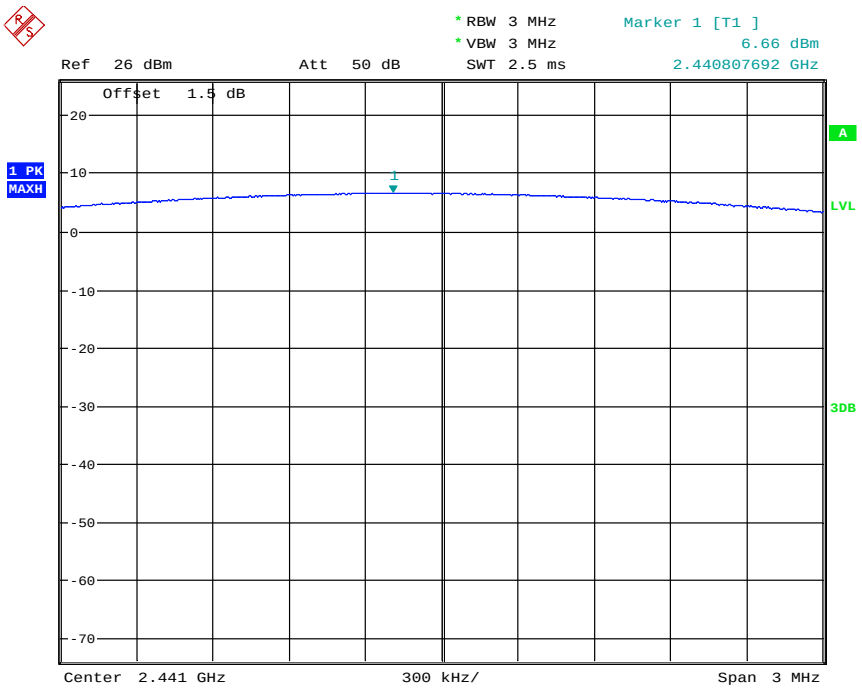
(Plot C: GFSK Channel = 2480)



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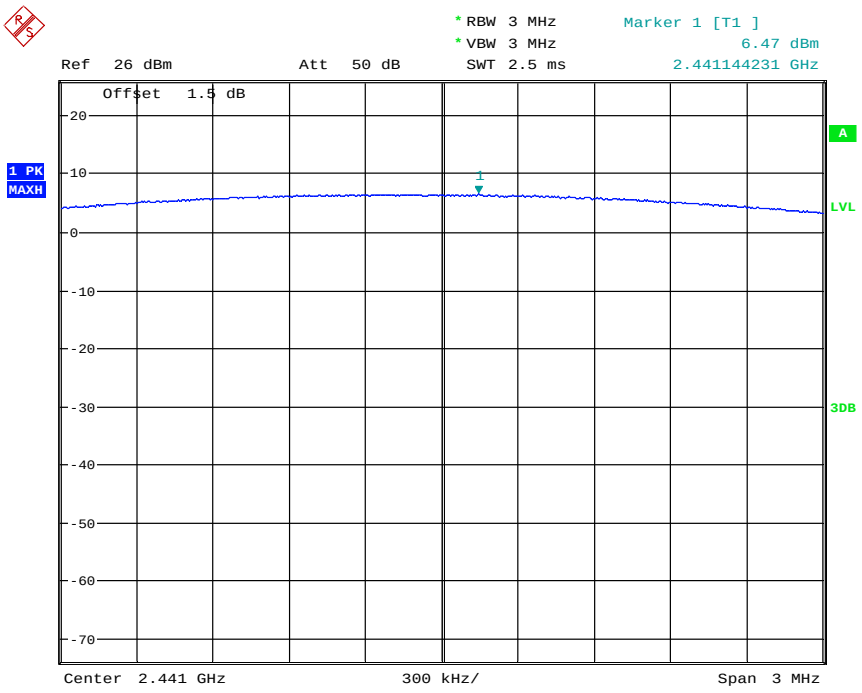
(Plot D: π/4-DQPSK Channel = 2402)



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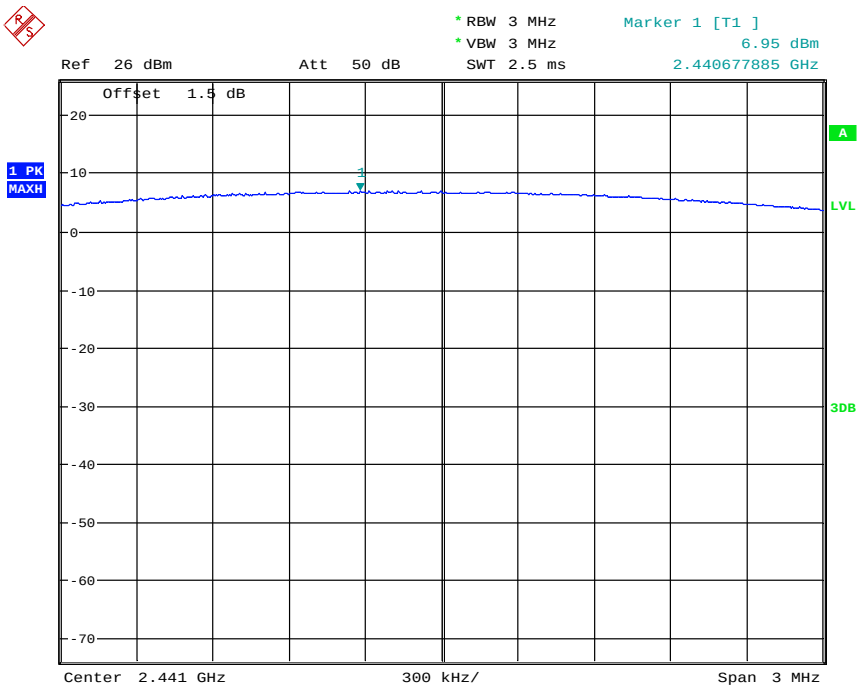
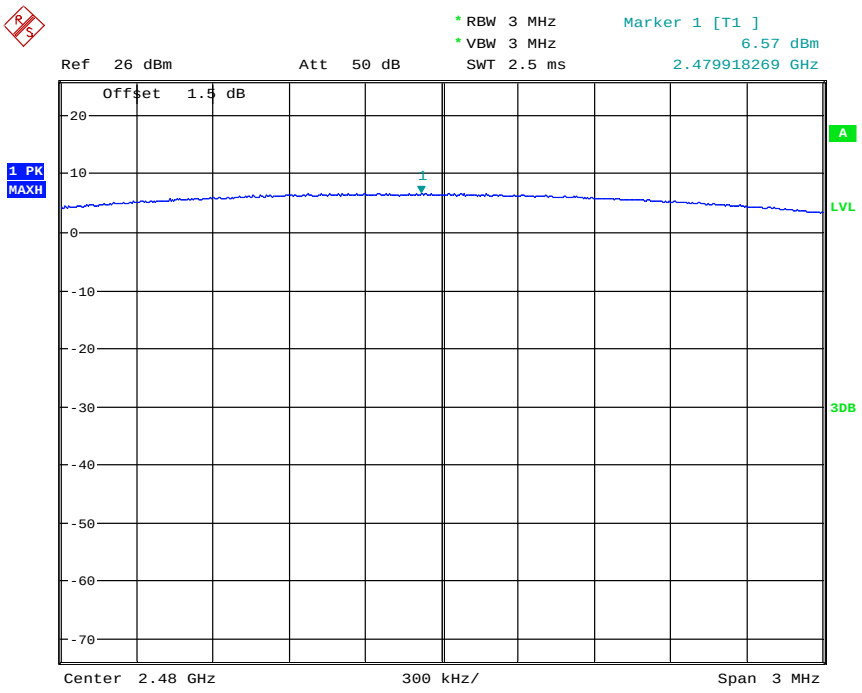
(Plot E: π/4-DQPSK Channel = 2441)

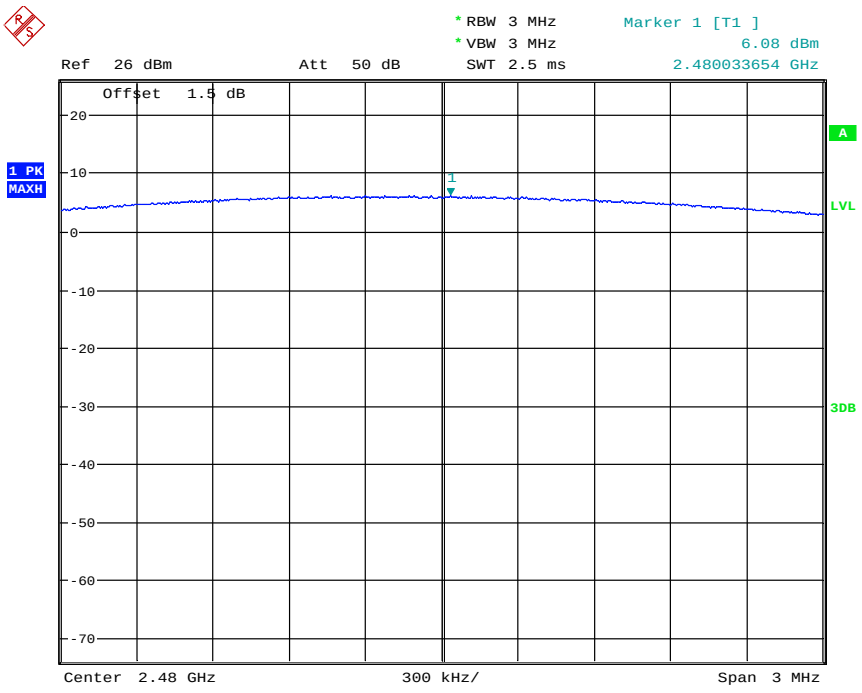


Date: 31.OCT.2016 13:59:53

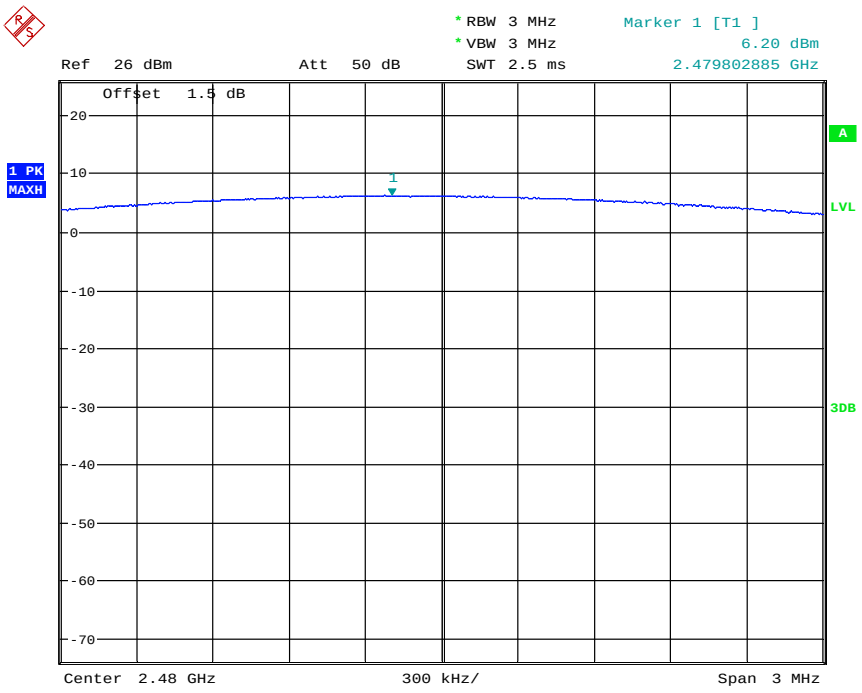
(Plot G: π/4-DQPSK Channel = 2480)



(Plot H: 8-DPSK Channel = 2402)



(Plot E: 8-DPSK Channel = 2441)



(Plot I: 8-DPSK Channel = 2480)

6.3 20dB Bandwidth

6.3.1 Definition

The 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

6.3.2 Test Setup

See section 6.1.2 of this report.

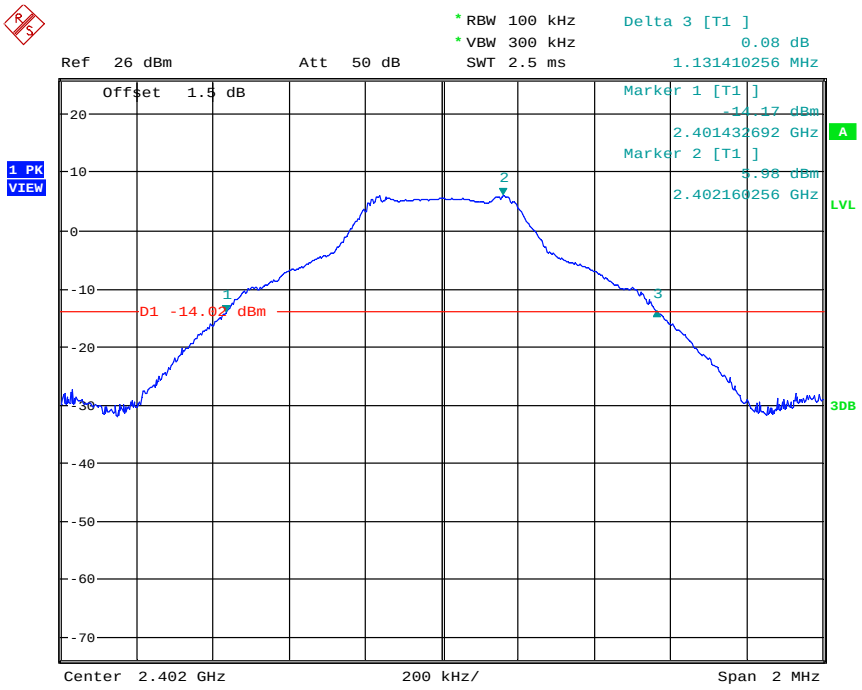
6.3.3 Test Result

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

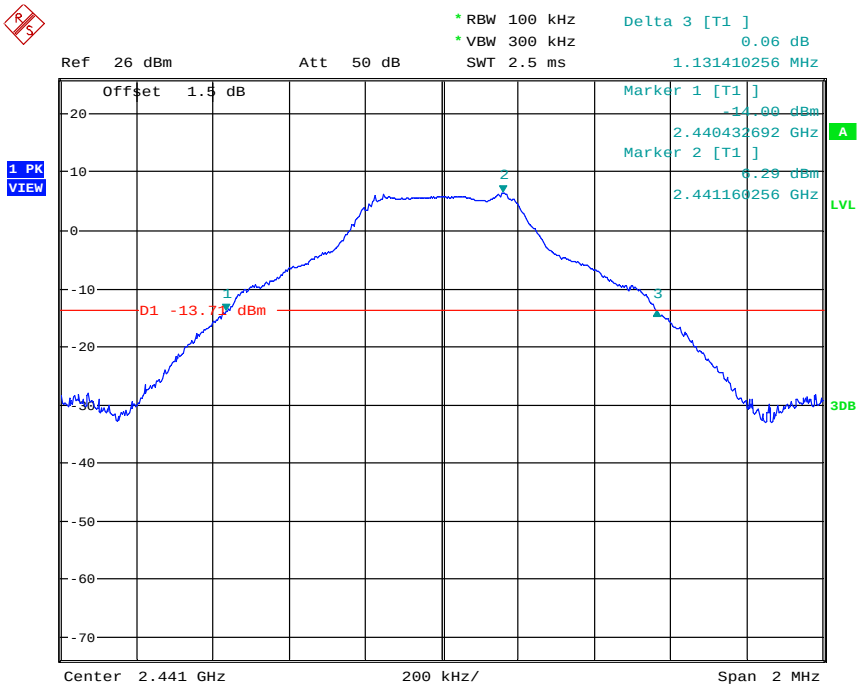
Modulation	Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
GFSK	0	2402	1.131	Plot A
	39	2441	1.131	Plot B
	78	2480	1.125	Plot C
π /4-DQPSK	0	2402	1.362	Plot D
	39	2441	1.362	Plot E
	78	2480	1.358	Plot F
8-DPSK	0	2402	1.371	Plot G
	39	2441	1.375	Plot H
	78	2480	1.368	Plot I

B. Test Plot:



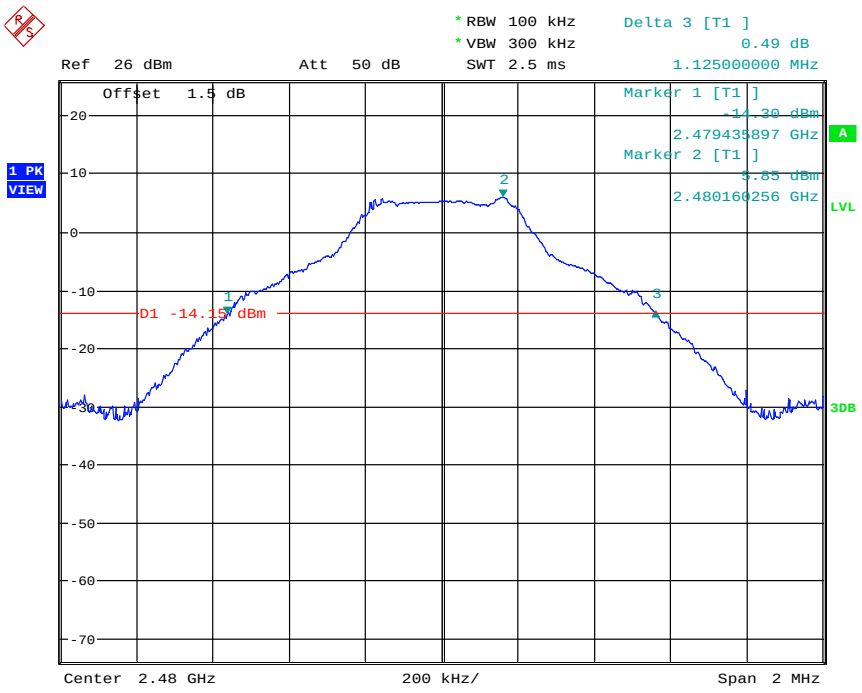
Date: 31.OCT.2016 15:46:13

(Plot A: Channel = 2402)



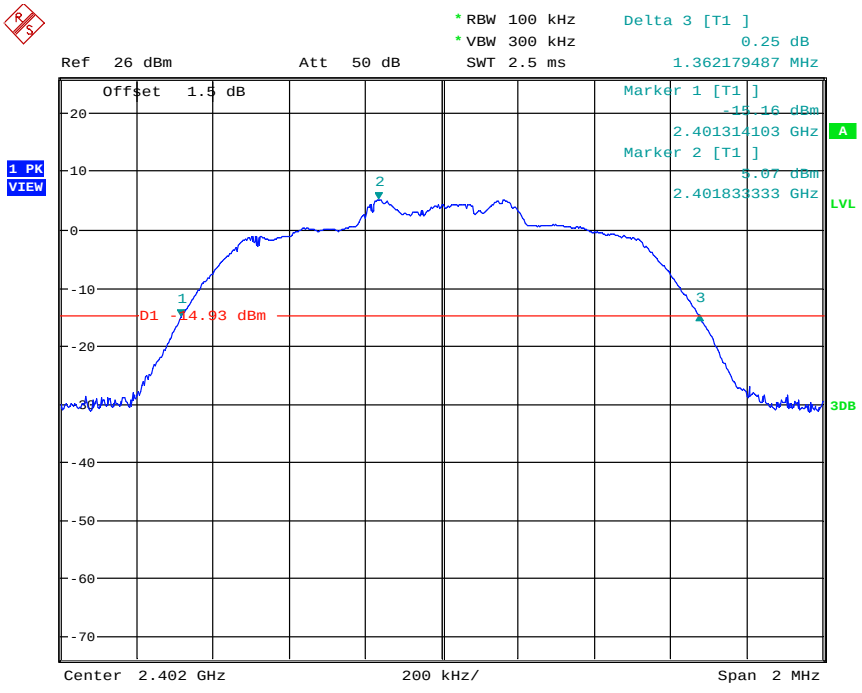
Date: 31.OCT.2016 15:53:28

(Plot B: Channel = 2441)



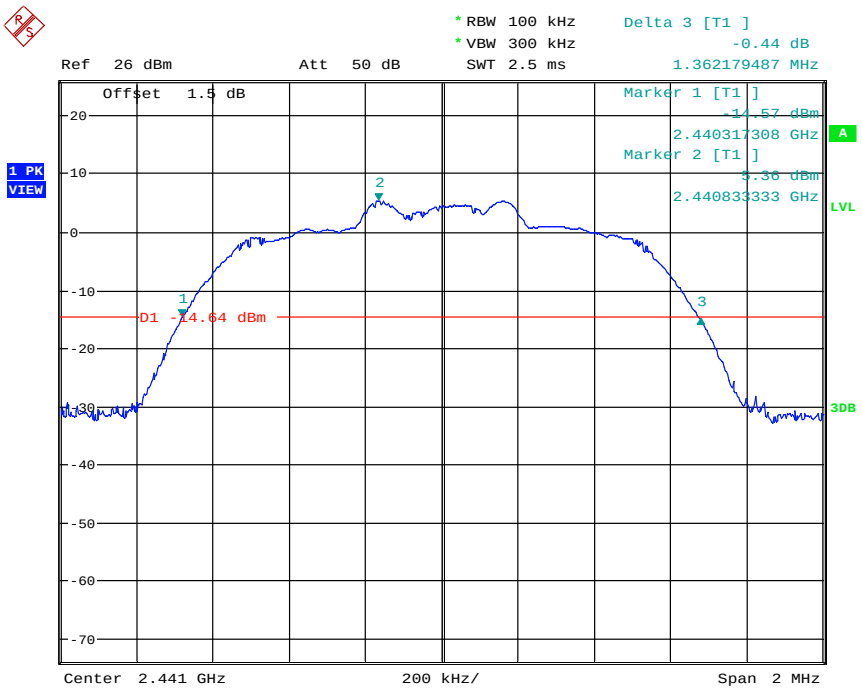
Date: 31.OCT.2016 15:54:27

(Plot C: Channel = 2480)



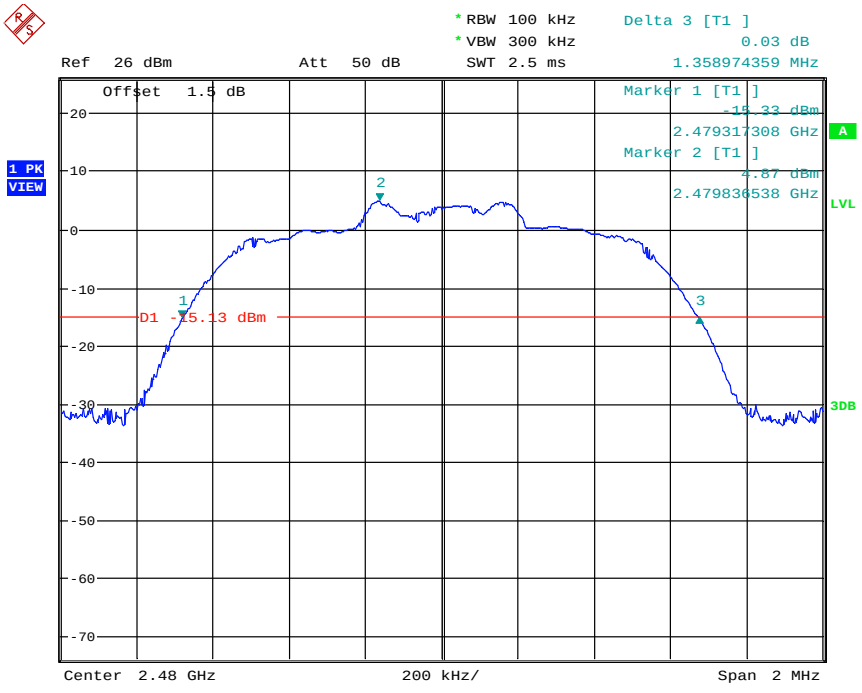
Date: 31.OCT.2016 15:47:49

(Plot D: Channel = 2402)



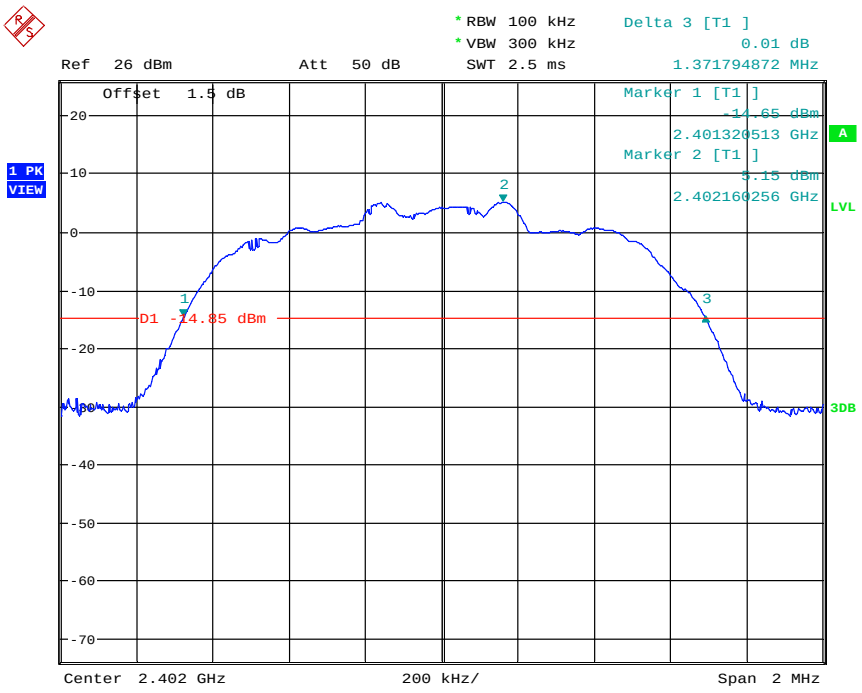
Date: 31.OCT.2016 15:52:19

(Plot E: Channel = 2441)



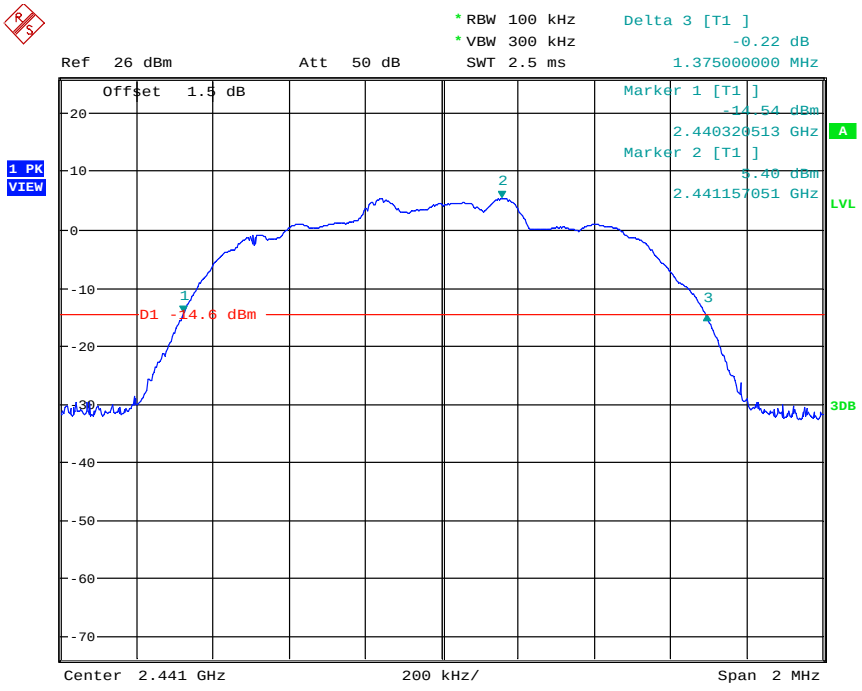
Date: 31.OCT.2016 15:55:41

(Plot F: Channel = 2480)



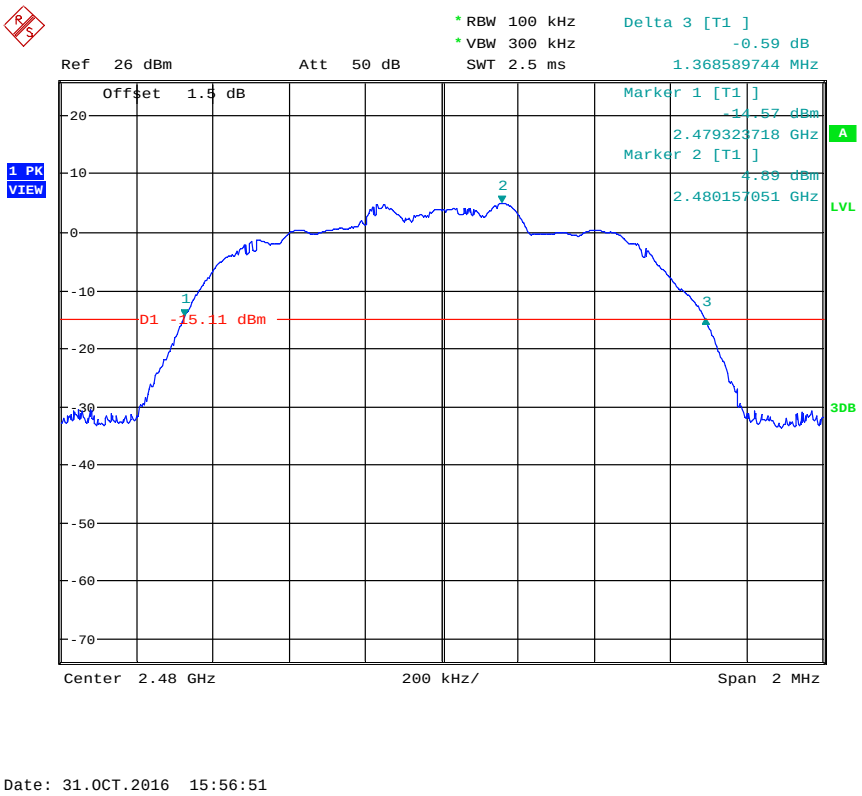
Date: 31.OCT.2016 15:49:45

(Plot G: Channel = 2402)



Date: 31.OCT.2016 15:51:19

(Plot H: Channel = 2441)



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(Plot I: Channel = 2480)

6.4 Carried Frequency Separation

6.4.1 Definition

According to FCC section 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.

6.4.2 Test Setup

See section 6.1.2 of this report.

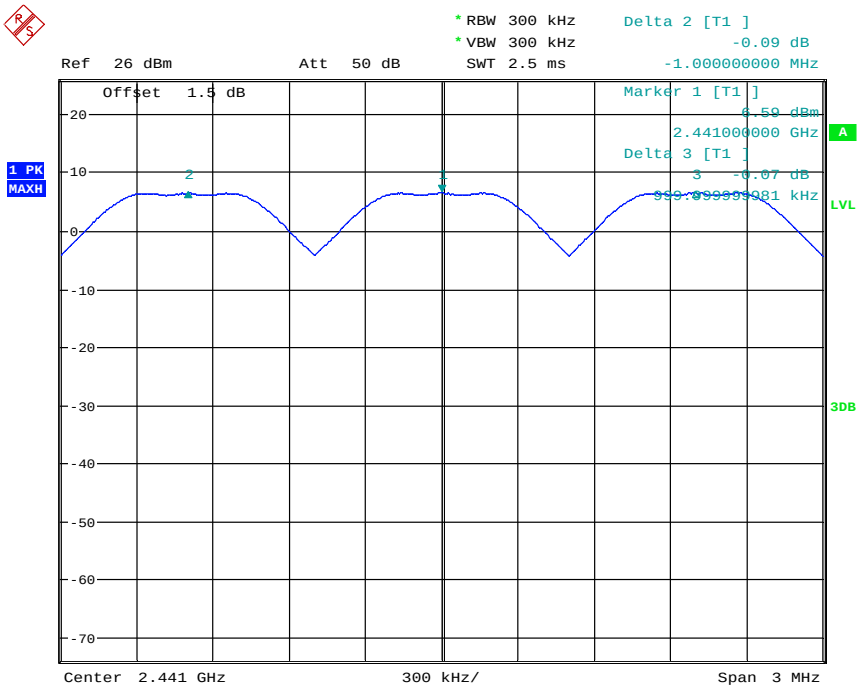
6.4.3 Test Result

The Bluetooth Module operates at hopping-on test mode.
For any adjacent channels, 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, whichever is greater. So, the verdict is PASS.

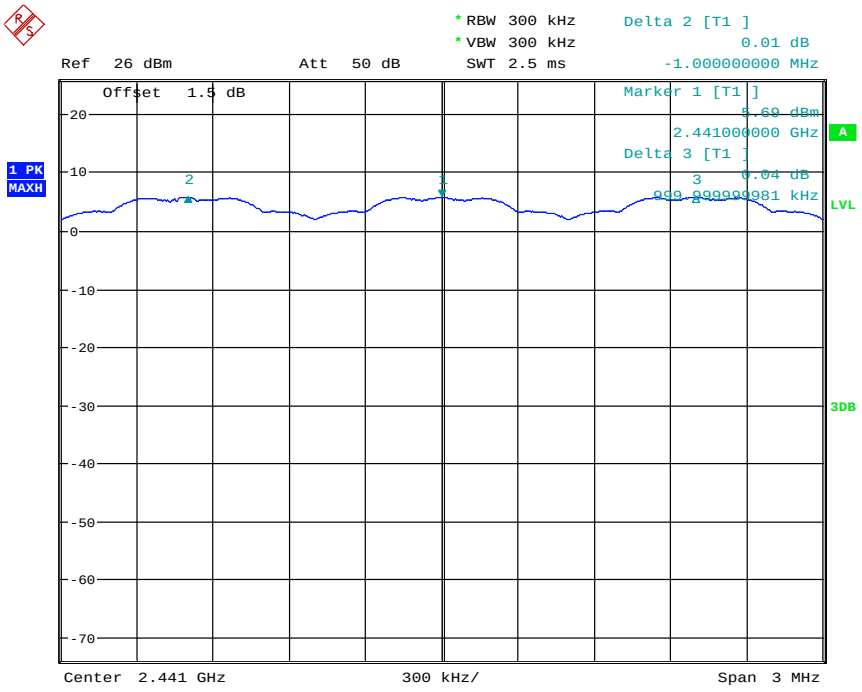
A. Test Verdict:

Modulation	Carried Frequency Separation（KHz）	Limit (MHz)	Refer to Plot	Result
GFSK	1000	0.025 or 2/3 the 20dB bandwidth	Plot A	PASS
π /4-DQPSK	1000	0.025 or 2/3 the 20dB bandwidth	Plot B	PASS
8DPSK	1000	0.025 or 2/3 the 20dB bandwidth	Plot C	PASS

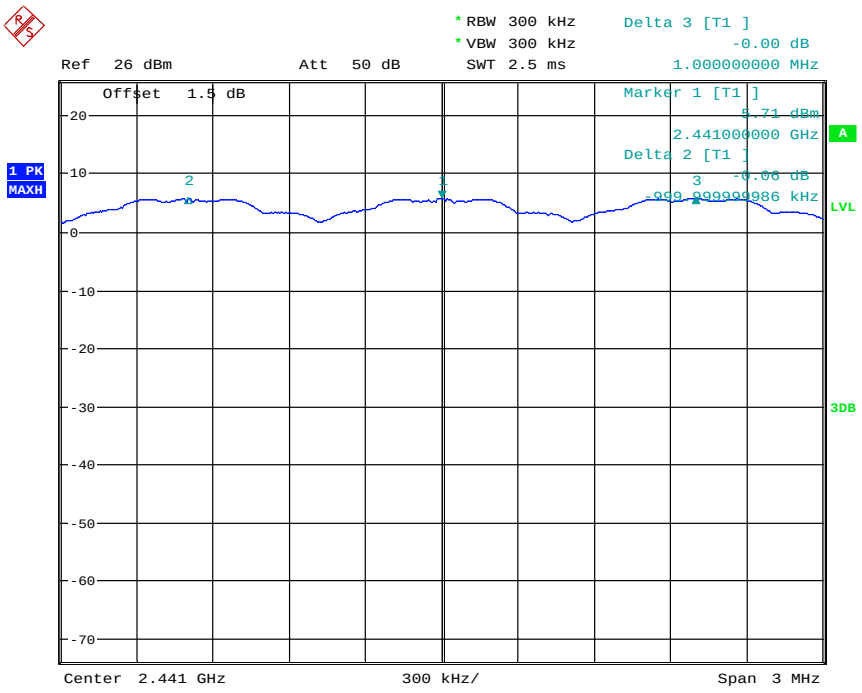
B. Test Plot:



(Plot A: GFSK Channel)



(Plot B: π/4-DQPSK Channel)



(Plot C: 8DPSK Channel)

6.5 Time of Occupancy (Dwell time)

6.5.1 Requirement

According to FCC section 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.

6.5.2 Test Setup

See section 6.1.2 of this report.

6.5.3 Test Result

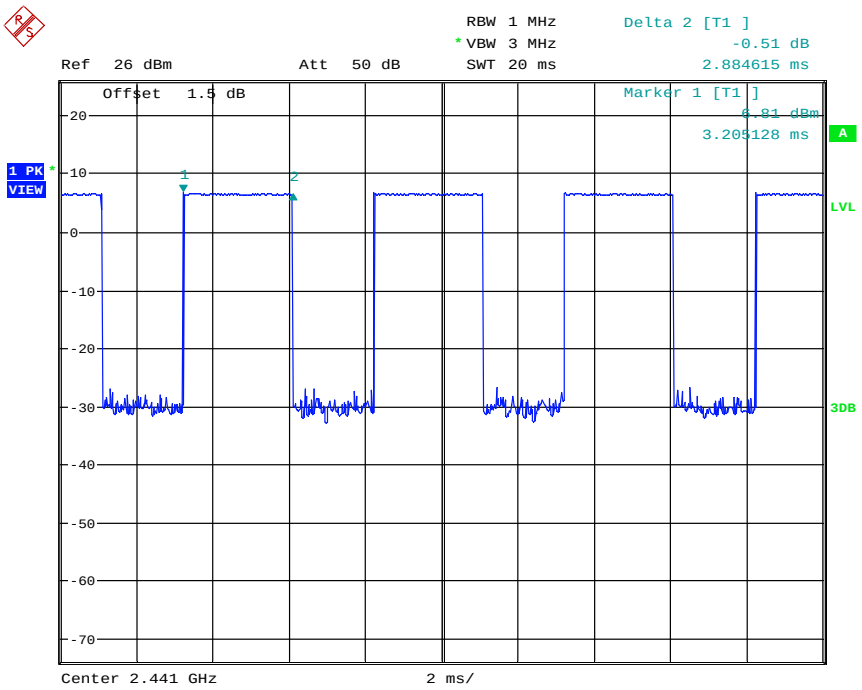
The average time of occupancy on any channel within the Period can be calculated with formulas:
DH5 : {Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4s * {Number of Hopping Frequency}
The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

A. Test Verdict:

Modulation	Channel	Pluse Time		Total of Dwell (ms)	Limit (ms)	Result
		ms	Refer to Plot			
GFSK	39	2.88	Plot A	307.20	400	PASS
π /4-DQPSK	39	2.88	Plot B	307.20	400	PASS
8DPSK	39	2.88	Plot C	307.20	400	PASS

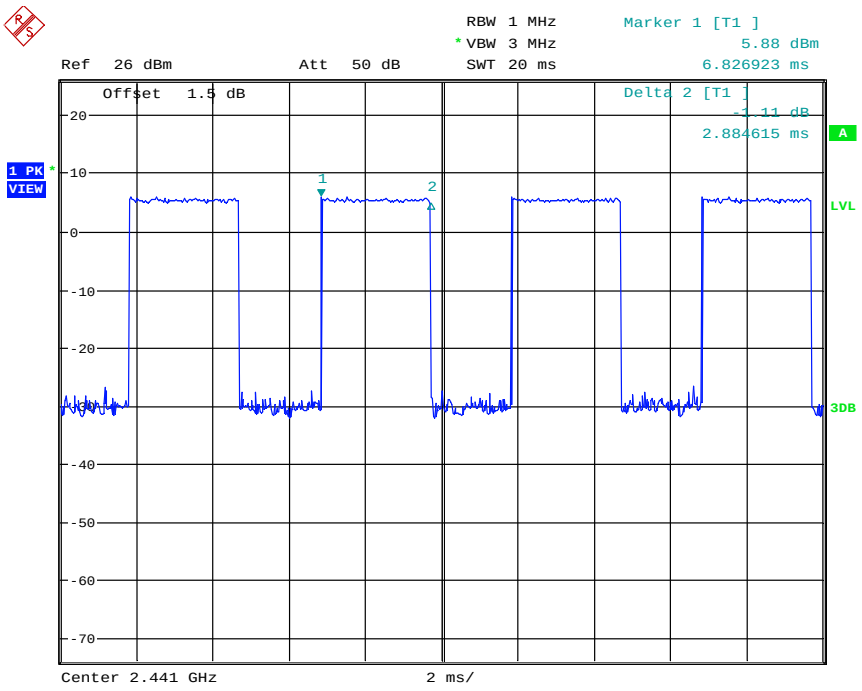
B. Test Plot:

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



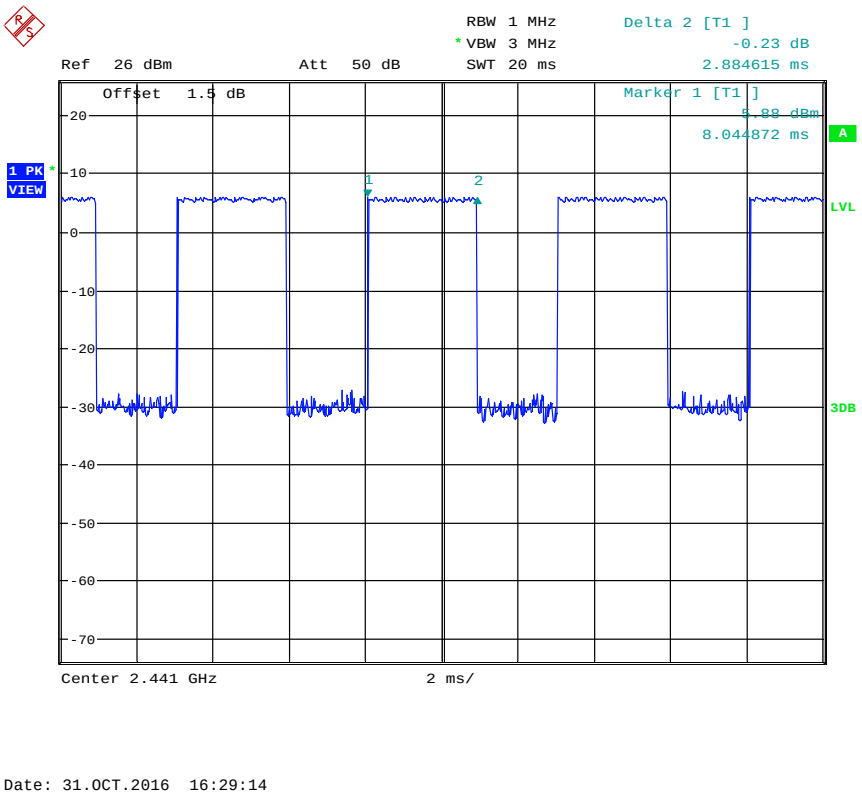
Date: 31.OCT.2016 16:27:52

(Plot A: GFSK Channel = 2441)



Date: 31.OCT.2016 16:28:35

(Plot B: π/4-DQPSK Channel = 2441)



Date: 31.OCT.2016 16:29:14

(Plot C: 8-DPSK Channel = 2441)

6.6 Conducted Spurious Emissions

6.6.1 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.

6.6.2 Test Setup

See section 6.1.2 of this report.

6.6.3 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

Modulation: GFSK

Channel	Frequency (MHz)	Measured Max Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Result
				Carrier Level	Calculated -20dBc Limit	
0	2402	-32.35	Plot A	5.79	-14.21	PASS
39	2441	-32.12	Plot B	5.63	-14.37	PASS
78	2480	-31.46	Plot C	4.75	-15.25	PASS

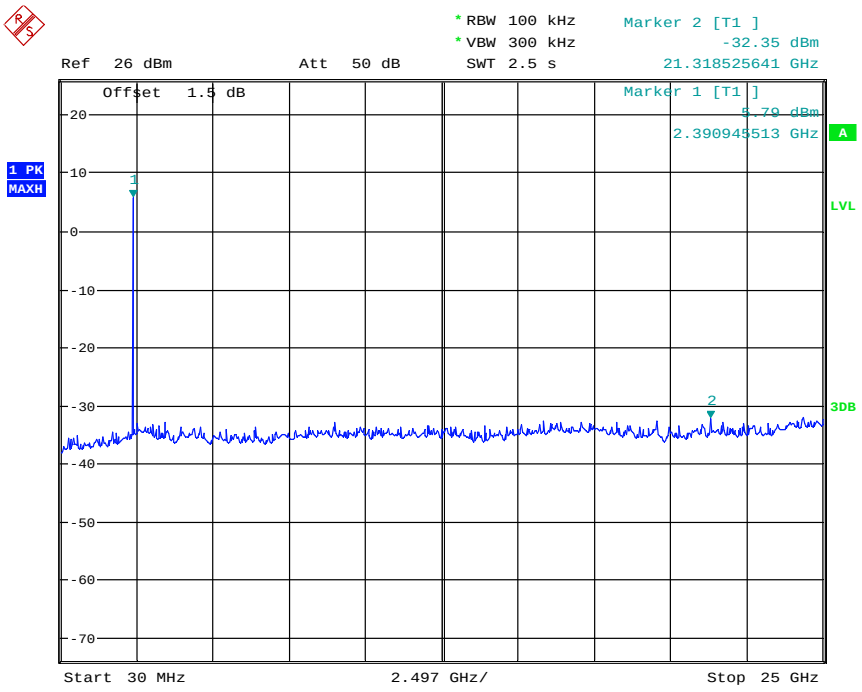
Modulation: π/4-DQPSK

Channel	Frequency (MHz)	Measured Max Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Result
				Carrier Level	Calculated -20dBc Limit	
0	2402	-32.26	Plot D	1.62	-18.38	PASS
39	2441	-31.91	Plot E	5.28	-14.72	PASS
78	2480	-30.59	Plot F	3.25	-16.75	PASS

Modulation: 8-DPSK

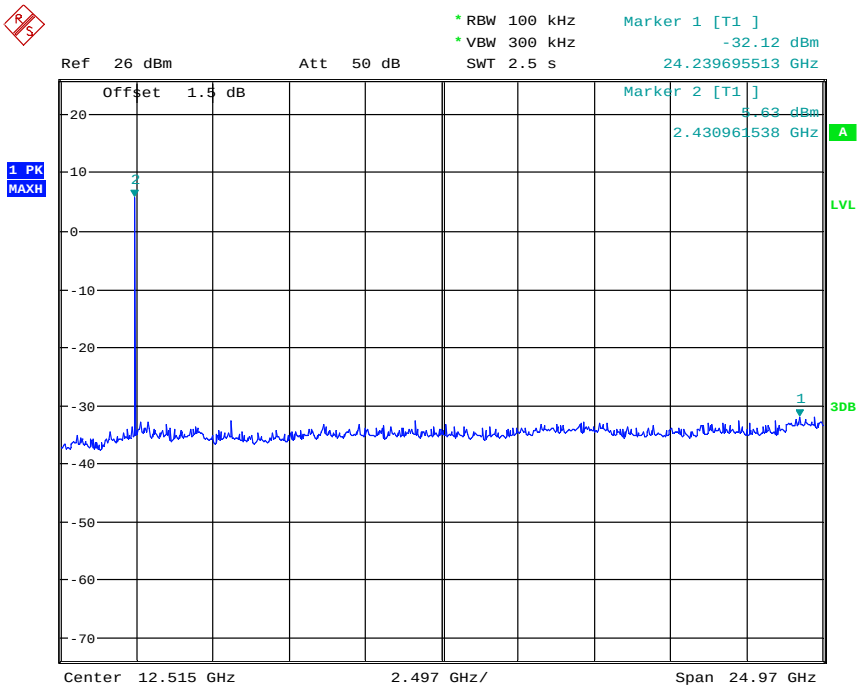
Channel	Frequency (MHz)	Measured Max Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Result
				Carrier Level	Calculated -20dBc Limit	
0	2402	-31.94	Plot G	1.45	-18.55	PASS
39	2441	-31.48	Plot H	1.30	-18.70	PASS
78	2480	-31.21	Plot I	2.28	-17.71	PASS

B. Test Plot



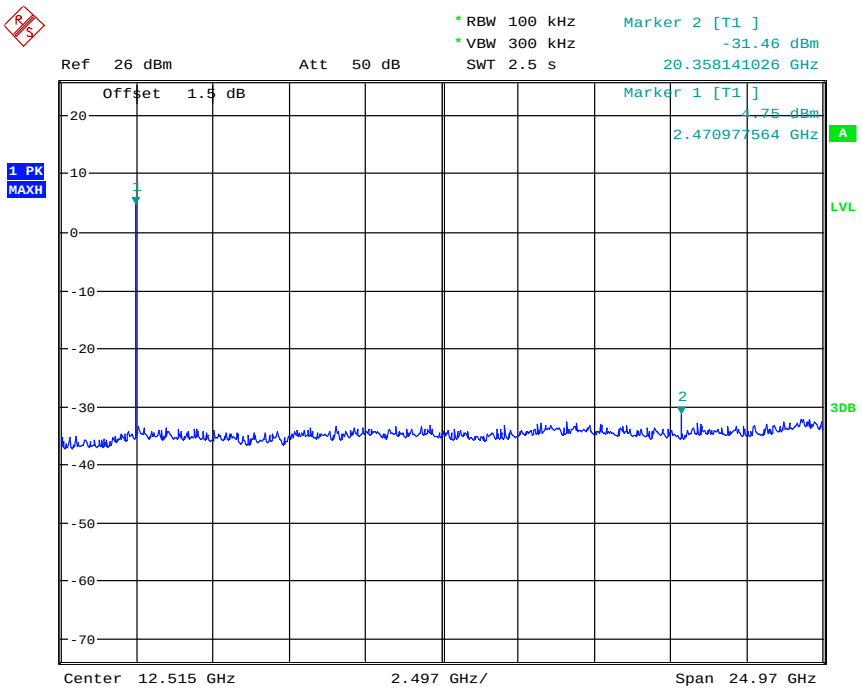
Date: 31.OCT.2016 17:03:04

Plot A



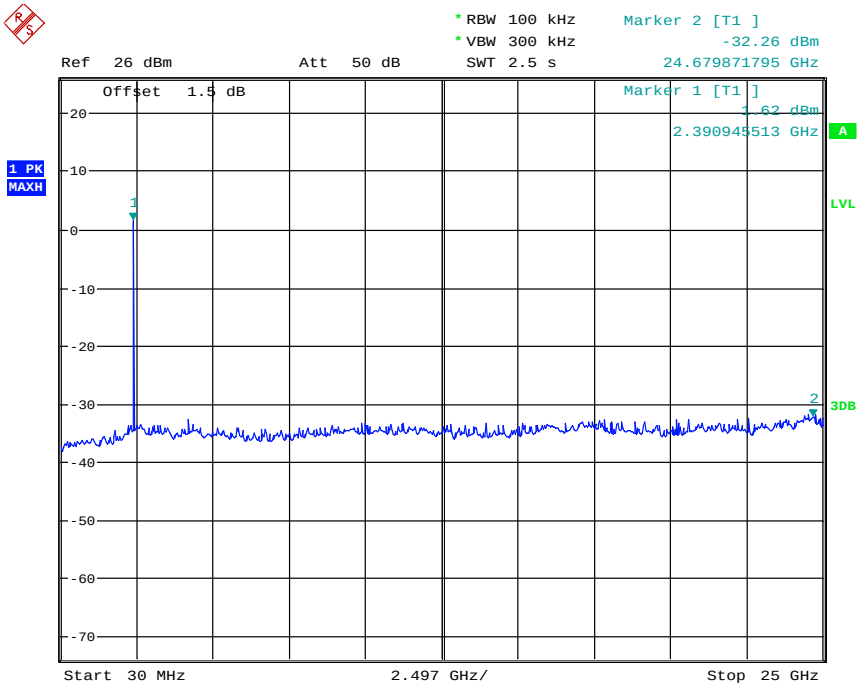
Date: 31.OCT.2016 17:10:04

Plot B



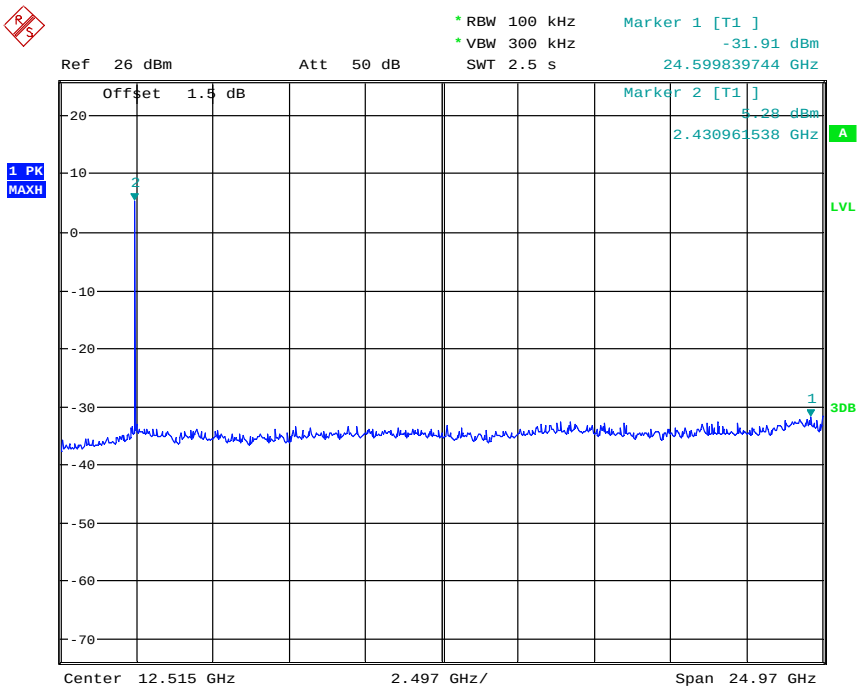
Date: 31.OCT.2016 17:09:17

Plot C



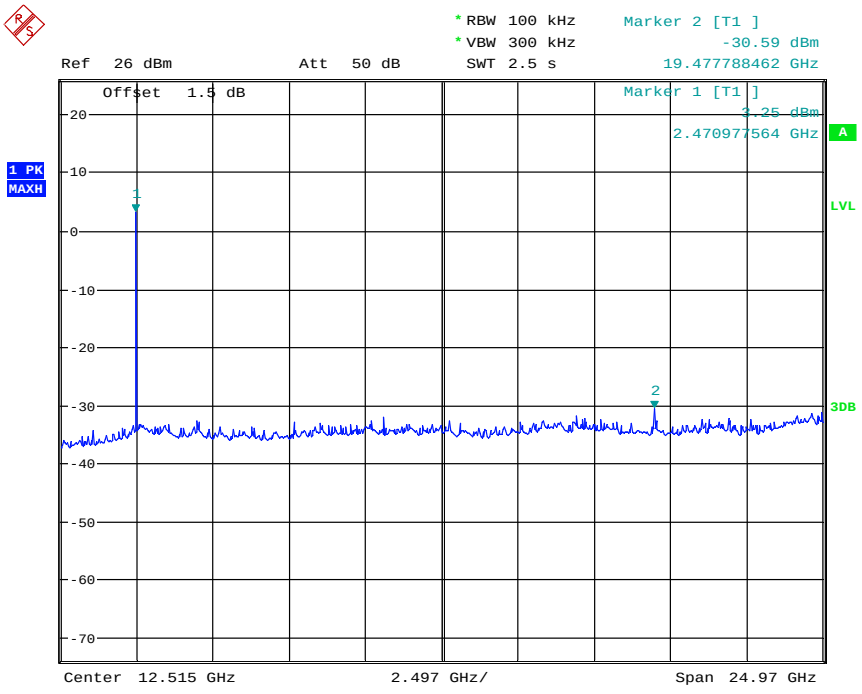
Date: 31.OCT.2016 17:04:17

Plot D



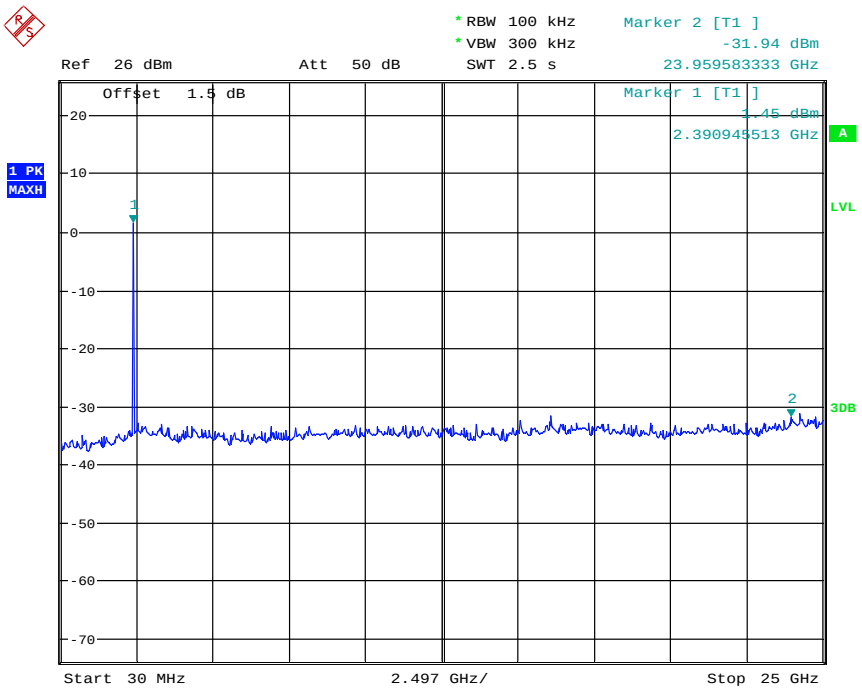
Date: 31.OCT.2016 17:11:01

Plot E

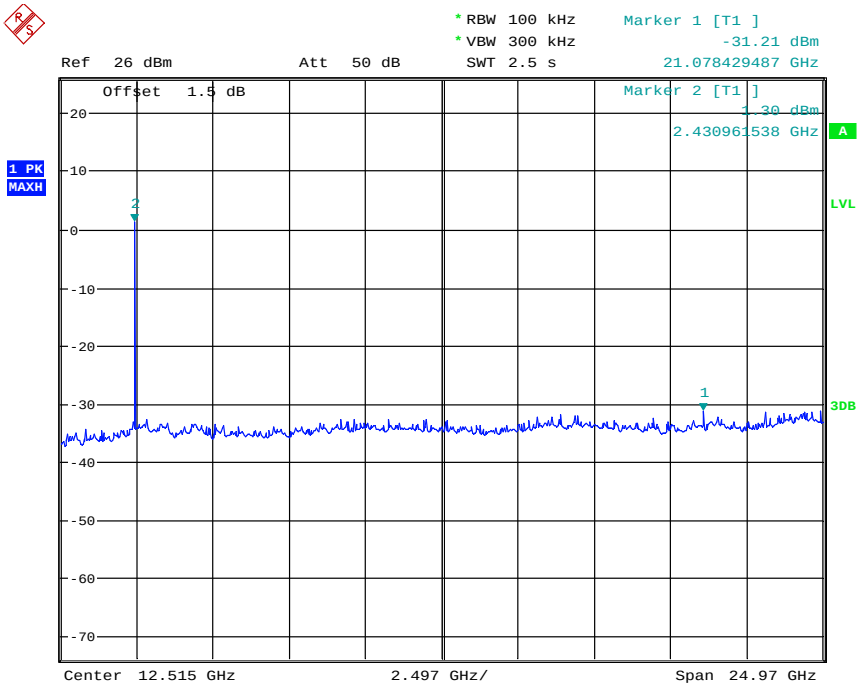


Date: 31.OCT.2016 17:08:19

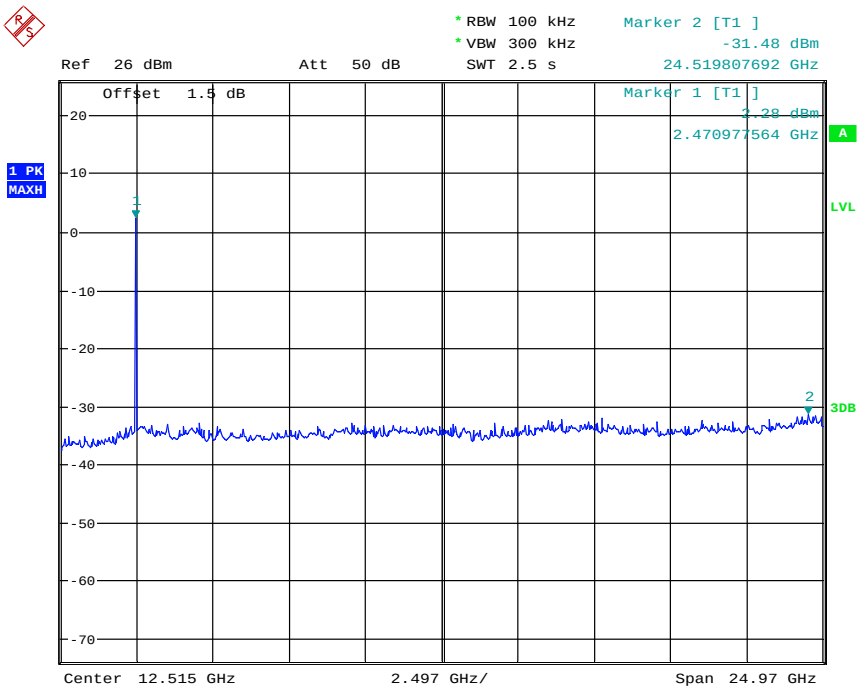
Plot F


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
Marker 2 [T1]
-31.94 dBm
23.959583333 GHz
Ref 26 dBm
Att 50 dB
Offset 1.5 dB
Marker 1 [T1]
1.45 dBm
2.390945513 GHz
1 PK
MAXH
A
LVL
3DB
Start 30 MHz
2.497 GHz/
Stop 25 GHz
Date: 31.OCT.2016 17:05:15

Plot G


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-31.21 dBm
21.078429487 GHz
Ref 26 dBm
Att 50 dB
Offset 1.5 dB
Marker 2 [T1]
1.30 dBm
2.430961538 GHz
1 PK
MAXH
A
LVL
3DB
Center 12.515 GHz
2.497 GHz/
Span 24.97 GHz
Date: 31.OCT.2016 17:13:00

Plot H



Date: 31.OCT.2016 17:06:42

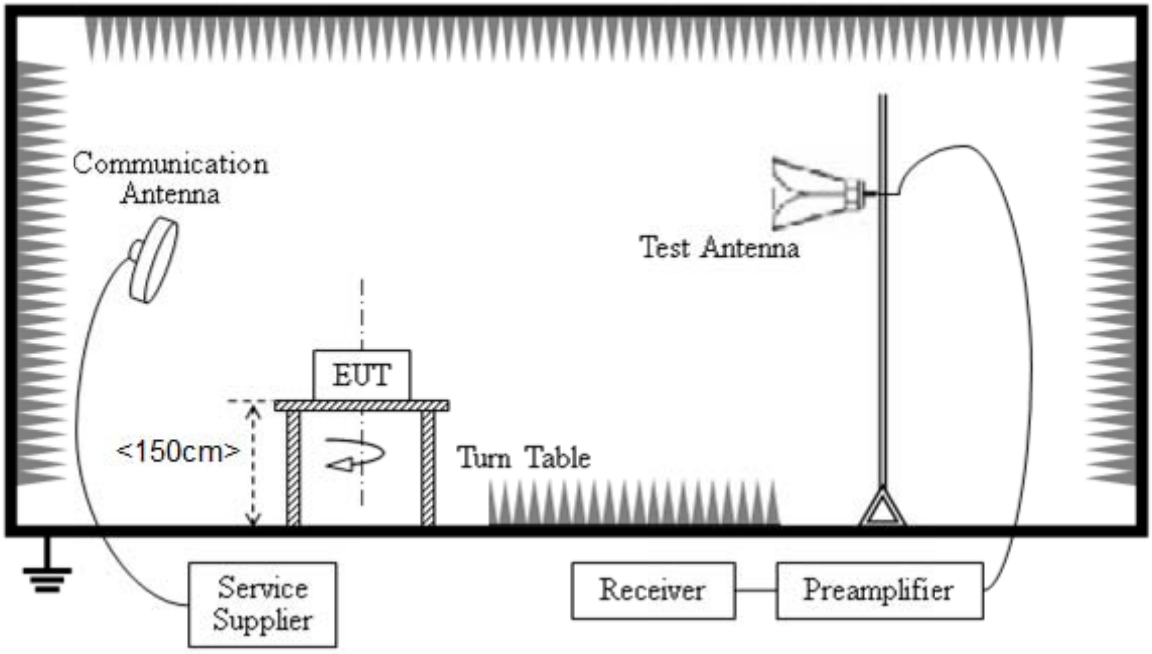
Plot I

6.7 Band Edge

6.7.1 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.

6.7.2 Test Setup

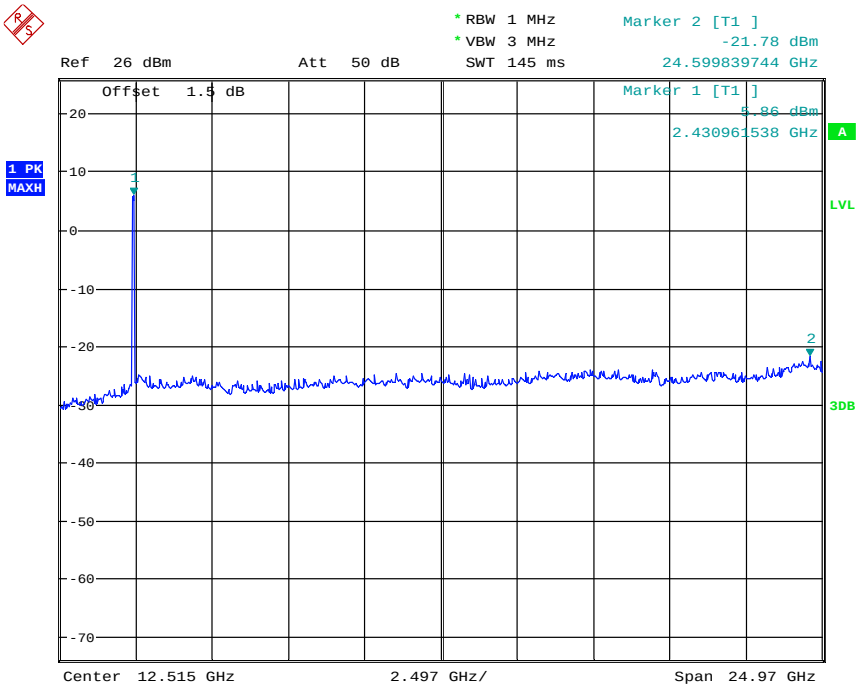


The Bluetooth Module of the EUT is powered by the battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth 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.

6.7.3 Test Result

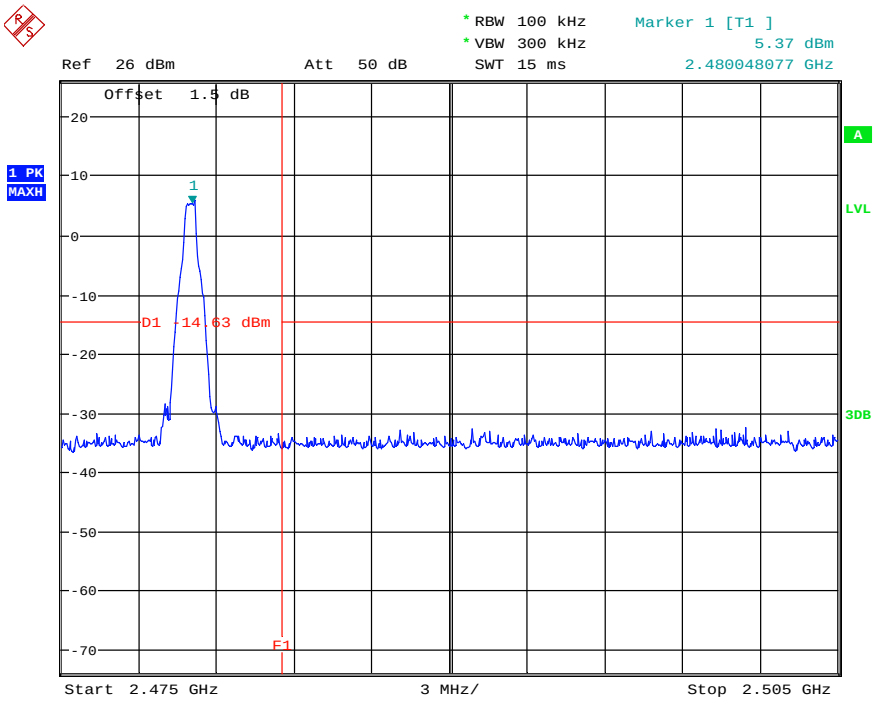
A. Conducted Band Edge:

Both hopping-on mode and hopping-off mode had been pre-tested and only the worst case (hopping –off mode) is recorded in the test report.



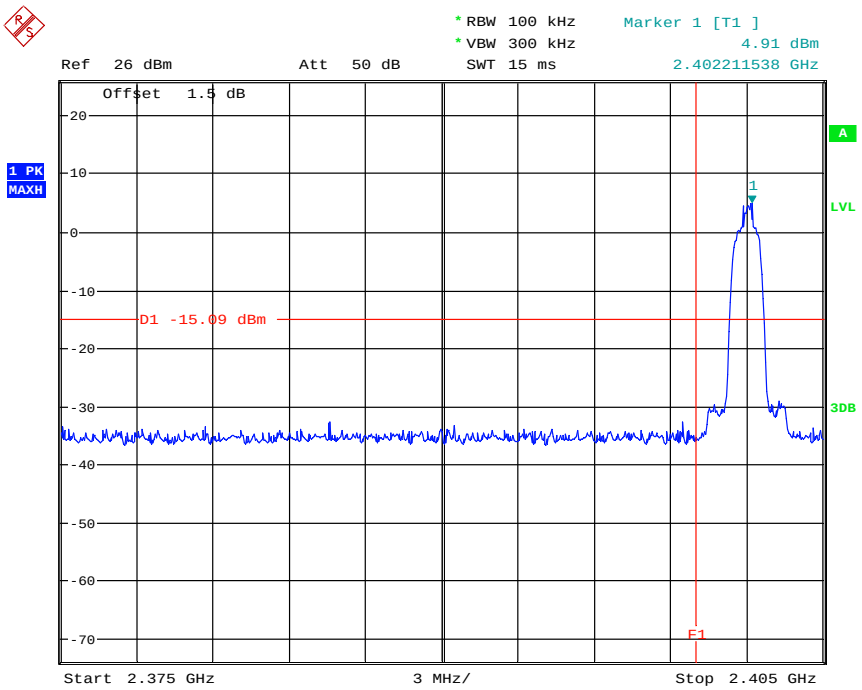
Date: 31.OCT.2016 16:42:46

(Plot A: GFSK Channel = 0)

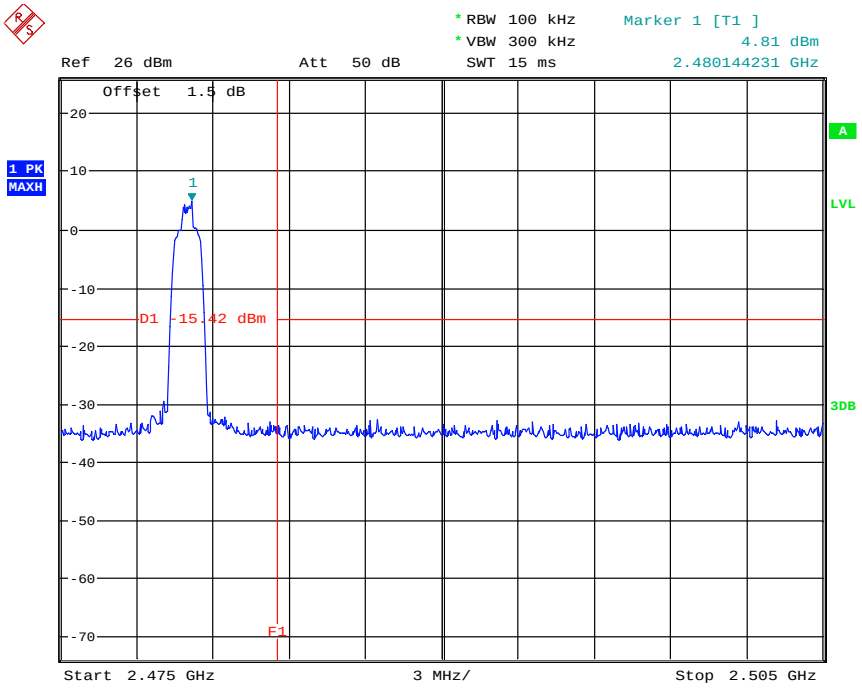


Date: 31.OCT.2016 16:51:15

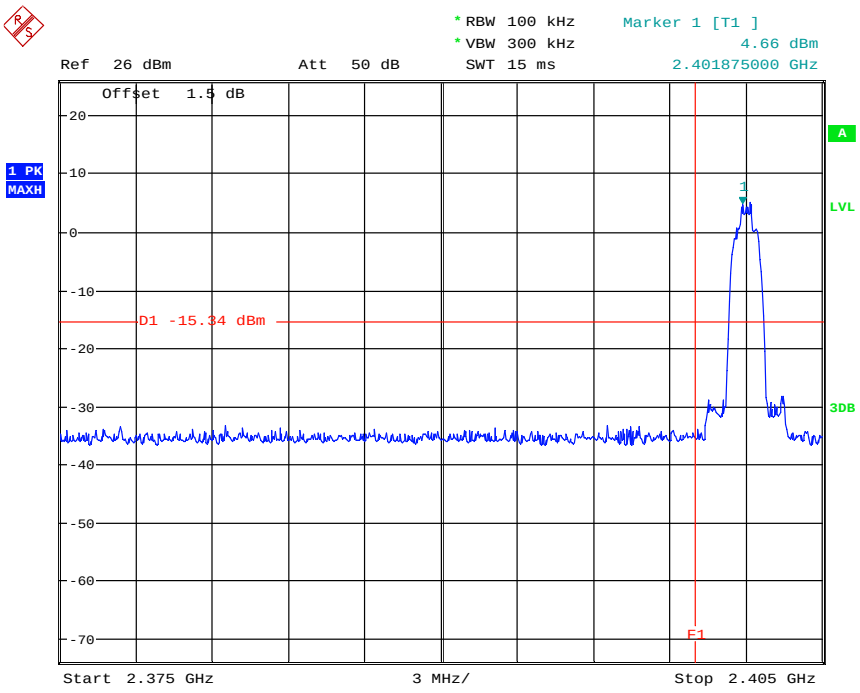
(Plot B: GFSK Channel = 78)



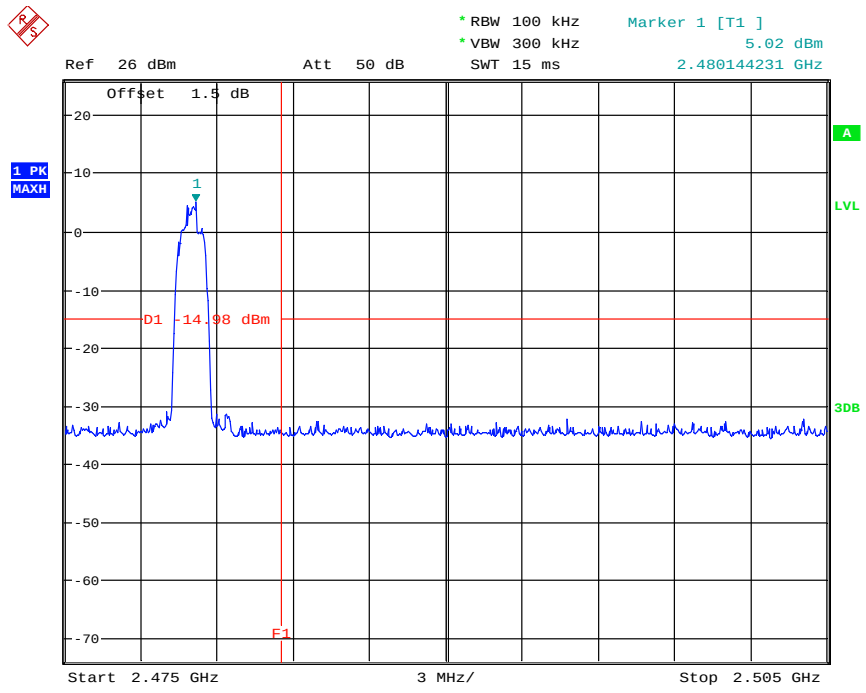
(Plot C: π/4-DQPSK Channel = 0)



(Plot D: π/4-DQPSK Channel = 78)



(Plot E: 8DPSK Channel = 0)



(Plot F: 8DPSK Channel = 78)

B. Radiated Band Edge:

The lowest and highest channels are tested to verify the Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBV/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
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.
The lowest and highest channels are tested to verify the Restricted Frequency Bands

Test Verdict

GFSK mode

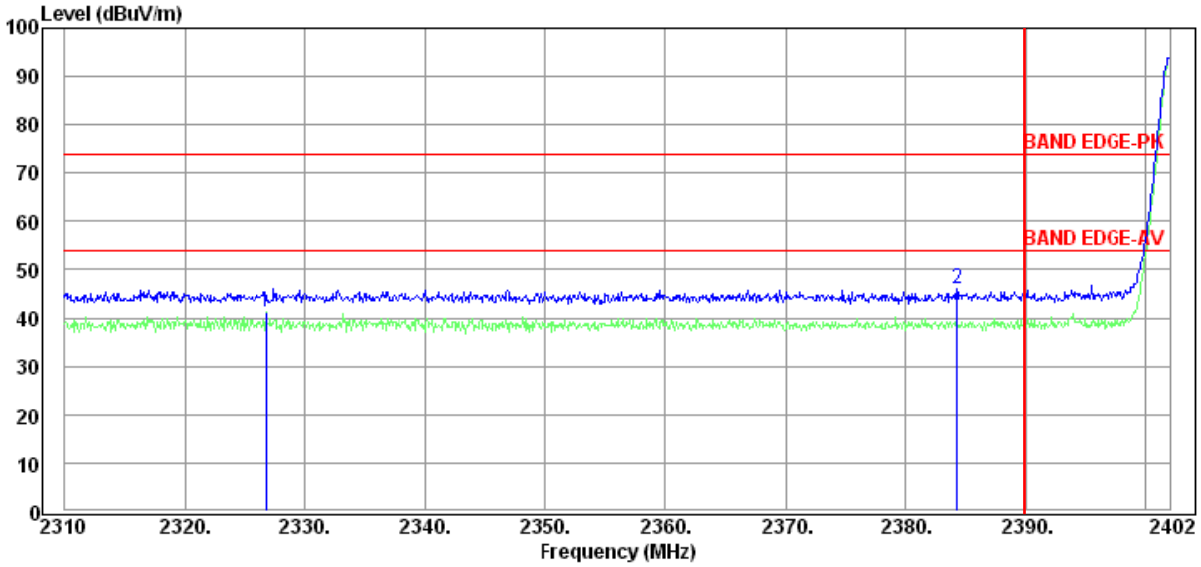
Ch	Frequency (MHz)	Detector PK/AV	Max. Emission (dBuV/m)	Limit (dBuV/m)	Plot	Result
0	2384.24	PK	46.17	74	Plot A	Pass
0	2326.74	AV	41.09	54		Pass
78	2498.54	PK	47.40	74	Plot B	Pass
78	2489.80	AV	42.54	54		Pass

π /4-DQPSK mode

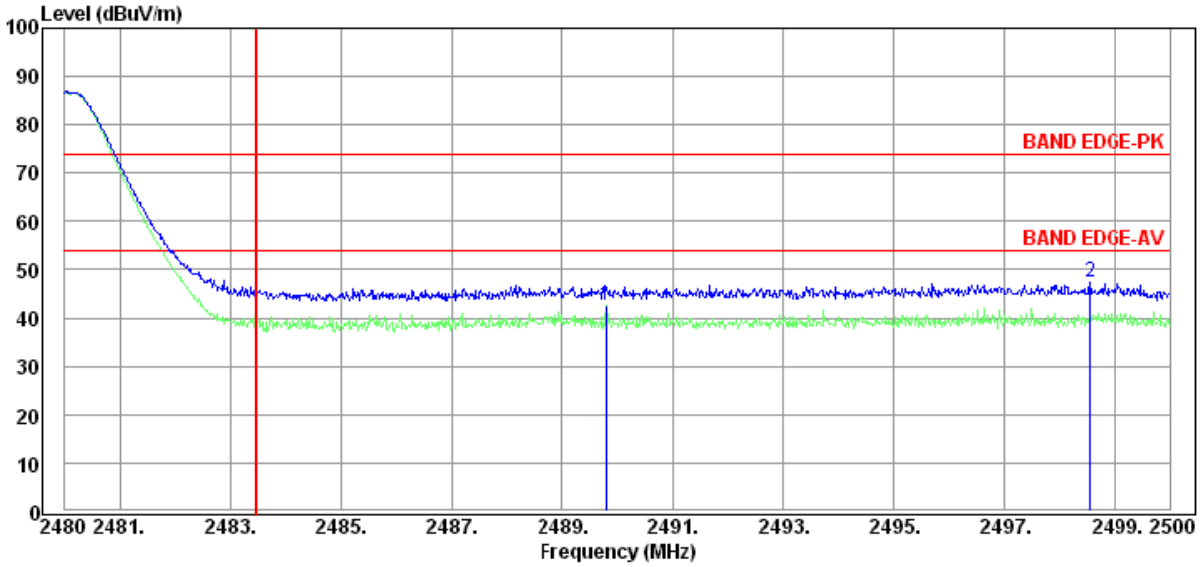
Ch	Frequency (MHz)	Detector PK/AV	Max. Emission (dBuV/m)	Limit (dBuV/m)	Plot	Result
0	2332.54	PK	46.23	74	Plot C	Pass
0	2328.77	AV	40.92	54		Pass
78	2498.66	PK	47.69	74	Plot D	Pass
78	2498.50	AV	42.56	54		Pass

8DPSK mode

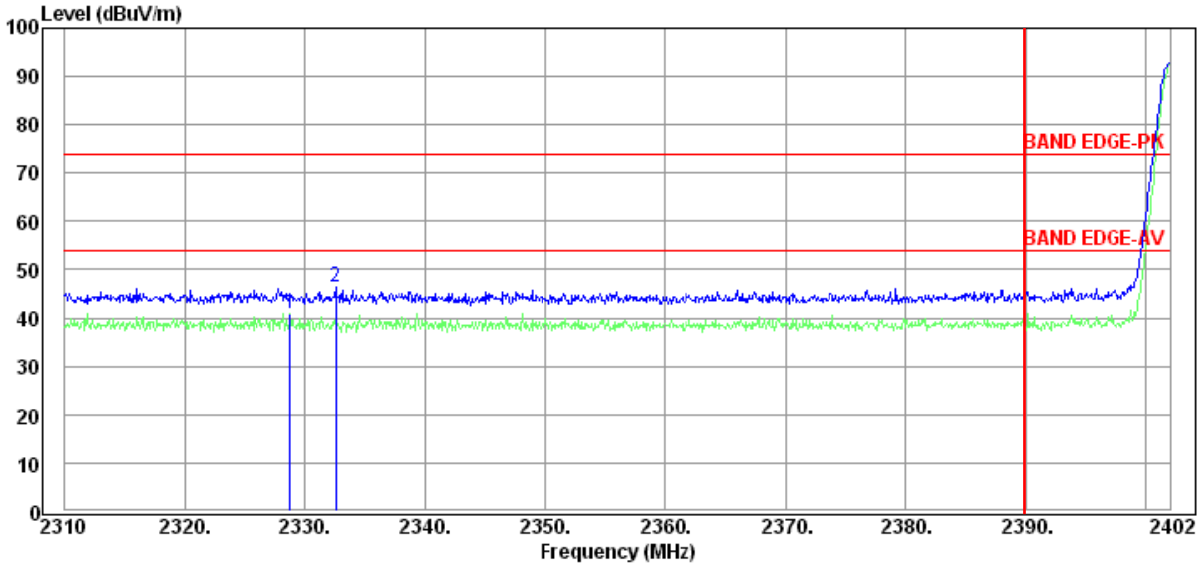
Ch	Frequency (MHz)	Detector PK/AV	Max. Emission (dBuV/m)	Limit (dBuV/m)	Plot	Result
0	2347.72	PK	45.98	74	Plot E	Pass
0	2324.81	AV	40.90	54		Pass
78	2488.20	PK	47.63	74	Plot F	Pass
78	2498.00	AV	42.16	54		Pass


Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
BAND EDGE-PK
BAND EDGE-AV
2
2310
2320.
2330.
2340.
2350.
2360.
2370.
2380.
2390.
2402
Frequency (MHz)

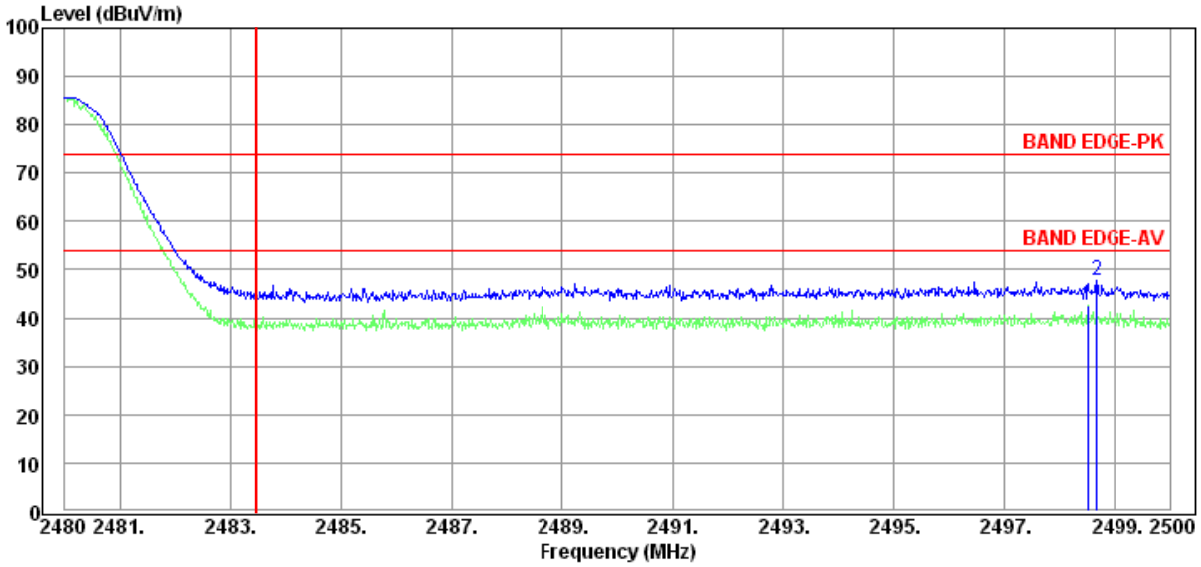
Plot A


Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
BAND EDGE-PK
BAND EDGE-AV
2
2480
2481.
2483.
2485.
2487.
2489.
2491.
2493.
2495.
2497.
2499.
2500
Frequency (MHz)

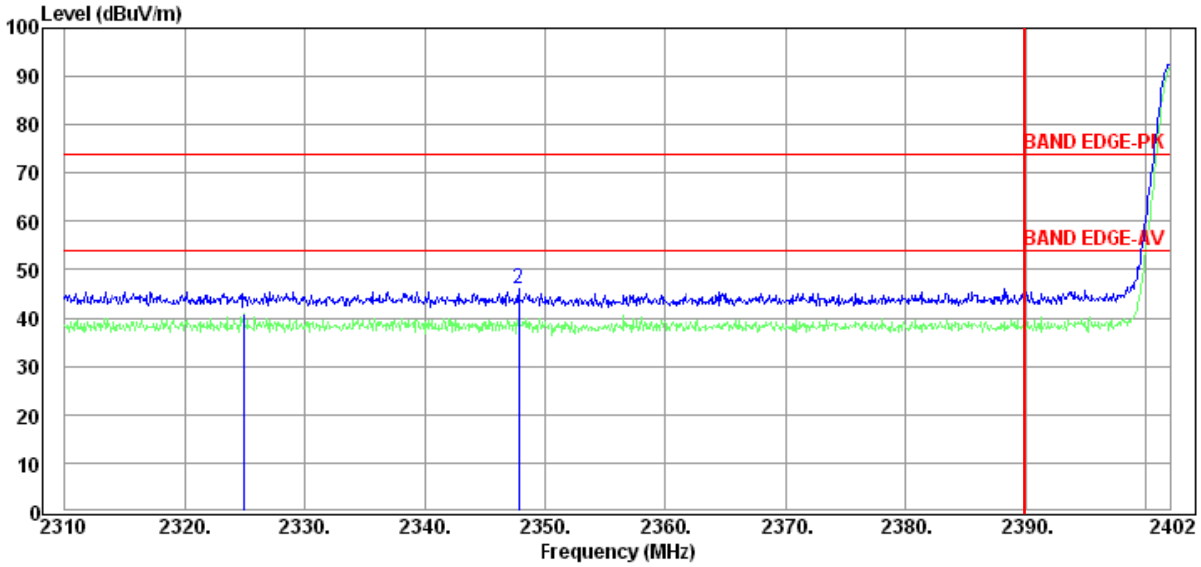
Plot B


Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
BAND EDGE-PK
BAND EDGE-AV
2
2310
2320.
2330.
2340.
2350.
2360.
2370.
2380.
2390.
2402
Frequency (MHz)

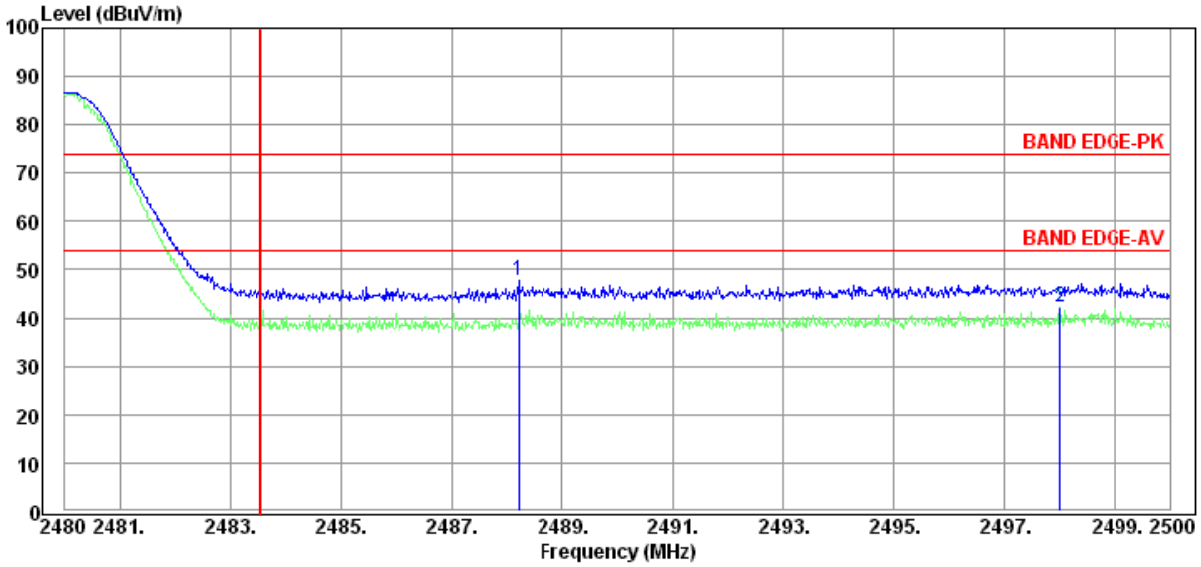
Plot C


Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
BAND EDGE-PK
BAND EDGE-AV
2
2480
2481.
2483.
2485.
2487.
2489.
2491.
2493.
2495.
2497.
2499.
2500
Frequency (MHz)

Plot D


Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
BAND EDGE-PK
BAND EDGE-AV
2
2310
2320.
2330.
2340.
2350.
2360.
2370.
2380.
2390.
2402
Frequency (MHz)

Plot E


Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
BAND EDGE-PK
BAND EDGE-AV
1
2
2480
2481.
2483.
2485.
2487.
2489.
2491.
2493.
2495.
2497.
2499.
2500
Frequency (MHz)

Plot F

6.8 Conducted Emission

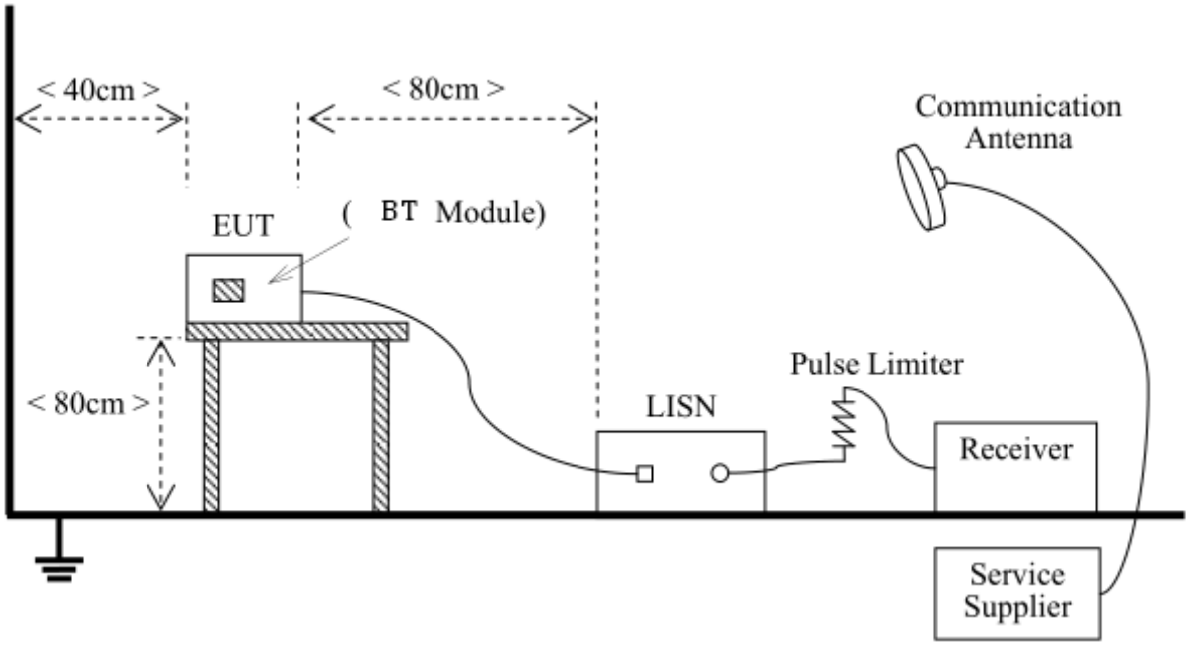
6.8.1 Requirement

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
5 - 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.

6.8.2 Test Description



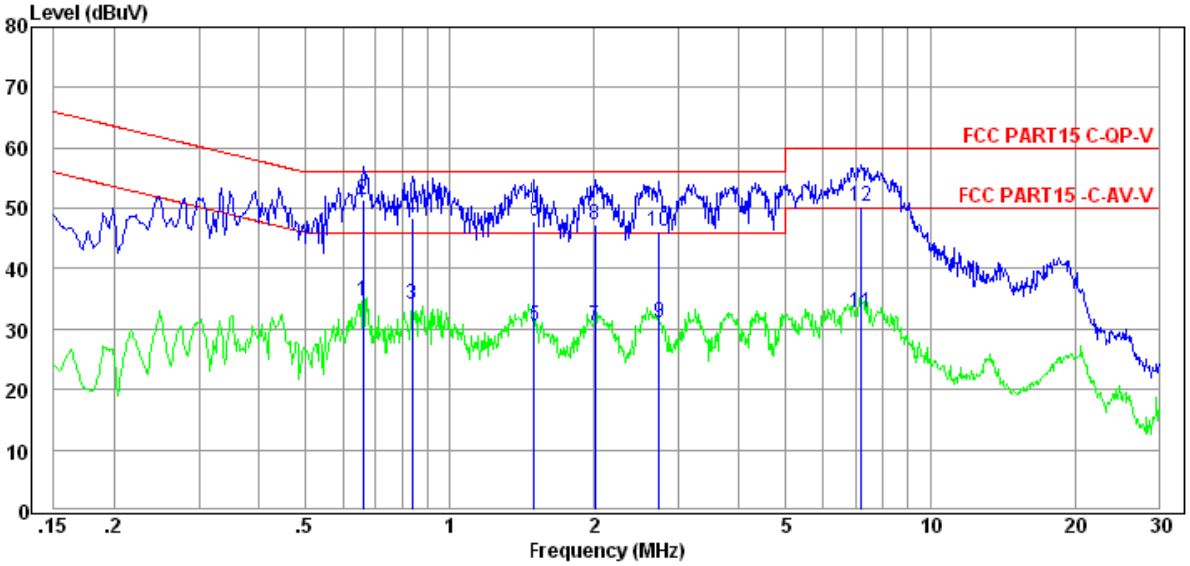
The EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. Power supplier is setting to 120V/60Hz. The set-up and test methods were according to ANSI C63.10:2013

6.8.3 Test result

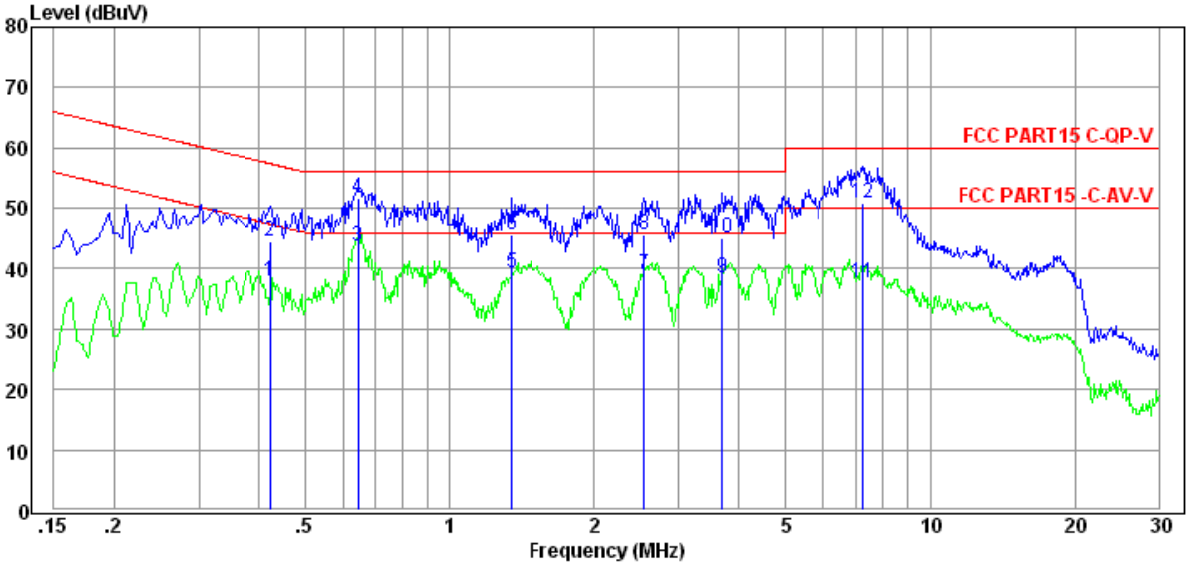
.

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Phase line	Detector
0.66	34.77	46.00	11.23	L	Average
0.66	51.48	56.00	4.52	L	QP
0.84	33.99	46.00	12.01	L	Average
0.84	48.31	56.00	7.69	L	QP
1.50	30.55	46.00	15.45	L	Average
1.50	47.94	56.00	8.06	L	QP
2.01	30.41	46.00	15.59	L	Average
2.01	47.18	56.00	8.82	L	QP
2.74	31.12	46.00	14.88	L	Average
2.74	46.05	56.00	9.95	L	QP
7.21	32.72	50.00	17.28	L	Average
7.21	50.22	60.00	9.78	L	QP
0.42	37.95	47.37	9.42	N	Average
0.42	44.63	57.37	12.74	N	QP
0.64	43.77	46.00	2.23	N	Average
0.64	51.73	56.00	4.27	N	QP
1.35	39.38	46.00	6.62	N	Average
1.35	45.59	56.00	10.41	N	QP
2.54	38.97	46.00	7.03	N	Average
2.54	45.51	56.00	10.49	N	QP
3.70	38.61	46.00	7.39	N	Average
3.70	45.11	56.00	10.89	N	QP
7.25	37.60	50.00	12.40	N	Average
7.25	50.84	60.00	9.16	N	QP

6.8.4 Test Plot



L Line



N Line

6.9 Radiated Emission

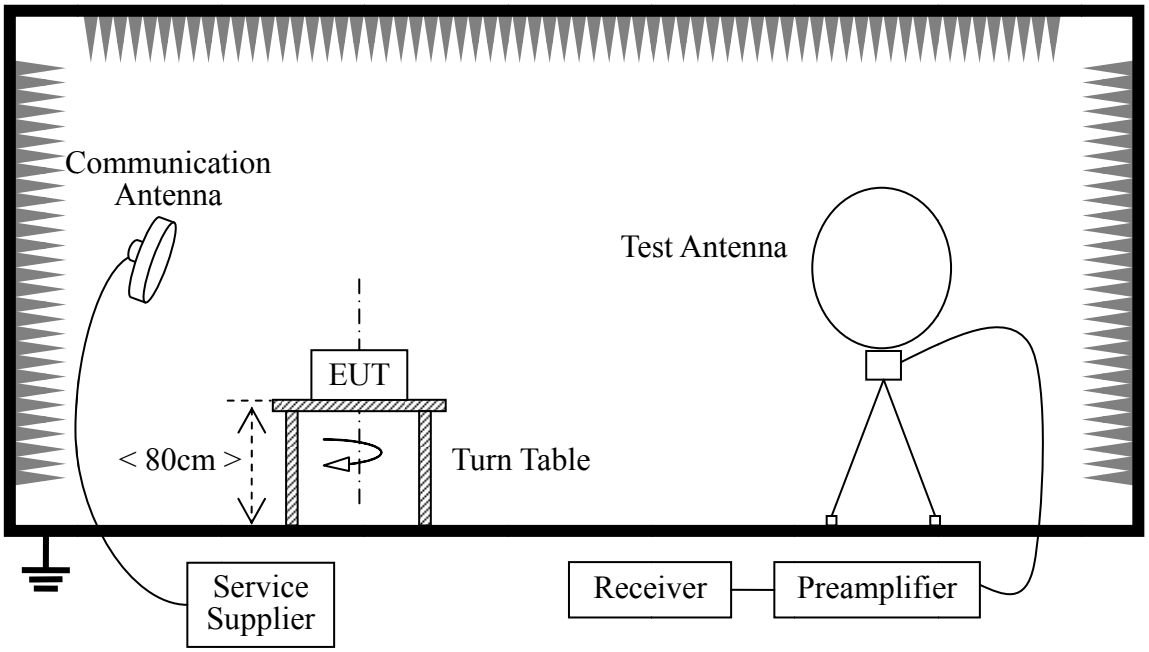
6.9.1 Requirement

According to FCC section 15.247(c), 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:

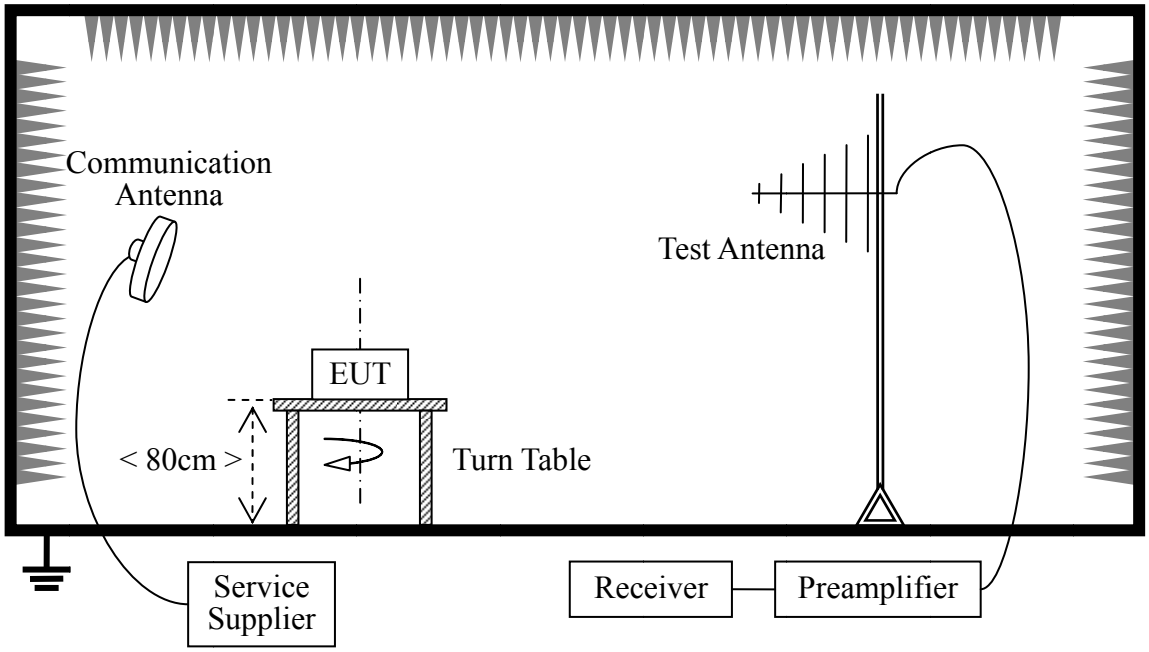
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Limit(dBμV/m)	Detector
0.009-0.490	2400/F(kHz)	300	/	/
0.490-1.705	24000/F(kHz)	30	/	/
1.705-30	30	30	/	/
30 - 88	100	3	40	QP
88 - 216	150	3	43.5	QP
216 - 960	200	3	46	QP
960 - 1000	500	3	54	QP
Above 1000	500	3	54	AV

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)

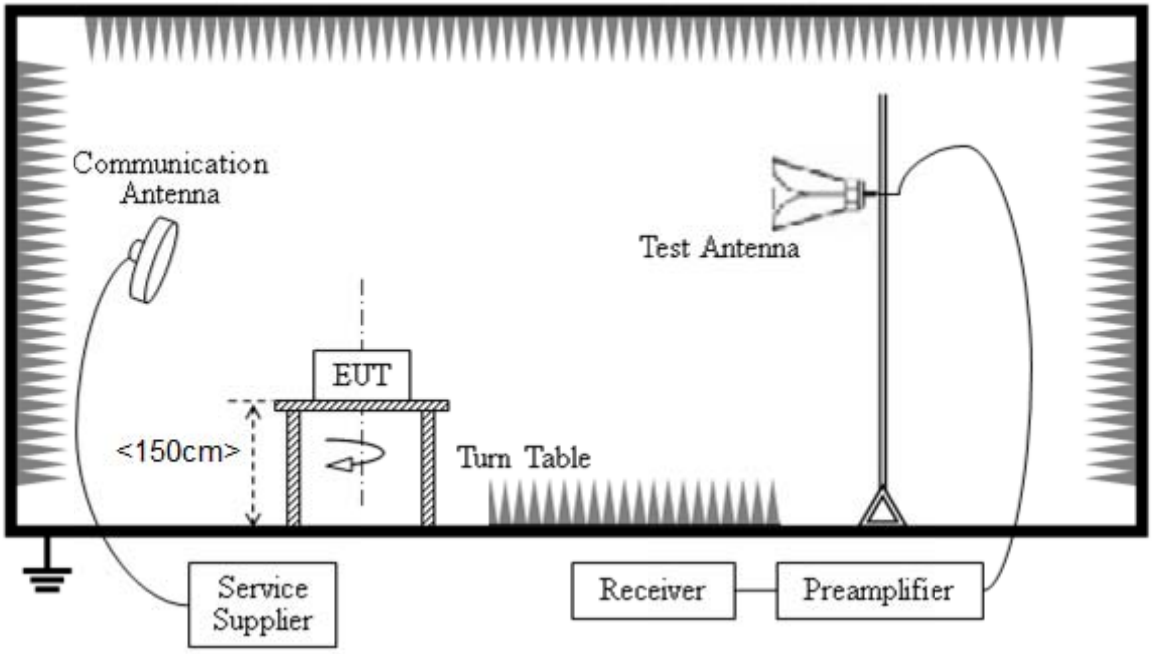
6.9.2 Test Setup



Radiated Emissions below 30MHz



Radiated Emissions 30-1000MHz



Radiated Emissions above 1000MHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10.

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 C63.10 for Radiated Emissions and the worst-case data was presented.

6.9.3 Test Result

A. Test Result for 9 kHz ~ 30 MHz:

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
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Note:

a) The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

b) Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

c) Limit line = specific limits (dBuV) + distance extrapolation factor.

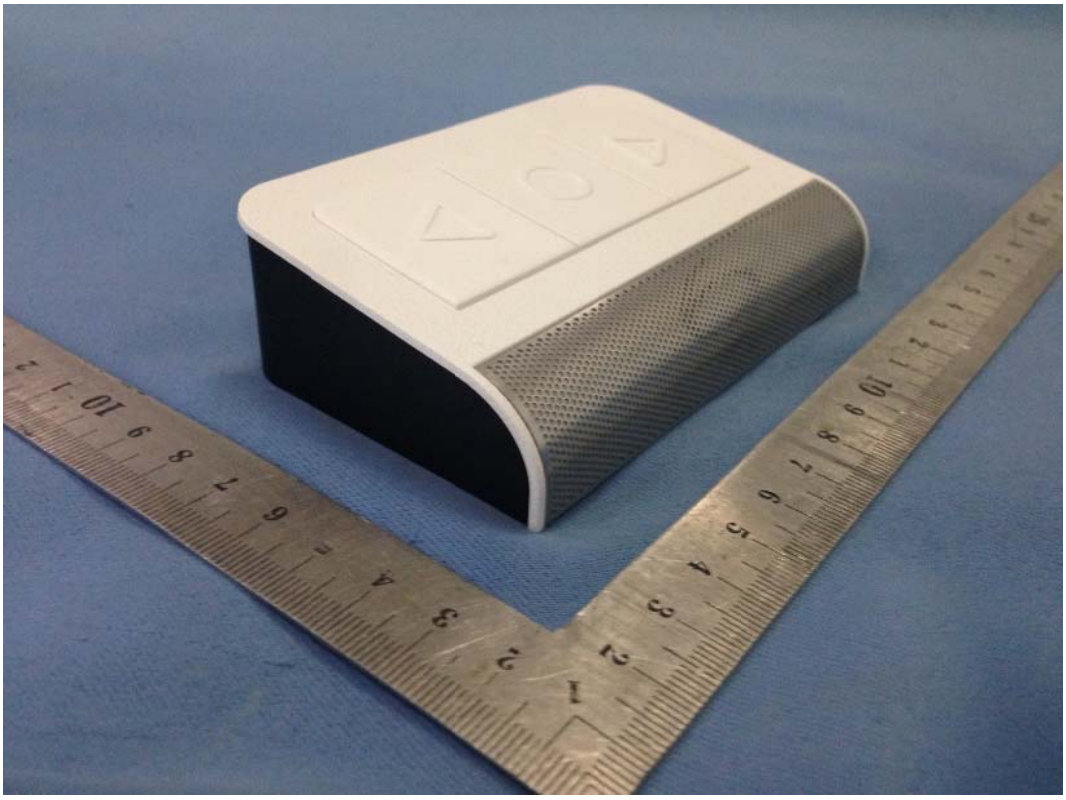
B. Test Result for 30 MHz ~ 10th Harmonic

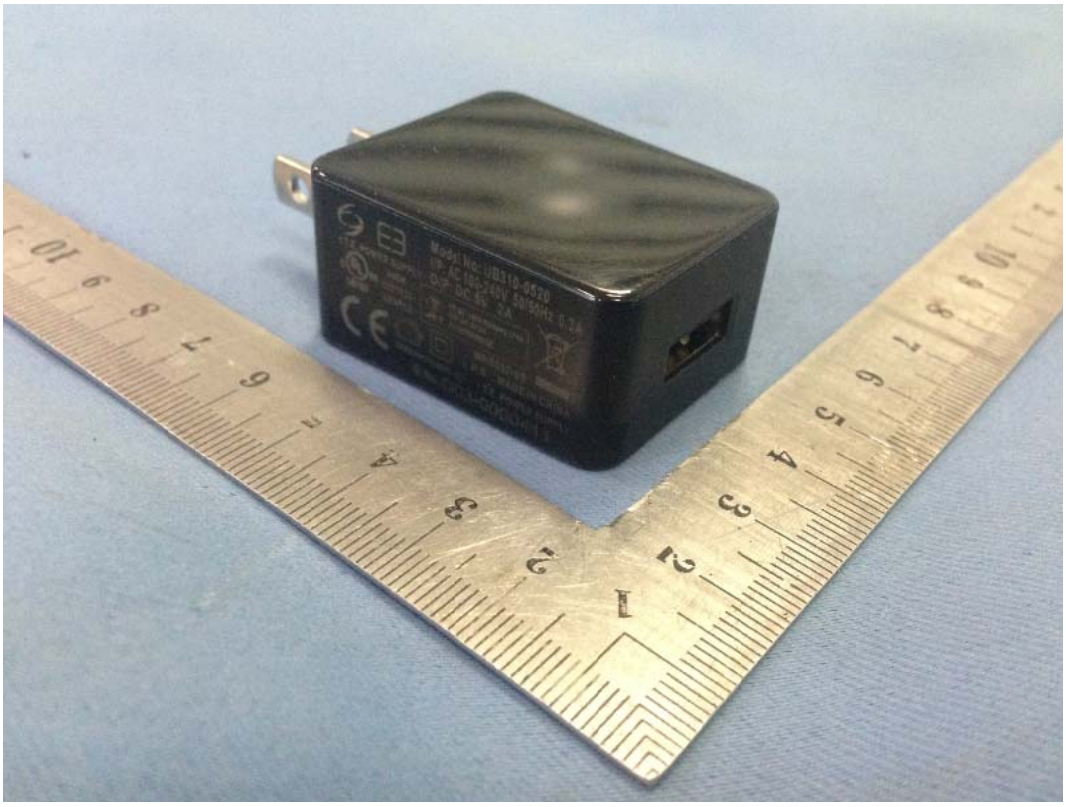
Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Detector	Result
87.42	19.03	40.00	20.97	Horizontal	QP	PASS
225.31	27.02	46.00	18.98	Horizontal	QP	PASS
325.60	28.86	46.00	17.14	Horizontal	QP	PASS
1378.13	21.31	54	32.69	Horizontal	Average	PASS
1496.53	21.49	54	28.51	Horizontal	Average	PASS
1724.08	19.85	54	30.15	Horizontal	Average	PASS
2589.40	23.13	54	26.87	Horizontal	Average	PASS
4882.74	43.98	54	14.02	Horizontal	Average	PASS
33.21	33.52	40.00	6.48	Vertical	QP	PASS
37.16	35.79	40.00	4.21	Vertical	QP	PASS
125.89	27.55	43.50	15.95	Vertical	QP	PASS
1496.53	21.98	54	32.02	Vertical	Average	PASS
1996.95	21.89	54	32.11	Vertical	Average	PASS
2489.31	23.45	54	30.55	Vertical	Average	PASS
4223.12	26.68	54	31.32	Vertical	Average	PASS
4882.74	35.58	54	22.42	Vertical	Average	PASS

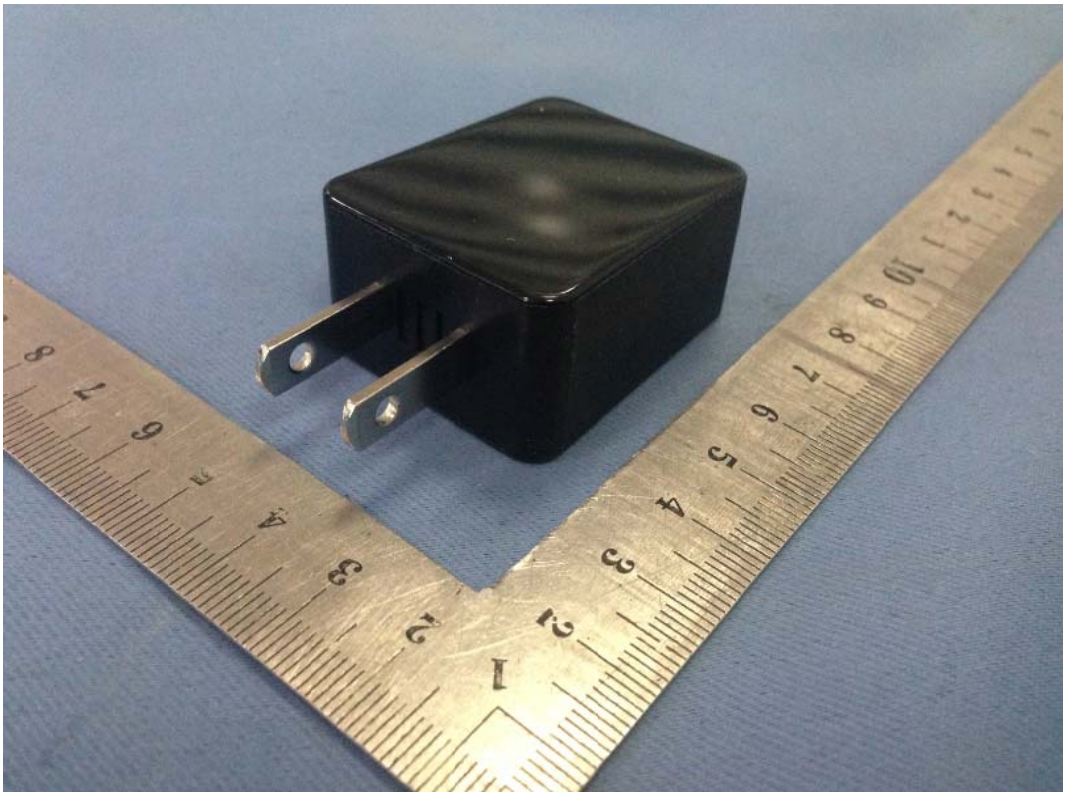
Note:

The worst case (GFSK, Channel 39:2441MHz) is recorded in the report.

Annex A Photos of the EUT

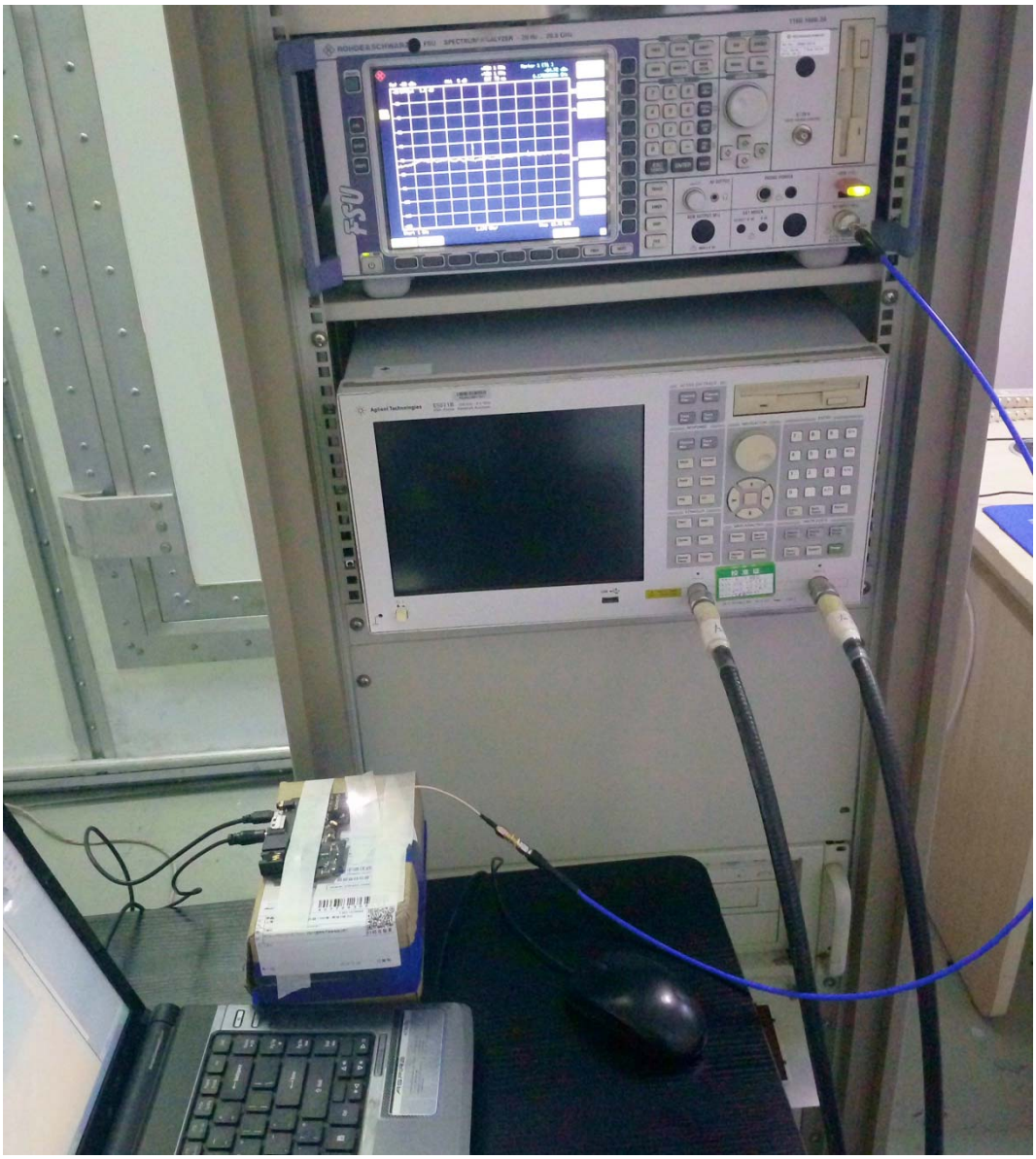






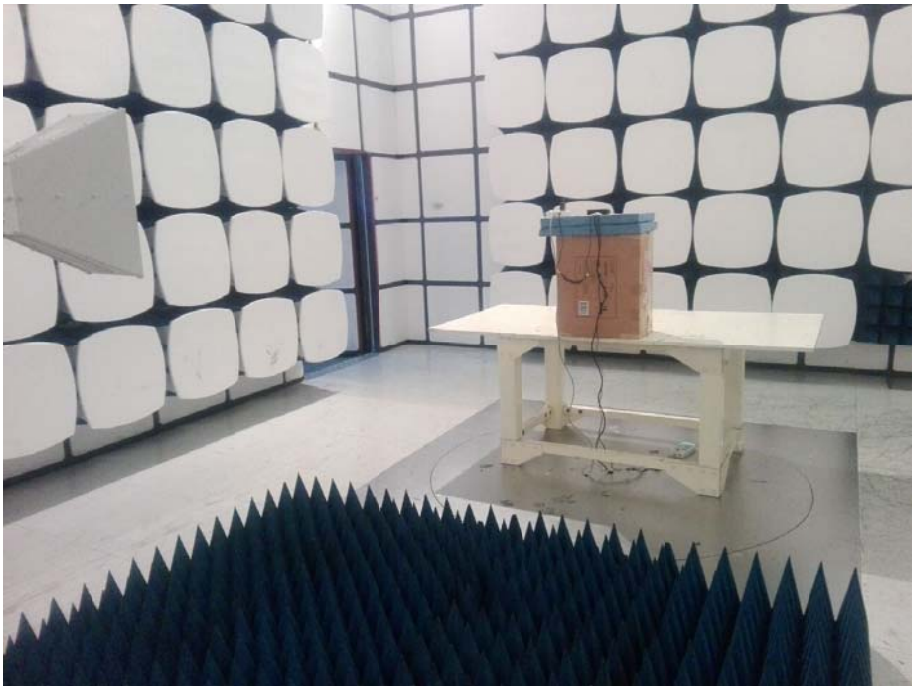
Annex B Photos of Setup

1. RF



2. Conducted Emission

3. Radiated Emission



** END OF REPORT **