

# FCC Radio Test Report

## FCC ID: 2AKAZ-LK310

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

**Project No.** : 1610247  
**Equipment** : Smart Lock  
**Model Name** : LK 310  
**Applicant** : Brainchild Electronic Co., Ltd.  
**Address** : No. 209, Chung Yang Rd. Nan Kang Dist. Taipei,  
Taiwan, R.O.C. 11573

**Date of Receipt** : Oct. 27, 2016  
**Date of Test** : Oct. 27, 2016 ~ Nov. 30, 2016  
**Issued Date** : Dec. 01, 2016  
**Tested by** : BTL Inc.

**Testing Engineer** : Rush Kao  
(Rush Kao)

**Technical Manager** : Jeff Yang  
(Jeff Yang)

**Authorized Signatory** : Andy Chiu  
(Andy Chiu)

### B T L I N C .

B1, No.37, Lane 365, Yang Guang St.,  
Nei-Hu District, Taipei City 114, Taiwan.

TEL:+886-2-2657-3299 FAX: +886-2- 2657-3331

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## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

**Table of Contents**

	<b>Page</b>
<b>1 . CERTIFICATION</b>	<b>6</b>
<b>2 . SUMMARY OF TEST RESULTS</b>	<b>7</b>
<b>2.1 TEST FACILITY</b>	<b>7</b>
<b>2.2 MEASUREMENT UNCERTAINTY</b>	<b>8</b>
<b>3 . GENERAL INFORMATION</b>	<b>9</b>
<b>3.1 GENERAL DESCRIPTION OF EUT</b>	<b>9</b>
<b>3.2 DESCRIPTION OF TEST MODES</b>	<b>11</b>
<b>3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING</b>	<b>11</b>
<b>3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED</b>	<b>12</b>
<b>3.5 DESCRIPTION OF SUPPORT UNITS</b>	<b>12</b>
<b>4 . EMC EMISSION TEST</b>	<b>13</b>
<b>4.1 CONDUCTED EMISSION MEASUREMENT</b>	<b>13</b>
<b>4.1.1 POWER LINE CONDUCTED EMISSION LIMITS</b>	<b>13</b>
<b>4.1.2 TEST PROCEDURE</b>	<b>13</b>
<b>4.1.3 DEVIATION FROM TEST STANDARD</b>	<b>13</b>
<b>4.1.4 TEST SETUP</b>	<b>14</b>
<b>4.1.5 EUT OPERATING CONDITIONS</b>	<b>14</b>
<b>4.1.6 EUT TEST CONDITIONS</b>	<b>14</b>
<b>4.1.7 TEST RESULTS</b>	<b>14</b>
<b>4.2 RADIATED EMISSION MEASUREMENT</b>	<b>15</b>
<b>4.2.1 RADIATED EMISSION LIMITS</b>	<b>15</b>
<b>4.2.2 TEST PROCEDURE</b>	<b>16</b>
<b>4.2.3 DEVIATION FROM TEST STANDARD</b>	<b>16</b>
<b>4.2.4 TEST SETUP</b>	<b>17</b>
<b>4.2.5 EUT OPERATING CONDITIONS</b>	<b>18</b>
<b>4.2.6 EUT TEST CONDITIONS</b>	<b>18</b>
<b>4.2.7 TEST RESULTS (9KHZ TO 30MHZ)</b>	<b>18</b>
<b>4.2.8 TEST RESULTS (30MHZ TO 1000 MHZ)</b>	<b>18</b>
<b>4.2.9 TEST RESULTS (ABOVE 1000 MHZ)</b>	<b>18</b>
<b>5 . BANDWIDTH TEST</b>	<b>19</b>
<b>5.1 APPLIED PROCEDURES / LIMIT</b>	<b>19</b>
<b>5.1.1 TEST PROCEDURE</b>	<b>19</b>
<b>5.1.2 DEVIATION FROM STANDARD</b>	<b>19</b>
<b>5.1.3 TEST SETUP</b>	<b>19</b>
<b>5.1.4 EUT OPERATION CONDITIONS</b>	<b>19</b>
<b>5.1.5 EUT TEST CONDITIONS</b>	<b>19</b>
<b>5.1.6 TEST RESULTS</b>	<b>19</b>
<b>6 . MAXIMUM OUTPUT POWER TEST</b>	<b>20</b>

**Table of Contents**

	Page
6.1 APPLIED PROCEDURES / LIMIT	20
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>28</b>
<b>ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)</b>	<b>29</b>
<b>ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)</b>	<b>34</b>
<b>ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)</b>	<b>37</b>
<b>ATTACHMENT E - BANDWIDTH</b>	<b>50</b>
<b>ATTACHMENT F - MAXIMUM OUTPUT POWER TEST</b>	<b>53</b>
<b>ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION</b>	<b>54</b>
<b>ATTACHMENT H - POWER SPECTRAL DENSITY TEST</b>	<b>61</b>

## REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1610247	Original Issue.	Dec. 01, 2016

**1. CERTIFICATION**

Equipment : Smart Lock  
Brand Name : N/A  
Model Name : LK 310  
Applicant : Brainchild Electronic Co., Ltd.  
Manufacturer : Brainchild Electronic Co., Ltd.  
Address : No. 209, Chung Yang Rd. Nan Kang Dist. Taipei, Taiwan, R.O.C. 11573  
Factory : Brainchild Electronic Co., Ltd.  
Address : No. 209, Chung Yang Rd. Nan Kang Dist. Taipei, Taiwan, R.O.C. 11573  
Date of Test : Oct. 27, 2016 ~ Nov. 30, 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-1-1610247) 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	
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:

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

**CB11:** (VCCI RN: R-4260; FCC RN:949005; FCC DN:TW1082; IC Assigned Code:20088)  
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

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

**CB11:** (VCCI RN: G-868; FCC RN:949005; FCC DN:TW1082; IC Assigned Code:20088)  
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

## 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  $U_{\text{cisp}}^r$  requirement.

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

### A. Radiated Measurement:

CB11 (3m)	CISPR	9kHz ~ 150kHz	2.66
		150kHz ~ 30MHz	2.42

Test Site	Method	Measurement Frequency Range	Ant. H / V	$U_{\text{cisp}}^r$ (dB)
CB11 (3m)	CISPR	30MHz ~ 200MHz	V	4.04
		30MHz ~ 200MHz	H	3.76
		200MHz ~ 1,000MHz	V	4.24
		200MHz ~ 1,000MHz	H	3.84

Test Site	Method	Measurement Frequency Range	Ant. H / V	$U_{\text{cisp}}^r$ (dB)
CB11 (3m)	CISPR	1GHz ~ 6GHz	V	4.46
		1GHz ~ 6GHz	H	4.40
		6GHz ~ 18GHz	V	4.18
		6GHz ~ 18GHz	H	4.34

Test Site	Method	Measurement Frequency Range	$U_{\text{cisp}}^r$ (dB)
CB11 (1m)	CISPR	18 ~ 26.5 GHz	4.80
		26.5 ~ 40 GHz	5.28

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

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called  $U_{\text{CISPR}}$ , 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  $U_{\text{lab}}$  values are smaller than  $U_{\text{CISPR}}$ .

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	Smart Lock	
Brand Name	N/A	
Model Name	LK 310	
Model Difference	N/A	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	2.87 dBm (1Mbps)
Power Source	Supplied from 4*AA Battery.	
Power Rating	DC 6V	

Note:

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

## 2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

## 3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Brilong	ANT3216LL12 R2400A	Chip	N/A	0.41

### 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

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

Note:

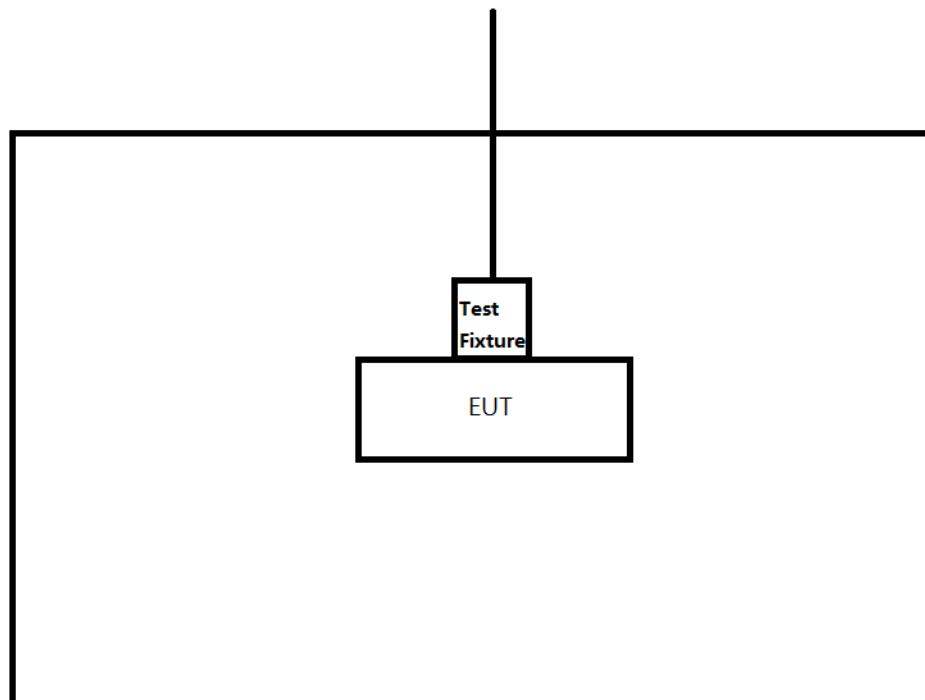
- (1) The measurements are performed at the high, middle, low available channels.
- (2) For radiated below 1G test, the 2480MHz is found to be the worst case and recorded.

### 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 BT LE

Test Software Version	nRFgo Studio		
Frequency (MHz)	2402	2440	2480
BT LE	DEF	DEF	DEF

### 3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



### 3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

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

## 4. EMC EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

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

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

Note:

(1) The limit of " \* " decreases with the logarithm of the frequency

(2) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)

Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

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

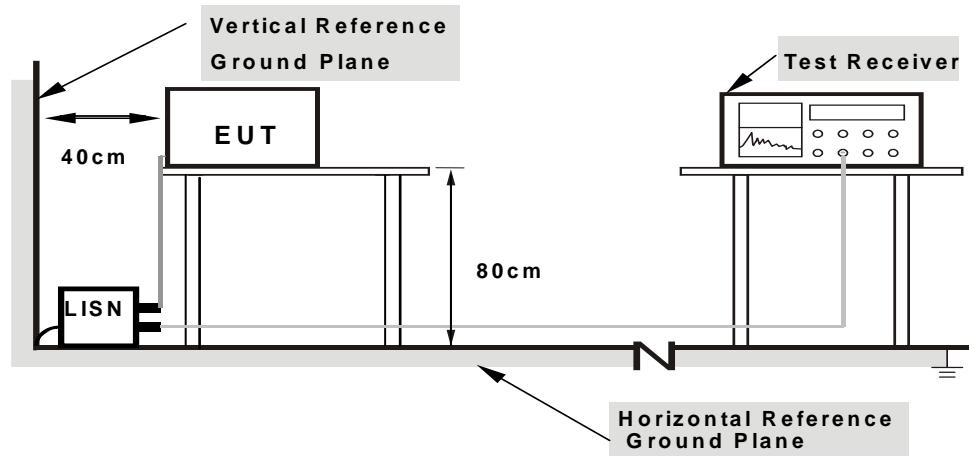
#### 4.1.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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: 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

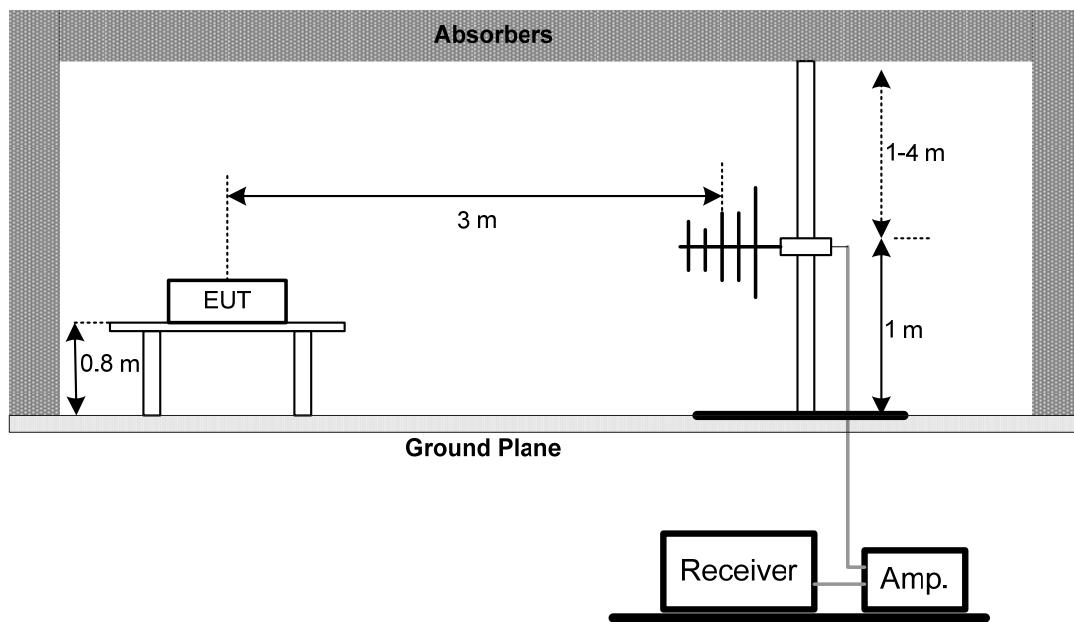
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 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 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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

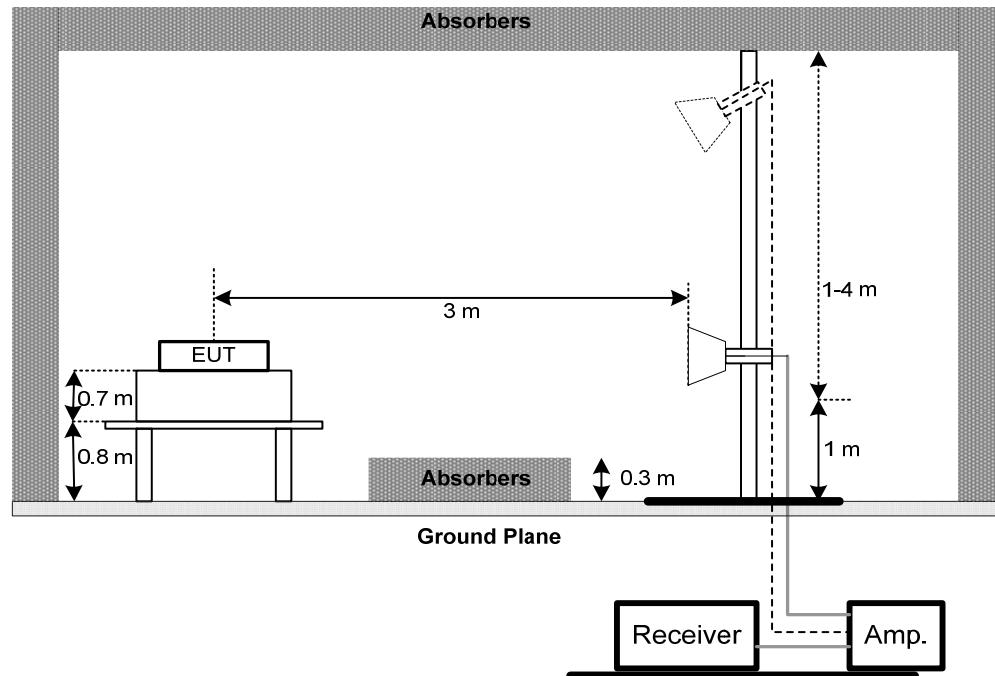
No deviation

#### 4.2.4 TEST SETUP

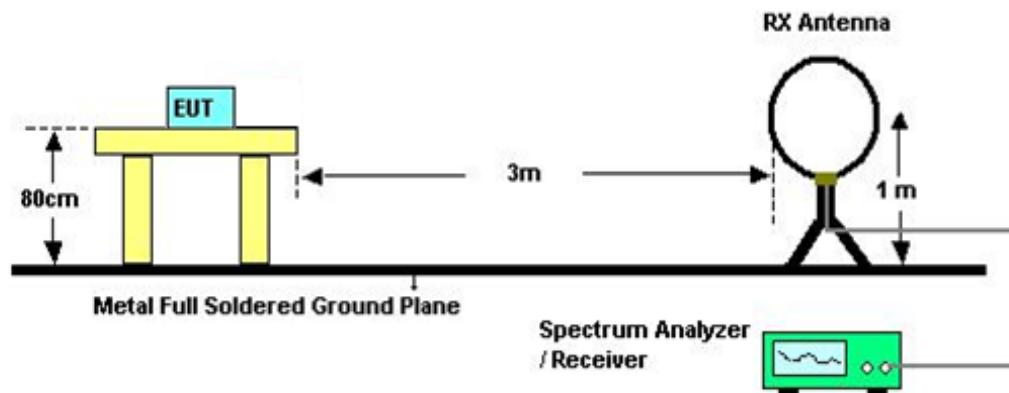
##### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



#### 4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.2.6 EUT TEST CONDITIONS

Temperature: 22°C    Relative Humidity: 56%    Test Voltage: DC 6V

#### 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.

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

Please refer to the Attachment D.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.  
For fundamental signal judgment was referred to Peak output test.

## 5. BANDWIDTH TEST

### 5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (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: 24°C    Relative Humidity: 60%    Test Voltage: DC 6V

#### 5.1.6 TEST RESULTS

Please refer to the Attachment E.

## 6. MAXIMUM OUTPUT POWER TEST

### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm	2400-2483.5	PASS

#### 6.1.1 TEST PROCEDURE

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

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



#### 6.1.4 EUT OPERATION CONDITIONS

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

#### 6.1.5 EUT TEST CONDITIONS

Temperature: 24°C    Relative Humidity: 60%    Test Voltage: DC 6V

#### 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

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

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



#### 7.1.4 EUT OPERATION CONDITIONS

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

#### 7.1.5 EUT OPERATION CONDITIONS

Temperature: 24°C    Relative Humidity: 60%    Test Voltage: DC 6V

#### 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: 24°C    Relative Humidity: 60%    Test Voltage: DC 6V

#### 8.1.6 TEST RESULTS

Please refer to the Attachment H.

## 9. MEASUREMENT INSTRUMENTS LIST

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB9168-352	9168-352	Feb. 04, 2017
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-546	Nov. 05, 2017
3	Pre-Amplifier	HP	8447D	2944A08891	Mar. 09 2017
4	Pre-Amplifier	Agilent	8449B	3008A02331	Jan. 24, 2017
5	Test Cable	EMCI	EMC8D-NM-NM-8000	150301	Mar. 09, 2017
6	Test Cable	EMCI	EMC104-SM-S M-2500	150303	Mar. 09, 2017
7	Test Cable	EMCI	EMC104-NM-S M-1000	150304	Mar. 09, 2017
8	Test Cable	EMCI	EMC104-SM-S M-5000	150302	Mar. 29, 2017
9	Test Cable	EMCI	EMC104-SM-S M-800	150305	Mar. 29, 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	R&S	FSP-40	100129	Jan. 17, 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	R&S	FSP-40	100129	Jan. 17, 2017

**Antenna Conducted Spurious Emission Measurement**

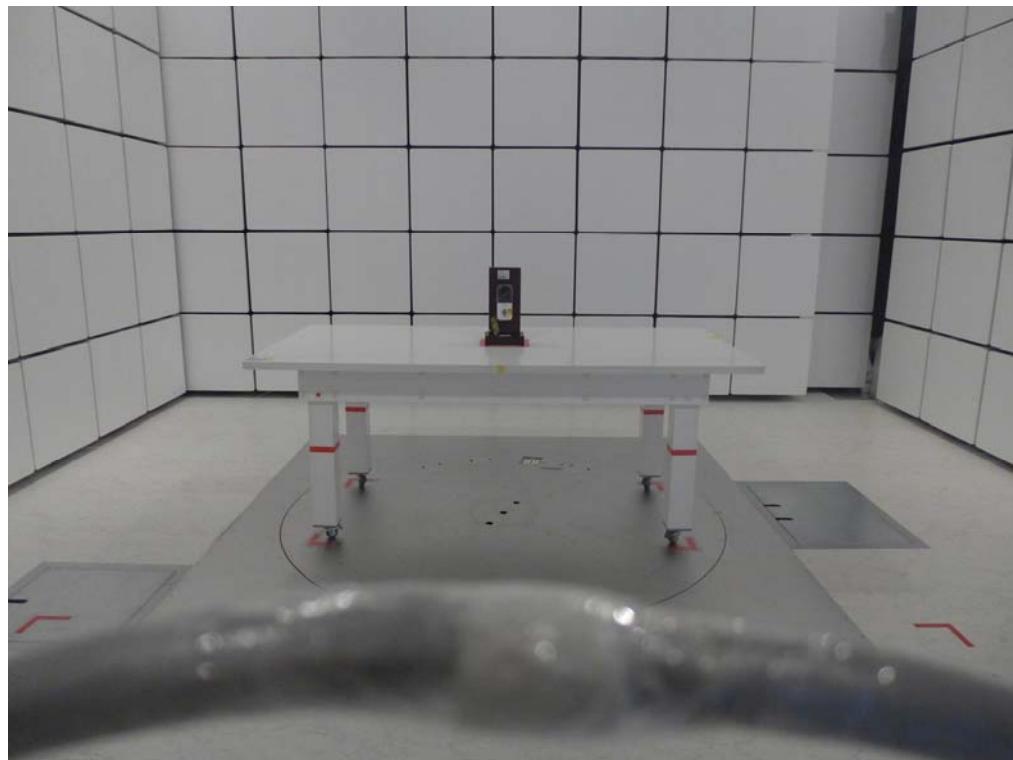
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

**Power Spectral Density Measurement**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 17, 2017

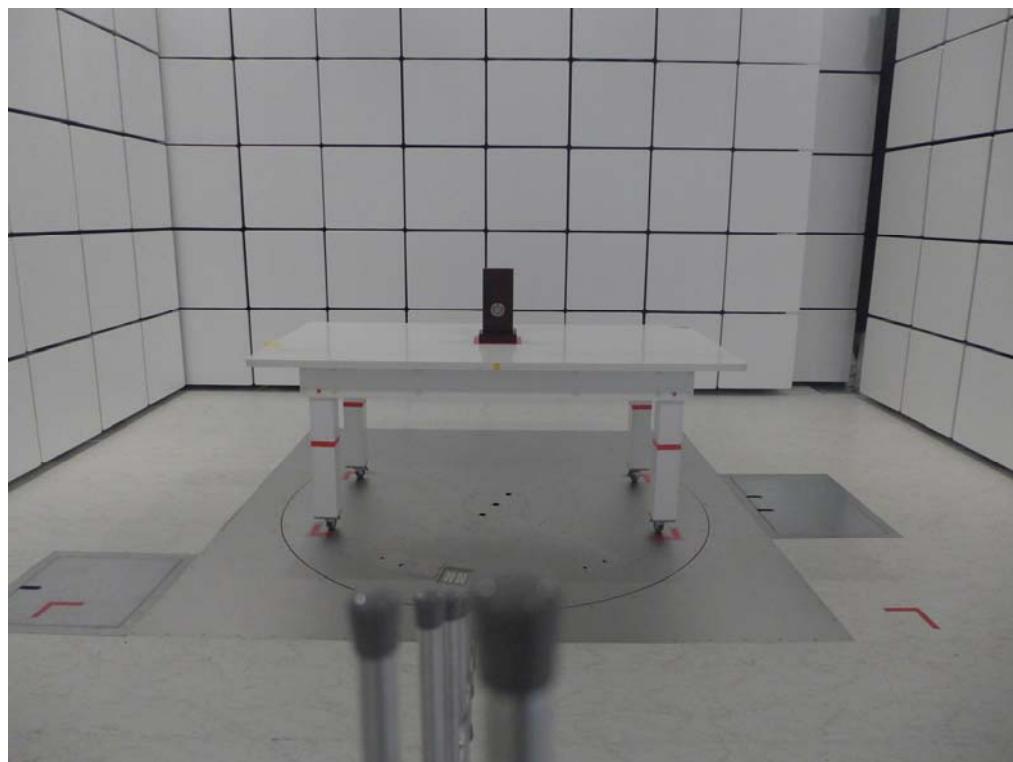
Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

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

### Radiated Measurement Photos

30MHz to 1000MHz



## Radiated Measurement Photos

### Above 1000MHz



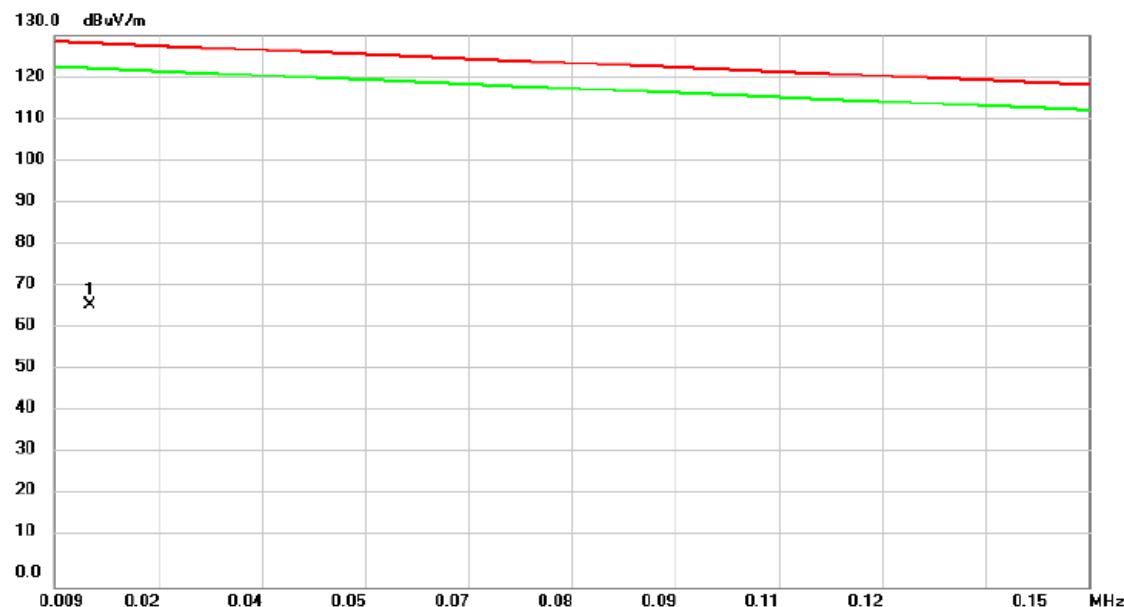
## ATTACHMENT A - CONDUCTED EMISSION

**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



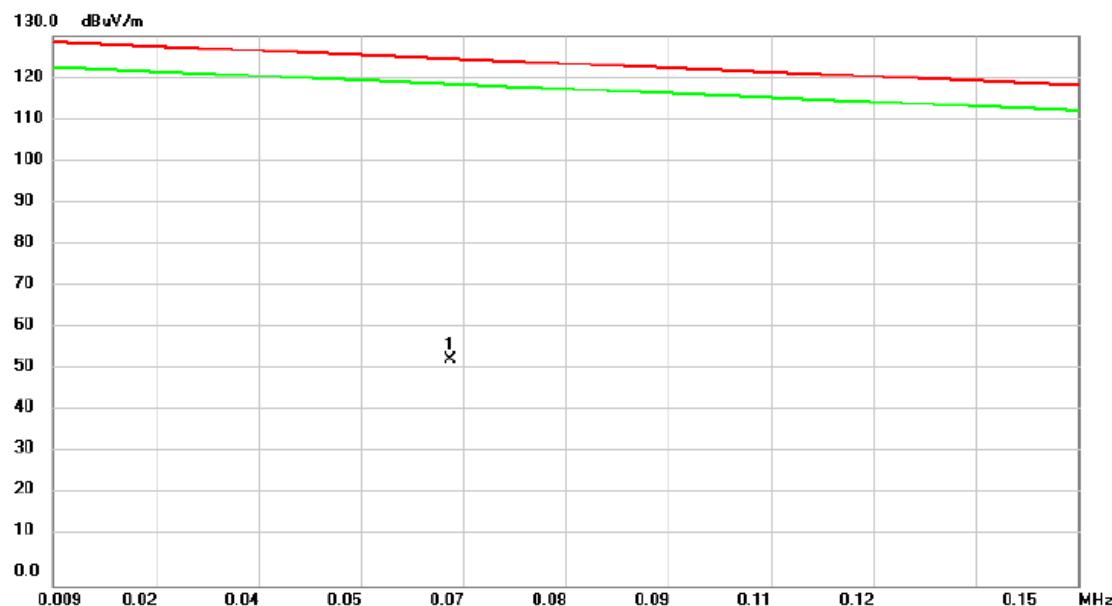
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1	*	0.0137	47.07	19.48	66.55	128.18	-61.63

Test Mode: TX Mode\_Open



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.6276	33.55	11.85	45.40	72.57	-27.17	peak	
2	*	1.3440	27.36	11.85	39.21	66.19	-26.98	peak	
3		2.3887	22.56	11.38	33.94	69.54	-35.60	peak	
4		4.3290	18.38	11.30	29.68	69.54	-39.86	peak	
5		6.6272	15.26	11.37	26.63	69.54	-42.91	peak	
6		8.8660	12.13	11.32	23.45	69.54	-46.09	peak	

Test Mode: TX Mode\_Close



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	0.0637	40.61	12.75	53.36	124.57	-71.21	peak

Test Mode: TX Mode\_Close

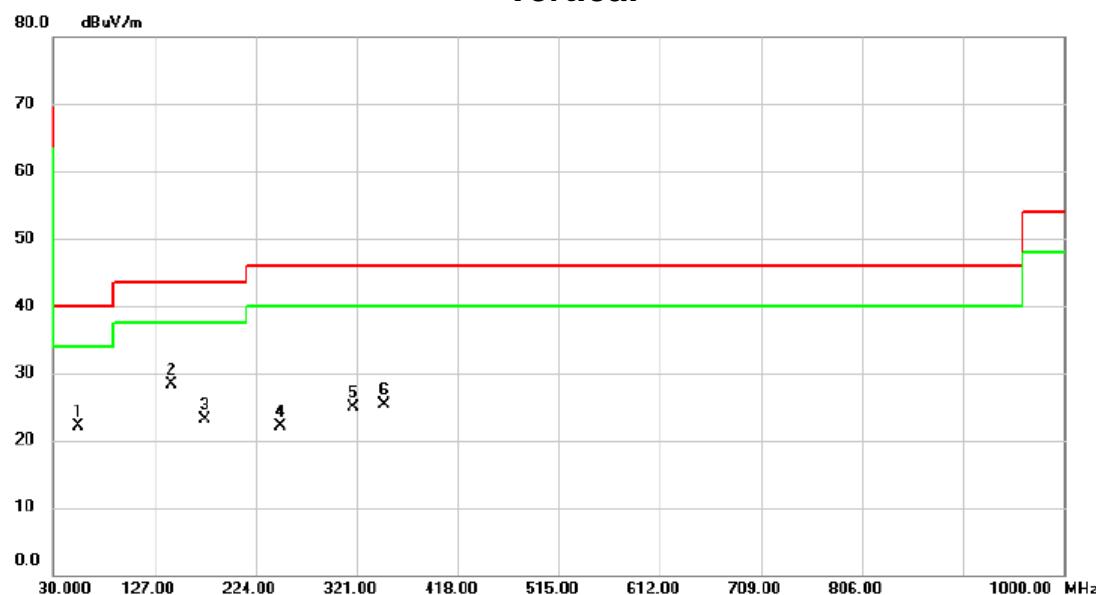


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.5675	35.78	11.83	47.61	73.11	-25.50	peak	
2		2.2395	24.62	11.44	36.06	69.54	-33.48	peak	
3		4.8662	16.94	11.38	28.32	69.54	-41.22	peak	
4		5.2842	16.97	11.39	28.36	69.54	-41.18	peak	
5		9.0152	12.79	11.32	24.11	69.54	-45.43	peak	
6		9.5228	13.44	11.31	24.75	69.54	-44.79	peak	

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

Test Mode: TX 2480MHz \_CH39\_1Mbps

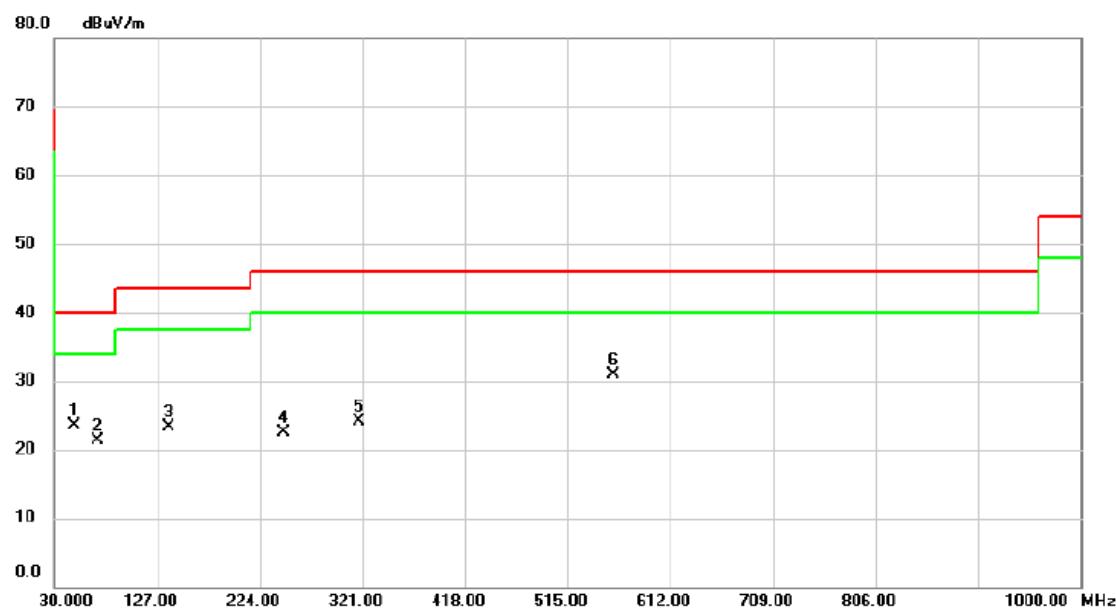
## Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		54.2500	30.84	-8.66	22.18	40.00	-17.82	peak	
2	*	142.5200	37.29	-8.89	28.40	43.50	-15.10	peak	
3		175.5000	32.80	-9.65	23.15	43.50	-20.35	peak	
4		248.2500	31.54	-9.53	22.01	46.00	-23.99	peak	
5		317.1200	32.17	-7.30	24.87	46.00	-21.13	peak	
6		347.1900	31.81	-6.43	25.38	46.00	-20.62	peak	

Test Mode: TX 2480MHz \_CH39\_1Mbps

## Horizontal

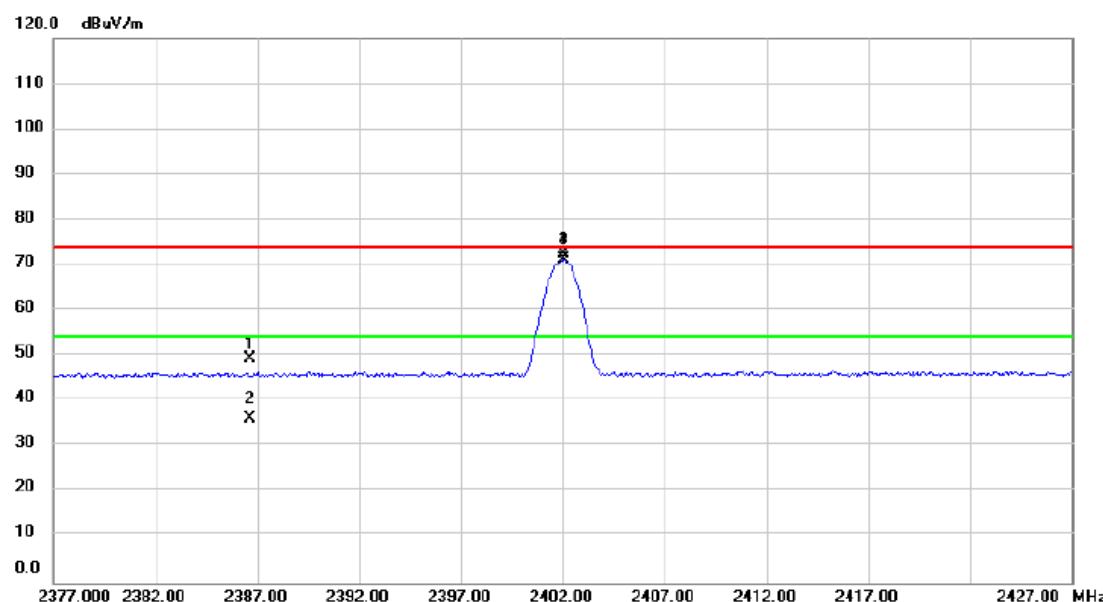


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dB			
1		48.4300	31.86	-8.39	23.47	40.00	-16.53	peak	
2		70.7400	32.09	-10.81	21.28	40.00	-18.72	peak	
3		137.6700	32.28	-9.07	23.21	43.50	-20.29	peak	
4		246.3100	32.14	-9.55	22.59	46.00	-23.41	peak	
5		318.0900	31.34	-7.27	24.07	46.00	-21.93	peak	
6	*	558.6500	32.61	-1.69	30.92	46.00	-15.08	peak	

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

Test Mode : TX 2402MHz\_CH00\_1Mbps

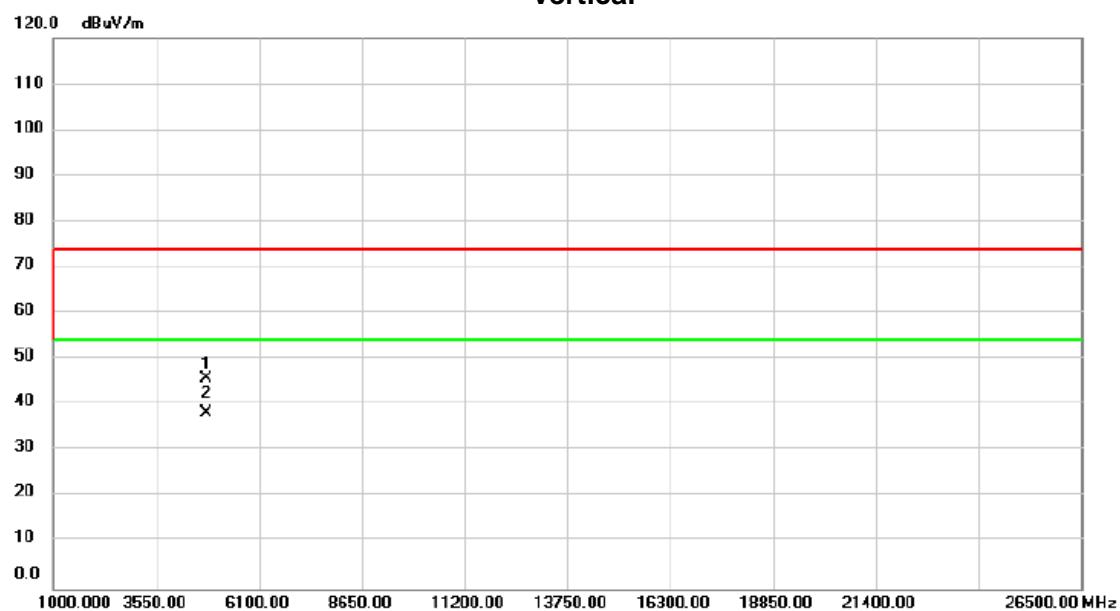
## Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Comment
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	
1		2386.607	18.51	30.95	49.46	74.00	-24.54	peak
2		2386.607	5.08	30.95	36.03	54.00	-17.97	AVG
3		2402.000	41.37	31.01	72.38	74.00	-1.62	peak NO LIMIT
4	*	2402.000	40.12	31.01	71.13	54.00	17.13	AVG NO LIMIT

Test Mode : TX 2402MHz\_CH00\_1Mbps

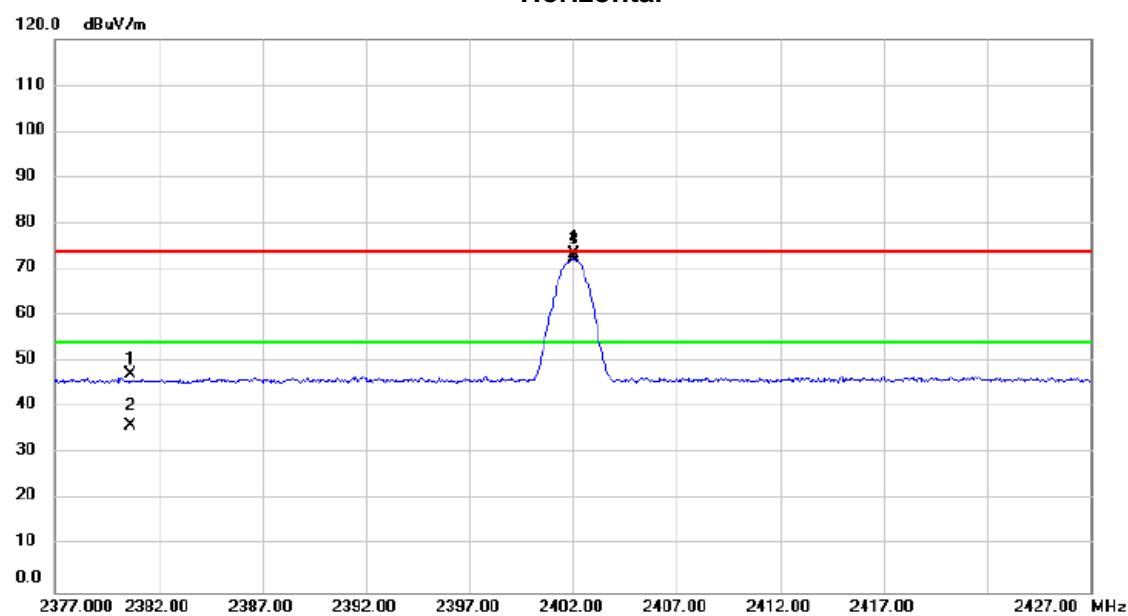
## Vertical



No.	Mk.	Reading Freq. MHz	Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB	Margin Detector	Comment
1		4804.000	57.21	-11.50	45.71	74.00	-28.29	peak
2	*	4804.000	49.63	-11.50	38.13	54.00	-15.87	AVG

Test Mode : TX 2402MHz\_CH00\_1Mbps

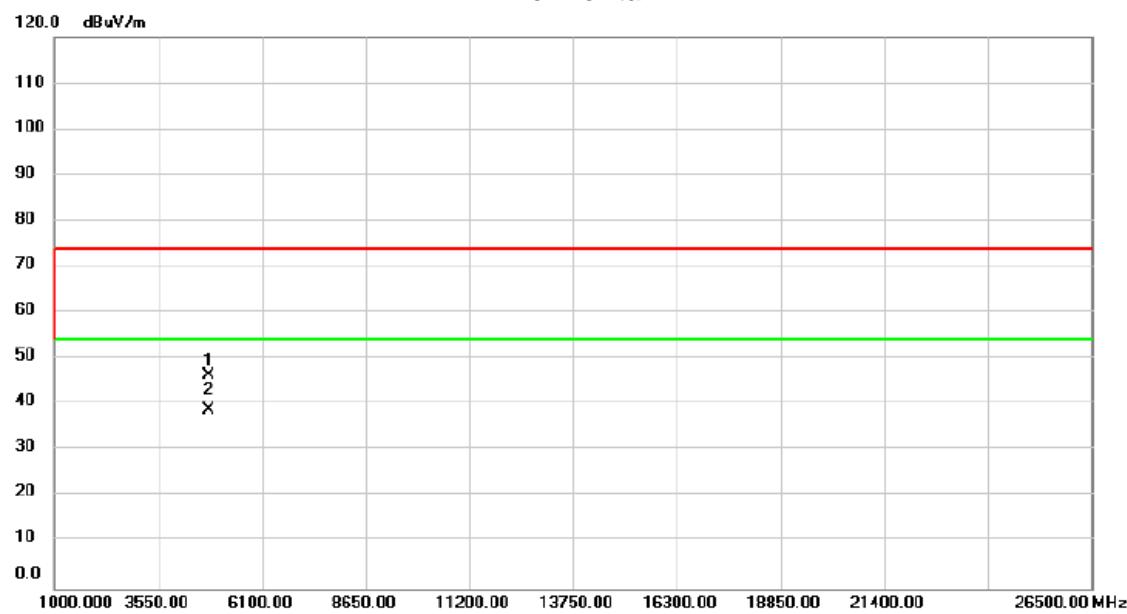
## Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		2380.666	16.22	30.93	47.15	74.00	-26.85	peak
2		2380.666	5.36	30.93	36.29	54.00	-17.71	AVG
3		2402.000	42.48	31.01	73.49	74.00	-0.51	peak NO LIMIT
4	*	2402.000	41.31	31.01	72.32	54.00	18.32	AVG NO LIMIT

Test Mode : TX 2402MHz\_CH00\_1Mbps

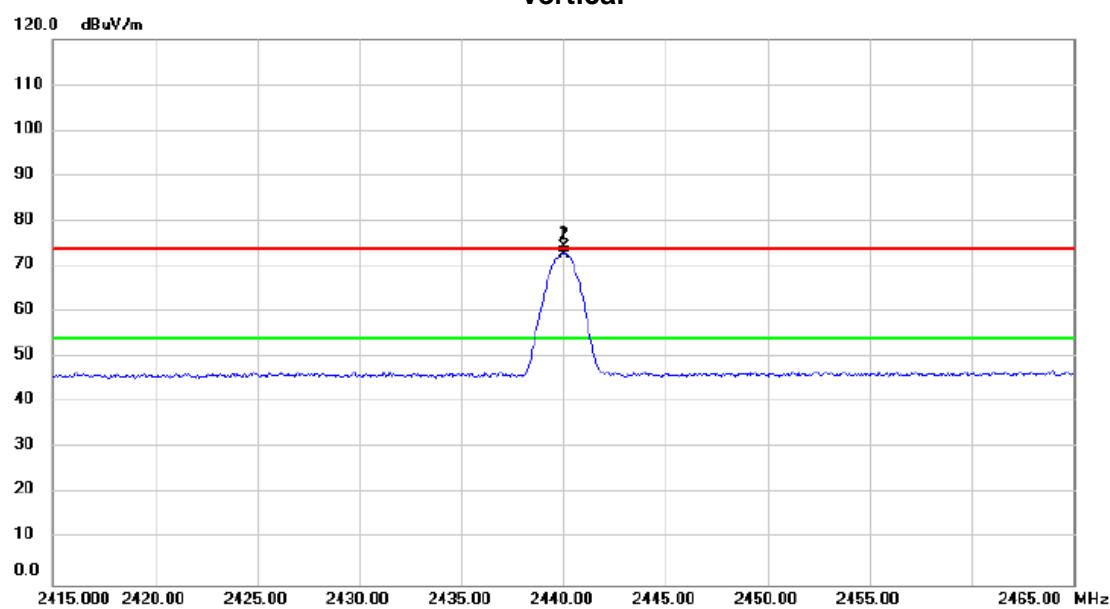
## Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		4804.000	57.73	-11.50	46.23	74.00	-27.77	peak
2	*	4804.000	50.28	-11.50	38.78	54.00	-15.22	AVG

Test Mode : TX 2440MHz\_CH19\_1Mbps

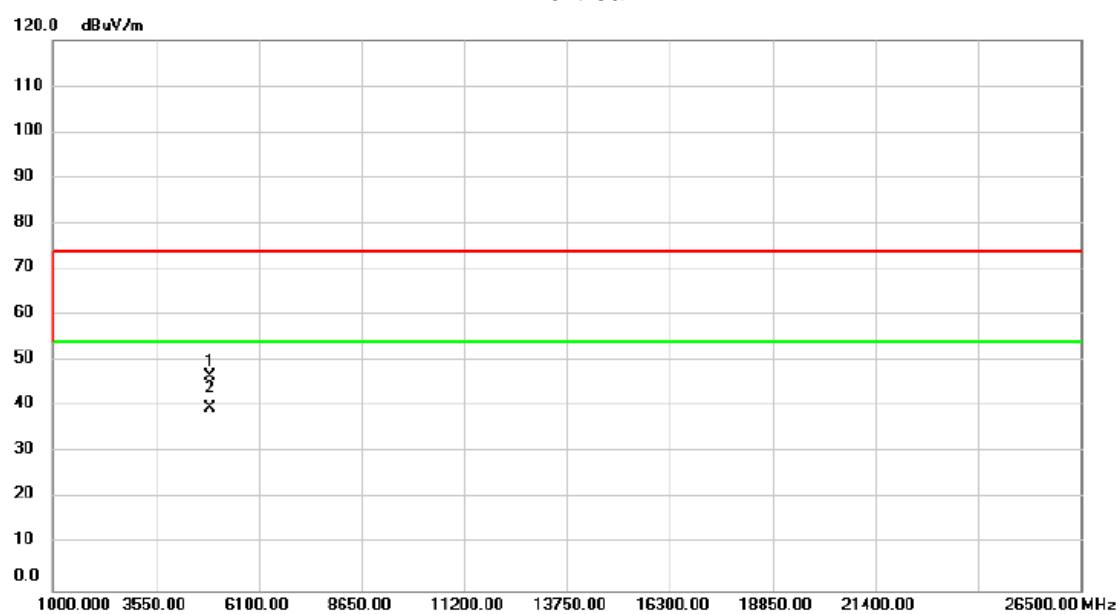
## Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	X	2440.000	43.07	31.15	74.22	74.00	0.22	peak NO LIMIT
2	*	2440.000	41.65	31.15	72.80	54.00	18.80	AVG NO LIMIT

Test Mode : TX 2440MHz\_CH19\_1Mbps

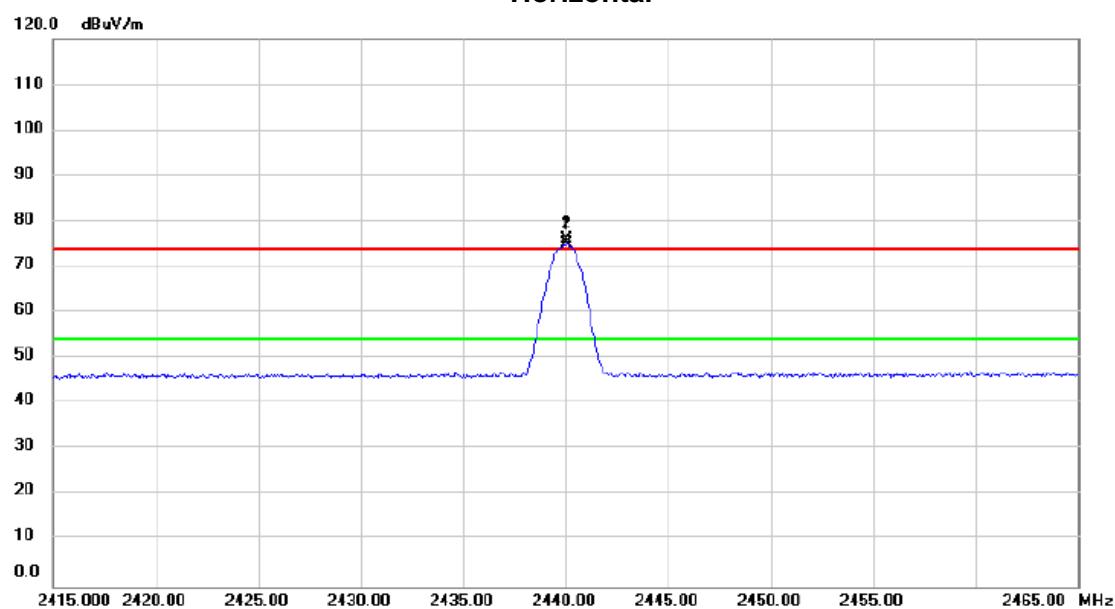
## Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		4880.000	57.91	-11.38	46.53	74.00	-27.47	peak
2	*	4880.000	50.99	-11.38	39.61	54.00	-14.39	AVG

Test Mode : TX 2440MHz\_CH19\_1Mbps

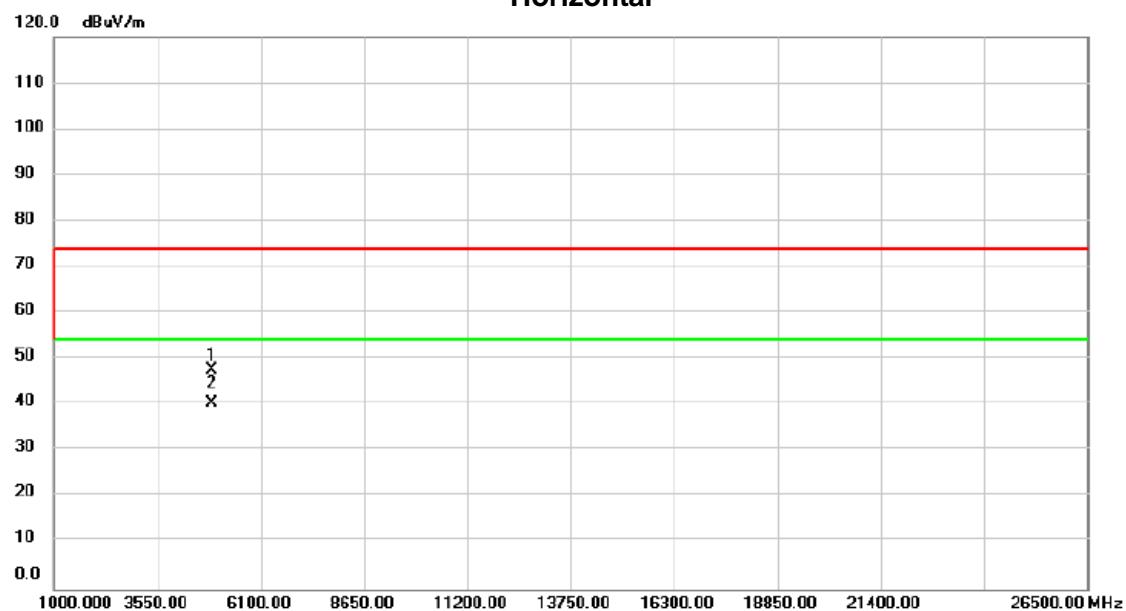
## Horizontal



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	X	2440.000	45.01	31.15	76.16	74.00	2.16	peak NO LIMIT
2	*	2440.000	43.93	31.15	75.08	54.00	21.08	AVG NO LIMIT

Test Mode : TX 2440MHz\_CH19\_1Mbps

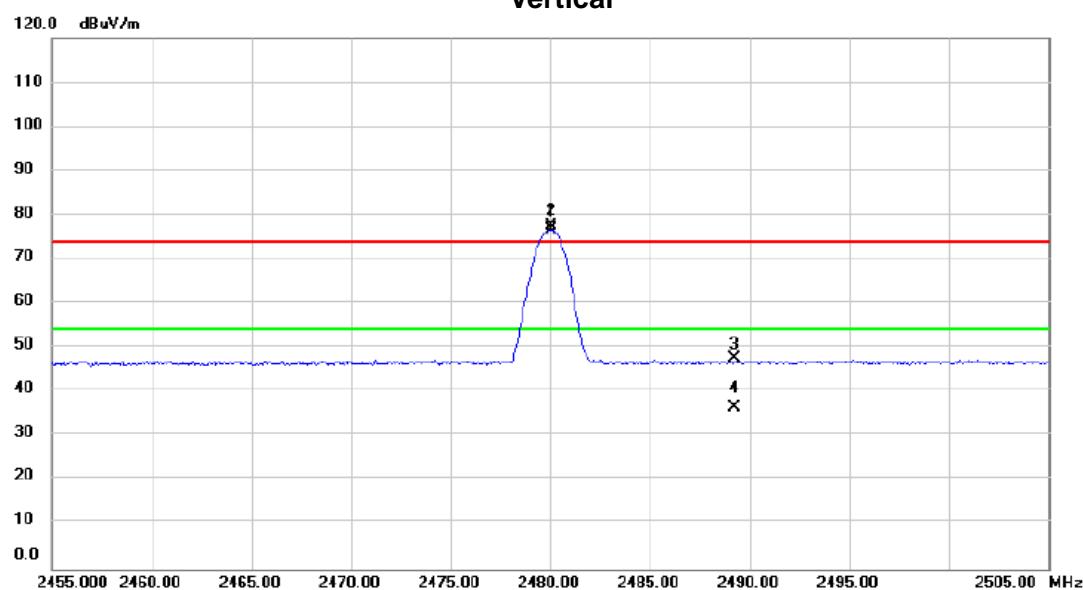
## Horizontal



No.	Mk.	Reading Freq. MHz	Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4880.000	58.82	-11.38	47.44	74.00	-26.56	peak	
2	*	4880.000	51.70	-11.38	40.32	54.00	-13.68	AVG	

Test Mode : TX 2480MHz\_CH39\_1Mbps

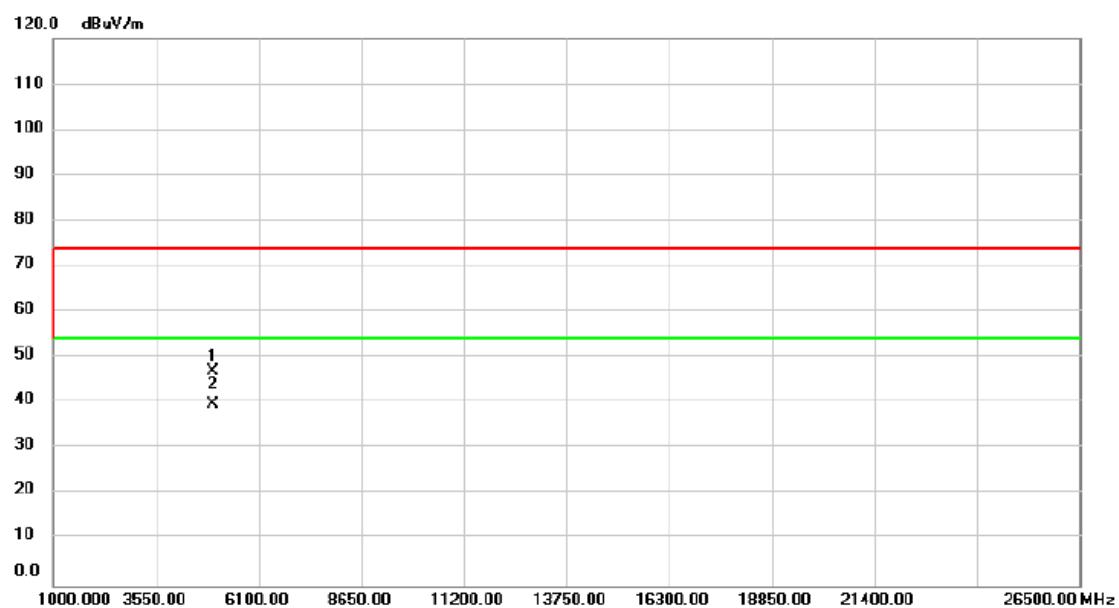
## Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Comment
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	
1	X	2480.000	46.37	31.29	77.66	74.00	3.66	peak NO LIMIT
2	*	2480.000	45.41	31.29	76.70	54.00	22.70	AVG NO LIMIT
3		2489.226	16.35	31.33	47.68	74.00	-26.32	peak
4		2489.226	5.19	31.33	36.52	54.00	-17.48	AVG

Test Mode : TX 2480MHz\_CH39\_1Mbps

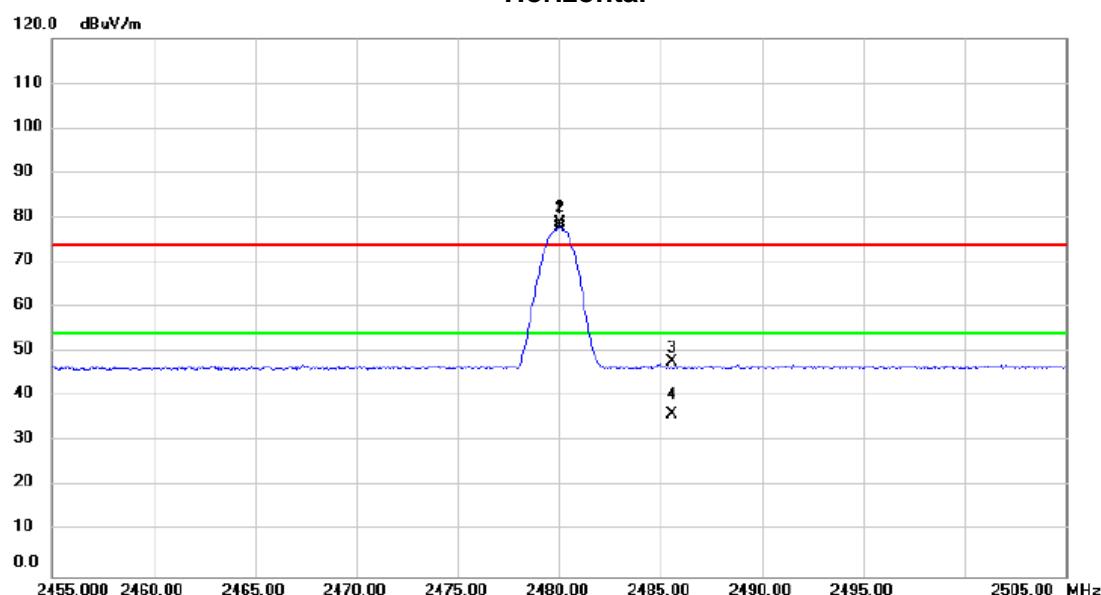
## Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		4960.000	58.33	-11.25	47.08	74.00	-26.92	peak
2	*	4960.000	51.13	-11.25	39.88	54.00	-14.12	AVG

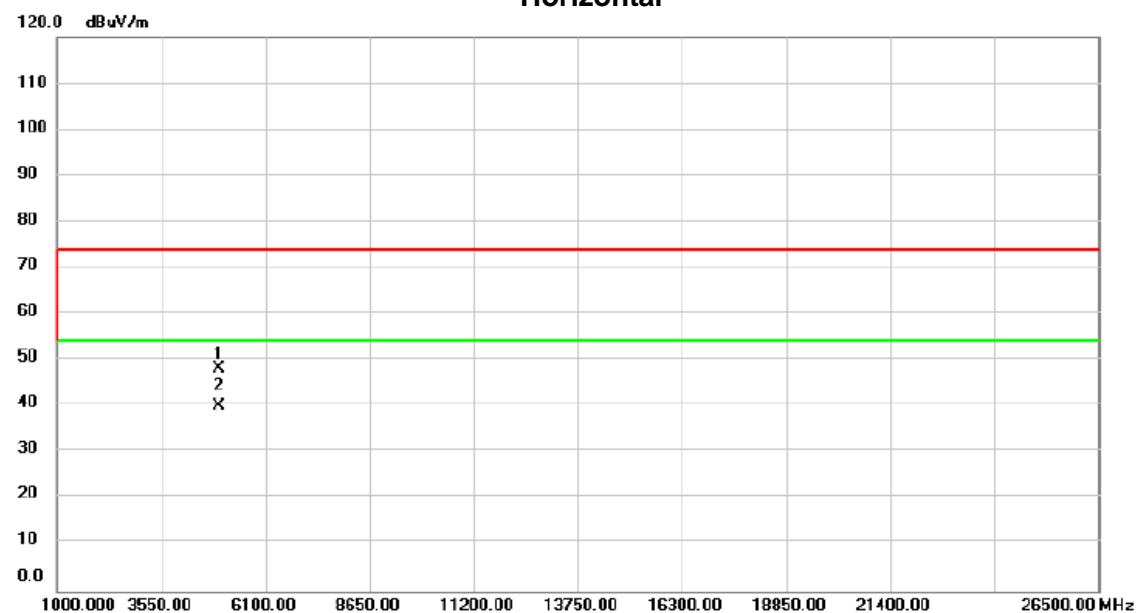
Test Mode : TX 2480MHz\_CH39\_1Mbps

## Horizontal



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Comment
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	
1	X	2480.000	47.44	31.29	78.73	74.00	4.73	peak NO LIMIT
2	*	2480.000	46.47	31.29	77.76	54.00	23.76	AVG NO LIMIT
3		2485.563	16.41	31.32	47.73	74.00	-26.27	peak
4		2485.563	4.96	31.32	36.28	54.00	-17.72	AVG

Test Mode : TX 2480MHz\_CH39\_1Mbps

**Horizontal**

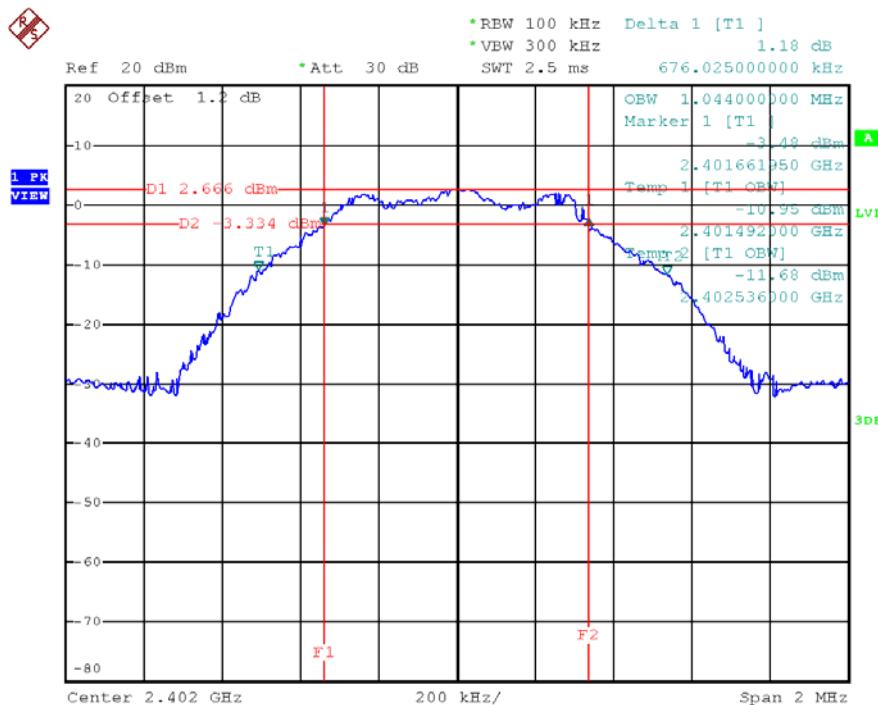
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		4960.000	59.27	-11.25	48.02	74.00	-25.98	peak
2	*	4960.000	51.41	-11.25	40.16	54.00	-13.84	AVG

## ATTACHMENT E - BANDWIDTH

Test Mode:	TX Mode
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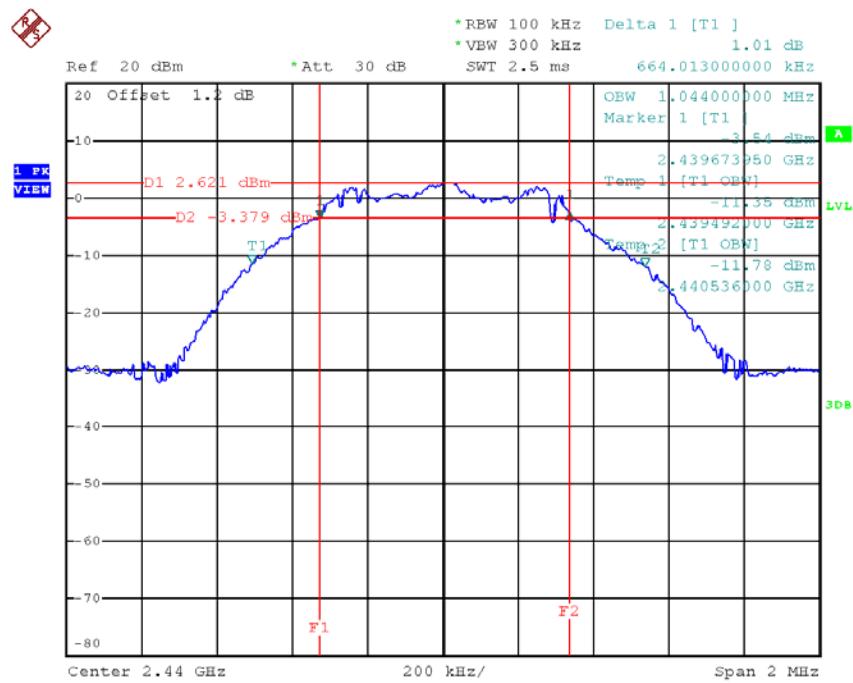
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.676	1.044	500	Pass
2440	0.664	1.044	500	Pass
2480	0.688	1.040	500	Pass

### TX CH00



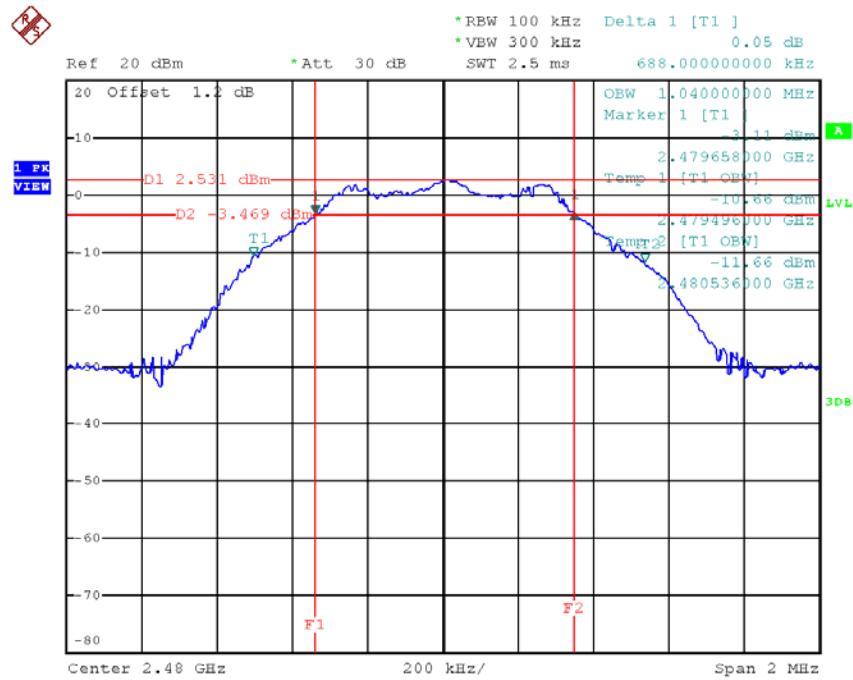
Date: 13.NOV.2016 07:10:30

## TX CH19



Date: 13.NOV.2016 07:12:02

## TX CH39



Date: 13.NOV.2016 07:13:32

## ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

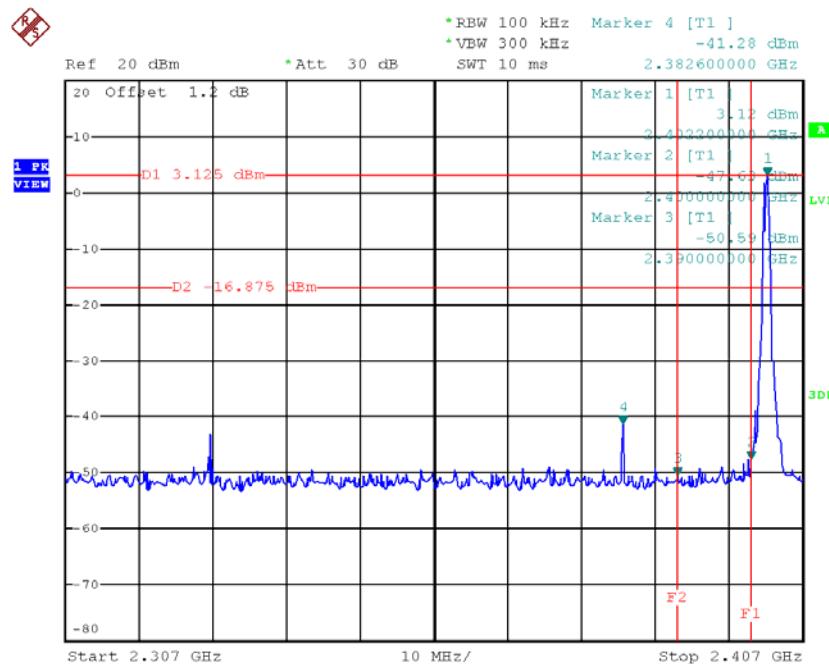
Test Mode :	CH00, CH19 , CH39 - 1Mbps
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	2.87	1.001	30.00	1.00	Pass
2440	2.71	1.001	30.00	1.00	Pass
2480	2.65	1.001	30.00	1.00	Pass

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

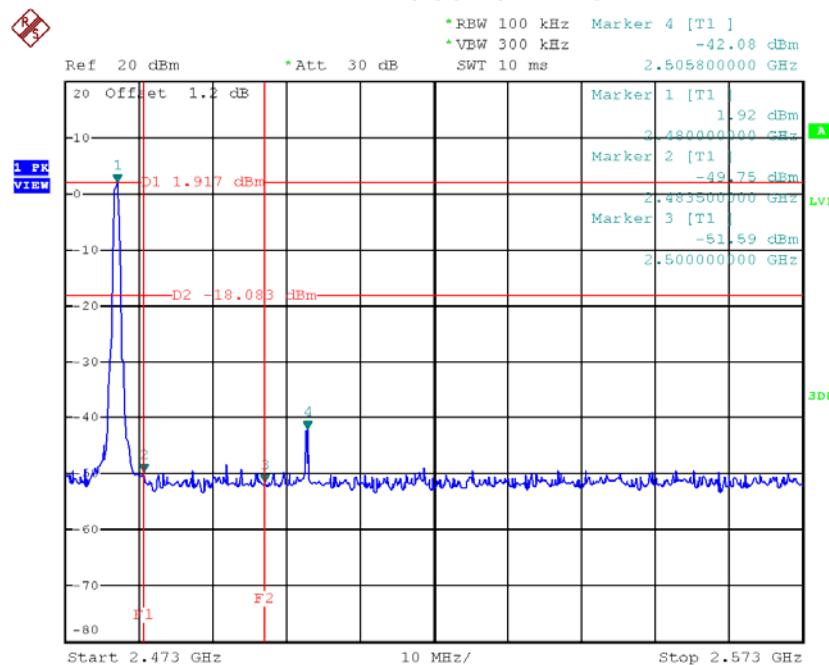
Test Mode : CH00, CH19 , CH39 - 1Mbps

### CH00 (Lower) - 1Mbps



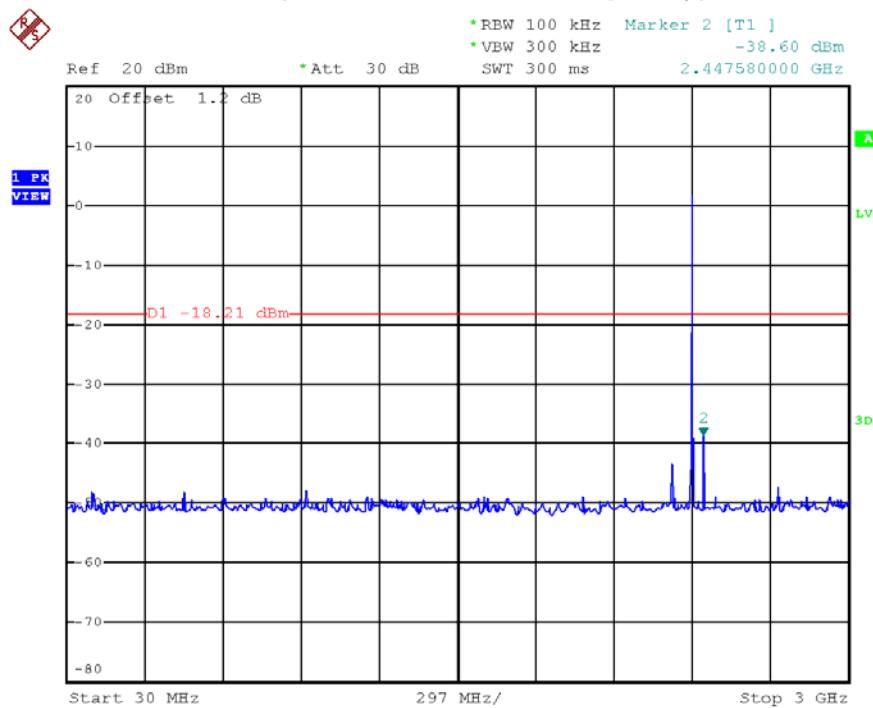
Date: 13.NOV.2016 07:10:37

### CH39 (upper) - 1Mbps



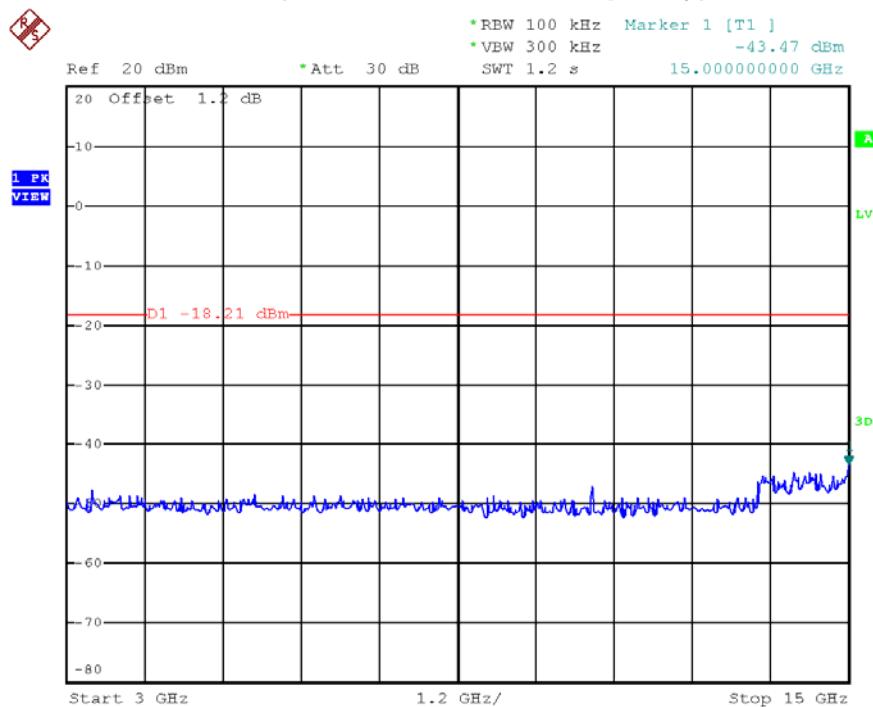
Date: 13.NOV.2016 07:13:39

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



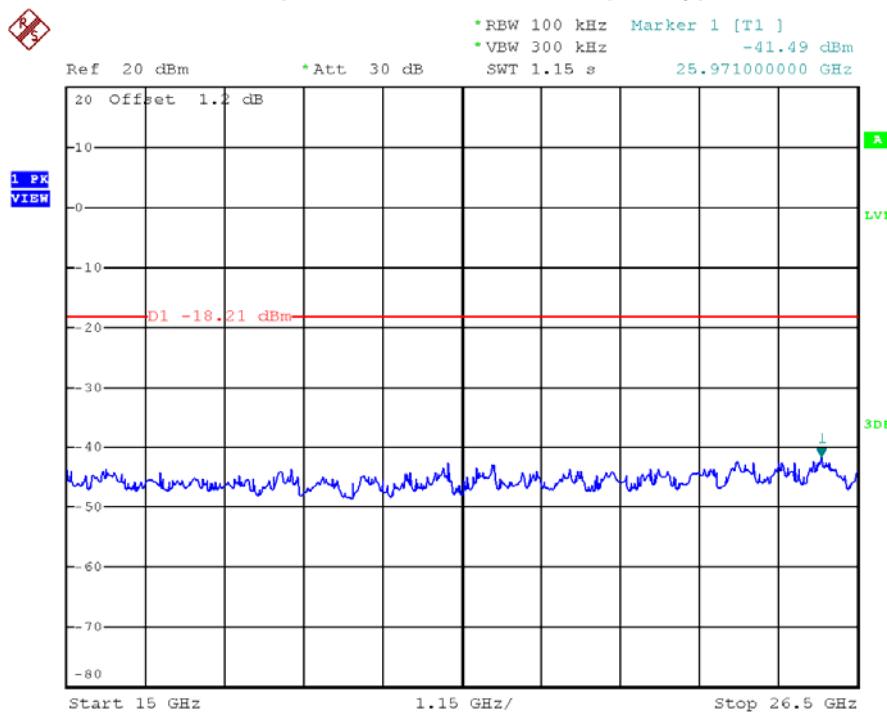
Date: 13.NOV.2016 07:10:50

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



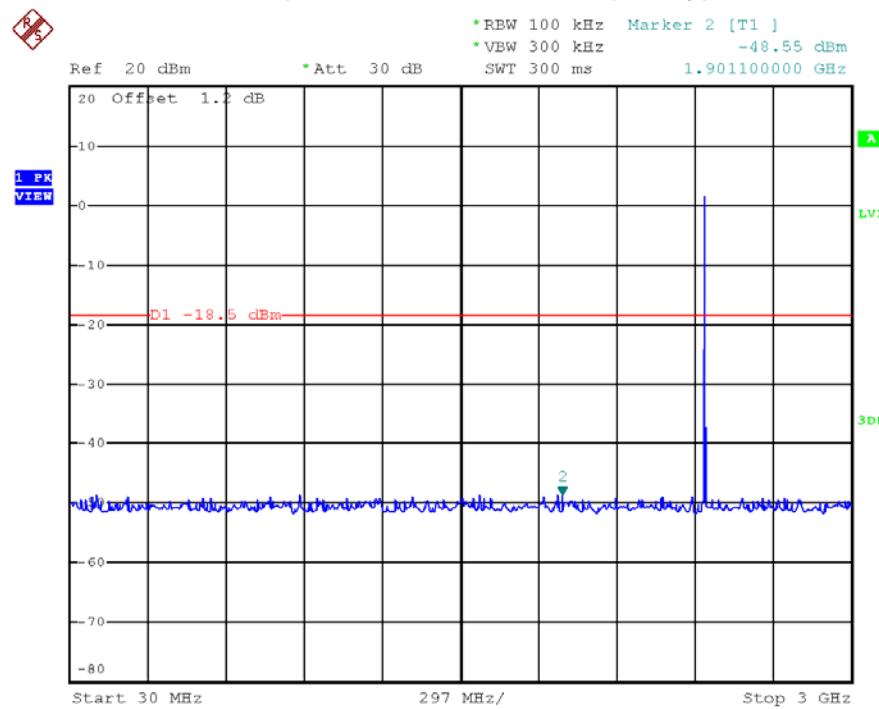
Date: 13.NOV.2016 07:10:56

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



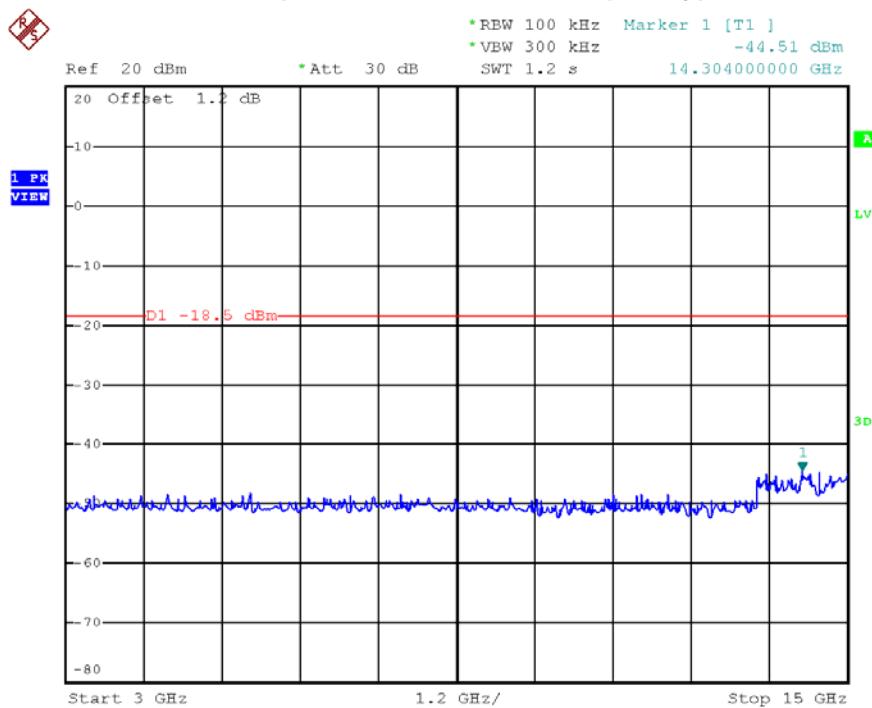
Date: 13.NOV.2016 07:11:03

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



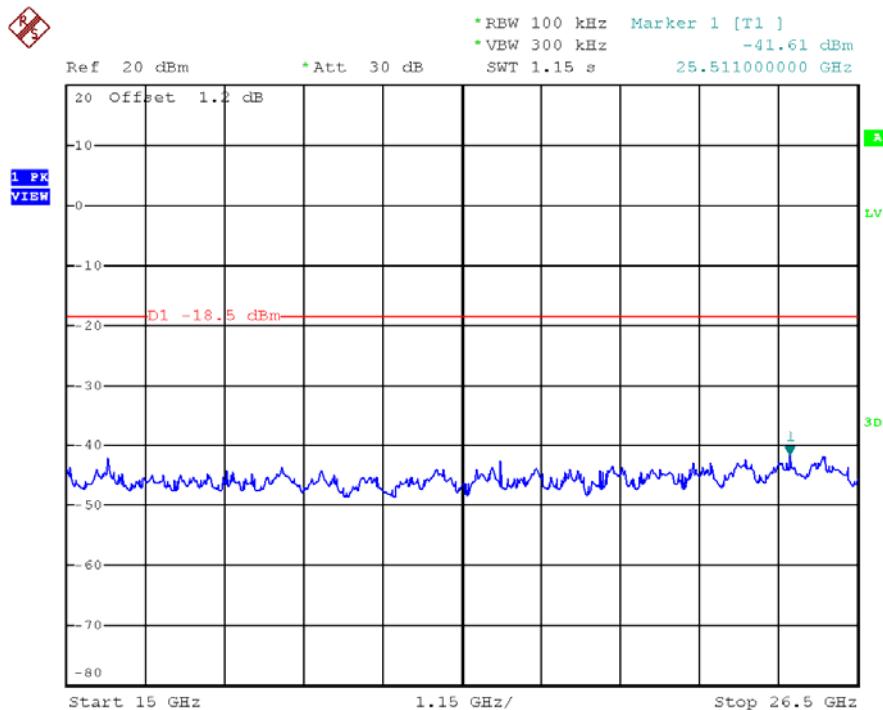
Date: 13.NOV.2016 07:12:14

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



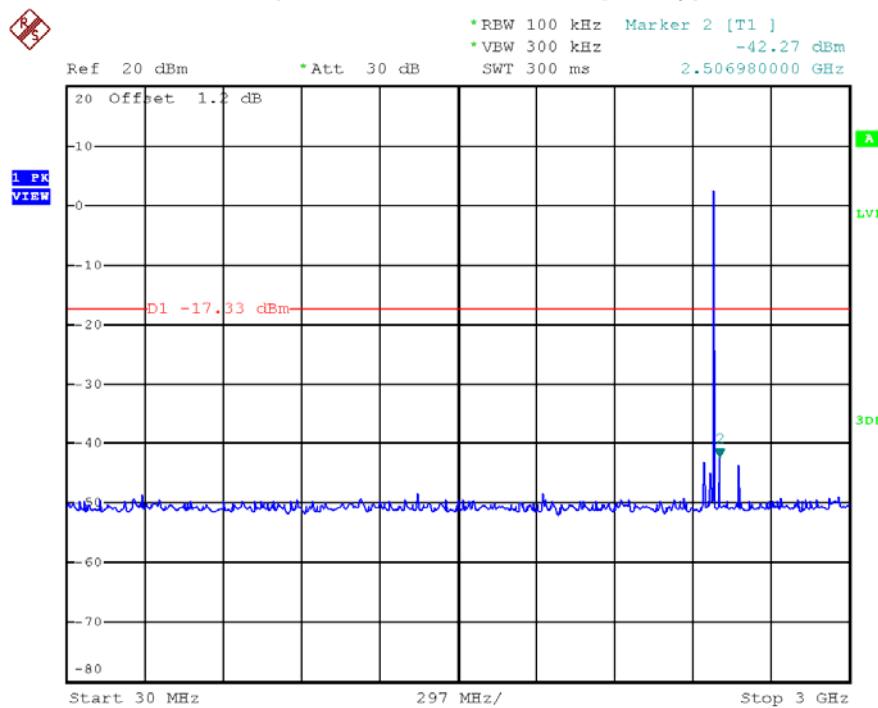
Date: 13.NOV.2016 07:12:21

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



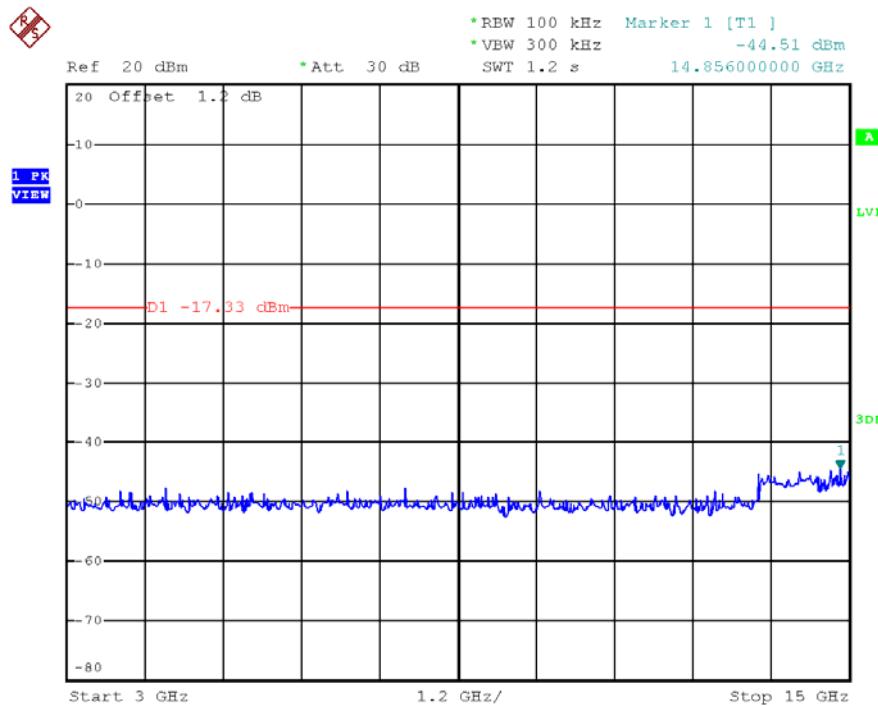
Date: 13.NOV.2016 07:12:28

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



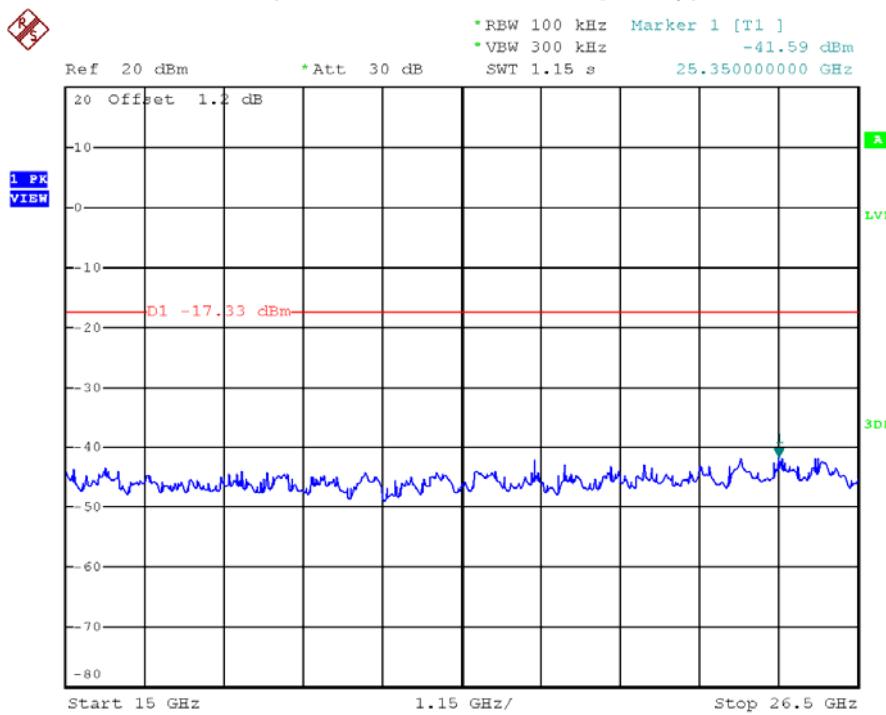
Date: 13.NOV.2016 07:13:51

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



Date: 13.NOV.2016 07:13:58

## CH39 (10 Harmonic of the frequency) 3



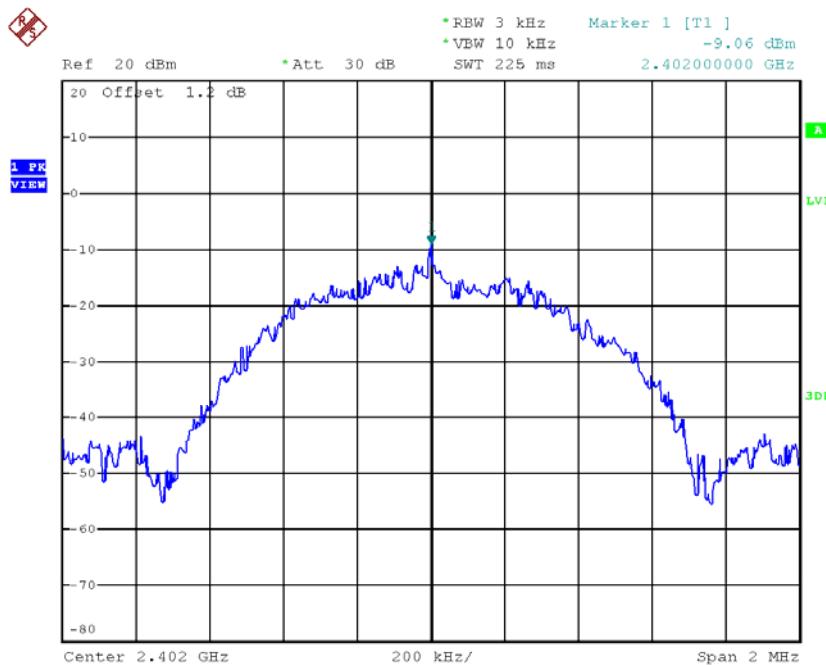
Date: 13.NOV.2016 07:14:05

## ATTACHMENT H - POWER SPECTRAL DENSITY TEST

Test Mode: CH00, CH19, CH39 - 1Mbps

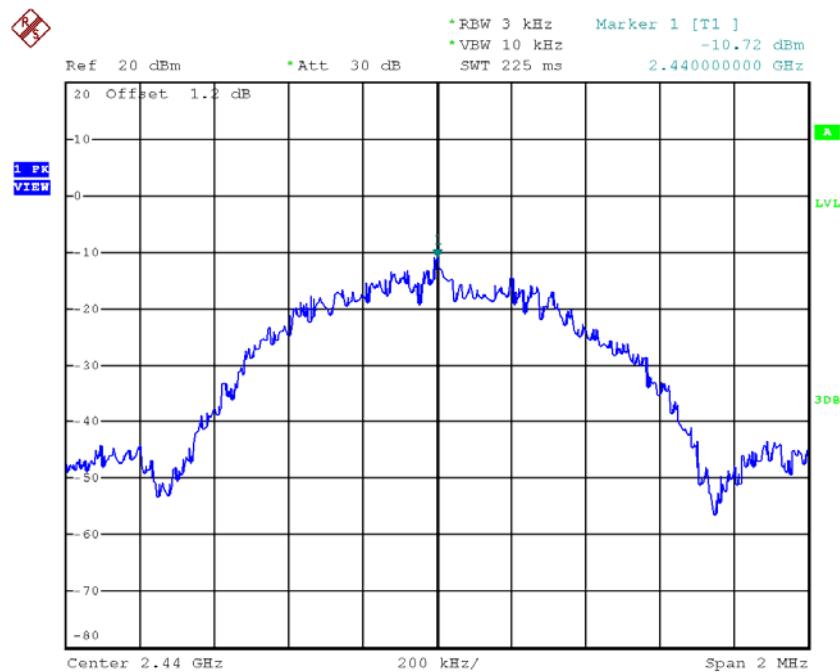
Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Test Result
2402	-9.06	0.124	8.00	Pass
2440	-10.72	0.085	8.00	Pass
2480	-8.57	0.139	8.00	Pass

## TX CH00



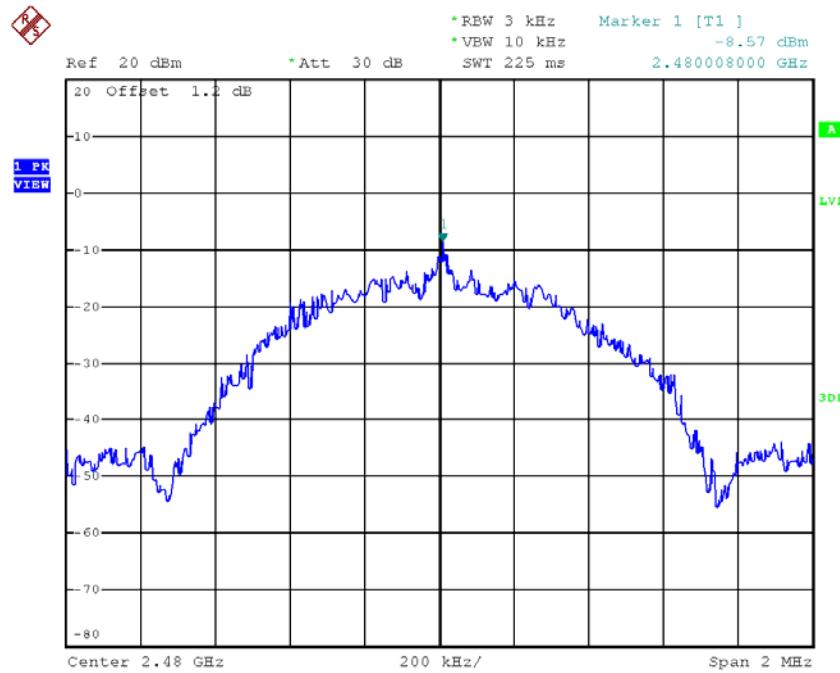
Date: 13.NOV.2016 07:11:08

## TX CH19



Date: 13.NOV.2016 07:12:33

## TX CH39



Date: 13.NOV.2016 07:14:10