

FCC Radio Test Report

FCC ID: RWO-RC30015902

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

Project No. : 1701C278B
Equipment : Wireless Gaming Headset
Model Name : RC30-015902
Applicant : Razer Inc.
Address : 201 3rd Street, Suite 900, San Francisco, CA 94103

Date of Receipt : Jan. 24, 2017
Date of Test : Jan. 24, 2017 ~ Jun. 13, 2017
Issued Date : Jun. 13, 2017
Tested by : BTL Inc.

Testing Engineer : Vitas Zhou
(Vitas Zhou)

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B T L I N C .

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1701C278B	Original Issue.	Jun. 13, 2017

1. CERTIFICATION

Equipment : Wireless Gaming Headset
Brand Name : RAZER
Model Name : RC30-015902
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 : Jan. 24, 2017 ~ Jun. 13, 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-1-1701C278B) 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: 319330

2.2 MEASUREMENT UNCERTAINTY

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

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

A. Conducted Measurement:

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

B. Radiated Measurement:

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

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Gaming Headset	
Brand Name	RAZER	
Model Name	RC30-015902	
Model Difference	The system's model is RZ04-0159, and the system contains of Wireless Gaming Headset (Model: RC30-015902) and Audio Hub (Model: RC30-015901).	
Product Description	Operation Frequency	2405.35-2477.35 MHz
	Modulation Technology	GFSK (2 Mbps)
	Bit Rate of Transmitter	
	AVG Power (Max.)	2.90dBm (2 Mbps)
Power Source	#1 Supplied from USB Port #2 Supplied from Battery Model: PL503450	
Power Rating	#1 DC 5V 500mA #2 DC 3.7V 1200mA	

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	2405.35	21	2445.35
02	2407.35	22	2447.35
03	2409.35	23	2449.35
04	2411.35	24	2451.35
05	2413.35	25	2453.35
06	2415.35	26	2455.35
07	2417.35	27	2457.35
08	2419.35	28	2459.35
09	2421.35	29	2461.35
10	2423.35	30	2463.35
11	2425.35	31	2465.35
12	2427.35	32	2467.35
13	2429.35	33	2469.35
14	2431.35	34	2471.35
15	2433.35	35	2473.35
16	2435.35	36	2475.35
17	2437.35	37	2477.35
18	2439.35		
19	2441.35		
20	2443.35		

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	2.53
2	N/A	N/A	Printed	N/A	2.53

Note: There are two antennas but only one antenna works at a time.

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)

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:

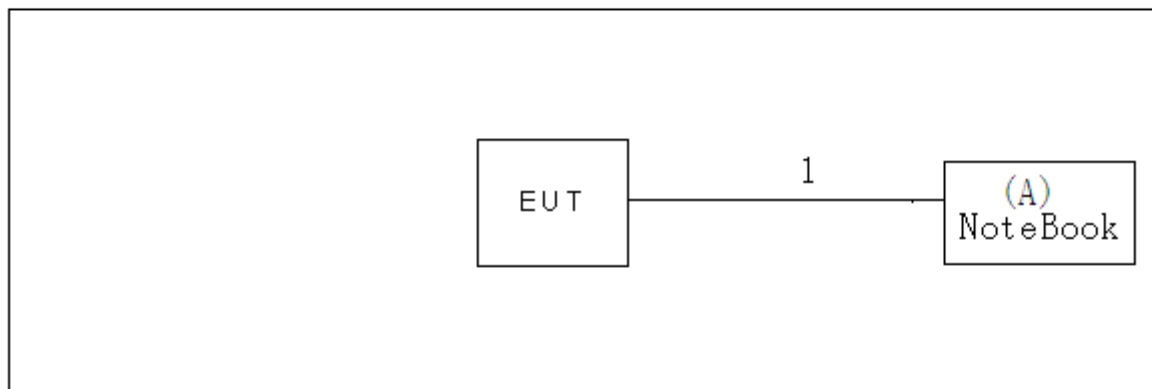
(1) The measurements are performed at the high, middle, low available channels.

3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

Test Software Version	N/A		
Frequency (MHz)	2405.35	2441.35	2477.35
-	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.
A	Notebook	Lenovo	INSPIRON 1420-	DOC	JX193A01SDC2

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	0.8M	USB Cable

Note:

- (1) For detachable type I/O cable should be specified the length in m in 『Length』 column.

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

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

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 -0.5	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	50

Note:

- (1) The limit of " * " decreases with the logarithm of the frequency
- (2) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

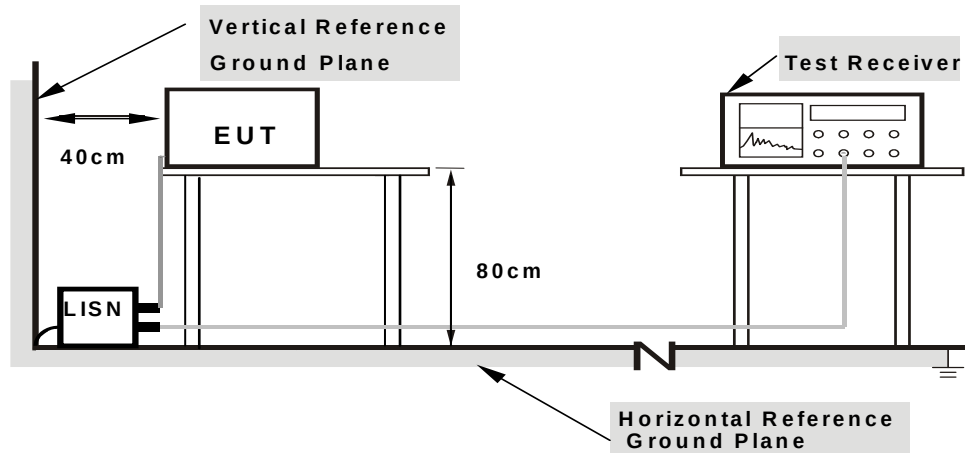
4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



- Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 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: 25°C Relative Humidity: 53% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform.In this case, a “ * ” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) “ N/A ” denotes test is not applicable to this device.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

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

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.2.2 TEST PROCEDURE

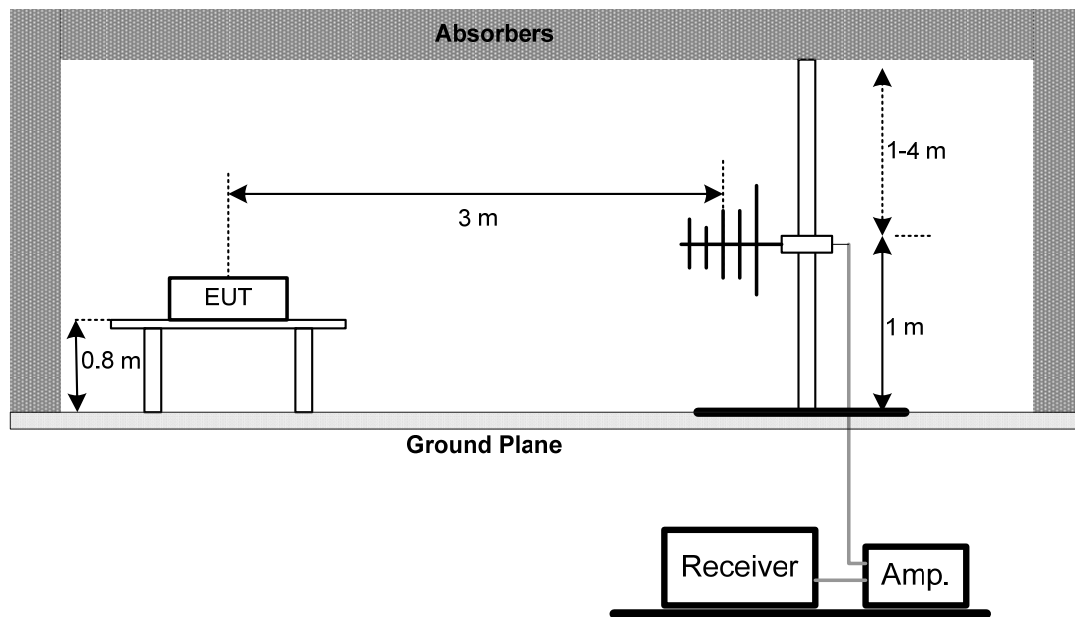
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 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.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

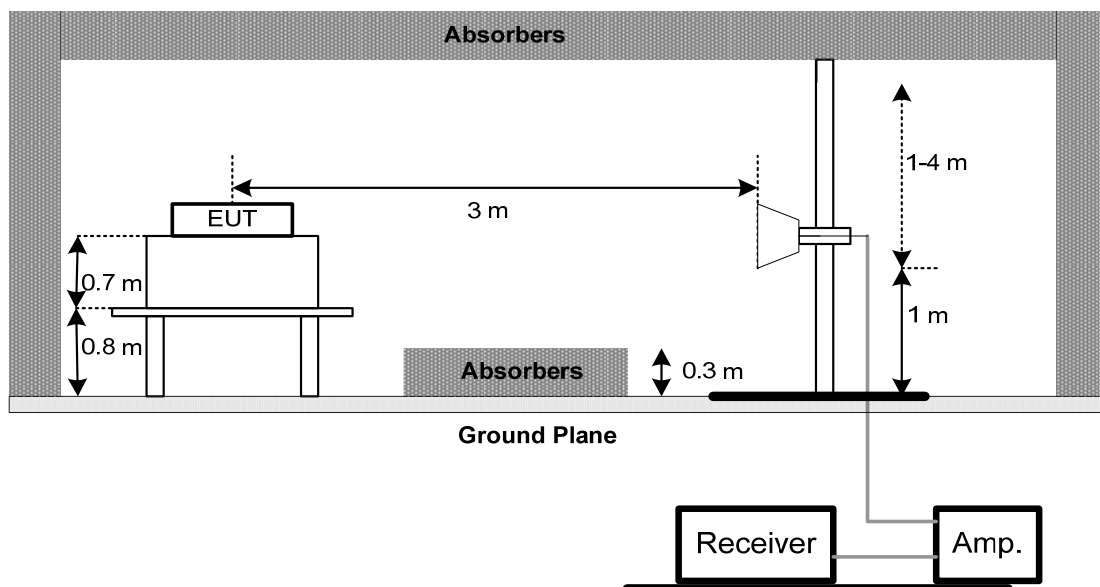
No deviation

4.2.4 TEST SETUP

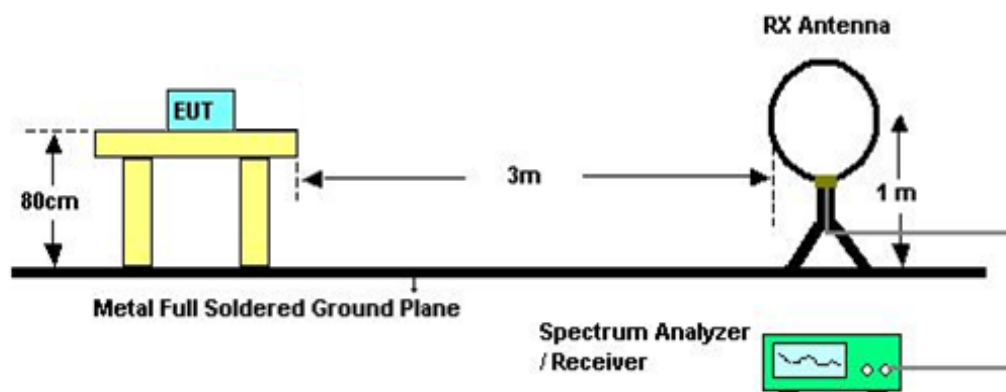
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

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

4.2.6 EUT TEST CONDITIONS

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

4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Attachment B

Remark:

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

4.2.8 TEST RESULTS (30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

- (1) 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 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

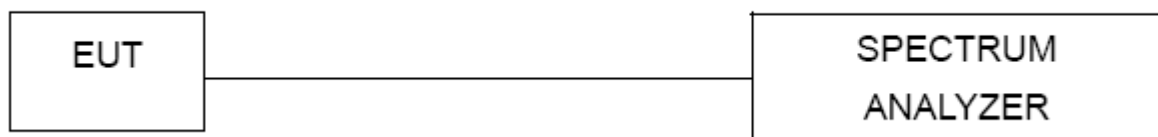
5.1.1 TEST PROCEDURE

- 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: 60% Test Voltage: DC 5V

5.1.6 TEST RESULTS

Please refer to the Attachment 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

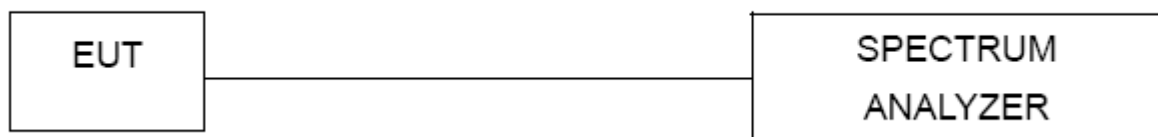
6.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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 5V

6.1.6 TEST RESULTS

Please refer to the Attachment F.

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

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

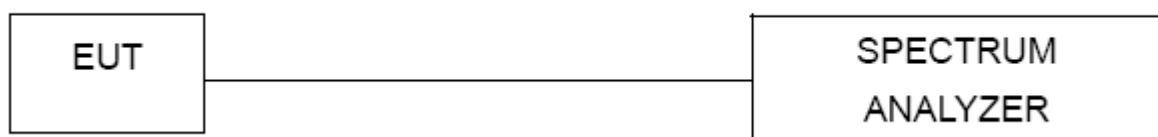
7.1.1 TEST PROCEDURE

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

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

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

7.1.5 EUT OPERATION CONDITIONS

Temperature: 25°C Relative Humidity: 60% Test Voltage: DC 5V

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

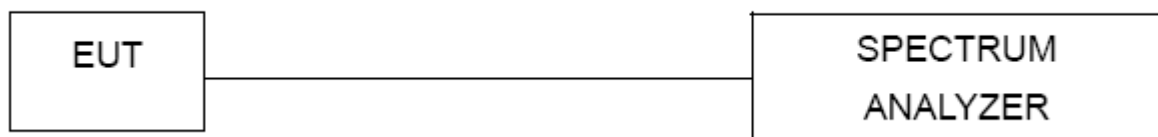
8.1.1 TEST PROCEDURE

- 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: 60% Test Voltage: DC 5V

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	EMI Test Receiver	R&S	ESCI	100382	Mar. 26, 2018
2	LISN	EMCO	3816/2	52765	Mar. 26, 2018
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 26, 2018
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 26, 2018
5	Cable	emci	RG223(9KHz-30M Hz)(5m)	N/A	Mar. 07, 2018
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. 26, 2018
2	Amplifier	HP	8447D	2944A09673	Oct. 20, 2017
3	Receiver	AGILENT	N9038A	MY52130039	Sep. 04, 2017
4	Test Cable	emci	LMR-400(30MHz-1 GHz)	C-01	Jun. 26, 2017
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-1 0000(1GHz-26.5G Hz)	C-68	Jun. 26, 2017
10	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2017
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. 07, 2017

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

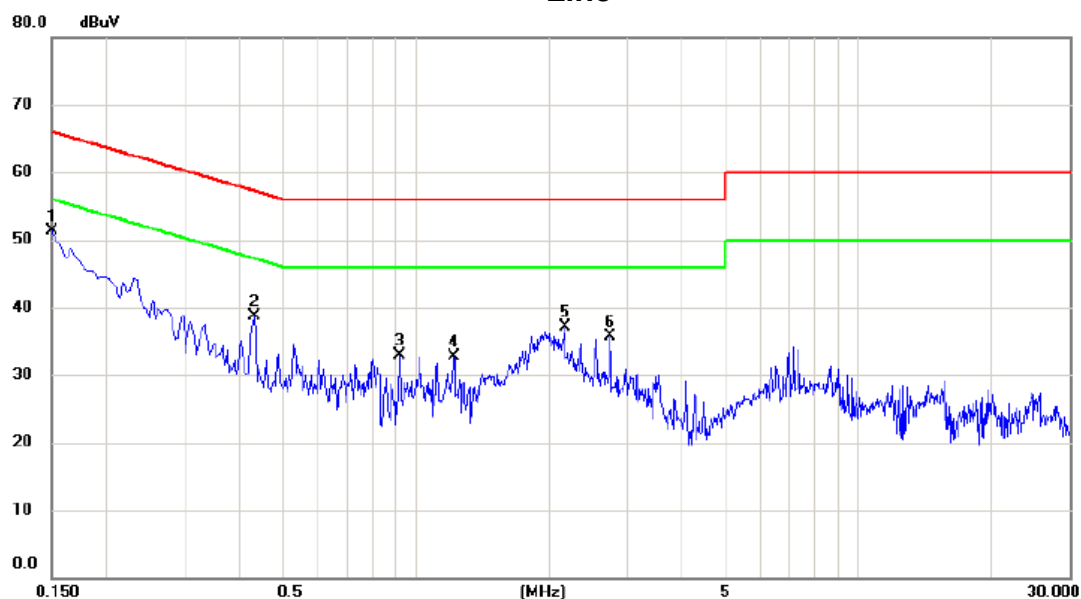
Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

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
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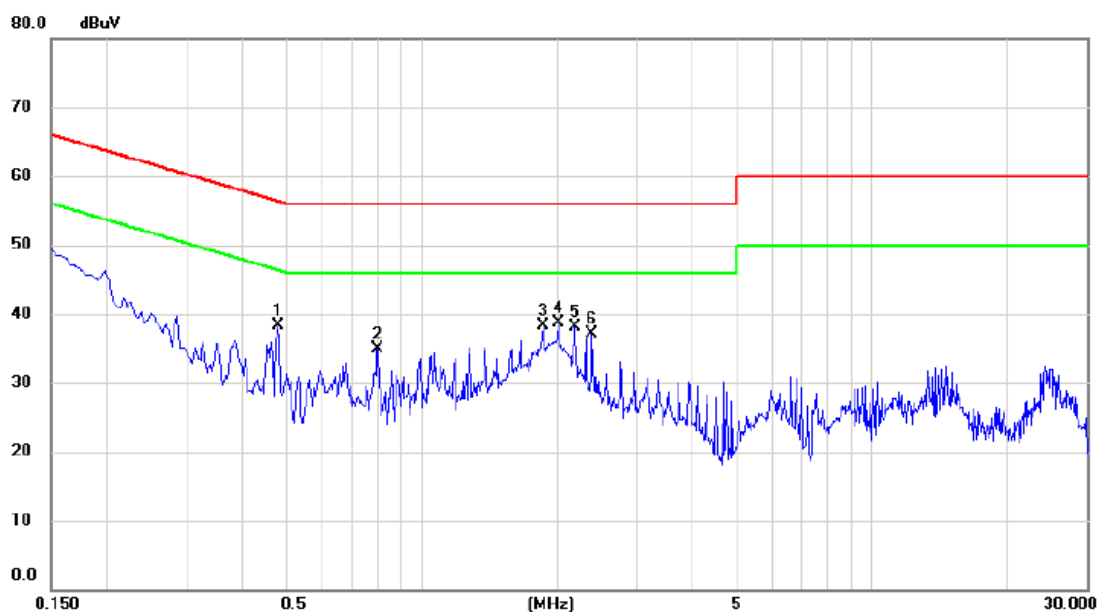
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1500	41.77	9.57	51.34	66.00	-14.66	peak	
2		0.4300	29.13	9.62	38.75	57.25	-18.50	peak	
3		0.9180	23.13	9.83	32.96	56.00	-23.04	peak	
4		1.2180	22.90	9.87	32.77	56.00	-23.23	peak	
5		2.1740	26.98	10.09	37.07	56.00	-18.93	peak	
6		2.7500	25.39	10.25	35.64	56.00	-20.36	peak	

Test Mode:	TX Mode
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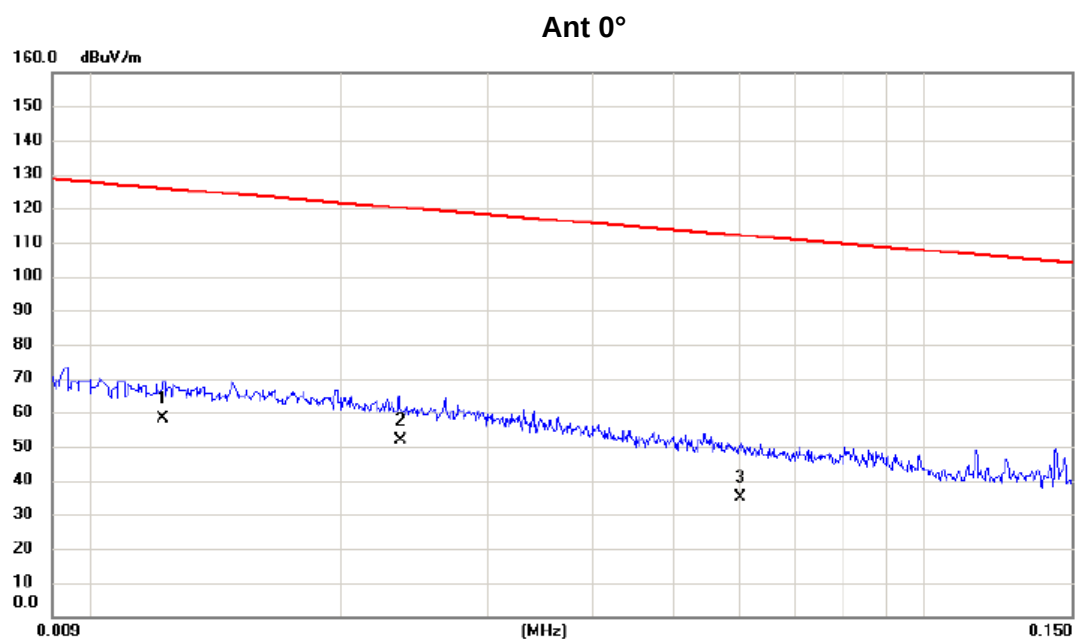
Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.4780	28.90	9.49	38.39	56.37	-17.98	peak	
2		0.7980	25.30	9.62	34.92	56.00	-21.08	peak	
3		1.8580	28.52	9.80	38.32	56.00	-17.68	peak	
4	*	2.0100	28.81	9.81	38.62	56.00	-17.38	peak	
5		2.1940	28.32	9.86	38.18	56.00	-17.82	peak	
6		2.3900	27.15	9.91	37.06	56.00	-18.94	peak	

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

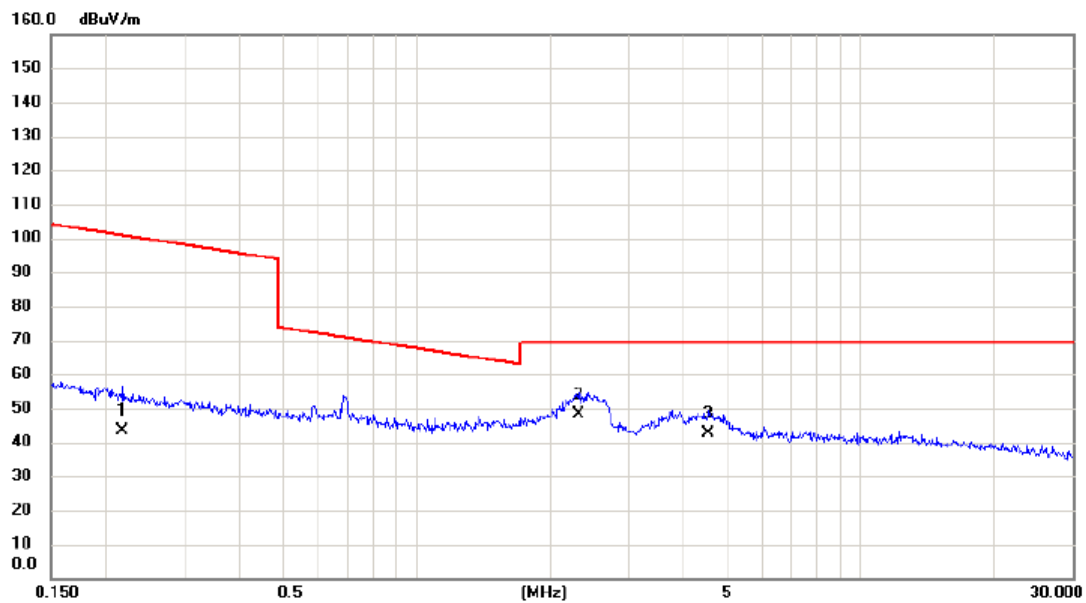
Test Mode:	TX Mode
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0122	34.35	23.99	58.34	125.88	-67.54	AVG	
2		0.0236	28.57	23.08	51.65	120.15	-68.50	AVG	
3		0.0601	15.24	19.71	34.95	112.03	-77.08	AVG	

Test Mode: TX Mode

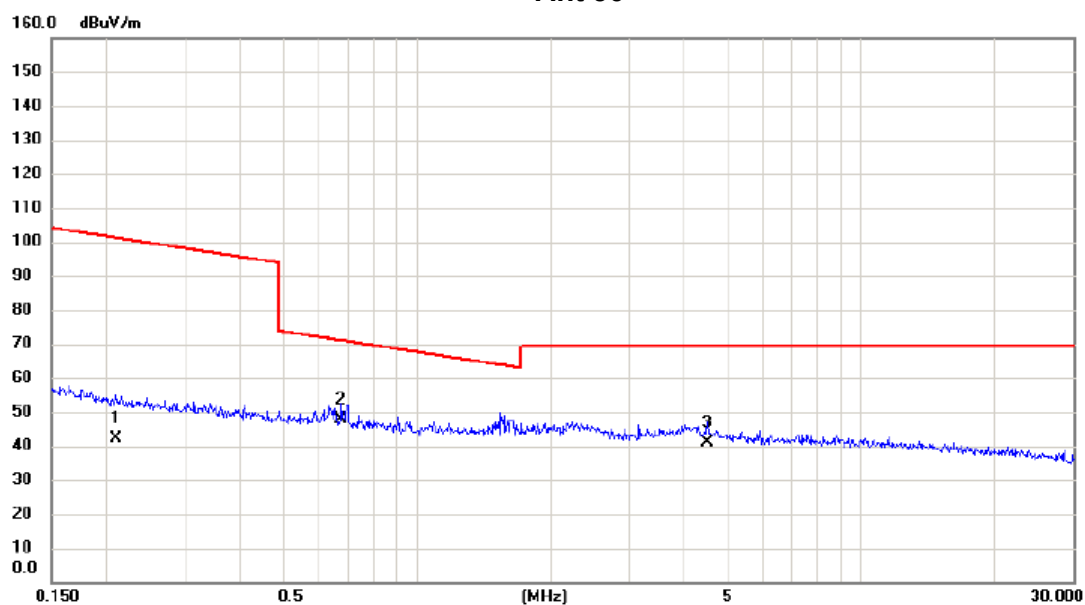
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2174	24.76	18.68	43.44	100.86	-57.42	AVG	
2	*	2.3090	30.57	17.51	48.08	69.54	-21.46	QP	
3		4.5494	24.87	17.62	42.49	69.54	-27.05	QP	

Test Mode: TX Mode

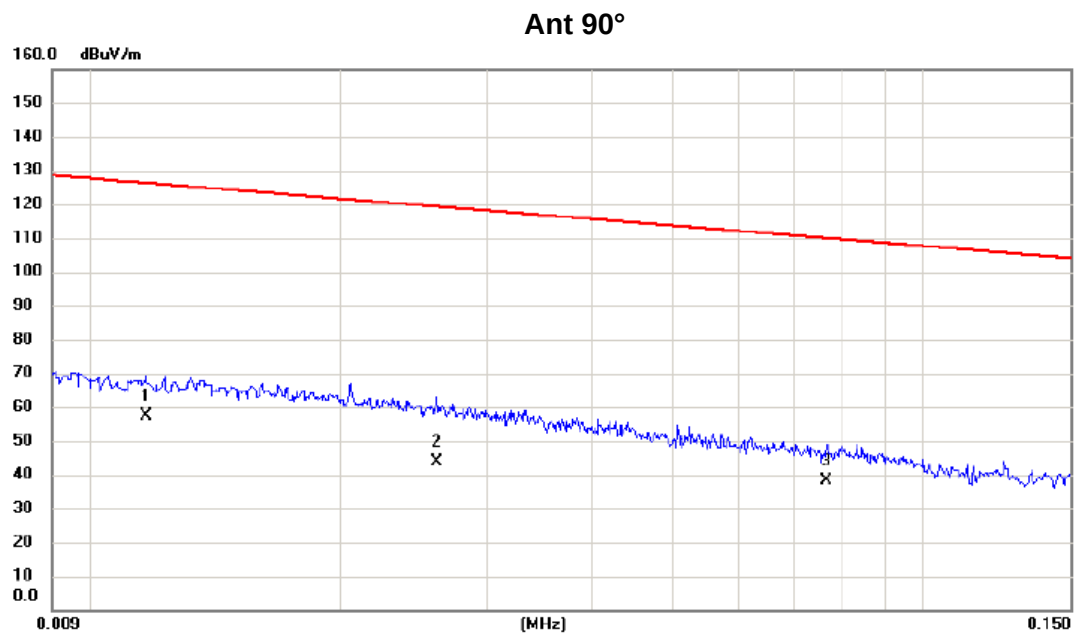
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.2094	23.42	18.69	42.11	101.19	-59.08	AVG	
2	*	0.6720	29.38	18.44	47.82	71.06	-23.24	QP	
3		4.5015	23.43	17.72	41.15	69.54	-28.39	QP	

Test Mode:

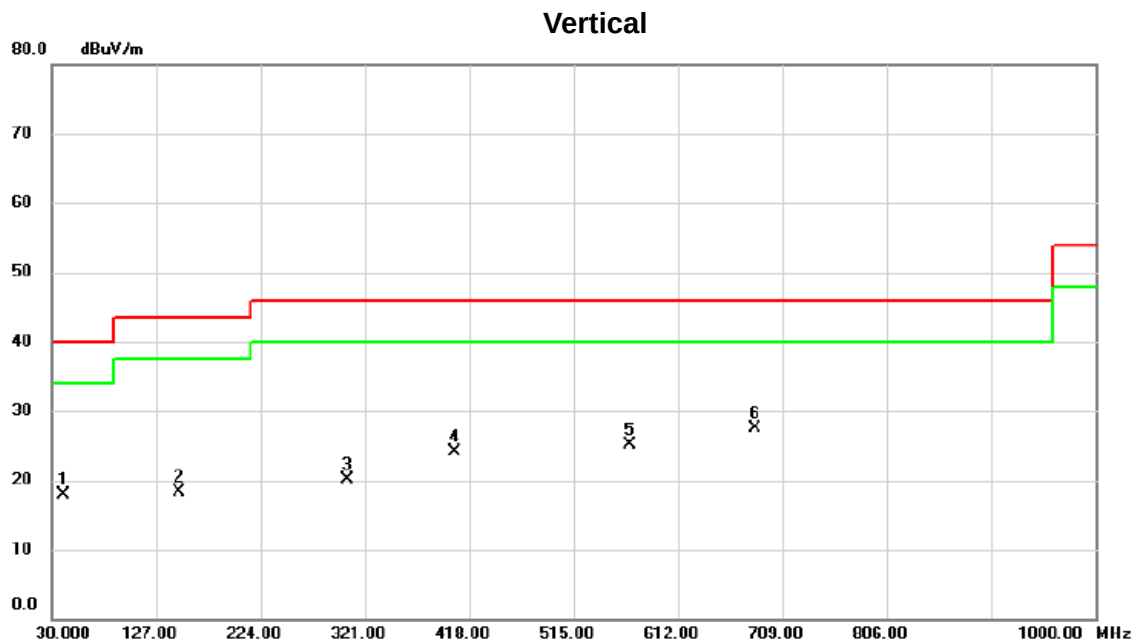
TX Mode



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment				
			dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0117	33.44	24.02	57.46	126.24	-68.78	AVG	
2		0.0261	21.04	22.77	43.81	119.27	-75.46	AVG	
3		0.0766	18.65	19.46	38.11	109.92	-71.81	AVG	

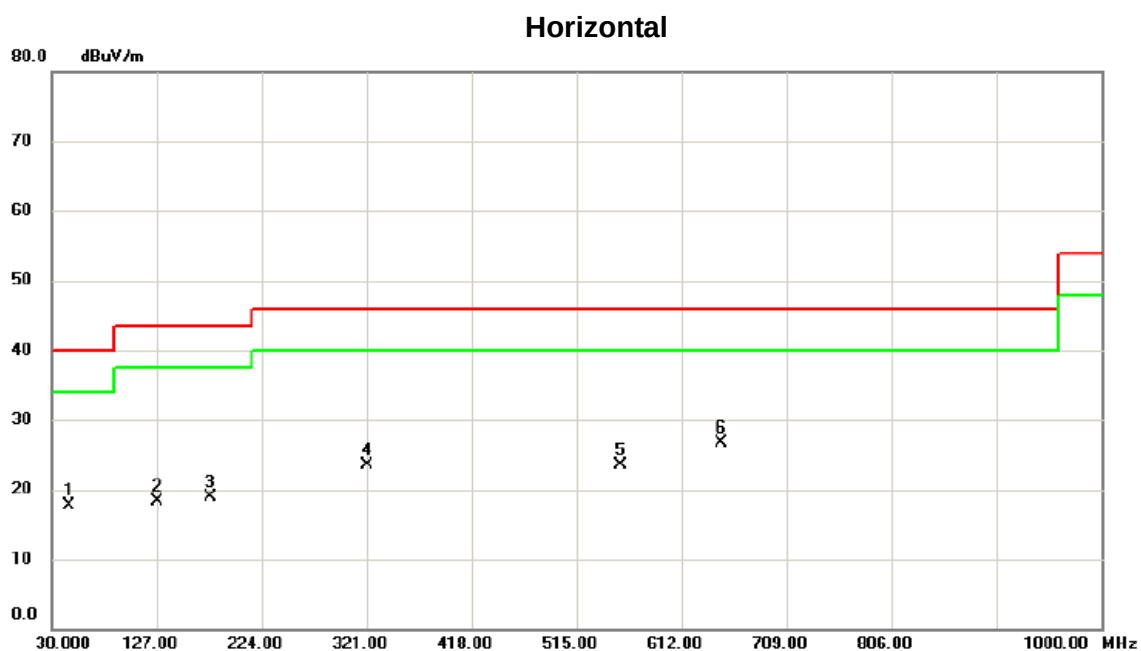
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)

Test Mode:	TX 2405.35MHz
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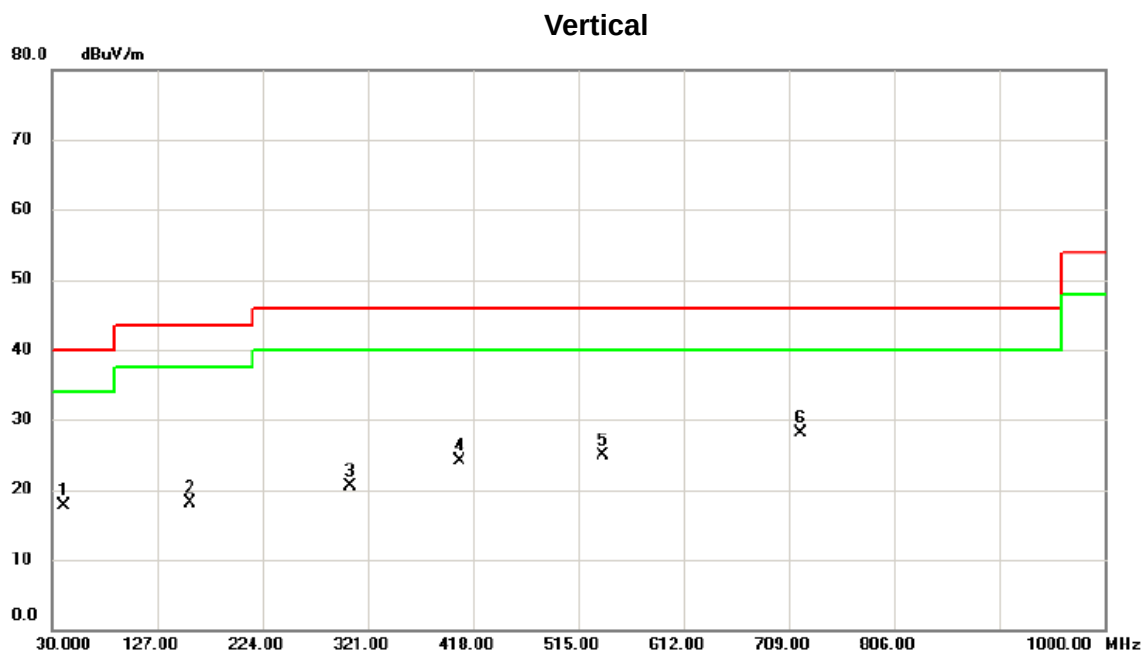
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		40.670	30.34	-12.38	17.96	40.00	-22.04	peak	
2		148.825	30.15	-11.92	18.23	43.50	-25.27	peak	
3		304.995	30.21	-10.02	20.19	46.00	-25.81	peak	
4		404.905	31.33	-7.19	24.14	46.00	-21.86	peak	
5		566.895	29.70	-4.58	25.12	46.00	-20.88	peak	
6	*	683.295	28.55	-1.00	27.55	46.00	-18.45	peak	

Test Mode:	TX 2405.35MHz
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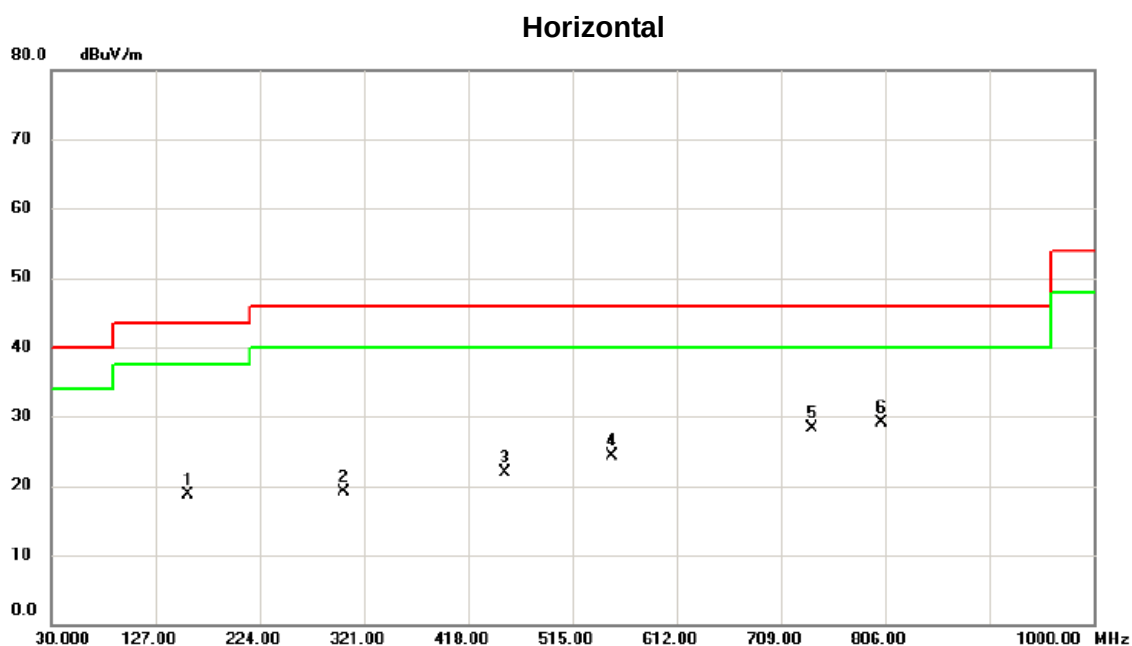
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		45.520	29.63	-11.97	17.66	40.00	-22.34	peak	
2		127.970	29.81	-11.44	18.37	43.50	-25.13	peak	
3		176.955	30.70	-11.71	18.99	43.50	-24.51	peak	
4		321.970	33.81	-10.31	23.50	46.00	-22.50	peak	
5		555.740	28.06	-4.49	23.57	46.00	-22.43	peak	
6	*	648.375	28.46	-1.78	26.68	46.00	-19.32	peak	

Test Mode:	TX 2441.35MHz
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		41.155	29.90	-12.28	17.62	40.00	-22.38	peak	
2		157.070	30.43	-12.36	18.07	43.50	-25.43	peak	
3		304.995	30.46	-10.02	20.44	46.00	-25.56	peak	
4		405.390	31.39	-7.19	24.20	46.00	-21.80	peak	
5		537.795	30.06	-5.22	24.84	46.00	-21.16	peak	
6	*	720.155	28.81	-0.74	28.07	46.00	-17.93	peak	

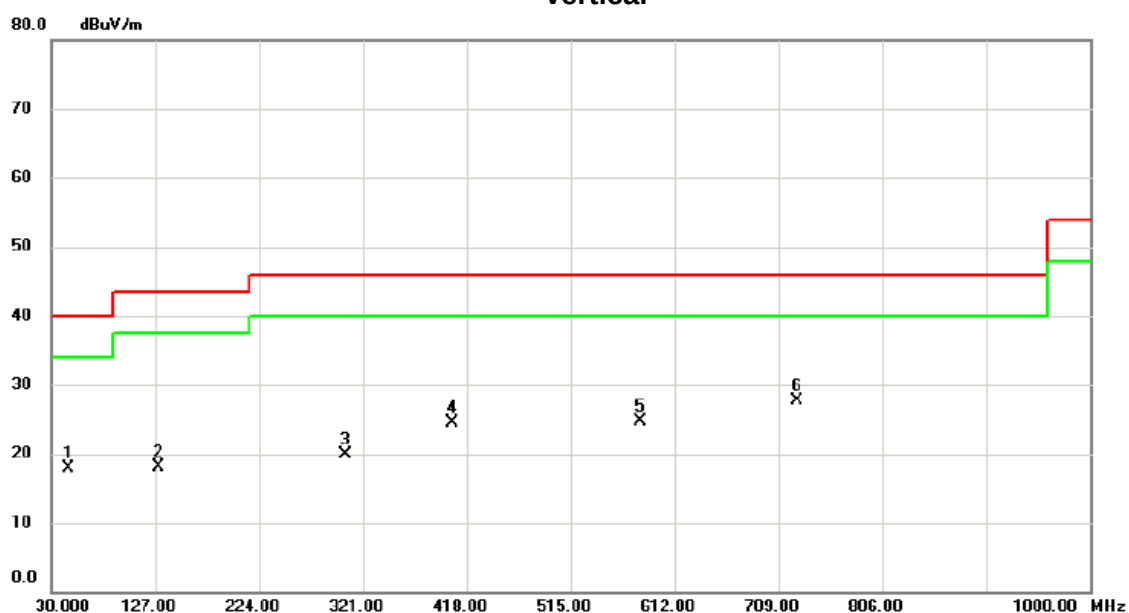
Test Mode: TX 2441.35MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		157.070	31.16	-12.36	18.80	43.50	-24.70	peak	
2		302.085	29.06	-9.97	19.09	46.00	-26.91	peak	
3		452.435	29.09	-7.11	21.98	46.00	-24.02	peak	
4		552.345	28.80	-4.46	24.34	46.00	-21.66	peak	
5		738.100	29.12	-0.81	28.31	46.00	-17.69	peak	
6	*	802.120	28.41	0.61	29.02	46.00	-16.98	peak	

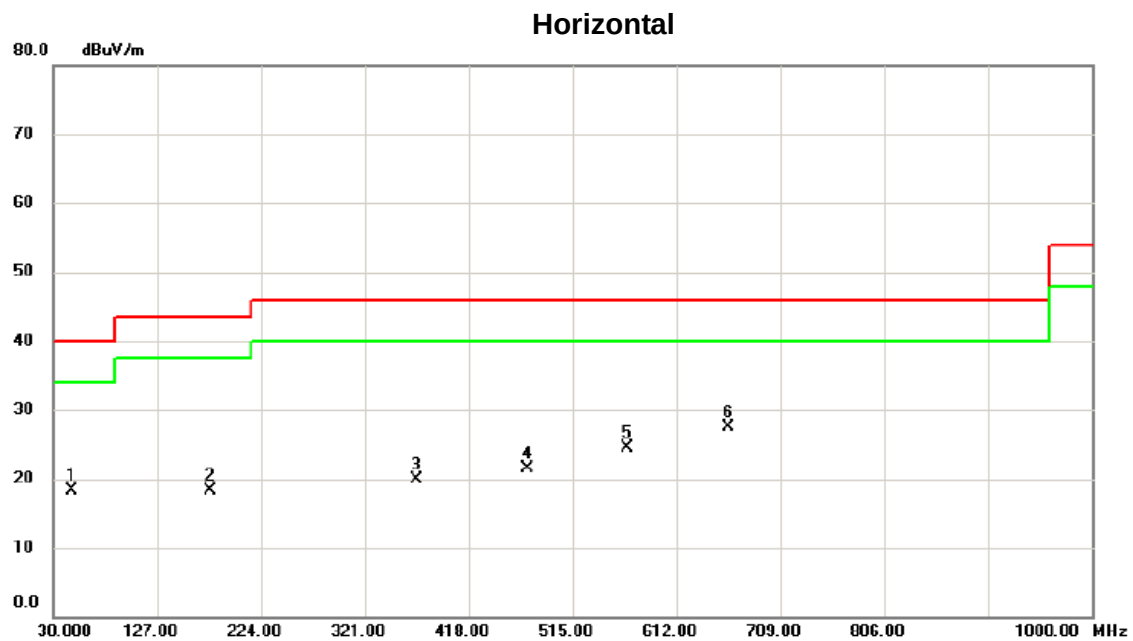
Test Mode:	TX 2477.35MHz
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Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		46.490	30.09	-12.17	17.92	40.00	-22.08	peak	
2		129.910	29.30	-11.16	18.14	43.50	-25.36	peak	
3		304.995	29.95	-10.02	19.93	46.00	-26.07	peak	
4		404.905	31.64	-7.19	24.45	46.00	-21.55	peak	
5		580.475	29.45	-4.68	24.77	46.00	-21.23	peak	
6	*	726.460	28.49	-0.76	27.73	46.00	-18.27	peak	

Test Mode:	TX 2477.35MHz
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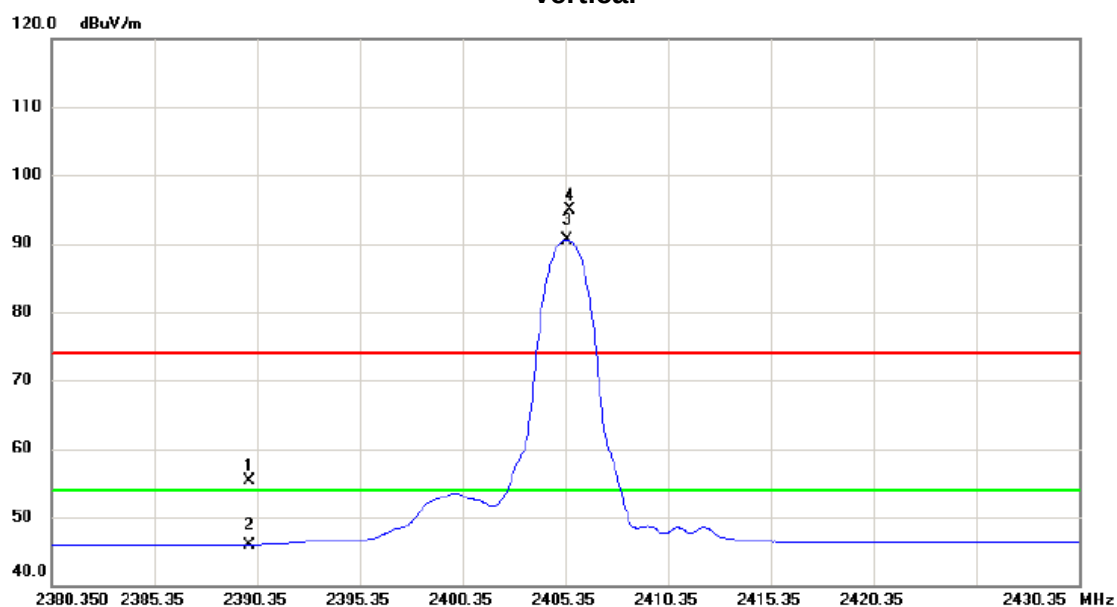


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		46.975	30.53	-12.26	18.27	40.00	-21.73	peak	
2		176.955	30.07	-11.71	18.36	43.50	-25.14	peak	
3		369.985	29.22	-9.34	19.88	46.00	-26.12	peak	
4		473.290	28.92	-7.34	21.58	46.00	-24.42	peak	
5		566.410	29.02	-4.57	24.45	46.00	-21.55	peak	
6	*	660.500	28.99	-1.47	27.52	46.00	-18.48	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

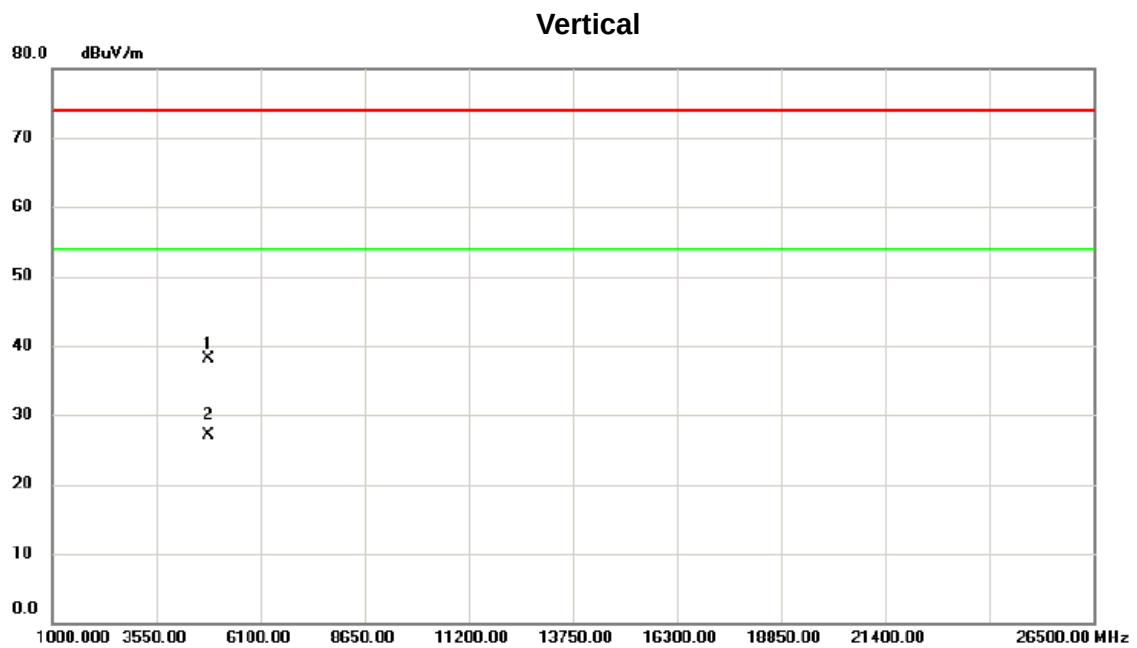
Test Mode	TX Mode_2405.35 MHz
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Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	22.30	33.01	55.31	74.00	-18.69	peak	
2		2390.000	12.96	33.01	45.97	54.00	-8.03	AVG	
3	*	2405.450	57.46	33.08	90.54	54.00	36.54	AVG	No Limit
4	X	2405.600	61.76	33.08	94.84	74.00	20.84	peak	No Limit

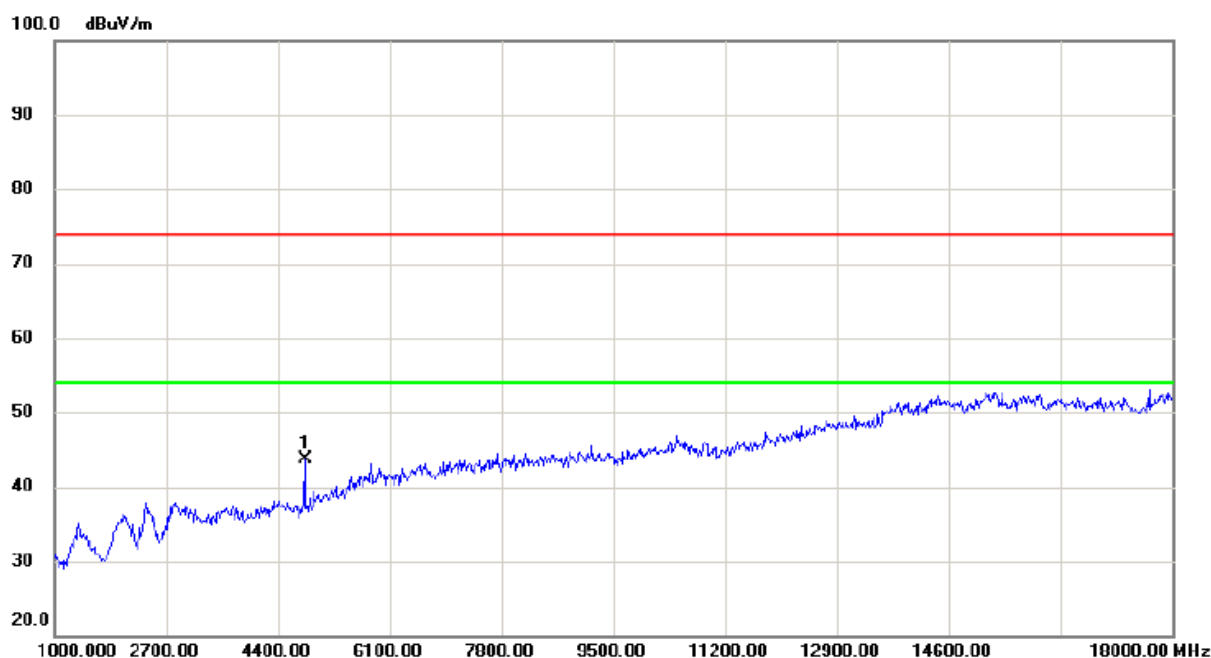
Test Mode	TX Mode_2405.35 MHz
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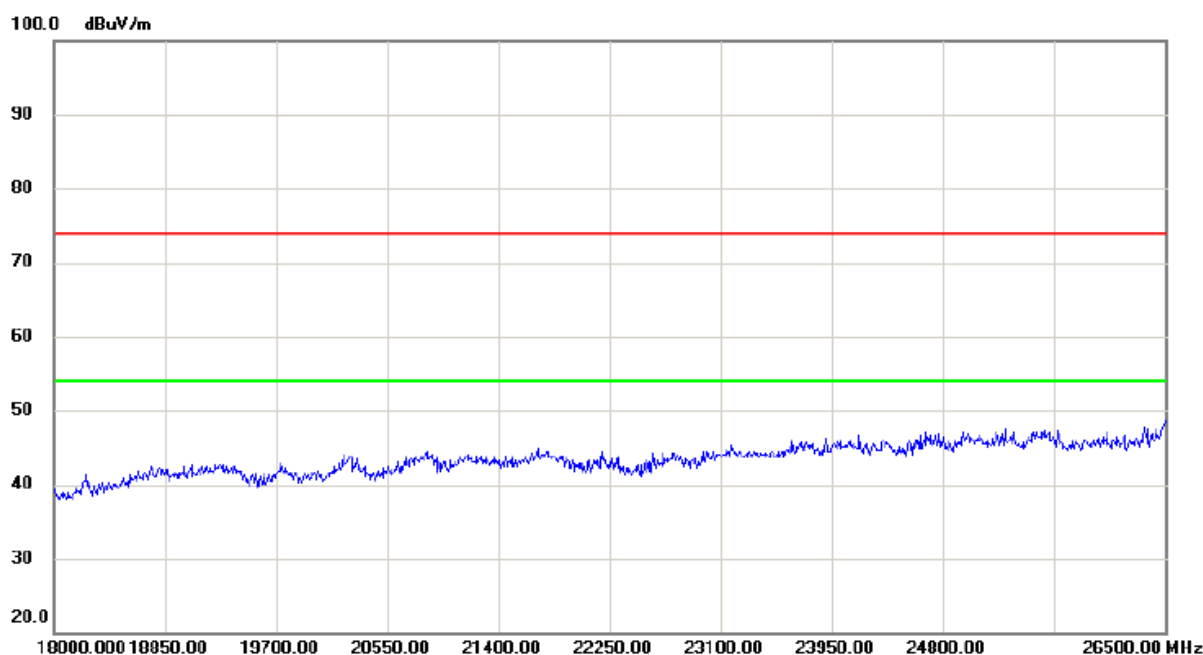
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4809.895	33.33	4.81	38.14	74.00	-35.86	peak	
2	*	4810.005	22.25	4.81	27.06	54.00	-26.94	AVG	

Test Mode	TX Mode_2405.35 MHz
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Vertical

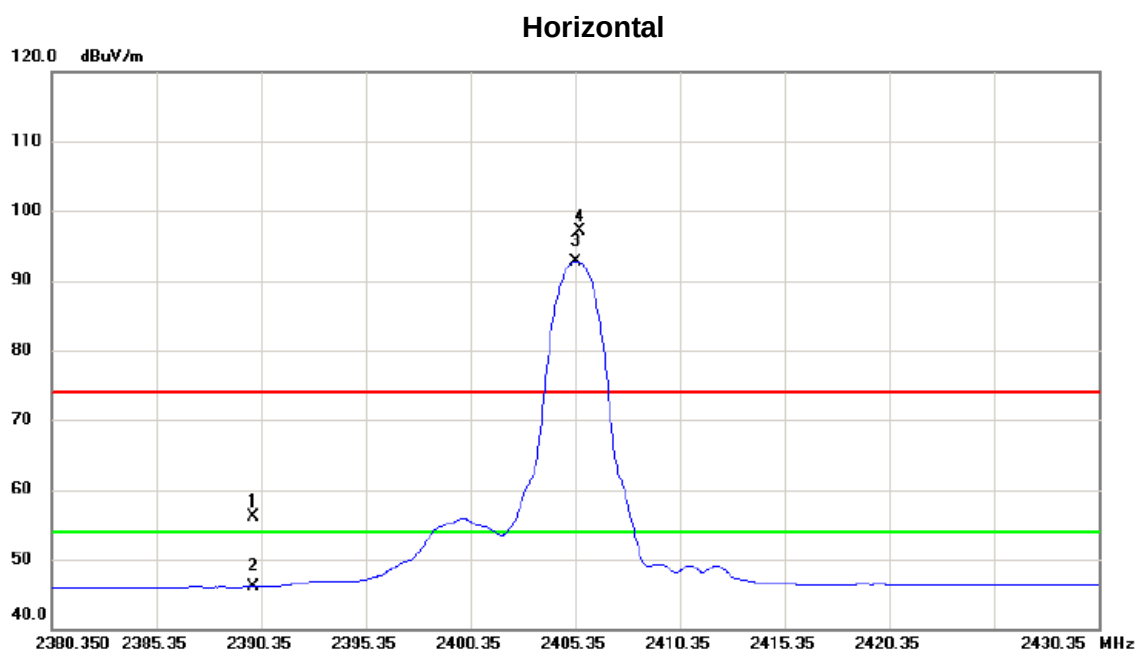


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4808.000	38.23	5.42	43.65	74.00	-30.35	peak	



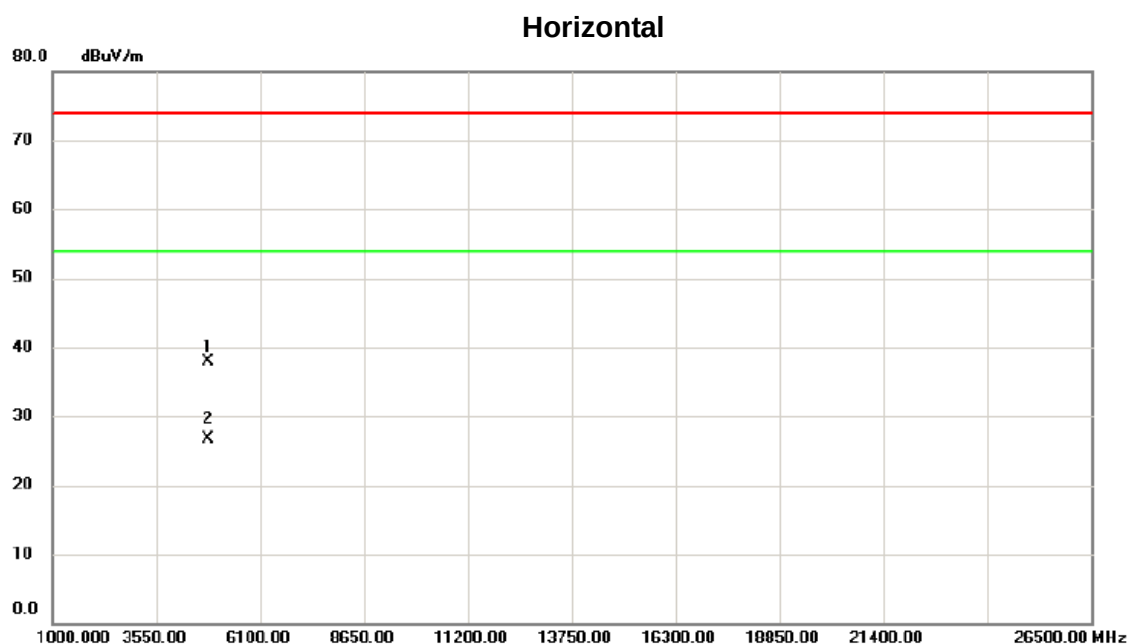
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
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Test Mode	TX Mode_2405.35 MHz
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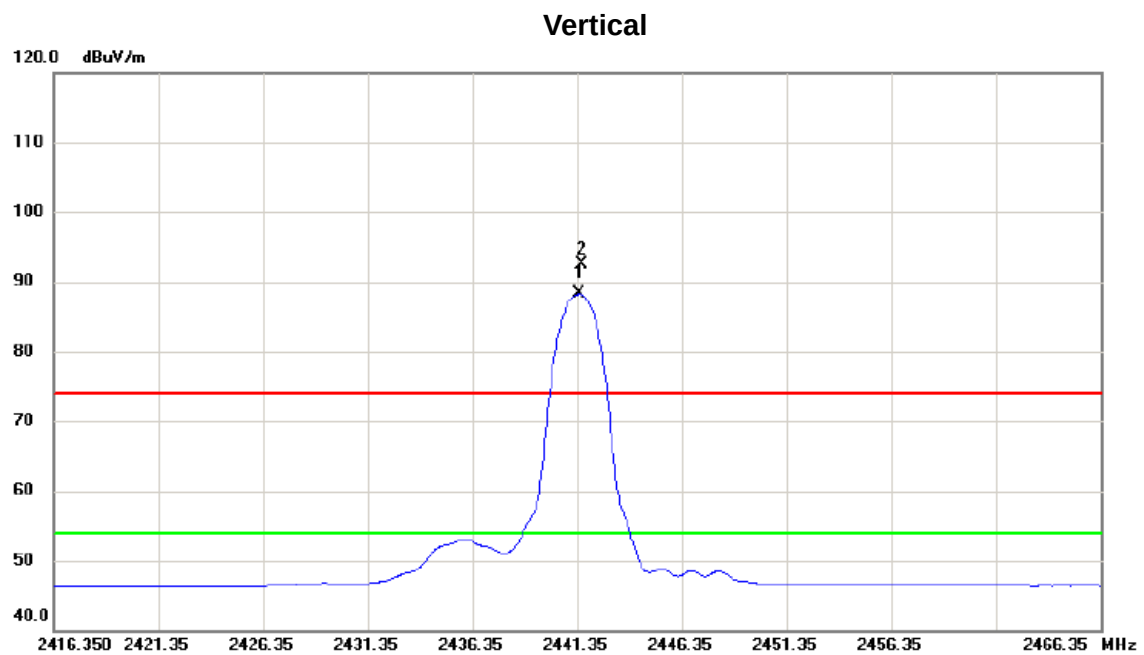
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	23.18	33.01	56.19	74.00	-17.81	peak	
2		2390.000	13.01	33.01	46.02	54.00	-7.98	AVG	
3	*	2405.400	59.64	33.08	92.72	54.00	38.72	AVG	No Limit
4	X	2405.600	63.93	33.08	97.01	74.00	23.01	peak	No Limit

Test Mode	TX Mode_2405.35 MHz
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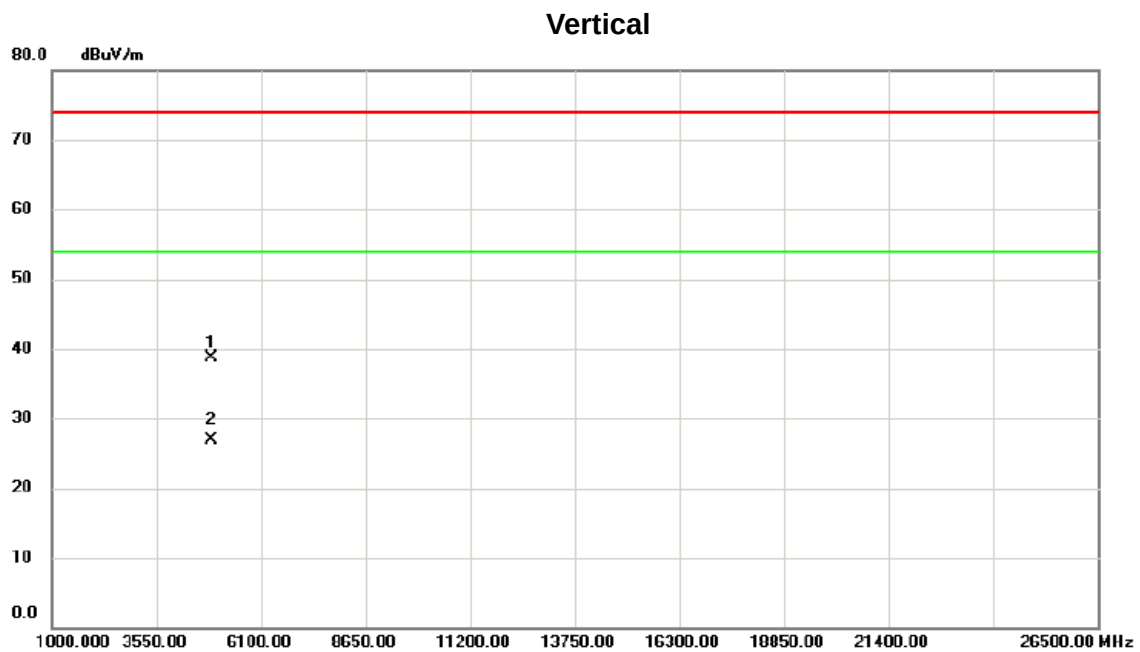
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4809.260	33.15	4.81	37.96	74.00	-36.04	peak	
2	*	4810.525	21.91	4.82	26.73	54.00	-27.27	AVG	

Test Mode	TX Mode_2441.35 MHz
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2441.450	54.99	33.22	88.21	54.00	34.21	AVG	No Limit
2	X	2441.600	59.38	33.22	92.60	74.00	18.60	peak	No Limit

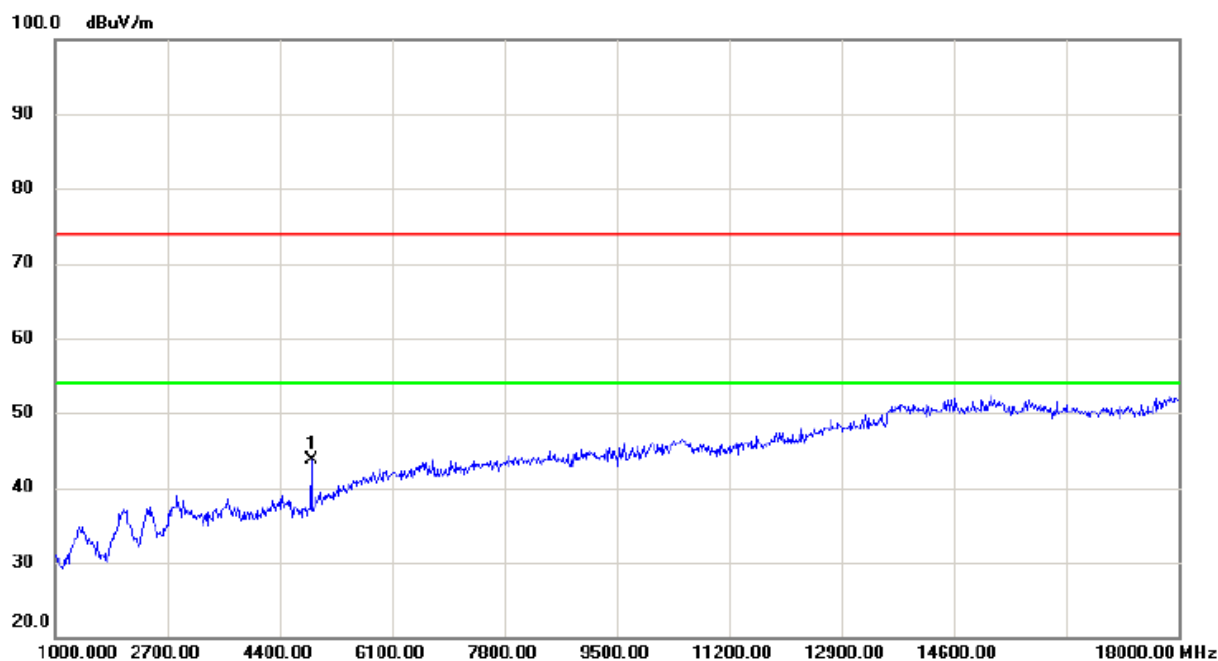
Test Mode	TX Mode_2441.35 MHz
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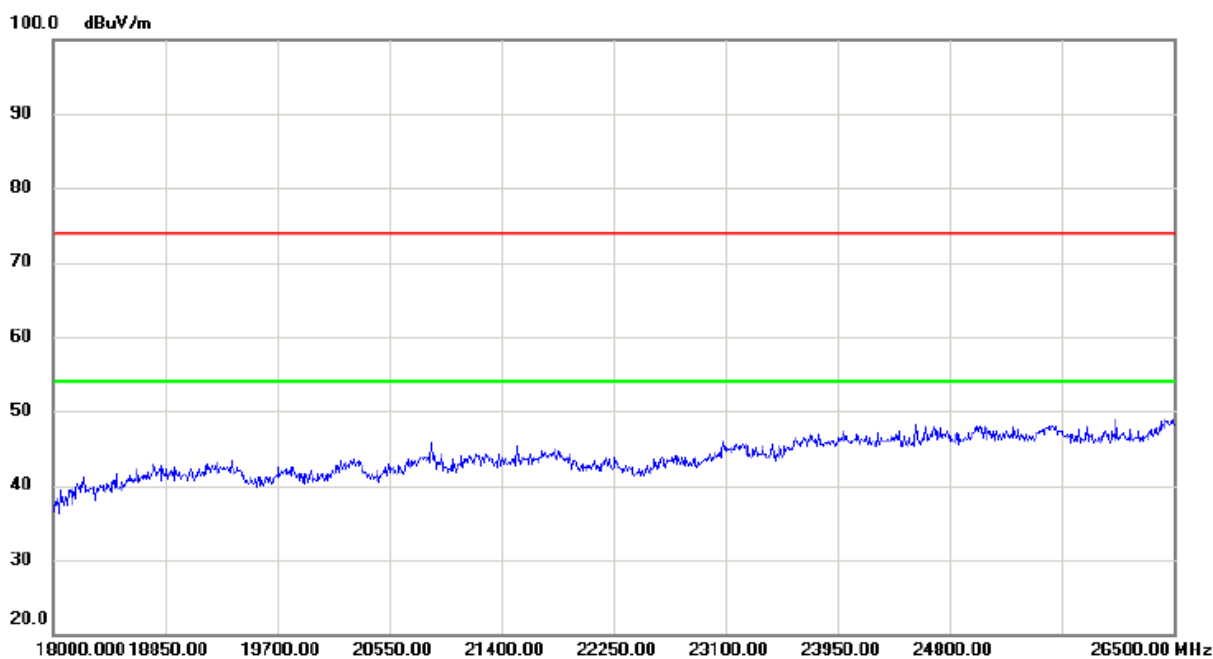
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4882.690	33.58	5.11	38.69	74.00	-35.31	peak	
2	*	4882.860	21.81	5.11	26.92	54.00	-27.08	AVG	

Test Mode	TX Mode_2441.35 MHz
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Vertical

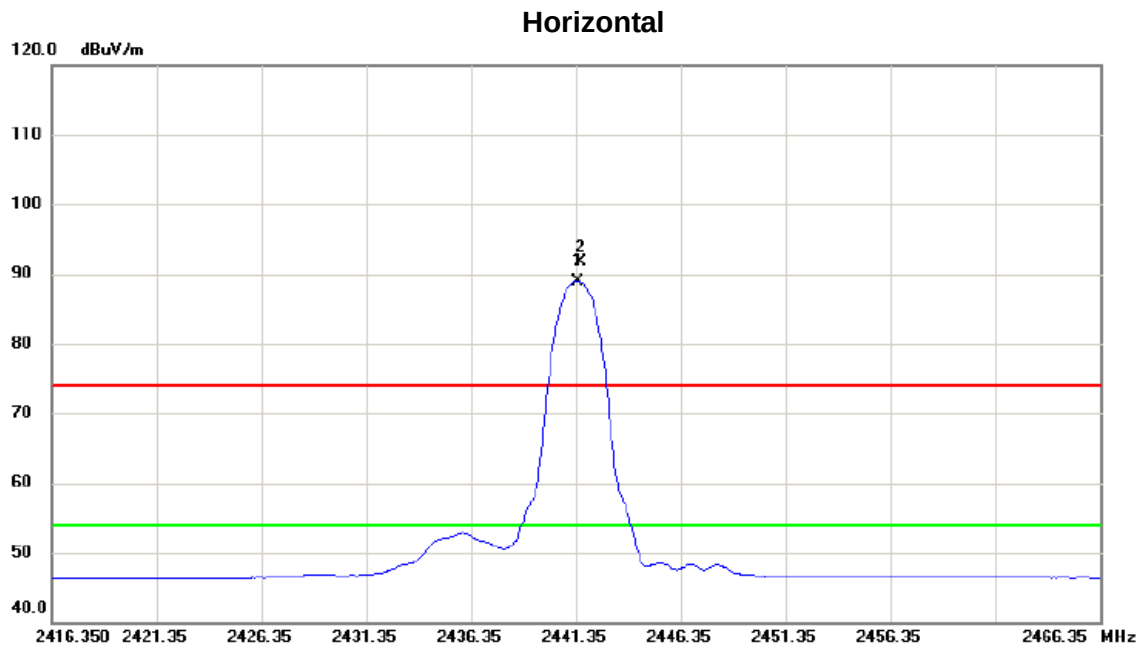


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4876.000	38.16	5.61	43.77	74.00	-30.23	peak	



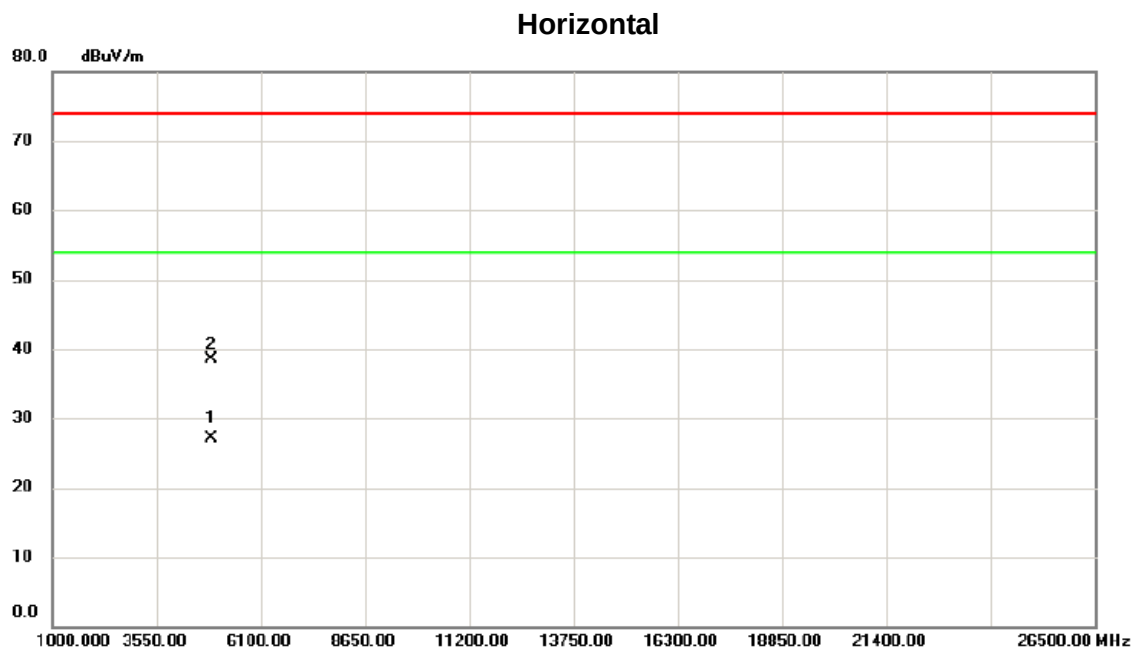
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
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Test Mode	TX Mode_2441.35 MHz
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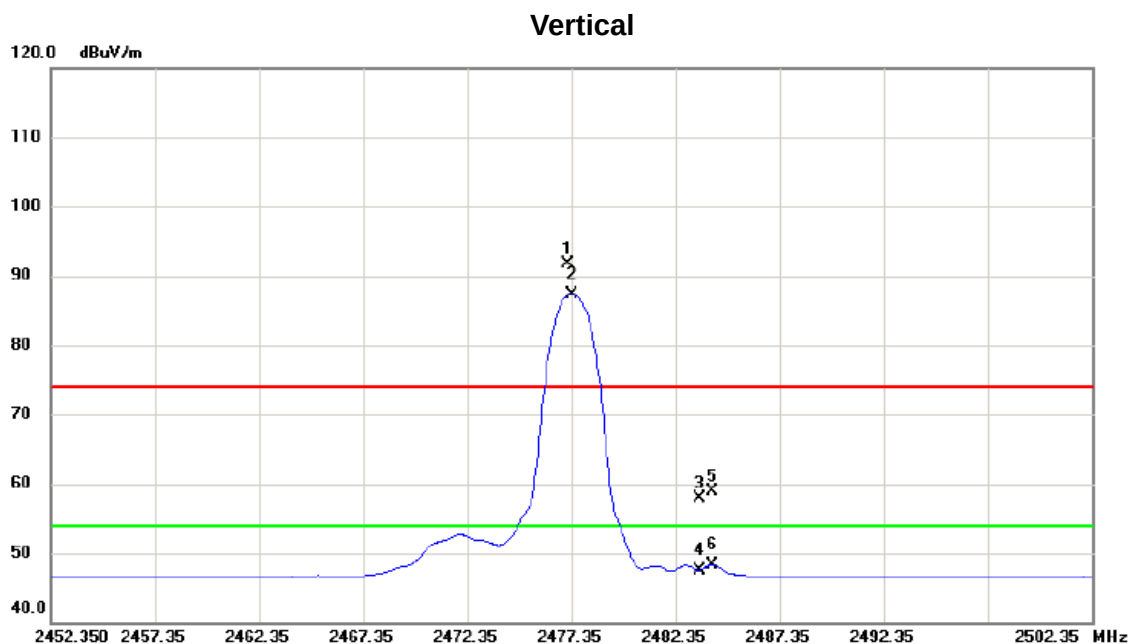
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2441.450	55.74	33.22	88.96	54.00	34.96	AVG	No Limit
2	X	2441.600	58.57	33.22	91.79	74.00	17.79	peak	No Limit

Test Mode	TX Mode_2441.35 MHz
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4882.555	22.00	5.11	27.11	54.00	-26.89	AVG	
2		4882.880	33.46	5.11	38.57	74.00	-35.43	peak	

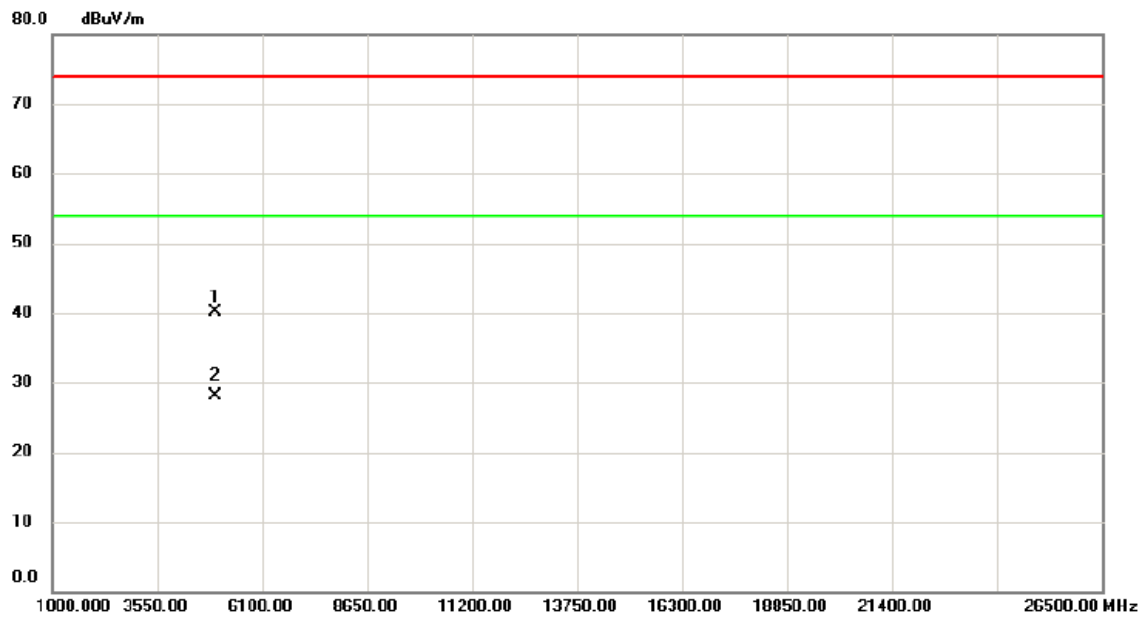
Test Mode	TX Mode_2477.35 MHz
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2477.150	58.28	33.38	91.66	74.00	17.66	peak	No Limit
2	*	2477.350	53.95	33.38	87.33	54.00	33.33	AVG	No Limit
3		2483.500	24.57	33.40	57.97	74.00	-16.03	peak	
4		2483.500	14.16	33.40	47.56	54.00	-6.44	AVG	
5		2484.100	25.52	33.40	58.92	74.00	-15.08	peak	
6		2484.100	14.93	33.40	48.33	54.00	-5.67	AVG	

Test Mode	TX Mode_2477.35 MHz
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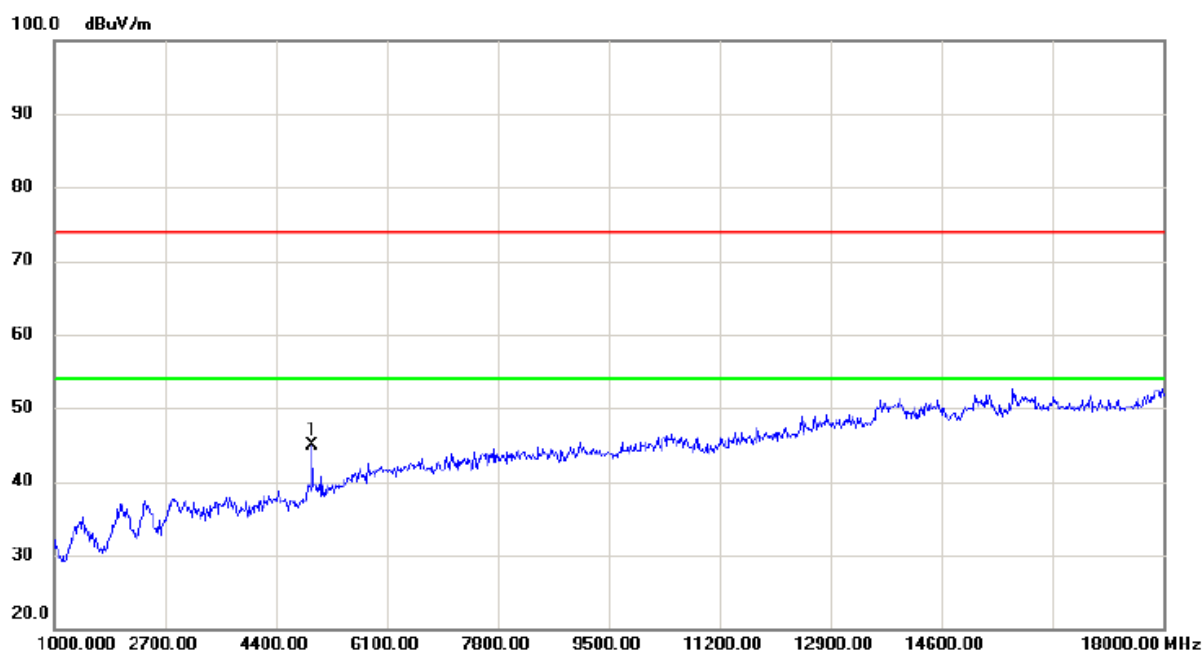
Vertical



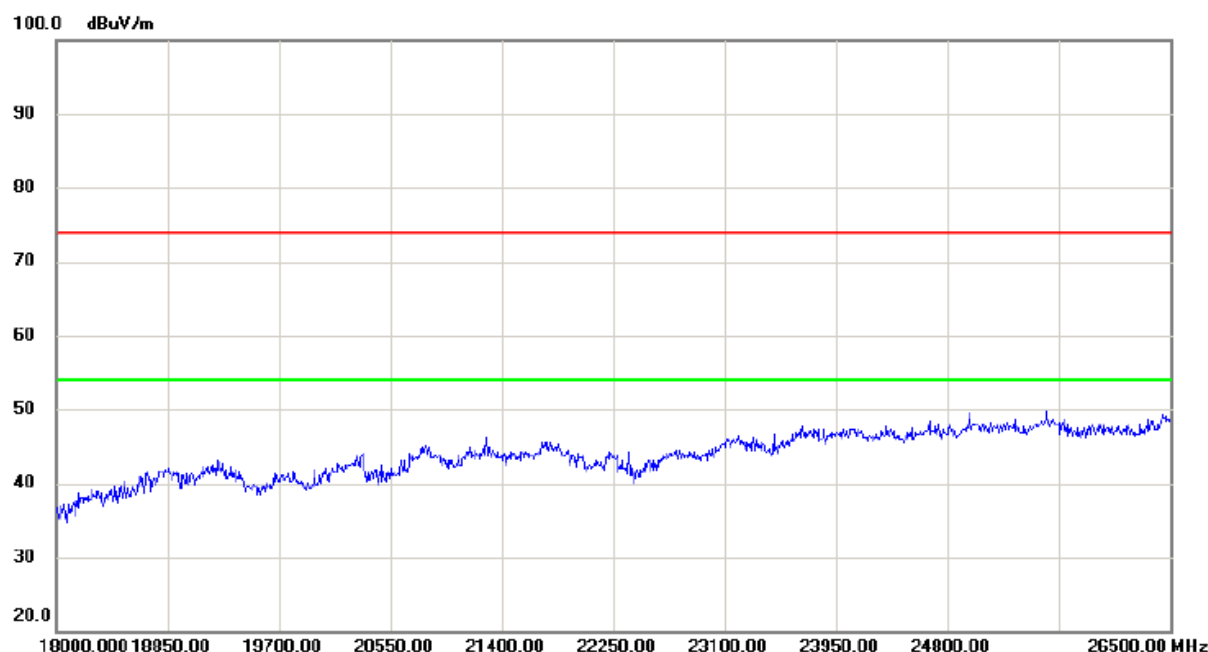
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4954.185	34.65	5.40	40.05	74.00	-33.95	peak	
2	*	4954.505	22.76	5.41	28.17	54.00	-25.83	AVG	

Test Mode	TX Mode_2477.35 MHz
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Vertical

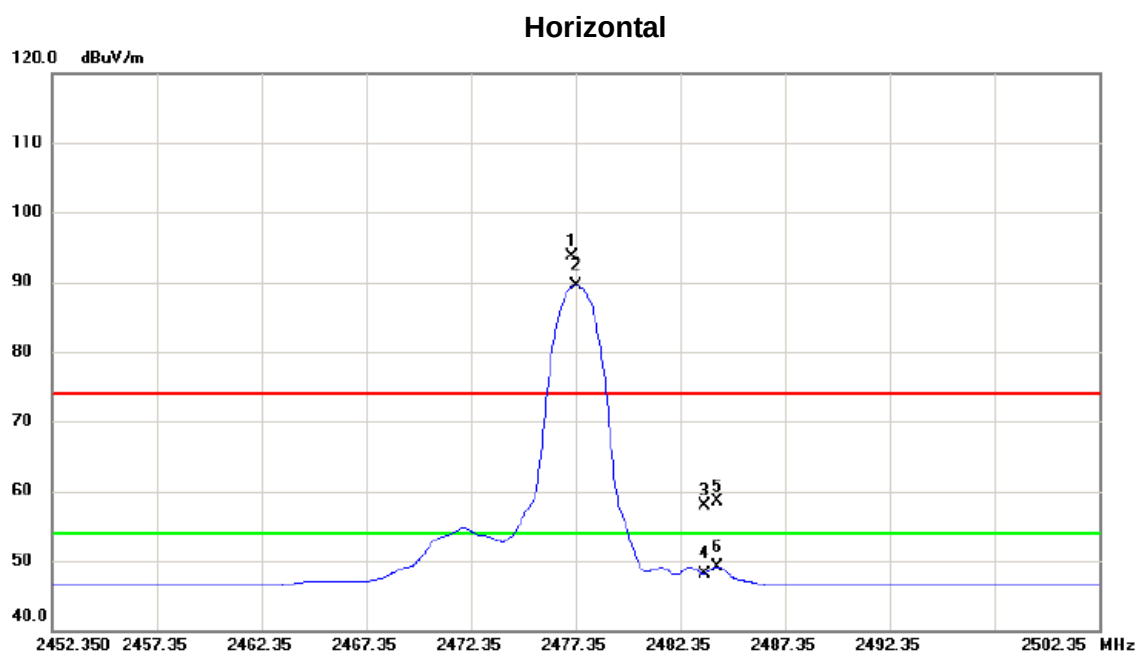


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4961.000	39.03	5.84	44.87	74.00	-29.13	peak	



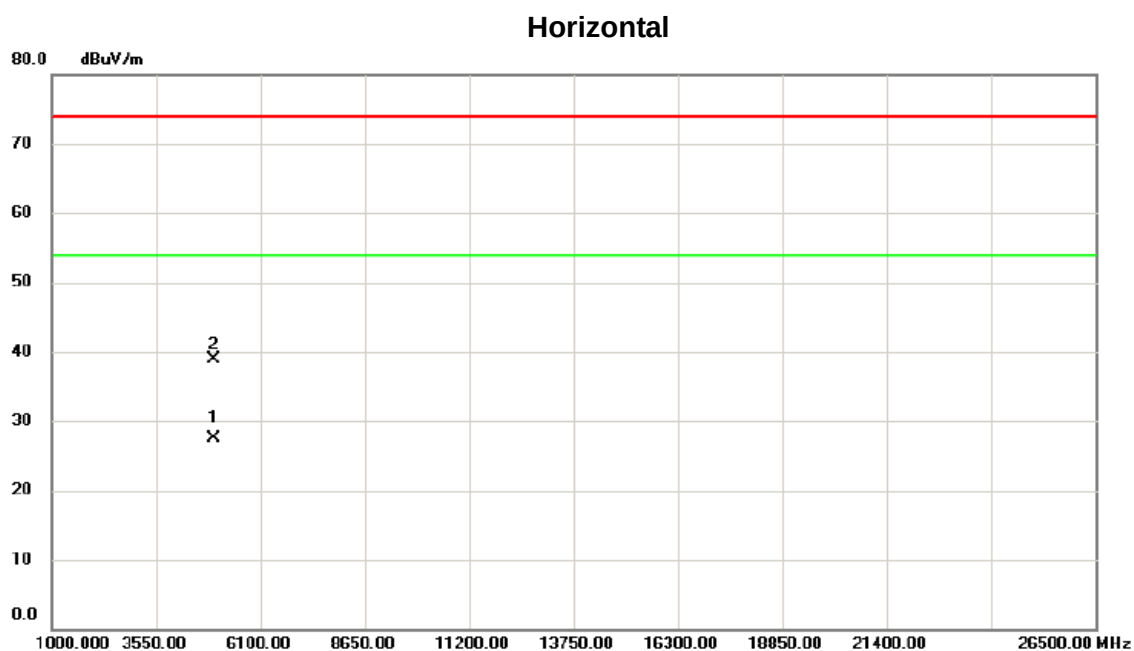
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment

Test Mode	TX Mode_2477.35 MHz
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2477.200	60.38	33.38	93.76	74.00	19.76	peak	No Limit
2	*	2477.350	56.05	33.38	89.43	54.00	35.43	AVG	No Limit
3		2483.500	24.59	33.40	57.99	74.00	-16.01	peak	
4		2483.500	14.77	33.40	48.17	54.00	-5.83	AVG	
5		2484.100	25.02	33.40	58.42	74.00	-15.58	peak	
6		2484.100	15.78	33.40	49.18	54.00	-4.82	AVG	

Test Mode	TX Mode_2477.35 MHz
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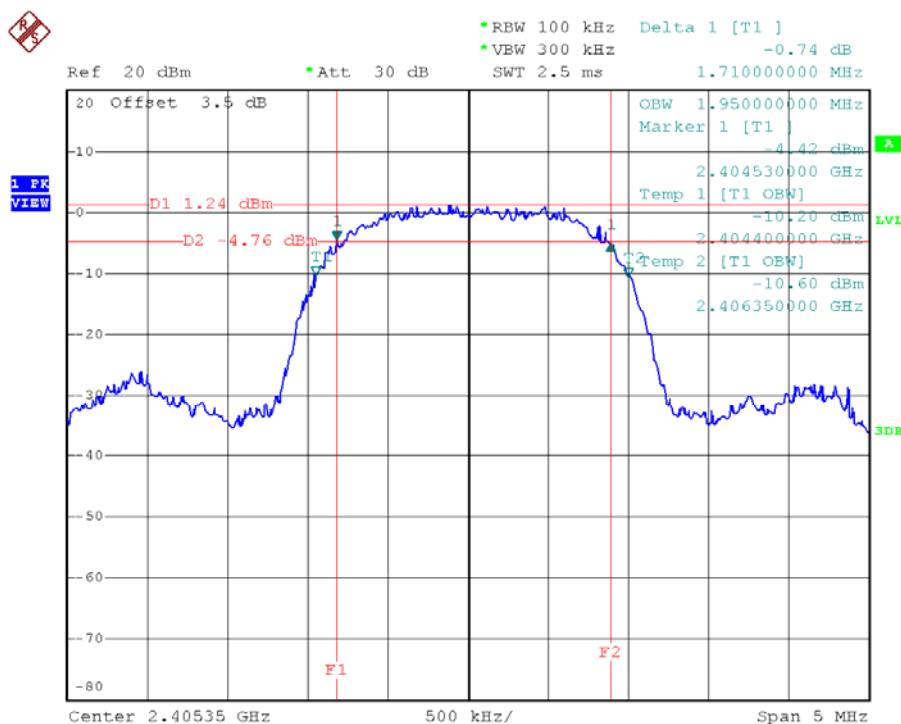
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4954.905	22.12	5.41	27.53	54.00	-26.47	AVG	
2		4955.450	33.49	5.41	38.90	74.00	-35.10	peak	

ATTACHMENT E - BANDWIDTH

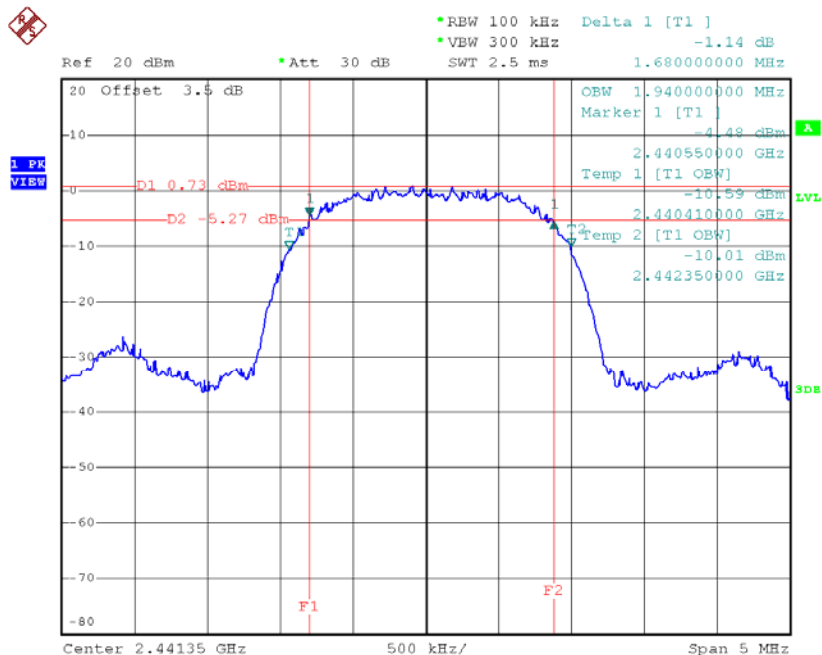
Test Mode:	TX Mode
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Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2405.35	1.71	1.95	500	Complies
2441.35	1.68	1.94	500	Complies
2477.35	1.64	1.94	500	Complies

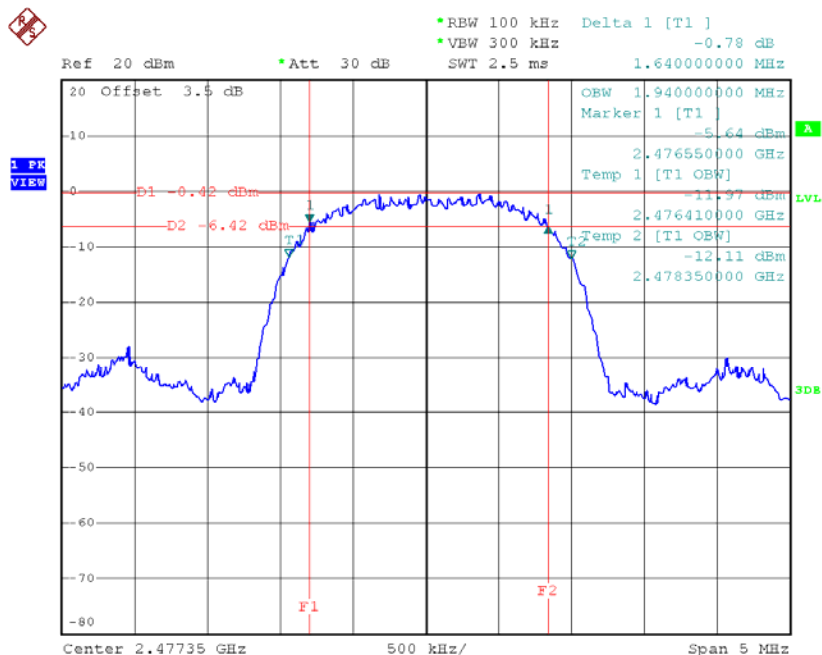
TX CH01



TX CH19

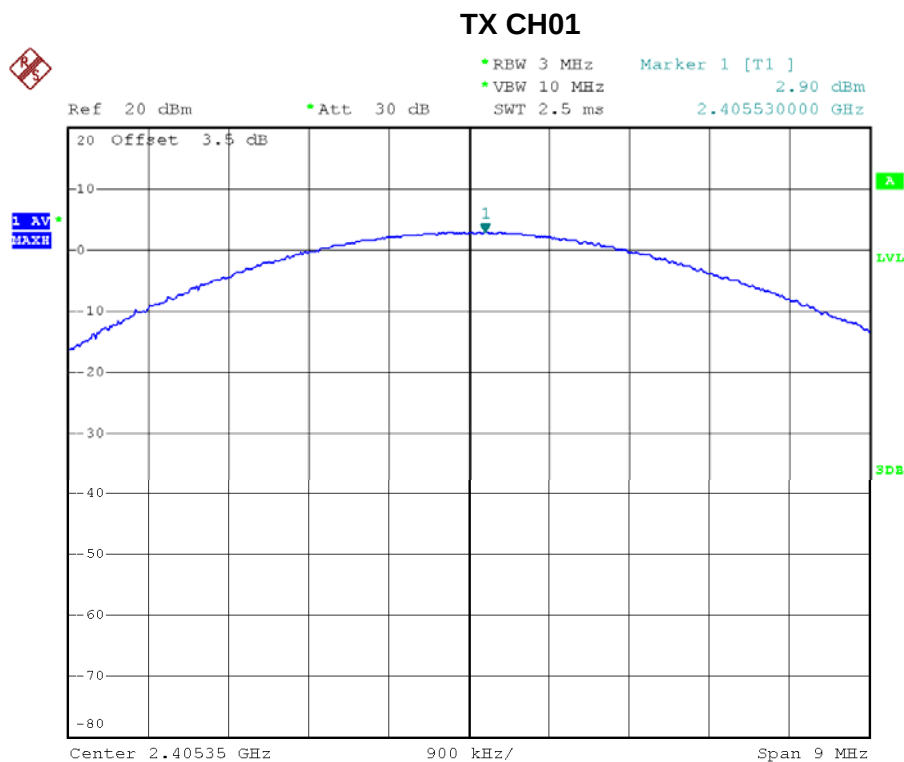


TX CH37



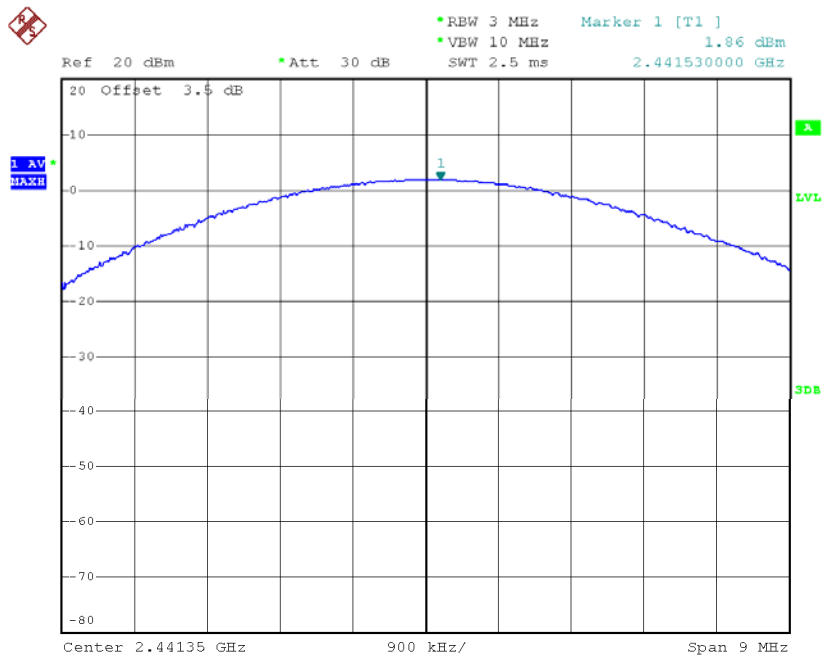
ATTACHMENT F - CONDUCTED POWER TEST

Test Mode					
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
2405.35	2.90	0.00195	30.00	1.00	Complies
2441.35	1.86	0.00153	30.00	1.00	Complies
2477.35	1.13	0.00130	30.00	1.00	Complies



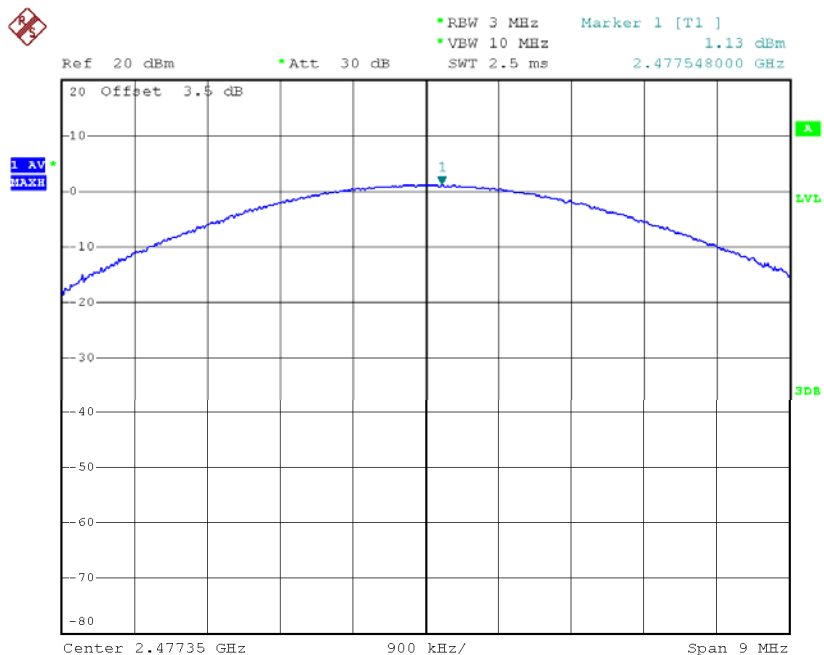
Date: 26.FEB.2017 14:09:59

TX CH19



Date: 26.FEB.2017 14:08:04

TX CH37

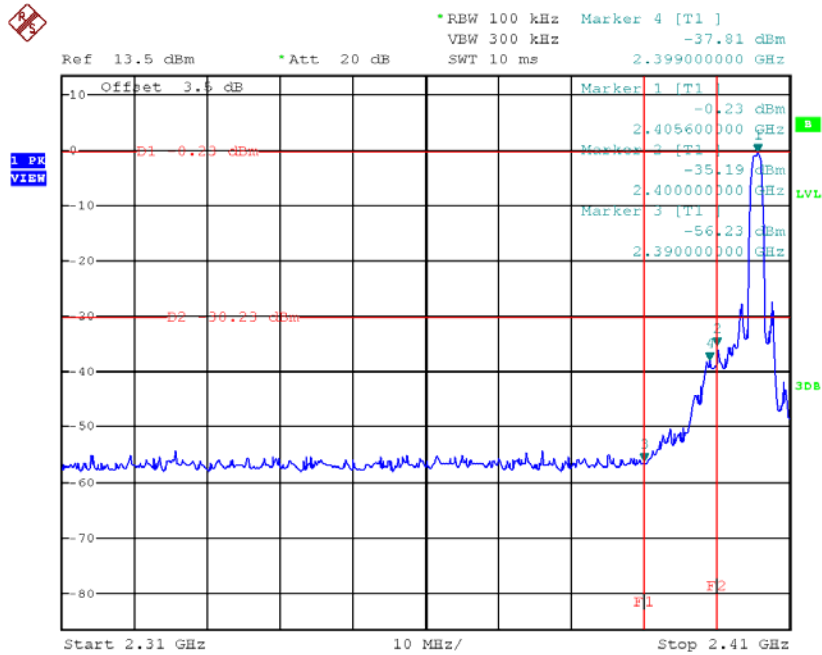


Date: 26.FEB.2017 14:08:58

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

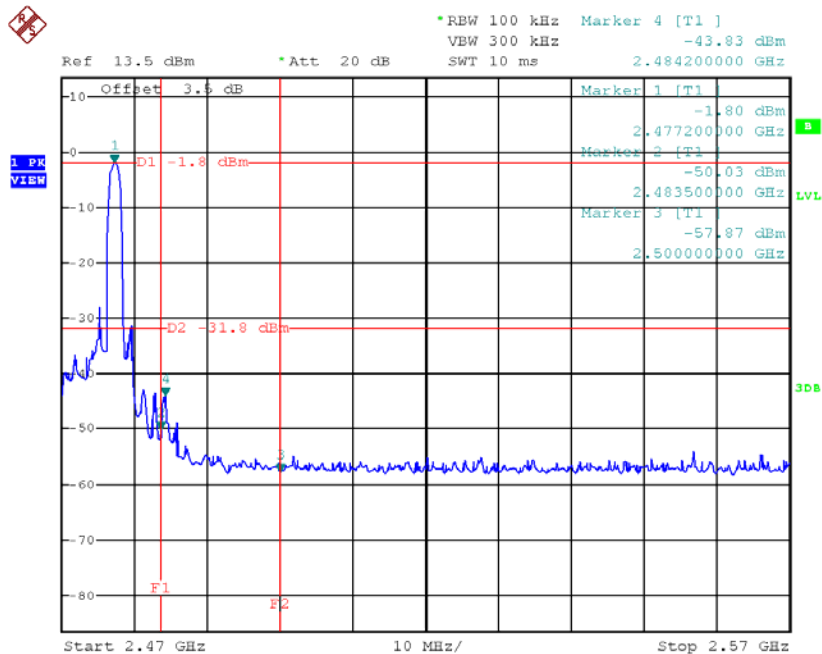
Test Mode : CH01, CH19 , CH37

CH01 (Lower)



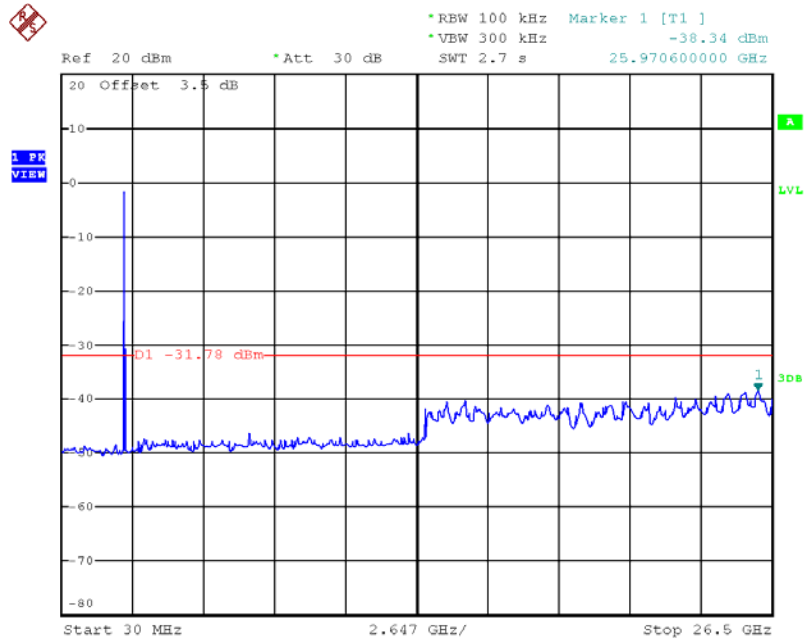
Date: 13.JUN.2017 14:51:29

CH37 (upper)



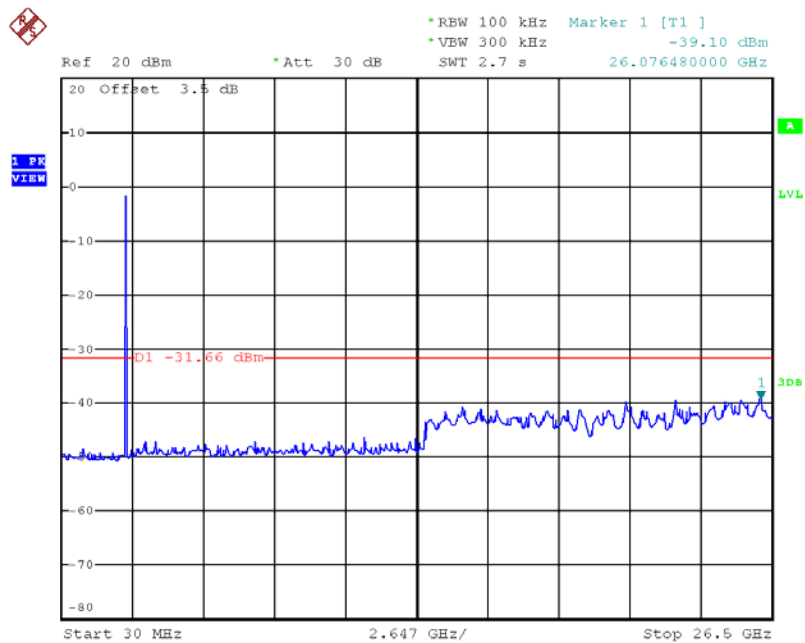
Date: 13.JUN.2017 14:45:29

CH01 (10 Harmonic of the frequency)



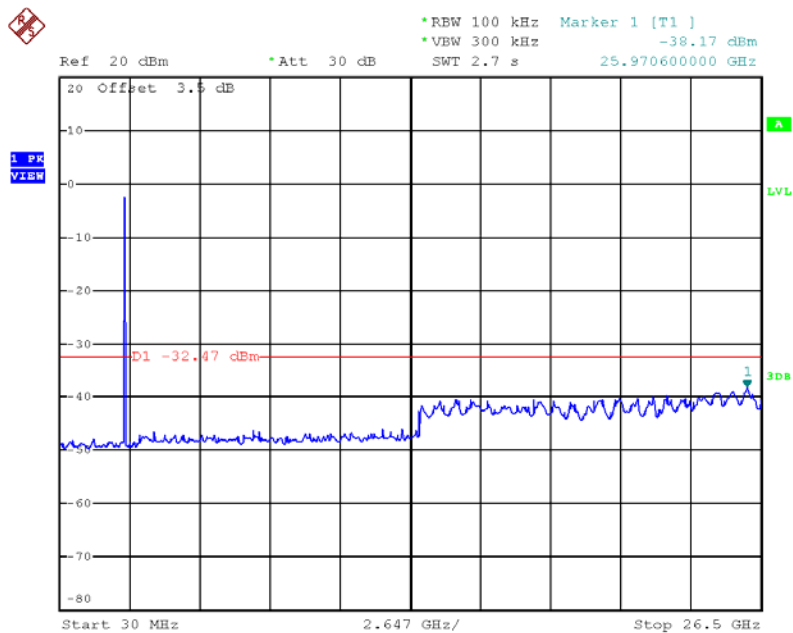
Date: 13.JUN.2017 14:36:14

CH19 (10 Harmonic of the frequency)



Date: 13.JUN.2017 14:58:32

CH37 (10 Harmonic of the frequency)



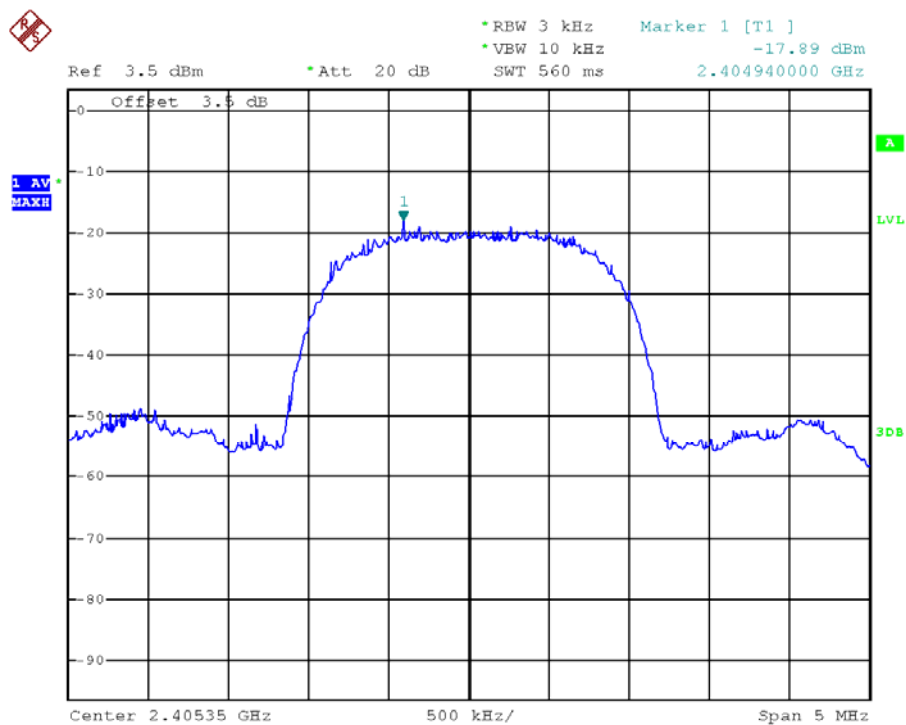
Date: 13.JUN.2017 14:11:47

ATTACHMENT H - POWER SPECTRAL DENSITY TEST

Test Mode:	TX Mode
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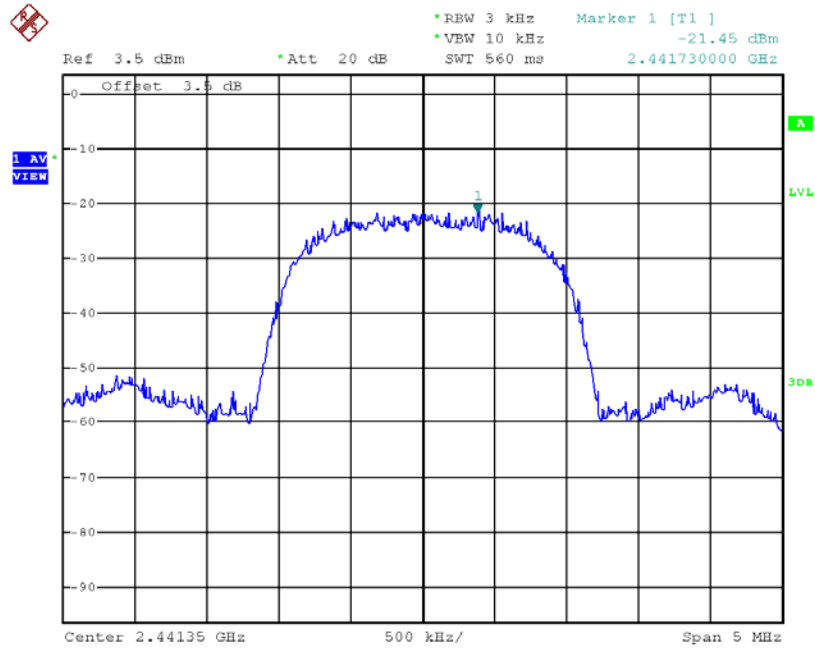
Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
2405.35	-17.89	0.016	8.00	Complies
2441.35	-21.45	0.007	8.00	Complies
2477.35	-20.17	0.010	8.00	Complies

TX CH01



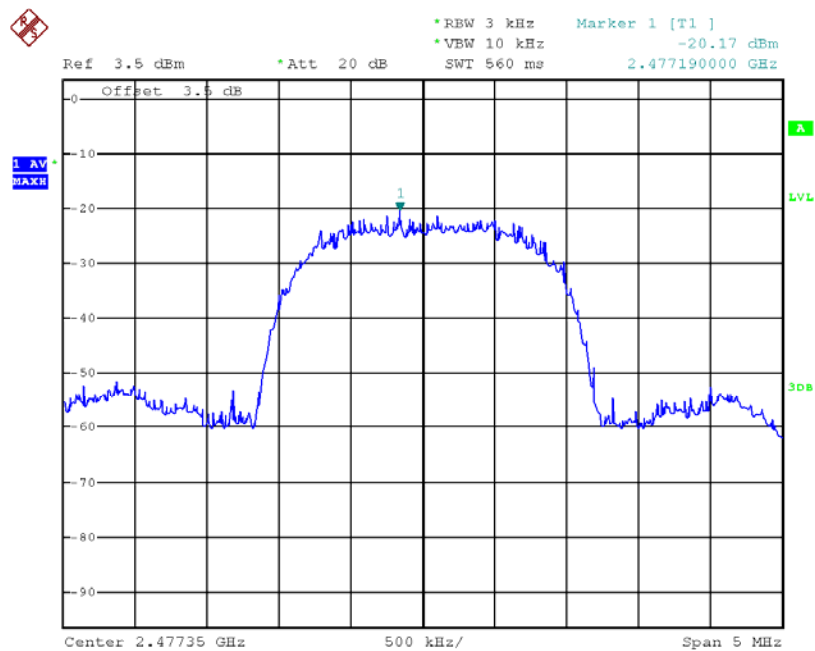
Date: 13.JUN.2017 11:57:54

TX CH19



Date: 13.JUN.2017 13:56:54

TX CH37



Date: 13.JUN.2017 14:02:08