Neutron Engineering Inc.

FCC & IC Radio Test Report

FCC ID: 2ABOW-BOOM-BOOM
IC: 11711A-BOOMBOOM

This report concerns (check one) : ☒ **Original Grant** ☐ **Class II Change**

Issued Date : Feb. 13, 2014
Project No. : 1312171
Equipment : BOOM BOOM !
Model Name : BOOM BOOM !

Applicant : Binauric SE
Address : Am Soeldnermoos 17, Hallbergmoos 85399, Germany

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Dec. 24, 2013
Date of Test: Dec. 24, 2013 ~ Jan. 08, 2014

Testing Engineer : (Josh Lin)

Technical Manager : (Jeff Yang)

Authorized Signatory : (Andy Chiu)

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Testing Laboratory 0659

Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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1. CERTIFICATION

Equipment	:	BOOM BOOM !
Brand Name	:	Binauric
Model Name	:	BOOM BOOM !
Applicant	:	Binauric SE
Date of Test	:	Dec. 24, 2013 ~ Jan. 08, 2014
Standards	:	RSS-210, Issue 8: 2010 FCC Part 15, Subpart C: 2012 ANSI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-2-1312171) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

RSS-210, Issue 8: 2010; FCC Part 15, Subpart C: 2012			
Standard Clause		**Test Item**	**Result**
RSS-210	**FCC Part 15, Subpart C**		
NOTE (2)	15.207	Conducted Emission	**PASS**
A8.5	15.247(d)	Antenna conducted Spurious Emission	**PASS**
A8.2 (a)	15.247(a)(2)	6 dB Bandwidth	**PASS**
A8.4 (4)	15.247(b)(3)	Maximum Peak Conducted Output Power	**PASS**
NOTE (3)	15.209/15.205	Radiated Spurious Emission	**PASS**
A8.2 (b)	15.247(e)	Power Spectral Density	**PASS**
NOTE (4)	15.205	Restricted Bands	**PASS**
NOTE (5)	15.203	Antenna Requirement	**PASS**

NOTE:
(1) N/A: denotes test is not applicable in this Test Report
(2) Reference standerads is RSS-GEN 7.2.4
(3) Reference standerads is RSS-GEN 7.2.5
(4) Reference standerads is RSS-GEN 7.2.2
(5) Reference standerads is RSS-GEN 7.1.2
(6) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r01 (Measurement Guidelines of DTS)

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Conducted emission Test:

C02: 1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

Radiated emission Test (Below 1 GHz):

CB08: 1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

Radiated emission Test (Above 1 GHz):

CB08: 1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty is not specified by FCC/Industry Canada rules and for reference only.

The reported uncertainty of measurement **y ± 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**%.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

A. Conducted emission test:

Test Site	Measurement Frequency Range	U，(dB)	NOTE
C02	150 kHz ~ 30 MHz	2.59	

B. Radiated emission test:

Test Site	Item	Measurement Frequency Range		Uncertainty	NOTE
CB08	Radiated emission at 3m	Horizontal Polarization	30 - 200MHz	3.35 dB	
			200 - 1000MHz	3.11 dB	
			1 - 18GHz	3.97 dB	
			18 - 40GHz	4.01 dB	
		Vertical Polarization	30 - 200MHz	3.22 dB	
			200 - 1000MHz	3.24 dB	
			1 - 18GHz	4.05 dB	
			18 - 40GHz	4.04 dB	

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR}.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>BOOM BOOM !</td></tr>
<tr><td>Brand Name</td><td>Binauric</td></tr>
<tr><td>Model Name</td><td>BOOM BOOM !</td></tr>
<tr><td>Model Difference</td><td>The EUT has three colors (White, Bordeaux and Khaki) which do not affect the EMI performance.</td></tr>
<tr><td>Product Description</td><td>
<table>
<tr><td>Operation Frequency</td><td>2402 MHz ~2480 MHz</td></tr>
<tr><td>Modulation Technology</td><td>GFSK</td></tr>
<tr><td>Bit Rate of Transmitter</td><td>1 Mbps</td></tr>
<tr><td>Number of Channel</td><td>40CH</td></tr>
<tr><td>Antenna Designation</td><td rowspan="2">Please see note 3.(Page 9)</td></tr>
<tr><td>Antenna Gain(Peak)</td></tr>
<tr><td>Maximum Conducted Output Power</td><td>3.47 dBm (0.0022W)</td></tr>
</table>
More details of EUT technical specification, please refer to the User's Manual.
</td></tr>
<tr><td>Power Source</td><td>1. Battery supplied.
2. DC Voltage supplied from External Power Supply.</td></tr>
<tr><td>Power Rating</td><td>1. Li-ion BATTERY PACK: 3.7V
2. External Power Supply:
I/P: AC 100-240V 50-60Hz 0.3A / O/P: DC 5V 1.5A 7.5W Max</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
<tr><td>Products Covered</td><td>1 * Li-ion BATTERY PACK: YOKU, 3.7V 1800mAh
1 * External Power Supply: Powertron Electronics Corp., PA1008-1SI
1 * USB Cable
1 * Audio Cable</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

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

2.

Channel List			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ACX	AT3216-T2R4PAA_	Chip	Soldered	1.50

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode **NOTE (1)**

For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode **NOTE (1)**

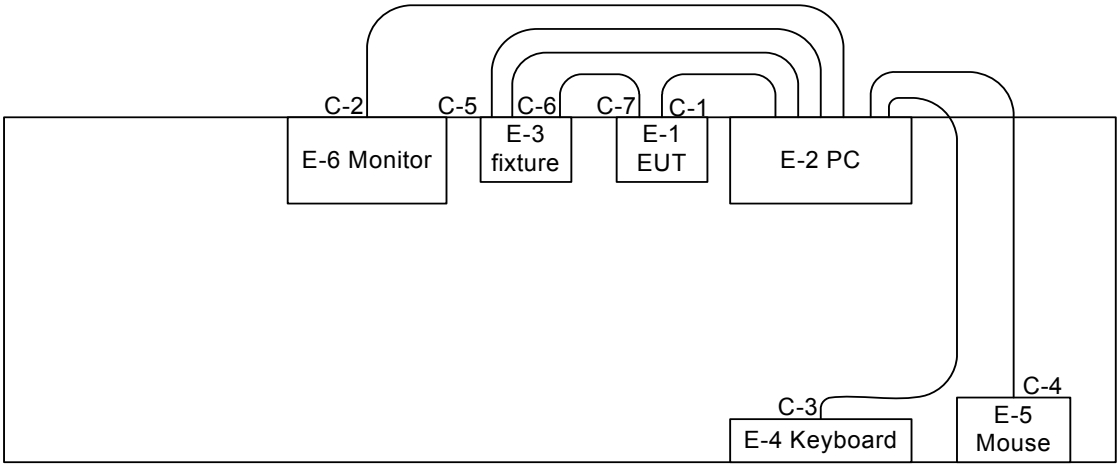
Note:
(1) The measurements are performed at the high, middle, low available channels.

3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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 of WLAN

Test software version	Bluetest3		
Frequency	**2402 MHz**	**2440 MHz**	**2480 MHz**
GFSK	37	37	37

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



C-1 USB Cable
C-2 VGA Cable
C-3 USB Cable
C-4 USB Cable
C-5 DATA Cable
C-6 USB Cable
C-7 DATA Cable

3.5 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.	FCC ID/IC	Series No.	Note
E-1	BOOM BOOM !	Binauric	BOOM BOOM !	FCC ID: 2ABOW-BOOM-BOOM IC: 11711A-BOOMBOOM	N/A	EUT
E-2	PC	N/A	N/A	N/A	N/A	
E-3	Fixture	N/A	N/A	N/A	N/A	
E-4	USB K/B	DELL	L50U	DOC	N/A	
E-5	USB Mouse	DELL	MS111-L	DOC	CN-09RRC7-44751-17J-OH1F	
E-6	24” LCD Monitor	DELL	U2410f	DOC	CN-OJ257M-72872-09J-067L	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	YES	NO	1.2M	
C-2	YES	YES	1.8M	
C-3	YES	NO	1.8M	
C-4	YES	NO	1.8M	
C-5	YES	NO	1.5M	
C-6	YES	NO	1M	
C-7	NO	NO	0.3M	

Note:

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

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION

4.1.1 LIMIT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 - 5.0	73.00	60.00	56.00	46.00
5.0 - 30.0	73.00	60.00	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.
3. The test result calculated as following:
   Measurement Value = Reading Level + Correct Factor
   Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
   Margin Level = Measurement Value – Limit Value

4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Apr. 22, 2014
2	Test Cable	TIMES	CFD300-NL	C01	Jun. 16, 2014
3	EMI Test Receiver	R&S	ESCI	100082	Mar. 21, 2014
4	Measurement Software	EZ	EZ_EMC (Version NB-02A)	N/A	N/A

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

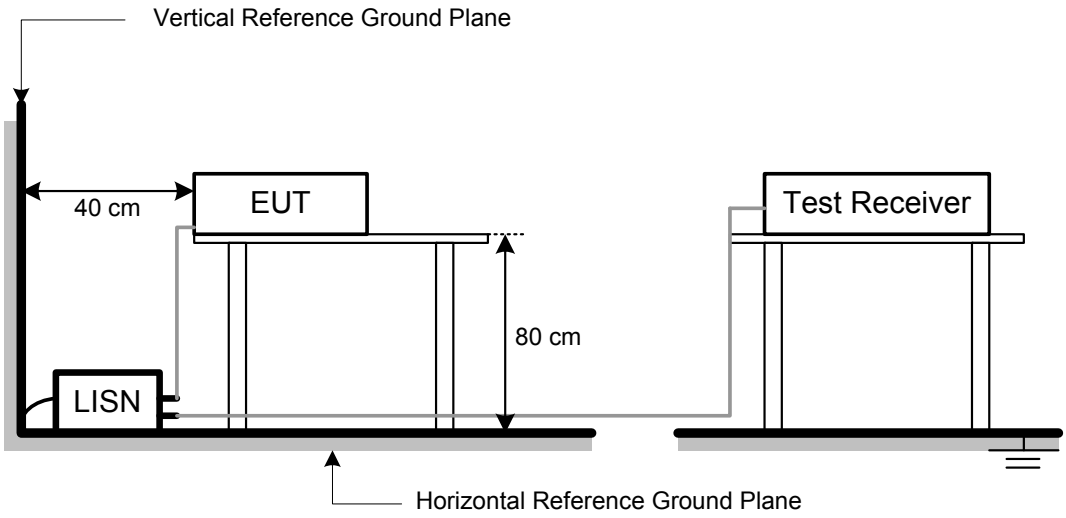
4.1.3 TEST PROCEDURES

a. 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.
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.

NOTE:

a. Reading in which marked as Peak, QP or AVG means measurements by using are Quasi-Peak or Average Mode with Detector BW=9 kHz (6 dB Bandwidth).
b. All readings are Peak Mode value unless otherwise stated QP or AVG in column of Note. If the Peak or QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only Peak or QP Mode was measured, but AVG Mode didn‘t perform.

4.1.4 TEST SETUP LAYOUT



4.1.5 DEVIATION FROM TEST STANDARD

No deviation

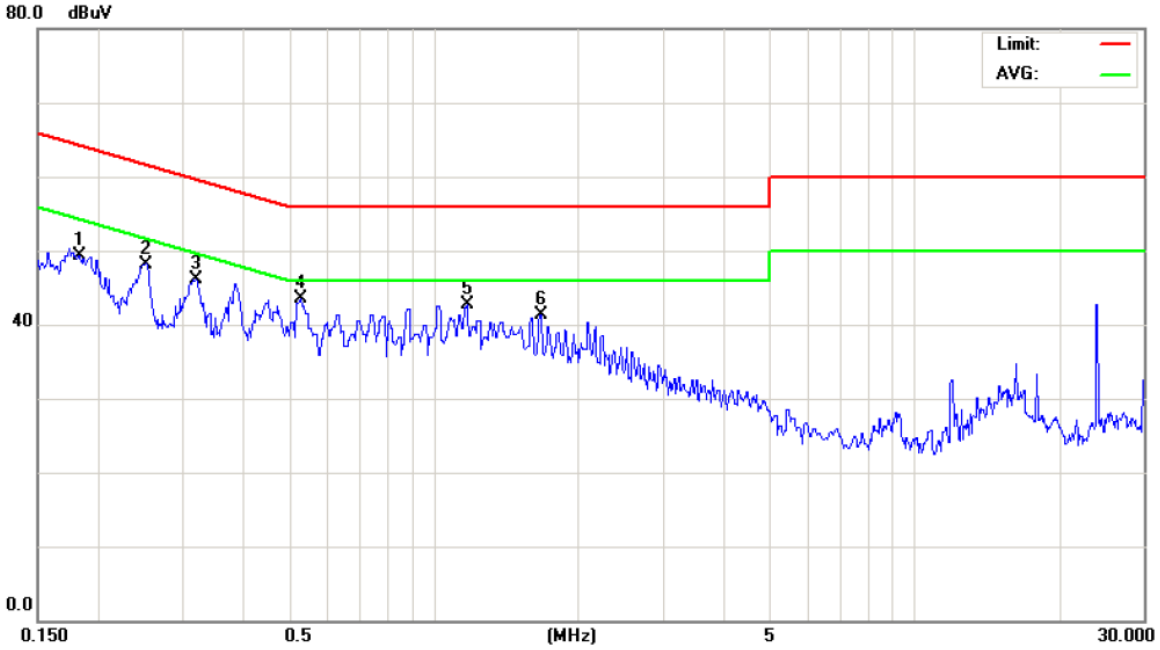
4.1.6 EUT OPERATING CONDITIONS

The EUT used during radiated and/or conducted emission measurement was designed to exercise in a manner similar to a typical use.

4.1.7 TEST RESULTS

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/2440 MHz		

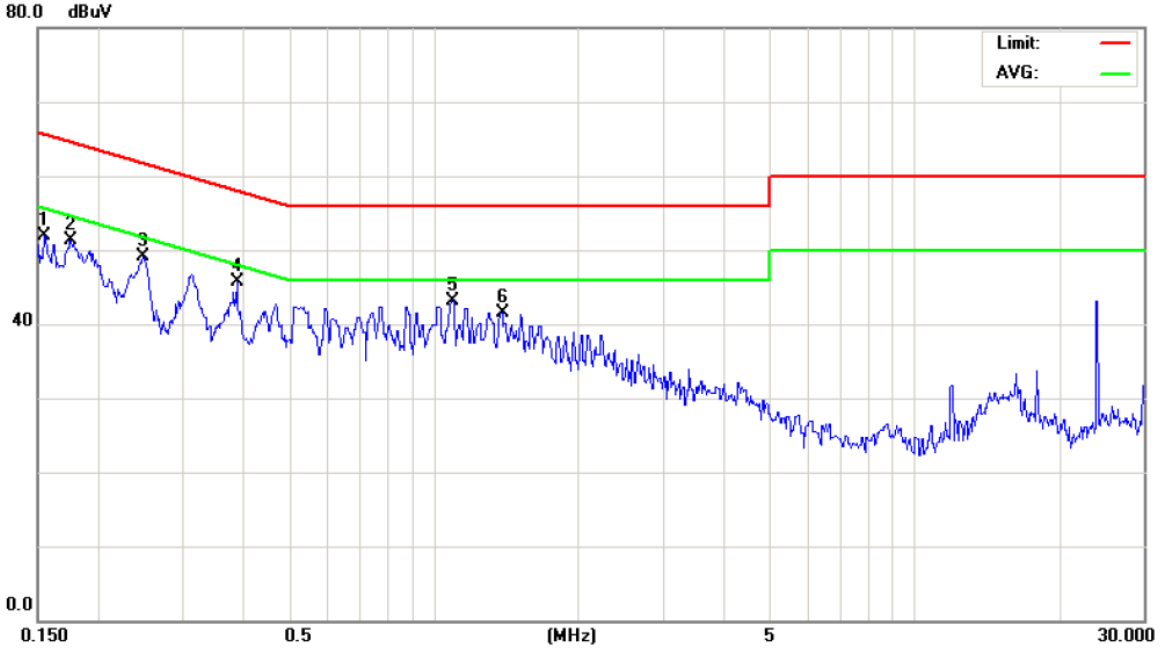
Phase: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1828	40.18	9.22	49.40	64.36	-14.96	peak	
2		0.2521	39.57	8.63	48.20	61.69	-13.49	peak	
3		0.3193	38.37	7.82	46.19	59.72	-13.53	peak	
4	*	0.5270	34.94	8.58	43.52	56.00	-12.48	peak	
5		1.1659	33.07	9.63	42.70	56.00	-13.30	peak	
6		1.6699	31.76	9.45	41.21	56.00	-14.79	peak	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/2440 MHz		

Phase: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1548	43.06	8.85	51.91	65.74	-13.83	peak	
2		0.1751	41.64	9.59	51.23	64.71	-13.48	peak	
3		0.2479	39.79	9.22	49.01	61.83	-12.82	peak	
4	*	0.3879	37.83	7.78	45.61	58.11	-12.50	peak	
5		1.0939	33.41	9.66	43.07	56.00	-12.93	peak	
6		1.3819	32.00	9.55	41.55	56.00	-14.45	peak	

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (Frequency Range 9KHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

4.2.2 MEASUREMENT INSTRUMENTS LIST ANS SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 15, 2014
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 16, 2014
4	Microflex Cable	Harbour industries	27478LL142	1m	May. 13, 2014
5	Microflex Cable	EMC	S104-SMA	8m	May. 13, 2014
6	Microflex Cable	Harbour industries	27478LL142	3m	May. 13, 2014
7	Test Cable	LMR	LMR-400	12m	May. 14, 2014
8	Test Cable	LMR	LMR-400	3m	May. 14, 2014
9	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 18, 2014
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 11, 2014
11	Preamplifier With Adaptor	EMC	EMC2654045	980030	Feb. 18, 2014
12	Horn Antenna	Schwarzbeck	BBHA 9170	340	Nov. 14, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz for PK/AVG detector
Start ~ Stop Frequency	90kHz~110kHz for QP detector
Start ~ Stop Frequency	110kHz~490kHz for PK/AVG detector
Start ~ Stop Frequency	490kHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.2.3 TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters 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 EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

NOTE (Between 30 MHz and 1000 MHz):

a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz; SPA setting in RBW=100 kHz, VBW =100 kHz, Swp. Time = 0.3 sec./ MHz.
b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform.

NOTE (Above 1000 MHz):

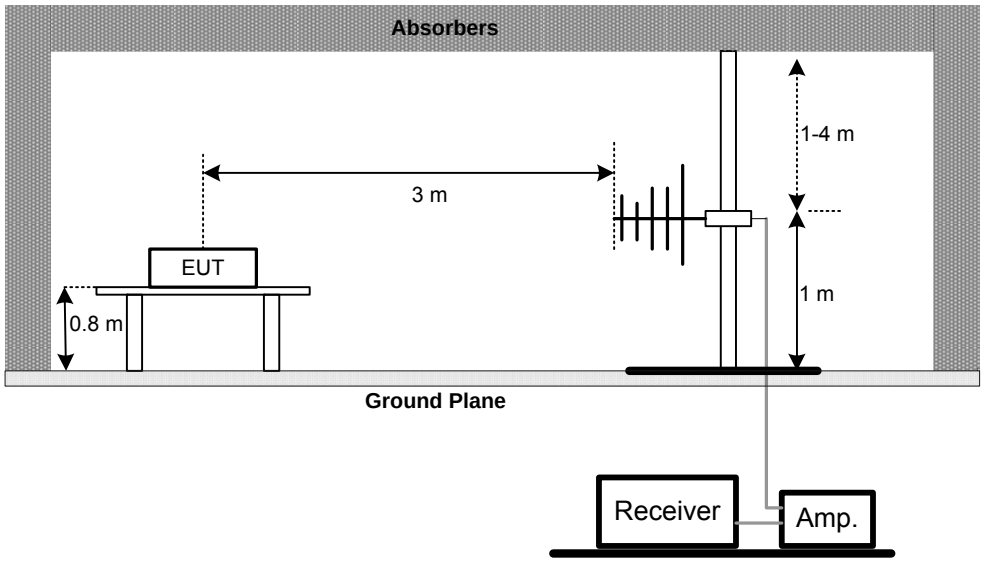
a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.
b. All readings 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 both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform.

4.2.4 DEVIATION FROM TEST STANDARD

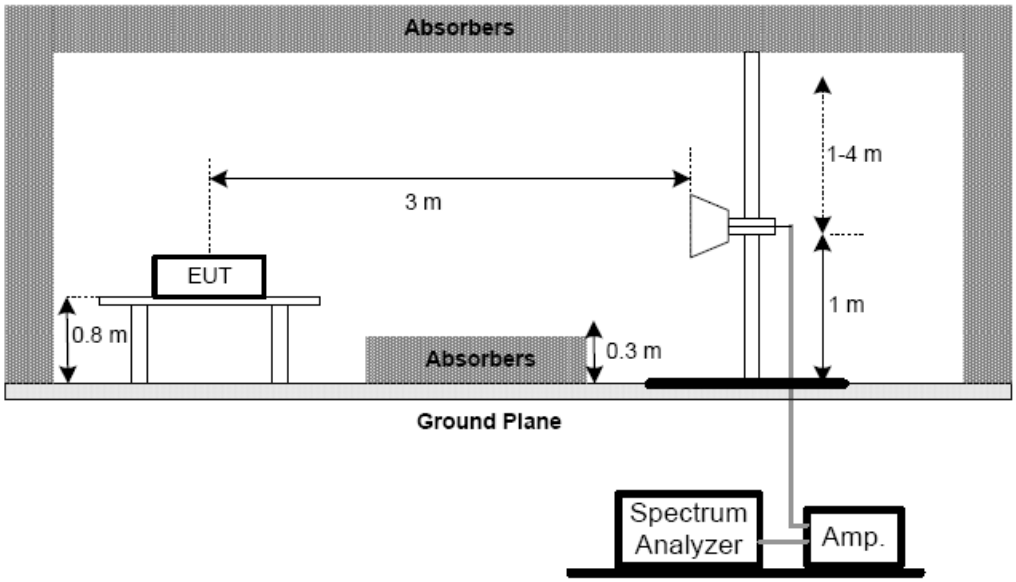
No deviation

4.2.5 TEST SETUP

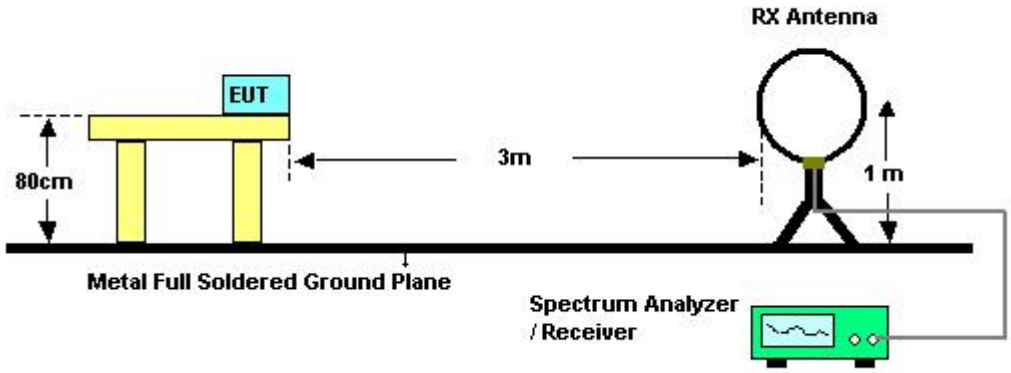
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For radiated emissions below 30MHz



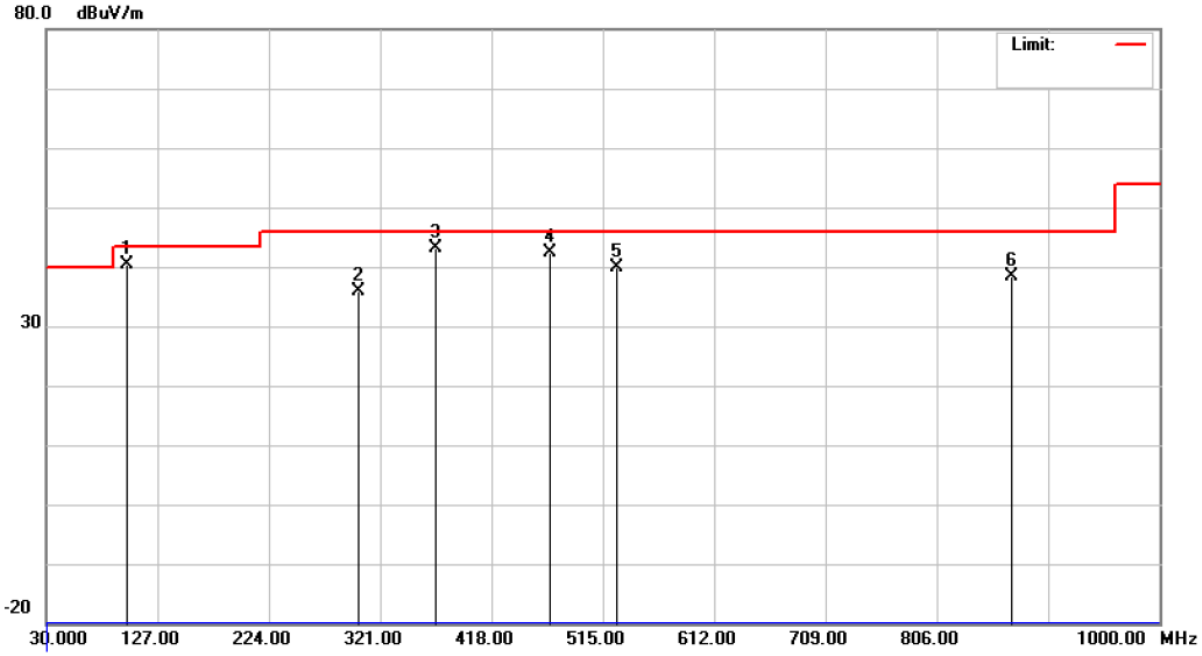
4.2.6 EUT OPERATING CONDITIONS

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.
The EUT was programmed to be in continuously transmitting mode.

4.2.8 TEST RESULTS-BETWEEN 30MHZ AND 1000MHZ

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

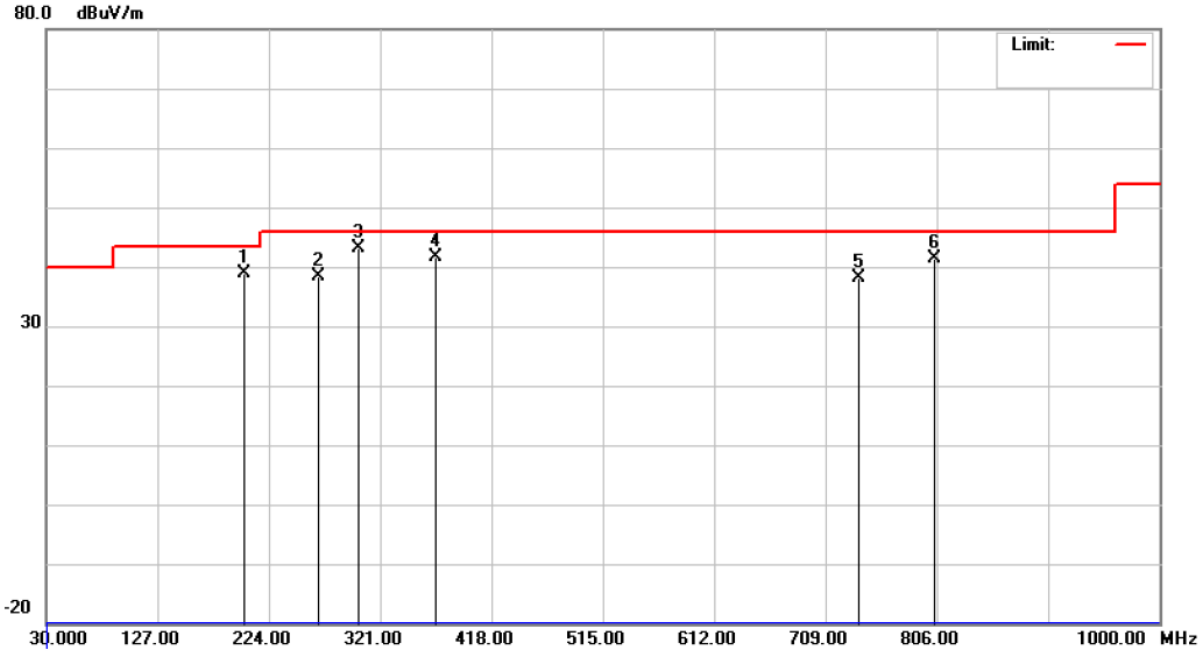
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		100.3248	59.51	-19.19	40.32	43.50	-3.18	peak	
2		301.6000	49.85	-13.88	35.97	46.00	-10.03	peak	
3	*	369.5000	55.30	-12.14	43.16	46.00	-2.84	peak	
4		468.9248	51.94	-9.66	42.28	46.00	-3.72	peak	
5		527.1250	48.70	-8.80	39.90	46.00	-6.10	peak	
6		871.4749	42.27	-3.88	38.39	46.00	-7.61	peak	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

Polarization: Horizontal

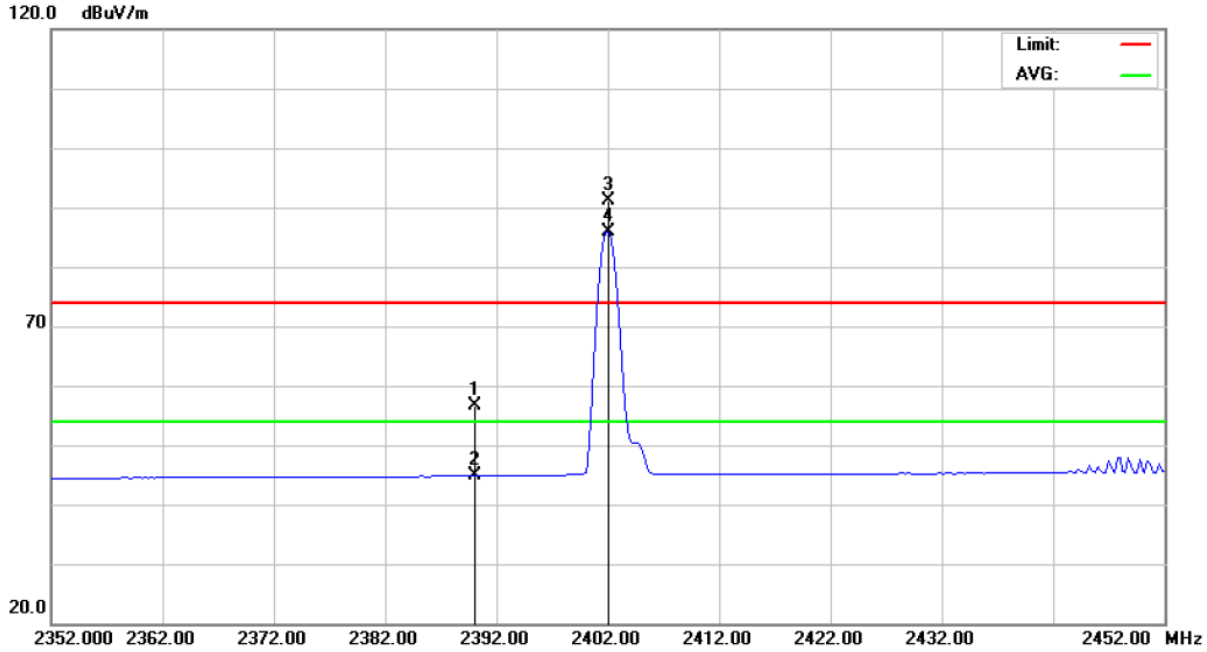


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		202.1750	55.84	-16.92	38.92	43.50	-4.58	peak	
2		267.6499	52.98	-14.49	38.49	46.00	-7.51	peak	
3	*	301.6000	56.92	-13.88	43.04	46.00	-2.96	peak	
4		369.5000	53.67	-12.14	41.53	46.00	-4.47	peak	
5		738.0999	43.74	-5.62	38.12	46.00	-7.88	peak	
6		803.5750	46.10	-4.78	41.32	46.00	-4.68	peak	

4.2.7 TEST RESULTS (ABOVE 1000 MHZ)

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

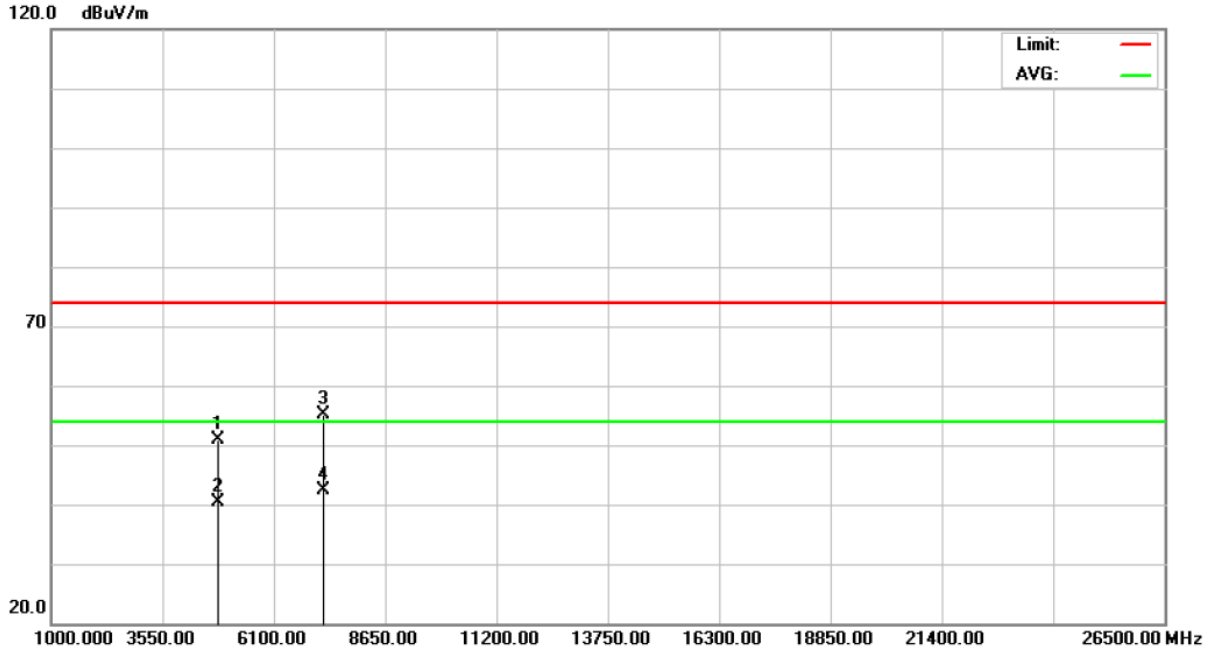
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.84	31.67	56.51	74.00	-17.49	peak	
2		2390.000	13.11	31.67	44.78	54.00	-9.22	AVG	
3	X	2402.000	59.43	31.72	91.15	74.00	17.15	peak	
4	*	2402.000	54.27	31.72	85.99	54.00	31.99	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

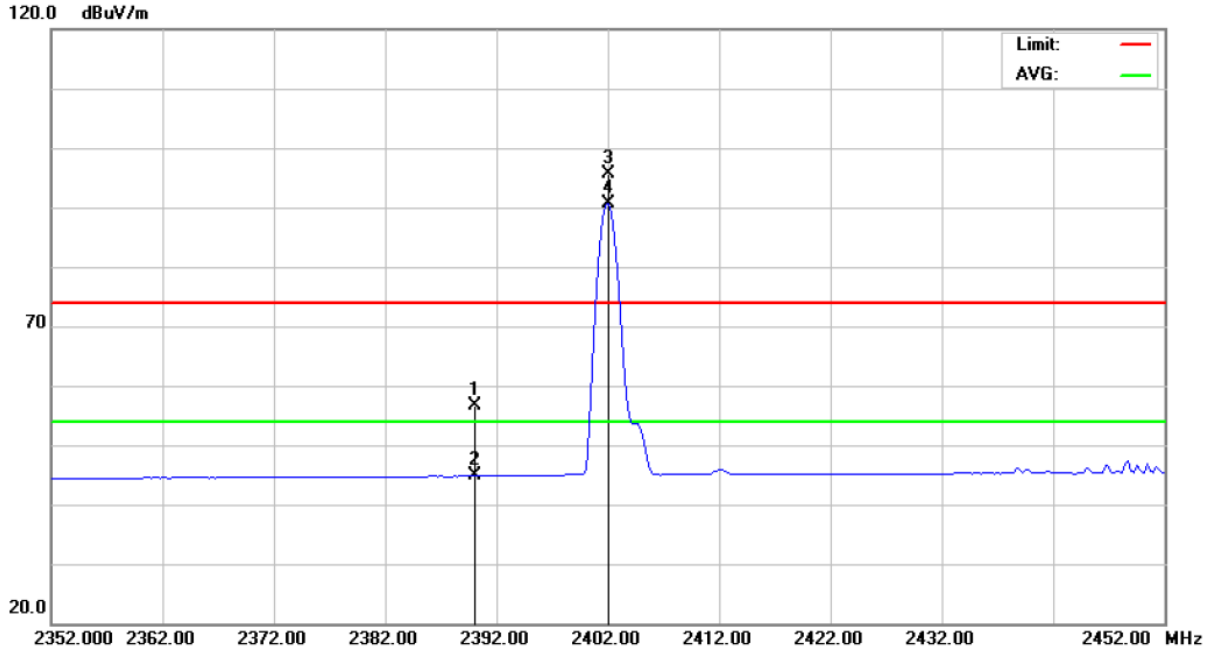
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4803.985	45.11	5.69	50.80	74.00	-23.20	peak	
2		4803.985	34.75	5.69	40.44	54.00	-13.56	AVG	
3		7206.695	42.83	12.18	55.01	74.00	-18.99	peak	
4	*	7206.695	30.24	12.18	42.42	54.00	-11.58	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

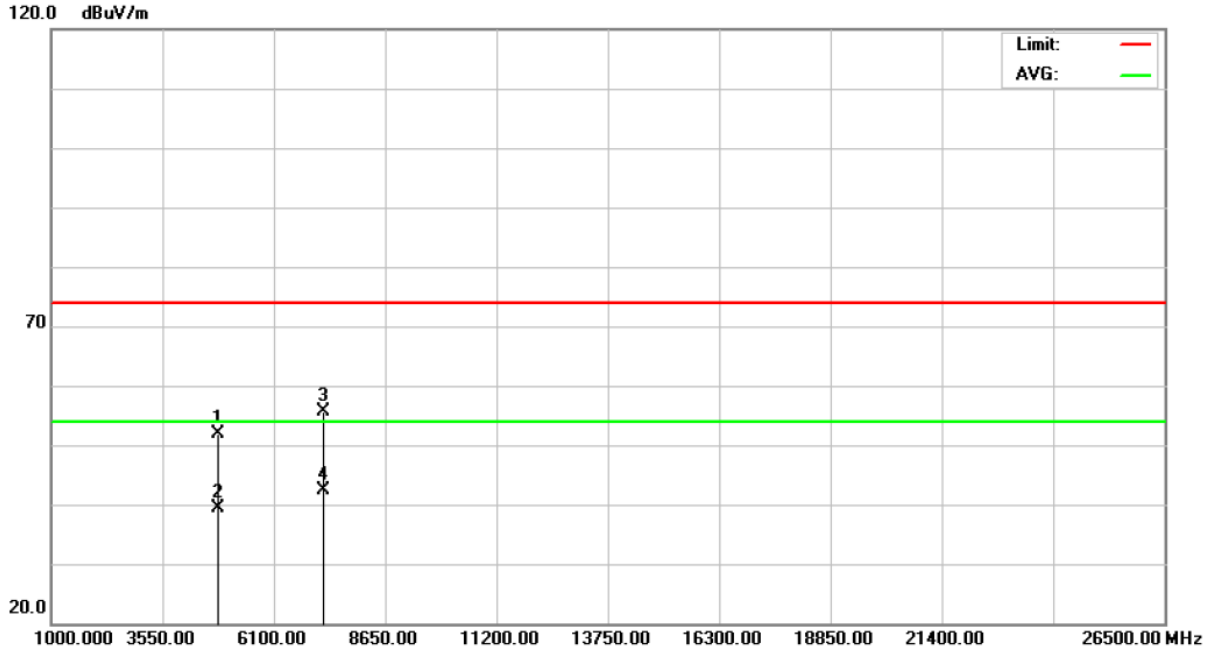
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.87	31.67	56.54	74.00	-17.46	peak	
2		2390.000	13.13	31.67	44.80	54.00	-9.20	AVG	
3	X	2402.000	63.91	31.72	95.63	74.00	21.63	peak	
4	*	2402.000	58.88	31.72	90.60	54.00	36.60	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

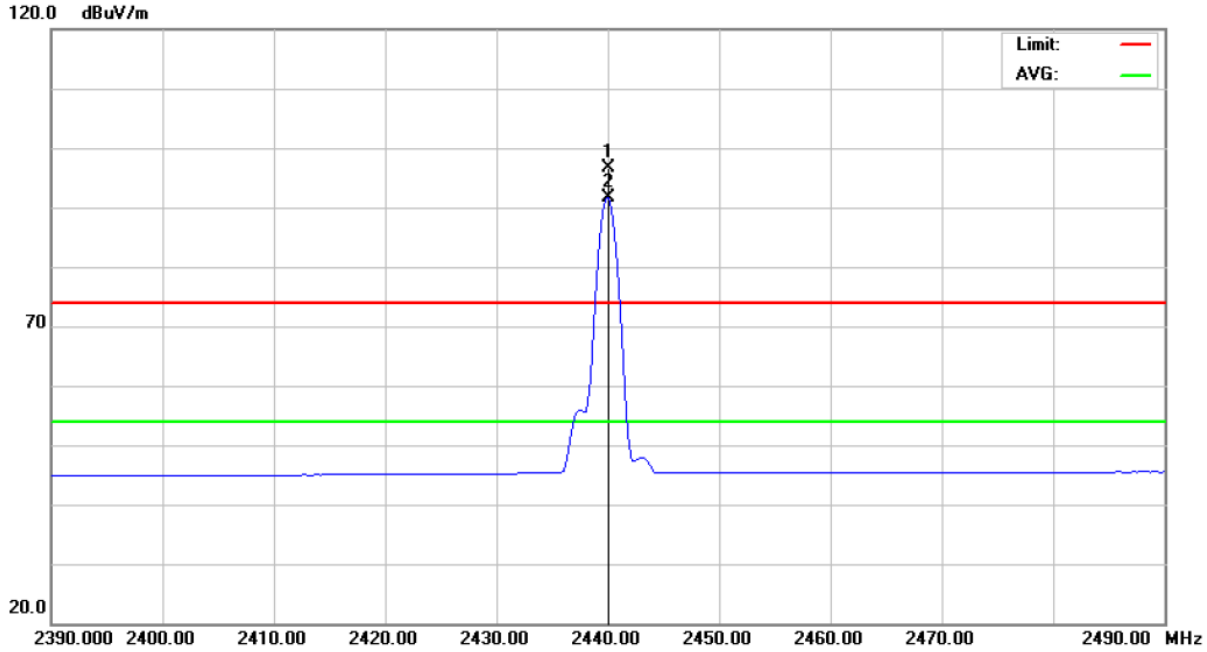
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.060	46.13	5.69	51.82	74.00	-22.18	peak	
2		4804.060	33.57	5.69	39.26	54.00	-14.74	AVG	
3		7205.715	43.53	12.18	55.71	74.00	-18.29	peak	
4	*	7205.715	30.18	12.18	42.36	54.00	-11.64	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

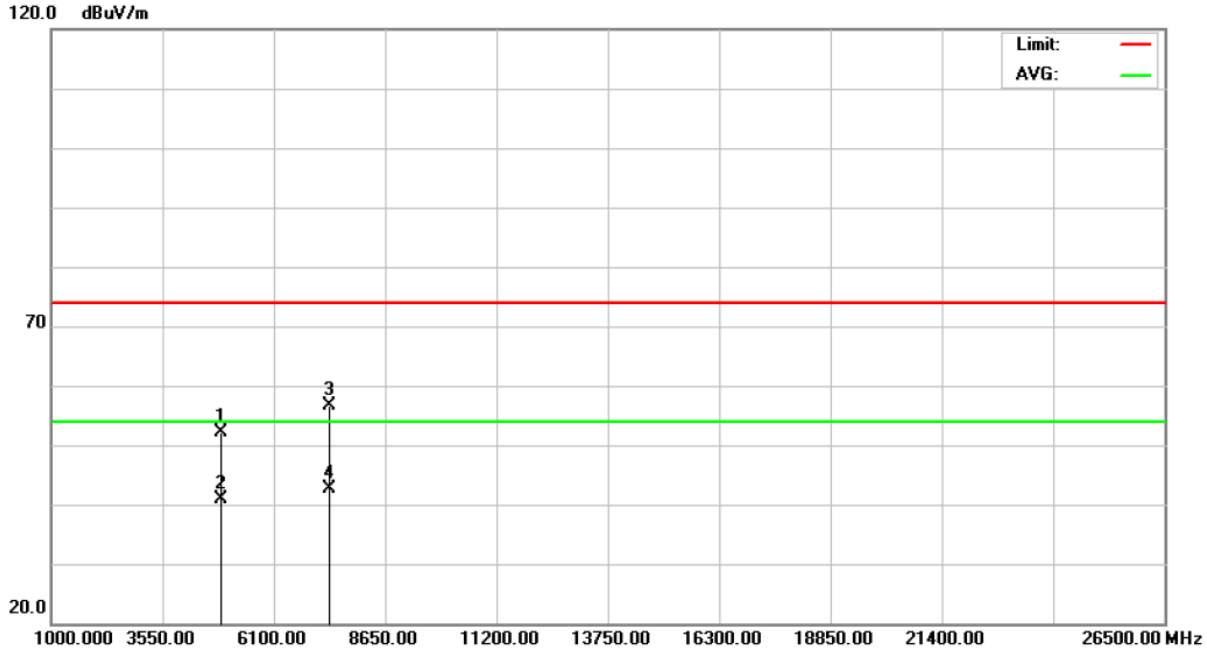
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2440.000	64.70	31.89	96.59	74.00	22.59	peak	
2	*	2440.000	59.62	31.89	91.51	54.00	37.51	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

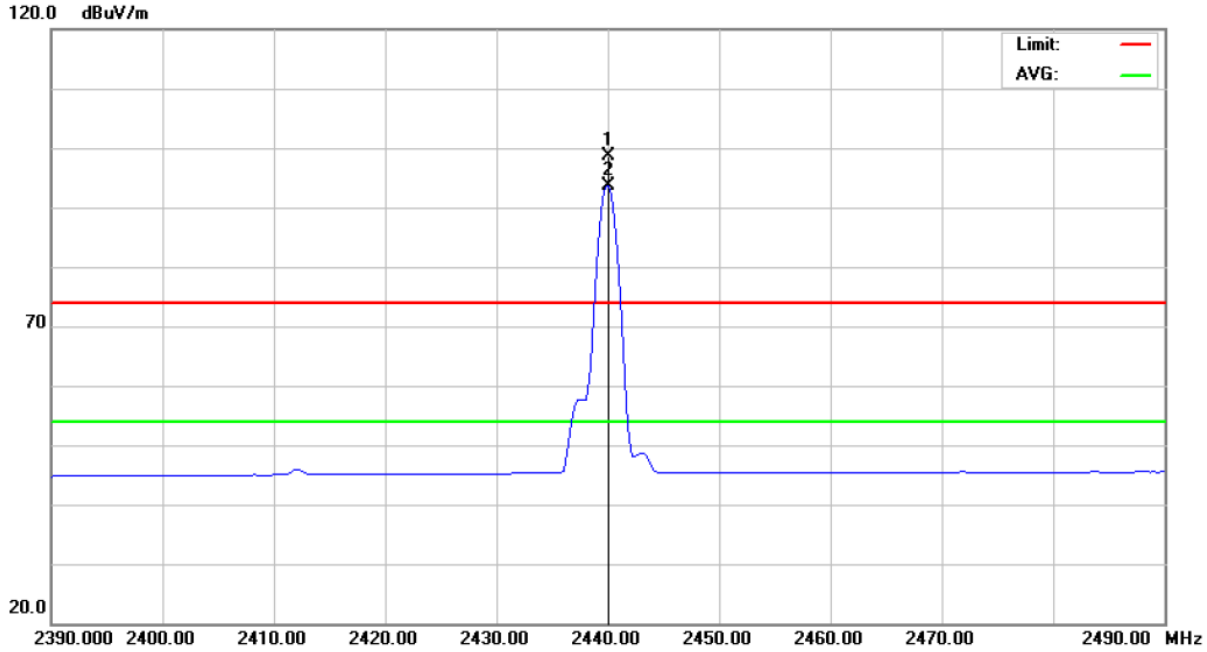
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4879.940	46.39	5.79	52.18	74.00	-21.82	peak	
2		4879.940	34.99	5.79	40.78	54.00	-13.22	AVG	
3		7320.670	44.06	12.60	56.66	74.00	-17.34	peak	
4	*	7320.670	30.10	12.60	42.70	54.00	-11.30	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

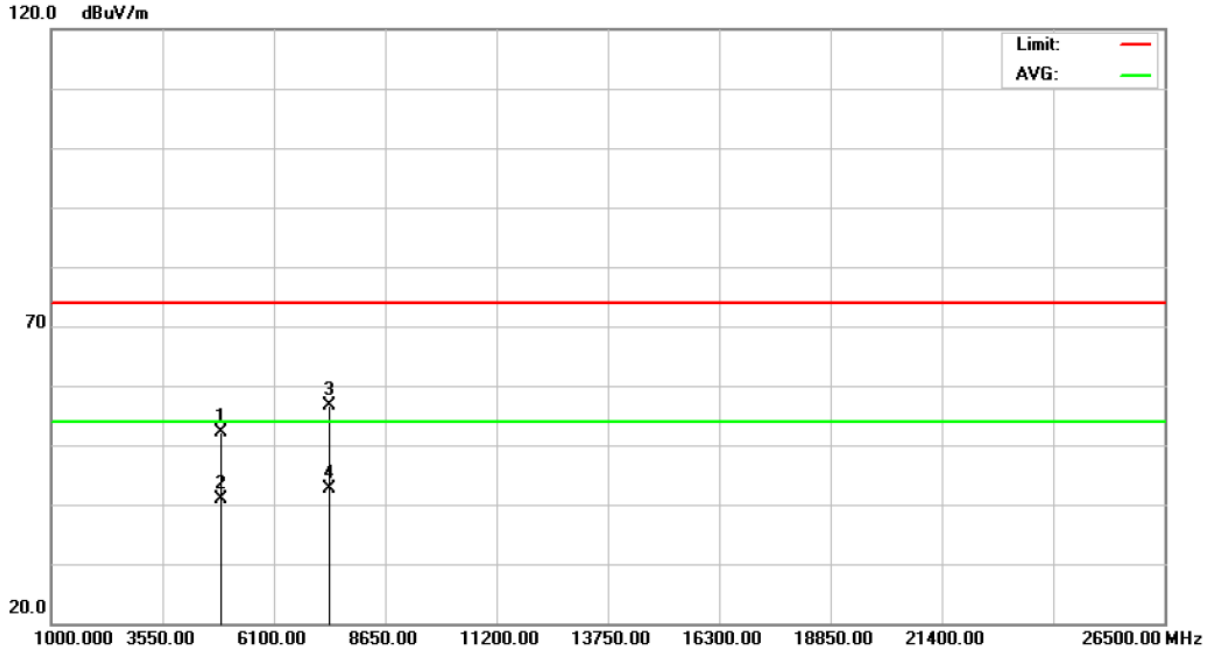
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2440.000	66.82	31.89	98.71	74.00	24.71	peak	
2	*	2440.000	61.66	31.89	93.55	54.00	39.55	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

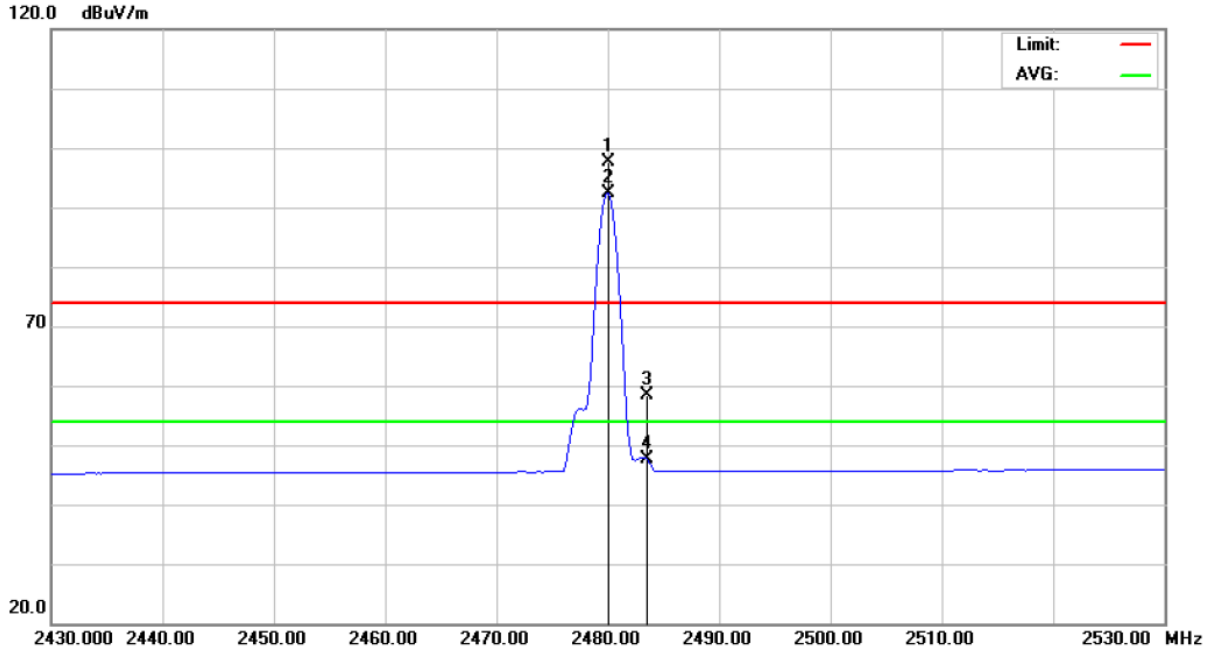
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4879.940	46.39	5.79	52.18	74.00	-21.82	peak	
2		4879.940	34.99	5.79	40.78	54.00	-13.22	AVG	
3		7320.670	44.06	12.60	56.66	74.00	-17.34	peak	
4	*	7320.670	30.10	12.60	42.70	54.00	-11.30	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

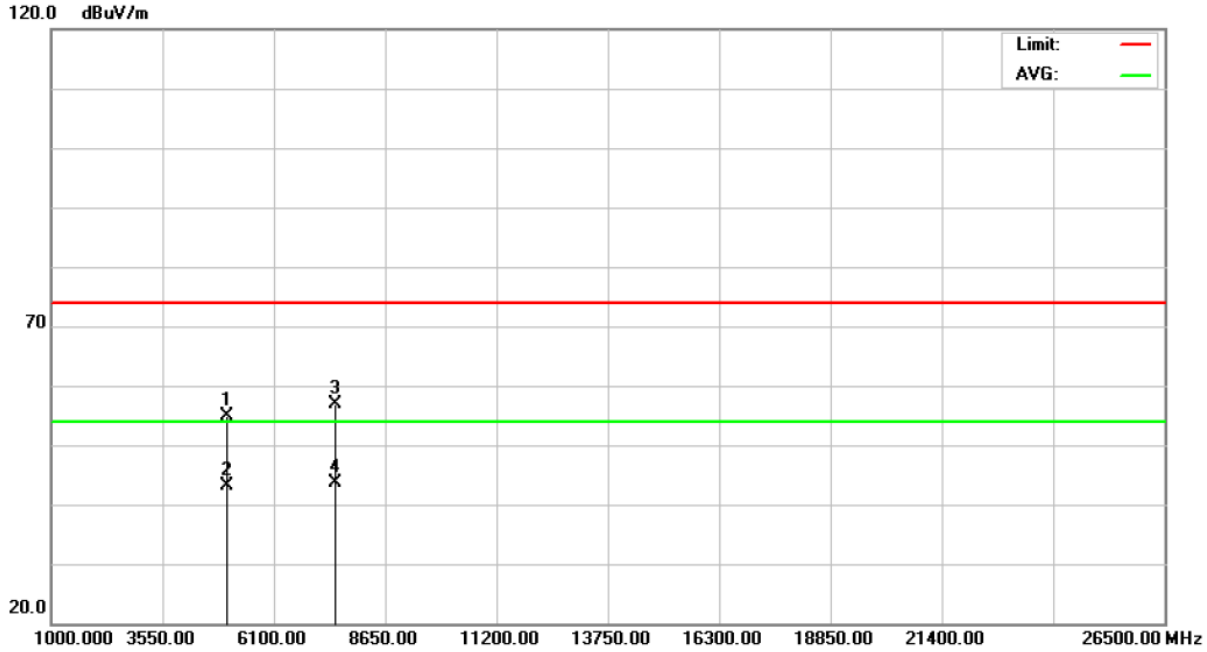
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	65.60	32.07	97.67	74.00	23.67	peak	
2	*	2480.000	60.25	32.07	92.32	54.00	38.32	AVG	
3		2483.500	26.39	32.09	58.48	74.00	-15.52	peak	
4		2483.500	15.46	32.09	47.55	54.00	-6.45	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

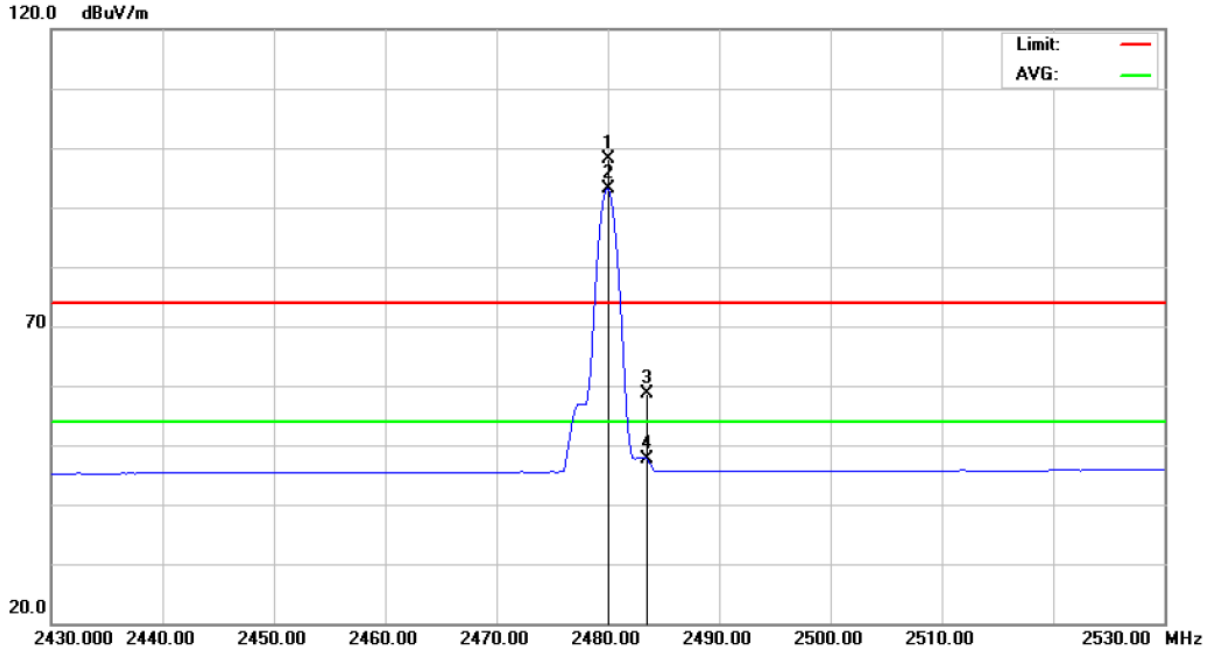
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.945	48.97	5.89	54.86	74.00	-19.14	peak	
2		4959.945	37.18	5.89	43.07	54.00	-10.93	AVG	
3		7439.955	43.76	13.05	56.81	74.00	-17.19	peak	
4	*	7439.955	30.68	13.05	43.73	54.00	-10.27	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

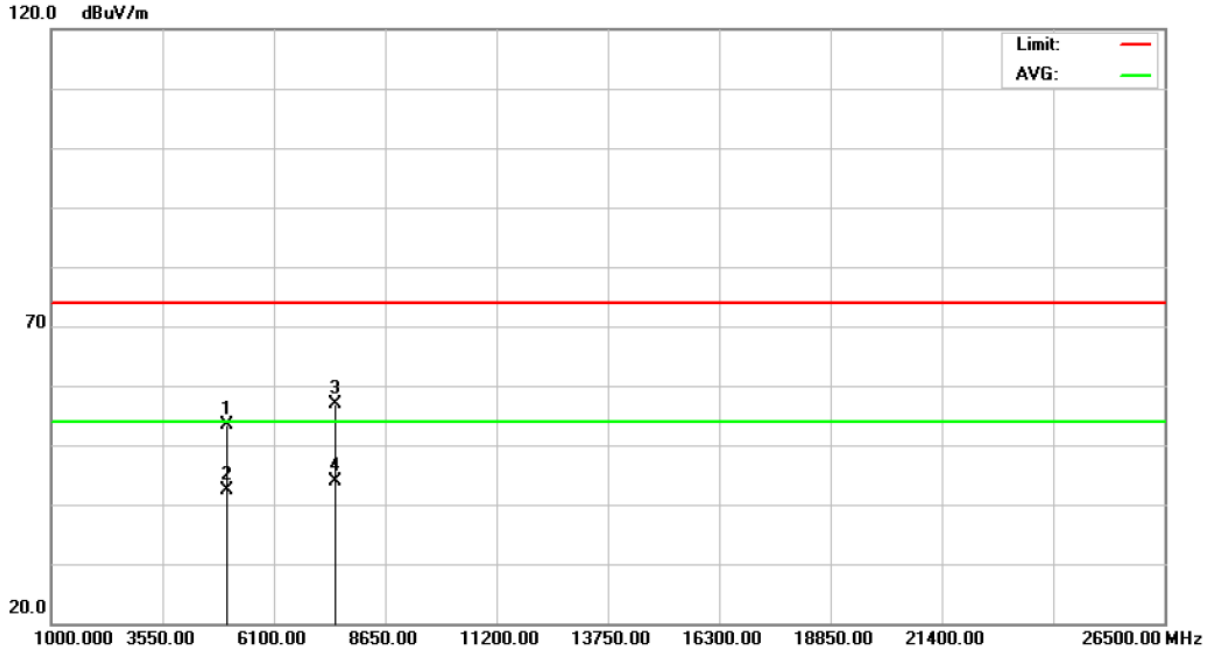
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	66.08	32.07	98.15	74.00	24.15	peak	
2	*	2480.000	60.95	32.07	93.02	54.00	39.02	AVG	
3		2483.500	26.54	32.09	58.63	74.00	-15.37	peak	
4		2483.500	15.48	32.09	47.57	54.00	-6.43	AVG	

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.895	47.53	5.89	53.42	74.00	-20.58	peak	
2		4959.895	36.45	5.89	42.34	54.00	-11.66	AVG	
3		7440.725	43.80	13.05	56.85	74.00	-17.15	peak	
4	*	7440.725	30.73	13.05	43.78	54.00	-10.22	AVG	

5. BANDWIDTH TEST

5.1 APPLIED PROCESURES / LIMIT

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	2400-2483.5	PASS

5.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

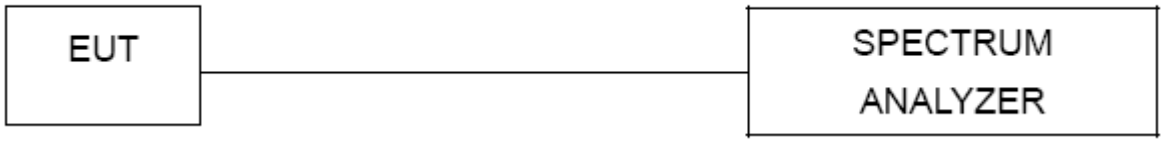
5.3 TEST PROCEDURE

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= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.4 DEVIATION FROM STANDARD

No deviation.

5.5 TEST SETUP



5.6 EUT OPERATION CONDITIONS

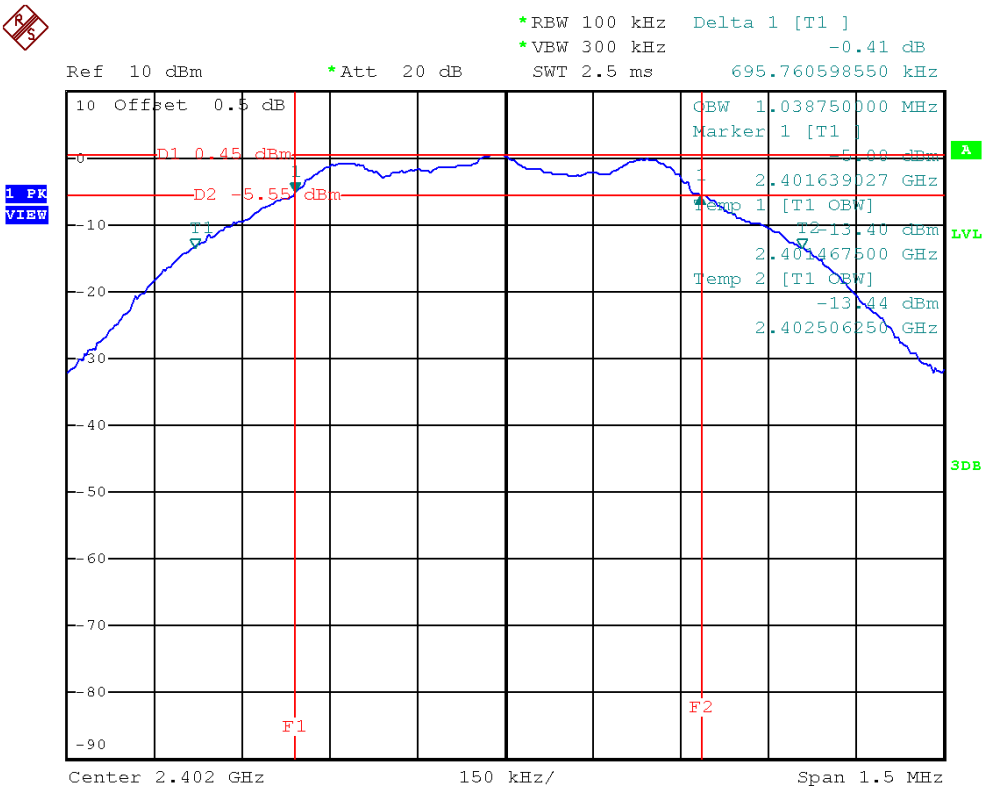
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

5.7 TEST RESULTS

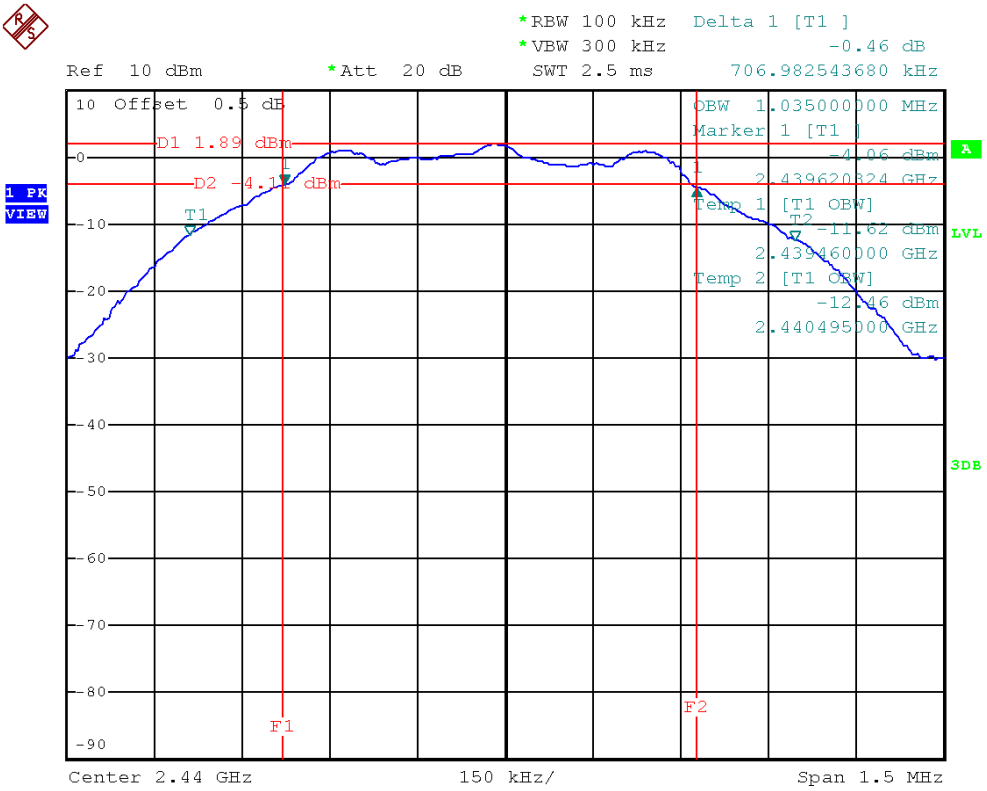
EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	CH00, CH19, CH39 - 1 Mbps		

Test Channel	Frequency (MHz)	Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Test Result
CH00	2402 MHz	0.70	1.04	Pass
CH19	2440 MHz	0.71	1.04	Pass
CH39	2480 MHz	0.70	1.04	Pass

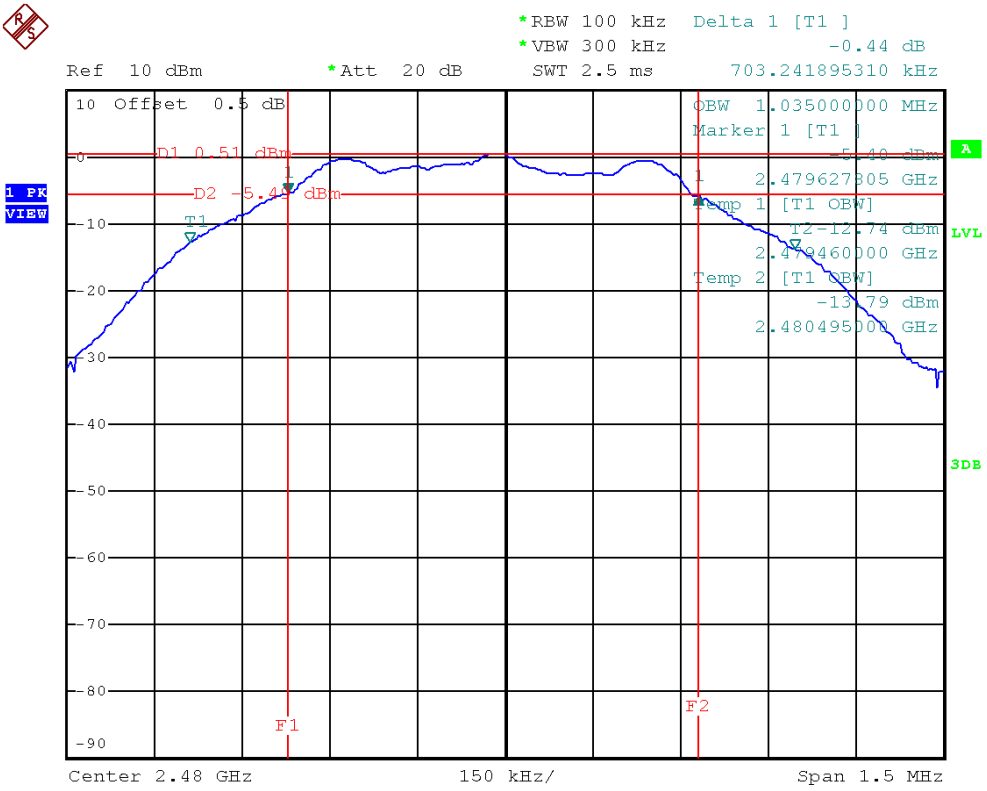
TX CH00



TX CH19



TX CH39



6. MAXIMUM OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

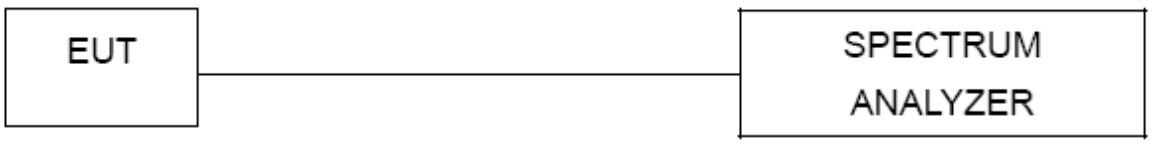
6.3 TEST PROCEDURE

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= 3 MHz, VBW= 3 MHz, Sweep time = Auto.
c. The maximum peak conducted output power was performed in accordance with method 9.1.3 of FCC KDB 558074

6.4 DEVIATION FROM STANDARD

No deviation.

6.5 TEST SETUP



6.6 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

6.7 TEST RESULTS

EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	CH00, CH19, CH39 - 1 Mbps		

Frequency	Peak Output Power		Limit		Result
	(dBm)	(W)	(dBm)	(W)	
2402 MHz	1.81	0.0015	30	1	PASS
2441 MHz	3.47	0.0022	30	1	PASS
2480 MHz	1.61	0.0014	30	1	PASS

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

7.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

7.3 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= 100KHz, VBW=300KHz, Sweep time = 10 ms.

7.4 DEVIATION FROM STANDARD

No deviation.

7.5 TEST SETUP

7.6 EUT OPERATION CONDITIONS

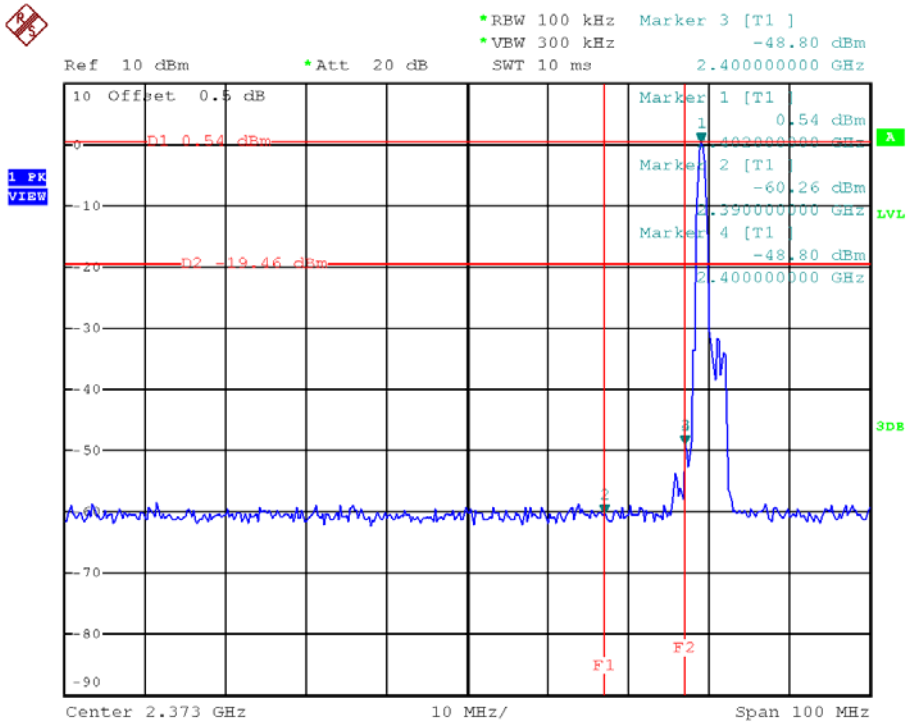
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

7.7 TEST RESULTS

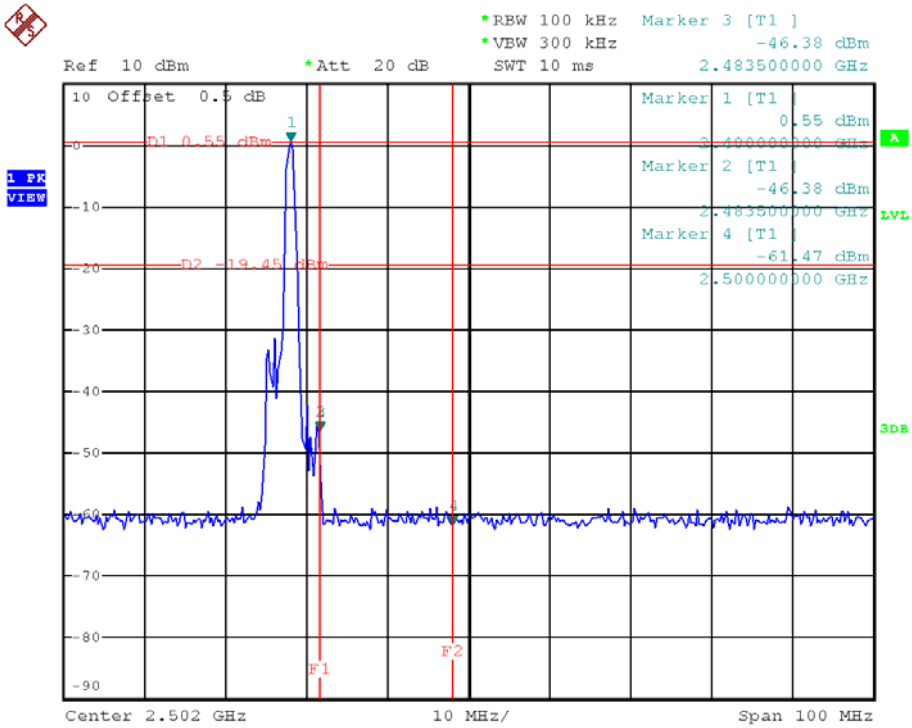
EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	CH00, CH19 , CH39 - 1 Mbps		

Channel of Worst Data: CH00			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2400.00	-48.80	2483.50	-46.38
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

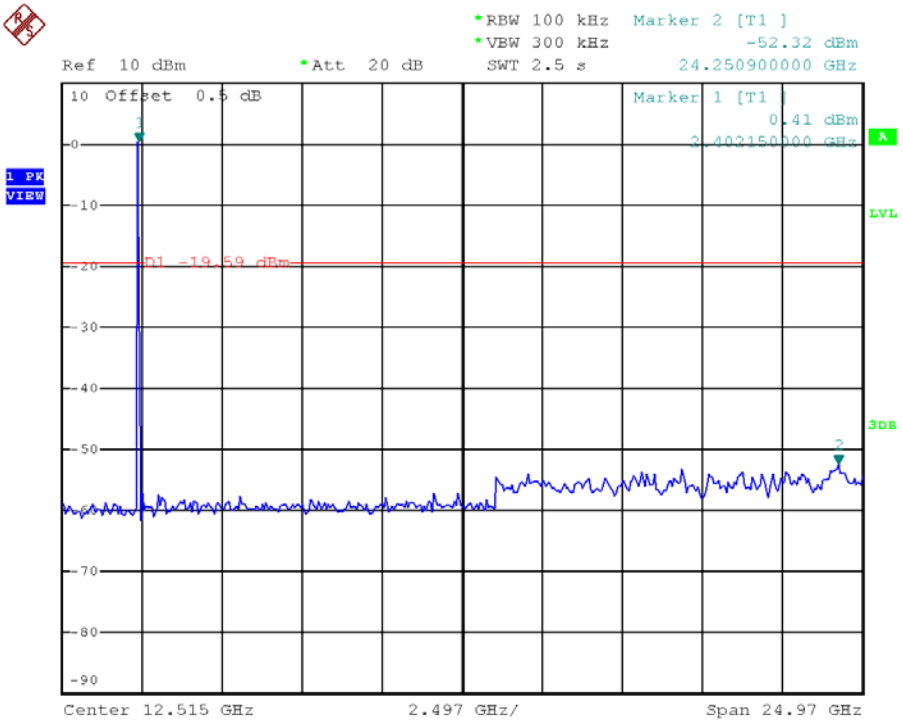
CH00 (Lower) - 1 Mbps



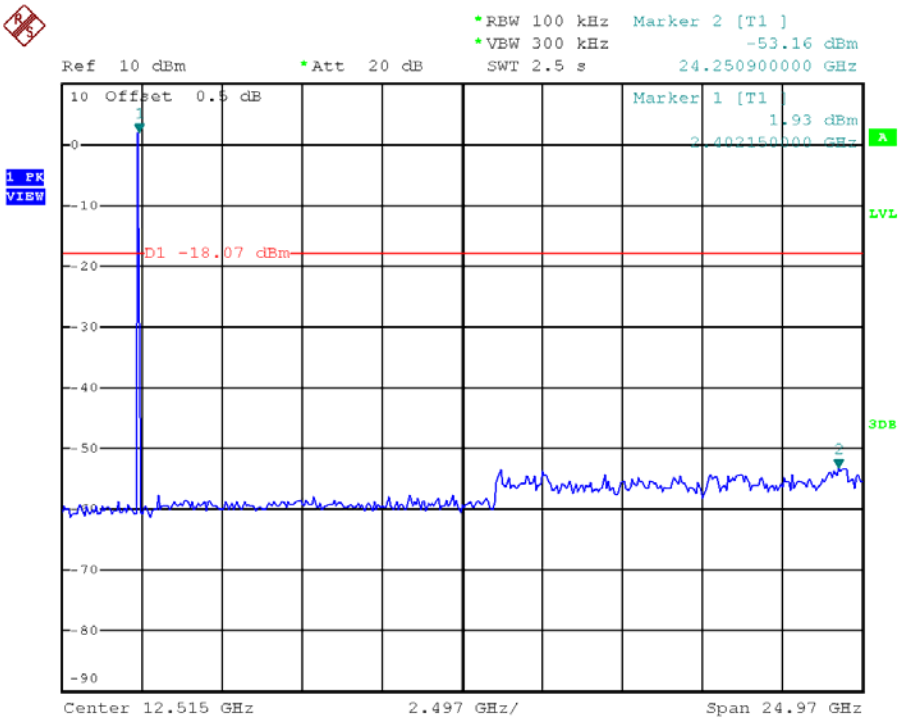
CH39 (upper) - 1 Mbps



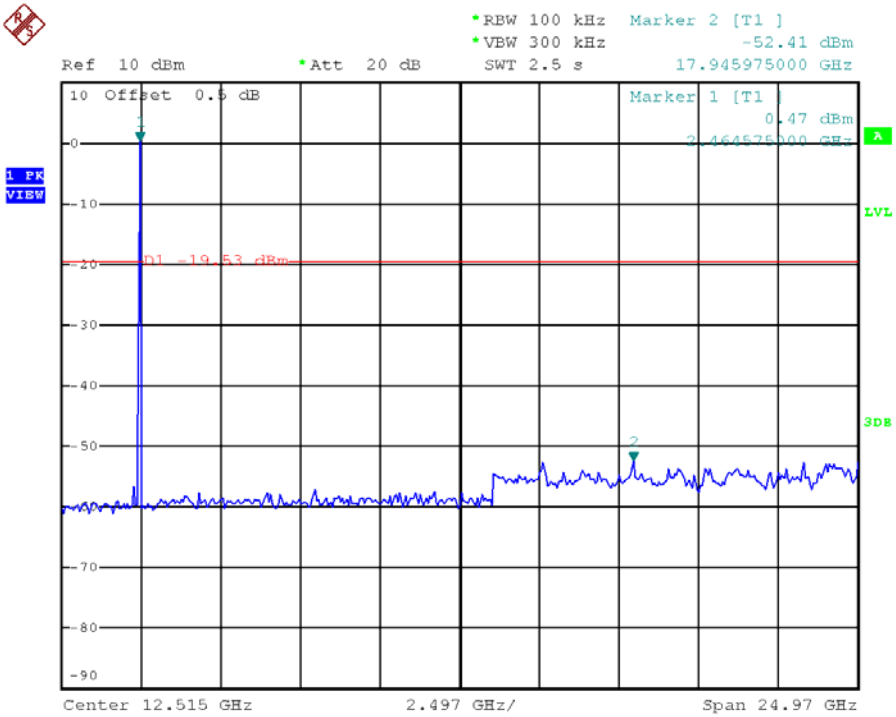
CH00 (10th Harmonic)



CH19 (10th Harmonic)



CH39 (10th Harmonic)



8. POWER SPECTRAL DENSITY TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

8.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

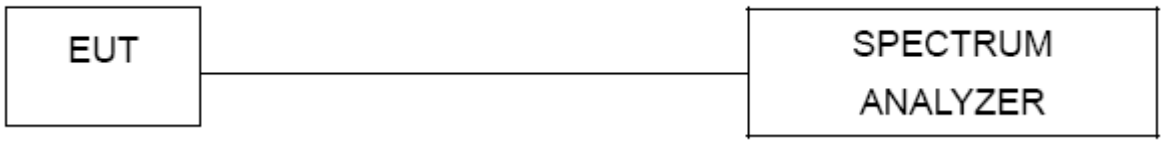
8.3 TEST PROCEDURE

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=3KHz, VBW=10KHz, Sweep time = auto.

8.4 DEVIATION FROM STANDARD

No deviation.

8.5 TEST SETUP



8.6 EUT OPERATION CONDITIONS

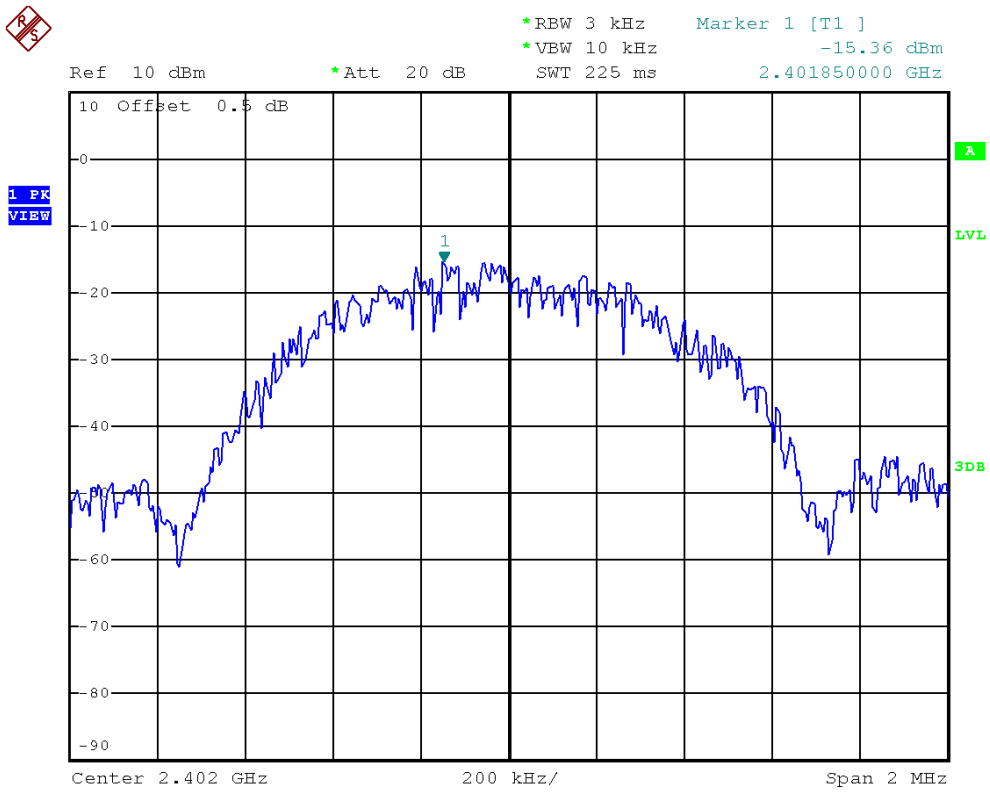
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

8.7 TEST RESULTS

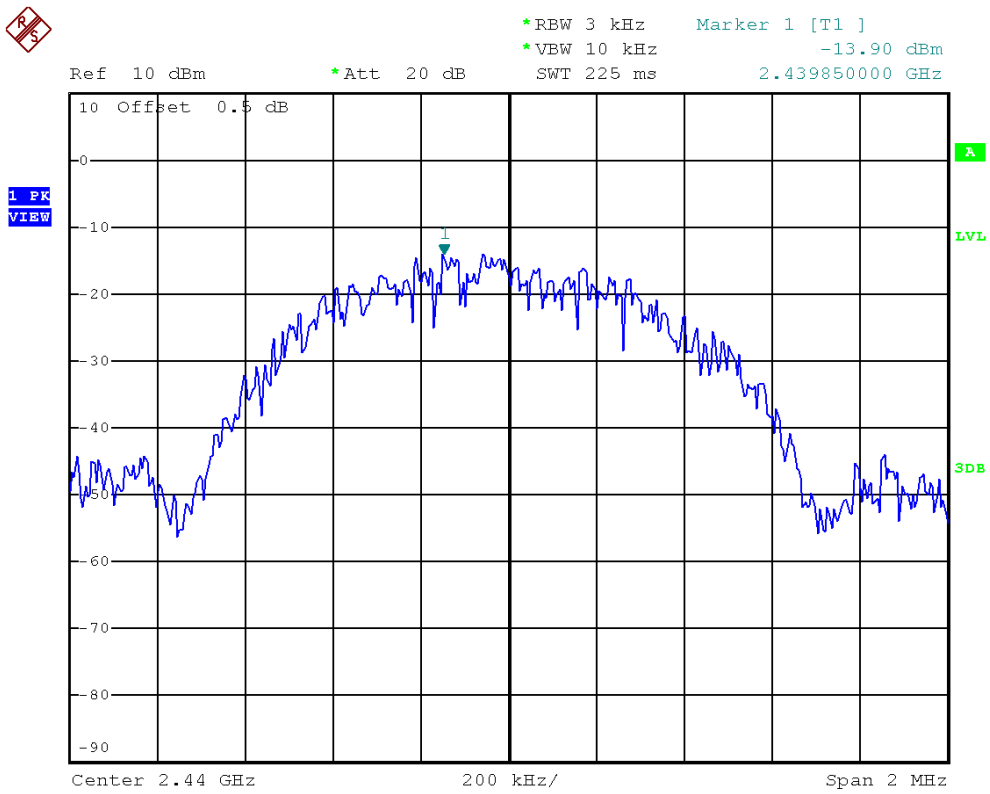
EUT	BOOM BOOM !	Model Name	BOOM BOOM !
Temperature	25°C	Relative Humidity	62%
Test Voltage	AC 120V/60Hz		
Test Mode	CH00, CH19, CH39 -1 Mbps		

Test Channel	Frequency (MHz)	Power Density (dBm)	LIMIT (dBm)
CH00	2402 MHz	-15.36	8
CH19	2440 MHz	-13.90	8
CH39	2480 MHz	-15.19	8

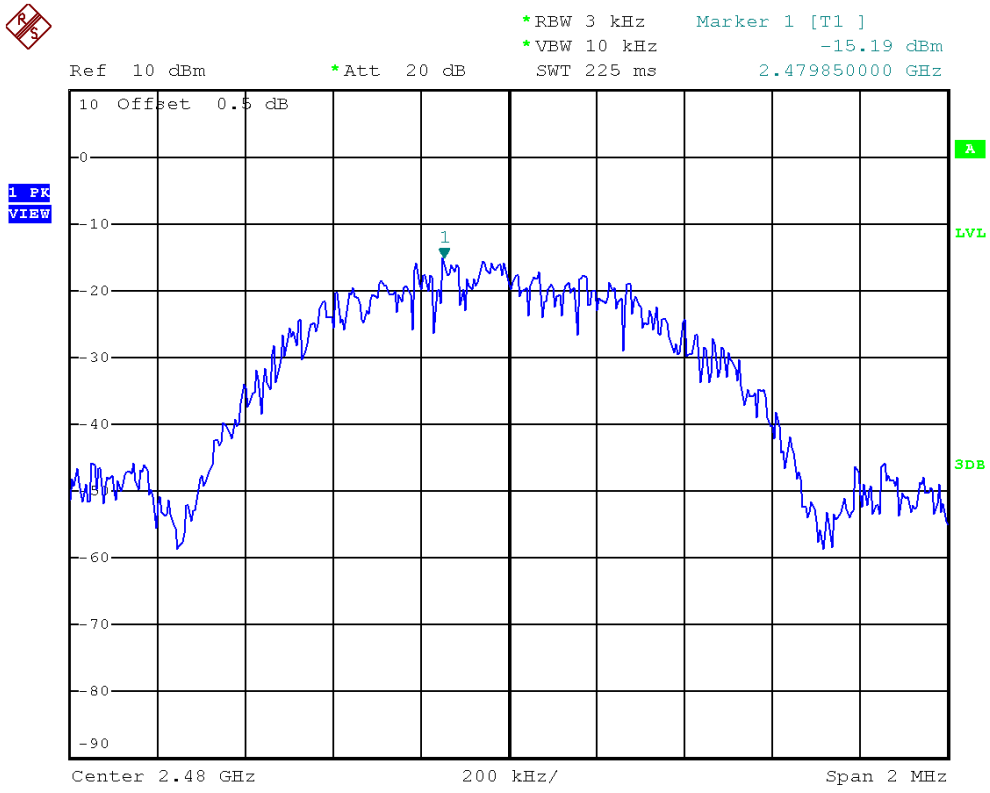
TX CH00



TX CH19



TX CH39



9. EUT TEST PHOTO

Conducted emission test photos

Radiated spurious emission test photos