

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C
REQUIREMENT T**

OF

KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station

MODEL No.: SCA-F35R, CA-E065A, CA-E065R, CA-E065O, CA-E065N, CA-E065G,
CA-E065B, CA-E065P, CA-E065W

Trademark: SONDPEX, TUNES2GO, KOOLMAX, SDX

FCC ID: 2AC4Z-CA-E065

REPORT NO: ES150709090E

ISSUE DATE: July 28, 2015

Prepared for

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VERIFICATION OF COMPLIANCE

Applicant	:	Sondpex Corporation of Amercia 4185 Route 27, Princeton, New Jersey 08540
Manufacturer	:	Hangzhou Datec Plastic Co., Ltd. No. 186 Songqiao Road, Economical & Technoglical Development Area Hangzhou, Zhejiang, China 310018
Product Description	:	KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station
Brand Name	:	SONDPEX, TUNES2GO, KOOLMAX, SDX
Model Number	:	SCA-F35R, CA-E065A, CA-E065R, CA-E065O, CA-E065N, CA-E065G, CA-E065B, CA-E065P, CA-E065W (Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only differences are the color and model no. for trading purpose. We prepare CA-E065O for test. and the worst result recorded in the report.)
File Number	:	ES150709090E
Date of Test:	:	June 27, 2015 to July 31 , 2015

We hereby certify that:

The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

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

Date of Test : June 27, 2015 to July 31 , 2015

Prepared by : 
 Jack Li/Editor

Reviewer : 
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Approve & Authorized Signer : 
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1. General Information

1.1 Product Description

Sondpex Corporation of Amercia

Model: CA-E065O (referred to as the EUT in this report) The EUT (KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station) is an short range, lower power Device. It is designed by way of utilizing the GFSK, $\pi/4$ -DQPSK and 8DPSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402-2480MHz
- B). Modulation: GFSK, $\pi/4$ -DQPSK, 8DPSK
- C). Number of Channel: 79
- D). Channel Space: 1MHz
- E). BIT Rate of Transmission: 1Mbps, 2Mbps, 3Mbps
- F). Antenna Type: PCB antenna
- G). Antenna Gain: 0dBi
- H). AC Supply: INPUT AC 100-240V, 50/60Hz Max1.2A
OUTPUT DC 17V 2A(Charging only)
- I).DC Supply:DC 12V lead-acid battery

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for 2AC4Z-CA-E065 filing to comply with Section 15.247 of the FCC Part 15 Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10 -2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description
EMC Lab.

- : Accredited by CNAS, 2013.10.29
The certificate is valid until 2016.10.28
The Laboratory has been assessed and proved to be in compliance with
CNAS/CL01:2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291
- Accredited by TUV Rheinland Shenzhen 2010.5.25
The Laboratory has been assessed according to the requirements ISO/IEC
17025
- Accredited by FCC, April 17, 2014
The Certificate Registration Number is 406365.
- Accredited by Industry Canada, November 29, 2012
The Certificate Registration Number is 4480A-4

Name of Firm
Site Location

- : SHENZHEN EMTEK CO., LTD
- : Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen,
Guangdong, China

2. System Test Configuration

2.1 EUT Configuration

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

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10-2013, conducted emissions from the EUT are measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station (EUT) were rotated through three orthogonal axes according to the requirements in section 6.4, section 6.5 and section 6.6 of ANSI C63.10-2013.

2.4 Limitation

(1) Channel Separation Test

FCC Part 15, Subpart C Section 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

Frequency Range (MHz)	Limit(kHz)
902-928	>25kHz
2400-2483.5	>25kHz
5725-5850	>25kHz

(2) 20dB Bandwidth

Frequency Range(MHz)	Quantity of Hopping Channel	Limit(kHz)			
		50	25	15	75
902-928		<250	>250	NA	NA
2400-2483.5		NA	NA	>1000	<1000

(3) Quantity of Hopping Channel

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	20dB bandwidth <250kHz	Limit(Quantity of Hopping Channel)		
		20dB bandwidth >250k Hz	20dB bandwidth <1MHz	20dB bandwidth >1MHz
902-928	50	25	NA	NA
2400-2483.5	NA	NA	75	15
5725-5850	NA	NA	75	NA

(4) Time of Occupancy(Dwell Time)

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	20dB bandwidth <250kHz(50Channel)	LIMIT(rms)	
		20dB bandwidth >250kHz(25 Channel)	20dB bandwidth <1MHz(75Channel)
902-928	400(20S)	400(10S)	NA
2400-2483.5	NA	NA	400(30S)
5725-5850	NA	NA	400(30S)

Note: The “()” is all channel’s average time of occupancy.

(5) Maximum Peak Output Power

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	Quantity of Hopping Channel	LIMIT(W)			
		50	25	15	75
902-928		1(30dBm)	0.125(21dBm)	NA	NA
2400-2483.5		NA	NA	0.125(21dBm)	1(30dBm)
5725-5850		NA	NA	NA	1(30dBm)

(6) Band edge

FCC Part15, Subpart C Section 15.247, In any 100kHz bandwidth outside the frequency band in with the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

Operating Frequency Range(MHz)	Spurious emission frequency	Limit Peak power ration to emission(dBc)	Emission level(dBuV/m)
902-928	<902	>20	NA
	>928	>20	NA
	960-1240	NA	54
2400-2483.5	<2400	>20	NA
	>2483.5-2500	NA	54
5725-5850	<5350-5460	NA	54
	<5725	>20	NA
	>5850	>20	NA

(7) Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

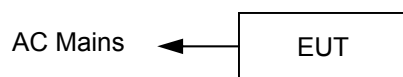
(8) Radiated Emission

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance(m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
0.009~0.490	2400/F(KHz)	300	/
0.490~1.705	2400/F(KHz)	30	/
1.705~30.0	30	30	/
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

- Remark:
1. Emission level in $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Distance extrapolation factor $= 40 \log (\text{Specific distance} / \text{test distance})$ (dB);
Limit line = Specific limits (dB μV) + distance extrapolation factor.

2.5 Configuration of Tested System



2.6 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station	SONDPEX, TUNES2GO, KOOLMAX, SDX	CA-E0650	2AC4Z-CA-E065	N/A	EUT

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

2.7 Description of Test Modes

The EUT (KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station) has been tested under normal operating condition. This EUT is a FHSS system. Pre-scanned tests, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test

Channel	Frequency(MHz)
Low channel	2402
Middle channel	2441
High channel	2480

3. Summary of Test Results

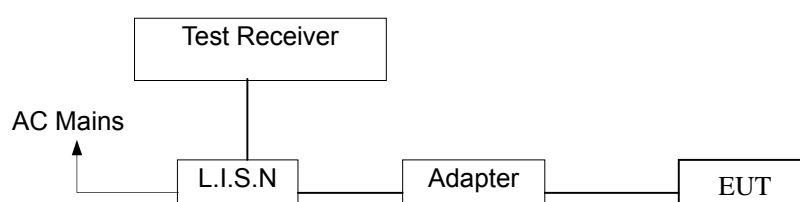
FCC Rules	Description Of Test	Result
FCC Part 15.247(a)(1)	Channel Separation Test	Compliant
FCC Part 15.247(a)(1)	20dB Bandwidth	Compliant
FCC Part 15.247(a)(1)	Quantity of Hopping Channel	Compliant
FCC Part 15.247(a)(1)	Time of Occupancy (Dwell Time)	Compliant
FCC Part 15.247(b)	Max Peak Output Power Test	Compliant
FCC Part 15.247(d)	Band Edge Test	Compliant
FCC Part 15.207	Conducted Emission	Compliant
FCC Part 15.247(d)&15.209	Radiated Emission	Compliant
FCC Part 15.247(d)	Antenna Port Emission	Compliant
FCC Part 15.203&15.247(b)	Antenna Requirement	Compliant

4. Conducted Emissions Test

4.1 Measurement Procedure

1. The EUT was placed on a table which is 0.1m above ground plane.
2. Maximum procedure was performed on the three highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

4.2 Test SET-UP (Block Diagram of Configuration)



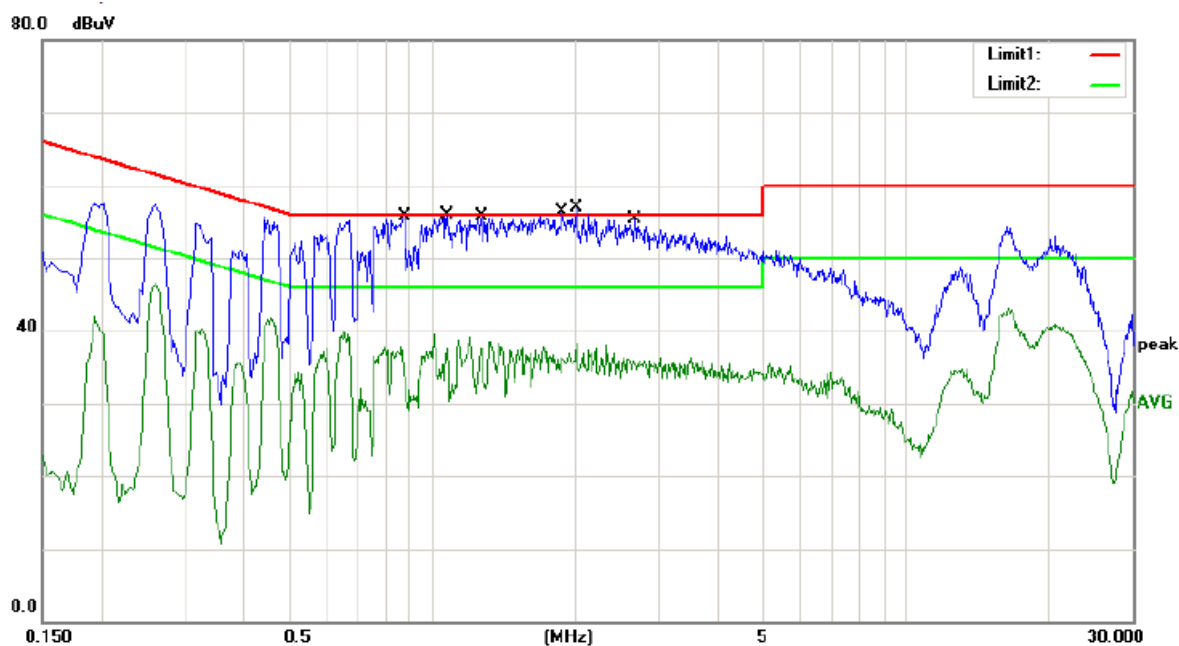
4.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/16/2015	05/15/2016
L.I.S.N.	Rohde & Schwarz	ENV216	101161	05/16/2015	05/15/2016
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/16/2015	05/15/2016
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/16/2015	05/15/2016

4.4 Measurement Equipment Used

Pass.
 Please refer to the following data.

Charging+BT Playing



Site site #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

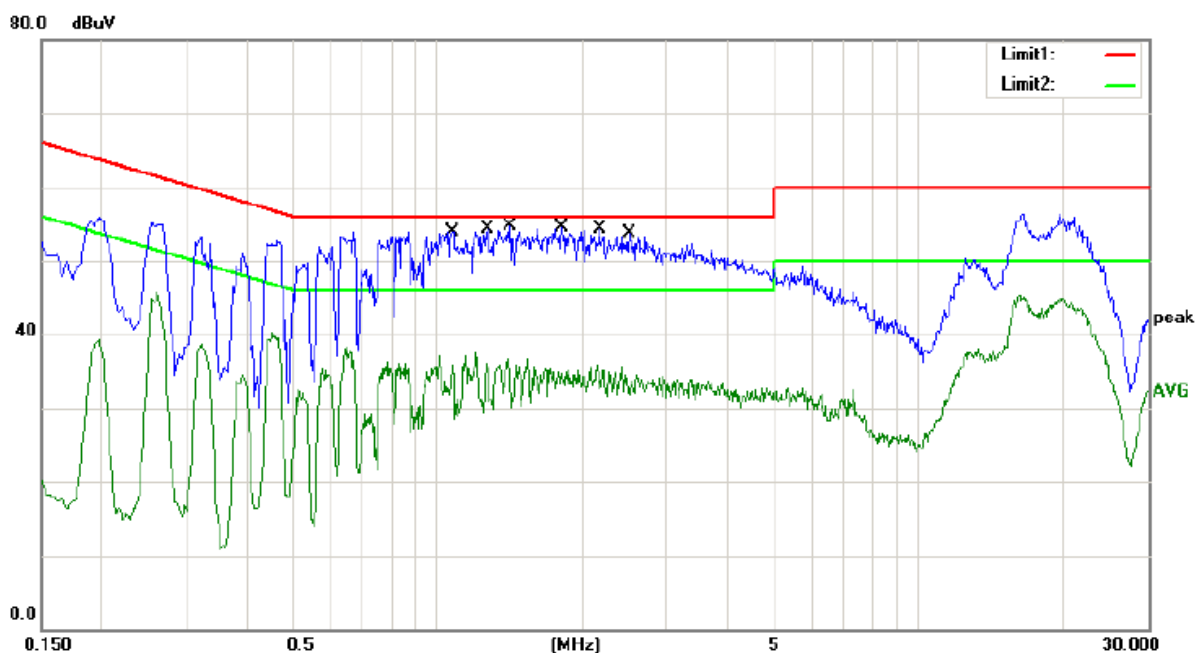
Power: AC 120V/60Hz

Humidity: 44 %

Mode: Charging+BT Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.8740	41.20	11.00	52.20	56.00	-3.80	QP	
2		0.8740	23.70	11.00	34.70	46.00	-11.30	AVG	
3	*	1.0740	41.70	11.00	52.70	56.00	-3.30	QP	
4		1.0740	26.00	11.00	37.00	46.00	-9.00	AVG	
5		1.2700	40.90	11.00	51.90	56.00	-4.10	QP	
6		1.2700	26.10	11.00	37.10	46.00	-8.90	AVG	
7		1.8780	39.70	11.00	50.70	56.00	-5.30	QP	
8		1.8780	25.50	11.00	36.50	46.00	-9.50	AVG	
9		2.0180	40.90	11.00	51.90	56.00	-4.10	QP	
10		2.0180	26.00	11.00	37.00	46.00	-9.00	AVG	
11		2.6740	39.10	11.00	50.10	56.00	-5.90	QP	
12		2.6740	24.50	11.00	35.50	46.00	-10.50	AVG	



Site site #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

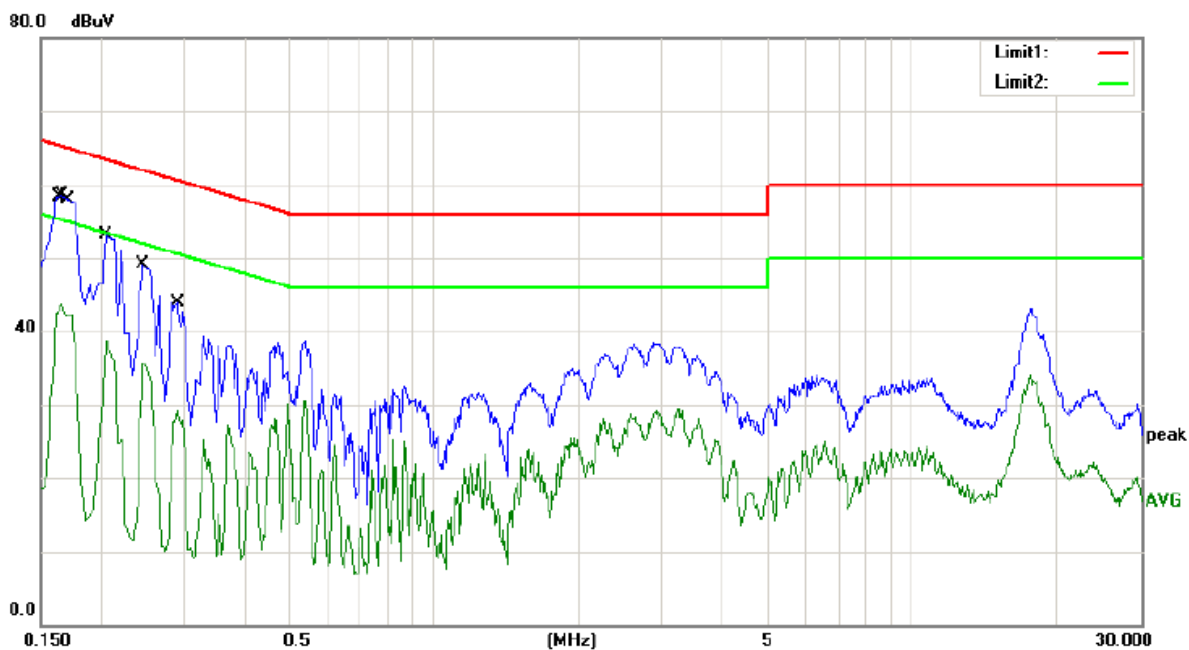
Humidity: 44 %

Mode: Charging+BT Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	1.0740	40.10	11.00	51.10	56.00	-4.90	QP	
2		1.0740	24.60	11.00	35.60	46.00	-10.40	AVG	
3		1.2740	39.40	11.00	50.40	56.00	-5.60	QP	
4		1.2740	24.50	11.00	35.50	46.00	-10.50	AVG	
5		1.4140	39.20	11.00	50.20	56.00	-5.80	QP	
6		1.4140	24.60	11.00	35.60	46.00	-10.40	AVG	
7		1.8140	39.40	11.00	50.40	56.00	-5.60	QP	
8		1.8140	24.40	11.00	35.40	46.00	-10.60	AVG	
9		2.1780	37.60	11.00	48.60	56.00	-7.40	QP	
10		2.1780	22.80	11.00	33.80	46.00	-12.20	AVG	
11		2.5100	38.20	11.00	49.20	56.00	-6.80	QP	
12		2.5100	22.50	11.00	33.50	46.00	-12.50	AVG	

Charging+BT Playing



Site site #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

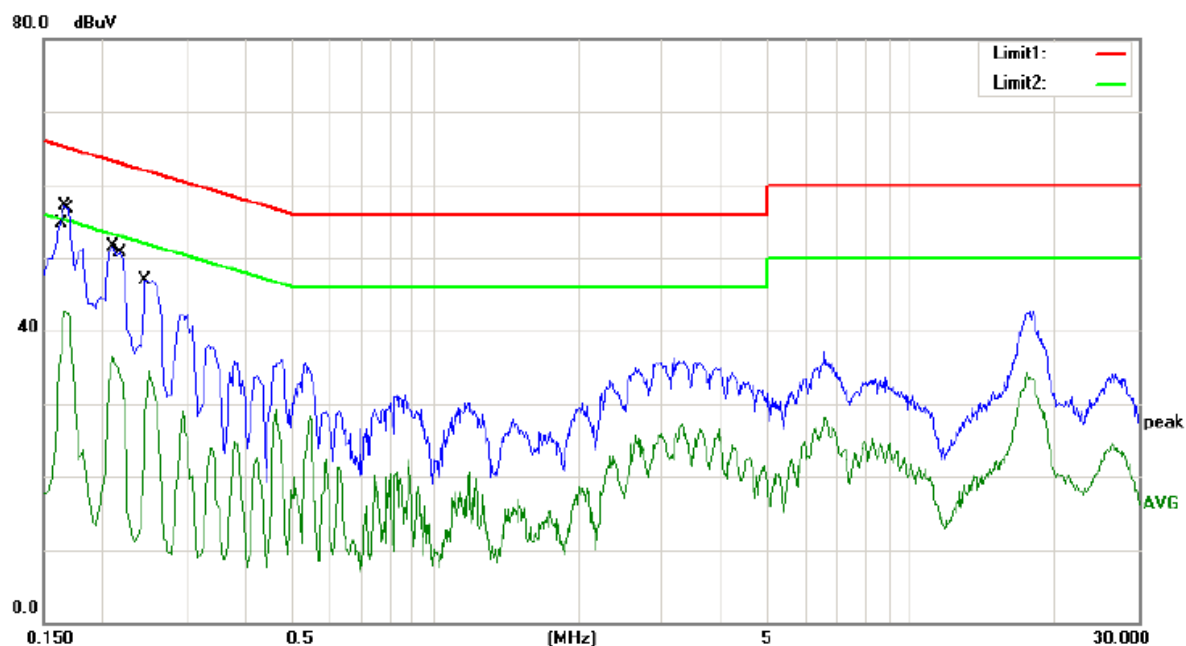
Power: AC 240V/60Hz

Humidity: 44 %

Mode: CHARGING+Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	47.20	11.00	58.20	65.36	-7.16	QP	
2		0.1620	31.40	11.00	42.40	55.36	-12.96	AVG	
3	*	0.1660	47.40	11.00	58.40	65.16	-6.76	QP	
4		0.1660	32.60	11.00	43.60	55.16	-11.56	AVG	
5		0.1731	46.70	11.00	57.70	64.81	-7.11	QP	
6		0.1731	31.20	11.00	42.20	54.81	-12.61	AVG	
7		0.2060	42.10	11.00	53.10	63.37	-10.27	QP	
8		0.2060	27.80	11.00	38.80	53.37	-14.57	AVG	
9		0.2460	38.00	11.00	49.00	61.89	-12.89	QP	
10		0.2460	24.70	11.00	35.70	51.89	-16.19	AVG	
11		0.2900	32.90	11.00	43.90	60.52	-16.62	QP	
12		0.2900	17.80	11.00	28.80	50.52	-21.72	AVG	



Site site #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

Power: AC 240V/60Hz

Humidity: 44 %

Mode: CHARGING+Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1607	42.20	11.00	53.20	65.43	-12.23	QP	
2		0.1607	19.60	11.00	30.60	55.43	-24.83	AVG	
3	*	0.1660	46.00	11.00	57.00	65.16	-8.16	QP	
4		0.1660	31.70	11.00	42.70	55.16	-12.46	AVG	
5		0.1712	42.30	11.00	53.30	64.90	-11.60	QP	
6		0.1712	28.10	11.00	39.10	54.90	-15.80	AVG	
7		0.2100	40.50	11.00	51.50	63.21	-11.71	QP	
8		0.2100	25.40	11.00	36.40	53.21	-16.81	AVG	
9		0.2185	39.20	11.00	50.20	62.88	-12.68	QP	
10		0.2185	22.50	11.00	33.50	52.88	-19.38	AVG	
11		0.2460	35.90	11.00	46.90	61.89	-14.99	QP	
12		0.2460	17.60	11.00	28.60	51.89	-23.29	AVG	

5. Radiated Emission Test

5.1 Measurement Procedure

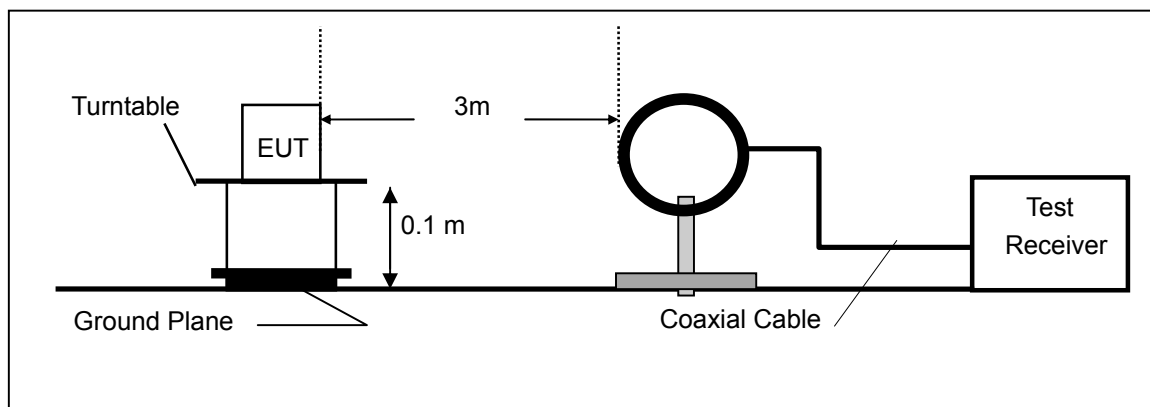
1. The EUT was placed on a turn table which is 0.1m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector (RBW=100kHz, VBW=300kHz) and all final readings of measurement from Test Receiver are Quasi-Peak values(Quasi Peak detector used with a bandwidth of 120 kHz).

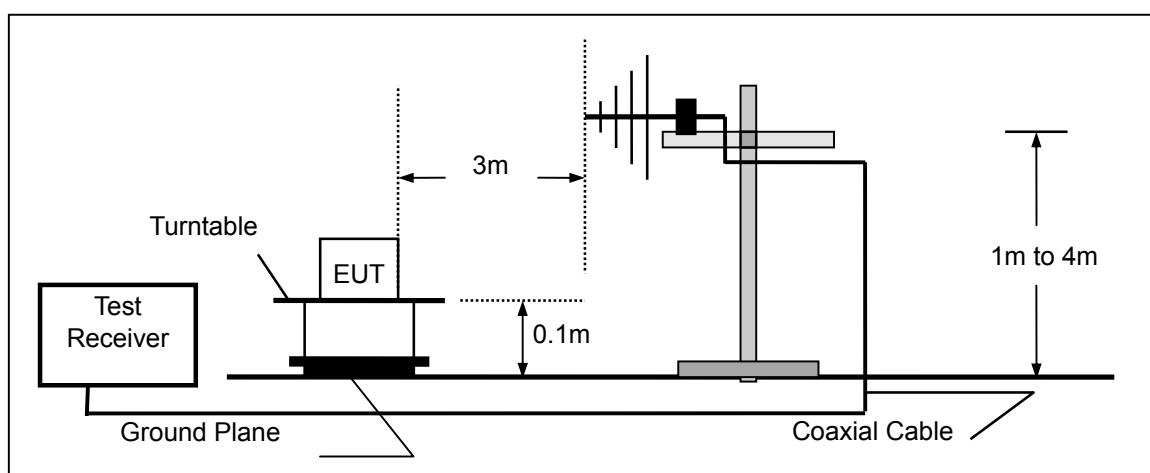
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

5.2 Test SET-UP (Block Diagram of Configuration)

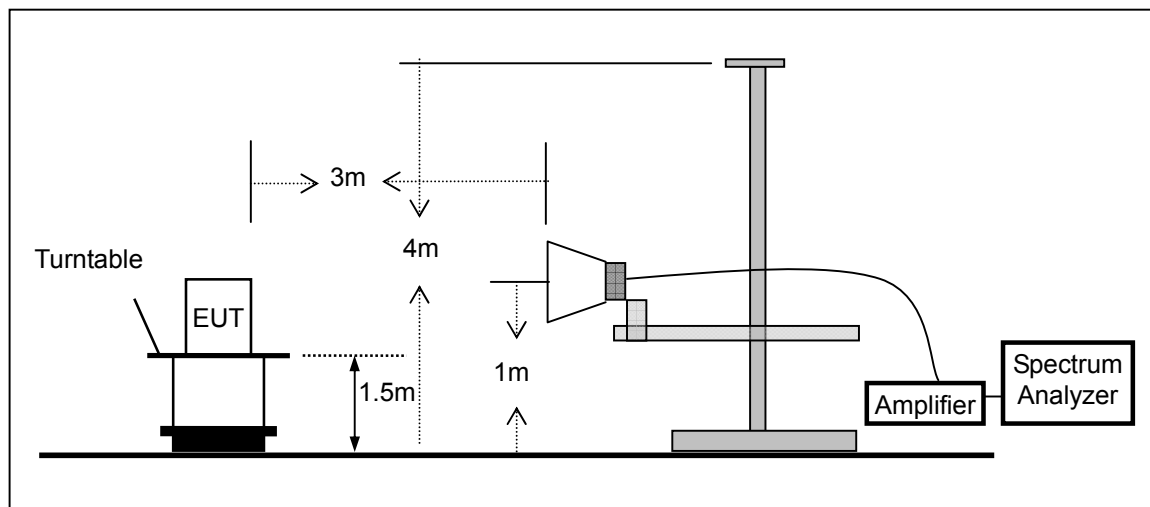
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



5.3 Measurement Equipment Used

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/16/2015	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	05/16/2015	1 Year
3.	Pre-Amplifier	A.H.	PAM-0126	1415261	05/16/2015	1 Year
4.	Bilog Antenna	Schwarzbeck	VULB9163	142	05/16/2015	1 Year
5.	Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	05/16/2015	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/16/2015	1 Year
7.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/16/2015	1 Year
8.	Cable	Schwarzbeck	AK9513	ACRX1	05/16/2015	1 Year
9.	Cable	Rosenberger	N/A	FP2RX2	05/16/2015	1 Year
10.	Cable	Schwarzbeck	AK9513	CRPX1	05/16/2015	1 Year
11.	Cable	Schwarzbeck	AK9513	CRRX2	05/16/2015	1 Year

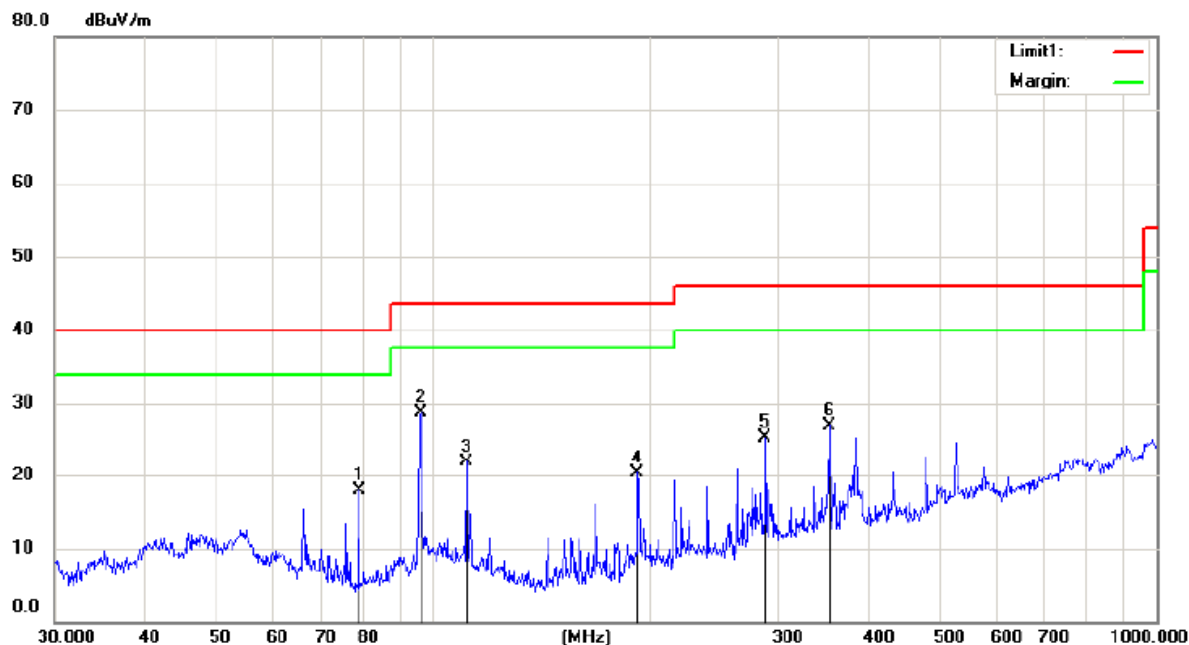
5.4 Measurement Result

(For range 9KHz~30MHz, The measured value is really too low to be recorded.)

Below 1000MHz (30M-1GHz)

BT mode:

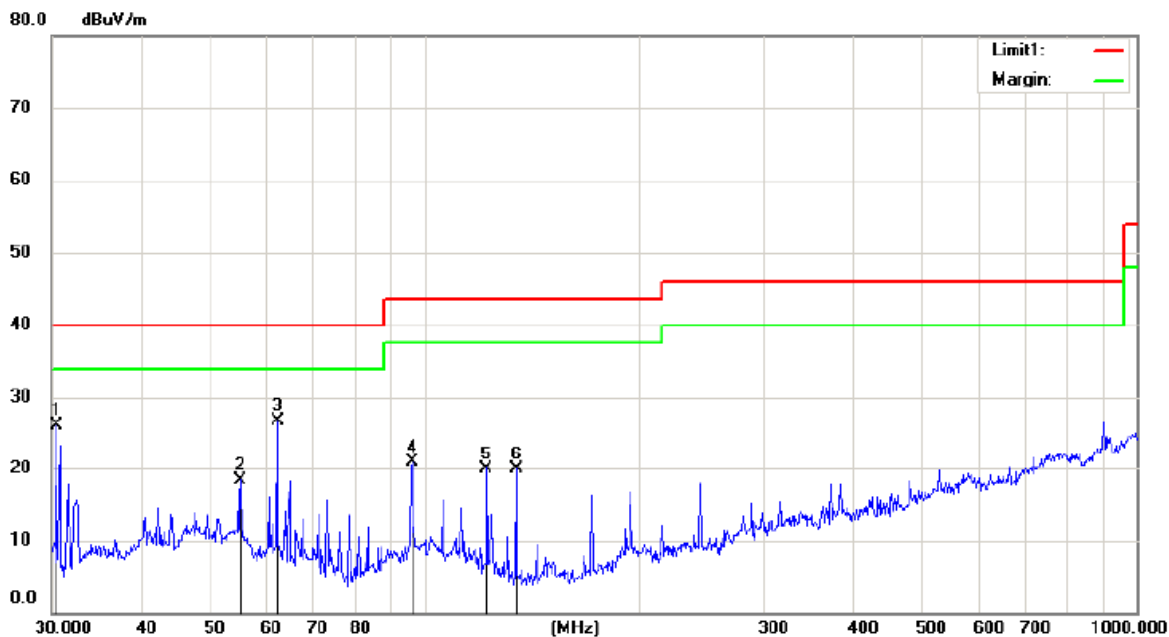
(Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result was report as below.
FULL LOAD means USB charging output port and 12V output port full load)



Site site #1
Limit: FCC Part15 Class B 3M Radiation
Mode:TX(GFSK,2402MHz)
Note:

Polarization: **Horizontal**
Power: DC 12V
Temperature: 20 C
Humidity: 52 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		78.9652	44.12	-26.12	18.00	40.00	-22.00			
2	*	96.0986	51.40	-22.70	28.70	43.50	-14.80			
3		111.3468	44.06	-22.06	22.00	43.50	-21.50			
4		191.7450	42.42	-22.02	20.40	43.50	-23.10			
5		287.9904	44.61	-19.31	25.30	46.00	-20.70			
6		352.9433	45.25	-18.25	27.00	46.00	-19.00			



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

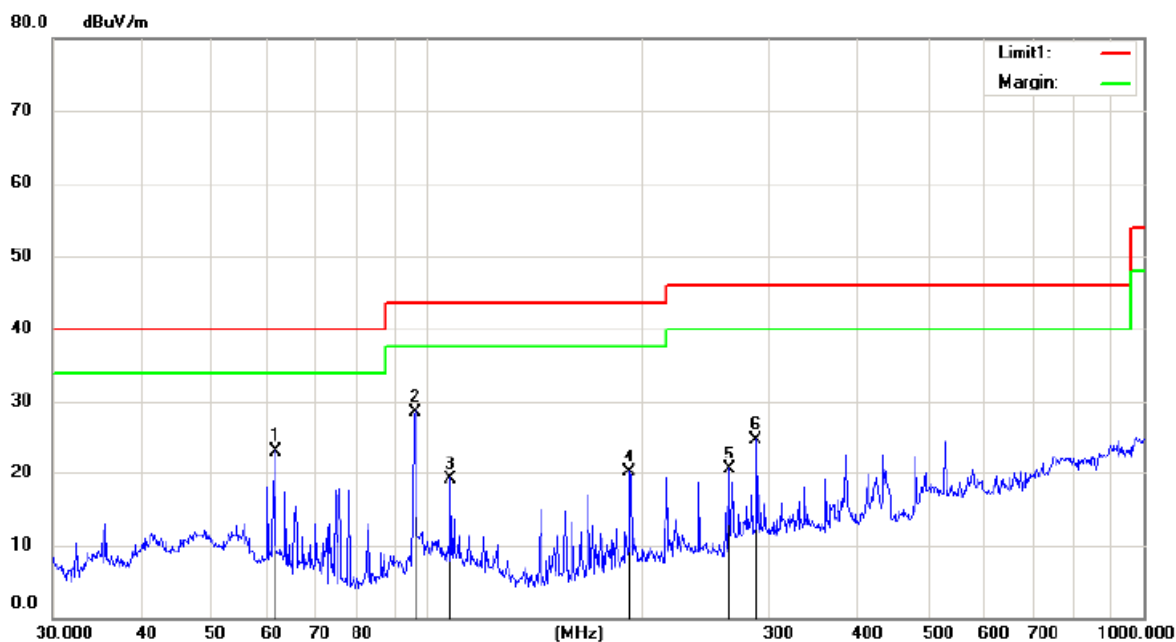
Power: DC 12V

Humidity: 52 %

Mode:TX(GFSK,2402MHz)

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.4237	50.25	-24.15	26.10	40.00	-13.90	QP		
2		55.2207	38.25	-19.85	18.40	40.00	-21.60	QP		
3	*	62.2128	48.95	-22.25	26.70	40.00	-13.30	QP		
4		96.0985	43.60	-22.70	20.90	43.50	-22.60	QP		
5		122.4040	43.78	-23.78	20.00	43.50	-23.50	QP		
6		134.5591	45.59	-25.69	19.90	43.50	-23.60	QP		



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

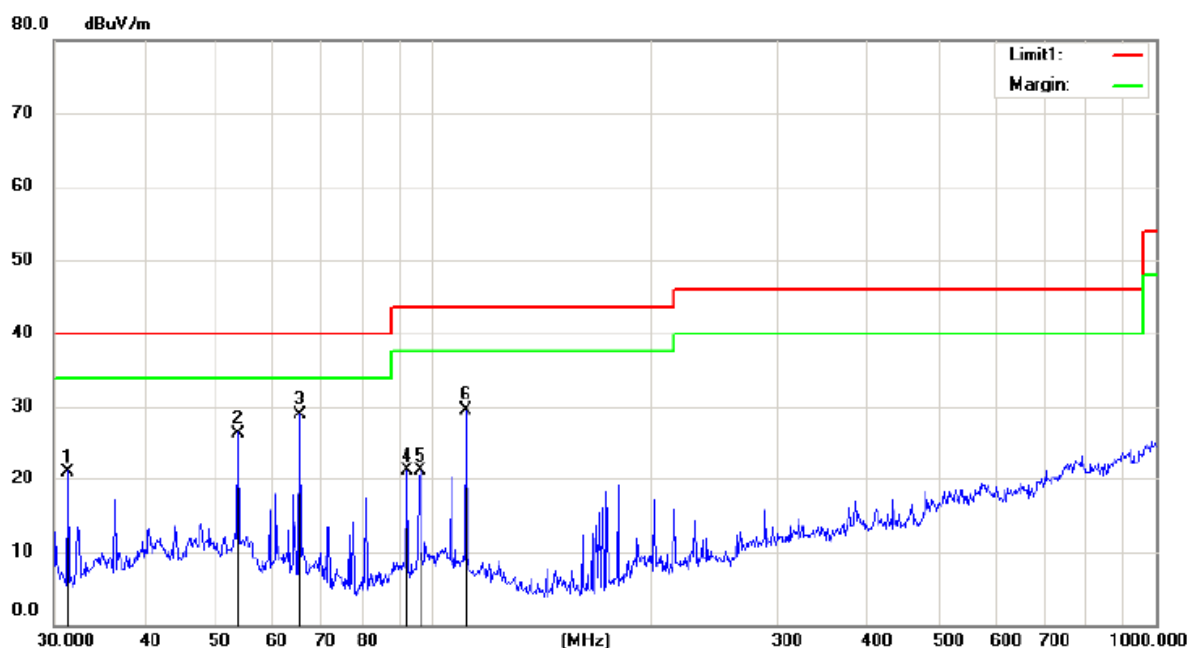
Power: DC 12V

Humidity: 52 %

Mode:TX(GFSK,2441MHz)

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		61.3463	45.28	-22.08	23.20	40.00	-16.80	QP			
2	*	96.0985	51.30	-22.70	28.60	43.50	-14.90	QP			
3		107.8877	40.80	-21.60	19.20	43.50	-24.30	QP			
4		191.7450	42.22	-22.02	20.20	43.50	-23.30	QP			
5		263.8190	41.20	-20.60	20.60	46.00	-25.40	QP			
6		287.9904	44.11	-19.31	24.80	46.00	-21.20	QP			



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

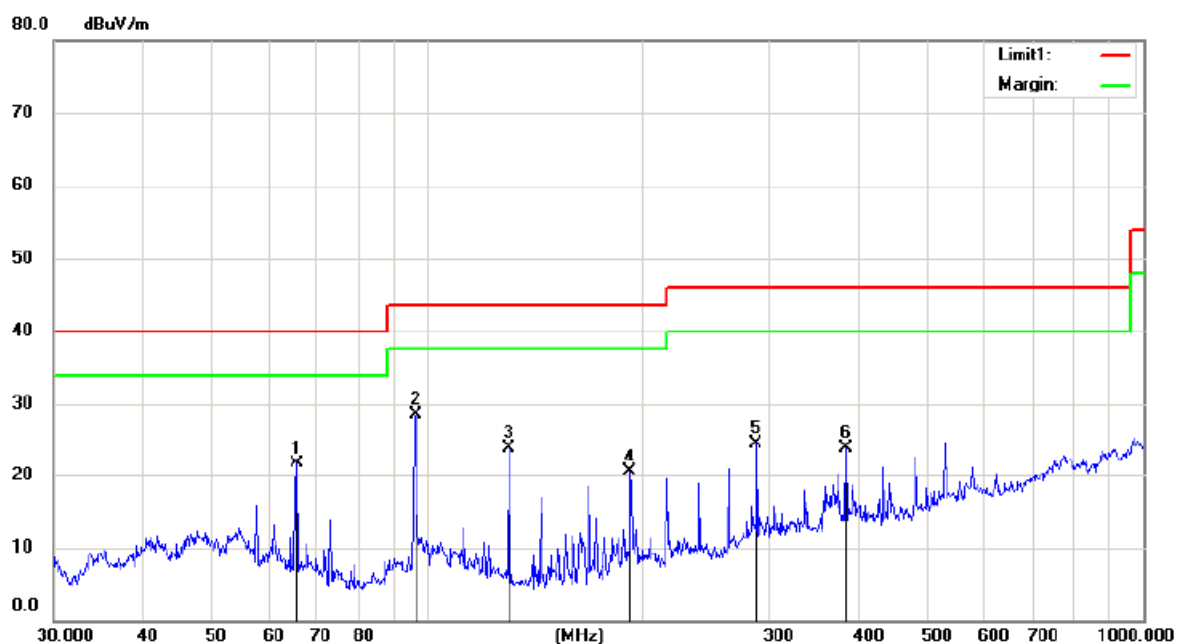
Power: DC 12V

Humidity: 52 %

Mode:TX(GFSK,2441MHz)

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		31.3992	44.60	-23.60	21.00	40.00	-19.00	QP		
2		53.8817	45.95	-19.55	26.40	40.00	-13.60	QP		
3	*	65.5727	51.94	-22.94	29.00	40.00	-11.00	QP		
4		92.4624	44.34	-23.24	21.10	43.50	-22.40	QP		
5		96.0985	43.80	-22.70	21.10	43.50	-22.40	QP		
6		111.3468	51.56	-22.06	29.50	43.50	-14.00	QP		



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

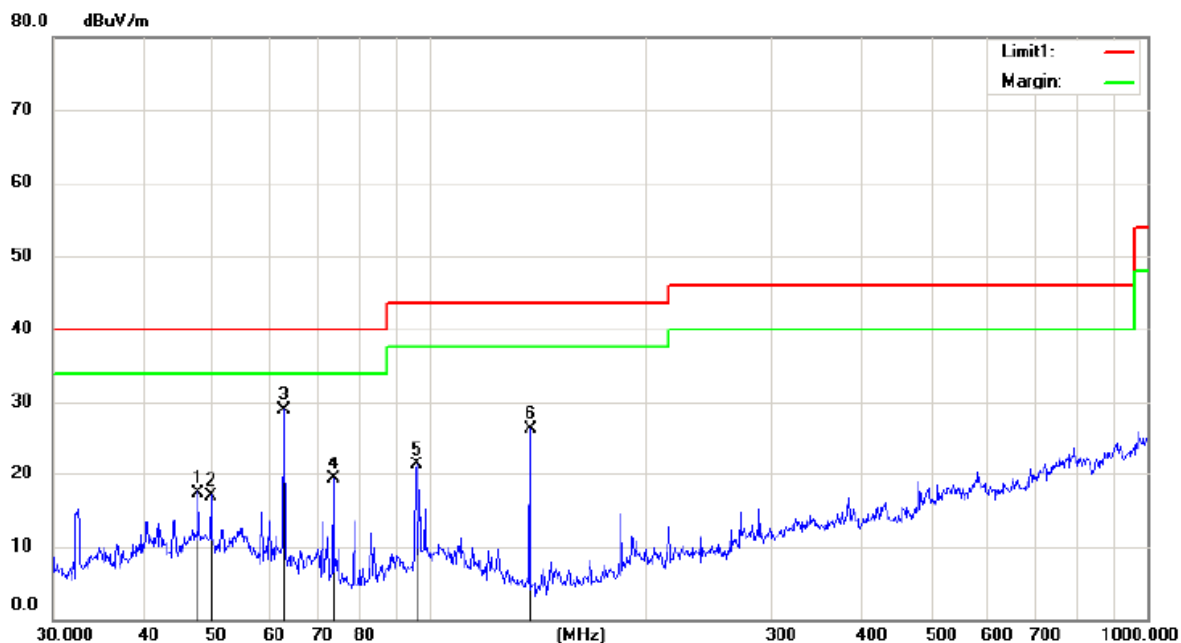
Power: DC 12V

Humidity: 52 %

Mode:TX(GFSK,2480MHz)

Note:

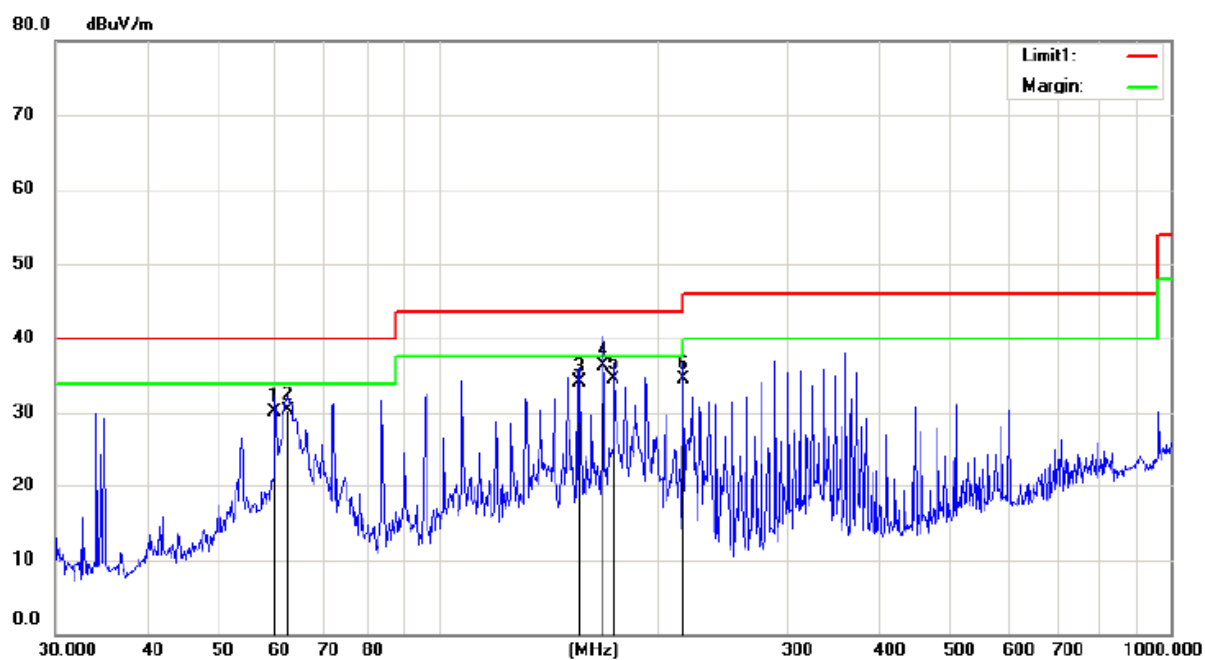
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		65.5727	44.64	-22.94	21.70	40.00	-18.30	QP		
2	*	96.0985	51.20	-22.70	28.50	43.50	-15.00	QP		
3		129.9225	49.04	-25.14	23.90	43.50	-19.60	QP		
4		191.7450	42.52	-22.02	20.50	43.50	-23.00	QP		
5		287.9904	43.91	-19.31	24.60	46.00	-21.40	QP		
6		383.9318	40.72	-16.82	23.90	46.00	-22.10	QP		



Site site #1 Polarization: **Vertical** Temperature: 20 C
 Limit: FCC Part15 Class B 3M Radiation Power: DC 12V Humidity: 52 %
 Mode:TX(GFSK,2480MHz)
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		47.8260	37.26	-19.86	17.40	40.00	-22.60	QP		
2		49.7066	36.37	-19.37	17.00	40.00	-23.00	QP		
3	*	62.8707	51.38	-22.38	29.00	40.00	-11.00	QP		
4		73.6170	44.57	-25.27	19.30	40.00	-20.70	QP		
5		96.0985	44.00	-22.70	21.30	43.50	-22.20	QP		
6		138.3873	52.36	-26.06	26.30	43.50	-17.20	QP		

USB Mode:



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

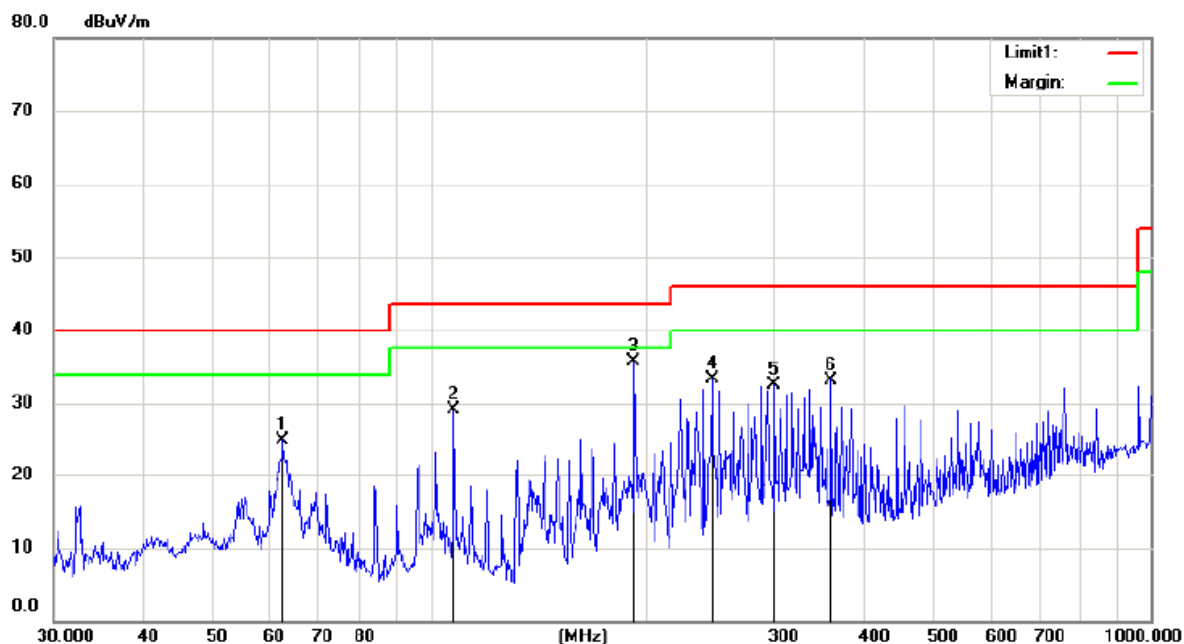
Power: DC 12V

Humidity: 52 %

Mode:USB Playing

Note: FULL LOAD

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		59.8588	51.99	-21.79	30.20	40.00	-9.80	QP		
2		62.4314	52.60	-22.30	30.30	40.00	-9.70	QP		
3		155.9101	59.66	-25.56	34.10	43.50	-9.40	QP		
4	*	167.8243	61.77	-25.37	36.40	43.50	-7.10	QP		
5		173.8135	59.51	-24.91	34.60	43.50	-8.90	QP		
6		216.0240	57.10	-22.50	34.60	46.00	-11.40	QP		



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

Power: DC 12V

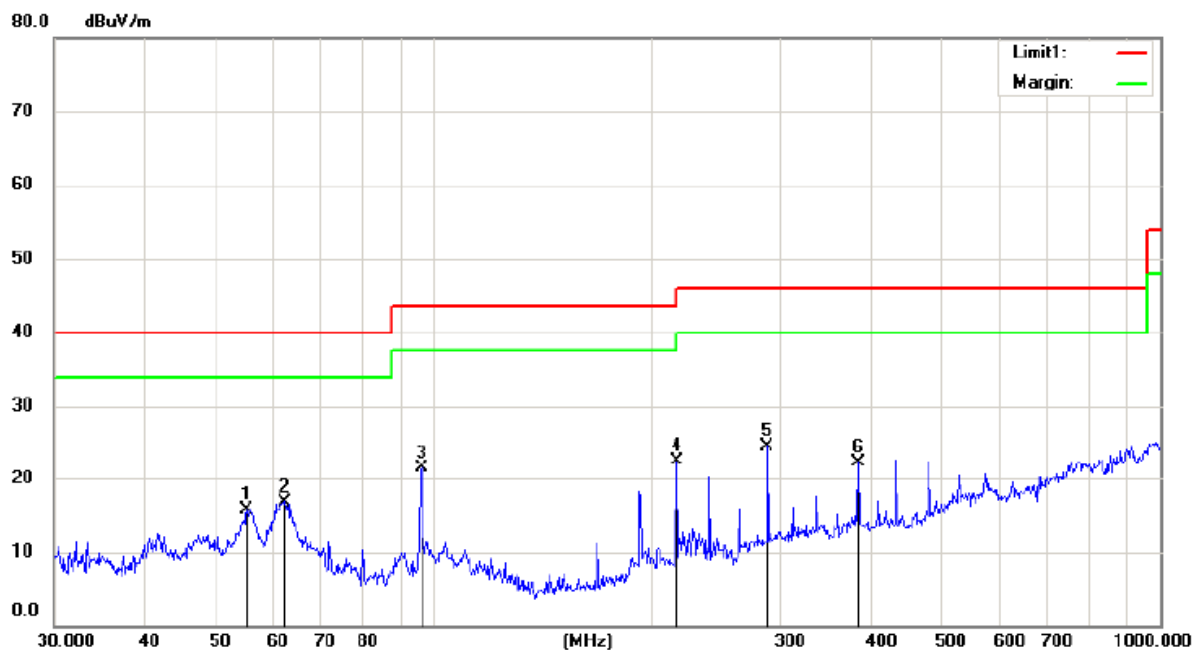
Humidity: 52 %

Mode:USB Playing

Note: FULL LOAD

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		62.4314	47.30	-22.30	25.00	40.00	-15.00	QP		
2		107.8877	50.70	-21.60	29.10	43.50	-14.40	QP		
3	*	191.7450	57.72	-22.02	35.70	43.50	-7.80	QP		
4		245.9510	54.51	-21.21	33.30	46.00	-12.70	QP		
5		300.3672	51.45	-18.95	32.50	46.00	-13.50	QP		
6		360.4476	51.31	-18.11	33.20	46.00	-12.80	QP		

AUX IN Mode



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

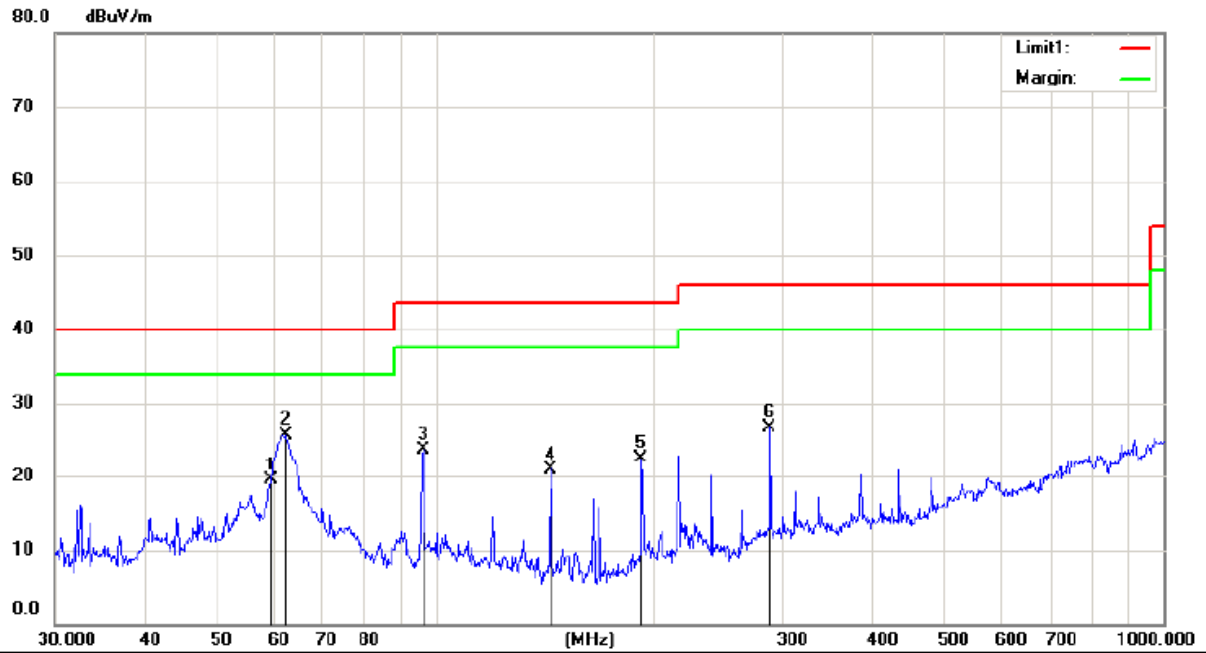
Power: DC 12V

Humidity: 52 %

Mode:AUX IN

Note: FULL LOAD

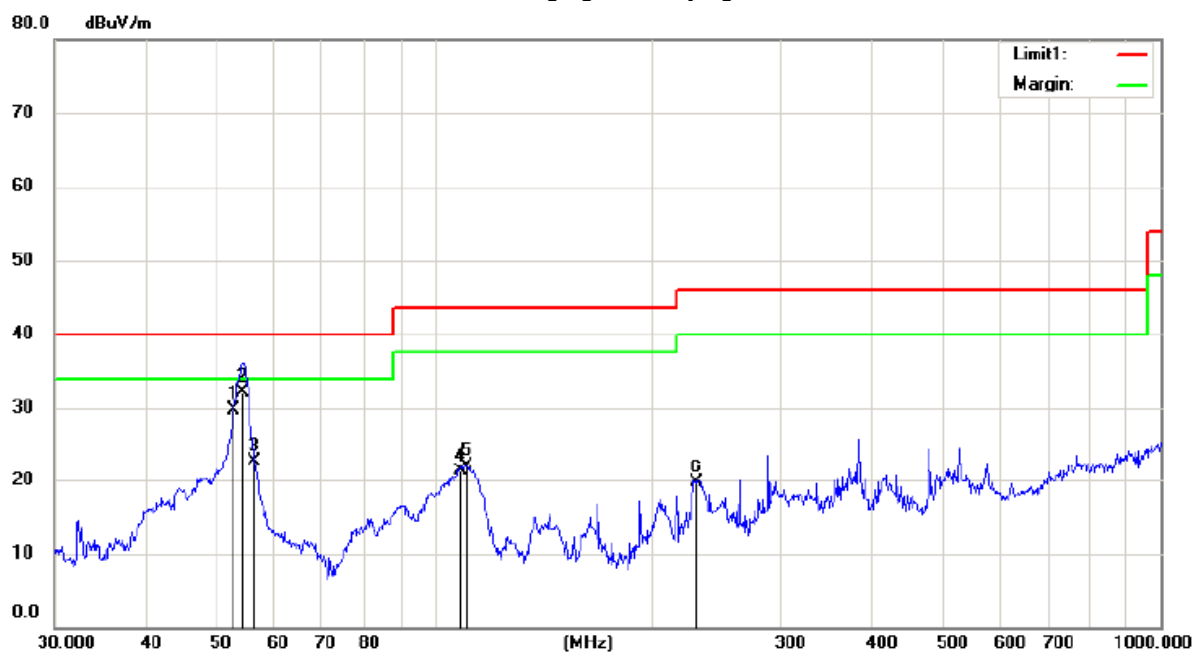
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		55.2207	35.55	-19.85	15.70	40.00	-24.30	QP		
2		62.4313	39.10	-22.30	16.80	40.00	-23.20	QP		
3		96.0985	44.20	-22.70	21.50	43.50	-22.00	QP		
4		216.0240	45.00	-22.50	22.50	46.00	-23.50	QP		
5	*	287.9904	43.91	-19.31	24.60	46.00	-21.40	QP		
6		383.9318	39.22	-16.82	22.40	46.00	-23.60	QP		



Site site #1 Polarization: **Vertical** Temperature: 20 C
 Limit: FCC Part15 Class B 3M Radiation Power: DC 12V Humidity: 52 %
 Mode:AUX IN
 Note: FULL LOAD

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		59.4405	41.21	-21.71	19.50	40.00	-20.50	QP		
2	*	62.2128	47.95	-22.25	25.70	40.00	-14.30	QP		
3		96.0985	46.40	-22.70	23.70	43.50	-19.80	QP		
4		143.8295	47.11	-26.11	21.00	43.50	-22.50	QP		
5		191.7450	44.52	-22.02	22.50	43.50	-21.00	QP		
6		287.9904	46.11	-19.31	26.80	46.00	-19.20	QP		

Charging+BT Playing



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

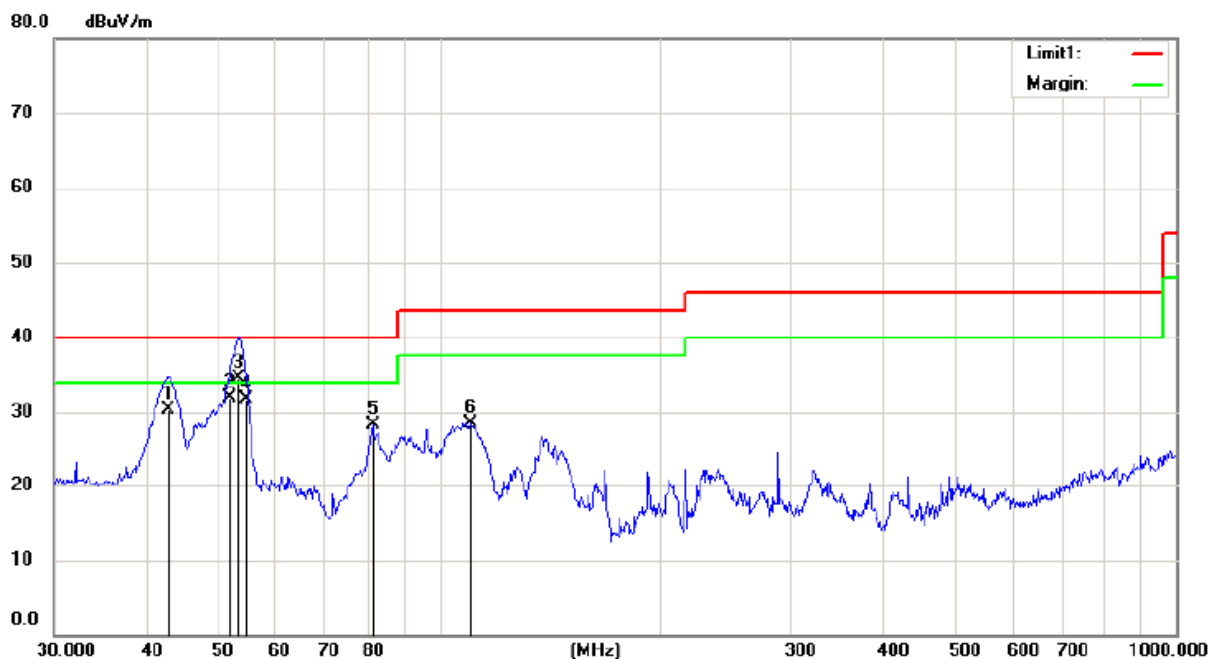
Power: AC 120V/60Hz

Humidity: 52 %

Mode:Charging+BT Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		52.9453	49.37	-19.57	29.80	40.00	-10.20	QP		
2	*	54.4516	51.86	-19.66	32.20	40.00	-7.80	QP		
3		56.5930	43.26	-20.46	22.80	40.00	-17.20	QP		
4		108.2667	42.94	-21.64	21.30	43.50	-22.20	QP		
5		110.9571	44.10	-22.00	22.10	43.50	-21.40	QP		
6		230.0985	41.08	-21.28	19.80	46.00	-26.20	QP		



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

Power: AC 120V/60Hz

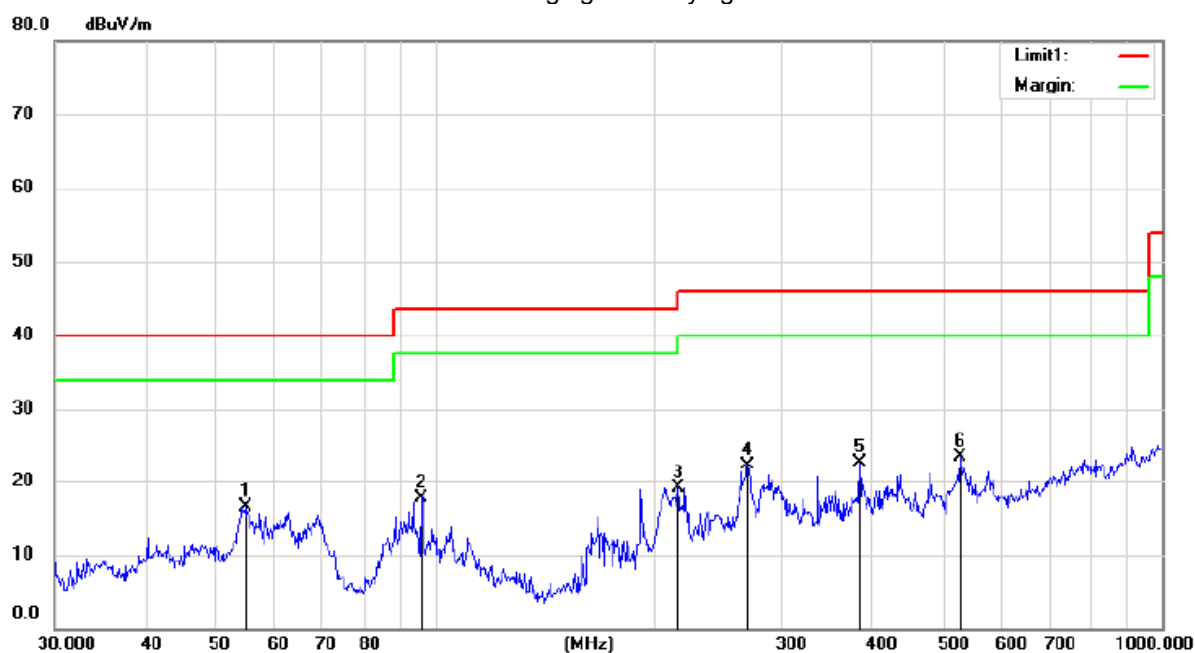
Humidity: 52 %

Mode:Charging+BT Playing

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		42.8998	50.56	-20.16	30.40	40.00	-9.60	QP		
2		52.0251	51.47	-19.57	31.90	40.00	-8.10	QP		
3	*	53.5052	54.05	-19.55	34.50	40.00	-5.50	QP		
4		54.6430	51.51	-19.71	31.80	40.00	-8.20	QP		
5		81.2117	54.30	-26.00	28.30	40.00	-11.70	QP		
6		110.1816	50.38	-21.88	28.50	43.50	-15.00	QP		

Charging+BT Playing



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

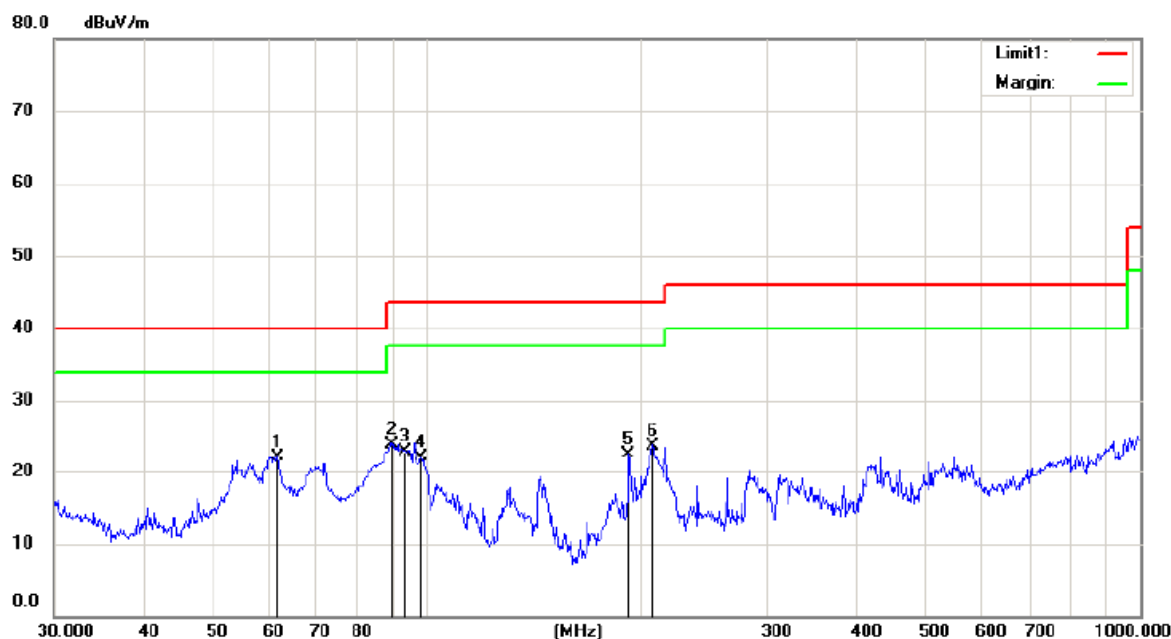
Power: AC 240V/60Hz

Humidity: 52 %

Mode:Charging+Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		54.8348	36.26	-19.76	16.50	40.00	-23.50	QP		
2		95.7622	40.66	-22.86	17.80	43.50	-25.70	QP		
3		216.0240	41.70	-22.50	19.20	46.00	-26.80	QP		
4		269.4284	42.55	-20.25	22.30	46.00	-23.70	QP		
5		383.9318	39.52	-16.82	22.70	46.00	-23.30	QP		
6	*	528.2458	36.68	-13.18	23.50	46.00	-22.50	QP		



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

Power: AC 240V/60Hz

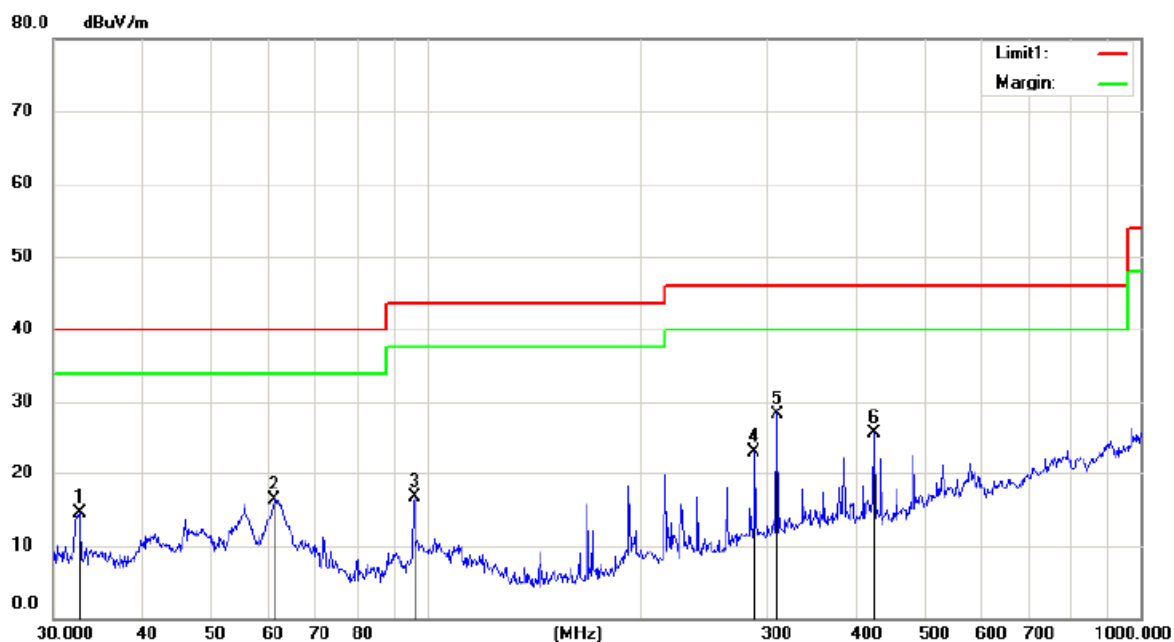
Humidity: 52 %

Mode:Charging+Playing

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	61.7781	44.37	-22.17	22.20	40.00	-17.80	QP			
2		89.2764	47.55	-23.55	24.00	43.50	-19.50	QP			
3		93.1132	46.23	-23.23	23.00	43.50	-20.50	QP			
4		98.1420	43.85	-21.75	22.10	43.50	-21.40	QP			
5		191.7450	44.62	-22.02	22.60	43.50	-20.90	QP			
6		207.1226	46.16	-22.36	23.80	43.50	-19.70	QP			

FM Mode



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

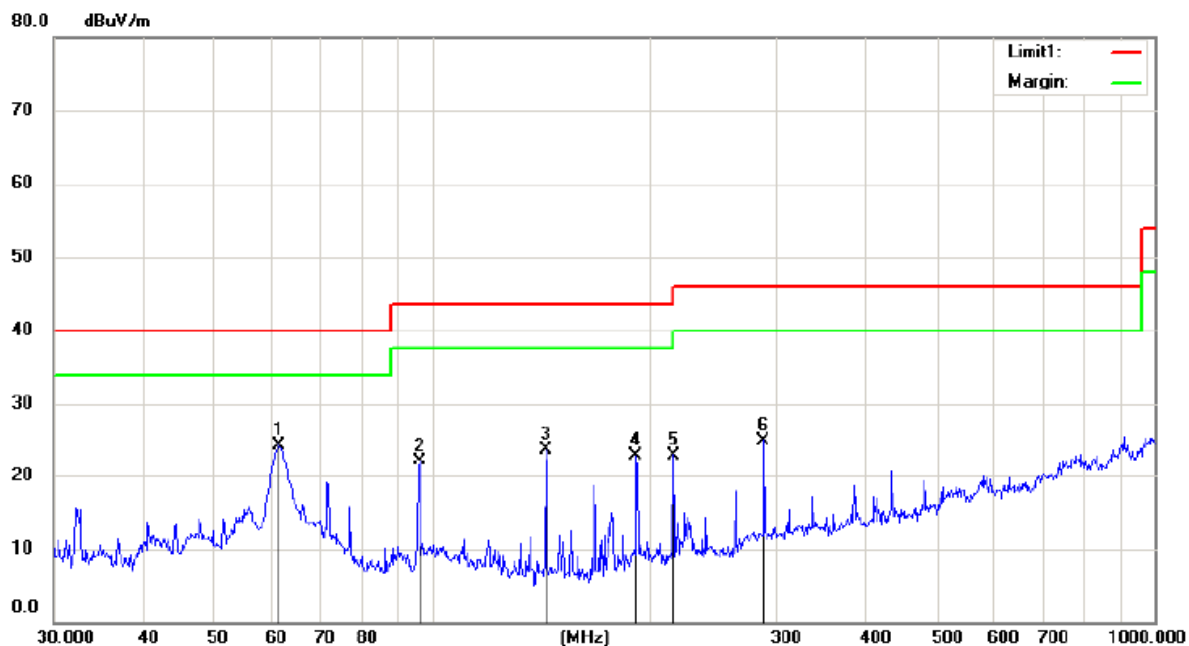
Power: DC 12V

Humidity: 52 %

Mode:FM

Note: FULL LOAD

No. Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	32.6340	37.56	-22.96	14.60	40.00	-25.40	QP		
2	61.1315	38.44	-22.04	16.40	40.00	-23.60	QP		
3	96.0985	39.40	-22.70	16.70	43.50	-26.80	QP		
4	287.9904	42.41	-19.31	23.10	46.00	-22.90	QP		
5 *	309.9977	47.20	-18.80	28.40	46.00	-17.60	QP		
6	423.5402	42.52	-16.72	25.80	46.00	-20.20	QP		



Site site #1 Polarization: **Vertical** Temperature: 20 C
 Limit: FCC Part15 Class B 3M Radiation Power: DC 12V Humidity: 52 %
 Mode:FM
 Note: FULL LOAD

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	61.5618	46.52	-22.12	24.40	40.00	-15.60	QP		
2		96.0986	44.80	-22.70	22.10	43.50	-21.40	QP		
3		143.8295	49.81	-26.11	23.70	43.50	-19.80	QP		
4		191.7450	44.92	-22.02	22.90	43.50	-20.60	QP		
5		216.0240	45.50	-22.50	23.00	46.00	-23.00	QP		
6		287.9904	44.31	-19.31	25.00	46.00	-21.00	QP		

Above 1000MHz:

Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result was report as below

Test Date : 07/16/2015 Temperature : 24 °C
Test Result: PASS Humidity : 53 %
Test By: KK

GFSK Mode: Low channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
5165.000	V	50.79	38.99	74.00	54.00	-23.21	-15.01
7817.000	V	53.81	42.84	74.00	54.00	-20.19	-11.16
9976.000	V	53.54	40.29	74.00	54.00	-20.46	-13.71
13155.000	V	53.26	41.21	74.00	54.00	-20.74	-12.79
15926.000	V	53.73	42.62	74.00	54.00	-20.27	-11.38
17847.000	V	53.18	39.66	74.00	54.00	-20.82	-14.34
6355.000	H	51.90	40.71	74.00	54.00	-24.13	-14.20
8344.000	H	52.90	40.26	74.00	54.00	-22.10	-13.29
11064.000	H	52.76	38.55	74.00	54.00	-21.10	-13.74
13461.000	H	53.26	39.61	74.00	54.00	-21.24	-15.45
17014.000	H	52.92	41.07	74.00	54.00	-20.74	-14.39
18000.000	H	53.32	40.16	74.00	54.00	-21.08	-12.93

GFSK Mode: Middle channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4621.000	V	51.98	37.84	74.00	54.00	-22.02	-16.16
8599.000	V	53.6	39.22	74.00	54.00	-20.40	-14.78
11319.000	V	53.61	38.95	74.00	54.00	-20.39	-15.05
14430.000	V	53.72	42.85	74.00	54.00	-20.28	-11.15
16402.000	V	53.06	41.85	74.00	54.00	-20.94	-12.15
17983.000	V	52.74	40.26	74.00	54.00	-9.28	-13.74
6695.000	H	52.93	40.70	74.00	54.00	-25.13	-13.30
8412.000	H	53.66	41.15	74.00	54.00	-21.07	-12.85
9636.000	H	53.73	40.07	74.00	54.00	-20.34	-13.93
11523.000	H	53.13	43.75	74.00	54.00	-20.27	-10.25
14515.000	H	53.87	42.88	74.00	54.00	-20.87	-11.12
16793.000	H	53.35	40.11	74.00	54.00	-20.13	-13.89

GFSK Mode: High channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4570.000	V	51.72	39.51	74.00	54.00	-22.28	-14.49
8582.000	V	52.33	42.84	74.00	54.00	-21.67	-11.16
9449.000	V	53.57	40.84	74.00	54.00	-20.43	-13.16
12271.000	V	53.89	40.95	74.00	54.00	-20.11	-13.05
13767.000	V	53.93	41.51	74.00	54.00	-20.07	-12.49
16470.000	V	52.96	40.15	74.00	54.00	-21.04	-13.85
6321.000	H	53.23	38.46	74.00	54.00	-20.77	-15.54
8565.000	H	53.41	39.51	74.00	54.00	-20.59	-14.49
9551.000	H	53.51	40.33	74.00	54.00	-20.49	-13.67
12696.000	H	53.76	40.95	74.00	54.00	-20.24	-13.05
15450.000	H	52.98	41.62	74.00	54.00	-21.02	-12.38
18000.000	H	53.36	40.31	74.00	54.00	-20.64	-13.69

6. Channel Separation Test

6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print out the test result from the spectrum by hard copy function.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

6.4 Measurement Results

The following table is the setting of spectrum analyzer.

Attenuation	Auto
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max hold

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	07/10/2015
Test By:	Kuki	Temperature :	21 °C
Test Result:	PASS	Humidity :	55 %

GFSK Mode:

Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 20dB Down BW(kHz)
Low Channel	2402	1000.00	834
Adjacency Channel	2403		
Middle channel	2441	1000.00	828
Adjacency Channel	2440		
High Channel	2480	1000.00	834
Adjacency Channel	2479		

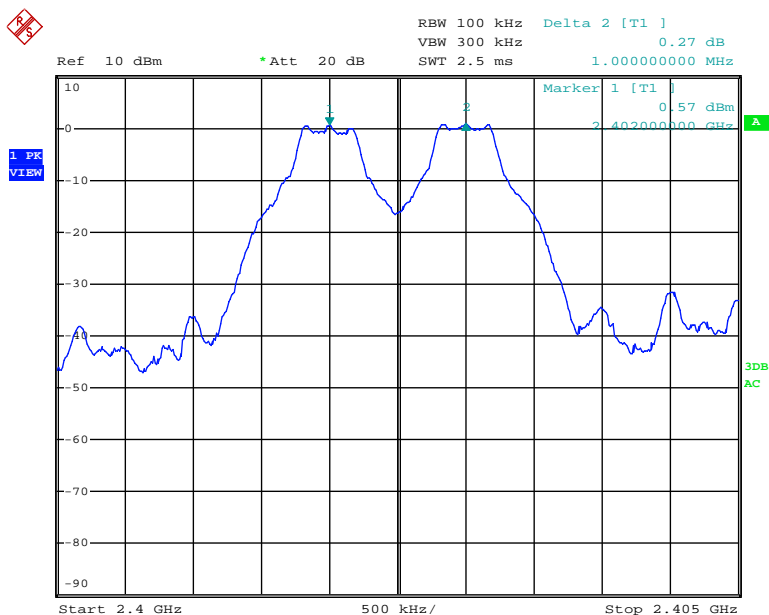
$\pi/4$ -DQPSK Mode

Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW(kHz)
Low Channel	2402	1000.00	740
Adjacency Channel	2403		
Middle channel	2441	1000.00	744
Adjacency Channel	2440		
High Channel	2480	1000.00	744
Adjacency Channel	2479		

8DPSK Mode:

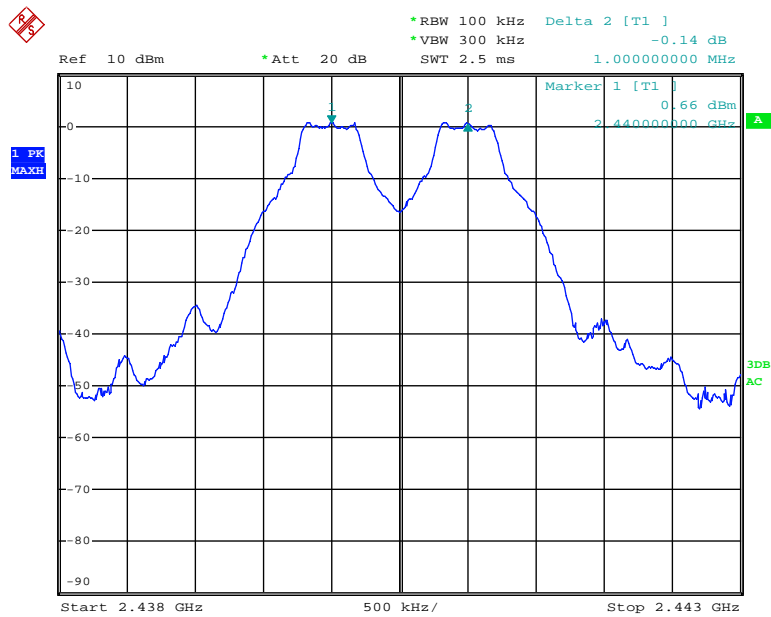
Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW(kHz)
Low Channel	2402	1000.00	780
Adjacency Channel	2403		
Middle channel	2441	1000.00	776
Adjacency Channel	2440		
High Channel	2480	1000.00	780
Adjacency Channel	2479		

GFSK Mode: Low channel



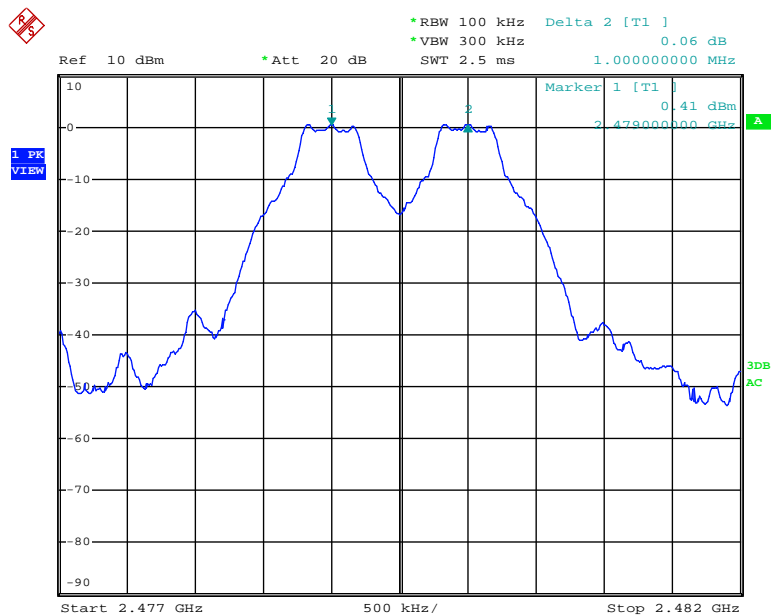
Date: 30.JUN.2015 11:43:04

GFSK Mode: Middle channel



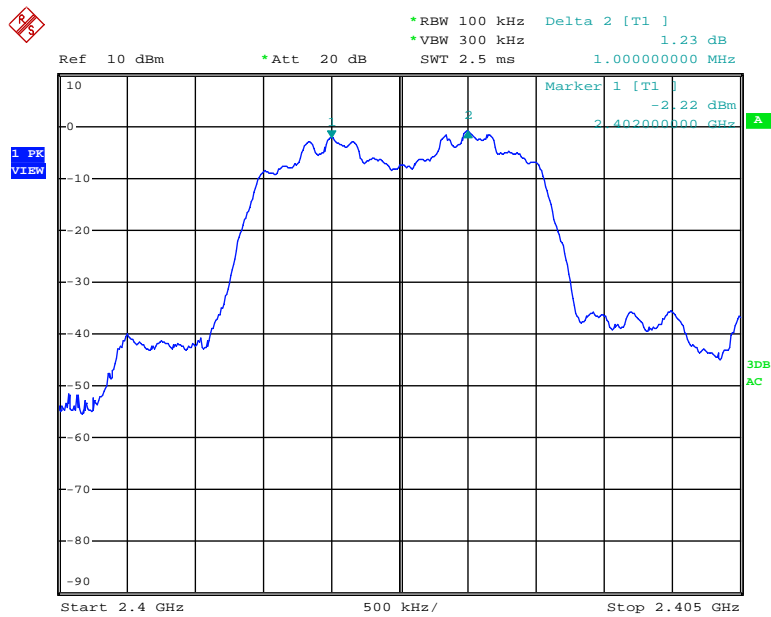
Date: 27.JUN.2015 10:47:07

GFSK Mode: High channel



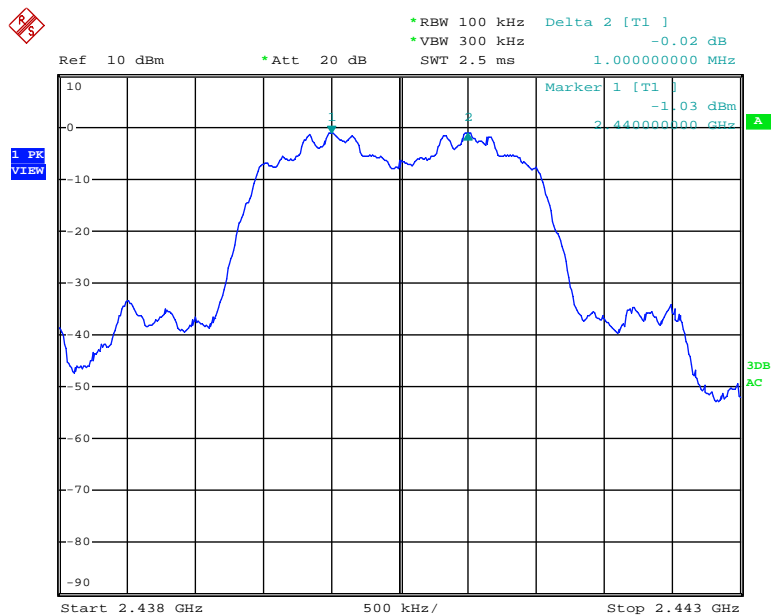
Date: 27.JUN.2015 10:48:18

$\pi/4$ -DQPSK Mode: Low channel



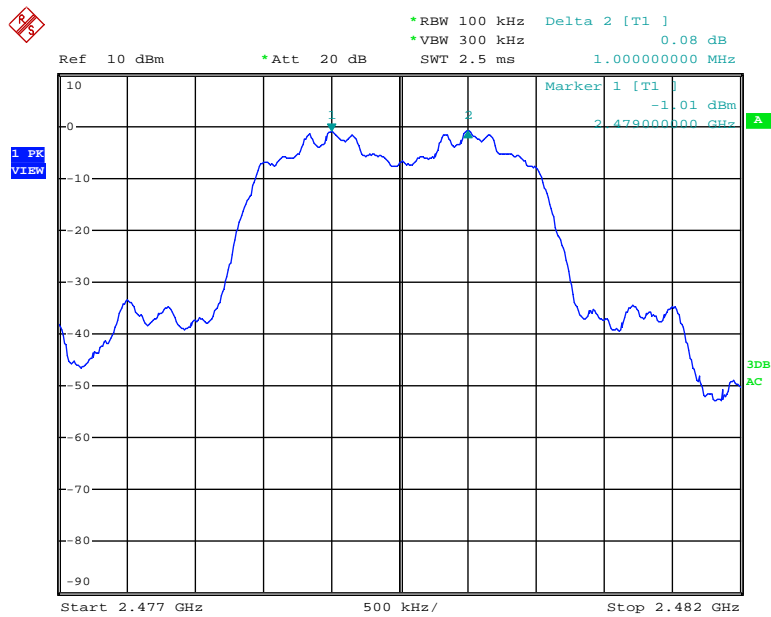
Date: 27.JUN.2015 10:49:34

$\pi/4$ -DQPSK Mode: Middle channel



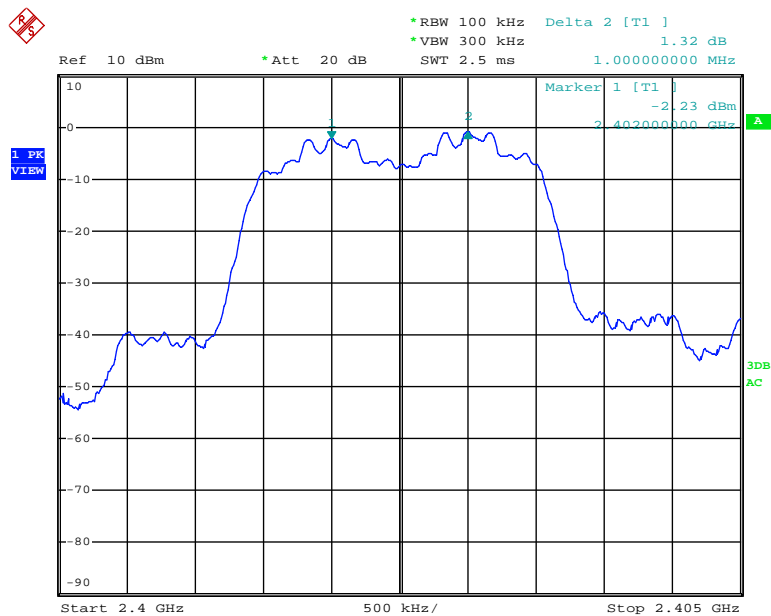
Date: 27.JUN.2015 10:51:25

$\pi/4$ -DQPSK Mode: High channel



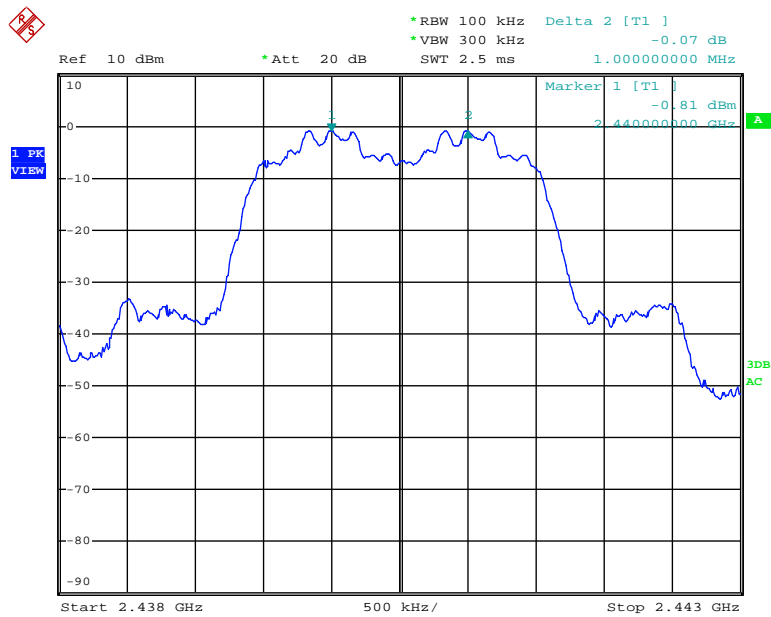
Date: 27.JUN.2015 10:52:23

8DPSK Mode: Low channel



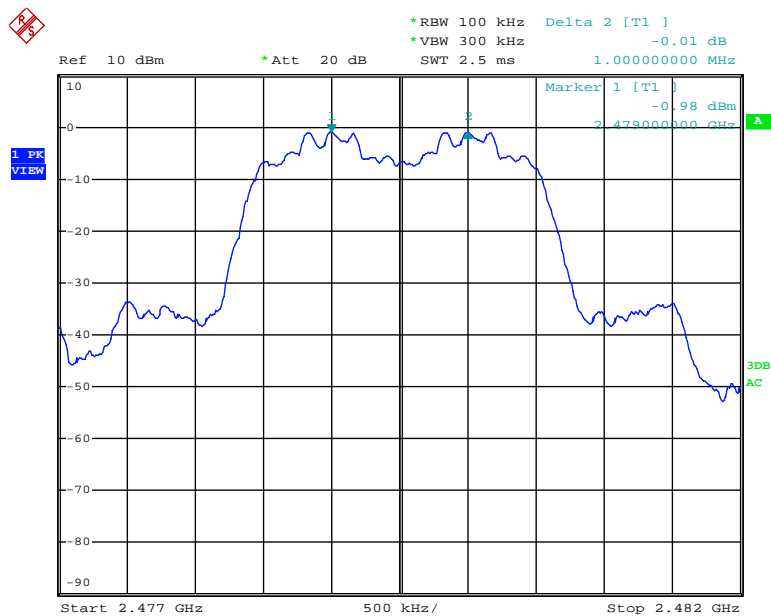
Date: 27.JUN.2015 10:56:09

8DPSK Mode: Middle channel



Date: 27.JUN.2015 10:57:12

8DPSK Mode: High channel



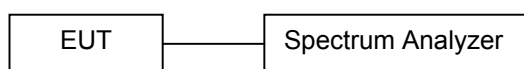
Date: 27.JUN.2015 10:58:26

7. Bandwidth Test

7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print out the test result from the spectrum by hard copy function.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

7.4 Measurement Results

The following table is the setting of spectrum analyzer.

Attenuation	Auto
SPAN	3MHz
RB	30KHz
VB	100KHz
Detector	Peak
Trace	Max hold

20dB Bandwidth test data Chart:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date:	07/12/2015
Test By:	Kuki	Temperature:	21 °C
Test Result:	N/A	Humidity:	55 %

GFSK Mode:

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	882
Middle channel	2441	852
High channel	2480	852

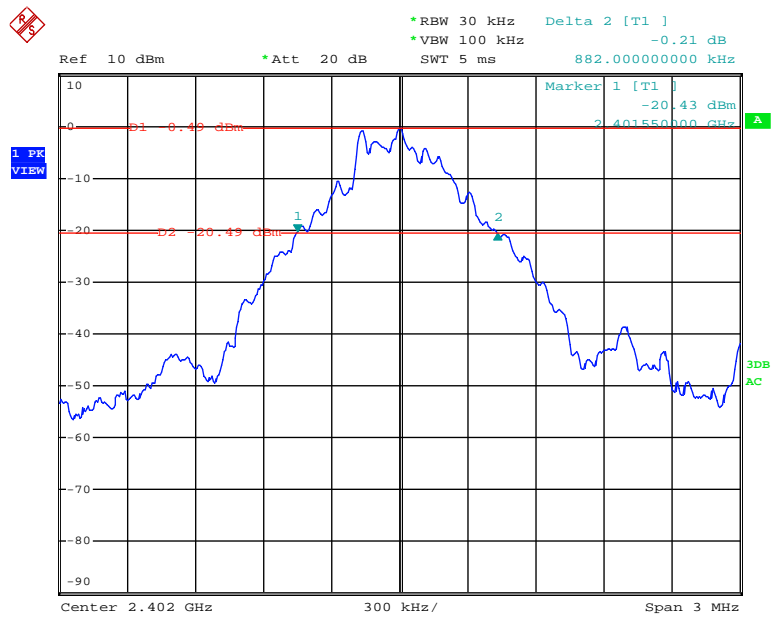
$\pi/4$ -DQPSK Mode:

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	1212
Middle channel	2441	1224
High channel	2480	1224

8DPSK Mode:

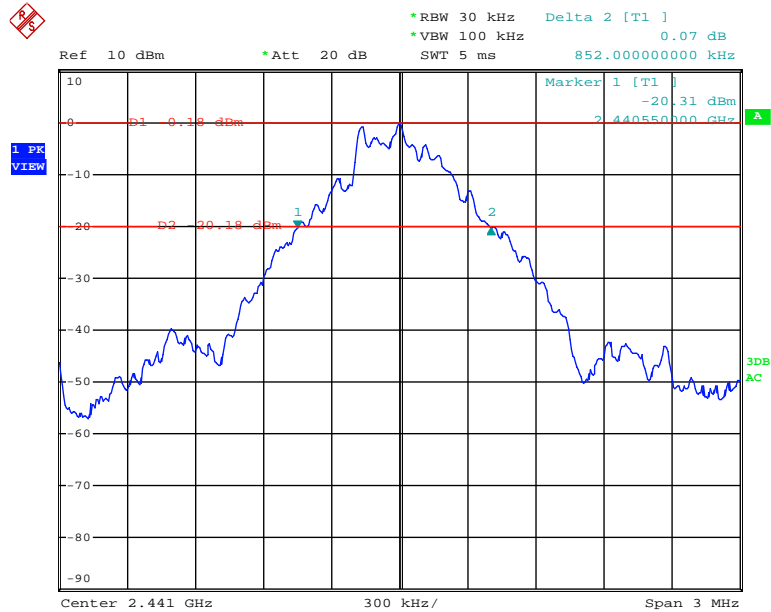
Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	1218
Middle channel	2441	1218
High channel	2480	1218

GFSK Mode: Low channel



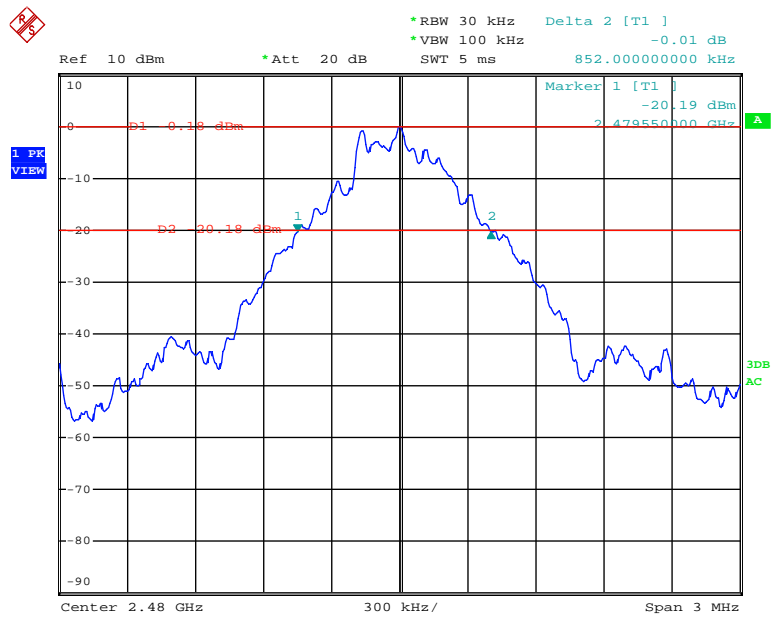
Date: 27.JUN.2015 09:51:00

GFSK Mode: Middle channel



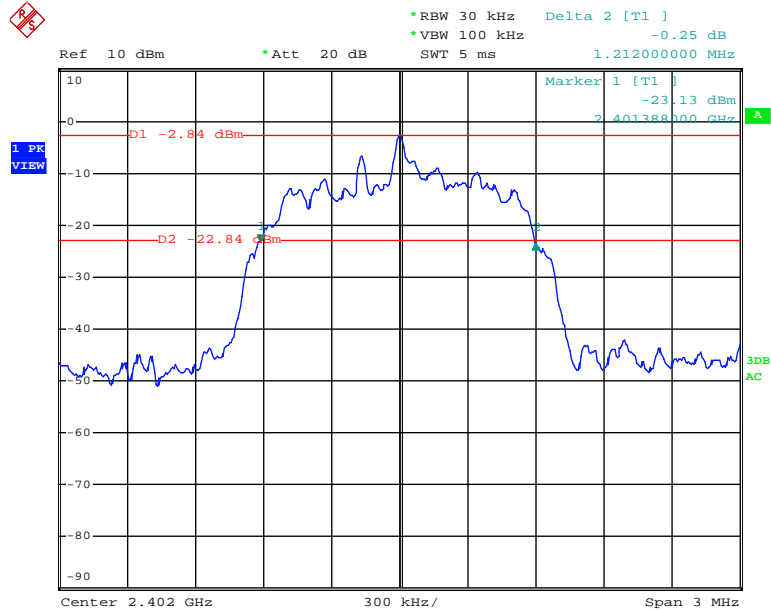
Date: 27.JUN.2015 09:51:59

GFSK Mode: High channel



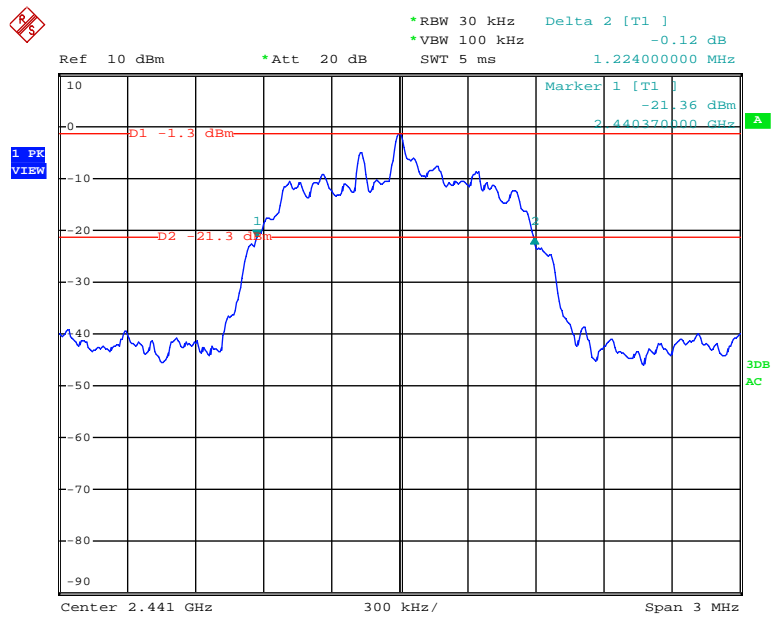
Date: 27.JUN.2015 09:52:47

$\pi/4$ -DQPSK Mode: Low channel



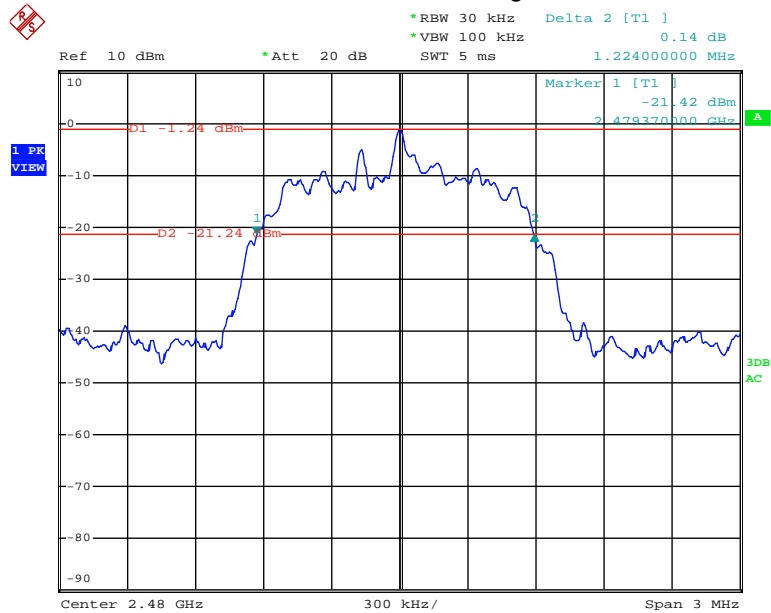
Date: 27.JUN.2015 09:54:23

$\pi/4$ -DQPSK Mode: Middle channel



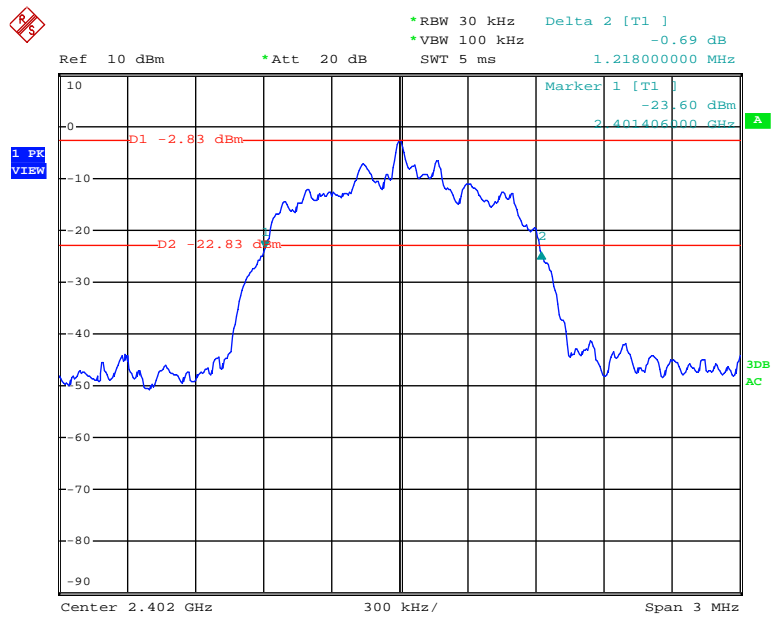
Date: 27.JUN.2015 09:55:14

$\pi/4$ -DQPSK Mode: High channel



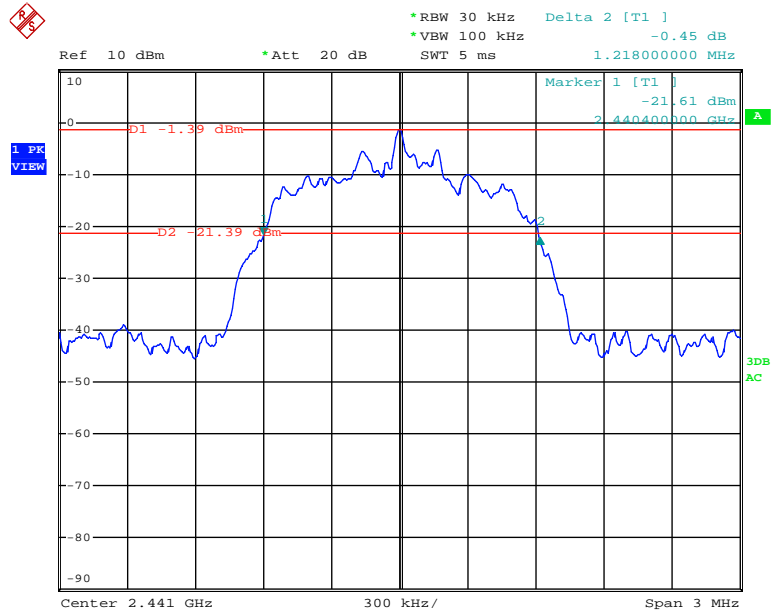
Date: 27.JUN.2015 09:56:04

8DPSK Mode: Low channel



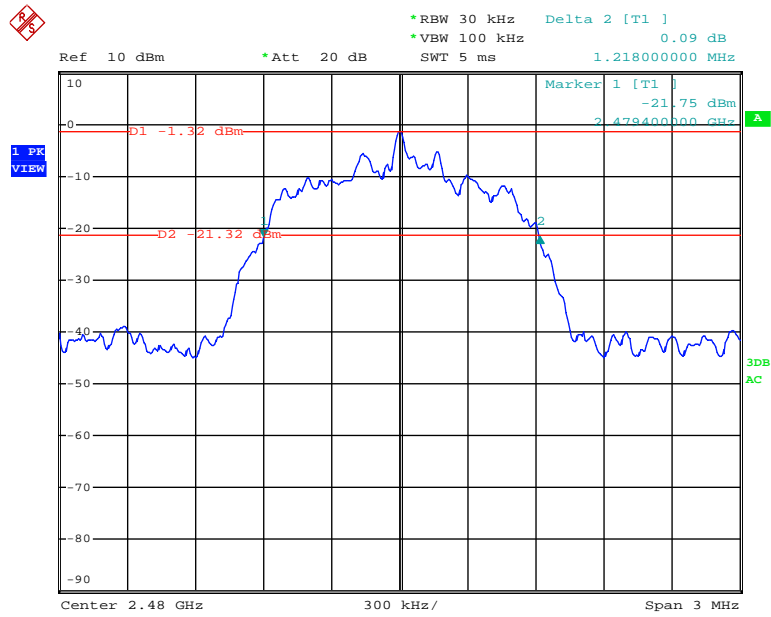
Date: 27.JUN.2015 09:57:14

8DPSK Mode: Middle channel



Date: 27.JUN.2015 09:58:02

8DPSK Mode: High channel



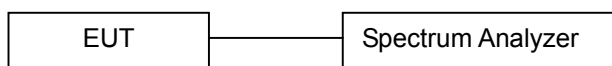
Date: 27.JUN.2015 09:59:06

8. Quantity of Hopping Channel Test

8.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print out the test result from the spectrum by hard copy function.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

8.4 Measurement Results

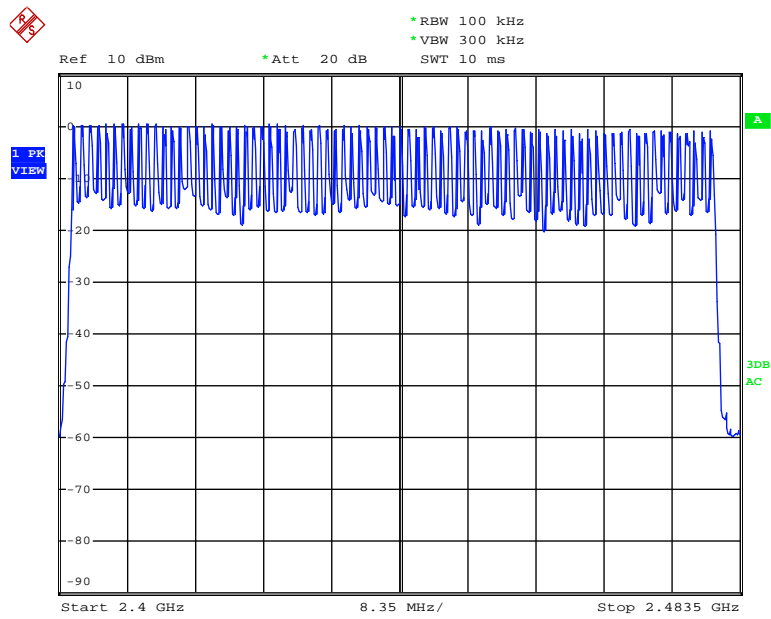
Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	07/12/2015
Test By:	Jary	Temperature :	21 °C
Test Result:	Pass	Humidity :	55 %

GFSK Mode, $\pi/4$ -DQPSK Mode, 8DPSK Mode:

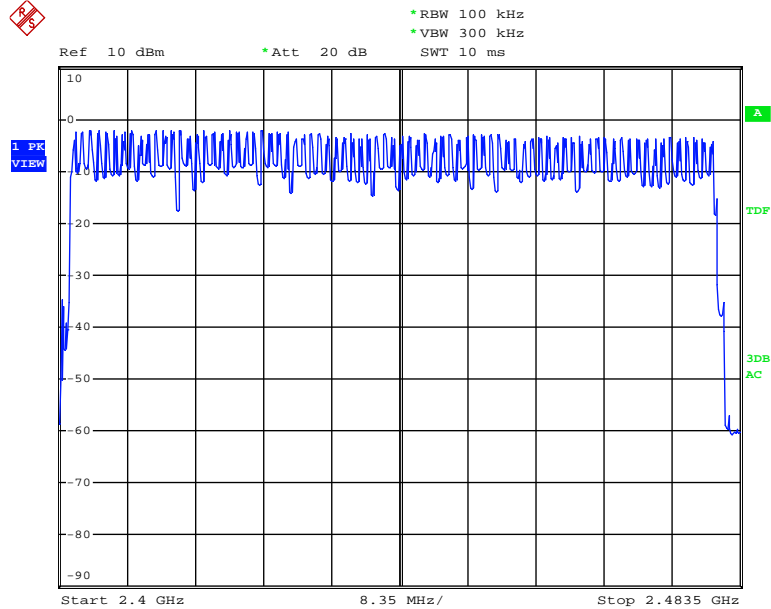
Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel limit
2402-2480	79	>15

GFSK Mode

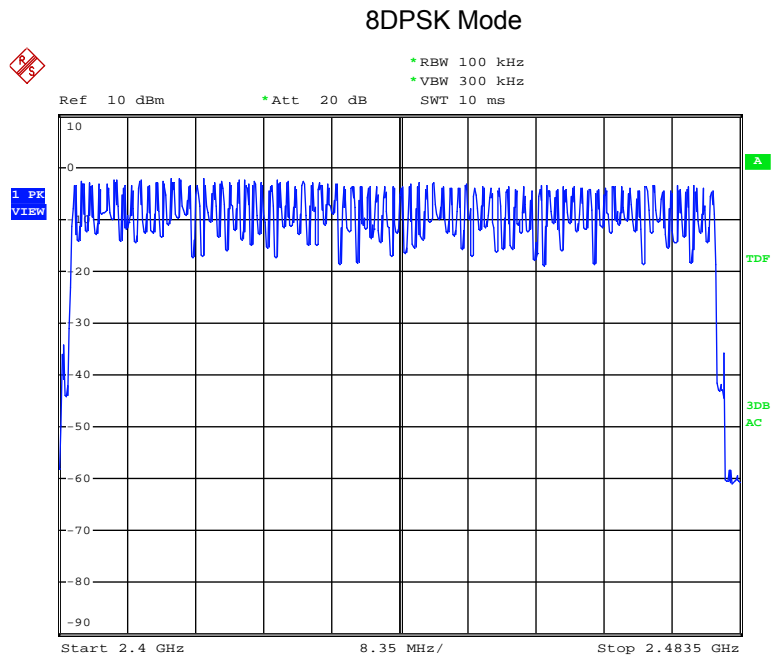


Date: 27.JUN.2015 10:34:49

$\pi/4$ -DQPSK Mode



Date: 27.JUN.2015 10:40:07



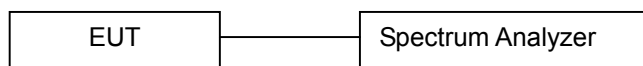
Date: 27.JUN.2015 10:42:16

9. Time of Occupancy (Dwell Time) Test

9.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

9.2 Test SET-UP (Block Diagram of Configuration)



9.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

9.4 Measurement Results

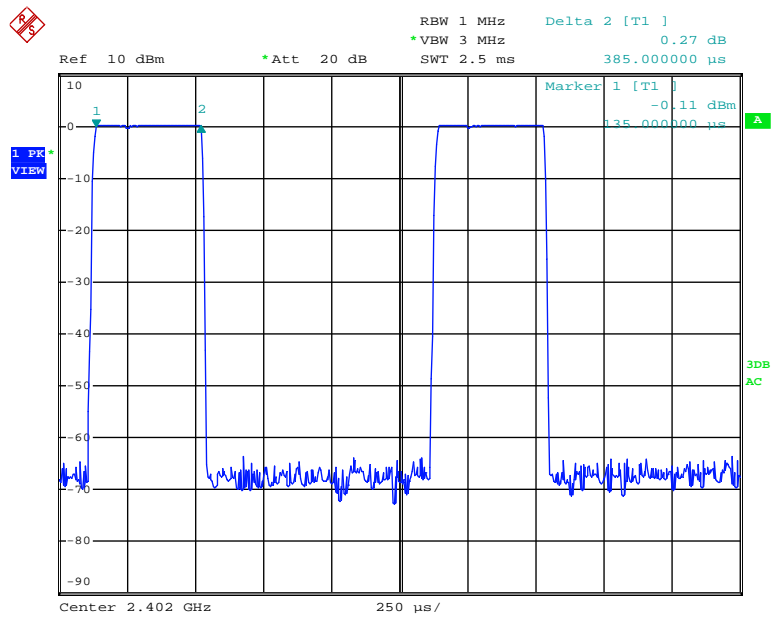
Refer to attached data chart.

Spectrum Detector: PK
 Test By: Kuki
 Test Result: PASS

Test Date : 07/12/2015
 Temperature : 21 °C
 Humidity : 55 %

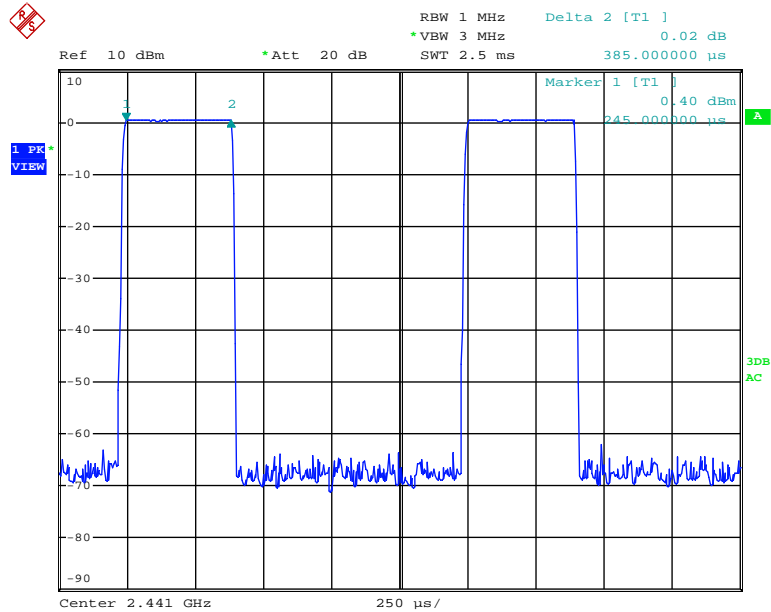
Mode	Channel	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
GFSK Mode					
DH1	Low channel	0.385	123.2	400	Pass
	Middle channel	0.385	123.2	400	Pass
	High channel	0.385	123.2	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH3	Low channel	1.640	262.4	400	Pass
	Middle channel	1.640	262.4	400	Pass
	High channel	1.640	262.4	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH5	Low channel	2.900	309.4	400	Pass
	Middle channel	2.900	309.4	400	Pass
	High channel	2.900	309.4	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				
π/4-DPSK Mode					
2DH1	Low channel	0.405	129.6	400	Pass
	Middle channel	0.405	129.6	400	Pass
	High channel	0.405	129.6	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
2DH3	Low channel	1.655	264.8	400	Pass
	Middle channel	1.655	264.8	400	Pass
	High channel	1.655	264.8	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
2DH5	Low channel	2.895	308.8	400	Pass
	Middle channel	2.895	308.8	400	Pass
	High channel	2.895	308.8	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				
8DPSK Mode					
3DH1	Low channel	0.405	129.6	400	Pass
	Middle channel	0.405	129.6	400	Pass
	High channel	0.405	129.6	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
3DH3	Low channel	1.655	264.8	400	Pass
	Middle channel	1.645	263.2	400	Pass
	High channel	1.650	264.0	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
3DH5	Low channel	2.890	308.3	400	Pass
	Middle channel	2.880	307.2	400	Pass
	High channel	2.890	308.3	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

DH1: Low channel



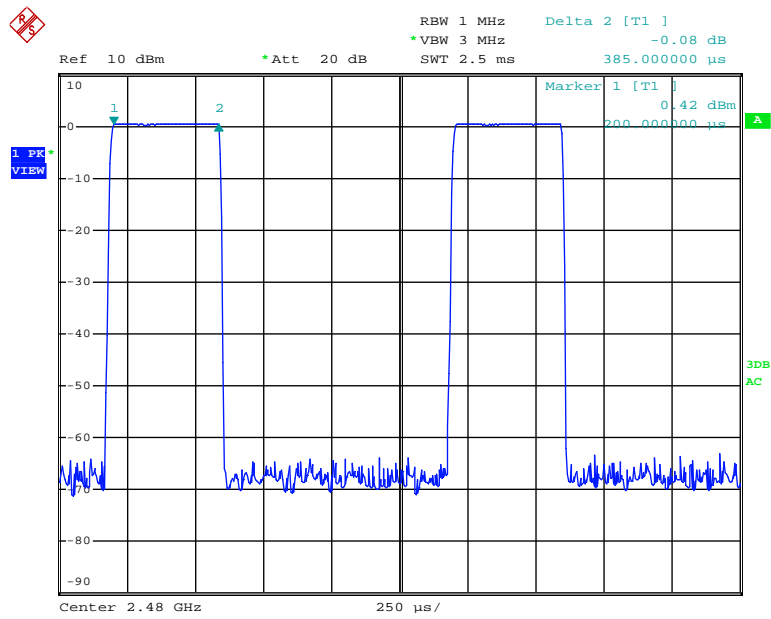
Date: 27.JUN.2015 10:05:32

DH1: Middle channel



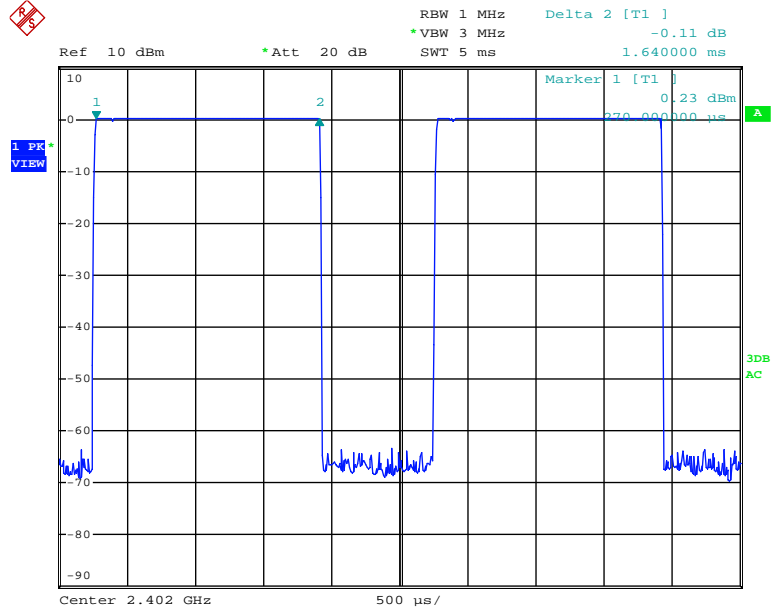
Date: 27.JUN.2015 10:06:19

DH1: High channel



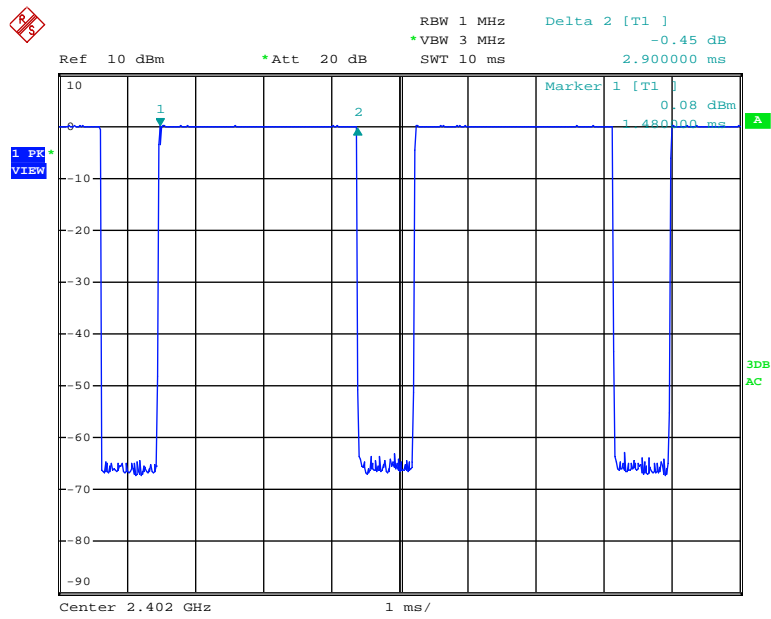
Date: 27.JUN.2015 10:06:51

DH3: Low channel



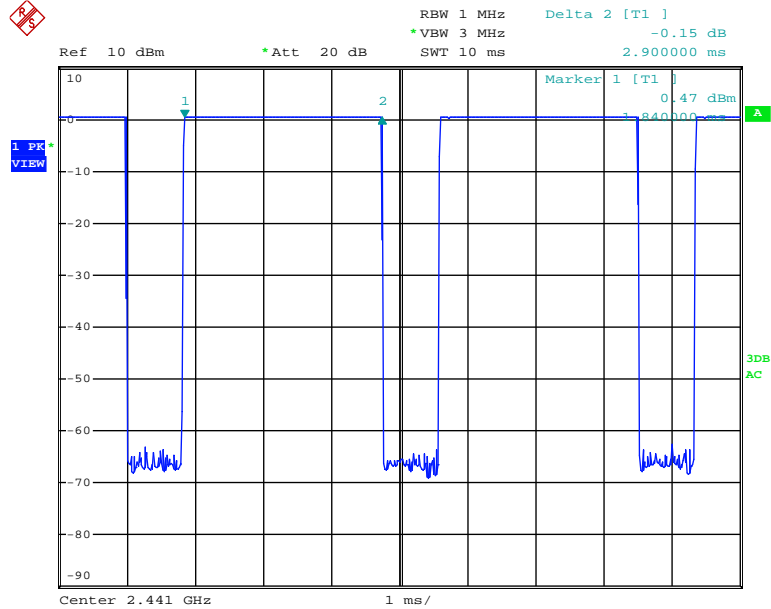
Date: 27.JUN.2015 10:07:55

DH5: Low channel



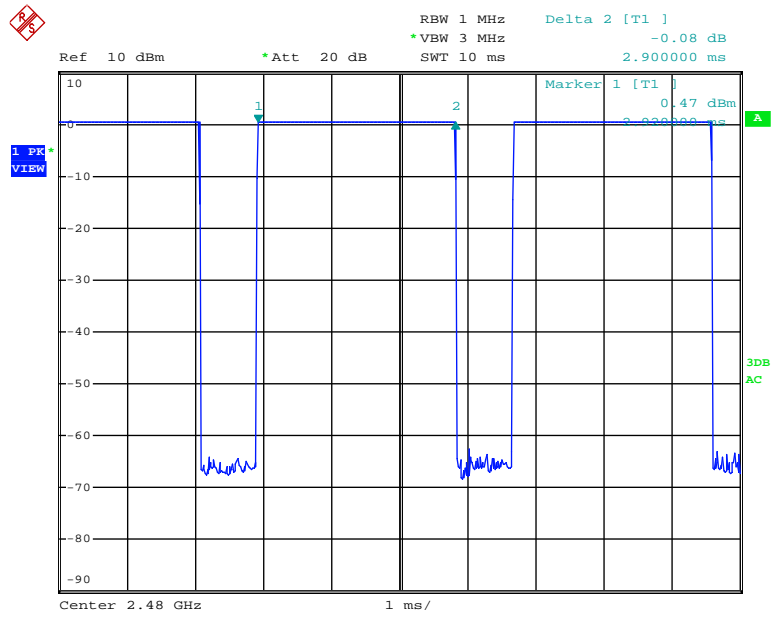
Date: 27.JUN.2015 10:10:31

DH5: Middle channel



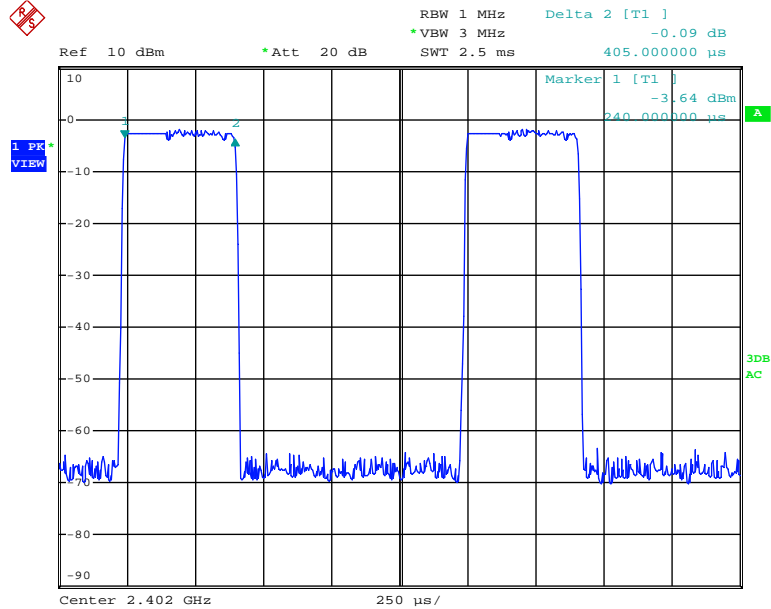
Date: 27.JUN.2015 10:11:14

DH5: High channel



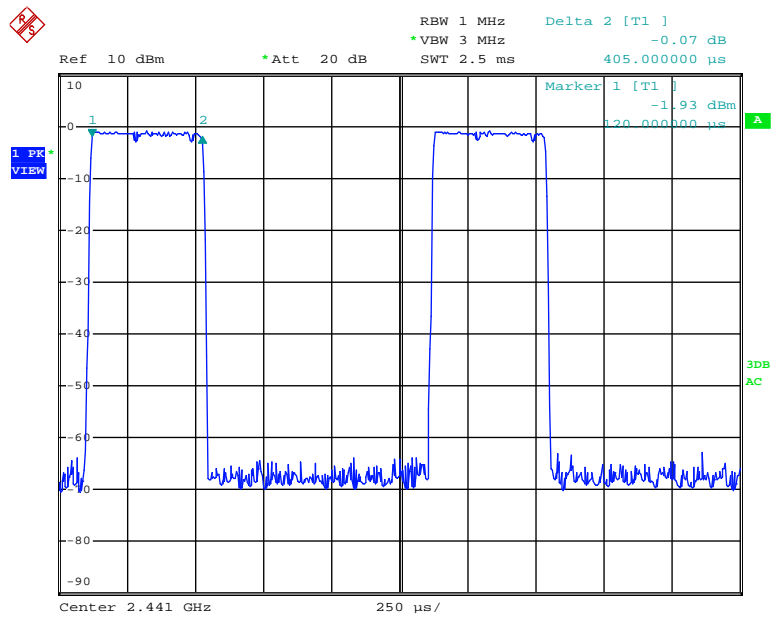
Date: 27.JUN.2015 10:11:47

2DH1: Low channel



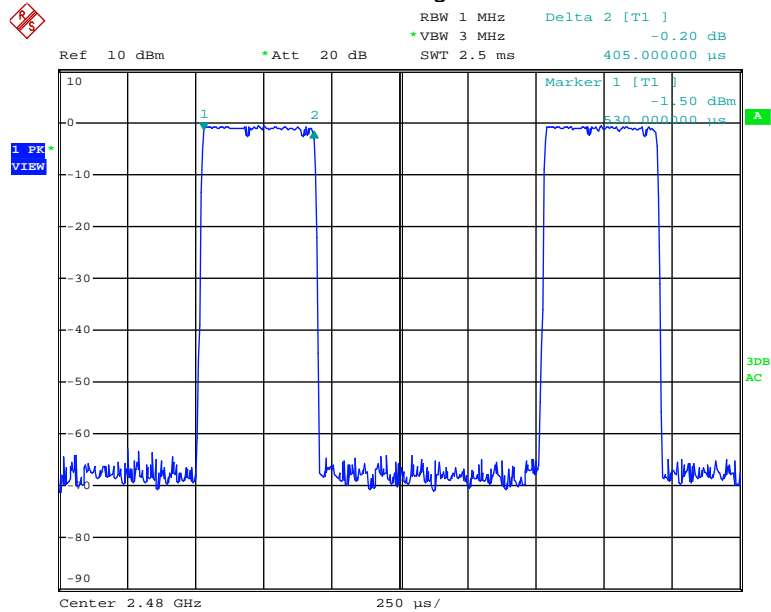
Date: 27.JUN.2015 10:13:01

2DH1: Middle channel



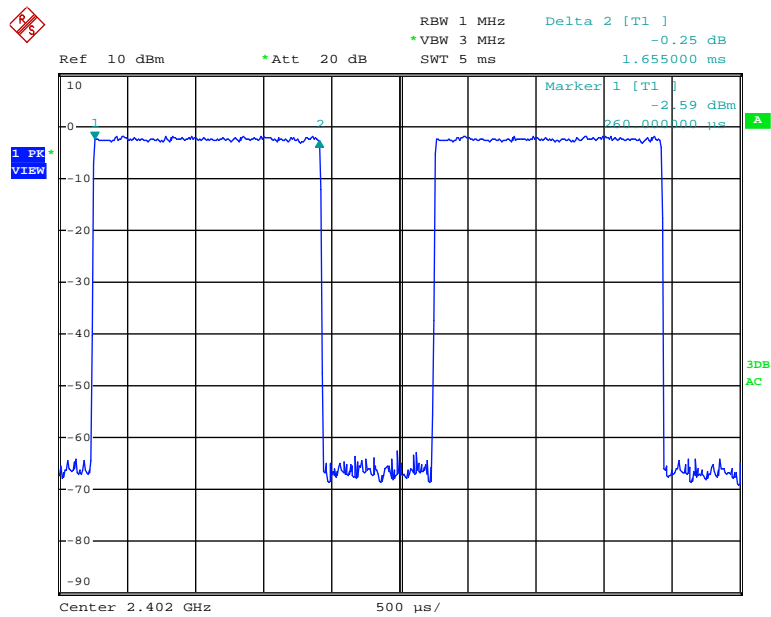
Date: 27.JUN.2015 10:13:57

2DH1: High channel



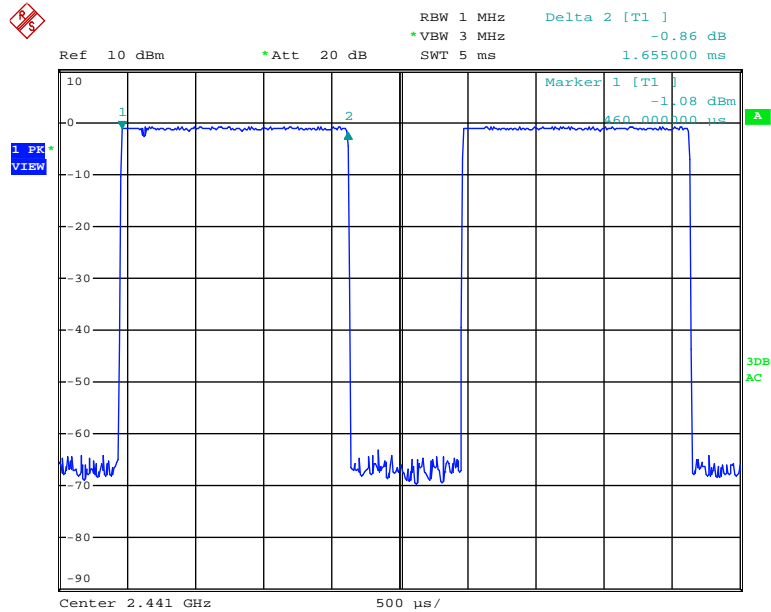
Date: 27.JUN.2015 10:14:34

2DH3: Low channel



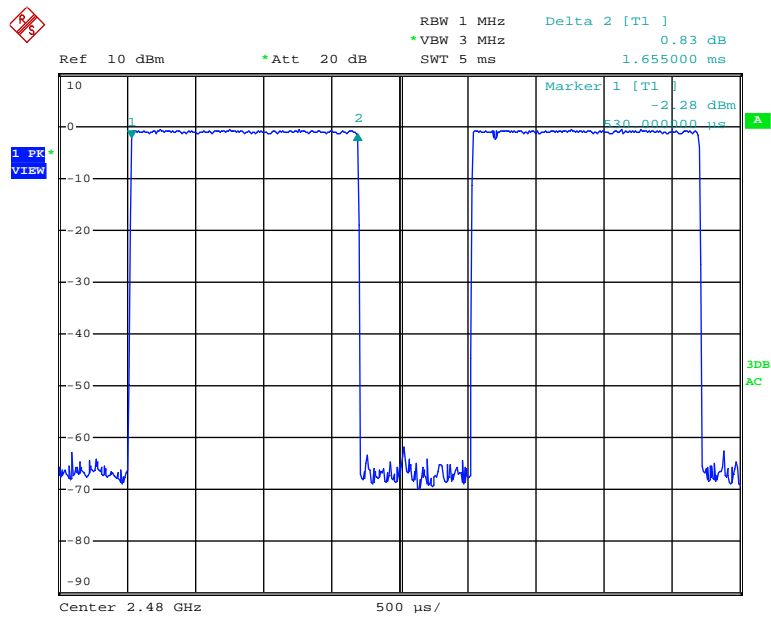
Date: 27.JUN.2015 10:15:35

2DH3: Middle channel



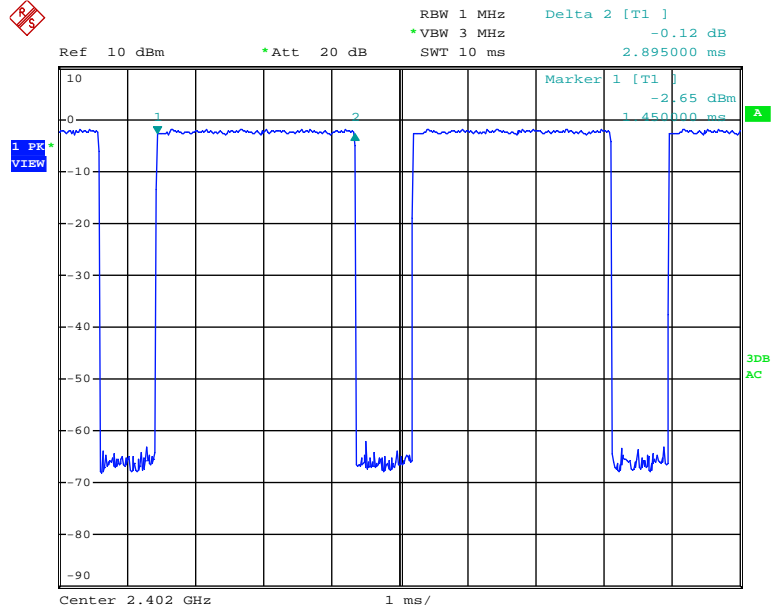
Date: 27.JUN.2015 10:16:03

2DH3: High channel



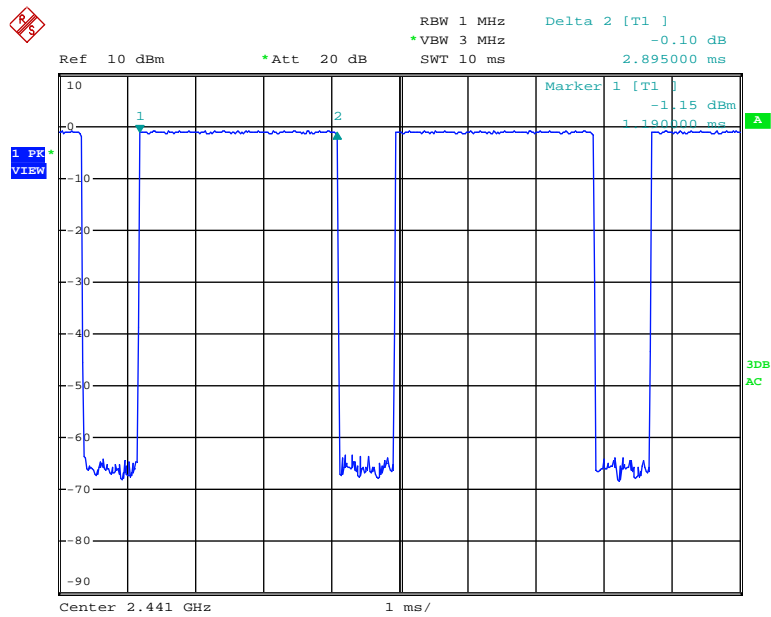
Date: 27.JUN.2015 10:16:30

2DH5: Low channel



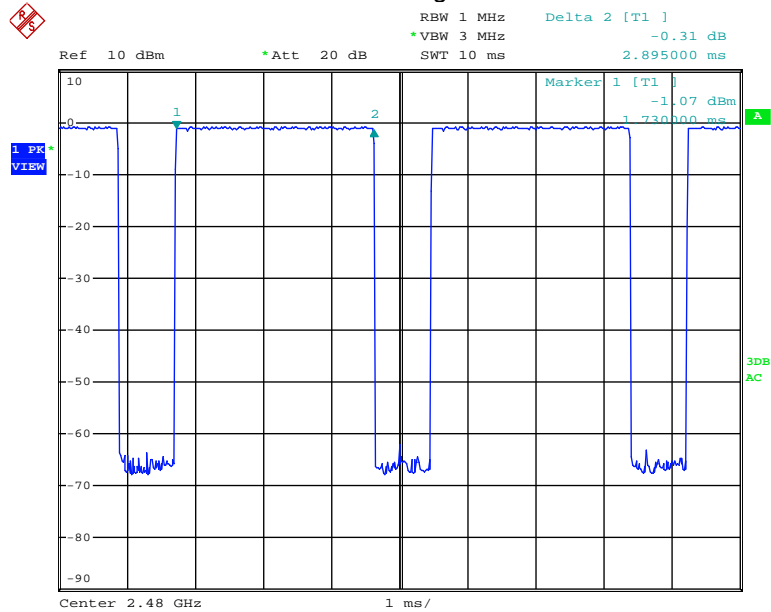
Date: 27.JUN.2015 10:17:53

2DH5: Middle channel



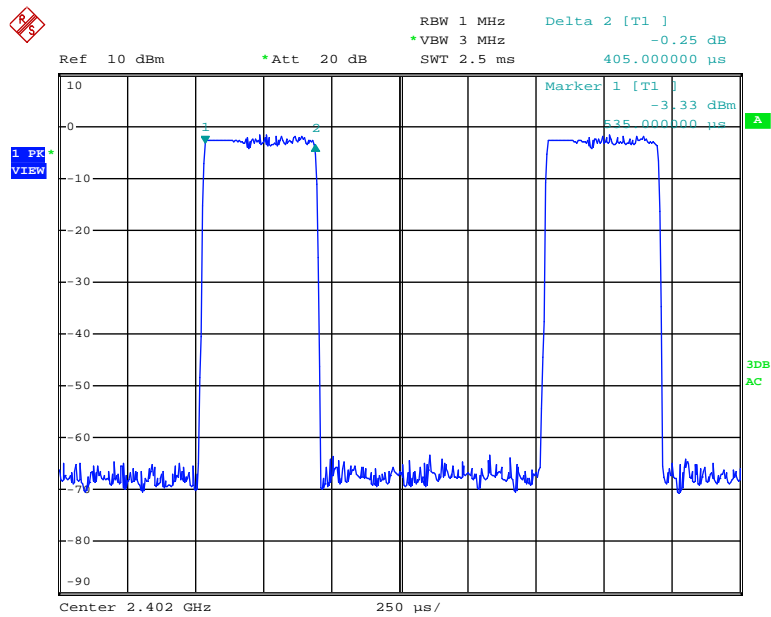
Date: 27.JUN.2015 10:18:24

2DH5: High channel



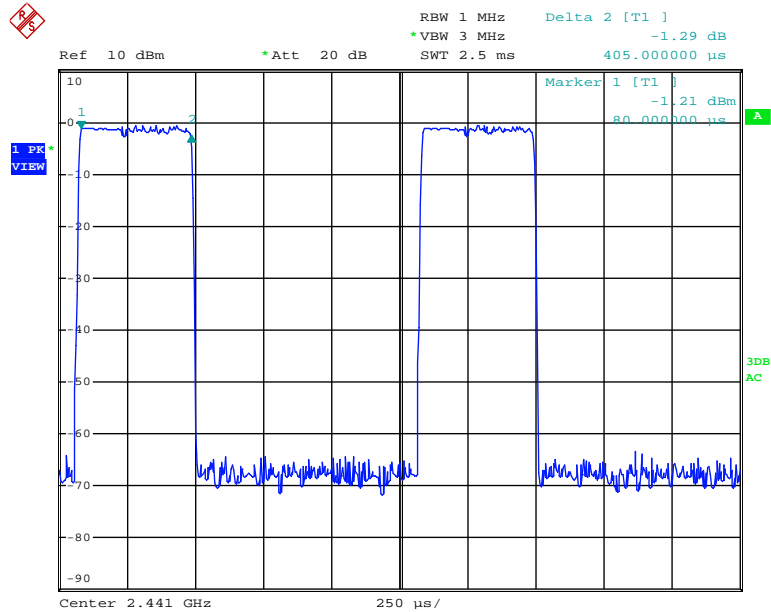
Date: 27.JUN.2015 10:18:58

3DH1: Low channel



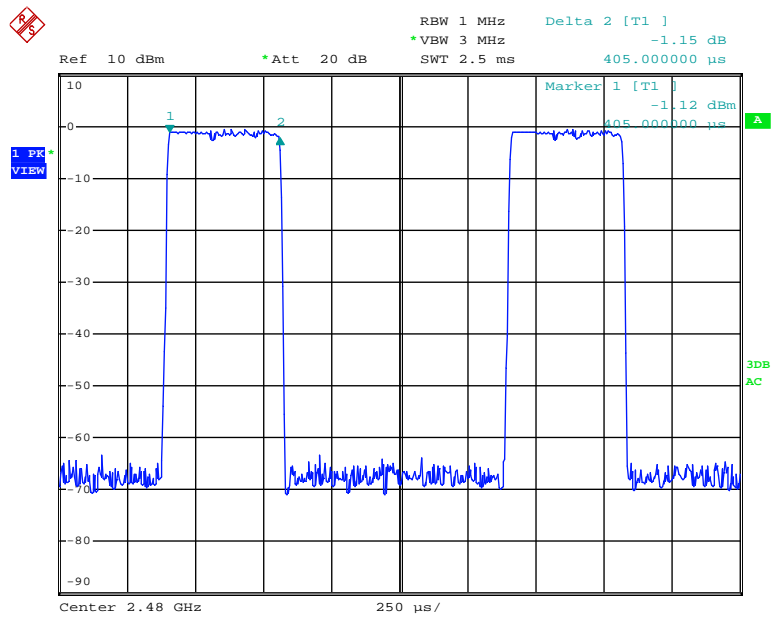
Date: 27.JUN.2015 10:19:50

3DH1: Middle channel



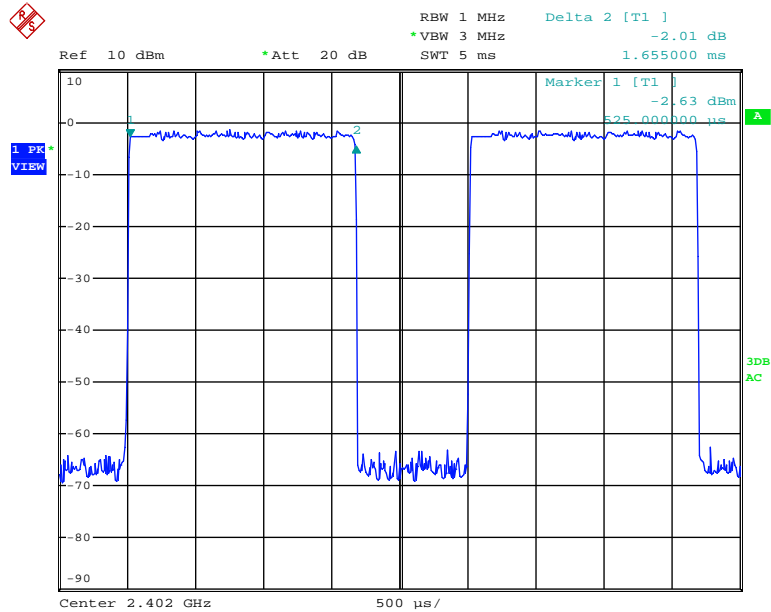
Date: 27.JUN.2015 10:20:13

3DH1: High channel



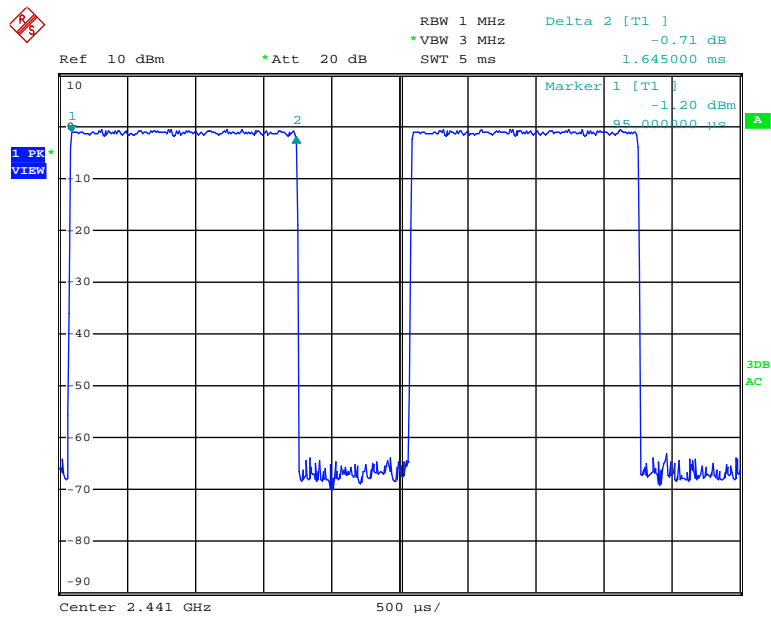
Date: 27.JUN.2015 10:20:44

3DH3: Low channel



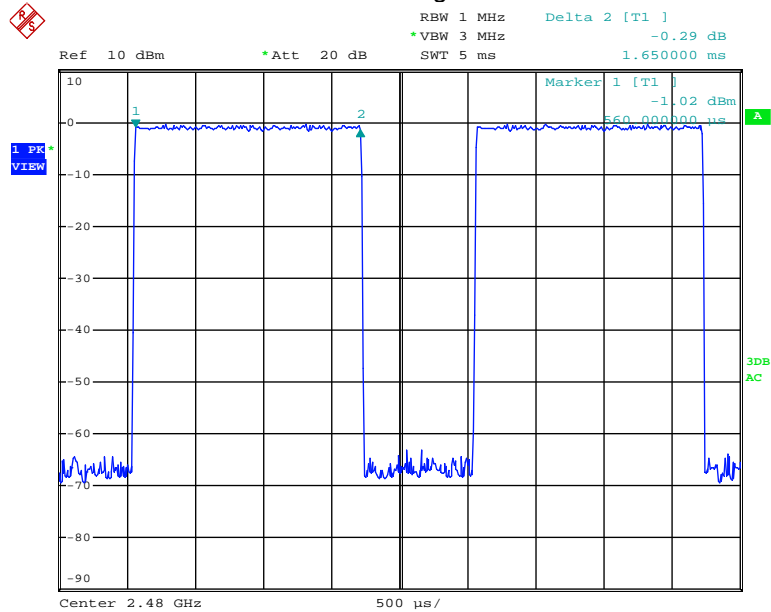
Date: 27.JUN.2015 10:21:42

3DH3: Middle channel



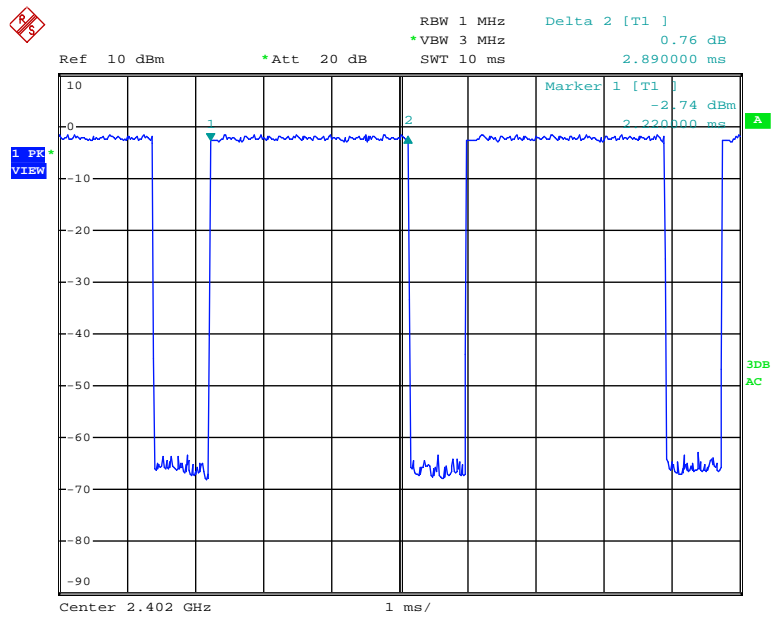
Date: 27.JUN.2015 10:22:22

3DH3: High channel



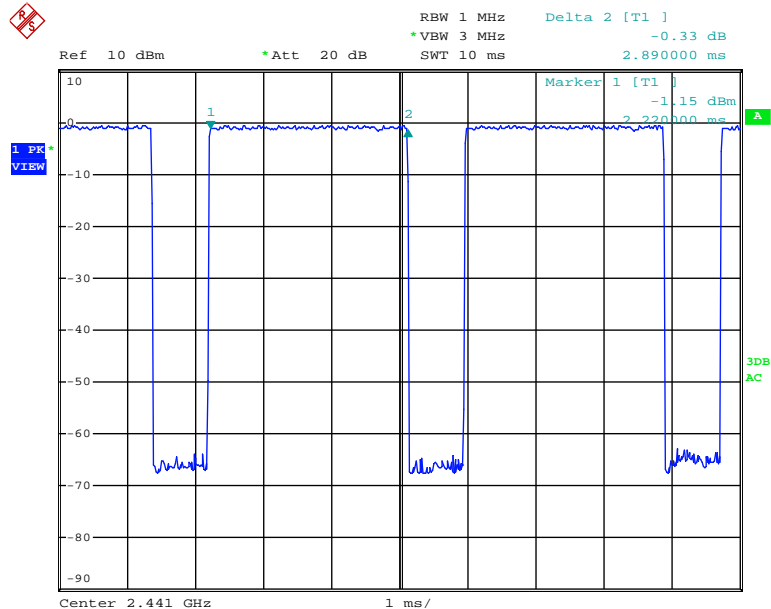
Date: 27.JUN.2015 10:22:59

3DH5: Low channel



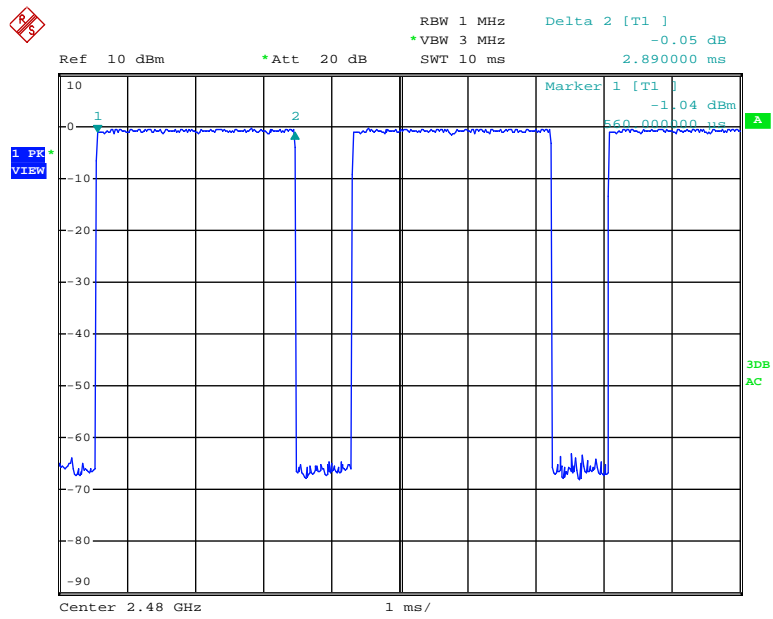
Date: 27.JUN.2015 10:23:52

3DH5: Middle channel



Date: 27.JUN.2015 10:24:19

3DH5: High channel



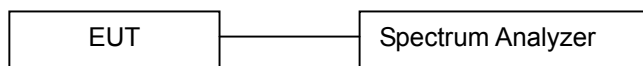
Date: 27.JUN.2015 10:24:48

10. Maximum Peak Output Power Test

10.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

10.2 Test SET-UP (Block Diagram of Configuration)



10.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

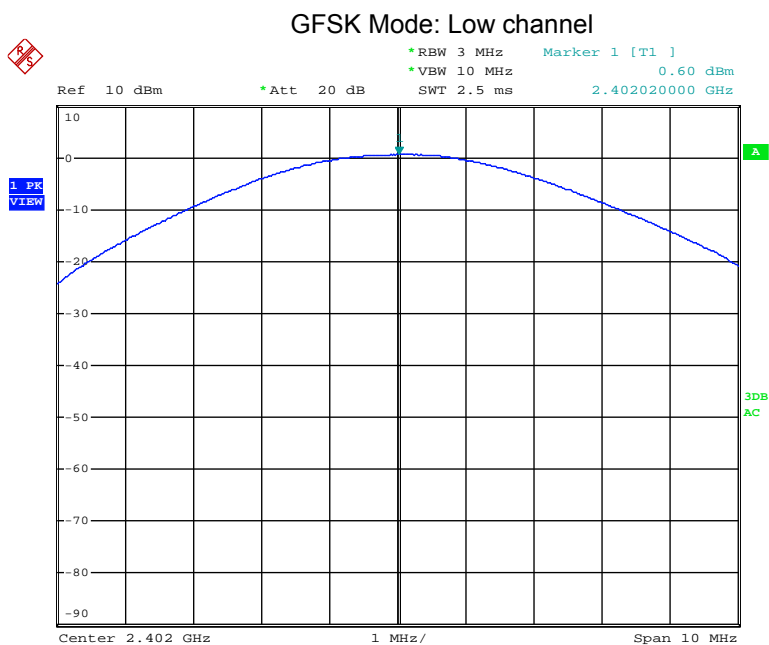
10.4 Measurement Results

Refer to attached data chart.

Spectrum Detector: PK
Test By: Kuki
Test Result: PASS

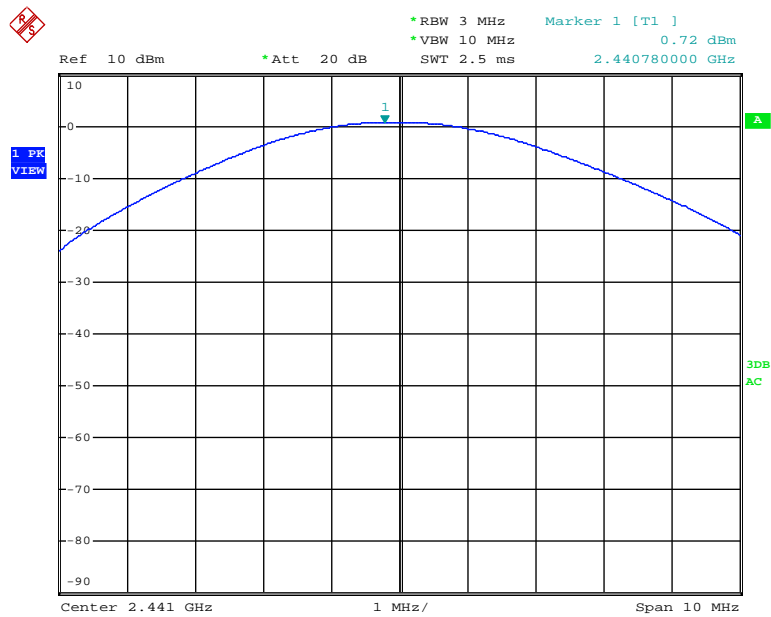
Test Date : 07/12/2015
Temperature : 21 °C
Humidity : 55 %

GFSK Mode					
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(W)	Pass/Fail
Low channel	2402.00	0.60	1.148	1	PASS
Middle channel	2441.00	0.72	1.180	1	PASS
High channel	2480.00	0.69	1.172	1	PASS
$\pi/4$ -DQPSK Mode					
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(mW)	Pass/Fail
Low channel	2402.00	-1.14	0.769	125	PASS
Middle channel	2441.00	-0.13	0.971	125	PASS
High channel	2480.00	-0.07	0.984	125	PASS
8DPSK Mode					
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(mW)	Pass/Fail
Low channel	2402.00	-0.68	0.855	125	PASS
Middle channel	2441.00	0.08	1.019	125	PASS
High channel	2480.00	0.17	1.040	125	PASS



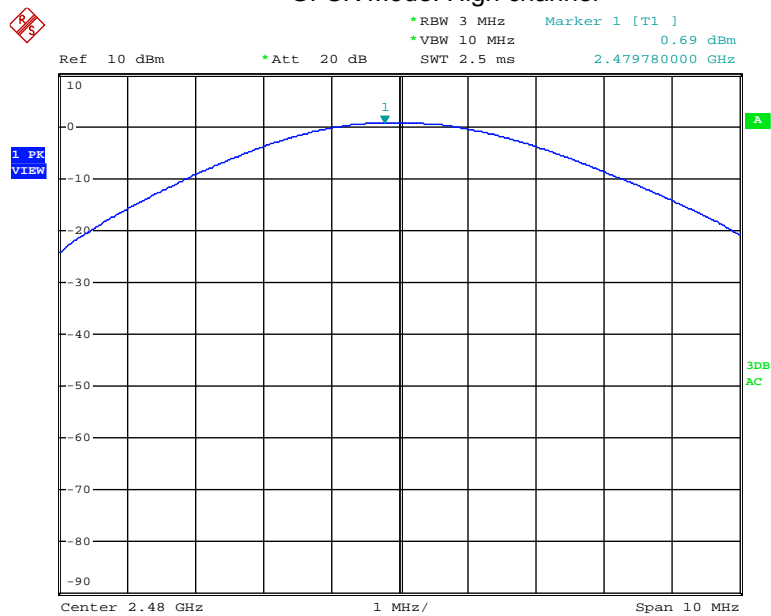
Date: 27.JUN.2015 09:59:59

GFSK Mode: Middle channel



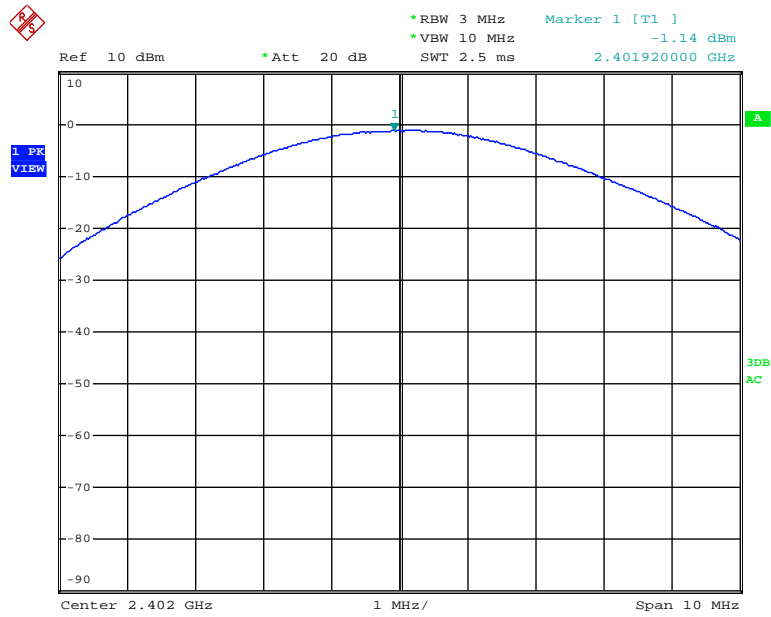
Date: 27.JUN.2015 10:00:23

GFSK Mode: High channel



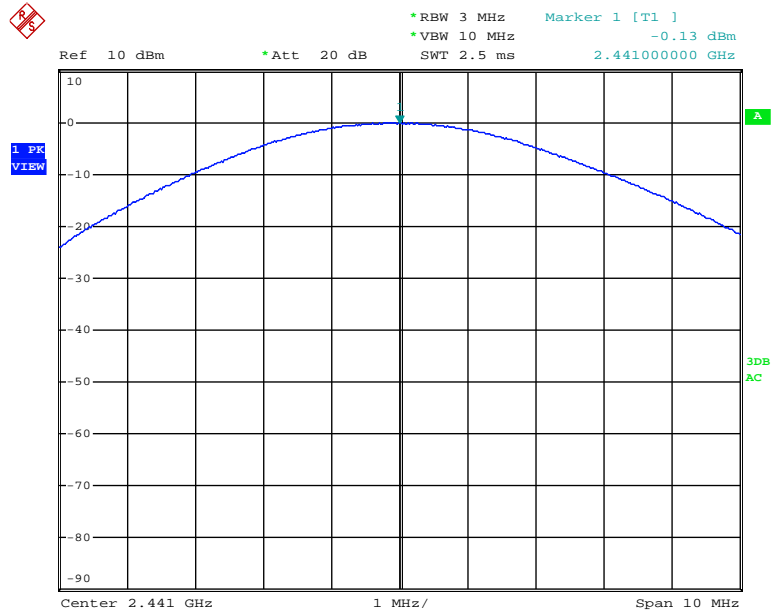
Date: 27.JUN.2015 10:00:49

$\pi/4$ -DQPSK Mode: Low channel



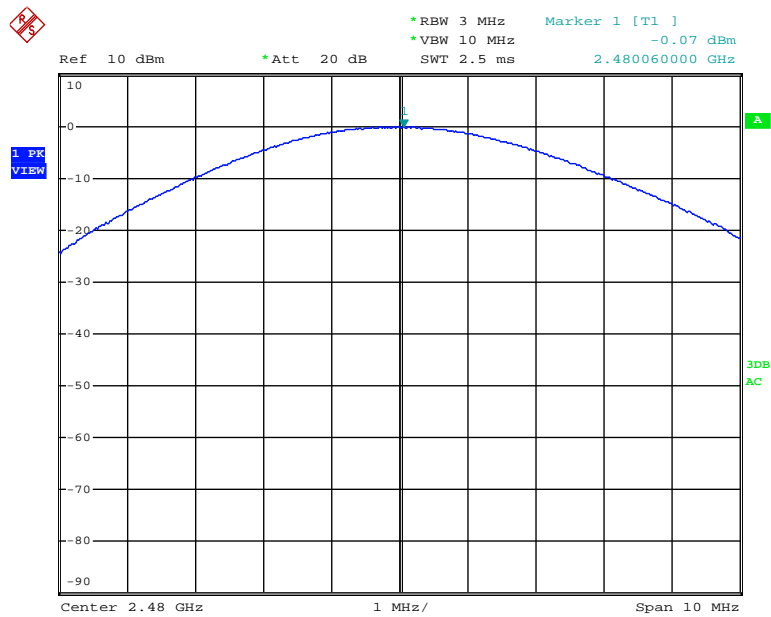
Date: 27.JUN.2015 10:01:30

$\pi/4$ -DQPSK Mode: Middle channel



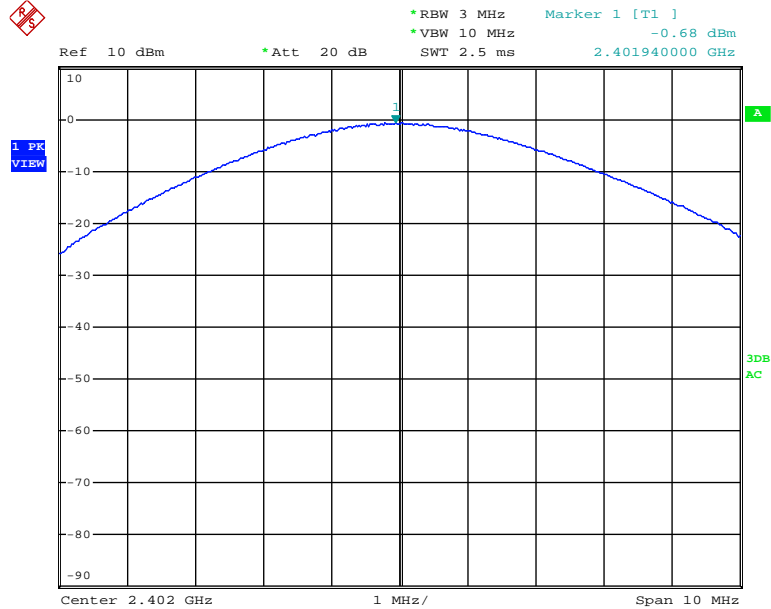
Date: 27.JUN.2015 10:01:56

$\pi/4$ -DQPSK Mode: High channel



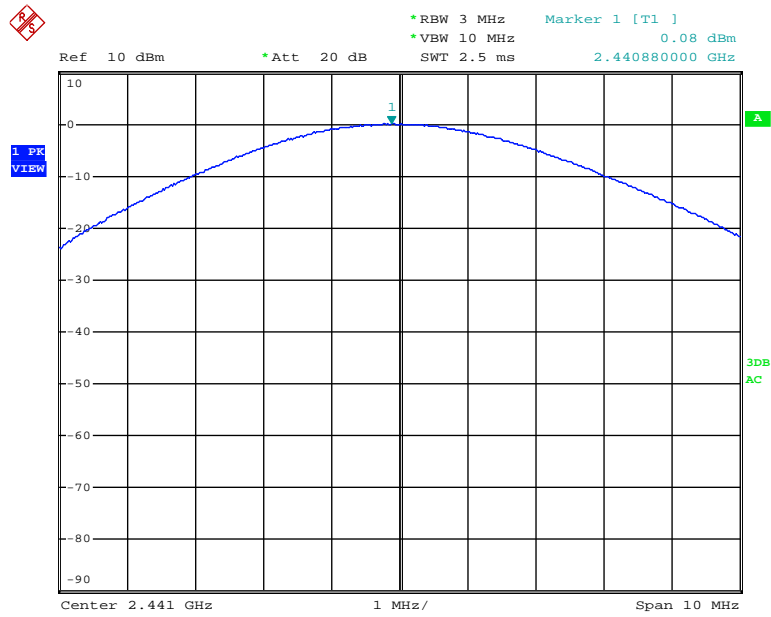
Date: 27.JUN.2015 10:02:17

8DPSK Mode: Low channel



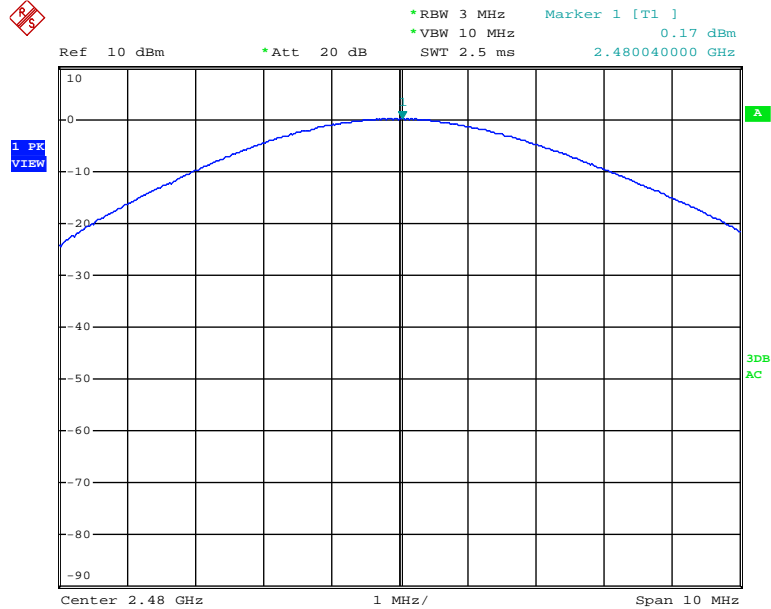
Date: 27.JUN.2015 10:03:11

8DPSK Mode: Middle channel



Date: 27.JUN.2015 10:03:39

8DPSK Mode: High channel



Date: 27.JUN.2015 10:04:08

11. Band Edge Test

11.1 Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Measurement Procedure

(A) Conducted method:

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: RBW = 100kHz, VBW = 300kHz.

(B) Radiated method:

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.
(Peak measurement: Peak detector, RBW=1MHz, VBW=3MHz, Sweep=Auto
Average measurement: Peak detector, RBW=1MHz, VBW=10Hz, Sweep=Auto)

11.3 Measurement Equipment Used

Conducted method: Same as 6.3 Channel Separation Measurement.

Radiated method: Same as 5.3 Radiated Emission Measurement.

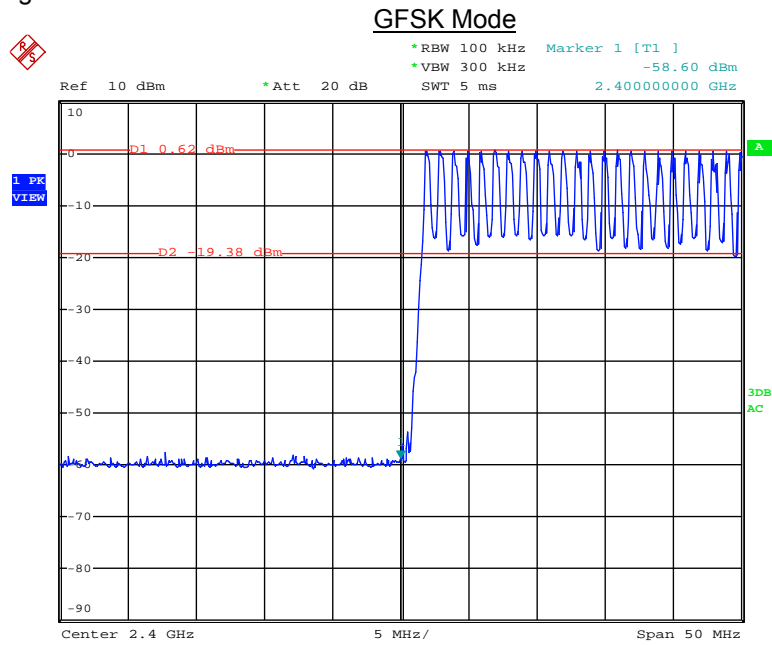
11.4 Measurement Results

Pass

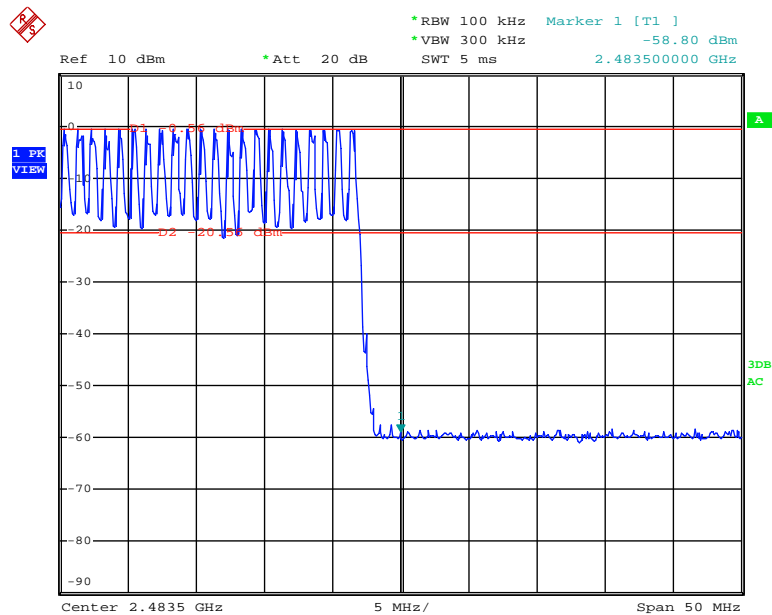
Refer to attached data chart.

(A) Conducted Measurement

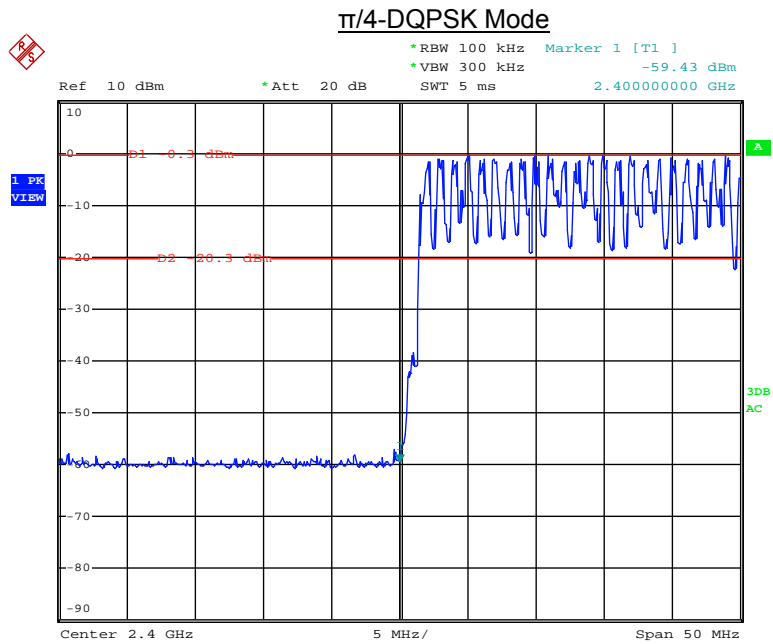
For Hopping Mode:



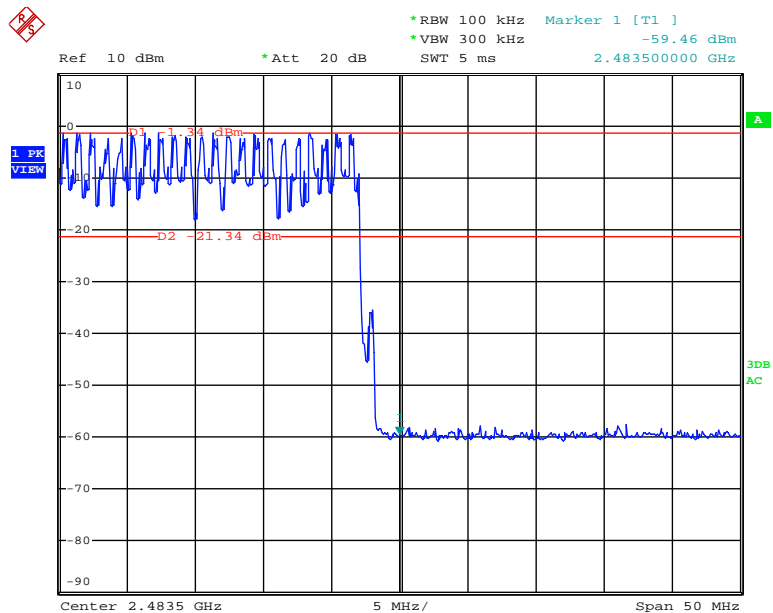
Date: 30.JUN.2015 09:14:27



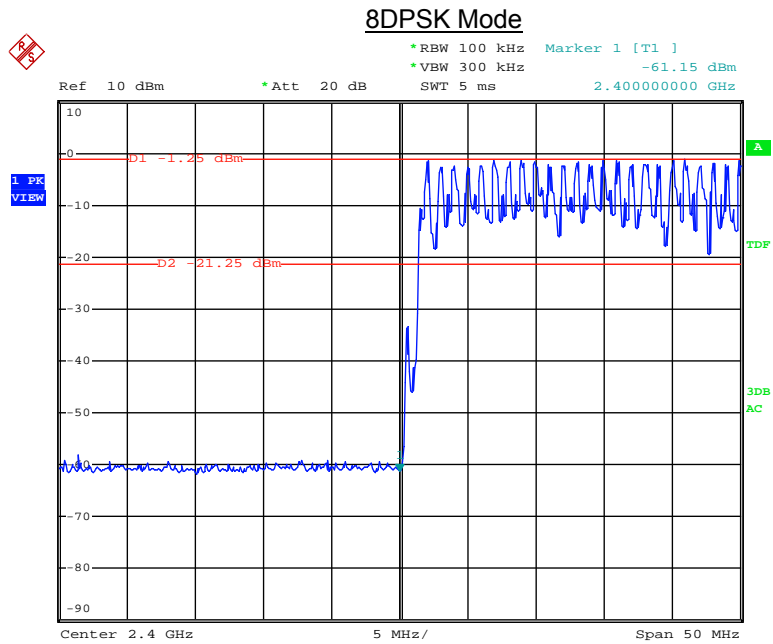
Date: 30.JUN.2015 09:16:47



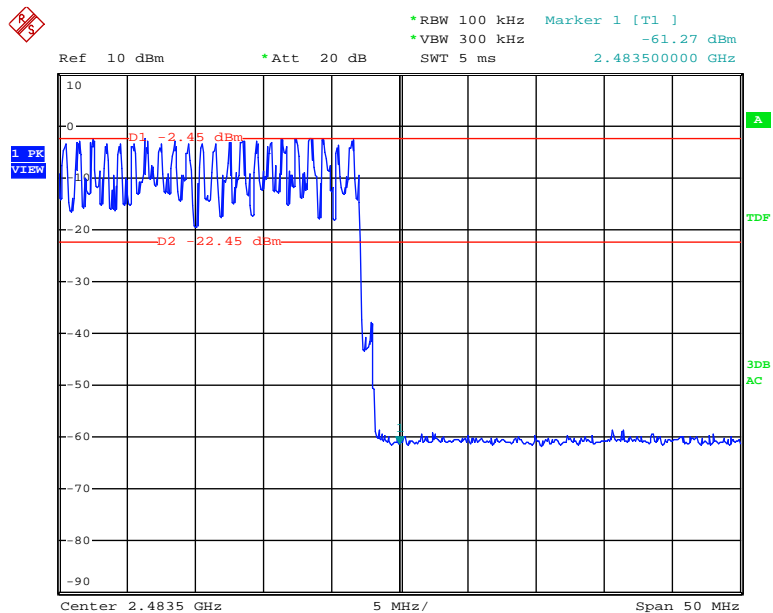
Date: 30.JUN.2015 09:20:35



Date: 30.JUN.2015 09:19:00



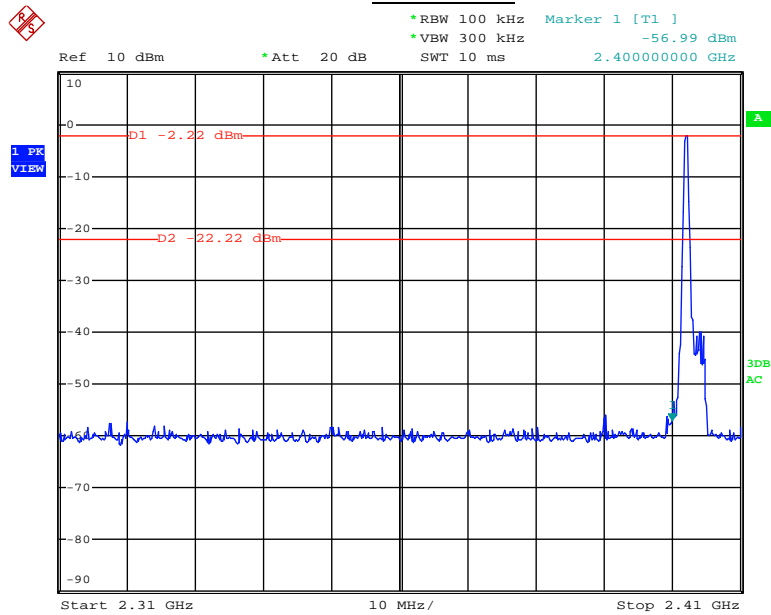
Date: 30.JUN.2015 09:23:28



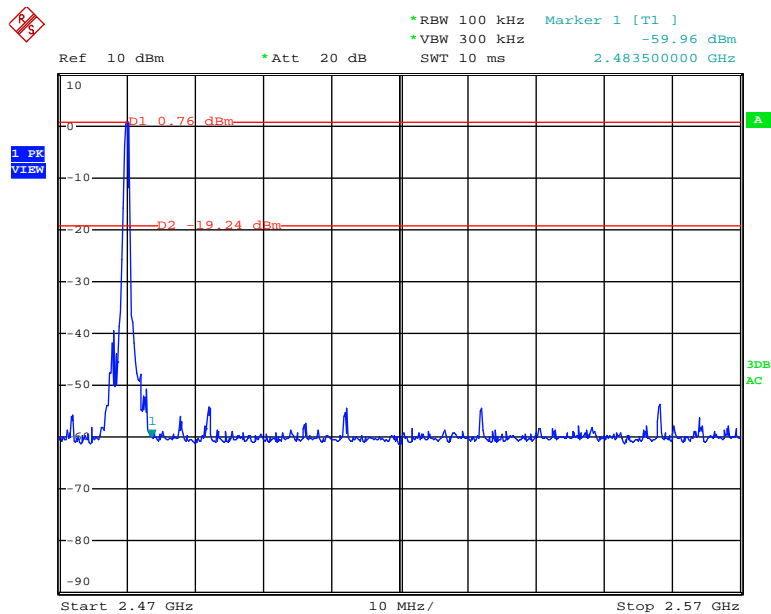
Date: 30.JUN.2015 09:25:18

For Non-Hopping Mode

GFSK Mode

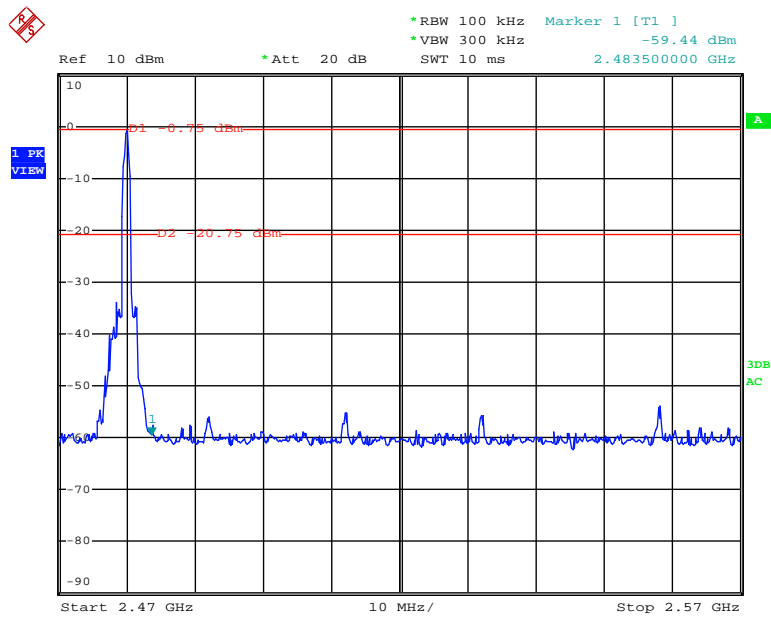


Date: 27.JUN.2015 11:05:39

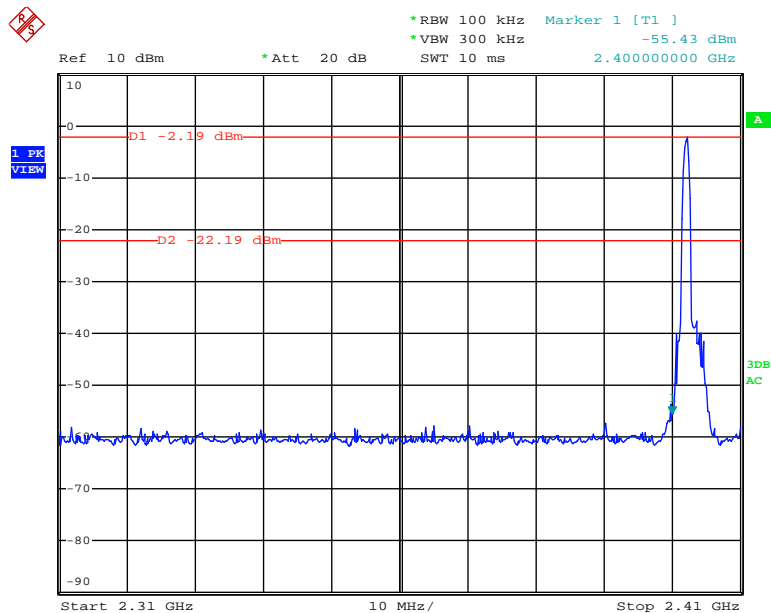


Date: 27.JUN.2015 11:07:12

$\pi/4$ -DQPSK Mode

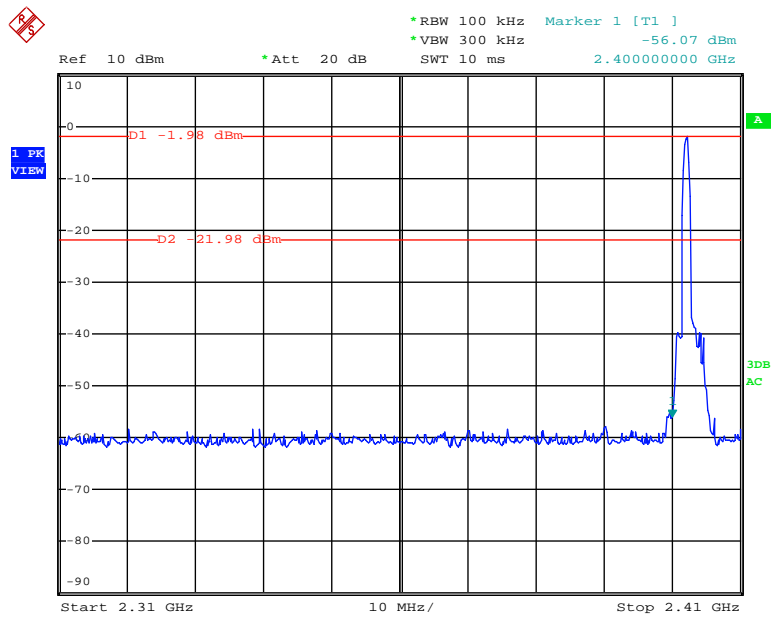


Date: 27.JUN.2015 11:08:16

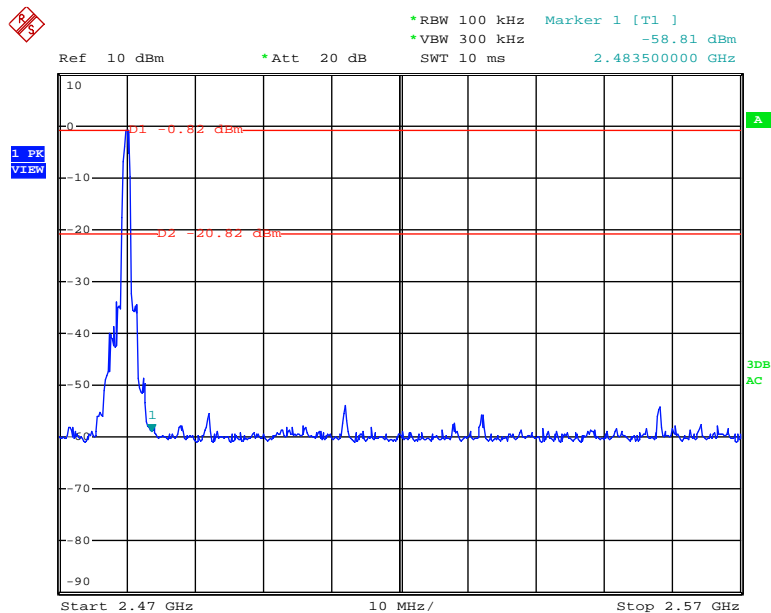


Date: 27.JUN.2015 11:09:35

8DPSK Mode



Date: 27.JUN.2015 11:10:33



Date: 27.JUN.2015 11:11:51

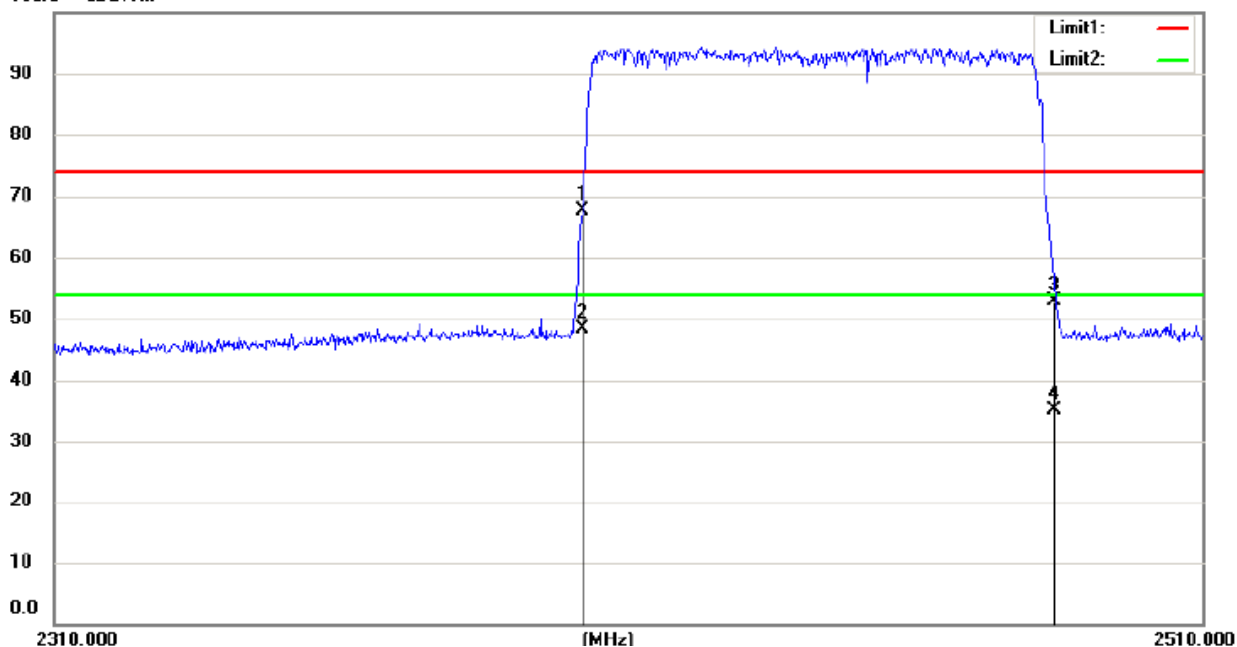
(B) Radiated Measurement

For Hopping Mode:

GFSK Mode

Vertical:

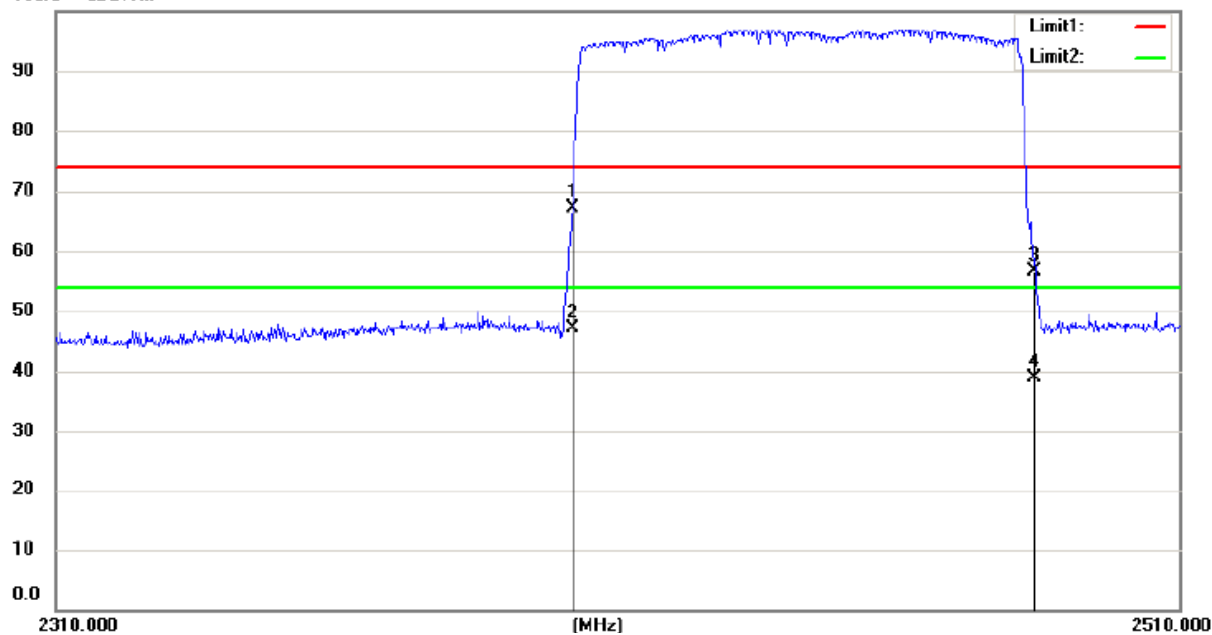
100.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2400.000	56.65	10.93	67.58	74.00	-6.42	peak
2	*	2400.000	37.39	10.93	48.32	54.00	-5.68	AVG
3		2483.500	41.95	11.00	52.95	74.00	-21.05	peak
4		2483.500	24.20	11.00	35.20	54.00	-18.80	AVG

Horizontal:

100.0 dBuV/m

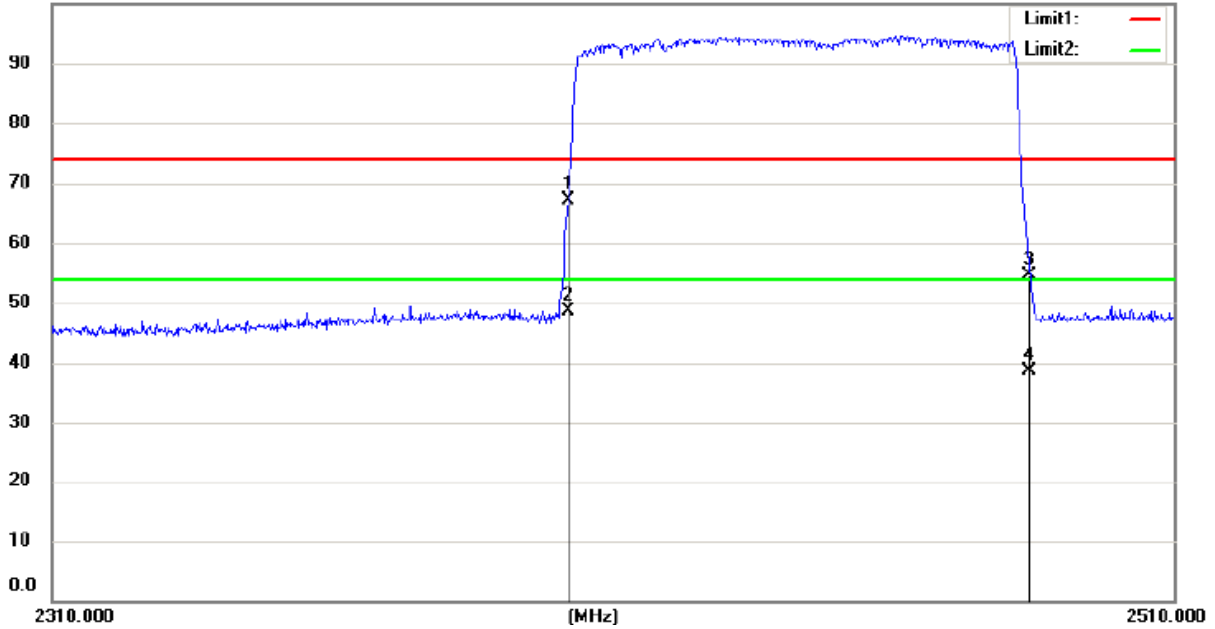


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2400.000	56.21	10.93	67.14	74.00	-6.86	peak
2	*	2400.000	36.30	10.93	47.23	54.00	-6.77	AVG
3		2483.500	45.69	11.00	56.69	74.00	-17.31	peak
4		2483.500	27.90	11.00	38.90	54.00	-15.10	AVG

$\pi/4$ -DQPSK Mode

Horizontal:

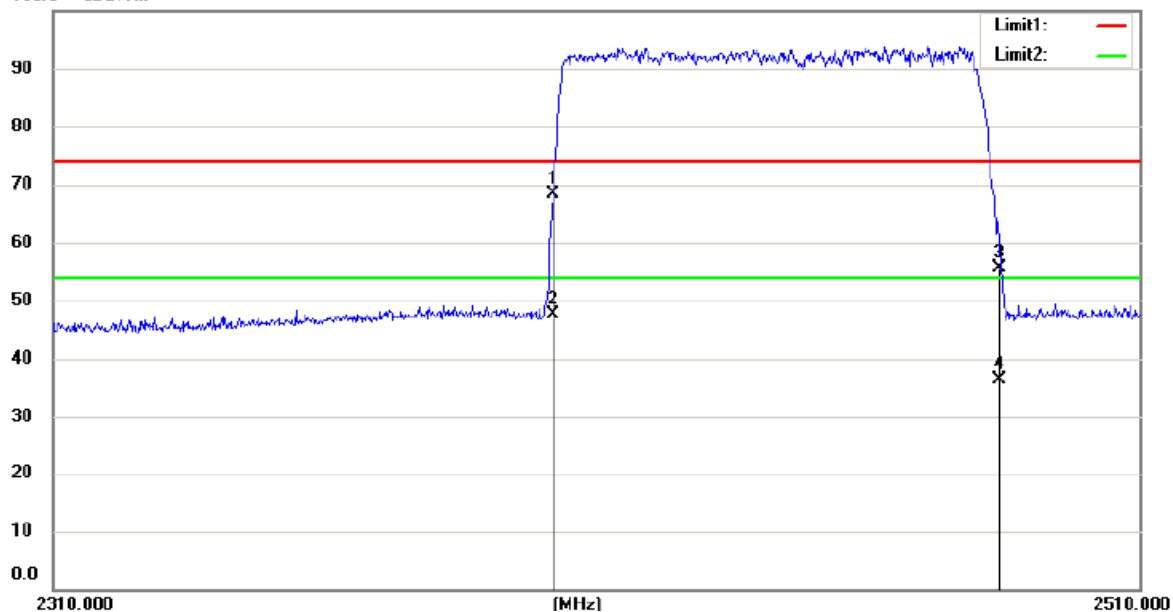
100.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2400.000	56.08	10.93	67.01	74.00	-6.99	peak
2	*	2400.000	37.78	10.93	48.71	54.00	-5.29	AVG
3		2483.500	43.67	11.00	54.67	74.00	-19.33	peak
4		2483.500	27.60	11.00	38.60	54.00	-15.40	AVG

Vertical:

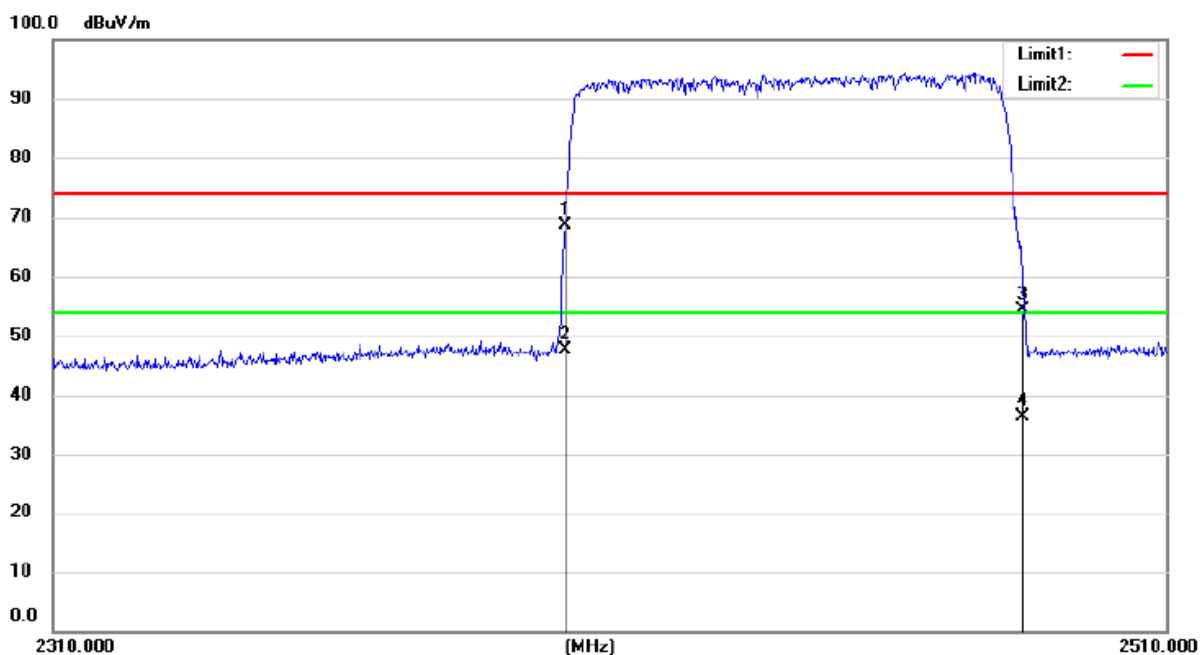
100.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	2400.000	57.43	10.93	68.36	74.00	-5.64	peak
2		2400.000	36.67	10.93	47.60	54.00	-6.40	AVG
3		2483.500	44.65	11.00	55.65	74.00	-18.35	peak
4		2483.500	25.50	11.00	36.50	54.00	-17.50	AVG

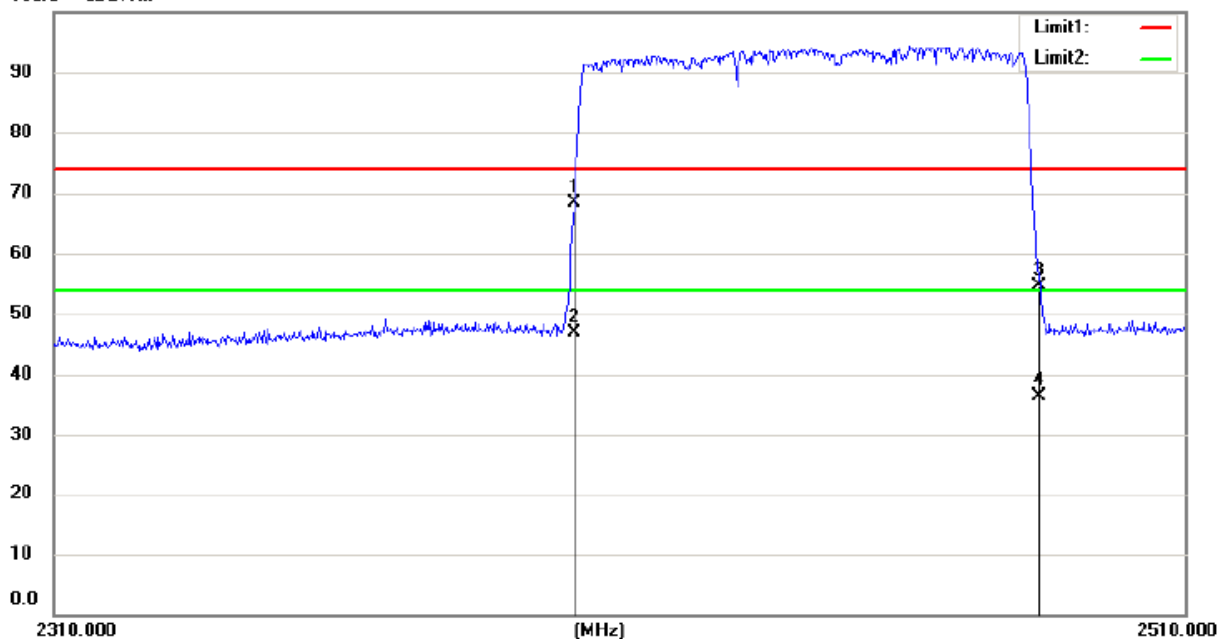
8DPSK Mode

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2400.000	57.74	10.93	68.67	74.00	-5.33	peak
2		2400.000	36.67	10.93	47.60	54.00	-6.40	AVG
3		2483.500	43.37	11.00	54.37	74.00	-19.63	peak
4		2483.500	25.50	11.00	36.50	54.00	-17.50	AVG

Horizontal:
100.0 dBuV/m

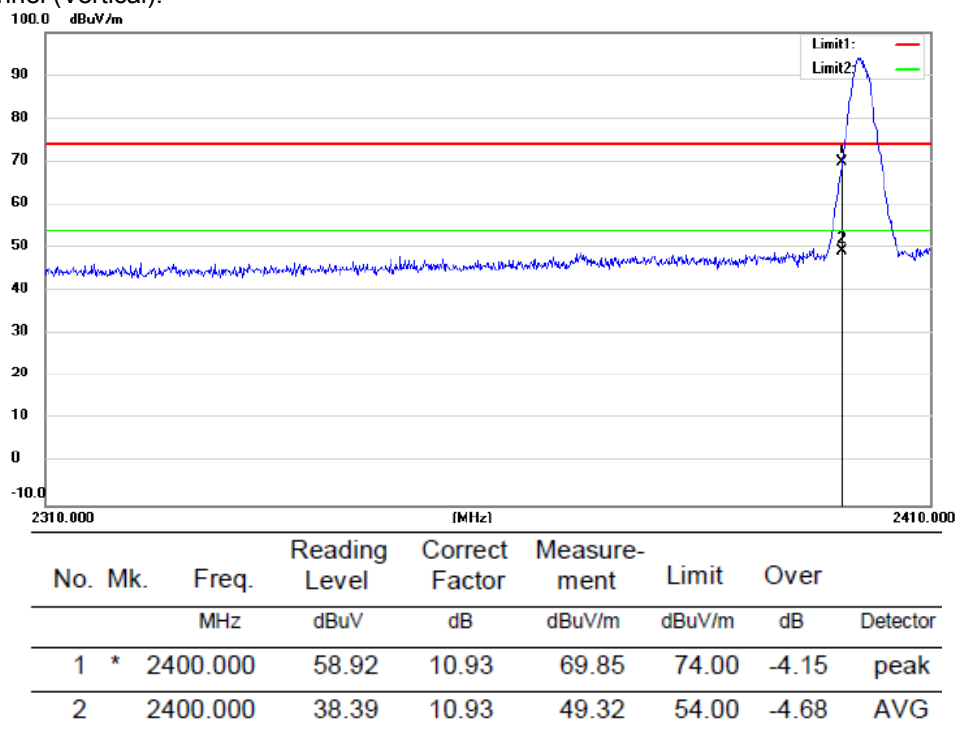


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	2400.000	57.45	10.93	68.38	74.00	-5.62	peak
2		2400.000	35.89	10.93	46.82	54.00	-7.18	AVG
3		2483.500	43.53	11.00	54.53	74.00	-19.47	peak
4		2483.500	25.47	11.00	36.47	54.00	-17.53	AVG

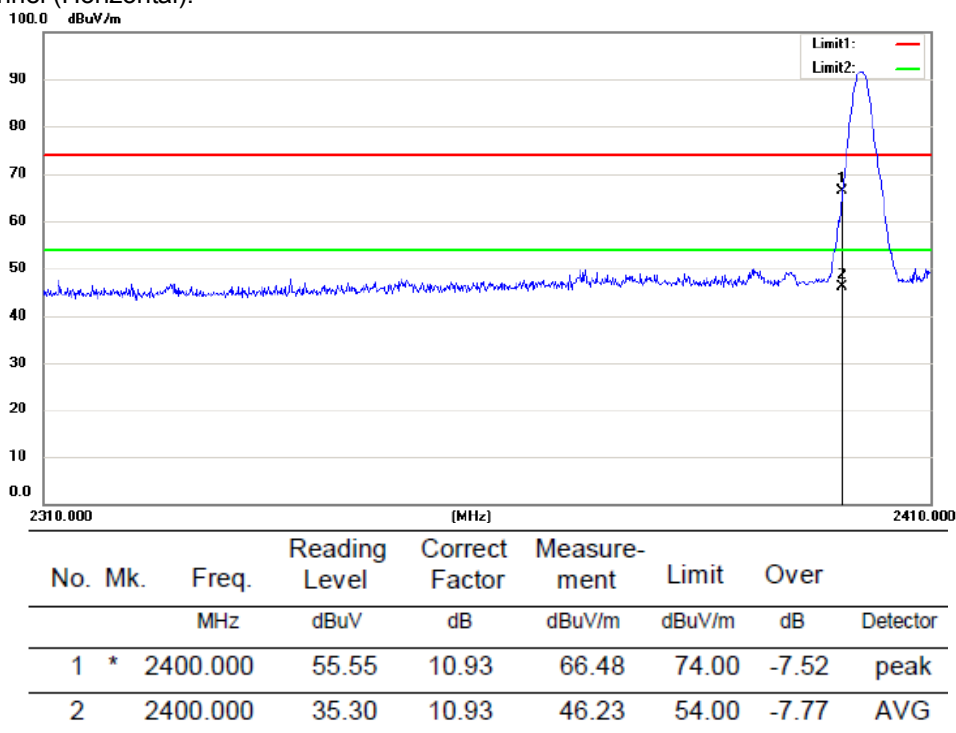
For Non-Hopping Mode:

GFSK Mode

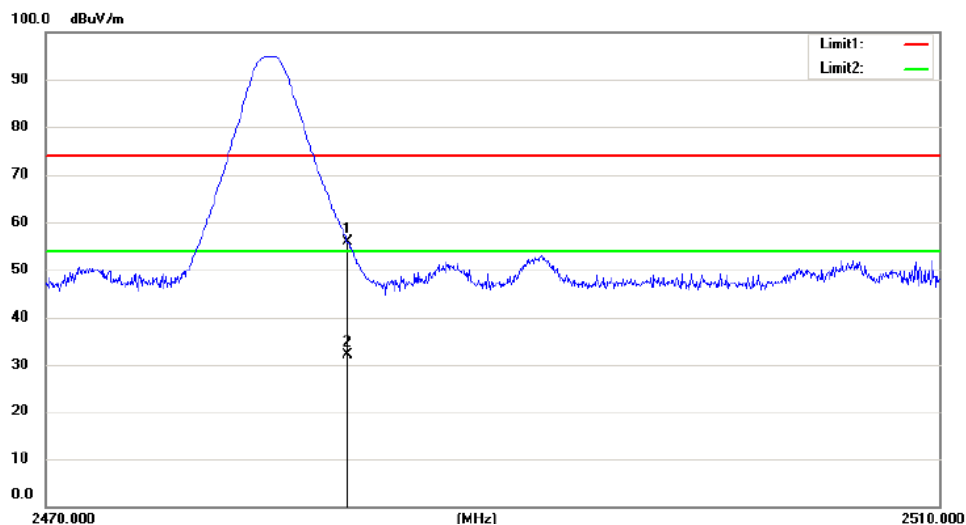
Low Channel (Vertical):



Low Channel (Horizontal):

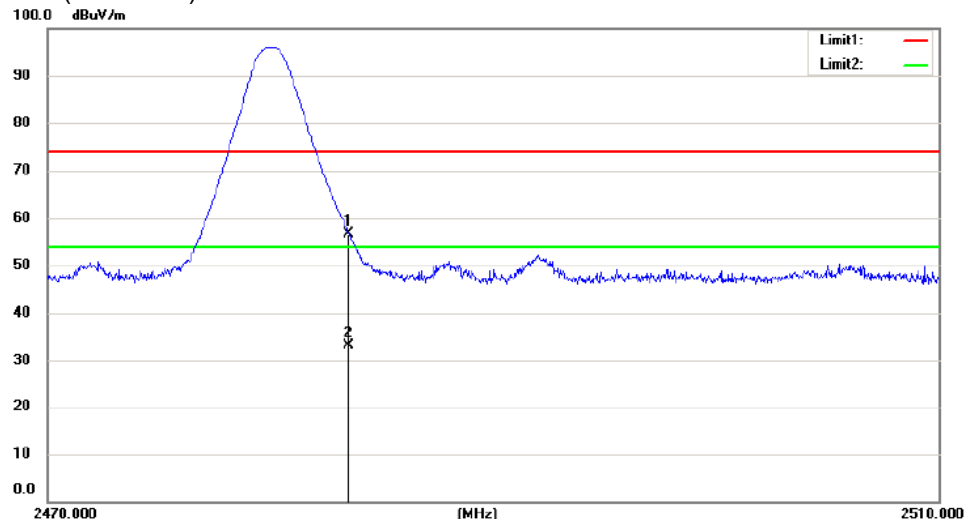


High Channel (Vertical):



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1	*	2483.500	44.82	11.00	55.82	74.00	-18.18	peak
2		2483.500	21.11	11.00	32.11	54.00	-21.89	AVG

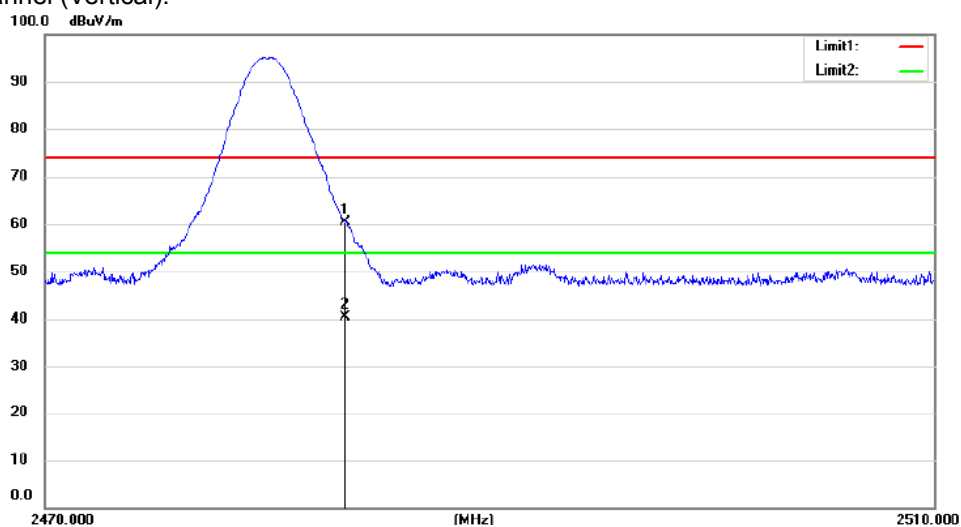
High Channel (Horizontal):



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1	*	2483.500	45.52	11.00	56.52	74.00	-17.48	peak
2		2483.500	22.21	11.00	33.21	54.00	-20.79	AVG

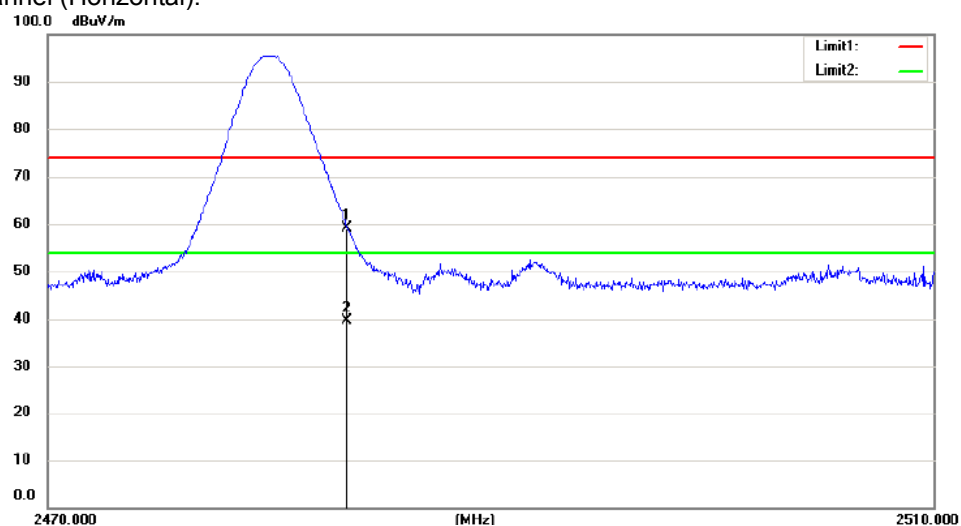
$\pi/4$ -DQPSK Mode

High Channel (Vertical):



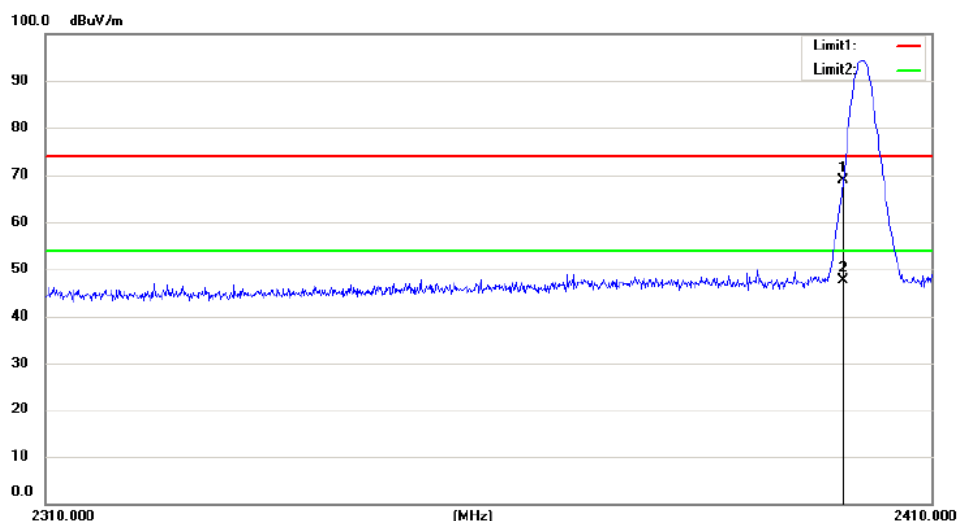
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	dBuV	Factor	ment	dBuV/m	dB	Detector
1		2483.500	49.29	11.00	60.29	74.00	-13.71	peak
2	*	2483.500	29.32	11.00	40.32	54.00	-13.68	AVG

High Channel (Horizontal):



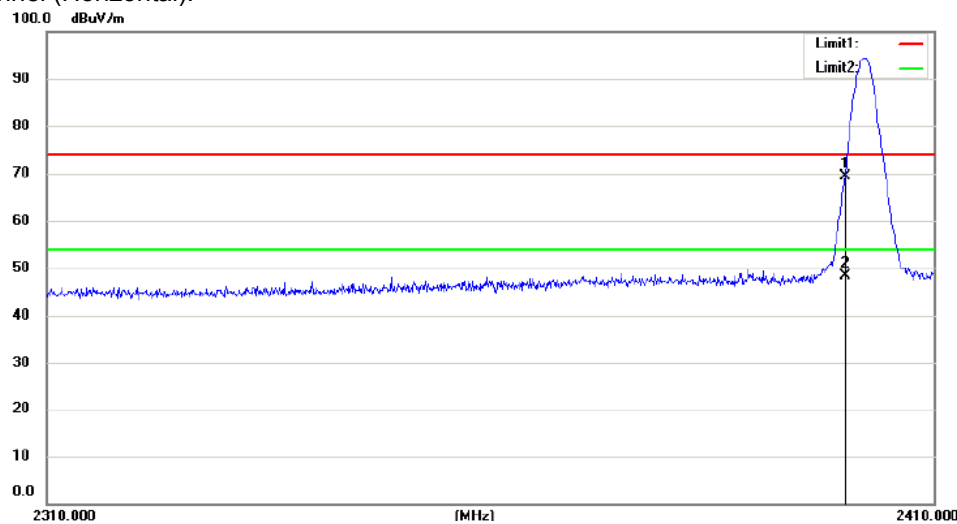
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	dBuV	Factor	ment	dBuV/m	dB	Detector
1		2483.500	48.07	11.00	59.07	74.00	-14.93	peak
2	*	2483.500	28.60	11.00	39.60	54.00	-14.40	AVG

Low Channel (Vertical):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2400.000	58.00	10.93	68.93	74.00	-5.07	peak
2		2400.000	36.67	10.93	47.60	54.00	-6.40	AVG

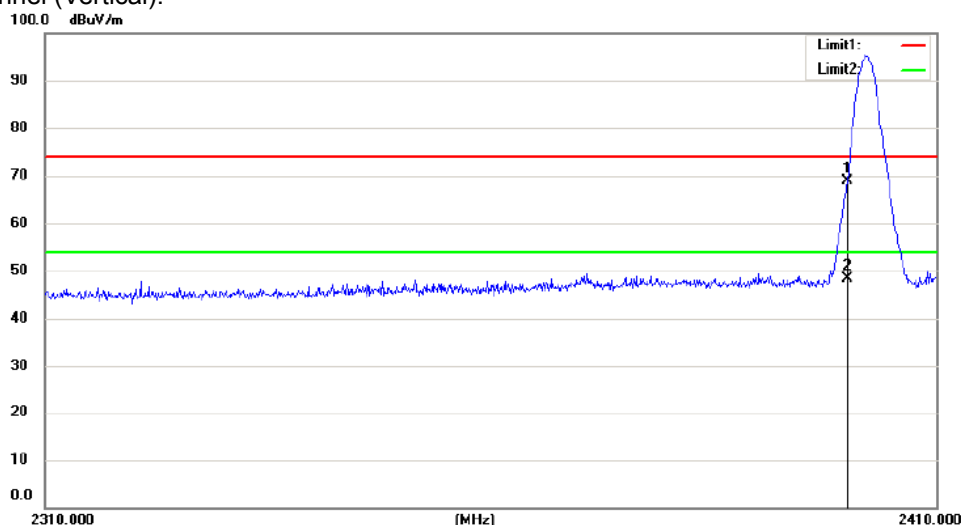
Low Channel (Horizontal):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2400.000	58.53	10.93	69.46	74.00	-4.54	peak
2		2400.000	37.57	10.93	48.50	54.00	-5.50	AVG

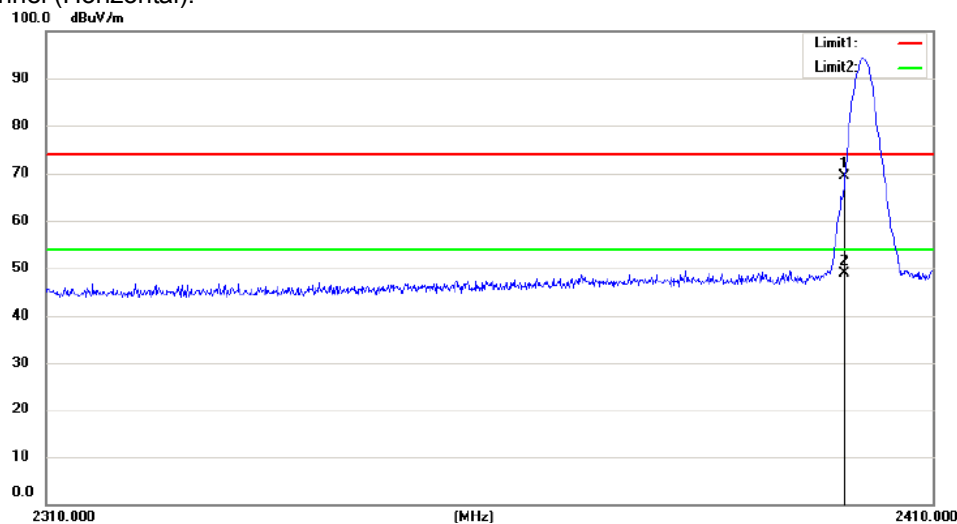
8DPSK Mode

Low Channel (Vertical):



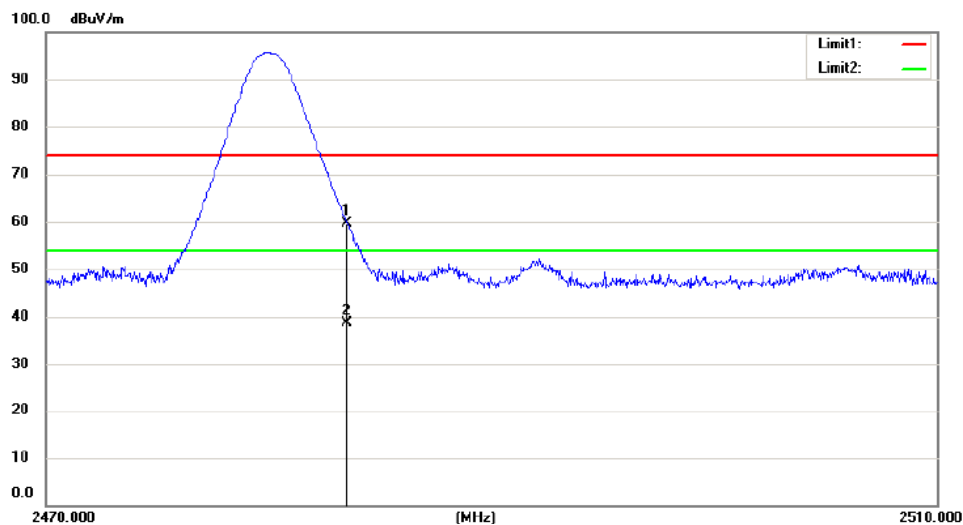
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2400.000	57.93	10.93	68.86	74.00	-5.14	peak
2		2400.000	37.39	10.93	48.32	54.00	-5.68	AVG

Low Channel (Horizontal):



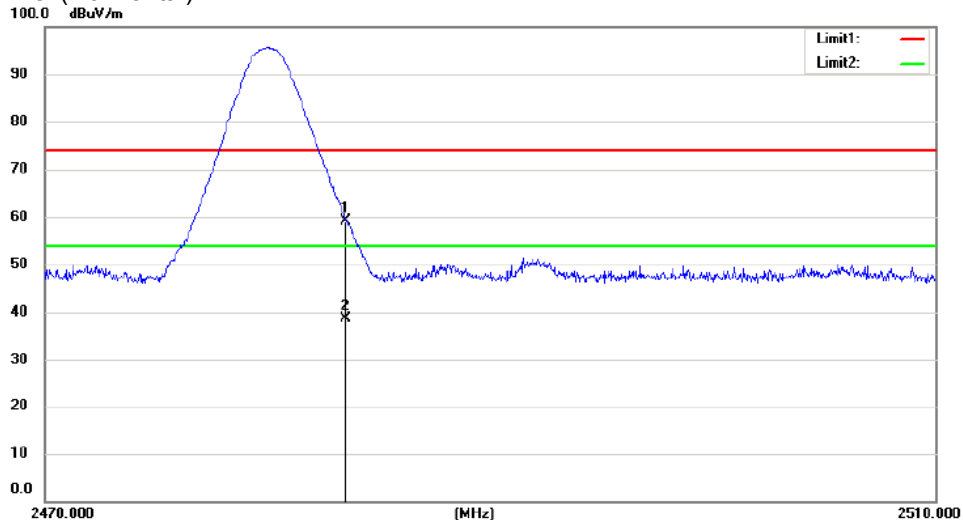
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2400.000	58.39	10.93	69.32	74.00	-4.68	peak
2		2400.000	37.99	10.93	48.92	54.00	-5.08	AVG

High Channel (Vertical):



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1	*	2483.500	48.58	11.00	59.58	74.00	-14.42	peak
2		2483.500	27.70	11.00	38.70	54.00	-15.30	AVG

High Channel (Horizontal):



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1	*	2483.500	48.20	11.00	59.20	74.00	-14.80	peak
2		2483.500	27.70	11.00	38.70	54.00	-15.30	AVG

12. Antenna Port Emission

12.1 Test Equipment

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	MY45107013	05/16/2015	05/15/2016

12.2 Measuring Instruments and setting

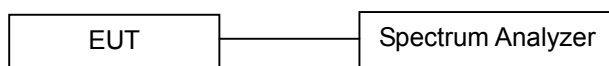
The following table is the setting of spectrum analyzer.

Attenuation	Auto
RB	100kHz
VB	300kHz
Detector	Peak
Trace	Max hold

12.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels, the limit was determined by attenuation 20dB of the RF peak power output.

12.4 Block Diagram of Test setup

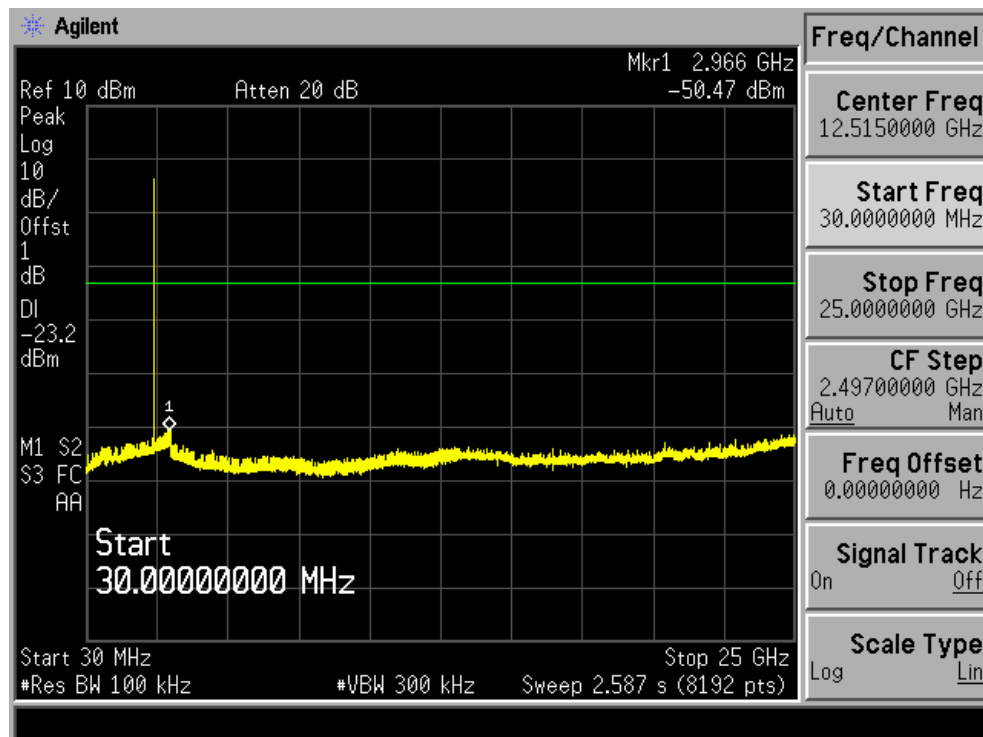


12.5 Test Result

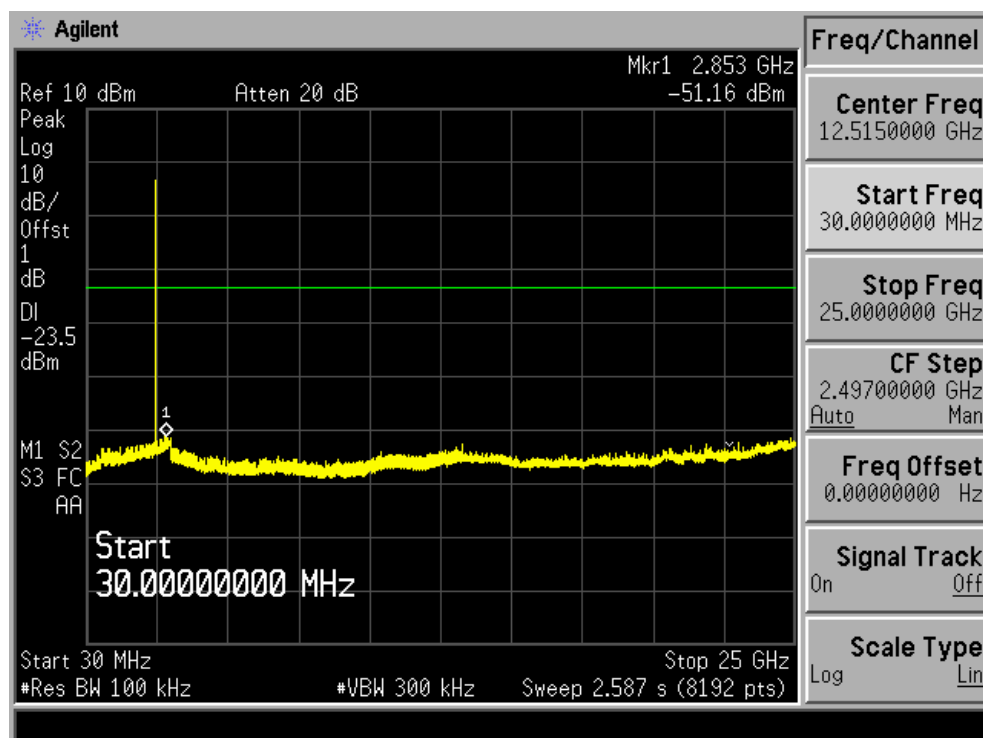
PASS.

(Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result(GFSK) was report as below.)

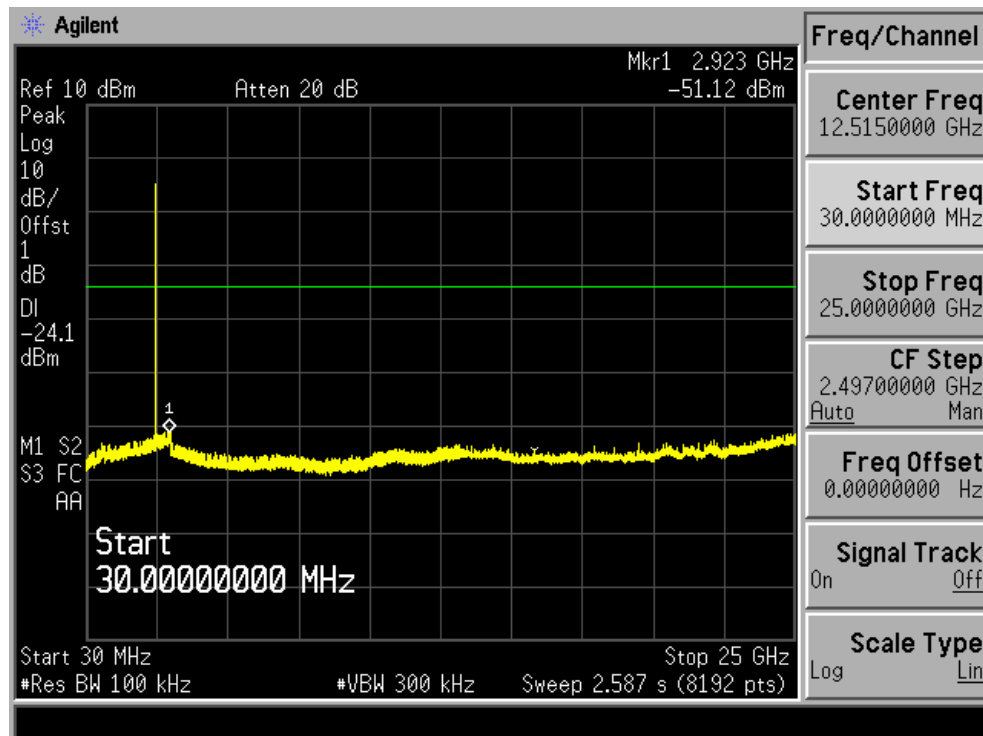
GFSK Mode: Low channel



GFSK Mode: Middle channel



GFSK Mode: High channel



13. Antenna Application

13.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.240.

FCC part 15C section 15.247 requirements:

Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

13.2 Result

The EUT's antenna integrated on PCB, The antenna's gain is 0dBi and meets the requirement

---The End---