

# FCC Radio Test Report

## FCC ID: P27SZDWS08

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

**Project No.** : 1611016  
**Equipment** : Micro Door Window Sensor  
**Test Model** : SZ-DWS08  
**Series Model** : SZ-DWS08Nxxxxxxxx(the 1st x should be "blank" or "-";  
the rest x could be 0 to 9, A to Z, "blank" or "-", for  
marking purpose)  
**Applicant** : Sercomm Corporation  
**Address** : 8F, No. 3-1, YuanQu St., NanKang, Taipei, Taiwan 115

**Date of Receipt** : Nov. 01, 2016  
**Date of Test** : Nov. 01, 2016 ~ Nov. 12, 2016  
**Issued Date** : Nov. 14, 2016  
**Tested by** : BTL Inc.

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(Rush Kao)

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Table of Contents	Page
<b>1 . CERTIFICATION</b>	<b>6</b>
<b>2 . SUMMARY OF TEST RESULTS</b>	<b>7</b>
2.1 TEST FACILITY	8
2.1.1 MEASUREMENT UNCERTAINTY	9
<b>3 . GENERAL INFORMATION</b>	<b>10</b>
3.1 GENERAL DESCRIPTION OF EUT	10
3.2 DESCRIPTION OF TEST MODES	11
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	11
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	12
3.5 DESCRIPTION OF SUPPORT UNITS	12
<b>4 . EMC EMISSION TEST</b>	<b>13</b>
4.1 CONDUCTED EMISSION MEASUREMENT	13
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	13
4.1.2 TEST PROCEDURE	13
4.1.3 DEVIATION FROM TEST STANDARD	13
4.1.4 TEST SETUP	14
4.1.5 EUT OPERATING CONDITIONS	14
4.1.6 EUT TEST CONDITIONS	14
4.1.7 TEST RESULTS	14
4.2 RADIATED EMISSION MEASUREMENT	15
4.2.1 RADIATED EMISSION LIMITS	15
4.2.2 TEST PROCEDURE	16
4.2.3 DEVIATION FROM TEST STANDARD	16
4.2.4 TEST SETUP	17
4.2.5 EUT TEST CONDITIONS	18
4.2.6 TEST RESULTS (9KHZ TO 30MHZ)	18
4.2.7 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)	18
4.2.8 TEST RESULTS (ABOVE 1000 MHZ)	18
<b>5 . BANDWIDTH TEST</b>	<b>19</b>
5.1 APPLIED PROCEDURES / LIMIT	19
5.1.1 TEST PROCEDURE	19
5.1.2 DEVIATION FROM STANDARD	19
5.1.3 TEST SETUP	19
5.1.4 EUT OPERATION CONDITIONS	19
5.1.5 EUT TEST CONDITIONS	19
5.1.6 TEST RESULTS	19
<b>6 . MAXIMUM OUTPUT POWER TEST</b>	<b>20</b>

Table of Contents	Page
<b>6.1 APPLIED PROCEDURES / LIMIT</b>	<b>20</b>
6.1.1 TEST PROCEDURE	20
6.1.2 DEVIATION FROM STANDARD	20
6.1.3 TEST SETUP	20
6.1.4 EUT OPERATION CONDITIONS	20
6.1.5 EUT TEST CONDITIONS	20
6.1.6 TEST RESULTS	20
<b>7 . ANTENNA CONDUCTED SPURIOUS EMISSION</b>	<b>21</b>
7.1 APPLIED PROCEDURES / LIMIT	21
7.1.1 TEST PROCEDURE	21
7.1.2 DEVIATION FROM STANDARD	21
7.1.3 TEST SETUP	21
7.1.4 EUT OPERATION CONDITIONS	21
7.1.5 EUT OPERATION CONDITIONS	21
7.1.6 TEST RESULTS	21
<b>8 . POWER SPECTRAL DENSITY TEST</b>	<b>22</b>
8.1 APPLIED PROCEDURES / LIMIT	22
8.1.1 TEST PROCEDURE	22
8.1.2 DEVIATION FROM STANDARD	22
8.1.3 TEST SETUP	22
8.1.4 EUT OPERATION CONDITIONS	22
8.1.5 EUT TEST CONDITIONS	22
8.1.6 TEST RESULTS	22
<b>9 . MEASUREMENT INSTRUMENTS LIST</b>	<b>23</b>
<b>10 . EUT TEST PHOTO</b>	<b>25</b>
<b>ATTACHMENT A - CONDUCTED EMISSION</b>	<b>29</b>
<b>ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)</b>	<b>30</b>
<b>ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)</b>	<b>35</b>
<b>ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)</b>	<b>38</b>
<b>ATTACHMENT E - BANDWIDTH</b>	<b>67</b>
<b>ATTACHMENT F - MAXIMUM OUTPUT POWER TEST</b>	<b>72</b>
<b>ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION</b>	<b>73</b>
<b>ATTACHMENT H - POWER SPECTRAL DENSITY TEST</b>	<b>82</b>



**REPORT ISSUED HISTORY**

Issued No.	Description	Issued Date
BTL-FCCP-1-1611016	Original Issue.	Nov. 14, 2016

## 1. CERTIFICATION

Equipment : Micro Door Window Sensor  
Brand Name : Sercomm  
Test Model : SZ-DWS08  
Series Model : SZ-DWS08Nxxxxxxxx(the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marking purpose)  
Applicant : Sercomm Corporation  
Manufacturer: SERCOMM CORP  
Address : 3F 81 YUYI RD CHU-NAN MIAO-LI, 350 TAIWAN  
Factory : SERCOMM CORP  
Address : 3F 81 YUYI RD CHU-NAN MIAO-LI, 350 TAIWAN  
Date of Test : Nov. 01, 2016 ~ Nov. 12, 2016  
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-1-1611016) 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	N/A	NOTE (1)
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(b)(3)	Peak Output Power	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
15.209/15.205	Transmitter Radiated Emissions	PASS	

NOTE:

(1)" N/A" denotes test is not applicable to this device.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

### **Conducted emission Test:**

**C05:** (VCCI RN: C-4742; FCC RN:674415; FCC DN:TW0659)  
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

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

**CB15:** (FCC RN:674415; FCC DN:TW0659)  
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

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

**CB15:** (FCC RN:674415; FCC DN:TW0659)  
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

### 2.1.1 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)
C05	CISPR	150 kHz ~ 30MHz	3.06

#### B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15 (3m)	CISPR	9kHz ~ 150kHz	2.96
		150kHz ~ 30MHz	2.74

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB15 (3m)	CISPR	30MHz ~ 200MHz	V	4.76
		30MHz ~ 200MHz	H	4.28
		200MHz ~ 1,000MHz	V	5.08
		200MHz ~ 1,000MHz	H	4.50

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB15 (3m)	CISPR	1GHz ~ 6GHz	V	4.48
		1GHz ~ 6GHz	H	4.50
		6GHz ~ 18GHz	V	4.30
		6GHz ~ 18GHz	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.

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our  $U_{lab}$  values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called  $U_{CISPR}$ , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our  $U_{lab}$  values are smaller than  $U_{CISPR}$ .

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	Micro Door Window Sensor	
Brand Name	Sercomm	
Test Model	SZ-DWS08	
Series Model	SZ-DWS08Nxxxxxxxx(the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marking purpose)	
Model Difference	Differ in marketing purpose.	
Power Source	DC Voltage supplied from Battery. Brand: Panasonic / Mitsubishi, Model: CR2450*1	
Power Rating	DC 3V	
Product Description	Operation Frequency	2405~2480 MHz
	Modulation Technology	OQPSK
	Bit Rate of Transmitter	250Kbps
	Output Power (Max.)	12.87 dBm

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

- Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Sercomm	SZ-DWS08N	Chip	Solder	0.67

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

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

Note:

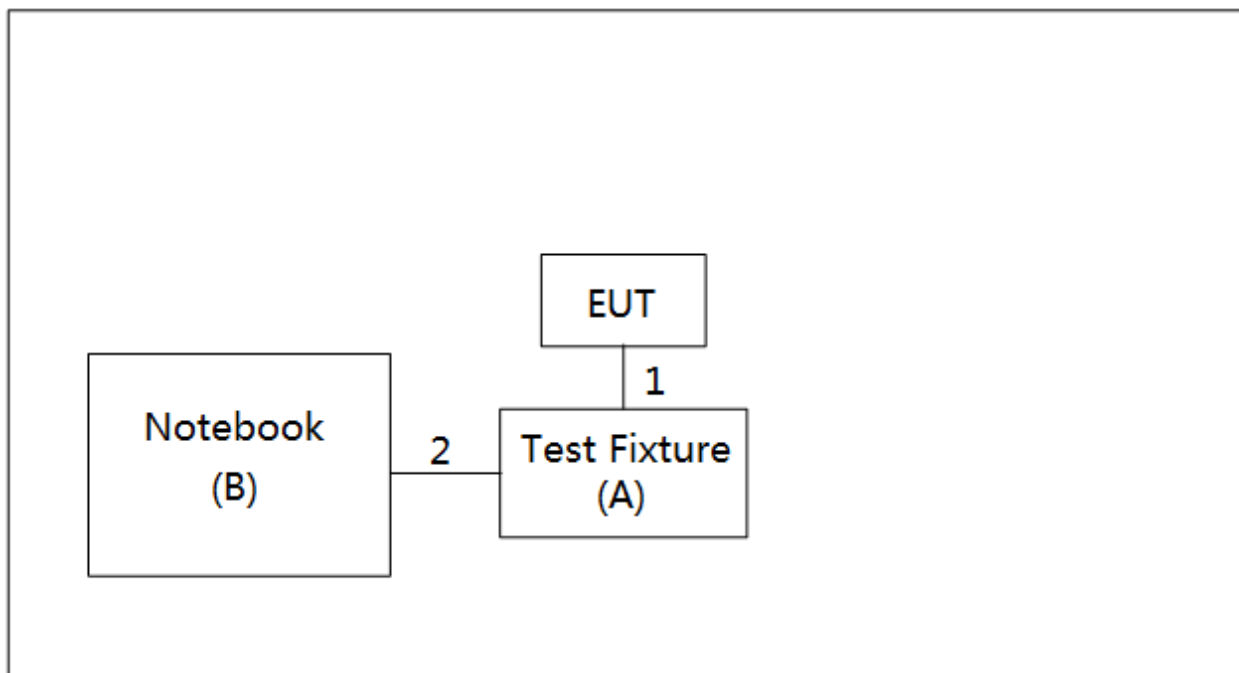
(1) The measurements are performed at the high, middle, low available channels.

### 3.3 TABLE OF PARAMETERS OF 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 IEEE 802.15.4.

Test Software Version	Putty		
Frequency (MHz)	2405	2425	2440
IEEE 802.15.4	a	a	a
Frequency (MHz)	2445	2450	2475
IEEE 802.15.4	a	a	a
Frequency (MHz)	2480		
IEEE 802.15.4	8		

### 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	Fixture	SILICON LABS	SLWSTK6000A	N/A	N/A
B	Notebook	Acer	M52351	DOC	NXV7JTA005334043D42000

Item	Shielded Type	Ferrite Core	Length	Note
1	N/A	N/A	0.15m	Flat Flexible Cable
2	N/A	N/A	1.5m	Mini 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	6
5.0 -30 0	0	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 = Antenna Factor + Cable Loss - Amplifier Gain(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

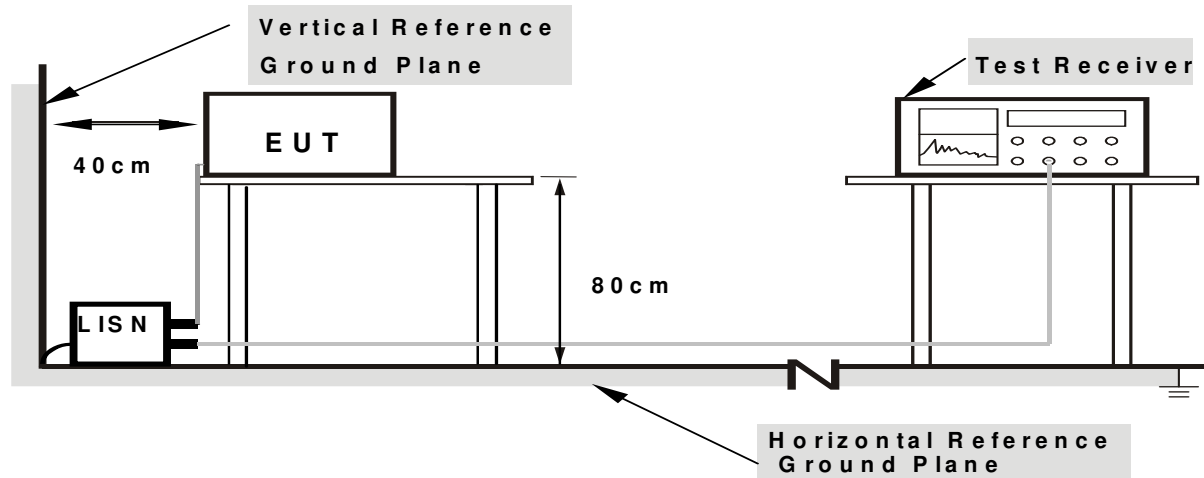
#### 4.1.2 TEST PROCEDURE

- 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  
from other units and other metal planes

#### 4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting/receiving data or hopping on mode.

#### 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 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

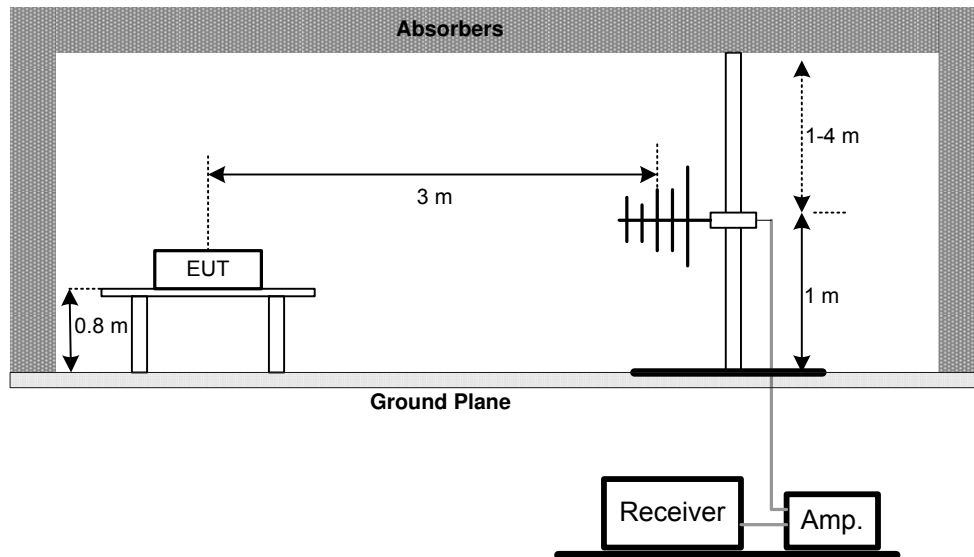
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 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.
- 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).
- 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.
- 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

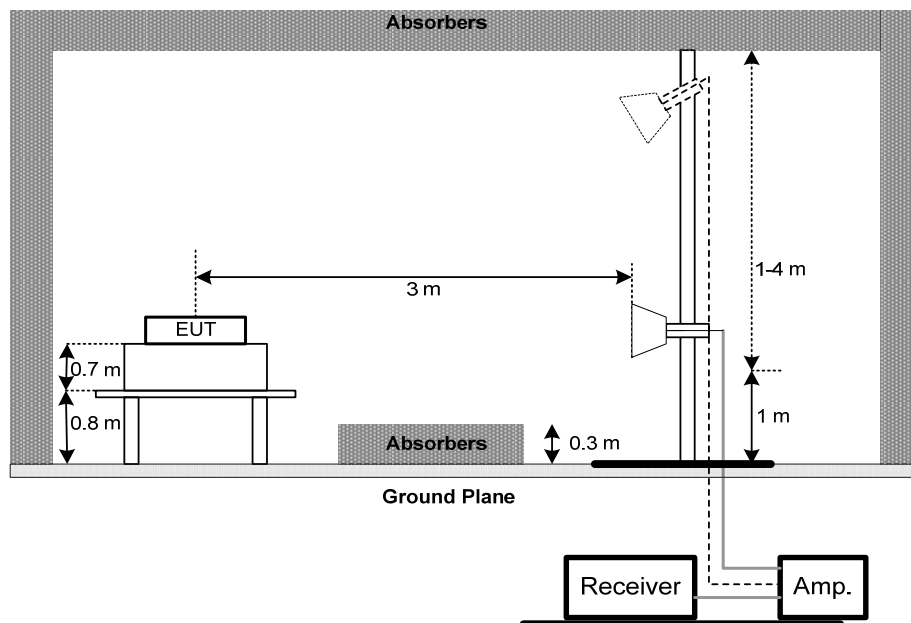
No deviation

#### 4.2.4 TEST SETUP

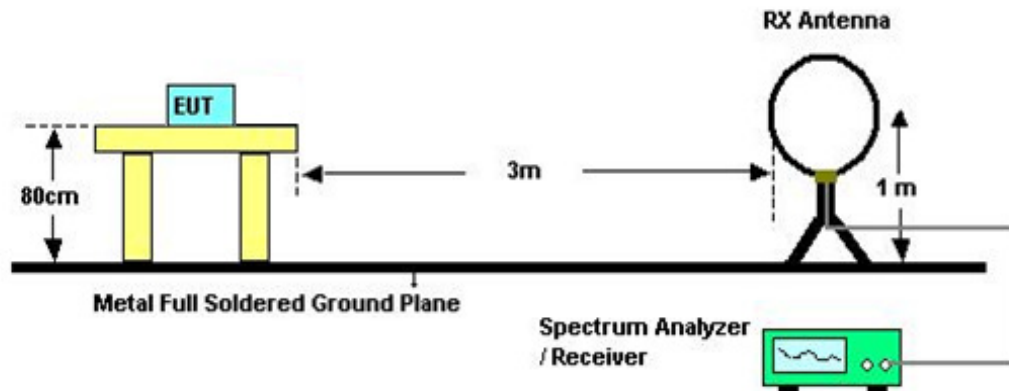
##### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



#### 4.2.5 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 65%

Test Voltage: DC 3V

#### 4.2.6 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.

#### 4.2.7 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

Remark:

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

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

Please refer to the Attachment D.

Remark:

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (3) EUT Orthogonal Axis:  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (4) 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
- (5) 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)	2405~2480 MHz	PASS

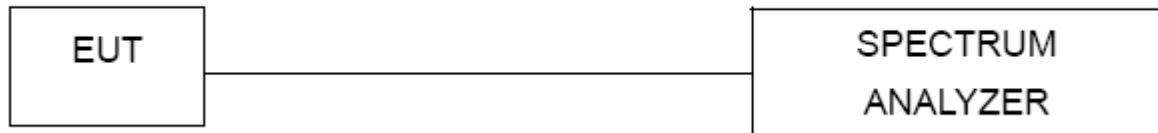
#### 5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP



#### 5.1.4 EUT OPERATION CONDITIONS

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

#### 5.1.5 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: DC 3V

#### 5.1.6 TEST RESULTS

Please refer to the Attachment E.

## 6. MAXIMUM OUTPUT POWER TEST

### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm	2405~2480 MHz	PASS

#### 6.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance 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.  
 Transmit output power was measured while the host equipment supply voltage was varied from 85 % to 115 % of the nominal rated supply voltage. No change in transmit output power was observed.

#### 6.1.5 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: DC 3V

#### 6.1.6 TEST RESULTS

Please refer to the Attachment F.



## 7. ANTENNA CONDUCTED SPURIOUS EMISSION

### 7.1 APPLIED PROCEDURES / LIMIT

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

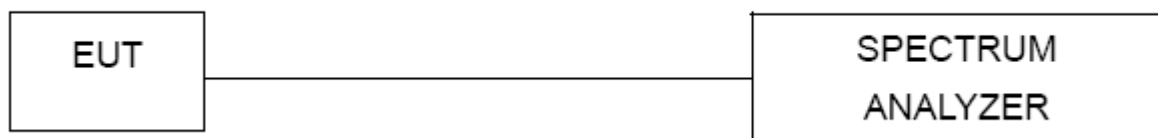
#### 7.1.1 TEST PROCEDURE

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

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



#### 7.1.4 EUT OPERATION CONDITIONS

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

#### 7.1.5 EUT OPERATION CONDITIONS

Temperature: 25°C  
Relative Humidity: 55%  
Test Voltage: DC 3V

#### 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)	2405~2480 MHz	PASS

#### 8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW=3KHz, VBW=10 KHz, Sweep time = auto.

#### 8.1.2 DEVIATION FROM STANDARD

No deviation.

#### 8.1.3 TEST SETUP



#### 8.1.4 EUT OPERATION CONDITIONS

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

#### 8.1.5 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: DC 3V

#### 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	TWO-LINE V-NETWORK	R&S	ENV216	101050	Jan. 26, 2017
2	Test Cable	TIMES	CFD300-NL	C02	Jun. 15, 2017
3	EMI Test Receiver	R&S	ESR7	101433	Dec. 10, 2016
4	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	EMI Receiver	Keysight	N9038A	MY55420127	Jan. 07, 2017
2	EXA Spectrum Analyzer	Keysight	N9010A	MY52220990	Feb. 23, 2017
3	Horn Antenna(1G~18G)	SCHWARZBECK	BBHA 9120 D	9120D-1342	Mar. 01, 2017
4	Trilog-Broadband Antenna(30M~1G)	Schwarzbeck	VULB9168	9168-548	Jan. 17, 2017
5	Pre-Amplifier(30M~1G)	EMCI	EMC02325	980217	Dec. 29, 2016
6	Pre-Amplifier(1G~26G)	EMCI	012645B	980267	Mar. 01, 2017
7	Test Cable	EMCI	EMC104-SM-S M-800	150207	Jan. 05, 2017
8	Test Cable	EMCI	EEMC104-SM-S M-3000	151205	Jan. 05, 2017
9	Test Cable	EMCI	S104-SMAP-2	M001220	Jan. 05, 2017
10	EXA Spectrum Analyzer	Agilent	N9010A	MY52220990	Feb. 24, 2017
11	EMI Test Receiver	Agilent	N9038A	MY51210215	Jan. 08, 2017
12	Loop Antenna	EMCO	6502	00042960	Nov. 05, 2017

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY51160196	Jul. 28, 2017

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2495A	1128008	Aug. 17, 2017
2	Power Meter Sensor	Anritsu	MA2491A	034138	Aug. 17, 2017
3	Spectrum Analyzer	Agilent	N9020A	MY51160196	Jul. 28, 2017

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY51160196	Jul. 28, 2017

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY51160196	Jul. 28, 2017

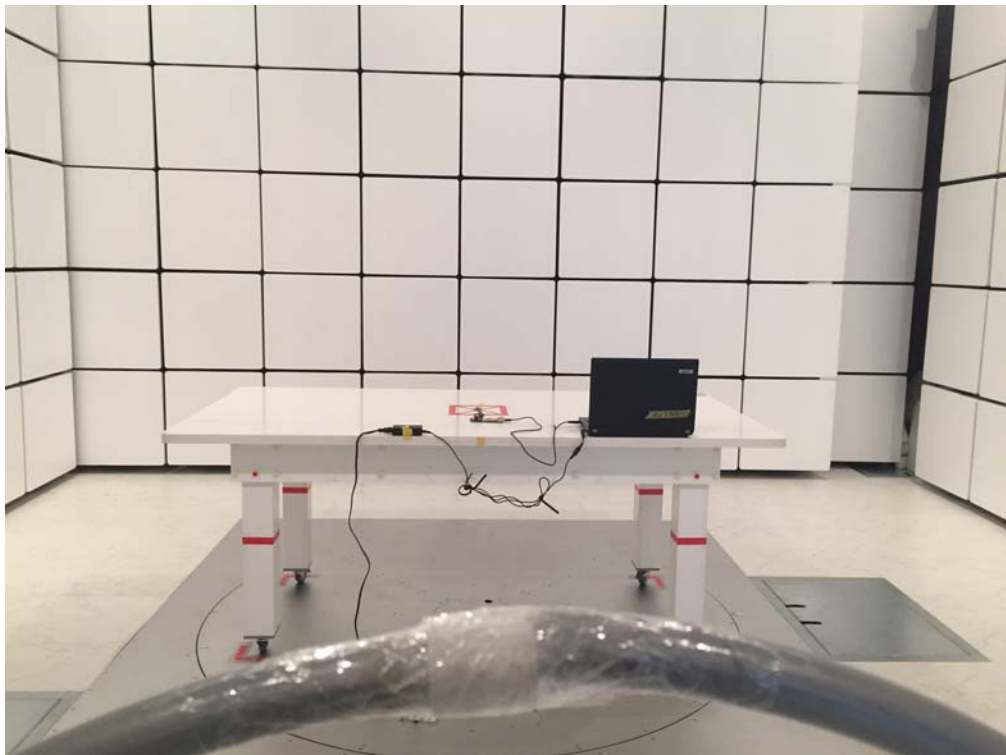
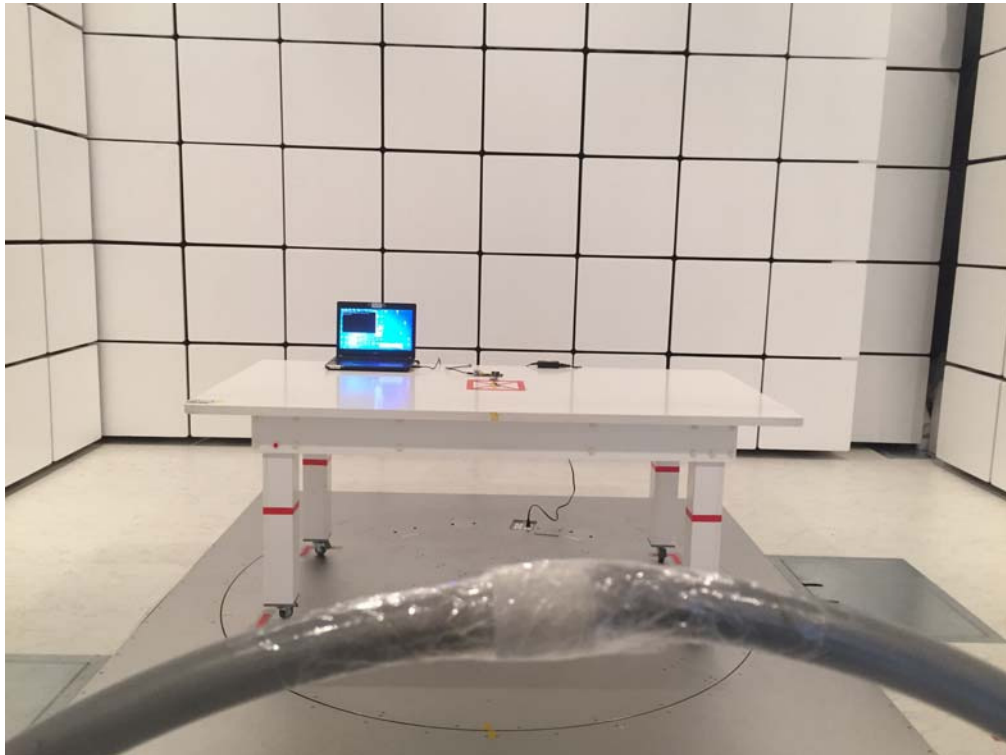
Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

## 10. EUT TEST PHOTO

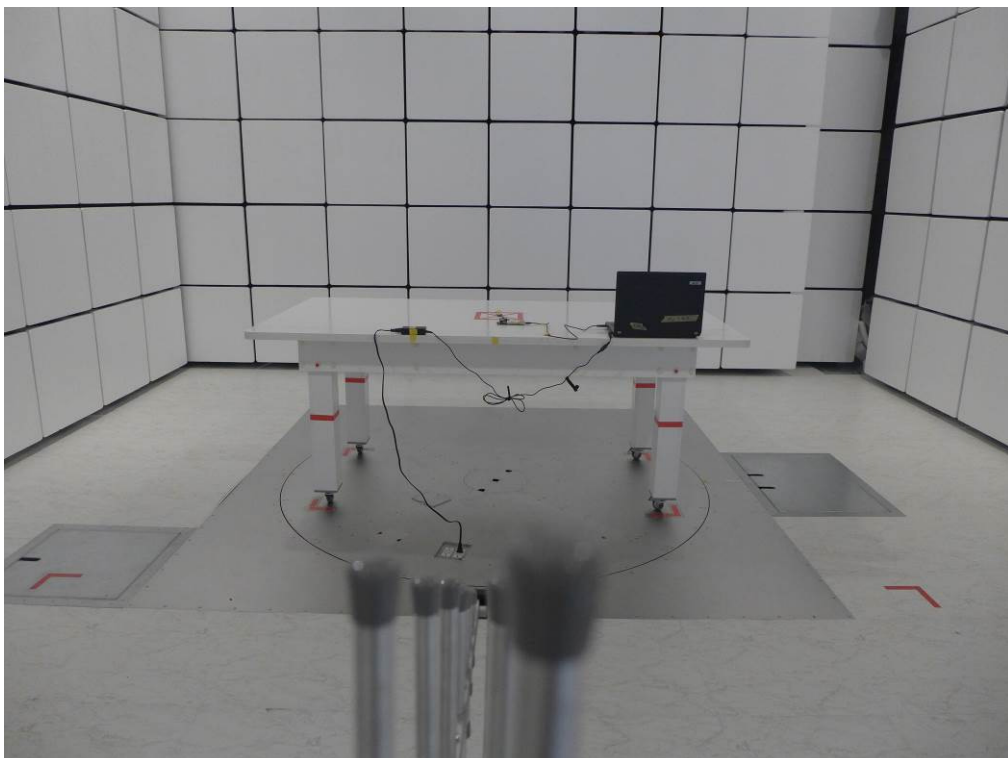
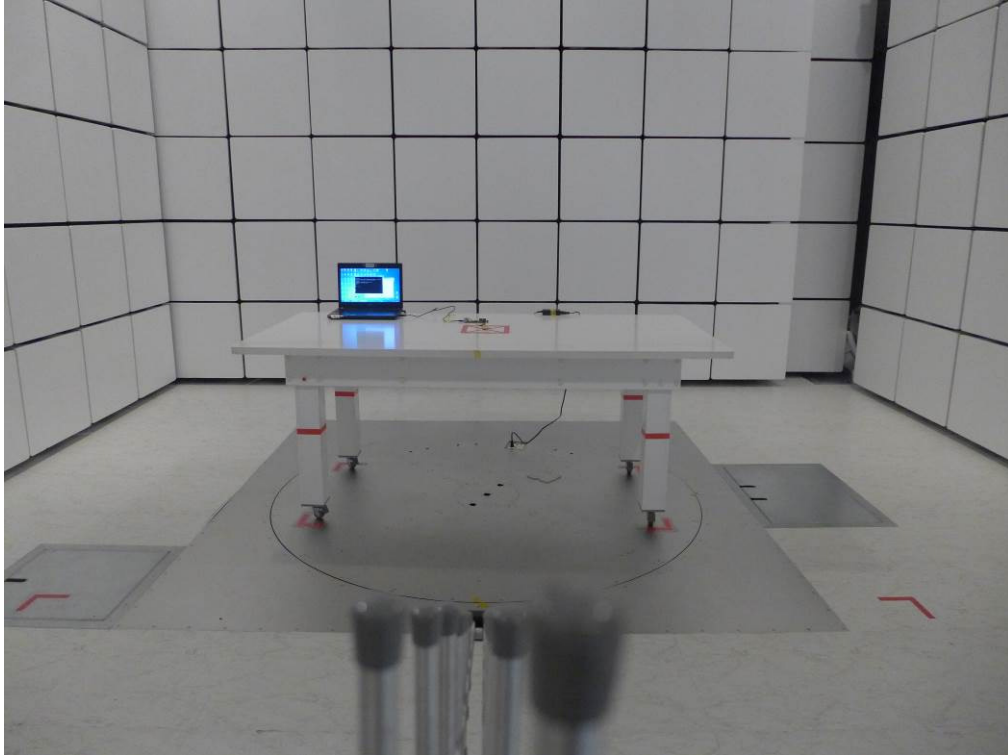
### Radiated Measurement Photos

9KHz to 30MHz



## Radiated Measurement Photos

30M to 1000MHz

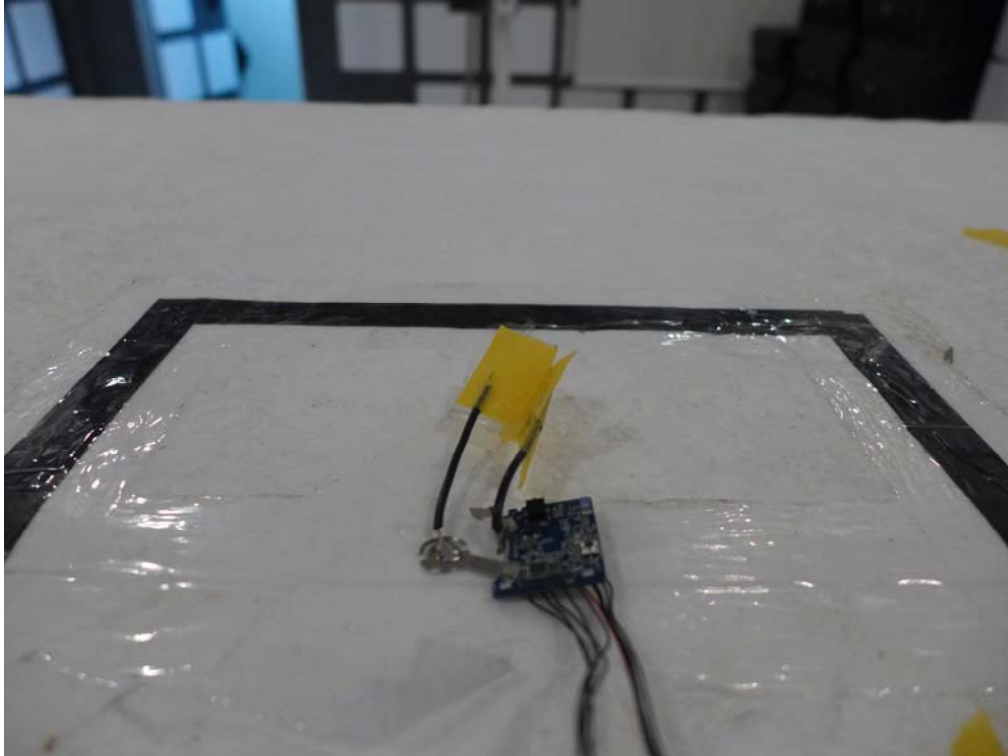


## Radiated Measurement Photos

Above 1000MHz



### Radiated Measurement Photos





## ATTACHMENT A - CONDUCTED EMISSION

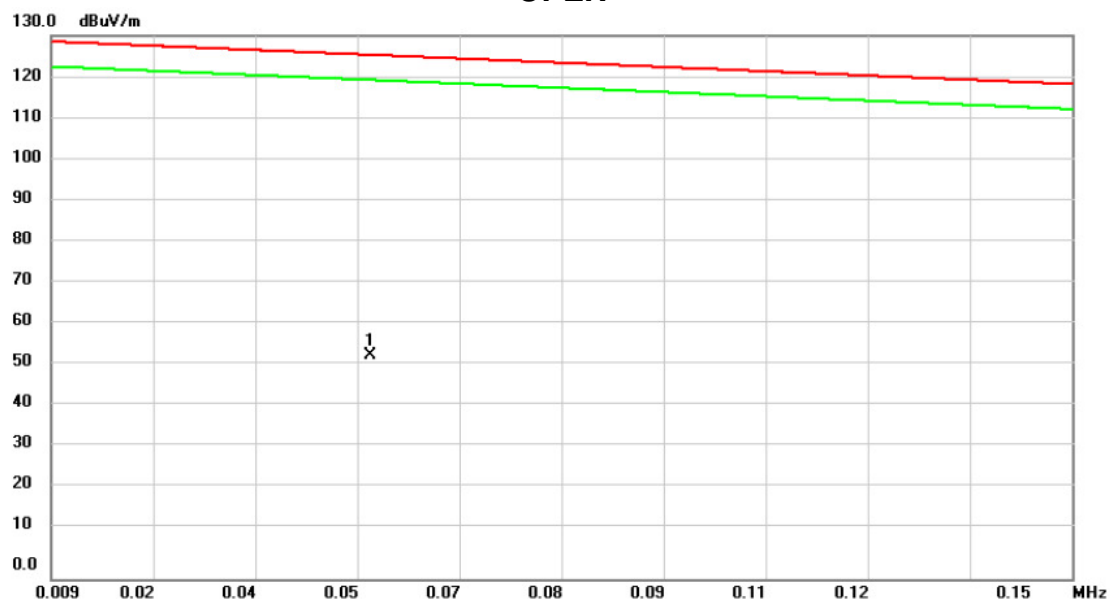
**Test Mode: N/A**

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

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

Test Mode: TX Mode

OPEN



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	0.0530	40.57	12.95	53.52	125.34	-71.82	peak	100	56

Test Mode: TX Mode

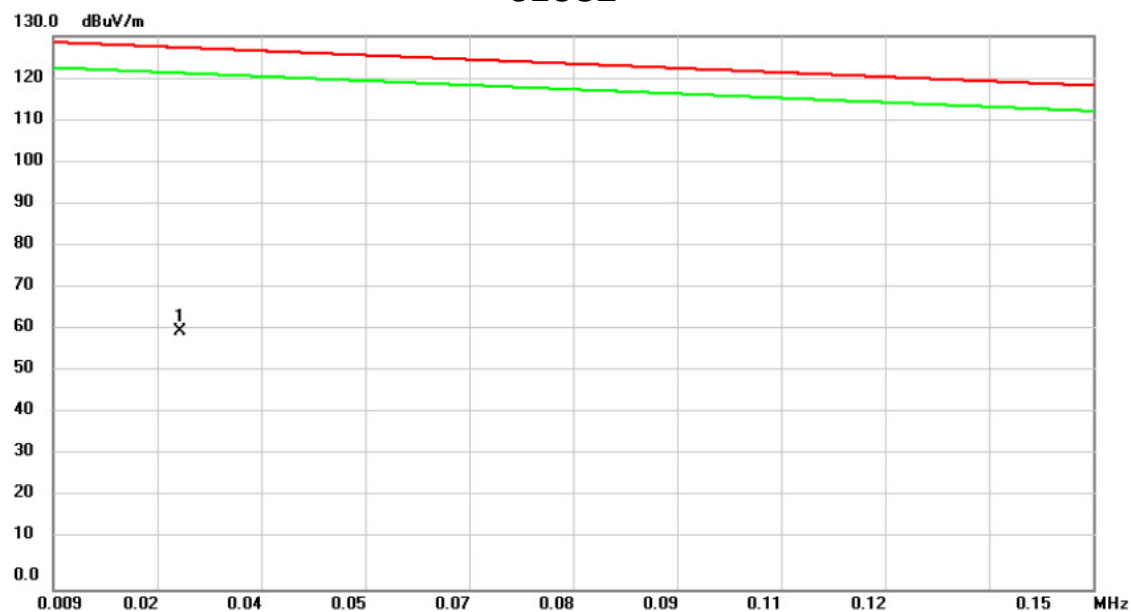
OPEN



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		0.1500	47.93	12.03	59.96	118.34	-58.38	peak	100	280
2		0.3886	38.80	11.80	50.60	101.12	-50.52	peak	100	33
3	*	1.0750	30.36	11.97	42.33	68.59	-26.26	peak	100	54
4		1.5530	25.58	11.75	37.33	64.32	-26.99	peak	100	215
5		2.3887	22.56	11.38	33.94	69.54	-35.60	peak	100	236
6		4.3290	18.38	11.30	29.68	69.54	-39.86	peak	100	4

Test Mode:	TX Mode
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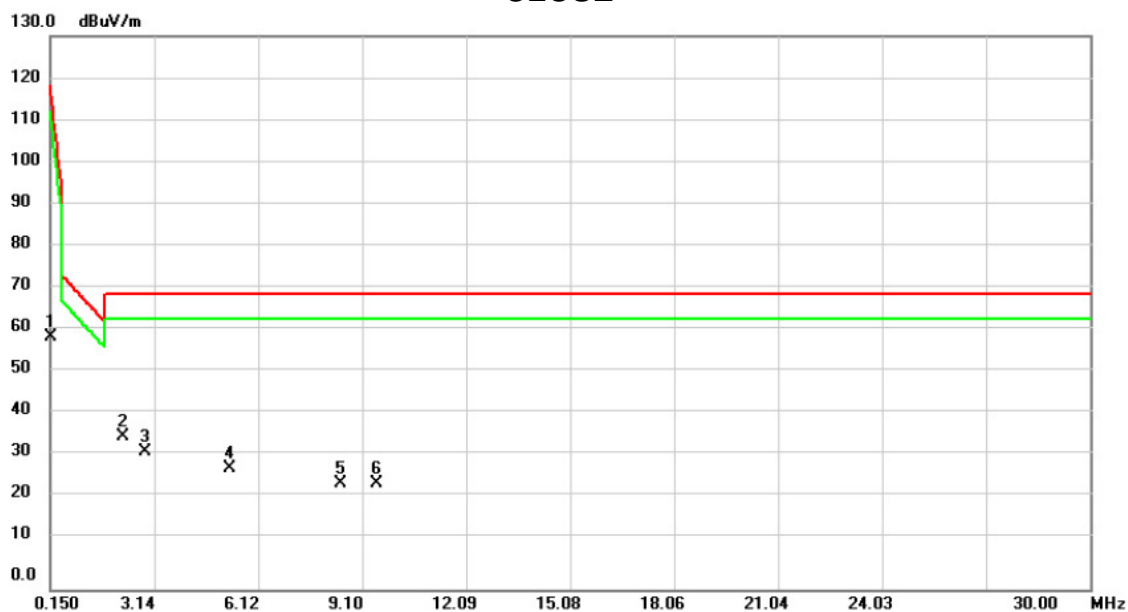
### CLOSE



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	0.0262	44.44	16.04	60.48	127.28	-66.80	peak	100	202

Test Mode: TX Mode

CLOSE

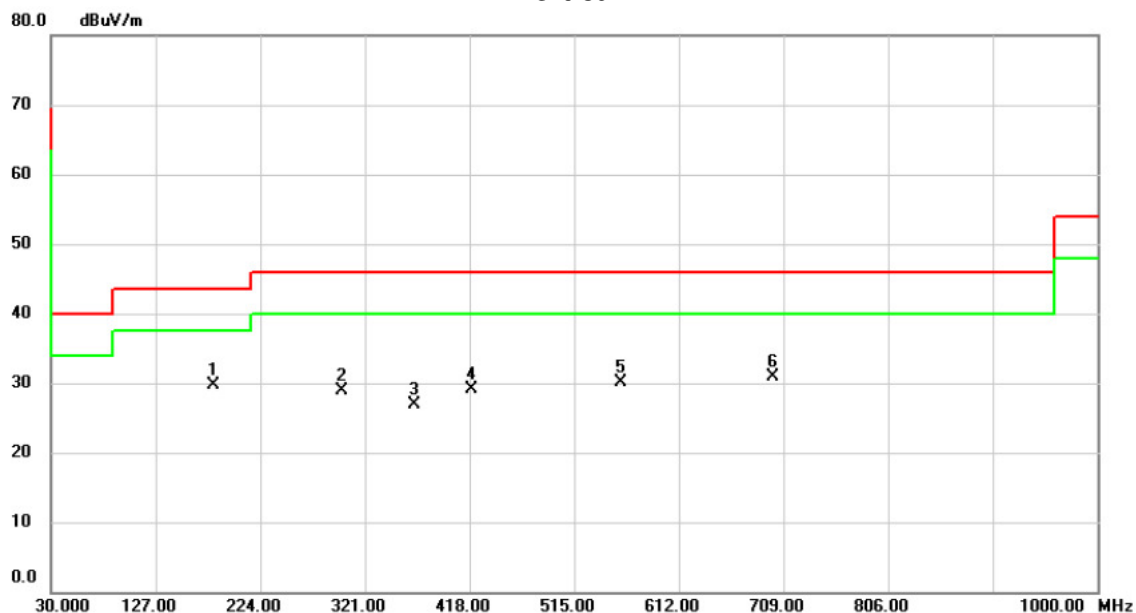


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		0.1500	47.16	12.03	59.19	118.34	-59.15	peak	100	42
2	*	2.2395	24.62	11.44	36.06	69.54	-33.48	peak	100	30
3		2.8664	21.25	11.16	32.41	69.54	-37.13	peak	100	35
4		5.2842	16.97	11.39	28.36	69.54	-41.18	peak	100	135
5		8.4780	13.54	11.33	24.87	69.54	-44.67	peak	100	46
6		9.5228	13.44	11.31	24.75	69.54	-44.79	peak	100	364

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

Test Mode: TX Mode

### Vertical

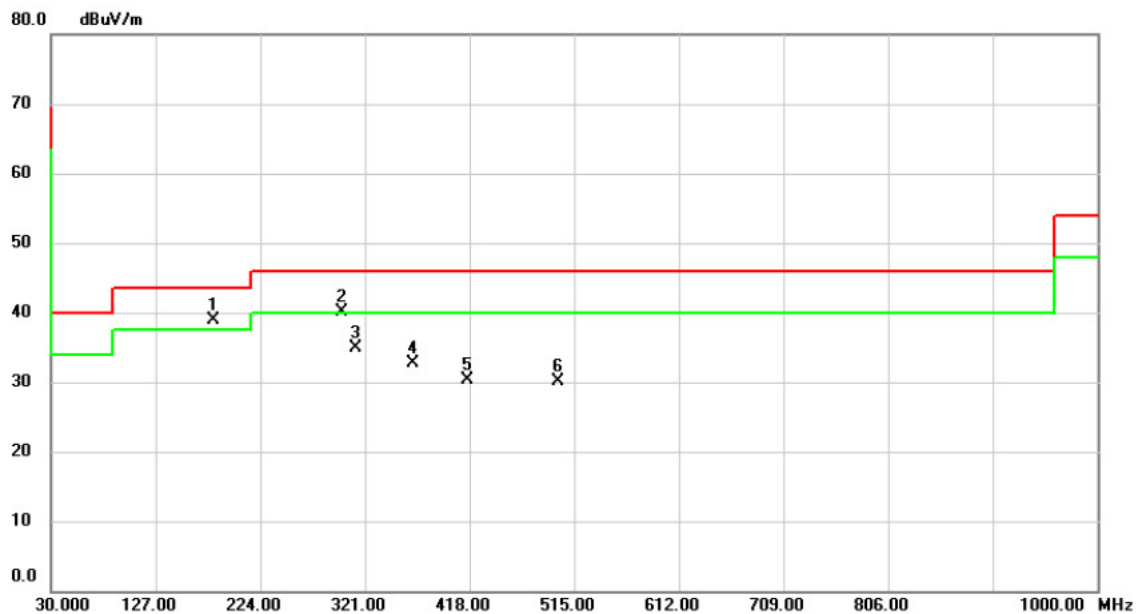


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1	*	180.3500	39.92	-10.14	29.78	43.50	-13.72	peak	200	142	
2		299.6600	36.64	-7.79	28.85	46.00	-17.15	peak	100	106	
3		366.5900	32.94	-5.98	26.96	46.00	-19.04	peak	100	96	
4		419.9400	33.88	-4.69	29.19	46.00	-16.81	peak	200	300	
5		558.6500	31.74	-1.69	30.05	46.00	-15.95	peak	400	164	
6		699.3000	30.00	0.85	30.85	46.00	-15.15	peak	100	268	



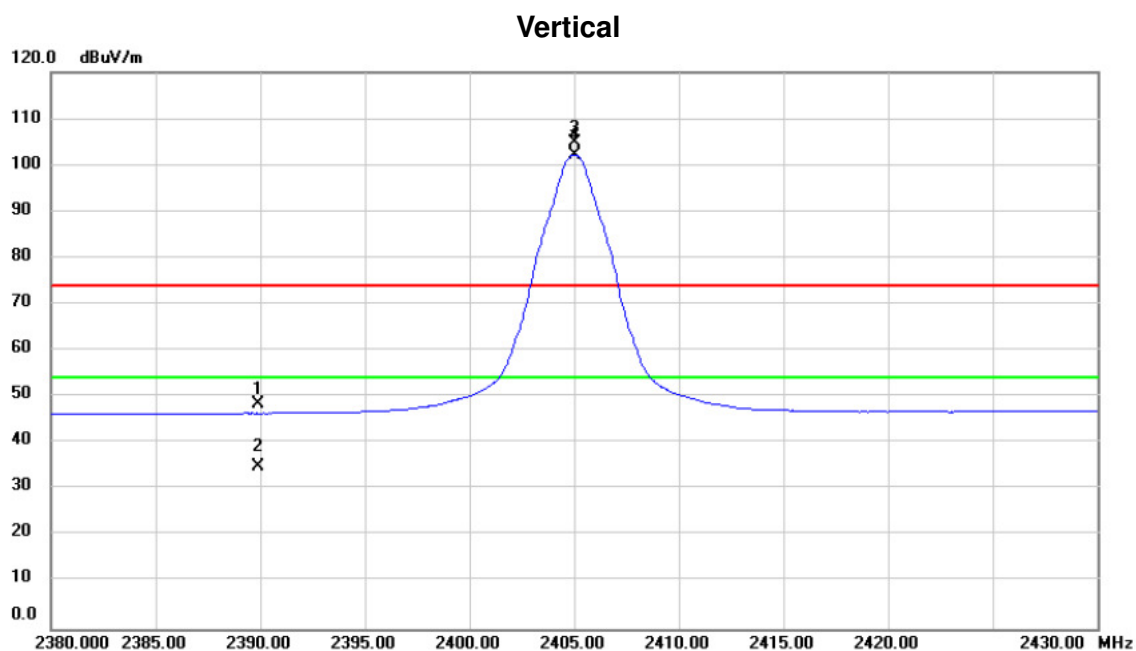
Test Mode: TX Mode

### Horizontal



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

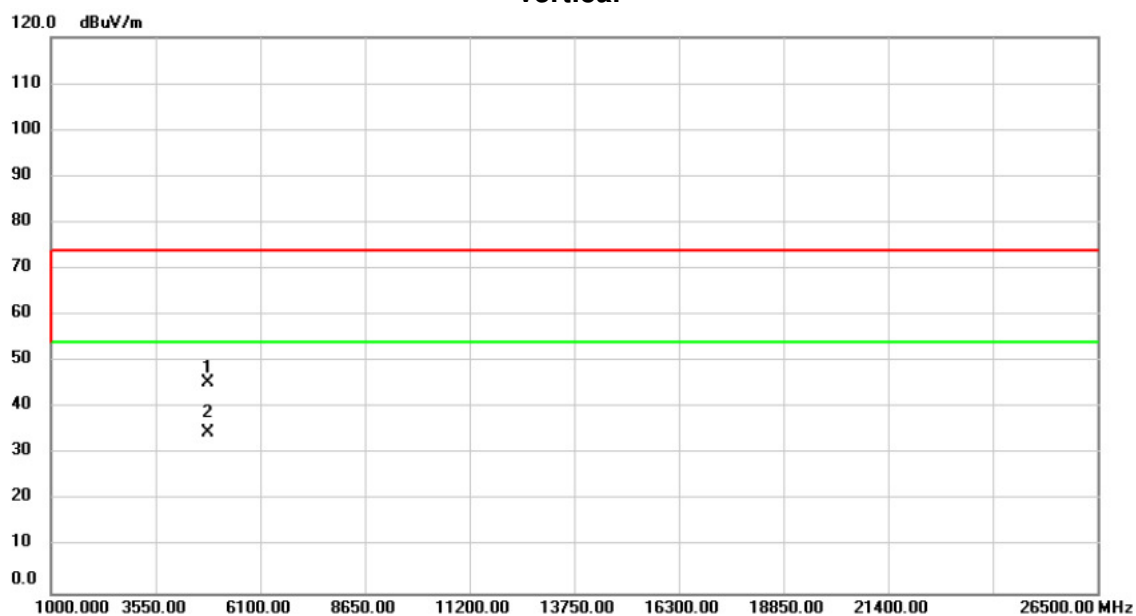
Orthogonal Axis :	X
Test Mode :	TX 2405MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1		2389.900	17.56	30.96	48.52	74.00	-25.48	peak	102	203	
2		2389.900	4.09	30.96	35.05	54.00	-18.95	AVG	102	203	
3	X	2405.000	73.72	31.02	104.74	74.00	30.74	peak	102	203	No Limit
4	*	2405.000	71.27	31.02	102.29	54.00	48.29	AVG	102	203	No Limit

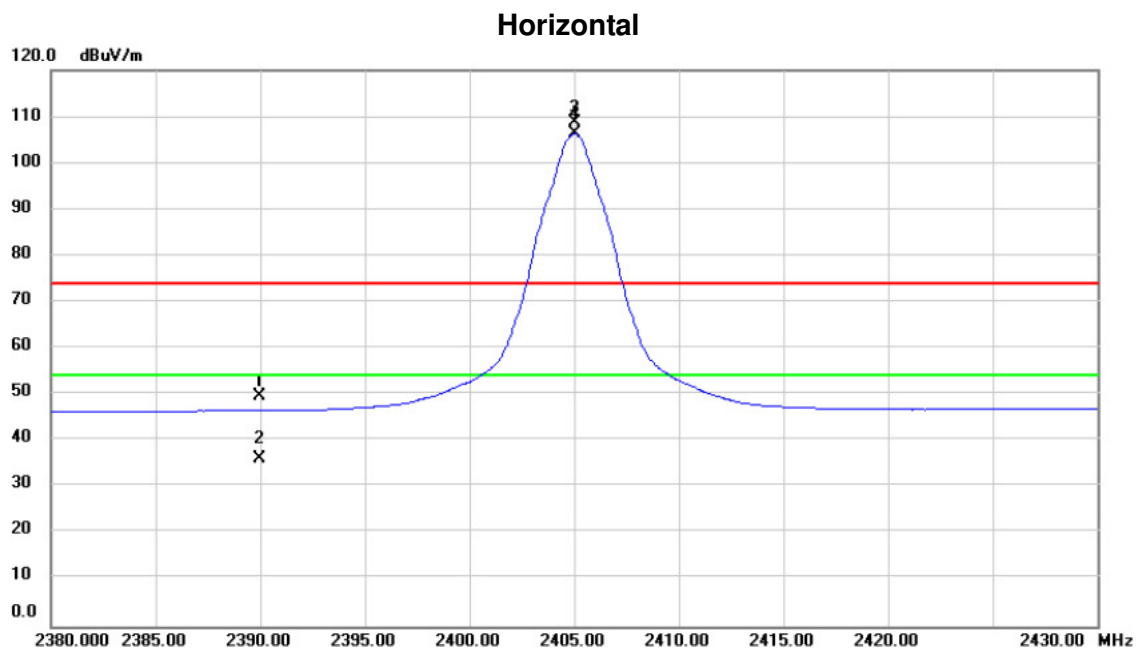
Orthogonal Axis :	X
Test Mode :	TX 2405MHz

### Vertical



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4810.000	56.93	-11.49	45.44	74.00	-28.56	peak	100	331
2 *	4810.000	46.06	-11.49	34.57	54.00	-19.43	AVG	100	331

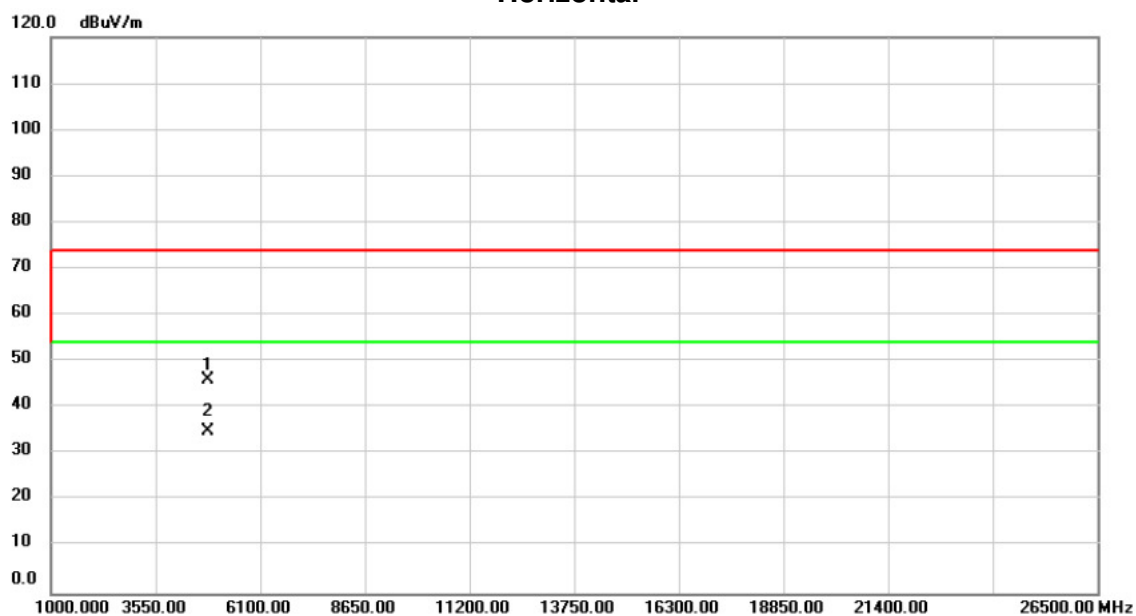
Orthogonal Axis :	X
Test Mode :	TX 2405MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2389.960	18.78	30.96	49.74	74.00	-24.26	peak	162	147
2		2389.960	5.32	30.96	36.28	54.00	-17.72	AVG	162	147
3	X	2405.000	77.70	31.02	108.72	74.00	34.72	peak	162	147
4	*	2405.000	75.26	31.02	106.28	54.00	52.28	AVG	162	147

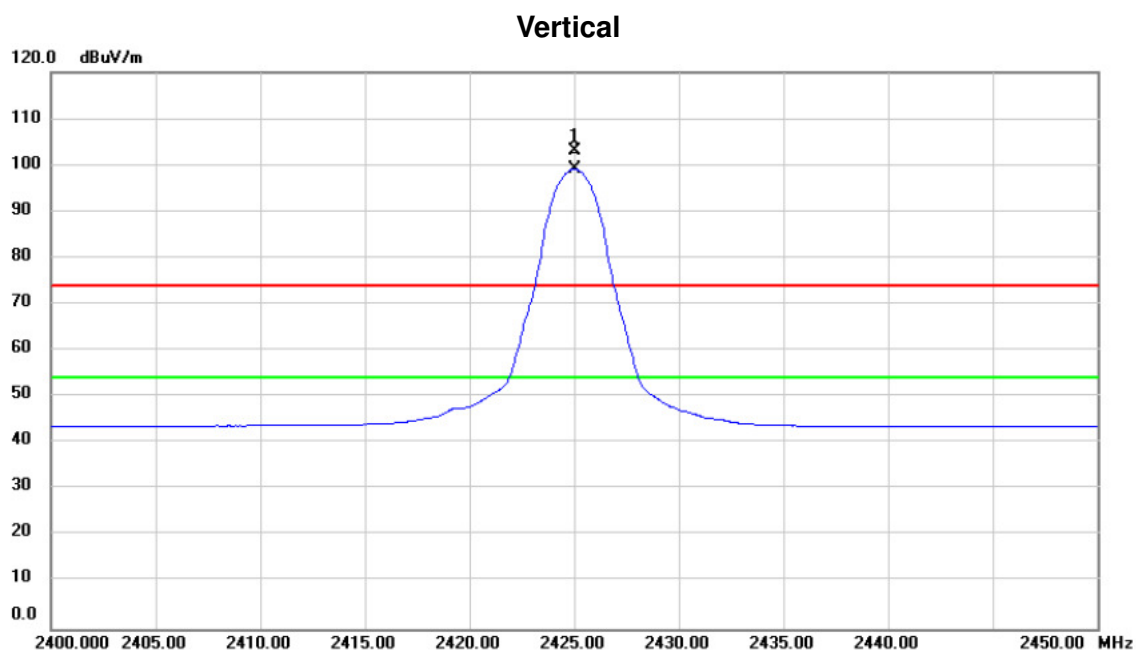
Orthogonal Axis :	X
Test Mode :	TX 2405MHz

### Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		4810.000	57.52	-11.49	46.03	74.00	-27.97	peak	100	27
2	*	4810.000	46.43	-11.49	34.94	54.00	-19.06	AVG	100	27

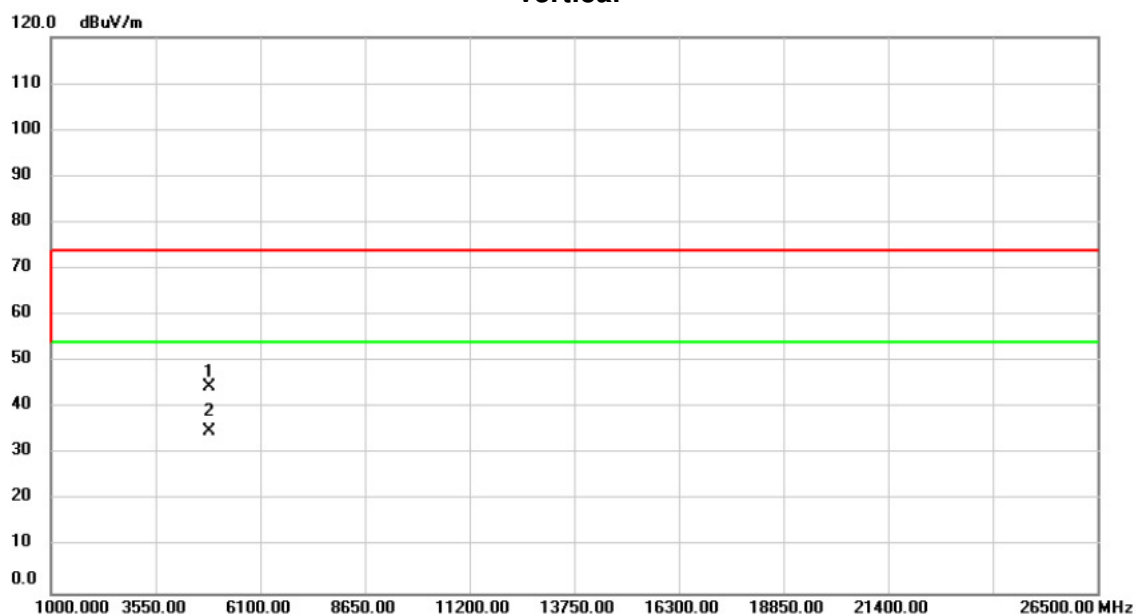
Orthogonal Axis :	X
Test Mode :	TX 2425MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1	X	2425.000	71.81	31.09	102.90	74.00	28.90	peak	335	41	No Limit
2	*	2425.000	68.02	31.09	99.11	54.00	45.11	AVG	335	41	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2425MHz

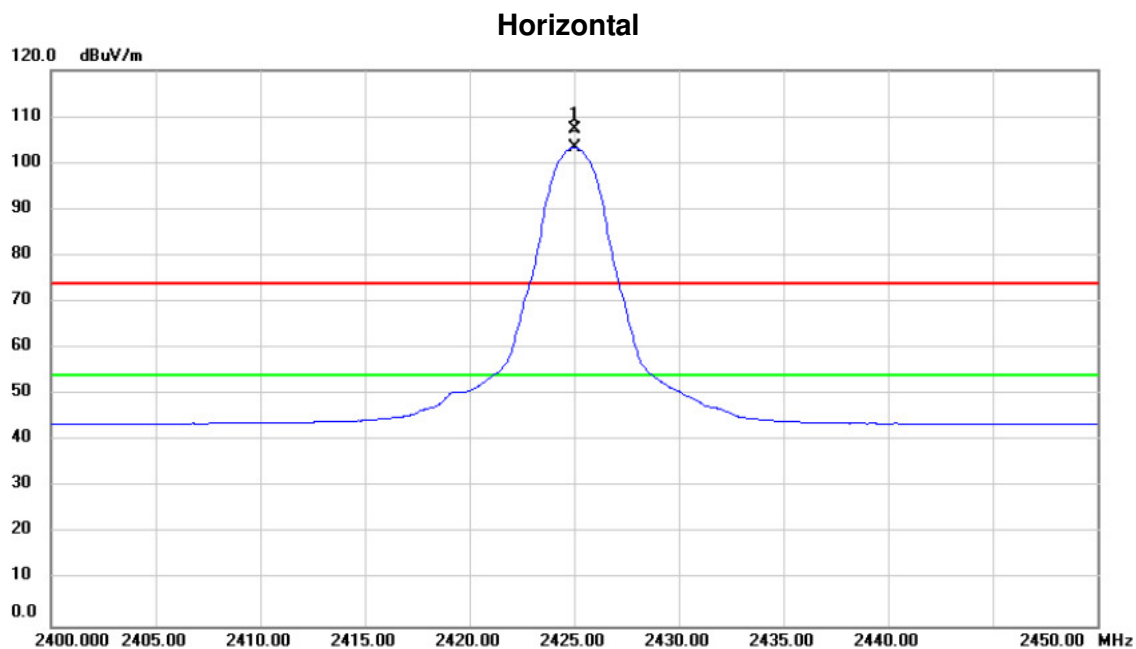
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		4850.000	55.86	-11.43	44.43	74.00	-29.57	peak	107	333
2	*	4850.000	46.33	-11.43	34.90	54.00	-19.10	AVG	107	333



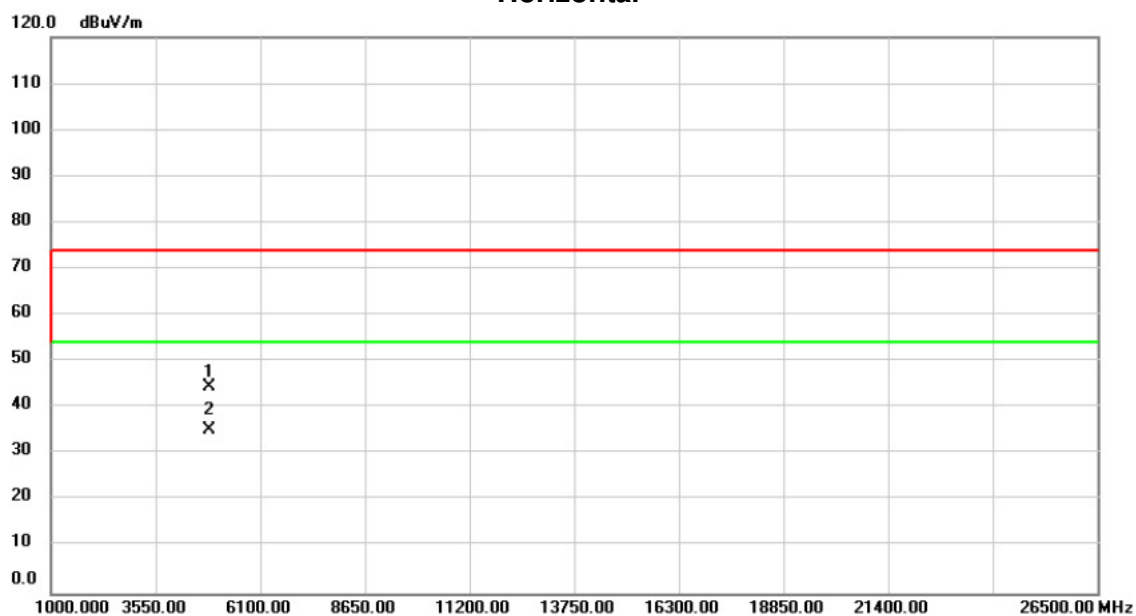
Orthogonal Axis :	X
Test Mode :	TX 2425MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2425.000	76.11	31.09	107.20	74.00	33.20	peak	380	143
2	*	2425.000	72.27	31.09	103.36	54.00	49.36	AVG	380	143

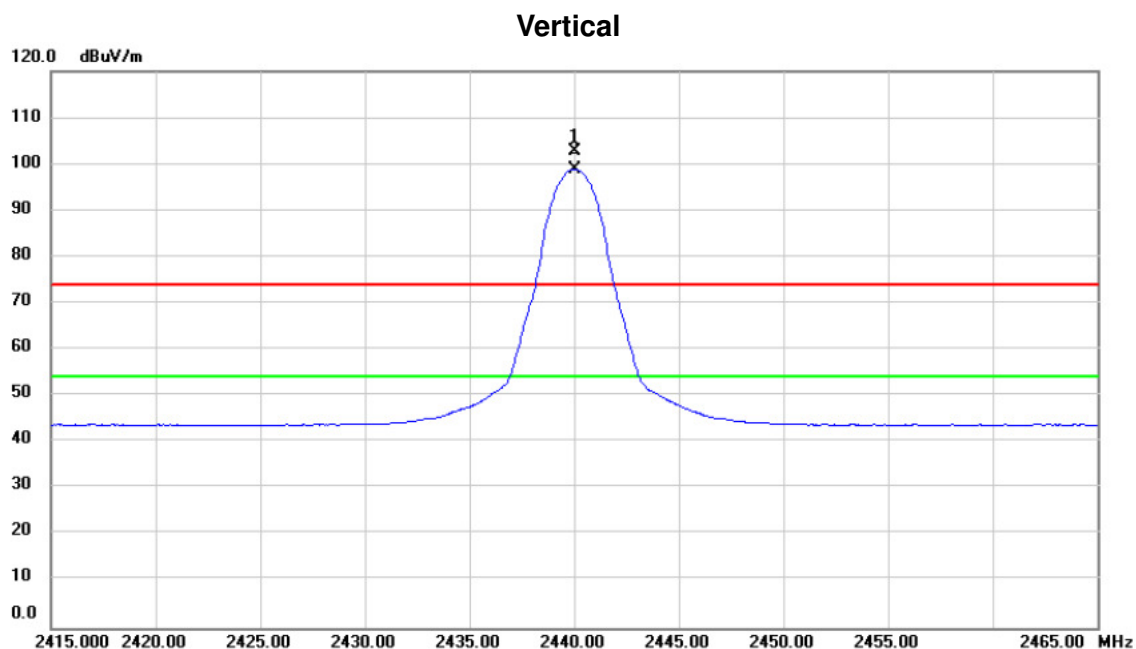
Orthogonal Axis :	X
Test Mode :	TX 2425MHz

### Horizontal



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4850.000	55.87	-11.43	44.44	74.00	-29.56	peak	100	195
2 *	4850.000	46.56	-11.43	35.13	54.00	-18.87	AVG	100	195

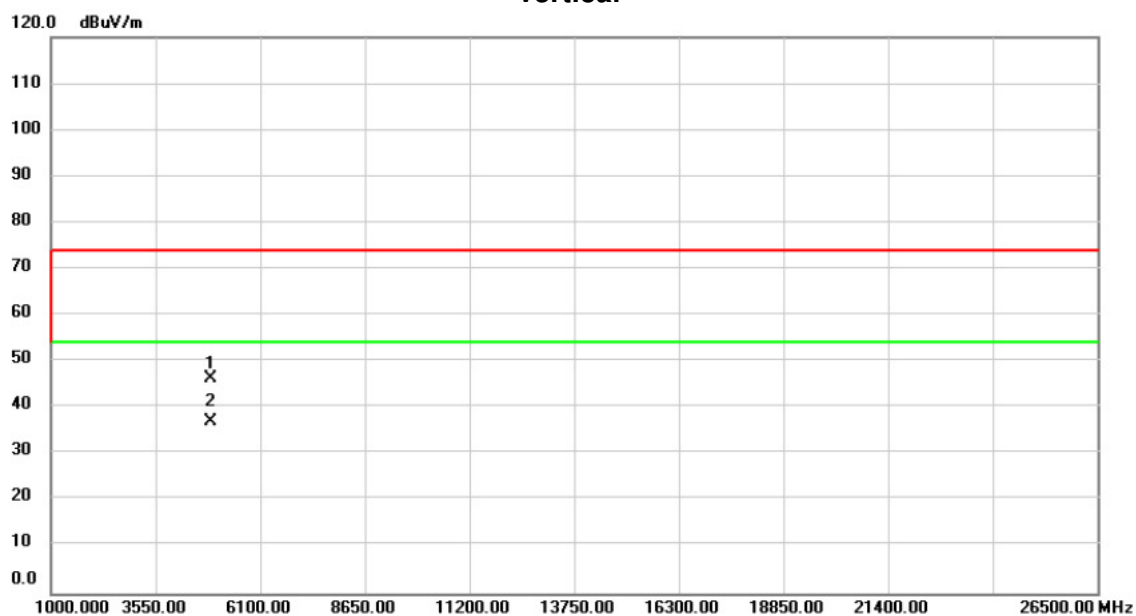
Orthogonal Axis :	X
Test Mode :	TX 2440MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	X	2440.000	71.51	31.15	102.66	74.00	28.66	peak	371	40	No Limit
2	*	2440.000	67.83	31.15	98.98	54.00	44.98	AVG	371	40	No Limit

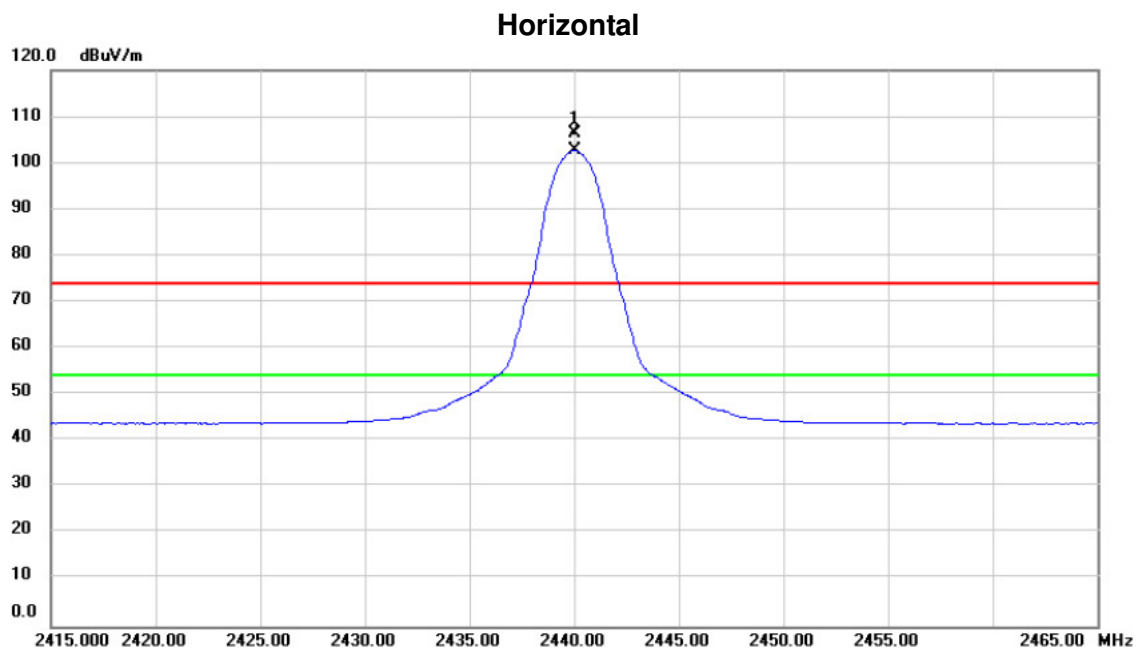
Orthogonal Axis :	X
Test Mode :	TX 2440MHz

### Vertical



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4880.000	57.85	-11.38	46.47	74.00	-27.53	peak	112	336
2 *	4880.000	48.39	-11.38	37.01	54.00	-16.99	AVG	112	336

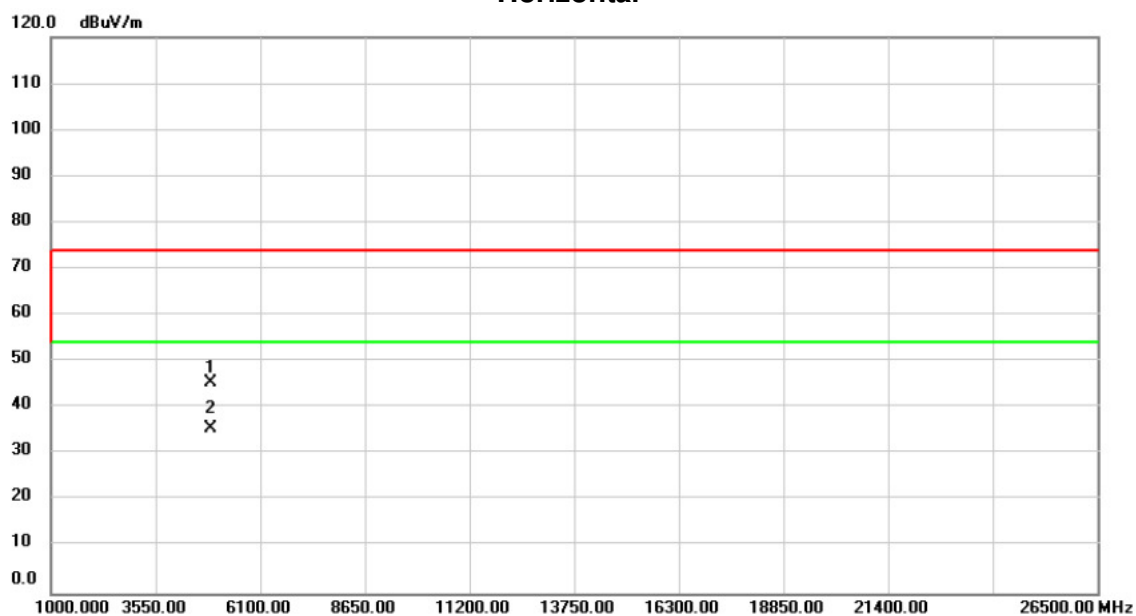
Orthogonal Axis :	X
Test Mode :	TX 2440MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2440.000	75.26	31.15	106.41	74.00	32.41	peak	373	142
2	*	2440.000	71.52	31.15	102.67	54.00	48.67	AVG	373	142

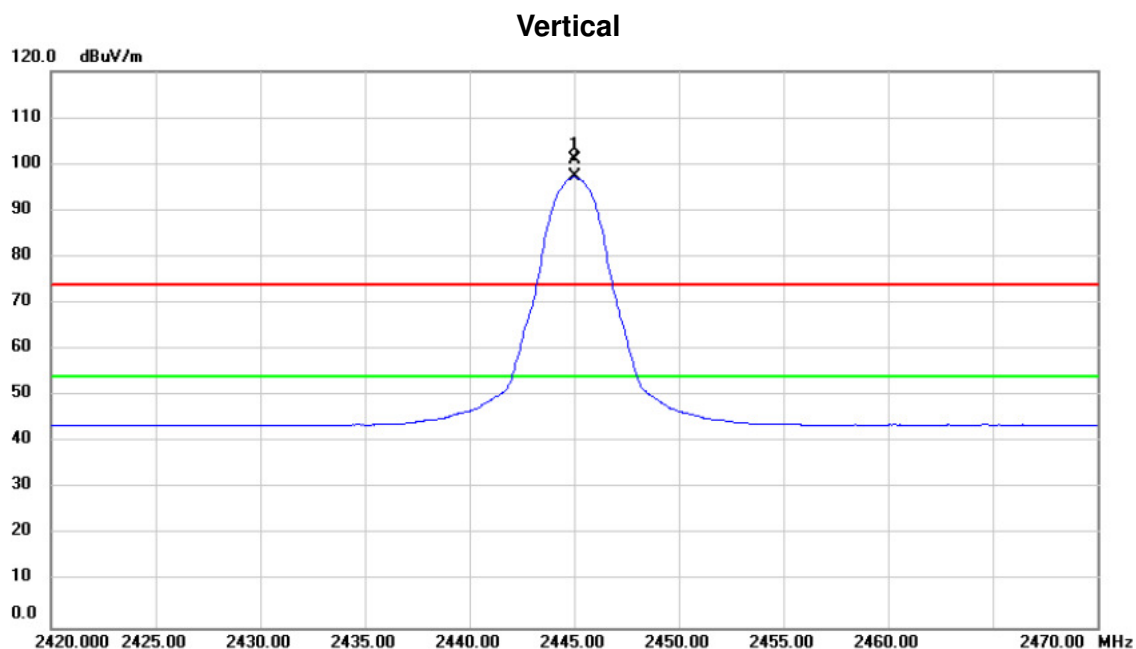
Orthogonal Axis :	X
Test Mode :	TX 2440MHz

### Horizontal



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4880.000	56.88	-11.38	45.50	74.00	-28.50	peak	100	292
2 *	4880.000	47.05	-11.38	35.67	54.00	-18.33	AVG	100	292

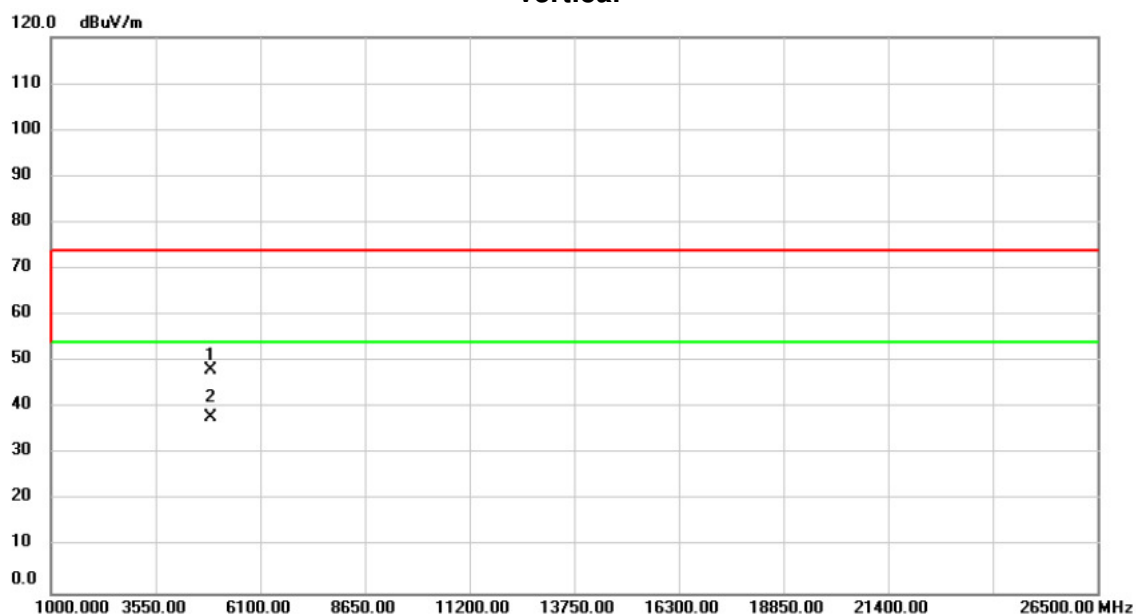
Orthogonal Axis :	X
Test Mode :	TX 2445MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	X	2445.000	69.82	31.17	100.99	74.00	26.99	peak	102	67	No Limit
2	*	2445.000	66.05	31.17	97.22	54.00	43.22	AVG	102	67	No Limit

Orthogonal Axis :	X
Test Mode :	TX 2445MHz

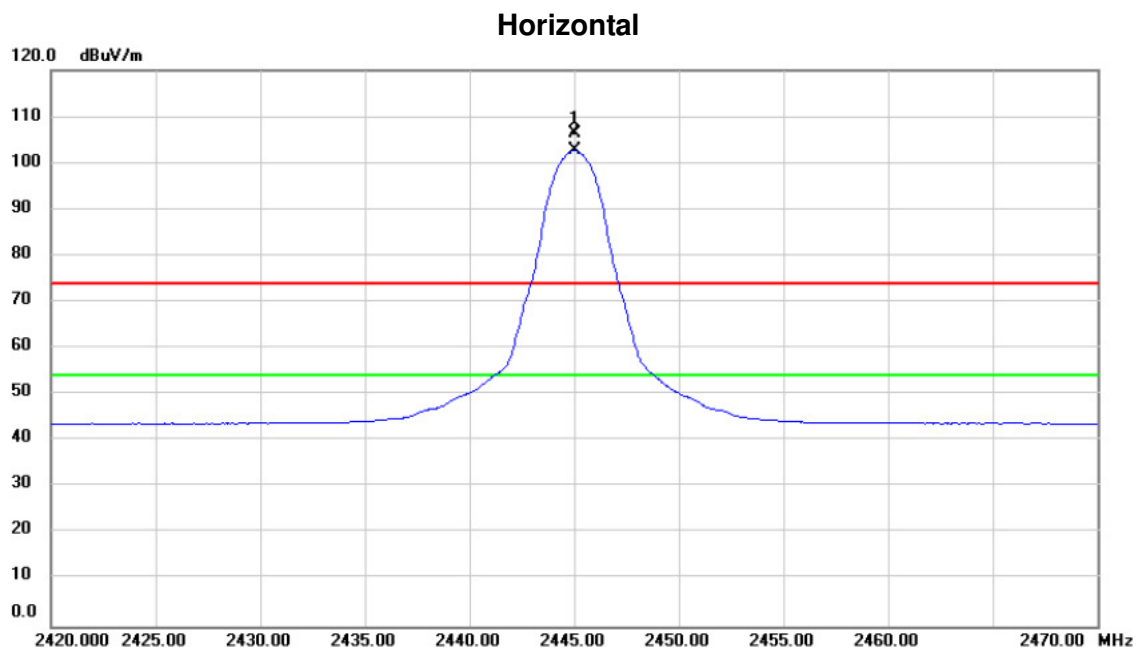
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		4890.000	59.56	-11.37	48.19	74.00	-25.81	peak	104	334
2	*	4890.000	49.22	-11.37	37.85	54.00	-16.15	AVG	104	334



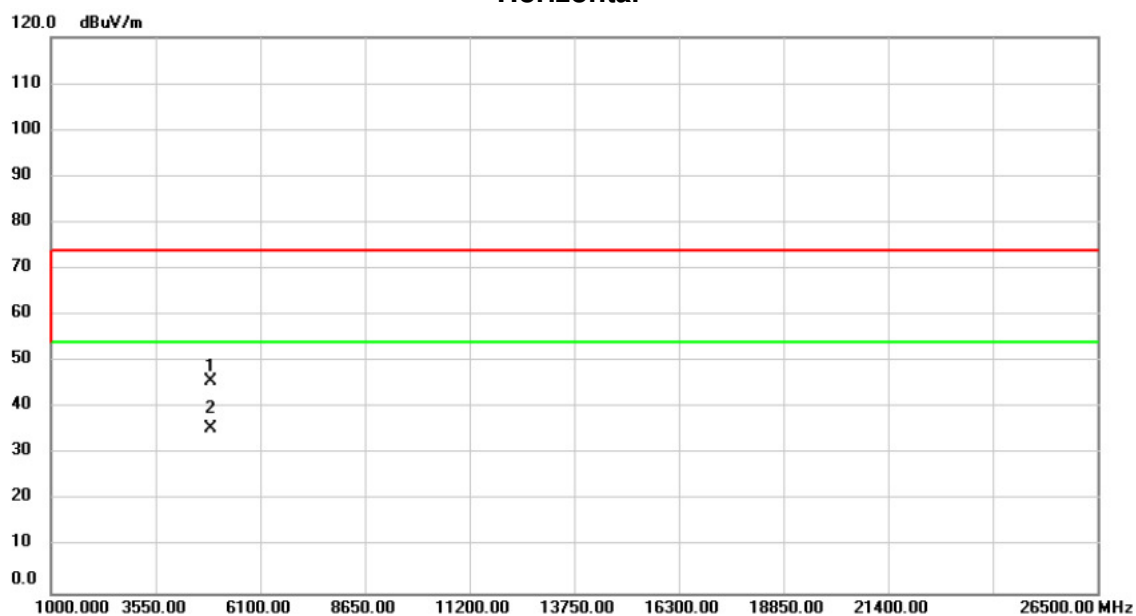
Orthogonal Axis :	X
Test Mode :	TX 2445MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2445.000	75.23	31.17	106.40	74.00	32.40	peak	293	161
2	*	2445.000	71.50	31.17	102.67	54.00	48.67	AVG	293	161

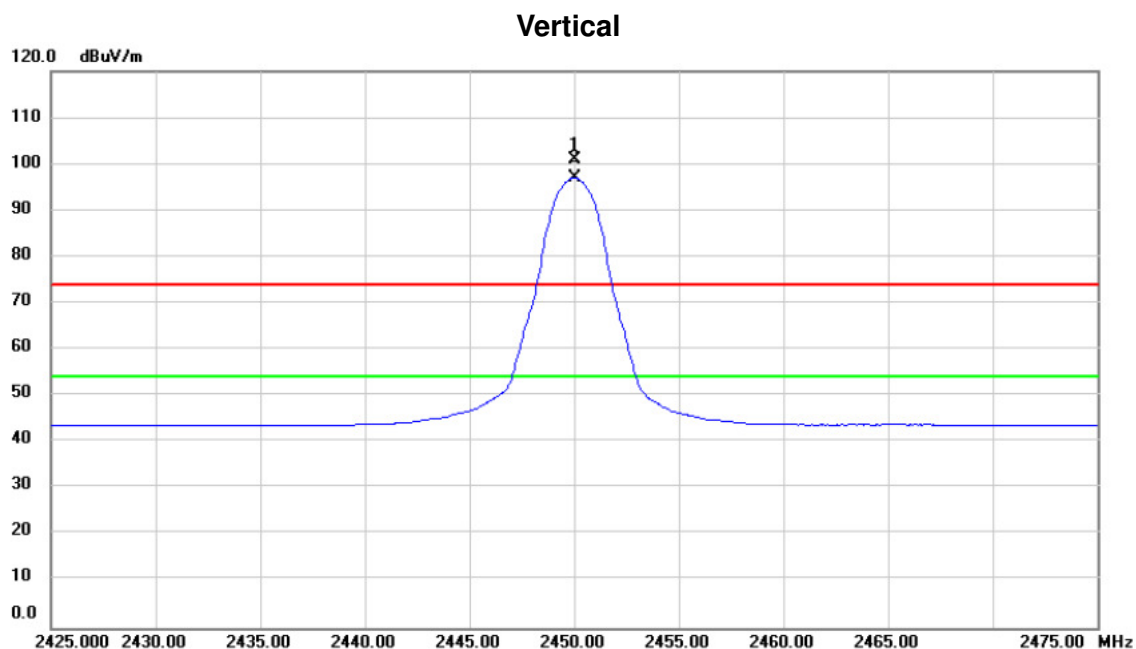
Orthogonal Axis :	X
Test Mode :	TX 2445MHz

### Horizontal



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4890.000	57.15	-11.37	45.78	74.00	-28.22	peak	100	152
2 *	4890.000	46.94	-11.37	35.57	54.00	-18.43	AVG	100	152

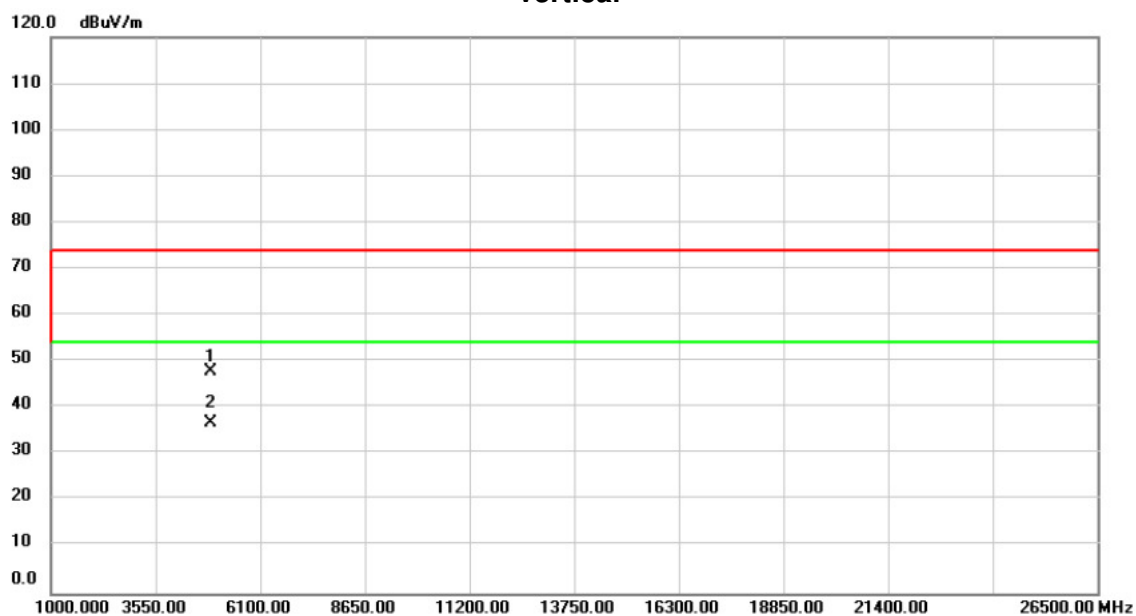
Orthogonal Axis :	X
Test Mode :	TX 2450MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2450.000	69.66	31.19	100.85	74.00	26.85	peak	102	68
2	*	2450.000	65.84	31.19	97.03	54.00	43.03	AVG	102	68

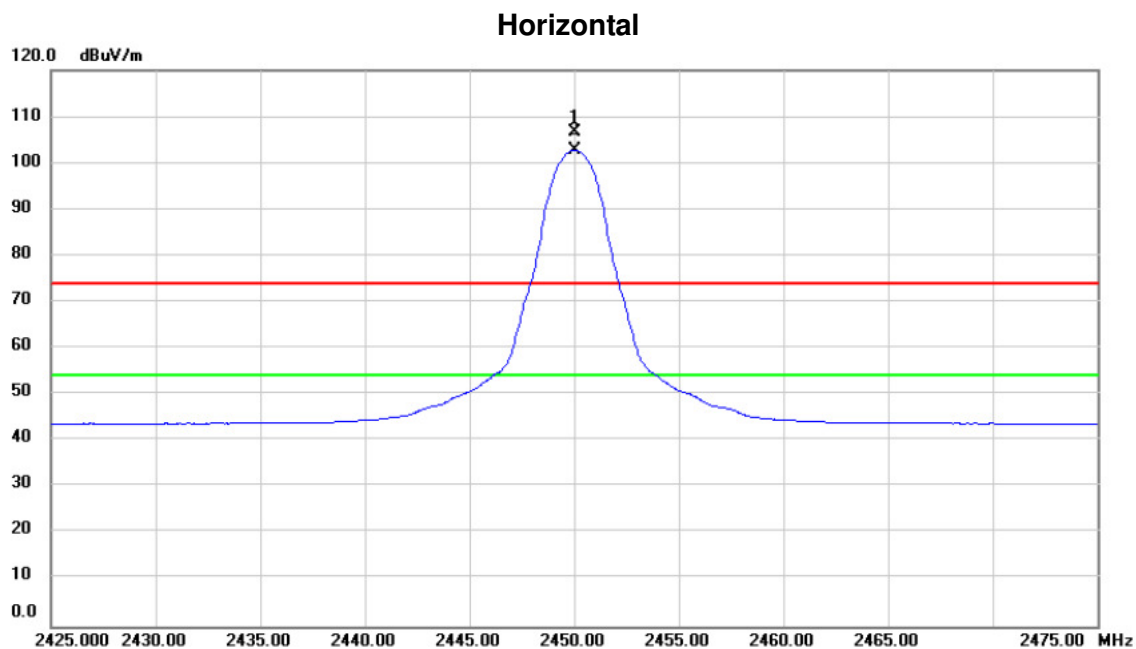
Orthogonal Axis :	X
Test Mode :	TX 2450MHz

### Vertical



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4900.000	59.09	-11.36	47.73	74.00	-26.27	peak	206	194
2 *	4900.000	48.03	-11.36	36.67	54.00	-17.33	AVG	206	194

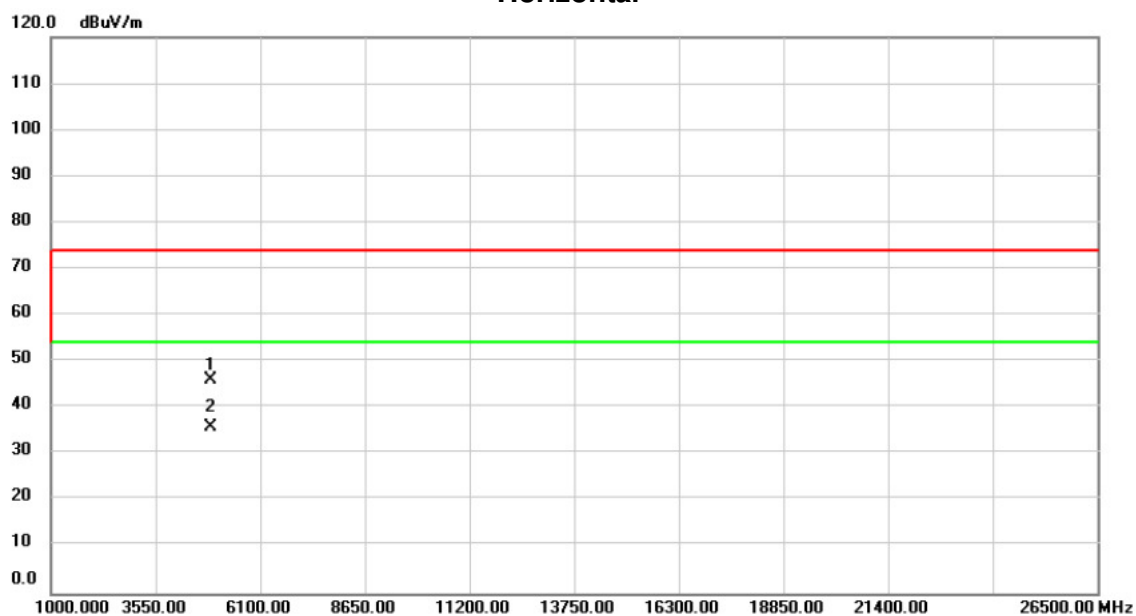
Orthogonal Axis :	X
Test Mode :	TX 2450MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2450.000	75.44	31.19	106.63	74.00	32.63	peak	109	161
2	*	2450.000	71.70	31.19	102.89	54.00	48.89	AVG	109	161

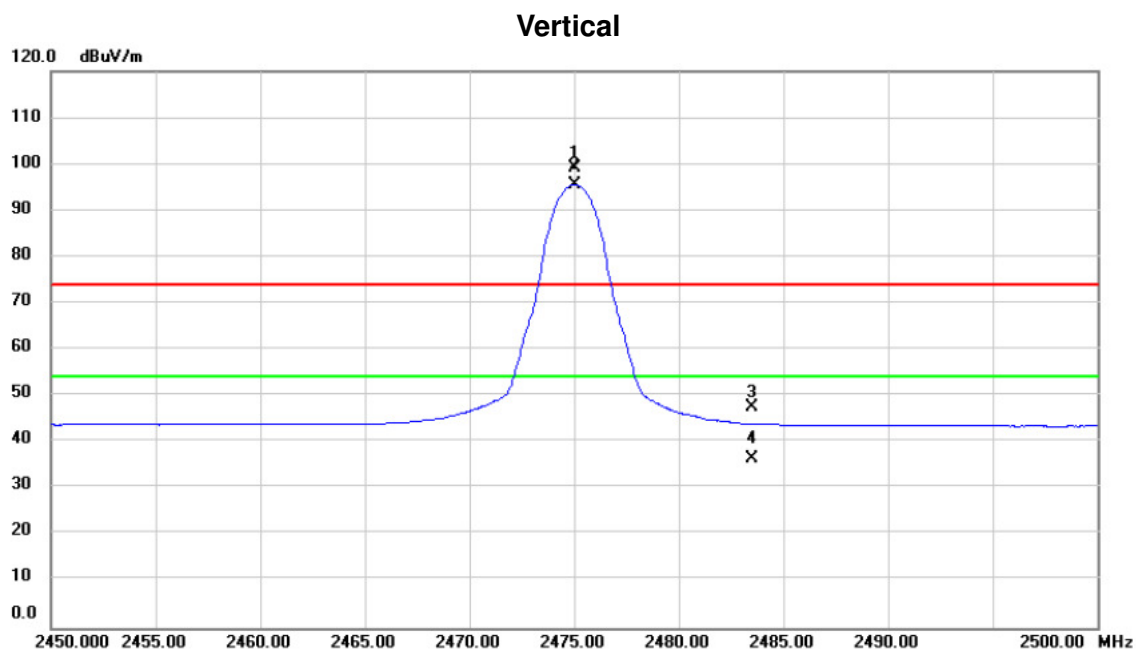
Orthogonal Axis :	X
Test Mode :	TX 2450MHz

### Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		4900.000	57.40	-11.36	46.04	74.00	-27.96	peak	100	151
2	*	4900.000	47.28	-11.36	35.92	54.00	-18.08	AVG	100	151

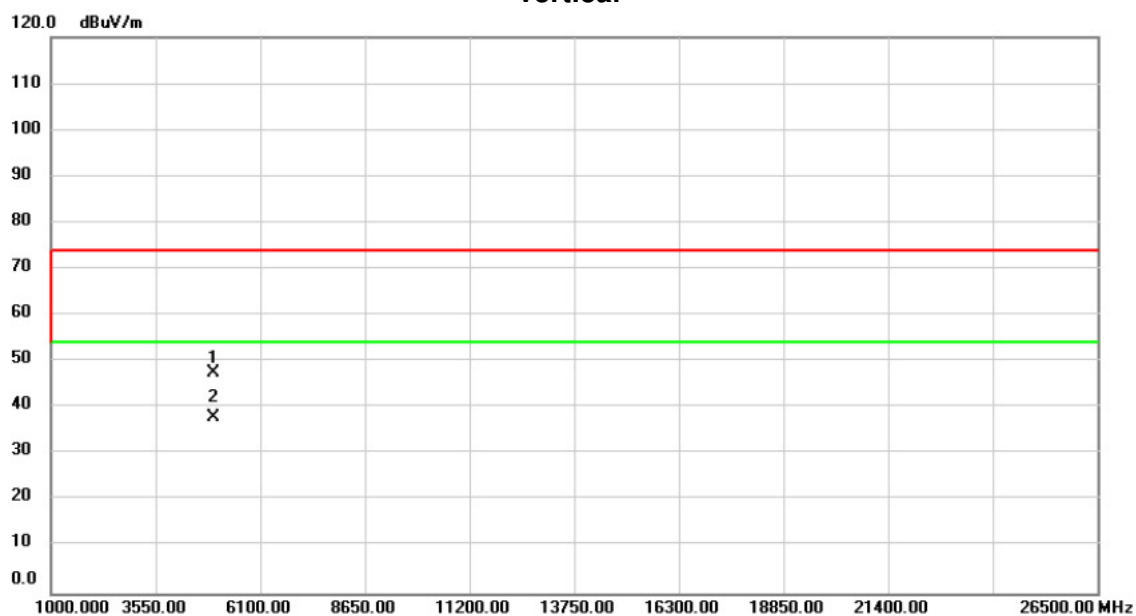
Orthogonal Axis :	X
Test Mode :	TX 2475MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	X	2475.000	68.02	31.28	99.30	74.00	25.30	peak	101	67	No Limit
2	*	2475.000	64.40	31.28	95.68	54.00	41.68	AVG	101	67	No Limit
3		2483.500	16.20	31.31	47.51	74.00	-26.49	peak	101	67	
4		2483.500	5.20	31.31	36.51	54.00	-17.49	AVG	101	67	

Orthogonal Axis :	X
Test Mode :	TX 2475MHz

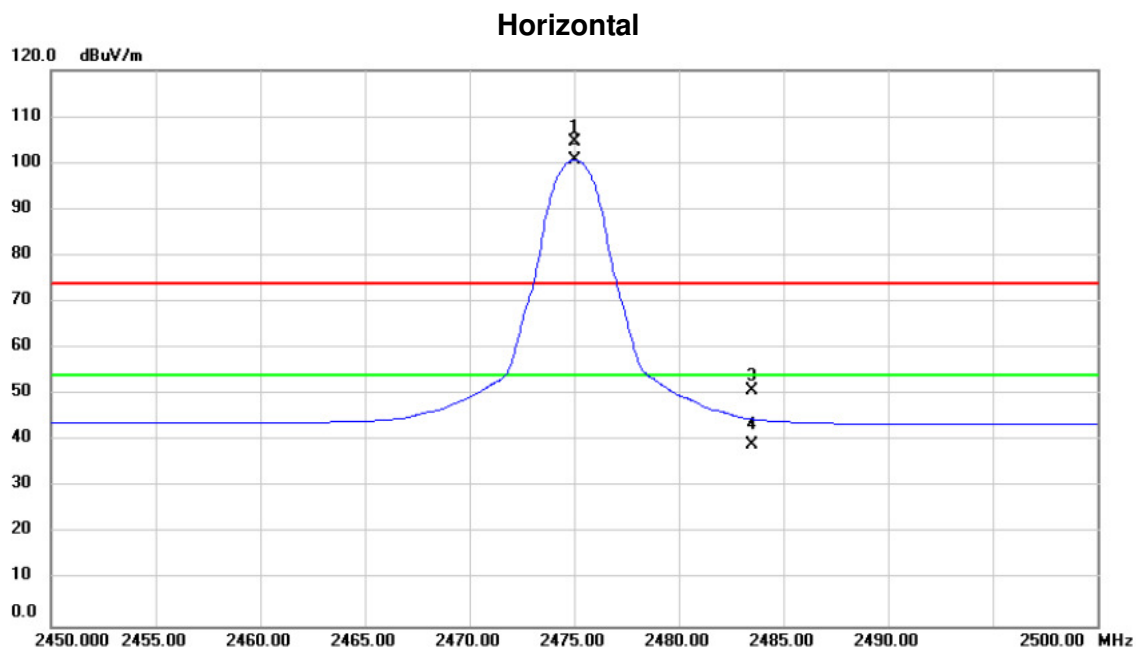
### Vertical



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4950.000	58.85	-11.27	47.58	74.00	-26.42	peak	261	97
2 *	4950.000	49.22	-11.27	37.95	54.00	-16.05	AVG	261	97



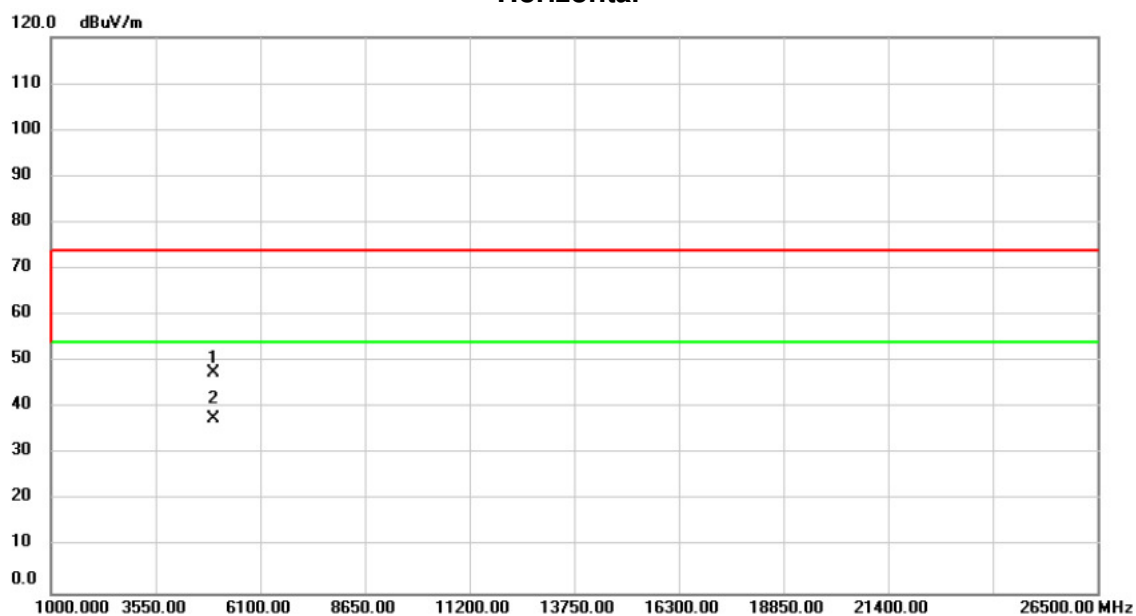
Orthogonal Axis :	X
Test Mode :	TX 2475MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2475.000	73.24	31.28	104.52	74.00	30.52	peak	328	130
2	*	2475.000	69.48	31.28	100.76	54.00	46.76	AVG	328	130
3		2483.500	19.63	31.31	50.94	74.00	-23.06	peak	328	130
4		2483.500	7.96	31.31	39.27	54.00	-14.73	AVG	328	130

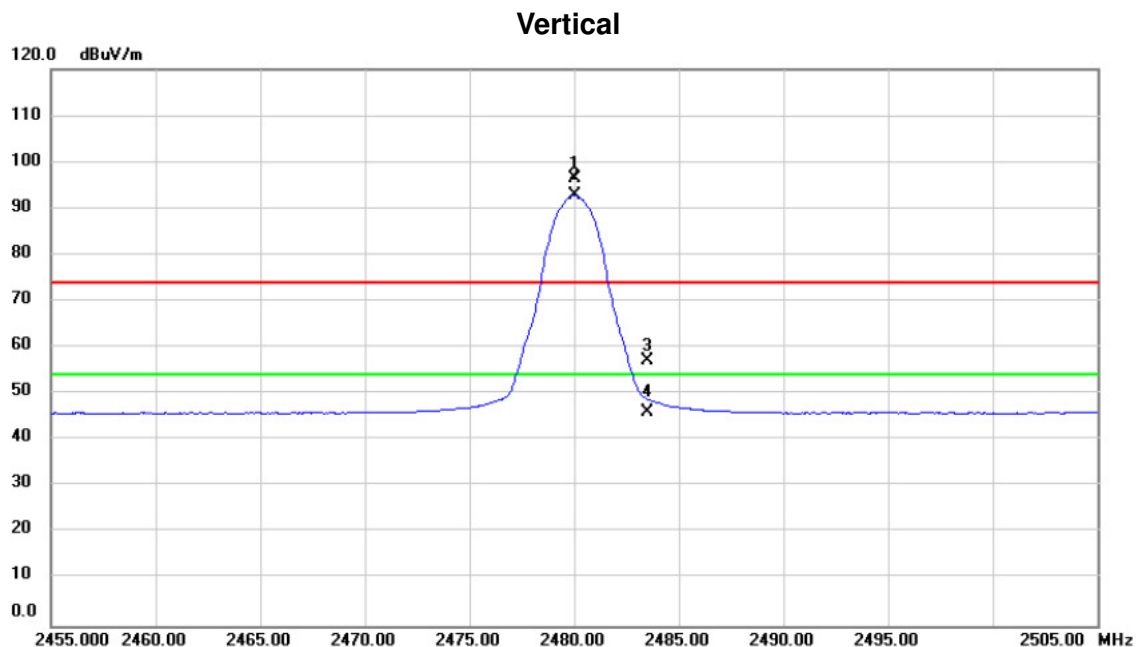
Orthogonal Axis :	X
Test Mode :	TX 2475MHz

### Horizontal



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4950.000	58.87	-11.27	47.60	74.00	-26.40	peak	110	295
2 *	4950.000	49.06	-11.27	37.79	54.00	-16.21	AVG	110	295

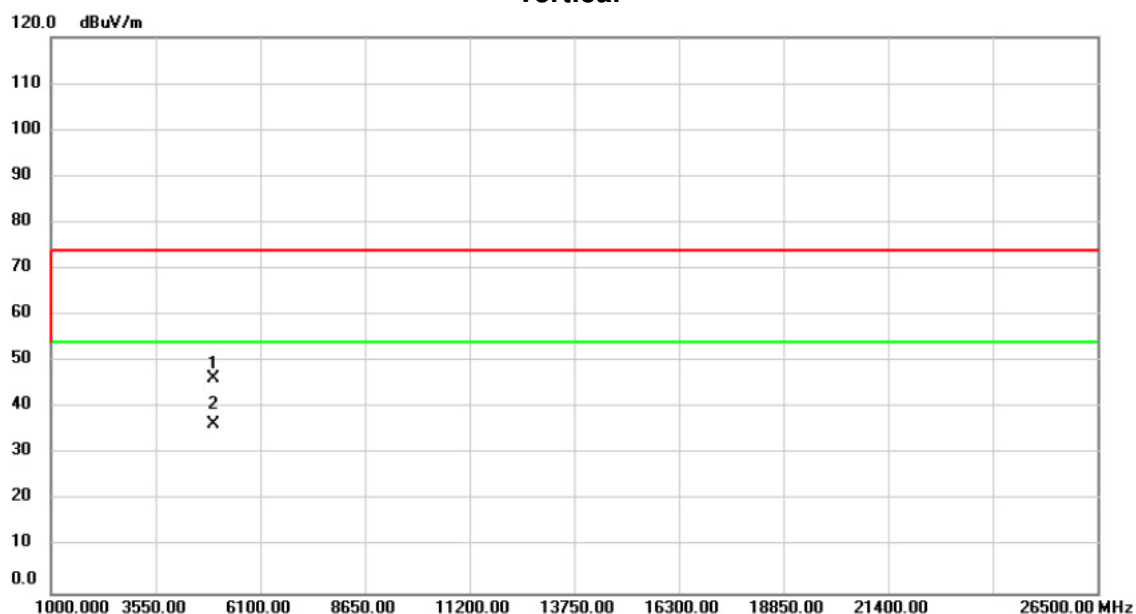
Orthogonal Axis :	X
Test Mode :	TX 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	X	2480.000	65.24	31.29	96.53	74.00	22.53	peak	100	68	No Limit
2	*	2480.000	61.47	31.29	92.76	54.00	38.76	AVG	100	68	No Limit
3		2483.500	25.96	31.31	57.27	74.00	-16.73	peak	100	68	
4		2483.500	14.62	31.31	45.93	54.00	-8.07	AVG	100	68	

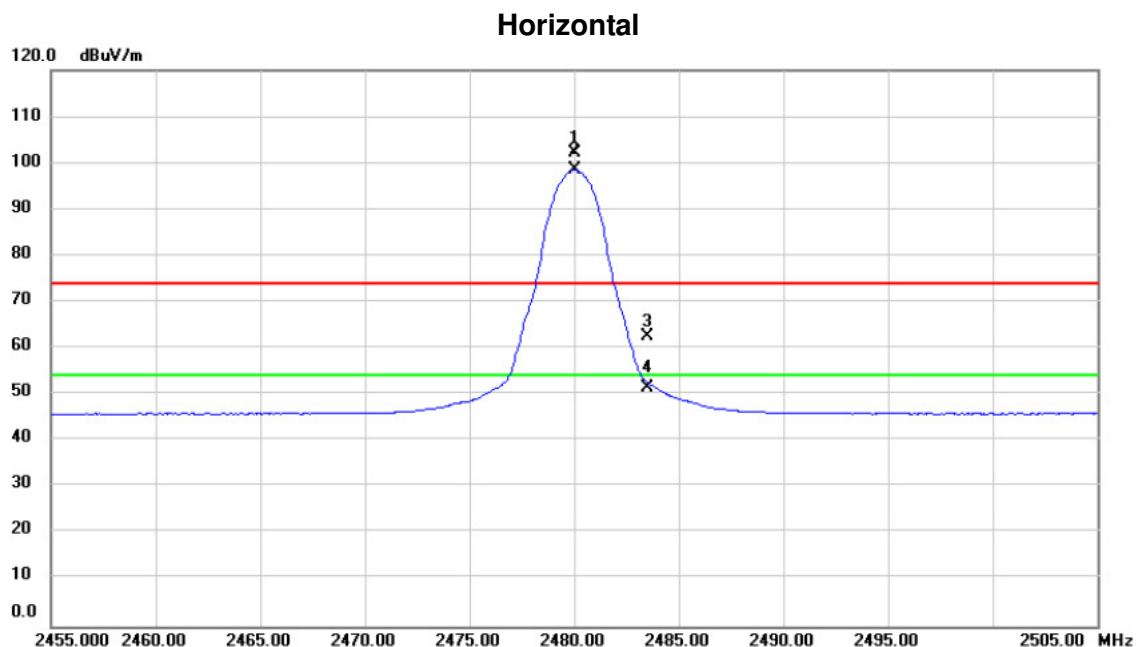
Orthogonal Axis :	X
Test Mode :	TX 2480MHz

### Vertical



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4960.000	57.74	-11.25	46.49	74.00	-27.51	peak	101	195
2 *	4960.000	47.61	-11.25	36.36	54.00	-17.64	AVG	101	195

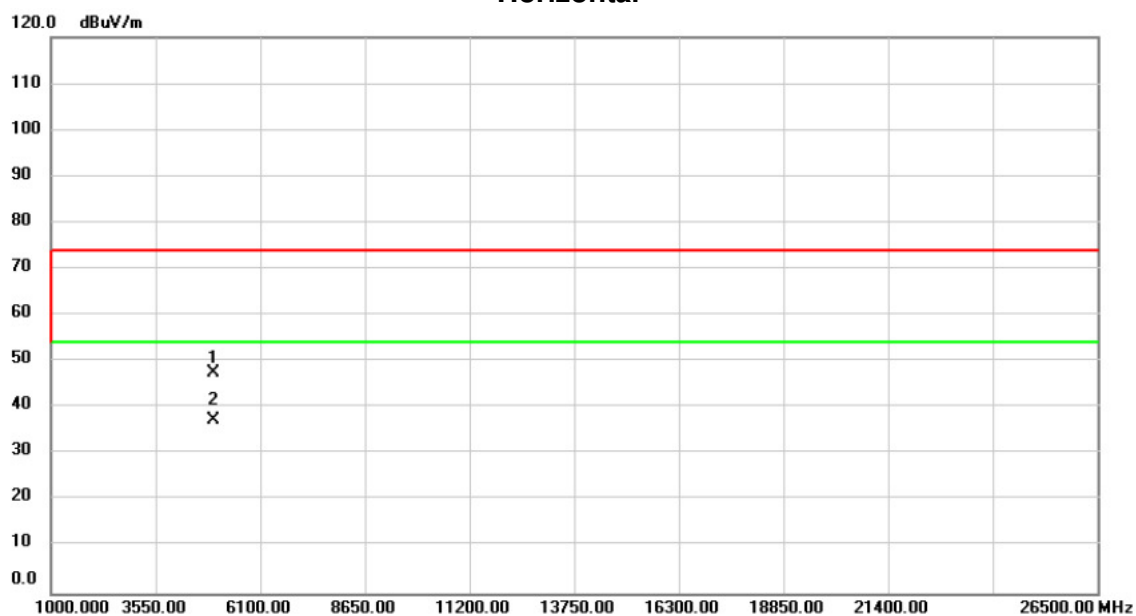
Orthogonal Axis :	X
Test Mode :	TX 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	X	2480.000	71.01	31.29	102.30	74.00	28.30	peak	323	129
2	*	2480.000	67.25	31.29	98.54	54.00	44.54	AVG	323	129
3		2483.500	31.12	31.31	62.43	74.00	-11.57	peak	323	129
4		2483.500	20.18	31.31	51.49	54.00	-2.51	AVG	323	129

Orthogonal Axis :	X
Test Mode :	TX 2480MHz

### Horizontal



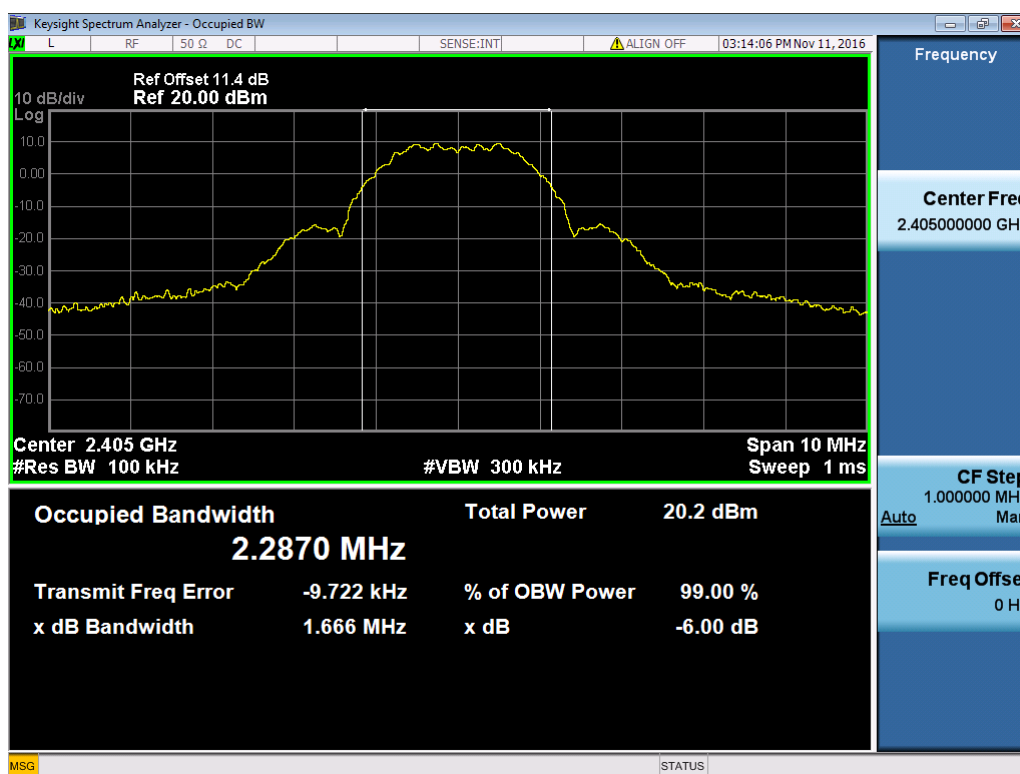
No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	4960.000	58.72	-11.25	47.47	74.00	-26.53	peak	109	150
2 *	4960.000	48.52	-11.25	37.27	54.00	-16.73	AVG	109	150

## ATTACHMENT E - BANDWIDTH

Test Mode :	TX Mode
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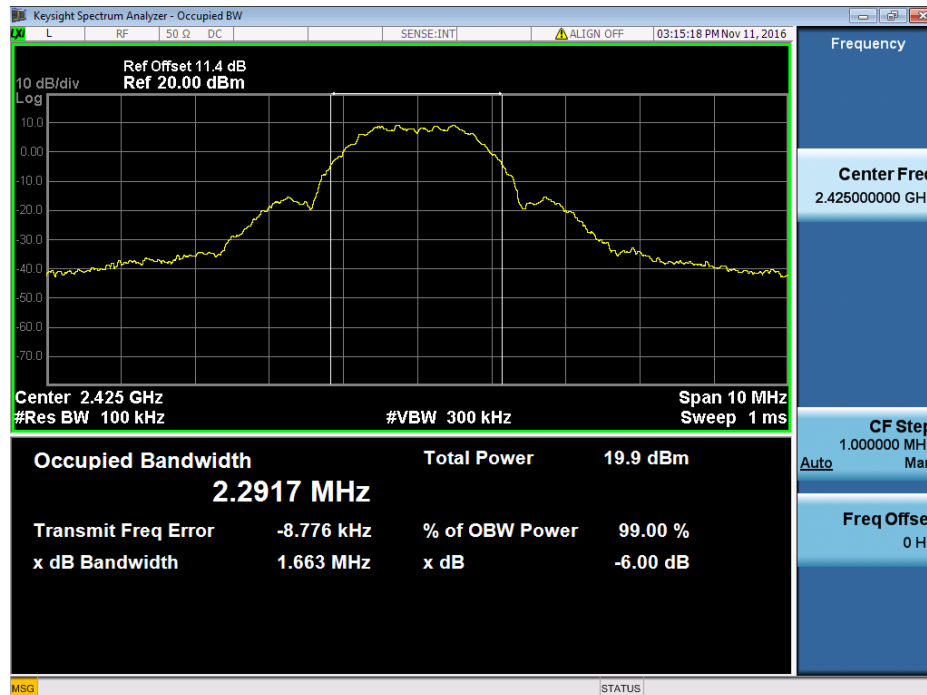
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)
2405	1.66	2.29	500
2425	1.66	2.29	500
2440	1.66	2.30	500
2445	1.66	2.30	500
2450	1.65	2.30	500
2475	1.66	2.31	500
2480	1.67	2.30	500

### 2405MHz

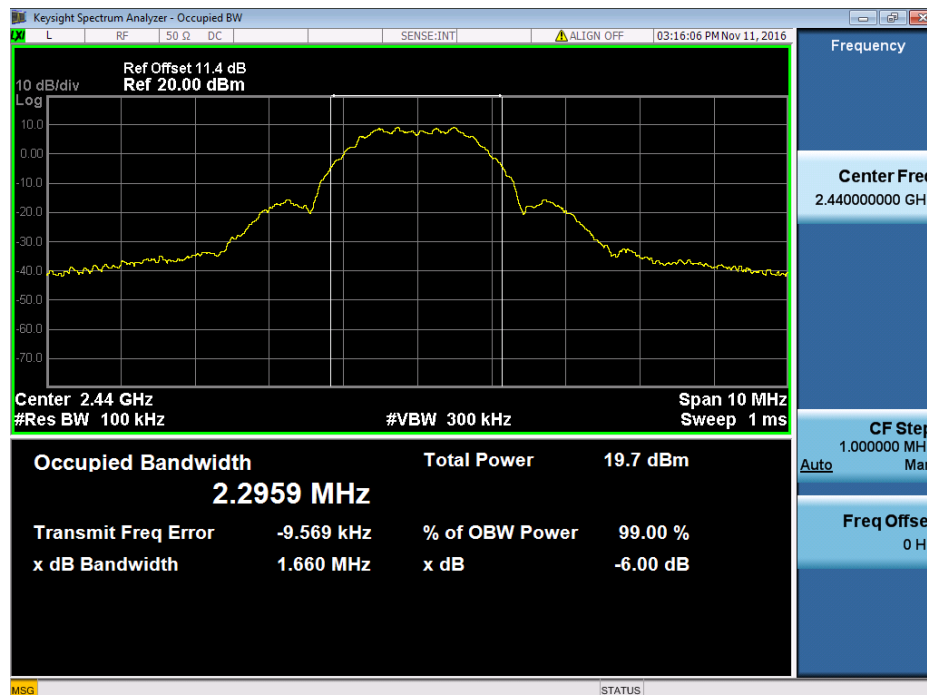




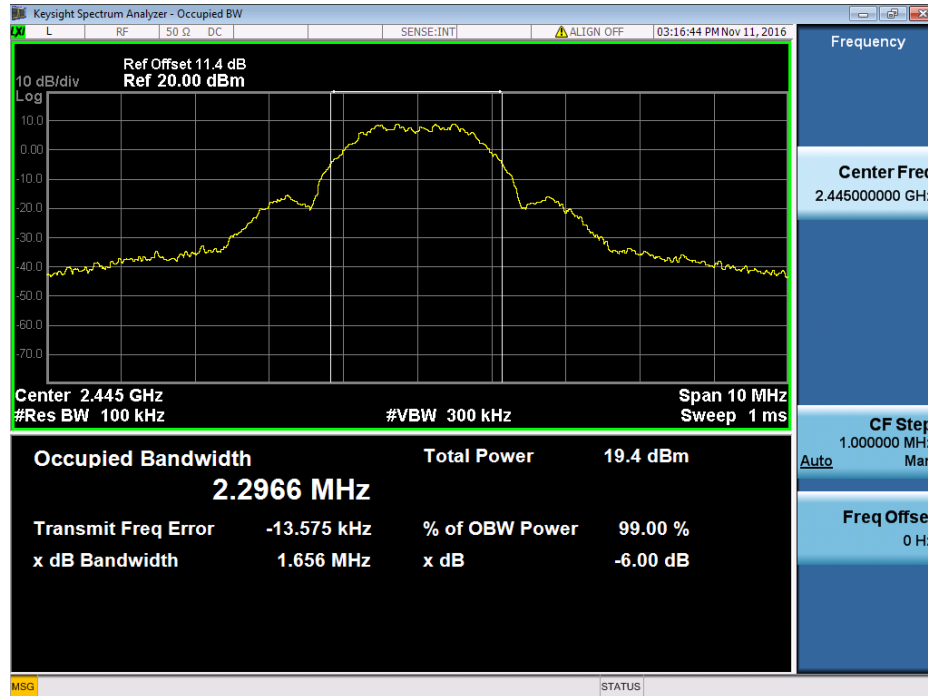
## 2425MHz



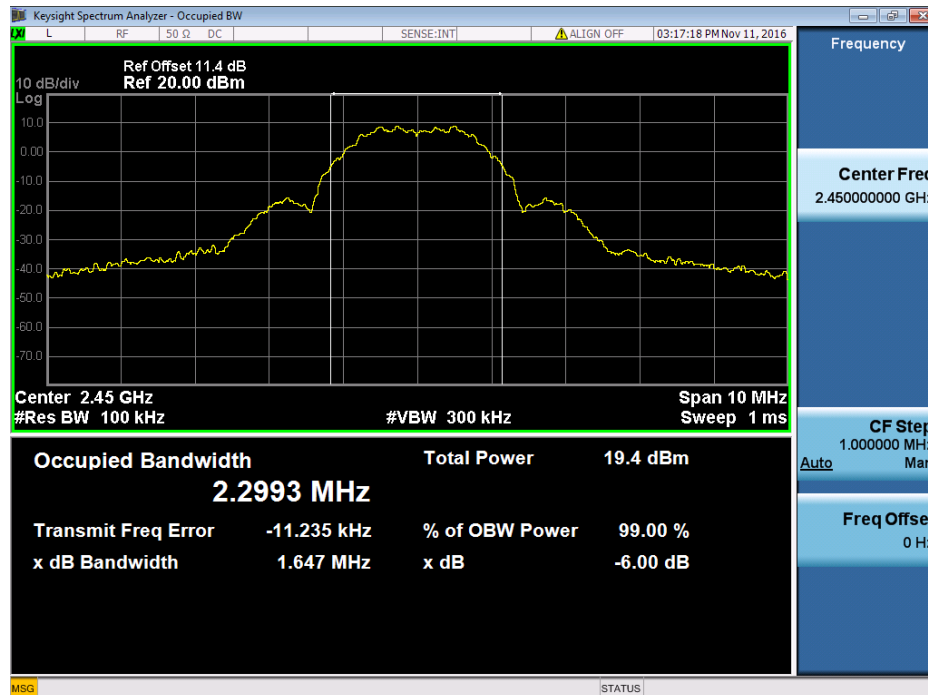
## 2440MHz



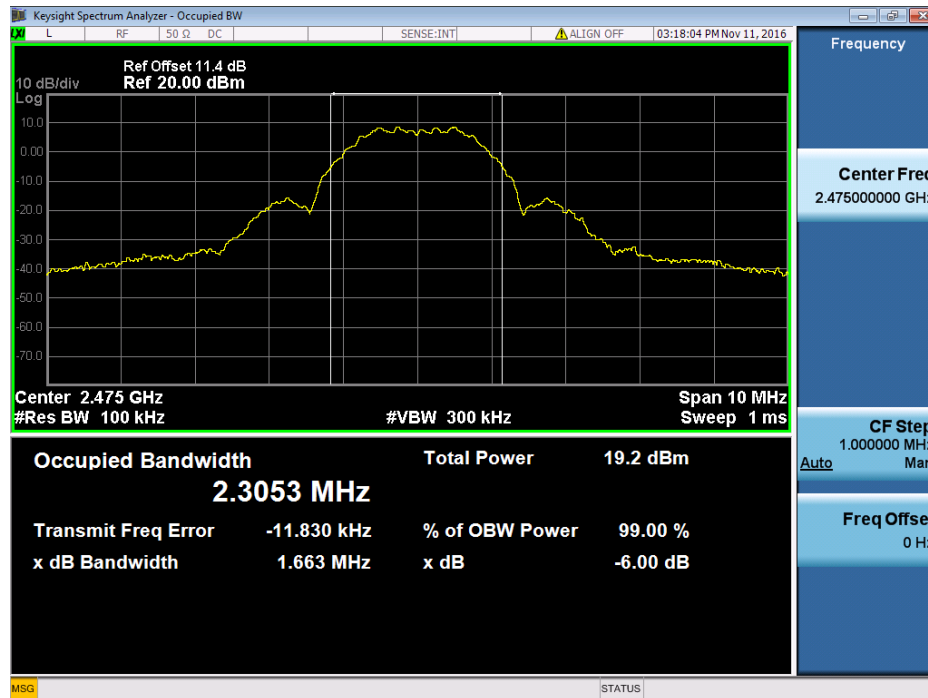
## 2445MHz



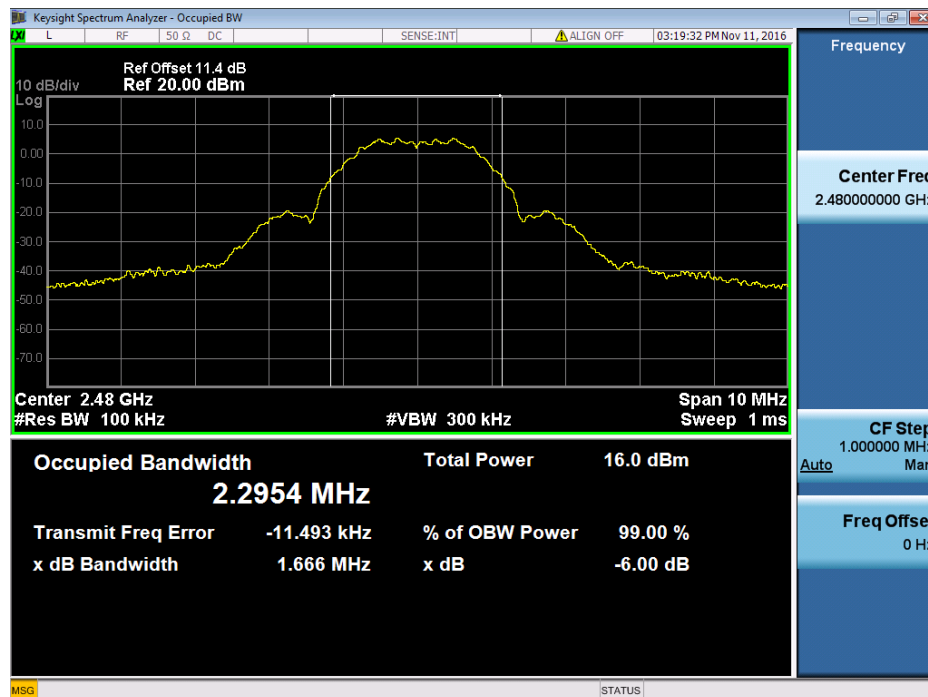
## 2450MHz



## 2475MHz



## 2480MHz



## ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

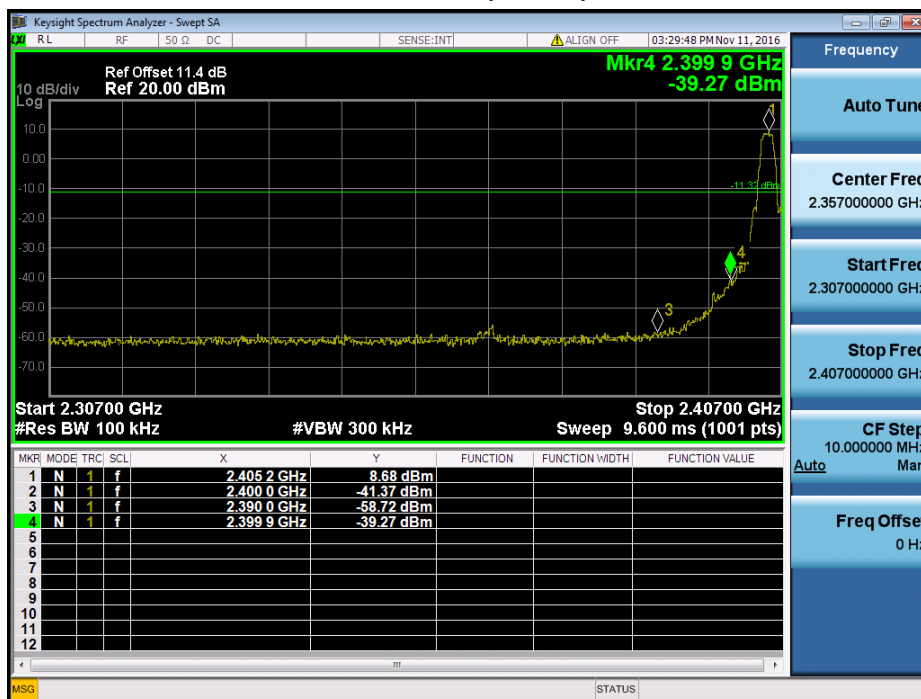
Test Mode :	TX Mode
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)
2405	12.87	0.0194	30.00	1.00
2425	12.62	0.0183	30.00	1.00
2440	12.35	0.0172	30.00	1.00
2445	12.32	0.0171	30.00	1.00
2450	12.30	0.0170	30.00	1.00
2475	12.50	0.0178	30.00	1.00
2480	9.02	0.0080	30.00	1.00

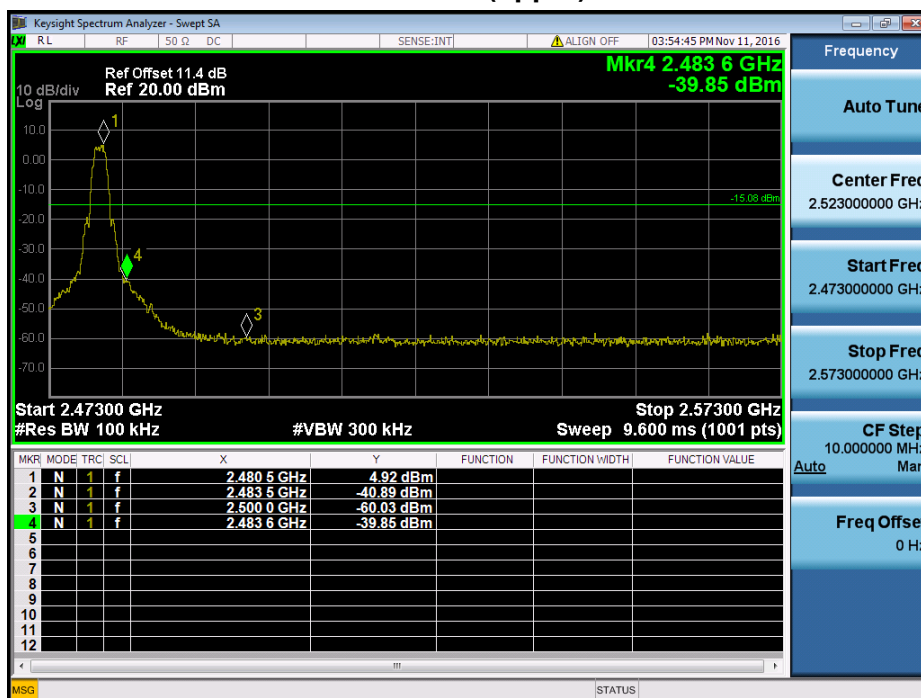
## **ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION**

Test Mode : TX Mode

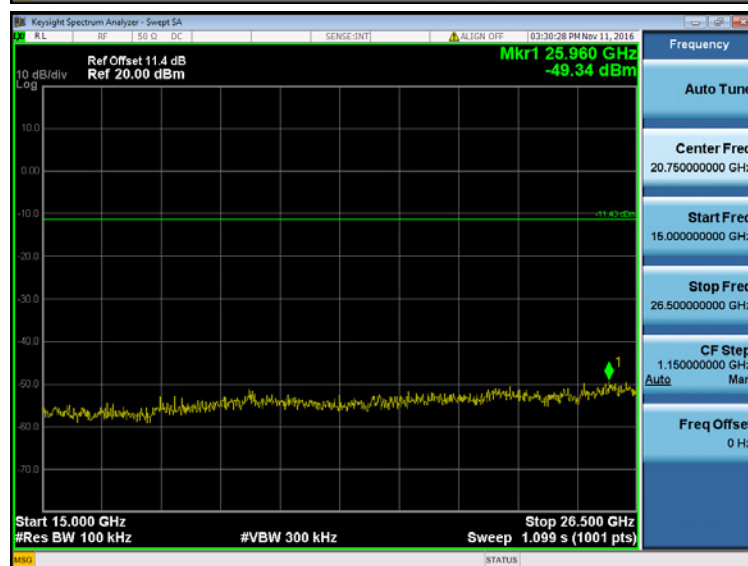
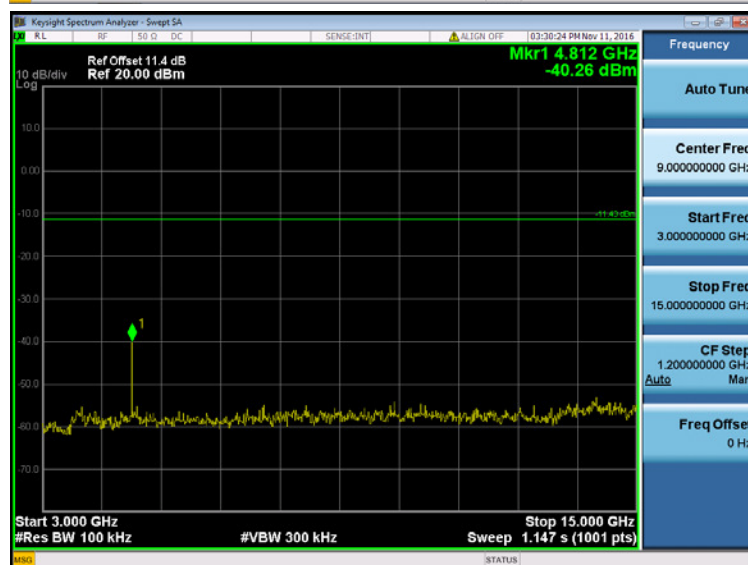
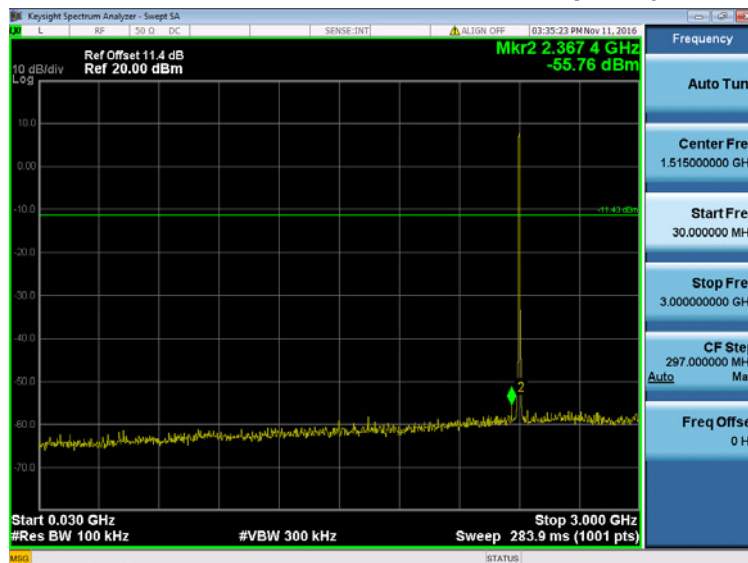
### 2405MHz (Lower)



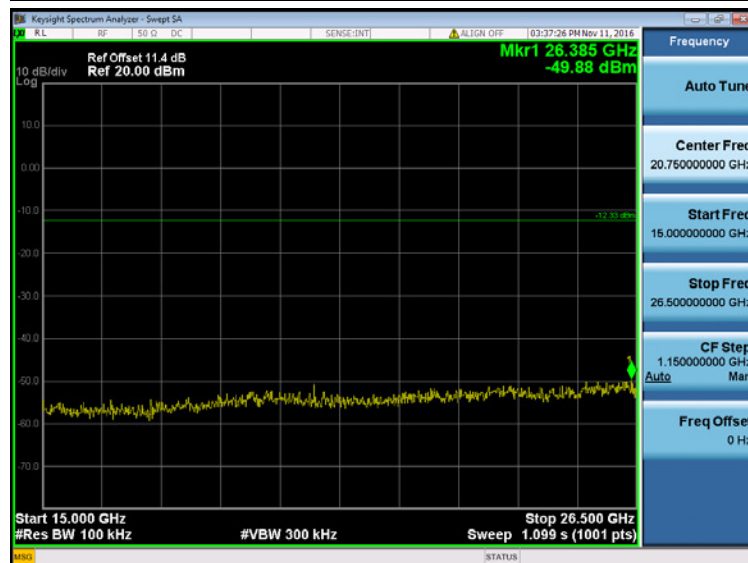
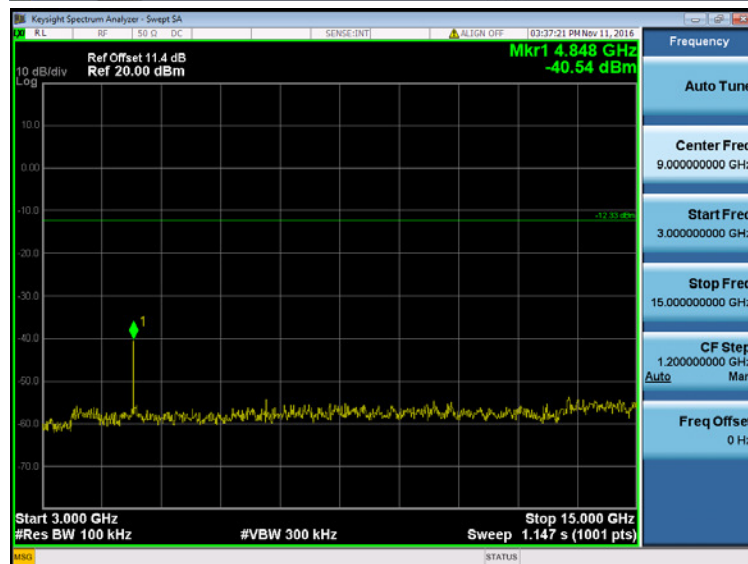
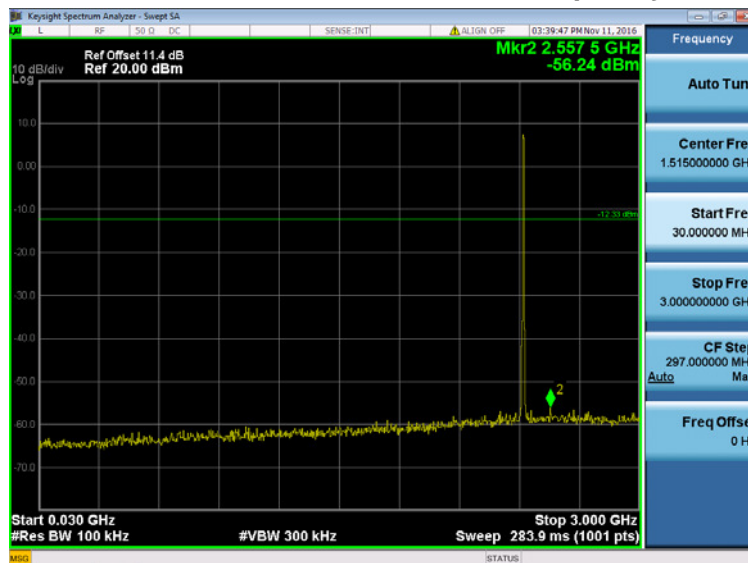
### 2480MHz (upper)



## 2405MHz (10<sup>th</sup> Harmonic of the frequency)

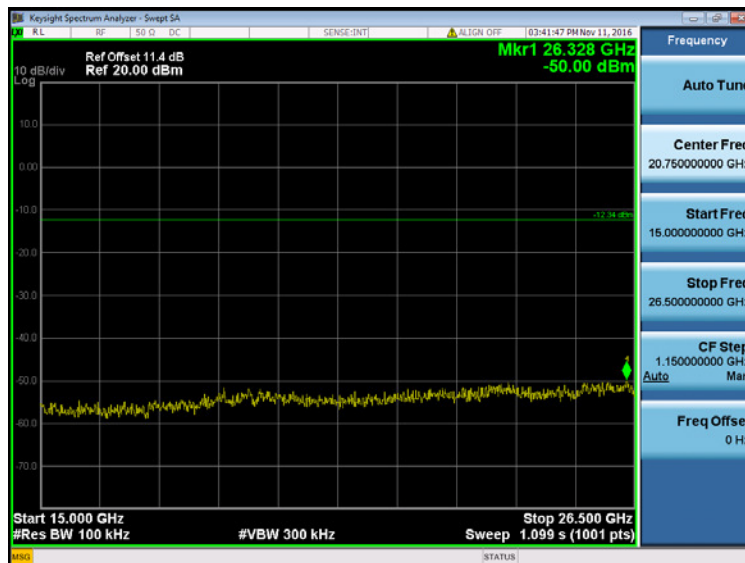
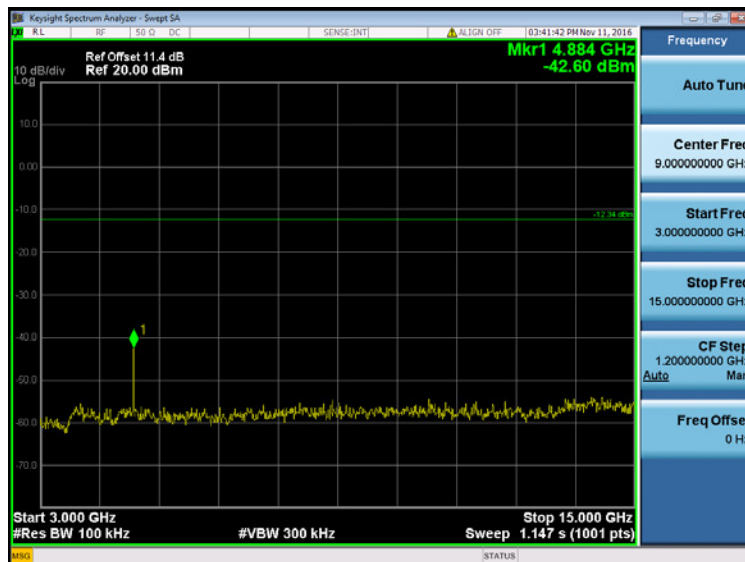
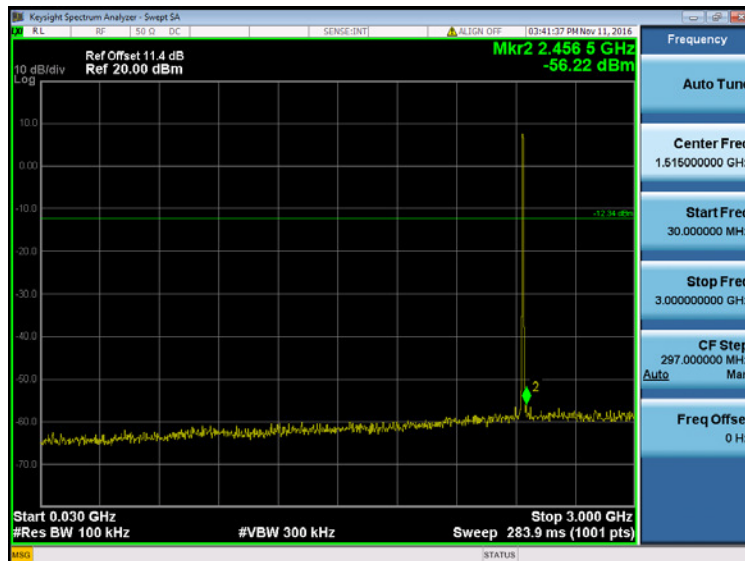


### 2425MHz (10<sup>th</sup> Harmonic of the frequency)

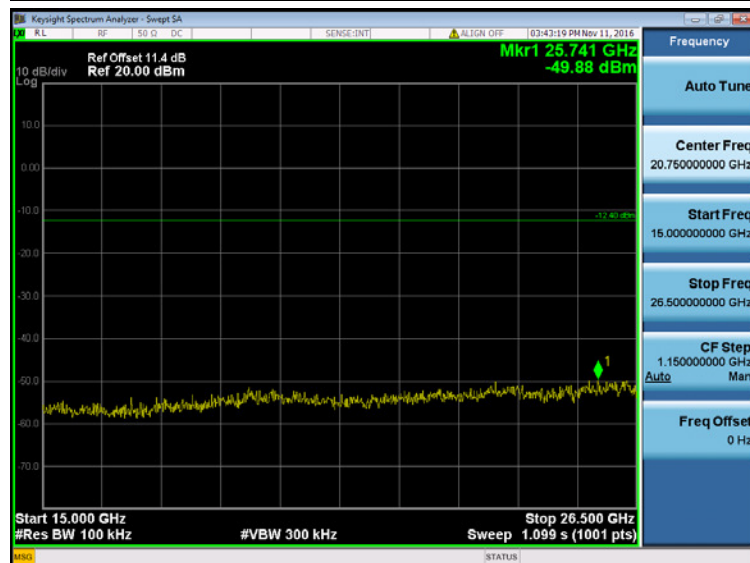
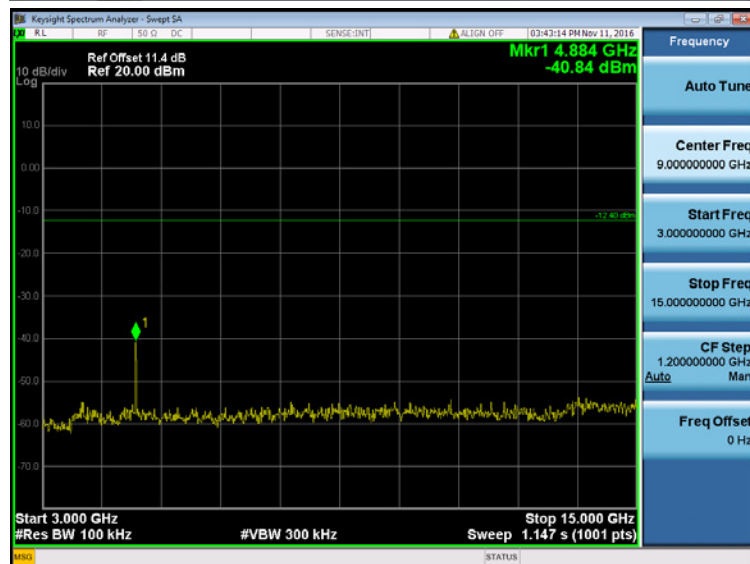
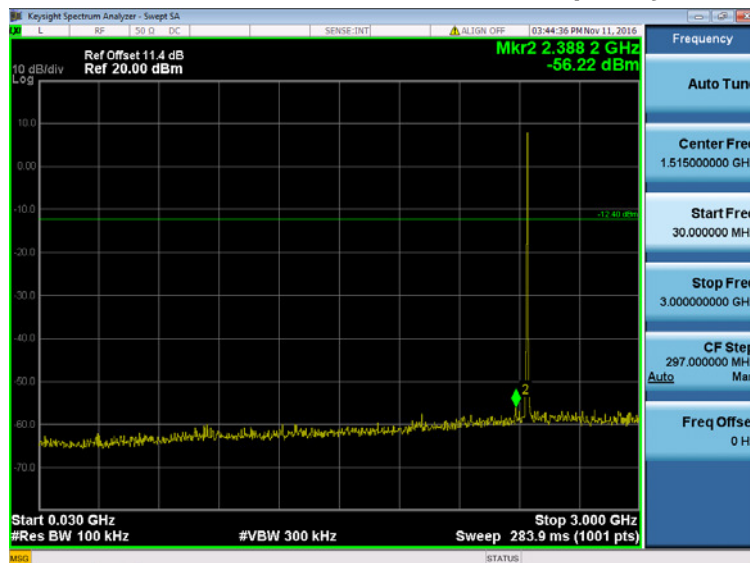




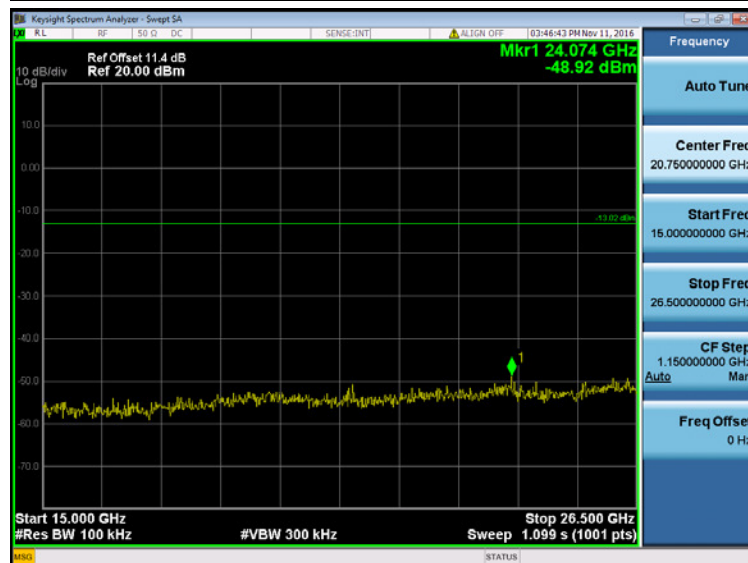
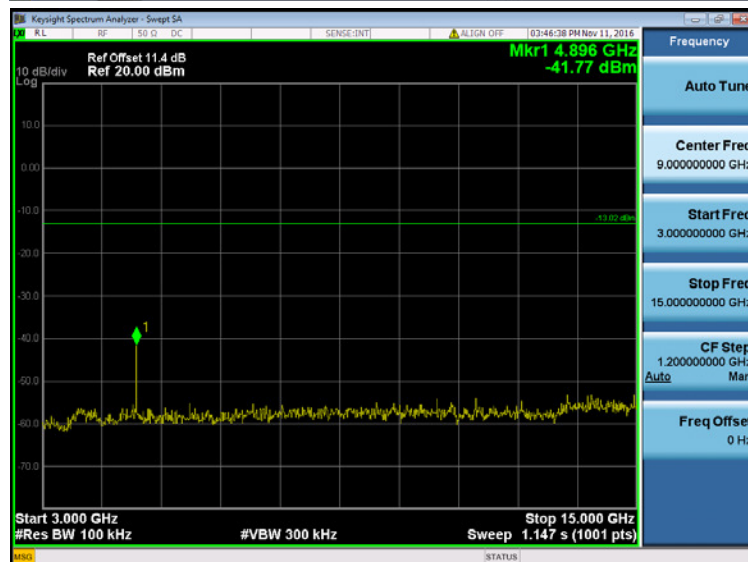
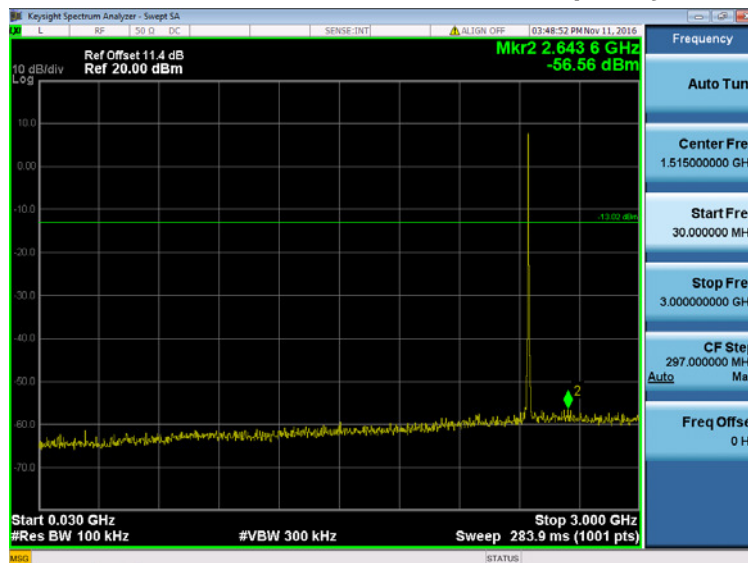
### 2440MHz (10<sup>th</sup> Harmonic of the frequency)



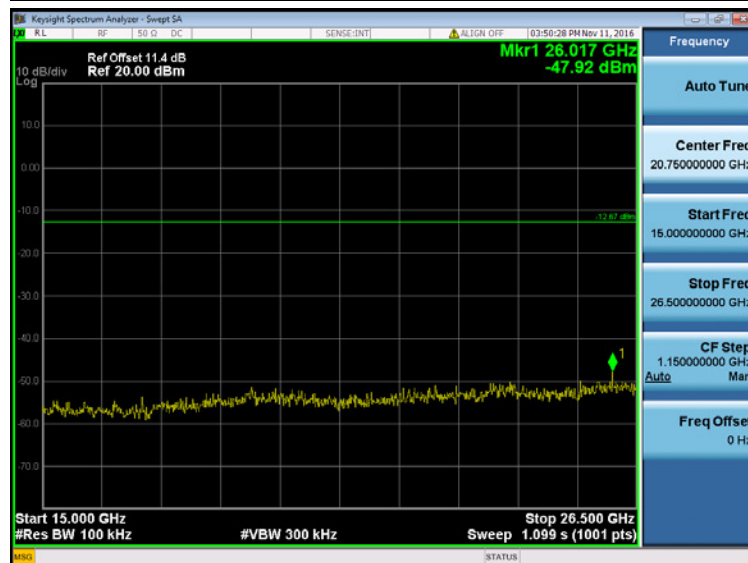
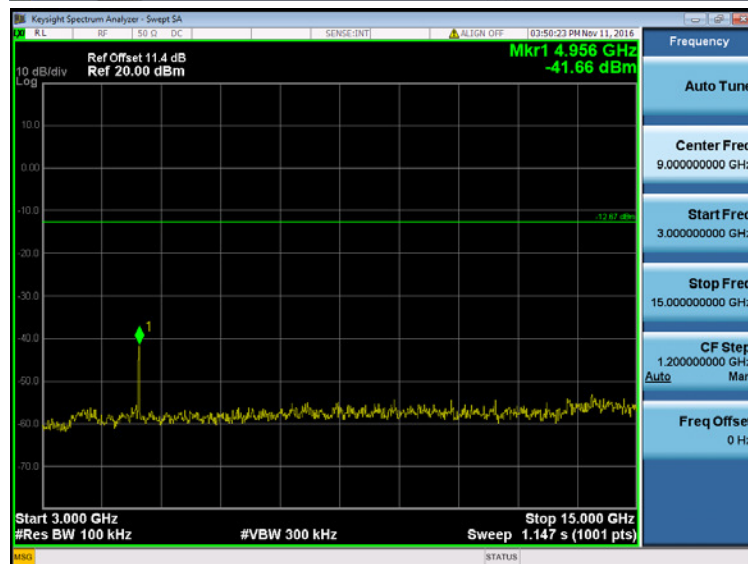
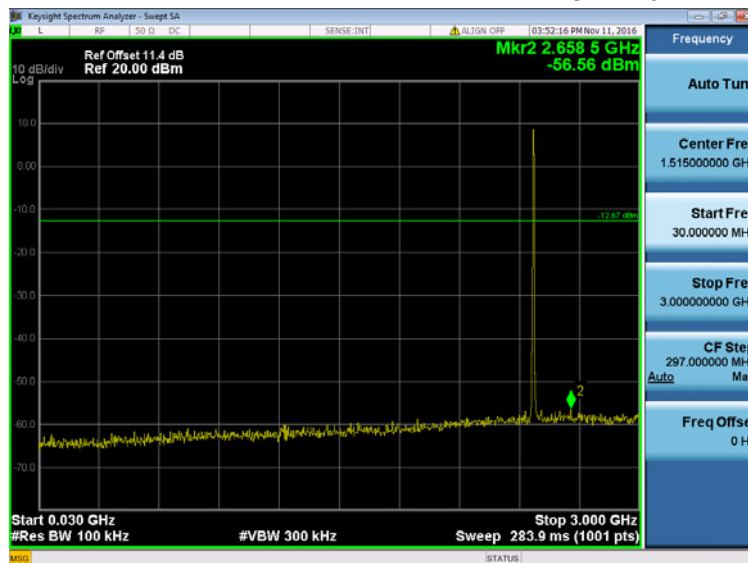
### 2445MHz (10<sup>th</sup> Harmonic of the frequency)



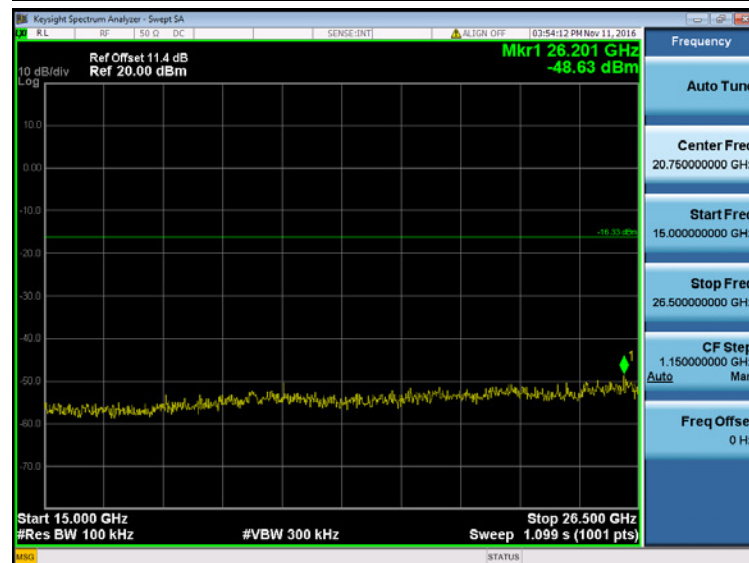
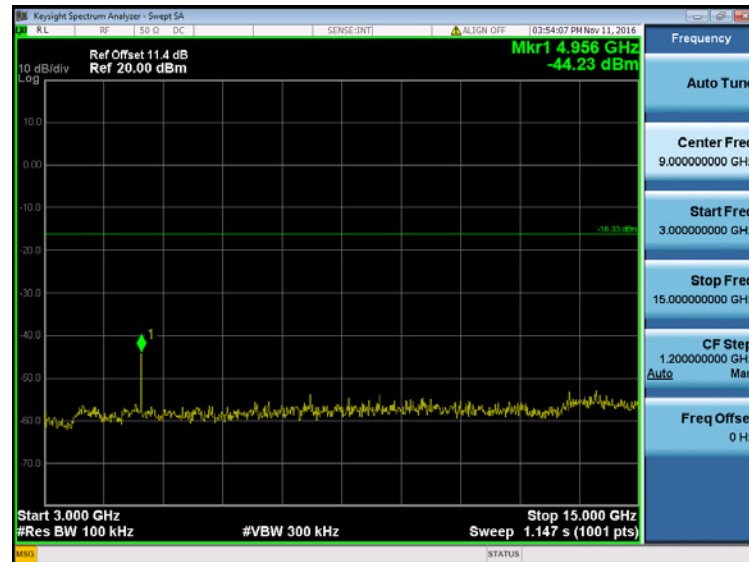
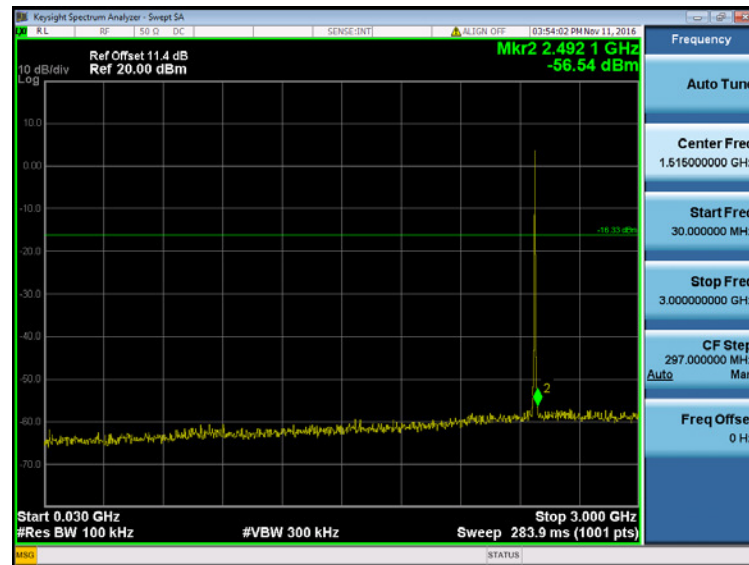
### 2450MHz (10<sup>th</sup> Harmonic of the frequency)



### 2475MHz (10<sup>th</sup> Harmonic of the frequency)



## 2480MHz (10<sup>th</sup> Harmonic of the frequency)

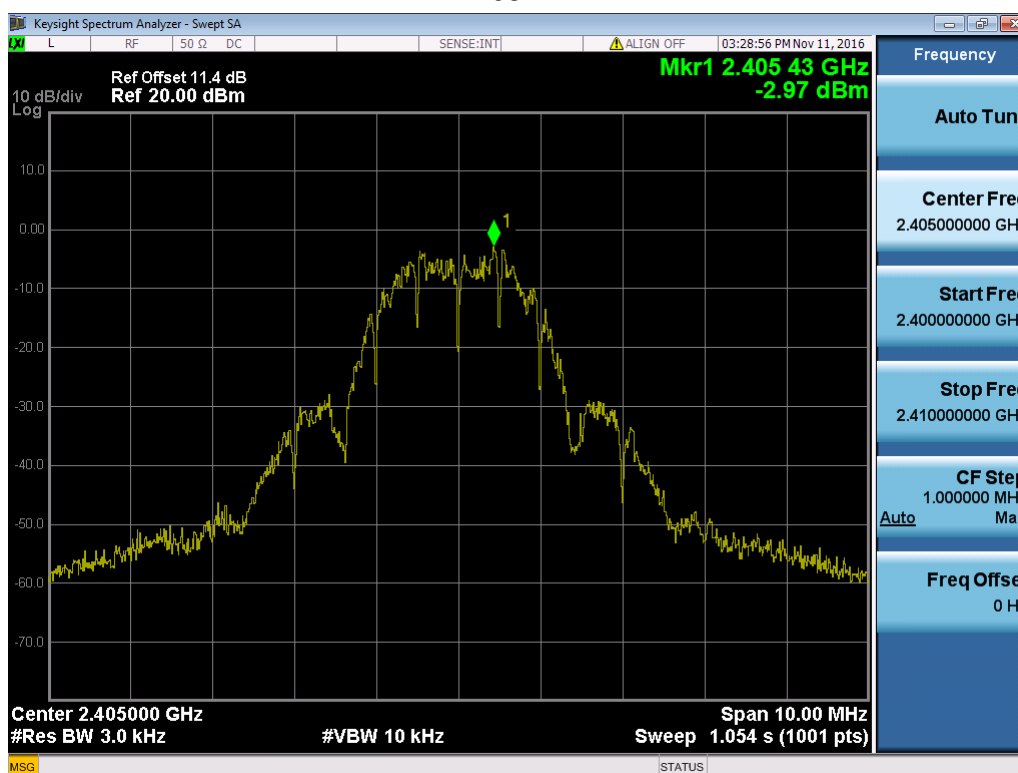


## ATTACHMENT H - POWER SPECTRAL DENSITY TEST

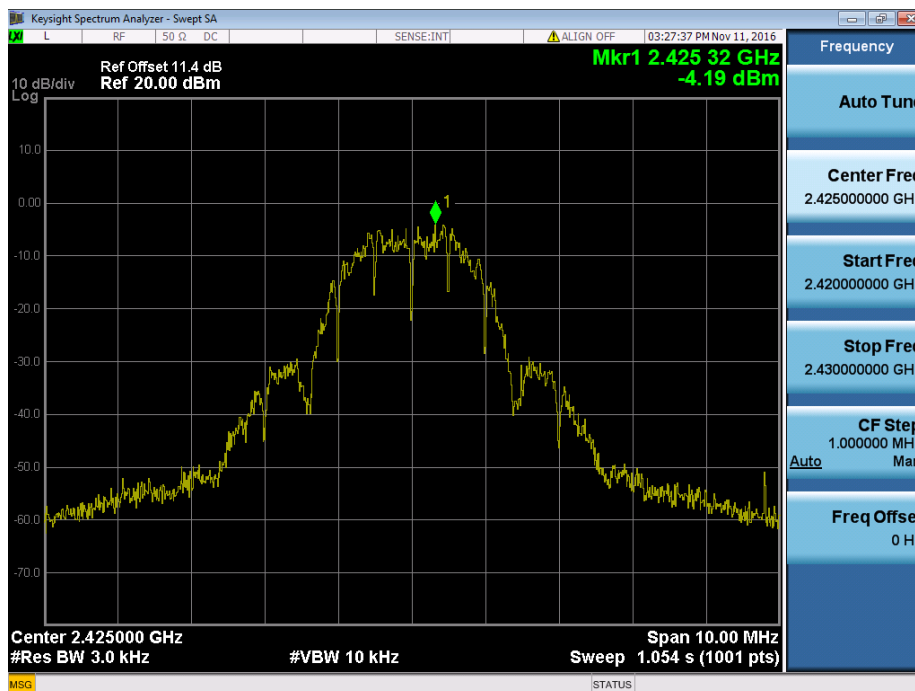
Test Mode :	TX Mode
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Frequency (MHz)	Power Density (dBm)	Max. Limit (dBm)
2405	-2.97	8
2425	-4.19	8
2440	-4.26	8
2445	-4.47	8
2450	-4.16	8
2475	-3.87	8
2480	-6.39	8

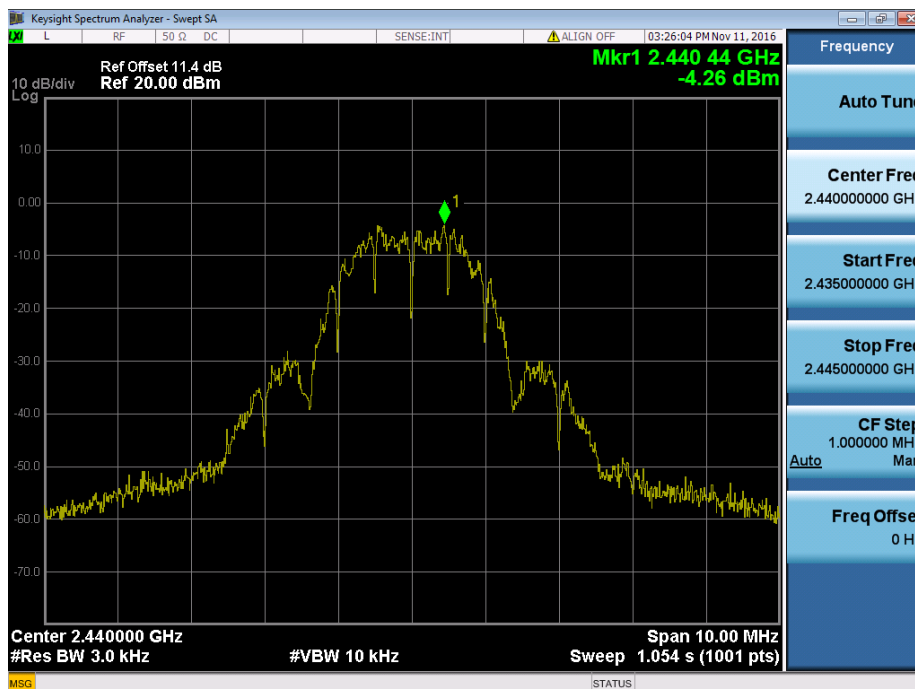
### 2405MHz



## 2425MHz

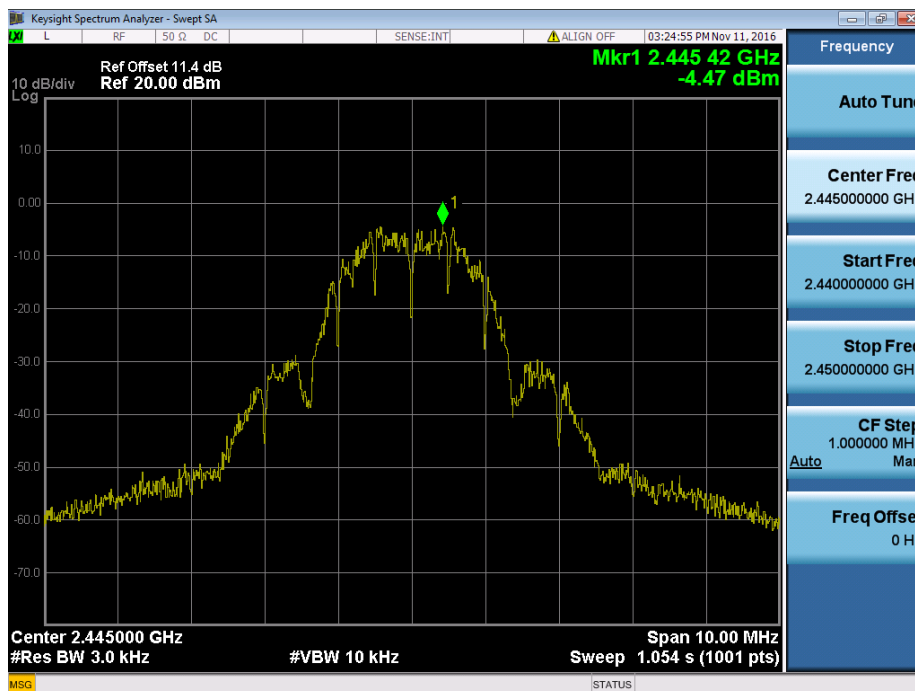


## 2440MHz

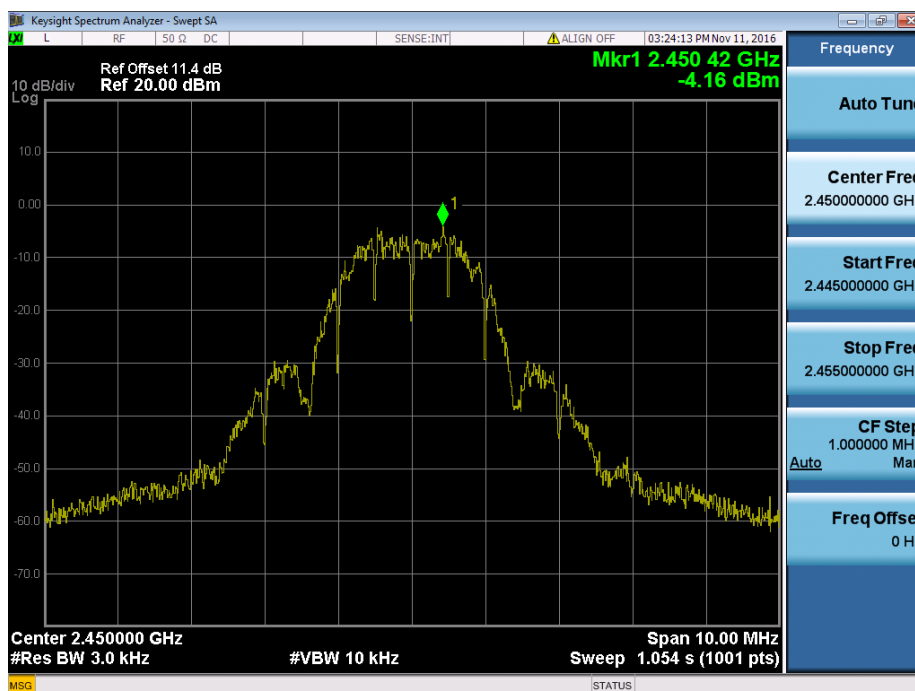




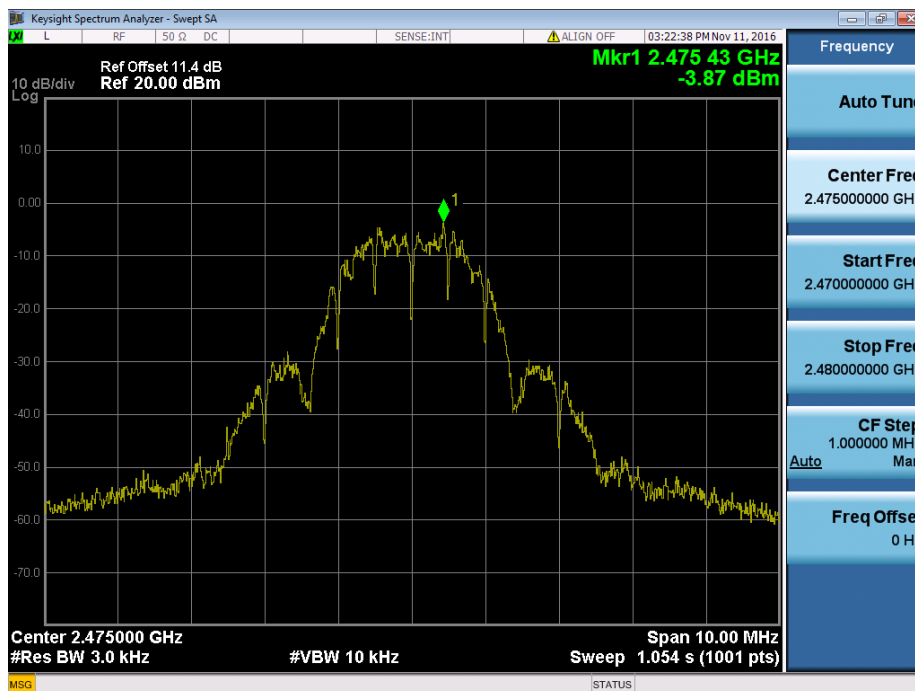
## 2445MHz



## 2450MHz



## 2475MHz



## 2480MHz

