

# Radio Test Report

Report No.: STS2403107W01

Issued for

GEMMY INDUSTRIES (HK)LIMITED BVI

Unit No.301 on 3rd Floor, East Ocean Centre, No.98,  
Kowloon, Hong Kong

Product Name: Orchestra of Lights-Lightshow Projection

Brand Name: N/A

Model Name: 883104

Series Model(s): N/A

FCC ID: GPO883104B

Test Standards: FCC Part 15.249

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.



TEST REPORT

**Applicant's Name** ..... : GEMMY INDUSTRIES (HK)LIMITED BVI  
**Address** ..... : Unit No.301 on 3rd Floor, East Ocean Centre, No.98, Kowloon, Hong Kong

**Manufacturer's Name** ..... : GEMMY INDUSTRIES (HK)LIMITED BVI  
**Address** ..... : Unit No.301 on 3rd Floor, East Ocean Centre, No.98, Kowloon, Hong Kong

**Factory1** ..... : ZAIXING ELECTRONIC (SHENZHEN) CO., LTD  
**Address** ..... : No. 1 and 3, 1st Road Yang Yong, Tangxiayong Community, Yanluo Street, Bao'an District, Shenzhen City, Guangdong Province, China

**Factory2** ..... : YUQI ELECTRONIC (HUAIBEI) CO., LTD  
**Address** ..... : 32 fengguan road, xiangshan district, Huaibei city, Anhui province, China

**Factory3** ..... : XINGYU ELECTRONIC (HUIZHOU) CO., LTD  
**Address** ..... : Hengjiangwei Village, Yihe Town, Boluo County, Huizhou City, Guangdong Province, China

**Factory4** ..... : QIYANG TECHNOLOGY (HUAIBEI) CO., LTD  
**Address** ..... : 32 Fengguan road, xiangshan district, Huaibei city, Anhui province

**Factory5** ..... : YUAN HONG COMPANY LIMITED  
**Address** ..... : No. 3 Street, My Xuan A Industrial Zone, My Xuan Ward, Phu My Town, Ba Ria-Vung Tau province, Vietnam

**Factory6** ..... : DYNATECH LIGHTING TECHNOLOGY CO., LTD  
**Address** ..... : GIGA RESOURCE SPECIAL ECONOMIC ZONE, NATIONAL ROAD NO.1, DERM POU VILLAGE, REAY COMMUNE, SVAY TEAP DISTRICT, SVAY RIENG PROVINCE, CAMBODIA

**Product Description**

**Product Name** ..... : Orchestra of Lights-Lightshow Projection

**Brand Name** ..... : N/A

**Model Name** ..... : 883104

**Series Model(s)** ..... : N/A

**Test Standards** ..... : FCC Part 15.249

**Test Procedure** ..... : ANSI C63.10-2020

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

**Date of Test** ..... :

**Date of receipt of test item** ..... : 11 Mar. 2024

**Date of performance of tests** . : 11 Mar. 2024 ~ 30 Apr. 2024

**Date of Issue** ..... : 30 Apr. 2024



Test Result ..... : **Pass**

Testing Engineer :

*Aaron Bu*

\_\_\_\_\_  
(Aaron Bu)

Technical Manager :

*Chris Chen*

\_\_\_\_\_  
(Chris Chen)



Authorized Signatory :

*Bovey Yang*

\_\_\_\_\_  
(Bovey Yang)



Table of Contents	Page
<b>1. SUMMARY OF TEST RESULTS</b>	<b>6</b>
1.1 TEST FACTORY	7
1.2 MEASUREMENT UNCERTAINTY	7
<b>2. GENERAL INFORMATION</b>	<b>8</b>
2.1 GENERAL DESCRIPTION OF THE EUT	8
2.2 DESCRIPTION OF THE TEST MODES	9
2.3 TEST SOFTWARE AND POWER LEVEL	9
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	9
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	12
<b>3. EMC EMISSION TEST</b>	<b>13</b>
3.1 CONDUCTED EMISSION MEASUREMENT	13
3.2 RADIATED EMISSION MEASUREMENT	17
<b>4. BANDWIDTH TEST</b>	<b>37</b>
4.1 TEST PROCEDURE	37
4.2 TEST SETUP	37
4.3 EUT OPERATION CONDITIONS	37
4.4 TEST RESULTS	38
<b>5. ANTENNA REQUIREMENT</b>	<b>40</b>
5.1 STANDARD REQUIREMENT	40
5.2 EUT ANTENNA	40
<b>APPENDIX- PHOTOS OF TEST SETUP</b>	<b>41</b>



**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	30 Apr. 2024	STS2403107W01	ALL	Initial Issue



### 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

<b>FCC Part 15.249 , Subpart C</b>			
<b>Standard Section</b>	<b>Test Item</b>	<b>Judgment</b>	<b>Remark</b>
15.207	Conducted Emission	Pass	
15.203	Antenna Requirement	Pass	
15.249	Radiated Spurious Emission	Pass	
15.249	Radiated Band Edge Emission	Pass	
15.249	Field Strength of fundamental	Pass	
15.215(c)	20dB Bandwidth	Pass	

**NOTE:**

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to ANSI C63.10-2020.

### 1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. :101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

### 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95** %.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.755\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.874\text{dB}$
3	All emissions, radiated 9K-30MHz	$\pm 3.80\text{dB}$
4	All emissions, radiated 30M-1GHz	$\pm 4.18\text{dB}$
5	All emissions, radiated 1G-6GHz	$\pm 4.90\text{dB}$
6	All emissions, radiated >6G	$\pm 5.24\text{dB}$
7	Conducted Emission (9KHz-150KHz)	$\pm 2.19\text{dB}$
8	Conducted Emission (150KHz-30MHz)	$\pm 2.53\text{dB}$
9	Occupied Channel Bandwidth	$\pm 3.5\%$
10	Power Spectral Density, conducted	$\pm 1.245\text{dB}$
11	Duty Cycle	$\pm 3.2\%$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Orchestra of Lights-Lightshow Projection
Brand Name	N/A
Model Name	883104
Series Model(s)	N/A
Model Difference	N/A
Product Description	The EUT is a Orchestra of Lights-Lightshow Projection.
	Operation Frequency: 2420MHz,2443MHz,2465MHz
	Modulation Type: GFSK
	Antenna Designation: PCB
	Antenna Gain(Peak): 3 dBi
	Based on the application, features, or specification exhibited in User Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User Manual.
Rating	Input: AC 120V
Connecting I/O Port(s)	Please refer to the Note 1.
Hardware version number	883104-USA ( V2 )
Software version number	883104-USA ( V2 )



Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
- 2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2420	2	2443	3	2465

- 3.

Test channel List		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	2420
middle	CH02	2443
highest	CH03	2465

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

## 2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions  
 Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

Pretest Mode	Description	Data/Modulation
Mode 1	TX/CH01	GFSK
Mode 2	TX/CH02	GFSK
Mode 3	TX/CH03	GFSK

Note:

- (1) All above mode have been measurement, only worst data was reported.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 4 : Keeping TX

## 2.3 TEST SOFTWARE AND POWER LEVEL

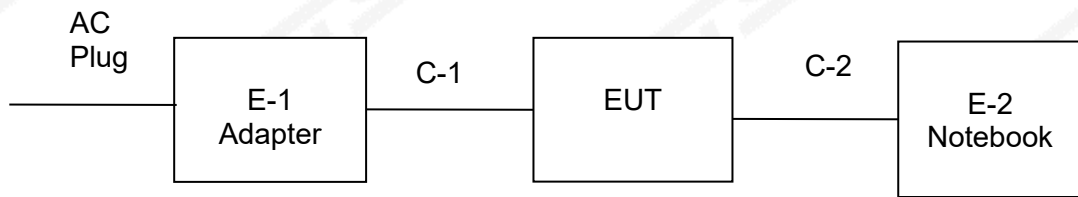
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
Other SRD	2.4G	GFSK	3	Default	The EUT has signal transmission when it is powered on

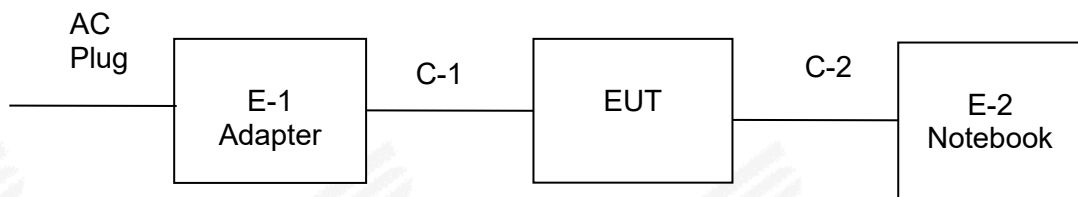
## 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters.

### Radiated Spurious Emission Test



### Conducted Emission Test



## 2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

### Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
	Personal computer	DELL	Inspiron 14-3467	N/A	N/A
	Adapter	N/A	N/A	150cm	NO

### Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
	Personal computer	DELL	Inspiron 14-3467	N/A	N/A
	USB Cable	N/A	N/A	150cm	NO
	Adapter	N/A	N/A	150cm	NO

#### Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



## 2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

## Radiation Test equipment

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2024.02.23	2025.02.22
Pre-Amplifier(1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2023.09.26	2024.09.25
Pre-Amplifier(18G-40GHz)	SKET	LNPA_1840-50	SK2018101801	2024.02.23	2025.02.22
Active loop Antenna	ZHINAN	ZN30900C	16035	2023.02.28	2025.02.27
Bilog Antenna	TESEQ	CBL6111D	34678	2022.09.30	2024.09.29
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2023.09.24	2025.09.23
Horn Antenna	A-INFOMW	LB-180400-KF	J211020657	2023.10.10	2025.10.09
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2023.09.26	2024.09.25
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	SC100_1	60531	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC power supply	HONGSHENG FENG	DPS-305AF	17064939	2023.09.26	2024.09.25
Test SW	EZ-EMC	Ver.STSLAB-03A1 RE			
Conduction Test equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2023.09.25	2024.09.24
Limtter	CYBERTEK	EM5010	N/A	2023.09.25	2024.09.24
LISN	R&S	ENV216	101242	2023.09.25	2024.09.24
LISN	EMCO	3810/2NM	23625	2023.09.25	2024.09.24
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
Test SW	EZ-EMC	Ver.STSLAB-03A1 CE			
RF Connected Test					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY51510623	2024.02.23	2025.02.22
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
Test SW	MW	MTS 8310_2.0.0.0			

### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “\*” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

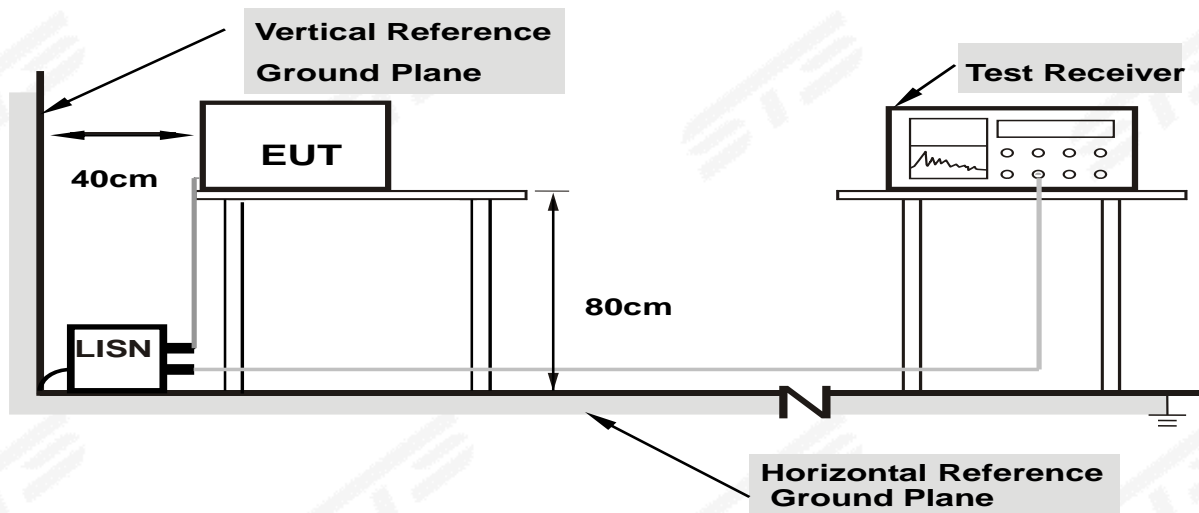
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

### 3.1.2 TEST PROCEDURE

- a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN is at least 80 cm from the nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 TEST SETUP



**Note: 1. Support units were connected to second LISN.**

**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support.**

### 3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

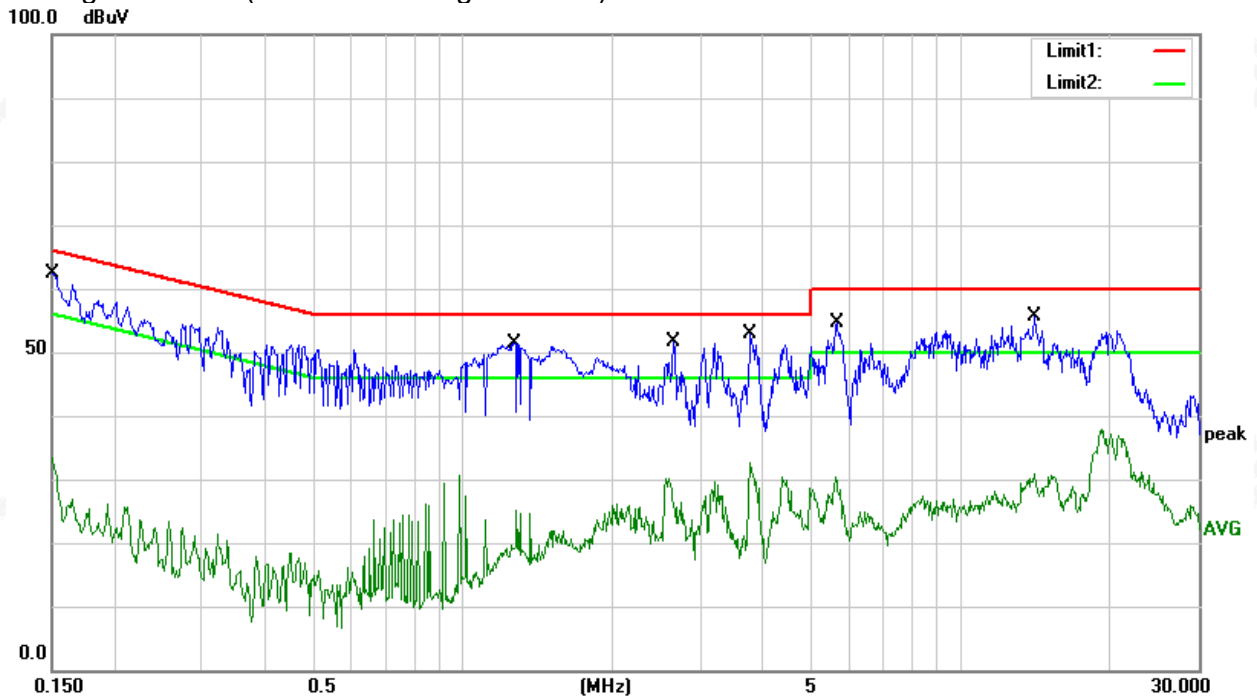
3.1.5 TEST RESULT

Temperature:	25.1(C)	Relative Humidity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	42.57	19.78	62.35	66.00	-3.65	QP
2	0.1500	13.63	19.78	33.41	56.00	-22.59	AVG
3	1.2700	31.70	19.77	51.47	56.00	-4.53	QP
4	1.2700	5.46	19.77	25.23	46.00	-20.77	AVG
5	2.6620	31.86	19.81	51.67	56.00	-4.33	QP
6	2.6620	10.39	19.81	30.20	46.00	-15.80	AVG
7	3.7860	33.07	19.84	52.91	56.00	-3.09	QP
8	3.7860	12.77	19.84	32.61	46.00	-13.39	AVG
9	5.6300	34.75	19.80	54.55	60.00	-5.45	QP
10	5.6300	8.49	19.80	28.29	50.00	-21.71	AVG
11	14.0580	35.18	20.36	55.54	60.00	-4.46	QP
12	14.0580	10.62	20.36	30.98	50.00	-19.02	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor) –Limit

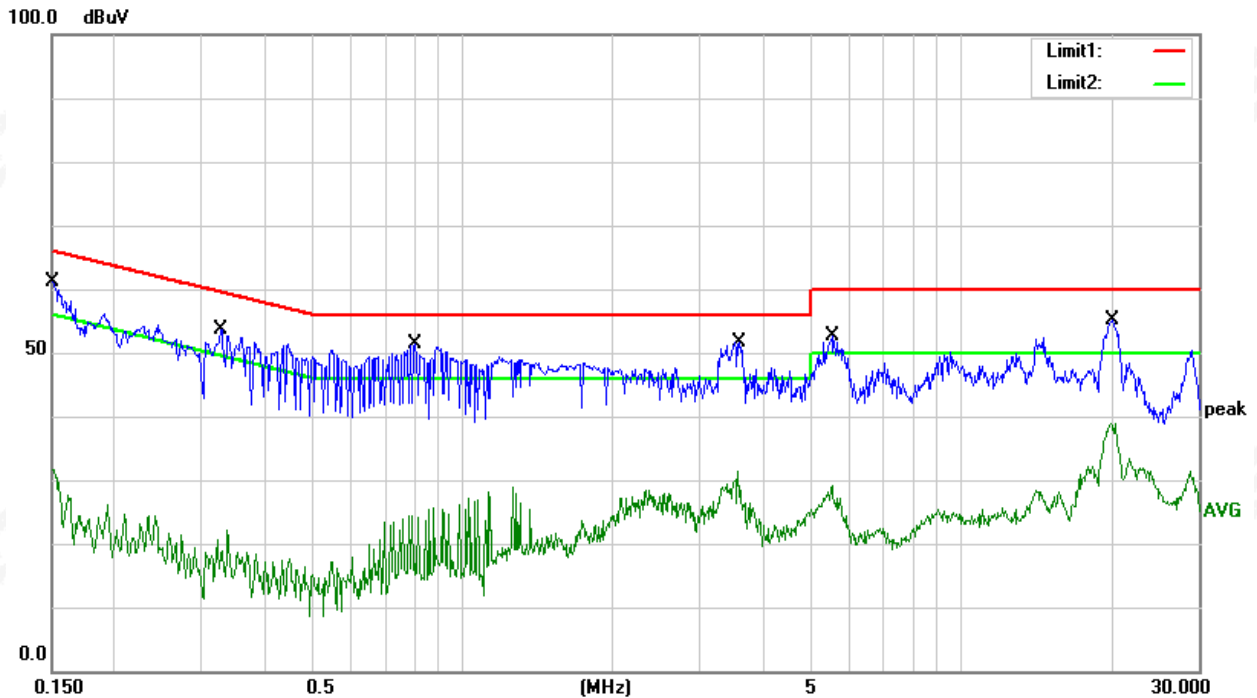


Temperature:	25.1(C)	Relative Humidity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	41.45	19.74	61.19	66.00	-4.81	QP
2	0.1500	12.00	19.74	31.74	56.00	-24.26	AVG
3	0.3266	33.38	20.20	53.58	59.54	-5.96	QP
4	0.3266	1.90	20.20	22.10	49.54	-27.44	AVG
5	0.8020	31.57	19.82	51.39	56.00	-4.61	QP
6	0.8020	4.52	19.82	24.34	46.00	-21.66	AVG
7	3.5860	31.62	19.94	51.56	56.00	-4.44	QP
8	3.5860	11.47	19.94	31.41	46.00	-14.59	AVG
9	5.5340	32.72	19.86	52.58	60.00	-7.42	QP
10	5.5340	7.38	19.86	27.24	50.00	-22.76	AVG
11	20.2260	34.59	20.52	55.11	60.00	-4.89	QP
12	20.2260	18.28	20.52	38.80	50.00	-11.20	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit





### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15.249 and the Part 15.209(a) limit in the table below has to be followed.

Standard FCC 15.209

Frequencies (MHz)	Field Strength (microrvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3
Above 1000	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	3

Standard FCC 15.249

Frequency of Emission (MHz)	Field Strength of fundamental (millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
900~928	50	500
2400~2483.5	50	500
5725~5875	50	500
24000~242500	250	2500

Notes:

- (1) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.
- (2) Emission level (dBuV/m) =20log Emission level (uV/m).

#### LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7



6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

Spectrum Parameter	Setting
Detector	Peak/AV
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB (emission in restricted band)	>20BW
VB (emission in restricted band)	=3xRB

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
	90kHz~110kHz / RB 200Hz for QP
	110kHz~490kHz / RB 200Hz for PK & AV
	490kHz~30MHz / RB 9kHz for QP
	30MHz~1000MHz / RB 120kHz for QP

### 3.2.2 TEST PROCEDURE

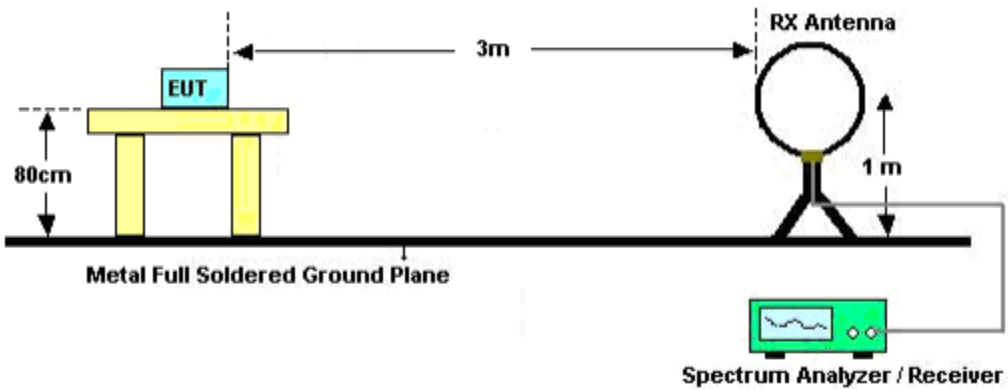
- a. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Below 1GHz)
- b. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Above 1GHz)
- c. The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform (Below 1GHz)
- f. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform. (Above 1GHz)
- g. For the actual test configuration, please refer to the related Item –EUT Test Photos.  
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

### 3.2.3 DEVIATION FROM TEST STANDARD

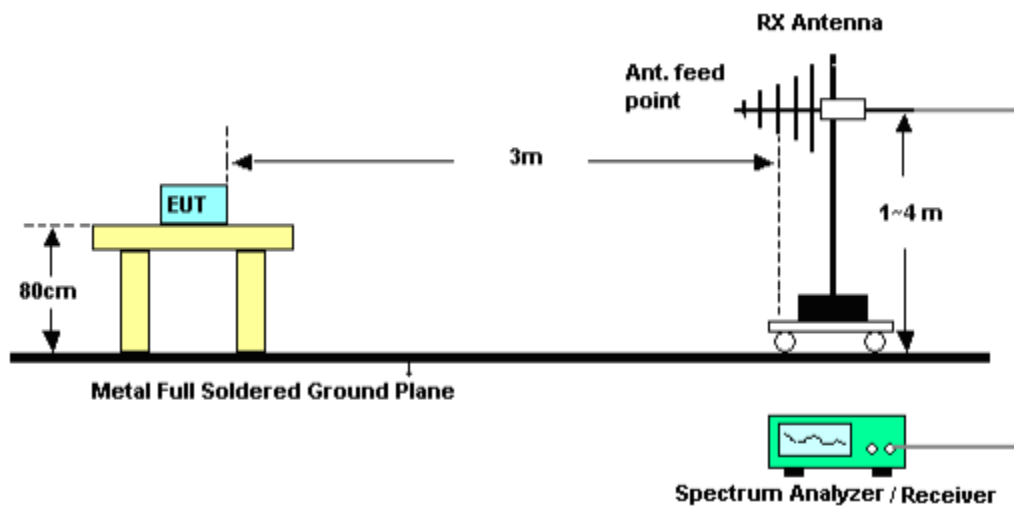
No deviation

## 3.2.4 TEST SETUP

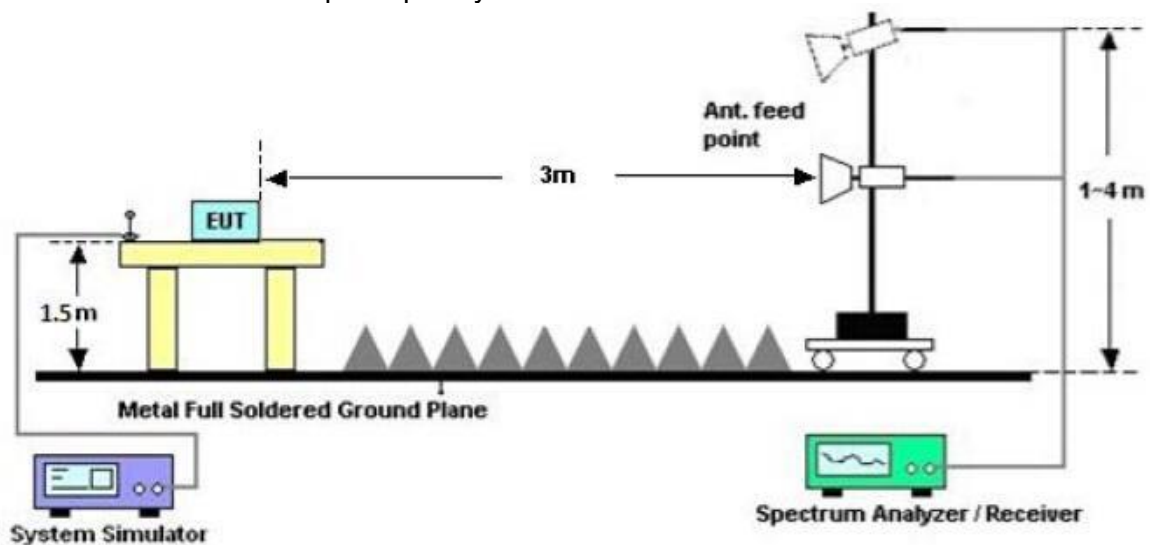
## (A) Radiated Emission Test-Up Frequency Below 30MHz



## (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



## (C) Radiated Emission Test-Up Frequency Above 1GHz





### 3.2.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

Margin=PL-PK L or AL- AV L; Margin only shown the worst case.

Where

PR = Peak Reading

AR = Average Reading

PL = Peak Level

AL = Average Level

AF = Antenna Factor

PK L = Peak Limit

AV L = AV Limit

For example

Frequency	PR	AR	AF	PL	AL	PK L	AV L	Margin
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2178	40.23	30.31	9.83	50.06	40.14	74.00	54.00	-13.86



### 3.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Below 30 MHz

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	AC 120V/60Hz	Polarization:	---
Test Mode:	TX Mode		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

**NOTE:**

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

Distance extrapolation factor =  $40 \log (\text{specific distance}/\text{test distance})$ (dB);

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



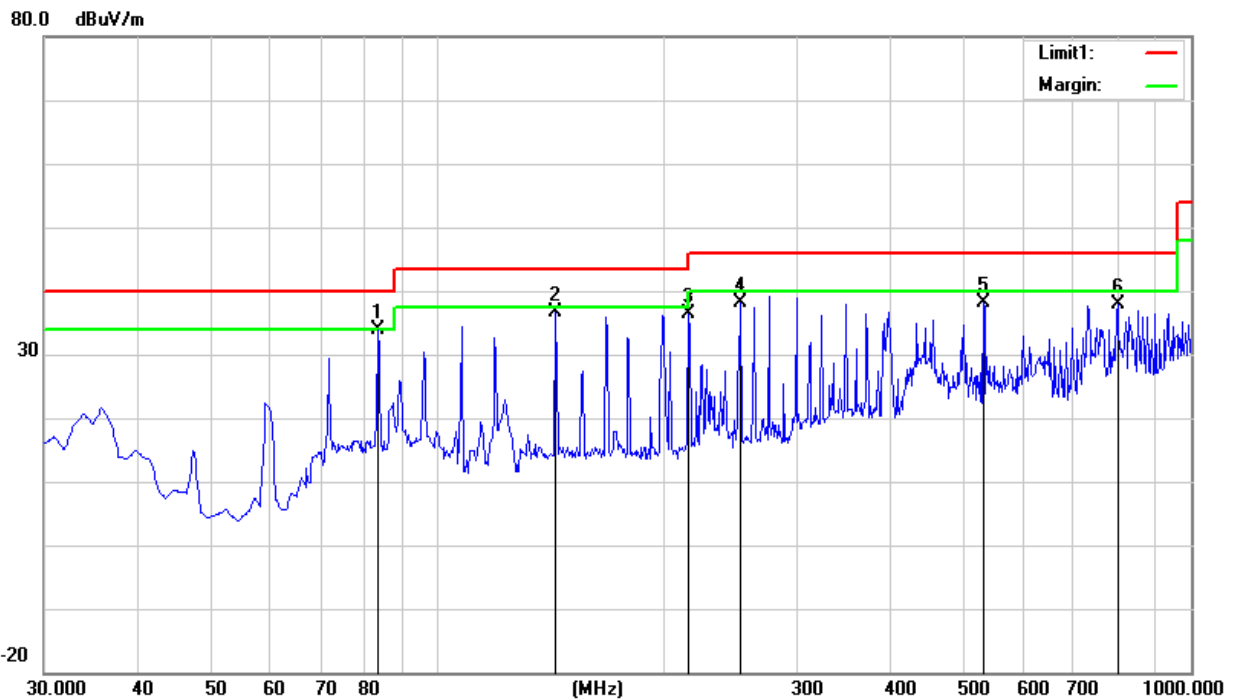
Between 30MHz – 1000 MHz Radiation Spurious

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3 (mode 1 most mode)		

No.	Frequency (MHz)	Reading (dBUV)	Correct Factor(dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Remark
1	83.3500	56.37	-22.52	33.85	40.00	-6.15	peak
2	143.4900	54.85	-18.23	36.62	43.50	-6.88	peak
3	215.2700	56.58	-20.17	36.41	43.50	-7.09	peak
4	252.1300	53.94	-15.80	38.14	46.00	-7.86	peak
5	531.4900	45.42	-7.37	38.05	46.00	-7.95	peak
6	799.2100	40.03	-2.04	37.99	46.00	-8.01	peak

Remark:

- 1. Margin = Result (Result =Reading + Factor )-Limit
- 2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

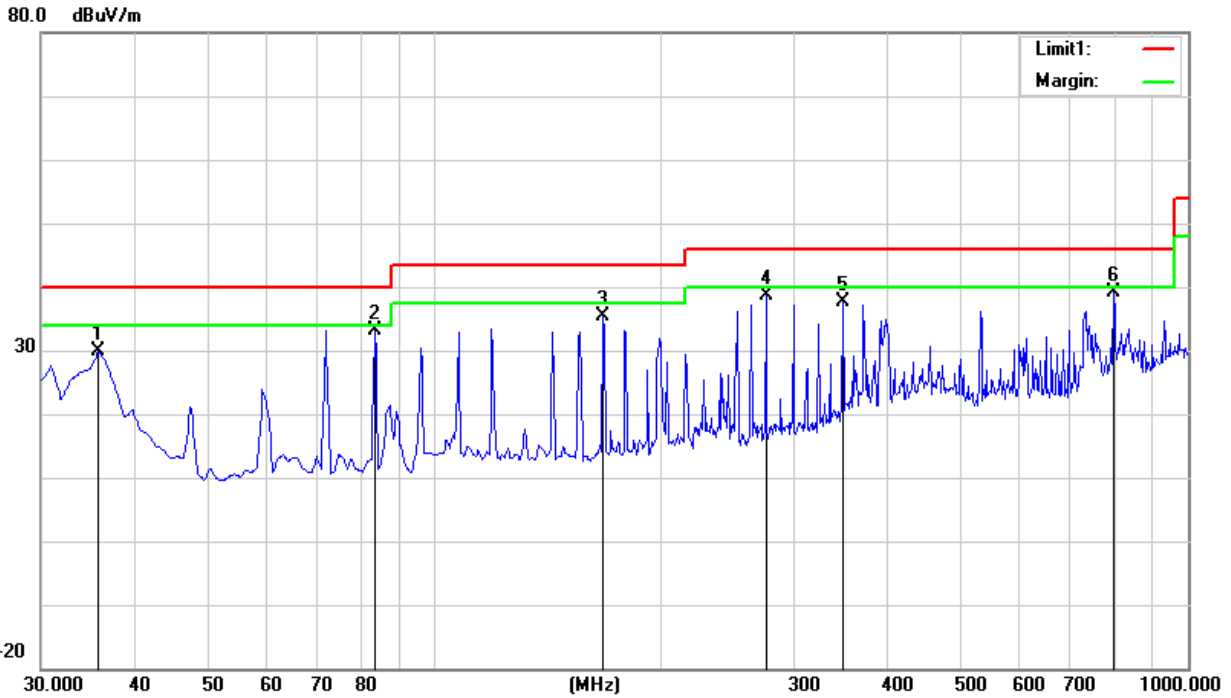


Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	Mode 1/2/3 (mode 1 most mode)		

No.	Frequency (MHz)	Reading (dBUV)	Correct Factor(dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Remark
1	35.8200	45.73	-15.91	29.82	40.00	-10.18	peak
2	83.3500	55.72	-22.52	33.20	40.00	-6.80	peak
3	167.7400	54.89	-19.58	35.31	43.50	-8.19	peak
4	275.4100	53.97	-15.46	38.51	46.00	-7.49	peak
5	348.1600	50.68	-13.13	37.55	46.00	-8.45	peak
6	798.2400	41.13	-2.03	39.10	46.00	-6.90	peak

Remark:

- Margin = Result (Result = Reading + Factor) - Limit
- Factor = Antenna factor + Cable attenuation factor (cable loss) - Amplifier gain



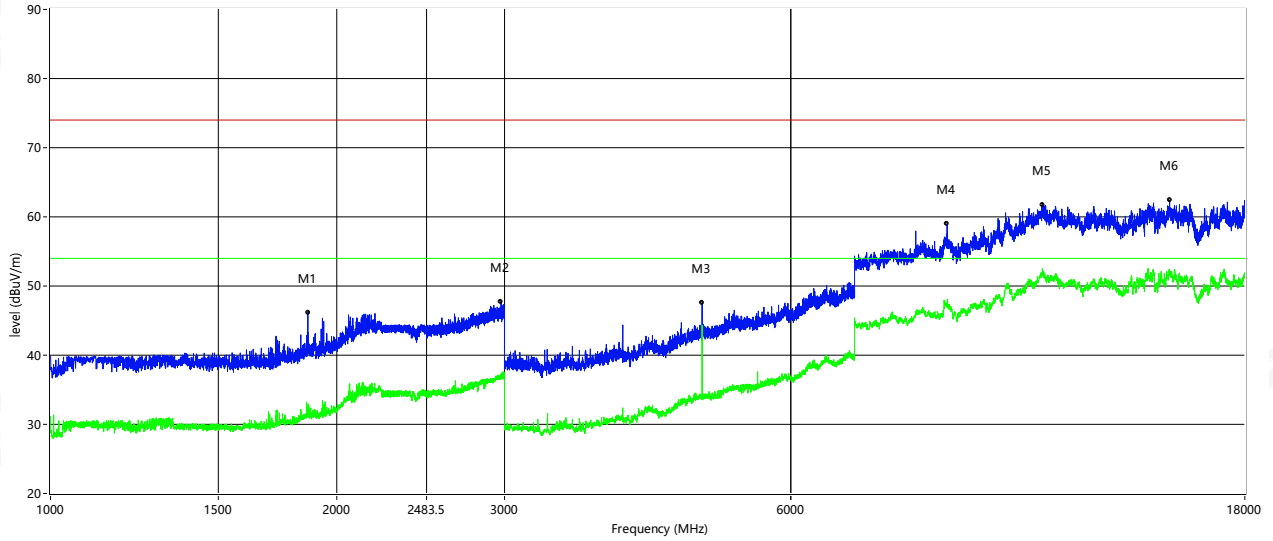




Above 1G Radiation Spurious

2420MHz  
Horizontal

RE\_FCC Test Case\_FCC 15C 1GHz-18GHz

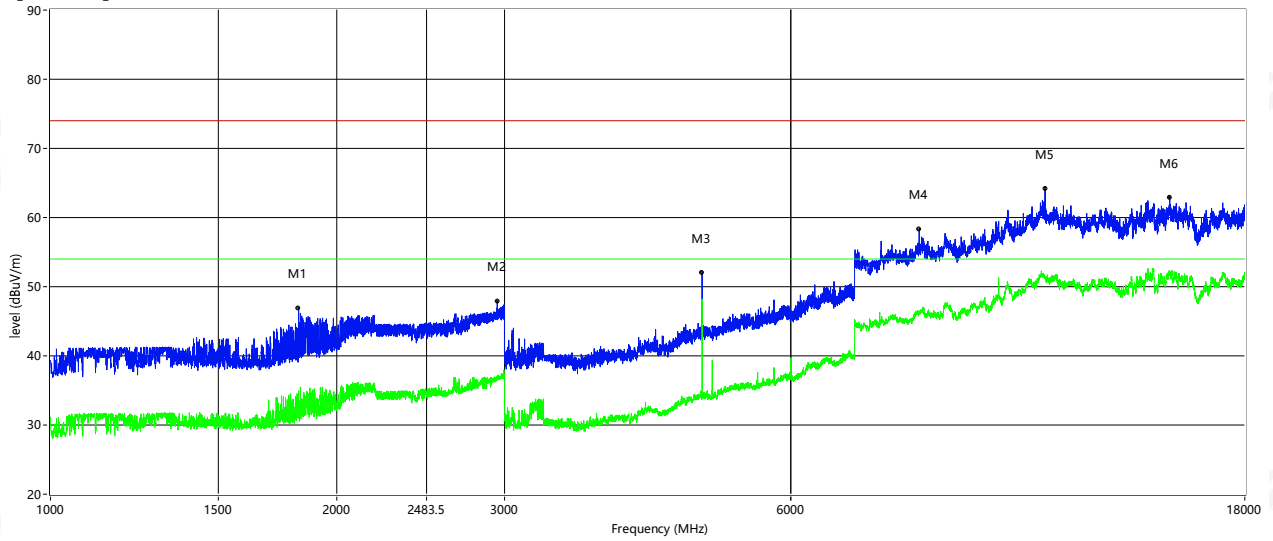


Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	Verdict
1864.000	46.14	32.35	0.80	74.0	54.0	-21.65	149.20	100	Pass
2975.500	47.78	36.82	6.00	74.0	54.0	-17.18	0.30	100	Pass
4840.000	47.61	44.36	-6.74	74.0	54.0	-9.64	106.10	100	Pass
8757.250	58.99	47.46	4.98	74.0	54.0	-6.54	316.10	100	Pass
11042.500	61.78	51.68	9.99	74.0	54.0	-2.32	354.10	100	Pass
15005.250	62.43	51.57	10.40	74.0	54.0	-2.43	25.70	100	Pass



Vertical

RE\_FCC Test Case\_FCC 15C 1GHz-18GHz

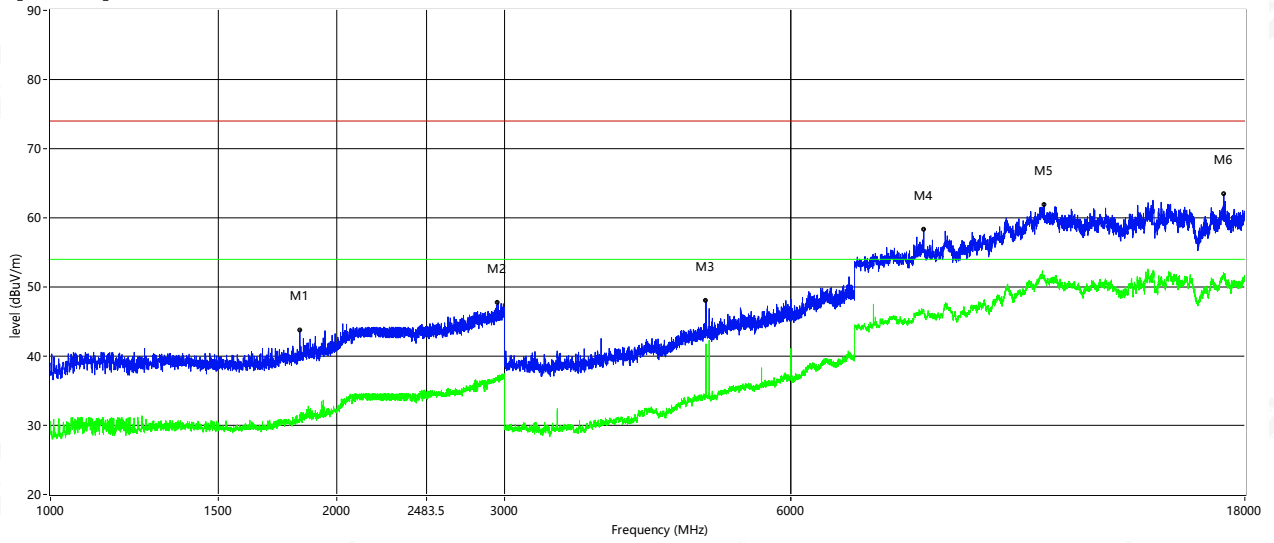


Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	Verdict
1823.000	46.89	34.94	0.31	74.0	54.0	-19.06	178.60	100	Pass
2948.000	47.89	36.89	5.88	74.0	54.0	-17.11	359.40	100	Pass
4840.000	52.06	48.20	-6.74	74.0	54.0	-5.80	23.20	100	Pass
8185.250	58.35	46.12	4.20	74.0	54.0	-7.88	141.30	100	Pass
11100.250	64.17	51.45	9.68	74.0	54.0	-2.55	108.50	100	Pass
14999.750	62.91	52.12	10.40	74.0	54.0	-1.88	238.60	100	Pass



2443MHz  
Horizontal

RE\_FCC Test Case\_FCC 15C 1GHz-18GHz

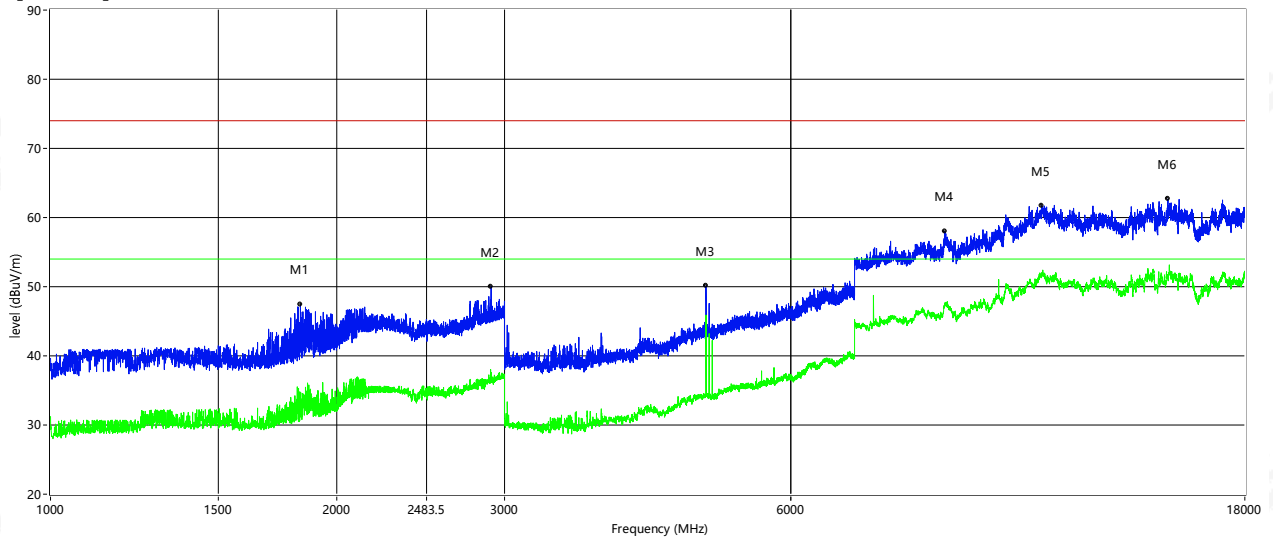


Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	Verdict
1828.500	43.66	31.60	0.41	74.0	54.0	-22.40	208.60	100	Pass
2953.500	47.77	36.95	5.91	74.0	54.0	-17.05	45.50	100	Pass
4886.000	48.06	41.77	-6.47	74.0	54.0	-12.23	124.80	100	Pass
8276.000	58.23	46.72	4.23	74.0	54.0	-7.28	29.70	100	Pass
11075.500	61.92	51.04	9.81	74.0	54.0	-2.96	59.10	100	Pass
17109.000	63.39	51.92	10.43	74.0	54.0	-2.08	148.60	100	Pass



Vertical

RE\_FCC Test Case\_FCC 15C 1GHz-18GHz

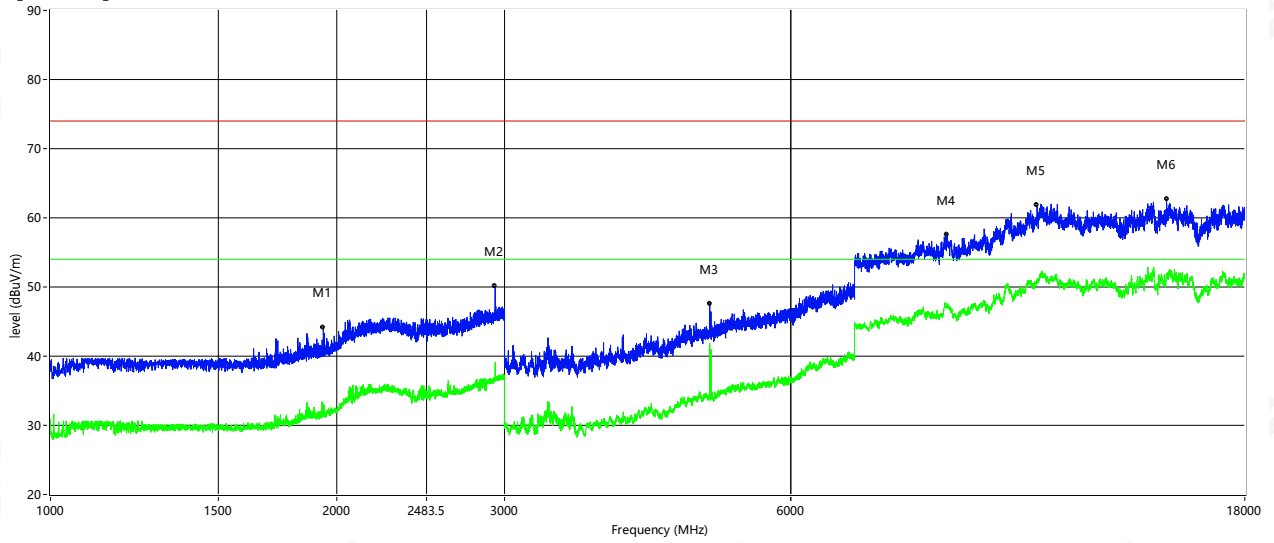


Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	Verdict
1831.000	47.37	34.42	0.45	74.0	54.0	-19.58	186.20	100	Pass
2904.500	50.03	37.60	5.64	74.0	54.0	-16.40	178.80	100	Pass
4885.000	50.13	42.51	-6.48	74.0	54.0	-11.49	340.40	100	Pass
8710.500	58.00	47.47	5.13	74.0	54.0	-6.53	347.70	100	Pass
11004.000	61.71	51.89	10.20	74.0	54.0	-2.11	2.00	100	Pass
14942.000	62.68	51.63	10.10	74.0	54.0	-2.37	25.00	100	Pass



2465MHz  
Horizontal

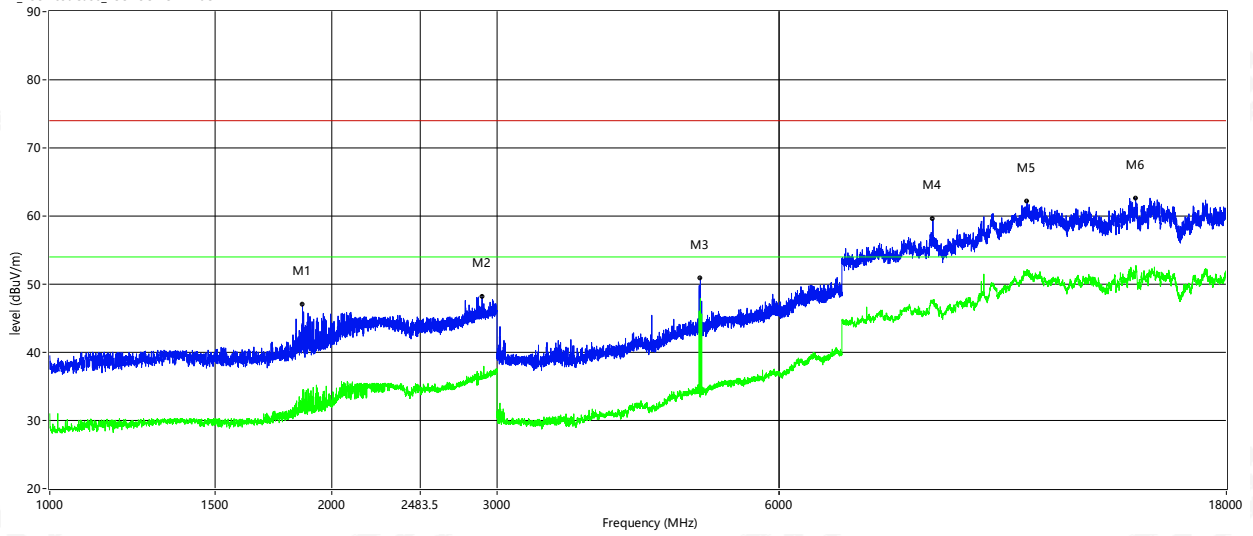
RE\_FCC Test Case\_FCC 15C 1GHz-18GHz



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	Verdict
1935.500	44.13	33.07	0.98	74.0	54.0	-20.93	150.20	100	Pass
2933.000	50.10	39.10	5.80	74.0	54.0	-14.90	195.60	100	Pass
4930.000	47.59	41.84	-6.39	74.0	54.0	-12.16	332.70	100	Pass
8757.250	57.61	47.61	4.98	74.0	54.0	-6.39	360.60	100	Pass
10885.750	61.79	50.51	9.28	74.0	54.0	-3.49	298.80	100	Pass
14892.500	62.72	51.92	9.90	74.0	54.0	-2.08	132.90	100	Pass

Vertical

RE\_FCC Test Case\_FCC 15C 1GHz-18GHz



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	Verdict
1860.500	46.95	33.19	0.79	74.0	54.0	-20.81	342.40	100	Pass
2892.000	48.16	36.29	5.61	74.0	54.0	-17.71	183.80	100	Pass
4945.000	50.82	47.89	-6.39	74.0	54.0	-6.11	77.30	100	Pass
8754.500	59.57	47.37	4.99	74.0	54.0	-6.63	6.60	100	Pass
11034.250	62.14	52.14	10.04	74.0	54.0	-1.86	328.70	100	Pass
14400.250	62.63	52.02	11.42	74.0	54.0	-1.98	277.50	100	Pass



Duty cycle

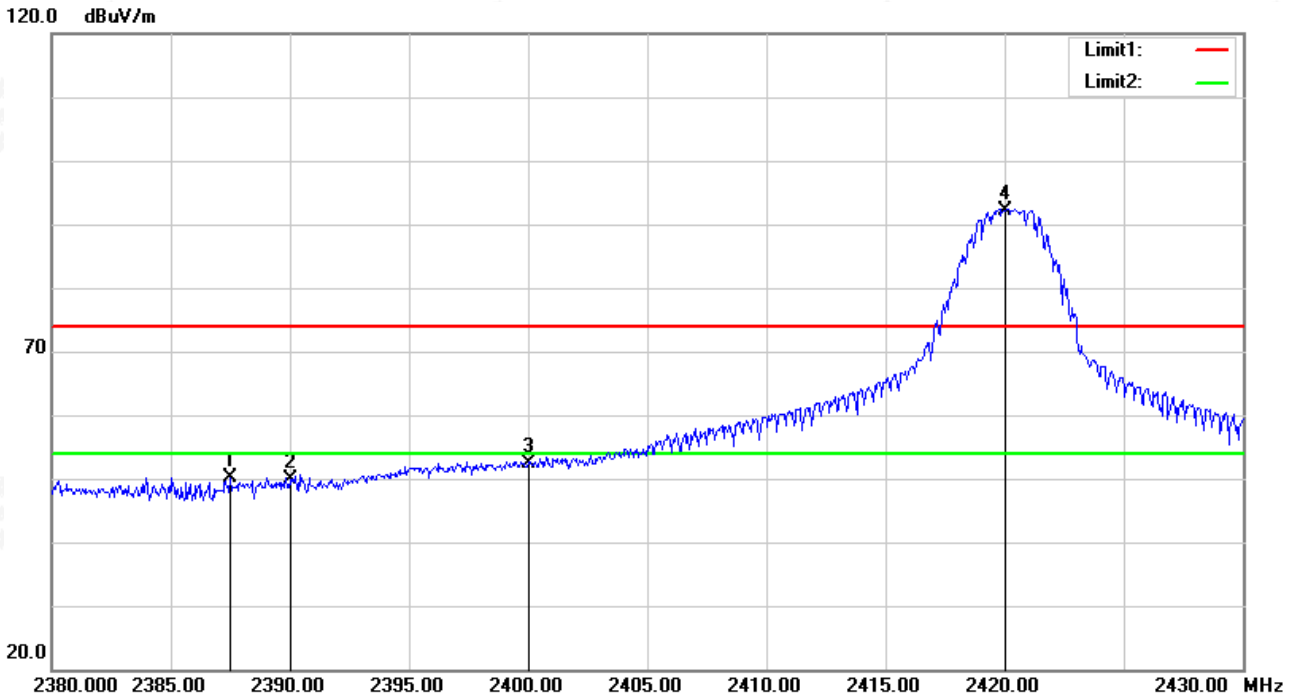


one Pulse Ton (ms)	Pulse Ton Number	Total Pulse Ton (ms)	Tp (ms)	Duty cycle(%)	Duty Factor
0.64	3	1.92	10.76	17.84%	14.97

Note: Duty Factor=20\*LOG10(1/(Ton/Tp))

(Radiation Band edge)

2420MHz  
Horizontal



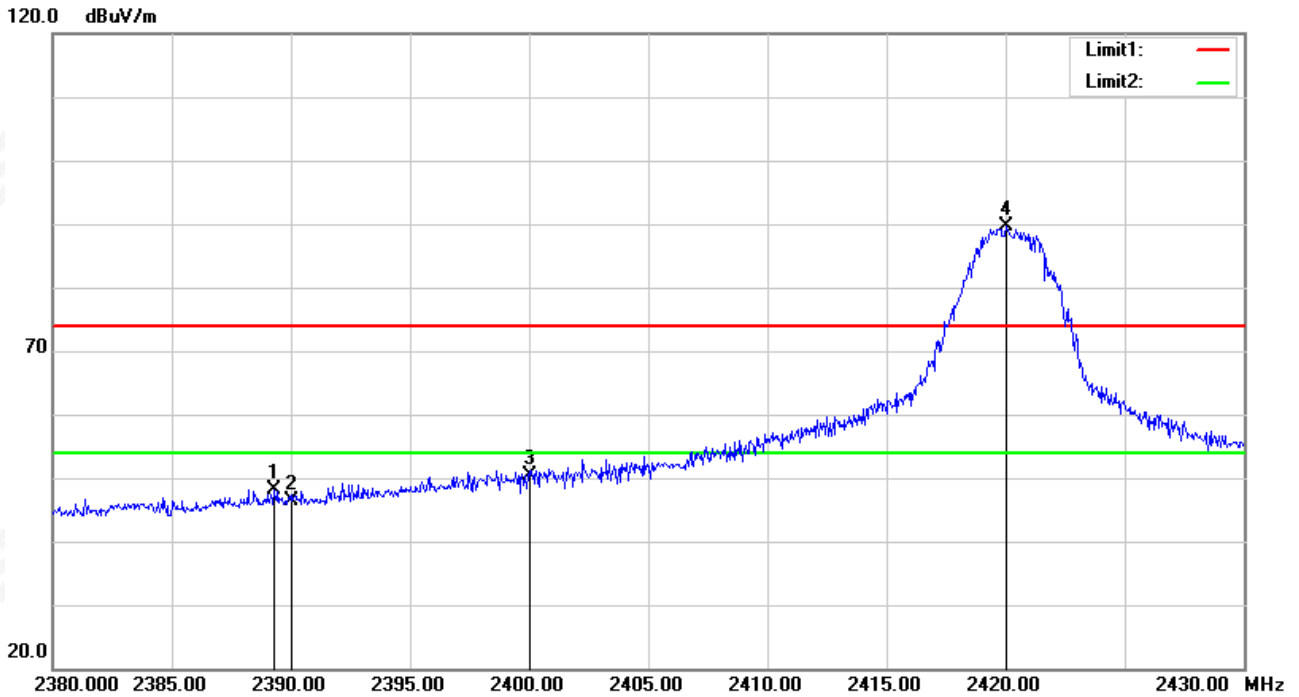
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.500	45.88	4.31	50.19	74.00	-23.81	peak
2	2390.000	45.59	4.34	49.93	74.00	-24.07	peak
3	2400.000	47.95	4.49	52.44	74.00	-21.56	peak

**Fundamental Frequency**

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Duty cycle Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4	2420.000	87.64	4.50	-	92.14	114	-21.86	peak
4	2420.000	87.64	4.50	14.97	77.17	94	-16.83	AVG



Vertical

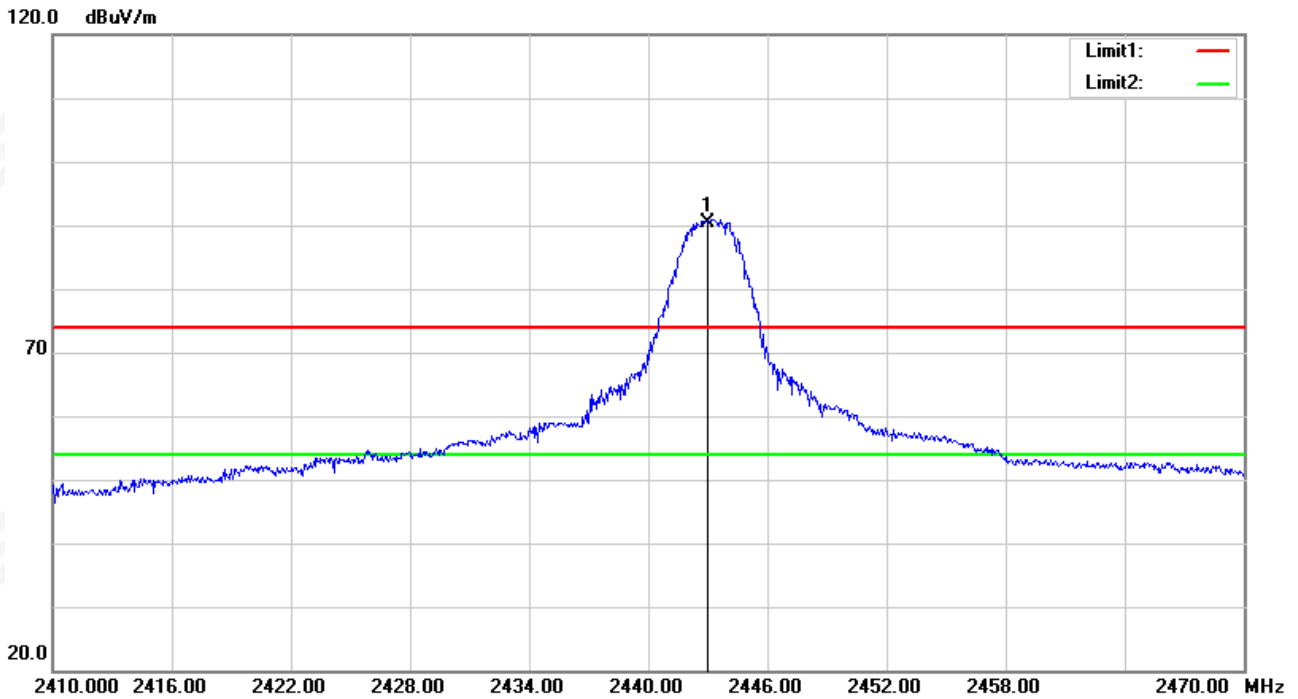


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.300	43.82	4.33	48.15	74.00	-25.85	peak
2	2390.000	42.14	4.34	46.48	74.00	-27.52	peak
3	2400.000	45.82	4.49	50.31	74.00	-23.69	peak

Fundamental Frequency

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Duty cycle Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4	2420.000	83.87	4.50	-	88.37	114	-25.63	peak
4	2420.000	83.87	4.50	14.97	73.40	94	-20.60	AVG

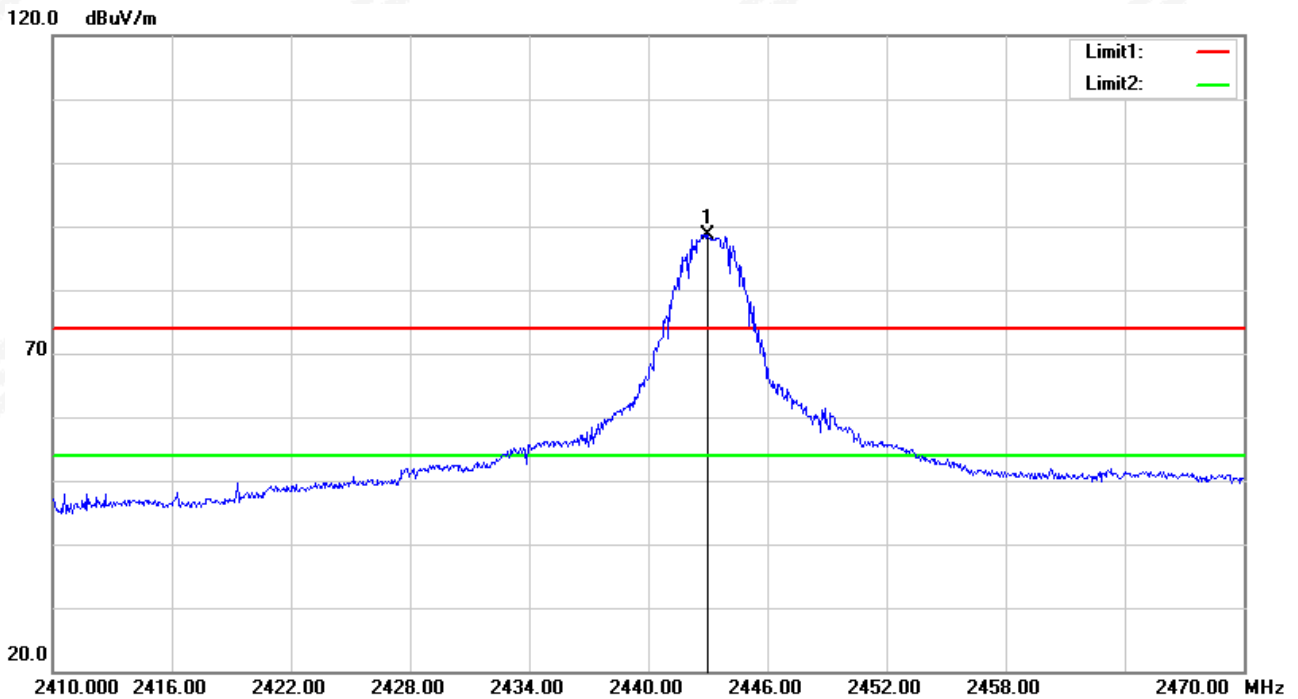
2443MHz  
Horizontal



Fundamental Frequency

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Duty cycle Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2443.000	85.78	4.52	-	90.3	114	-23.7	peak
1	2443.000	85.78	4.52	14.97	75.33	94	-18.67	AVG

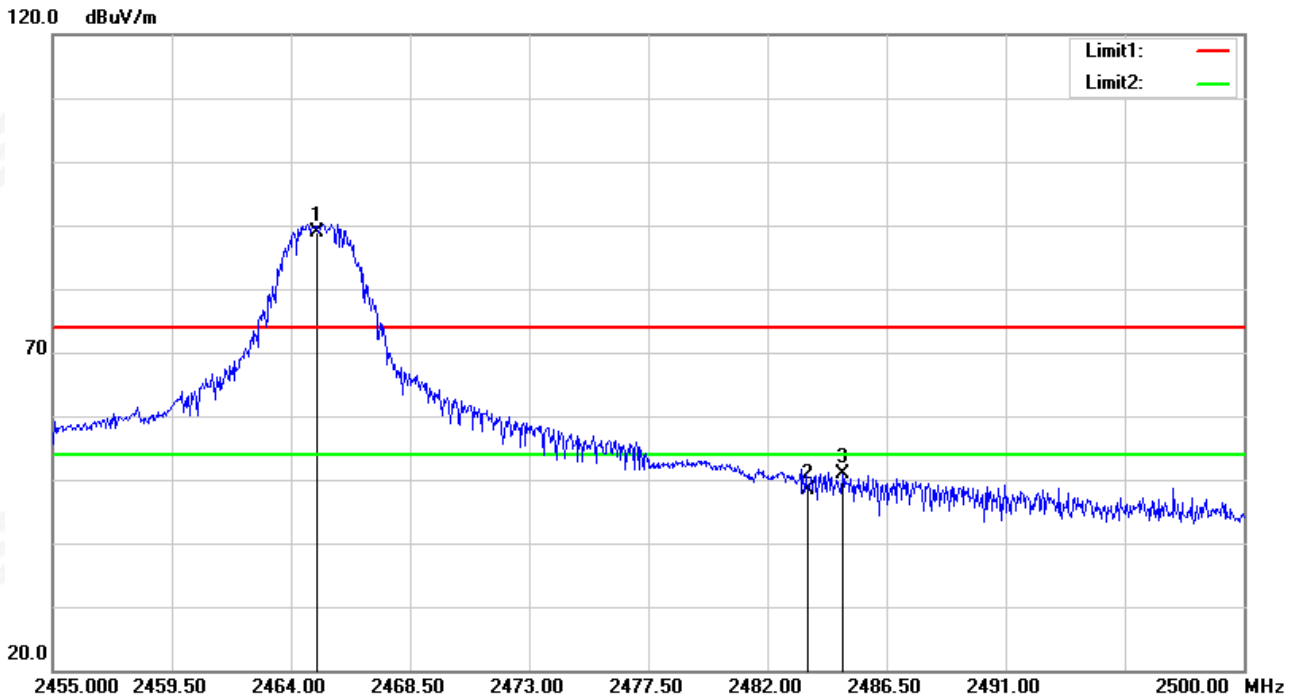
Vertical



Fundamental Frequency

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Duty cycle Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2443.000	84.06	4.52	-	88.58	114	-25.42	peak
1	2443.000	84.06	4.52	14.97	73.61	94	-20.39	AVG

2465MHz  
Horizontal

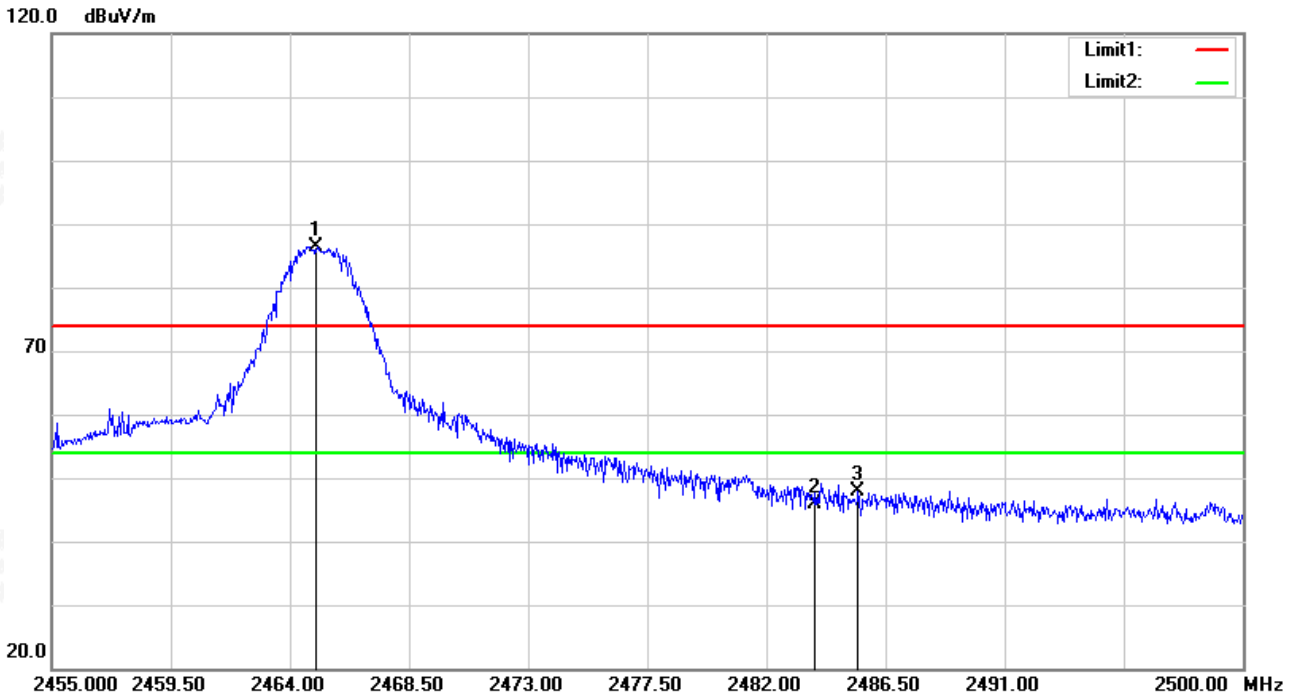


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2	2483.500	43.71	4.60	48.31	74.00	-25.69	peak
3	2484.835	46.16	4.61	50.77	74.00	-23.23	peak

Fundamental Frequency

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Duty cycle Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2465.000	84.25	4.56	-	88.81	114	-25.19	peak
1	2465.000	84.25	4.56	14.97	73.84	94	-20.16	AVG

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2	2483.800	41.26	4.60	45.86	74.00	-28.14	peak
3	2485.465	43.38	4.61	47.99	74.00	-26.01	peak

Fundamental Frequency

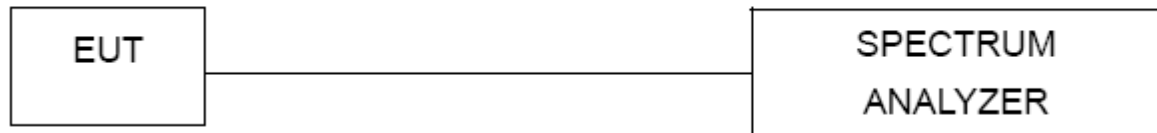
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Duty cycle Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2465.000	81.80	4.56	-	86.36	114	-27.64	peak
1	2465.000	81.80	4.56	14.97	71.39	94	-22.61	AVG

#### 4. BANDWIDTH TEST

##### 4.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting : RBW= 1% to 5% OBW, VBW $\geq$ RBW, Sweep time = Auto.

##### 4.2 TEST SETUP



##### 4.3 EUT OPERATION CONDITIONS

TX mode.

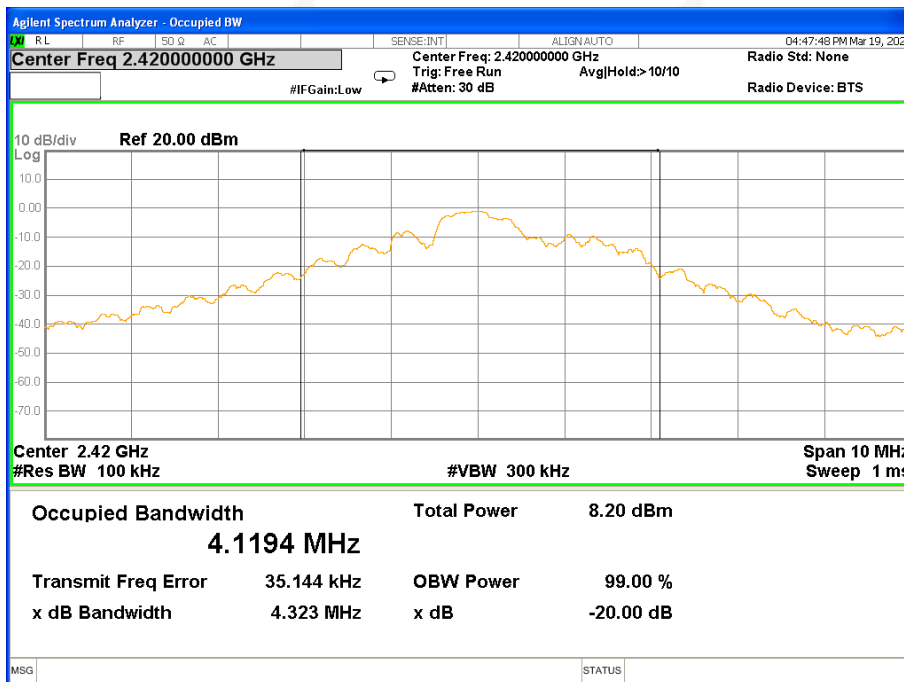


4.4 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Voltage:	AC 120V/60Hz		

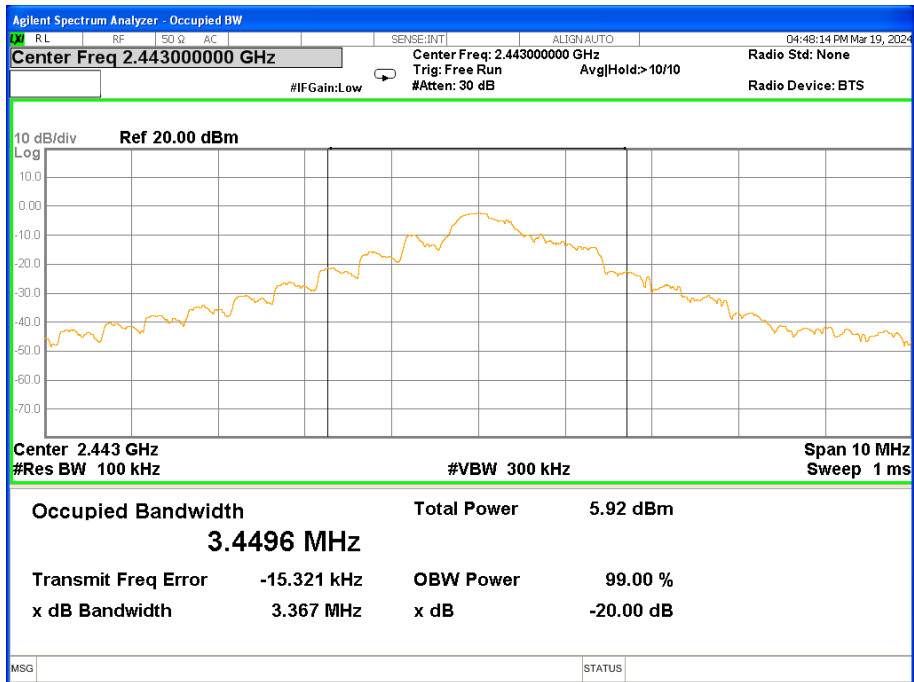
Test Channel	Frequency(MHz)	20 dB Bandwidth(KHz)
CH01	2420	4323
CH02	2443	3367
CH03	2465	2606

CH01

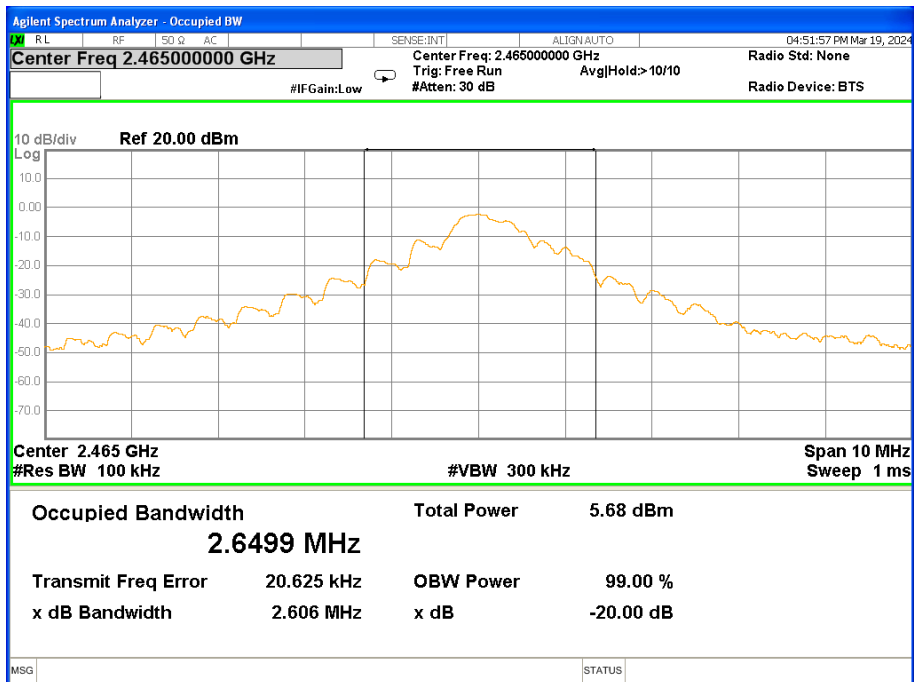




### CH02



### CH03





## 5. ANTENNA REQUIREMENT

### 5.1 STANDARD REQUIREMENT

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### 5.2 EUT ANTENNA

The EUT antenna is PCB Antenna. It conforms to the standard requirements.





## APPENDIX- PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

\*\*\*\*\*END OF THE REPORT\*\*\*\*\*