

FCC Radio Test Report

FCC ID: RWO-RZ090165

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

Project No. : 1512C067
Equipment : Notebook
Model Name : RZ09-0165
Applicant : Razer Inc.
Address : 9 Pasteur, Suite 100 Irvine, California 92618, United States

Date of Receipt : Dec. 09, 2015
Date of Test : Dec. 09, 2015 ~ Dec. 23, 2015
Issued Date : Dec. 24, 2015
Tested by : BTL Inc.

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B T L I N C .

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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 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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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-2-1512C067	Original Issue.	Dec. 24, 2015

1. CERTIFICATION

Equipment : Notebook
Brand Name : RAZER
Model Name : RZ09-0165
Applicant : Razer Inc.
Manufacturer : Razer Inc.
Address : 9 Pasteur, Suite 100 Irvine, California 92618, United States
Factory : RAZER TECHNOLOGY AND DEVELOPMENT (SHENZHEN) CO., LTD
Address : East Wing, 3rd Floor, Block 2, Phase 1 of Vision Shenzhen Business Park Keji
South Road, Hi-Tech Industrial Park, Shenzhen 518057, China
Date of Test : Dec. 09, 2015 ~ Dec. 23, 2015
Test Sample : Engineering Sample
Standard(s) : FCC Part15, Subpart C :2014 (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-2-1512C067) 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).

Test results included in this report is only for the Bluetooth LE part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15 (15.247) , Subpart C: 2014				
Standard(s)	Section	Test Item	Judgment	Remark
	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 $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

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	Notebook	
Brand Name	RAZER	
Model Name	RZ09-0165	
Model Difference	NA	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	-1.01 dBm (1Mbps)
Power Source	1# DC voltage supplied from AC/DC adapter. Model: RC30-0165 2# Supplied Li-ion battery Model: BETTY4	
Power Rating	1# I/P: AC 100-240V 2.5A 50/60Hz O/P: DC 19.8V 8.33A 2# DC 11.4V 6160mAh 70Wh	

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)	Note
1	N/A	N/A	Internal	N/A	2.97	N/A

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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)
Mode 2	TX Mode

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

For Conducted Test	
Final Test Mode	Description
Mode 2	TX Mode

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

Note:

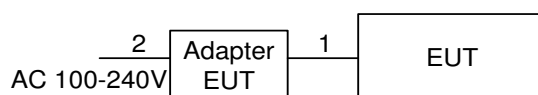
- (1) The measurements are performed at the high, middle, low available channels.
- (2) Both adapter and battery are evaluated, operated the adapter is the worst and recorded as below test data

3.3 TABLE OF PARAMETERS OF TEST 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	Run QCARCT		
Frequency	2402 MHz	2441 MHz	2480 MHz
BT LE	N/A	N/A	N/A

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.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.8m	DC Cable
2	NO	NO	1m	AC 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	50

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

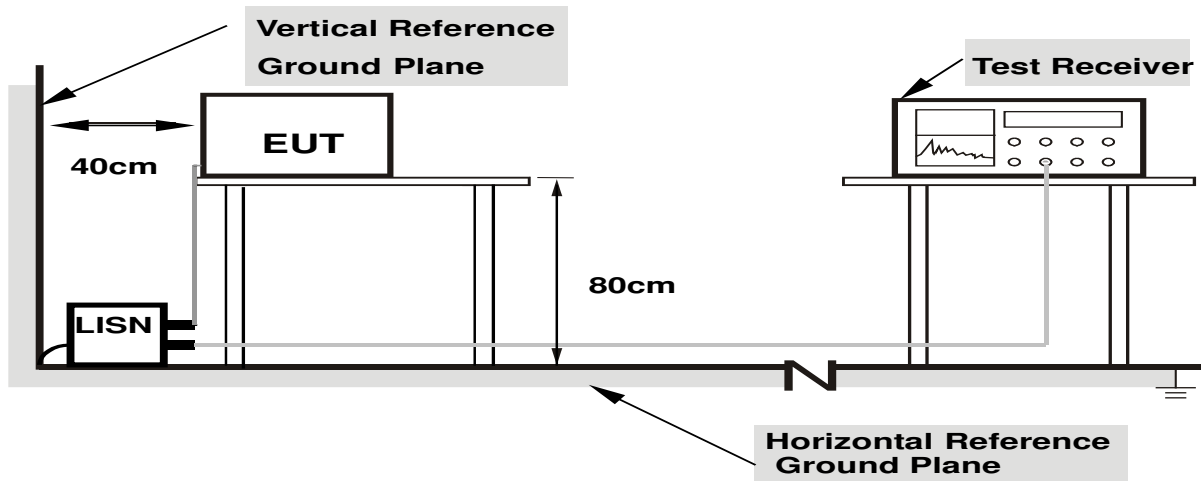
4.1.2 TEST PROCEDURE

- 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.
- (3) “ N/A ” denotes test is not applicable to this device.

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

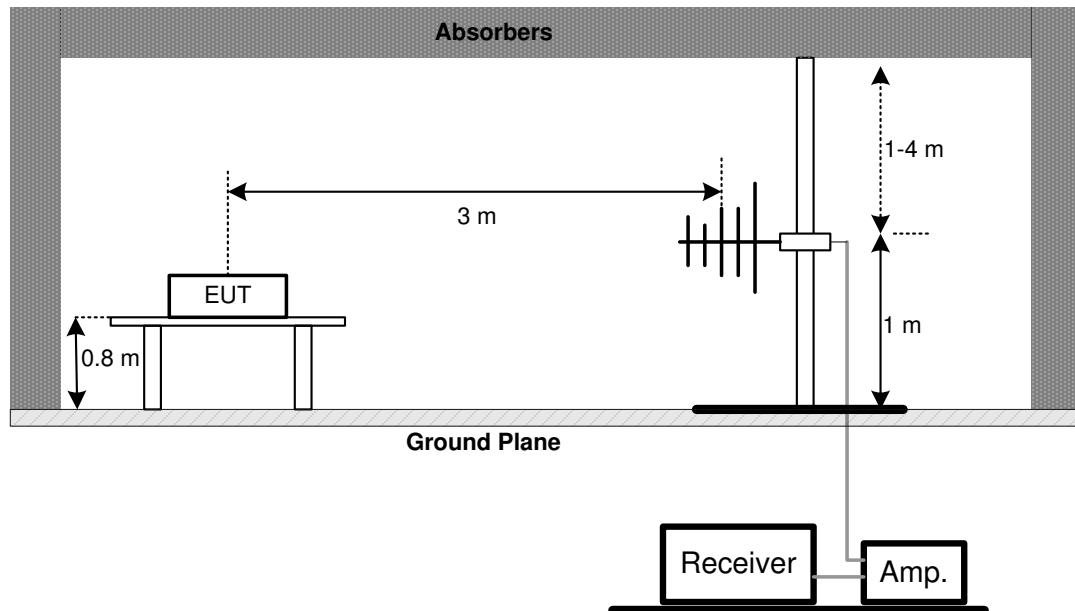
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 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)
- 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.
- 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.
- 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. (below 1GHz)
- 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. (above 1GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

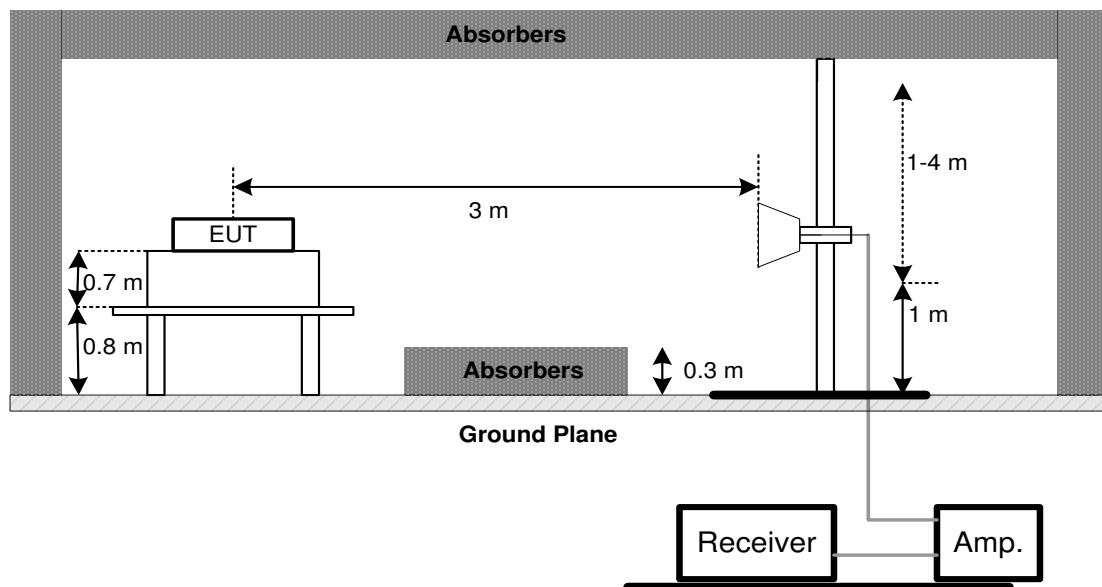
No deviation

4.2.4 TEST SETUP

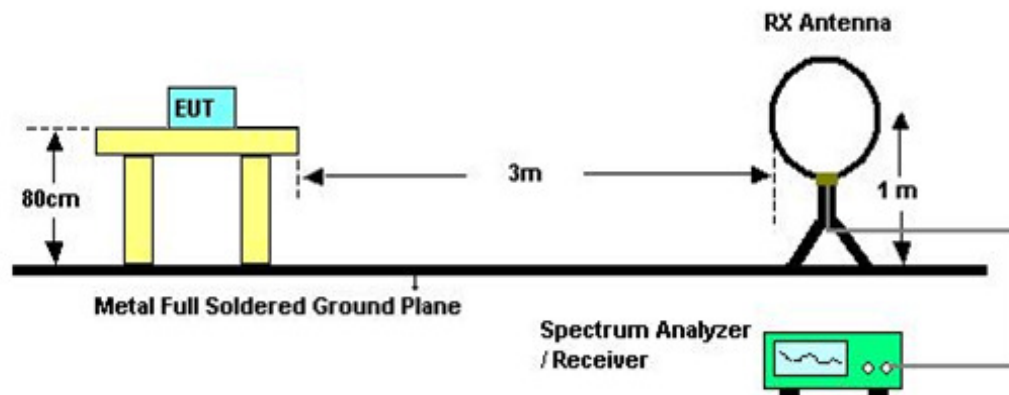
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V 60Hz

4.2.7 TEST 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 = $40 \log (\text{specific distance} / \text{test distance})$ (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

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

4.2.9 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

Remark:

- (1) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (2) EUT Orthogonal Axis:
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (3) 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
- (4) 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	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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

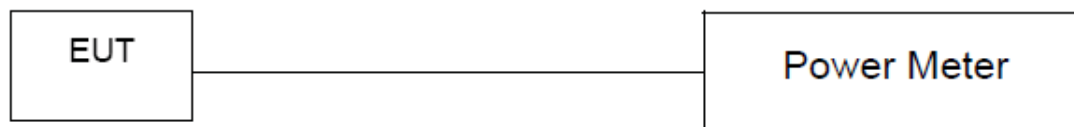
6.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance v03r03.

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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 10 ms.
- Offset=antenna 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 OPERATION 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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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-30MHz)	C_17	Mar. 13, 2016
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	Antenna	ETS	3115	00075789	Mar. 28, 2016
7	Amplifier	Agilent	8449B	3008A02274	Nov. 01, 2016
8	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
9	Test Cable	emci	EMC104-SM-S M-10000(1GHz – 26.5GHz)	C-68	Jun. 28, 2016
10	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
11	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
12	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 07, 2016
13	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

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

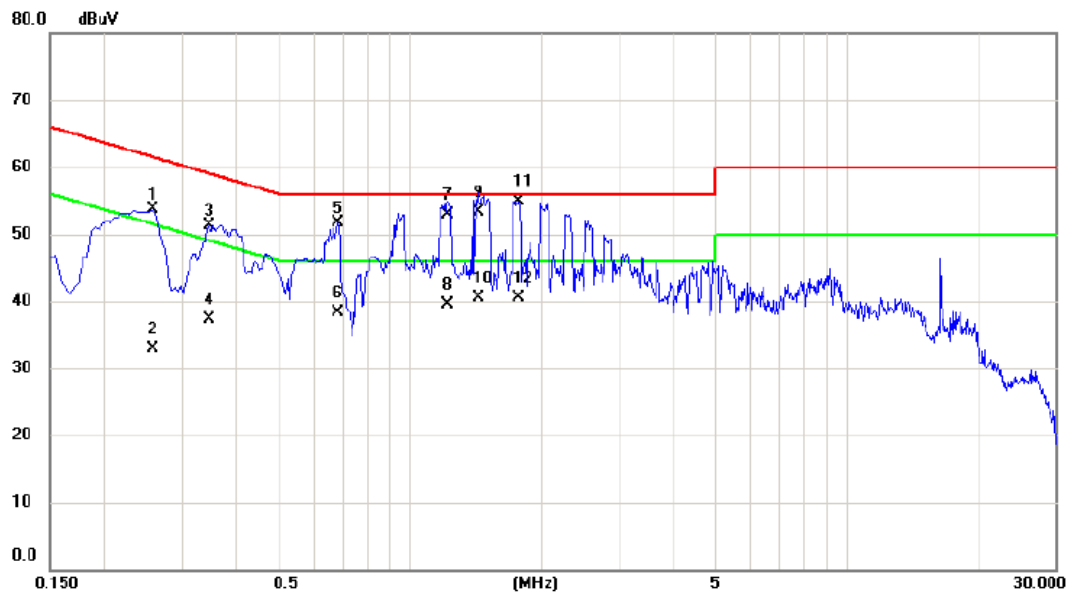
Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

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

ATTACHMENT A - CONDUCTED EMISSION

Test Mode: TX Mode

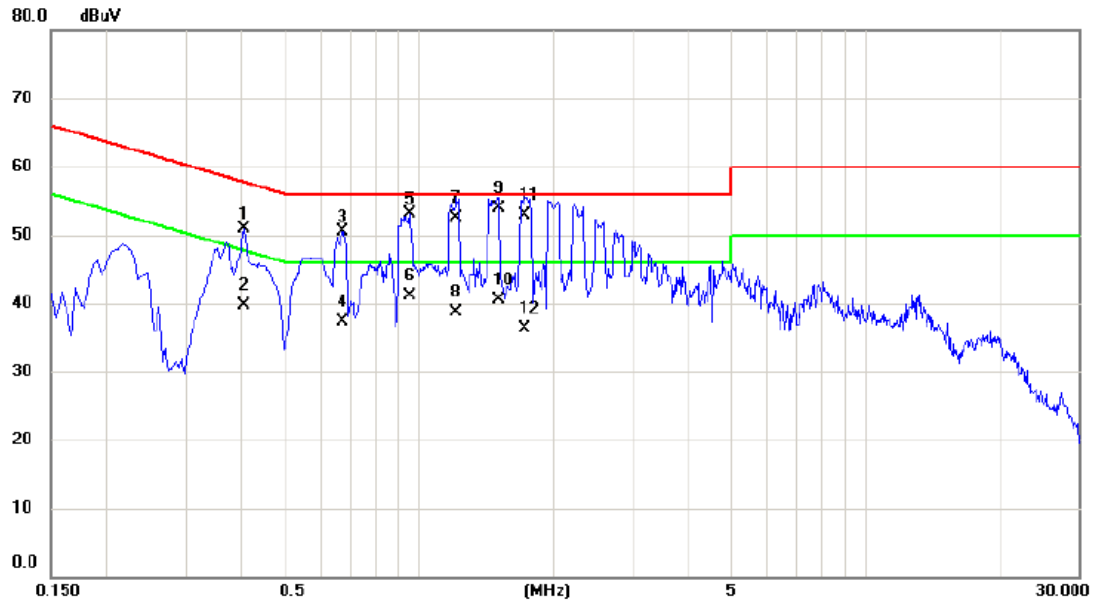
Line



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.2580	44.01	9.61	53.62	61.50	-7.88	peak	
2	0.2580	23.30	9.61	32.91	51.50	-18.59	AVG	
3	0.3460	41.76	9.64	51.40	59.06	-7.66	peak	
4	0.3460	27.60	9.64	37.24	49.06	-11.82	AVG	
5	0.6820	41.88	9.73	51.61	56.00	-4.39	peak	
6	0.6820	28.60	9.73	38.33	46.00	-7.67	AVG	
7	1.2180	43.10	9.81	52.91	56.00	-3.09	QP	
8	1.2180	29.60	9.81	39.41	46.00	-6.59	AVG	
9	1.4300	43.50	9.84	53.34	56.00	-2.66	QP	
10	1.4300	30.70	9.84	40.54	46.00	-5.46	AVG	
11 *	1.7740	45.02	9.89	54.91	56.00	-1.09	QP	
12	1.7740	30.60	9.89	40.49	46.00	-5.51	AVG	

Test Mode: TX Mode

Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.4060	41.37	9.53	50.90	57.73	-6.83	peak	
2		0.4060	30.10	9.53	39.63	47.73	-8.10	AVG	
3		0.6740	40.90	9.54	50.44	56.00	-5.56	peak	
4		0.6740	27.80	9.54	37.34	46.00	-8.66	AVG	
5		0.9500	43.59	9.58	53.17	56.00	-2.83	peak	
6		0.9500	31.60	9.58	41.18	46.00	-4.82	AVG	
7		1.2140	42.90	9.62	52.52	56.00	-3.48	QP	
8		1.2140	29.10	9.62	38.72	46.00	-7.28	AVG	
9	*	1.5020	44.20	9.66	53.86	56.00	-2.14	QP	
10		1.5020	30.80	9.66	40.46	46.00	-5.54	AVG	
11		1.7260	43.20	9.68	52.88	56.00	-3.12	QP	
12		1.7260	26.60	9.68	36.28	46.00	-9.72	AVG	

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

Test Mode:	TX Mode
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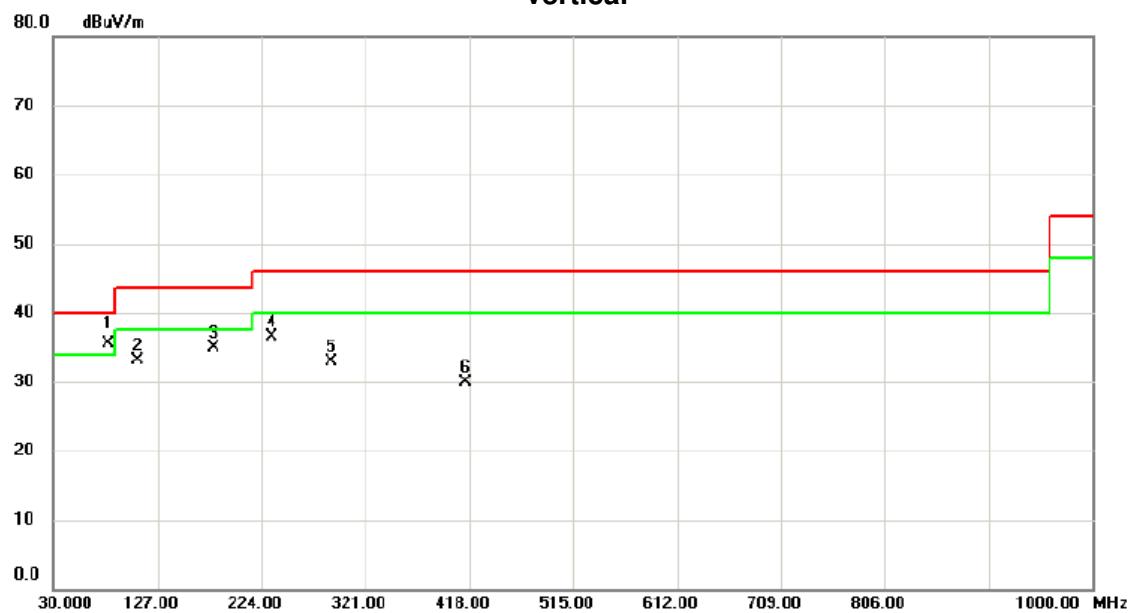
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0135	0°	13.24	24.7117	37.9517	124.9975	-87.0459	AVG
0.0135	0°	14.12	24.7117	38.8317	144.9975	-106.1659	PEAK
0.0277	0°	6.08	23.8123	29.8923	118.7546	-88.8623	AVG
0.0277	0°	8.33	23.8123	32.1423	138.7546	-106.6123	PEAK
0.0349	0°	3.29	23.3563	26.6463	116.7477	-90.1014	AVG
0.0349	0°	5.43	23.3563	28.7863	136.7477	-107.9614	PEAK
0.0512	0°	1.46	22.3760	23.8360	113.4188	-89.5828	AVG
0.0512	0°	2.11	22.3760	24.4860	133.4188	-108.9328	PEAK
0.5792	0°	19.30	20.0534	39.3534	72.3477	-32.9942	QP
1.9884	0°	23.22	19.5012	42.7212	69.5400	-26.8188	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0108	90°	13.51	24.3000	37.8100	126.9357	-89.1257	AVG
0.0108	90°	14.23	24.3000	38.5300	146.9357	-108.4057	PEAK
0.0214	90°	7.42	24.2113	31.6313	120.9959	-89.3646	AVG
0.0214	90°	8.37	24.2113	32.5813	140.9959	-108.4146	PEAK
0.0482	90°	5.72	22.5140	28.2340	113.9433	-85.7093	AVG
0.0482	90°	6.57	22.5140	29.0840	133.9433	-104.8593	PEAK
0.0531	90°	1.20	22.3380	23.5380	113.1023	-89.5643	AVG
0.0531	90°	2.82	22.3380	25.1580	133.1023	-107.9443	PEAK
0.6047	90°	22.06	20.1350	42.1950	71.9734	-29.7784	QP
2.0021	90°	24.31	19.4987	43.8087	69.5400	-25.7313	QP

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

Test Mode: TX 2402MHz -CH00 -1Mbps

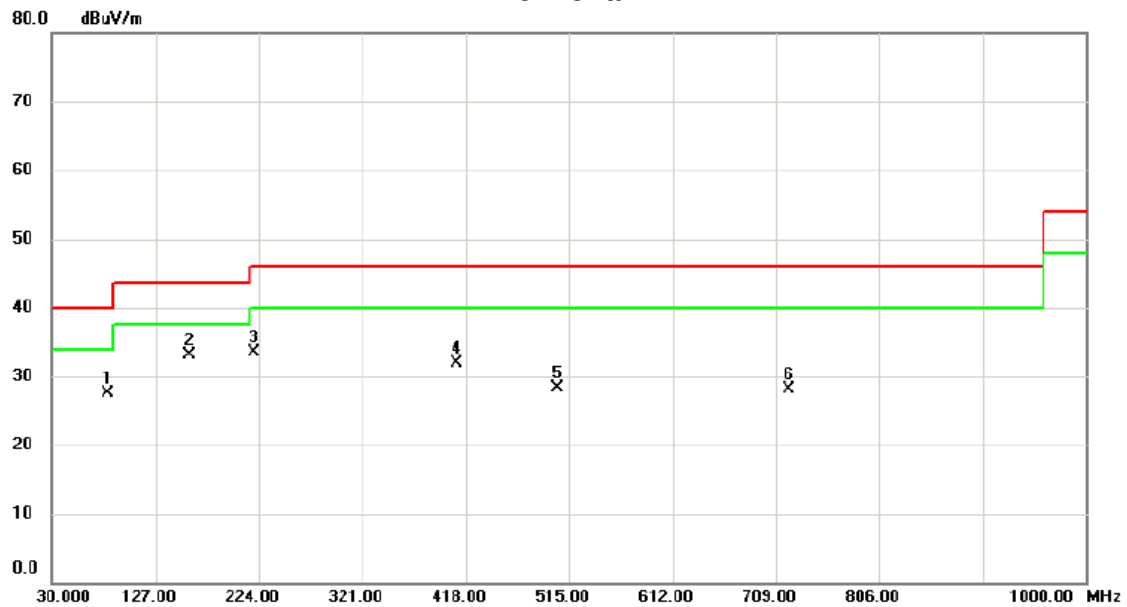
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	81.4100	51.36	-15.76	35.60	40.00	-4.40	QP	
2		107.6000	47.02	-14.01	33.01	43.50	-10.49	peak	
3		179.3800	46.40	-11.45	34.95	43.50	-8.55	peak	
4		233.7000	49.08	-12.63	36.45	46.00	-9.55	peak	
5		289.9600	42.67	-9.82	32.85	46.00	-13.15	peak	
6		414.1200	36.74	-6.88	29.86	46.00	-16.14	peak	

Test Mode: TX 2402MHz -CH00 -1Mbps

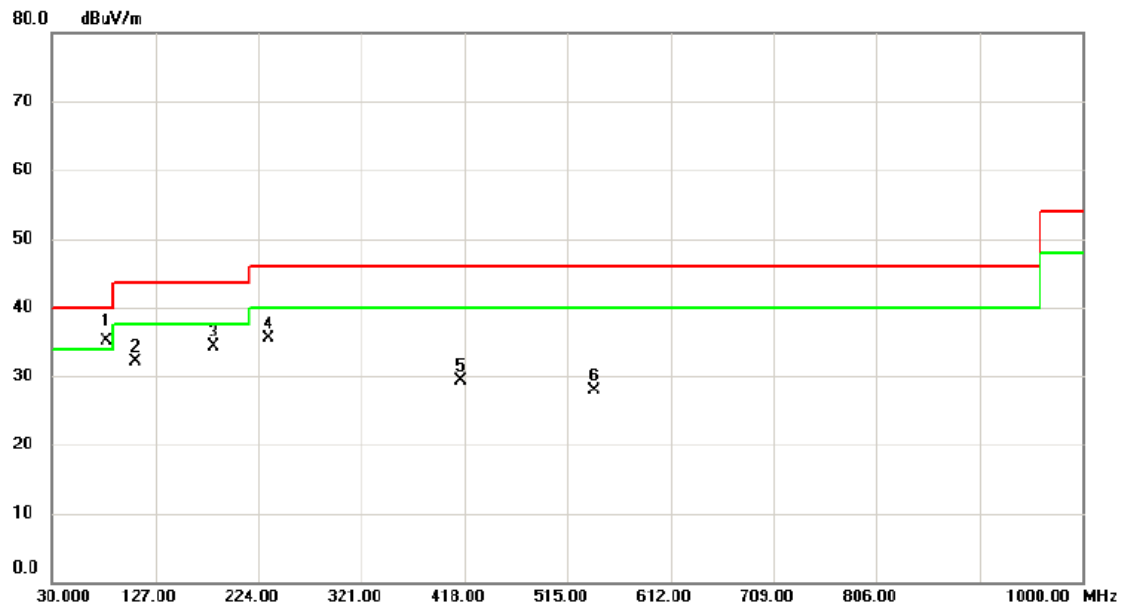
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		82.3800	43.28	-15.80	27.48	40.00	-12.52	peak	
2	*	158.0400	45.16	-12.13	33.03	43.50	-10.47	peak	
3		219.1500	47.01	-13.42	33.59	46.00	-12.41	peak	
4		409.2700	39.01	-7.02	31.99	46.00	-14.01	peak	
5		504.3300	35.43	-7.14	28.29	46.00	-17.71	peak	
6		720.6400	29.52	-1.45	28.07	46.00	-17.93	peak	

Test Mode: TX 2440MHz -CH19 -1Mbps

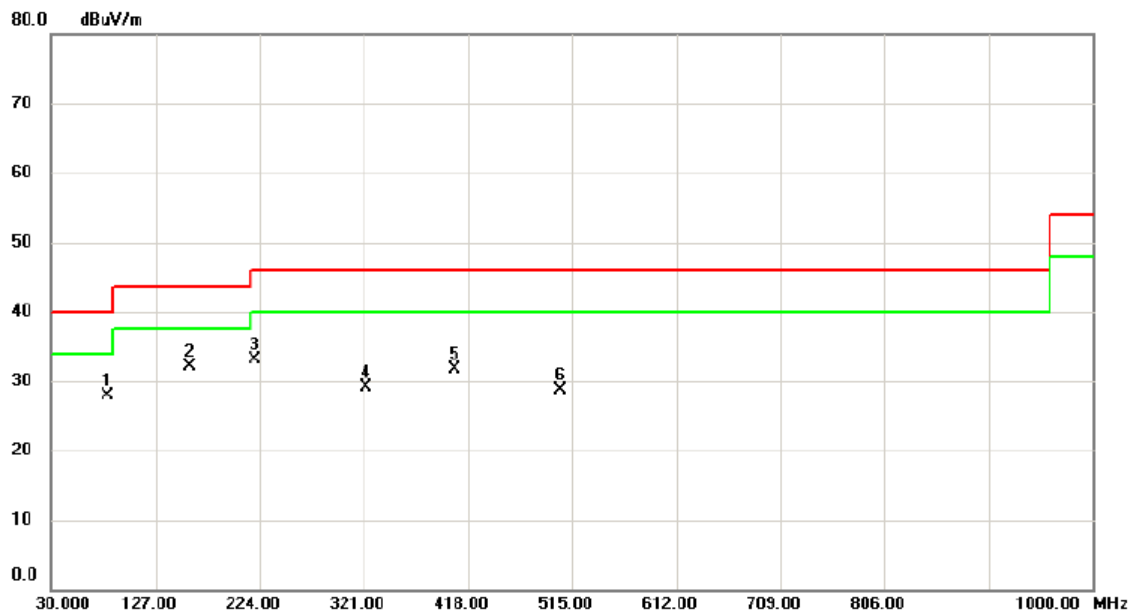
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	81.4100	50.89	-15.76	35.13	40.00	-4.87	QP	
2		107.6000	46.02	-14.01	32.01	43.50	-11.49	peak	
3		182.2900	46.12	-11.82	34.30	43.50	-9.20	peak	
4		233.7000	48.08	-12.63	35.45	46.00	-10.55	peak	
5		414.1200	36.24	-6.88	29.36	46.00	-16.64	peak	
6		540.2200	33.09	-5.17	27.92	46.00	-18.08	peak	

Test Mode: TX 2440MHz -CH19 -1Mbps

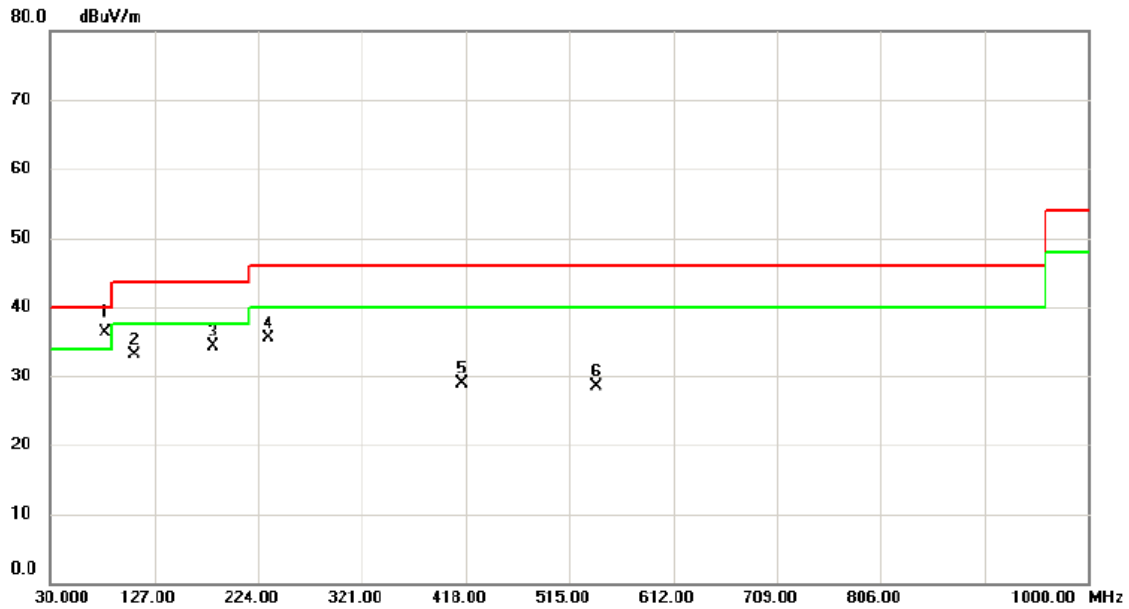
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		82.3800	43.78	-15.80	27.98	40.00	-12.02	peak	
2	*	158.0400	44.16	-12.13	32.03	43.50	-11.47	peak	
3		219.1500	46.51	-13.42	33.09	46.00	-12.91	peak	
4		322.9400	38.88	-9.74	29.14	46.00	-16.86	peak	
5		405.3900	38.80	-7.12	31.68	46.00	-14.32	peak	
6		504.3300	35.93	-7.14	28.79	46.00	-17.21	peak	

Test Mode: TX 2480MHz -CH39 -1Mbps

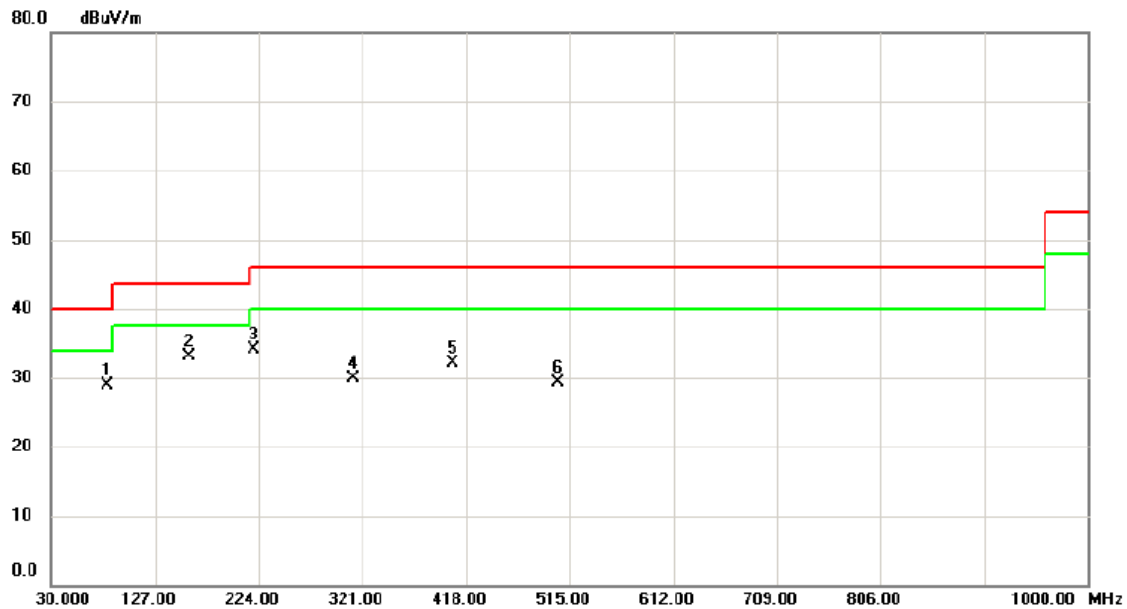
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	81.4100	52.03	-15.76	36.27	40.00	-3.73	QP	
2		107.6000	47.02	-14.01	33.01	43.50	-10.49	peak	
3		182.2900	46.12	-11.82	34.30	43.50	-9.20	peak	
4		233.7000	48.08	-12.63	35.45	46.00	-10.55	peak	
5		414.1200	35.74	-6.88	28.86	46.00	-17.14	peak	
6		540.2200	33.59	-5.17	28.42	46.00	-17.58	peak	

Test Mode: TX 2480MHz -CH39 -1Mbps

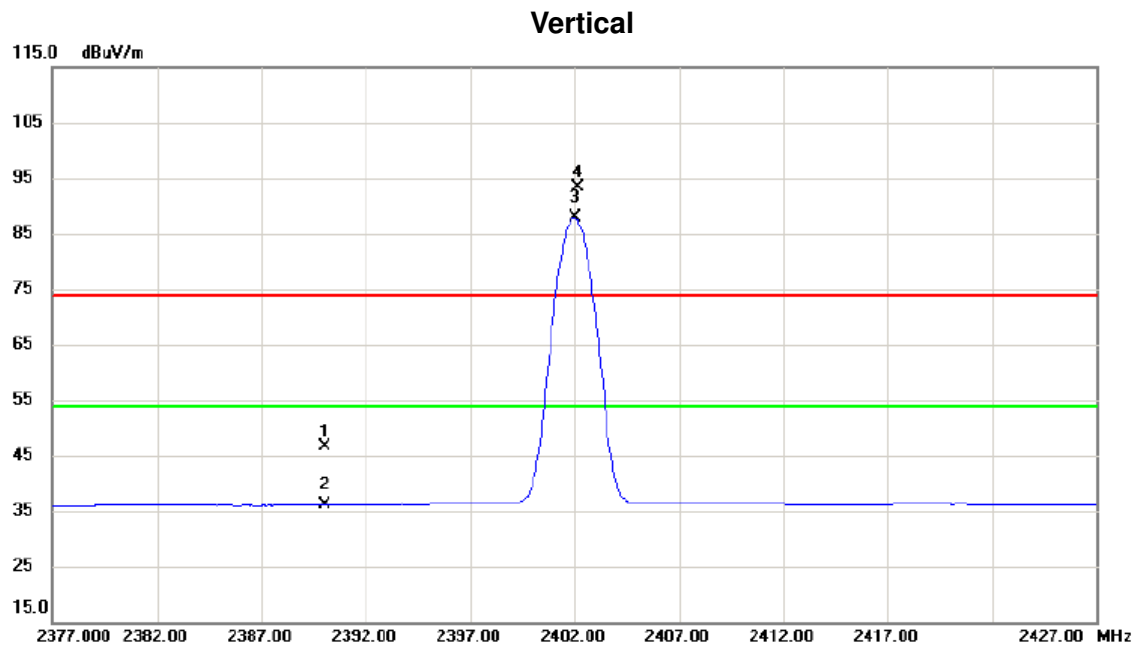
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		82.3800	44.78	-15.80	28.98	40.00	-11.02	peak	
2	*	158.0400	45.16	-12.13	33.03	43.50	-10.47	peak	
3		219.1500	47.51	-13.42	34.09	46.00	-11.91	peak	
4		312.2700	39.52	-9.67	29.85	46.00	-16.15	peak	
5		405.3900	39.31	-7.12	32.19	46.00	-13.81	peak	
6		504.3300	36.43	-7.14	29.29	46.00	-16.71	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

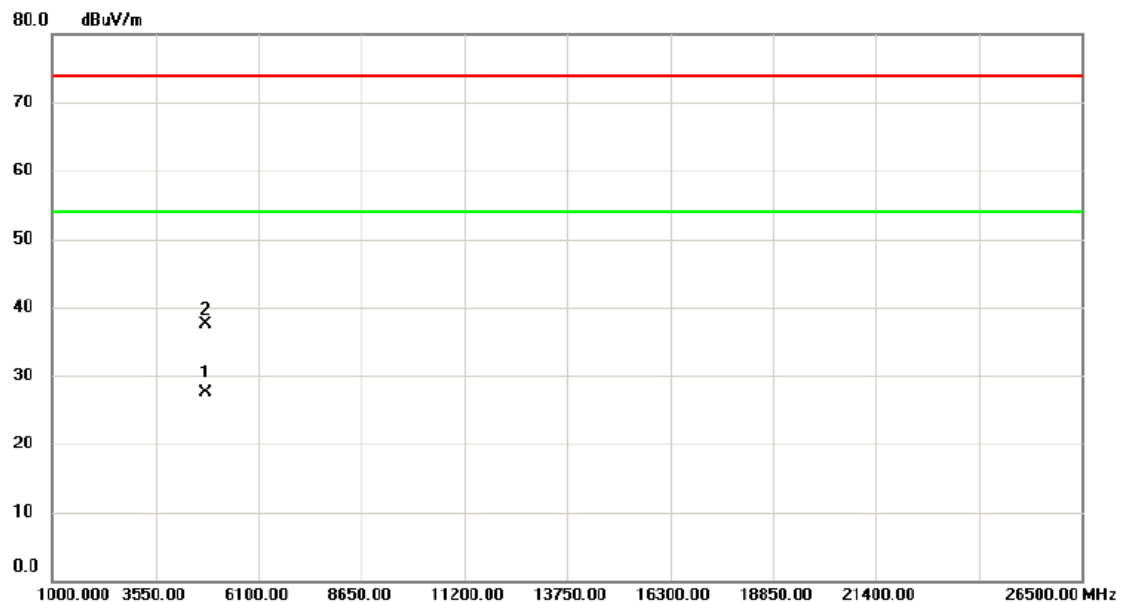
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	12.40	34.23	46.63	74.00	-27.37	peak	
2		2390.000	1.89	34.23	36.12	54.00	-17.88	AVG	
3	*	2402.000	53.62	34.30	87.92	54.00	33.92	AVG	No Limit
4	X	2402.200	59.08	34.30	93.38	74.00	19.38	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

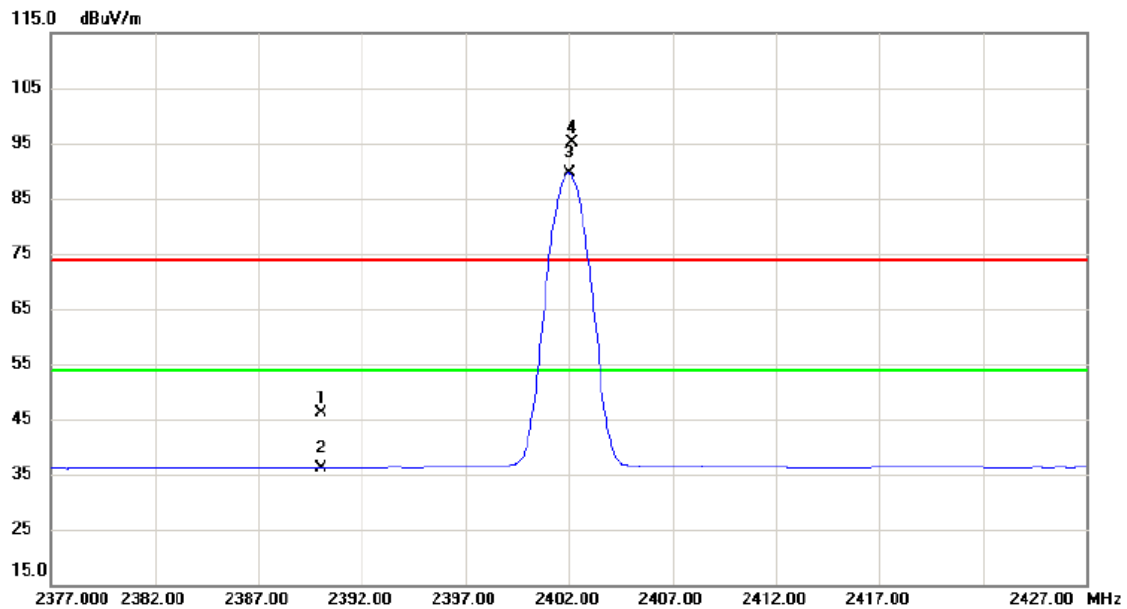
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4803.900	24.43	3.00	27.43	54.00	-26.57	AVG	
2		4804.060	34.56	3.00	37.56	74.00	-36.44	peak	

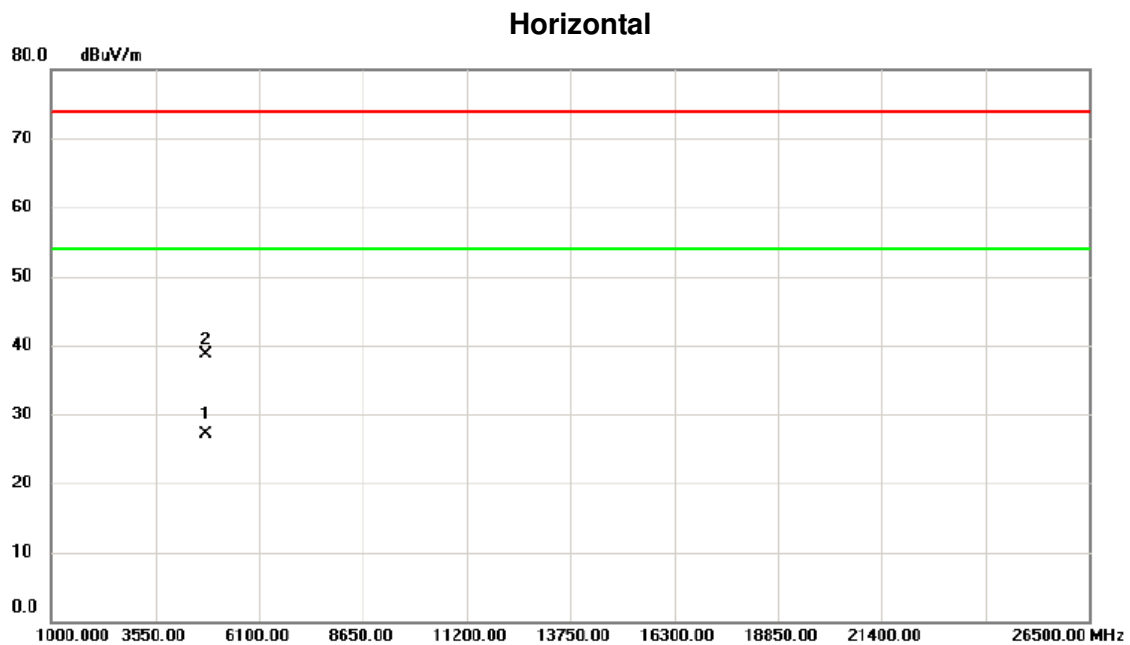
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

Horizontal



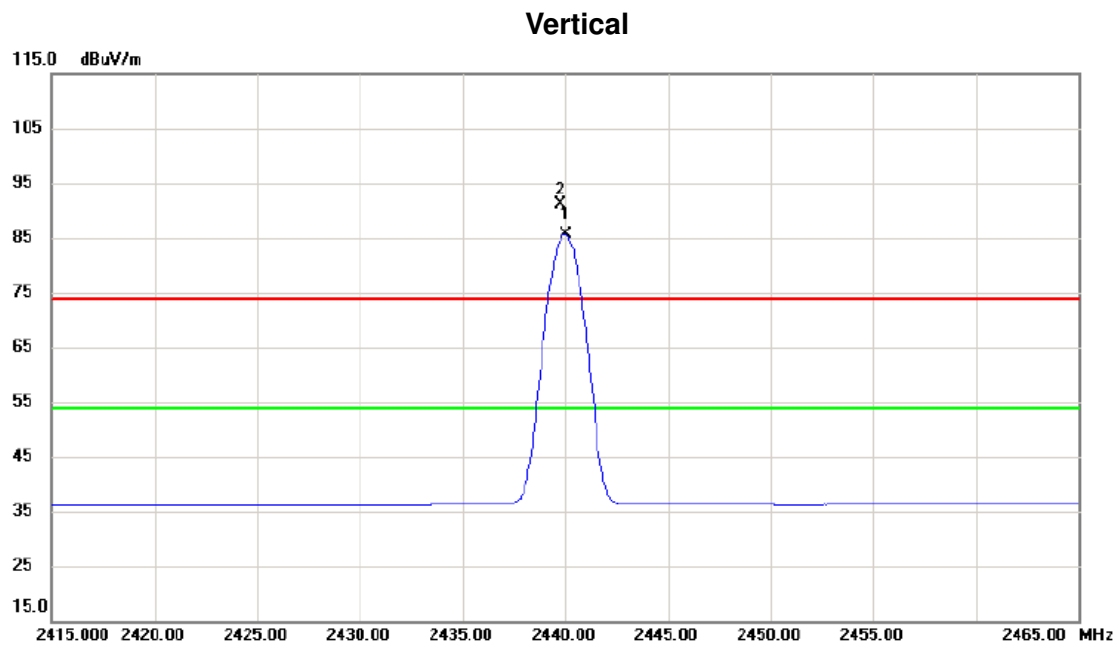
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	11.95	34.23	46.18	74.00	-27.82	peak	
2		2390.000	1.90	34.23	36.13	54.00	-17.87	AVG	
3	*	2402.000	55.23	34.30	89.53	54.00	35.53	AVG	No Limit
4	X	2402.200	60.78	34.30	95.08	74.00	21.08	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4803.900	24.15	3.00	27.15	54.00	-26.85	AVG	
2		4803.980	35.68	3.00	38.68	74.00	-35.32	peak	

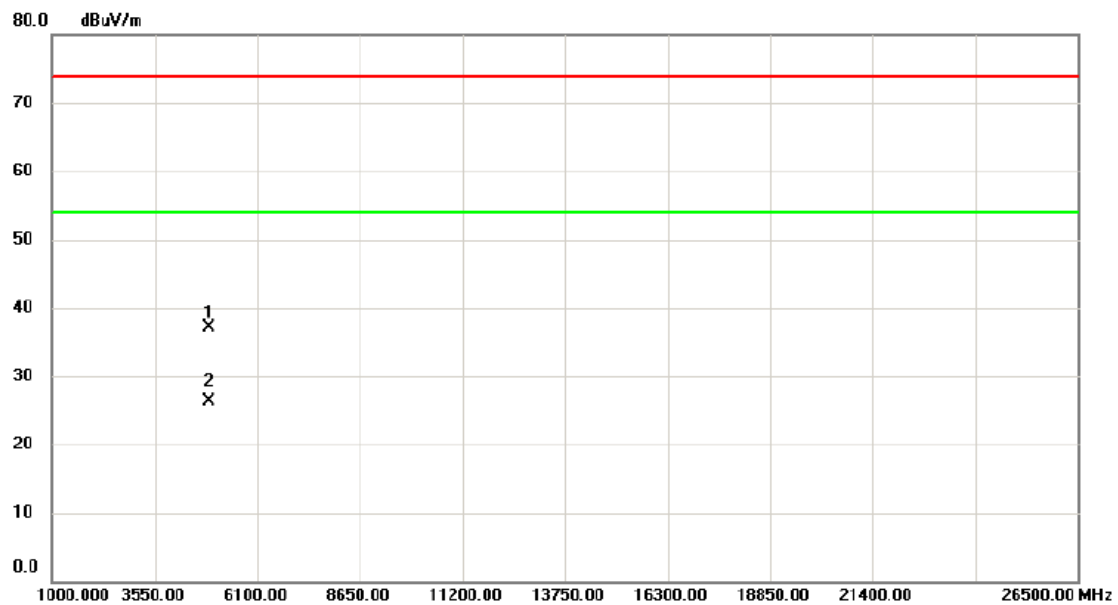
Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2440.000	51.11	34.52	85.63	54.00	31.63	AVG	No Limit
2	X	2439.750	56.66	34.52	91.18	74.00	17.18	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

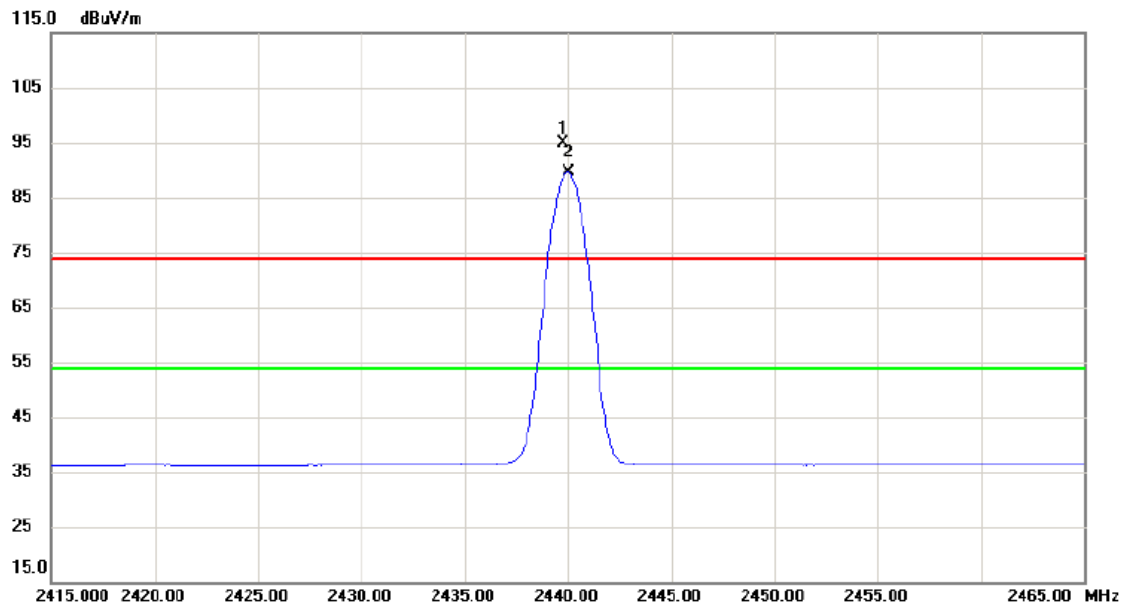
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4880.040	34.11	3.02	37.13	74.00	-36.87	peak	
2	*	4880.060	23.19	3.02	26.21	54.00	-27.79	AVG	

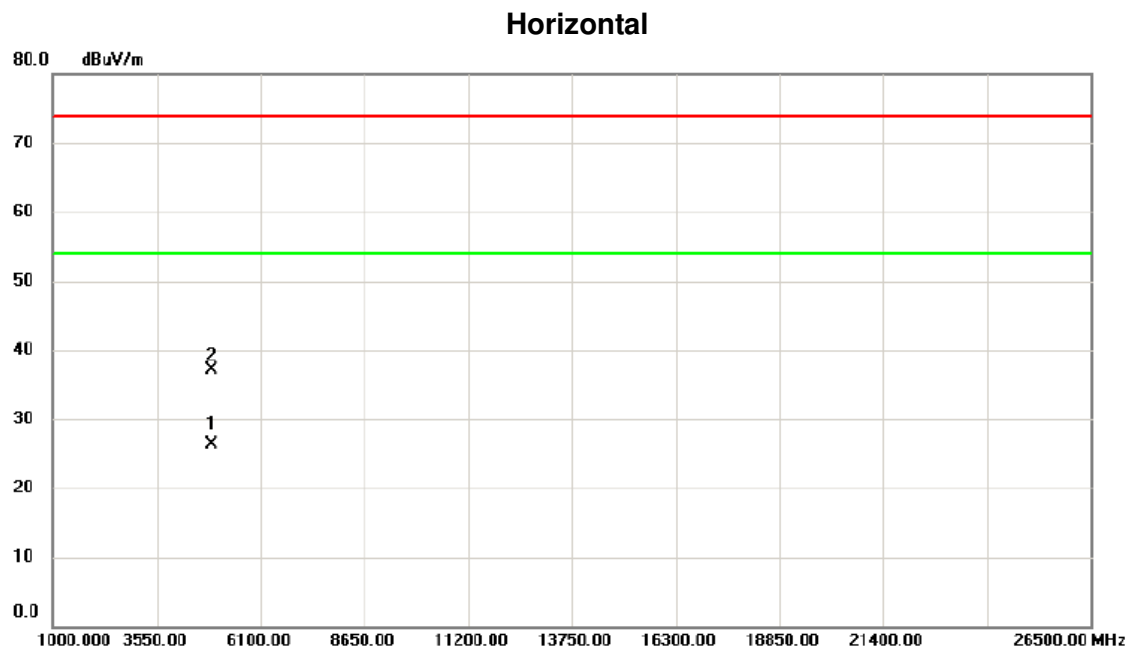
Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2439.750	60.37	34.52	94.89	74.00	20.89	peak	No Limit
2	*	2440.000	55.05	34.52	89.57	54.00	35.57	AVG	No Limit

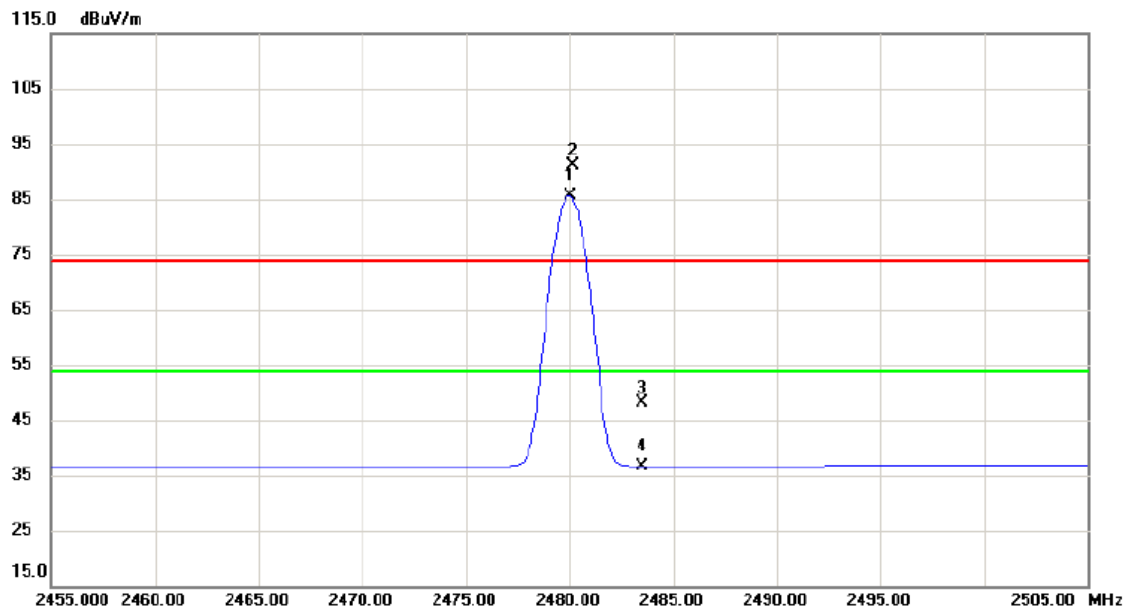
Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4879.800	23.34	3.02	26.36	54.00	-27.64	AVG	
2		4879.980	34.12	3.02	37.14	74.00	-36.86	peak	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps

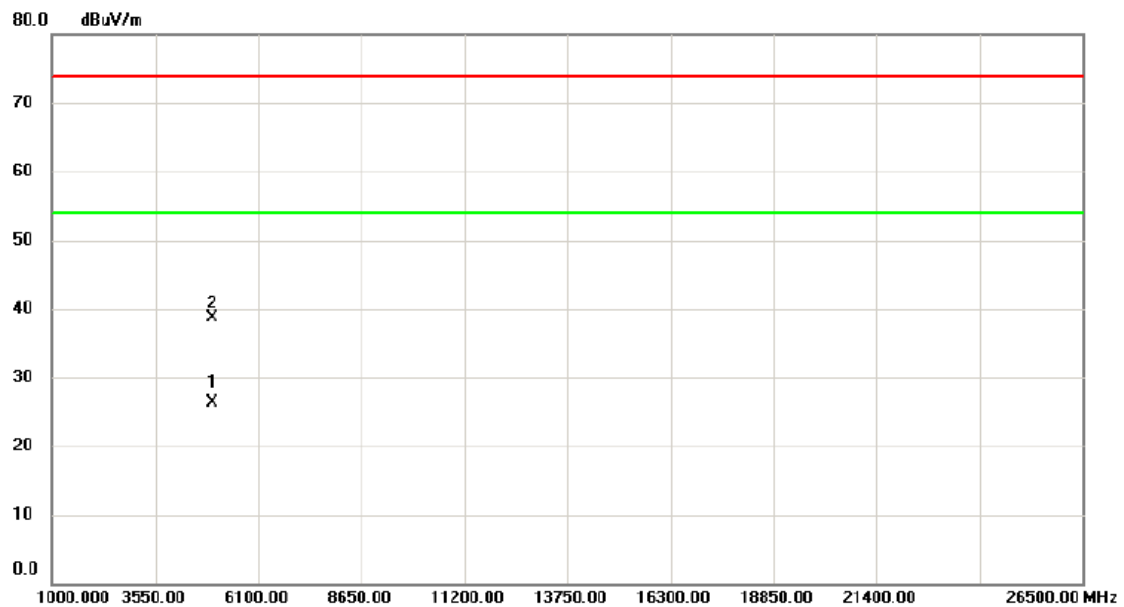
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2480.000	50.92	34.75	85.67	54.00	31.67	AVG	No Limit
2	X	2480.200	56.46	34.75	91.21	74.00	17.21	peak	No Limit
3		2483.500	13.38	34.78	48.16	74.00	-25.84	peak	
4		2483.500	1.90	34.78	36.68	54.00	-17.32	AVG	

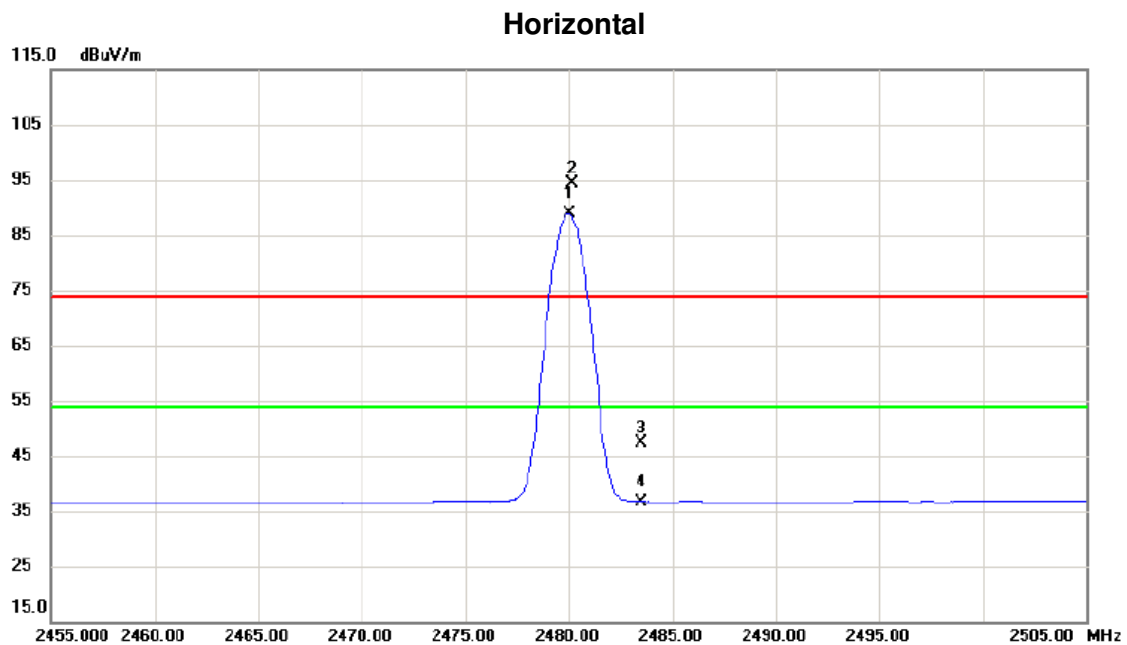
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps

Vertical



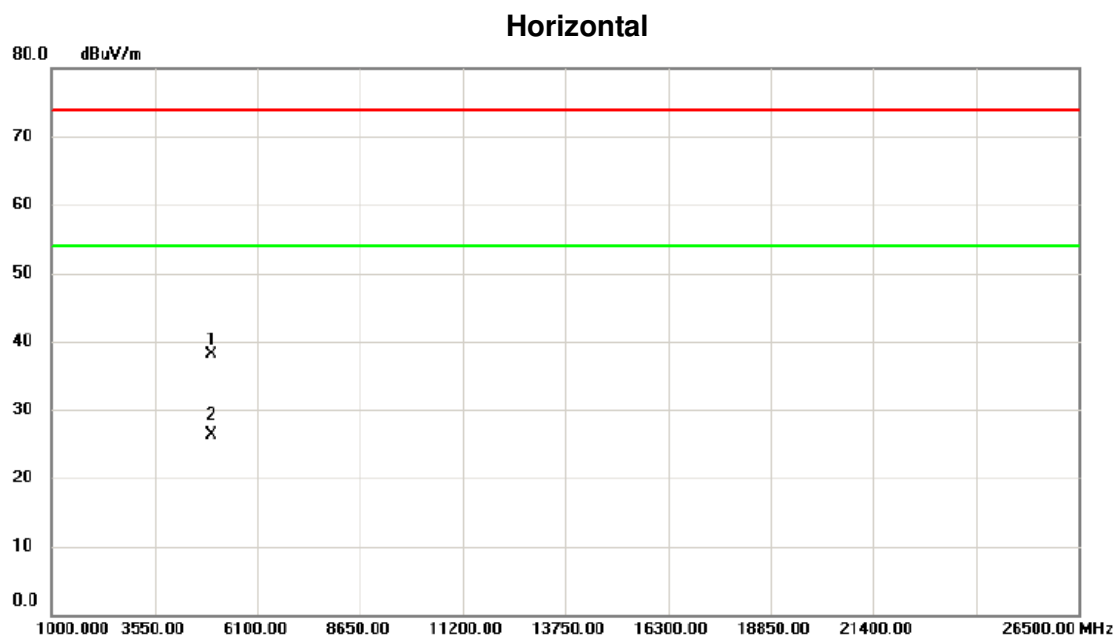
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4959.820	23.16	3.07	26.23	54.00	-27.77	AVG	
2		4960.040	35.60	3.07	38.67	74.00	-35.33	peak	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2480.000	54.16	34.75	88.91	54.00	34.91	AVG	No Limit
2	X	2480.200	59.67	34.75	94.42	74.00	20.42	peak	No Limit
3		2483.500	12.71	34.78	47.49	74.00	-26.51	peak	
4		2483.500	1.97	34.78	36.75	54.00	-17.25	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps



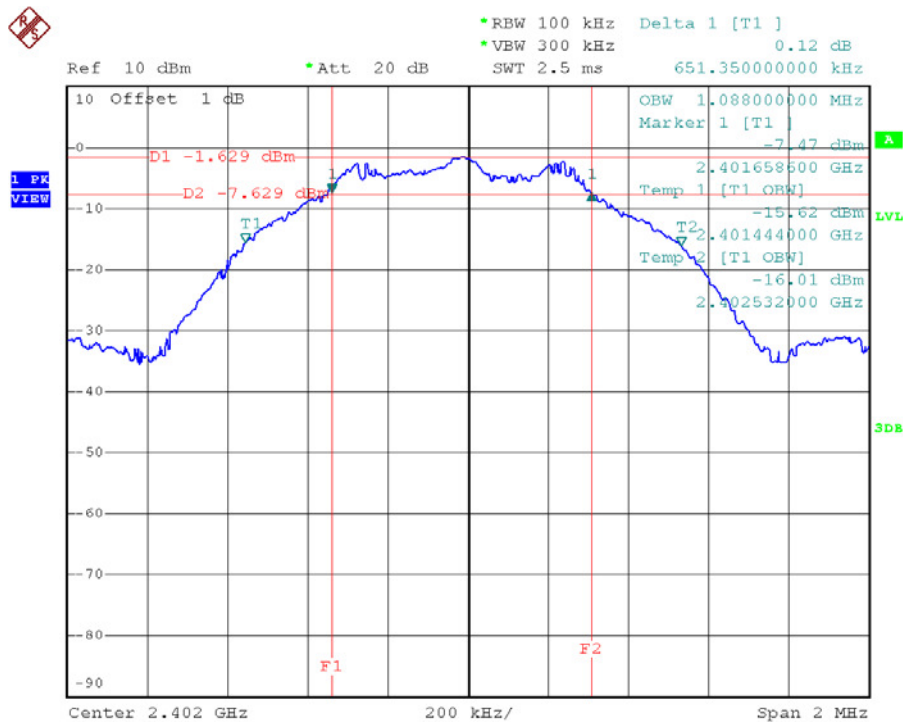
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4959.680	34.94	3.07	38.01	74.00	-35.99	peak	
2	*	4960.120	23.32	3.07	26.39	54.00	-27.61	AVG	

ATTACHMENT E - BANDWIDTH

Test Mode : CH00, CH19 , CH39 - 1Mbps

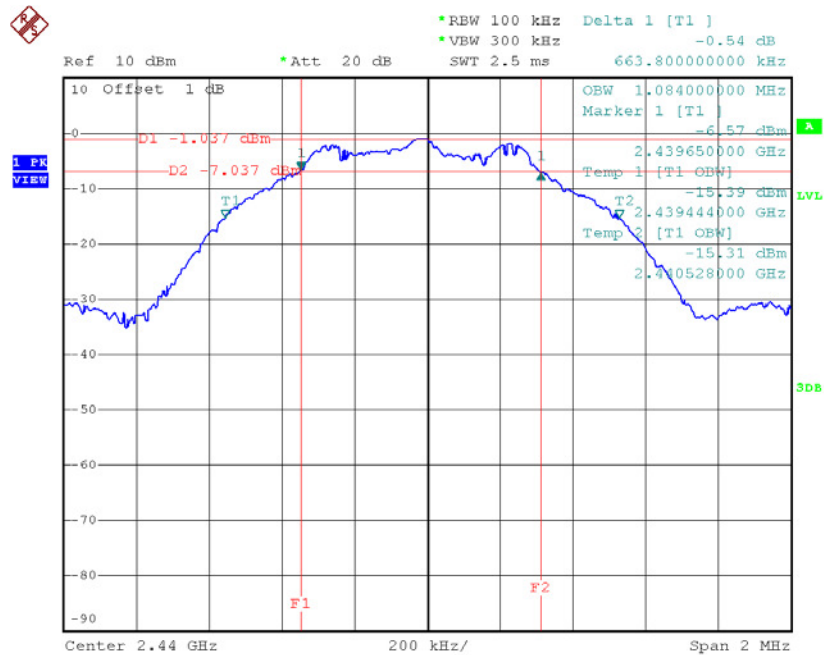
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.651	1.088	500	Complies
2440	0.664	1.084	500	Complies
2480	0.654	1.084	500	Complies

TX CH00



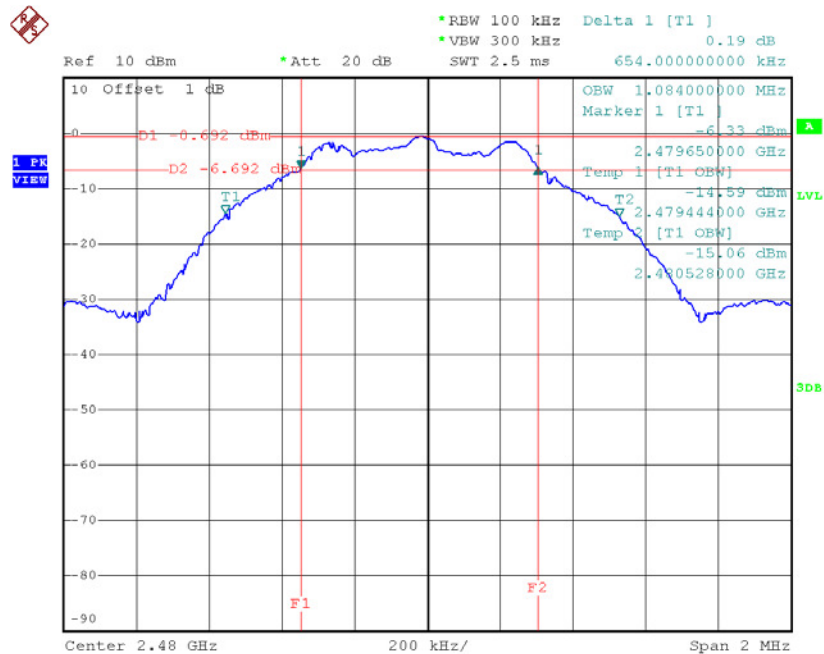
Date: 19.DEC.2015 11:55:25

TX CH19



Date: 19.DEC.2015 11:56:38

TX CH39



Date: 19.DEC.2015 11:57:49

ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

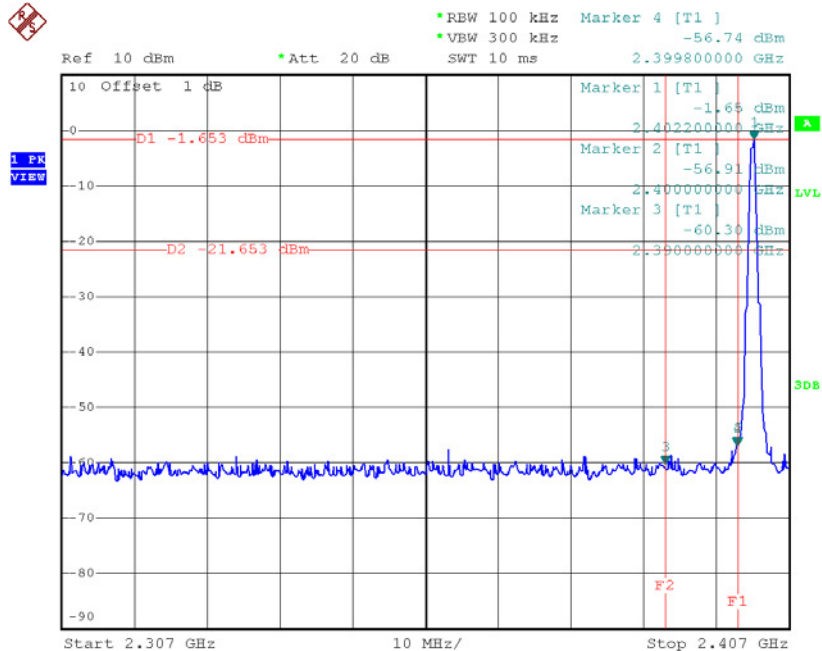
Test Mode :	CH00, CH19 , CH39 - 1Mbps
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	-1.54	0.0007	30.00	1.00	Complies
2440	-1.27	0.0007	30.00	1.00	Complies
2480	-1.01	0.0008	30.00	1.00	Complies

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

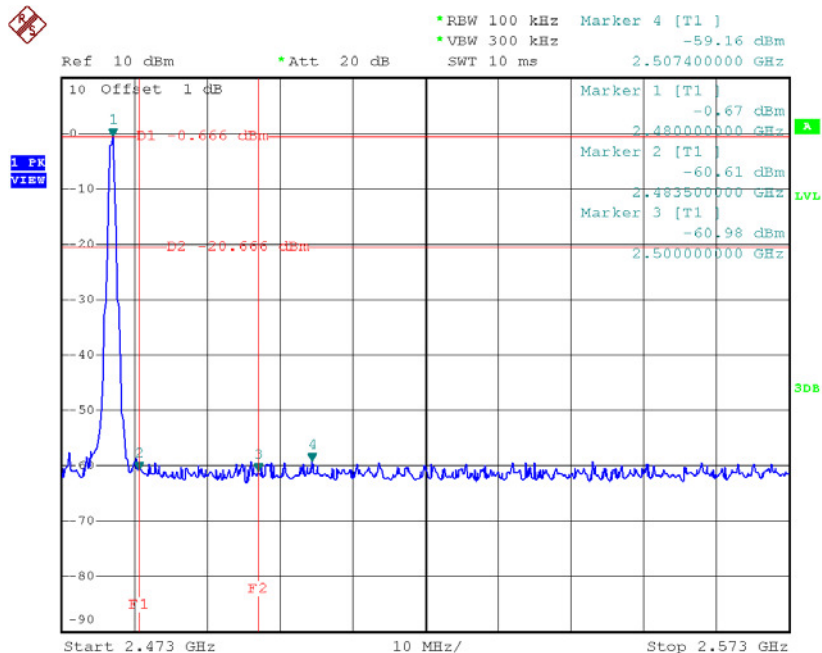
Test Mode : CH00, CH19 , CH39 - 1Mbps

CH00 (Lower) - 1Mbps



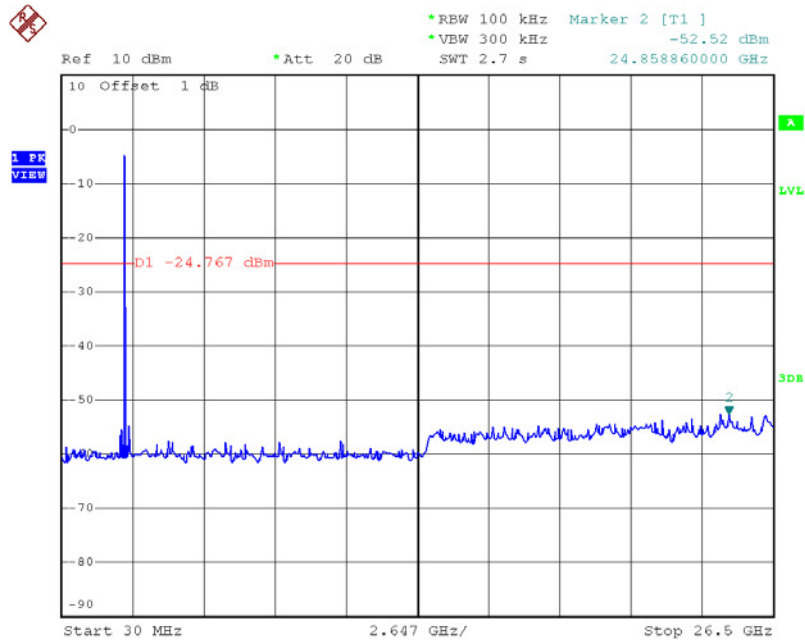
Date: 19.DEC.2015 11:55:33

CH39 (upper) - 1Mbps



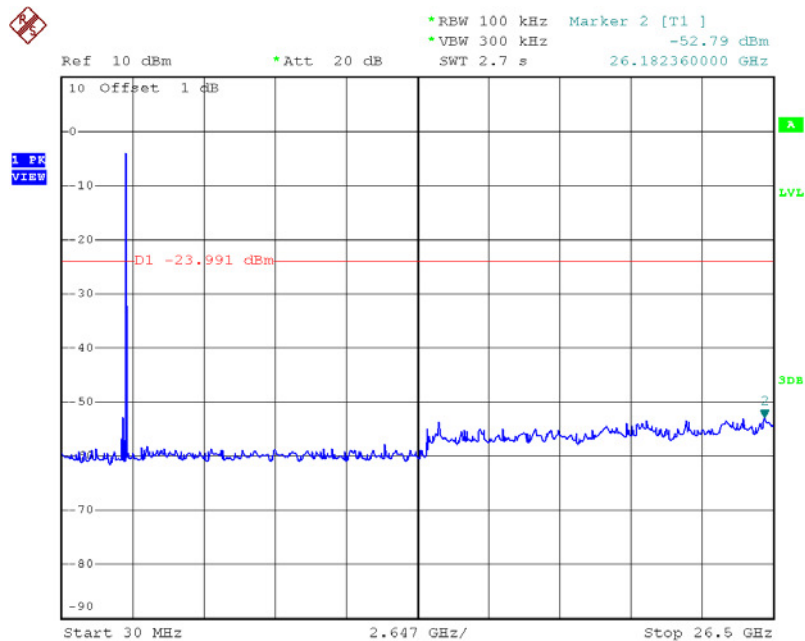
Date: 19.DEC.2015 11:57:57

CH00 (10 Harmonic of the frequency)



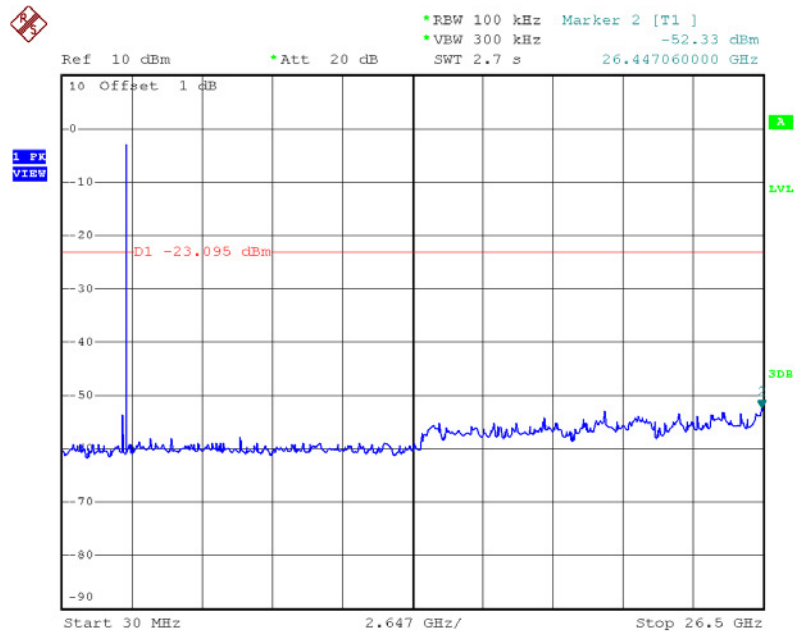
Date: 19.DEC.2015 11:55:46

CH19 (10 Harmonic of the frequency)



Date: 19.DEC.2015 11:56:55

CH39 (10 Harmonic of the frequency)



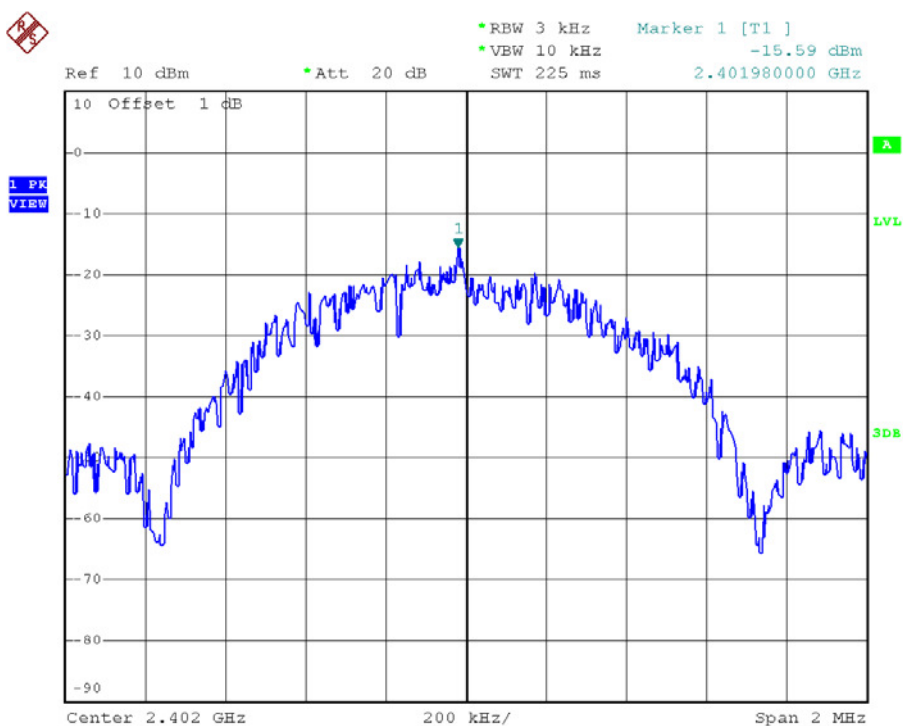
Date: 19.DEC.2015 11:58:10

ATTACHMENT H - POWER SPECTRAL DENSITY TEST

Test Mode :	CH00, CH19 , CH39 - 1Mbps
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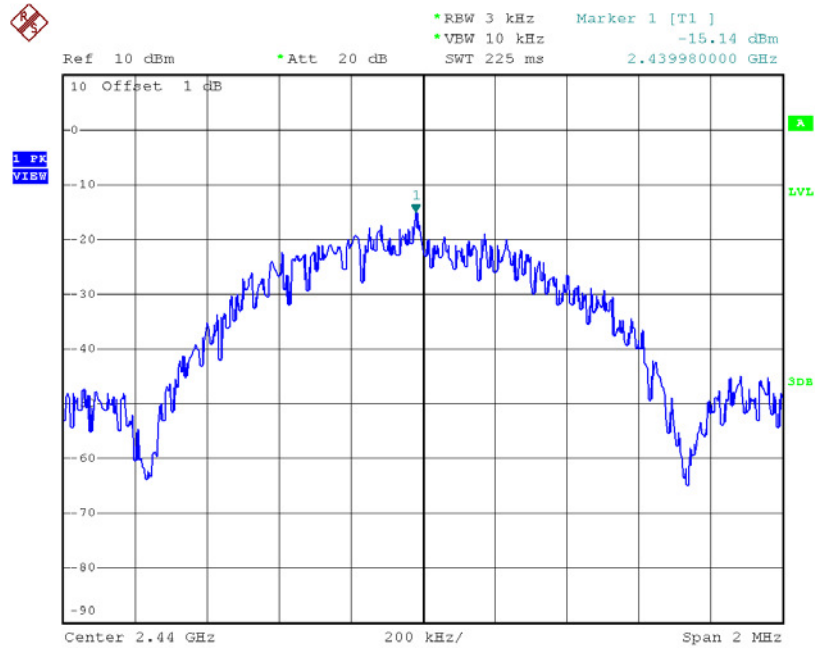
Frequency (MHz)	Power Density (dBm)	Max. Limit (dBm)	Result
2402	-15.59	8	Complies
2440	-15.14	8	Complies
2480	-14.81	8	Complies

TX CH00



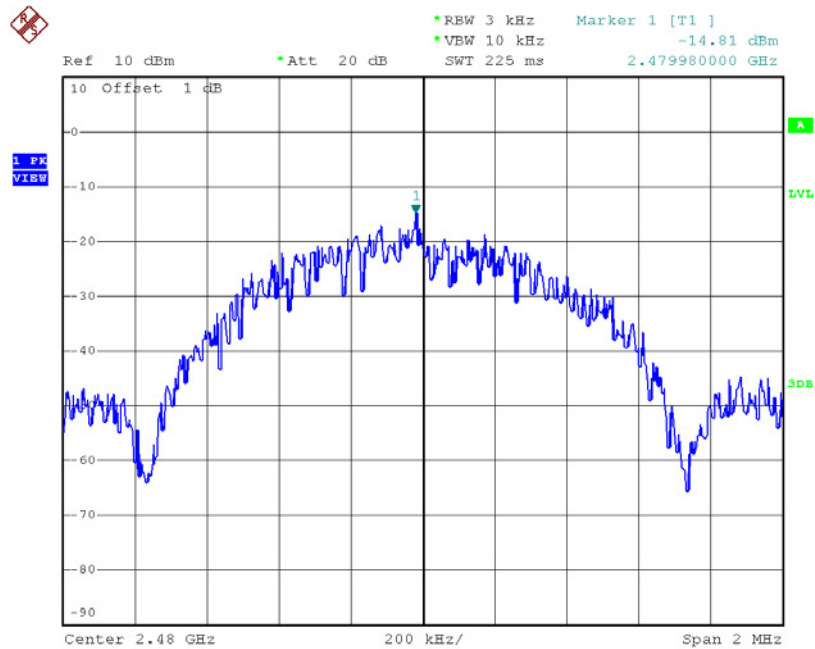
Date: 19.DEC.2015 11:55:53

TX CH19



Date: 19.DEC.2015 11:57:01

TX CH39



Date: 19.DEC.2015 11:58:16