

FCC Radio Test Report

FCC ID: QWHULM300MCH1

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

Project No. : 1709C095
Equipment : 2.4GHz Digital Wireless System
Model Name : ULM300M
Applicant : MUSIC Group Manufacturing PH Ltd.
Address : 17A Brunswick Street Hamilton HM 10 Bermuda

Date of Receipt : Sep. 13, 2017
Date of Test : Sep. 13, 2017 ~ Oct. 20, 2017
Issued Date : Oct. 23, 2017
Tested by : BTL Inc.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1709C095	Original Issue.	Oct. 23, 2017

1. CERTIFICATION

Equipment : 2.4GHz Digital Wireless System

Brand Name : 
behringer, BEHRINGER

Model Name : ULM300M

Applicant : MUSIC Group Manufacturing PH Ltd.

Manufacturer : MUSIC Group Manufacturing PH Ltd

Address : 17A Brunswick Street Hamilton HM 10 Bermuda

Factory : Zhongshan Eurotec Electronics Ltd.

Address : Eurotec Industrial Park #1 Junjing Rd., Min Zhong Town, Zhongshan,
Guangdong 528441 China.

Date of Test : Sep. 13, 2017 ~ Oct. 20, 2017

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-1-1709C095) 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)	AVG Power	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
15.209/15.205	Transmitter Radiated Emissions	PASS	
15.209/15.205	Band Edge 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: 854385

Designation number for FCC: CN5020

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. 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	2.4GHz Digital Wireless System	
Brand Name	 behringer, BEHRINGER	
Model Name	ULM300M	
Model Difference	N/A	
Product Description	Operation Frequency	2404~2478 MHz
	Modulation Technology	GFSK (2 Mbps)
	Bit Rate of Transmitter	
	AVG Power (Max.)	9.09 dBm
Power Source	Supplied from 2*AA Battery.	
Power Rating	DC 3V	

Note:

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

2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
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		
20	2442		

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	0

3.2 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description
Mode 1	TX Mode NOTE (1)

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

For Conducted Test	
Final Test Mode	Description
Mode 1	TX Mode

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

Note:

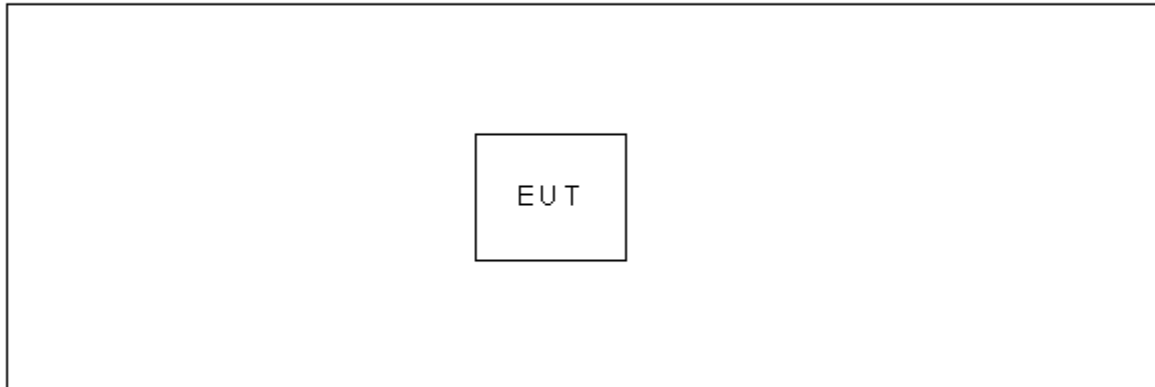
(1) The measurements are performed at the high, middle, low available channels.

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	N/A		
Frequency (MHz)	2404	2440	2478
-	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
-	-	-	-	-

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 μ 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

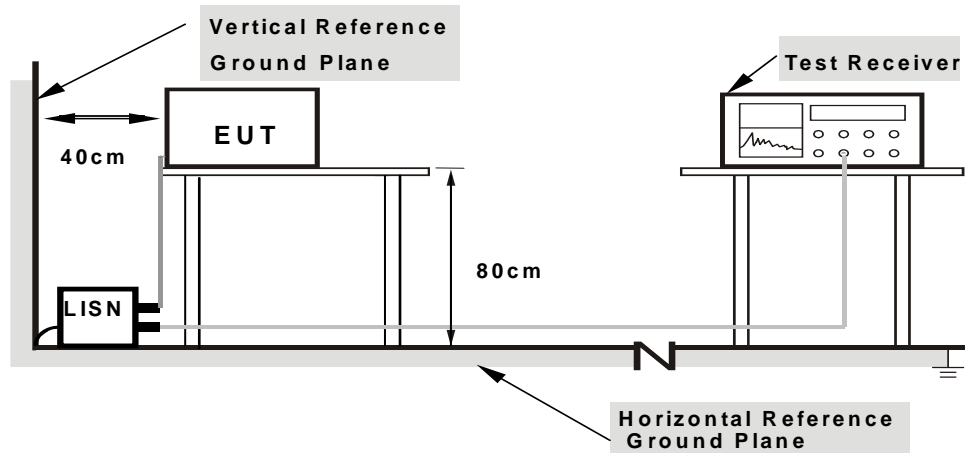
4.1.2 TEST PROCEDURE

- 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 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: N/A Relative Humidity:N/A Test Voltage: N/A

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

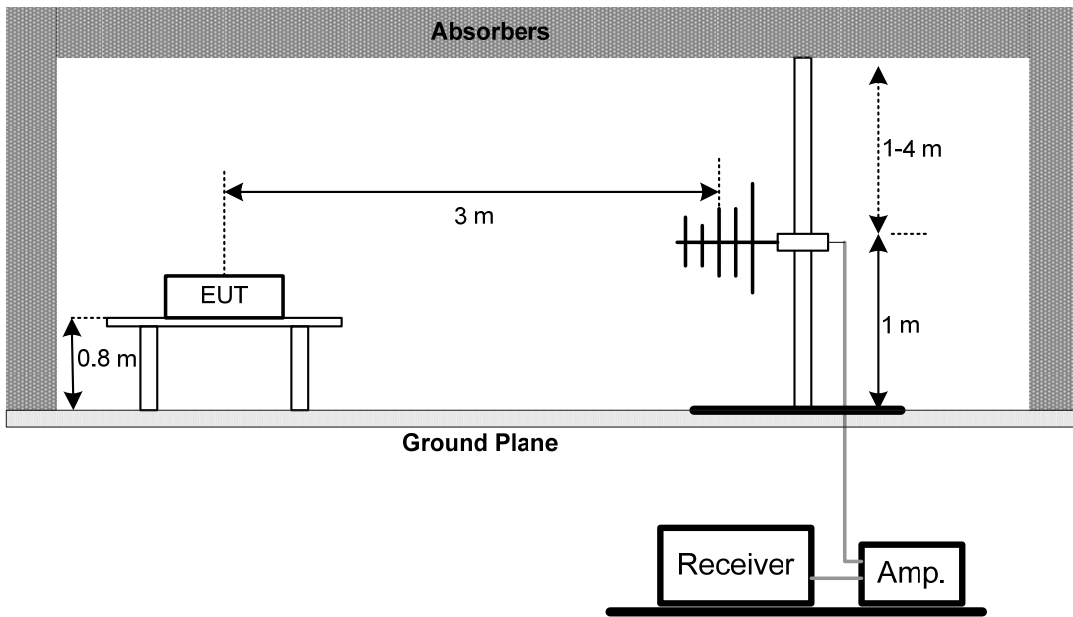
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance 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 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. 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)
- f. 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)
- g. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

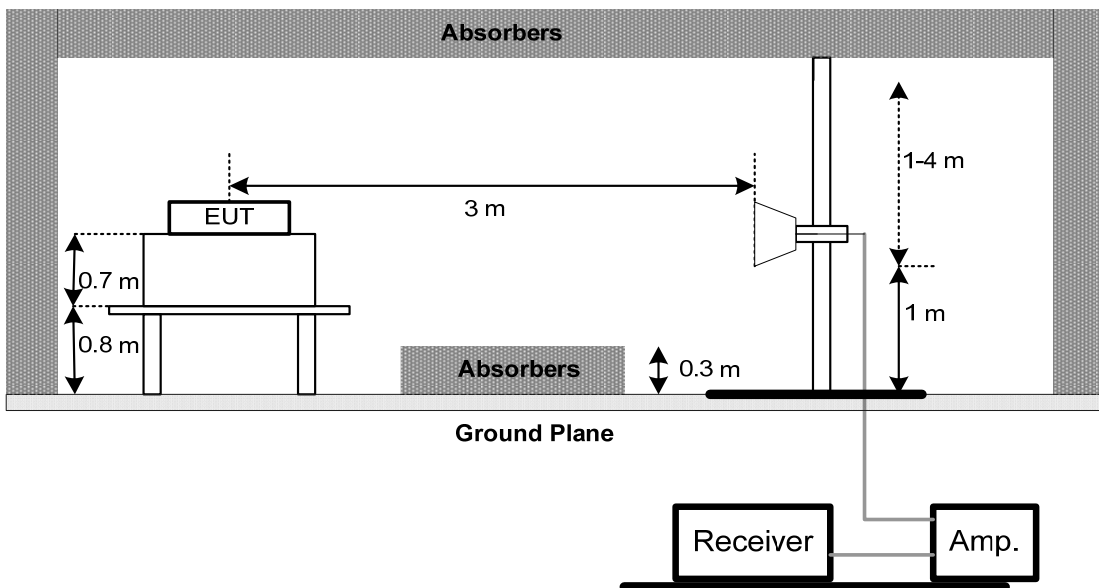
No deviation

4.2.4 TEST SETUP

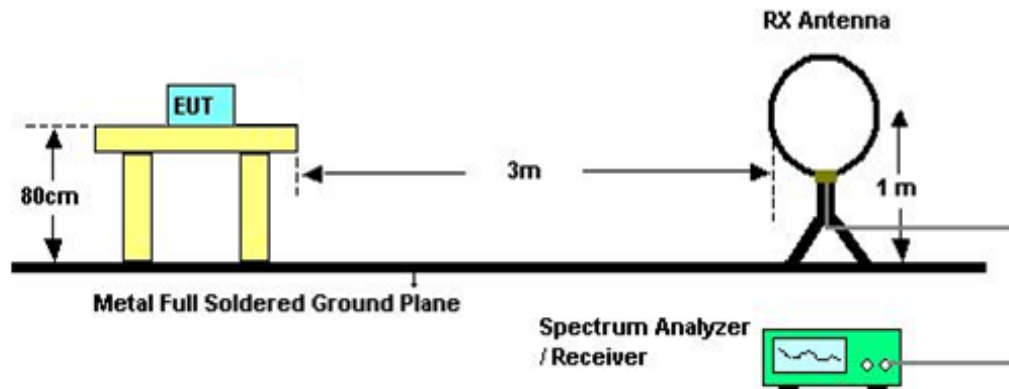
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: 60% Test Voltage: DC 3V

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 1000 MHZ)

Please refer to the Appendix C.

Remark:

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz.
- (3) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

4.2.9 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Appendix 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

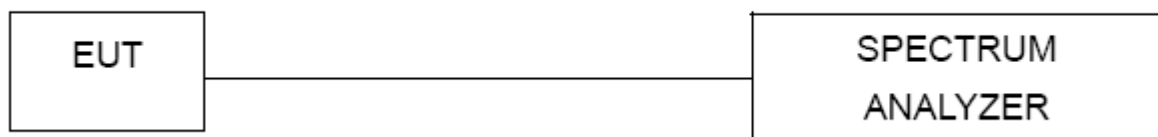
5.1.1 TEST PROCEDURE

- 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: 60% Test Voltage: DC 3V

5.1.6 TEST RESULTS

Please refer to the Appendix E.

6. CONDUCTED 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

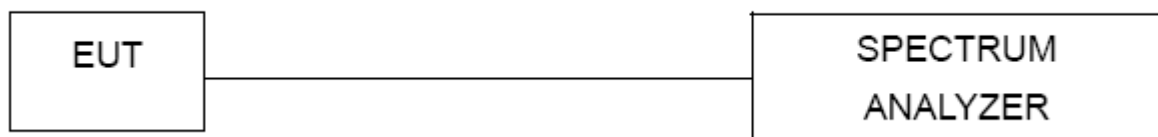
6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. The maximum conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance v03r05.

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: 60% Test Voltage: DC 3V

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.

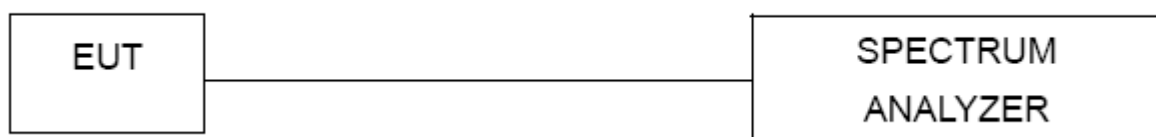
7.1.1 TEST PROCEDURE

- 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: 25°C Relative Humidity: 60% Test Voltage: DC 3V

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: 25°C Relative Humidity: 60% Test Voltage: DC 3V

8.1.6 TEST RESULTS

Please refer to the Appendix H.

9. MEASUREMENT INSTRUMENTS LIST

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 26, 2018
2	Amplifier	HP	8447D	2944A09673	Oct. 19, 2018
3	Receiver	AGILENT	N9038A	MY52130039	Aug. 20, 2018
4	Test Cable	emci	LMR-400(30MHz-1 GHz)	C-01	Jun. 25, 2018
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. 26, 2018
8	Amplifier	Agilent	8449B	3008A02274	Nov. 01, 2017
9	Test Cable	emci	EMC104-SM-SM-10000(1GHz-26.5G Hz)	C-68	Jun. 25, 2018
10	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2018
11	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 26, 2018
12	EMI Test Receiver	R&S	ESCI	100895	Mar. 26, 2018
13	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 06, 2018

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

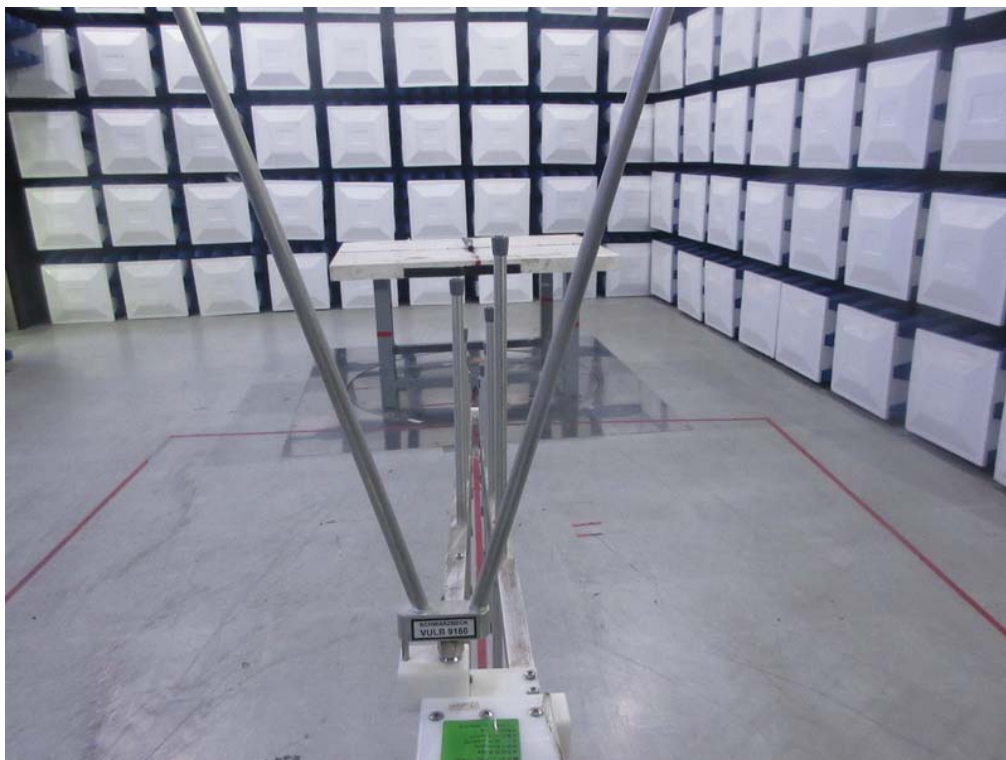
Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

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

10. EUT TEST PHOTO**Radiated Measurement Photos****9KHz to 30MHz**

Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

Above 1000MHz



APPENDIX A - CONDUCTED EMISSION

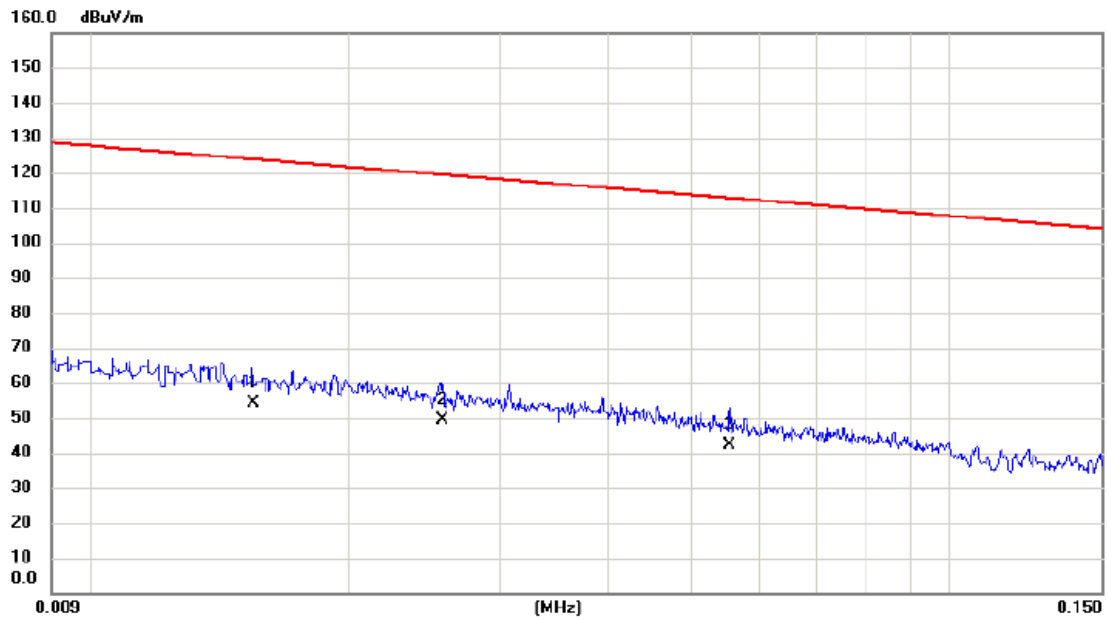
Test Mode: N/A

Note: "N/A" denotes test is not applicable to this device.

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

Test Mode: TX Mode

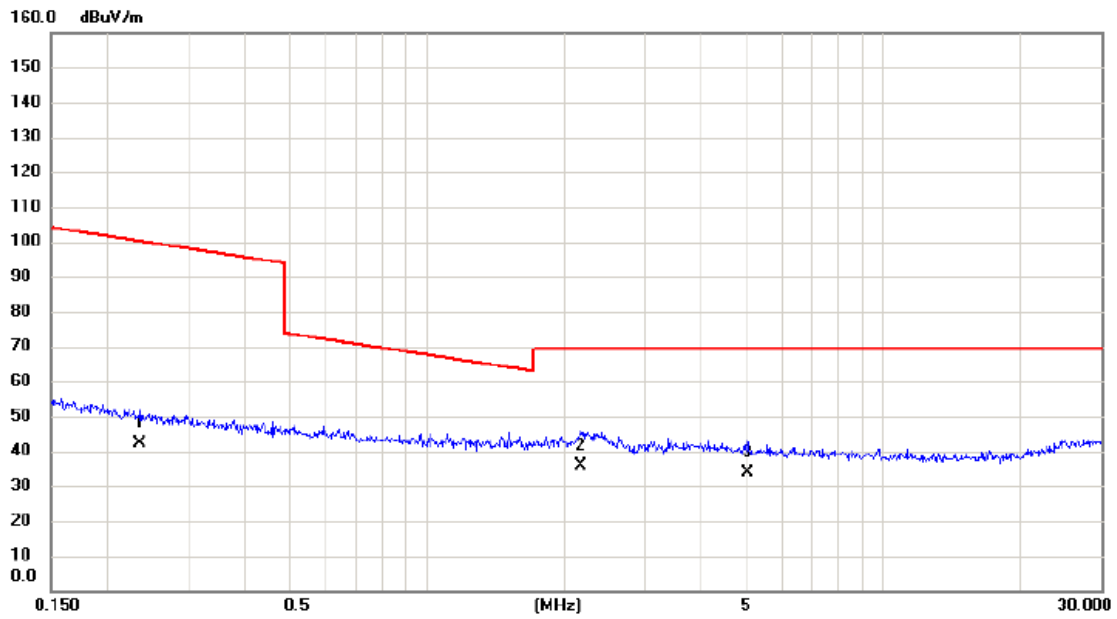
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0155	33.92	20.20	54.12	123.80	-69.68	AVG	
2		0.0257	29.89	19.45	49.34	119.41	-70.07	AVG	
3		0.0554	23.55	18.62	42.17	112.73	-70.56	AVG	

Test Mode: TX Mode

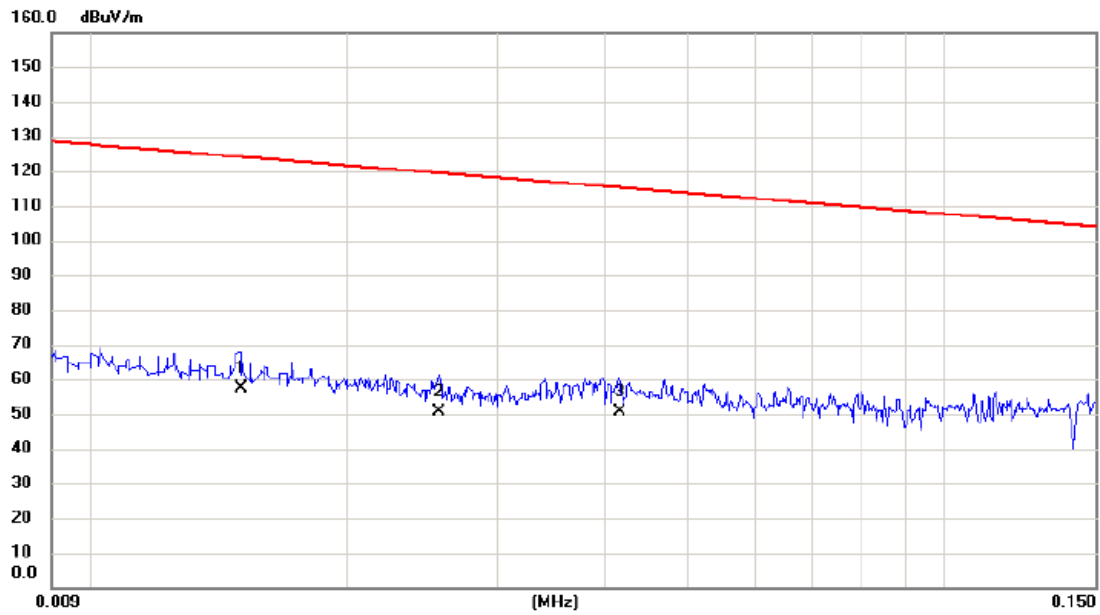
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2353	25.36	16.69	42.05	100.17	-58.12	AVG	
2	*	2.1783	20.16	15.46	35.62	69.54	-33.92	QP	
3		5.0312	19.58	14.37	33.95	69.54	-35.59	QP	

Test Mode: TX Mode

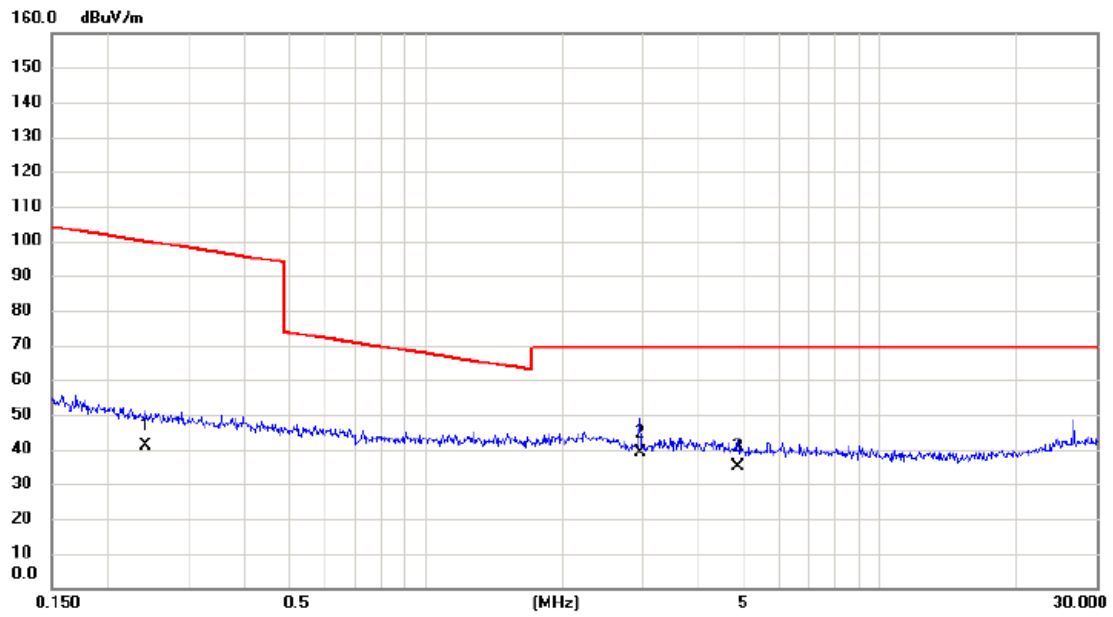
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.0150	37.31	20.27	57.58	124.08	-66.50	AVG	
2		0.0256	31.19	19.45	50.64	119.44	-68.80	AVG	
3	*	0.0416	31.51	18.97	50.48	115.22	-64.74	AVG	

Test Mode: TX Mode

Ant 90°

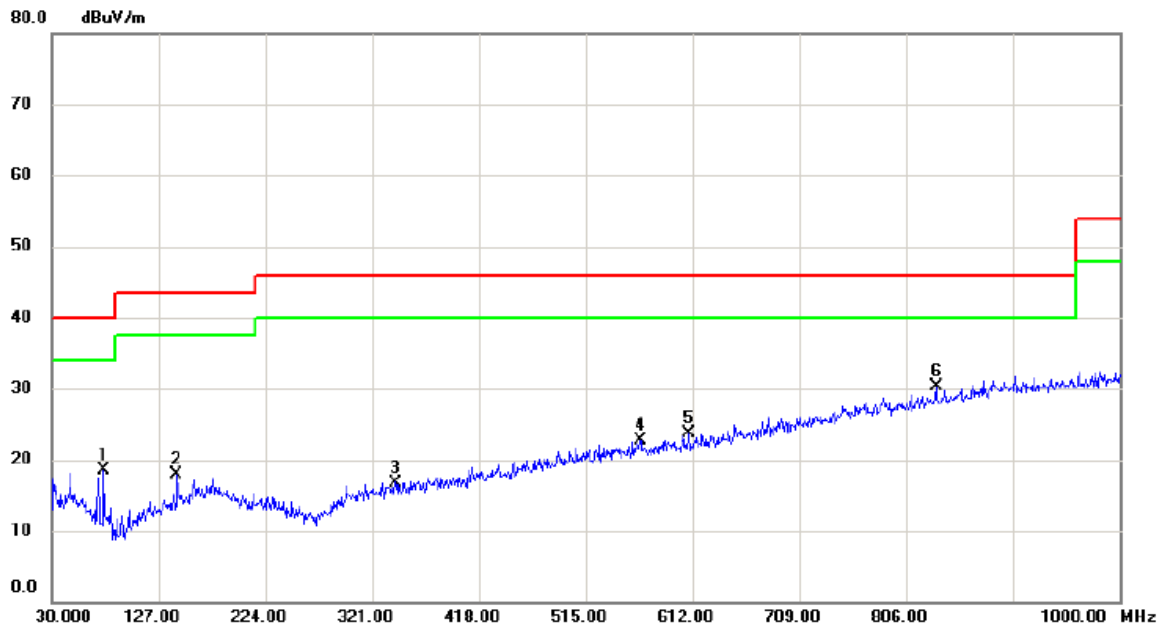


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2416	24.51	16.69	41.20	99.94	-58.74	AVG	
2	*	2.9620	23.94	15.24	39.18	69.54	-30.36	QP	
3		4.8738	20.48	14.45	34.93	69.54	-34.61	QP	

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

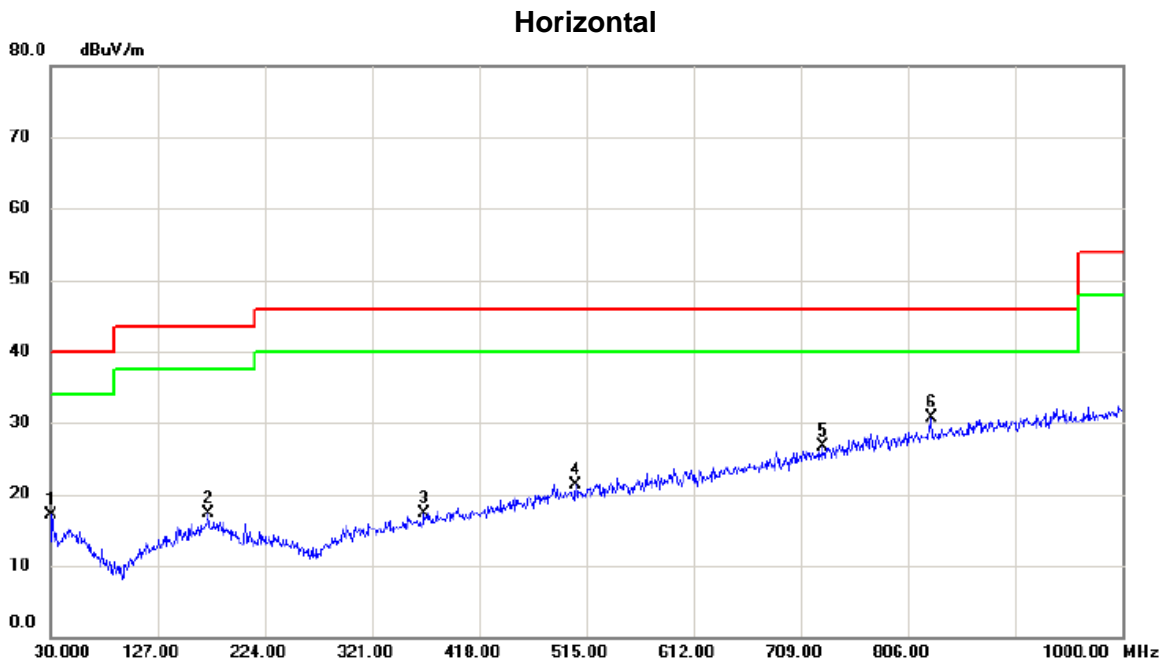
Test Mode: TX 2404MHz

Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.530	36.11	-17.66	18.45	40.00	-21.55	peak	
2		143.490	31.84	-13.97	17.87	43.50	-25.63	peak	
3		342.340	28.89	-12.09	16.80	46.00	-29.20	peak	
4		564.470	30.06	-7.34	22.72	46.00	-23.28	peak	
5		609.090	29.90	-6.25	23.65	46.00	-22.35	peak	
6	*	833.160	30.83	-0.46	30.37	46.00	-15.63	peak	

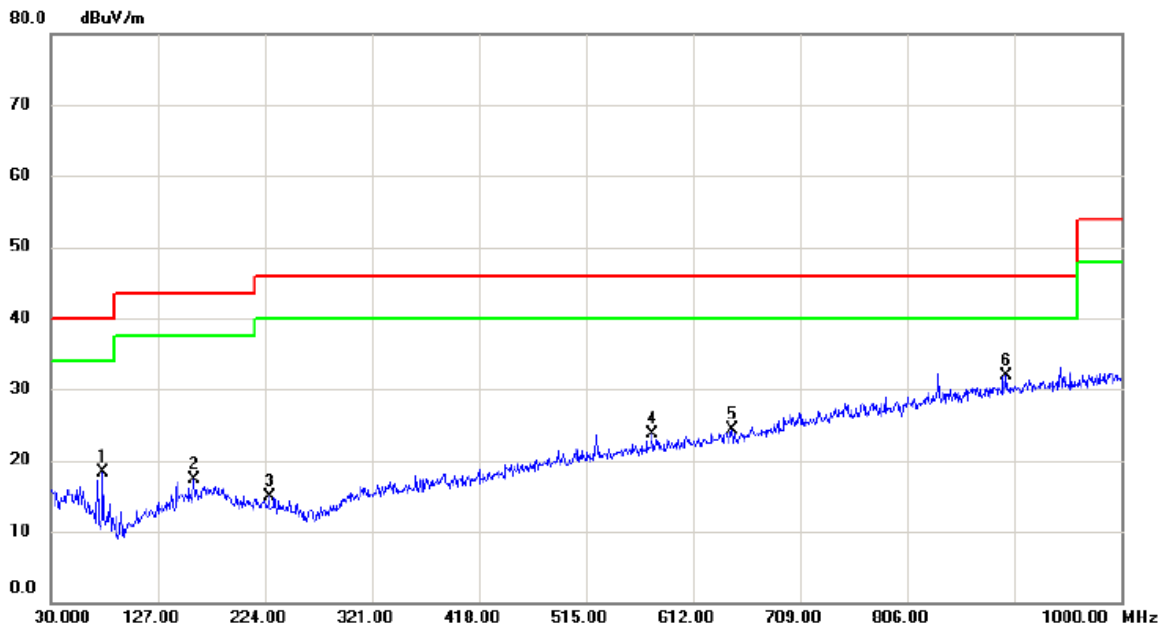
Test Mode: TX 2404MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		30.970	32.20	-15.14	17.06	40.00	-22.94	peak	
2		172.590	29.49	-12.26	17.23	43.50	-26.27	peak	
3		368.530	28.99	-11.73	17.26	46.00	-28.74	peak	
4		505.300	29.88	-8.61	21.27	46.00	-24.73	peak	
5		728.400	29.83	-3.09	26.74	46.00	-19.26	peak	
6	*	827.340	31.25	-0.61	30.64	46.00	-15.36	peak	

Test Mode: TX 2440MHz

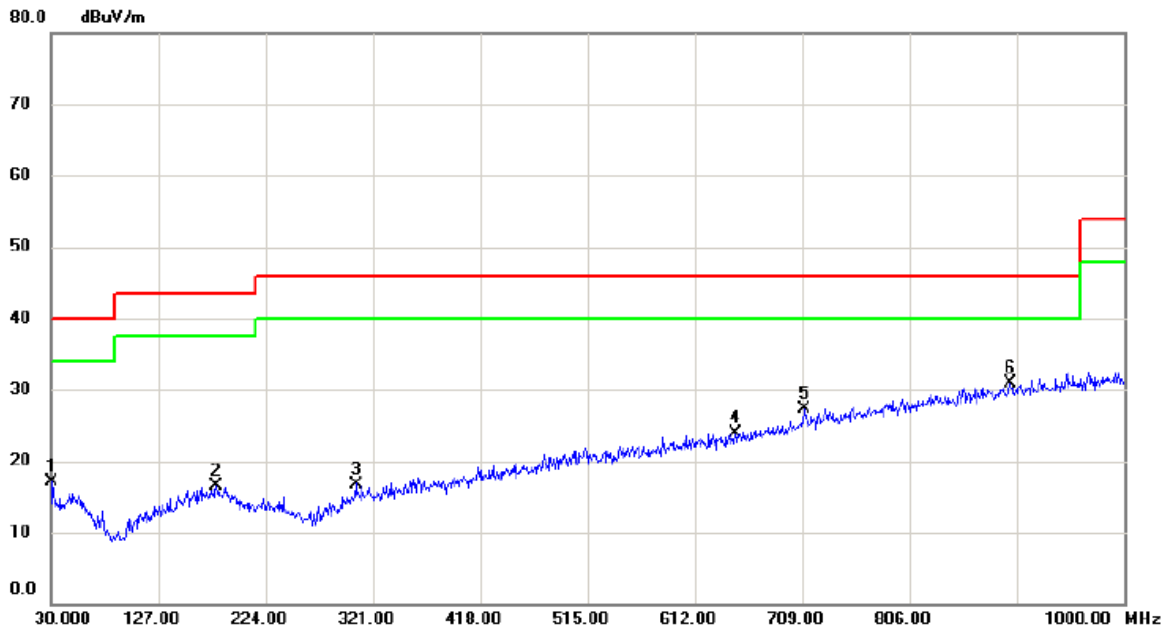
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.530	35.92	-17.66	18.26	40.00	-21.74	peak	
2		159.980	30.28	-12.93	17.35	43.50	-26.15	peak	
3		227.880	28.90	-14.09	14.81	46.00	-31.19	peak	
4		575.140	30.78	-7.06	23.72	46.00	-22.28	peak	
5		647.890	29.80	-5.52	24.28	46.00	-21.72	peak	
6	*	896.210	30.89	0.95	31.84	46.00	-14.16	peak	

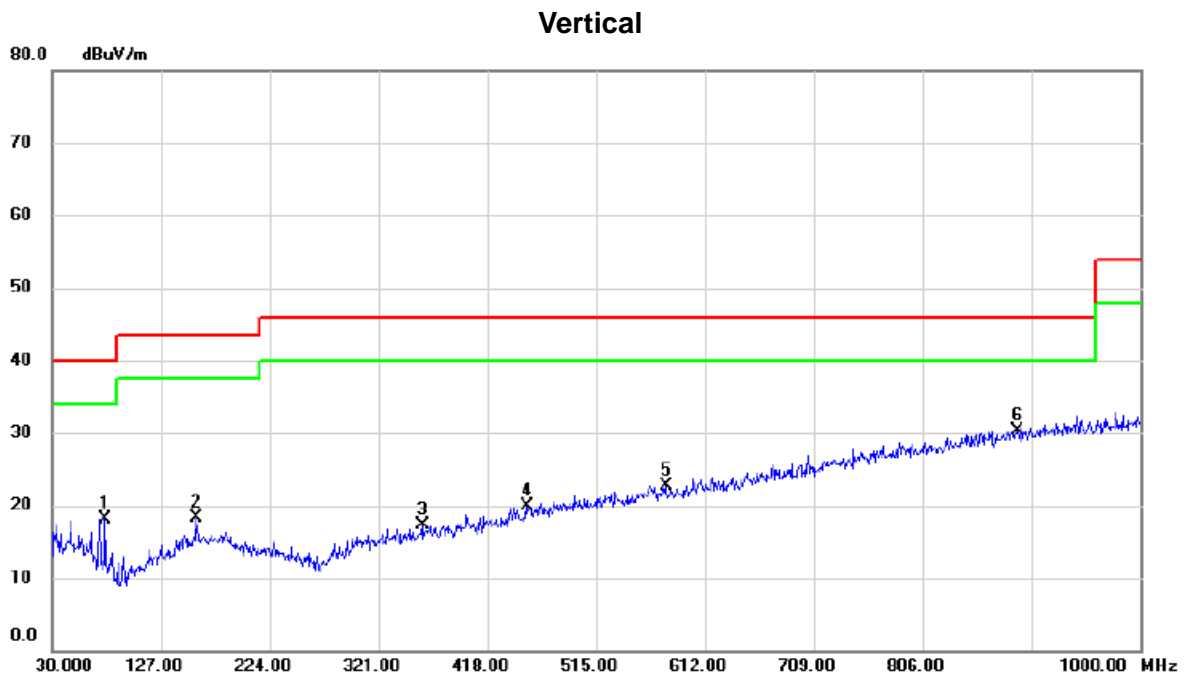
Test Mode: TX 2440MHz

Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		30.970	32.30	-15.14	17.16	40.00	-22.84	peak	
2		179.380	28.59	-12.06	16.53	43.50	-26.97	peak	
3		305.480	29.53	-12.73	16.80	46.00	-29.20	peak	
4		648.860	29.49	-5.51	23.98	46.00	-22.02	peak	
5		710.940	30.92	-3.62	27.30	46.00	-18.70	peak	
6	*	897.180	29.94	0.97	30.91	46.00	-15.09	peak	

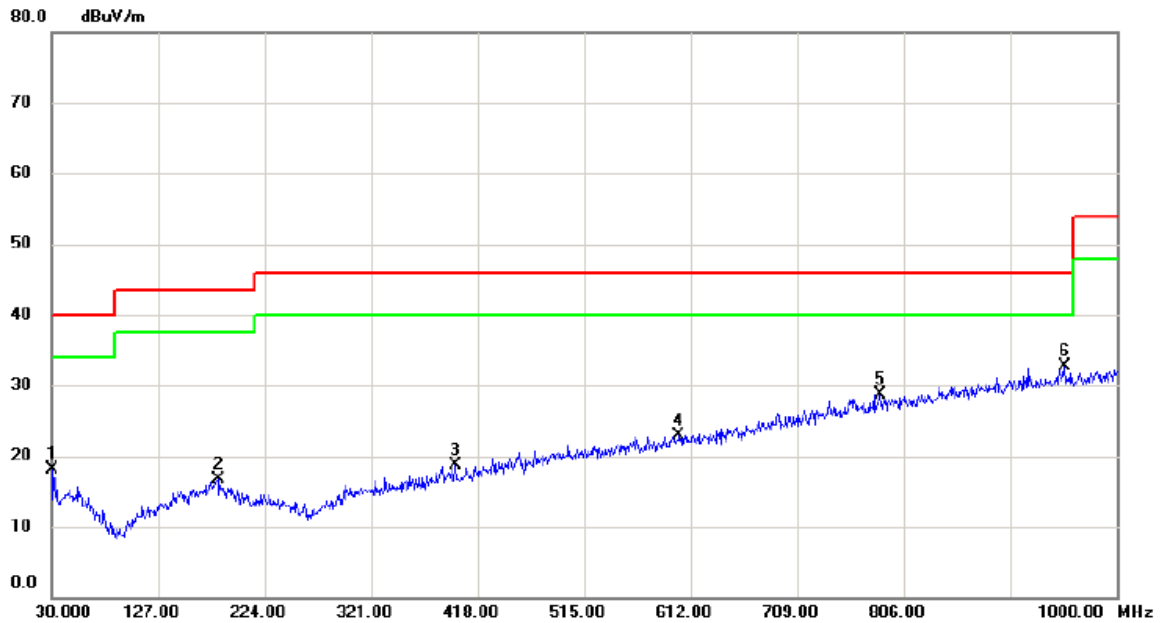
Test Mode: TX 2478MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		77.530	35.86	-17.66	18.20	40.00	-21.80	peak	
2		158.040	31.34	-13.04	18.30	43.50	-25.20	peak	
3		359.800	29.17	-11.84	17.33	46.00	-28.67	peak	
4		452.920	29.84	-9.87	19.97	46.00	-26.03	peak	
5		577.080	29.82	-7.02	22.80	46.00	-23.20	peak	
6	*	890.390	29.55	0.84	30.39	46.00	-15.61	peak	

Test Mode: TX 2478MHz

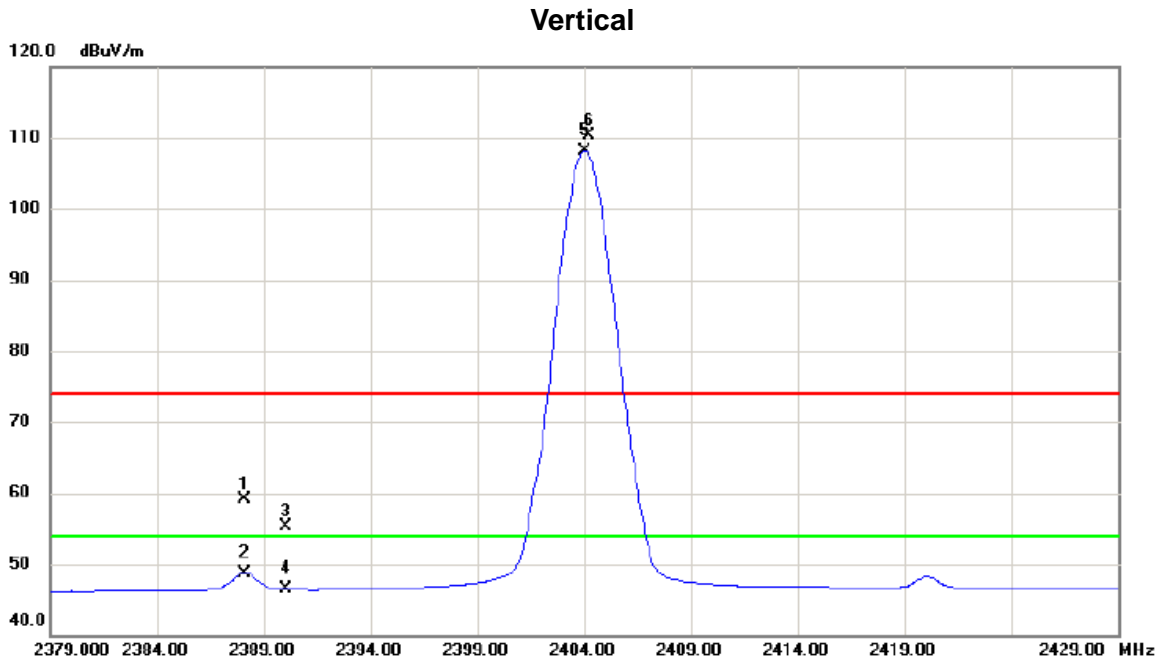
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		30.970	33.16	-15.14	18.02	40.00	-21.98	peak	
2		181.320	28.77	-12.14	16.63	43.50	-26.87	peak	
3		397.630	30.17	-11.38	18.79	46.00	-27.21	peak	
4		601.330	29.36	-6.39	22.97	46.00	-23.03	peak	
5		784.660	30.48	-1.70	28.78	46.00	-17.22	peak	
6	*	952.470	30.60	2.04	32.64	46.00	-13.36	peak	

APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

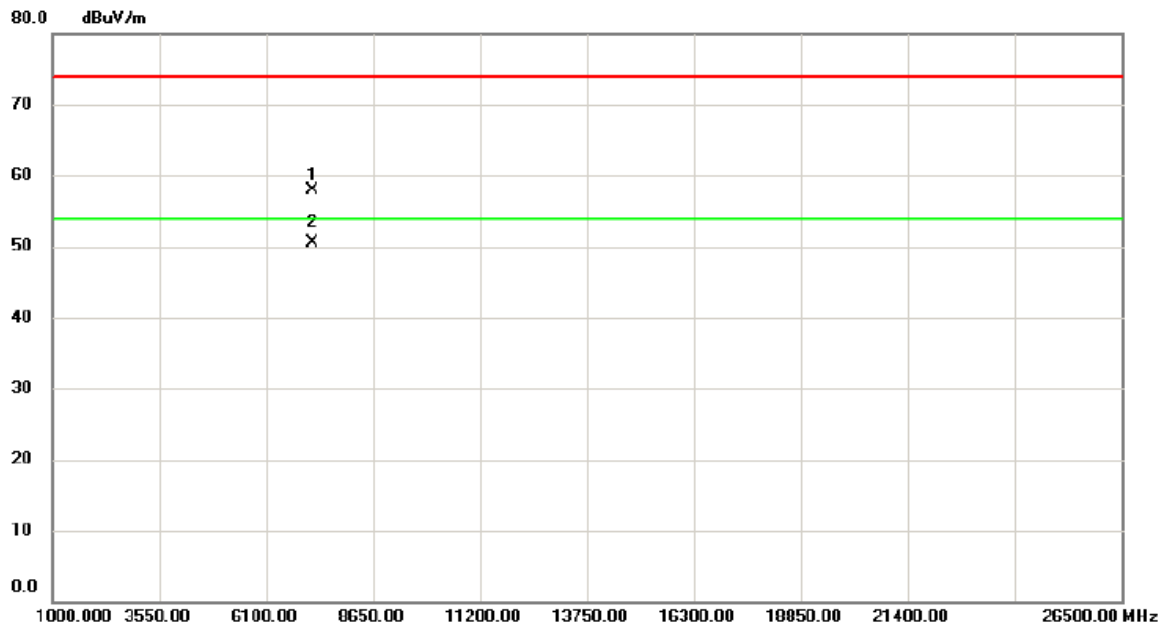
Test Mode TX Mode_2404 MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2388.100	26.03	33.05	59.08	74.00	-14.92	peak	
2		2388.100	15.73	33.05	48.78	54.00	-5.22	AVG	
3		2390.000	22.17	33.05	55.22	74.00	-18.78	peak	
4		2390.000	13.39	33.05	46.44	54.00	-7.56	AVG	
5	*	2404.050	75.02	33.11	108.13	54.00	54.13	AVG	No Limit
6	X	2404.250	77.14	33.11	110.25	74.00	36.25	peak	No Limit

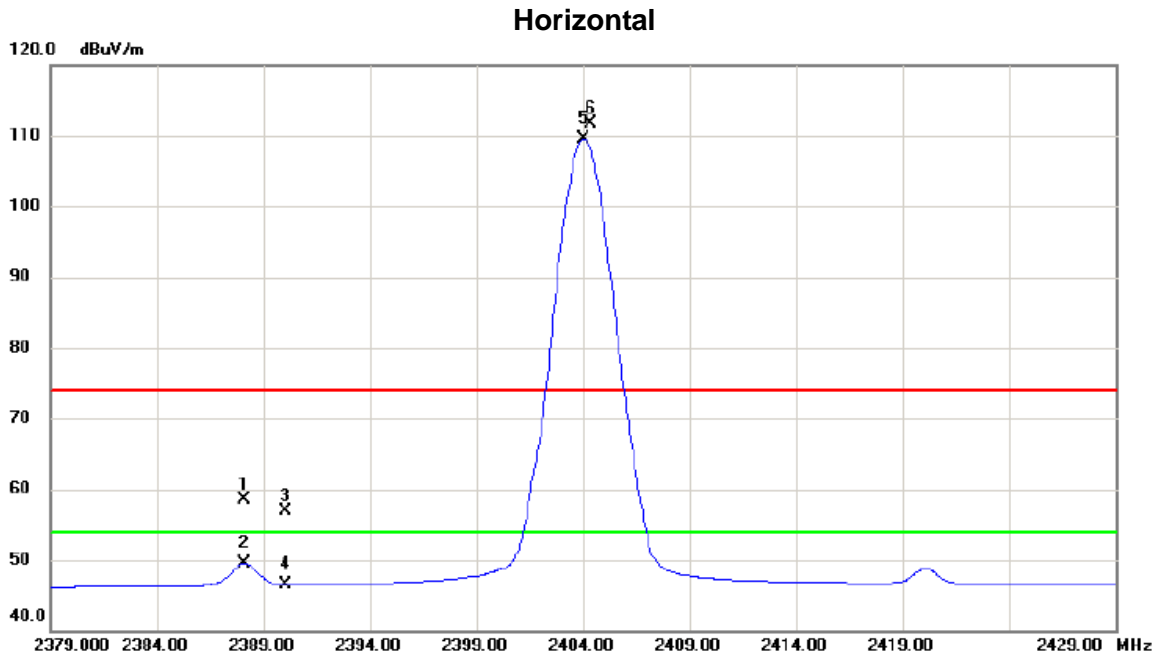
Test Mode	TX Mode_2404 MHz
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Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		7211.120	44.69	13.21	57.90	74.00	-16.10	peak	
2	*	7211.180	37.29	13.21	50.50	54.00	-3.50	AVG	

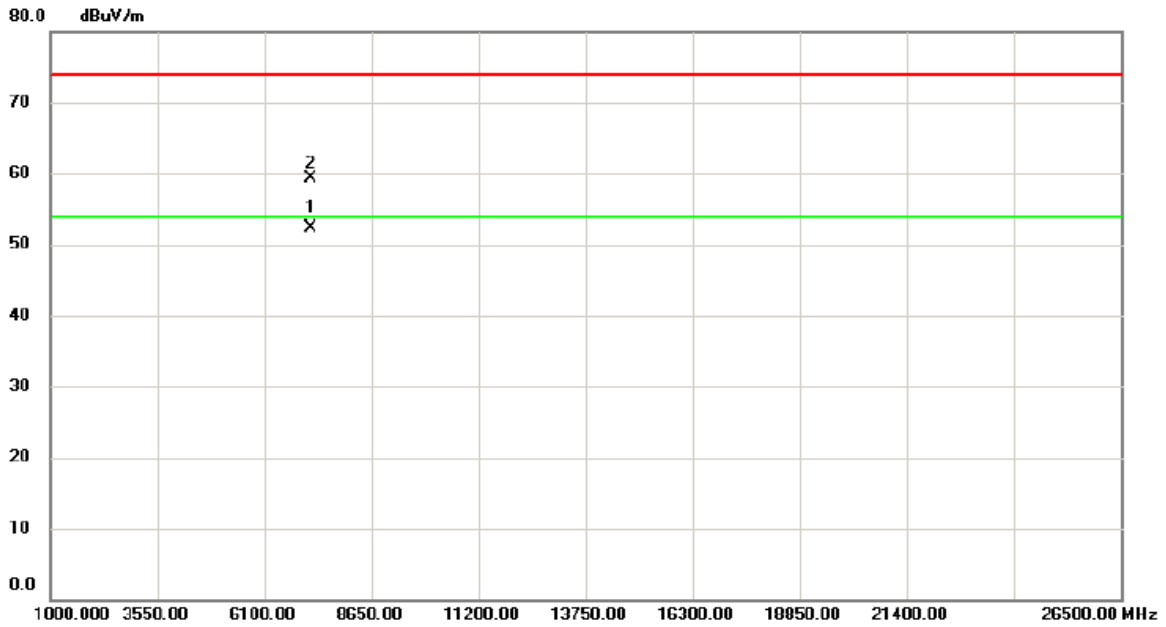
Test Mode TX Mode_2404 MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2388.100	25.38	33.05	58.43	74.00	-15.57	peak	
2		2388.100	16.48	33.05	49.53	54.00	-4.47	AVG	
3		2390.000	23.83	33.05	56.88	74.00	-17.12	peak	
4		2390.000	13.47	33.05	46.52	54.00	-7.48	AVG	
5	*	2404.050	76.42	33.11	109.53	54.00	55.53	AVG	No Limit
6	X	2404.350	78.55	33.11	111.66	74.00	37.66	peak	No Limit

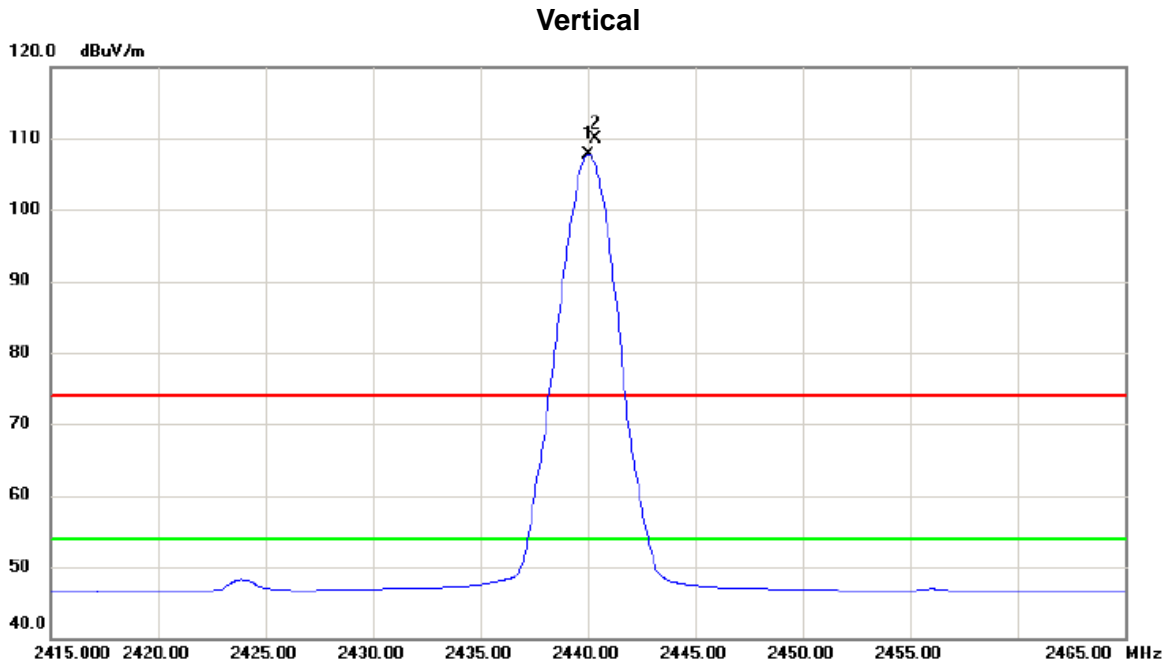
Test Mode	TX Mode_2404 MHz
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Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	7211.185	39.03	13.21	52.24	54.00	-1.76	AVG	
2		7211.280	46.16	13.21	59.37	74.00	-14.63	peak	

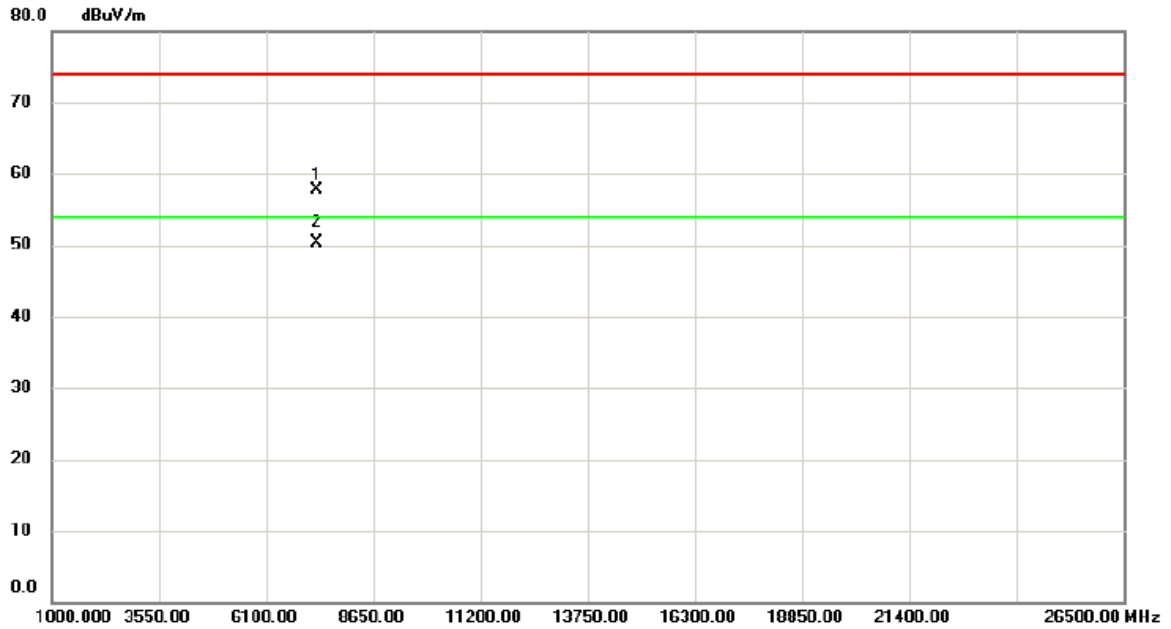
Test Mode TX Mode_2440 MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2440.050	74.50	33.24	107.74	54.00	53.74	AVG	No Limit
2	X	2440.350	76.57	33.24	109.81	74.00	35.81	peak	No Limit

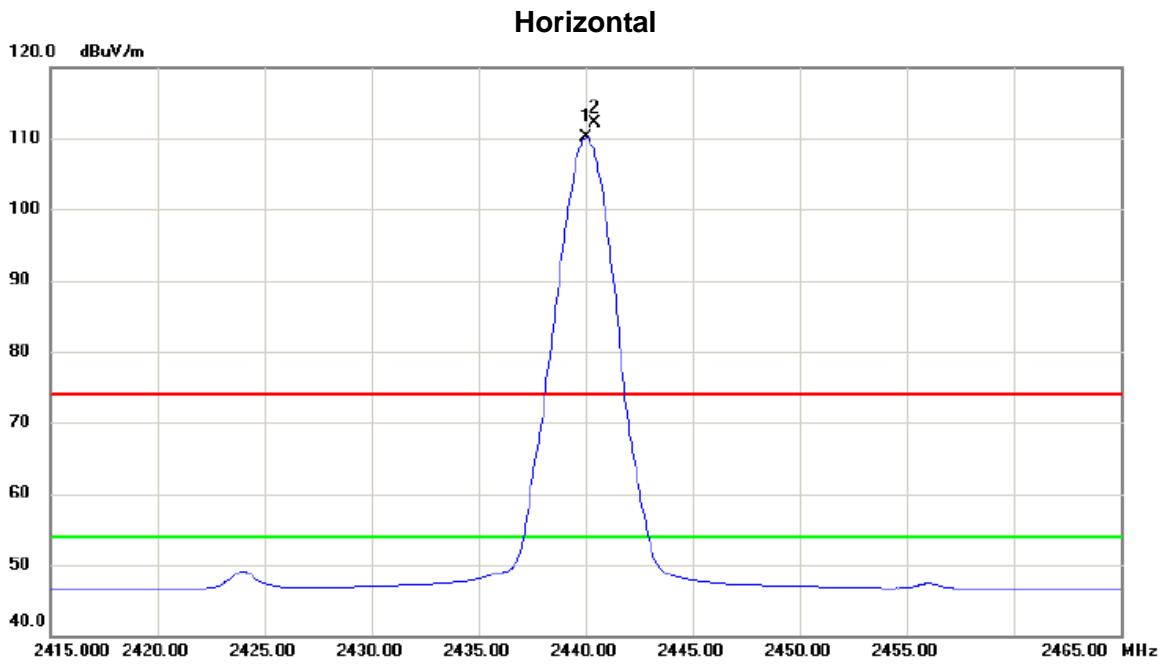
Test Mode	TX Mode_2440 MHz
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Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		7319.994	44.40	13.22	57.62	74.00	-16.38	peak	
2	*	7320.492	37.01	13.22	50.23	54.00	-3.77	AVG	

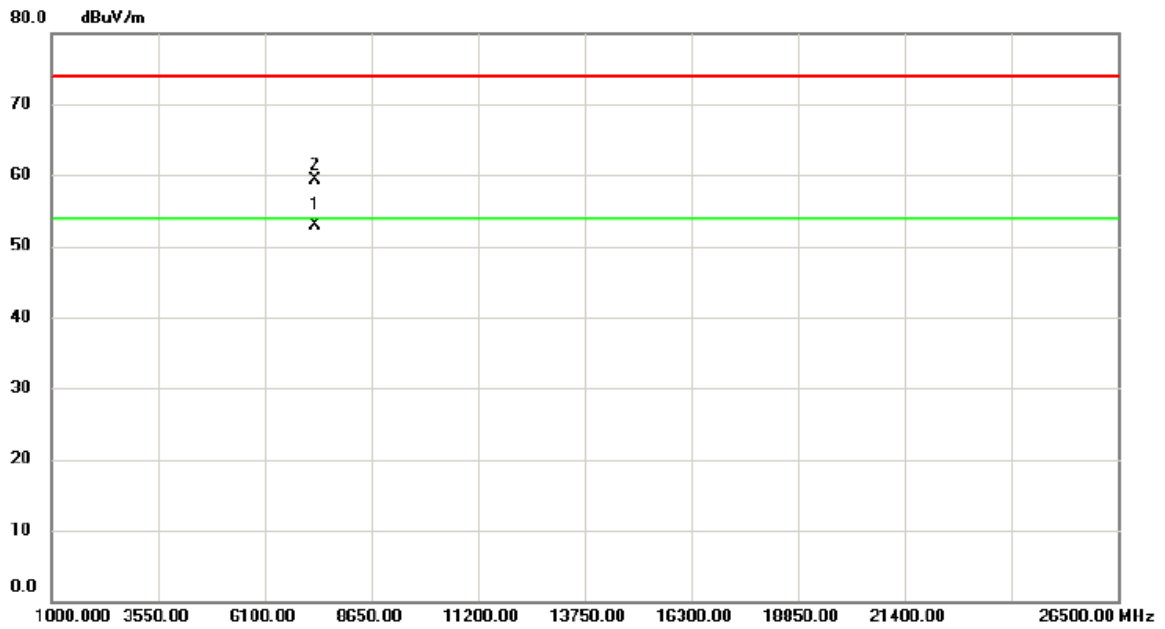
Test Mode TX Mode_2440 MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2440.050	76.83	33.24	110.07	54.00	56.07	AVG	No Limit
2	X	2440.450	78.91	33.25	112.16	74.00	38.16	peak	No Limit

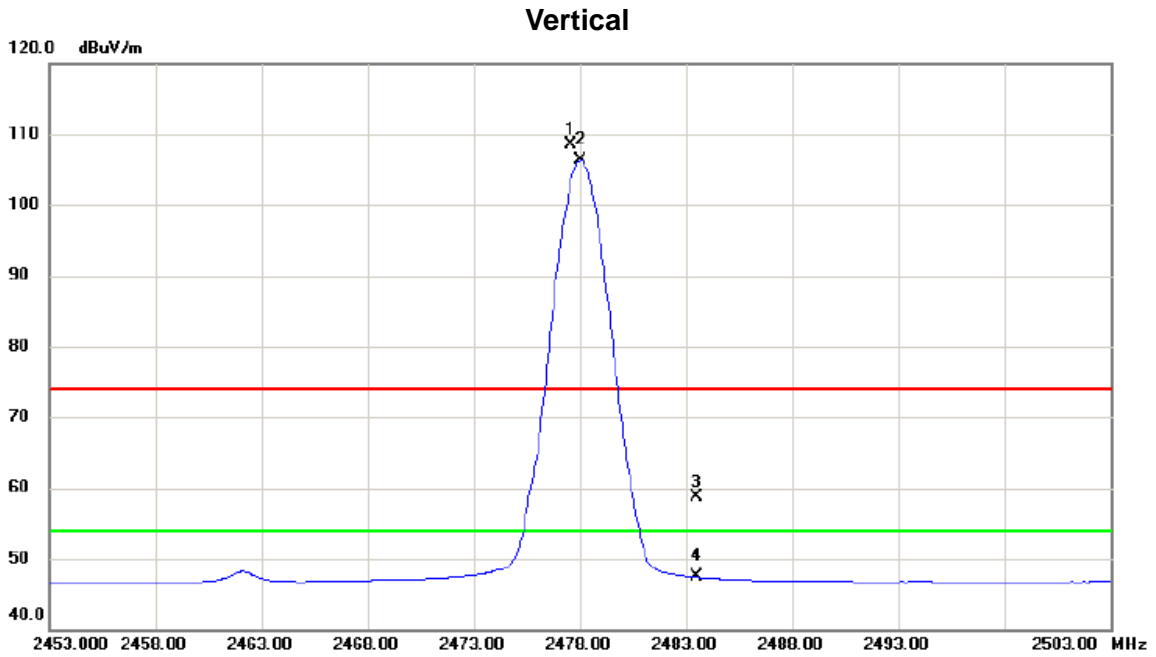
Test Mode	TX Mode_2440 MHz
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Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	7319.232	39.65	13.22	52.87	54.00	-1.13	AVG	
2		7319.472	46.07	13.22	59.29	74.00	-14.71	peak	

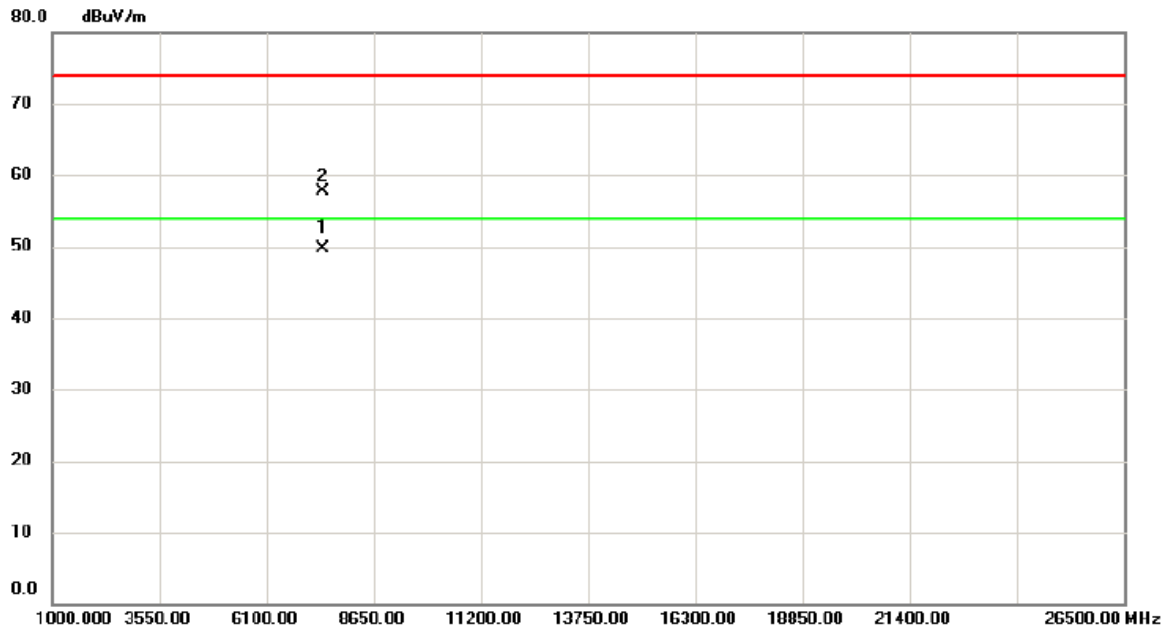
Test Mode TX Mode_2478 MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2477.600	75.03	33.38	108.41	74.00	34.41	peak	No Limit
2	*	2478.050	72.89	33.38	106.27	54.00	52.27	AVG	No Limit
3		2483.500	25.35	33.41	58.76	74.00	-15.24	peak	
4		2483.500	14.02	33.41	47.43	54.00	-6.57	AVG	

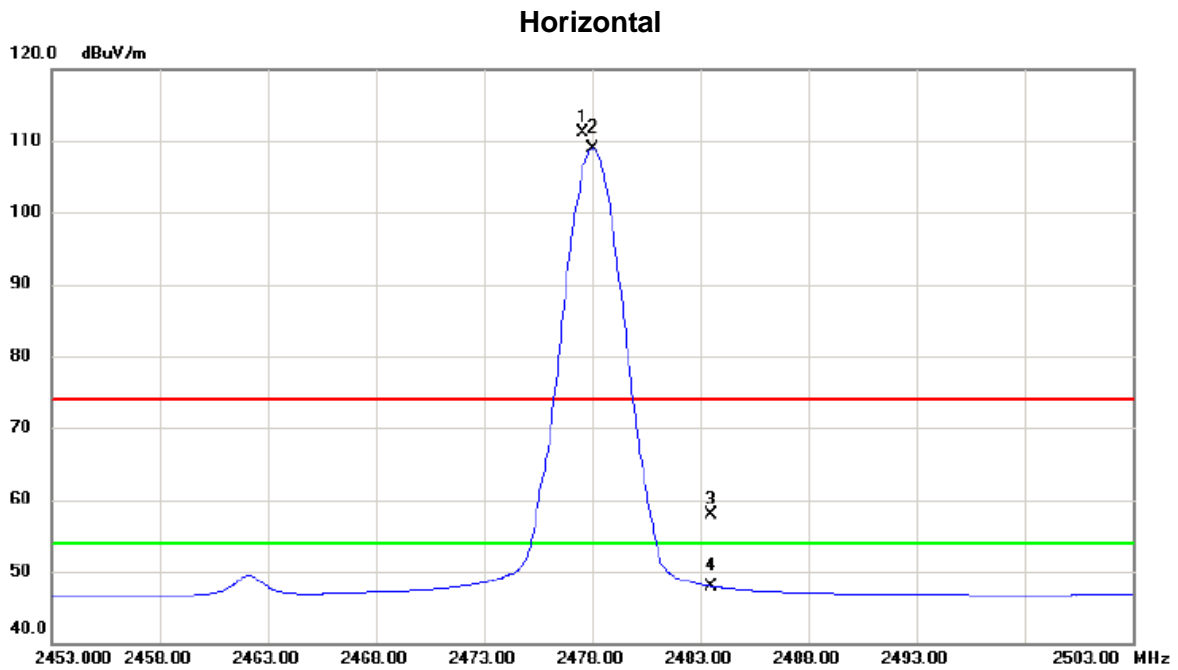
Test Mode	TX Mode_2478 MHz
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Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	7433.178	36.45	13.31	49.76	54.00	-4.24	AVG	
2		7433.181	44.42	13.31	57.73	74.00	-16.27	peak	

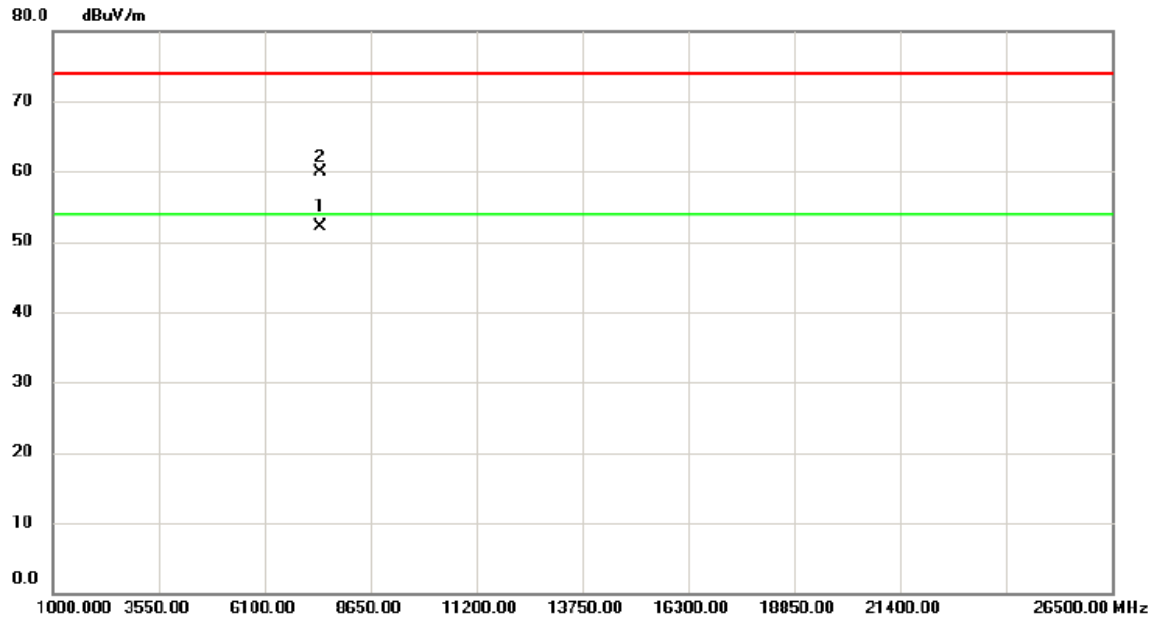
Test Mode TX Mode_2478 MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2477.600	77.80	33.38	111.18	74.00	37.18	peak	No Limit
2	*	2478.050	75.62	33.38	109.00	54.00	55.00	AVG	No Limit
3		2483.500	24.59	33.41	58.00	74.00	-16.00	peak	
4		2483.500	14.58	33.41	47.99	54.00	-6.01	AVG	

Test Mode	TX Mode_2478 MHz
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Horizontal



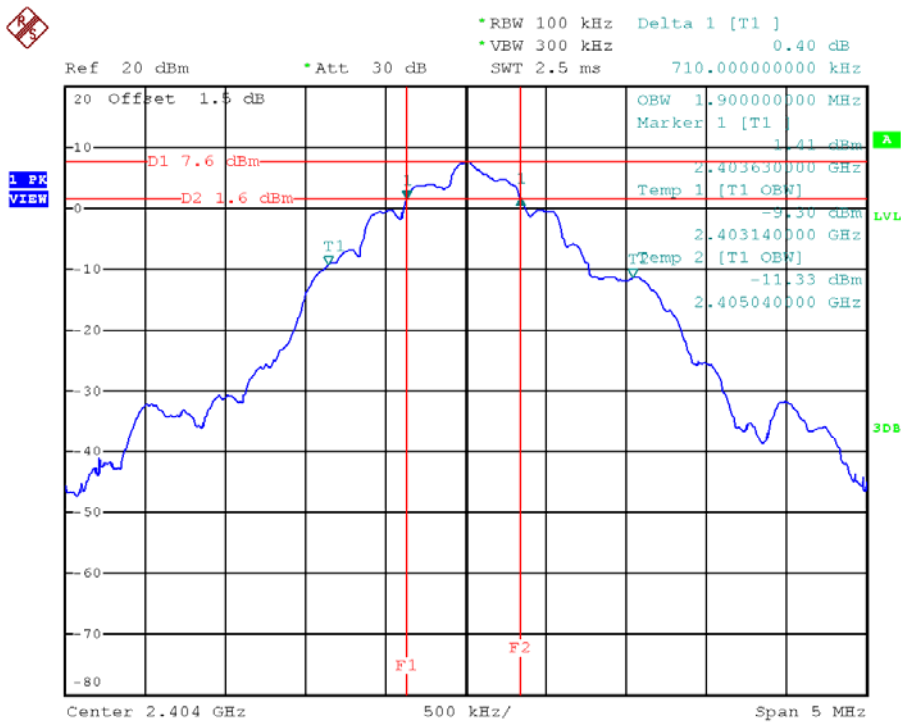
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	7433.196	38.77	13.31	52.08	54.00	-1.92	AVG	
2		7435.035	46.62	13.31	59.93	74.00	-14.07	peak	

APPENDIX E - BANDWIDTH

Test Mode:	TX Mode
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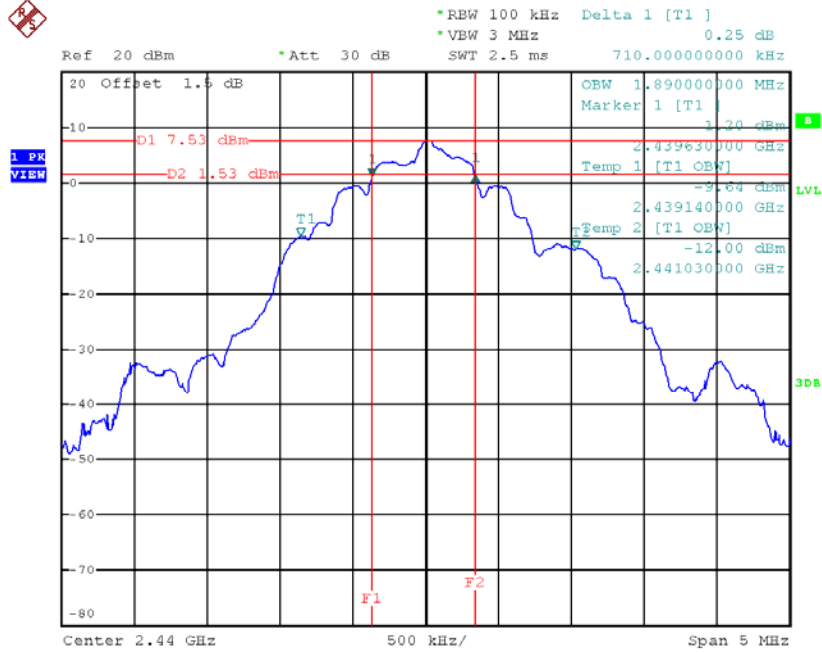
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2404	0.71	1.90	500	Complies
2440	0.71	1.89	500	Complies
2478	0.73	1.88	500	Complies

TX CH01



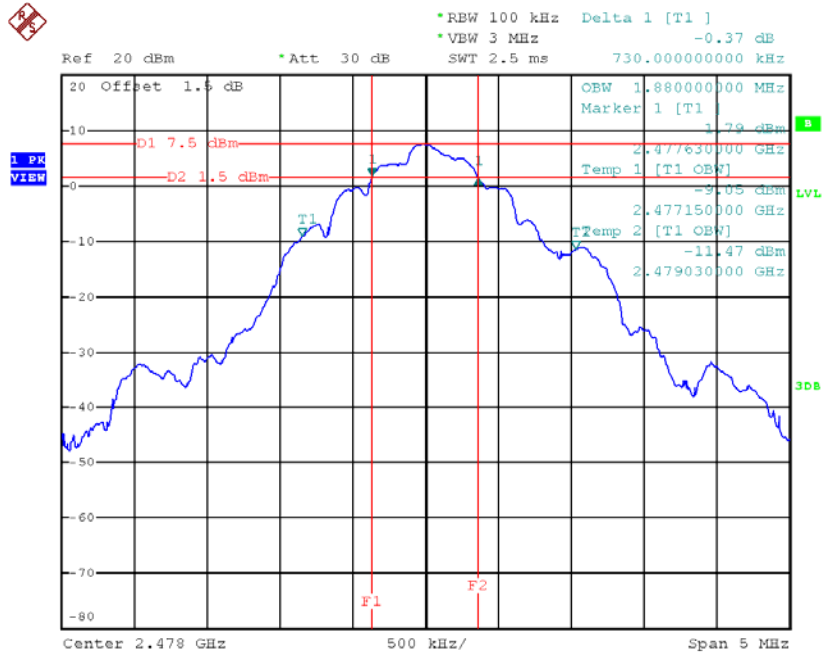
Date: 22.SEP.2017 14:47:49

TX CH19



Date: 22.SEP.2017 15:00:59

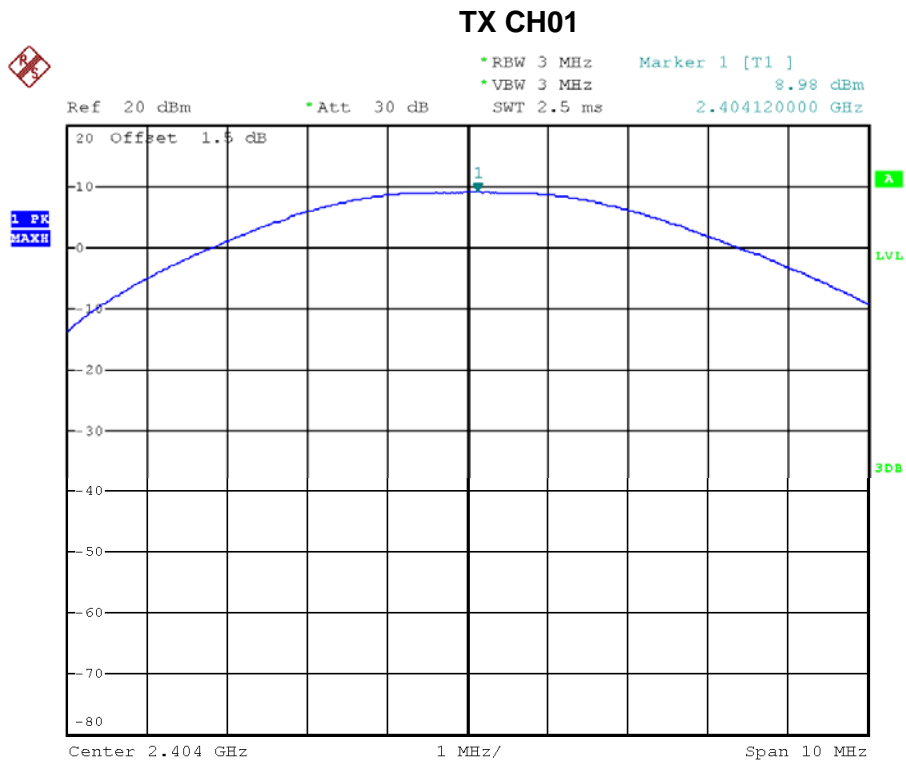
TX CH38



Date: 22.SEP.2017 15:05:17

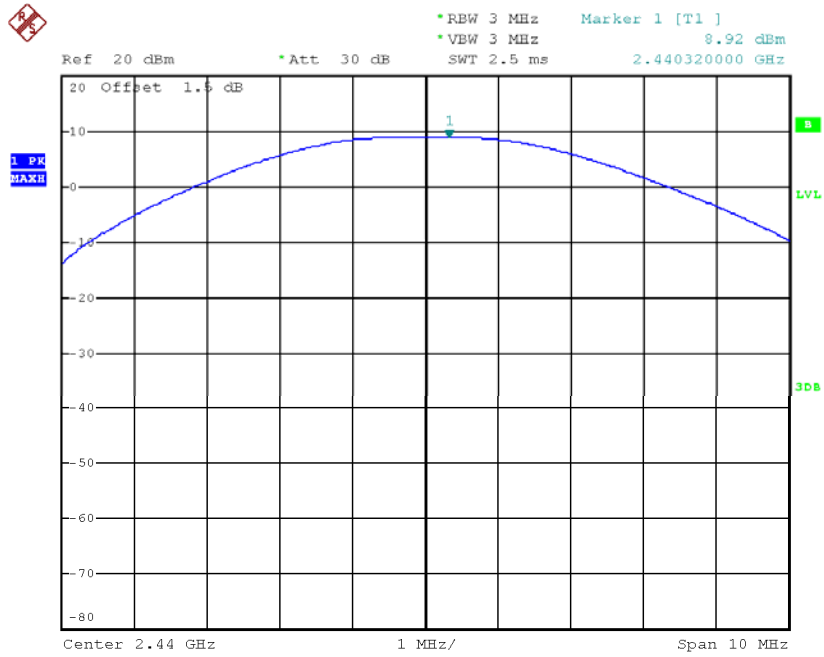
APPENDIX F - CONDUCTED POWER TEST

Test Mode					
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
2404	8.98	0.0079	30.00	1.00	Complies
2440	8.92	0.0078	30.00	1.00	Complies
2478	9.09	0.0081	30.00	1.00	Complies



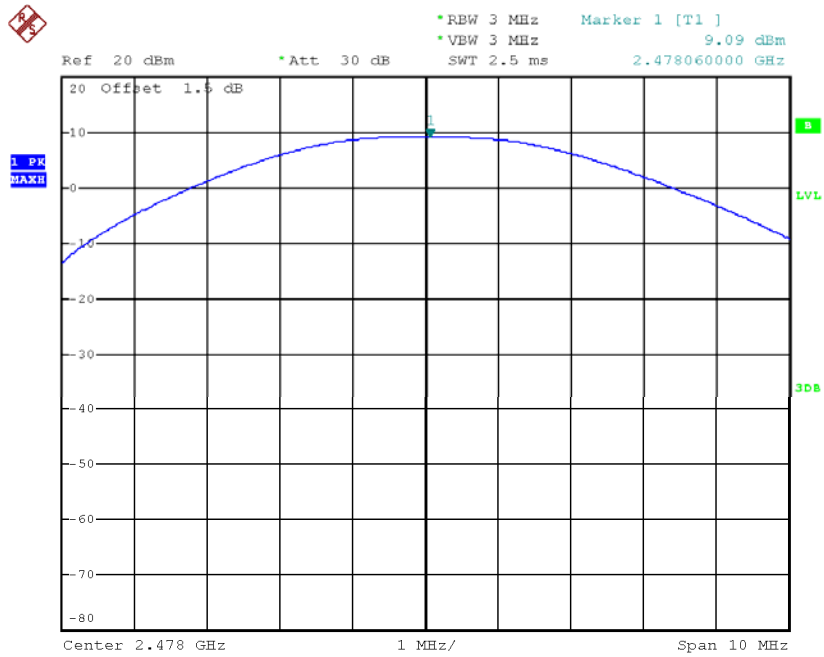
Date: 22.SEP.2017 14:43:15

TX CH19



Date: 22.SEP.2017 14:59:00

TX CH38

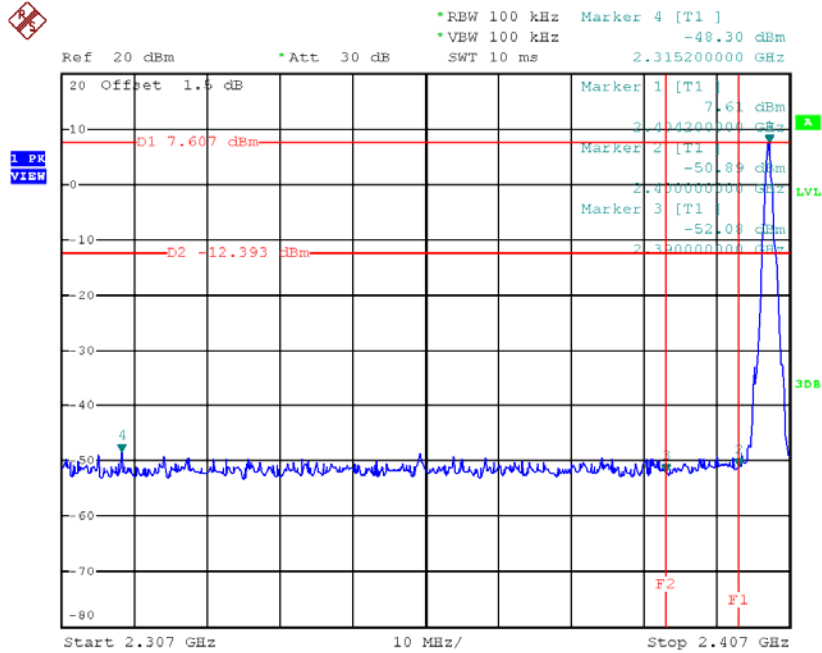


Date: 22.SEP.2017 14:57:28

APPENDIX G - ANTENNA CONDUCTED SPURIOUS EMISSION

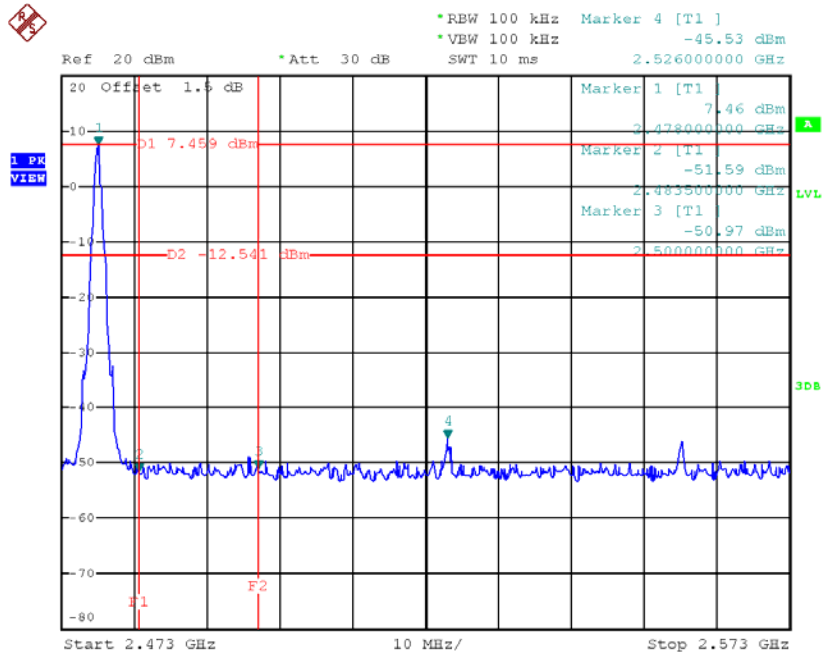
Test Mode : CH01, CH19 , CH37

CH01 (Lower)



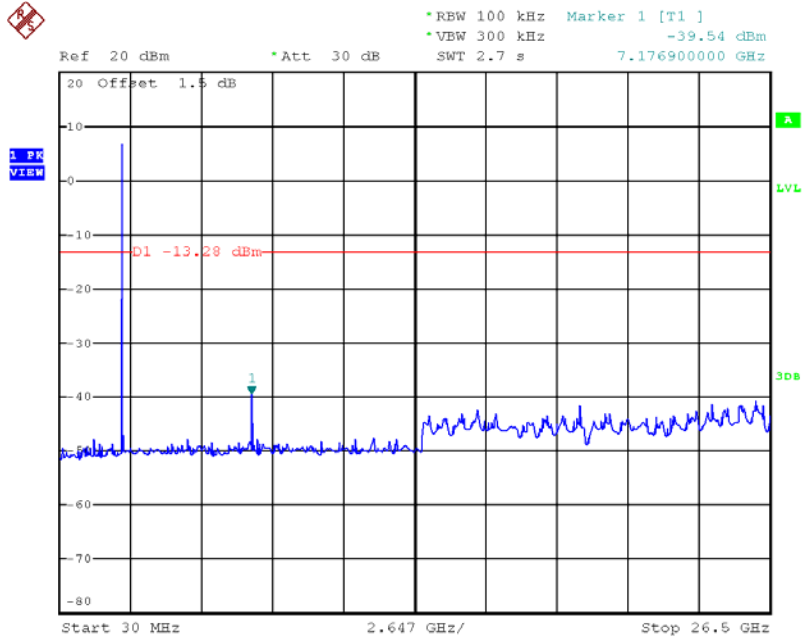
Date: 22.SEP.2017 15:10:04

CH38 (upper)



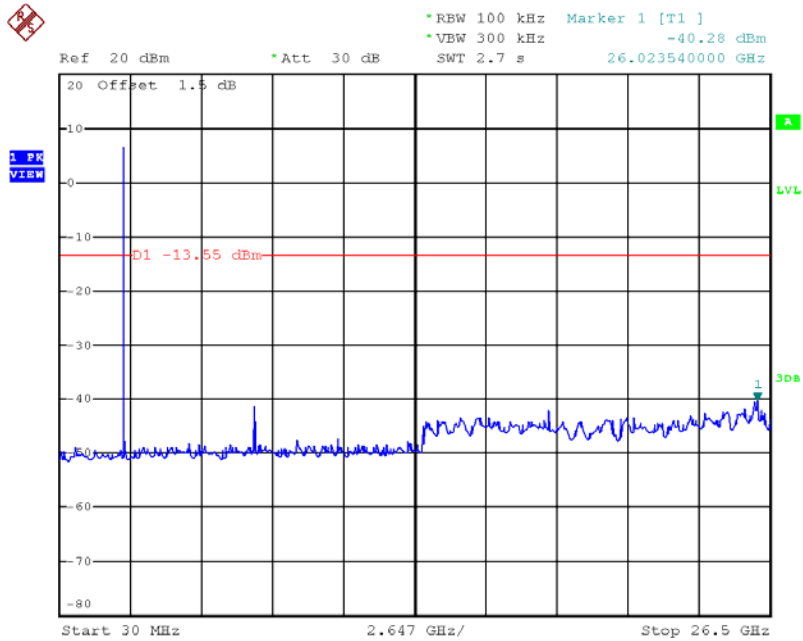
Date: 22.SEP.2017 15:11:06

CH01 (10 Harmonic of the frequency)



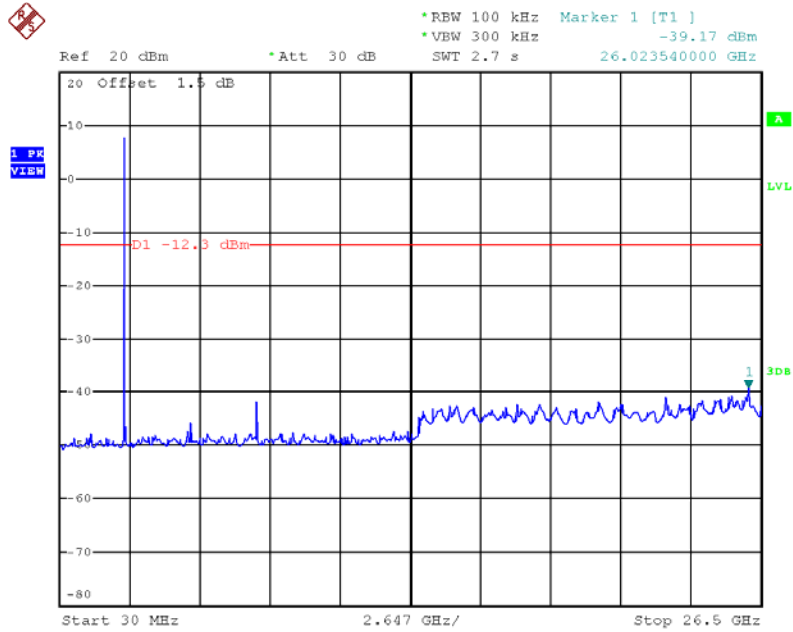
Date: 22.SEP.2017 15:18:41

CH19 (10 Harmonic of the frequency)



Date: 22.SEP.2017 15:16:49

CH38 (10 Harmonic of the frequency)



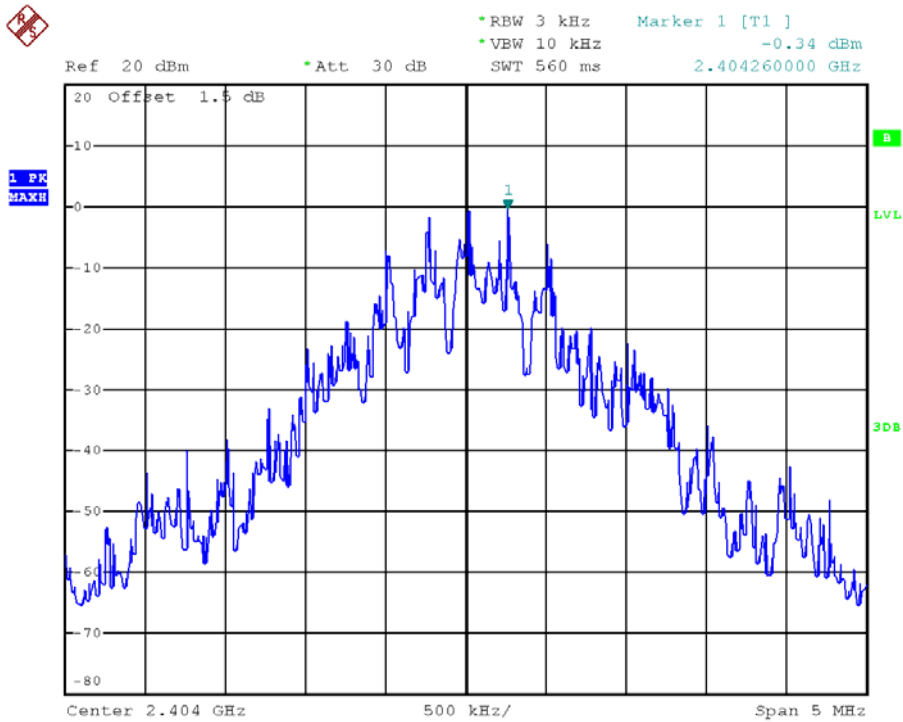
Date: 22.SEP.2017 15:14:47

APPENDIX H - POWER SPECTRAL DENSITY TEST

Test Mode:	TX Mode
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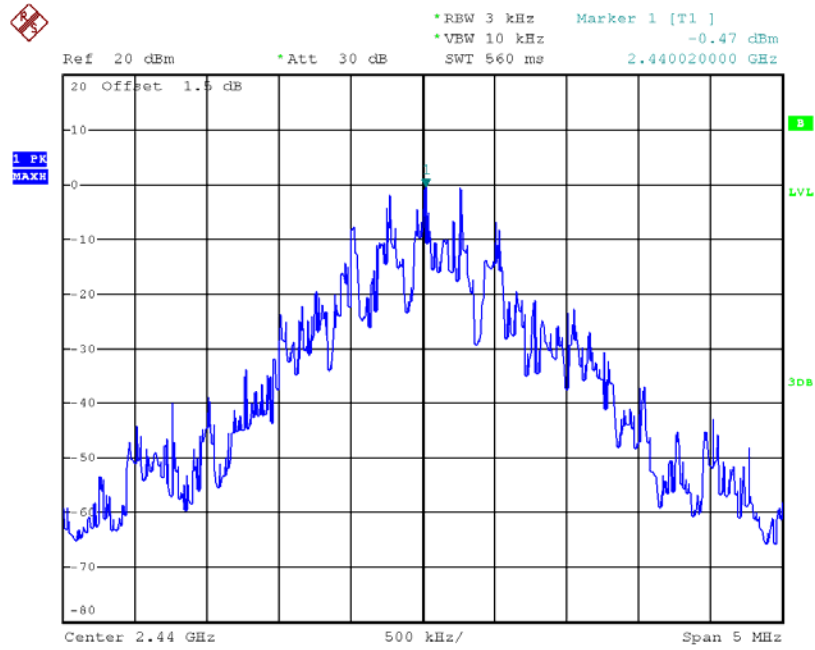
Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
2404	-0.34	0.000	8.00	Complies
2440	-0.47	0.000	8.00	Complies
2478	-0.06	0.000	8.00	Complies

TX CH01



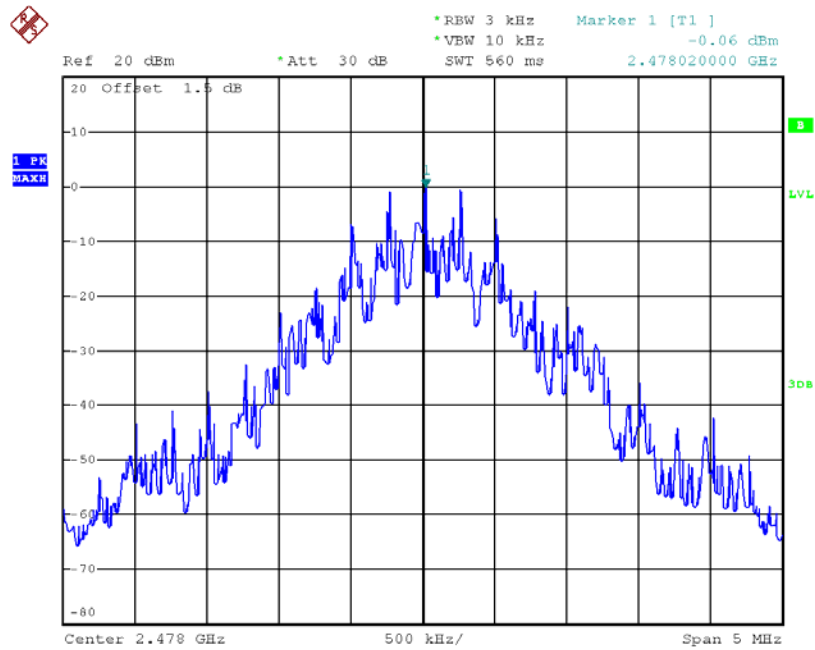
Date: 22.SEP.2017 14:52:19

TX CH19



Date: 22.SEP.2017 14:54:44

TX CH38



Date: 22.SEP.2017 14:56:21