

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

*OF*

Wireless Charging Transmitter

MODEL No.: CFS011

Trademark: N/A

FCC ID: 2AI98-CFS011

REPORT NO: ES160608011E

ISSUE DATE: December 01, 2016

*Prepared for*

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*Prepared by*

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## VERIFICATION OF COMPLIANCE


Applicant:	SHENZHEN MUWEISAN TECHNOLOGY CO. LTD Room 923, Baoyuan Building, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, Guangdong, china
Manufacturer:	SHENZHEN MUWEISAN TECHNOLOGY CO. LTD Room 923, Baoyuan Building, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, Guangdong, china
Product Description:	Wireless Charging Transmitter
Model Number:	CFS011
Brand Name:	N/A
File Number:	ES160608011E
Date of Test:	June 03, 2016 to July 20, 2016


**We hereby certify that:**

The above equipment was tested by EMTEK (SHENZHEN) 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 03, 2016 to July 20, 2016

Prepared by :   
Joe Xia /Editor

Reviewer :   
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# 1. GENERAL INFORMATION

## 1.1 Product Description

The Shenzhen Muweisan Technology Co. Ltd, Model: CFS011 (referred to as the EUT in this report) The EUT is an short range, lower power transmitter. It is designed by way of utilizing the following modulation achieves the system operating.

Model Number	CFS011
Operation Frequency	2402 MHz – 2480 MHz
Modulation	GFSK
Number of Channel	40
Channel space	2MHz
Antenna Type	PCB antenna
Antenna GAIN	1.3dBi
Network and Wireless connectivity	Wireless Power Transmission, BLE
Power Source	DC 15V(Adapter)

### Ancillary Equipment:

Charger	
Brand Name	N/A
Model No.	HJ-AD24-150150
Rated Input	AC 100-240V 50/60Hz 0.7A
Rated Output	DC 15V 1500mA

### Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		

#### Note:

1. Test of channel was included the lowest 2402MHz, middle 2440MHz and highest frequency 2480MHz in highest data rate and to perform the test, then record on this report.

**Apply to the following mobile phone:**

Mobile phone model	FCC ID Number
Iphone 5	BCG-E2599A
Iphone 5C	BCG-E2644A
Iphone 5S	BCG-E2643A
Iphone 6	BCG-E2816A
Iphone 6Plus	BCG-E2817A
Iphone 6S	BCG-E2946A
Iphone 6S Plus	BCG-E2944A
Iphone SE	BCG-E3042A
SAMSUNG S6	A3LSM9200

## 1.2 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.

Tested in accordance with FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05 for compliance to FCC 47CFR 15.247 requirements.

## 1.3 Special Accessories

Not available for this EUT intended for grant.

## 1.4 Equipment Modifications

Not available for this EUT intended for grant.

## 1.5 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, March 5, 2010  
The Certificate Registration Number is 4480A-2.

Name of Firm

Site Location

- : EMTEK (SHENZHEN) 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 transmission application.

### 2.2 EUT Exercise

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

### 2.3 Test Procedure

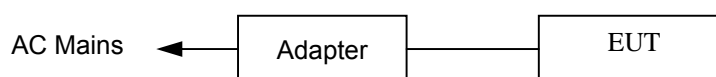
#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10-2013. 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 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 LED lamp (EUT) was 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 Configuration of Tested System



### 2.5 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
\	\	\	\	\	\	\

**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 has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode A. Therefore only the test data of the mode was recorded in this report.

The details of test channels and bandwidth were for RF conductive measurement.

1. For lowest channel : 2402MHz(Channel 00)
2. For middle channel : 2440MHz(Channel 19)
3. For highest channel: 2480MHz(Channel 39)

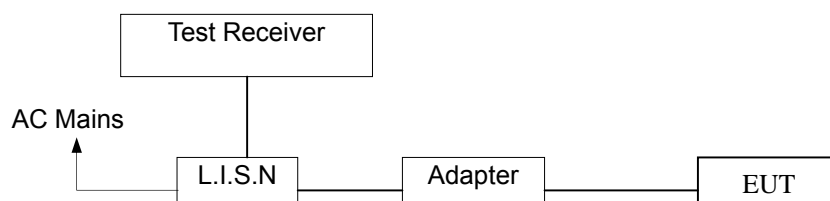


## 4. Conducted Emissions Test

### 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 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	05/15/2016	05/14/2017
L.I.S.N.	Rohde & Schwarz	ENV216	101161	05/15/2016	05/14/2017
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/15/2016	05/14/2017
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/15/2016	05/14/2017

### 4.4 Conducted Emission Limit

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

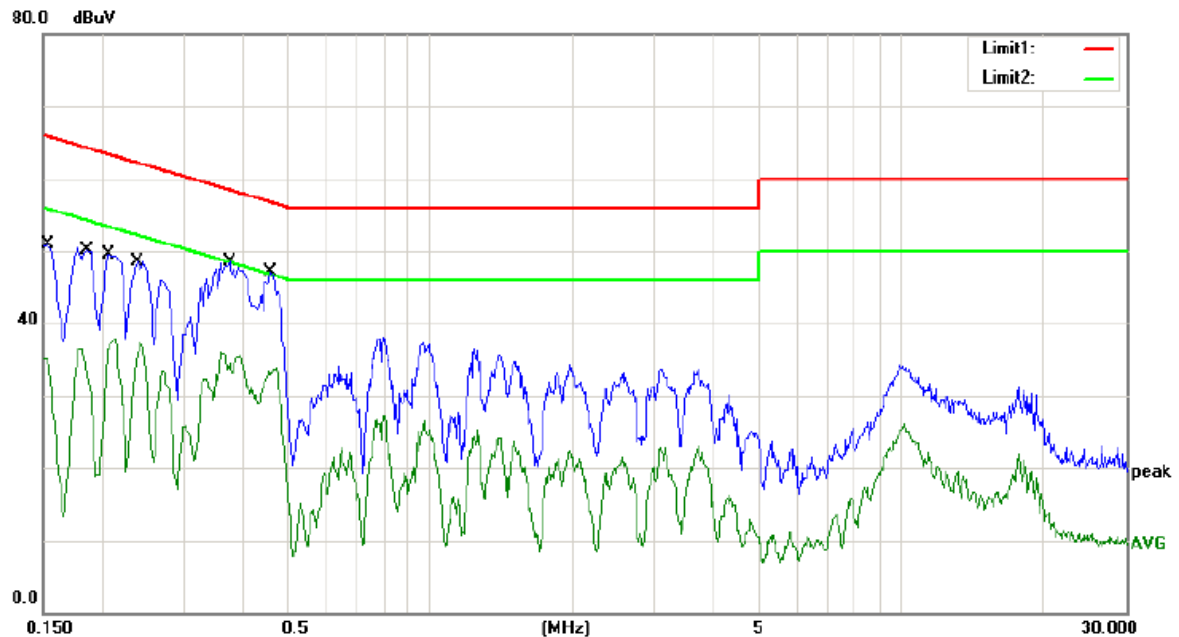
NOTE1-The lower limit shall apply at the transition frequencies.  
 NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

### 4.5 Measurement Result

Test mode : Continuous modulated carrier  
 Please refer to the following data.

**Note: All configurations have been tested, only the worst configuration (Low Channel) shown here.**

TX Mode:



Site site #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B\_QP

Power: AC 120V/60Hz

Humidity: 50 %

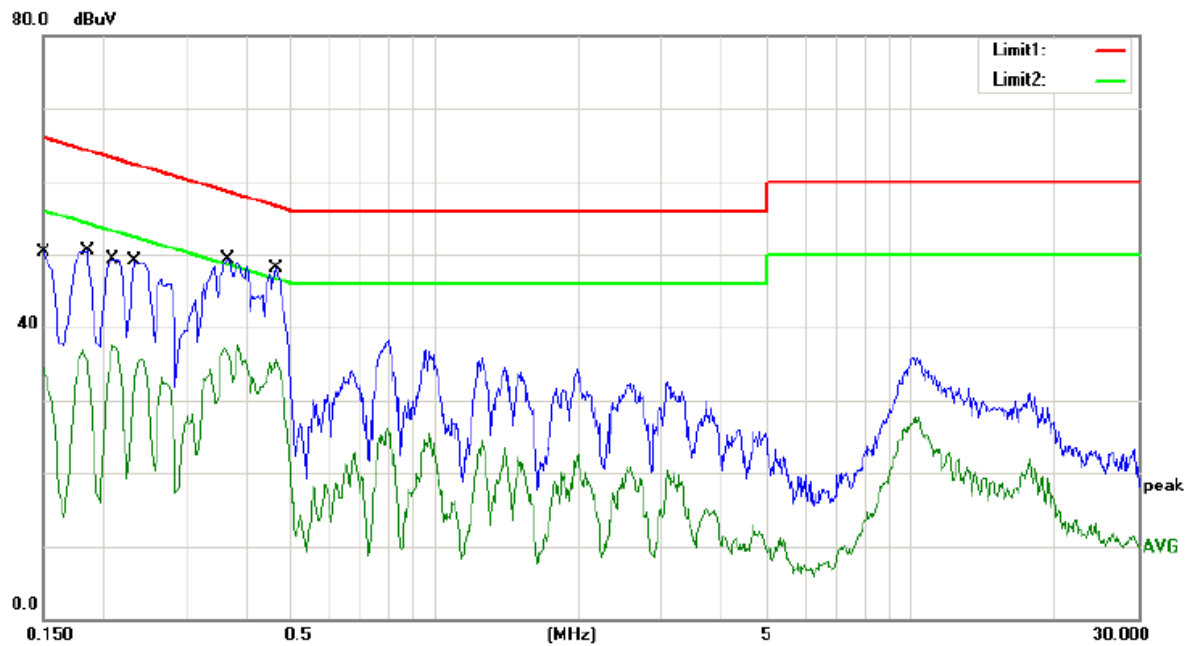
EUT: Wireless Chraging Transmitter

M/N: CFS011

Mode: TX(2402MHz)

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1540	39.90	11.00	50.90	65.78	-14.88	QP	
2		0.1540	24.10	11.00	35.10	55.78	-20.68	AVG	
3		0.1860	39.10	11.00	50.10	64.21	-14.11	QP	
4		0.1860	21.70	11.00	32.70	54.21	-21.51	AVG	
5		0.2100	38.30	11.00	49.30	63.21	-13.91	QP	
6		0.2100	26.30	11.00	37.30	53.21	-15.91	AVG	
7		0.2380	37.40	11.00	48.40	62.17	-13.77	QP	
8		0.2380	24.90	11.00	35.90	52.17	-16.27	AVG	
9		0.3740	37.40	11.00	48.40	58.41	-10.01	QP	
10		0.3740	23.00	11.00	34.00	48.41	-14.41	AVG	
11	*	0.4580	36.00	11.00	47.00	56.73	-9.73	QP	
12		0.4580	21.80	11.00	32.80	46.73	-13.93	AVG	



Site site #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 class B\_QP

Power: AC 120V/60Hz

Humidity: 50 %

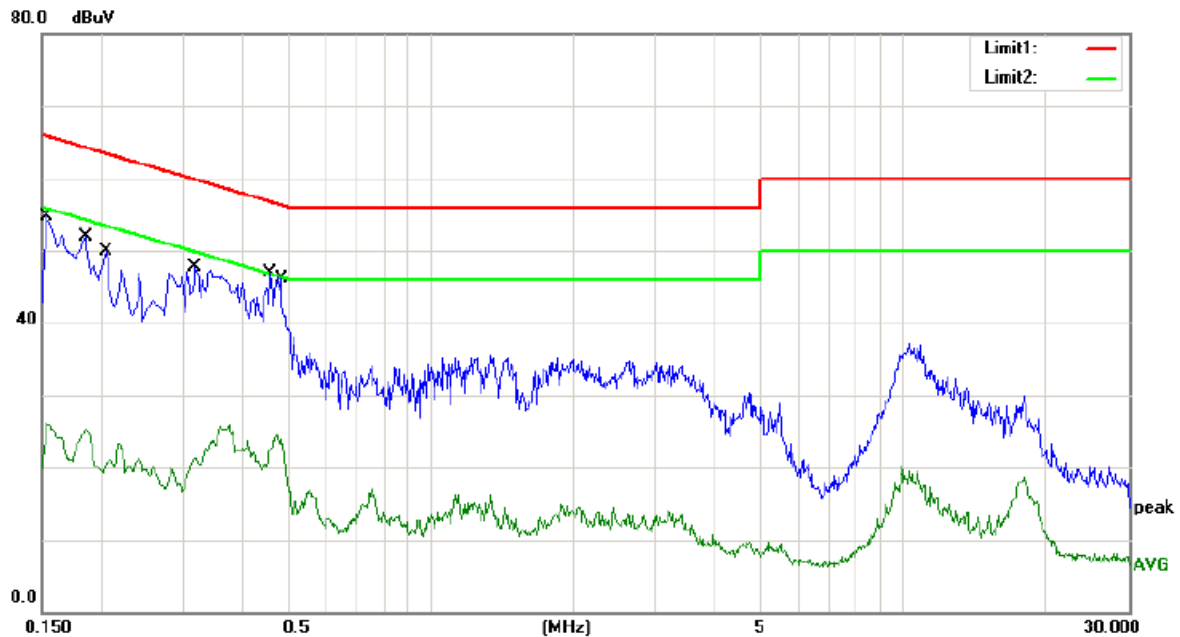
EUT: Wireless Chraging Transmitter

M/N: CFS011

Mode: TX(2402MHz)

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	39.30	11.00	50.30	66.00	-15.70	QP	
2		0.1500	23.50	11.00	34.50	56.00	-21.50	AVG	
3		0.1860	39.40	11.00	50.40	64.21	-13.81	QP	
4		0.1860	23.50	11.00	34.50	54.21	-19.71	AVG	
5		0.2100	38.30	11.00	49.30	63.21	-13.91	QP	
6		0.2100	26.40	11.00	37.40	53.21	-15.81	AVG	
7		0.2340	38.00	11.00	49.00	62.31	-13.31	QP	
8		0.2340	22.50	11.00	33.50	52.31	-18.81	AVG	
9		0.3660	38.20	11.00	49.20	58.59	-9.39	QP	
10		0.3660	25.40	11.00	36.40	48.59	-12.19	AVG	
11	*	0.4620	37.00	11.00	48.00	56.66	-8.66	QP	
12		0.4620	24.10	11.00	35.10	46.66	-11.56	AVG	



Site site #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B\_QP

Power: AC 240V/60Hz

Humidity: 50 %

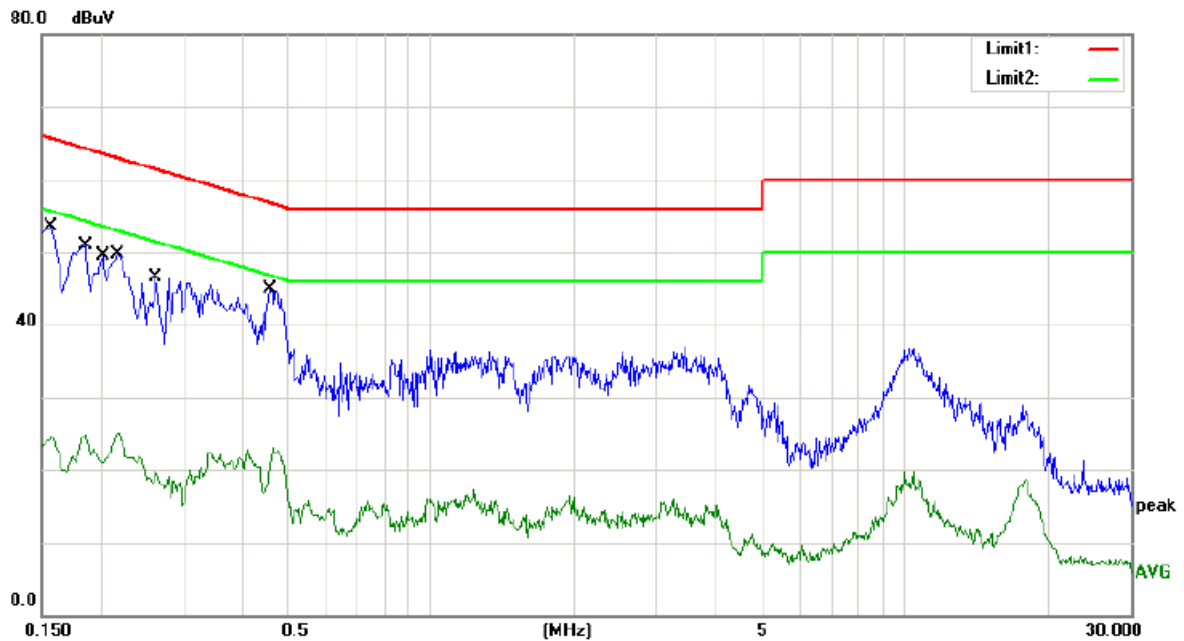
EUT: Wireless Chraging Transmitter

M/N: CFS011

Mode: TX(2402MHz)

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1540	43.60	11.00	54.60	65.78	-11.18	QP	
2		0.1540	15.10	11.00	26.10	55.78	-29.68	AVG	
3		0.1860	40.90	11.00	51.90	64.21	-12.31	QP	
4		0.1860	14.20	11.00	25.20	54.21	-29.01	AVG	
5		0.2060	38.80	11.00	49.80	63.37	-13.57	QP	
6		0.2060	9.60	11.00	20.60	53.37	-32.77	AVG	
7		0.3180	36.70	11.00	47.70	59.76	-12.06	QP	
8		0.3180	10.30	11.00	21.30	49.76	-28.46	AVG	
9	*	0.4580	35.80	11.00	46.80	56.73	-9.93	QP	
10		0.4580	11.50	11.00	22.50	46.73	-24.23	AVG	
11		0.4820	35.10	11.00	46.10	56.30	-10.20	QP	
12		0.4820	12.30	11.00	23.30	46.30	-23.00	AVG	



Site site #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 class B\_QP

Power: AC 240V/60Hz

Humidity: 50 %

EUT: Wireless Chraging Transmitter

M/N: CFS011

Mode: TX(2402MHz)

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1580	42.40	11.00	53.40	65.57	-12.17	QP	
2		0.1580	13.50	11.00	24.50	55.57	-31.07	AVG	
3		0.1860	39.90	11.00	50.90	64.21	-13.31	QP	
4		0.1860	13.60	11.00	24.60	54.21	-29.61	AVG	
5		0.2020	38.50	11.00	49.50	63.53	-14.03	QP	
6		0.2020	10.10	11.00	21.10	53.53	-32.43	AVG	
7		0.2180	38.60	11.00	49.60	62.89	-13.29	QP	
8		0.2180	14.10	11.00	25.10	52.89	-27.79	AVG	
9		0.2620	35.50	11.00	46.50	61.37	-14.87	QP	
10		0.2620	8.70	11.00	19.70	51.37	-31.67	AVG	
11	*	0.4580	33.80	11.00	44.80	56.73	-11.93	QP	
12		0.4580	9.90	11.00	20.90	46.73	-25.83	AVG	

## 5. Radiated Emission Test

### 5.1 Measurement Procedure

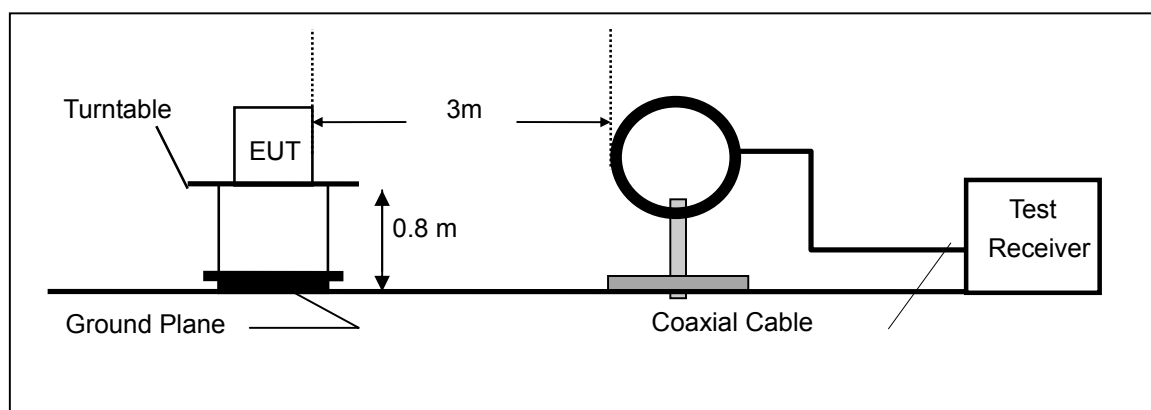
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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

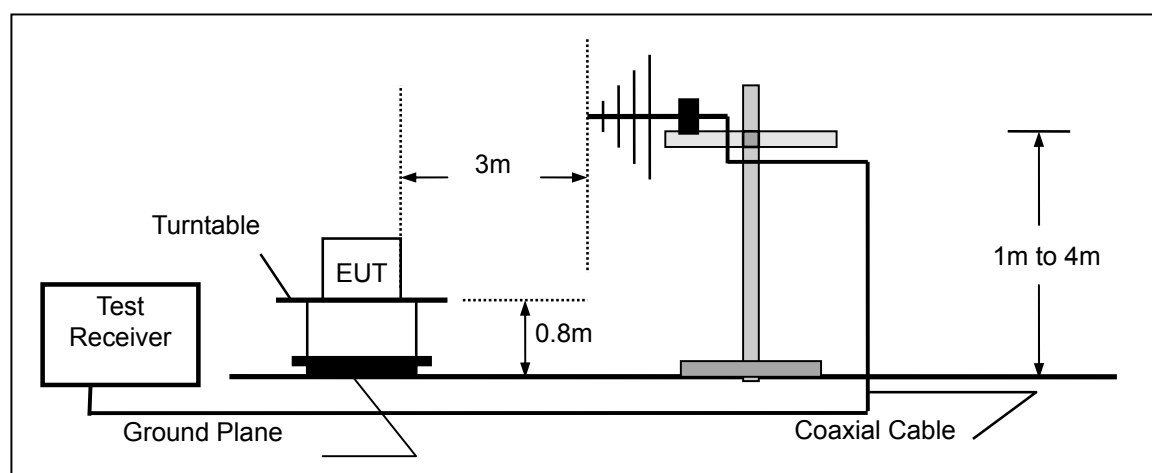
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

### 5.2 Test SET-UP (Block Diagram of Configuration)

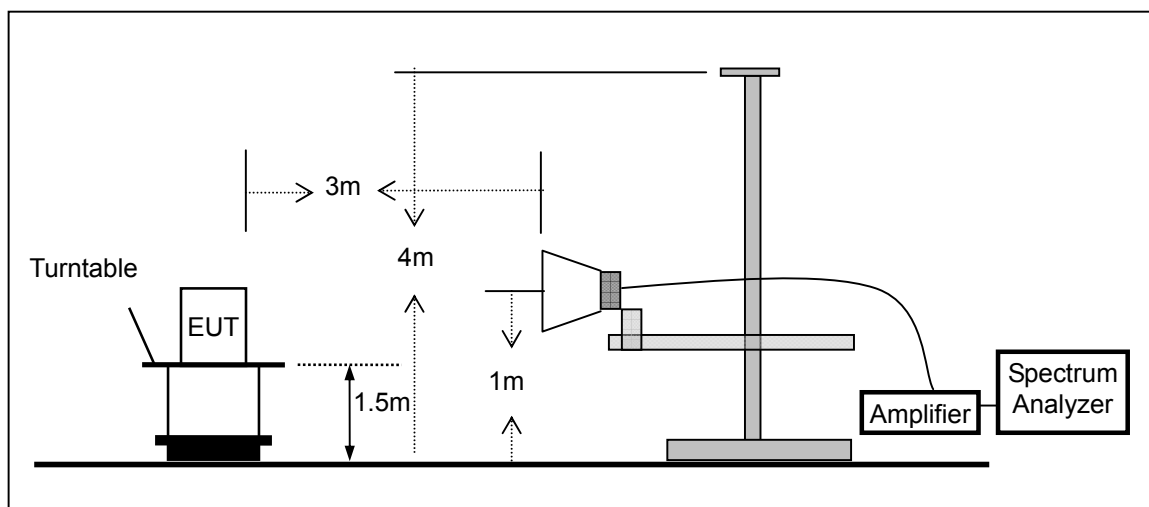
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(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	05/15/2016	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	05/15/2016	1 Year
3.	Pre-Amplifier	A.H.	PAM-0126	1415261	05/15/2016	1 Year
4.	Bilog Antenna	Schwarzbeck	VULB9163	142	05/15/2016	1 Year
5.	Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	05/15/2016	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/15/2016	1 Year
7.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/15/2016	1 Year
8.	Cable	Schwarzbeck	AK9513	ACRX1	05/15/2016	1 Year
9.	Cable	Rosenberger	N/A	FP2RX2	05/15/2016	1 Year
10.	Cable	Schwarzbeck	AK9513	CRPX1	05/15/2016	1 Year
11.	Cable	Schwarzbeck	AK9513	CRRX2	05/15/2016	1 Year

#### 5.4 Radiated emission limit

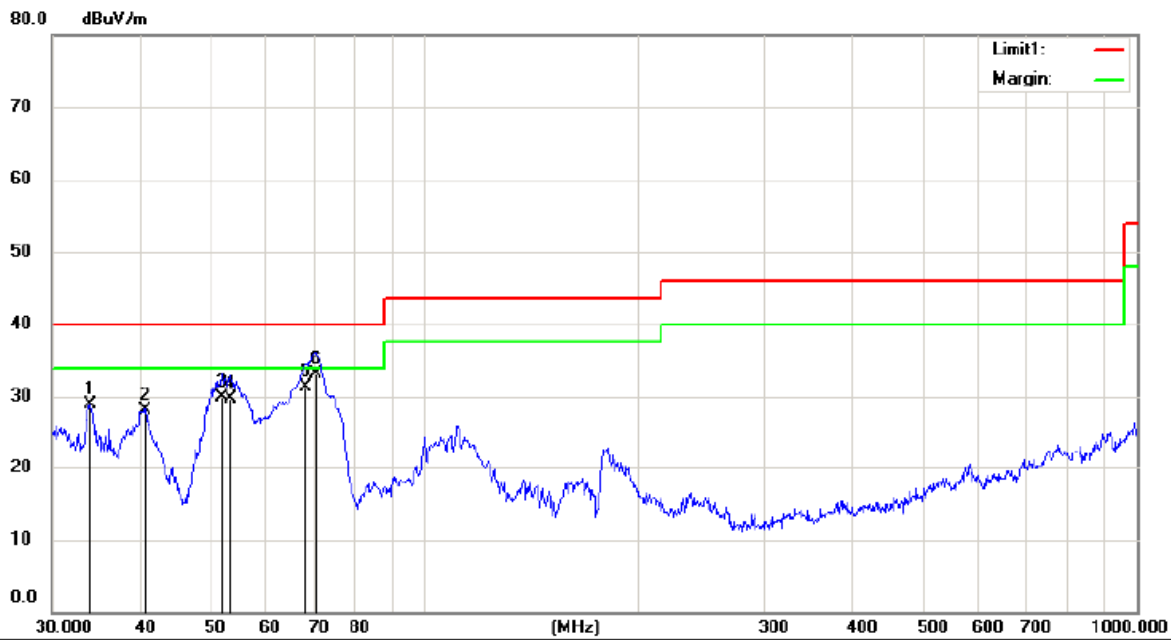
Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance(m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
0.009~0.490	2400/F(KHz)	300	/
0.490~1.705	2400/F(KHz)	30	/
1.705~30.0	30	30	/
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

#### 5.5 Measurement Result

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



Note: All configurations have been tested, only the worst configuration (GFSK Low Channel) shown here.



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

Power: AC 120V/60Hz

Humidity: 52 %

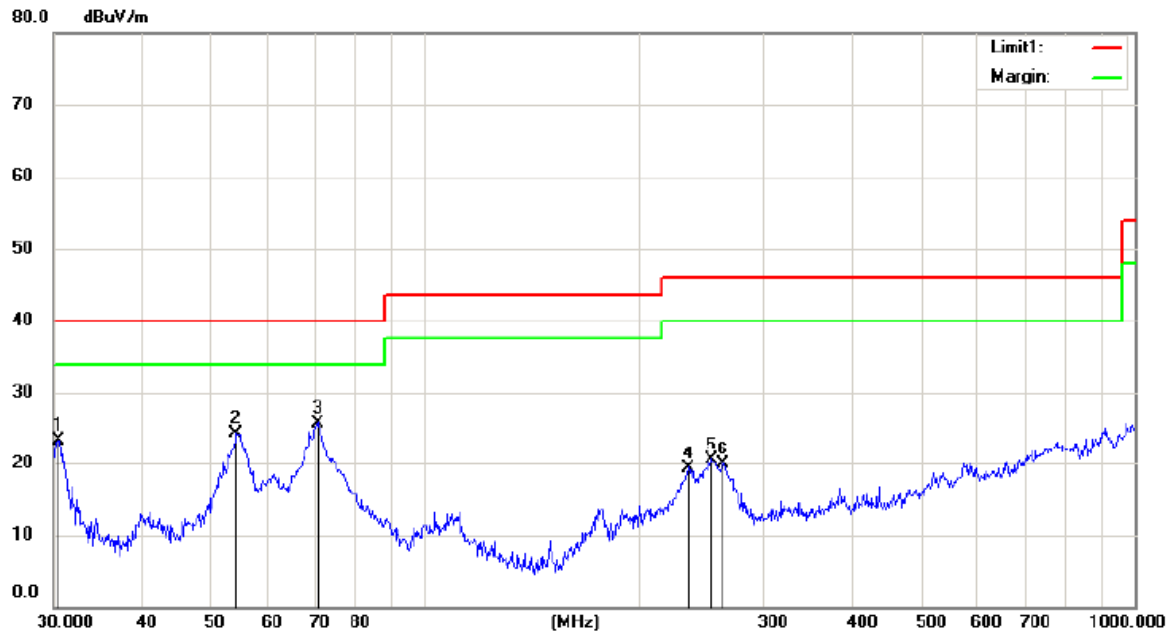
EUT: Wireless Chraging Transmitter

M/N: CFS011

Mode:TX(2402MHz)

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		33.9172	51.28	-22.38	28.90	40.00	-11.10	QP		
2		40.5591	48.76	-20.56	28.20	40.00	-11.80	QP		
3		52.0251	49.57	-19.57	30.00	40.00	-10.00	QP		
4		53.5052	49.35	-19.55	29.80	40.00	-10.20	QP		
5		68.1512	54.99	-23.59	31.40	40.00	-8.60	QP		
6	*	70.3365	57.37	-24.17	33.20	40.00	-6.80	QP		



Site site #1  
 Limit: FCC Part15 Class B 3M Radiation  
 EUT: Wireless Chraging Transmitter  
 M/N: CFS011  
 Mode:TX(2402MHz)  
 Note:

Polarization: **Horizontal**  
 Power: AC 120V/60Hz  
 Temperature: 20 C  
 Humidity: 52 %

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		30.5306	47.48	-24.08	23.40	40.00	-16.60	QP		
2		54.2610	43.92	-19.62	24.30	40.00	-15.70	QP		
3	*	70.5836	50.06	-24.26	25.80	40.00	-14.20	QP		
4		234.9910	40.66	-21.26	19.40	46.00	-26.60	QP		
5		253.8367	42.02	-21.42	20.60	46.00	-25.40	QP		
6		262.8955	40.86	-20.86	20.00	46.00	-26.00	QP		

Above 1000MHz:

Test Date : 06/21/2016 Temperature : 24 °C  
 Test Result: Pass Humidity : 54 %  
 Test By: KY

TX Mode (CH00: 2402MHz)							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4802.00	V	63.18	45.97	74.00	54.00	-10.82	-8.03
7202.00	V	59.47	42.22	74.00	54.00	-14.53	-11.78
9611.00	V	60.86	42.50	74.00	54.00	-13.14	-11.50
12009.00	V	59.80	42.52	74.00	54.00	-14.20	-11.48
14412.00	V	59.10	40.92	74.00	54.00	-14.90	-13.08
4802.00	H	65.32	47.17	74.00	54.00	-8.68	-6.83
7202.00	H	60.14	42.21	74.00	54.00	-13.86	-11.79
9611.00	H	59.09	41.89	74.00	54.00	-14.91	-12.11
12009.00	H	60.32	42.05	74.00	54.00	-13.68	-11.95
14409.00	H	59.67	41.01	74.00	54.00	-14.33	-12.99

TX Mode (CH19: 2440MHz)							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4880.00	H	64.62	46.88	74.00	54.00	-9.38	-7.12
7323.00	H	60.56	42.67	74.00	54.00	-13.44	-11.33
9769.00	H	61.00	44.19	74.00	54.00	-13.00	-9.81
12209.00	H	59.50	40.85	74.00	54.00	-14.50	-13.15
14654.00	H	60.52	40.50	74.00	54.00	-13.48	-13.50
4880.00	V	64.10	45.85	74.00	54.00	-9.90	-8.15
7322.00	V	60.99	43.67	74.00	54.00	-13.01	-10.33
9768.00	V	61.08	42.58	74.00	54.00	-12.92	-11.42
12206.00	V	60.60	42.31	74.00	54.00	-13.40	-11.69
14648.00	V	58.30	41.79	74.00	54.00	-15.70	-12.21

TX Mode (CH39: 2480MHz)							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4960.00	H	63.94	45.62	74.00	54.00	-10.06	-8.38
7439.00	H	62.06	43.73	74.00	54.00	-11.94	-10.27
9921.00	H	61.30	43.88	74.00	54.00	-12.70	-10.12
12397.00	H	62.36	43.69	74.00	54.00	-11.64	-10.31
14879.00	H	57.58	41.03	74.00	54.00	-16.42	-12.97
4960.00	V	64.54	45.27	74.00	54.00	-9.46	-8.73
7438.00	V	62.38	43.26	74.00	54.00	-11.62	-10.74
9924.00	V	62.05	43.05	74.00	54.00	-11.95	-10.95
12399.00	V	62.52	42.77	74.00	54.00	-11.48	-11.23
14879.00	V	59.49	39.93	74.00	54.00	-14.51	-14.07

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

## 6. 6dB Bandwidth Measurement

### 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	101414	05/15/2016	05/14/2017

### 6.4 Limit

The minimum 6dB bandwidth shall be at least 500kHz.

### 6.5 Measurement Results

The following table is the setting of spectrum analyzer.

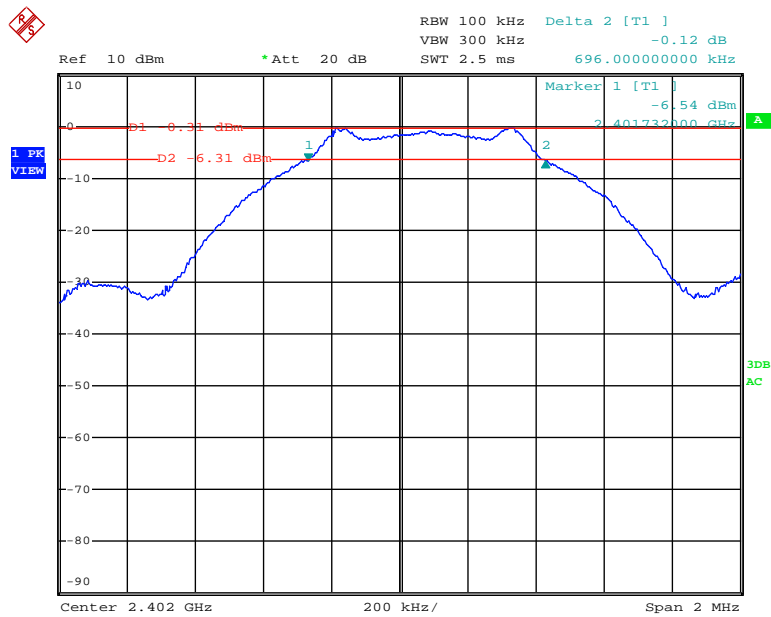
Attenuation	Auto
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max hold

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	06/04/2015
Test By:	KK	Temperature :	24 °C
Test Result:	Pass	Humidity :	53 %

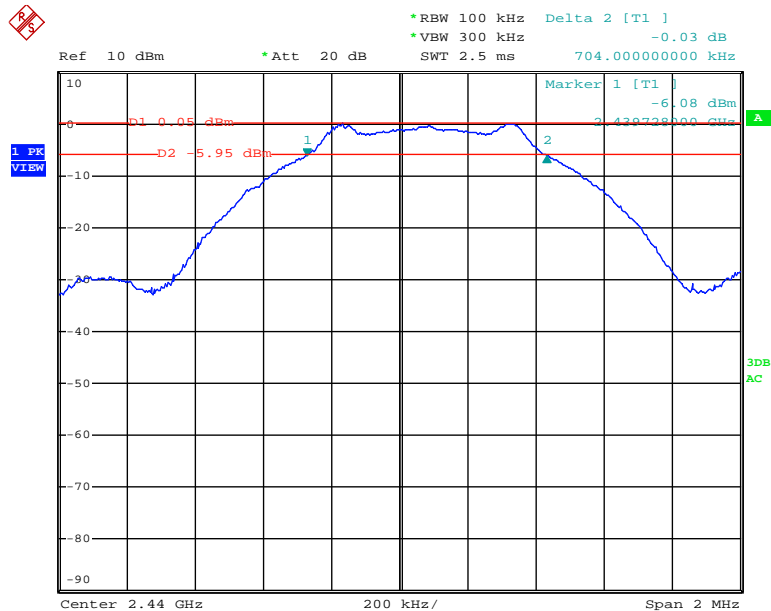
Channel number	Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)
00	2402	696	>500
19	2440	704	>500
39	2480	708	>500

### Channel 00:



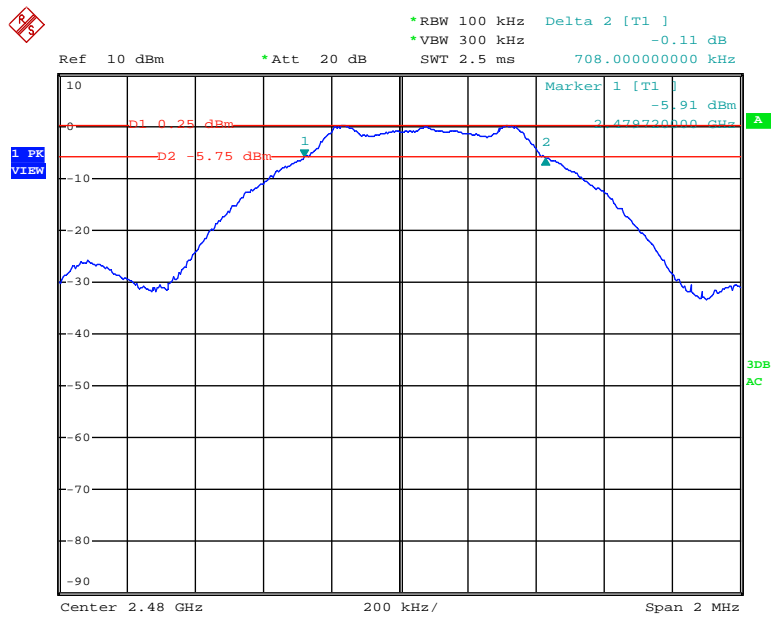
Date: 4.JUN.2016 15:17:57

### Channel 19:



Date: 4.JUN.2016 15:26:06

**Channel 39:**



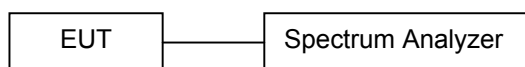
Date: 4.JUN.2016 15:30:19

## 7. Maximum Peak Output Power Test

### 7.1 Measurement Procedure

- The Transmitter output (antenna port) was connected to the spectrum Analyzer.
- Turn on the EUT and then record the peak power value.
- Repeat above procedures on all channels needed to be tested.

### 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	101414	05/15/2016	05/14/2017

### 7.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

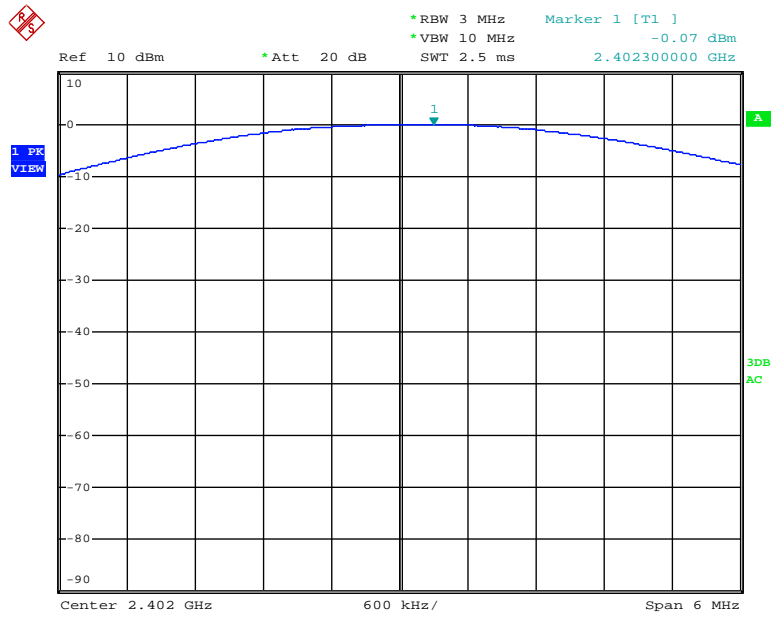
### 7.5 Measurement Results

Refer to attached data chart.

Spectrum Detector:	PK	Test Date:	06/04/2016
Test By:	KK	Temperature:	24 °C
Test Result:	Pass	Humidity:	53 %

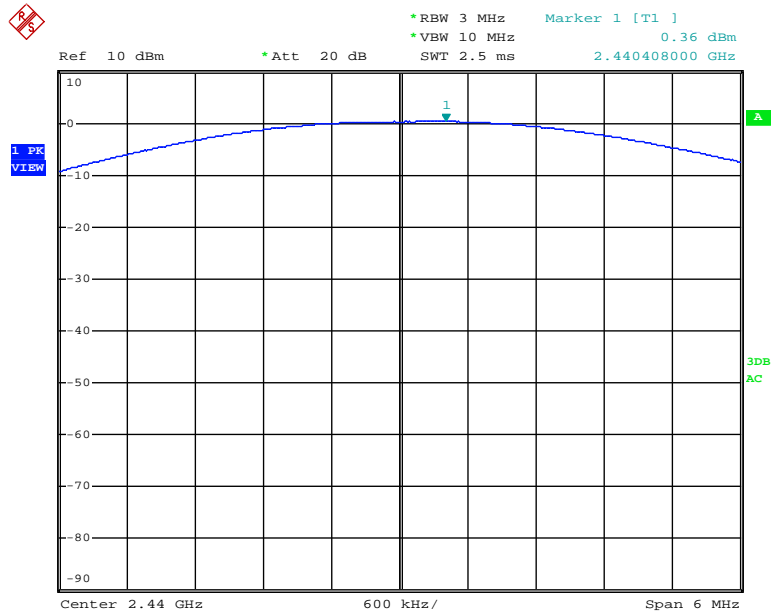
Channel number	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(W)	Pass/Fail
00	2402	-0.07	0.98	1W(30dBm)	Pass
20	2440	0.36	1.09	1W(30dBm)	Pass
39	2480	1.00	1.26	1W(30dBm)	Pass

### Channel 00:



Date: 4.JUN.2016 15:18:38

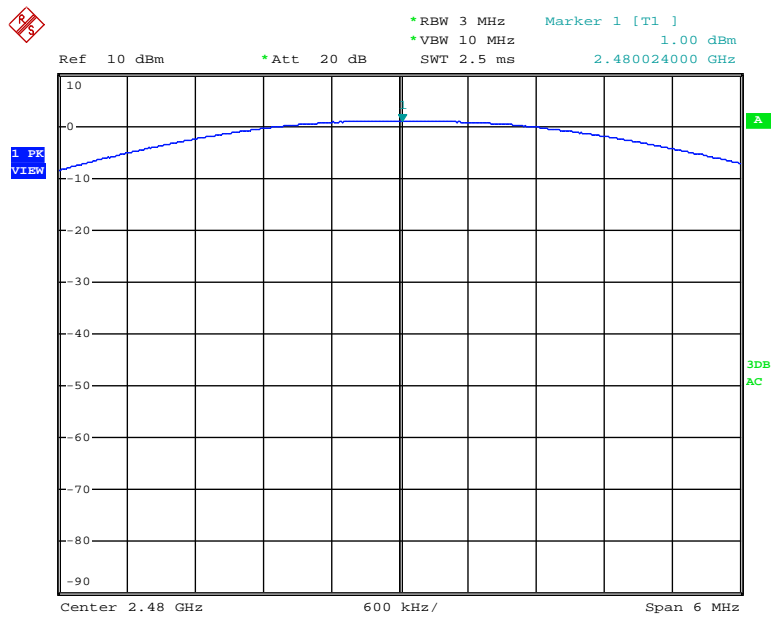
### Channel 19:



Date: 4.JUN.2016 15:27:46



**Channel 39:**



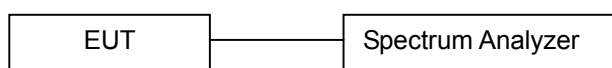
Date: 4.JUN.2016 15:29:24

## 8. Power Spectral Density Measurement

### 8.1 Measurement Procedure

The EUT was operating in Bluetooth 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

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	101414	05/15/2016	05/14/2017

### 8.4 Measurement Procedure

- The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- Set to the maximum power setting and enable the EUT transmit continuously.
- Make the measurement with the spectrum analyzer's resolution bandwidth (RBW)=3 kHz. Video bandwidth VBW =10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
- Detector =Peak, Sweep time =Auto couple, Trace mode =Max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
- Measure and record the results in the test report.
- The Measured power density (dBm)/ 100KHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

### 8.5 Measurement Results

The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS bandwidth.
RB	3KHz
VB	10KHz
Detector	Peak
Trace	Max hold
Sweep Time	Automatic

Refer to attached data chart.

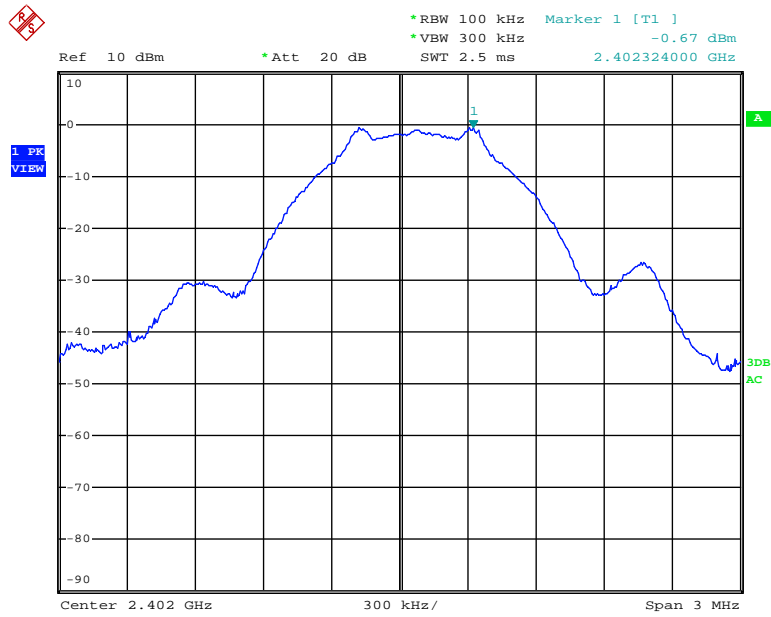
Spectrum Detector:	PK	Test Date :	06/04/2016
Test By:	KK	Temperature :	24 °C
Test Result:	Pass	Humidity :	53 %

Channel number	Channel frequency (MHz)	Measurement level (dBm)		Required Limit (dBm/3kHz)	Pass/Fail
		PSD/100kHz	PSD/3kHz		
00	2402	-0.67	-13.47	8	Pass
20	2440	-0.08	-12.86	8	Pass
39	2480	-0.01	-11.71	8	Pass

Note:

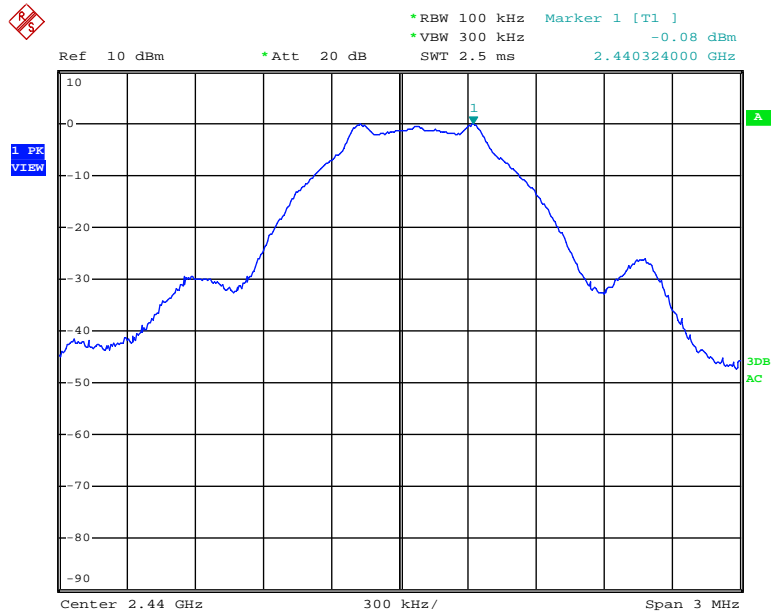
1. Measured power density(dBm) has offset with cable loss.
2. The measured power density(dBm)/100KHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.

### PSD 100kHz Plot: Channel 00



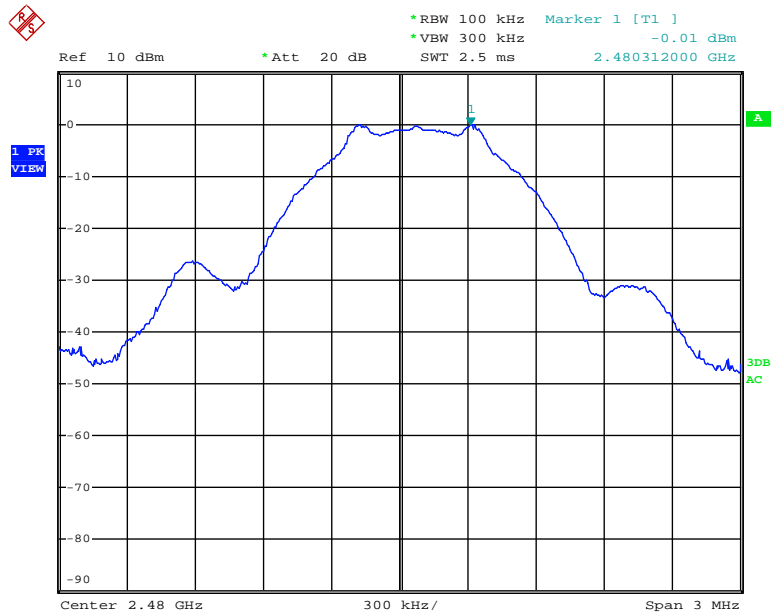
Date: 4.JUN.2016 15:19:41

### PSD 100kHz Plot: Channel 19



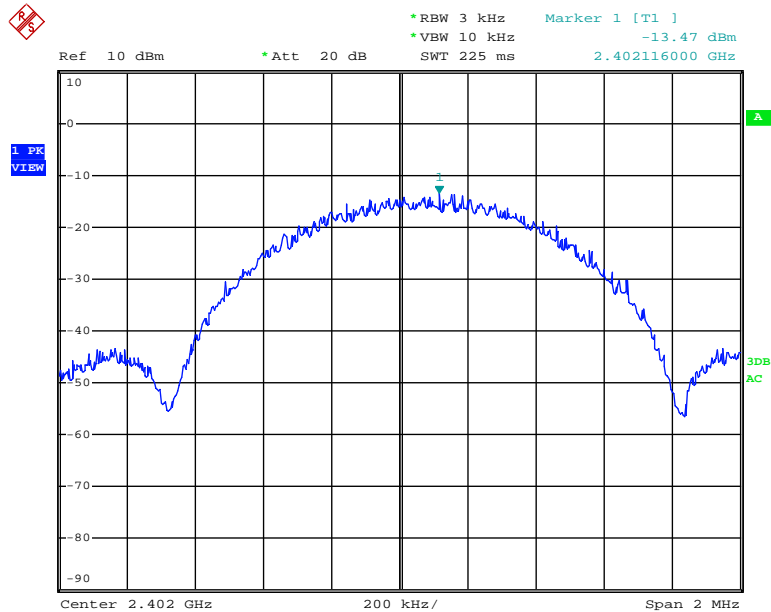
Date: 4.JUN.2016 15:26:40

### PSD 100kHz Plot: Channel 39



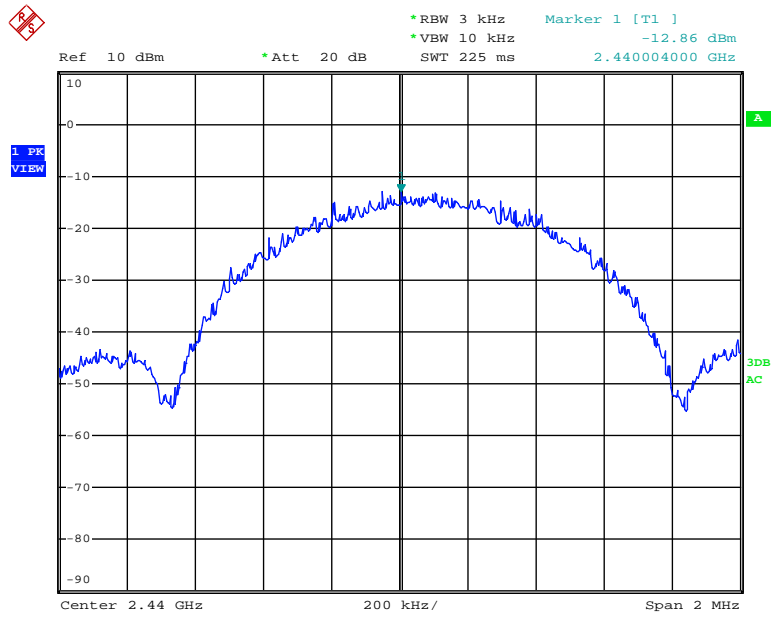
Date: 4.JUN.2016 15:30:52

### PSD 3kHz Plot: Channel 00



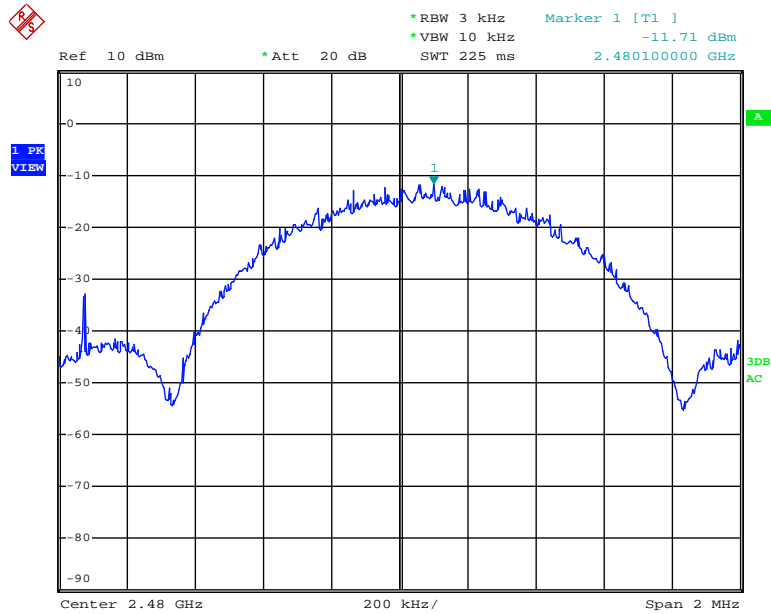
Date: 4.JUN.2016 15:21:45

### PSD 3kHz Plot: Channel 19



Date: 4.JUN.2016 15:27:02

### PSD 3kHz Plot: Channel 39



Date: 4.JUN.2016 15:31:39

## 9. Band Edge Test

### 9.1 Measurement Procedure

(A) Conducted method:

- The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.
- The spectrum from 30MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.
- Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were preformed with all chains feeding a combiner.

(B) Radiated method:

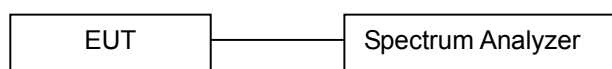
- The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
- The EUT was placed on a turn table which is 0.8m above ground plane.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until all frequency measured were complete.

(Peak measurement: Peak detector, RBW=1MHz, VBW=3MHz, Sweep=Auto)

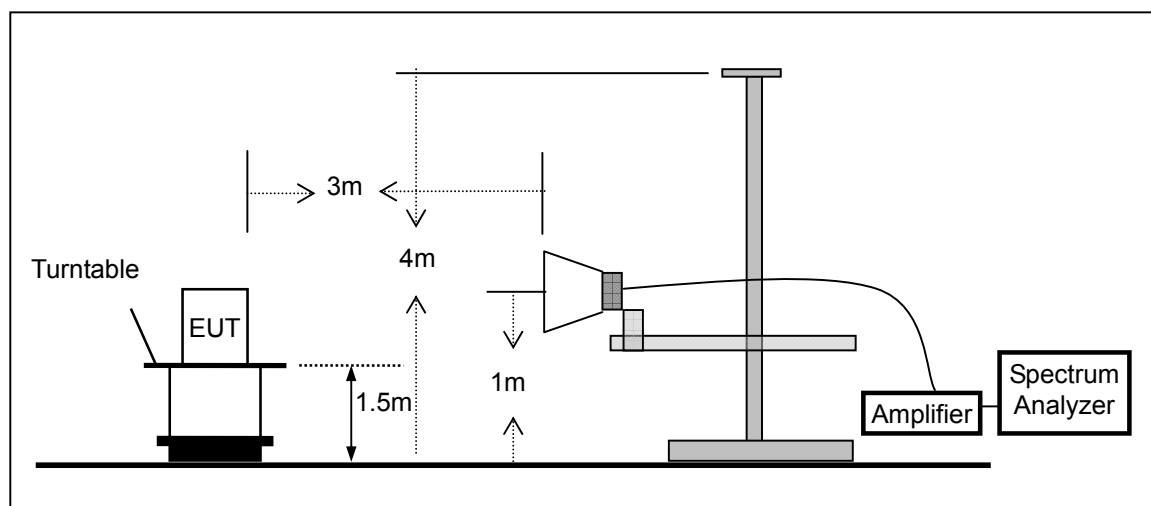
(Average measurement: Peak detector, RBW=1MHz, VBW=10Hz, Sweep=Auto)

### 9.2 Test SET-UP (Block Diagram of Configuration)

Conducted method:



Radiated method:



### 9.3 Measurement Equipment Used

Conducted method: Same as 6.3 Channel Separation Measurement.  
Radiated method: Same as 5.3 Radiated Emission Measurement.

### 9.4 Measurement Results

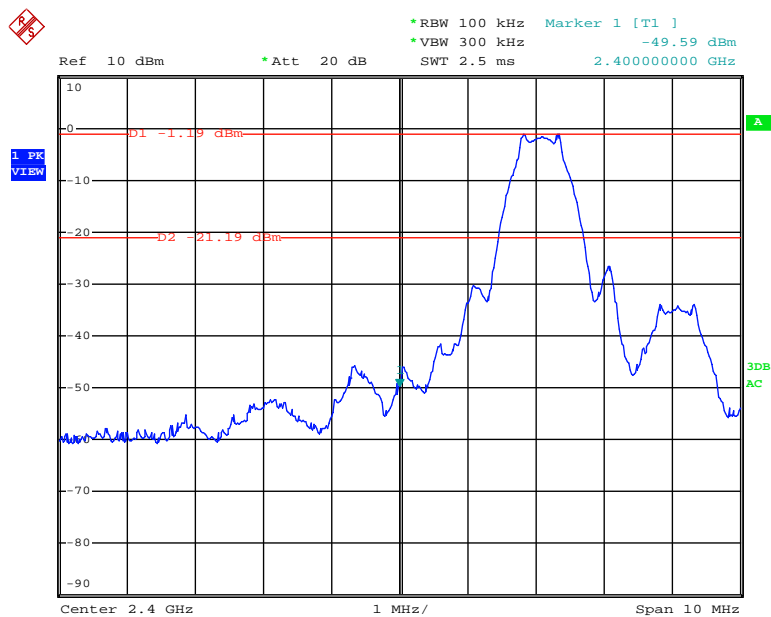
Pass  
Refer to attached data chart.

#### (A) Conducted method:

Spectrum Detector:	PK	Test Date :	06/04/2016
Test By:	KK	Temperature :	24 °C
Test Result:	Pass	Humidity :	53 %

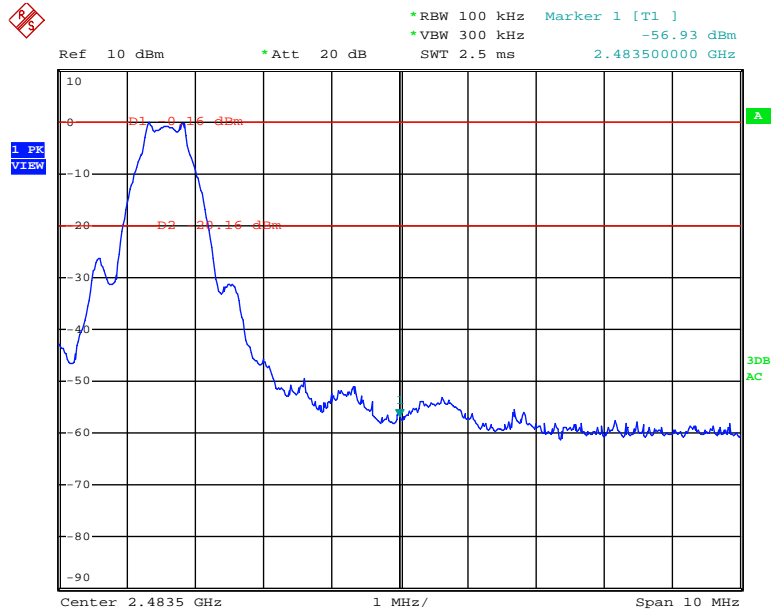
Frequency (MHz)	Peak Power Output(dBm)	Emission read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)
2400.00	-1.19	-49.59	48.40	>20dBc
2483.50	-0.16	-56.93	56.77	>20dBc

Test Plot:



Date: 4.JUN.2016 15:23:03





Date: 4.JUN.2016 15:33:03

**(B) Radiated method:**

Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
2400.00	H	55.30	47.66	74.00	54.00	-18.70	-6.34
2400.00	V	53.02	44.05	74.00	54.00	-20.98	-9.95
2483.50	H	58.01	47.08	74.00	54.00	-15.99	-6.92
2483.50	V	56.40	43.80	74.00	54.00	-17.60	-10.20

## **10. Antenna Application**

### **10.1 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.

### **10.2 Result**

The EUT'S antenna is PCB antenna, and the antenna can't be replaced by the user, which in accordance to section 15.203, please refer to the internal photos. The antenna's gain is 1.3dBi and meets the requirement.

**---The End---**