FCC Radio Test Report

FCC ID: 2ADBM-LS9-AC11DBT

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

Project No.	:	1602C104
Equipment	:	media/audio streaming module
Model Name	:	LS9-AC11DBT
Applicant	:	Libre Wireless Technologies Inc
Address	:	5405 Alton Parkway, Suite A-563, Irvine, CA 92604, USA

Date of Receipt	:	Mar. 01, 2016
Date of Test	:	Mar. 01, 2016 ~ Mar. 15, 2016
Issued Date	:	Mar. 16, 2016
Tested by	:	BTL Inc.

Testing Engineer : Shawn Xiao
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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

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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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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-2-1602C104	Original Issue.	Mar. 16, 2016

1. CERTIFICATION

Equipment	:	media/audio streaming module
Brand Name	:	Libre Sync
Model Name	:	LS9-AC11DBT
Applicant		Libre Wireless Technologies Inc
Manufacturer	:	#1 Shenzhen Zowee Technology Co., Ltd #2 Hansong (Nanjing) Technology Ltd.
Address	:	#1 NO.5 Zowee technology building, Science & Technology industrial park of privately owned enterprises, Pingshan, Xili, Nanshan district, Shenzhen, China. #2 8th Kangping Road,Jiangning EconomyandTechnology Development Zone, Nanjing,211106,China.
Date of Test	:	Mar. 01, 2016 ~ Mar. 15, 2016
Test Sample	:	Engineering Sample
Standard(s)	:	FCC Part15, Subpart C (15.247) / ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1602C104) 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

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15 (15.247) , Subpart C		
Standard(s) Section	Test Item	Judgment
15.207	Conducted Emission	PASS
15.247(d)	Antenna conducted Spurious Emission	PASS
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)(3)	Peak Output Power	PASS
15.247(e)	Power Spectral Density	PASS
15.203	Antenna Requirement	PASS
15.209/15.205	Transmitter Radiated Emissions	PASS

NOTE:

(1)" N/A" denotes test is not applicable to this device.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.
BTL's test firm number for FCC: 319330

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

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

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150 KHz ~ 30MHz	2.32

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
DG-CB03	CISPR	9KHz~30MHz	V	3.79
		9KHz~30MHz	H	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	H	3.78
		200MHz ~ 1,000MHz	V	4.10
		200MHz ~ 1,000MHz	H	4.06
		1GHz~18GHz	V	3.12
		1GHz~18GHz	H	3.68
		18GHz~40GHz	V	4.15
		18GHz~40GHz	H	4.14

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	media/audio streaming module	
Brand Name	Libre Sync	
Model Name	LS9-AC11DBT	
OEM Model	WMBG2CDWX-LW(for factory: Shenzhen Zowee Technology Co., Ltd) 00-06040-01(for factory: Hansong (Nanjing) Technology Ltd.)	
Model Difference	N/A	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK (1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	7.14dBm
Power Source	Supplied from system.	
Power Rating	EUT I/P:DC 3.3V	

Note:

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

2. Channel List:

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	Libre Sync	N/A	Dipole	N/A	2

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)**

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

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.

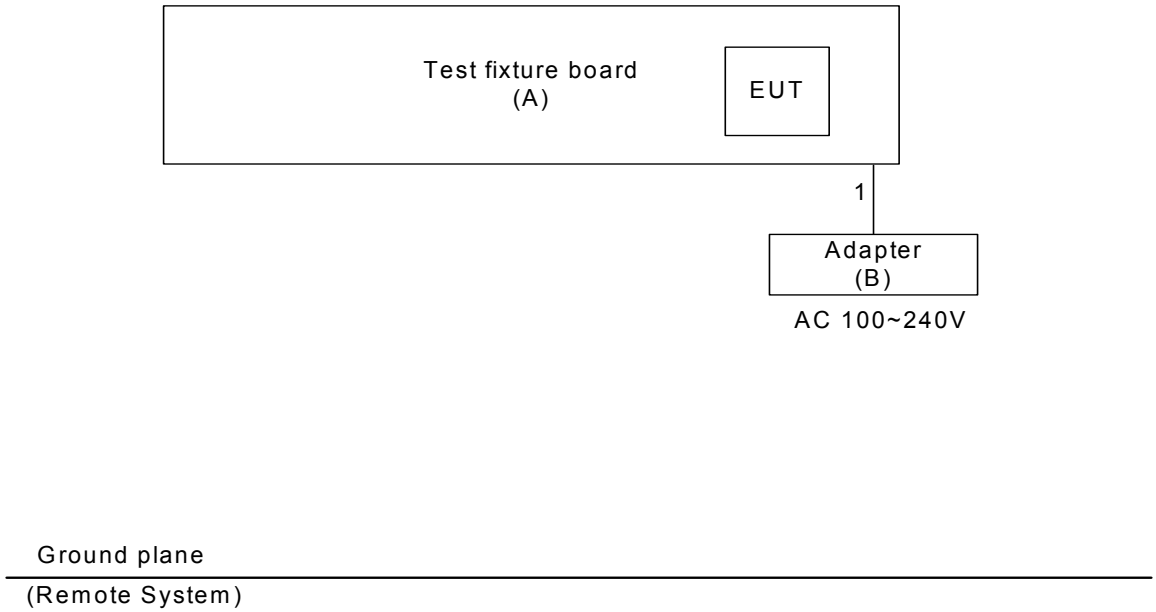
(2) The EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test

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	DutApi_w8887_BrdigeEth		
Frequency (MHz)	2402	2440	2480
BT LE	8	8	8

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



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	Series No.
A	Test fixture board	N/A	N/A	N/A	N/A
B	Adapter	Vonhk	KSAFE0900270W1US	VER	N/A

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.45	Power Cable

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 MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 -0.5	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	5

Note:

(1) The limit of " * " decreases with the logarithm of the frequency

(2) 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

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

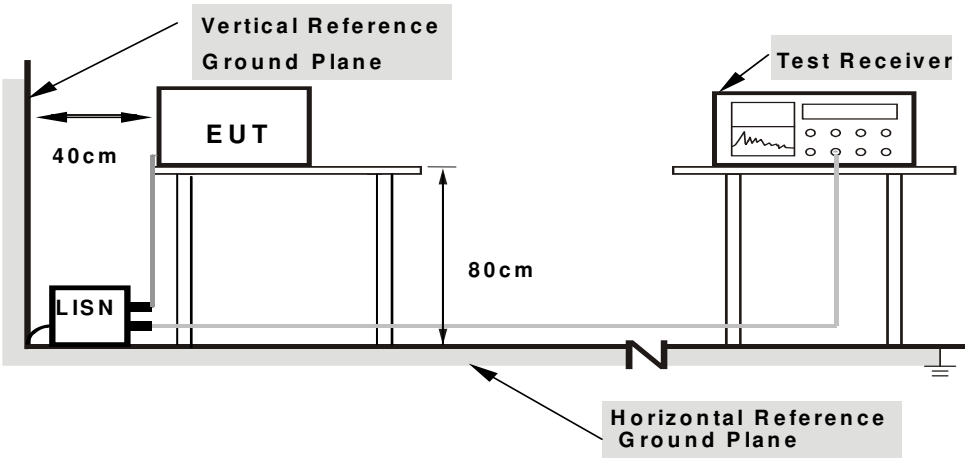
4.1.2 TEST PROCEDURE

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.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 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

4.1.5 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.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

(1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the 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 QP Mode was measured, but AVG Mode didn't perform.In this case, a " * " marked in AVG Mode column of Interference Voltage Measured.

(2) Measuring frequency range from 150KHz to 30MHz.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

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.

LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

Frequency (MHz)	Field Strength (microvolts/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 3 meters)	
	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).

(4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1MHz VBW 3MHz peak detector for Pk value RMS detector for AV value

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

4.2.2 TEST PROCEDURE

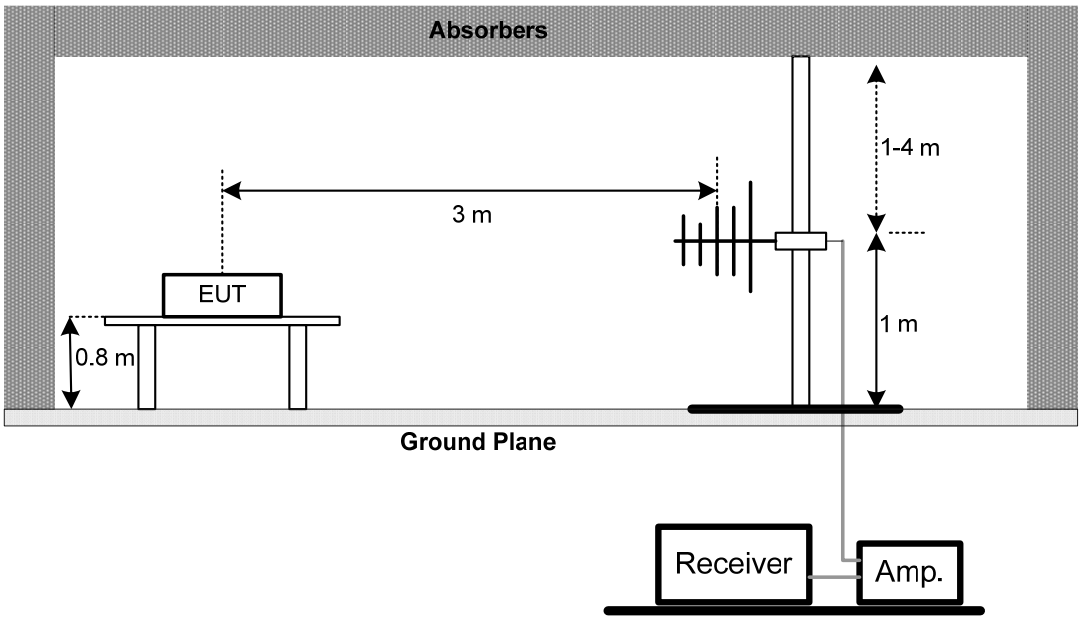
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 m semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m; 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 radiated emission data is a receiver 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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

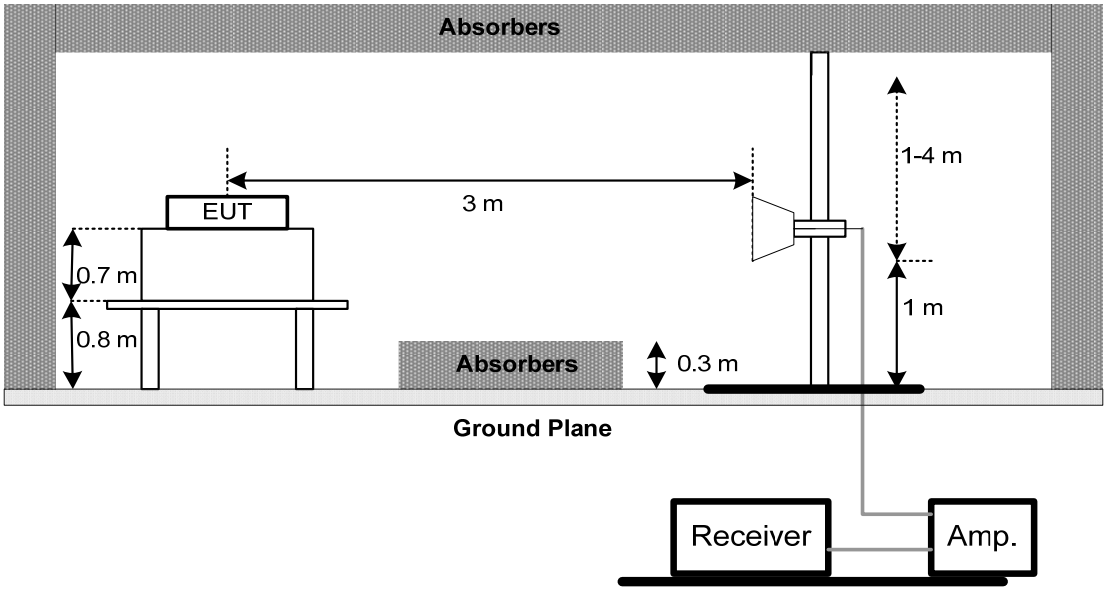
No deviation

4.2.4 TEST SETUP

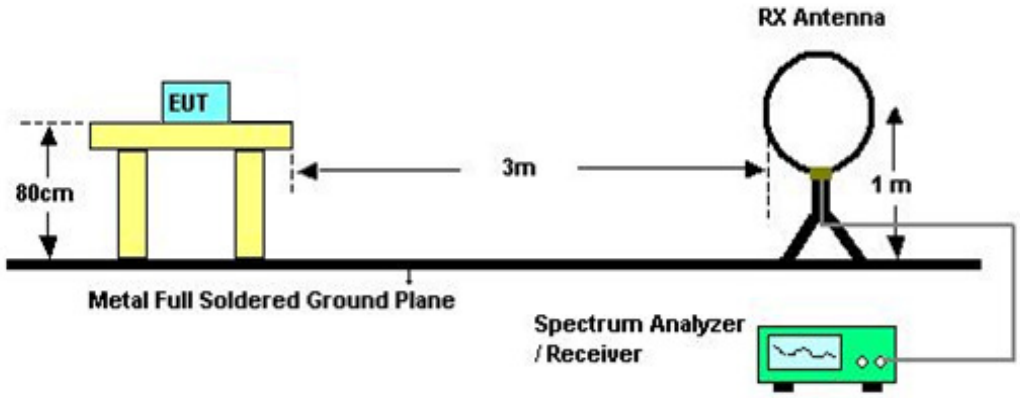
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 EUT TEST CONDITIONS

Temperature: 22°C
Relative Humidity: 56%
Test Voltage: AC 120V/60Hz

4.2.7TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Attachment B

Remark:

(1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
(2) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
(3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8TEST RESULTS (30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

(1) 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.
(2) Measuring frequency range from 30MHz to 1000MHz.
(3) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

4.2.9TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

Remark:

(1) 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.
(2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
(3) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
(4) EUT Orthogonal Axis:
”X” - denotes Laid on Table；”Y” - denotes Vertical Stand；”Z” - denotes Side Stand
(5) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
(6) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5. BANDWIDTH TEST

5.1 Applied procedures / limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

5.1.1 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= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Attachment E.

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

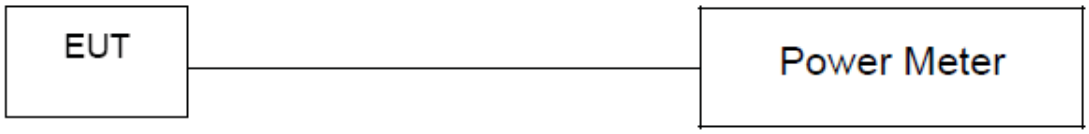
6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance v03r04.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Attachment F.

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 Applied procedures / limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

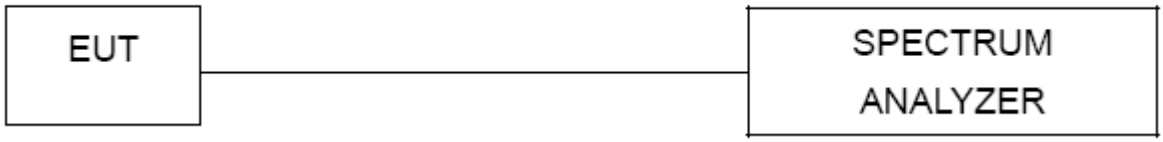
7.1.1 TEST PROCEDURE

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= 100KHz, VBW=300KHz, Sweep time = 10 ms.
c. Offset=antanna gain + cable loss

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: AC 120V/60Hz

7.1.6 TEST RESULTS

Please refer to the Attachment G.

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

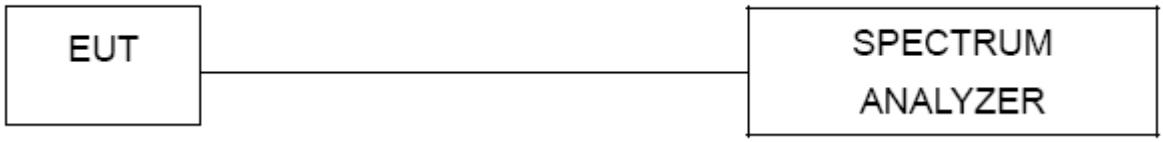
8.1.1 TEST PROCEDURE

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

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS

Please refer to the Attachment H.

9. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	Mar. 28, 2016
2	LISN	R&S	ENV216	101447	Mar. 28, 2016
3	Test Cable	emci	RG223(9KHz-30 MHz)	C_17	Mar. 12, 2017
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 28, 2016
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 28, 2016
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 28, 2016
2	Amplifier	HP	8447D	2944A09673	Nov. 09, 2016
3	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
4	Test Cable	emci	LMR-400(30MHz-1GHz)	C-01	Jun. 28, 2016
5	Controller	CT	SC100	N/A	N/A
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	Antenna	ETS	3115	00075789	Mar. 28, 2016
8	Amplifier	Agilent	8449B	3008A02274	Nov. 01, 2016
9	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
10	Test Cable	emci	EMC104-SM-SM-10000(1GHz－26.5GHz)	C-68	Jun. 28, 2016
11	Controller	CT	SC100	N/A	N/A
12	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
13	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
14	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 07, 2016

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	ANRITSU	ML2495A	1128009	Mar. 28, 2016
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	Mar. 28, 2016

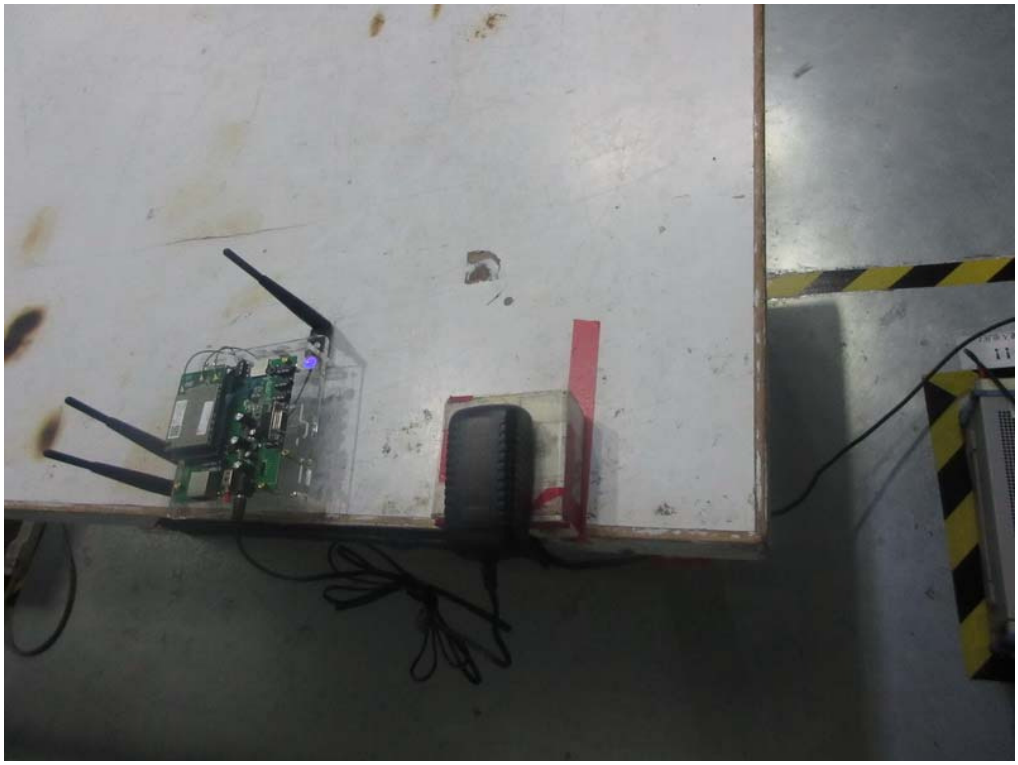
Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

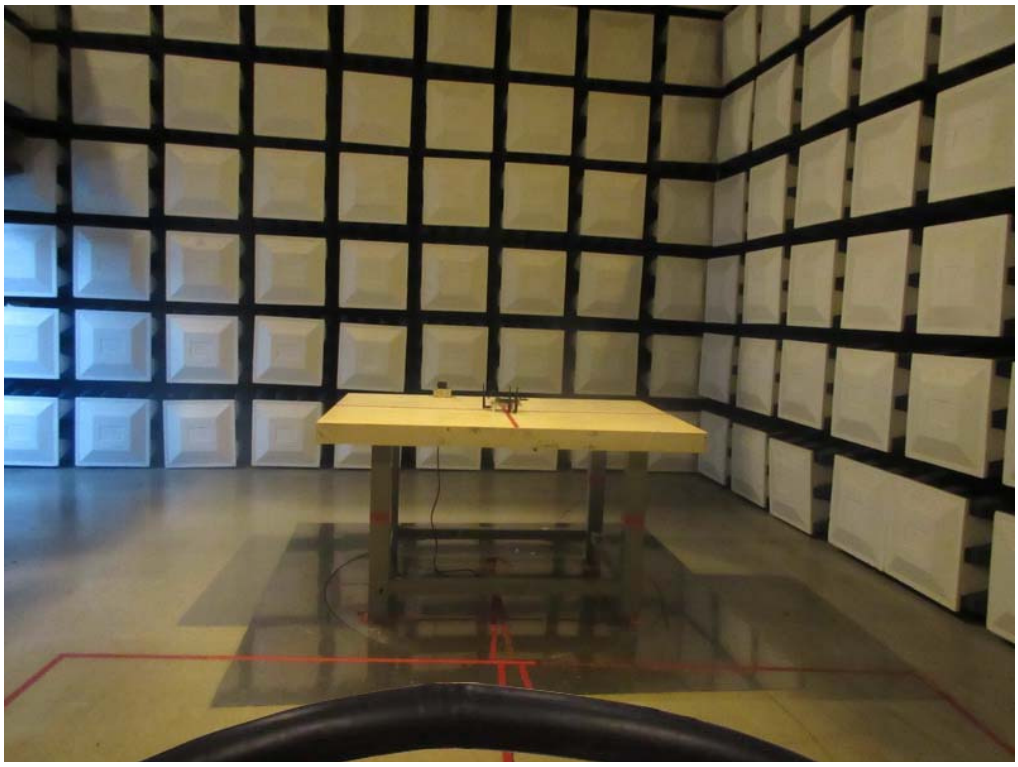
10. EUT TEST PHOTO

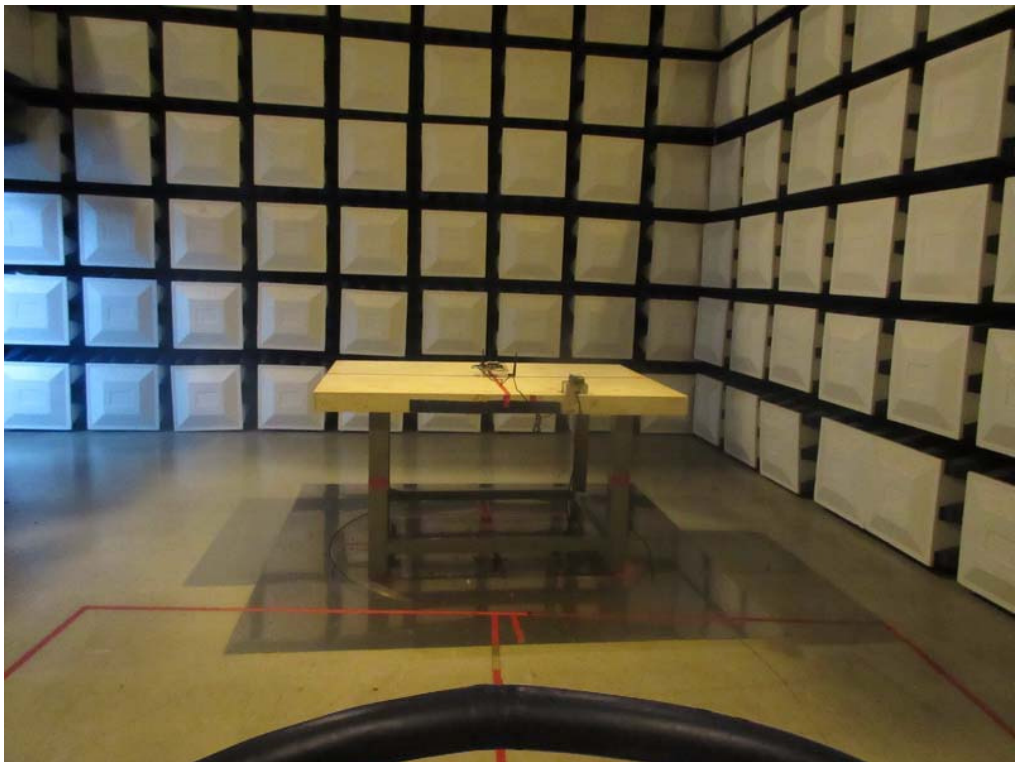
Conducted Measurement Photos



Radiated Measurement Photos

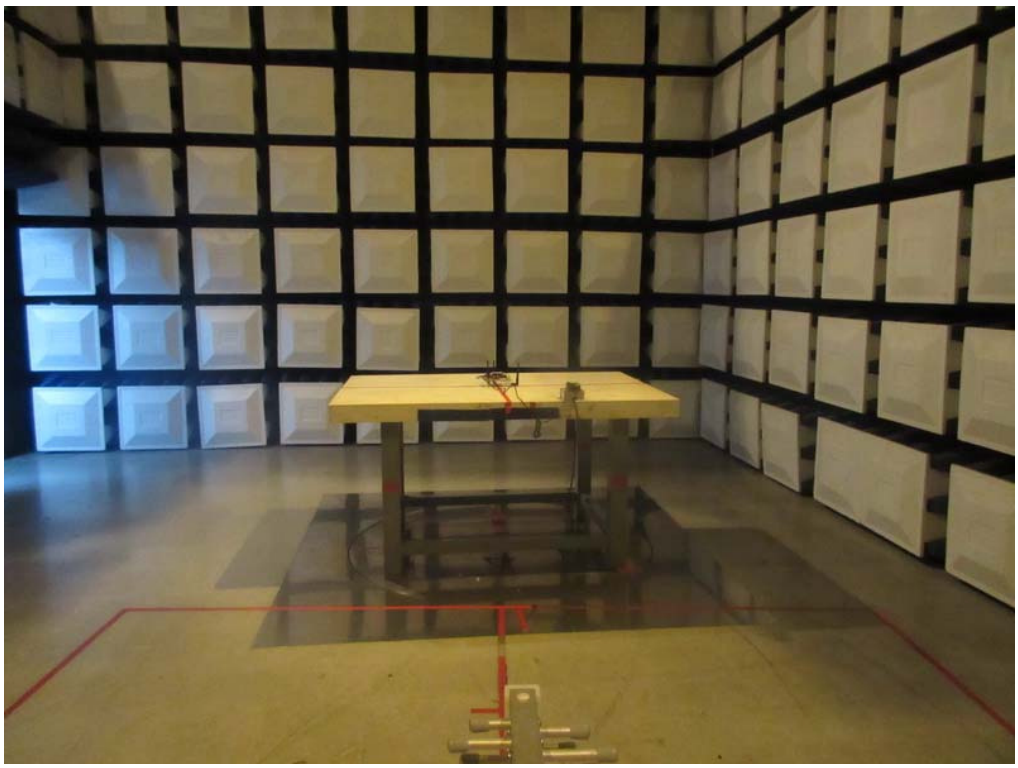
9KHz to 30MHz





Radiated Measurement Photos

30MHz to 1000MHz



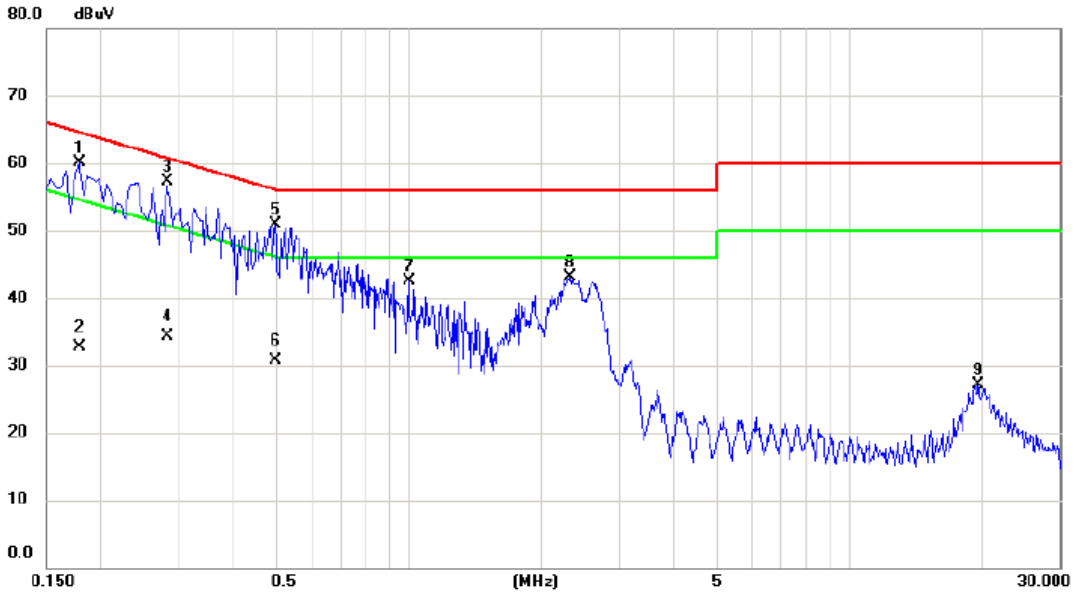
Radiated Measurement Photos

Above 1000MHz

ATTACHMENT A - CONDUCTED EMISSION

Test Mode:	TX Mode

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1780	50.55	9.56	60.11	64.58	-4.47	peak	
2		0.1780	23.06	9.56	32.62	54.58	-21.96	AVG	
3	*	0.2820	47.60	9.63	57.23	60.76	-3.53	peak	
4		0.2820	24.59	9.63	34.22	50.76	-16.54	AVG	
5		0.4980	41.15	9.68	50.83	56.03	-5.20	peak	
6		0.4980	21.11	9.68	30.79	46.03	-15.24	AVG	
7		0.9980	32.66	9.80	42.46	56.00	-13.54	peak	
8		2.3220	33.15	9.97	43.12	56.00	-12.88	peak	
9		19.6220	17.30	9.85	27.15	60.00	-32.85	peak	

Test Mode:	TX Mode

Neutral

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1540	50.14	9.49	59.63	65.78	-6.15	peak	
2		0.1540	25.33	9.49	34.82	55.78	-20.96	AVG	
3	*	0.3820	43.32	9.53	52.85	58.24	-5.39	peak	
4		0.3820	17.37	9.53	26.90	48.24	-21.34	AVG	
5		0.5220	40.85	9.56	50.41	56.00	-5.59	peak	
6		0.5220	18.79	9.56	28.35	46.00	-17.65	AVG	
7		0.8860	34.32	9.58	43.90	56.00	-12.10	peak	
8		2.2820	33.58	9.74	43.32	56.00	-12.68	peak	
9		19.5060	18.16	9.97	28.13	60.00	-31.87	peak	

ATTACHMENT A - RADIATED EMISSION (9KHZ TO 30MHZ)

Test Mode:	TX Mode

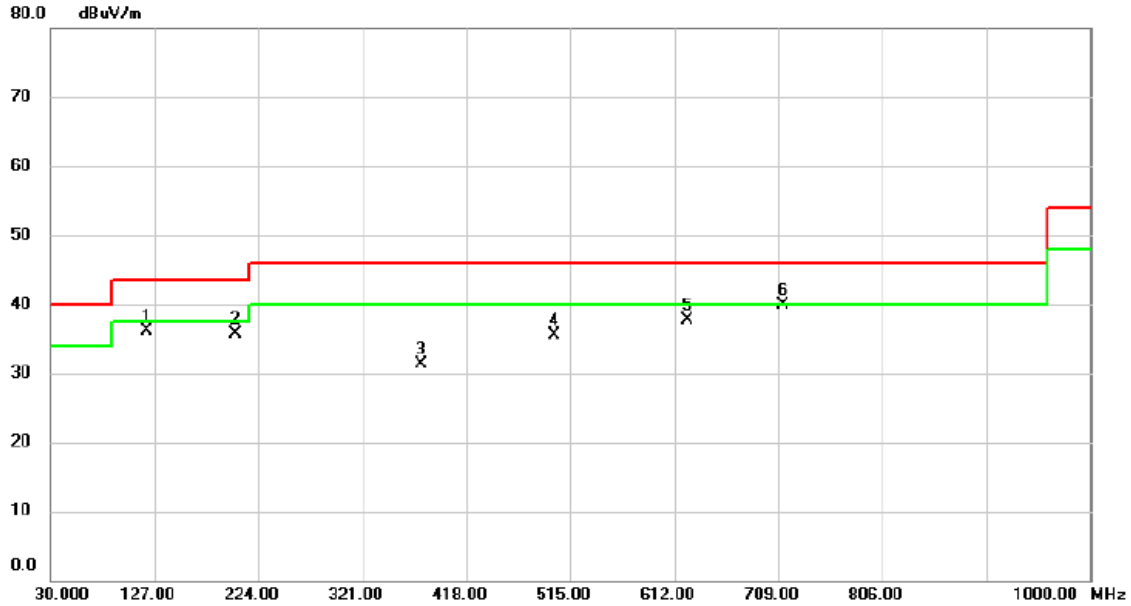
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0092	0°	12.36	24.98	37.34	128.33	-90.98	AVG
0.0092	0°	15.27	24.98	40.25	148.33	-108.07	PEAK
0.0158	0°	9.29	24.57	33.86	123.63	-89.78	AVG
0.0158	0°	10.32	24.57	34.89	143.63	-108.75	PEAK
0.0237	0°	6.17	24.07	30.24	120.11	-89.87	AVG
0.0237	0°	8.46	24.07	32.53	140.11	-107.58	PEAK
0.0413	0°	1.21	22.95	24.16	115.29	-91.12	AVG
0.0413	0°	2.57	22.95	25.52	135.29	-109.76	PEAK
0.5203	0°	18.13	19.86	37.99	73.28	-35.28	QP
1.9216	0°	22.45	19.51	41.96	69.54	-27.58	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0126	90°	10.73	24.30	35.03	125.60	-90.57	AVG
0.0126	90°	12.18	24.30	36.48	145.60	-109.12	PEAK
0.0281	90°	6.21	23.79	30.00	118.63	-88.63	AVG
0.0281	90°	7.19	23.79	30.98	138.63	-107.65	PEAK
0.0353	90°	2.64	23.33	25.97	116.65	-90.68	AVG
0.0353	90°	3.34	23.33	26.67	136.65	-109.98	PEAK
0.0452	90°	1.06	22.70	23.76	114.50	-90.74	AVG
0.0452	90°	2.38	22.70	25.08	134.50	-109.42	PEAK
0.6152	90°	20.49	20.17	40.66	71.82	-31.17	QP
2.3057	90°	24.37	19.32	43.69	69.54	-25.85	QP

ATTACHMENT B - RADIATED EMISSION (30MHZ TO 1000MHZ)

Test Mode:	TX 2402MHz -CH00

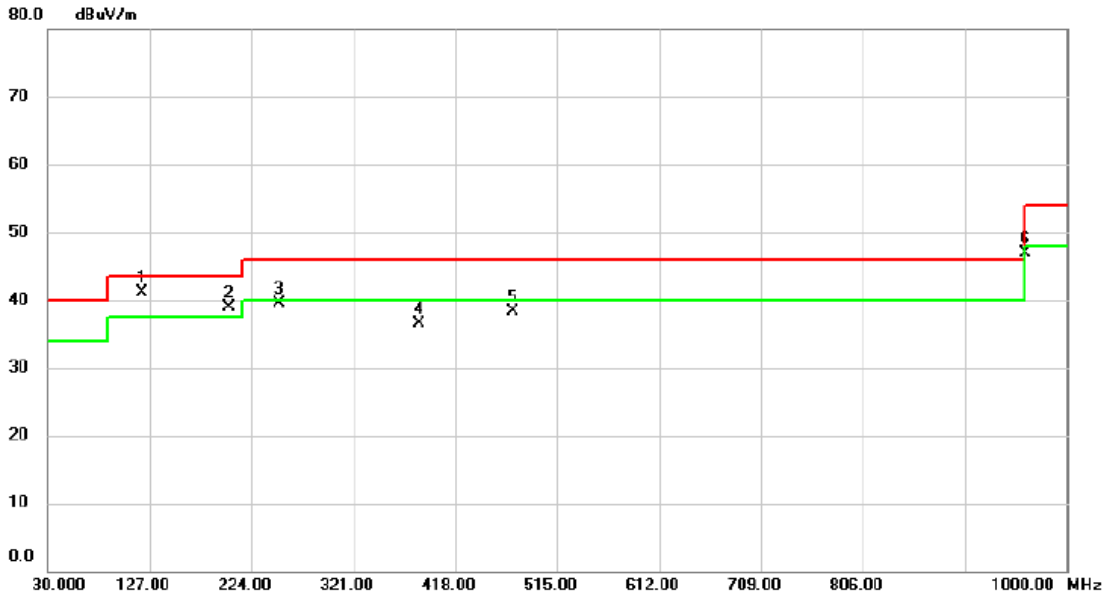
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		120.2100	51.07	-15.03	36.04	43.50	-7.46	peak	
2		202.6600	51.35	-15.70	35.65	43.50	-7.85	peak	
3		375.3200	41.13	-9.78	31.35	46.00	-14.65	peak	
4		500.4500	42.69	-7.15	35.54	46.00	-10.46	peak	
5		624.6100	42.47	-4.77	37.70	46.00	-8.30	peak	
6	*	712.8800	43.16	-3.33	39.83	46.00	-6.17	peak	

Test Mode:	TX 2402MHz -CH00

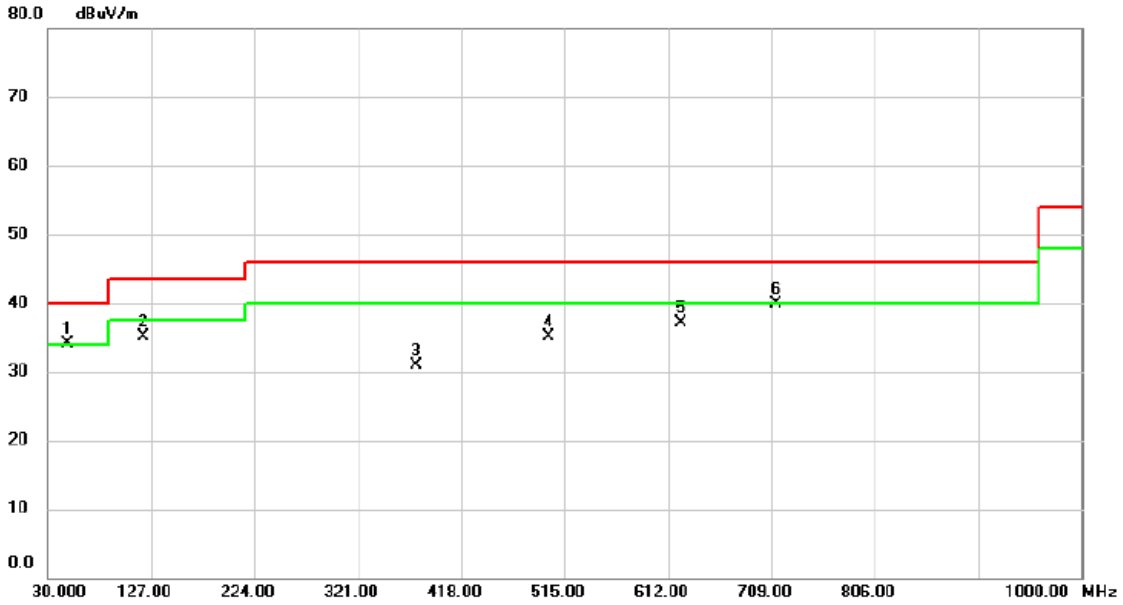
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	120.2100	56.18	-15.03	41.15	43.50	-2.35	peak	
2	!	202.6600	54.69	-15.70	38.99	43.50	-4.51	peak	
3		250.1900	52.86	-13.36	39.50	46.00	-6.50	peak	
4		384.0500	46.14	-9.57	36.57	46.00	-9.43	peak	
5		472.3200	45.76	-7.48	38.28	46.00	-7.72	peak	
6		960.2300	45.00	1.83	46.83	54.00	-7.17	peak	

Test Mode:	TX 2440MHz -CH19

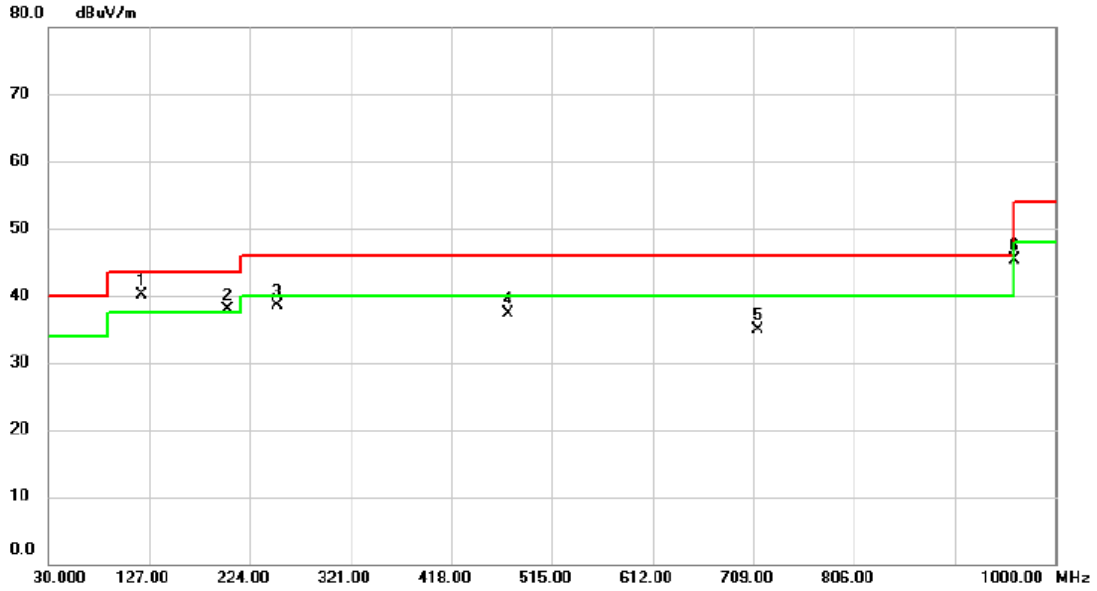
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	48.4300	47.36	-13.23	34.13	40.00	-5.87	peak	
2		120.2100	50.07	-15.03	35.04	43.50	-8.46	peak	
3		375.3200	40.63	-9.78	30.85	46.00	-15.15	peak	
4		500.4500	42.19	-7.15	35.04	46.00	-10.96	peak	
5		624.6100	41.97	-4.77	37.20	46.00	-8.80	peak	
6		712.8800	43.16	-3.33	39.83	46.00	-6.17	peak	

Test Mode:	TX 2440MHz -CH19

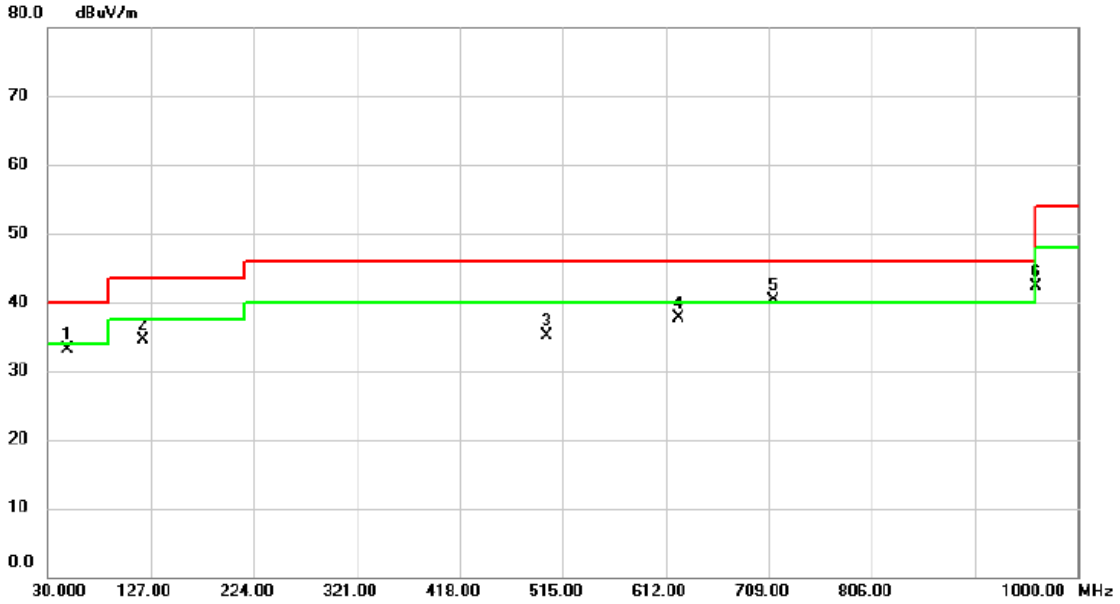
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	120.2100	55.18	-15.03	40.15	43.50	-3.35	peak	
2	!	202.6600	53.69	-15.70	37.99	43.50	-5.51	peak	
3		250.1900	51.86	-13.36	38.50	46.00	-7.50	peak	
4		472.3200	44.76	-7.48	37.28	46.00	-8.72	peak	
5		712.8800	38.14	-3.33	34.81	46.00	-11.19	peak	
6		960.2300	43.50	1.83	45.33	54.00	-8.67	peak	

Test Mode:	TX 2480MHz -CH39

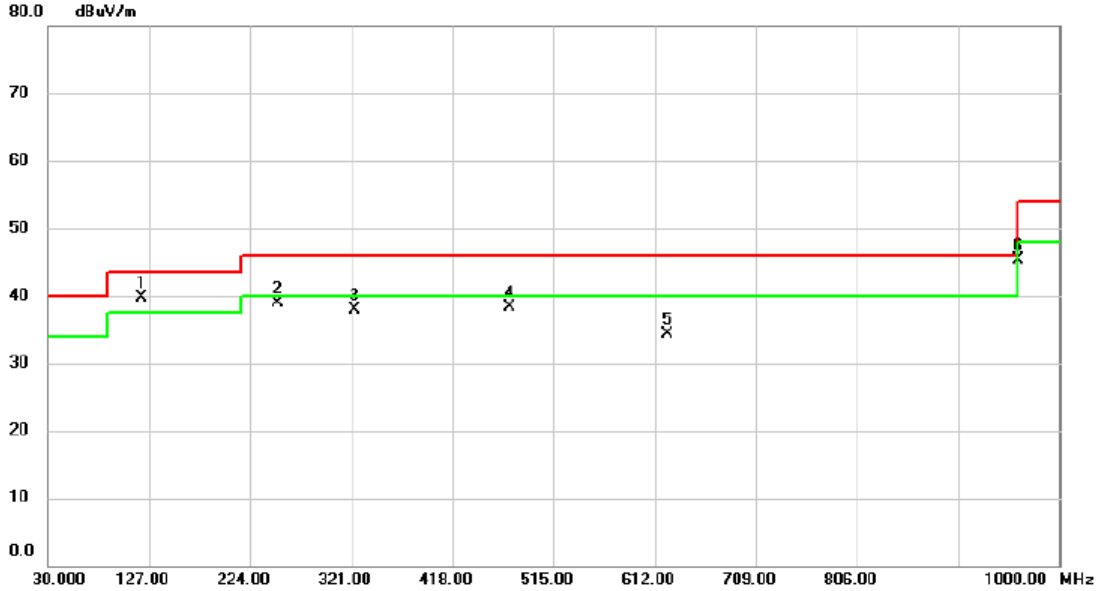
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		48.4300	46.36	-13.23	33.13	40.00	-6.87	peak	
2		120.2100	49.57	-15.03	34.54	43.50	-8.96	peak	
3		500.4500	42.19	-7.15	35.04	46.00	-10.96	peak	
4		624.6100	42.47	-4.77	37.70	46.00	-8.30	peak	
5	*	712.8800	43.66	-3.33	40.33	46.00	-5.67	peak	
6		960.2300	40.51	1.83	42.34	54.00	-11.66	peak	

Test Mode:	TX 2480MHz -CH39

Horizontal

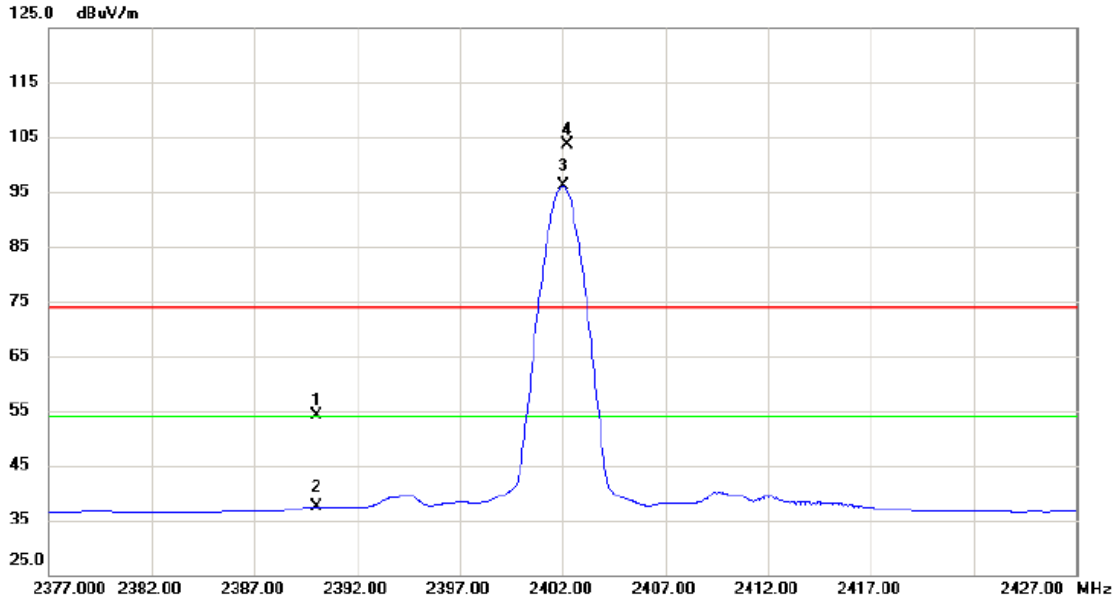


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	120.2100	54.68	-15.03	39.65	43.50	-3.85	peak	
2		250.1900	52.36	-13.36	39.00	46.00	-7.00	peak	
3		323.9100	48.70	-10.88	37.82	46.00	-8.18	peak	
4		472.3200	45.76	-7.48	38.28	46.00	-7.72	peak	
5		624.6100	38.98	-4.77	34.21	46.00	-11.79	peak	
6		960.2300	43.50	1.83	45.33	54.00	-8.67	peak	

ATTACHMENT C - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00

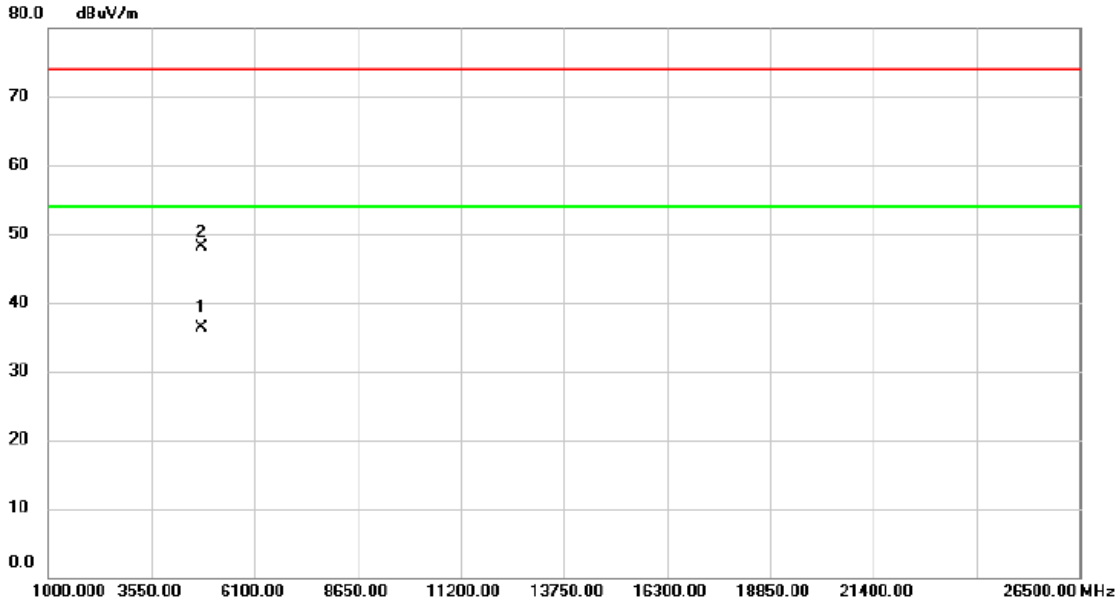
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	19.81	34.23	54.04	74.00	-19.96	peak	
2		2390.000	3.06	34.23	37.29	54.00	-16.71	AVG	
3	*	2402.000	61.83	34.30	96.13	54.00	42.13	AVG	No Limit
4	X	2402.250	69.23	34.30	103.53	74.00	29.53	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00

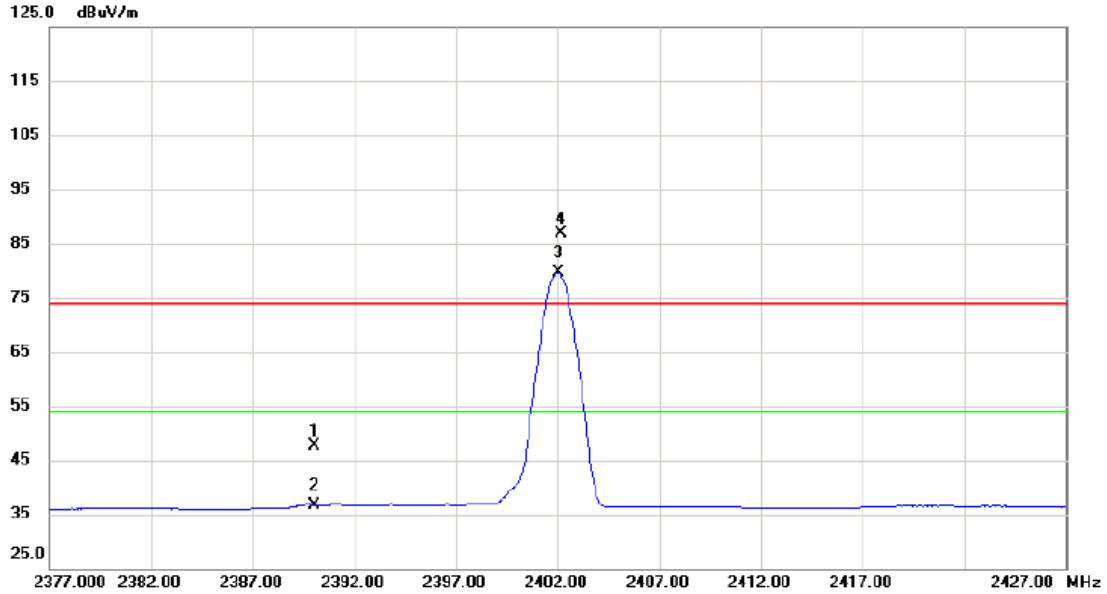
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.300	30.51	5.81	36.32	54.00	-17.68	AVG	
2		4804.700	42.27	5.81	48.08	74.00	-25.92	peak	

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00

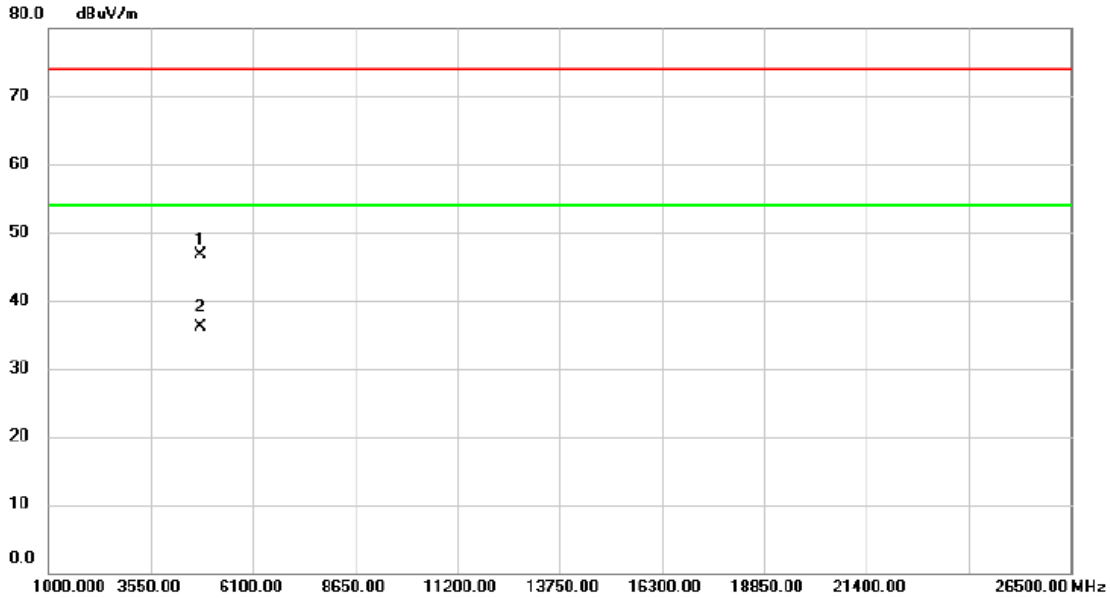
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	13.30	34.23	47.53	74.00	-26.47	peak	
2		2390.000	2.49	34.23	36.72	54.00	-17.28	AVG	
3	*	2402.000	45.43	34.30	79.73	54.00	25.73	AVG	No Limit
4	X	2402.200	52.58	34.30	86.88	74.00	12.88	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00

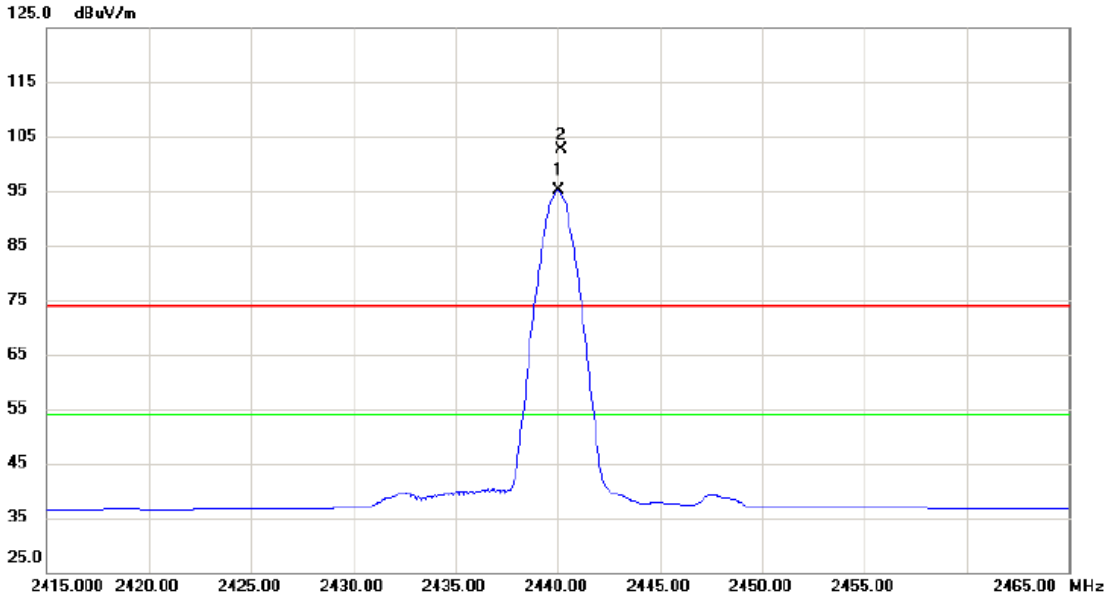
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4805.000	40.80	5.81	46.61	74.00	-27.39	peak	
2	*	4804.300	30.20	5.81	36.01	54.00	-17.99	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19

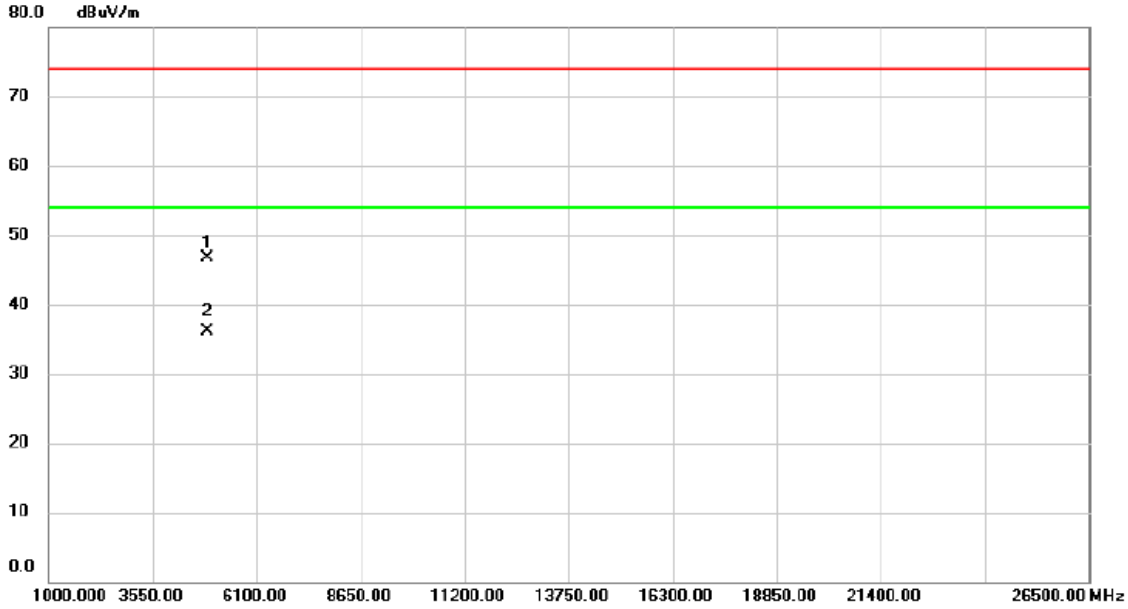
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2440.000	60.53	34.52	95.05	54.00	41.05	AVG	No Limit
2	X	2440.200	68.11	34.52	102.63	74.00	28.63	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19

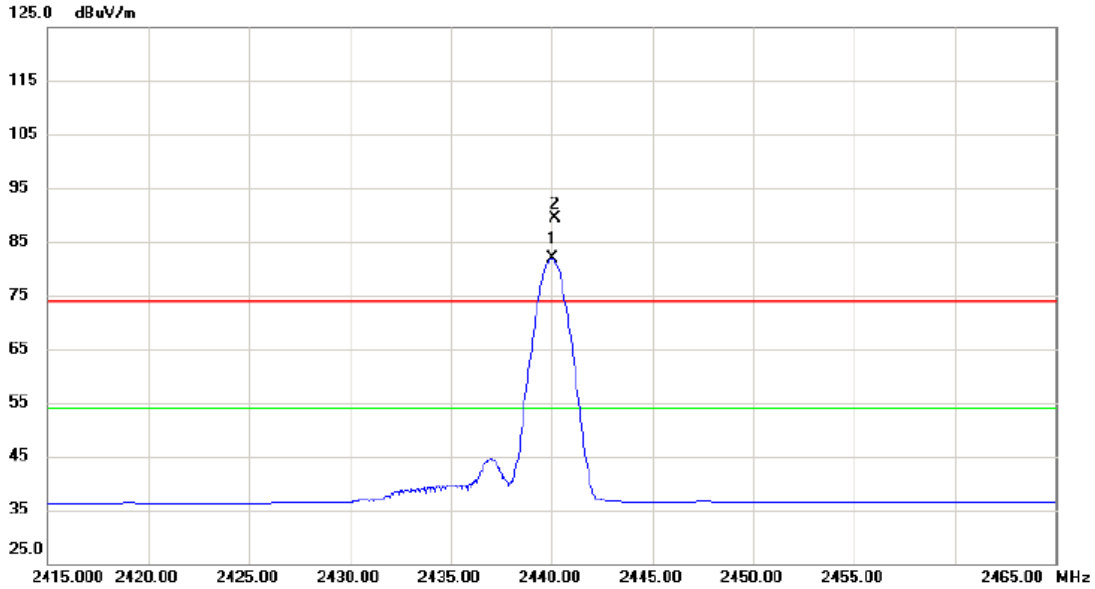
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4879.560	40.65	6.02	46.67	74.00	-27.33	peak	
2	*	4880.160	30.12	6.02	36.14	54.00	-17.86	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19

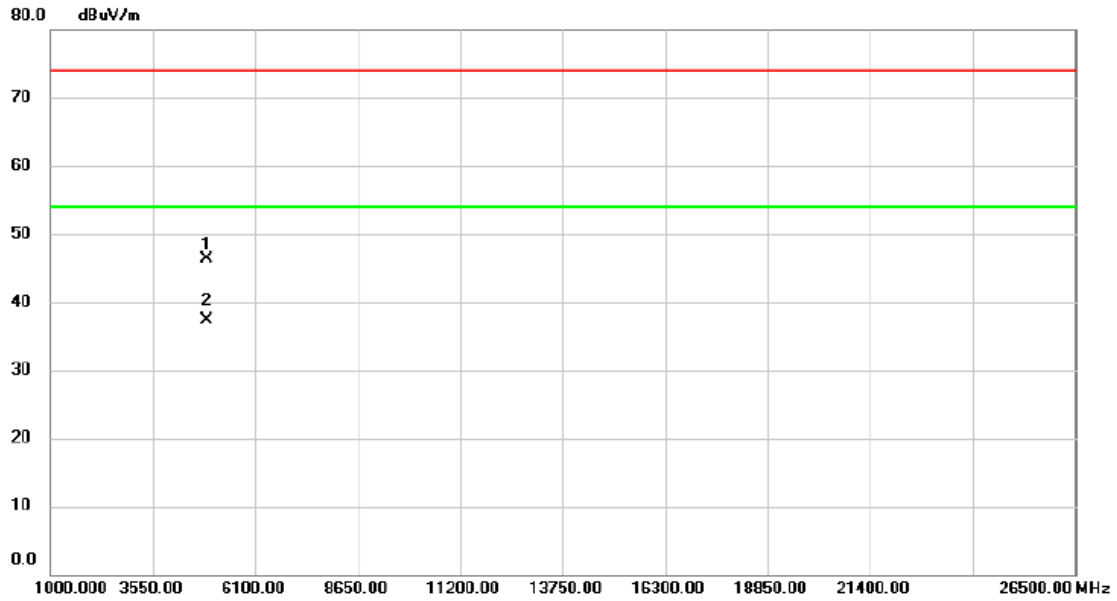
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2440.000	47.43	34.52	81.95	54.00	27.95	AVG	No Limit
2	X	2440.200	54.87	34.52	89.39	74.00	15.39	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19

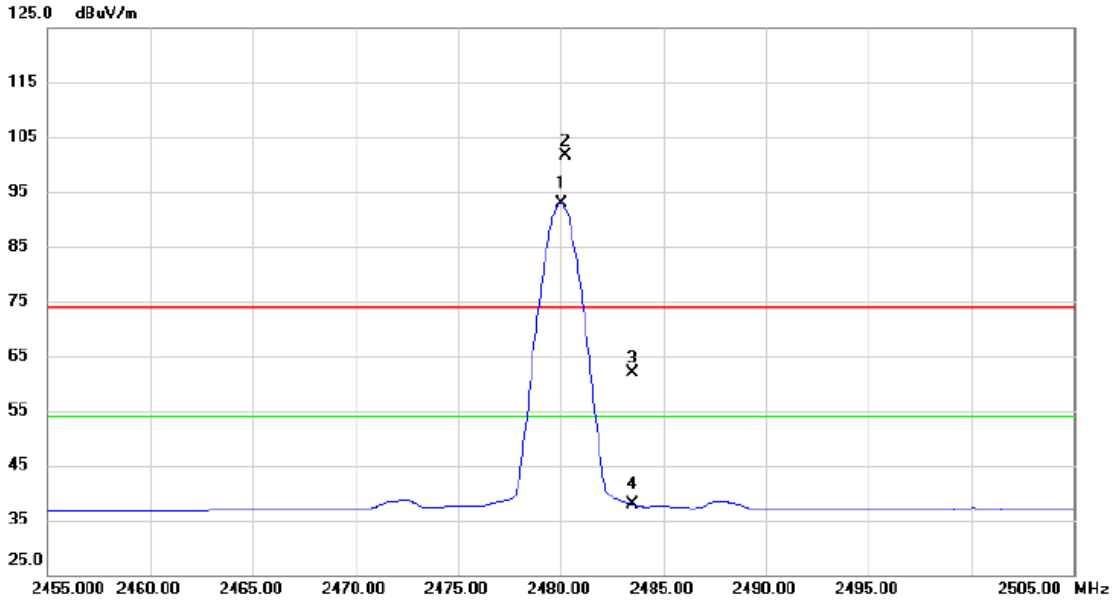
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4879.420	40.19	6.02	46.21	74.00	-27.79	peak	
2	*	4880.420	31.21	6.02	37.23	54.00	-16.77	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39

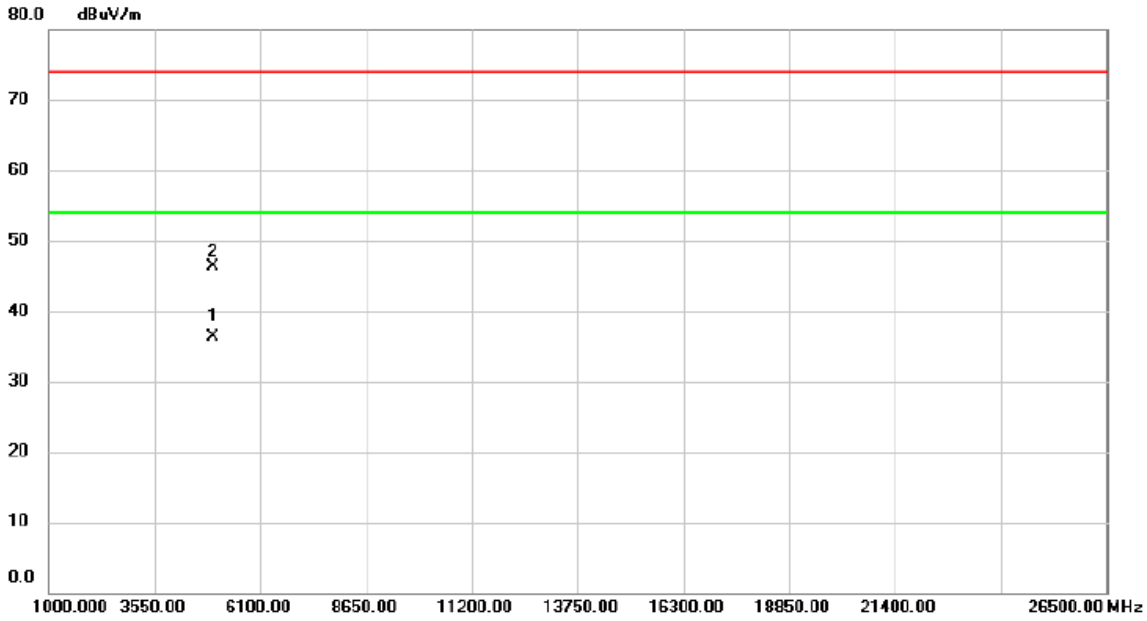
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	58.23	34.75	92.98	54.00	38.98	AVG	No Limit
2	X	2480.250	66.98	34.75	101.73	74.00	27.73	peak	No Limit
3		2483.500	27.10	34.78	61.88	74.00	-12.12	peak	
4		2483.500	3.09	34.78	37.87	54.00	-16.13	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39

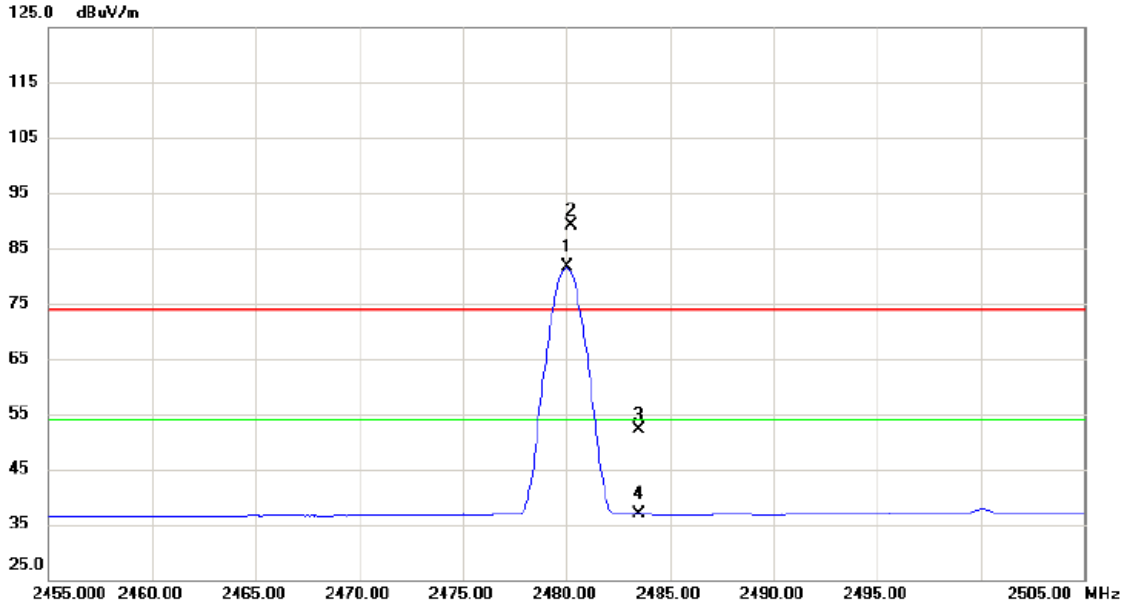
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.430	29.98	6.24	36.22	54.00	-17.78	AVG	
2		4961.200	40.11	6.24	46.35	74.00	-27.65	peak	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39

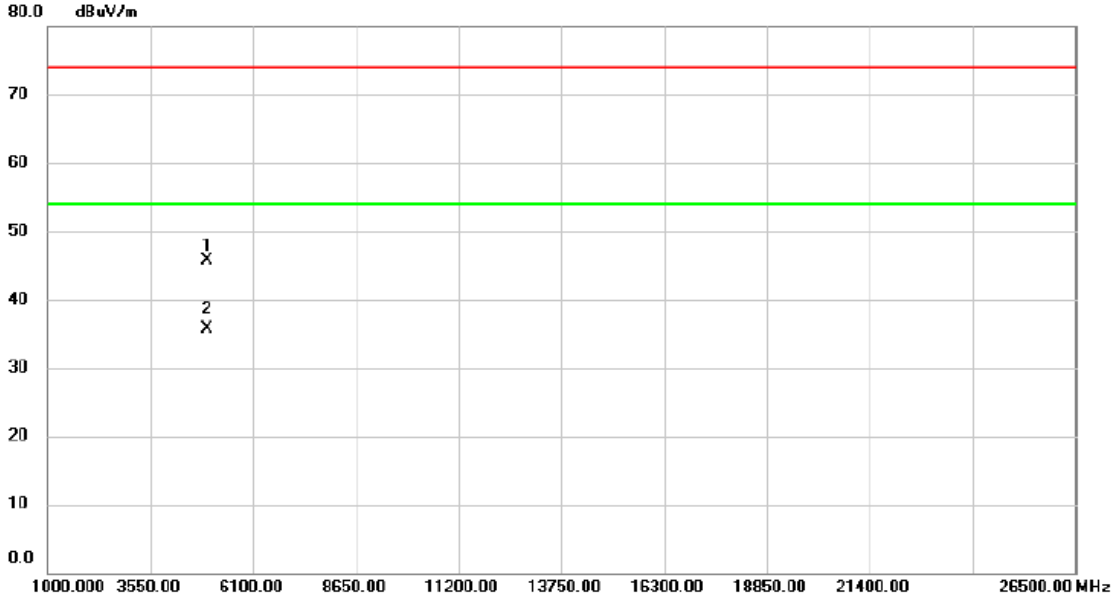
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	46.77	34.75	81.52	54.00	27.52	AVG	No Limit
2	X	2480.250	54.31	34.75	89.06	74.00	15.06	peak	No Limit
3		2483.500	17.41	34.78	52.19	74.00	-21.81	peak	
4		2483.500	2.04	34.78	36.82	54.00	-17.18	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39

Horizontal



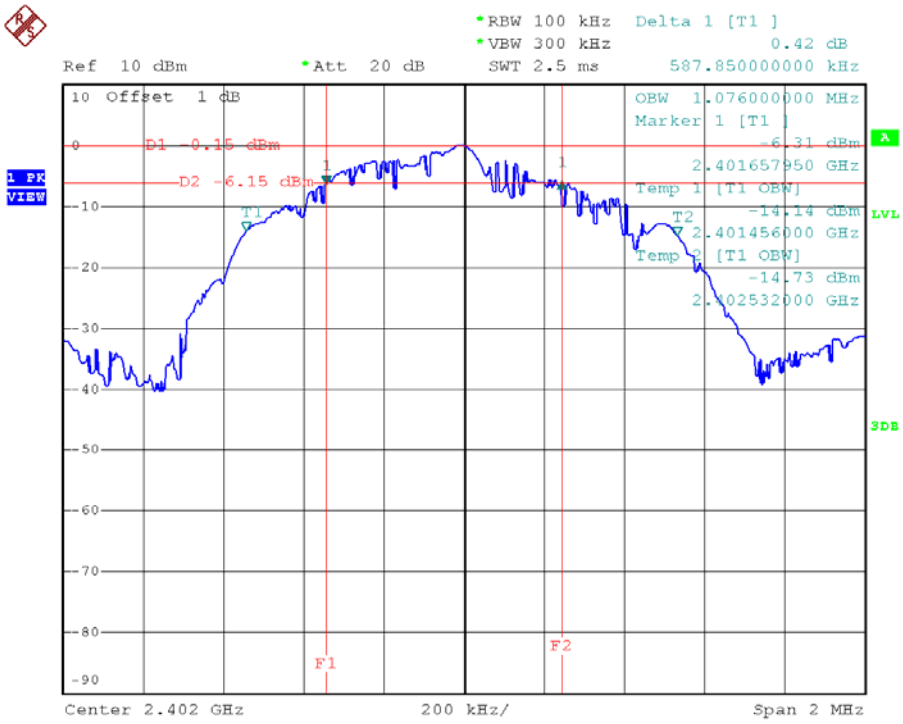
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.440	39.49	6.23	45.72	74.00	-28.28	peak	
2	*	4960.160	29.54	6.23	35.77	54.00	-18.23	AVG	

ATTACHMENT D - BANDWIDTH

Test Mode :	CH00, CH19 , CH39

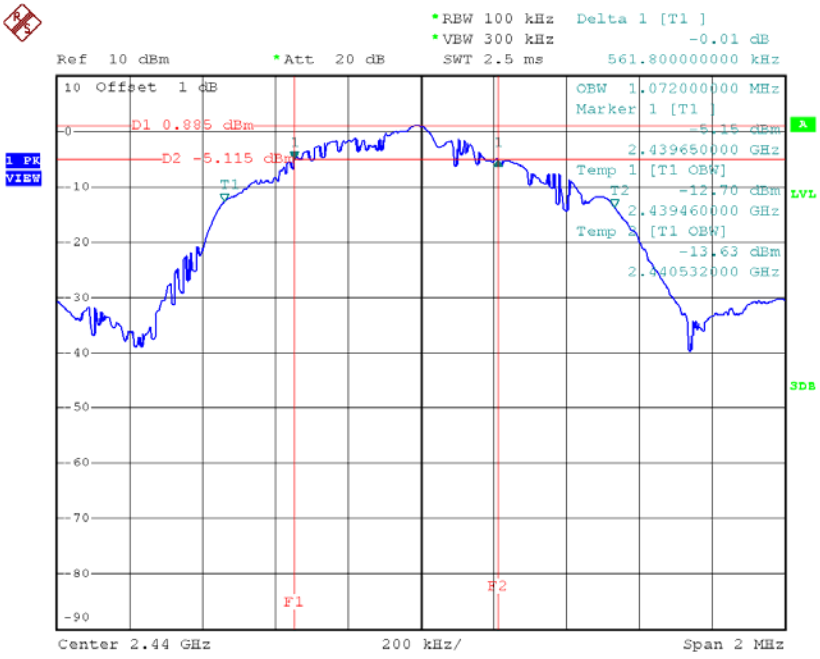
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.588	1.076	500	Complies
2440	0.562	1.072	500	Complies
2480	0.563	1.072	500	Complies

TX CH00



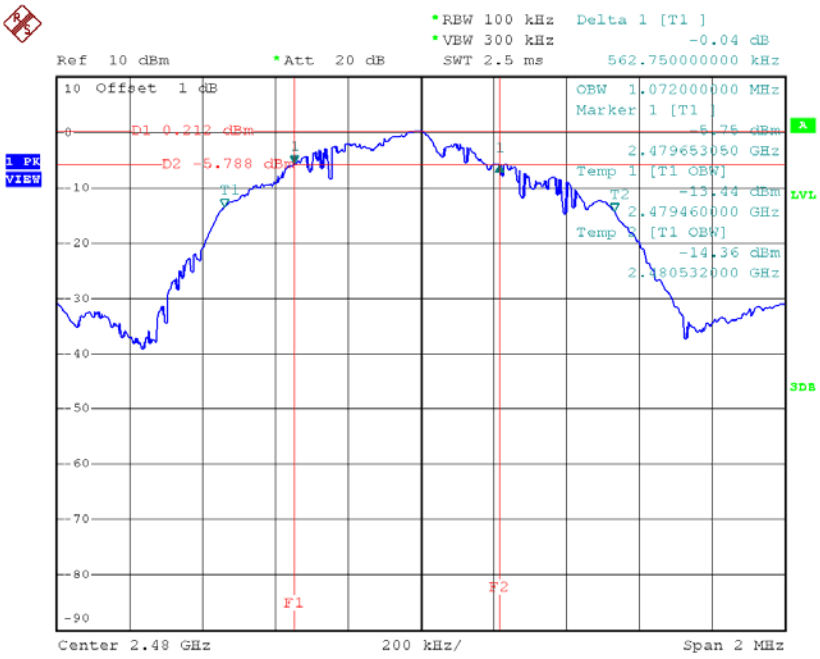
Date: 7.MAR.2016 10:50:09

TX CH19



Date: 7.MAR.2016 10:55:02

TX CH39



Date: 7.MAR.2016 10:58:12

ATTACHMENT E - MAXIMUM OUTPUT POWER TEST

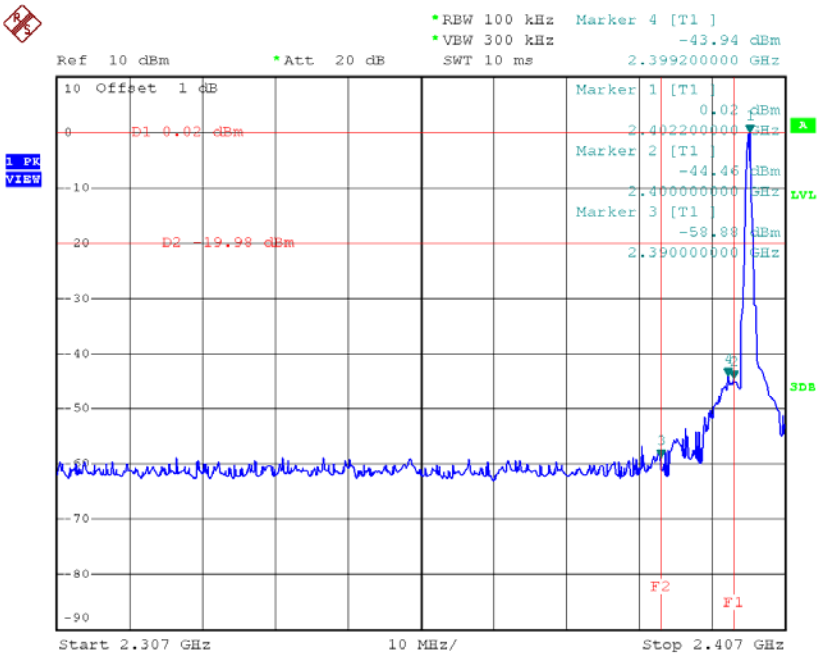
Test Mode :	CH00, CH19 , CH39

Frequency	Conducted Power (dBm)	Conducted Power (W)	Max. Limit(dBm)	Max. Limit(W)	Result
2402 MHz	7.14	0.0052	30.00	1.0000	Complies
2440 MHz	7.03	0.0050	30.00	1.0000	Complies
2480 MHz	6.91	0.0049	30.00	1.0000	Complies

ATTACHMENT F - ANTENNA CONDUCTED SPURIOUS EMISSION

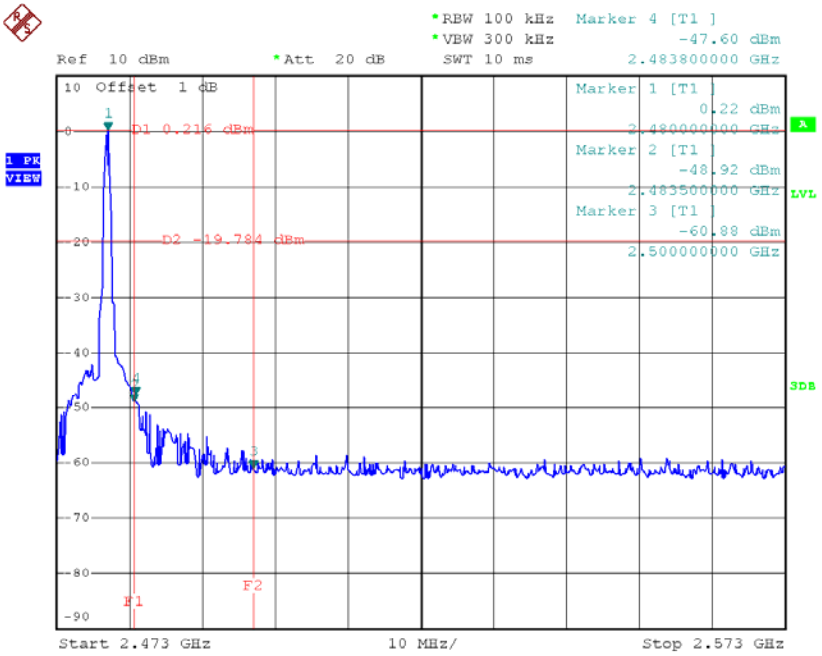
Test Mode :	CH00, CH19 , CH39

CH00 (Lower)



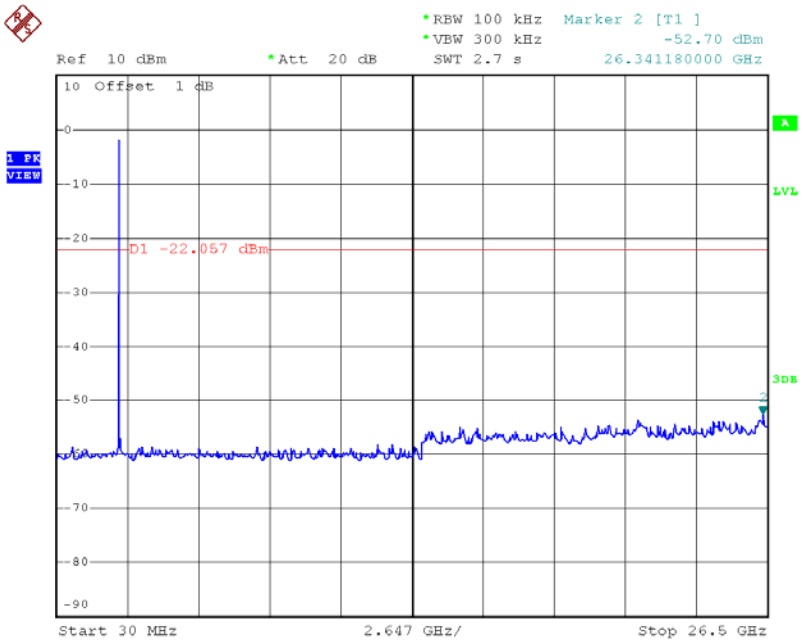
Date: 7.MAR.2016 10:50:17

CH39 (upper) - 1Mbps



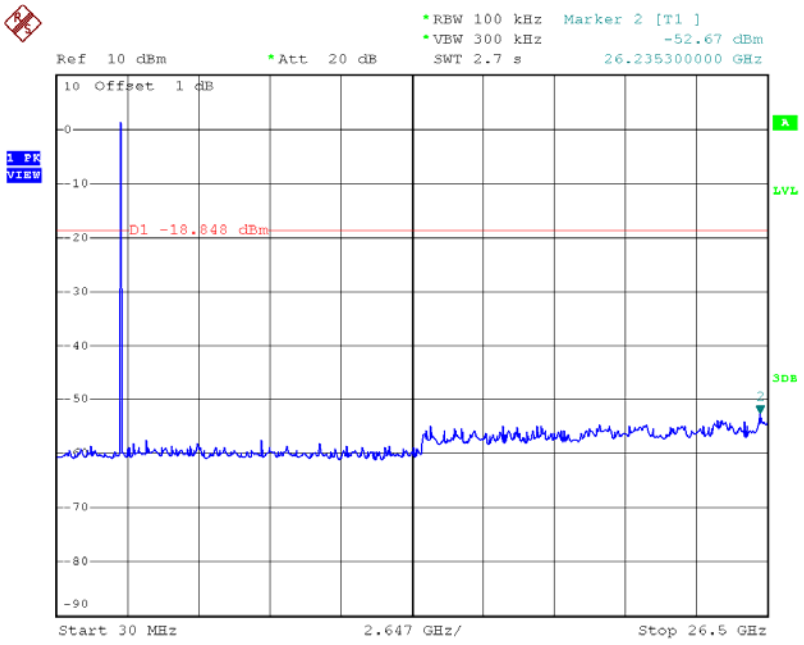
Date: 7.MAR.2016 10:58:21

CH00 (10 Harmonic of the frequency)



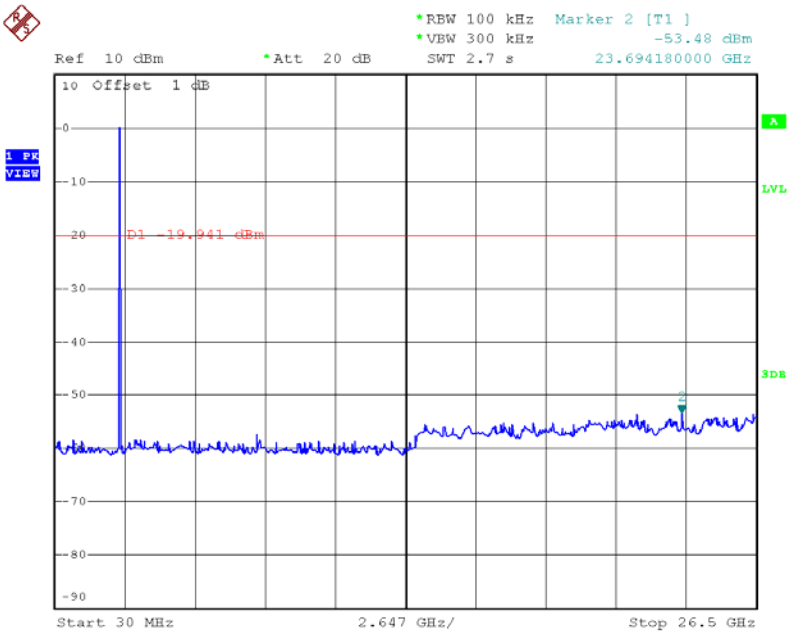
Date: 7.MAR.2016 10:50:31

CH19 (10 Harmonic of the frequency)



Date: 7.MAR.2016 10:55:17

CH39 (10 Harmonic of the frequency)



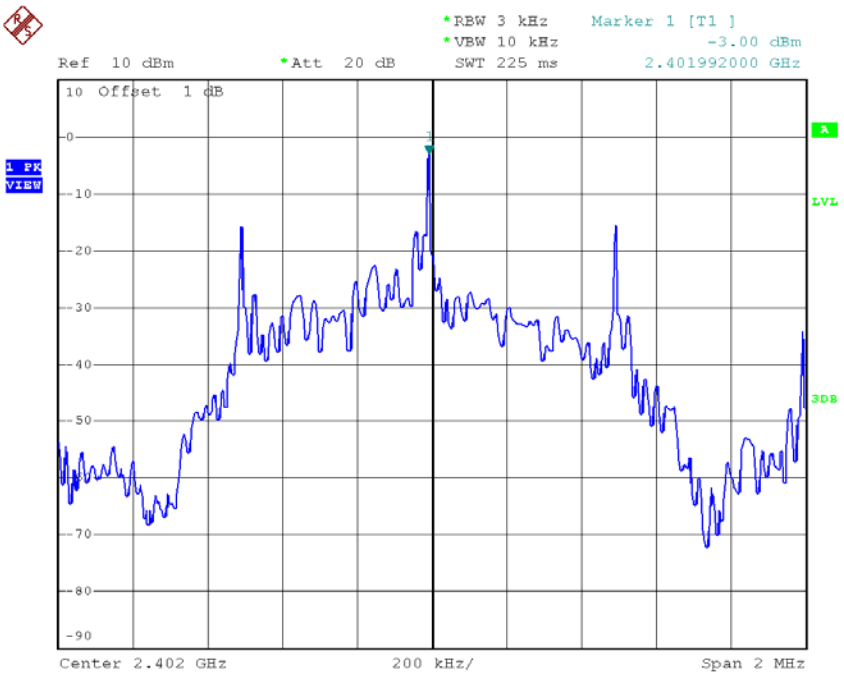
Date: 7.MAR.2016 10:58:35

ATTACHMENT G - POWER SPECTRAL DENSITY TEST

Test Mode :	CH00, CH19 , CH39

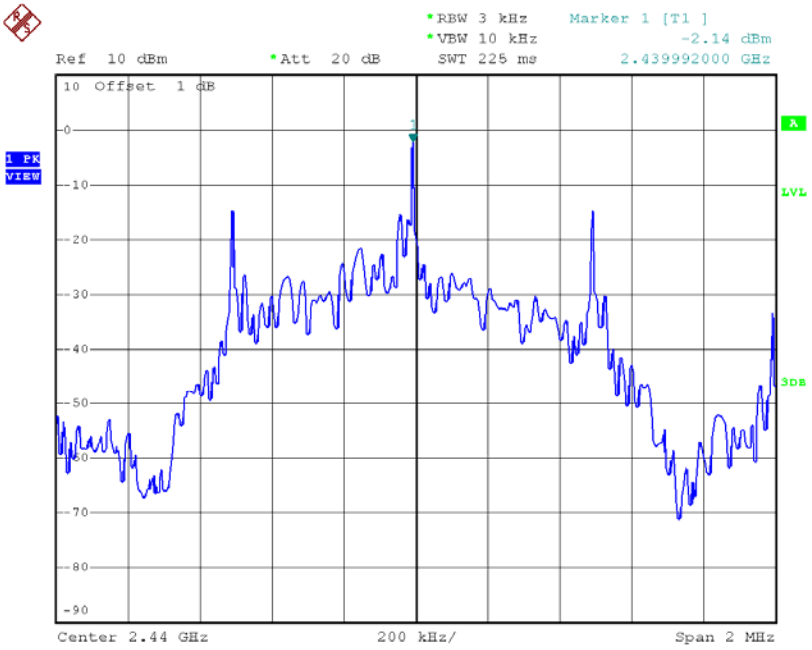
Frequency (MHz)	Power Density (dBm)	Max. Limit (dBm)	Result
2402	-3.00	8	Complies
2440	-2.14	8	Complies
2480	-4.02	8	Complies

TX CH00



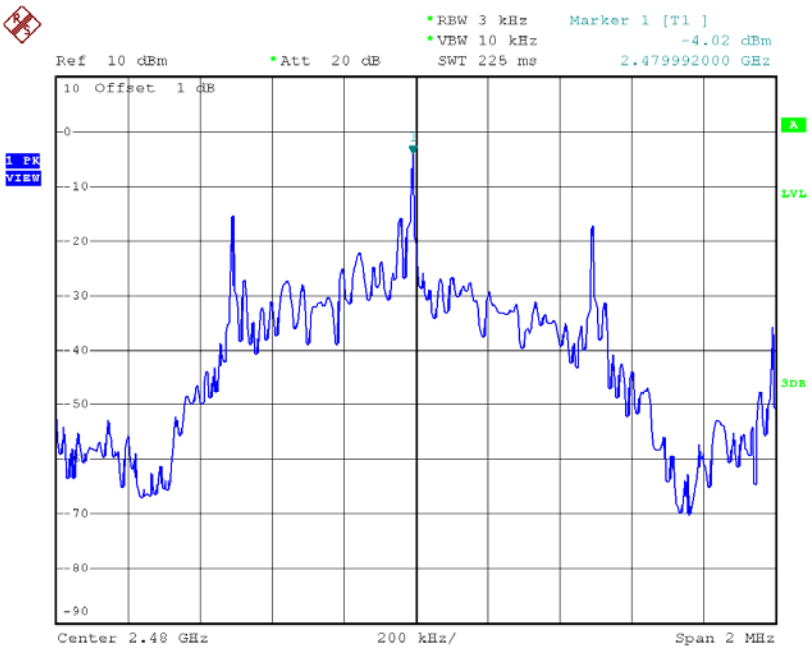
Date: 7.MAR.2016 10:50:37

TX CH19



Date: 7.MAR.2016 10:55:23

TX CH39



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