

FCC Radio Test Report

FCC ID: RWO-RZ030133

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

Project No. : 1503C157
Equipment : Gaming Lapboard
Model Name : RZ03-0133
Applicant : Razer Inc.
Address : 9 Pasteur, Suite 100 Irvine, California 92618, United States

Date of Receipt : Mar. 19, 2015
Date of Test : Mar. 19, 2015 ~ Apr. 13, 2015
Issued Date : Apr. 14, 2015
Tested by : BTL Inc.

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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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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-1-1503C157	Original Issue.	Apr. 14, 2015

1. CERTIFICATION

Equipment : Gaming Lapboard
Brand Name : RAZER
Model Name : RZ03-0133
Applicant : Razer Inc.
Manufacturer : Razer (Asia-Pacific) Pte Ltd
Address : 514 Chai Chee Lane #07-01 ~ 06 Singapore 469029
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 : Mar. 19, 2015 ~ Apr. 13, 2015
Test Sample : ENGINEERING SAMPLE
Standard(s) : FCC Part15, Subpart C :2014 (15.247) / ANSI C63.4-2009

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-1-1503C157) 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	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) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r02 (Measurement Guidelines of DTS)

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 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)	Note
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)	Note
DG-CB03	CISPR	9KHz~30MHz	V	3.79	
		9KHz~30MHz	H	3.57	
		30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	H	3.68	
		18GHz~40GHz	V	4.15	
		18GHz~40GHz	H	4.14	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Gaming Lapboard	
Brand Name	RAZER	
Model Name	RZ03-0133	
Model Difference	N/A	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	1.87 dBm (1Mbps)
Power Source	#1 DC Voltage supplied from AC/DC adapter. (For Dock charger) Brand / Model:  / KSA29A0500250D5 #2 Supplied from Dock charger.(For Keyboard) Model: RC30-0133 #3 Supplied from battery(For Keyboard) Model: PL325385	
Power Rating	#1 I/P 100-240V~ 50/60Hz 0.5A O/P: DC 5.0V 2.5A(For Dock charger) #2 DC 5V 1000mA (For Keyboard) #3 DC 3.7V 1500mAh (For Keyboard)	

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	P/N	Antenna Type	Connector	Gain (dBi)
1		RFANT8010080A3T	Chip	N/A	3.03

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:

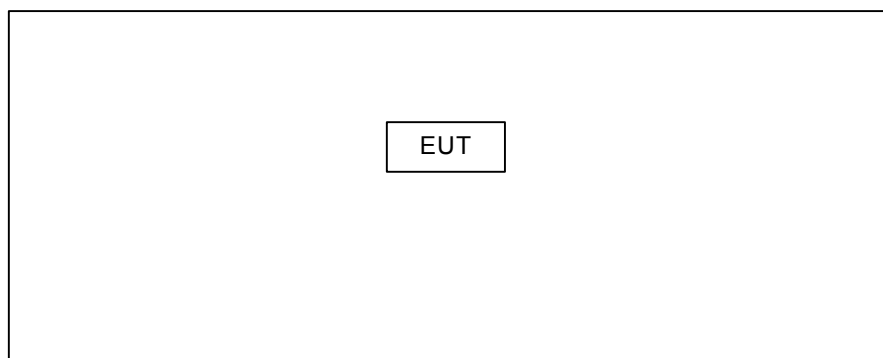
(1) The measurements are performed at the high, middle, low available channels.

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	0		
Frequency (MHz)	2402	2440	2480
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.	Note
-	-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

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

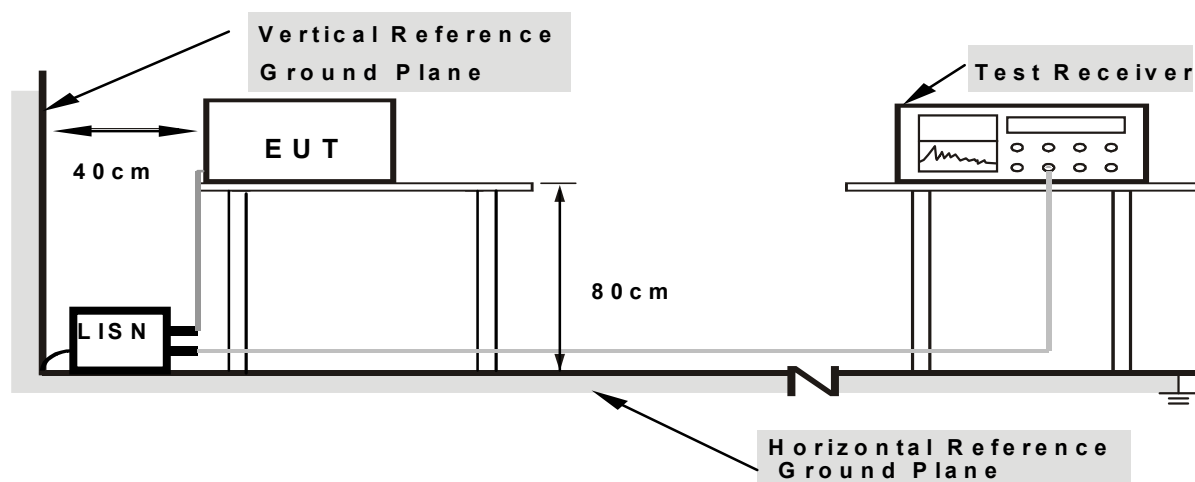
4.1.2 TEST PROCEDURE

- 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

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

20dB 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.

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)	1MHz / 3MHz for Peak, 1MHz / 1/T 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

4.2.2 TEST PROCEDURE

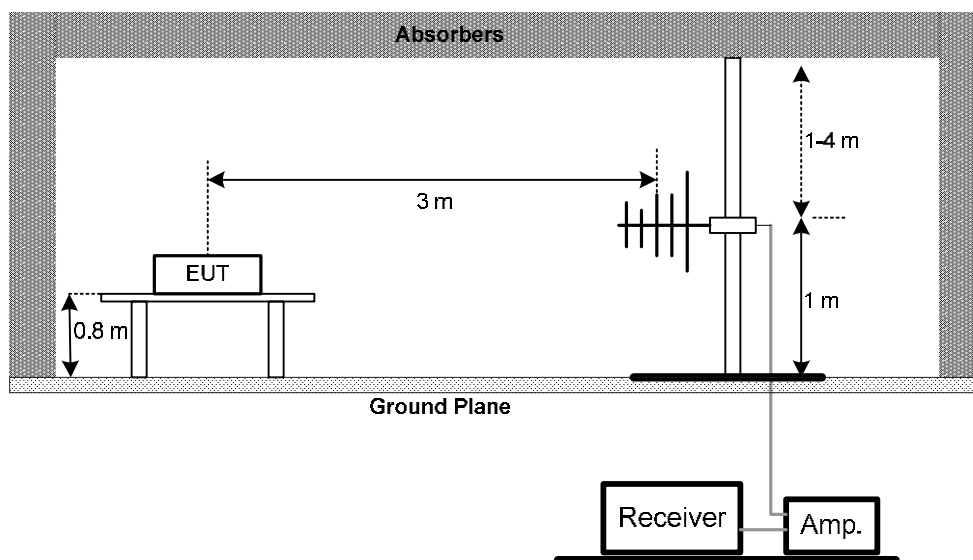
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3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

4.2.3 DEVIATION FROM TEST STANDARD

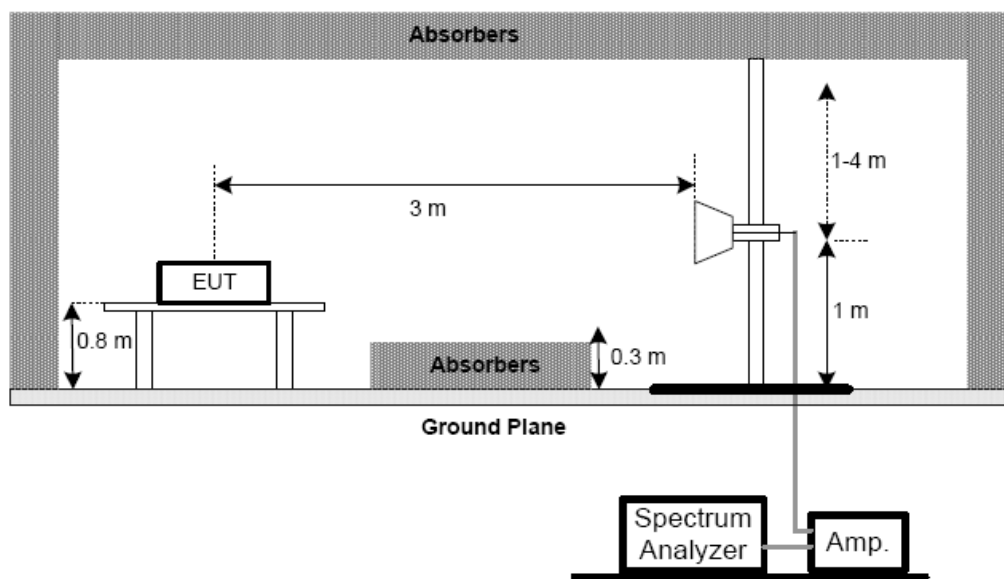
No deviation

4.2.4 TEST SETUP

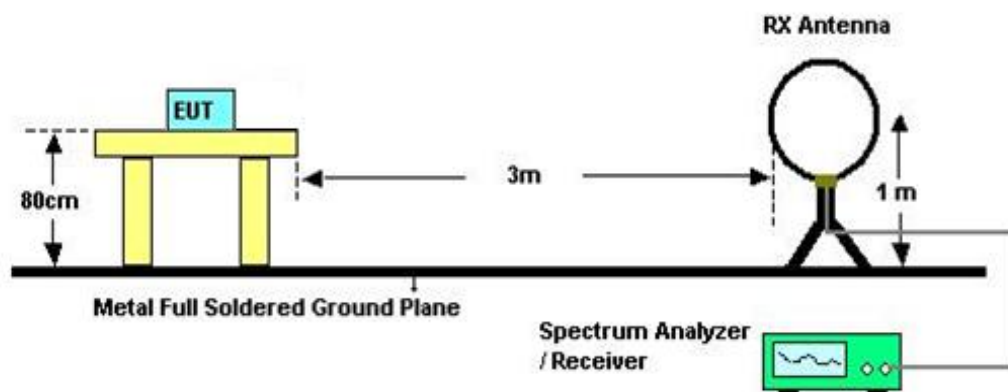
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: DC 3.7V

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 (BETWEEN 30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz.
- (2) 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.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) 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) 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	$\geq 500\text{KHz}$ (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: DC 3.7V

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 v03r02.

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.
 Transmit output power was measured while the host equipment supply voltage was varied from 85 % to 115 % of the nominal rated supply voltage. No change in transmit output power was observed.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C
 Relative Humidity: 55%
 Test Voltage: DC 3.7V

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 intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 measurement, provided 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.

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: DC 3.7V

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

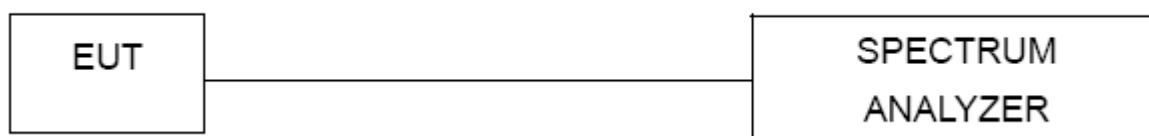
8.1.1 TEST PROCEDURE

- 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: DC 3.7V

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	N/A	C_17	N/A	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. 17, 2015
3	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
4	Test Cable	N/A	C-01_CB03	N/A	Jul. 01, 2015
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. 02, 2015
9	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
10	Test Cable	HUBER+SUHNER	C-48	N/A	Apr. 30, 2015
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
12	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
13	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 16, 2015

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	P-series Power meter	Agilent	N1911A	MY45100473	Mar. 28, 2016
2	Wireband Power sensor	Agilent	N1921A	MY51100041	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	Nov. 02, 2015

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

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		0.1655	24.63	9.46	34.09	65.18	-31.09	peak	
2		0.2945	23.61	9.51	33.12	60.40	-27.28	peak	
3	*	0.5720	22.62	9.56	32.18	56.00	-23.82	peak	
4		1.5992	16.49	9.53	26.02	56.00	-29.98	peak	
5		2.7945	15.57	9.52	25.09	56.00	-30.91	peak	
6		7.4883	15.84	9.58	25.42	60.00	-34.58	peak	

Test Mode: TX Mode

Neutral



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1		0.1734	23.88	9.55	33.43	64.80	-31.37	peak	
2		0.2437	22.04	9.54	31.58	61.97	-30.39	peak	
3	*	0.5641	26.67	9.54	36.21	56.00	-19.79	peak	
4		0.9156	20.56	9.54	30.10	56.00	-25.90	peak	
5		1.5211	19.47	9.54	29.01	56.00	-26.99	peak	
6		8.3945	15.86	9.57	25.43	60.00	-34.57	peak	

ATTACHMENT B - 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
0.0109	0°	4.21	24.30	28.51	126.86	-98.35	AVG
0.0109	0°	7.48	24.30	31.78	146.86	-115.08	PEAK
0.0144	0°	4.25	24.30	28.55	124.44	-95.89	AVG
0.0144	0°	8.29	24.30	32.59	144.44	-111.85	PEAK
0.0273	0°	6.48	23.84	30.32	118.88	-88.56	AVG
0.0273	0°	8.31	23.84	32.15	138.88	-106.73	PEAK
0.3390	0°	2.72	20.19	22.91	97.00	-74.09	AVG
0.3390	0°	6.82	20.19	27.01	117.00	-89.99	PEAK
2.0921	0°	16.62	19.44	36.06	69.54	-33.48	QP
3.4648	0°	21.37	18.95	40.32	69.54	-29.22	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0118	90°	4.82	24.30	29.12	126.17	-97.05	AVG
0.0118	90°	7.85	24.30	32.15	146.17	-114.02	PEAK
0.0169	90°	3.63	24.30	27.93	123.05	-95.12	AVG
0.0169	90°	6.71	24.30	31.01	143.05	-112.04	PEAK
0.0271	90°	3.55	23.85	27.40	118.94	-91.54	AVG
0.0271	90°	4.94	23.85	28.79	138.94	-110.15	PEAK
0.0399	90°	1.38	23.04	24.42	115.58	-91.17	AVG
0.0399	90°	4.26	23.04	27.30	135.58	-108.29	PEAK
1.6441	90°	19.92	19.54	39.46	63.29	-23.83	QP
2.1619	90°	22.26	19.40	41.66	69.54	-27.88	QP

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

Test Mode: TX 2402MHz -CH00 -1Mbps

Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1		119.2400	35.39	-14.28	21.11	43.50	-22.39	peak	
2		176.4700	33.09	-12.90	20.19	43.50	-23.31	peak	
3		329.7300	29.28	-11.47	17.81	46.00	-28.19	peak	
4		438.3700	28.56	-8.83	19.73	46.00	-26.27	peak	
5		557.6800	29.24	-7.93	21.31	46.00	-24.69	peak	
6	*	831.2200	32.30	-3.05	29.25	46.00	-16.75	peak	

Test Mode: TX 2402MHz -CH00 -1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		71.7100	37.04	-16.38	20.66	40.00	-19.34	peak	
2		175.5000	37.10	-12.88	24.22	43.50	-19.28	peak	
3		239.5200	36.60	-14.05	22.55	46.00	-23.45	peak	
4		288.0200	34.54	-11.40	23.14	46.00	-22.86	peak	
5		640.1300	31.09	-5.69	25.40	46.00	-20.60	peak	
6	*	876.8100	30.18	-2.28	27.90	46.00	-18.10	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		119.2400	36.39	-14.28	22.11	43.50	-21.39	peak	
2		176.4700	34.09	-12.90	21.19	43.50	-22.31	peak	
3		329.7300	31.28	-11.47	19.81	46.00	-26.19	peak	
4		443.2200	31.16	-8.74	22.42	46.00	-23.58	peak	
5		665.3500	30.65	-5.08	25.57	46.00	-20.43	peak	
6	*	831.2200	32.80	-3.05	29.75	46.00	-16.25	peak	

Test Mode: TX 2440MHz -CH19 -1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		71.7100	39.04	-16.38	22.66	40.00	-17.34	peak	
2		175.5000	38.60	-12.88	25.72	43.50	-17.78	peak	
3		239.5200	39.10	-14.05	25.05	46.00	-20.95	peak	
4		288.0200	36.54	-11.40	25.14	46.00	-20.86	peak	
5		640.1300	32.09	-5.69	26.40	46.00	-19.60	peak	
6	*	876.8100	31.18	-2.28	28.90	46.00	-17.10	peak	

Test Mode: TX 2480MHz -CH39 -1Mbps

Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1		119.2400	36.39	-14.28	22.11	43.50	-21.39	peak	
2		176.4700	34.09	-12.90	21.19	43.50	-22.31	peak	
3		443.2200	31.16	-8.74	22.42	46.00	-23.58	peak	
4		557.6800	30.74	-7.93	22.81	46.00	-23.19	peak	
5		709.0000	31.04	-4.87	26.17	46.00	-19.83	peak	
6	*	831.2200	33.30	-3.05	30.25	46.00	-15.75	peak	

Test Mode: TX 2480MHz -CH39 -1Mbps

Horizontal

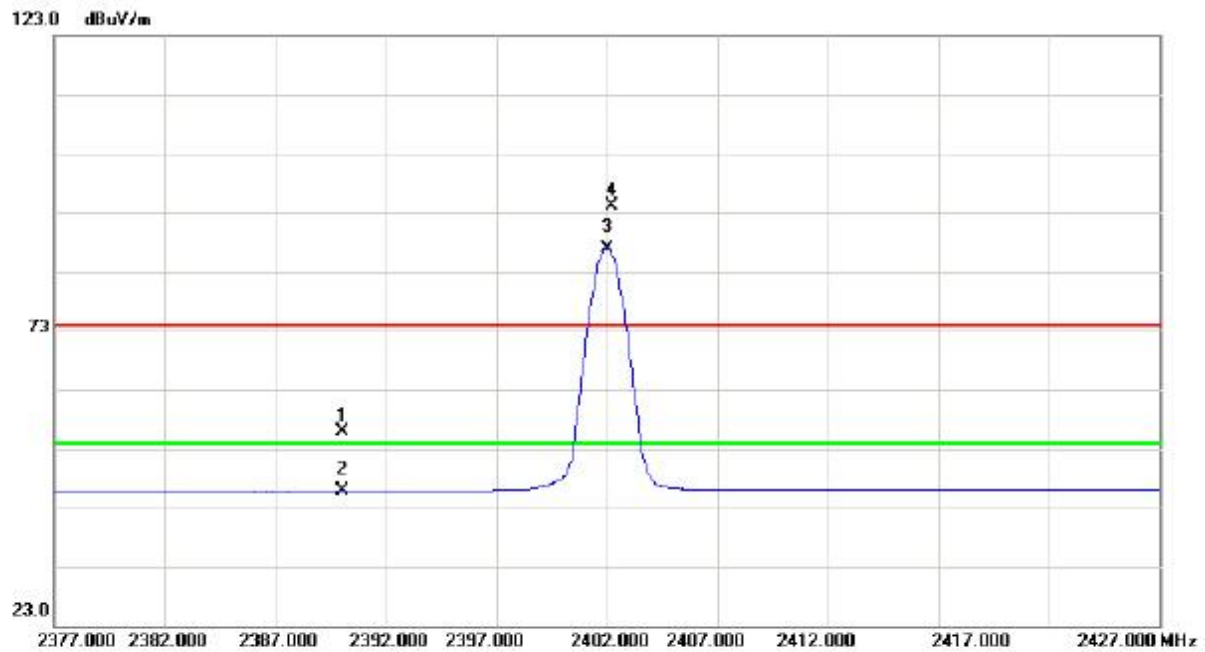


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		71.7100	38.54	-16.38	22.16	40.00	-17.84	peak	
2		175.5000	38.10	-12.88	25.22	43.50	-18.28	peak	
3		288.0200	36.04	-11.40	24.64	46.00	-21.36	peak	
4		447.1000	31.01	-8.67	22.34	46.00	-23.66	peak	
5		640.1300	32.59	-5.69	26.90	46.00	-19.10	peak	
6	*	876.8100	31.18	-2.28	28.90	46.00	-17.10	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis :	X
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		2390.000	24.02	31.88	55.90	74.00	-18.10	peak	
2		2390.000	13.99	31.88	45.87	54.00	-8.13	AVG	
3	*	2402.050	55.10	31.89	86.99	54.00	32.99	AVG	No Limit
4	X	2402.250	62.36	31.89	94.25	74.00	20.25	peak	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz_CH00_1Mbps

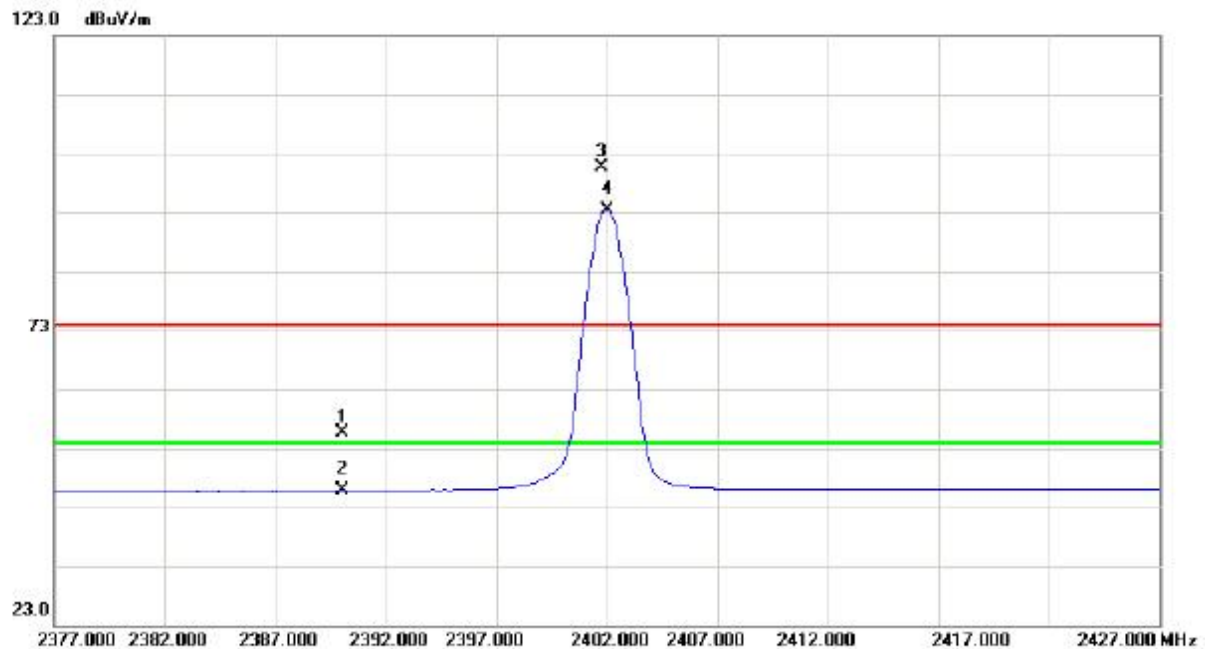
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4803.980	29.21	3.58	32.79	54.00	-21.21	AVG	
2		4804.010	39.54	3.58	43.12	74.00	-30.88	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	23.66	31.88	55.54	74.00	-18.46	peak	
2		2390.000	13.95	31.88	45.83	54.00	-8.17	AVG	
3	X	2401.750	68.83	31.89	100.72	74.00	26.72	peak	No Limit
4	*	2402.050	61.54	31.89	93.43	54.00	39.43	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

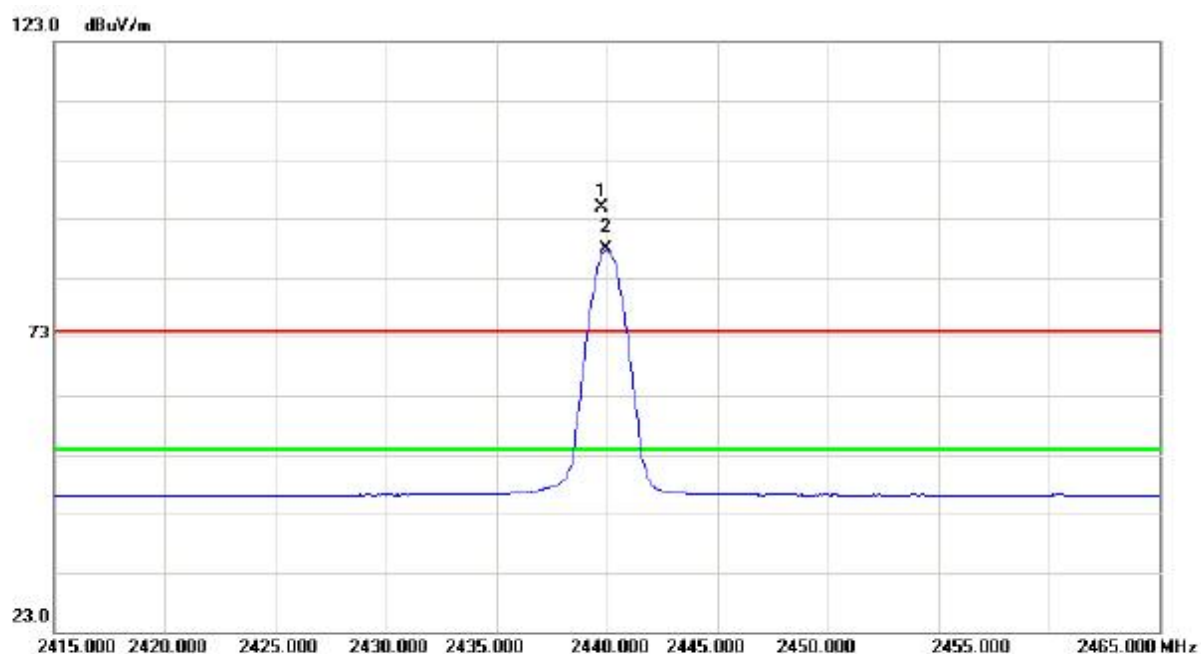
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.010	40.31	3.58	43.89	74.00	-30.11	peak	
2	*	4804.030	31.05	3.58	34.63	54.00	-19.37	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2440MHz_CH19_1Mbps

Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2439.750	63.05	31.95	95.00	74.00	21.00	peak	No Limit
2	*	2439.950	55.87	31.95	87.82	54.00	33.82	AVG	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2440MHz_CH19_1Mbps

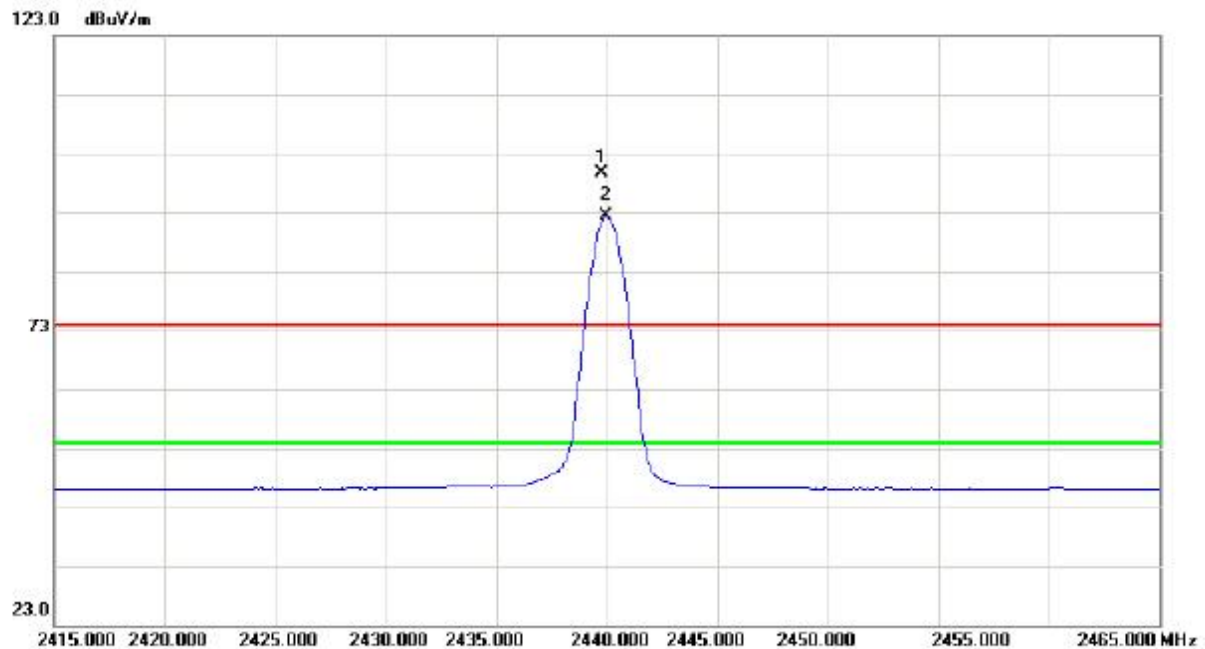
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4879.900	32.33	3.73	36.06	54.00	-17.94	AVG	
2		4879.980	42.65	3.73	46.38	74.00	-27.62	peak	

Orthogonal Axis :	X
Test Mode :	TX 2440MHz_CH19_1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2439.750	67.63	31.95	99.58	74.00	25.58	peak	No Limit
2	*	2439.950	60.44	31.95	92.39	54.00	38.39	AVG	No Limit

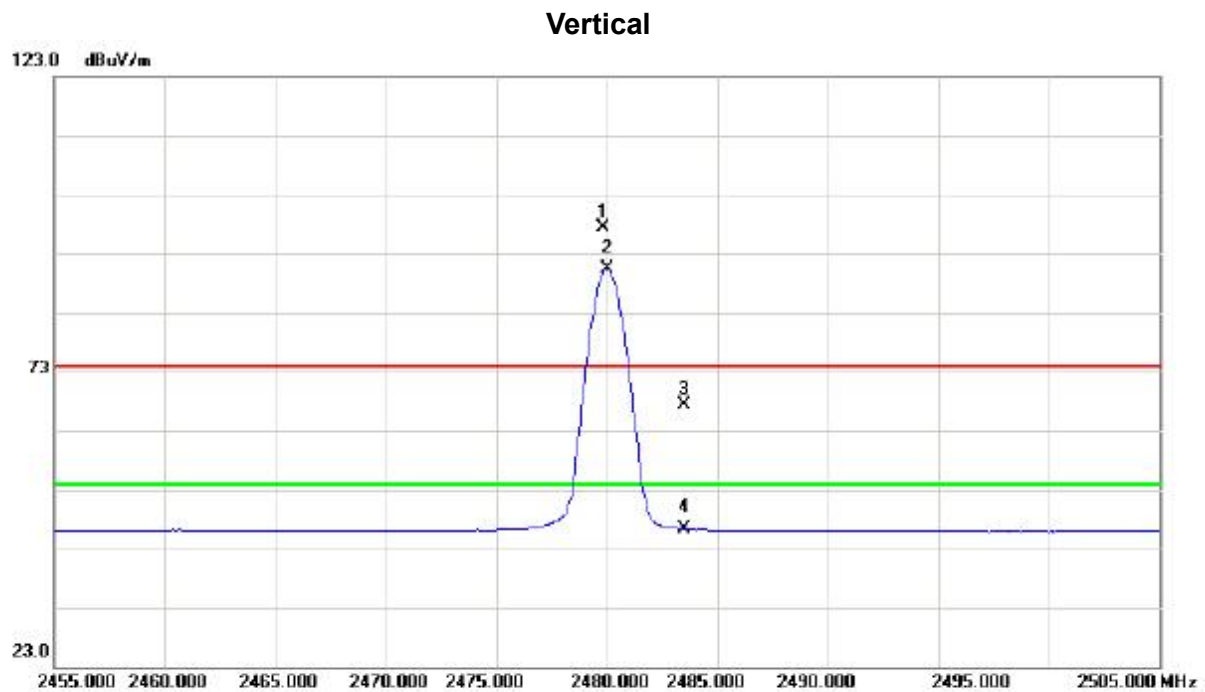
Orthogonal Axis :	X
Test Mode :	TX 2440MHz_CH19_1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4880.050	33.96	3.73	37.69	54.00	-16.31	AVG	
2		4880.100	45.41	3.73	49.14	74.00	-24.86	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	X	2479.800	65.47	32.00	97.47	74.00	23.47	peak	No Limit
2	*	2480.000	58.50	32.00	90.50	54.00	36.50	AVG	No Limit
3		2483.500	35.42	32.01	67.43	74.00	-6.57	peak	
4		2483.500	14.35	32.01	46.36	54.00	-7.64	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz_CH39_1Mbps

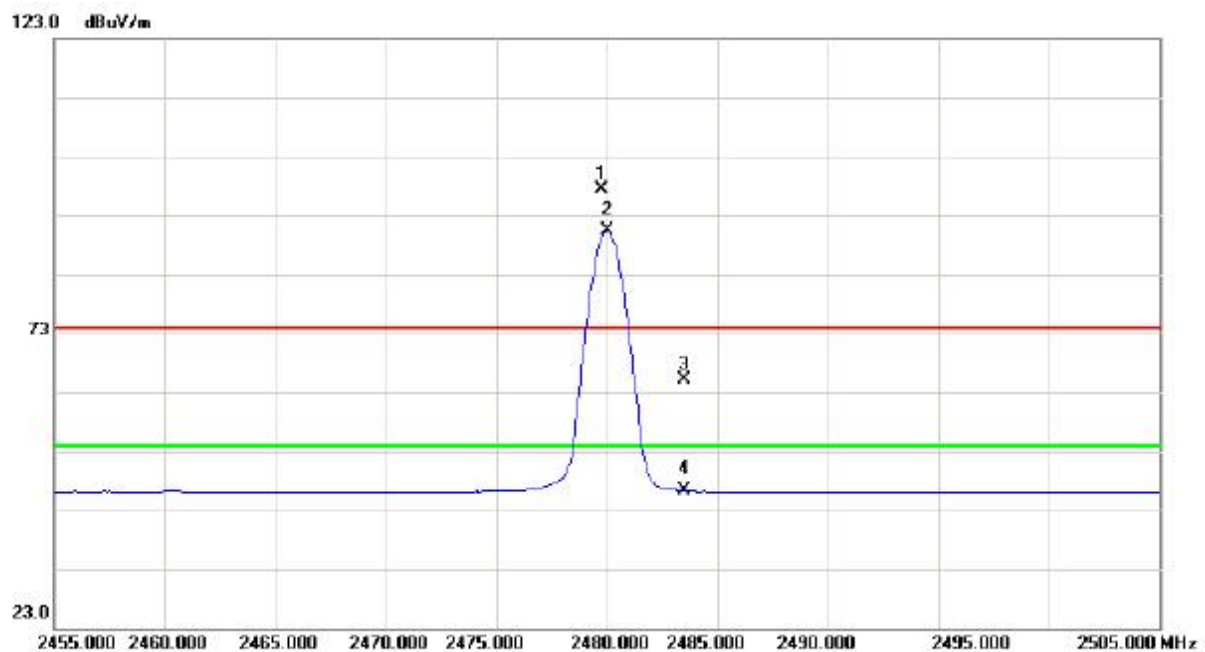
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.880	30.14	3.88	34.02	54.00	-19.98	AVG	
2		4959.960	40.34	3.88	44.22	74.00	-29.78	peak	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz_CH39_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	2479.750	65.47	32.00	97.47	74.00	23.47	peak	No Limit
2	*	2480.000	58.41	32.00	90.41	54.00	36.41	AVG	No Limit
3		2483.500	33.08	32.01	65.09	74.00	-8.91	peak	
4		2483.500	14.37	32.01	46.38	54.00	-7.62	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2480MHz_CH39_1Mbps

Horizontal



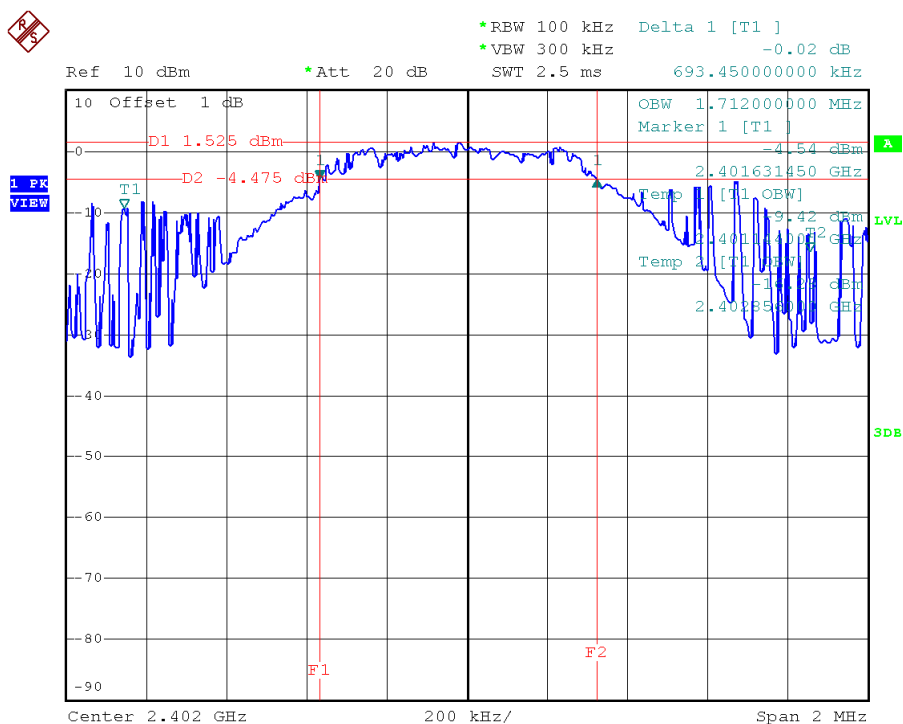
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.700	41.15	3.88	45.03	74.00	-28.97	peak	
2	*	4959.920	31.89	3.88	35.77	54.00	-18.23	AVG	

ATTACHMENT E - BANDWIDTH

Test Mode : CH00, CH19 , CH39 - 1Mbps

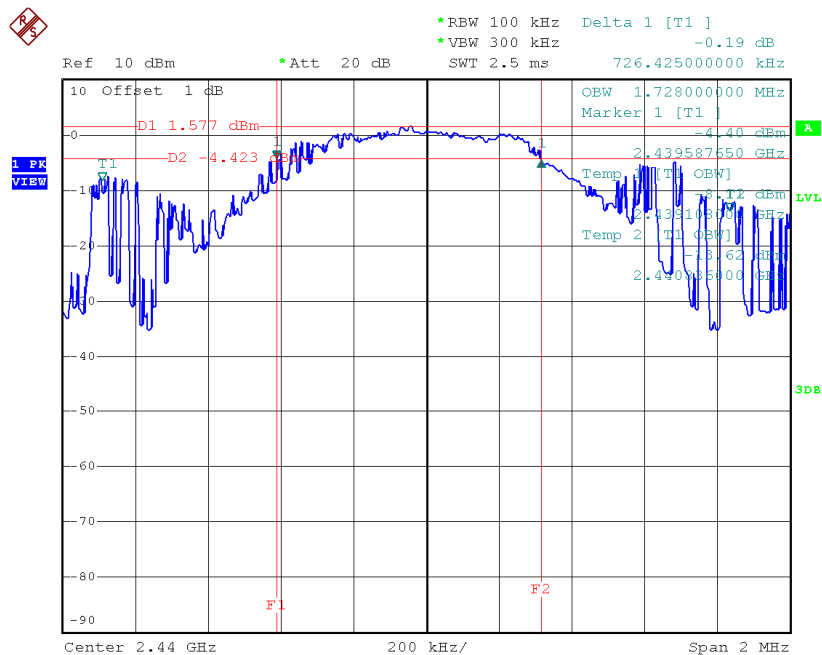
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.693	1.712	500	Complies
2440	0.726	1.728	500	Complies
2480	0.648	1.708	500	Complies

TX CH00



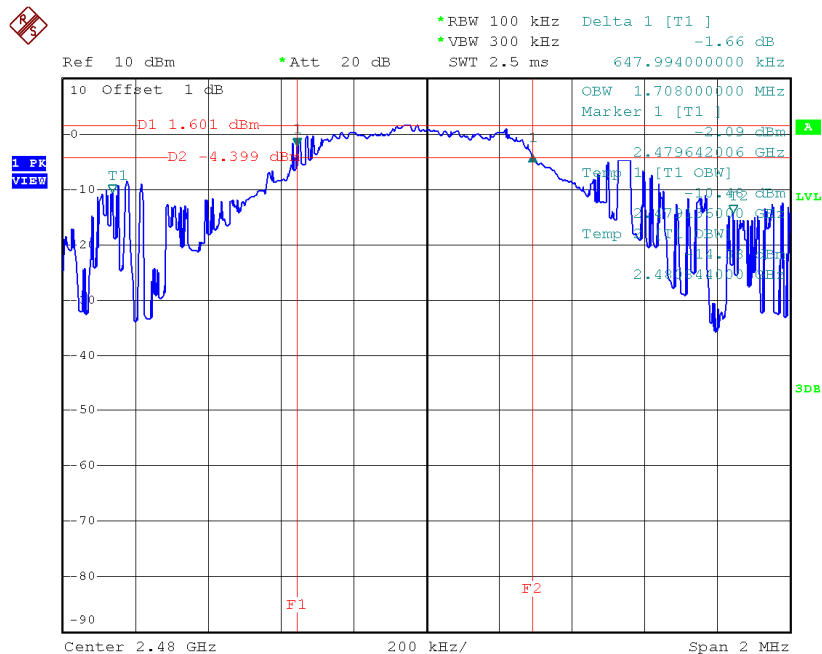
Date: 26.MAR.2015 22:43:05

TX CH19



Date: 26.MAR.2015 22:43:59

TX CH39



Date: 26.MAR.2015 22:44:46

ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

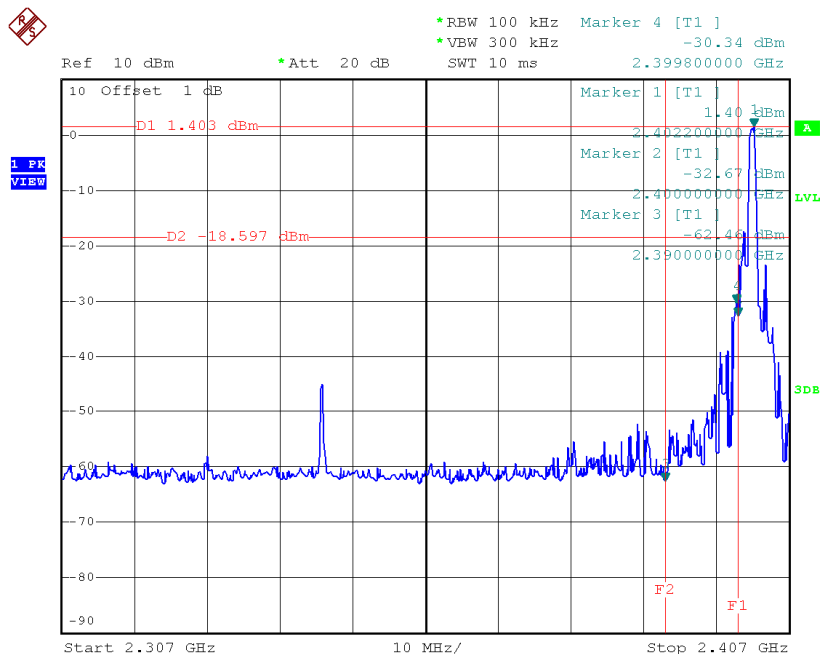
Test Mode :	CH00, CH19 , CH39 - 1Mbps
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	1.87	0.0015	30.00	1.00	Complies
2440	1.82	0.0015	30.00	1.00	Complies
2480	1.83	0.0015	30.00	1.00	Complies

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

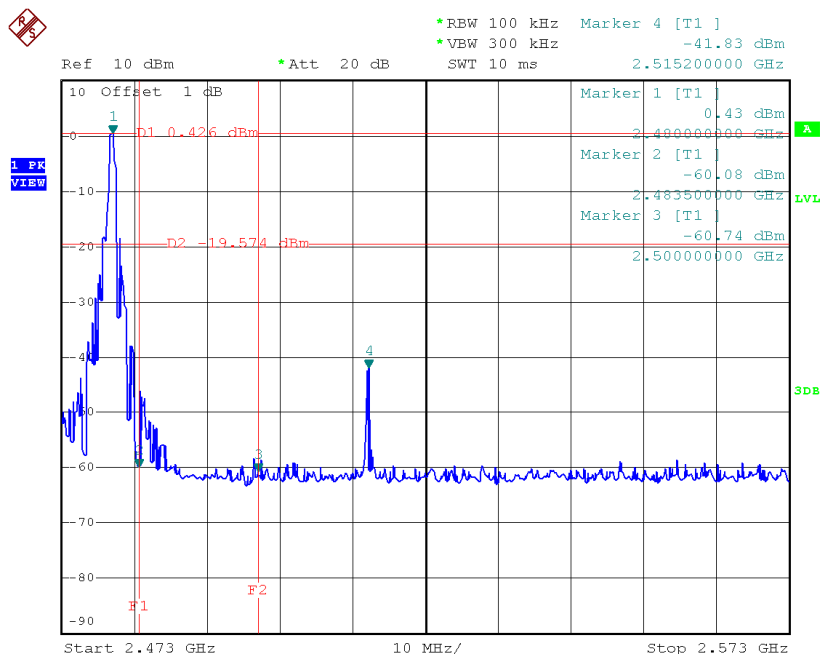
Test Mode : CH00, CH19 , CH39 - 1Mbps

CH00 (Lower) - 1Mbps



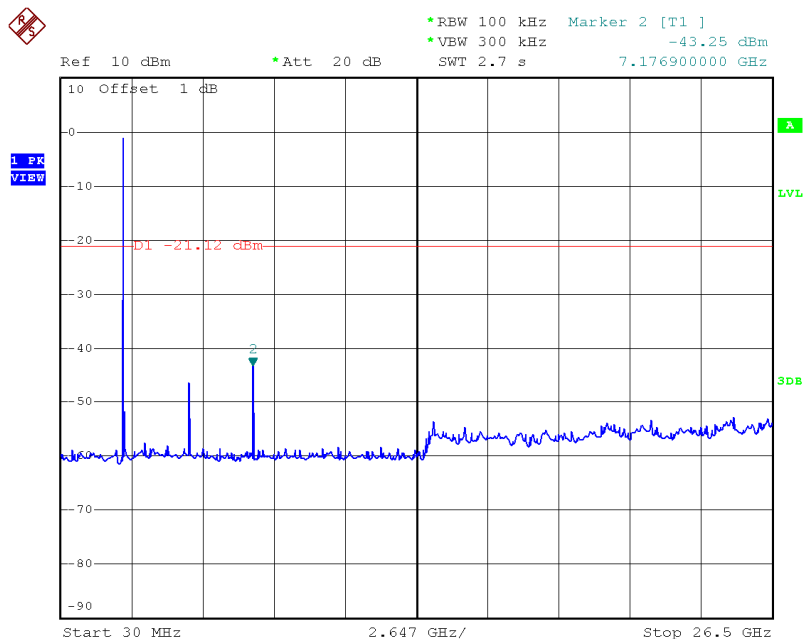
Date: 26.MAR.2015 22:43:14

CH39 (upper) - 1Mbps



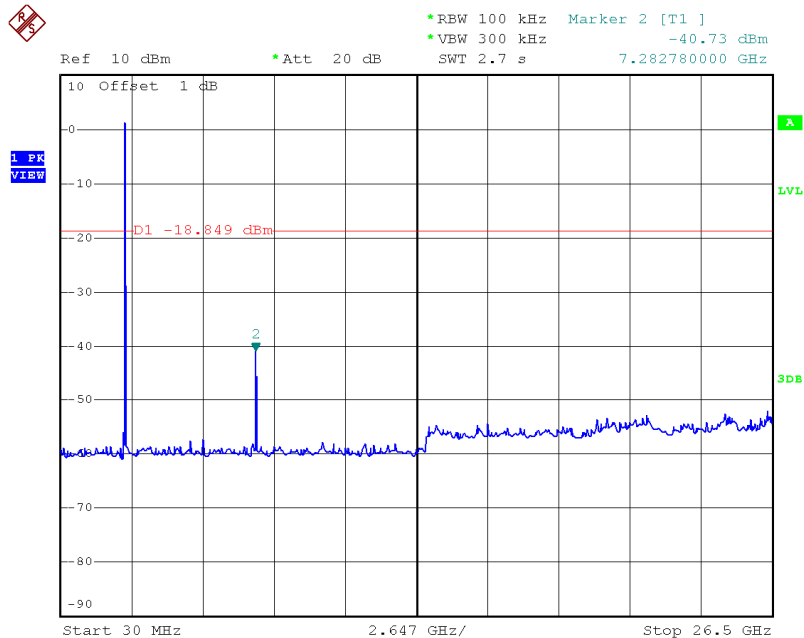
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CH00 (10 Harmonic of the frequency)



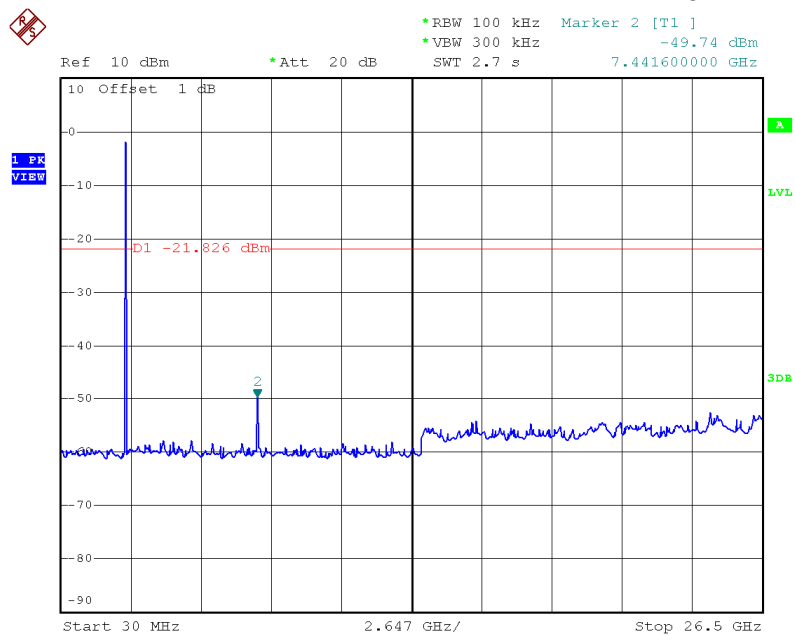
Date: 26.MAR.2015 22:43:28

CH19 (10 Harmonic of the frequency)



Date: 26.MAR.2015 22:44:23

CH39 (10 Harmonic of the frequency)



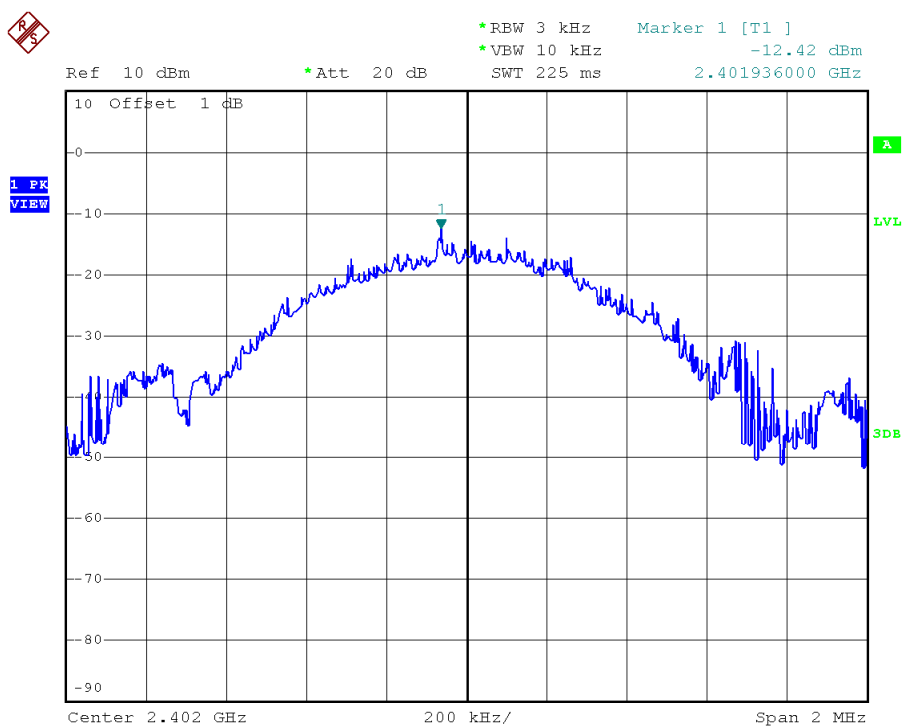
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ATTACHMENT H - POWER SPECTRAL DENSITY TEST

Test Mode :	CH00, CH19 , CH39 - 1Mbps
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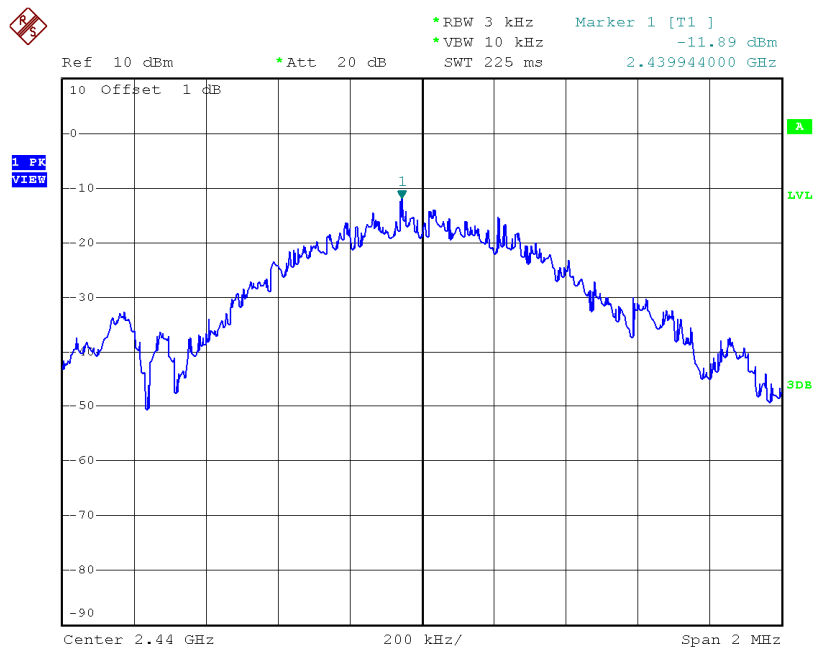
Frequency (MHz)	Power Density (dBm)	Max. Limit (dBm)	Result
2402	-12.42	8	Complies
2440	-11.89	8	Complies
2480	-12.54	8	Complies

TX CH00



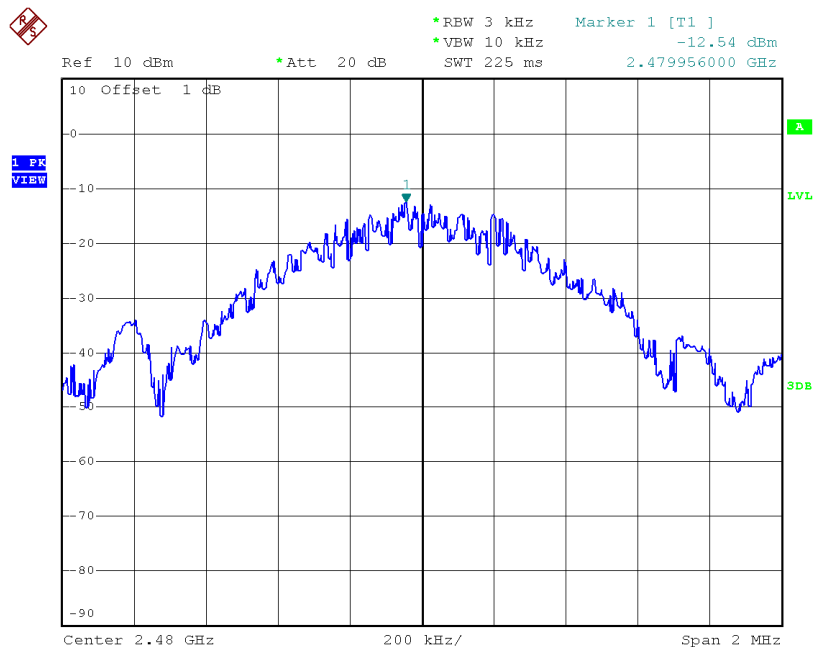
Date: 26.MAR.2015 22:43:34

TX CH19



Date: 26.MAR.2015 22:44:29

TX CH39



Date: 26.MAR.2015 22:45:12