



## FCC TEST REPORT

Report No:STS1707231W04

Issued for

BYROBOT Co., Ltd.

A-#1001, Bundang Suji U-Tower, Sinsu-ro 767, Suji-gu  
Yongin-si, Gyeonggi-do South Korea 16827

<b>Product Name:</b>	Lightrone Transmitter
<b>Brand Name:</b>	BYROBOT
<b>Model Name:</b>	BRLT-F-RT0
<b>Series Model:</b>	N/A
<b>FCC ID:</b>	2ABMZBRLT-F-RT0
<b>Test Standard:</b>	FCC Part 15.249

Any reproduction of this document must be done in full. No single part of this document may be reproduced without permission from STS, All Test Data Presented in this report is only applicable to presented Test sample.

Shenzhen STS Test Services Co., Ltd.  
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,  
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China  
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com



**TEST RESULT CERTIFICATION**

**Applicant's name :** BYROBOT Co., Ltd.  
**Address :** A-#1001, Bundang Suji U-Tower, Sinsu-ro 767, Suji-gu  
Yongin-si, Gyeonggi-do South Korea 16827

**Manufacture's Name :** BYROBOT Co., Ltd.  
**Address :** A-#1001, Bundang Suji U-Tower, Sinsu-ro 767, Suji-gu  
Yongin-si, Gyeonggi-do South Korea 16827

**Product description**

**Product name :** Lightrone Transmitter  
**Brand name :** BYROBOT  
**Model and/or type reference :** BRLT-F-RT0  
**Standards :** FCC Part15.249  
**Test procedure :** ANSI C63.10-2013

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.

This report shall not be reproduced except in full, without the written approval of STS, this document may be altered or revised by STS, personal only, and shall be noted in the revision of the document.

**Date of Test :**  
**Date of performance of tests :** 12 Aug. 2017 ~18 Aug. 2017  
**Date of Issue :** 19 Aug. 2017  
**Test Result :** **Pass**

Testing Engineer :

(Sean she)

Technical Manager :

(Hakim.hou)

Authorized Signatory :

(Vita Li)





Table of Contents	Page
<b>1. SUMMARY OF TEST RESULTS</b>	<b>5</b>
1.1 TEST FACTORY	6
1.2 MEASUREMENT UNCERTAINTY	6
<b>2. GENERAL INFORMATION</b>	<b>7</b>
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	9
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.4 DESCRIPTION OF SUPPORT UNITS	11
2.5 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	16
<b>4. CONDUCTED SPURIOUS &amp; BAND EDGE EMISSION</b>	<b>28</b>
4.1 REQUIREMENT	28
4.2 TEST PROCEDURE	28
4.3 TEST SETUP	28
4.4 EUT OPERATION CONDITIONS	28
4.5 TEST RESULTS	29
<b>5. BANDWIDTH TEST</b>	<b>30</b>
5.1 TEST PROCEDURE	30
5.2 TEST SETUP	30
5.3 EUT OPERATION CONDITIONS	30
5.4 TEST RESULTS	31
<b>6. ANTENNA REQUIREMENT</b>	<b>33</b>
6.1 STANDARD REQUIREMENT	33
6.2 EUT ANTENNA	33
<b>APPENDIX- PHOTOS OF TEST SETUP</b>	<b>34</b>



**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	19 Aug. 2017	STS1707231W04	ALL	Initial Issue





## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 15.249 , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.203	Antenna Requirement	Pass	
15.249	Radiated Spurious Emission	Pass	
	conduction Spurious Emission	N/A	
15.205	Radiated Band Edge Emission	Pass	
	conduction Band Edge Emission	N/A	
15.249	20dB Bandwidth	Pass	

### NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

(2) All tests are according to ANSI C63.10-2013



### 1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.

Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,  
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

CNAS Registration No.: L7649;

FCC Registration No.: 625569; IC Registration No.: 12108A

### 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	Conducted Emission (9KHz-150KHz)	$\pm 2.88\text{dB}$
2	Conducted Emission (150KHz-30MHz)	$\pm 2.67\text{dB}$
3	RF power,conducted	$\pm 0.71\text{dB}$
4	Spurious emissions,conducted	$\pm 0.63\text{dB}$
5	All emissions,radiated (9KHz-30MHz)	$\pm 3.02\text{dB}$
6	All emissions,radiated (30MHz-200MHz)	$\pm 3.80\text{dB}$
7	All emissions,radiated (200MHz-1000MHz)	$\pm 3.97\text{dB}$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Lightrone Transmitter
Trade Name	BYROBOT
Model Name	BRLT-F-RT0
Series Model	N/A
Model Difference	N/A
Product Description	The EUT is a Lightrone Transmitter
	Operation Frequency: 2402-2479MHz
	Modulation Type: GFSK
	Antenna Designation: Whip antenna
	Antenna Gain(Peak): 2 dBi
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Adapter	Input: DC 5V,1A Output: DC4.2V, 400mA
Battery	Rated Voltage: 3.7V Charge Limit: 4.25V Capacity: 200mAh

Note:

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



2.

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	19	2420	47	2438	65	2456
02	2403	20	2421	48	2439	66	2457
03	2404	21	2422	49	2440	67	2468
04	2405	22	2423	50	2441	68	2469
05	2406	23	2424	51	2442	69	2470
06	2407	24	2425	52	2443	70	2471
07	2408	25	2426	53	2444	71	2472
08	2409	26	2427	54	2445	72	2473
09	2410	27	2428	55	2446	73	2474
10	2411	28	2429	56	2447	74	2475
11	2412	39	2430	57	2448	75	2476
12	2413	40	2431	58	2449	76	2477
13	2414	41	2432	59	2450	77	2478
14	2415	42	2433	60	2451	78	2479
15	2416	43	2434	61	2452		
16	2417	44	2435	62	2453		
17	2418	45	2436	63	2454		
18	2419	46	2437	64	2455		

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	BYROBOT	BRLT-F-RT0	Whip antenna	NA	2	Antenna

The EUT antenna is Whip antenna. No antenna other than that furnished by the responsible party shall be used with the device.





## 2.2 DESCRIPTION OF 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	1 MHz/GFSK
Mode 2	TX CH50	1 MHz/GFSK
Mode 3	TX CH78	1 MHz/GFSK

Note:

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





### 2.3 BLOCK DIGRAM 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



NOTE: New battery is used during all test





## 2.4 DESCRIPTION OF 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.

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-1	Lightrone Transmitter	BYROBOT	BRLT-F-RT0	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
N/A	N/A	N/A	N/A	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



## 2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

## Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESW	101535	2017/06/01	2018/05/31
Bilog Antenna	TESEQ	CBL6111D	34678	2017/03/24	2018/03/23
Horn Antenna	Schwarzbeck	BBHA 9120D (1201)	9120D-1343	2017/03/06	2018/03/05
Operational Manual Passive Loop (9K--30MHz)	ETS	6512	00165355	2017/03/06	2018/03/05
Pre-mpifier (0.1M-3GHz)	EM	EM330	60538	2017/03/12	2018/03/11
PreAmplifier	Agilent	8449B	60538	2016/10/23	2017/10/22
USB RF power sensor	DARE	RPR3006W	15I00041SNO0 3	2016/10/23	2017/10/22
Semi-anechoic chamber	Changling	966	N/A	2016/10/23	2017/10/22

## Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2016/10/23	2017/10/22
LISN	R&S	ENV216	101242	2016/10/26	2017/10/25
conduction Cable	EM	C01	N/A	2017/03/12	2018/03/11
Temperature & Humidity	Mieo	HH660	N/A	2016/10/23	2017/10/22

### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 15.249 limit in the table below has to be followed.

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

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

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.

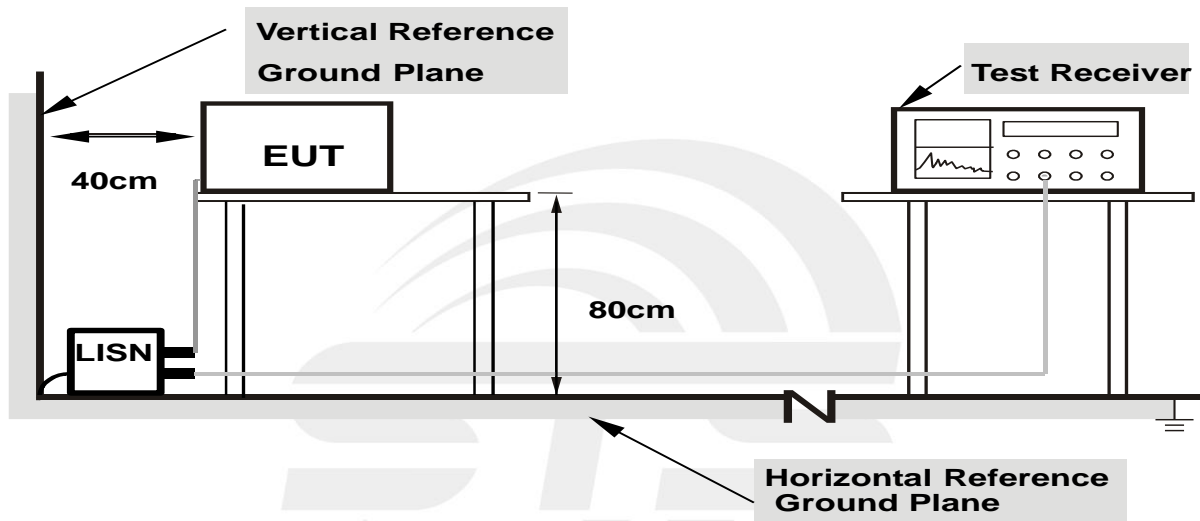
The following table is the setting of the receiver

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 was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 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 at least 80 cm from 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 from other units and other metal planes**

### 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 RESULTS

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	L/N
Test Voltage:	DC 3V	Test Mode:	N/A

*Note: denotes test is not applicable in this test report.*



### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS

20dBc 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 (micorvolts/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.

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

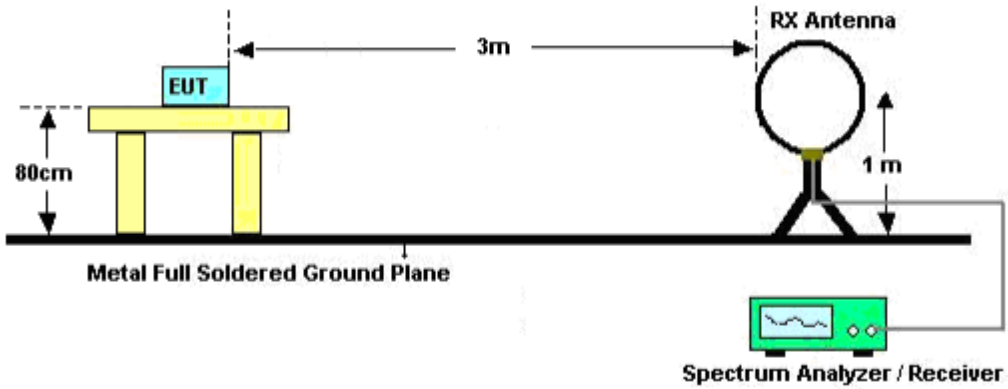
- a. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Below 1GHz)
- b. The measuring distance 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

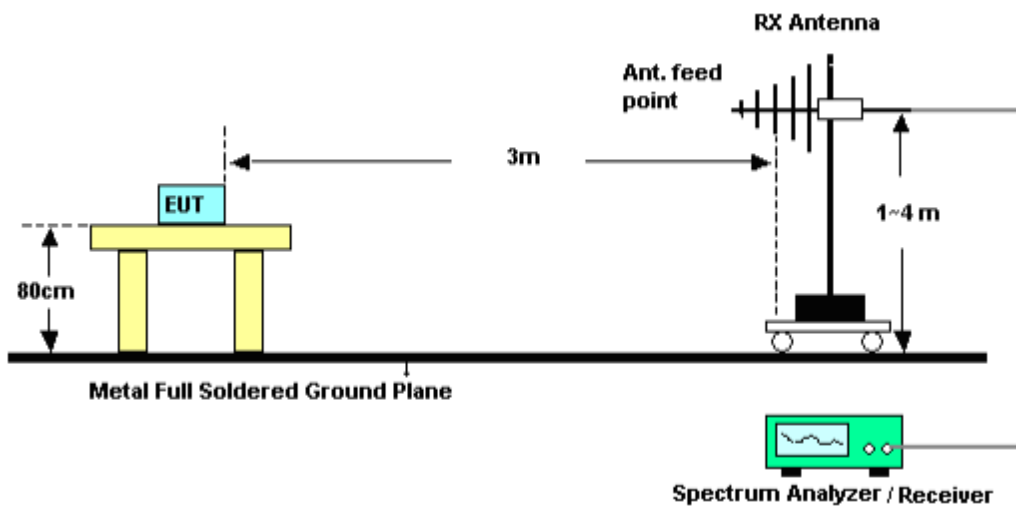
No deviation

### 3.2.4 TEST SETUP

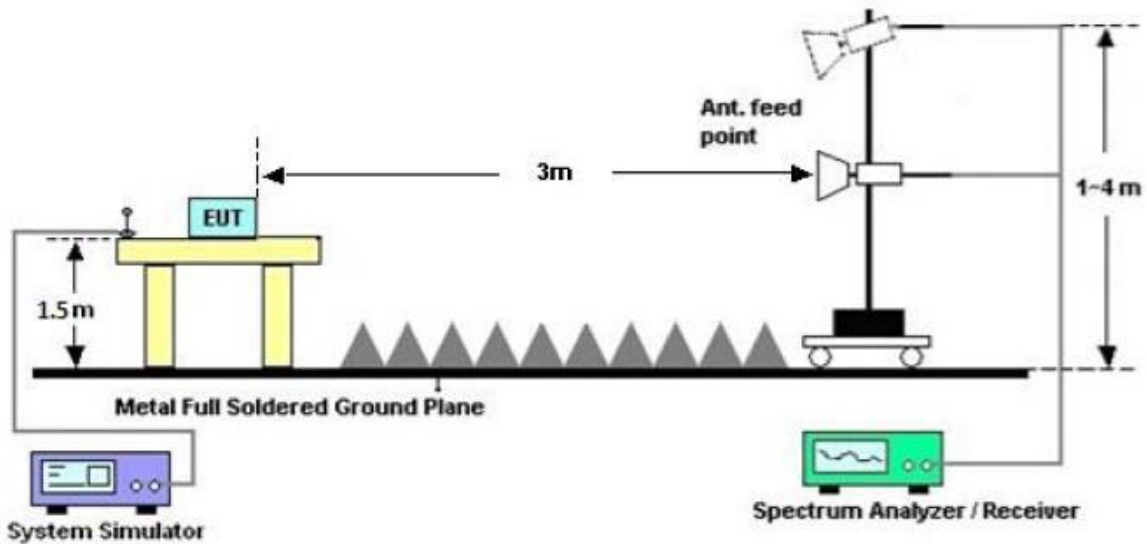
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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





### 3.2.5 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 °C	Relative Humidity:	50%
Pressure:	1010 hPa	Polarization:	---
Test Voltage:	DC 3V		
Test Mode:	TX Mode		

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State 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

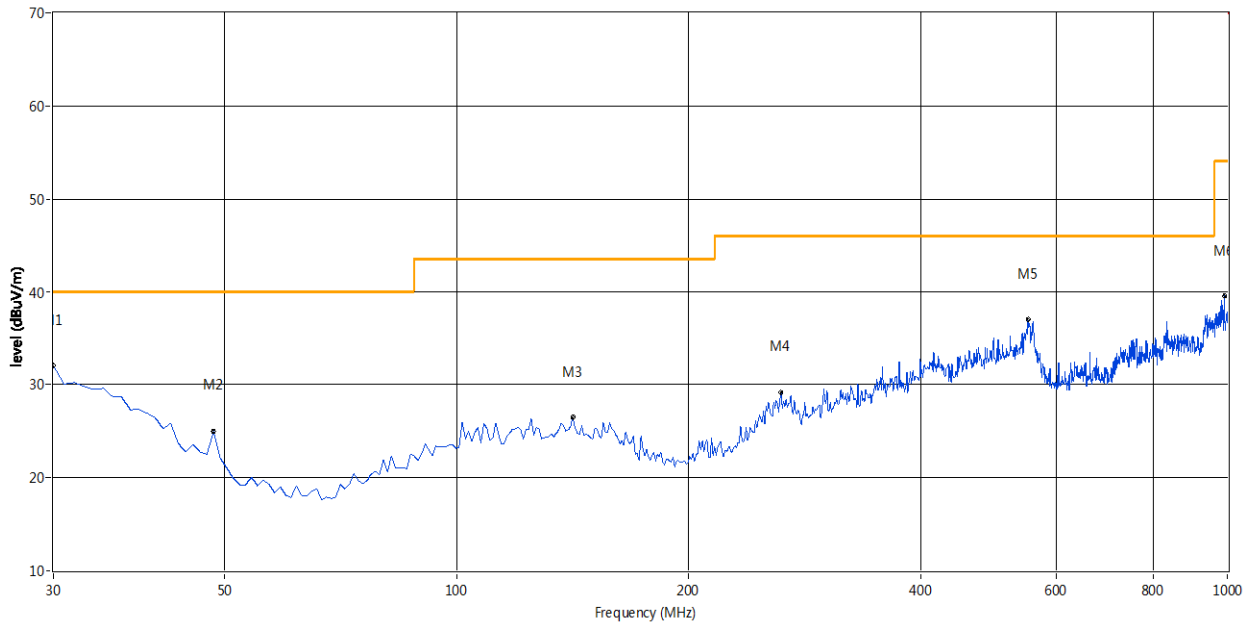
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	DC 3V	Test Mode:	Mode 1/2/3(Model 1 worst)

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
30.000	41.00	-8.93	32.07	40.0	-7.93	QP
48.412	43.62	-18.66	24.96	40.0	-15.04	QP
141.439	41.58	-15.08	26.50	43.5	-17.00	QP
263.536	41.69	-12.49	29.20	46.0	-16.80	QP
550.370	42.05	-5.05	37.00	46.0	-9.00	QP
990.310	41.90	-2.34	39.56	54.0	-14.44	QP

Remark:

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

RE\_FCC Test Case\_FCC 15B 30MHz-1GHz





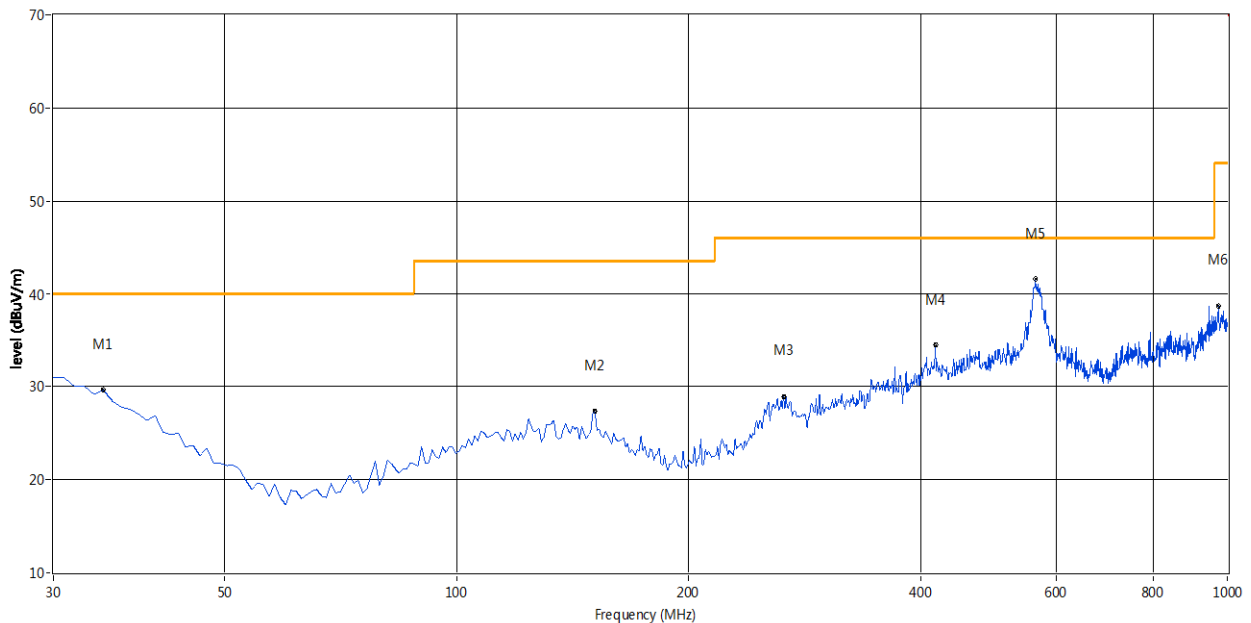
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	DC 3V	Test Mode:	Mode 1/2/3(Model 1 worst)

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
34.845	41.03	-11.41	29.62	40.0	-10.38	QP
151.129	42.91	-15.58	27.33	43.5	-16.17	QP
265.475	41.46	-12.54	28.92	46.0	-17.08	QP
417.612	42.82	-8.40	34.42	46.0	-11.58	QP
562.967	47.58	-6.01	41.57	46.0	-4.43	QP
972.867	40.95	-2.23	38.72	54.0	-15.28	QP

Remark:

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

RE\_FCC Test Case\_FCC 15B 30MHz-1GHz





Fundamental frequency:

PK

Frequency (MHz)	Reading (dB $\mu$ V/m)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Factor(dB) Corr.	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin(dB)	Polarization
	PEAK					PEAK	PEAK		
2402	97.723	44.40	6.03	27.60	-10.77	86.96	114	-27.04	Vertical
2402	95.685	44.40	6.03	27.60	-10.77	84.92	114	-29.08	Horizontal
2441	93.176	44.40	6.04	27.63	-10.73	82.45	114	-31.55	Vertical
2441	91.262	44.40	6.04	27.63	-10.73	80.54	114	-33.46	Horizontal
2479	95.415	44.40	6.06	27.66	-10.68	84.74	114	-29.26	Vertical
2479	92.241	44.40	6.06	27.66	-10.68	81.56	114	-32.44	Horizontal

AV

Frequency (MHz)	Reading (dB $\mu$ V/m)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Factor(dB) Corr.	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin(dB)	Polarization
	AV					AV	PEAK	PEAK	
2402	75.423	44.40	6.03	27.60	-10.77	64.66	94	-29.34	Vertical
2402	74.649	44.40	6.03	27.60	-10.77	63.88	94	-30.12	Horizontal
2441	72.879	44.40	6.04	27.63	-10.73	62.15	94	-31.85	Vertical
2441	73.128	44.40	6.04	27.63	-10.73	62.40	94	-31.60	Horizontal
2479	74.843	44.40	6.06	27.66	-10.68	64.17	94	-29.83	Vertical
2479	72.134	44.40	6.06	27.66	-10.68	61.46	94	-32.54	Horizontal

Note: RBW>20BW; VBW=3xRBW



Above 1G Radiation Spurious

Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)										
3264.70	48.81	44.70	6.70	28.20	-9.80	39.01	74.00	-34.99	PK	Vertical
3264.70	39.61	44.70	6.70	28.20	-9.80	29.81	54.00	-24.19	AV	Vertical
3264.68	47.89	44.70	6.70	28.20	-9.80	38.09	74.00	-35.91	PK	Horizontal
3264.68	38.45	44.70	6.70	28.20	-9.80	28.65	54.00	-25.35	AV	Horizontal
4816.31	59.53	44.20	9.04	31.60	-3.56	55.97	74.00	-18.03	PK	Vertical
4816.31	38.75	44.20	9.04	31.60	-3.56	35.19	54.00	-18.81	AV	Vertical
4816.53	58.50	44.20	9.04	31.60	-3.56	54.94	74.00	-19.06	PK	Horizontal
4816.53	38.84	44.20	9.04	31.60	-3.56	35.28	54.00	-18.72	AV	Horizontal
5359.82	45.33	44.20	9.86	32.00	-2.34	42.99	74.00	-31.01	PK	Vertical
5359.82	37.86	44.20	9.86	32.00	-2.34	35.52	54.00	-18.48	AV	Vertical
5359.61	46.10	44.20	9.86	32.00	-2.34	43.76	74.00	-30.24	PK	Horizontal
5359.61	37.28	44.20	9.86	32.00	-2.34	34.94	54.00	-19.06	AV	Horizontal
7223.78	50.89	43.50	11.40	35.50	3.40	54.29	74.00	-19.71	PK	Vertical
7223.78	33.23	43.50	11.40	35.50	3.40	36.63	54.00	-17.37	AV	Vertical
7223.93	51.06	43.50	11.40	35.50	3.40	54.46	74.00	-19.54	PK	Horizontal
7223.93	32.63	43.50	11.40	35.50	3.40	36.03	54.00	-17.97	AV	Horizontal
11035.74	40.27	43.60	14.30	39.50	10.20	50.47	74.00	-23.53	PK	Vertical
11035.74	29.80	43.60	14.30	39.50	10.20	40.00	54.00	-14.00	AV	Vertical
11036.27	39.99	43.60	14.30	39.50	10.20	50.19	74.00	-23.81	PK	Horizontal
11036.27	30.46	43.60	14.30	39.50	10.20	40.66	54.00	-13.34	AV	Horizontal
13299.21	40.26	42.60	15.90	38.90	12.20	52.46	74.00	-21.54	PK	Vertical
13299.21	28.54	42.60	15.90	38.90	12.20	40.74	54.00	-13.26	AV	Vertical
13299.46	39.65	42.60	15.90	38.90	12.20	51.85	74.00	-22.15	PK	Horizontal
13299.46	29.36	42.60	15.90	38.90	12.20	41.56	54.00	-12.44	AV	Horizontal
15999.66	39.95	42.70	18.00	37.10	12.40	52.35	74.00	-21.65	PK	Vertical
15999.66	28.64	42.70	18.00	37.10	12.40	41.04	54.00	-12.96	AV	Vertical
15999.72	40.44	42.70	18.00	37.10	12.40	52.84	74.00	-21.16	PK	Horizontal
15999.72	29.49	42.70	18.00	37.10	12.40	41.89	54.00	-12.11	AV	Horizontal
17997.65	30.46	42.70	19.40	46.50	23.20	53.66	74.00	-20.34	PK	Vertical
17997.65	19.70	42.70	19.40	46.50	23.20	42.90	54.00	-11.10	AV	Vertical
17997.56	30.34	42.70	19.40	46.50	23.20	53.54	74.00	-20.46	PK	Horizontal
17997.56	18.22	42.70	19.40	46.50	23.20	41.42	54.00	-12.58	AV	Horizontal



Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Middle Channel (2441 MHz)										
3264.67	48.84	44.70	6.70	28.20	-9.80	39.04	74.00	-34.96	PK	Vertical
3264.67	38.97	44.70	6.70	28.20	-9.80	29.17	54.00	-24.83	AV	Vertical
3264.65	48.48	44.70	6.70	28.20	-9.80	38.68	74.00	-35.32	PK	Horizontal
3264.65	38.81	44.70	6.70	28.20	-9.80	29.01	54.00	-24.99	AV	Horizontal
4880.32	58.84	44.20	9.04	31.60	-3.56	55.28	74.00	-18.72	PK	Vertical
4880.32	39.37	44.20	9.04	31.60	-3.56	35.81	54.00	-18.19	AV	Vertical
4880.58	58.53	44.20	9.04	31.60	-3.56	54.97	74.00	-19.03	PK	Horizontal
4880.58	38.38	44.20	9.04	31.60	-3.56	34.82	54.00	-19.18	AV	Horizontal
5359.74	45.66	44.20	9.86	32.00	-2.34	43.32	74.00	-30.68	PK	Vertical
5359.74	38.06	44.20	9.86	32.00	-2.34	35.72	54.00	-18.28	AV	Vertical
5359.82	45.53	44.20	9.86	32.00	-2.34	43.19	74.00	-30.81	PK	Horizontal
5359.82	37.82	44.20	9.86	32.00	-2.34	35.48	54.00	-18.52	AV	Horizontal
7320.82	51.02	43.50	11.40	35.50	3.40	54.42	74.00	-19.58	PK	Vertical
7320.82	33.64	43.50	11.40	35.50	3.40	37.04	54.00	-16.96	AV	Vertical
7320.74	51.89	43.50	11.40	35.50	3.40	55.29	74.00	-18.71	PK	Horizontal
7320.74	32.79	43.50	11.40	35.50	3.40	36.19	54.00	-17.81	AV	Horizontal
9759.96	40.43	43.60	14.30	39.50	10.20	50.63	74.00	-23.37	PK	Vertical
9759.96	30.78	43.60	14.30	39.50	10.20	40.98	54.00	-13.02	AV	Vertical
9760.09	39.93	43.60	14.30	39.50	10.20	50.13	74.00	-23.87	PK	Horizontal
9760.09	30.38	43.60	14.30	39.50	10.20	40.58	54.00	-13.42	AV	Horizontal
13299.31	40.42	42.60	15.90	38.90	12.20	52.62	74.00	-21.38	PK	Vertical
13299.31	28.54	42.60	15.90	38.90	12.20	40.74	54.00	-13.26	AV	Vertical
13299.36	40.87	42.60	15.90	38.90	12.20	53.07	74.00	-20.93	Pk	Horizontal
13299.36	28.60	42.60	15.90	38.90	12.20	40.80	54.00	-13.20	AV	Horizontal
15999.71	39.92	42.70	18.00	37.10	12.40	52.32	74.00	-21.68	PK	Vertical
15999.71	28.64	42.70	18.00	37.10	12.40	41.04	54.00	-12.96	AV	Vertical
15999.76	39.63	42.70	18.00	37.10	12.40	52.03	74.00	-21.97	PK	Horizontal
15999.76	29.87	42.70	18.00	37.10	12.40	42.27	54.00	-11.73	AV	Horizontal
17997.91	30.87	42.70	19.40	46.50	23.20	54.07	74.00	-19.93	PK	Vertical
17997.91	19.79	42.70	19.40	46.50	23.20	42.99	54.00	-11.01	AV	Vertical
17997.68	31.21	42.70	19.40	46.50	23.20	54.41	74.00	-19.59	PK	Horizontal
17997.68	17.86	42.70	19.40	46.50	23.20	41.06	54.00	-12.94	AV	Horizontal





Frequency (MHz)	Reading (dB $\mu$ V)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type	Comment
High Channel (2479 MHz)										
3264.69	48.02	44.70	6.70	28.20	-9.80	38.22	74.00	-35.78	PK	Vertical
3264.69	38.54	44.70	6.70	28.20	-9.80	28.74	54.00	-25.26	AV	Vertical
3264.74	48.05	44.70	6.70	28.20	-9.80	38.25	74.00	-35.75	PK	Horizontal
3264.74	38.75	44.70	6.70	28.20	-9.80	28.95	54.00	-25.05	AV	Horizontal
4948.29	59.56	44.20	9.04	31.60	-3.56	56.00	74.00	-18.00	PK	Vertical
4948.29	38.13	44.20	9.04	31.60	-3.56	34.57	54.00	-19.43	AV	Vertical
4948.60	59.09	44.20	9.04	31.60	-3.56	55.53	74.00	-18.47	PK	Horizontal
4948.60	38.54	44.20	9.04	31.60	-3.56	34.98	54.00	-19.02	AV	Horizontal
5359.77	45.02	44.20	9.86	32.00	-2.34	42.68	74.00	-31.32	PK	Vertical
5359.77	38.35	44.20	9.86	32.00	-2.34	36.01	54.00	-17.99	AV	Vertical
5359.59	46.27	44.20	9.86	32.00	-2.34	43.93	74.00	-30.07	PK	Horizontal
5359.59	38.50	44.20	9.86	32.00	-2.34	36.16	54.00	-17.84	AV	Horizontal
7421.83	50.55	43.50	11.40	35.50	3.40	53.95	74.00	-20.05	PK	Vertical
7421.83	33.77	43.50	11.40	35.50	3.40	37.17	54.00	-16.83	AV	Vertical
7421.68	50.56	43.50	11.40	35.50	3.40	53.96	74.00	-20.04	PK	Horizontal
7421.68	33.08	43.50	11.40	35.50	3.40	36.48	54.00	-17.52	AV	Horizontal
9895.80	39.95	43.60	14.30	39.50	10.20	50.15	74.00	-23.85	PK	Vertical
9895.80	31.09	43.60	14.30	39.50	10.20	41.29	54.00	-12.71	AV	Vertical
9896.26	41.12	43.60	14.30	39.50	10.20	51.32	74.00	-22.68	PK	Horizontal
9896.26	29.80	43.60	14.30	39.50	10.20	40.00	54.00	-14.00	AV	Horizontal
13299.29	40.10	42.70	18.00	37.10	12.40	52.50	74.00	-21.50	PK	Vertical
13299.29	28.54	42.70	18.00	37.10	12.40	40.94	54.00	-13.06	AV	Vertical
13299.40	41.04	42.70	18.00	37.10	12.40	53.44	74.00	-20.56	PK	Horizontal
13299.40	28.97	42.70	18.00	37.10	12.40	41.37	54.00	-12.63	AV	Horizontal
17997.82	30.43	42.70	19.40	46.50	23.20	53.63	74.00	-20.37	PK	Vertical
17997.82	20.10	42.70	19.40	46.50	23.20	43.30	54.00	-10.70	AV	Vertical
17997.56	29.80	42.70	19.40	46.50	23.20	53.00	74.00	-21.00	PK	Horizontal
17997.56	18.12	42.70	19.40	46.50	23.20	41.32	54.00	-12.68	AV	Horizontal

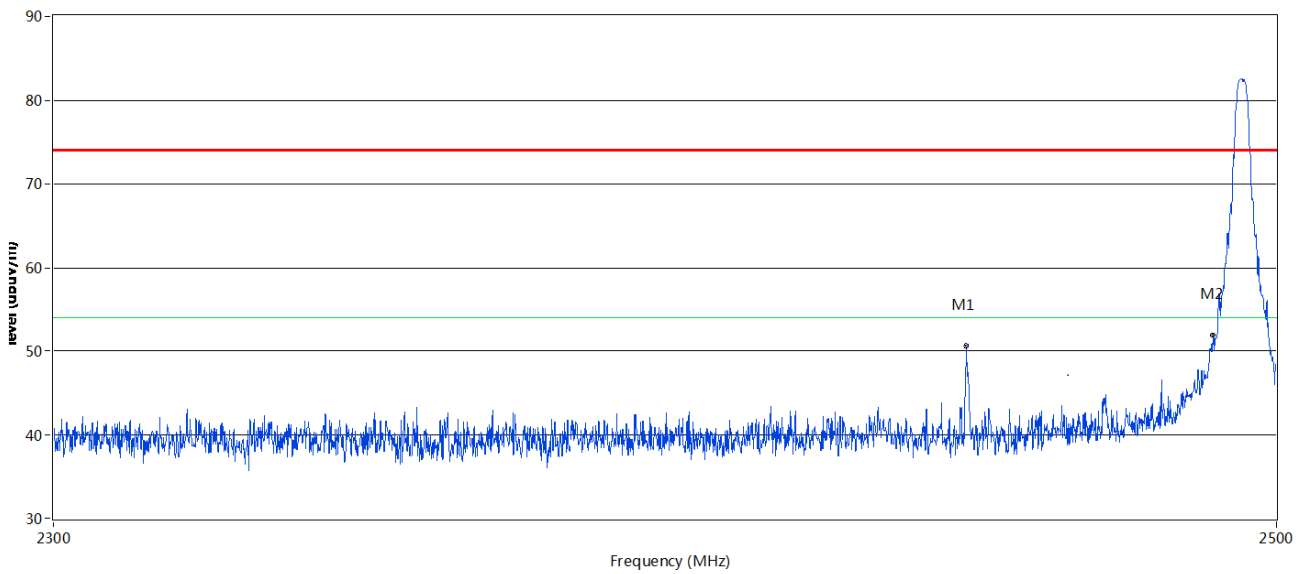


(Radiation Band edge)

Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	ANT
2390.00	50.21	74.0	-23.79	Peak	Horizontal
2390.00	40.10	54.0	-13.90	Average	Horizontal
2390.00	51.69	74.0	-22.31	Peak	Vertical
2390.00	41.23	54.0	-12.77	Average	Vertical

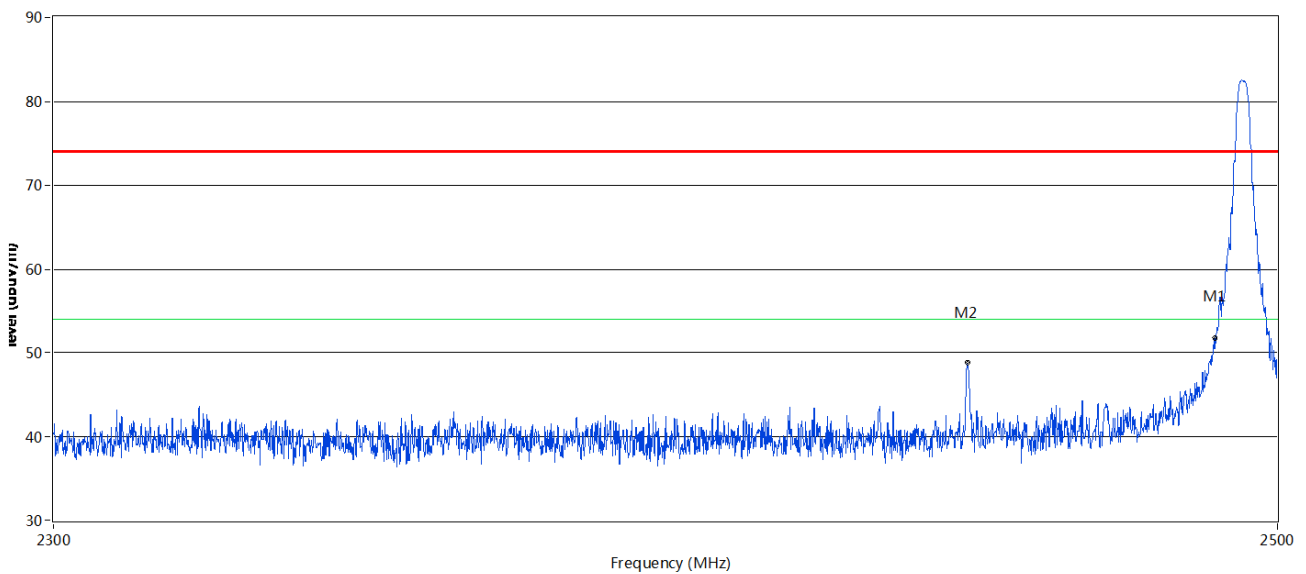
Low channel Horizontal

Radiated band-edge\_2.4G-Band-edge single-L



Low channel Vertical

Radiated band-edge\_2.4G-Band-edge single-L

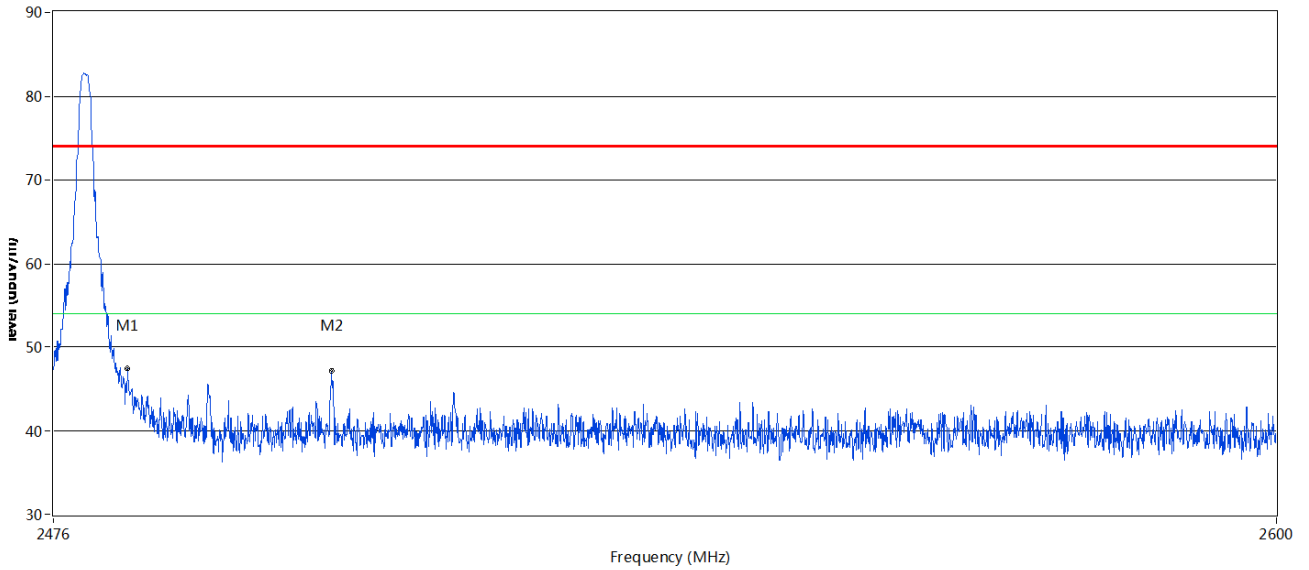




Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	ANT
2390.00	46.64	74.0	-27.36	Peak	Horizontal
2390.00	36.58	54.0	-17.42	Average	Horizontal
2390.00	46.50	74.0	-27.50	Peak	Vertical
2390.00	36.44	54.0	-17.56	Average	Vertical

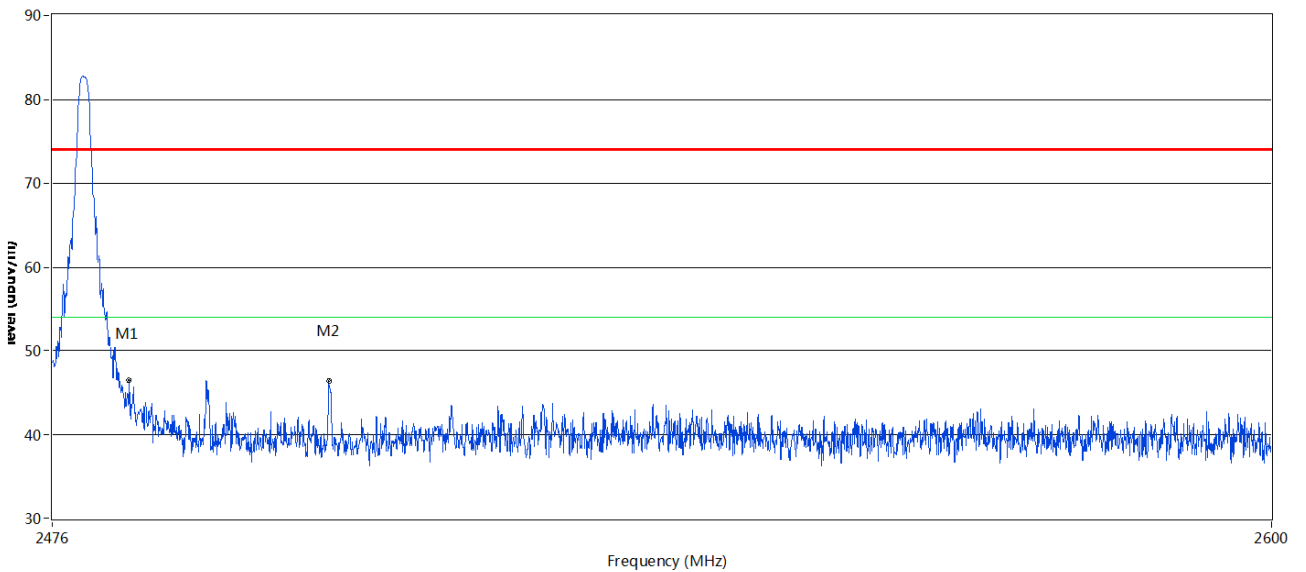
### High channel Horizontal

Radiated band-edge\_2.4G-Band-edge single-H



### High channel Vertical

Radiated band-edge\_2.4G-Band-edge single-H



#### 4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

##### 4.1 REQUIREMENT

According to FCC section 15.249, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50dB 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.

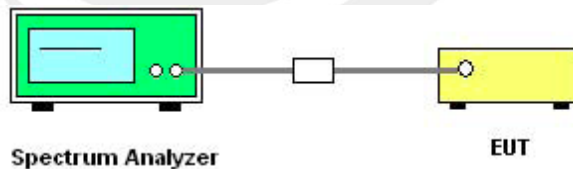
##### 4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2310 – 2404 MHz Upper Band Edge: 2478 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

##### 4.3 TEST SETUP



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

##### 4.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



#### 4.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage:	DC 3V
Test Mode:	N/A		

Note: denotes test is not applicable in this test report.



## 5. BANDWIDTH TEST

### 5.1 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= 30KHz, VBW $\geq$ RBW, Sweep time = Auto.

### 5.2 TEST SETUP



### 5.3 EUT OPERATION CONDITIONS

TX mode.



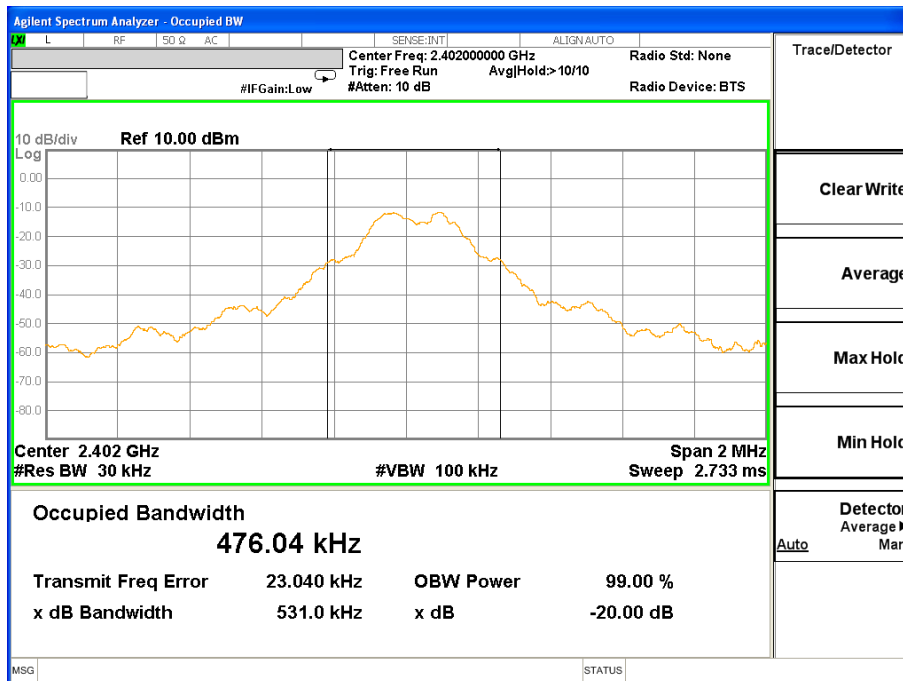


5.4 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage:	DC 3V

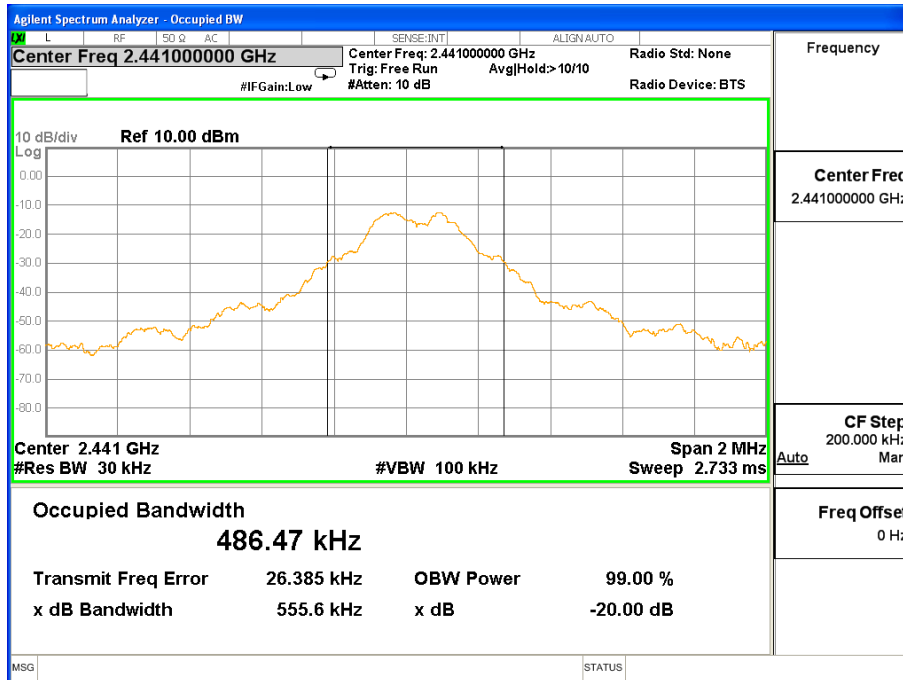
Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)	99% Bandwidth (MHz)
CH01	2402	0.531	2.0599
CH50	2441	0.556	2.0598
CH78	2479	0.559	2.0567

The Lowest Channel:2402MHz

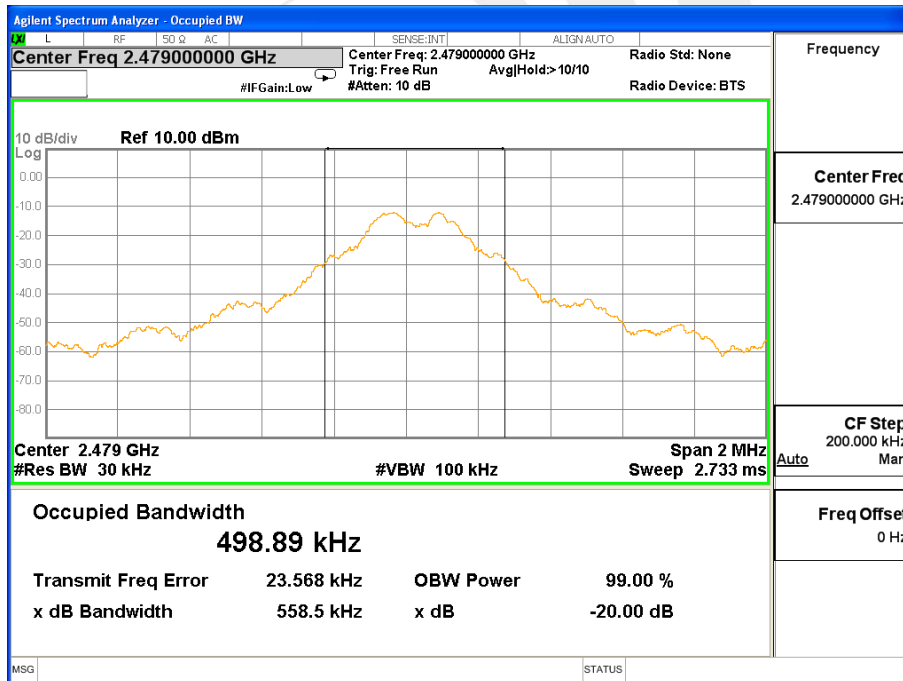




### The Middle Channel:2441MHz



### The High Channel: 2479MHz







## 6. ANTENNA REQUIREMENT

### 6.1 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.

### 6.2 EUT ANTENNA

The EUT antenna is Whip antenna.It conforms to the standard requirements.



## APPENDIX- PHOTOS OF TEST SETUP

### Radiated Measurement Photos



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