FCC PART 15 SUBPART C MEASURMENT AND TEST REPORT

For

Huizhou Desay Auto. Electronics Co., Ltd.

No.15 Zhongkai National Hi-tech Industrial Park, Huizhou, Guangdong, P.R. China

E.U.T.: CAR RADIO RECEIVER

Model Name: RA11A0, RA0001, 84399209, 84399213

Trade name: DESAY, CNH

FCC ID: ZVB-RA11A0D08

Report Number: WB1108001F

Test Date(s): August 10 2011 to August 17 2011

Report Date(s): August 18, 2011

Prepared by

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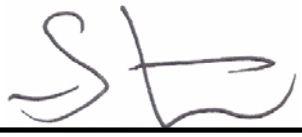
Approved By



Sunm Lv / Q.A. Director
Dongguan NTC Co., Ltd.

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1.0 GENERAL INFORMATION

1.1 Product Description for Equipment under Test

The Huizhou Desay Auto. Electronics Co., Ltd.'s product, model name : RA11A0 (referred to as the EUT in this report) is an short range, lower power, CAR Radio Receiver designed as an Input Device. It is designed by way of utilizing the GFSK modulation achieves the system operating.

A major descriptions of EUT is described as following:

Operation Frequency: 2402-2480MHz
Modulation: GFSK
Number of Channel: 79
Channel space: 1MHz
Max RF Output Power: 4dBm
Antenna Type: PCB antenna
Antenna GAIN: 2dBi
Power Supply: DC 12V
Model name & difference: RA11A0, RA0001, 84399209, 84399213
All models are the same except panel appearance, trade name and model name, we prepare RA11A0 for EMC test.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: ZVB-RA11A0D08 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 (2009), American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Valtage Electrical and Electronic Equipment in the range of 9KHz to 40GHz.

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

Accredited by FCC, August 02, 2011
The Certificate Registration Number is 665078.

Accredited by Industry Canada, July 01, 2011
The Certificate Registration Number is 46405-9743.

1.7 Local Support Equipment List and Details

PC	:	Manufacturer: Dell M/N: DCSM S/N: 33RN22X CE, FCC: DOC
LCD Monitor	:	Manufacturer: Lenovo M/N: L2061WD S/N: 3M04769B1102083 CE , FCC:DOC
Mouse	:	Manufacturer: Lenovo P/N: 910-001580 S/N: LZ117230B8J CE, FCC: DOC
Keyboard	:	Manufacturer: Lenovo M/N: LXH-JME2208P S/N: 103C0925 CE, FCC: DOC

1.8 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.247(a)(1)	Channel Separation test	Compliant
§15.247(a)(1)	20dB Bandwidth	Compliant
§15.247(a)(1)(iii)	Quantity of Hopping Channel	Compliant
§15.247(a)(1)(iii)	Time of Occupancy(Dwell Time)	Compliant
§15.247(b)	Max Peak output Power test	Compliant
§15.247(d)	Band edge test	Compliant
§15.207	AC Power Conducted Emission	N/A
§15.247(d),§15.209	Radiated Emission	Compliant
§15.203	Antenna Requirement	Compliant
§1.1310, §15.247(i)	RF Exposure	Compliant

2.0 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 a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. 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 hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009.

3. Description of test modes

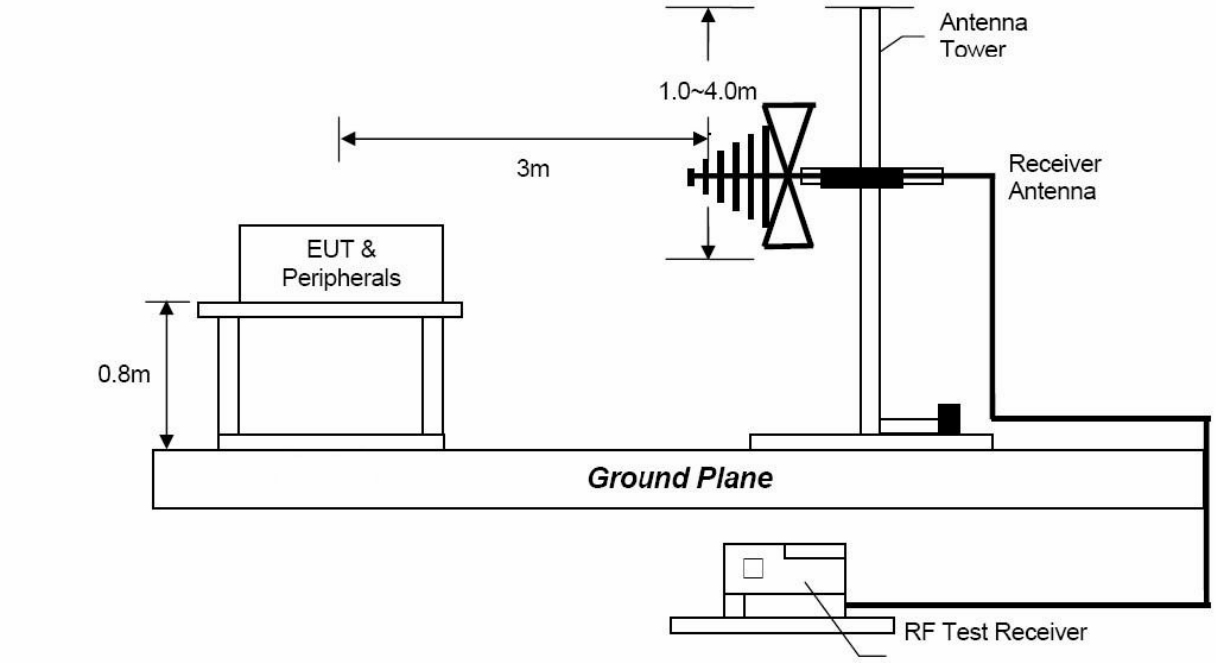
The EUT (Car Radio Receiver) has been tested under normal operating condition.
This EUT is a FHSS system, we use blue test to control the EUT with parallel port, Let EUT hopping on and transmit at every channel with highest power, Only output power use conducted method, others are using radiated method. After sirfdemo 330R1 send the command to EUT, it can be removed, and the EUT keep hopping. 79 Channels are provided by EUT. The 3 channels of the lowest, medium and the highest were chosen for test.

Channel	Frequency(MHz)
Lowest	2402
Middle	2441
Highest	2480

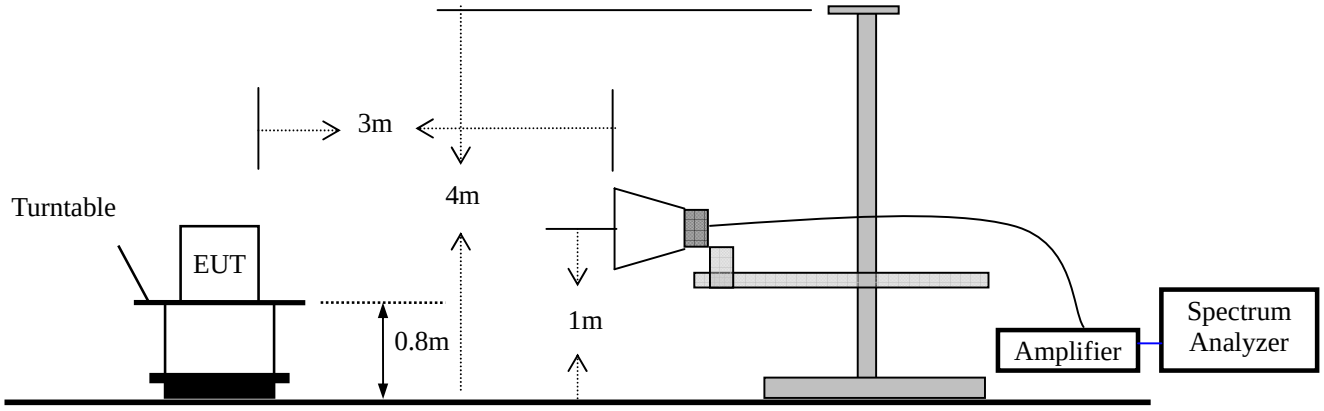
4. Radiated Emission Test

4.1 Test SET-UP (Block Diagram of Configuration)

Radiated Emission Test Set-Up, Frequency Below 1GHz



Radiated Emission Test Set-Up, Frequency above 1GHz



4.2 Measurement Result

Operation Mode:	RX Mode	Test Date :	August 11, 2011
Frequency Range:	30~1000MHz	Temperature :	23 ℃
Test Result:	PASS	Humidity :	54 %
Measured Distance:	3m	Test By:	Ifen

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
194.38	V	32.20	43.50	-11.30	PK
279.21	V	34.27	46.00	-11.73	PK
361.37	V	32.95	46.00	-13.05	PK
422.1	V	40.24	46.00	-5.76	PK
624.84	V	37.18	46.00	-8.82	PK
114.62	H	36.75	43.50	-6.75	PK
194.27	H	37.15	43.50	-6.35	PK
408.25	H	32.65	46.00	-13.35	PK
422.39	H	35.62	46.00	-10.38	PK
768.61	H	39.94	46.00	-6.06	PK

Note: (1) All Readings are Peak Value.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode:	TX Mode (Low)	Test Date :	August 11, 2011
Frequency Range:	Above 1GHz	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Ifen

Freq.	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4804	V	45.11	40.36	74.00	54.00	-28.89	-13.64
7206	V	49.92	42.87	74.00	54.00	-24.08	-11.13
9608	V	53.11	43.41	74.00	54.00	-20.89	-10.59
12010	V	50.92	44.95	74.00	54.00	-23.08	-9.05
4804	H	47.30	42.29	74.00	54.00	-26.70	-11.71
7206	H	50.09	42.81	74.00	54.00	-23.91	-11.19
9608	H	53.14	44.35	74.00	54.00	-20.86	-9.65
12010	H	49.68	43.15	74.00	54.00	-24.32	-10.85

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode:	TX Mode (Mid)	Test Date :	August 11, 2011
Frequency Range:	Above 1GHz	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Ifen

Freq.	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4882	V	52.48	42.50	74.00	54.00	-21.52	-11.50
7323	V	50.37	41.13	74.00	54.00	-23.63	-12.87
9764	V	48.79	38.49	74.00	54.00	-25.21	-14.51
12205	V	49.28	39.72	74.00	54.00	-24.72	-14.28
4882	H	48.62	43.51	74.00	54.00	-25.38	-10.49
7323	H	49.54	43.33	74.00	54.00	-24.46	-10.67
9764	H	52.47	40.92	74.00	54.00	-21.53	-13.08
12205	H	52.60	40.66	74.00	54.00	-21.40	-13.34

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode:	TX Mode (High)	Test Date :	August 11, 2011
Frequency Range:	Above 1GHz	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Ifen

Freq.	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4960	V	49.74	40.09	74.00	54.00	-24.26	-13.91
7440	V	53.32	43.62	74.00	54.00	-20.68	-10.38
9920	V	51.83	42.28	74.00	54.00	-22.17	-11.72
12400	V	47.92	42.47	74.00	54.00	-26.08	-11.53
4960	H	51.69	39.44	74.00	54.00	-22.31	-14.56
7440	H	48.39	39.65	74.00	54.00	-25.61	-14.35
9920	H	49.34	40.12	74.00	54.00	-24.66	-13.88
12400	H	48.54	42.43	74.00	54.00	-25.46	-11.57

Other harmonics emissions are lower than 20dB below the allowable limit.

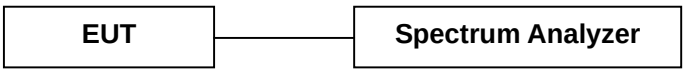
Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

5. Channel Separation test

5.1 Measurement Procedure

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

5.2 Test SET-UP (Block Diagram of Configuration)



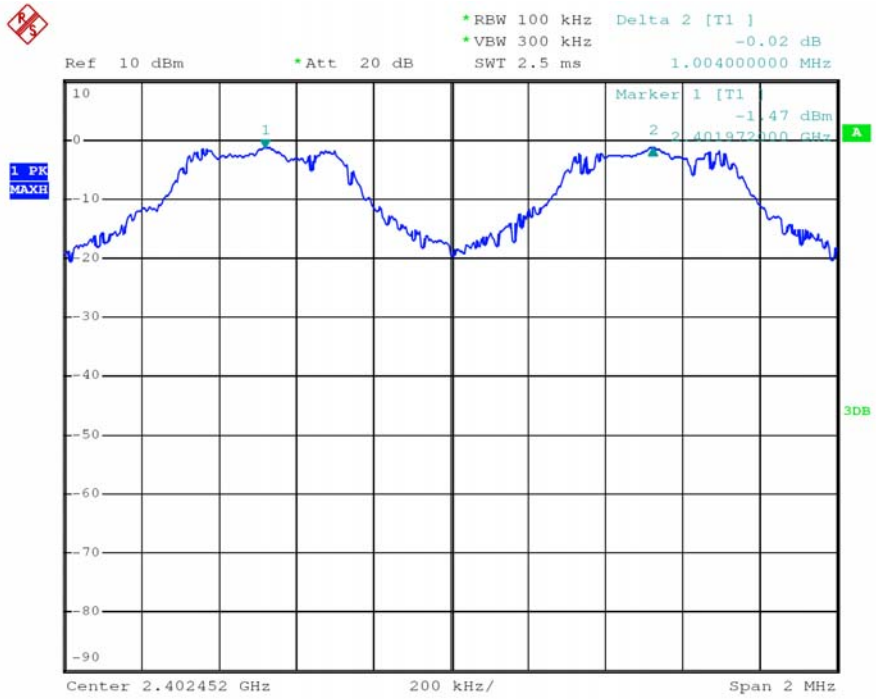
5.3 Measurement Results:

Refer to attached data chart.

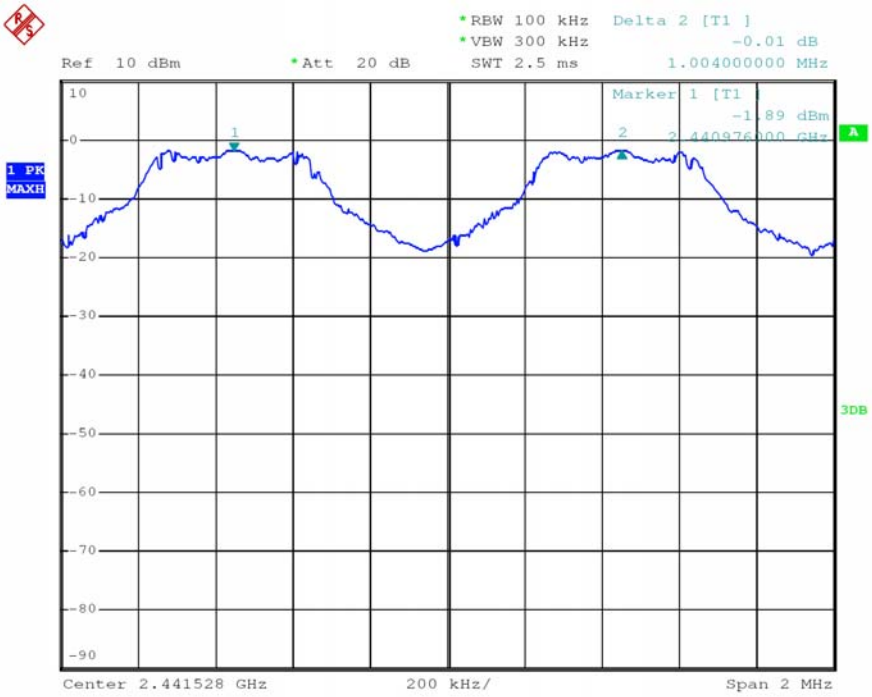
Modulation	GFSK		
RBW:	100KHz	VBW:	300KHz
Spectrum Detector:	PK	Test Date :	August 12, 2011
Test By:	Ifen	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %

Channel number	Channel frequency (MHz)	Separation Read Value (KHz)	Separation Limit (KHz)
Lowest	2402	1004	>530.67
Middle	2441	1004	>528
Highest	2480	1004	>530.67

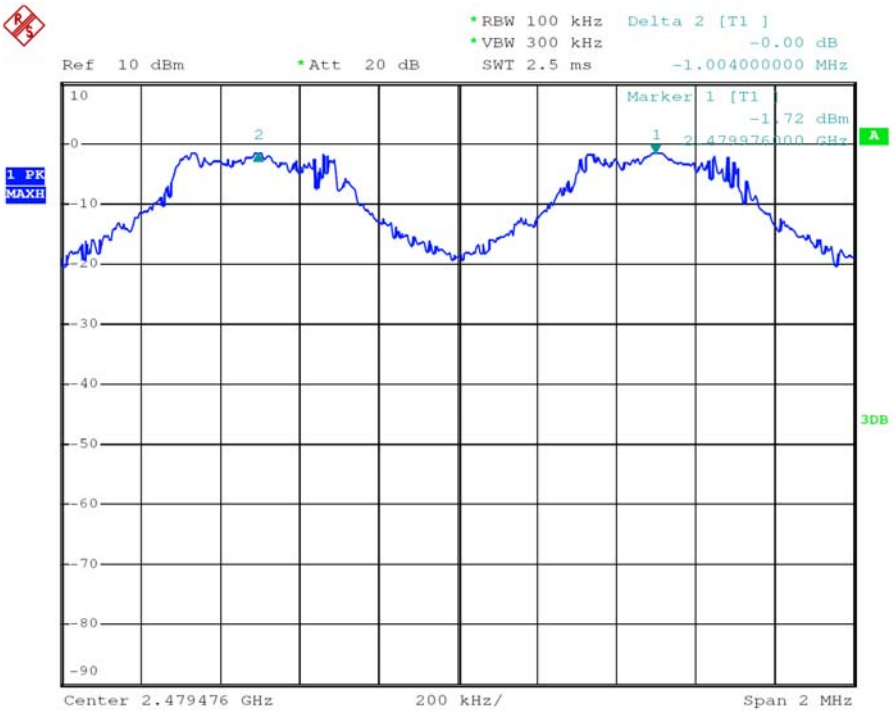
Lowest Channel



Middle Channel



Highest Channel

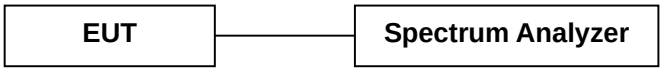


6. 20dB Bandwidth

6.1 Measurement Procedure

Maximum 20dB RF Bandwidth, FCC Rule 15.247(a)(1):
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

6.2 Test SET-UP (Block Diagram of Configuration)



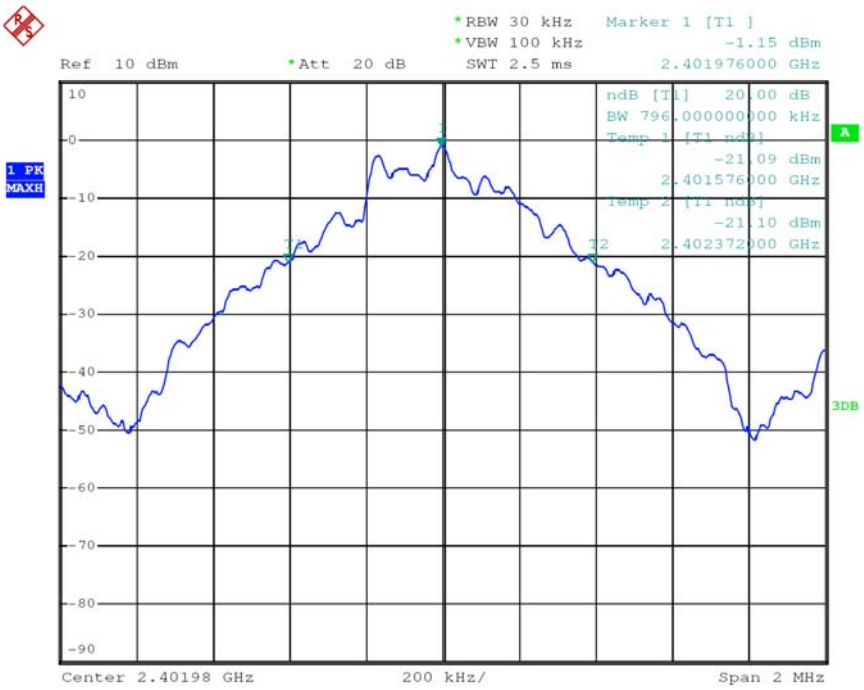
6.3 Measurement Results:

Refer to attached data chart.

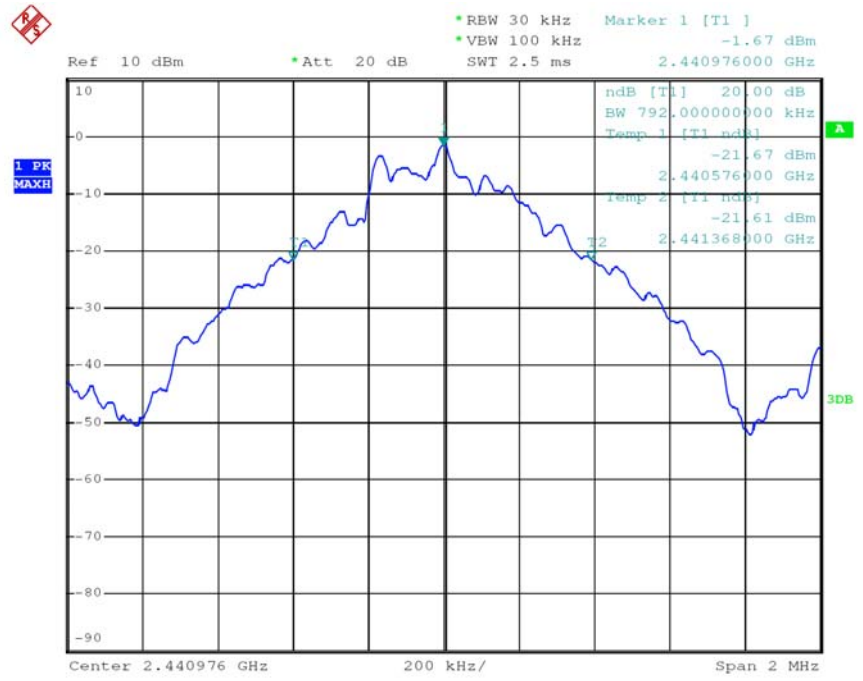
Modulation	GFSK	Packet	DH 5
RBW	30KHz	VBW	100KHz
Spectrum Detector:	PK	Test Date :	August 12, 2011
Test By:	Ifen	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %

Channel frequency (MHz)	20dB Down BW(kHz)
2402	796
2441	792
2480	796

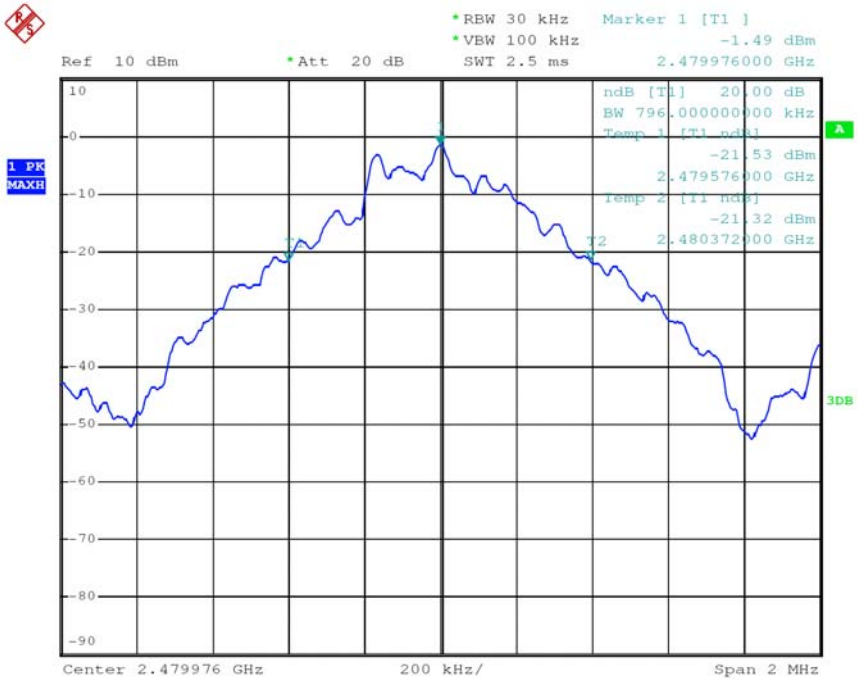
Lowest Channel



Middle Channel



Highest Channel

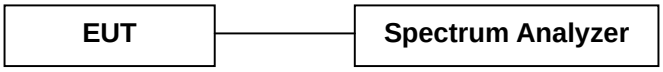


7. Hopping Channel Number

7.1 Measurement Procedure

Minimum Number of Hopping Frequencies, FCC Rule 15.247(a)(1)(iii):
Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum, and the spectrum analyzer set to MAX HOLD readings were taken for 3-5 minutes. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

7.2 Test SET-UP (Block Diagram of Configuration)

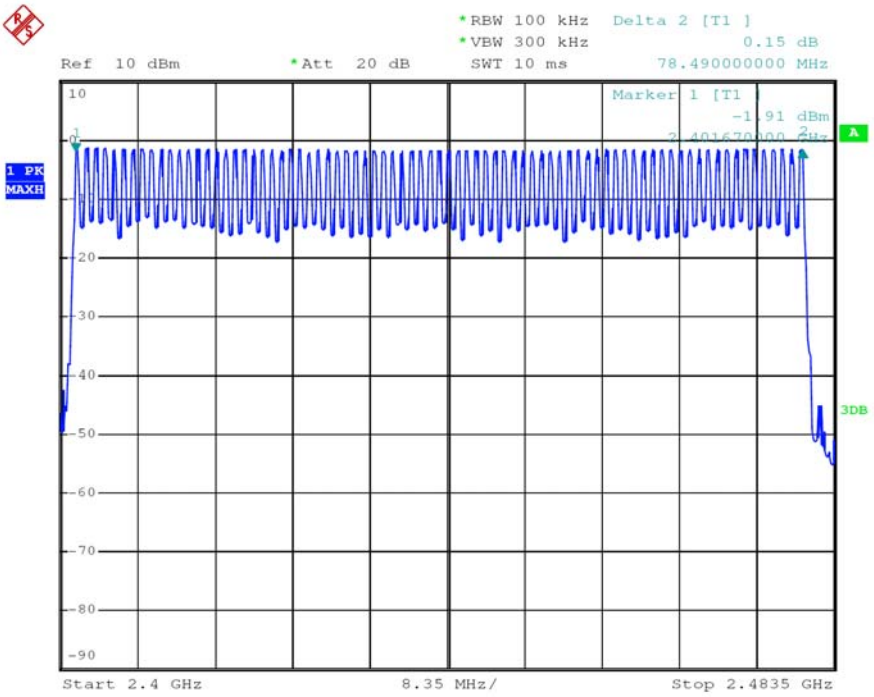


7.3 Measurement Results:

Refer to attached data chart.

Modulation	GFSK		
RBW	100KHz	VBW	300KHz
Spectrum Detector:	PK	Test Date :	August 12, 2011
Test By:	Ifen	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %

Hopping Channel Frequency Range	Number of Hopping Channels
2402-2480	79


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 10 ms
Delta 2 [T1]
0.15 dB
78.490000000 MHz
Marker 1 [T1]
-1.91 dBm
1 PK
MAXH
3DB
Start 2.4 GHz
8.35 MHz/
Stop 2.4835 GHz

8. Time of Occupancy (Dwell Time)

8.1 Measurement Procedure

Average Channel Occupancy Time, FCC Ref:15.247(a)(1)(iii):
Connect EUT antenna terminal to the specturm analyzer with a low loss cable.
The spectrum analyzer center frequency was set to one of the known hopping channels. The Sweep was set to 10ms, the SPAN was set to Zero SPAN. The time duration of the transmissions so captured was measured with the Marker Delta function

8.2 Measurement Results:

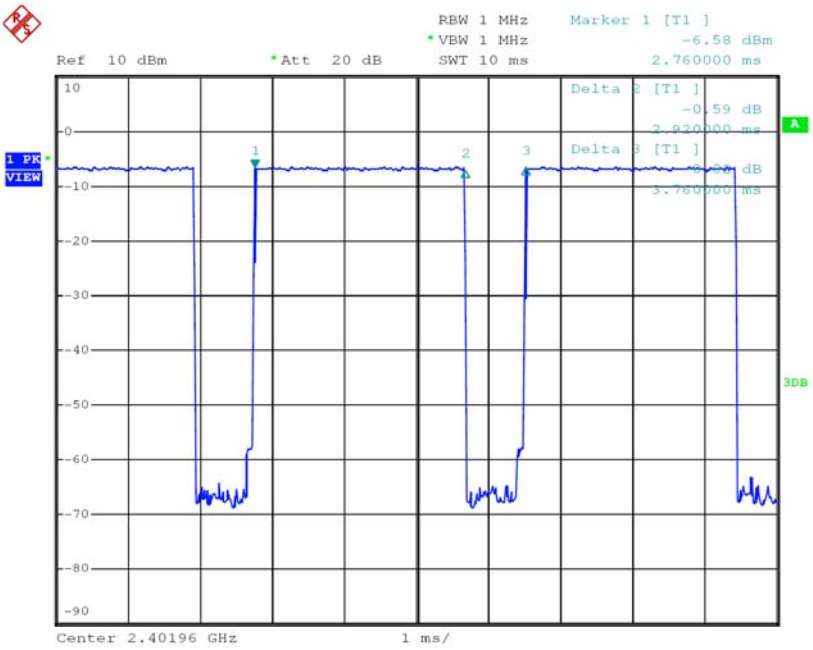
The maximum number of hopping channels in 31.6s (0.4s/Channel x 79 Channel)

Refer to attached data chart.(worest data DH 5)

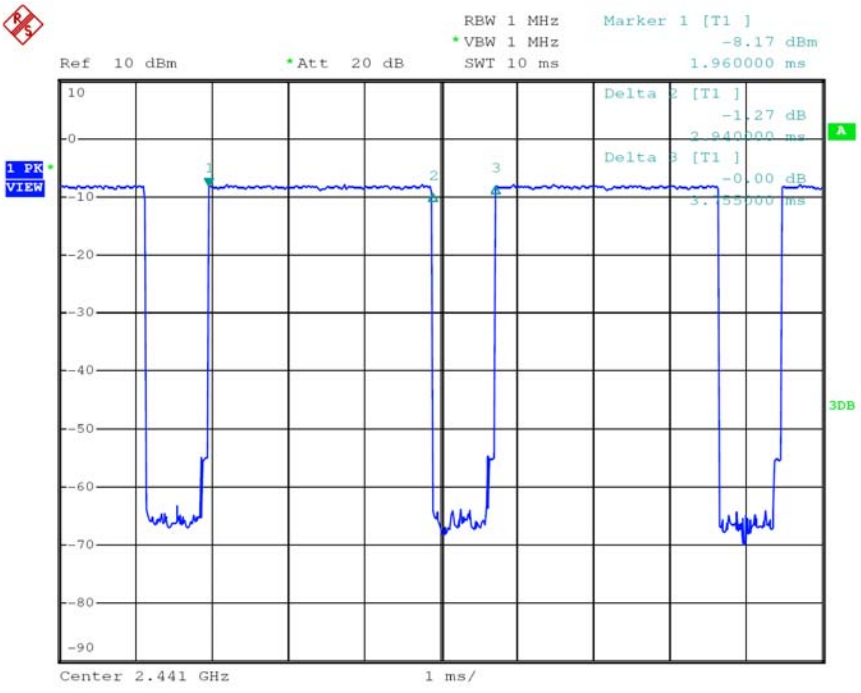
Modulation :	GFSK	Packet :	DH 1, DH 3, DH 5
RBW :	1MHz	VBW :	1MHz
Spectrum Detector:	PK	Test Date :	August 12, 2011
Test By:	Ifen	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %

Packet	Frequency (MHz)	Result (msec)	Limit (msec)
DH5	2402	2.92(ms)*(1600/(6*79))*31.6=311.6	400
DH5	2441	2.94(ms)*(1600/(6*79))*31.6=313.7	400
DH5	2480	2.94(ms)*(1600/(6*79))*31.6=313.7	400

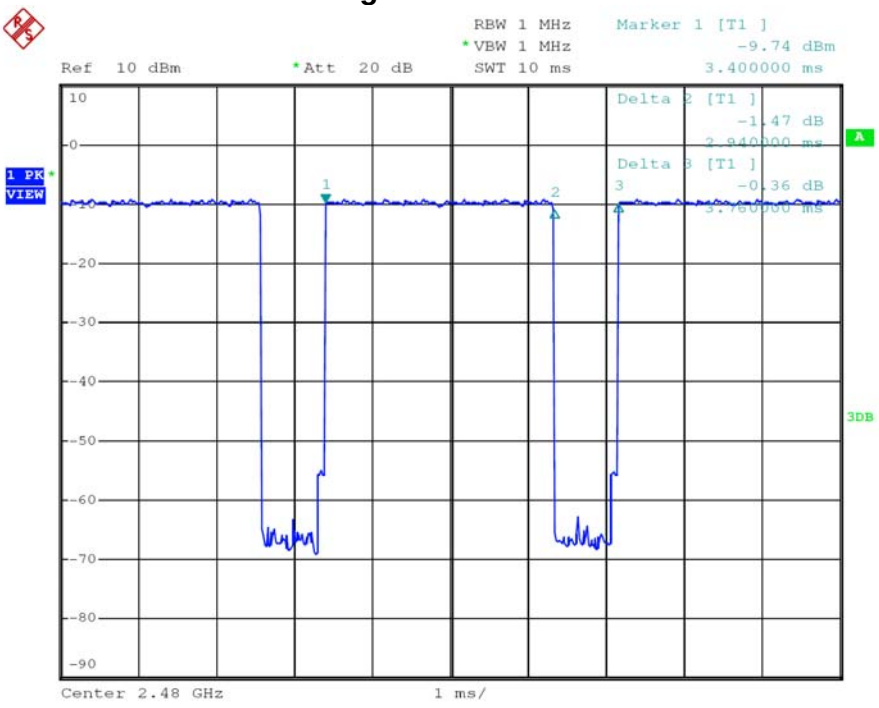
Lowest Channel



Middle Channel



Highest Channel



9. MAXIMUM PEAK OUTPUT POWER

9.1 Measurement Procedure

Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1): Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum. The analyzer was set for RBW > 20dB bandwidth and power was read directly in dBm. Cable loss was considered during this measurement. Test SET-UP (Block Diagram of Configuration)

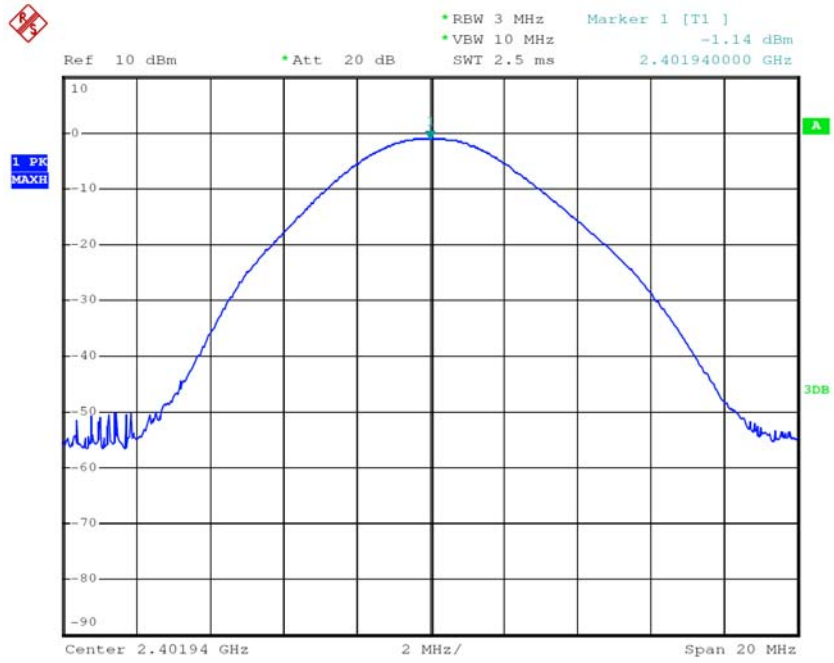
9.2 Measurement Results:

Refer to attached data chart.

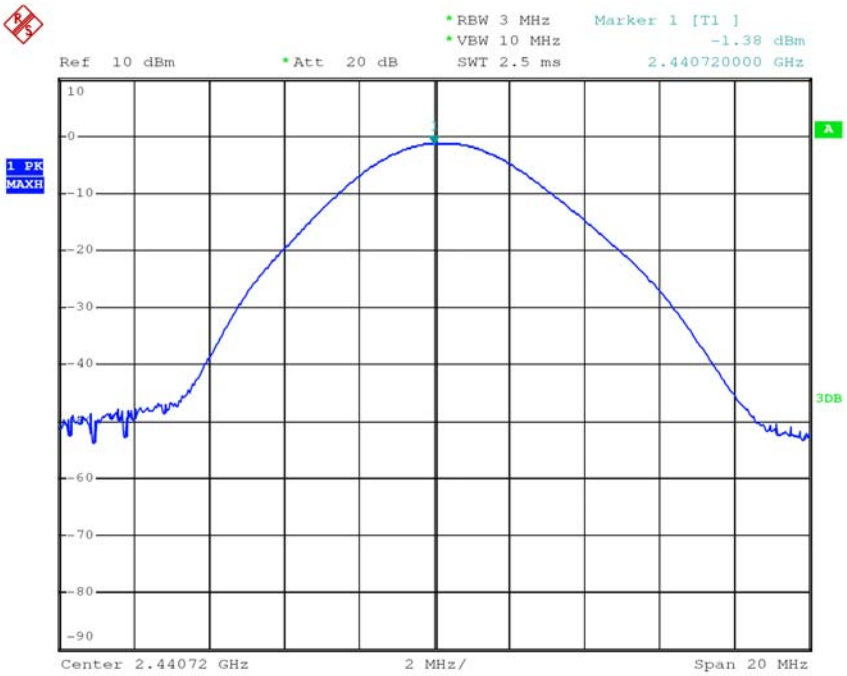
Modulation :	GFSK	Packet :	DH 5
RBW :	3MHz	VBW :	10MHz
Spectrum Detector:	PK	Test Date :	August 22, 2011
Test By:	Ifen	Temperature :	24 ℃
Test Result:	PASS	Humidity :	52 %

Channel Frequency (MHz)	Cable Loss dB	Peak Power output(mW)	Peak Power output(dBm)	Peak Power Limit(mW)	Pass/Fail
2402.00	1.5	1.086	0.36	125	PASS
2441.00	1.5	1.028	0.12	125	PASS
2480.00	1.5	0.991	-0.04	125	PASS

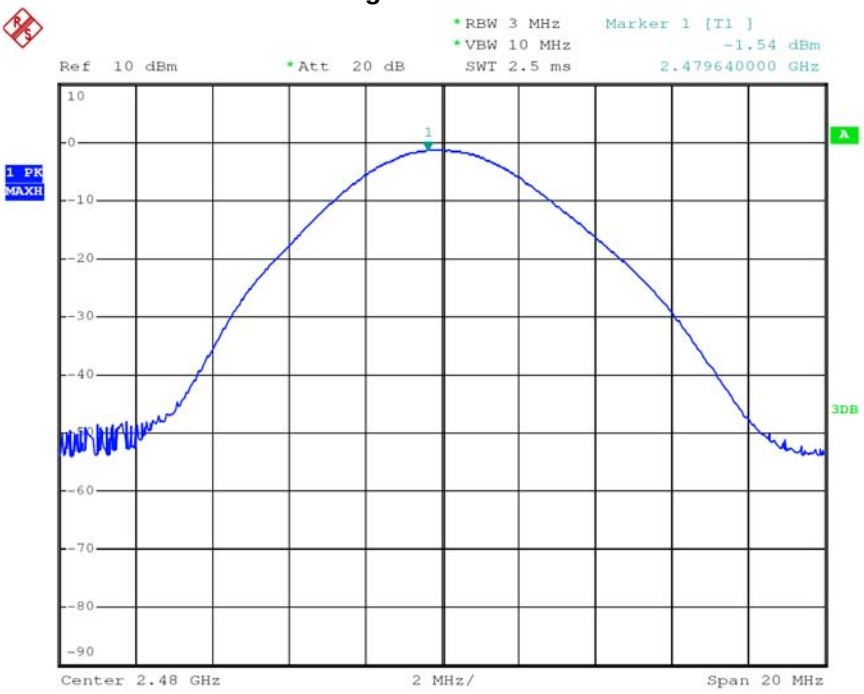
Lowest Channel



Middle Channel



Highest Channel



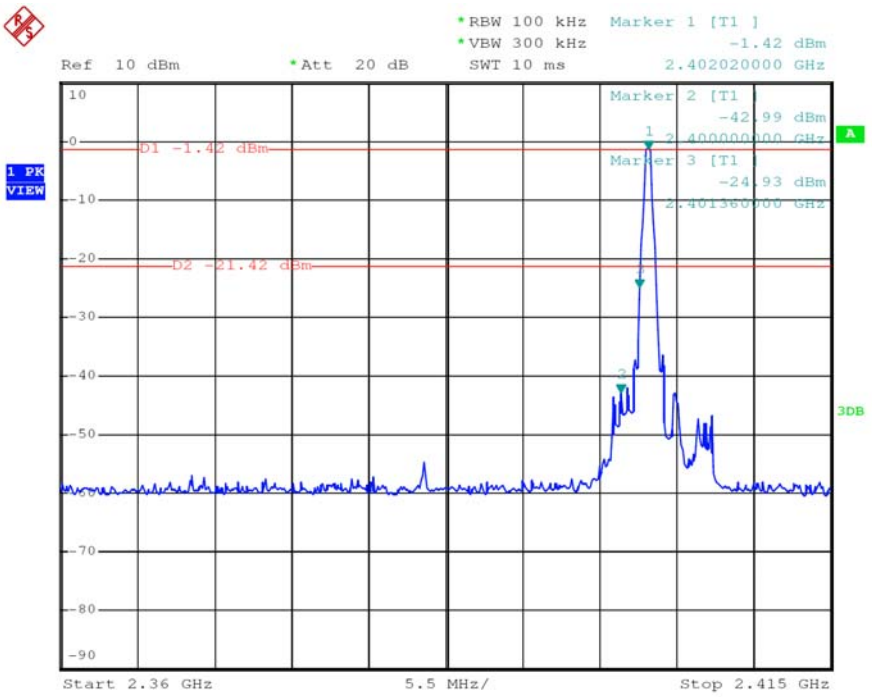
10. Band Edge

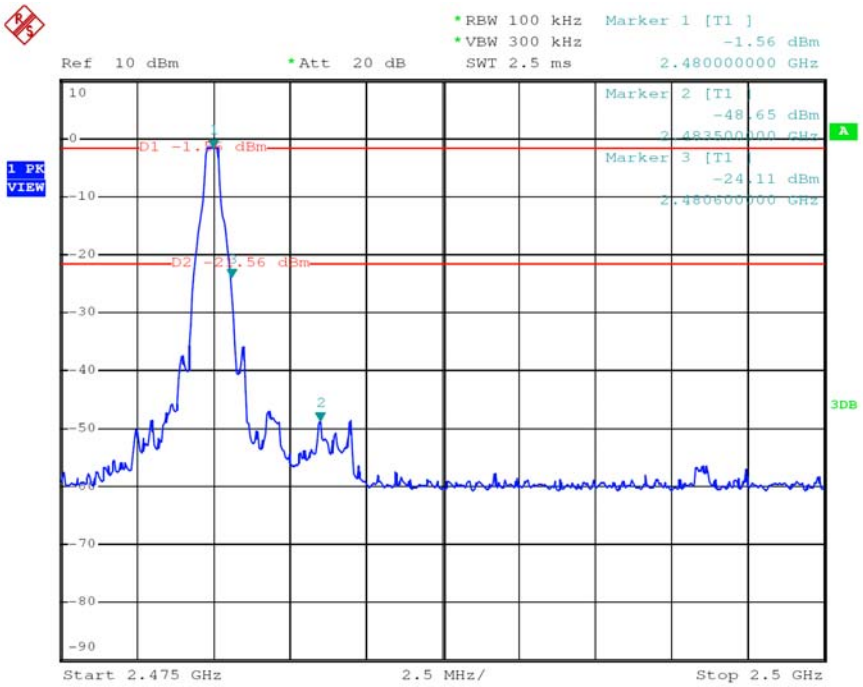
10.1 Measurement Procedure

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.

10.2 Limit

15.247(d)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 measurment.


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 10 ms
Marker 1 [T1]
-1.42 dBm
2.402020000 GHz
Marker 2 [T1]
-42.99 dBm
2.400000000 GHz
Marker 3 [T1]
-24.93 dBm
2.401360000 GHz
D1 -1.42 dBm
D2 -21.42 dBm
1 PK VIEW
A
3DB
Start 2.36 GHz
5.5 MHz/
Stop 2.415 GHz


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
Marker 1 [T1]
-1.56 dBm
2.480000000 GHz
Marker 2 [T1]
-48.65 dBm
Marker 3 [T1]
-24.11 dBm
2.480600000 GHz
D2 -21.56 dBm
1 PK VIEW
A
3DB
Start 2.475 GHz
2.5 MHz/
Stop 2.5 GHz

11.Antenna Application

11.1 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.

11.2. Result

The EUT's antenna used a chip antenna and integrated on PCB, The antenna's gain is 2Bi and meets the requirement.

12.RF Exposure

According to §15.247(i) and 1.1307(b)(1), systems operating under the provisions of this section shall be operated in manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure(MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	**--**	**--**	**F/300**	**6**
1500-100000	**--**	**--**	**5**	**6**
(B) Limits for General Population/Uncontrol Exposures				
300-1500	**--**	**--**	**F/1500**	**6**
1500-100000	**--**	**--**	**1**	**30**

Friis transmission formula: Pd=(Pout*G)\(4*pi*R^2)

Where
Pd= Power density in mW/cm2
Pout=output power to antenna in Mw
G= gain of antenna in linear scale
Pi=3.1416
R= distance between observation point and center of the radiator in cm
Pd the limit of MPE, 1mW/cm2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Measurement Result

Channel	Channel Frequency (MHz)	Output Peak power (mW)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
Low	2402	1.086	2	3.42e-4	1
Middle	2441	1.028	2	3.24e-4	1
High	2480	0.991	2	3.12e-4	1

13.Test Equipment List

Description	Manfucaturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
Receiver	Rohde & Schwarz	ESCI7	100837	Mar.14 2011	Mar.14 2012
Spectrum Analyzer	Agilent	8564E	3943A10314	Mar. 19, 2011	Mar. 19, 2012
Pre-Amplifier	HP	8447D	2944A07999	Mar. 19, 2011	Mar. 19, 2012
Broadband Antenna	Schwarzbeck	VULB9162	9162-010	Apr. 18, 2011	Apr. 18, 2012
Horn Antenna	Schwarzbeck	BBHA9120D	D262	Mar. 26, 2011	Mar. 26, 2012
Horn Antenna	ETS	3116	00101347	Apr. 24, 2011	Apr. 24, 2012
Pre-Amplifier	Agilent	8449B	3008A02964	Mar. 19, 2011	Mar. 19, 2012
Cable	UBER+SUHNER	CBL2-NN-1M	22320001	Mar. 19, 2011	Mar. 19, 2012
Cable	Schwarzbeck	CIL02	N/A	Mar. 19, 2011	Mar. 19, 2012