FCC RF TEST REPORT

Issued to

Zylight, LLC

For

Newz

Model Name	:	Newz
Trade Name	:	Newz
Brand Name	:	Zylight
Standard	:	47 CFR Part 15,Subpart C ANSI C63.4-2014 RSS 247 Issue1 RSS GEN Issue 4
FCC ID		T3YNZ
IC	:	6423A-NZ
Test date	:	Nov.2,2015 to Nov.3,2015
Issue date	:	Nov.4,2015

by

Shanghai MORLAB Communication Technology Co., Ltd.

Tested by Wu Hongtei *Approved by* Gu Yeqiang *Review by* Zhang Jie

DIRECTORY

Change History

Issue	Date	Reason for change
1.0	Nov.4,2015	First edition

1. General Information

1.1 Applicant

Zylight, LLC
10718 McCune Ave., Los Angeles, CA. 90034

1.2 Manufacturer

Zylight, LLC
10718 McCune Ave., Los Angeles, CA. 90034

1.3 Description of EUT

EUT Name..... :	Newz
Model Name..... :	Newz
Brand Name..... :	Zylight
Trade Name ..... :	Newz
Hardware Version ..... :	4
Software Version ..... :	1.11
Modulation Type ..... :	DSSS
Frequency Range..... :	2.405GHz - 2.450GHz (at interval of 5MHz)
Channel Number..... :	10
EUT Stage ..... :	Production Unit
Antenna Type..... :	PCB Antenna
Antenna Gain..... :	-5 dBi
Power Supply ..... :	100-240V, 50-60Hz

NOTE 1:
*The EUT is a LED light. The EUT contains Zigbee Module operating at 2.4GHz ISM band; the frequencies allocated for the Zigbee Module is F(MHz)=2400+5*n (1<=n<=10). The lowest, middle, highest channel numbers of the Zigbee Module used and tested in this report are separately 1 (2405MHz), 5 (2425MHz) and 10 (2450MHz).*
NOTE 2:
For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacture.

2. Facilities and Accreditations

2.1 Test Facility

Shanghai Morlab Communications Technology Co., Ltd. Morlab Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 15~35°C
Relative humidity: 30~60%
Atmosphere pressure: 86-106kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.
Uncertainty of Conducted Emission: ±1.76dB
Uncertainty of Radiated Emission:±3.16dB

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Service Simulator	Anritsu	MT8852A	6K00002788	2015.9.22	1year
Spectrum Analyzer	R&S	FSU26	200880	2015.2.25	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Power Splitter	Mini-Circuits	ZFRSC-183-S+	765001016	(n.a.)	(n.a.)
Attenuator 1	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)
Full/Semi-Anechoie Chamber	Albatross	9m*6m*6m	(n.a.)	2015.9.14	3year
EMI Test Receiver	R&S	ESCI	101351	2015.8.5	1year
Antenna	Schwarzbeck	BBHA 9120C	9120C-384	2015.7.25	1year
Antenna	R&S	HL562	100385	2015.6.17	1year
Antenna	R&S	HF906	100565	2015.6.17	1year
LISN	Rohde&Schwarz	ENV216	812744	2015.9.22	1year
Personal Computer	HP	(n.a.)	(n.a.)	(n.a.)	(n.a.)
Test Antenna-Horn	Schwarzbeck	BBHA9170	BBHA91970171	2015.9.22	1year
Test Antenna-Log	Schwarzbeck	VULB 9163	9163-561	2015.9.25	1year
Test Antenna-Loop	Rohde&Schwarz	HFH2-Z2	860004/001	2015.9.22	1year
Temporary Antenna Connector	Farpu	SMA-K	(n.a.)	(n.a.)	(n.a.)
RF Cable	(n.a.)	(n.a.)	(n.a.)	(n.a.)	(n.a.)

NOTE:
Equipments listed above have been calibrated and are in the period of validation.

3. Test Standards and Results

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

FCC Part 15 Subpart C §15.247
ANSI C63.4-2014
June 2015 KDB558074
INDUSTRY CANADA RSS 247 Issue 1
INDUSTRY CANADA RSS GEN Issue 4

NOTE:
(1)All test items were verified and recorded according to the standards and without any deviation during the test.
(2)This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart C and RSS-247,recorded in a separate test report.

Test items and the results are as bellow:

No.	FCC Rules	IC Rules	Description	Result
1	15.203	RSS-GEN 7.1.2	Antenna Requirement	Pass
2	15.247(b)	RSS-247 5.4(4)	Peak Output power	Pass
3	15.247(b)	RSS-247 5.4(4)	Average Power	Pass
4	15.247(a)	RSS-247 5.2(1)	20dB/6dB Bandwidth	Pass
5	15.247(d)	RSS-247 5.5 RSS-GEN 8.10	Conducted Spurious Emmission	Pass
6	15.247(d)	RSS-247 5.5 RSS-GEN 8.10	Band Edge	Pass
7	15.207	RSS-GEN 8.8	Conducted Emission	Pass
8	15.247(d) 15.209	RSS-247 5.5 RSS-GEN 8.9	Radiated Emission	Pass
9	15.247(e)	RSS-247 5.2(2)	Power Spectral Density (PSD)	Pass

4. 47 CFR Part 15C

4.1 Antenna requirement

4.1.1 Applicable standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

5. Test Result

5.1 Peak Output Power

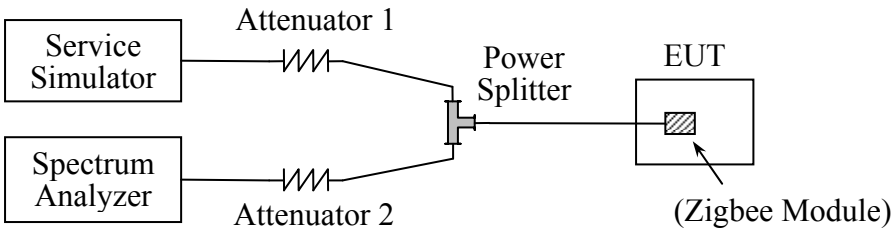
5.1.1 Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

5.1.2 Test Description

The measured output power was calculated by the reading of the spectrum analyzer and calibration.

A. Test Setup:



The Zigbee Module of the EUT, is coupled to the Spectrum Analyzer (SA) and the Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factoris calibrated to correct the reading. During the measurement, the Zigbee Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting at maximum power.

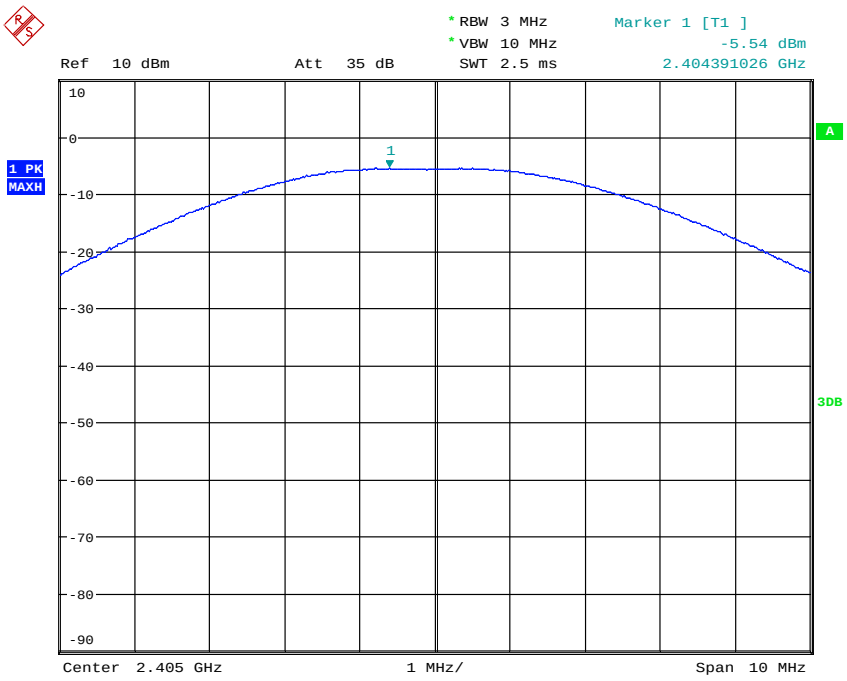
5.1.3 Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module. (Duty cycle > 98%)

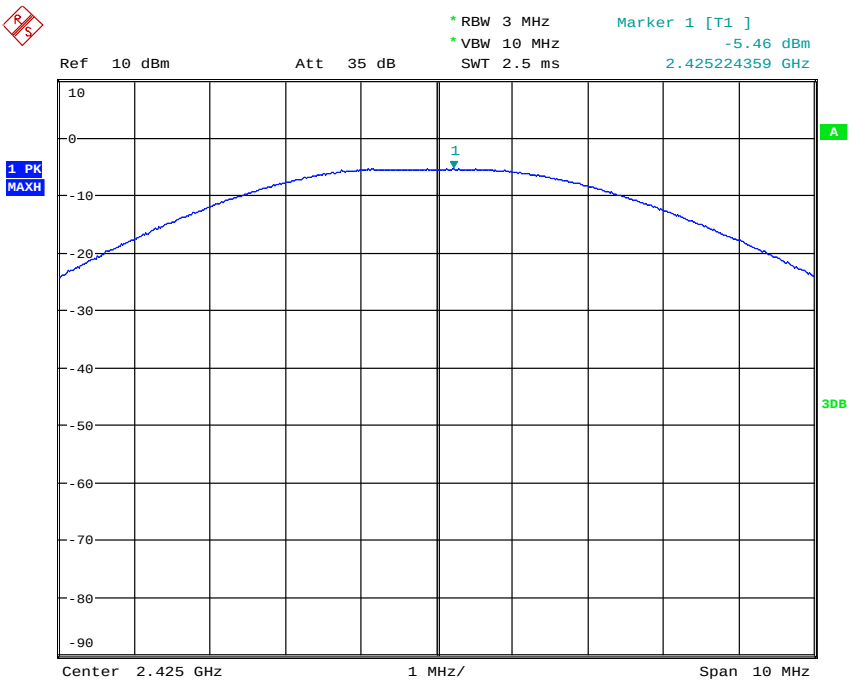
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Refer to plot	Limit		Verdict
		dBm	W		dBm	W	
1	2405	-5.54	0.000279	Plot A	30	1	Pass
5	2425	-5.46	0.000284	Plot B			Pass
10	2450	-5.11	0.000308	Plot C			Pass

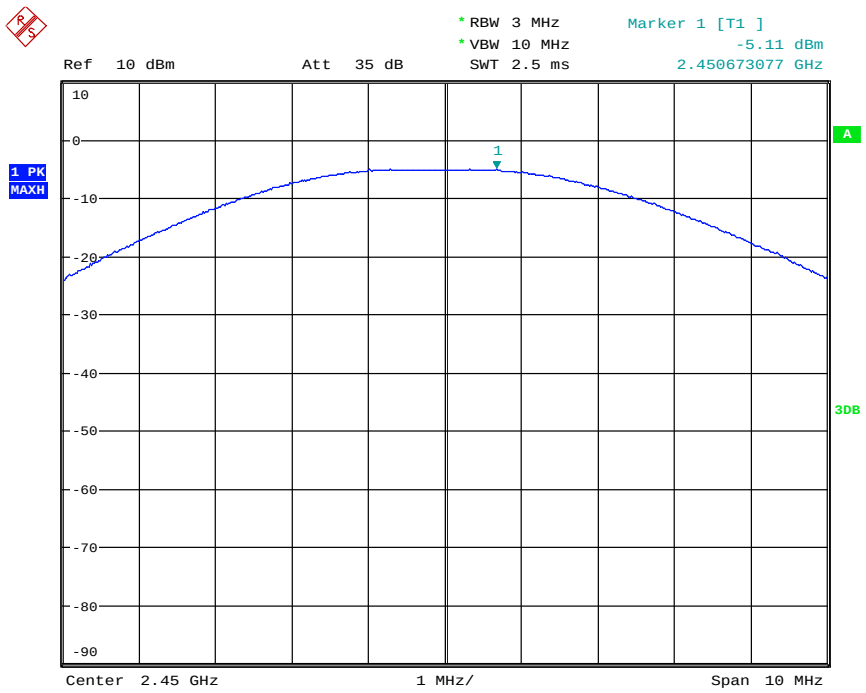
B. Test Plots:



(Plot A: Channel 1:2405MHz)



(Plot B:Channel 5: 2425MHz)



(Plot C: Channel 10:2450MHz)

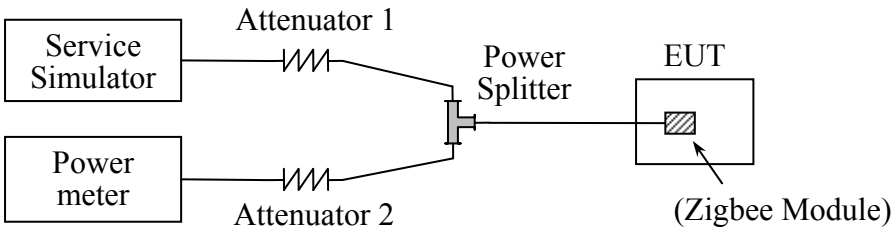
5.2 Average Power

5.2.1 Requirement

None; for reporting purposes only.

5.2.2 Test Description

The transmitter output was split to 2 ways, the one was connected to Service Simulator as monitor, the other one was connected to Power Meter. (Duty cycle > 98%)



5.2.3 Results

Channel	Frequency (MHz)	Measured Output Average Power	
		dBm	W
1	2405	-5.94	0.000255
5	2425	-5.86	0.000259
10	2450	-5.49	0.000282

5.3 6dB & 20dB Bandwidth

5.3.1 Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.3.2 Test Description

See section 5.1.2 of this report.

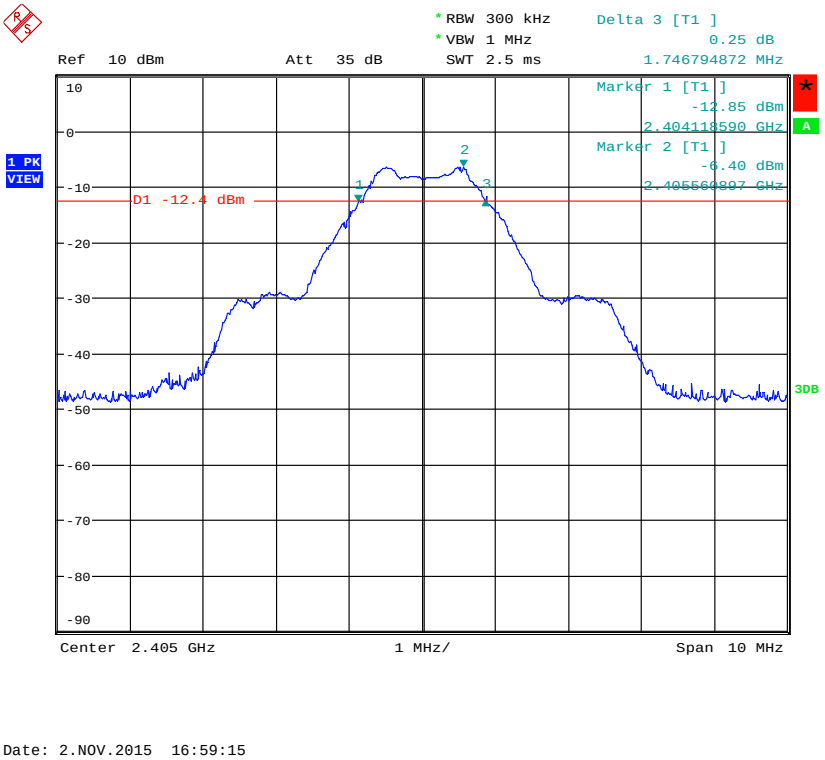
5.3.3 Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

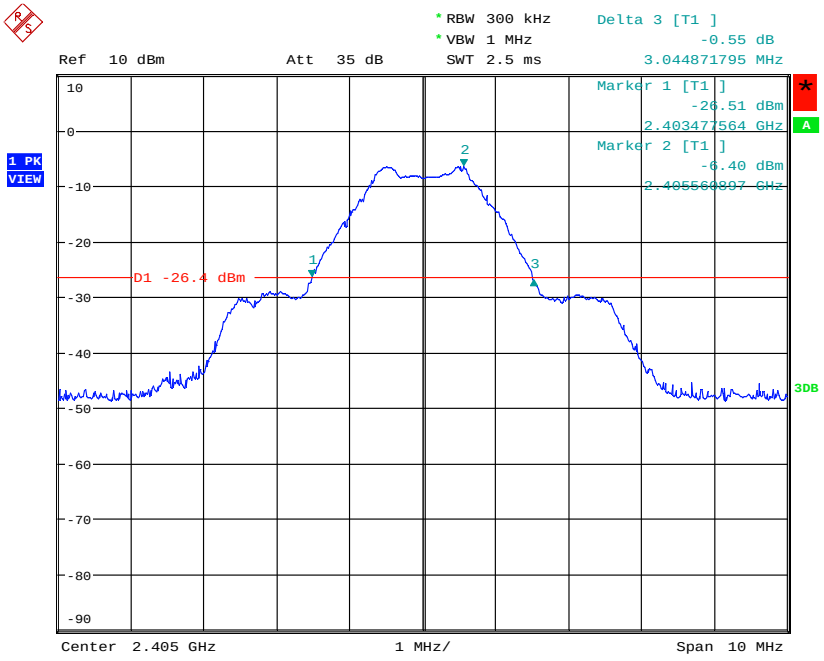
A. Test Verdict:

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Refer to plot	20dB Bandwidth (MHz)	Refer to plot	Limit (KHz)	Result
1	2405	1.746	Plot A1	3.044	Plot A2	⩾500	Pass
5	2425	1.730	Plot B1	3.044	Plot B2	⩾500	Pass
10	2450	1.730	Plot C1	2.996	Plot C2	⩾500	Pass

B. Test Plots:

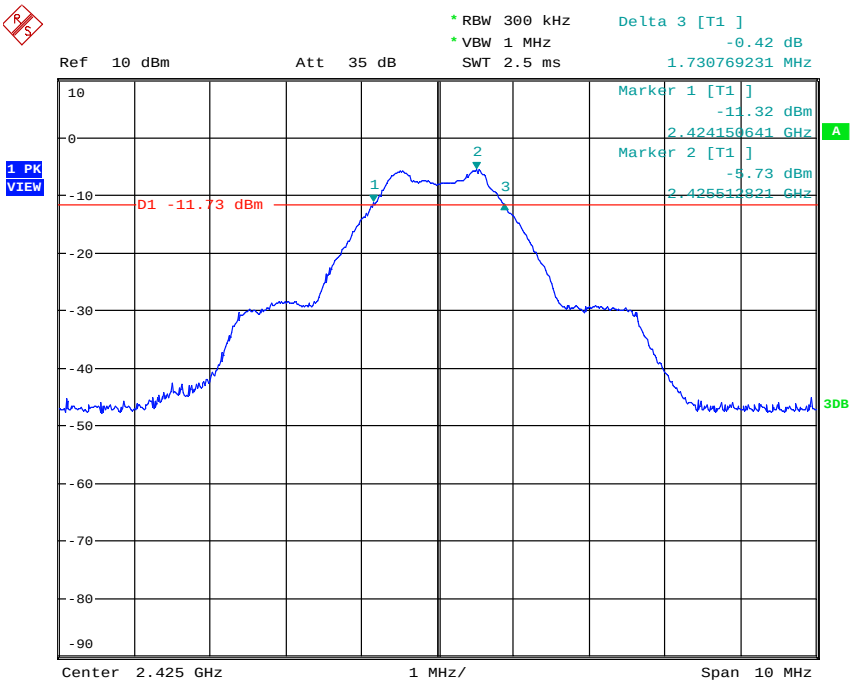


(Plot A1:Channel 1:2405MHz)



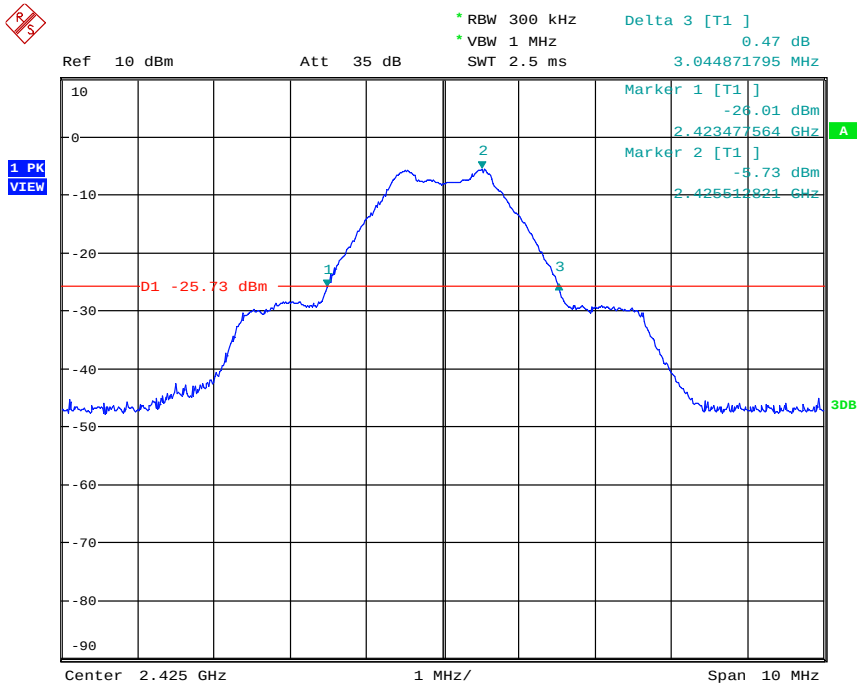
Date: 2.NOV.2015 16:59:59

(Plot A2:Channel 1:2405MHz)



Date: 2.NOV.2015 16:53:31

(Plot B1:Channel 5:2425MHz)



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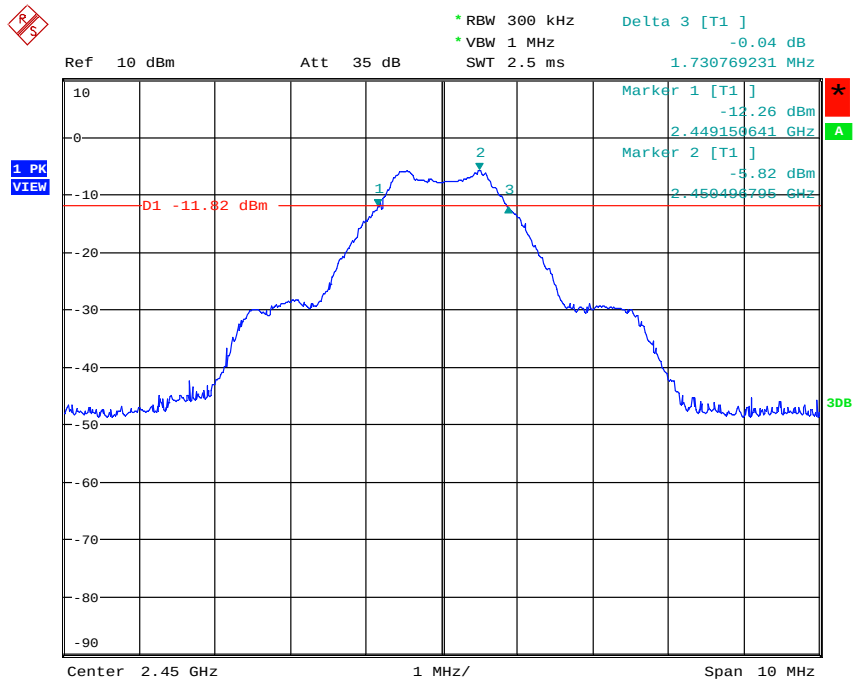
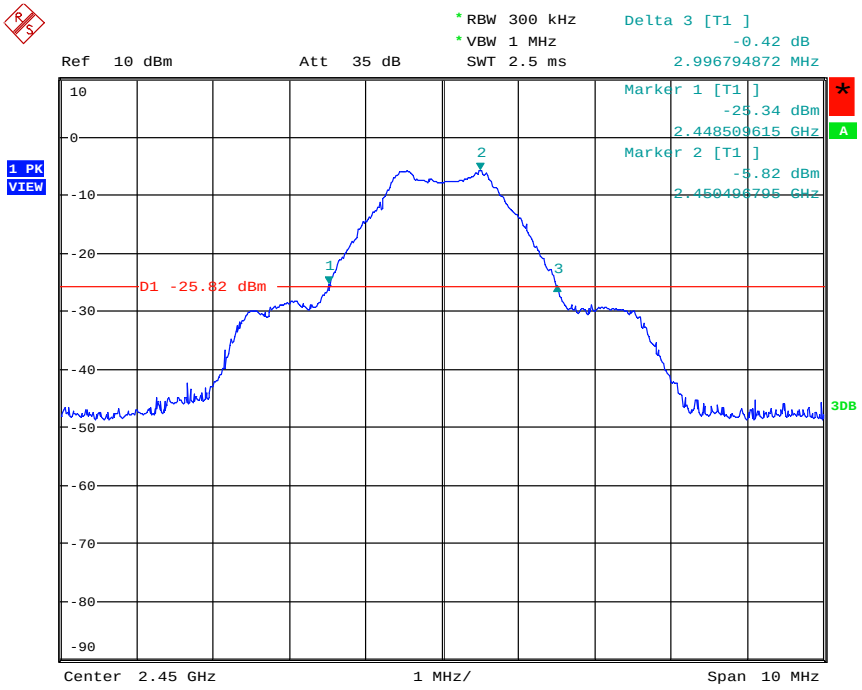
(Plot B2:Channel 5:2425MHz)



Date: 2.NOV.2015 16:57:34

(Plot C1:Channel 10:2450MHz)



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(Plot C2:Channel 10:2450MHz)

5.4 Conducted Spurious Emissions and Band Edge

5.4.1 Requirement

According to FCC section 15.247(d), 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.4.2 Test Description

See section 5.1.2 of this report.

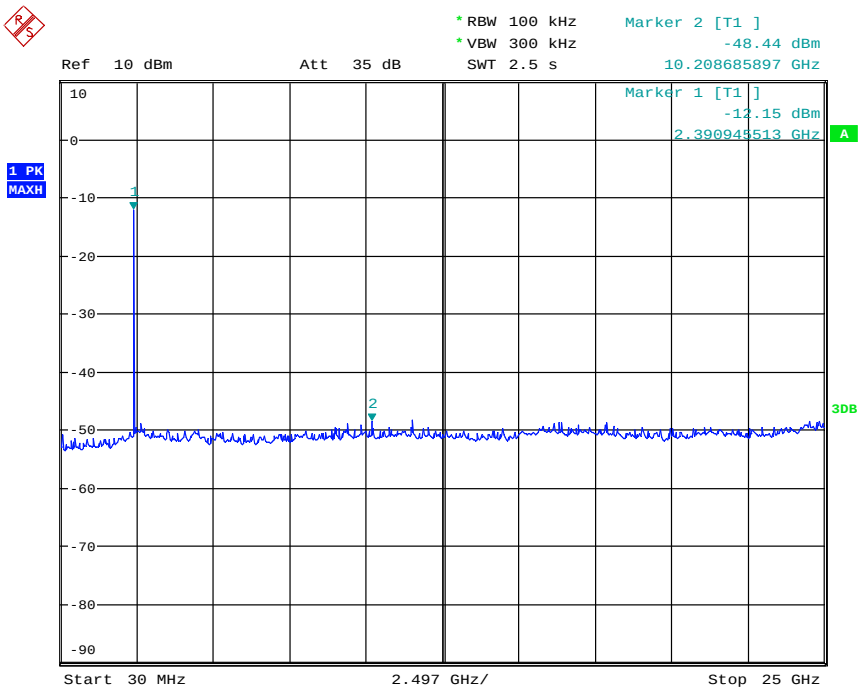
5.4.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

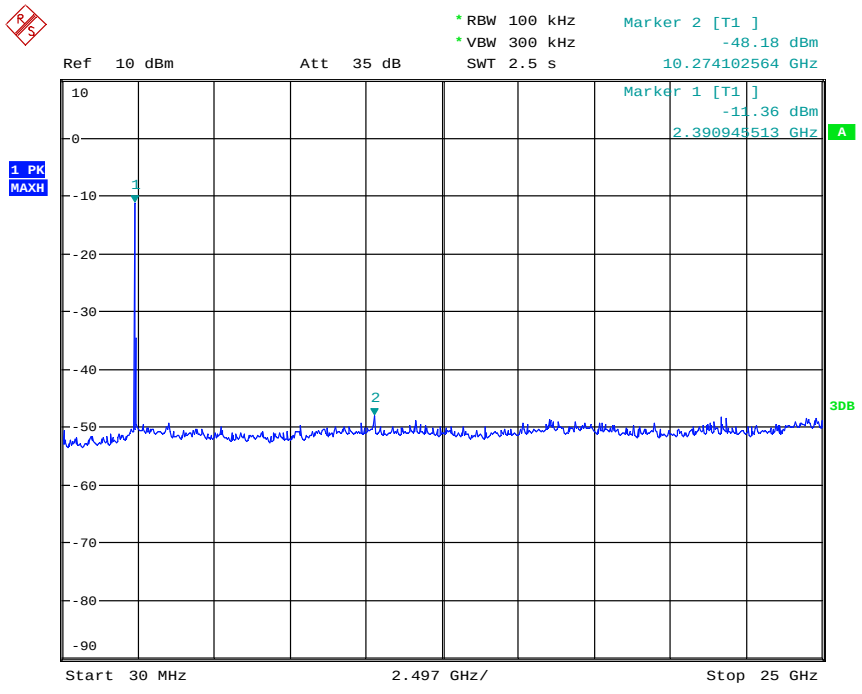
A. Test Verict:

Channel	Frequency (MHz)	Measured max out of band emission(dBm)	Refer to plot	Limit(dBm)		Result
				Carrier level	Calculated 20dBc limit	
0	2402	-48.44	Plot A	-12.15	-32.15	Pass
19	2440	-48.18	Plot B	-11.36	-31.36	Pass
39	2480	-48.10	Plot C	-12.23	-32.23	Pass

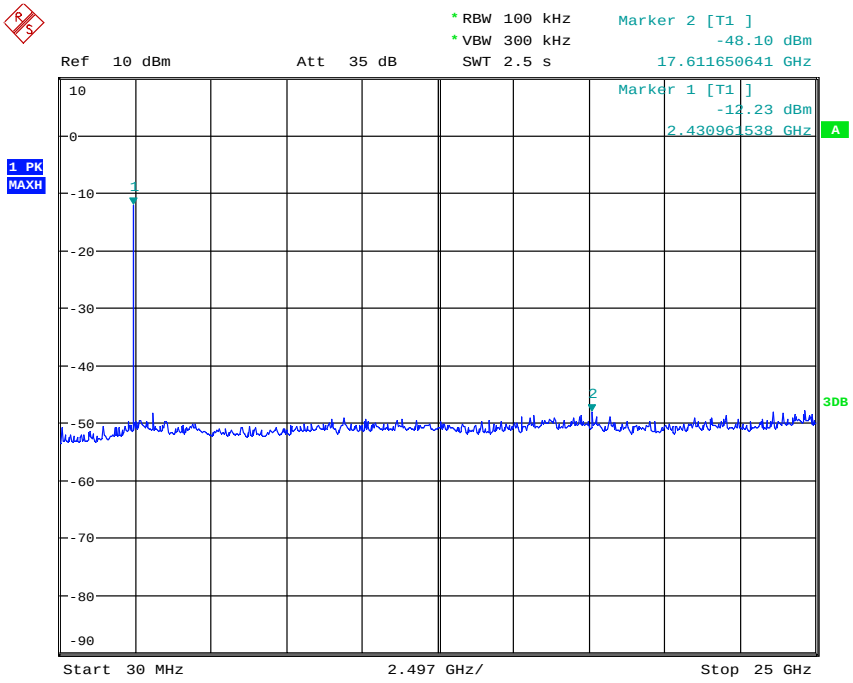
B. Test Plot:



(Plot A:Channel 1:2405MHz 30MHz~25GHz)



(PlotB: Channel 5:2425MHz 30MHz~25GHz)



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(PlotC: Channel 10:2450MHz 30MHz~25GHz)

5.5 Power Spectral Density (PSD)

5.5.1 Requirement

According to FCC section 15.247(e), the same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used

5.5.2 Test Description

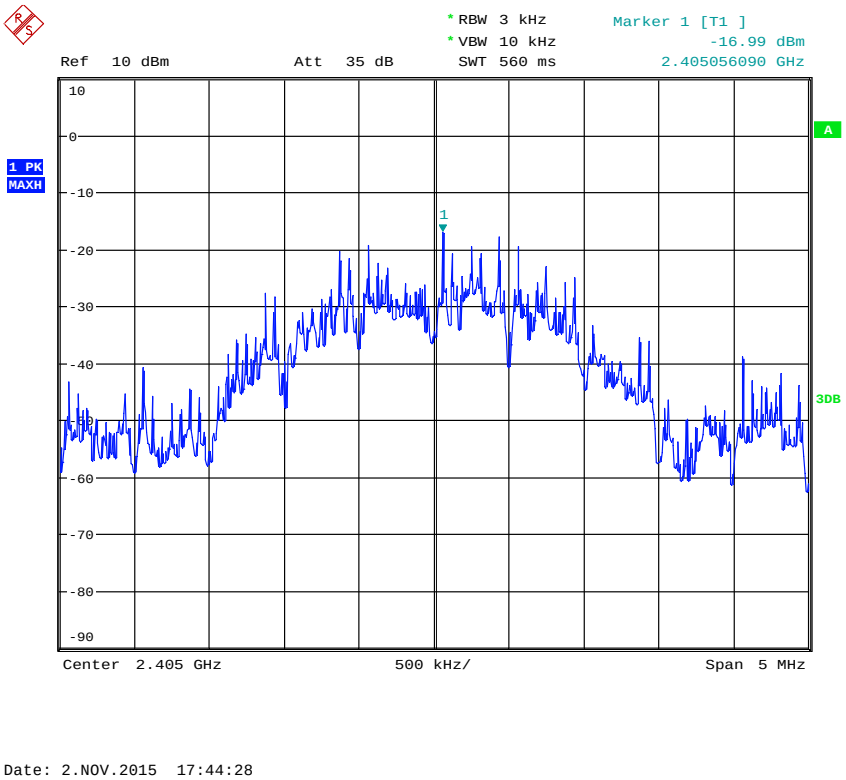
See section 5.1.2 of this report.

5.5.3 Test Result

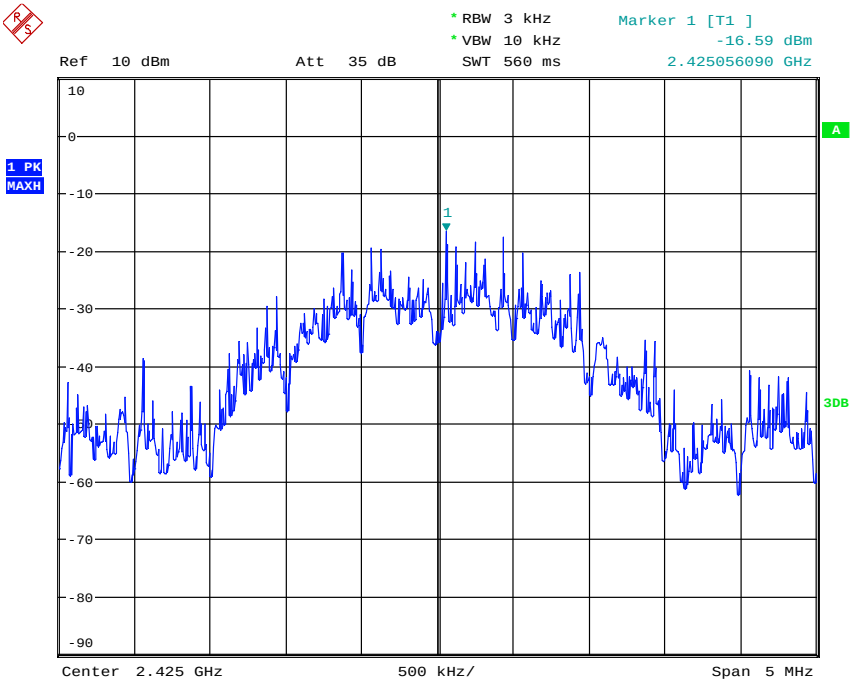
A. Test Verdict

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to plot	Limit (dBm/3kHz)	Result
0	2405	-16.99	Plot A	8	Pass
19	2425	-16.59	Plot B	8	Pass
39	2450	-16.58	Plot C	8	Pass

B. Test Plot



(Plot A: Channel 1, 2405MHz)



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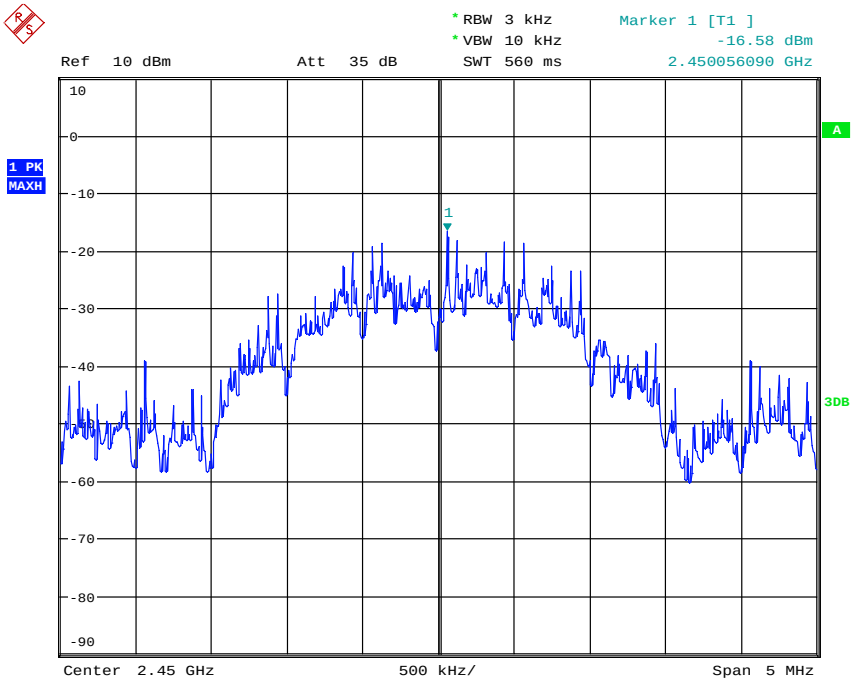
(Plot B: Channel 5, 2425MHz)



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(Plot C: Channel 10, 2450MHz)

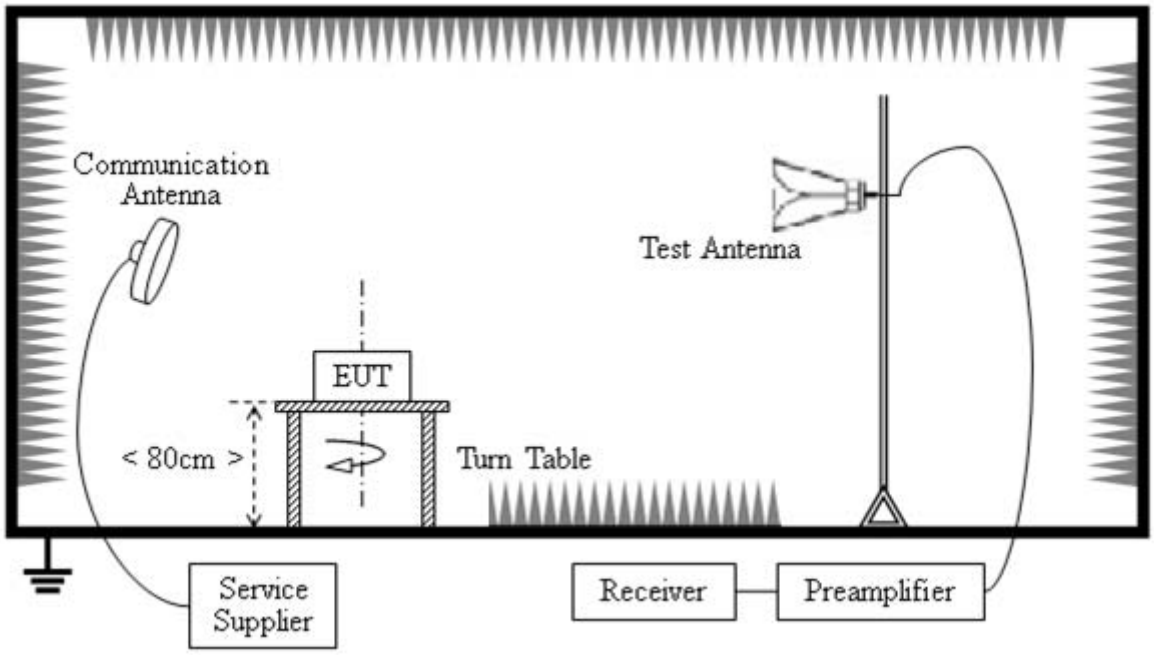
5.6 Band Edge

5.6.1 Requirement

According to FCC section 15.247(d), 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.6.2 Test Description

A. Test Setup



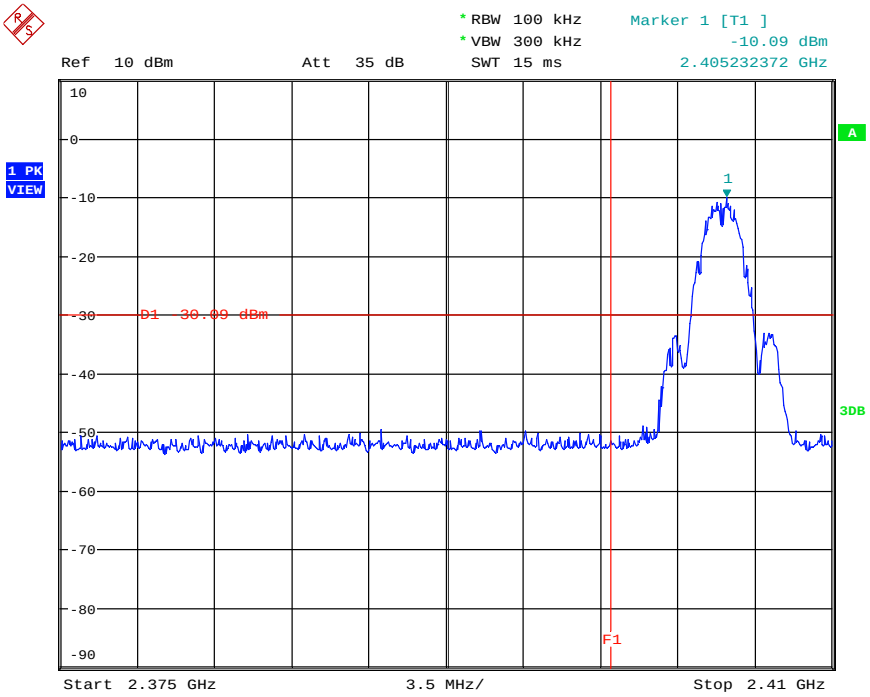
The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

5.6.3 Test Result

A. Conducted Band Edge:



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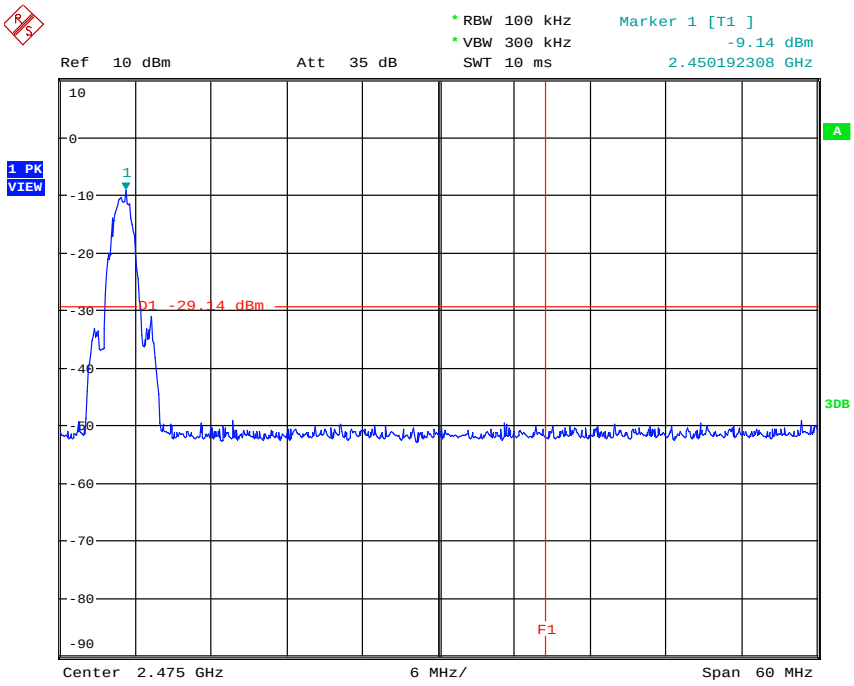
(Plot A Channel 1)



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(Plot B Channel 10)

5.7 Conducted Emission

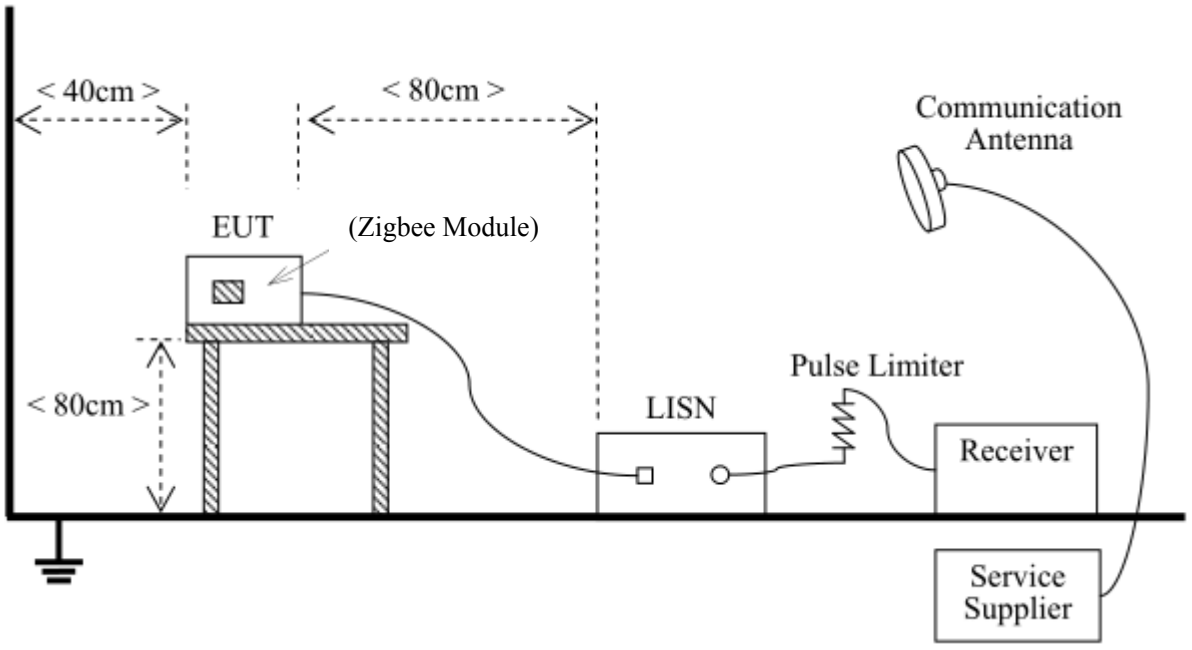
5.7.1 Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network(LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:
(a) The lower limit shall apply at the band edges.
(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

5.7.2 Test Description

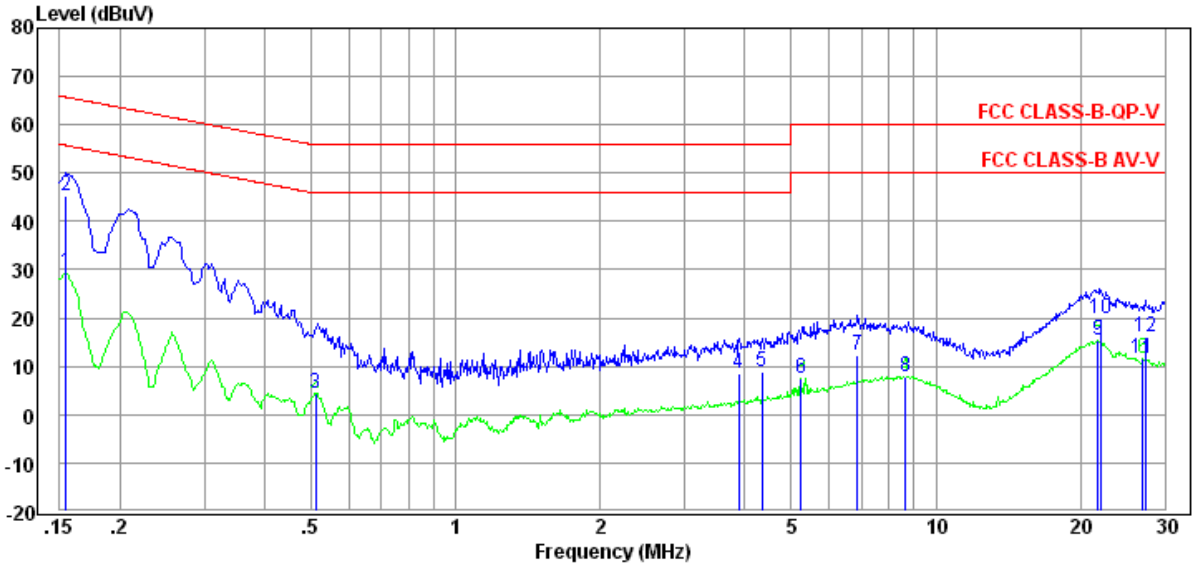


The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2014

5.7.3 Test result

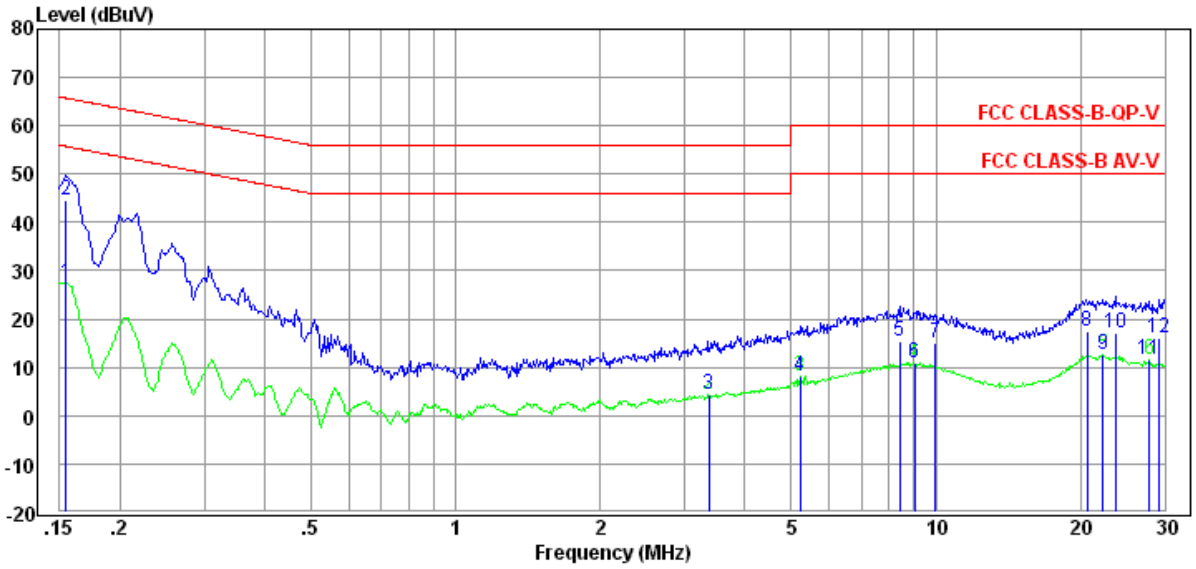
1) Test Result of "L" line-120V:

No.	Frequency MHz	Level dBμV	Detector	Limit dBμV	Magin dB
1	0.15	29.52	Average	26.22	55.74
2	0.15	45.41	QP	20.33	65.74
3	0.51	4.54	Average	41.46	46.00
4	3.89	8.60	QP	47.40	56.00
5	4.34	8.83	QP	47.17	56.00
6	5.24	7.66	Average	42.34	50.00
7	6.86	12.36	QP	47.64	60.00
8	8.66	7.94	Average	42.06	50.00
9	21.79	15.24	Average	34.76	50.00
10	22.01	19.88	QP	40.12	60.00
11	27.01	11.73	Average	38.27	50.00
12	27.29	16.01	QP	43.99	60.00



2) Test Result of "N" line-120V:

No.	Frequency MHz	Level dBμV	Detector	Limit dBμV	Magin dB
1	0.15	45.20	QP	20.54	65.74
2	0.35	19.42	Average	29.58	49.00
3	0.50	20.58	Average	25.42	46.00
4	0.50	32.28	QP	23.72	56.00
5	1.15	28.86	QP	27.14	56.00
6	1.29	28.61	QP	27.39	56.00
7	1.30	18.37	Average	27.63	46.00
8	2.04	28.37	QP	27.63	56.00
9	2.83	25.04	QP	30.96	56.00
10	2.92	17.32	Average	28.68	46.00
11	3.71	16.53	Average	29.47	46.00
12	28.77	19.93	Average	30.07	50.00



5.8 Radiated Emission

5.8.1 Requirement

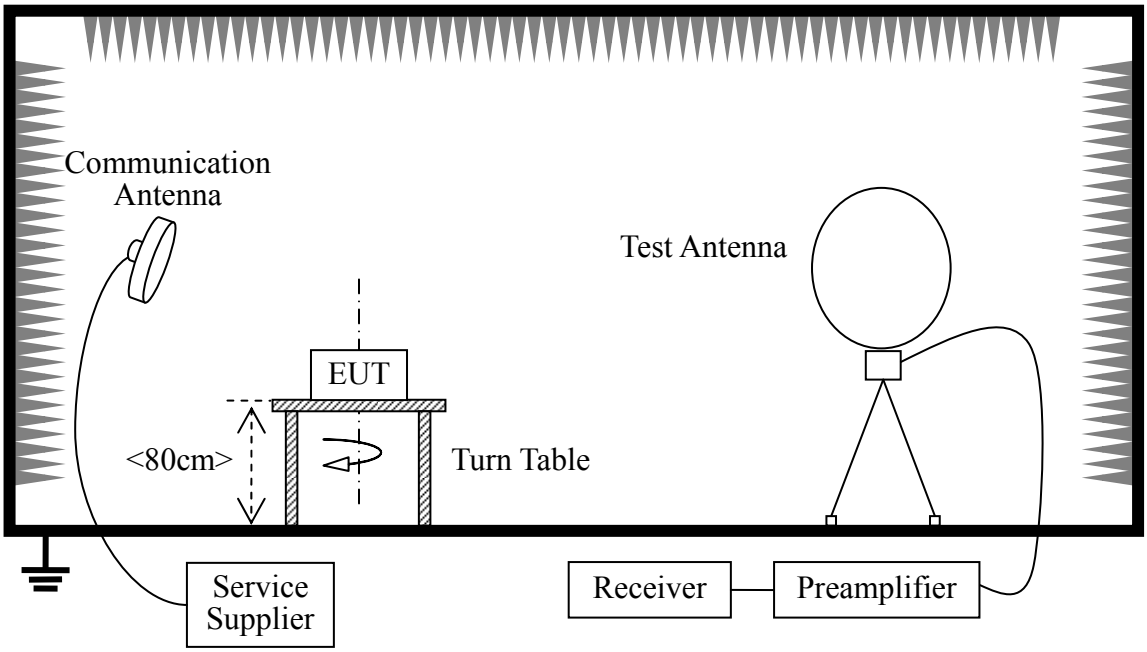
According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

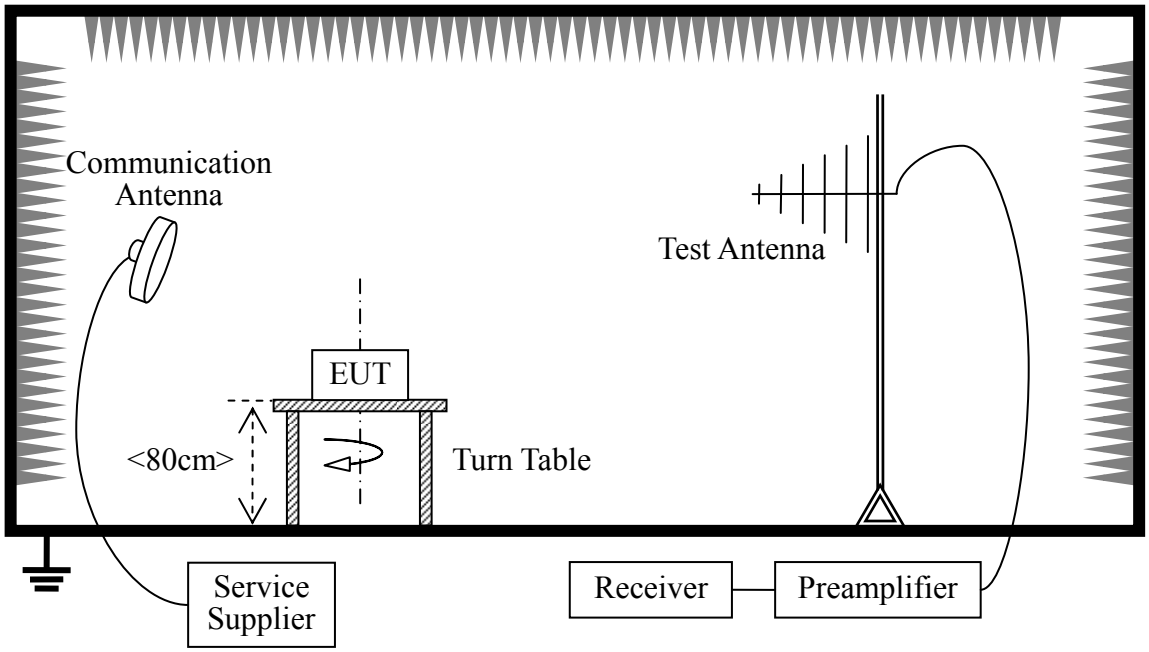
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Limit(dBμV/m)	Detector
0.009-0.490	2400/F(kHz)	300	/	/
0.490-1.705	24000/F(kHz)	30	/	/
1.705-30	30	30	/	/
30 - 88	100	3	40	QP
88 - 216	150	3	43.5	QP
216 - 960	200	3	46	QP
960 - 1000	500	3	54	QP
Above 1000	500	3	54	AV

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

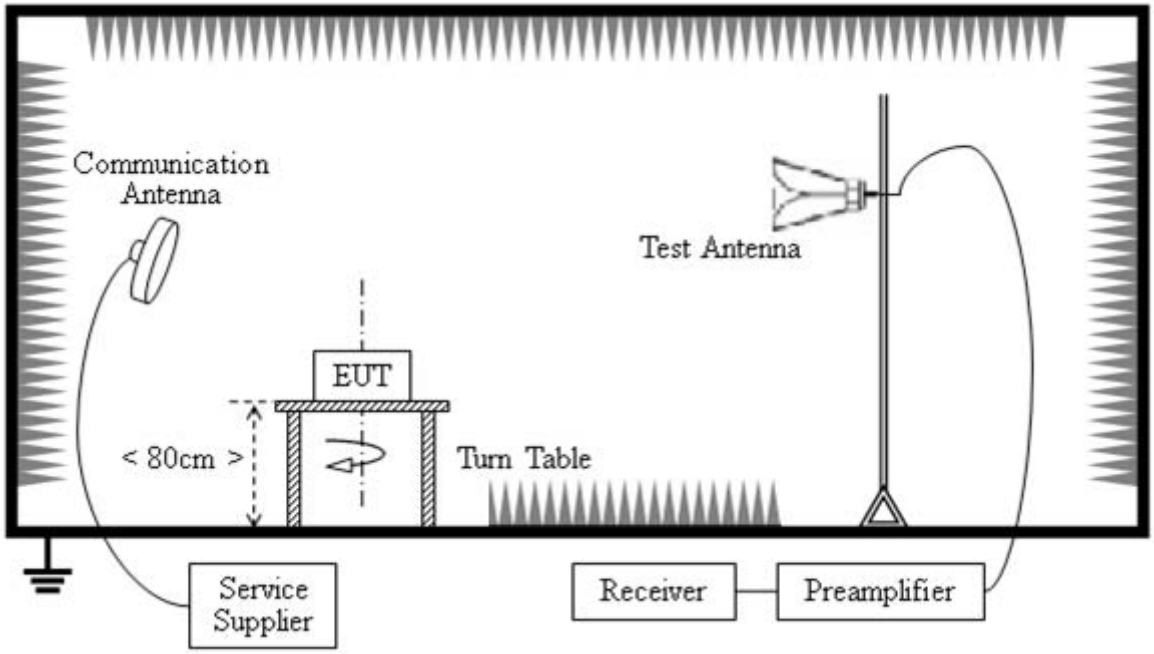
5.8.2 Test setup



Radiated Emissions Below 30MHz



Radiated Emissions 30-1000MHz



Radiated Emissions above 1000MHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2014). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The Zigbee Module of the EUT is powered by the Battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Zigbee Module is activated and controlled by the Zigbee Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test

mode transmitting 339 bytes DH5 packages at maximum power.

For the Test Antenna: In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0o to 360o, the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in 3 orthogonal positions as recommended in ANSI C63.4 for Radiated Emissions and the worst-case data was presented.

5.8.3 Test Result Test Result

A. Test Result for 9kHz~30MHz

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
--	--	10	--	See Note

Note:

a) The amplitude of spurious emissions that are attenuated by more than 10dB below the permissible value has no need to be reported.

b) Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

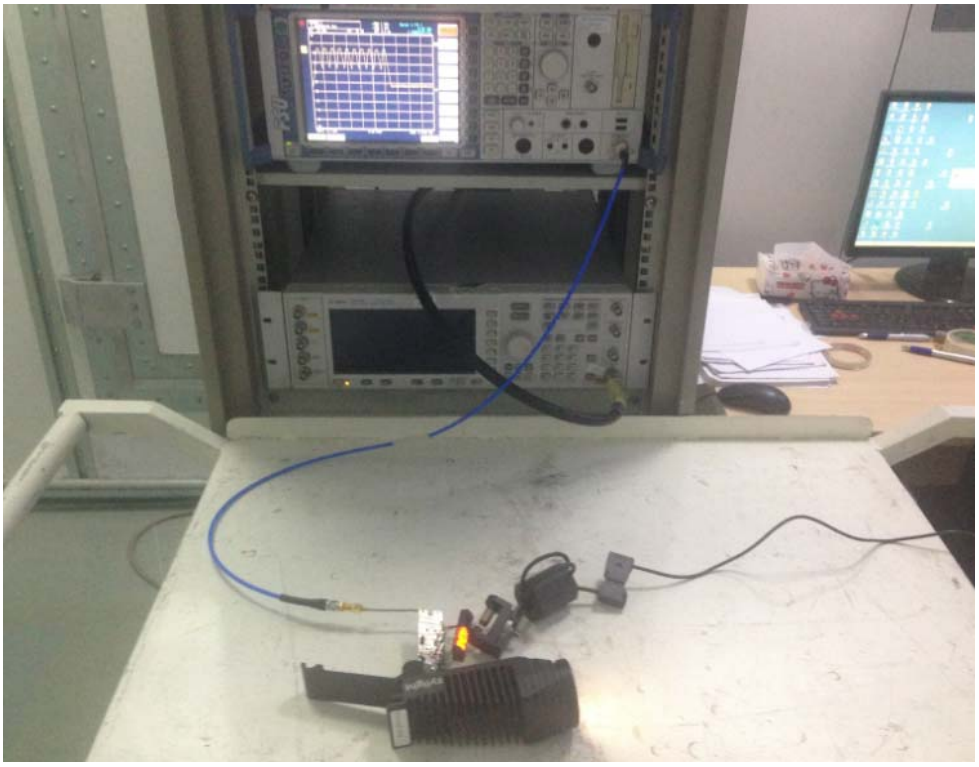
c) Limit line = specific limits (dBuV) + distance extrapolation factor.

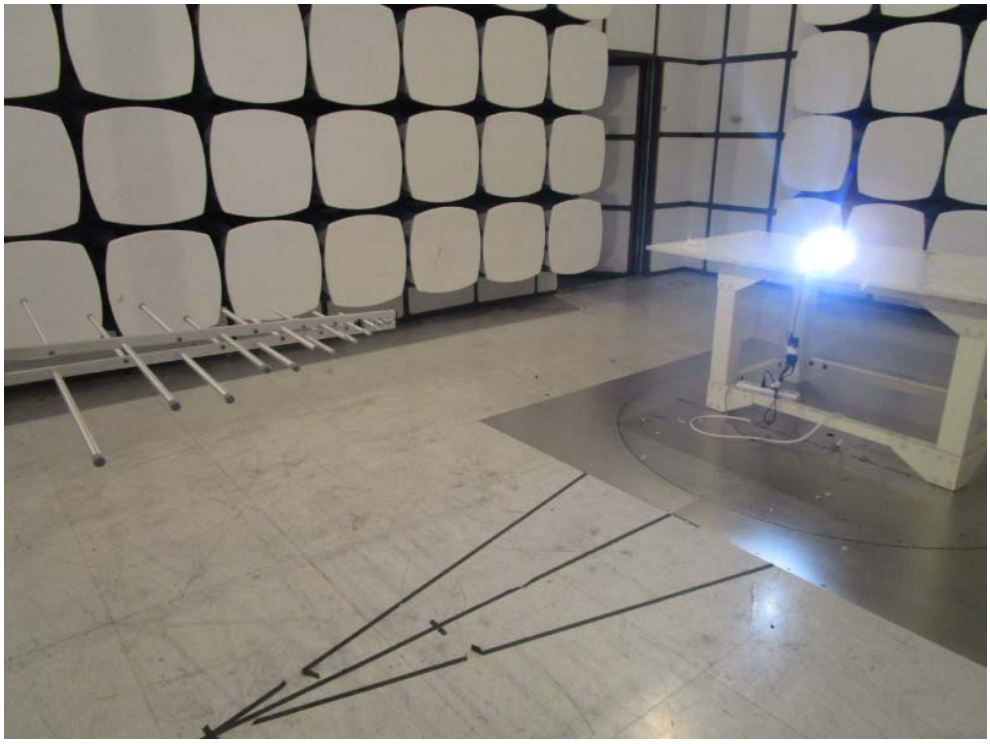
B. Test Result for above 30MHz ~ 10th Harmonic

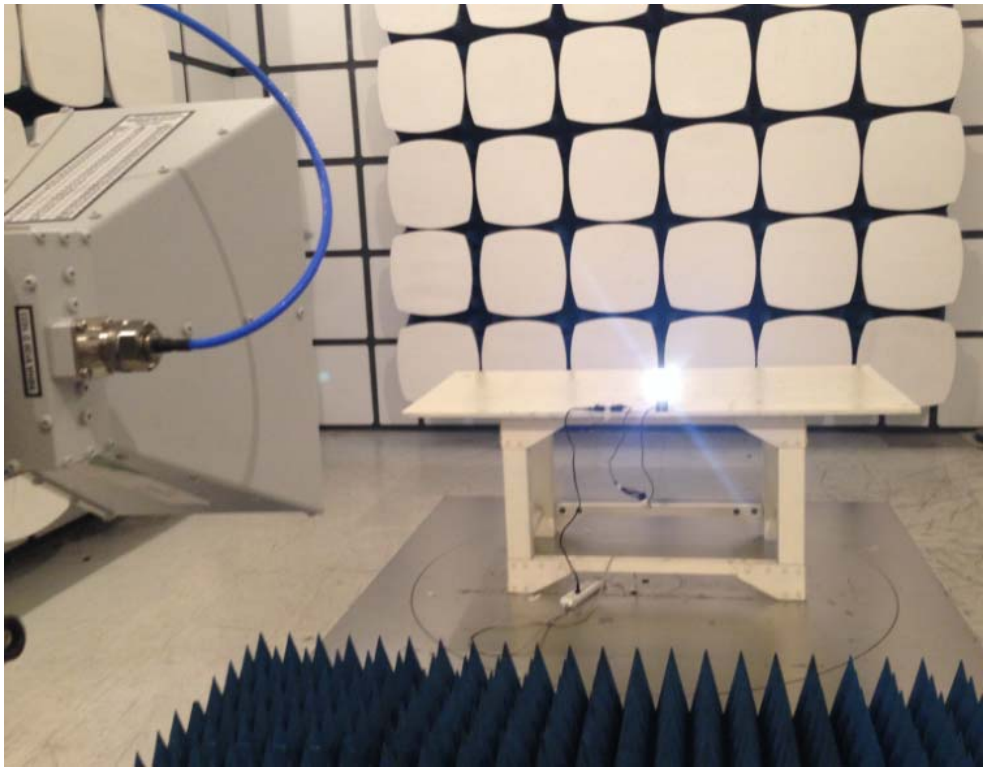
Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
37.03	35.37	40.00	4.63	Horizontal	PASS
94.43	34.88	43.50	8.62	Horizontal	PASS
221.39	32.28	46.00	13.72	Horizontal	PASS
4829.07	28.91	54.00	25.09	Horizontal	PASS
5528.28	28.02	54.00	25.98	Horizontal	PASS
5967.84	28.20	54.00	25.80	Horizontal	PASS
7369.01	29.75	54.00	24.25	Horizontal	PASS
98.14	42.24	43.50	1.26	Vertical	PASS
147.92	32.26	43.50	11.24	Vertical	PASS
218.31	34.14	46.00	11.86	Vertical	PASS
4823.51	29.04	54.00	24.96	Vertical	PASS
5529.46	27.94	54.00	26.06	Vertical	PASS
5946.59	28.17	54.00	25.83	Vertical	PASS
7357.63	29.94	54.00	24.06	Vertical	PASS

Annex A Photos of the EUT

Annex B Photos of Setup







** END OF REPORT **