



FCC TEST REPORT

Report No: STS1609189F01

Issued for

Futlight Optoelectronics Co.,Ltd

Floor 2, Building D, Fusen Technology Park, Hangcheng Road, Bao'an District, Shenzhen City, China

Product Name:	LED Controlling system
Brand Name:	Mi.light
Model Name:	FUT092-FUT039
Series Model:	FUT025,FUT027,FUT007-FUT035, FUT036-FUT006,FUT096-FUT037, FUT095-FUT038
FCC ID:	2AJWW-FUT092
Test Standard:	FCC Part 15.249

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**TEST RESULT CERTIFICATION**

Applicant's name : Futlight Optoelectronics Co.,Ltd

Address : Floor 2, Building D, Fusen Technology Park, Hangcheng Road, Bao'an District, Shenzhen City, China

Manufacture's Name : Futlight Optoelectronics Co.,Ltd

Address : Floor 2, Building D, Fusen Technology Park, Hangcheng Road, Bao'an District, Shenzhen City, China

Product description

Product name : LED Controlling system

Brand name : Mi.light

Model and/or type reference : FUT092-FUT039, FUT025,FUT027,FUT007-FUT035, FUT036-FUT006,FUT096-FUT037,FUT095-FUT038

Standards : FCC Part15.249

Test procedure : ANSI C63.10-2013

This device described above has been tested by STS, and 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.

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Date of Test :

Date of performance of tests : 19 Sep. 2016 ~18 Oct. 2016

Date of Issue : 18 Oct. 2016

Test Result : **Pass**

Testing Engineer :

(Tony Liu)

Technical Manager :

(Vita Li)

Authorized Signatory :

(Bovey Yang)





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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	18 Oct. 2016	STS1609189F01	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 C63.4-2014 and 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.: 842334; IC Registration No.: 12108A-1

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended 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	$\pm 0.70\text{Db}$
4	Spurious emissions,conducted	$\pm 1.19\text{Db}$
5	All emissions,radiated(<1G) 30MHz-200MHz	$\pm 2.83\text{Db}$
6	All emissions,radiated(<1G) 200MHz-1000MHz	$\pm 2.94\text{Db}$
7	All emissions,radiated(>1G)	$\pm 3.03\text{Db}$
8	Temperature	$\pm 0.5^{\circ}\text{C}$
9	Humidity	$\pm 2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	LED Controlling system	
Trade Name	Mi.light	
Model Name	FUT092-FUT039	
Series Model	FUT025,FUT027,FUT007-FUT035,FUT036-FUT006,FUT096-FUT037,FUT095-FUT038	
Model Difference	Only different in model name	
Product Description	The EUT is a LED Controlling system	
	Operation Frequency:	2410-2472MHz
	Modulation Type:	FSK
	Antenna Designation:	Dipole Antenna
	Antenna Gain(Peak)	0.5 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.	
Power Supply	Input: DC 3V	

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)
01	2410	33	2442
02	2411	34	2443
03	2412	35	2444
04	2413	36	2445
05	2414	37	2446
06	2415	38	2447
07	2416	39	2448
08	2417	40	2449
09	2418	41	2450
10	2419	42	2451
11	2420	43	2452
12	2421	44	2453
13	2422	45	2454
14	2423	46	2455
15	2424	47	2456
16	2425	48	2457
17	2426	49	2458
18	2427	50	2459
19	2428	51	2460
20	2429	52	2461
21	2430	53	2462
22	2431	54	2463
23	2432	55	2464
24	2433	56	2465
25	2434	57	2466
26	2435	58	2467
27	2436	59	2468
28	2437	60	2469
29	2438	61	2470
30	2439	62	2471
31	2440	63	2472
32	2441		

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	Mi.light	FUT092-FUT039	Dipole	NA	0.5	Antenna

The EUT antenna is Dipole 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/FSK
Mode 2	TX CH32	1 MHz/FSK
Mode 3	TX CH63	1 MHz/FSK

Note:

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

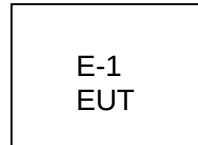




2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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	LED Controlling system	Mi.light	FUT092-FUT039	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
Spectrum Analyzer	Agilent	E4407B	MY50140340	2015.10.25	2016.10.24
Test Receiver	R&S	ESCI	101427	2015.10.25	2016.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2015.11.25	2016.11.24
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	9120D-1343	2016.03.06	2017.03.05
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.06	2017.06.05
PreAmplifier	Agilent	8449B	60538	2015.10.25	2016.10.24
Loop Antenna	ARA	PLA-1030/B	1029	2016.06.08	2017.06.07
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2015.10.25	2016.10.24

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	102086	2015.11.20	2016.11.19
LISN	R&S	ENV216	101242	2015.10.25	2016.10.24
LISN	EMCO	3810/2NM	000-23625	2015.10.25	2016.10.24



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.

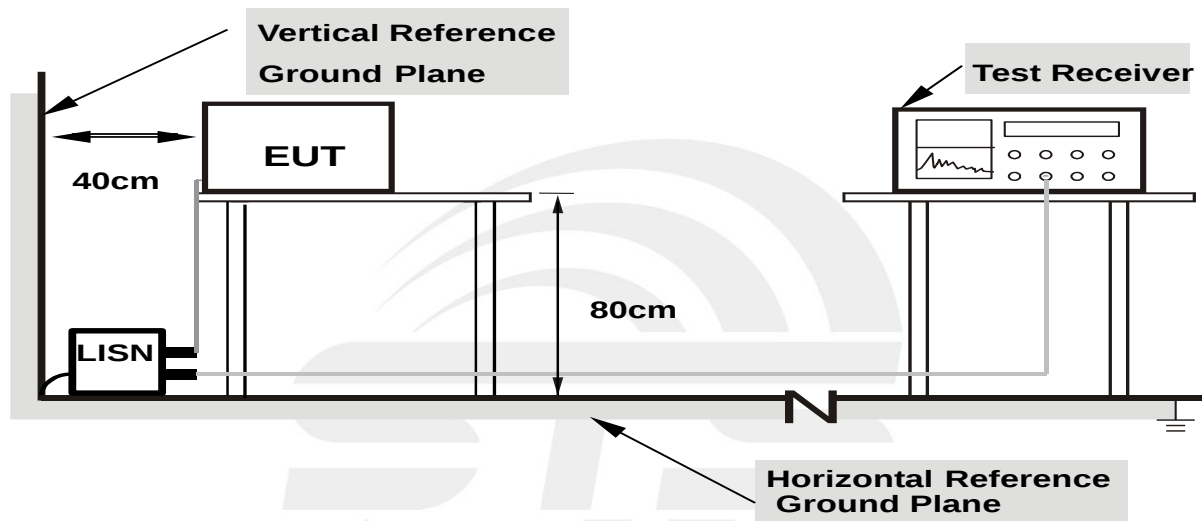
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 3 MHz



Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
	150kHz~30MHz / RBW 9kHz for QP
	30MHz~1000MHz / RBW 100kHz for PK
	Above 1GHz / RBW 1MHz VBW 3MHz for PK RBW 1MHz VBW 3MHz RMS detector for AV

3.2.2 TEST PROCEDURE

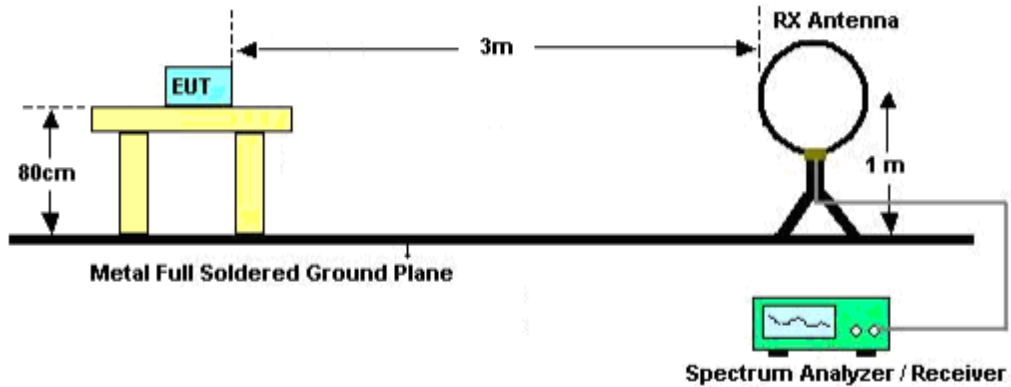
- The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Below 1GHz)
- The measuring distance of 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)
- 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.
- 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.
- All readings are peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading complies with the QP limits and then QP Mode measurement didn't perform (Below 1GHz)
- All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value complies 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)
- 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 axes. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

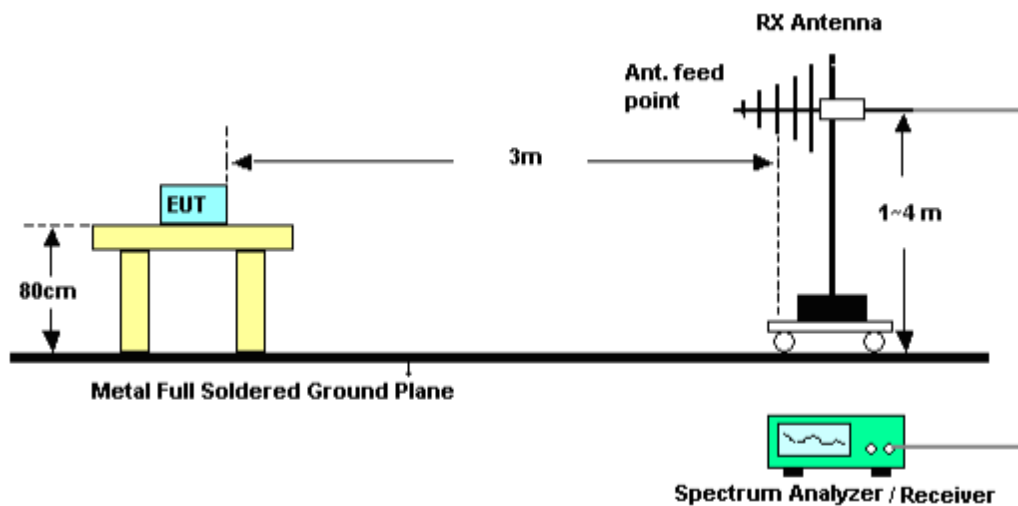
No deviation

3.2.4 TEST SETUP

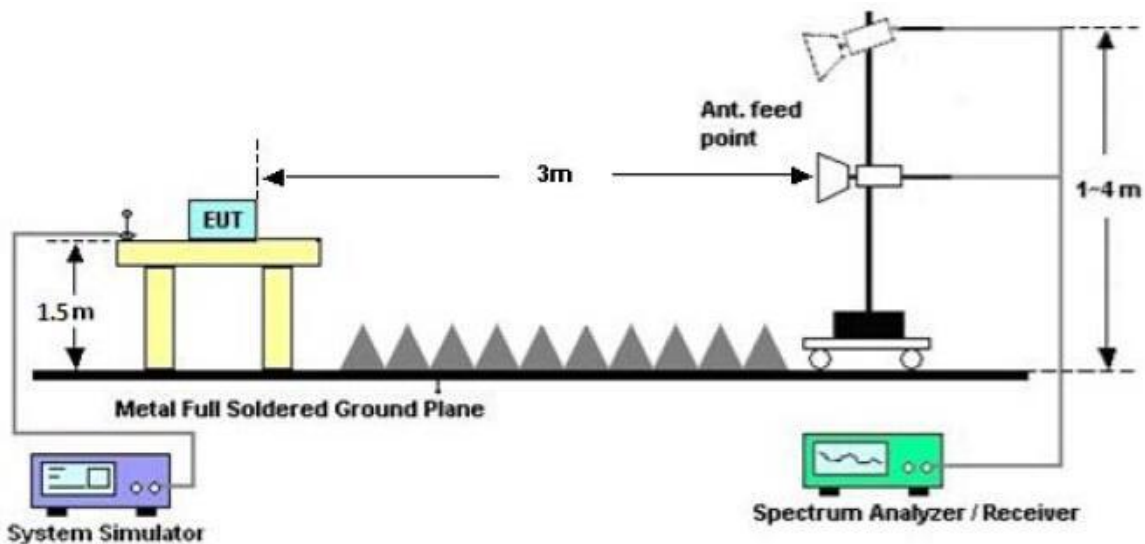
(A) Radiated Emission Test-Up Frequency Below 30MHz



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

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



Between 30MHz – 1000 MHz Radiation Spurious

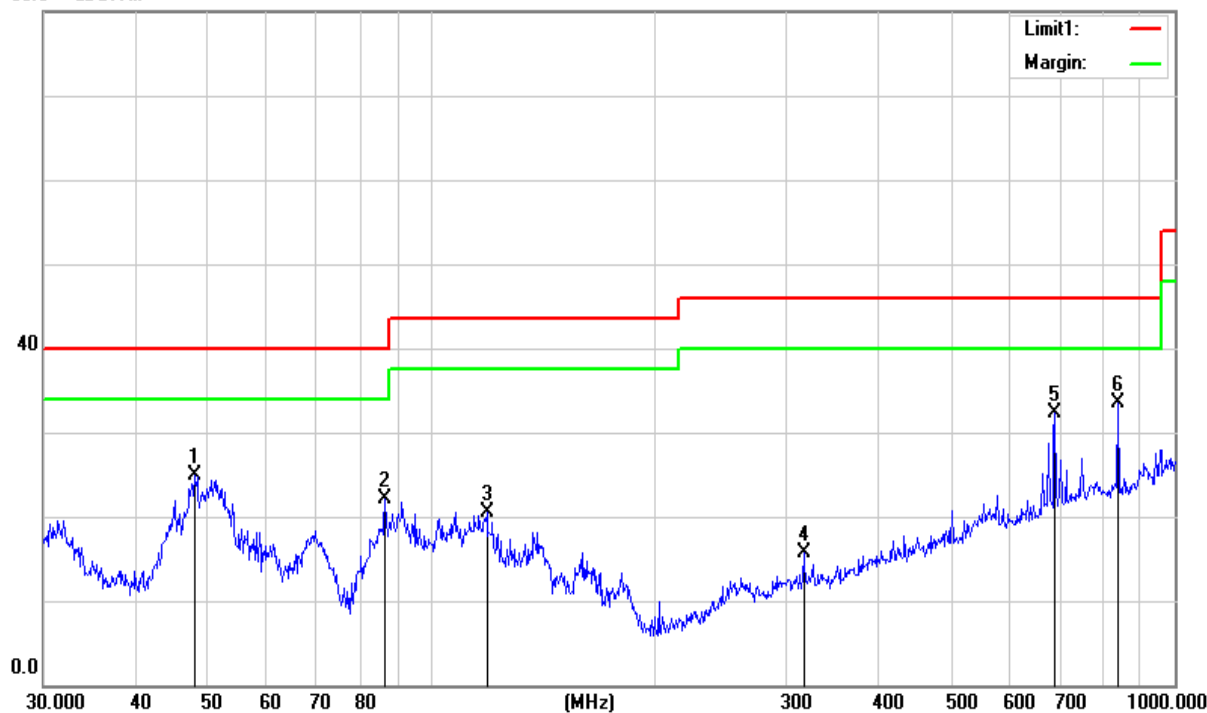
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	DC 3V	Test Mode:	Mode 1/2/3(Model 1 worst)

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
47.9940	45.29	-20.45	24.84	40.00	-15.16	QP
86.5030	43.13	-21.07	22.06	40.00	-17.94	QP
118.6013	38.23	-17.78	20.45	43.50	-23.05	QP
316.5890	29.90	-14.28	15.62	46.00	-30.38	QP
689.5643	37.92	-5.57	32.35	46.00	-13.65	QP
839.1816	36.31	-2.78	33.53	46.00	-12.47	QP

Remark:

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

80.0 dBuV/m





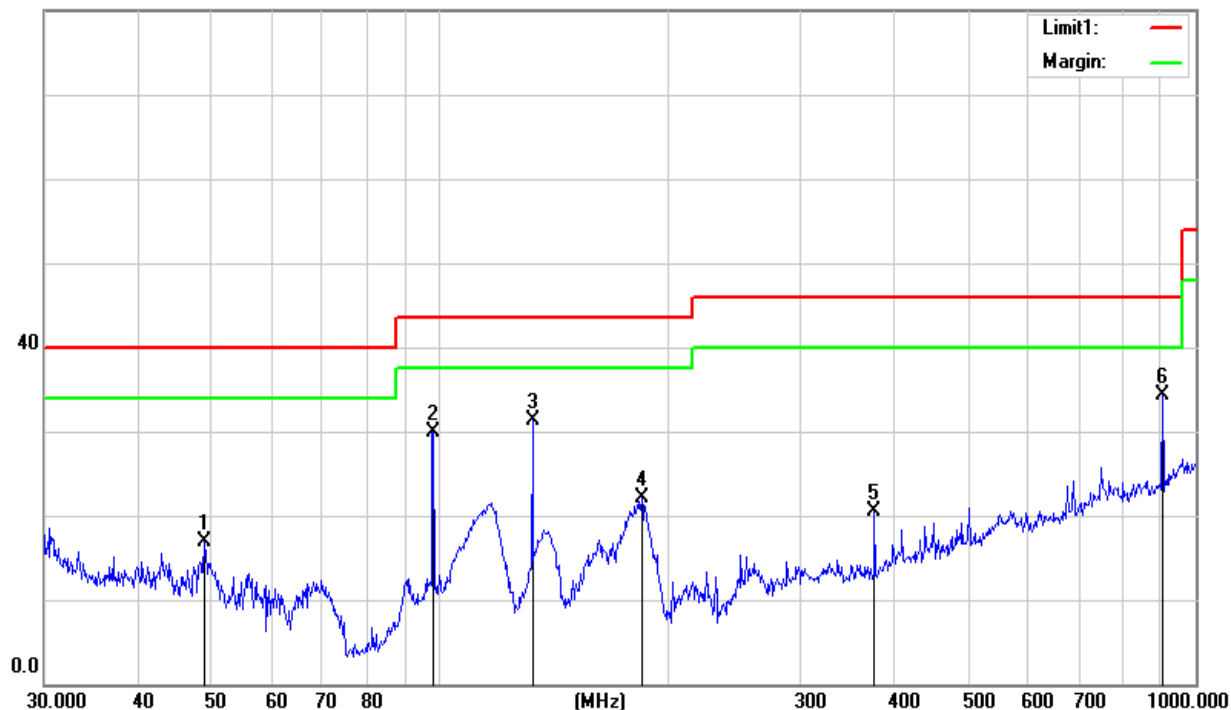
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	DC 3V	Test Mode:	Mode 1/2/3(Model 1 worst)

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
48.8430	37.81	-20.89	16.92	40.00	-23.08	QP
98.1420	49.35	-19.38	29.97	43.50	-13.53	QP
132.6850	48.79	-17.54	31.25	43.50	-12.25	QP
185.1380	41.93	-19.85	22.08	43.50	-21.42	QP
375.9385	33.14	-12.73	20.41	46.00	-25.59	QP
903.3094	36.50	-2.14	34.36	46.00	-11.64	QP

Remark:

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

80.0 dBuV/m





Fundamental frequency:
PK

Frequency (MHz)	Reading (dB μ V/m)	Amplifier	Loss	Antenna Factor	Factor(dB) Corr.	Result (dB μ V/m)	Limit (dB μ V/m)	Margin(dB)	Polarization
	PEAK	(dB)	(dB)	(dB/m)		PEAK	PEAK	PEAK	
2410	79.336	44.40	6.03	27.60	-10.77	68.57	114	-45.43	Vertical
2410	77.545	44.40	6.03	27.60	-10.77	66.78	114	-47.22	Horizontal
2441	79.468	44.40	6.04	27.63	-10.73	68.74	114	-45.26	Vertical
2441	77.865	44.40	6.04	27.63	-10.73	67.14	114	-46.86	Horizontal
2472	78.643	44.40	6.06	27.66	-10.68	67.97	114	-46.03	Vertical
2472	76.778	44.40	6.06	27.66	-10.68	66.10	114	-47.90	Horizontal

AV

Frequency (MHz)	Reading (dB μ V/m)	Amplifier	Loss	Antenna Factor	Factor(dB) Corr.	Result (dB μ V/m)	Limit (dB μ V/m)	Margin(dB)	Polarization
	AV	(dB)	(dB)	(dB/m)		AV	AV	AV	
2410	62.784	44.40	6.03	27.60	-10.77	52.02	94	-41.98	Vertical
2410	60.579	44.40	6.03	27.60	-10.77	49.81	94	-44.19	Horizontal
2441	62.468	44.40	6.04	27.63	-10.73	51.74	94	-42.26	Vertical
2441	60.562	44.40	6.04	27.63	-10.73	49.84	94	-44.16	Horizontal
2472	61.764	44.40	6.06	27.66	-10.68	51.09	94	-42.91	Vertical
2472	60.467	44.40	6.06	27.66	-10.68	49.79	94	-44.21	Horizontal

Note: RBW= 3MHz; VBW= 3MHz



Above 1G Radiation Spurious

Frequency (MHz)	Meter 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 (2410 MHz)										
3265.26	50.10	44.70	6.70	28.20	-9.80	40.30	74.00	-33.70	PK	Vertical
3265.26	40.18	44.70	6.70	28.20	-9.80	30.38	54.00	-23.62	AV	Vertical
3265.23	50.10	44.70	6.70	28.20	-9.80	40.30	74.00	-33.70	PK	Horizontal
3265.23	40.10	44.70	6.70	28.20	-9.80	30.30	54.00	-23.70	AV	Horizontal
4816.74	60.41	44.20	9.04	31.60	-3.56	56.85	74.00	-17.15	PK	Vertical
4816.74	50.47	44.20	9.04	31.60	-3.56	46.91	54.00	-7.09	AV	Vertical
4816.61	60.40	44.20	9.04	31.60	-3.56	56.84	74.00	-17.16	PK	Horizontal
4816.61	50.21	44.20	9.04	31.60	-3.56	46.65	54.00	-7.35	AV	Horizontal
5360.20	47.36	44.20	9.86	32.00	-2.34	45.02	74.00	-28.98	PK	Vertical
5360.20	39.34	44.20	9.86	32.00	-2.34	37.00	54.00	-17.00	AV	Vertical
5360.20	47.33	44.20	9.86	32.00	-2.34	44.99	74.00	-29.01	PK	Horizontal
5360.20	39.11	44.20	9.86	32.00	-2.34	36.77	54.00	-17.23	AV	Horizontal
7224.91	52.82	43.50	11.40	35.50	3.40	56.22	74.00	-17.78	PK	Vertical
7224.91	44.77	43.50	11.40	35.50	3.40	48.17	54.00	-5.83	AV	Vertical
7223.88	52.80	43.50	11.40	35.50	3.40	56.20	74.00	-17.80	PK	Horizontal
7223.88	44.79	43.50	11.40	35.50	3.40	48.19	54.00	-5.81	AV	Horizontal
11036.36	42.09	43.60	14.30	39.50	10.20	52.29	74.00	-21.71	PK	Vertical
11036.36	32.13	43.60	14.30	39.50	10.20	42.33	54.00	-11.67	AV	Vertical
11036.59	42.04	43.60	14.30	39.50	10.20	52.24	74.00	-21.76	PK	Horizontal
11036.59	32.07	43.60	14.30	39.50	10.20	42.27	54.00	-11.73	AV	Horizontal
13299.74	41.82	42.60	15.90	38.90	12.20	54.02	74.00	-19.98	PK	Vertical
13299.74	31.88	42.60	15.90	38.90	12.20	44.08	54.00	-9.92	AV	Vertical
13299.88	41.88	42.60	15.90	38.90	12.20	54.08	74.00	-19.92	PK	Horizontal
13299.88	30.88	42.60	15.90	38.90	12.20	43.08	54.00	-10.92	AV	Horizontal
16000.29	41.95	42.70	18.00	37.10	12.40	54.35	74.00	-19.65	PK	Vertical
16000.29	31.88	42.70	18.00	37.10	12.40	44.28	54.00	-9.72	AV	Vertical
16000.20	41.96	42.70	18.00	37.10	12.40	54.36	74.00	-19.64	PK	Horizontal
16000.20	31.18	42.70	18.00	37.10	12.40	43.58	54.00	-10.42	AV	Horizontal
17998.30	32.05	42.70	19.40	46.50	23.20	55.25	74.00	-18.75	PK	Vertical
17998.30	22.18	42.70	19.40	46.50	23.20	45.38	54.00	-8.62	AV	Vertical
17998.16	32.12	42.70	19.40	46.50	23.20	55.32	74.00	-18.68	PK	Horizontal
17998.16	22.20	42.70	19.40	46.50	23.20	45.40	54.00	-8.60	AV	Horizontal



Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Middle Channel (2441 MHz)										
3265.16	50.04	44.70	6.70	28.20	-9.80	40.24	74.00	-33.76	PK	Vertical
3265.16	40.00	44.70	6.70	28.20	-9.80	30.20	54.00	-23.80	AV	Vertical
3265.17	50.06	44.70	6.70	28.20	-9.80	40.26	74.00	-33.74	PK	Horizontal
3265.17	40.04	44.70	6.70	28.20	-9.80	30.24	54.00	-23.76	AV	Horizontal
4880.85	60.34	44.20	9.04	31.60	-3.56	56.78	74.00	-17.22	PK	Vertical
4880.85	50.34	44.20	9.04	31.60	-3.56	46.78	54.00	-7.22	AV	Vertical
4880.80	60.33	44.20	9.04	31.60	-3.56	56.77	74.00	-17.23	PK	Horizontal
4880.80	50.40	44.20	9.04	31.60	-3.56	46.84	54.00	-7.16	AV	Horizontal
5360.10	47.24	44.20	9.86	32.00	-2.34	44.90	74.00	-29.10	PK	Vertical
5360.10	39.24	44.20	9.86	32.00	-2.34	36.90	54.00	-17.10	AV	Vertical
5360.02	47.23	44.20	9.86	32.00	-2.34	44.89	74.00	-29.11	PK	Horizontal
5360.02	39.24	44.20	9.86	32.00	-2.34	36.90	54.00	-17.10	AV	Horizontal
7320.46	52.70	43.50	11.40	35.50	3.40	56.10	74.00	-17.90	PK	Vertical
7320.46	44.65	43.50	11.40	35.50	3.40	48.05	54.00	-5.95	AV	Vertical
7320.58	52.73	43.50	11.40	35.50	3.40	56.13	74.00	-17.87	PK	Horizontal
7320.58	44.73	43.50	11.40	35.50	3.40	48.13	54.00	-5.87	AV	Horizontal
11036.30	41.98	43.60	14.30	39.50	10.20	52.18	74.00	-21.82	PK	Vertical
11036.30	31.95	43.60	14.30	39.50	10.20	42.15	54.00	-11.85	AV	Vertical
11036.47	41.93	43.60	14.30	39.50	10.20	52.13	74.00	-21.87	PK	Horizontal
11036.47	31.98	43.60	14.30	39.50	10.20	42.18	54.00	-11.82	AV	Horizontal
13299.83	41.75	42.60	15.90	38.90	12.20	53.95	74.00	-20.05	PK	Vertical
13299.83	31.80	42.60	15.90	38.90	12.20	44.00	54.00	-10.00	AV	Vertical
13299.75	41.84	42.60	15.90	38.90	12.20	54.04	74.00	-19.96	PK	Horizontal
13299.75	30.77	42.60	15.90	38.90	12.20	42.97	54.00	-11.03	AV	Horizontal
16000.14	41.87	42.70	18.00	37.10	12.40	54.27	74.00	-19.73	PK	Vertical
16000.14	31.67	42.70	18.00	37.10	12.40	44.07	54.00	-9.93	AV	Vertical
16000.09	41.84	42.70	18.00	37.10	12.40	54.24	74.00	-19.76	PK	Horizontal
16000.09	31.19	42.70	18.00	37.10	12.40	43.59	54.00	-10.41	AV	Horizontal
17998.29	31.97	42.70	19.40	46.50	23.20	55.17	74.00	-18.83	PK	Vertical
17998.29	22.03	42.70	19.40	46.50	23.20	45.23	54.00	-8.77	AV	Vertical
17998.17	32.03	42.70	19.40	46.50	23.20	55.23	74.00	-18.77	PK	Horizontal
17998.17	21.88	42.70	19.40	46.50	23.20	45.08	54.00	-8.92	AV	Horizontal



Frequency (MHz)	Meter 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
High Channel (2472 MHz)										
3265.16	50.01	44.70	6.70	28.20	-9.80	40.21	74.00	-33.79	PK	Vertical
3265.16	40.05	44.70	6.70	28.20	-9.80	30.25	54.00	-23.75	AV	Vertical
3265.16	50.06	44.70	6.70	28.20	-9.80	40.26	74.00	-33.74	PK	Horizontal
3265.16	40.06	44.70	6.70	28.20	-9.80	30.26	54.00	-23.74	AV	Horizontal
4944.34	60.30	44.20	9.04	31.60	-3.56	56.74	74.00	-17.26	PK	Vertical
4944.34	50.33	44.20	9.04	31.60	-3.56	46.77	54.00	-7.23	AV	Vertical
4944.51	60.21	44.20	9.04	31.60	-3.56	56.65	74.00	-17.35	PK	Horizontal
4944.51	50.30	44.20	9.04	31.60	-3.56	46.74	54.00	-7.26	AV	Horizontal
5360.14	47.23	44.20	9.86	32.00	-2.34	44.89	74.00	-29.11	PK	Vertical
5360.14	39.29	44.20	9.86	32.00	-2.34	36.95	54.00	-17.05	AV	Vertical
5360.14	47.23	44.20	9.86	32.00	-2.34	44.89	74.00	-29.11	PK	Horizontal
5360.14	39.22	44.20	9.86	32.00	-2.34	36.88	54.00	-17.12	AV	Horizontal
7422.16	52.73	43.50	11.40	35.50	3.40	56.13	74.00	-17.87	PK	Vertical
7422.16	44.65	43.50	11.40	35.50	3.40	48.05	54.00	-5.95	AV	Vertical
7422.23	52.72	43.50	11.40	35.50	3.40	56.12	74.00	-17.88	PK	Horizontal
7422.23	44.71	43.50	11.40	35.50	3.40	48.11	54.00	-5.89	AV	Horizontal
11036.26	41.99	43.60	14.30	39.50	10.20	52.19	74.00	-21.81	PK	Vertical
11036.26	31.94	43.60	14.30	39.50	10.20	42.14	54.00	-11.86	AV	Vertical
11036.30	41.98	43.60	14.30	39.50	10.20	52.18	74.00	-21.82	PK	Horizontal
11036.30	32.00	43.60	14.30	39.50	10.20	42.20	54.00	-11.80	AV	Horizontal
16000.14	41.88	42.70	18.00	37.10	12.40	54.28	74.00	-19.72	PK	Vertical
16000.14	31.74	42.70	18.00	37.10	12.40	44.14	54.00	-9.86	AV	Vertical
16000.15	41.86	42.70	18.00	37.10	12.40	54.26	74.00	-19.74	PK	Horizontal
16000.15	31.08	42.70	18.00	37.10	12.40	43.48	54.00	-10.52	AV	Horizontal
17998.29	31.95	42.70	19.40	46.50	23.20	55.15	74.00	-18.85	PK	Vertical
17998.29	22.00	42.70	19.40	46.50	23.20	45.20	54.00	-8.80	AV	Vertical
17998.17	32.04	42.70	19.40	46.50	23.20	55.24	74.00	-18.76	PK	Horizontal
17998.17	22.03	42.70	19.40	46.50	23.20	45.23	54.00	-8.77	AV	Horizontal



(Radiation Band edge)

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Orrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Low CH										
2400.00	69.17	43.80	4.91	25.90	-12.99	56.18	74	-17.82	PK	Vertical
2400.00	55.03	43.80	4.91	25.90	-12.99	42.04	54	-11.96	AV	Vertical
2400.00	70.20	43.80	4.91	25.90	-12.99	57.21	74	-16.79	PK	Horizontal
2400.00	54.01	43.80	4.91	25.90	-12.99	41.02	54	-12.98	AV	Horizontal
2483.50	70.96	43.80	5.12	25.90	-12.78	58.18	74	-15.82	PK	Vertical
2483.50	53.96	43.80	5.12	25.90	-12.78	41.18	54	-12.82	AV	Vertical
2483.50	71.07	43.80	5.12	25.90	-12.78	58.29	74	-15.71	PK	Horizontal
2483.50	53.97	43.80	5.12	25.90	-12.78	41.19	54	-12.81	AV	Horizontal
High CH										
2400.00	67.28	43.80	4.91	25.90	-12.99	54.29	74	-19.71	PK	Vertical
2400.00	53.56	43.80	4.91	25.90	-12.99	40.57	54	-13.43	AV	Vertical
2400.00	68.25	43.80	4.91	25.90	-12.99	55.26	74	-18.74	PK	Horizontal
2400.00	53.07	43.80	4.91	25.90	-12.99	40.08	54	-13.92	AV	Horizontal
2483.50	69.47	43.80	5.12	25.90	-12.78	56.69	74	-17.31	PK	Vertical
2483.50	52.69	43.80	5.12	25.90	-12.78	39.91	54	-14.09	AV	Vertical
2483.50	70.55	43.80	5.12	25.90	-12.78	57.77	74	-16.23	PK	Horizontal
2483.50	52.20	43.80	5.12	25.90	-12.78	39.42	54	-14.58	AV	Horizontal

Low measurement frequencies is range from 2310 to 2400 MHz, high measurement frequencies is range from 2483.5 to 2500 MHz.

Only show the worst point data of the emissions in the frequency 2310-2400 MHz and 2483.5-2500 MHz.

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.

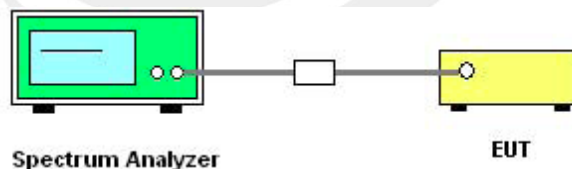
4.2 TEST PROCEDURE

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.





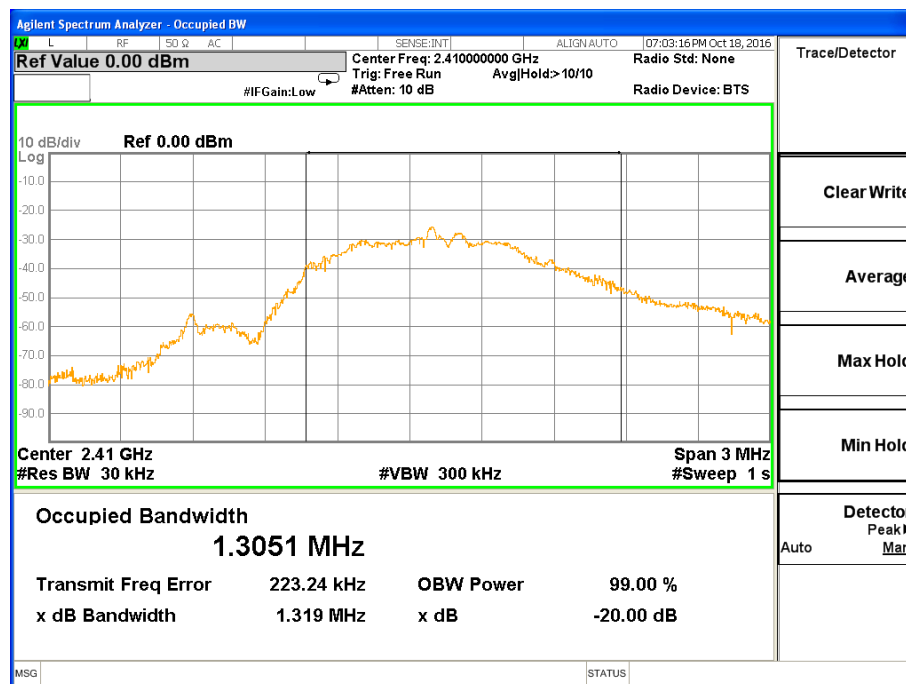
5.4 TEST RESULTS

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	2410	1.319	1.3051
CH32	2441	1.283	1.2273
CH63	2472	1.691	1.5119

Detector: Peak

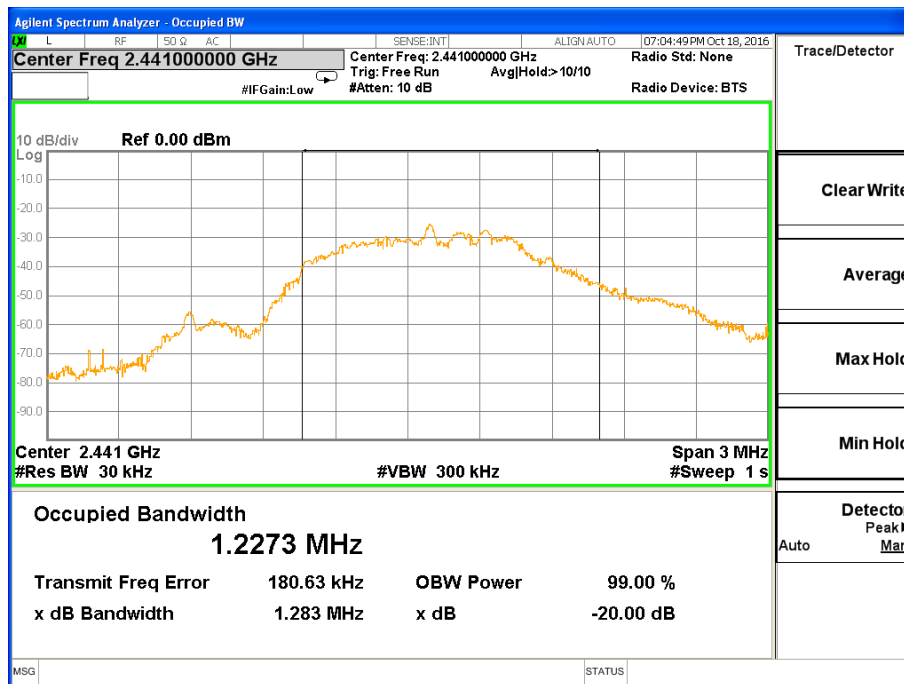
The Lowest Channel:2410MHz





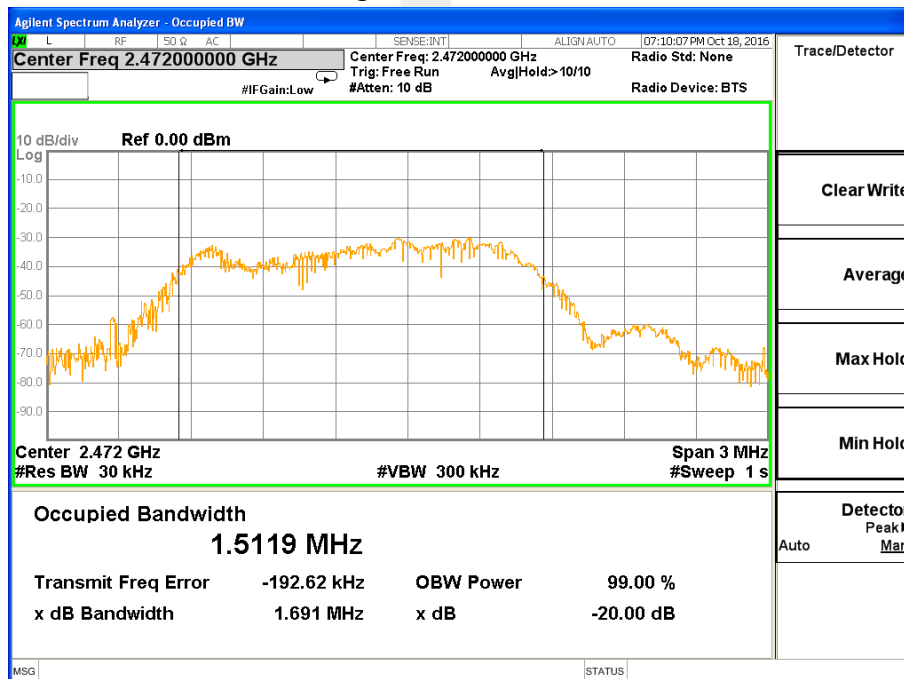
Detector: Peak

The Middle Channel: 2441MHz



Detector: Peak

The High Channel: 2472MHz





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. The use of a permanently attached antenna to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

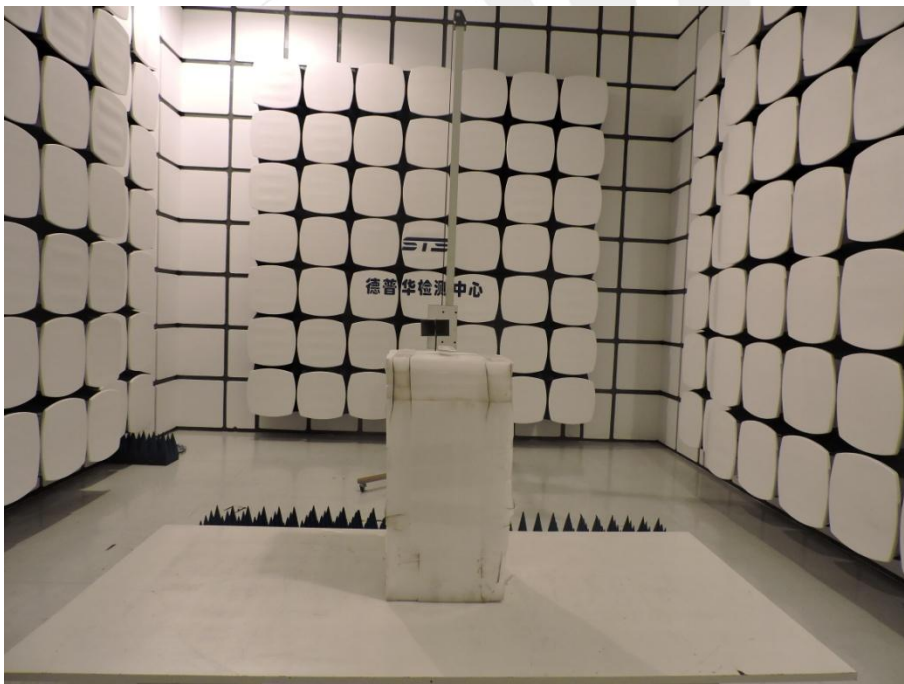
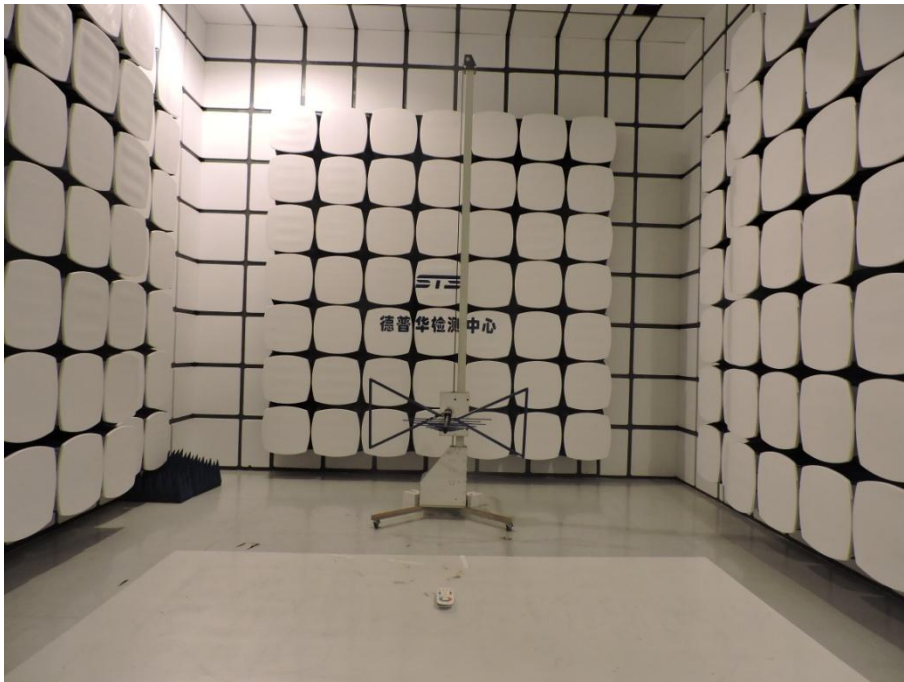
6.2 EUT ANTENNA

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



APPENDIX- PHOTOS OF TEST SETUP

Radiated Measurement Photos



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