

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

OF

Talk and Soothe Vid Monitor

MODEL No.: Y7648C

BRAND NAME: Not Provided

Dade Code: G1113TFL00

FCC ID: BMWTFY7648C

REPORT NO.: ED130613102E

ISSUE DATE: July 16, 2013

Prepared for

**TOMY International, Inc.
1111 W. 22nd Street Suite 320 Oak Brook, IL 60523 United States**

Prepared by

DONGGUAN EMTEK CO., LTD.

**No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China
TEL: 86-769-22807078
FAX: 86-769-22807079**

VERIFICATION OF COMPLIANCE

Applicant:	TOMY International, Inc. 1111 W. 22nd Street Suite 320 Oak Brook, IL 60523 United States
Product Description:	Talk and Soothe Vid Monitor
Brand Name:	Not Provided
Model Number:	Y7648C
Serial Number:	N/A
File Number:	ED130613102E
Date of Test:	June 13, 2013 to July 16, 2013

We hereby certify that:

The above equipment was tested by DONGGUAN 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 C63.4 (2009) 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.

Approved By



Sam Lv / Q.A. Manager
DONGGUAN EMTEK CO., LTD.

Table of Contents

1.	GENERAL INFORMATION	5
1.1	PRODUCT DESCRIPTION.....	5
1.2	RELATED SUBMITTAL(S) / GRANT (S).....	6
1.3	TEST METHODOLOGY	6
1.4	SPECIAL ACCESSORIES.....	6
1.5	EQUIPMENT MODIFICATIONS	6
1.6	TEST FACILITY	7
2.	SYSTEM TEST CONFIGURATION	8
2.1	EUT CONFIGURATION.....	8
2.2	EUT EXERCISE	8
2.3	TEST PROCEDURE	8
2.4	LIMITATION	8
2.5	CONFIGURATION OF TESTED SYSTEM	12
3.	DESCRIPTION OF TEST MODES.....	13
4.	CONDUCTED EMISSIONS TEST	14
4.1	MEASUREMENT PROCEDURE:	14
4.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	14
4.3	MEASUREMENT EQUIPMENT USED:	14
4.4	MEASUREMENT RESULT:.....	15
4.5	CONDUCTED MEASUREMENT PHOTOS:.....	17
5.	RADIATED EMISSION TEST.....	18
5.1	MEASUREMENT PROCEDURE	18
5.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	18
5.3	MEASUREMENT EQUIPMENT USED:	19
5.4	MEASUREMENT RESULT	20
5.5	RADIATED MEASUREMENT PHOTOS:.....	24
6.	CHANNEL SEPARATION TEST	25
6.1	MEASUREMENT PROCEDURE	25
6.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	25
6.3	MEASUREMENT EQUIPMENT USED:	25
6.4	MEASUREMENT RESULTS:.....	25
7.	20DB BANDWIDTH TEST	28
7.1	MEASUREMENT PROCEDURE	28
7.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	28
7.3	MEASUREMENT EQUIPMENT USED:	28

7.4	MEASUREMENT RESULTS:.....	28
8.	QUANTITY OF HOPPING CHANNEL TEST	31
8.1	MEASUREMENT PROCEDURE	31
8.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	31
8.3	MEASUREMENT EQUIPMENT USED:.....	31
8.4	MEASUREMENT RESULTS:.....	31
9.	TIME OF OCCUPANCY (DWELL TIME) TEST	32
9.1	MEASUREMENT PROCEDURE	32
9.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	32
9.3	MEASUREMENT EQUIPMENT USED:.....	32
9.4	MEASUREMENT RESULTS:.....	33
10.	M AX IMUM PEAK OUTPUT POWER TEST	36
10.1	MEASUREMENT PROCEDURE	36
10.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	36
10.3	MEASUREMENT EQUIPMENT USED:.....	36
10.4	MEASUREMENT RESULTS:.....	36
11.	BAND EDGE TEST.....	39
11.1	MEASUREMENT PROCEDURE	39
11.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	39
11.3	MEASUREMENT EQUIPMENT USED:.....	39
11.4	MEASUREMENT RESULTS:.....	39
12.	ANTENNA APPLICATION	41
12.1	ANTENNA REQUIREMENT	41
12.2.	RESULT.....	41
13.	RF EXPOSURE EVALUATION	42
13.1	FRIIS TRANSMISSION FORMULA: $P_D=(P_{OUT}*G)/(4*\pi*R^2)$	42
13.2	MEASUREMENT RESULT	42

Appedix I(Photos of EUT) (4 Pages)

1. GENERAL INFORMATION

1.1 Product Description

The TOMY International, Inc. Model: Y7648C(referred to as the EUT in this report)
The EUT is a short range, lower power, Talk and Soothe Vid Monitor designed as an Input Device. It is designed by way of utilizing the GFSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402-2480MHz
- B). Modulation: GFSK
- C). Number of Channel: 40
- D). Channel space: 2MHz
- E). Rated RF Output Power: 13.17dBm
- F). Antenna Type: Internal PCB Antenna
- G). Antenna GAIN: 0 dBi
- H). Power Supply: DC 6.0V, 500mA Come from Adapter
- I). Adapter: Model: SW-0600550A
Input: AC 100-240V, 50/60Hz, 0.2A Max
Output: DC 6.0V, 550mA

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: BMWTFY7648C 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

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2009). 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, 2012.07.04
The certificate is valid until 2015.07.03
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2006
The Certificate Registration Number is L3150

Accredited by TUV Product Service Group 2011.07.05
The certificate is valid until 2012.11.12
The Laboratory has been assessed according to the requirements ISO/IEC 17025: 2005

Accredited by FCC, Aug. 18, 2011
The Certificate Number is 247565

Accredited by Industry Canada, January 13, 2011
The Certificate Registration Number. is 9444A.

Name of Firm : DONGGUAN EMTEK CO., LTD
Site Location : No.281, Guantai Road, Nancheng District,
Dongguan, 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 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.

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 20 Bandwidth of the hopping channel, whichever is greater.

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

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

(4) Time of Occupancy(Dwell Time)

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	LIMIT(rms)		
	20dB bandwidth <250kHz(50Channel)	20dB bandwidth >250kHz(25Channel)	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 which 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 ratio 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 dB $\mu\text{V/m}$
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 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.

FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000MHz

Frequency(MHz)	Class A(dB $\mu\text{V/m}$)(at 3m)		Class B(dB $\mu\text{V/m}$)(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

FCC Part 15, Subpart C Section 15.249. The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency(MHz)	Filed Strength of Fundamental(at 3m)		Filed Strength of Harmonics(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Talk and Soothe Vid Monitor	Not Provided	Y7648C	BMWTFY7468C	N/A	EUT

Note:

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

3. Description of test modes

The EUT (Talk and Soothe Vid Monitor) has been tested under normal operating condition. This EUT is a FHSS system, we use blue test to control the EUT with LPT1, Let EUT hopping on and transmit at every channel with highest power, Only output power use conducted method, others are using radiated method. After sirfdemo330R1 send the command to EUT, it can be removed, and the EUT keep hopping. 40 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for best.

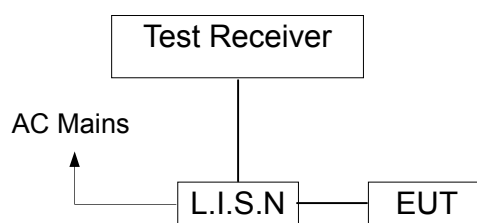
Channel	Frequency(MHz)
01	2402
20	2440
40	2480

4. Conducted Emissions Test

4.1 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

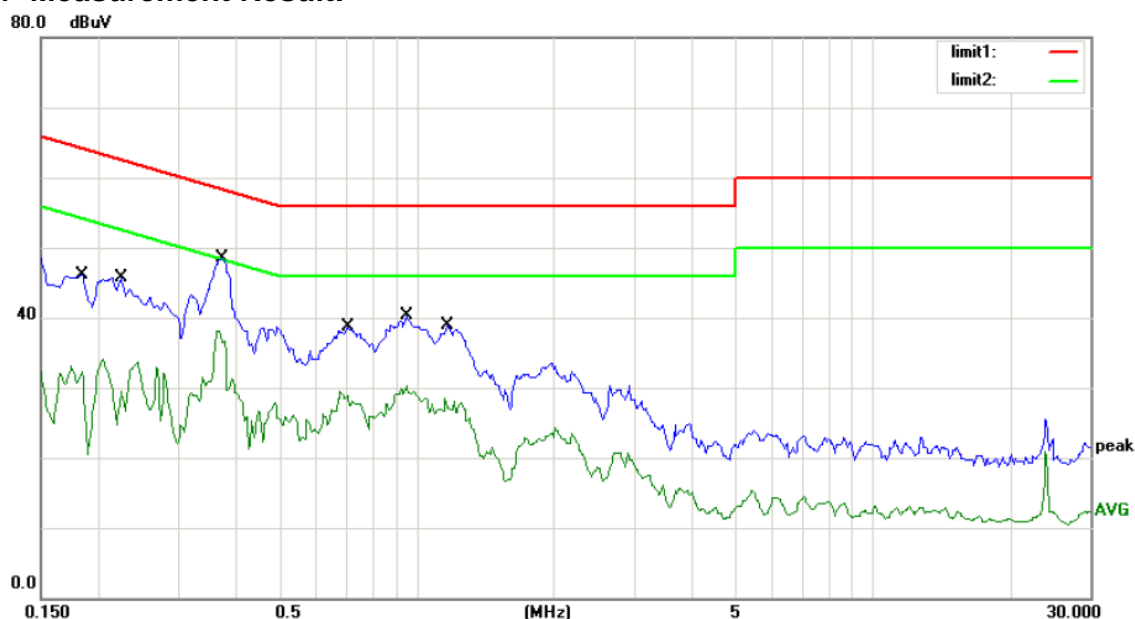
4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Measurement Equipment Used:

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 18, 2013	May 18, 2014
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	May 18, 2013	May 18, 2014
50ΩCoaxial Switch	Anritsu	MP59B	M20531	May 18, 2013	May 18, 2014

4.4 Measurement Result:



Site site #1

Phase: **L1**

Temperature: 26

Limit: (CE)FCC PART 15 class C_QP

Power: AC 120V/60Hz

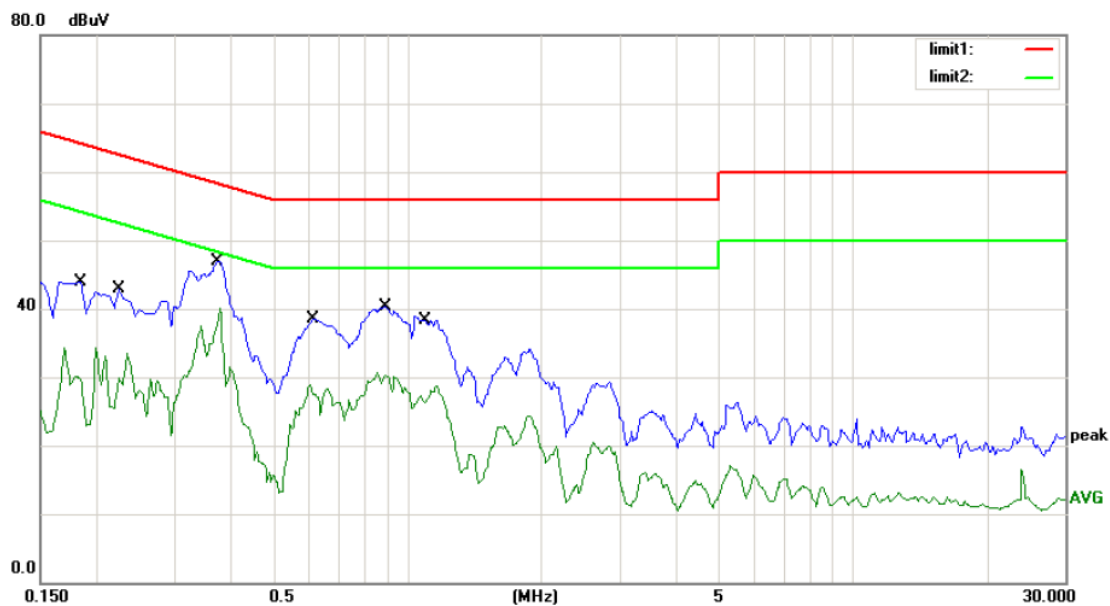
Humidity: 60 %

Mode: TX

Note:

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1850	40.30	0.00	40.30	64.26	-23.96	QP	
2	0.1850	32.22	0.00	32.22	54.26	-22.04	AVG	
3	0.2250	41.20	0.00	41.20	62.63	-21.43	QP	
4	0.2250	29.50	0.00	29.50	52.63	-23.13	AVG	
5	0.3750	45.10	0.00	45.10	58.39	-13.29	QP	
6 *	0.3750	38.19	0.00	38.19	48.39	-10.20	AVG	
7	0.7050	36.80	0.00	36.80	56.00	-19.20	QP	
8	0.7050	28.96	0.00	28.96	46.00	-17.04	AVG	
9	0.9500	36.50	0.00	36.50	56.00	-19.50	QP	
10	0.9500	30.26	0.00	30.26	46.00	-15.74	AVG	
11	1.1700	34.50	0.00	34.50	56.00	-21.50	QP	
12	1.1700	27.10	0.00	27.10	46.00	-18.90	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: **N** Temperature: 26
Limit: (CE)FCC PART 15 class C_QP Power: AC 120V/60Hz Humidity: 60 %
Mode: TX
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1850	38.20	0.00	38.20	64.26	-26.06	QP	
2		0.1850	30.11	0.00	30.11	54.26	-24.15	AVG	
3		0.2250	38.60	0.00	38.60	62.63	-24.03	QP	
4		0.2250	29.77	0.00	29.77	52.63	-22.86	AVG	
5		0.3750	45.10	0.00	45.10	58.39	-13.29	QP	
6	*	0.3750	40.12	0.00	40.12	48.39	-8.27	AVG	
7		0.6150	35.60	0.00	35.60	56.00	-20.40	QP	
8		0.6150	28.99	0.00	28.99	46.00	-17.01	AVG	
9		0.8900	37.10	0.00	37.10	56.00	-18.90	QP	
10		0.8900	30.25	0.00	30.25	46.00	-15.75	AVG	
11		1.0950	35.20	0.00	35.20	56.00	-20.80	QP	
12		1.0950	27.40	0.00	27.40	46.00	-18.60	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.

4.5 Conducted Measurement Photos:



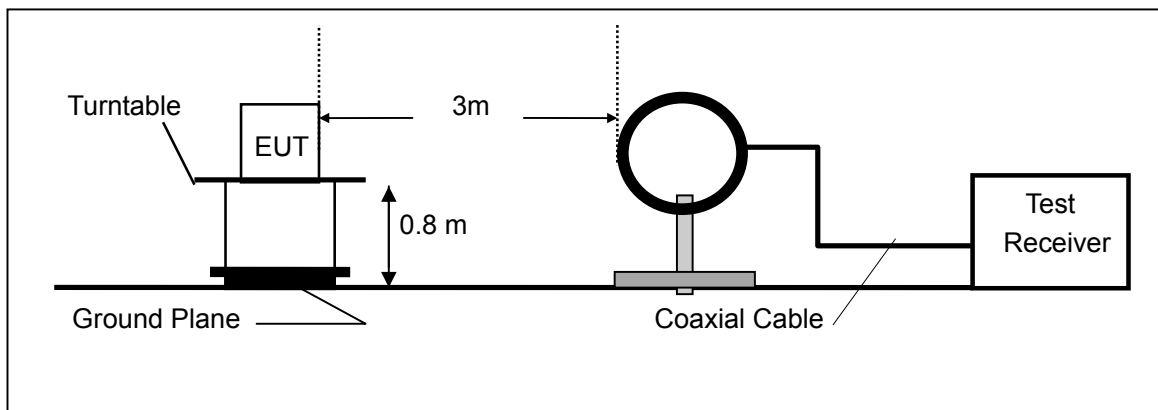
5. Radiated Emission Test

5.1 Measurement Procedure

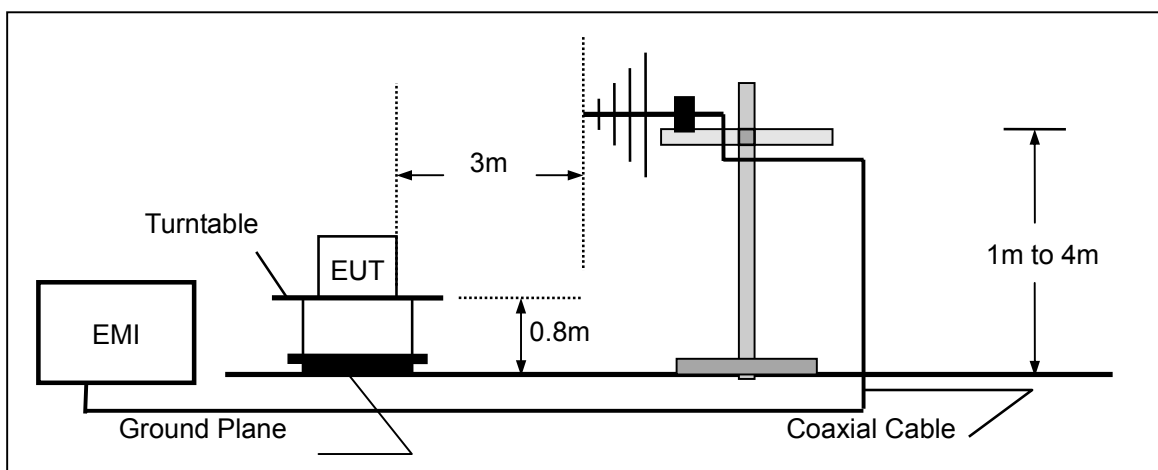
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

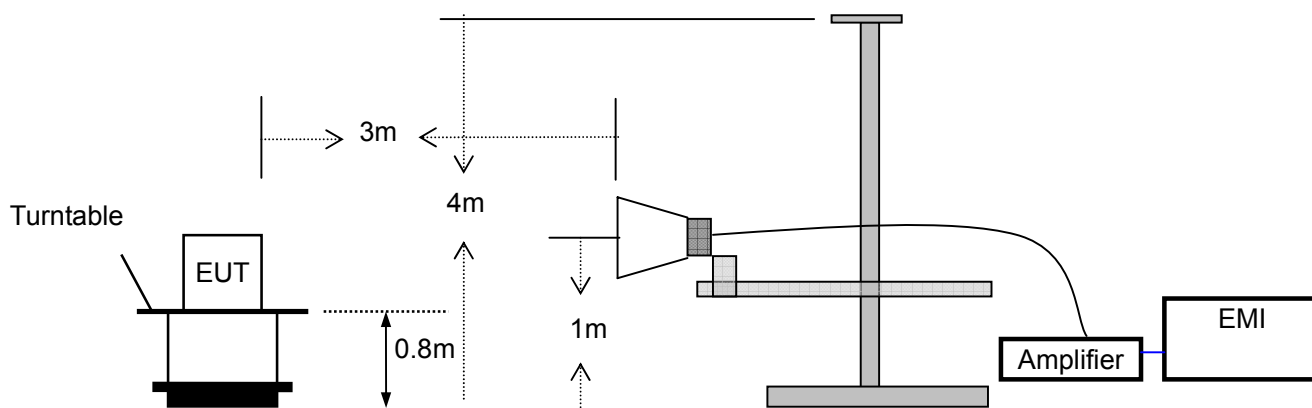
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



5.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	May 18, 2013	May 18, 2014
Spectrum Analyzer	HP	E4407B	839840481	May 11, 2013	May 11, 2014
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 28, 2013	May 28, 2014
Pre-Amplifier	HP	8447D	2944A07999	May 28, 2013	May 28, 2014
Bilog Antenna	Schwarzbeck	VULB9163	142	May 18, 2013	May 18, 2014
Loop Antenna	ARA	PLA-1030/B	1029	May 29, 2013	May 29, 2014
Horn Antenna	Electro-Metrics	EM-6961	103314	May 29, 2013	May 29, 2014
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 29, 2013	May 29, 2014

5.4 Measurement Result

Operation Mode: TX Mode Test Date : June 23, 2013
Frequency Range: 30~1000MHz Temperature : 25 °C
Test Result: PASS Humidity : 50 %
Measured Distance: 3m Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Note
227.8800	V	41.02	46.00	-4.98	PK
239.5200	V	43.02	46.00	-2.98	PK
384.0500	V	41.74	46.00	-4.26	PK
480.0800	V	42.08	46.00	-3.92	PK
576.1100	V	42.31	46.00	-3.69	PK
768.1700	V	41.55	46.00	-4.45	PK
216.2400	H	36.45	46.00	-9.55	PK
227.8800	H	41.85	46.00	-4.15	PK
239.5200	H	43.42	46.00	-2.58	PK
252.1300	H	38.22	46.00	-7.78	PK
335.5500	H	37.55	46.00	-8.45	PK
384.0500	H	43.99	46.00	-2.01	PK

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.209.

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: CH01: 2402Hz Test Date : June 23, 2013
Frequency Range: 1-25GHz Temperature : 25 °C
Test Result: PASS Humidity : 50 %
Measured Distance: 3m Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
2402.000	V	52.12	39.24	74.00	54.00	-21.88	-14.76
4804.00	V	55.34	39.45	74.00	54.00	-18.66	-14.55
7206.00	V	50.54	33.56	74.00	54.00	-23.46	-20.44
9608.00	V	62.65	48.31	74.00	54.00	-11.35	-5.69
12010.00	V	57.36	40.34	74.00	54.00	-16.64	-13.66
2402.000	H	51.34	45.55	74.00	54.00	-22.66	-8.45
4804.00	H	58.64	38.16	74.00	54.00	-15.36	-15.84
7206.00	H	59.14	39.43	74.00	54.00	-14.86	-14.57
9608.00	H	54.45	35.52	74.00	54.00	-19.55	-18.48
12010.00	H	51.46	43.34	74.00	54.00	-22.54	-10.66

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.247.

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: CH20: 2440Hz Test Date : June 23, 2013
Frequency Range: 1-25GHz Temperature : 25 °C
Test Result: PASS Humidity : 50 %
Measured Distance: 3m Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4880.00	V	51.12	42.24	74.00	54.00	-22.88	-11.76
7320.00	V	58.93	43.43	74.00	54.00	-15.07	-10.57
9760.00	V	53.34	43.53	74.00	54.00	-20.66	-10.47
12200.00	V	53.71	32.54	74.00	54.00	-20.29	-21.46
4880.00	H	56.32	47.34	74.00	54.00	-17.68	-6.66
7320.00	H	54.78	39.76	74.00	54.00	-19.22	-14.24
9760.00	H	53.86	37.15	74.00	54.00	-20.14	-16.85
12200.00	H	54.34	44.24	74.00	54.00	-19.66	-9.76

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.247.

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.

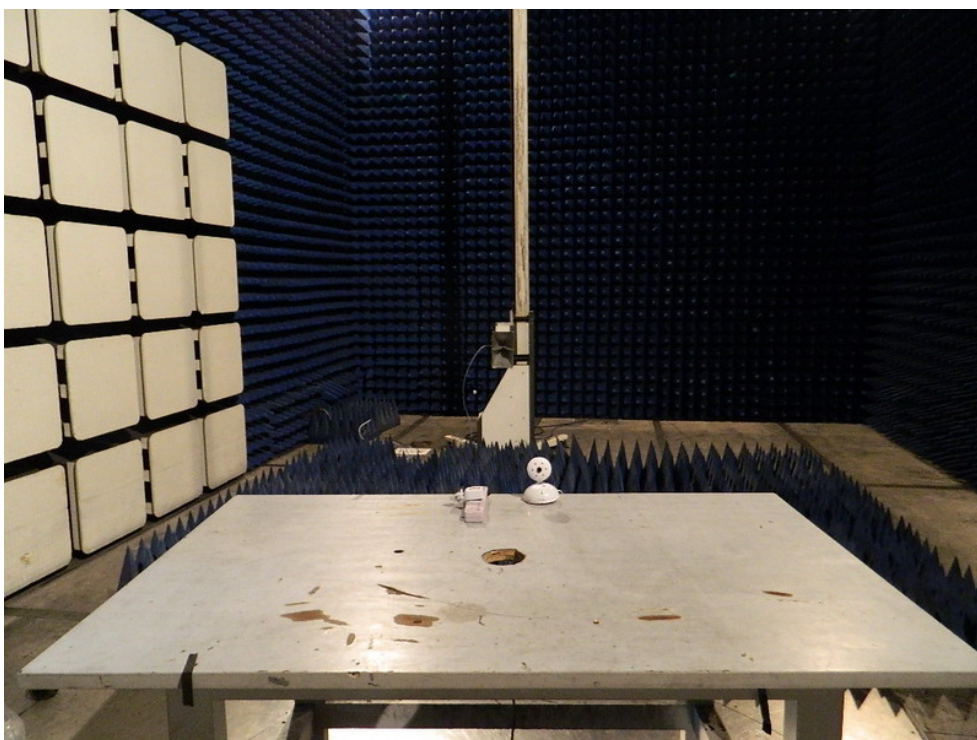
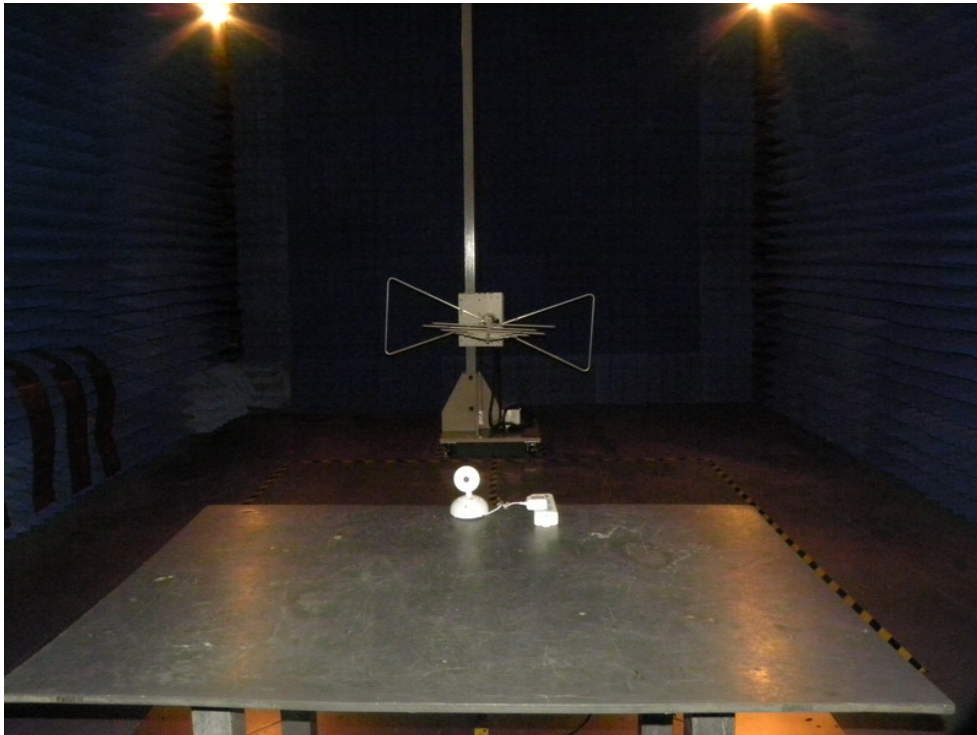
Operation Mode: CH40: 2480MHz Test Date : June 23, 2013
Frequency Range: 1-25GHz Temperature : 25 °C
Test Result: PASS Humidity : 50 %
Measured Distance: 3m Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
2480.00	V	51.22	40.22	74.00	54.00	-22.78	-13.78
4960.00	V	54.34	41.34	74.00	54.00	-19.66	-12.66
7440.00	V	56.63	38.56	74.00	54.00	-17.37	-15.44
9920.00	V	57.32	36.23	74.00	54.00	-16.68	-17.77
12400.00	V	52.56	35.23	74.00	54.00	-21.44	-18.77
2480.00	H	56.45	42.23	74.00	54.00	-17.55	-11.77
4960.00	H	54.56	37.45	74.00	54.00	-19.44	-16.55
7440.00	H	55.37	32.12	74.00	54.00	-18.63	-21.88
9920.00	H	59.17	44.43	74.00	54.00	-14.83	-9.57
12400.00	H	54.21	34.65	74.00	54.00	-19.79	-19.35

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.247.

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.

5.5 Radiated Measurement Photos:

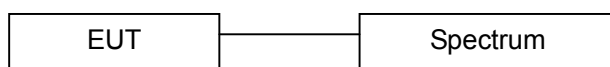


6. Channel Separation test

6.1 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.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used:

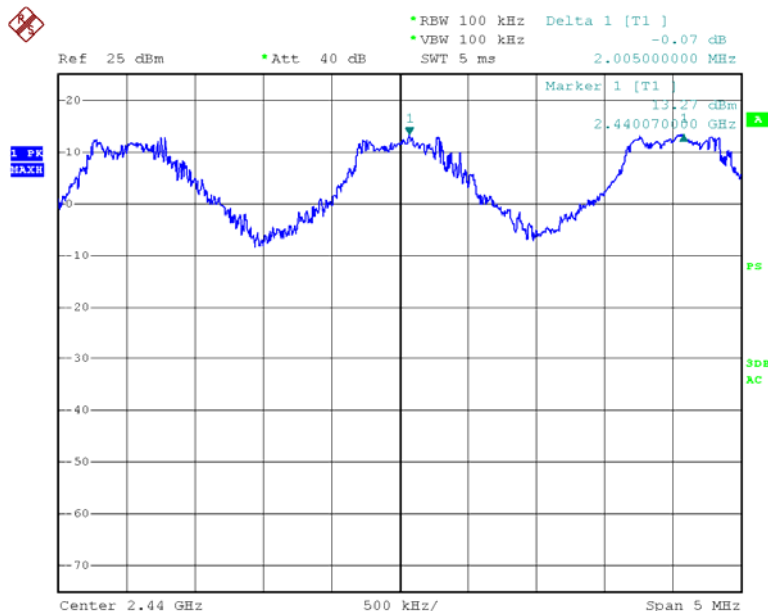
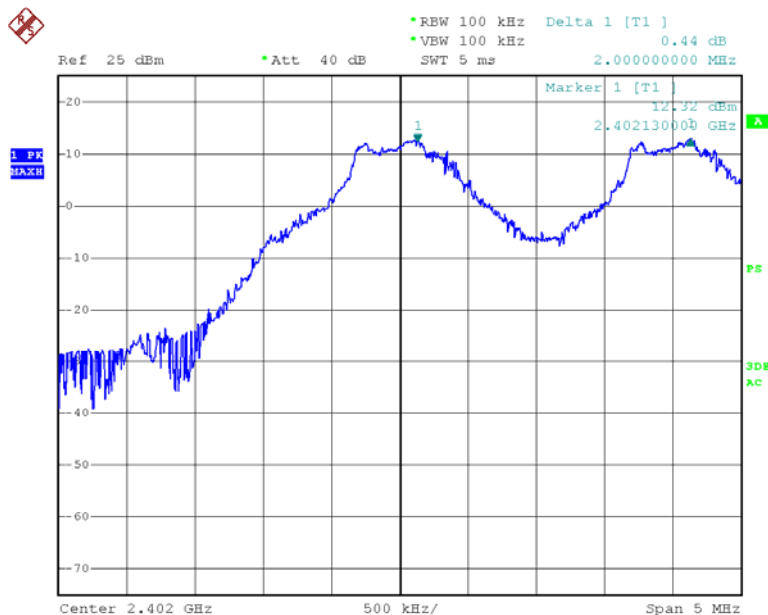
Same as 5.3 Radiated Emission Measurement.

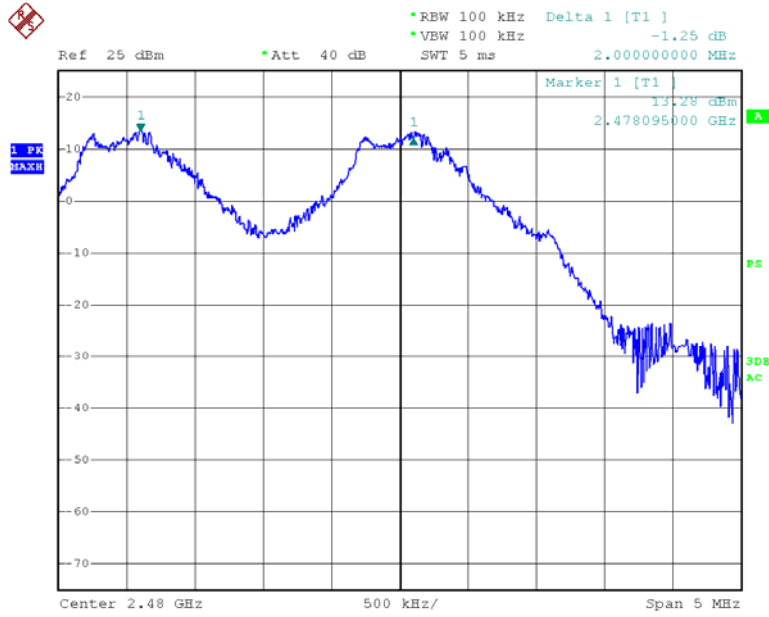
6.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	June 23, 2013
Test By:	Andy	Temperature :	25 °C
Test Result:	PASS	Humidity :	50 %

Channel number	Channel frequency (MHz)	Separation Read Value (MHz)	20dB Down BW(MHz)
01	2402	2	>2.050
20	2440	2	>2.230
40	2480	2	>2.205



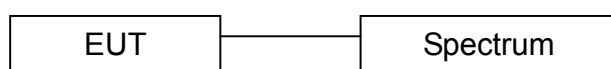


7. 20dB Bandwidth test

7.1 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.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used:

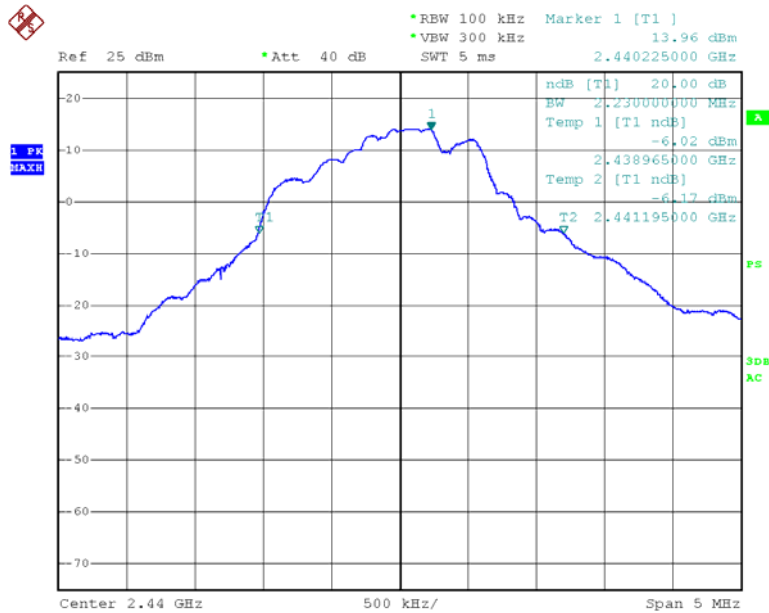
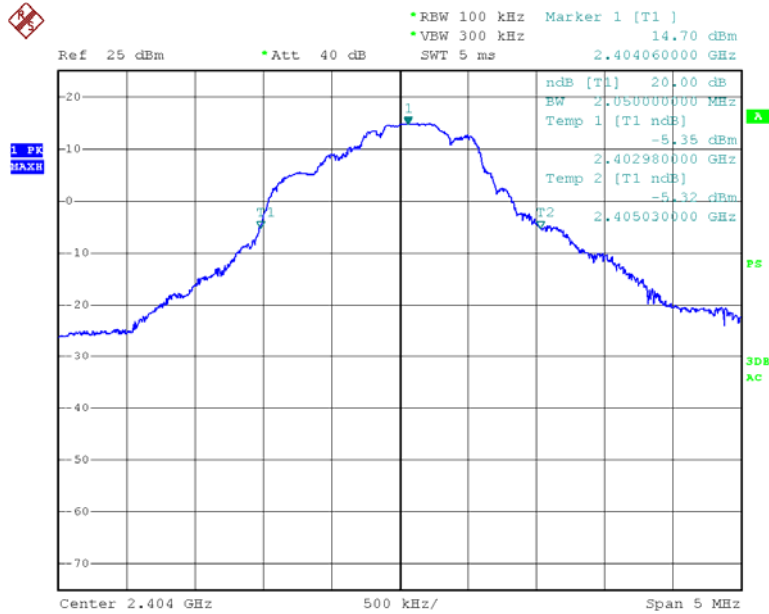
Same as 5.3 Radiated Emission Measurement.

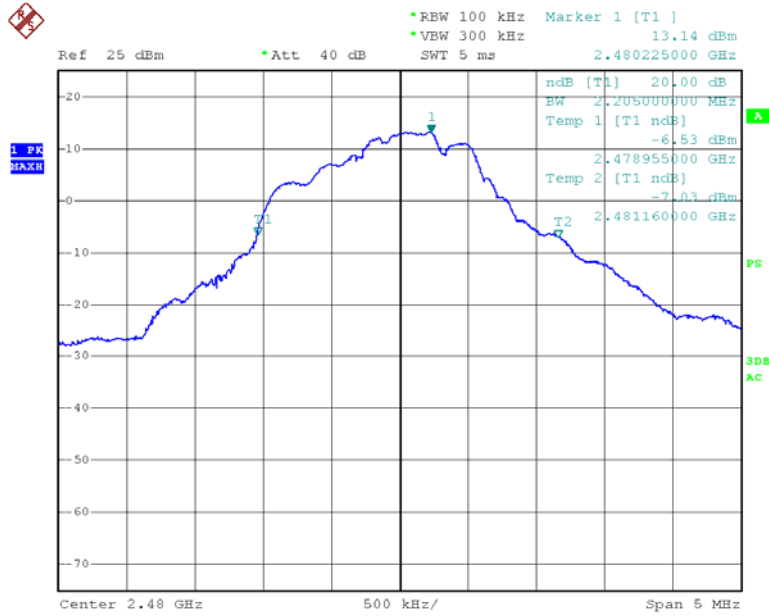
7.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	June 23, 2013
Test By:	Andy	Temperature :	25 °C
Test Result:	PASS	Humidity :	50 %

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
01	2402	2050
20	2440	2230
40	2480	2205



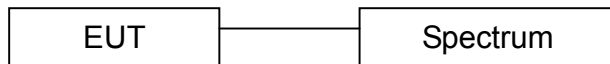


8. Quantity of Hopping Channel Test

8.1 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.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used:

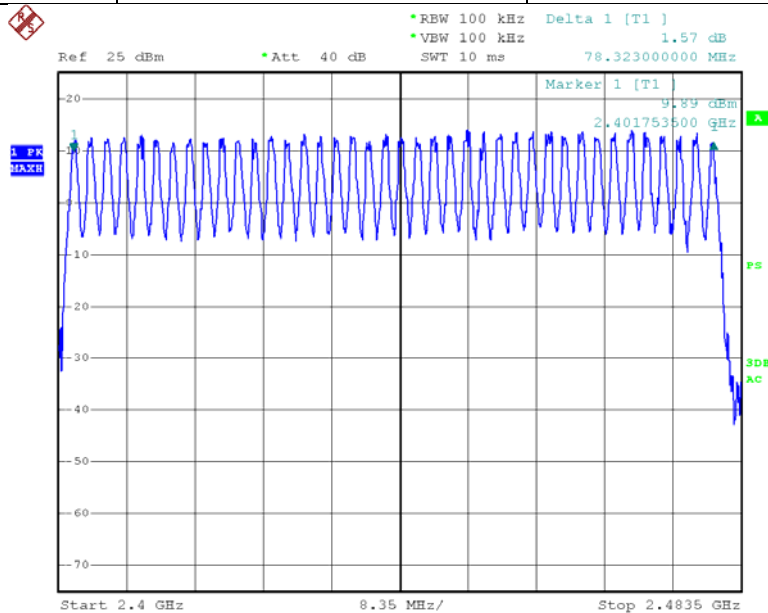
Same as 5.3 Radiated Emission Measurement.

8.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	June 23, 2013
Test By:	Andy	Temperature :	25 °C
Test Result:	PASS	Humidity :	50 %

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel(Limit)
2402-2480MHz	40	>15

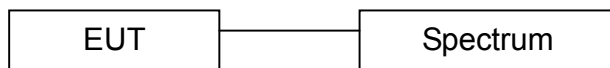


9. Time of Occupancy (Dwell Time) test

9.1 Measurement Procedure

- a. Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- b. 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.
- c. 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.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. 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:

Same as 5.3 Radiated Emission Measurement.

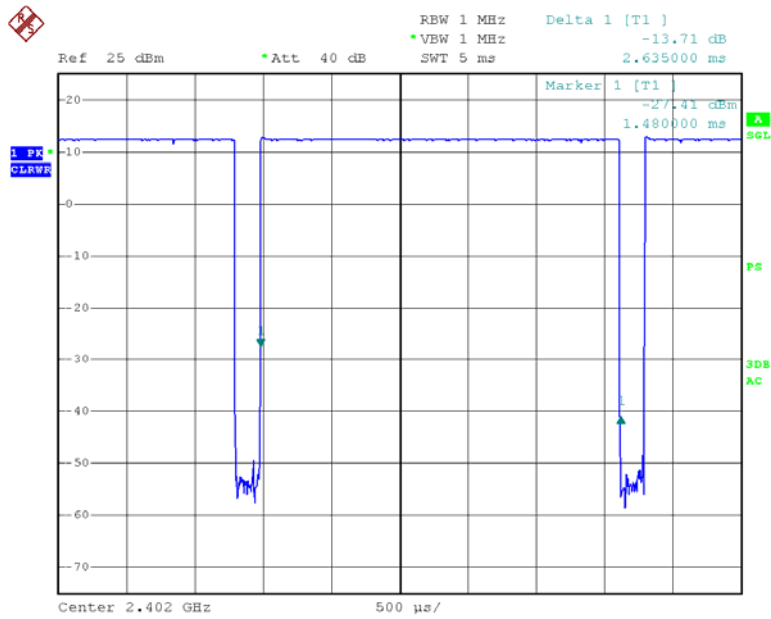
9.4 Measurement Results:

Refer to attached data chart.

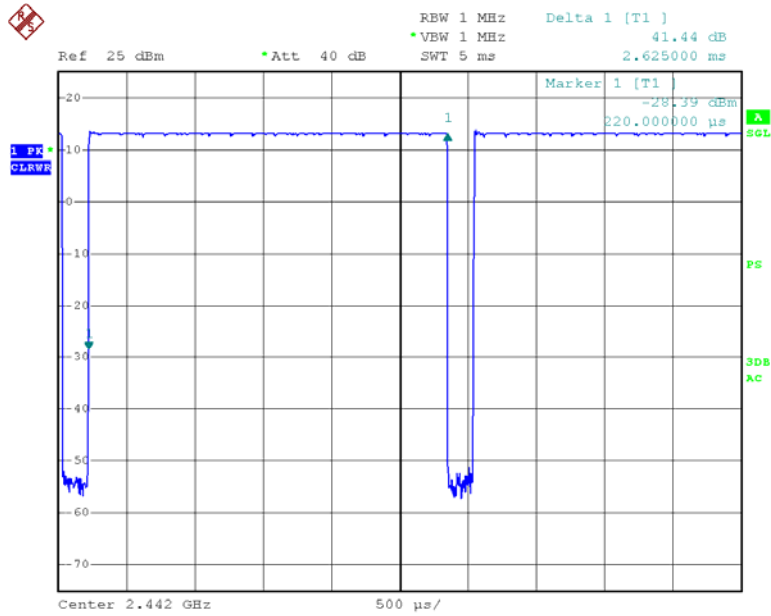
Spectrum Detector: PK Test Date : June 23, 2013
Test By: Andy Temperature : 25 °C
Test Result: PASS Humidity : 50 %

Mode	Number of transmission in a 16 (40 Hopping*0.4)	Length of transmissions time(msec)	Result (msec)	Limit (msec)
2402	16/5*10	2.635	84.3	400
2441	16/5*10	2.625	42.0	400
2480	16/5*10	2.625	27.9	400

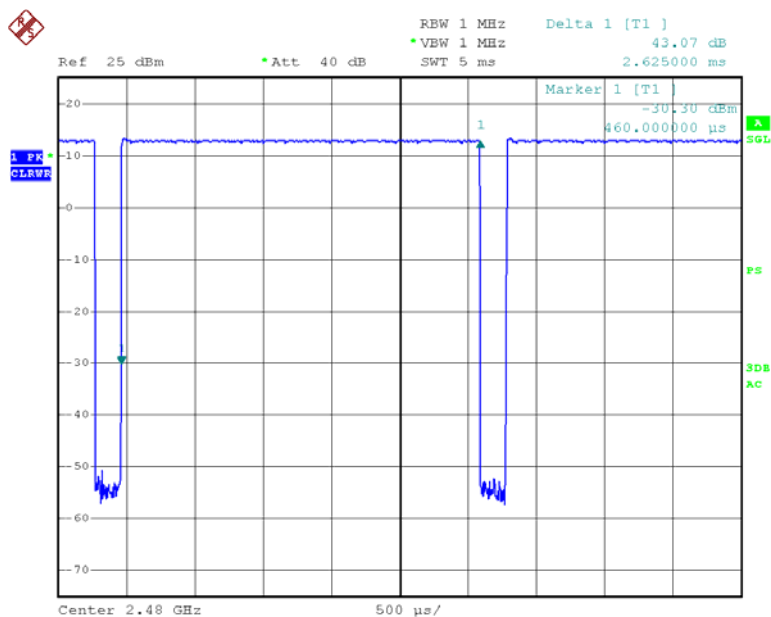
2402MHz:



2441MHz:



2480MHz:

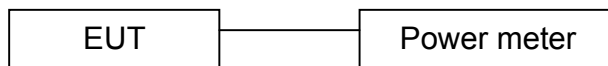


10. MAXIMUM PEAK OUTPUT POWER TEST

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:

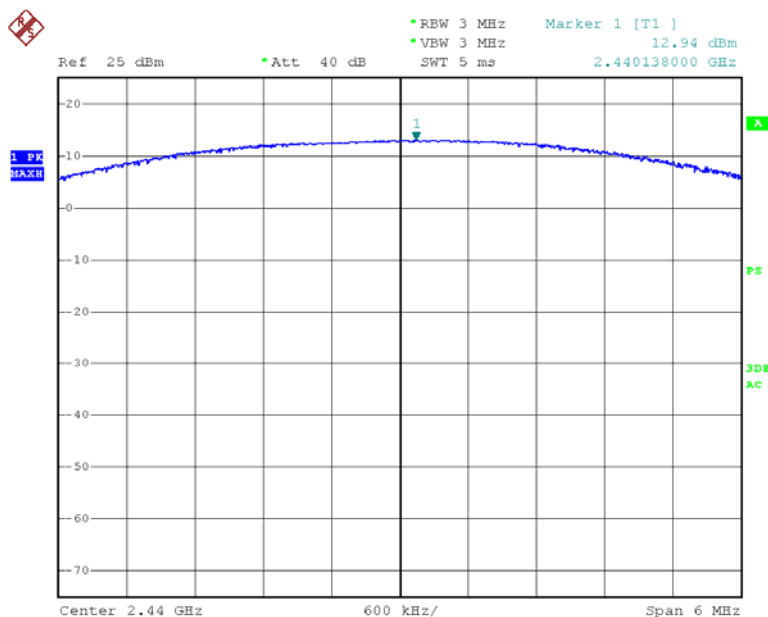
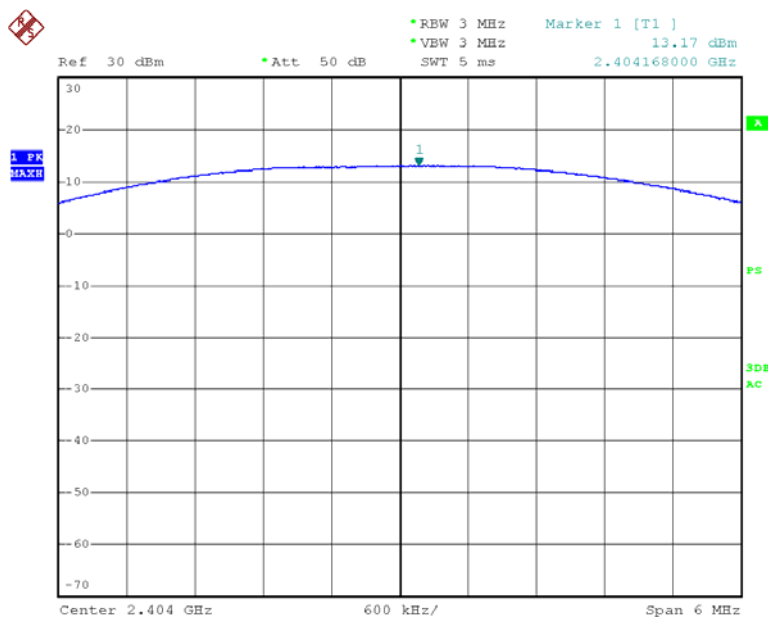
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	Boonton	4232A	29001	05/29/2013	05/29/2014
Power sensor	Boonton	51011-EMC	31184	05/29/2013	05/29/2014

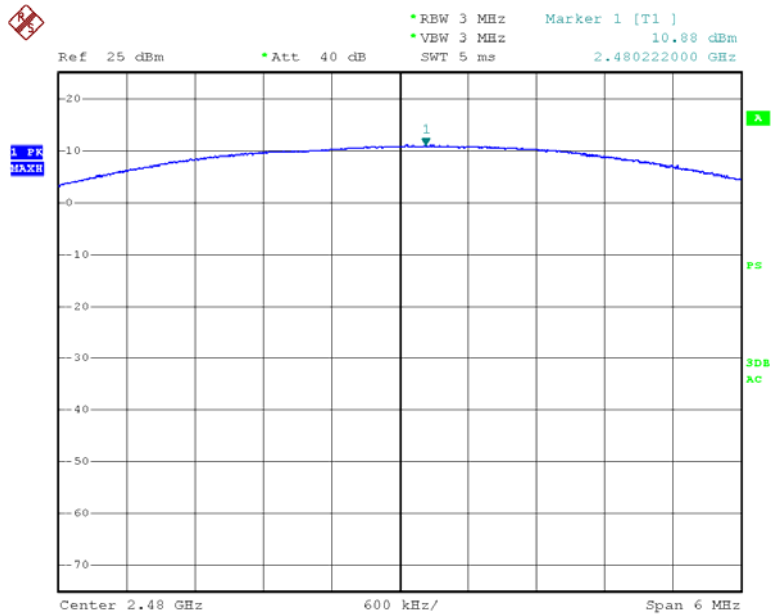
10.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector: PK Test Date : June 23, 2013
 Test By: Andy Temperature : 25 °C
 Test Result: PASS Humidity : 50 %

Channel number	Channel Frequency (MHz)	Peak Power output(mW)	Peak Power output(dBm)	Limit (mW)	Pass/Fail
01	2402	20.749	13.17	125	PASS
20	2440	19.679	12.94	125	PASS
40	2480	12.246	10.88	125	PASS





11. Band EDGE test

11.1 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.

11.2 Test SET-UP (Block Diagram of Configuration)

Same as 5.2 Radiated Emission Set-up.

11.3 Measurement Equipment Used:

Same as 5.3 Radiated Emission Measurement.

11.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	June 23, 2013
Test By:	Andy	Temperature :	25 °C
Test Result:	PASS	Humidity :	50 %

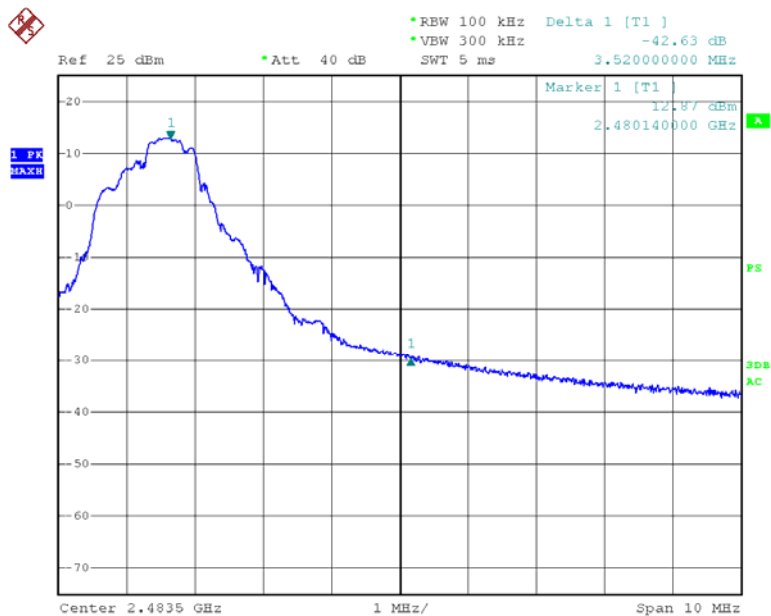
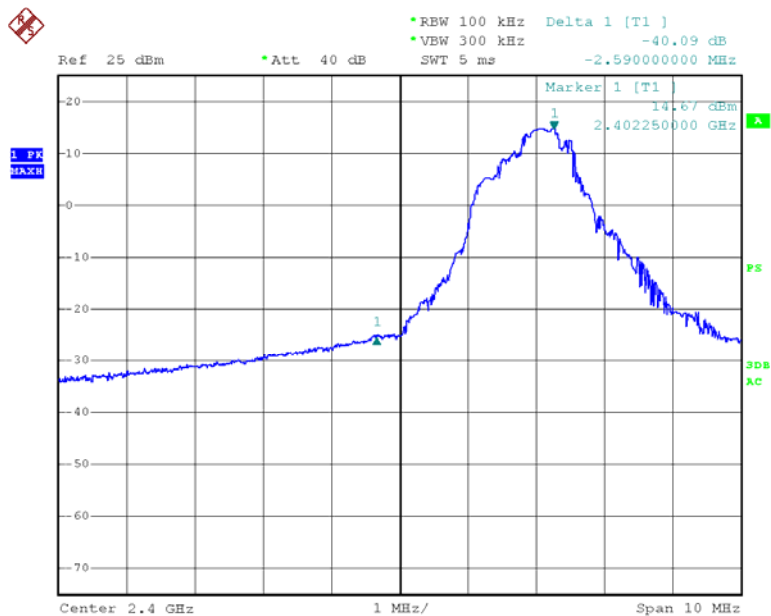
1. Conducted Test

Frequency (MHz)	Peak Power Output(dBm)	Emission read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)
<2400	14.67	-40.09	54.76	>20dBc
>2483.5	12.87	-42.63	55.50	>20dBc

2. Radiated emission test

Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)	
		QP	AV	QP	AV
<2400	V	51.23	42.14	74.00	54.00
>2483.5	V	54.33	49.45	74.00	54.00

Remark: The results of Horizontal polarization and Vertical polarization are same.



12. Antenna Application

12.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247.

FCC part 15C section 15.247 requirements:

Systems operating in the 2.4GHz 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.

12.2. Result

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

13.RF EXPOSURE EVALUATION

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

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

13.1 Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = Power density in mW/cm²

P_{out} =output power to antenna in Mw

G= gain of antenna in linear scale

π =3.1416

R= distance between observation point and center of the radiator in cm

P_d 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.

13.2 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	20.749	0	6.55E-03	1
Middle	2440	19.679	0	6.21E-03	1
High	2480	12.246	0	3.86E-03	1

APPENDIX I (Photos of EUT)

General Appearance of the EUT



