

# FCC Radio Test Report

## FCC ID: RWO-RZ370251

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

Project No. : 1712C246  
Equipment : Gaming Router  
Test Model : RZ37-0251  
Series Model : RZ37-0251XXXX-XXXX(X: Can be 0-9, A-Z)  
Applicant : Razer Inc.  
Address : 201 3rd Street, Suite 900, San Francisco,CA  
94103,USA

Date of Receipt : Nov. 28, 2017  
Date of Test : Nov. 28, 2017 ~ Feb. 09, 2018  
Issued Date : Mar. 12, 2018  
Tested by : BTL Inc.

Testing Engineer : Kenji Lin  
(Kenji Lin)

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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-1-1712C246	Original Issue.	Mar. 12, 2018

## 1. CERTIFICATION

Equipment : Gaming Router  
Brand Name : RAZER  
Test Model : RZ37-0251  
Series Model : RZ37-0251XXXX-XXXX (X: Can be 0-9, A-Z)  
Applicant : Razer Inc.  
Manufacturer : Razer (Asia-Pacific) Pte.,Ltd  
Address : 514 Chai Chee Lane #07-01 ~ 06 Singapore 469029, Tel: +65 6505 2188  
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 : Nov. 28, 2017 ~ Feb. 09, 2018  
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-1-1712C246) 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			
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	
15.247(d)/ 15.205/ 15.209	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:

### Conducted emission Test:

**C05:** (VCCI RN: C-4742; FCC RN:965108; FCC DN:TW0659)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

### Radiated emission Test (Below 1 GHz):

**CB11:** (VCCI RN: R-4260; FCC RN:949005; FCC DN:TW0659; IC Assigned Code:20088)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

### Radiated emission Test (Above 1 GHz):

**CB11:** (VCCI RN: G-868; FCC RN:949005; FCC DN:TW0659; IC Assigned Code:20088)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

## 2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor)  $k=1.96$  or  $k=2$  (which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %,  $U=2xUc(y)$ .

The BTL measurement uncertainty as below table:

### A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
C05	CISPR	150 kHz ~ 30MHz	2.68

### B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
CB11 (3m)	CISPR	9kHz ~ 150kHz	4.00
		150kHz ~ 30MHz	4.00

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB11 (3m)	CISPR	30MHz ~ 200MHz	V	3.06
		30MHz ~ 200MHz	H	2.58
		200MHz ~ 1,000MHz	V	3.50
		200MHz ~ 1,000MHz	H	3.10

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB11 (3m)	CISPR	1GHz ~ 6GHz	V	4.14
		1GHz ~ 6GHz	H	4.14
		6GHz ~ 18GHz	V	5.34
		6GHz ~ 18GHz	H	5.34

Test Site	Method	Measurement Frequency Range	U,(dB)
CB11 (1m)	CISPR	18 ~ 26.5 GHz	4.80
		26.5 ~ 40 GHz	5.28

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	Gaming Router	
Brand Name	RAZER	
Test Model	RZ37-0251	
Series Model	RZ37-0251XXXX-XXXX (X: Can be 0-9, A-Z)	
Model Difference	It is the same as the basic model and X is used to define which country it is for under the same family series.	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	-1.72 dBm (1Mbps)
Power Source	Supplied from adapter. Brand / Model: APD / WA-36A12R	
Power Rating	Input:100-240V ~50-60Hz, 0.9A Max Output: 12V ---3A	

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. No.	Ant. Brand	Ant. Model	Ant. Type	Ant. Gain (dBi)
9	<b>LYNwave</b>	N/A	Internal Antenna	3.33

### 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 <b>NOTE (1)</b>

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 1	TX Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>

Note:

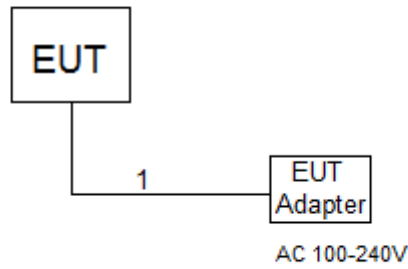
(1) The measurements are performed at the high, middle, low available channels.

### 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 BT LE

Test Software Version	Putty		
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.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.8m	Power Cable

## 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 (dB $\mu$ V)	
	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

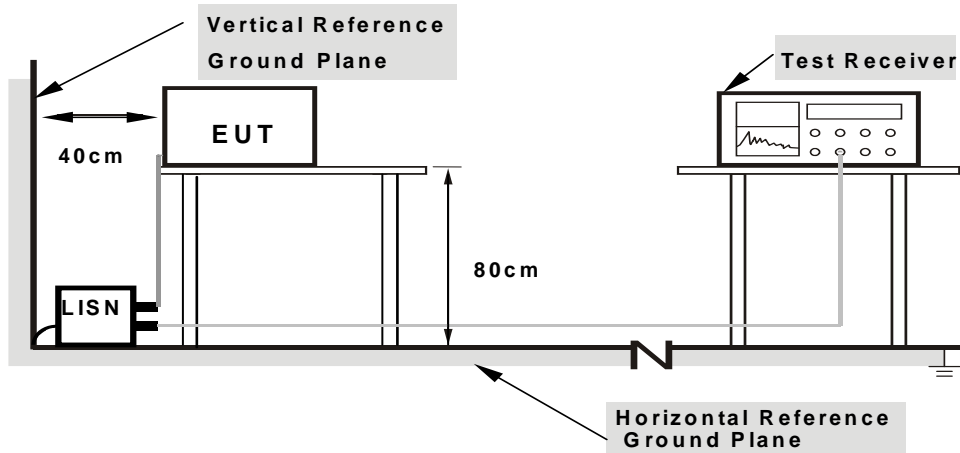
#### 4.1.2 TEST PROCEDURE

- 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 equipment 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 cm 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: 24°C    Relative Humidity: 60%    Test Voltage: AC 120V/60Hz

#### 4.1.7 TEST RESULTS

Please refer to the Appendix 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

- 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 meter 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 0.8m 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. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. 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.
- g. 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)
- h. 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)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

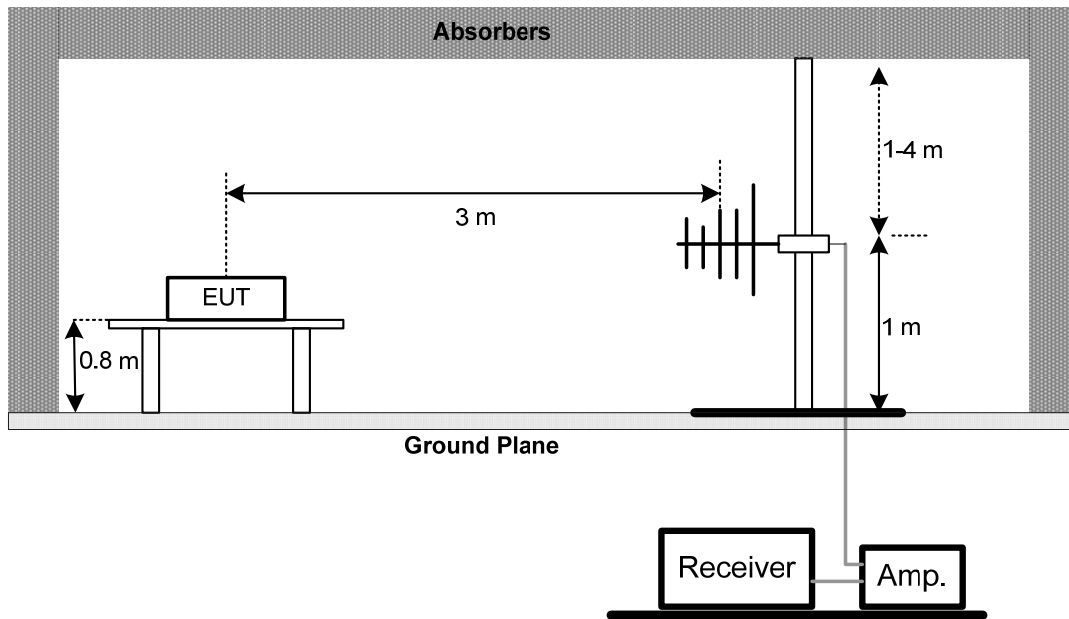
#### 4.2.3 DEVIATION FROM TEST STANDARD

No deviation

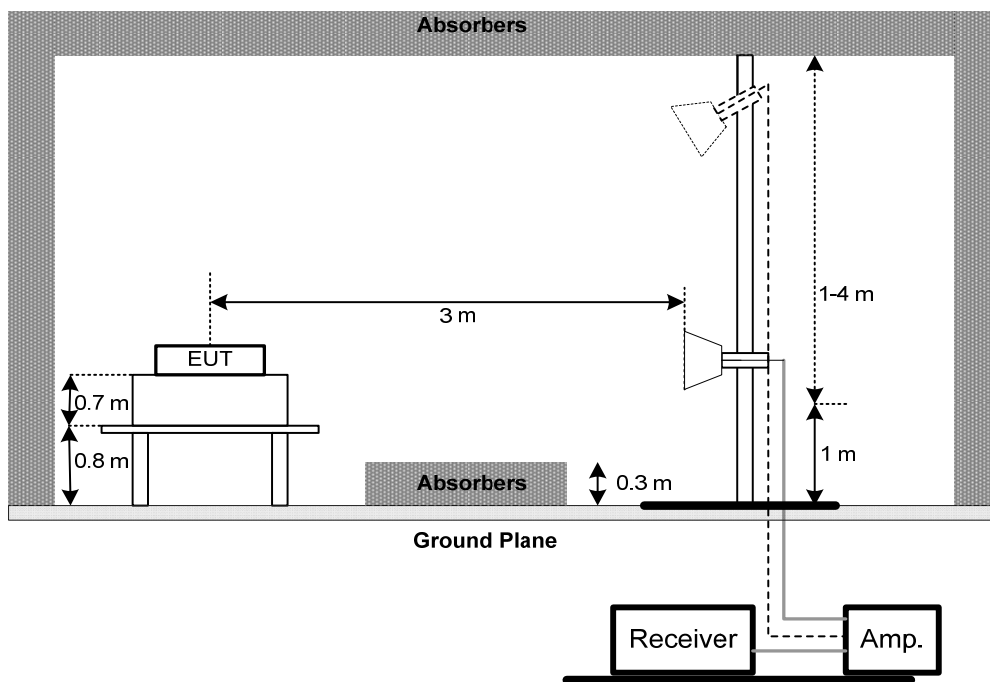


**4.2.4 TEST SETUP**

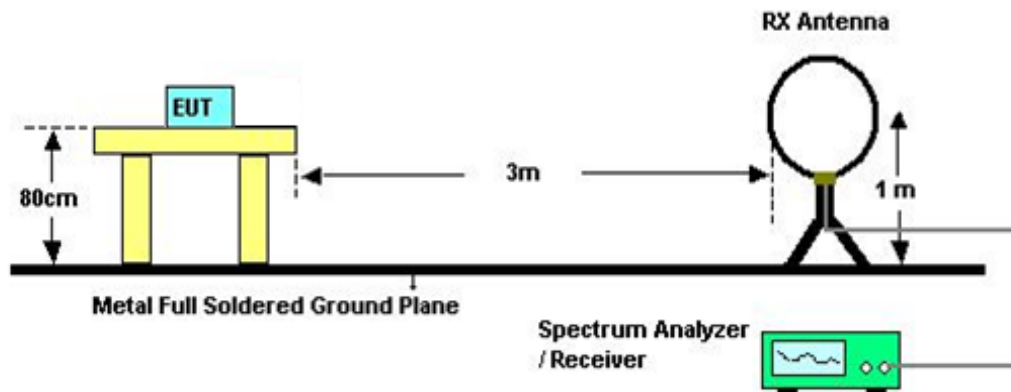
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



#### 4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.2.6 EUT TEST CONDITIONS

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

#### 4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Appendix 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 1000MHZ)

Please refer to the Appendix C.

#### 4.2.9 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the Appendix D.

Remark:

- (1) 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

- 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: 24°C    Relative Humidity: 60%    Test Voltage: AC 120V/60Hz

#### 5.1.6 TEST RESULTS

Please refer to the Appendix 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

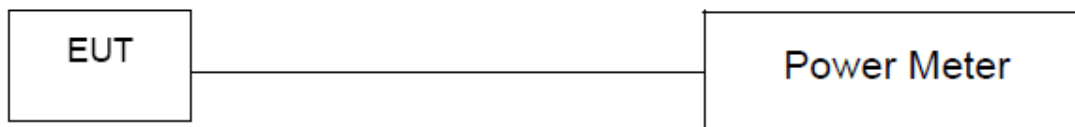
#### 6.1.1 TEST PROCEDURE

- 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.

#### 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: 24°C    Relative Humidity: 60%    Test Voltage: AC 120V/60Hz

#### 6.1.6 TEST RESULTS

Please refer to the Appendix 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.

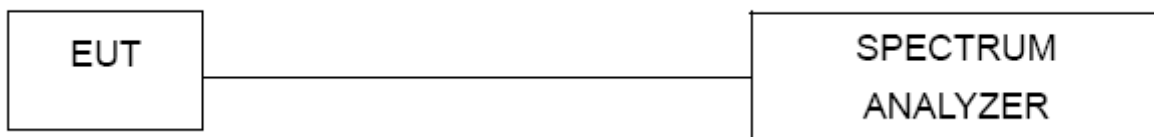
#### 7.1.1 TEST PROCEDURE

- 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=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: 24°C    Relative Humidity: 60%    Test Voltage: AC 120V/60Hz

#### 7.1.6 TEST RESULTS

Please refer to the Appendix 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: 24°C    Relative Humidity: 60%    Test Voltage: AC 120V/60Hz

#### 8.1.6 TEST RESULTS

Please refer to the Appendix H.

## 9. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Jan. 24, 2019
2	Test Cable	TIMES	CFD300-NL	C02	Jun. 12, 2018
3	EMI Test Receiver	R&S	ESR7	101433	Dec. 07, 2018
4	Power Dividers	HP	11636A	8103	May 02, 2018
5	Measurement Software	EZ	EZ EMC (Version NB-03A)	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jul. 28, 2018
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 18, 2018
3	Horn Antenna	Schwarzbeck	BBHA 9120	9120D-1333	May 18, 2018
4	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 14, 2018
5	Pre-Amplifier	Agilent	8449B	3008A01714	Apr. 12, 2018
6	Test Cable	LMR	LMR-400	01(10M)	May 10, 2018
7	Test Cable	LMR	LMR-400	01(3M)	May 10, 2018
8	Test Cable	Harbour industries	27478LL142	1M	May 10, 2018
9	Test Cable	Harbour industries	27478LL142	3M	May 10, 2018
10	Test Cable	AISI	S104-SMAP-1	8M	May 10, 2018
11	Spectrum Analyzer	Agilent	N9020A	MY51160196	Aug. 01, 2018
12	EMI Test Receiver	R&S	ESCI	100080	May 10, 2018
13	Measurement Software	Farad	EZ EMC (Version NB-03A)	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	100129	Jan. 15, 2019

**Peak Output Power Measurement**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2487A	6K00004714	May 17, 2018
2	Power Meter Sensor	Anritsu	MA2491A	034138	May 17, 2018

**Antenna Conducted Spurious Emission Measurement**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 15, 2019

**Power Spectral Density Measurement**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 15, 2019

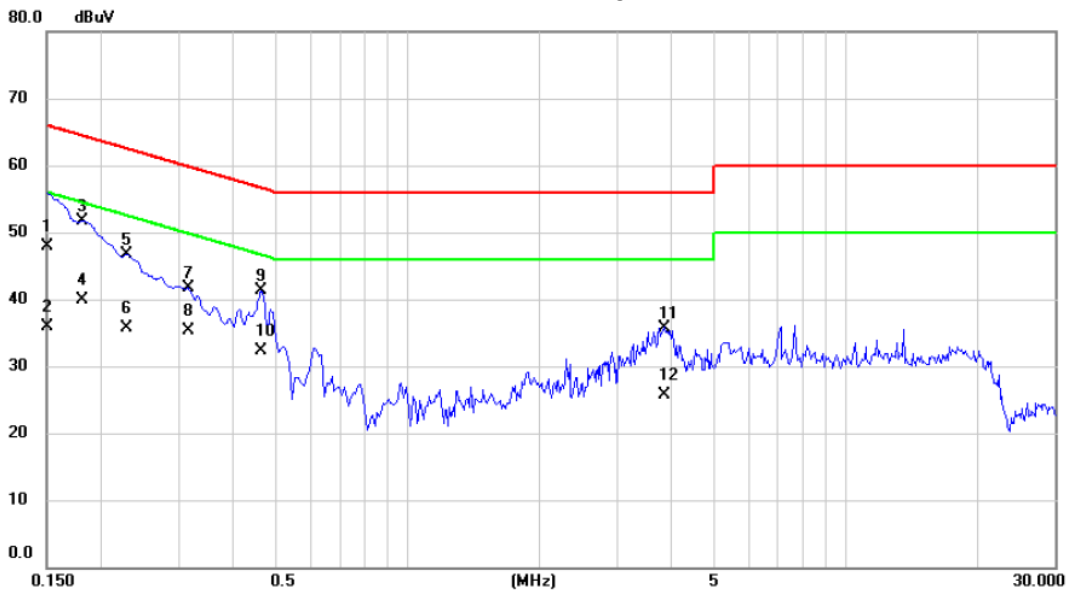
Remark: "N/A" denotes no model name, serial no. or calibration specified.  
 All calibration period of equipment list is one year.



## APPENDIX A - CONDUCTED EMISSION

Test Mode: TX Mode

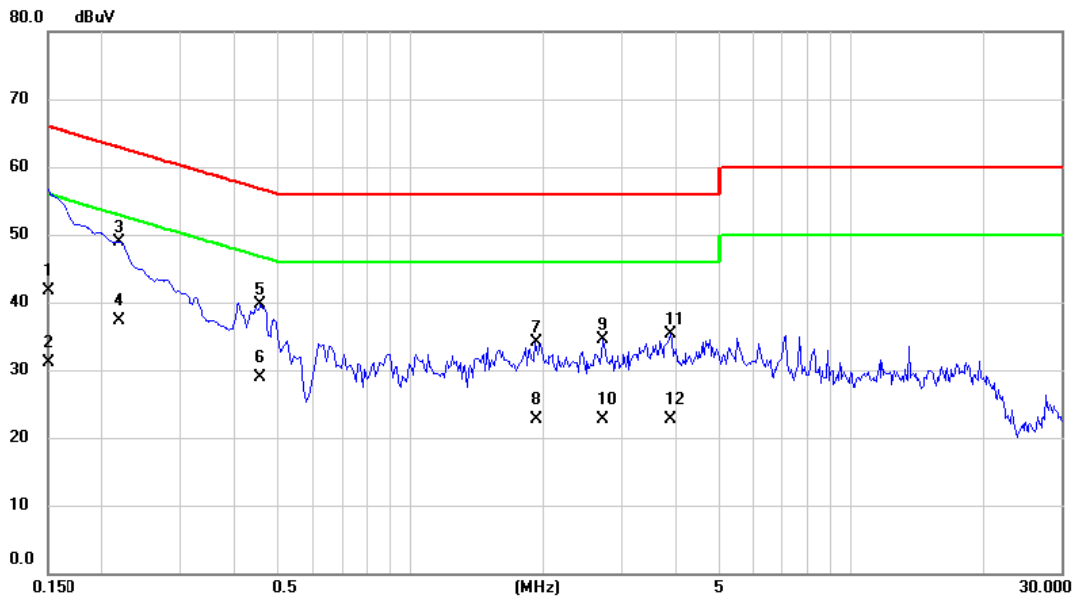
### Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1500	38.23	9.73	47.96	66.00	-18.04	QP	
2		0.1500	26.26	9.73	35.99	56.00	-20.01	AVG	
3	*	0.1814	41.93	9.72	51.65	64.42	-12.77	peak	
4		0.1814	30.17	9.72	39.89	54.42	-14.53	AVG	
5		0.2283	37.01	9.72	46.73	62.51	-15.78	peak	
6		0.2283	25.97	9.72	35.69	52.51	-16.82	AVG	
7		0.3150	31.99	9.73	41.72	59.84	-18.12	peak	
8		0.3150	25.54	9.73	35.27	49.84	-14.57	AVG	
9		0.4635	31.48	9.74	41.22	56.63	-15.41	peak	
10		0.4635	22.47	9.74	32.21	46.63	-14.42	AVG	
11		3.8480	26.00	9.80	35.80	56.00	-20.20	peak	
12		3.8480	15.87	9.80	25.67	46.00	-20.33	AVG	

Test Mode: TX Mode

### Neutral

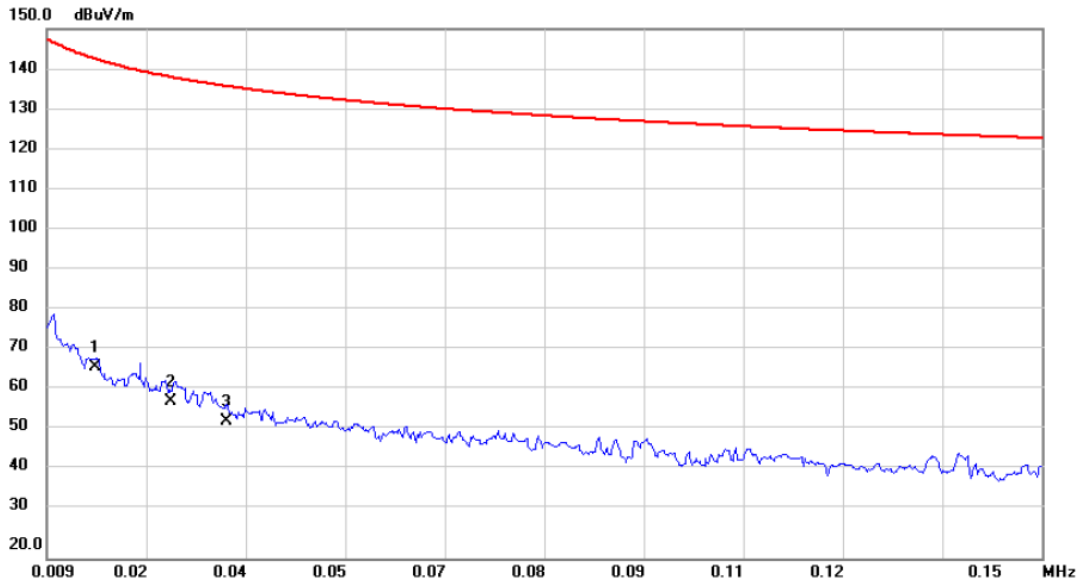


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1500	32.14	9.65	41.79	66.00	-24.21	QP	
2		0.1500	21.43	9.65	31.08	56.00	-24.92	AVG	
3	*	0.2184	39.28	9.66	48.94	62.88	-13.94	peak	
4		0.2184	27.65	9.66	37.31	52.88	-15.57	AVG	
5		0.4577	30.03	9.68	39.71	56.73	-17.02	peak	
6		0.4577	19.23	9.68	28.91	46.73	-17.82	AVG	
7		1.9217	24.40	9.71	34.11	56.00	-21.89	peak	
8		1.9217	12.96	9.71	22.67	46.00	-23.33	AVG	
9		2.7317	24.71	9.73	34.44	56.00	-21.56	peak	
10		2.7317	13.03	9.73	22.76	46.00	-23.24	AVG	
11		3.8840	25.61	9.76	35.37	56.00	-20.63	peak	
12		3.8840	12.89	9.76	22.65	46.00	-23.35	AVG	

## APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)

Test Mode: TX Mode

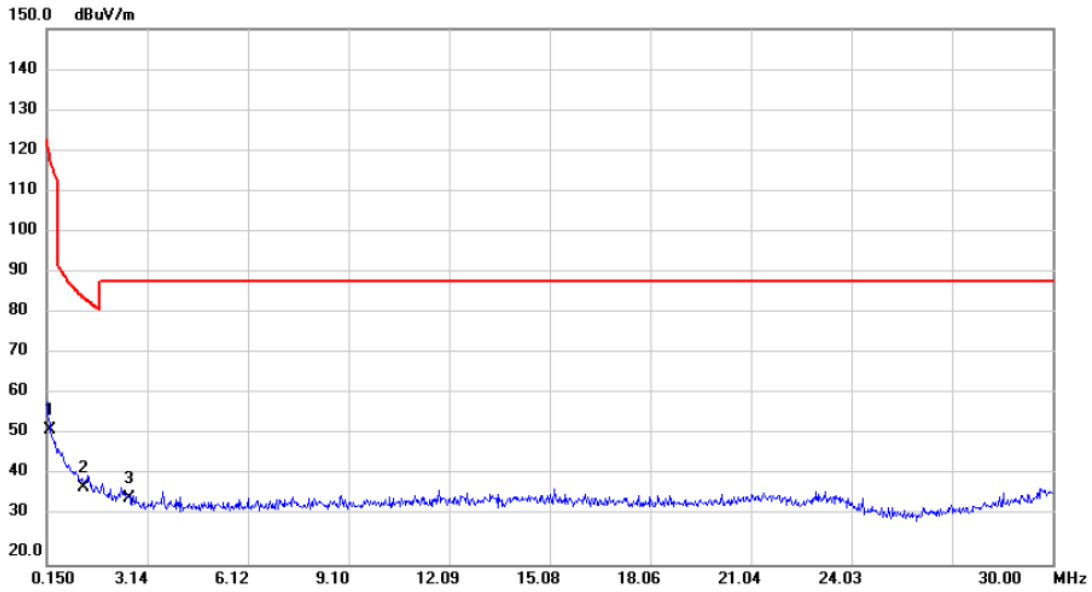
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0158	-8.14	74.96	66.82	142.71	-75.89	AVG	
2		0.0265	-12.12	70.78	58.66	138.22	-79.56	AVG	
3		0.0345	-14.85	68.55	53.70	135.93	-82.23	AVG	

Test Mode: TX Mode

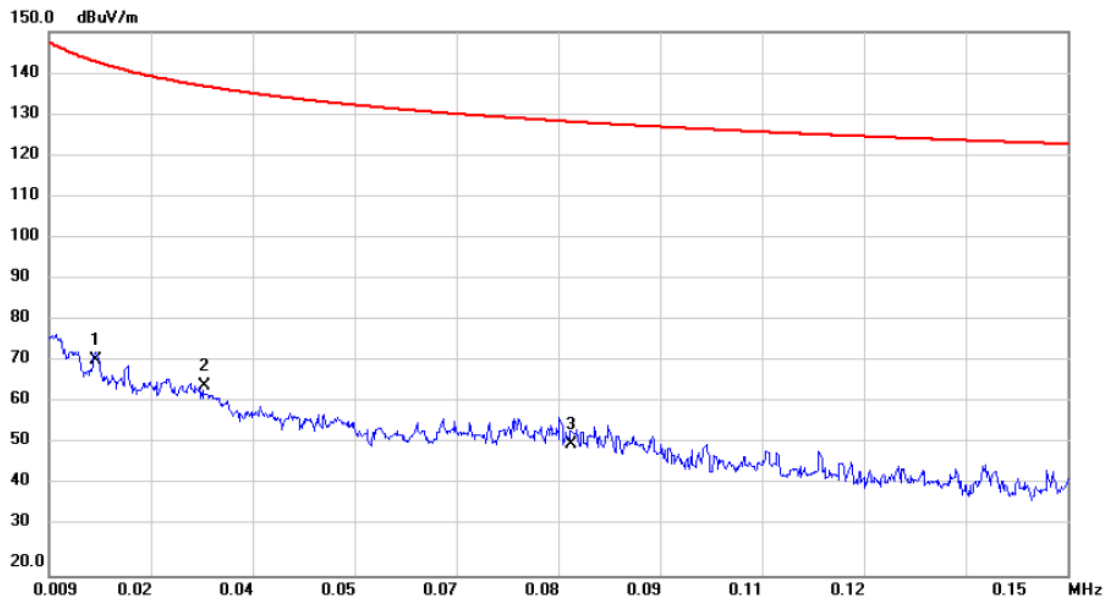
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2341	1.50	51.14	52.64	119.30	-66.66	AVG	
2	*	1.2291	-2.32	40.85	38.53	84.90	-46.37	QP	
3		2.6082	-2.64	38.57	35.93	88.63	-52.70	QP	

Test Mode: TX Mode

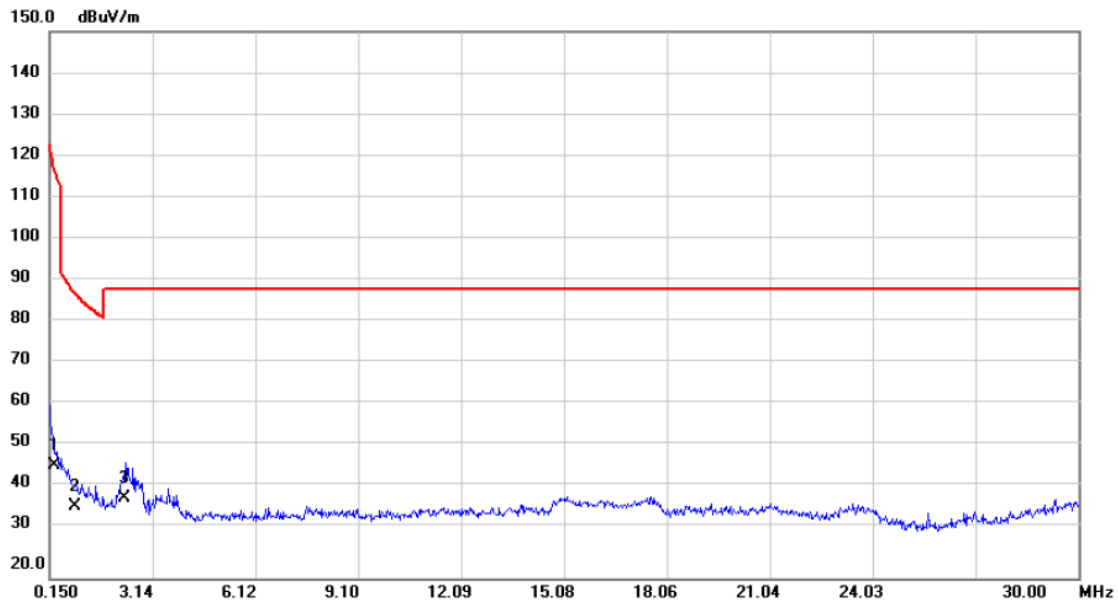
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0154	-3.68	75.21	71.53	142.93	-71.40	AVG	
2		0.0306	-4.40	69.72	65.32	136.97	-71.65	AVG	
3		0.0812	-8.99	60.19	51.20	128.49	-77.29	AVG	

Test Mode: TX Mode

Ant 90°



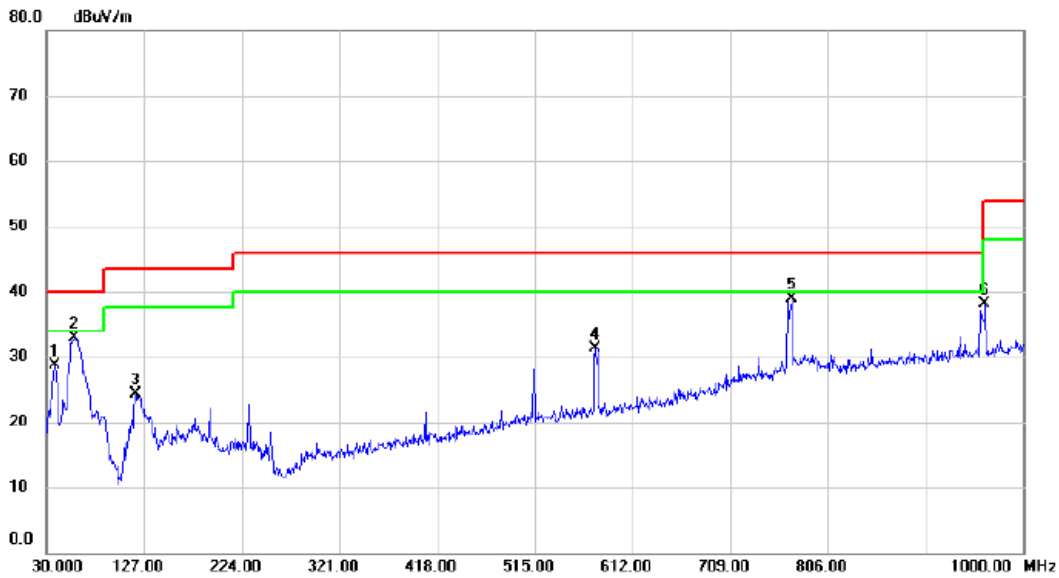
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2830	-2.52	49.48	46.96	117.66	-70.70	AVG	
2		0.8892	-4.68	41.85	37.17	87.71	-50.54	QP	
3	*	2.3213	0.32	38.78	39.10	88.63	-49.53	QP	



## APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)

Test Mode: TX 2402MHz \_CH00\_1Mbps

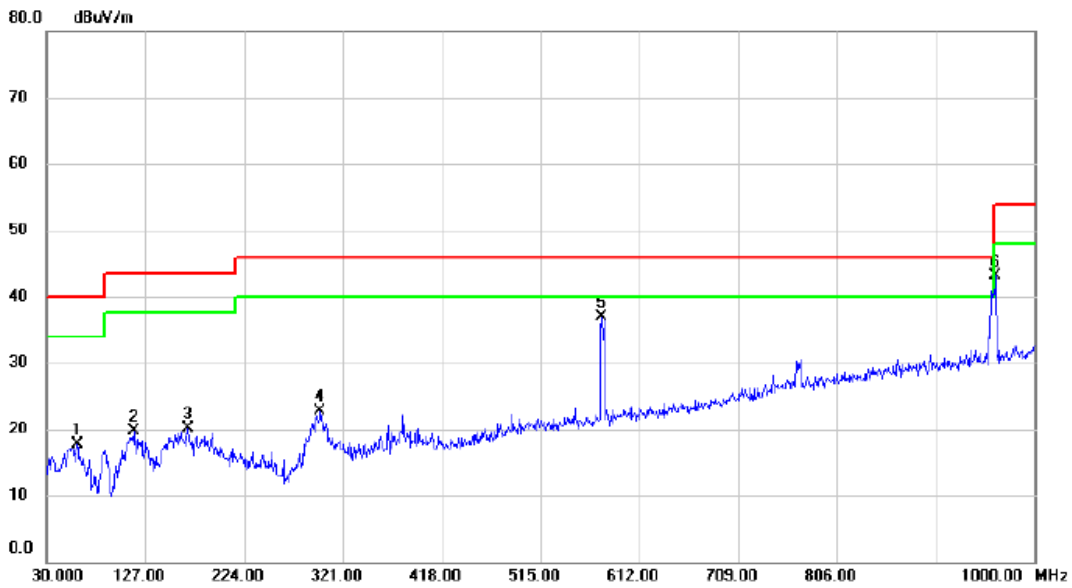
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		37.760	64.22	-35.54	28.68	40.00	-11.32	peak	
2		57.160	66.43	-33.52	32.91	40.00	-7.09	peak	
3		118.270	53.38	-29.13	24.25	43.50	-19.25	peak	
4		575.140	51.94	-20.63	31.31	46.00	-14.69	peak	
5	*	770.110	55.09	-16.17	38.92	46.00	-7.08	peak	
6		962.170	50.56	-12.40	38.16	54.00	-15.84	peak	

Test Mode: TX 2402MHz \_CH00\_1Mbps

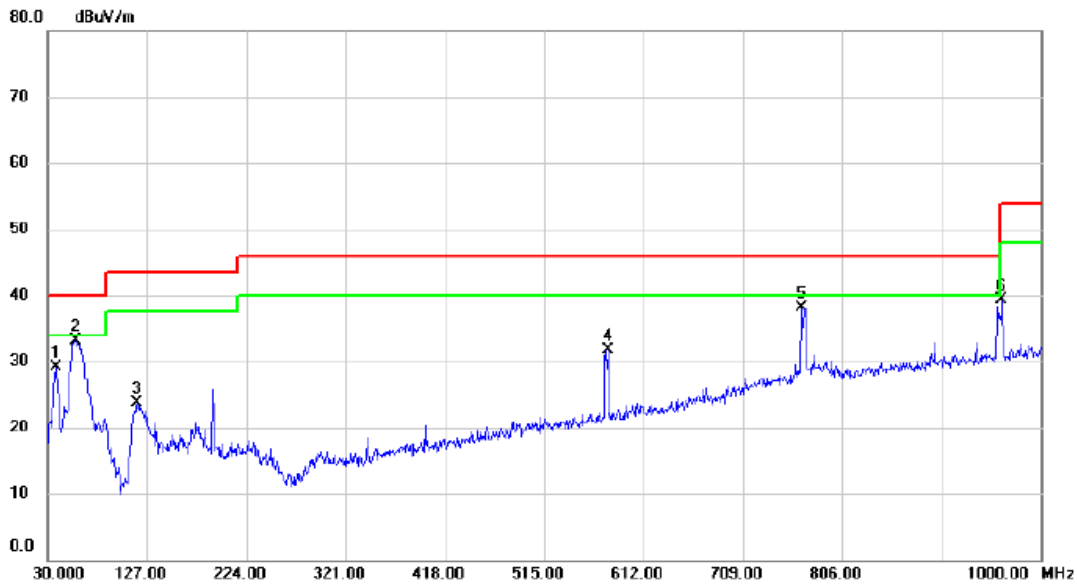
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		60.070	51.77	-34.07	17.70	40.00	-22.30	peak	
2		115.360	49.06	-29.43	19.63	43.50	-23.87	peak	
3		168.710	48.71	-28.53	20.18	43.50	-23.32	peak	
4		298.690	50.75	-28.00	22.75	46.00	-23.25	peak	
5	*	575.140	57.46	-20.63	36.83	46.00	-9.17	peak	
6		962.170	55.60	-12.40	43.20	54.00	-10.80	peak	

Test Mode: TX 2440MHz \_CH19\_1Mbps

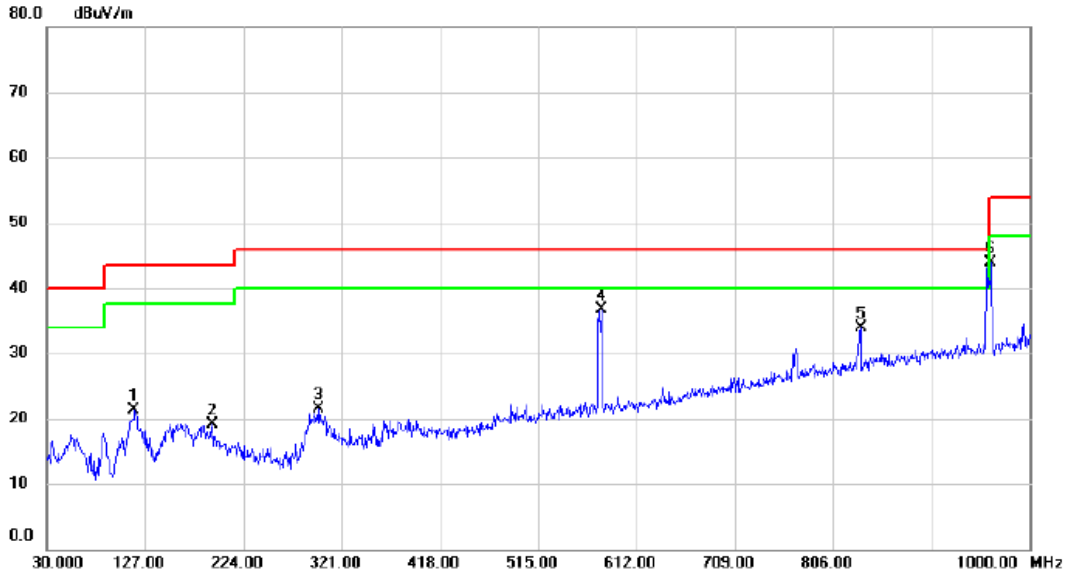
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		37.760	64.55	-35.54	29.01	40.00	-10.99	peak	
2	*	57.160	66.66	-33.52	33.14	40.00	-6.86	peak	
3		117.300	53.02	-29.24	23.78	43.50	-19.72	peak	
4		577.080	52.23	-20.58	31.65	46.00	-14.35	peak	
5		766.230	54.50	-16.31	38.19	46.00	-7.81	peak	
6		962.170	51.74	-12.40	39.34	54.00	-14.66	peak	

Test Mode: TX 2440MHz \_CH19\_1Mbps

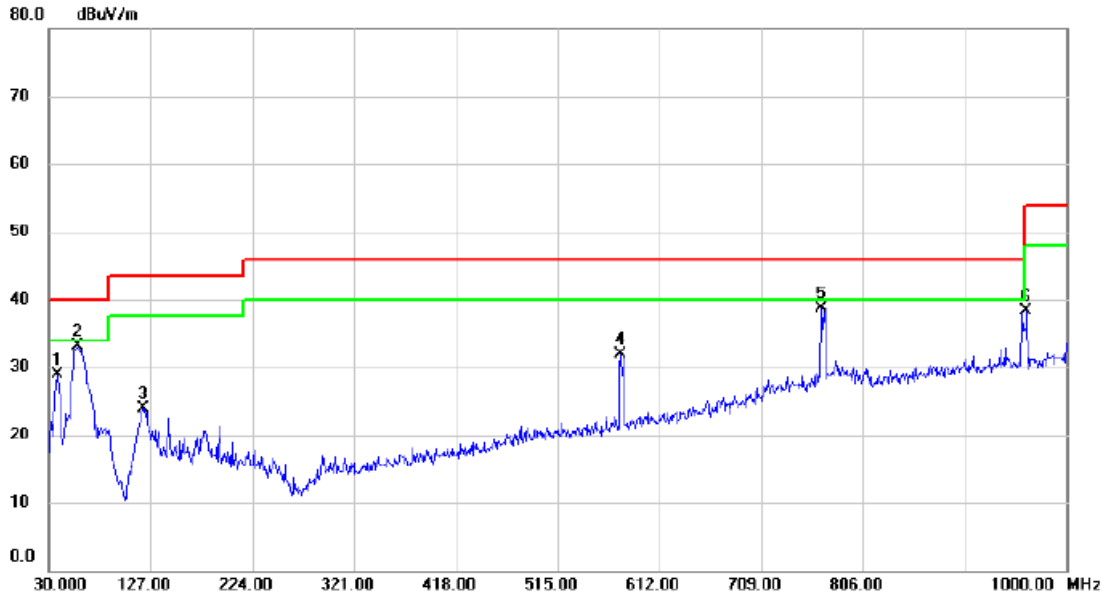
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		116.330	50.68	-29.33	21.35	43.50	-22.15	peak	
2		193.930	49.34	-30.14	19.20	43.50	-24.30	peak	
3		298.690	49.55	-28.00	21.55	46.00	-24.45	peak	
4	*	577.080	57.19	-20.58	36.61	46.00	-9.39	peak	
5		833.160	48.44	-14.58	33.86	46.00	-12.14	peak	
6		962.170	56.26	-12.40	43.86	54.00	-10.14	peak	

Test Mode: TX 2480MHz \_CH39\_1Mbps

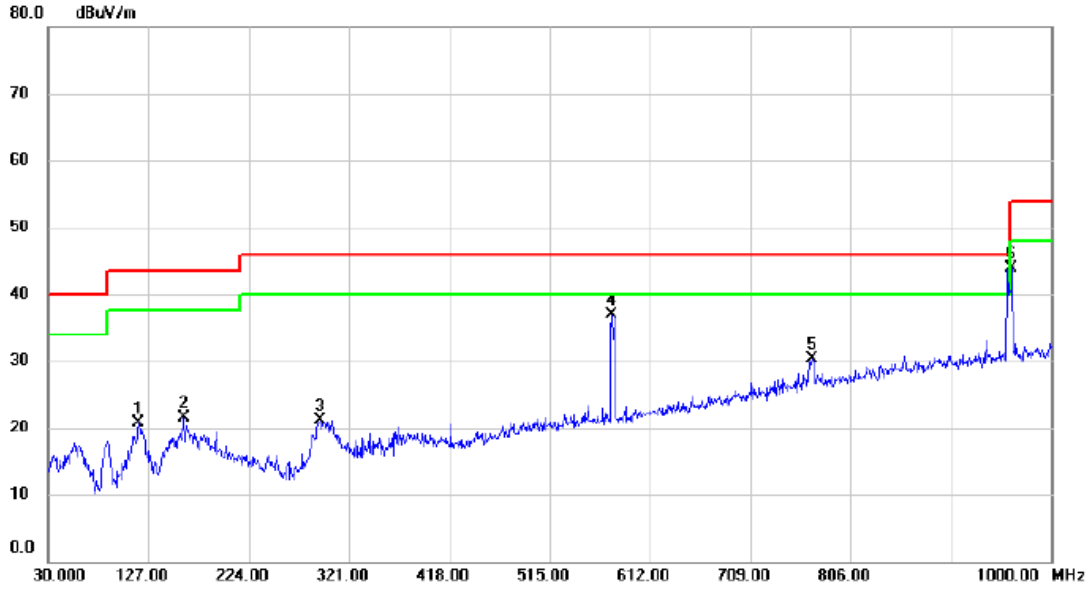
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		37.760	64.49	-35.54	28.95	40.00	-11.05	peak	
2	*	57.160	66.69	-33.52	33.17	40.00	-6.83	peak	
3		119.240	53.00	-29.05	23.95	43.50	-19.55	peak	
4		575.140	52.63	-20.63	32.00	46.00	-14.00	peak	
5		766.230	55.10	-16.31	38.79	46.00	-7.21	peak	
6		962.170	50.67	-12.40	38.27	54.00	-15.73	peak	

Test Mode: TX 2480MHz \_CH39\_1Mbps

### Horizontal



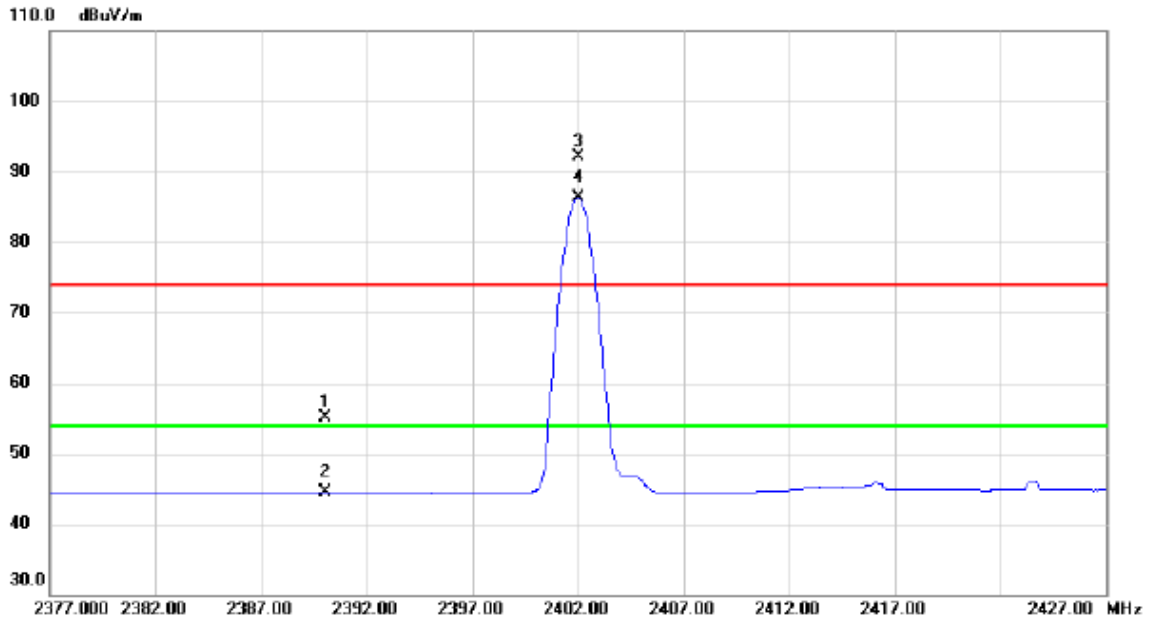
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		117.300	49.99	-29.24	20.75	43.50	-22.75	peak	
2		160.950	49.73	-28.17	21.56	43.50	-21.94	peak	
3		293.840	49.24	-28.10	21.14	46.00	-24.86	peak	
4	*	575.140	57.51	-20.63	36.88	46.00	-9.12	peak	
5		769.140	46.44	-16.21	30.23	46.00	-15.77	peak	
6		962.170	56.25	-12.40	43.85	54.00	-10.15	peak	

## APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)



Test Mode : TX 2402MHz \_CH00\_1Mbps

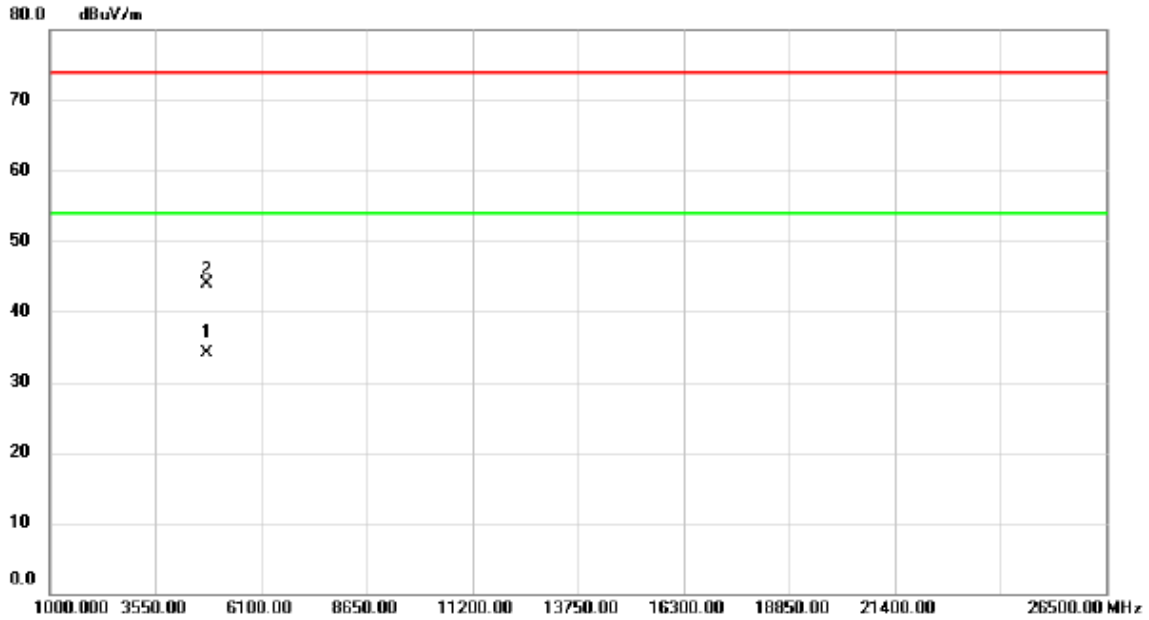
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	22.85	32.30	55.15	74.00	-18.85	peak	
2		2390.000	12.24	32.30	44.54	54.00	-9.46	AVG	
3	X	2402.000	59.74	32.36	92.10	74.00	18.10	peak	No Limit
4	*	2402.000	53.93	32.36	86.29	54.00	32.29	AVG	No Limit

Test Mode : TX 2402MHz \_CH00\_ 1Mbps

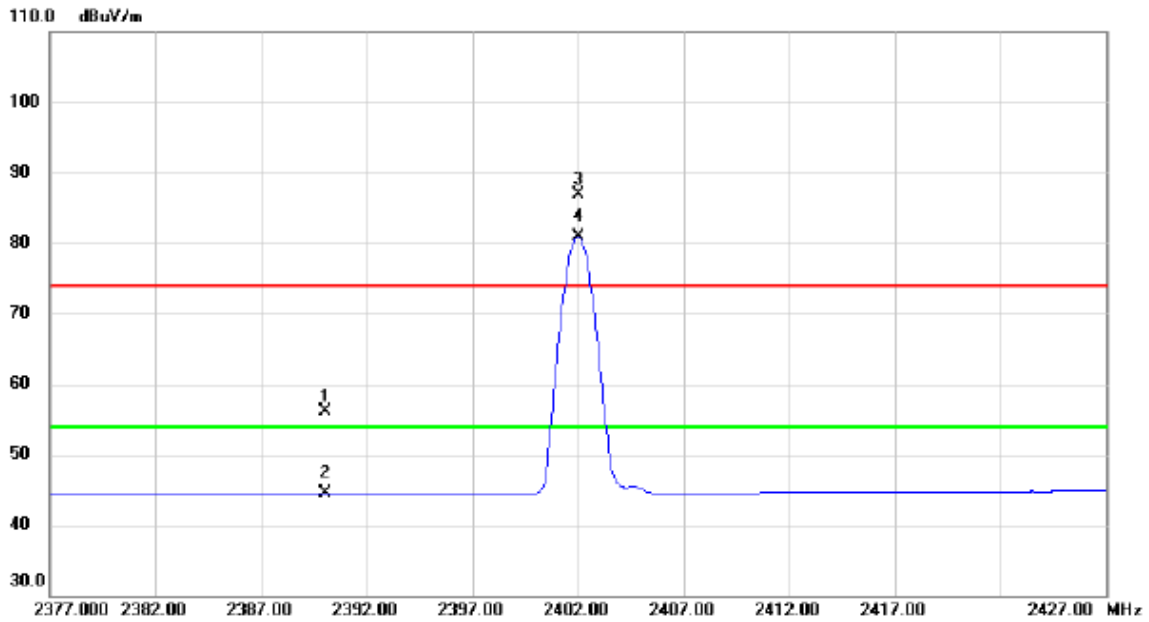
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4803.970	45.36	-11.30	34.06	54.00	-19.94	AVG	
2		4804.485	55.30	-11.30	44.00	74.00	-30.00	peak	

Test Mode : TX 2402MHz \_CH00\_ 1Mbps

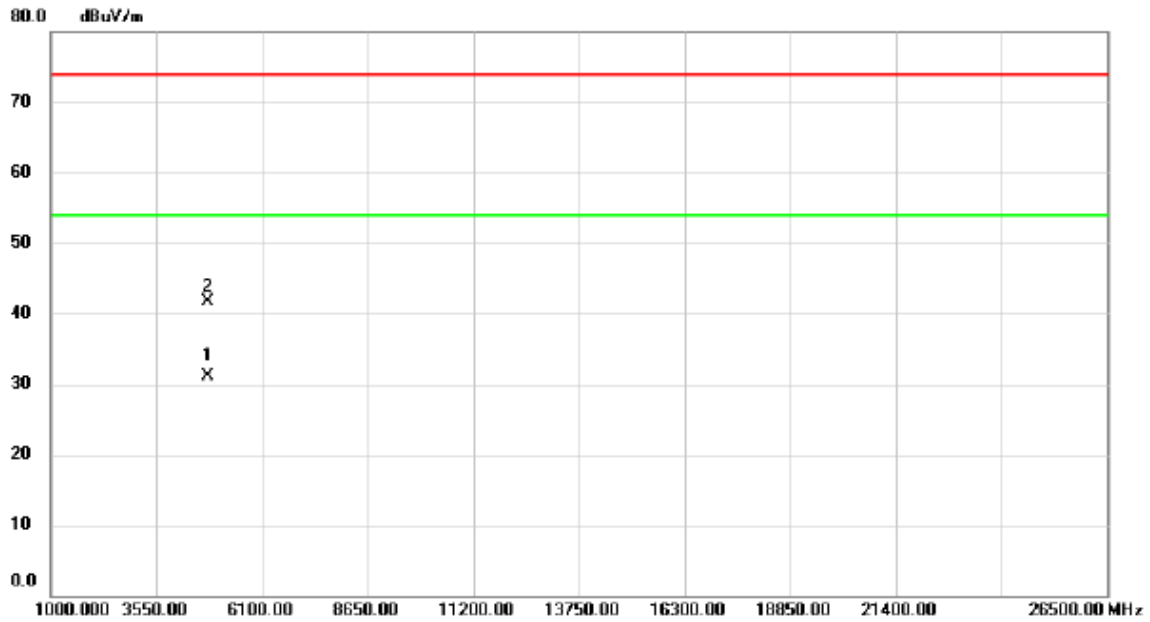
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	23.84	32.30	56.14	74.00	-17.86	peak	
2		2390.000	12.24	32.30	44.54	54.00	-9.46	AVG	
3	X	2402.000	54.52	32.36	86.88	74.00	12.88	peak	No Limit
4	*	2402.000	48.49	32.36	80.85	54.00	26.85	AVG	No Limit

Test Mode : TX 2402MHz \_CH00\_ 1Mbps

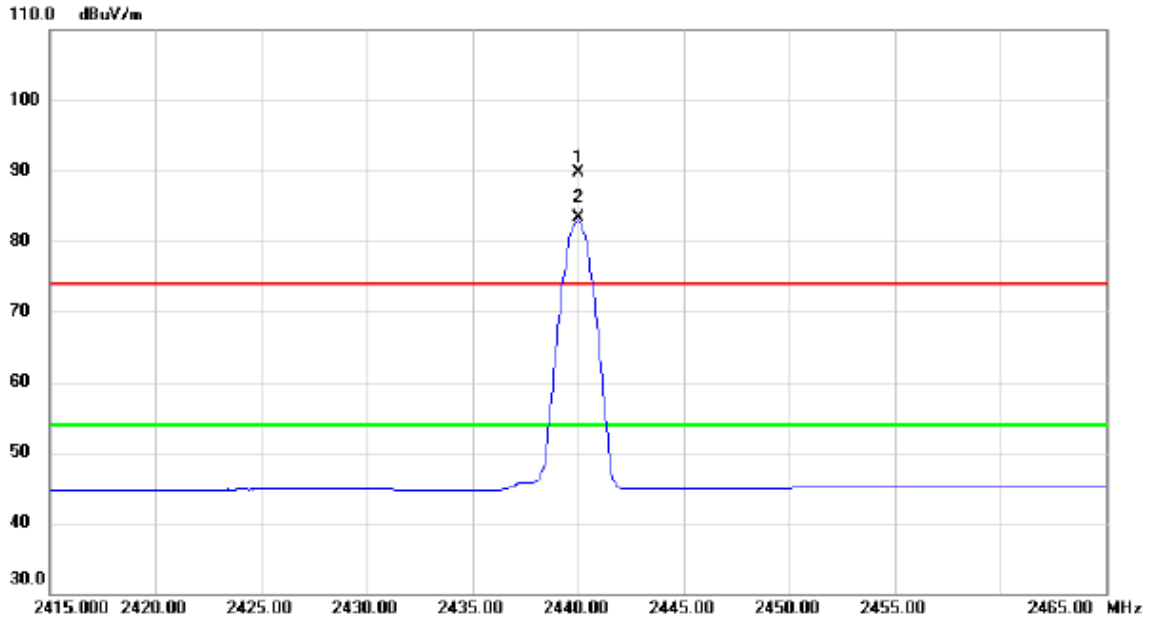
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4803.975	42.39	-11.30	31.09	54.00	-22.91	AVG	
2		4804.635	52.94	-11.30	41.64	74.00	-32.36	peak	

Test Mode : TX 2440MHz \_CH19\_1Mbps

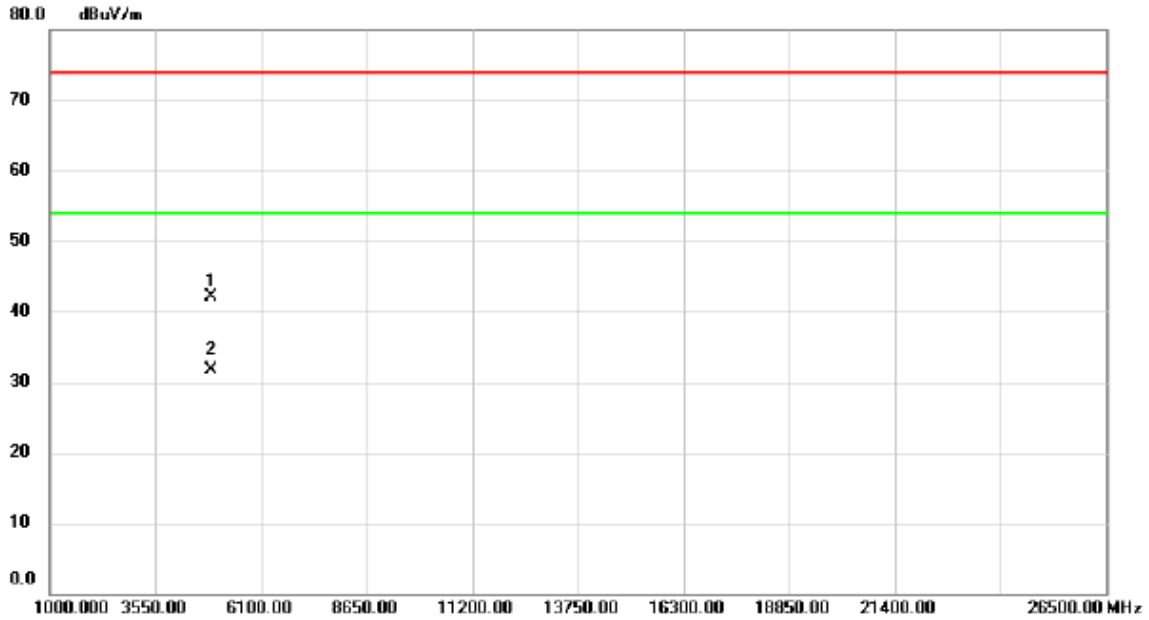
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2440.000	57.24	32.54	89.78	74.00	15.78	peak	No Limit
2	*	2440.000	50.68	32.54	83.22	54.00	29.22	AVG	No Limit

Test Mode : TX 2440MHz \_CH19\_ 1Mbps

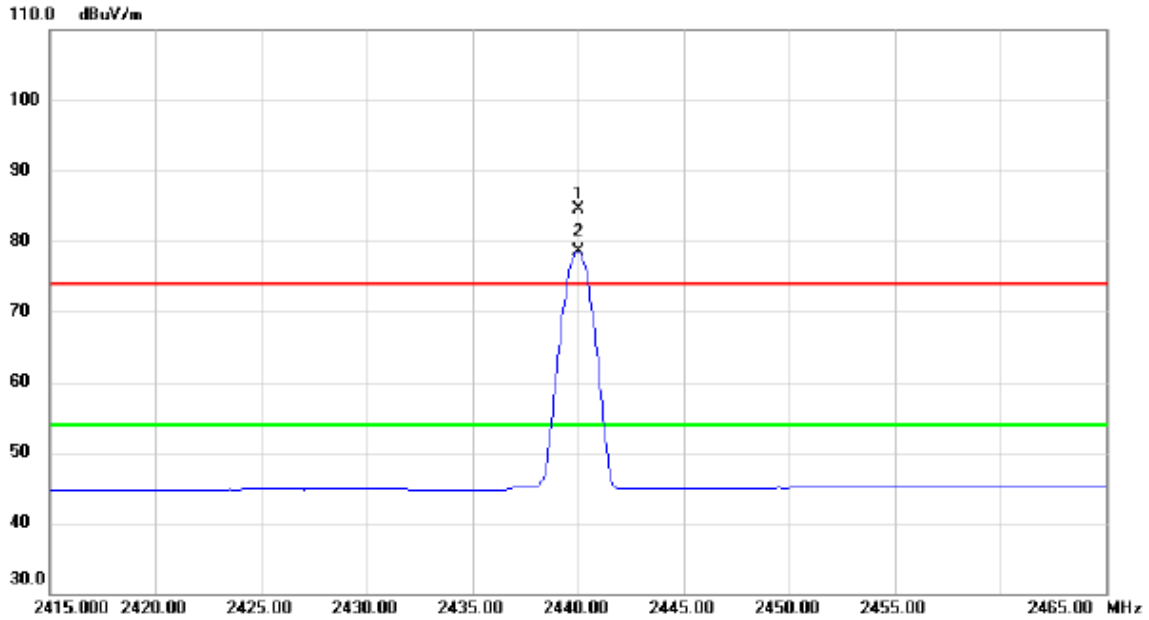
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4879.460	53.15	-11.13	42.02	74.00	-31.98	peak	
2	*	4879.875	42.85	-11.13	31.72	54.00	-22.28	AVG	

Test Mode : TX 2440MHz \_CH19\_ 1Mbps

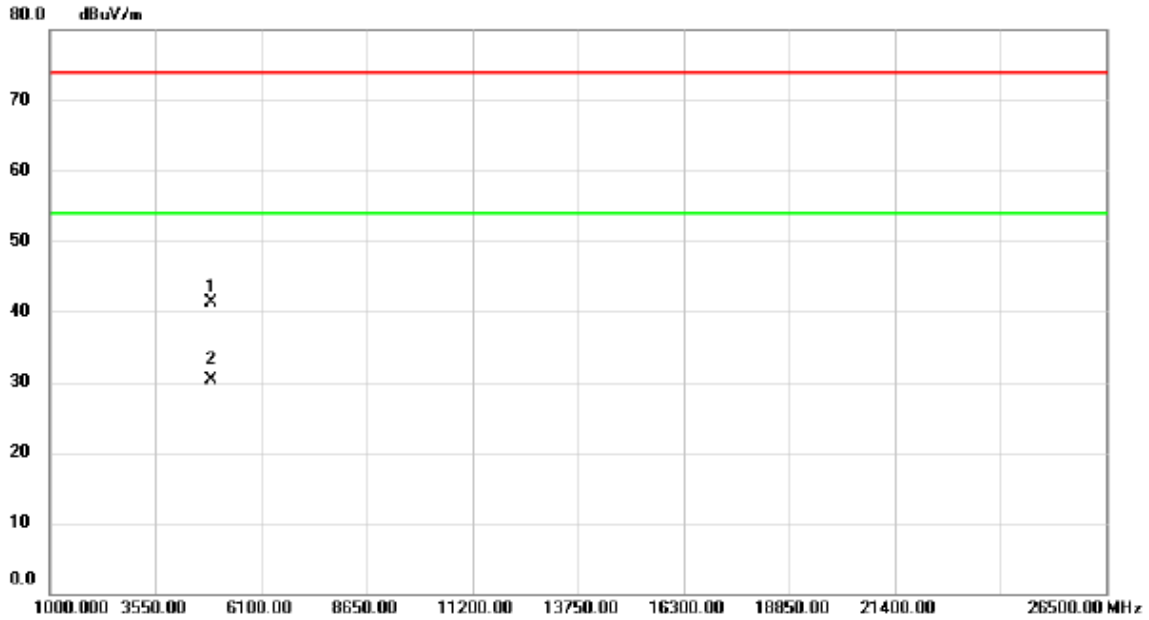
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2440.000	52.00	32.54	84.54	74.00	10.54	peak	No Limit
2	*	2440.000	46.04	32.54	78.58	54.00	24.58	AVG	No Limit

Test Mode : TX 2440MHz \_CH19\_ 1Mbps

### Horizontal

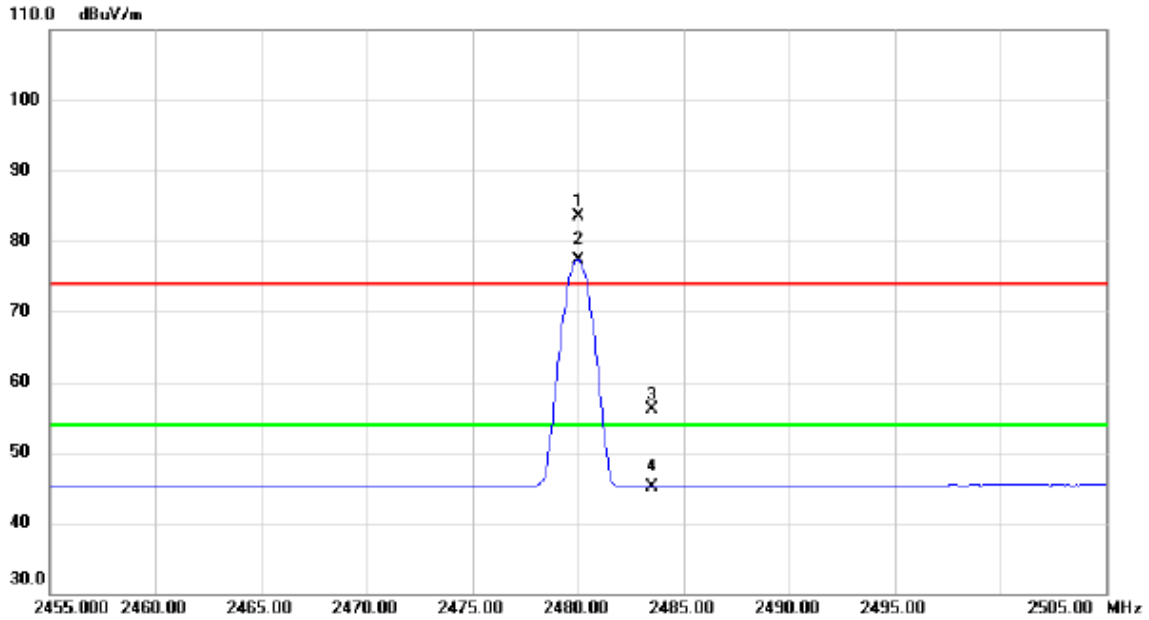


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4879.615	52.47	-11.13	41.34	74.00	-32.66	peak	
2	*	4879.840	41.43	-11.13	30.30	54.00	-23.70	AVG	



Test Mode : TX 2480MHz \_CH39\_1Mbps

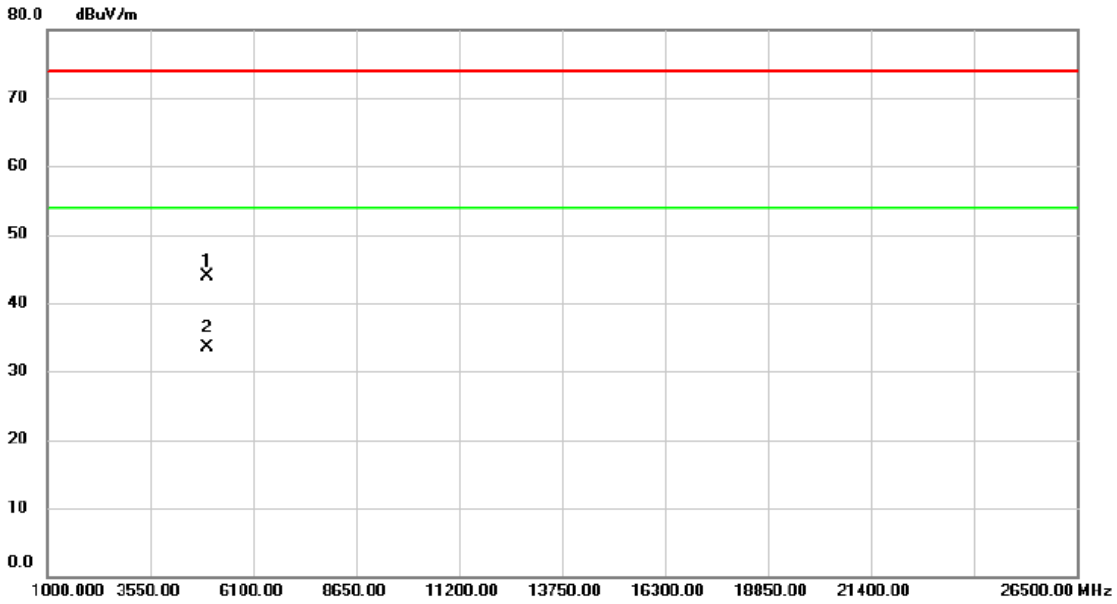
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.000	50.71	32.72	83.43	74.00	9.43	peak	No Limit
2	*	2480.000	44.66	32.72	77.38	54.00	23.38	AVG	No Limit
3		2483.500	23.36	32.73	56.09	74.00	-17.91	peak	
4		2483.500	12.42	32.73	45.15	54.00	-8.85	AVG	

Test Mode : TX 2480MHz \_CH39\_ 1Mbps

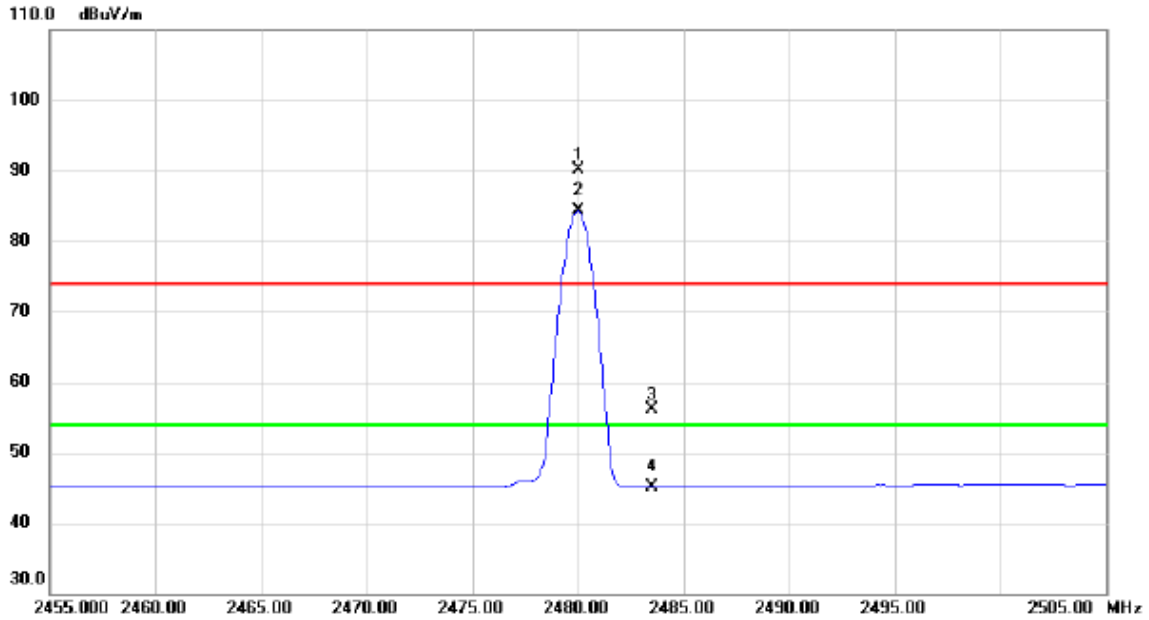
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4959.685	54.91	-10.94	43.97	74.00	-30.03	peak	
2	*	4959.850	44.45	-10.94	33.51	54.00	-20.49	AVG	

Test Mode : TX 2480MHz \_CH39\_ 1Mbps

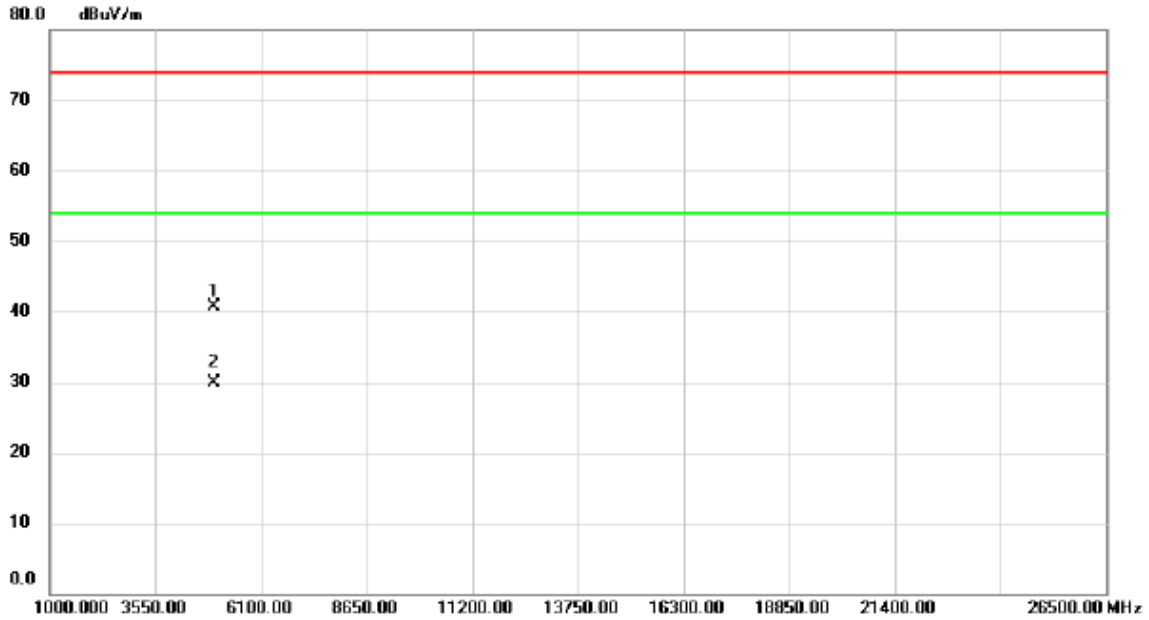
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.000	57.45	32.72	90.17	74.00	16.17	peak	No Limit
2	*	2480.000	51.52	32.72	84.24	54.00	30.24	AVG	No Limit
3		2483.500	23.36	32.73	56.09	74.00	-17.91	peak	
4		2483.500	12.42	32.73	45.15	54.00	-8.85	AVG	

Test Mode : TX 2480MHz \_CH39\_ 1Mbps

### Horizontal



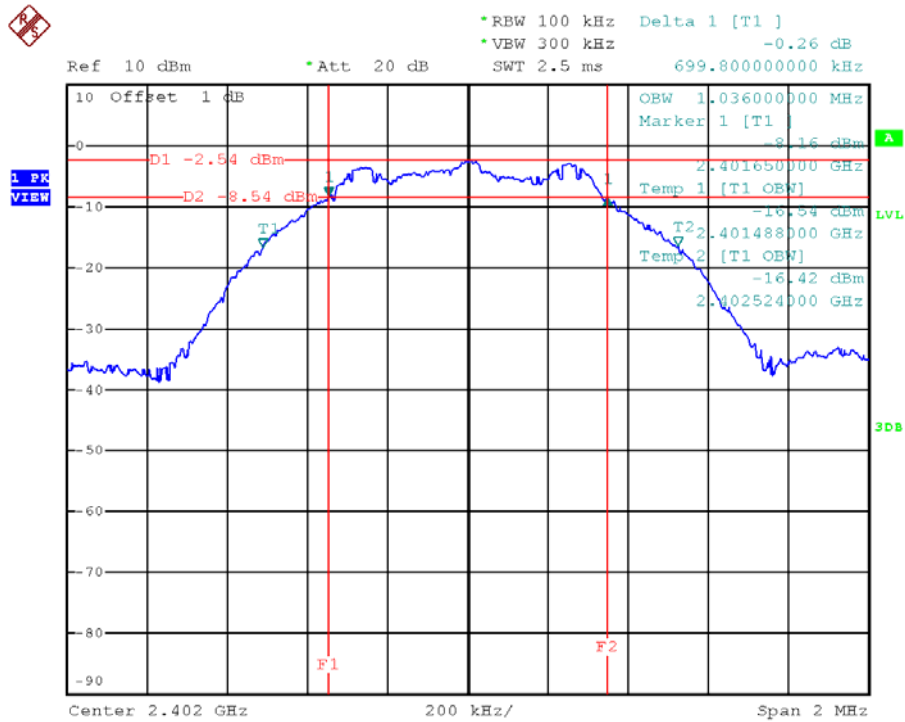
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4959.515	51.68	-10.95	40.73	74.00	-33.27	peak	
2	*	4959.780	40.81	-10.94	29.87	54.00	-24.13	AVG	

## APPENDIX E - BANDWIDTH

Test Mode: TX Mode

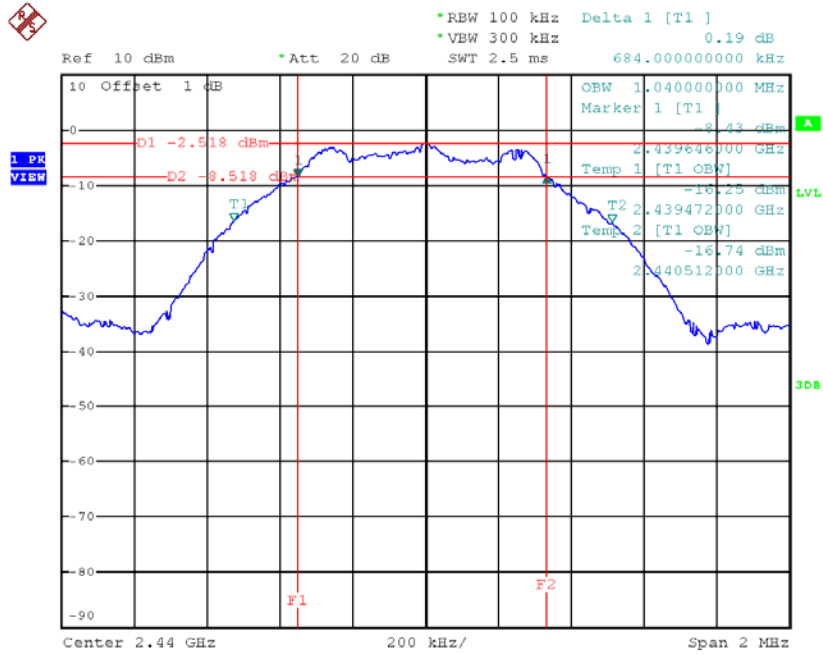
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.6998	1.0360	500	Pass
2440	0.6840	1.0400	500	Pass
2480	0.6980	1.0400	500	Pass

**TX CH00**



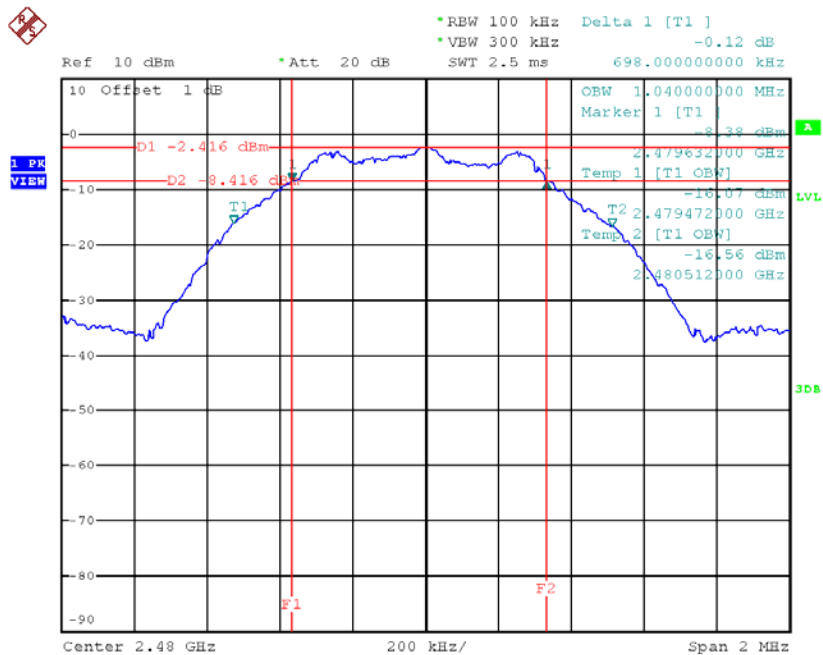
Date: 25.JAN.2018 18:46:33

**TX CH19**



Date: 25.JAN.2018 18:49:24

**TX CH39**



Date: 25.JAN.2018 18:52:15

## APPENDIX F - MAXIMUM OUTPUT POWER TEST

Test Mode : CH00, CH19 , CH39 - 1Mbps

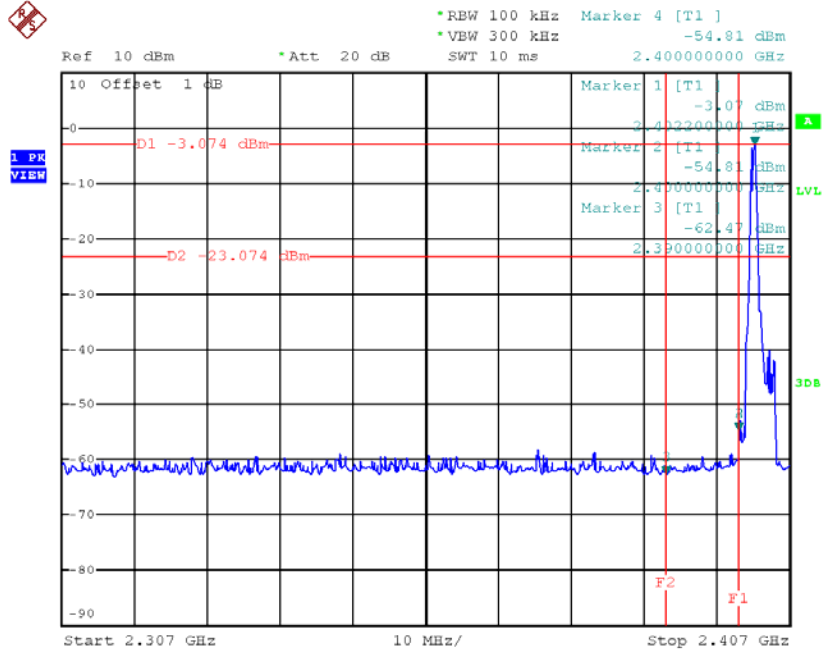
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	-1.72	0.0007	30.00	1.00	Pass
2440	-1.95	0.0006	30.00	1.00	Pass
2480	-1.92	0.0006	30.00	1.00	Pass



## APPENDIX G - ANTENNA CONDUCTED SPURIOUS EMISSION

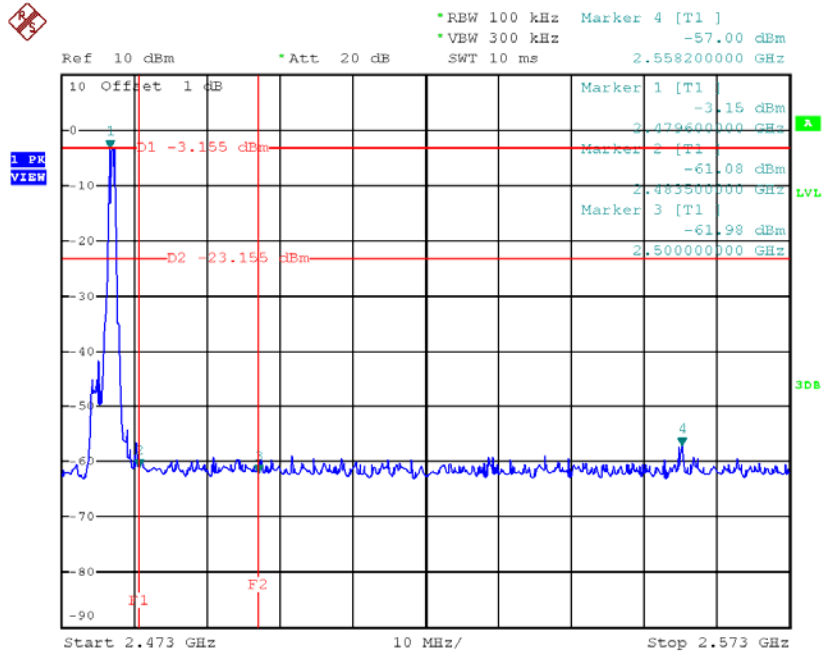
Test Mode : CH00, CH19 , CH39 - 1Mbps

**CH00 (Lower) - 1Mbps**



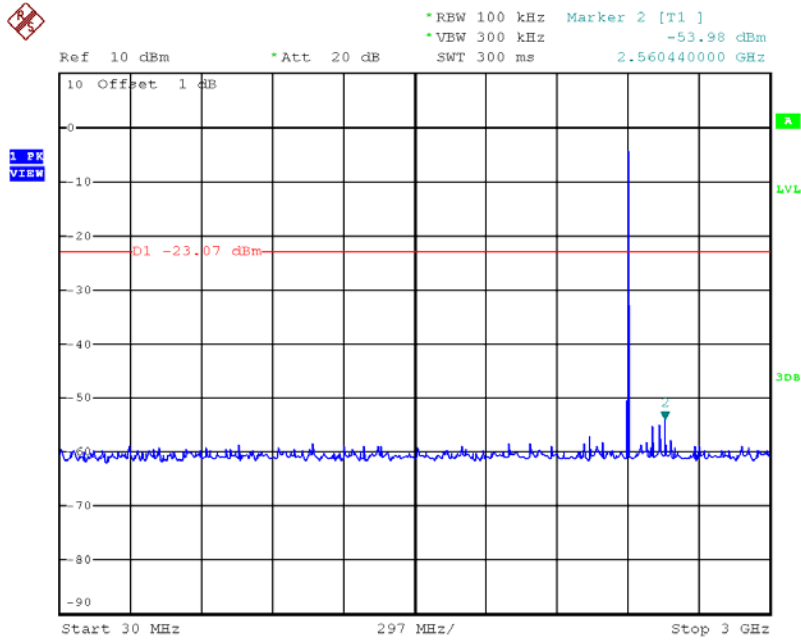
Date: 25.JAN.2018 18:46:40

**CH39 (upper) - 1Mbps**



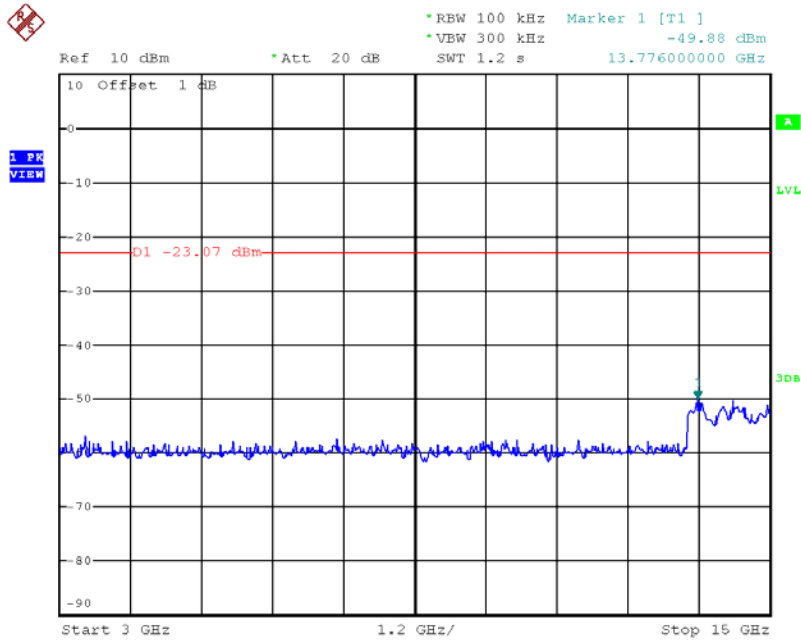
Date: 25.JAN.2018 18:52:39

### CH00 (10 Harmonic of the frequency) 1



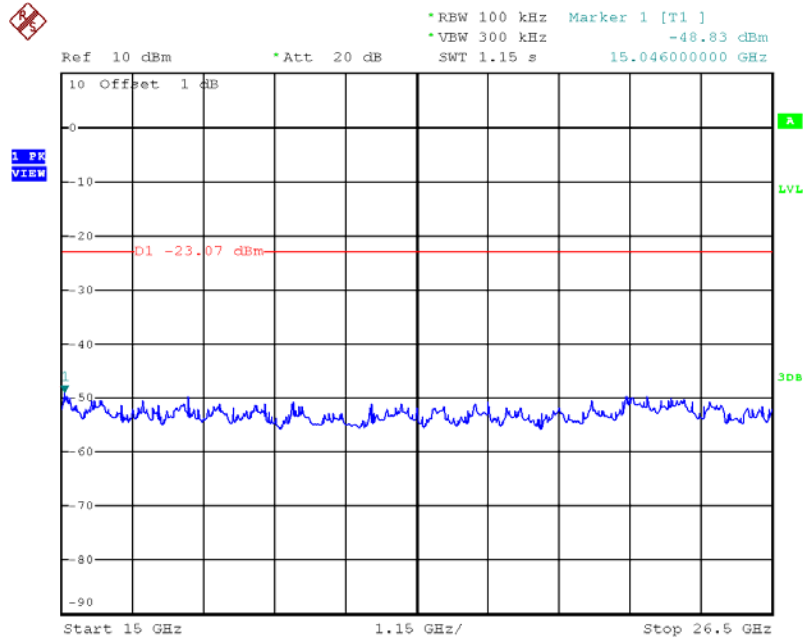
Date: 25.JAN.2018 18:46:52

### CH00 (10 Harmonic of the frequency) 2



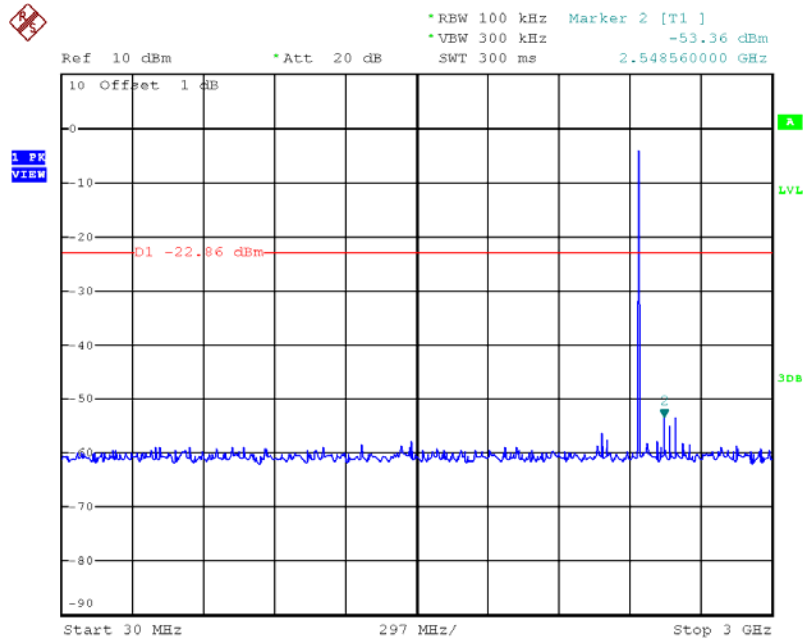
Date: 25.JAN.2018 18:46:59

### CH00 (10 Harmonic of the frequency) 3



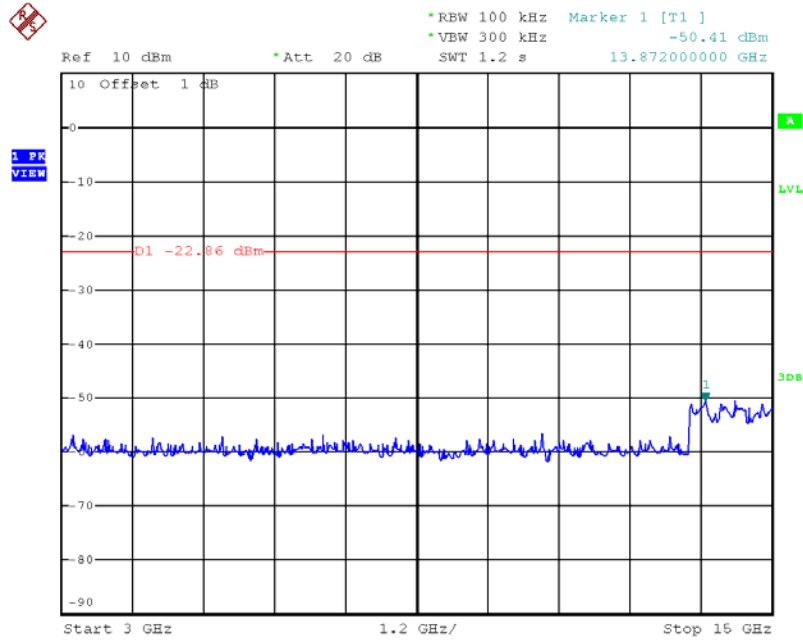
Date: 25.JAN.2018 18:47:06

### CH19 (10 Harmonic of the frequency) 1



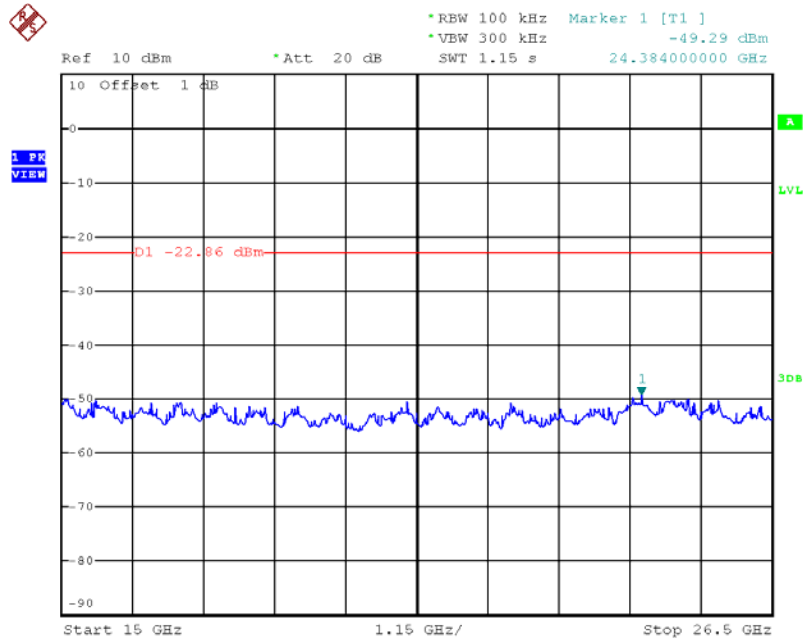
Date: 25.JAN.2018 18:50:00

### CH19 (10 Harmonic of the frequency) 2



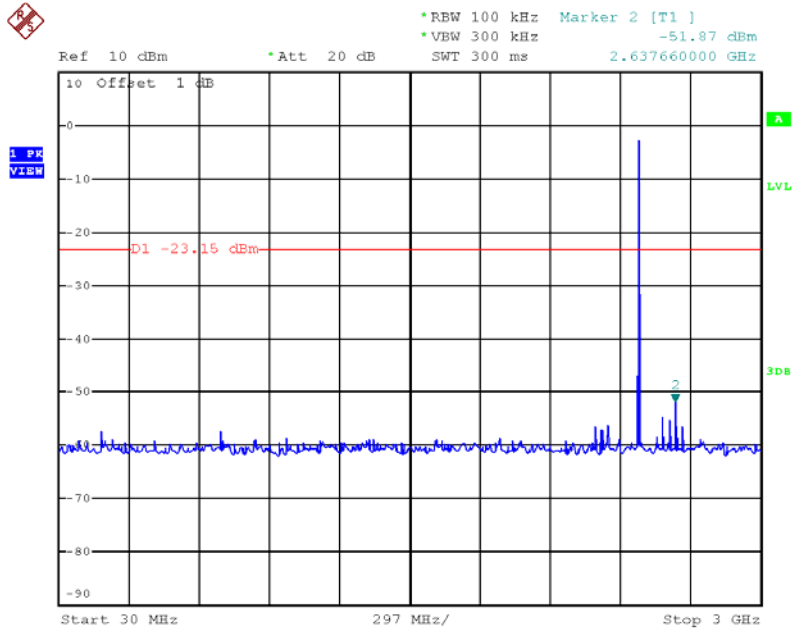
Date: 25.JAN.2018 18:50:07

### CH19 (10 Harmonic of the frequency) 3



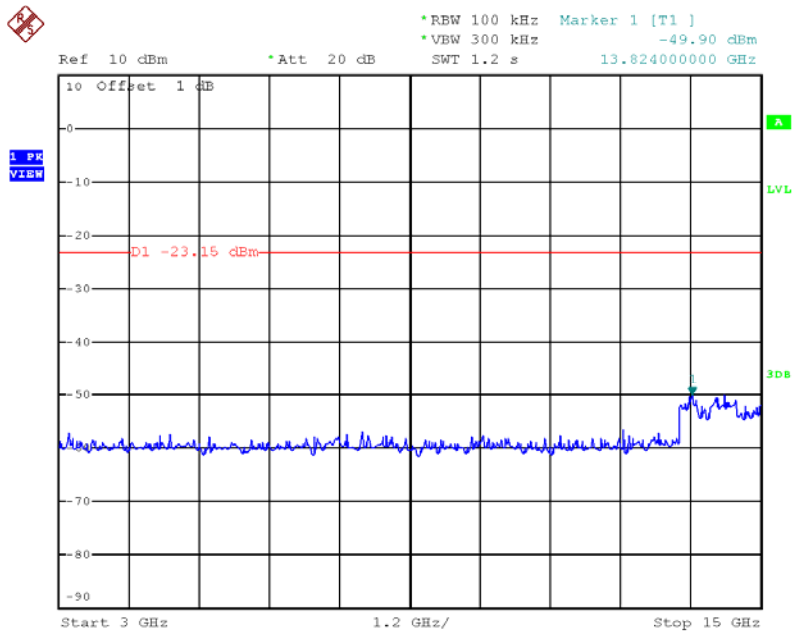
Date: 25.JAN.2018 18:50:13

### CH39 (10 Harmonic of the frequency) 1



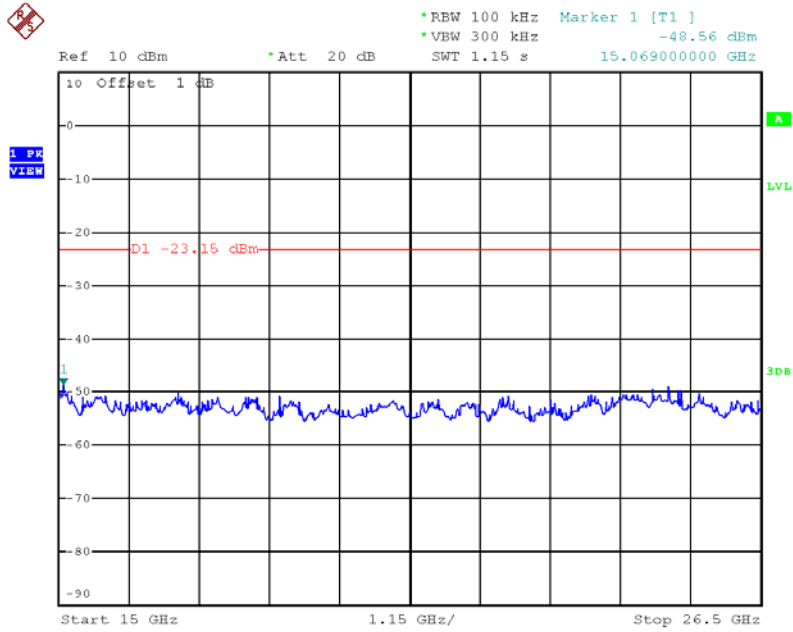
Date: 25.JAN.2018 18:52:51

### CH39 (10 Harmonic of the frequency) 2



Date: 25.JAN.2018 18:52:58

### CH39 (10 Harmonic of the frequency) 3



Date: 25.JAN.2018 18:53:05

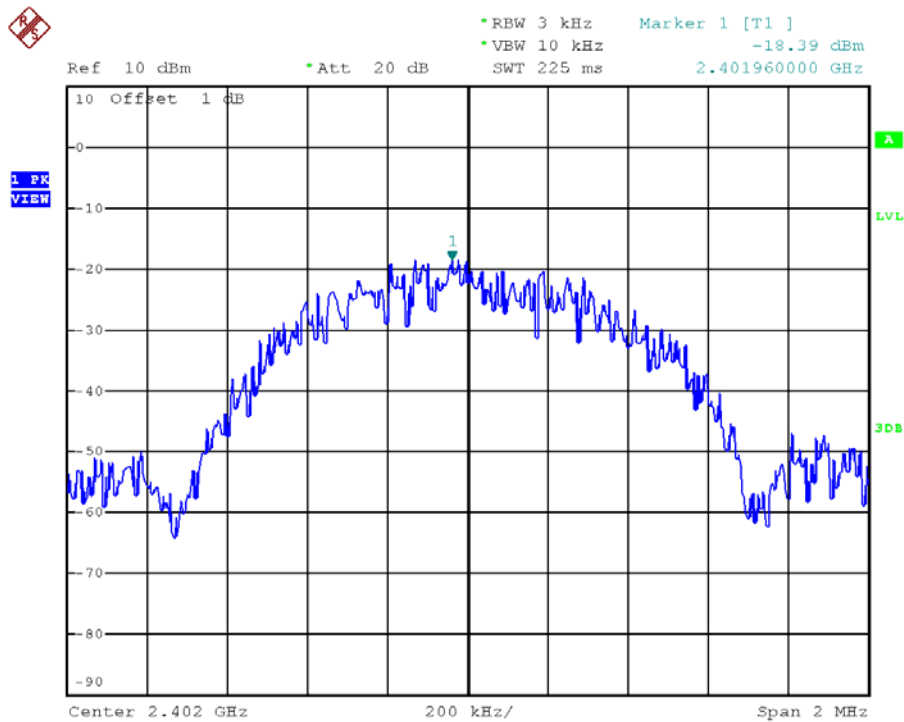
## APPENDIX H - POWER SPECTRAL DENSITY TEST



Test Mode: CH00, CH19 , CH39 - 1Mbps

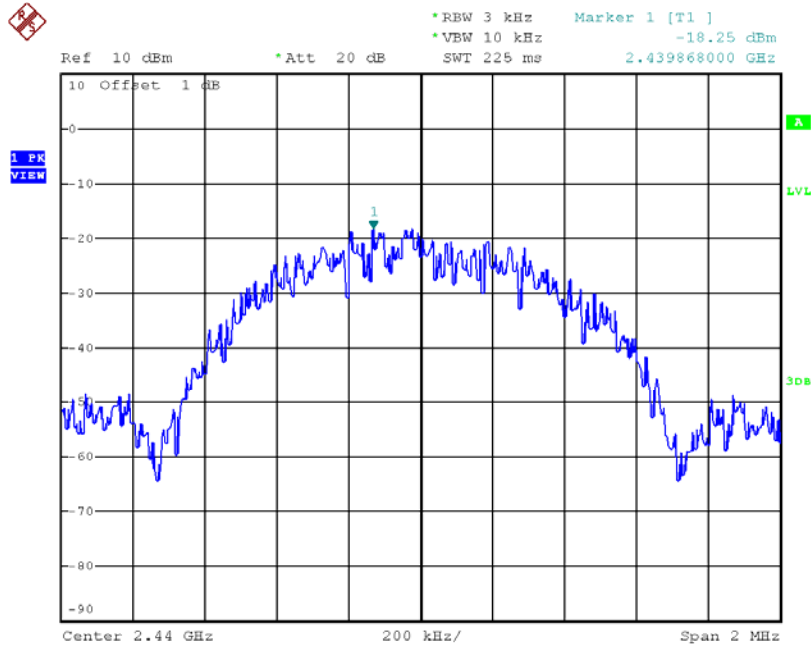
Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Test Result
2402	-18.39	0.014	8.00	Pass
2440	-18.25	0.015	8.00	Pass
2480	-18.03	0.016	8.00	Pass

### TX CH00



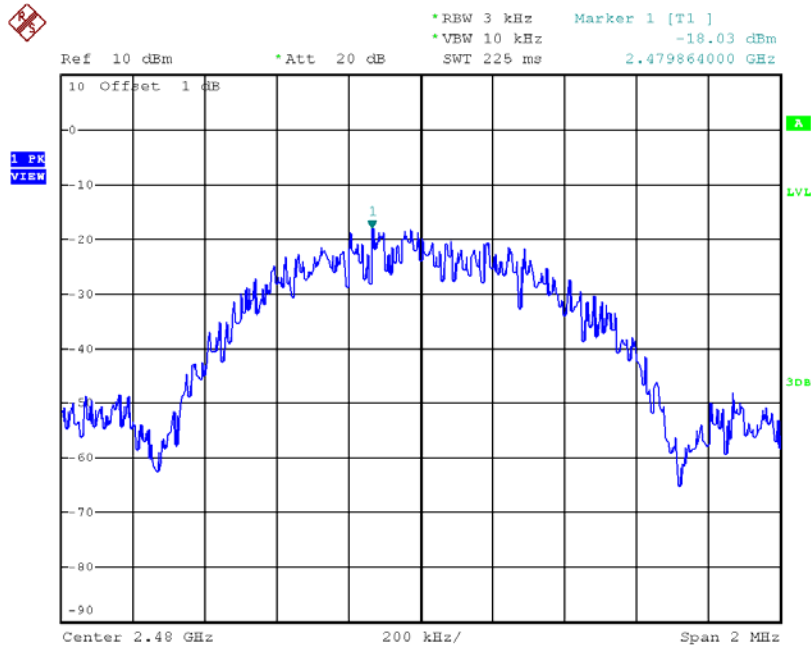
Date: 25.JAN.2018 18:47:11

### TX CH19



Date: 25.JAN.2018 18:50:19

### TX CH39



Date: 25.JAN.2018 18:53:10