

# FCC Radio Test Report


## FCC ID: H8GRN10C

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

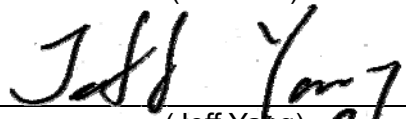
**Project No.** : 1506028  
**Equipment** : 2.4G RF Dongle  
**Model Name** : RN-10B, RN-10C  
**Applicant** : A-FOUR TECH CO., LTD.  
**Address** : 6F., No.108, Min-Chuan Rd., Xindian Dist., New Taipei City, Taiwan R.O.C.

**Date of Receipt** : Jun. 08, 2015  
**Date of Test** : Jun. 08, 2015 ~ Jun. 25, 2015  
**Issued Date** : Jul. 01, 2015  
**Tested by** : BTL Inc.

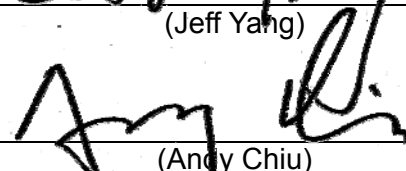
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### **Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**, or National Institute of Standards and Technology (**NIST**) of **U.S.A**.

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### **Limitation**

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

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## REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1506028	Original Issue.	Jul. 01, 2015

## 1. CERTIFICATION

Equipment : 2.4G RF Dongle  
Brand Name : A4Tech  
Model Name : RN-10B, RN-10C  
Applicant : A-FOUR TECH CO., LTD.  
Manufacturer : 5-Link Technology Co.,Ltd.  
Address : Xiwang Industrial District, Tiantangwei, Fenggang Town, Dongguan  
City,Guangdong,China  
Date of Test : Jun. 08, 2015 ~ Jun. 25, 2015  
Test Sample : ENGINEERING SAMPLE  
Standard(s) : FCC Part15, Subpart C :2014 (15.247) / ANSI C63.4-2009

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-1-1506028) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15 (15.247) , Subpart C				
Standard(s)	Section	Test Item	Judgment	Remark
	15.207	Conducted Emission	PASS	
	15.247(d)	Antenna conducted Spurious Emission	PASS	
	15.247(a)(2)	6dB Bandwidth	PASS	
	15.247(b)(3)	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) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r02 (Measurement Guidelines of DTS)

## 2.1 TEST FACILITY

### Conducted emission Test:

**C05:** (FCC RN:965108; FCC DN:TW1082)

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

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

**CB08:** (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)

1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

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

**CB08:** (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)

1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

## 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:

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 emission test:

Test Site	Measurement Frequency Range	$U$ , (dB)	NOTE
C05	150 kHz ~ 30 MHz	1.94	

### B. Radiated emission test:

Test Site	Item	Measurement Frequency Range	Uncertainty	NOTE
CB08	Radiated emission at 3m	Horizontal Polarization	30 - 200MHz	3.35 dB
			200 - 1000MHz	3.11 dB
			1 - 18GHz	3.97 dB
			18 - 40GHz	4.01 dB
	Vertical Polarization		30 - 200MHz	3.22 dB
			200 - 1000MHz	3.24 dB
			1 - 18GHz	4.05 dB
			18 - 40GHz	4.04 dB

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  $U_{CISPR}$ .

If  $U_{lab}$  is less than or equal to  $U_{CISPR}$ , then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{CISPR}$ , then:

- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{CISPR})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{CISPR})$ , exceeds the disturbance limit.



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4G RF Dongle	
Brand Name	A4Tech	
Model Name	RN-10B, RN-10C	
Model Difference	Only differ in model name.	
Product Description	Operation Frequency	2405-2474MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	-1.66 dBm
Power Source	Supplied from PC USB Port.	
Power Rating	I/P: DC 5V 30mA	

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)	Channel	Frequency (MHz)
01	2405	05	2430	09	2458
02	2407	06	2437	10	2469
03	2418	07	2442	11	2471
04	2426	08	2447	12	2474

#### 3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	-17.29

### 3.2 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>
Mode 2	TX Mode

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

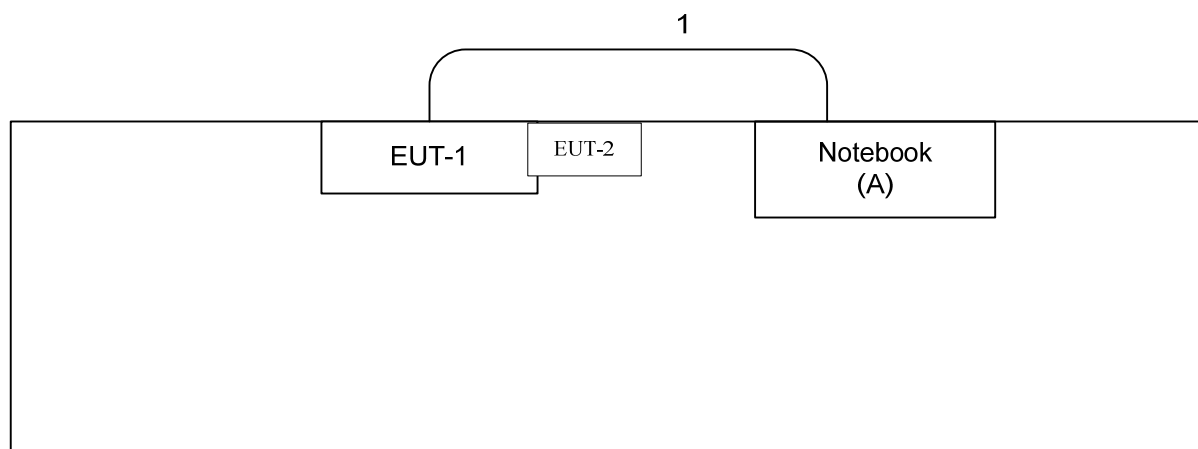
For Conducted Test	
Final Test Mode	Description
Mode 2	TX Mode

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 radiation below 1GHz, the middle channel is worst case and recorded in the test report.

### 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/IC	Series No.	Note
A	Notebook PC	DELL	PP18L	DOC	PF329 A01	

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.4m	-

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 (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

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

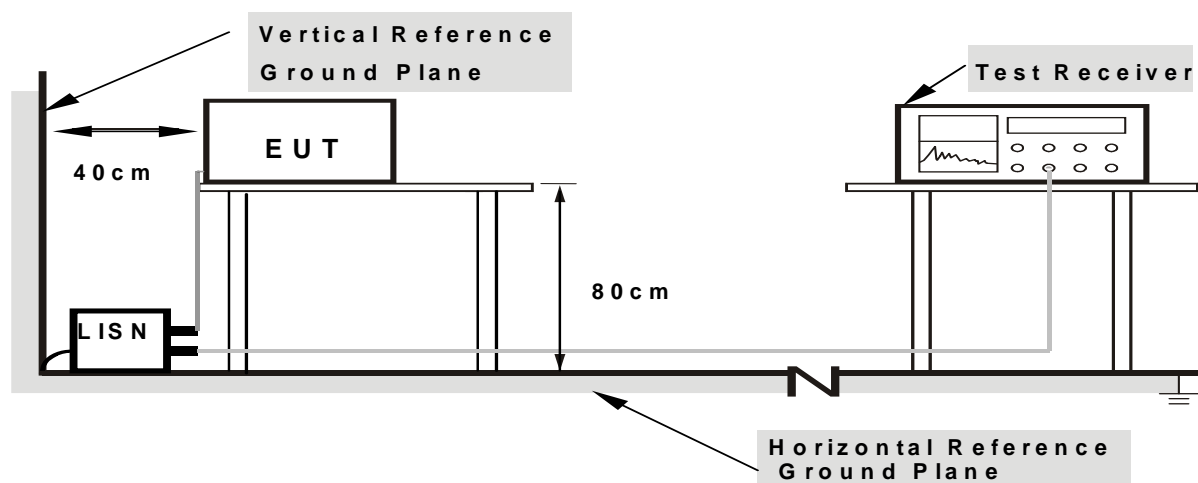
#### 4.1.2 TEST PROCEDURE

- 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  
 from other units and other metal planes

#### 4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

#### 4.1.6 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: AC 120V 60Hz

#### 4.1.7 TEST RESULTS

**Please refer to the Attachment A.**

Remark:

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

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 RADIATED EMISSION LIMITS

20dB in any 100 KHz bandwidth outside the operating frequency band. 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/PK detector

#### 4.2.2 TEST PROCEDURE

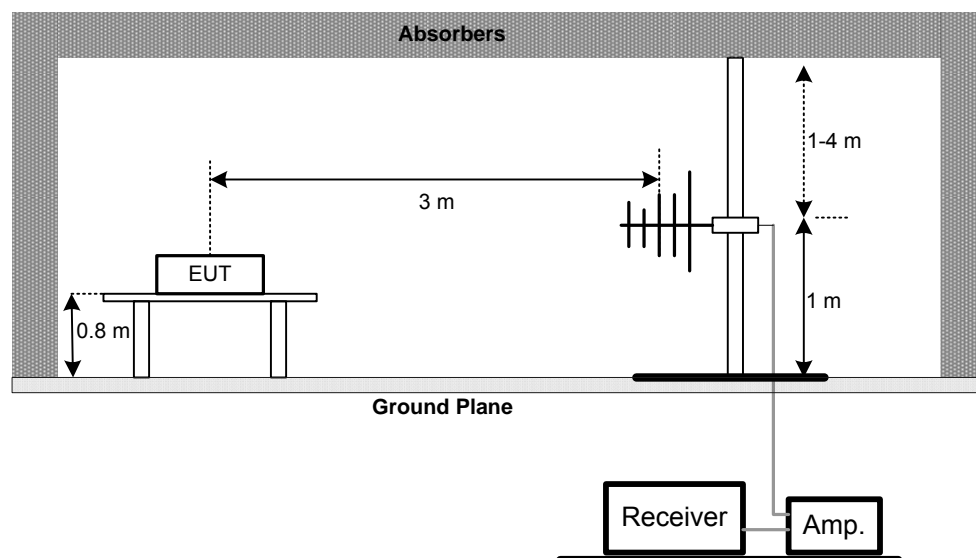
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-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; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.3 DEVIATION FROM TEST STANDARD

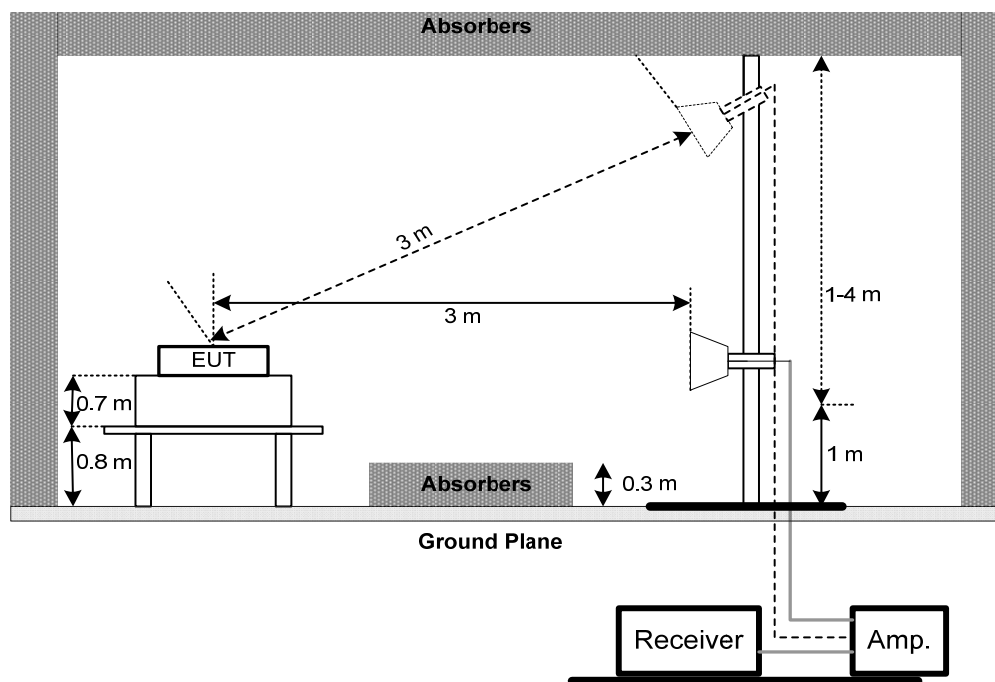
No deviation

#### 4.2.4 TEST SETUP

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

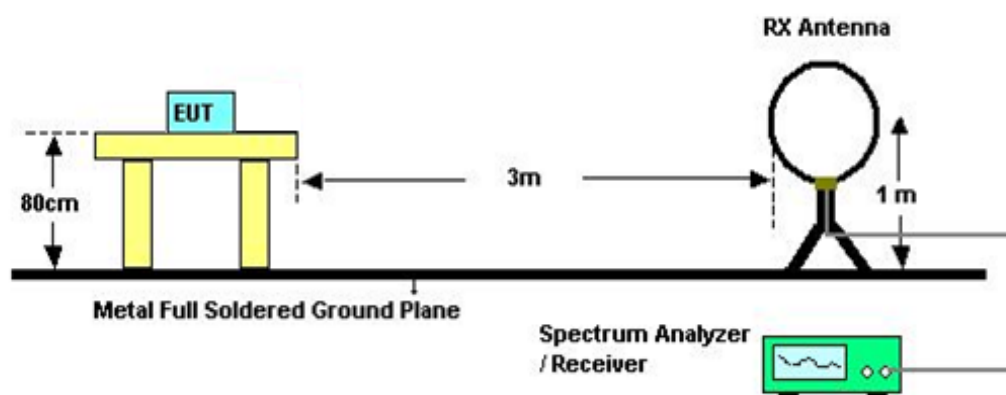


##### (B) Radiated Emission Test Set-Up Frequency Above 1 GHz





(C) For radiated emissions below 30MHz



#### 4.2.5 EUT OPERATING CONDITIONS

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

#### 4.2.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

**Test Voltage:** AC 120V/60Hz

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

**Please refer to the Attachment B**

Remark:

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

**4.2.8 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)**

**Please refer to the Attachment C.**

Remark:

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz.
- (2) 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.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

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

**Please refer to the Attachment D.**

Remark:

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (3) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (4) EUT Orthogonal Axis:  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (5) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (6) No limit: This is fundamental signal, the judgment is not applicable.  
For fundamental signal judgment was referred to Peak output test.

## 5. BANDWIDTH TEST

### 5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2407-2473	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: AC 120V/60Hz

#### 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	2407-2473	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 v03r02.

#### 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: AC 120V/60Hz

#### 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.

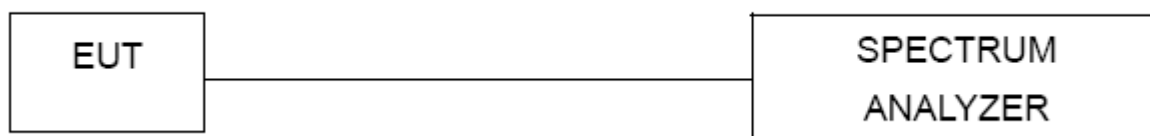
#### 7.1.1 TEST PROCEDURE

- 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.

#### 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: AC 120V/60Hz

#### 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)	2407-2473	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: AC 120V/60Hz

#### 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	LISN	R&S	ENV216	101050	Nov. 24, 2015
2	Test Cable	TIMES	CFD300-NL	C01	Jun. 16, 2016
3	EMI Test Receiver	R&S	ESCI	100082	Apr. 14, 2016
4	Measurement Software	EZ	EZ EMC (Version NB-02A)	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan.07, 2016
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Jun. 15, 2016
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 16, 2016
4	Microflex Cable	Harbour industries	27478LL142	1m	May. 13, 2016
5	Microflex Cable	EMC	S104-SMA	8m	May. 15, 2016
6	Microflex Cable	Harbour industries	27478LL142	3m	May. 13, 2016
7	Test Cable	LMR	LMR-400	12m	May. 14, 2016
8	Test Cable	LMR	LMR-400	3m	May. 14, 2016
9	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 18, 2015
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 18, 2015
11	Loop Antenna	EMCO	6502	00042960	Nov. 08, 2015

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 07, 2016

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2495A	1128008	Aug. 7, 2016
2	Power Meter Sensor	Anritsu	MA2411B	1126001	Aug. 7, 2016

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. 07, 2016

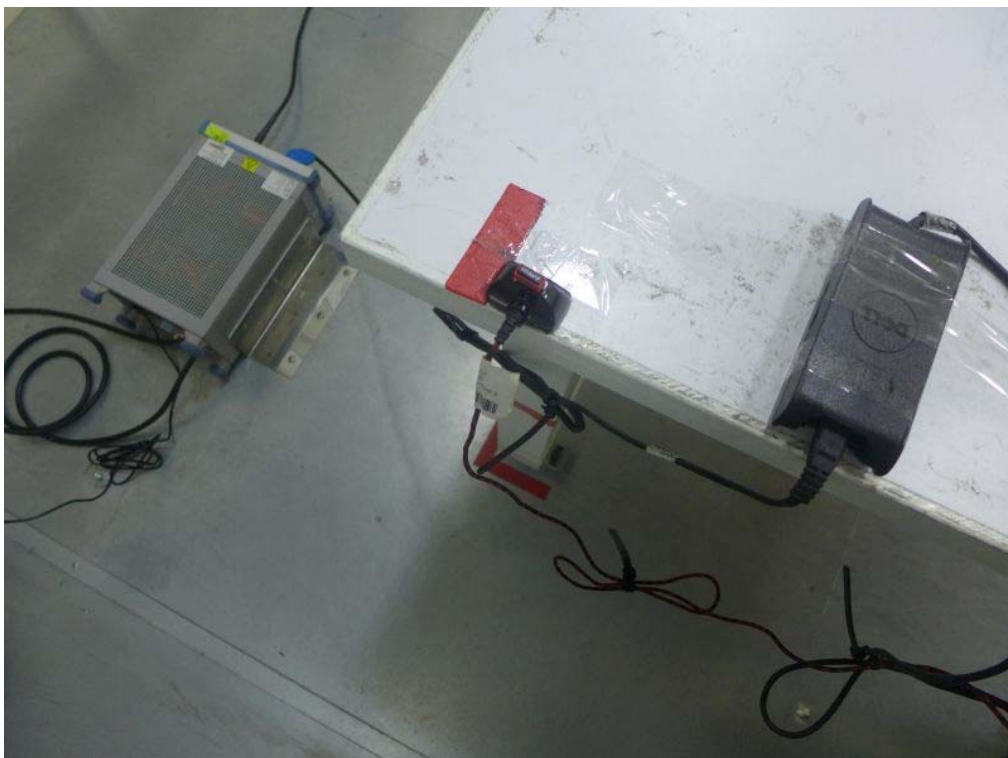
Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 07, 2016

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



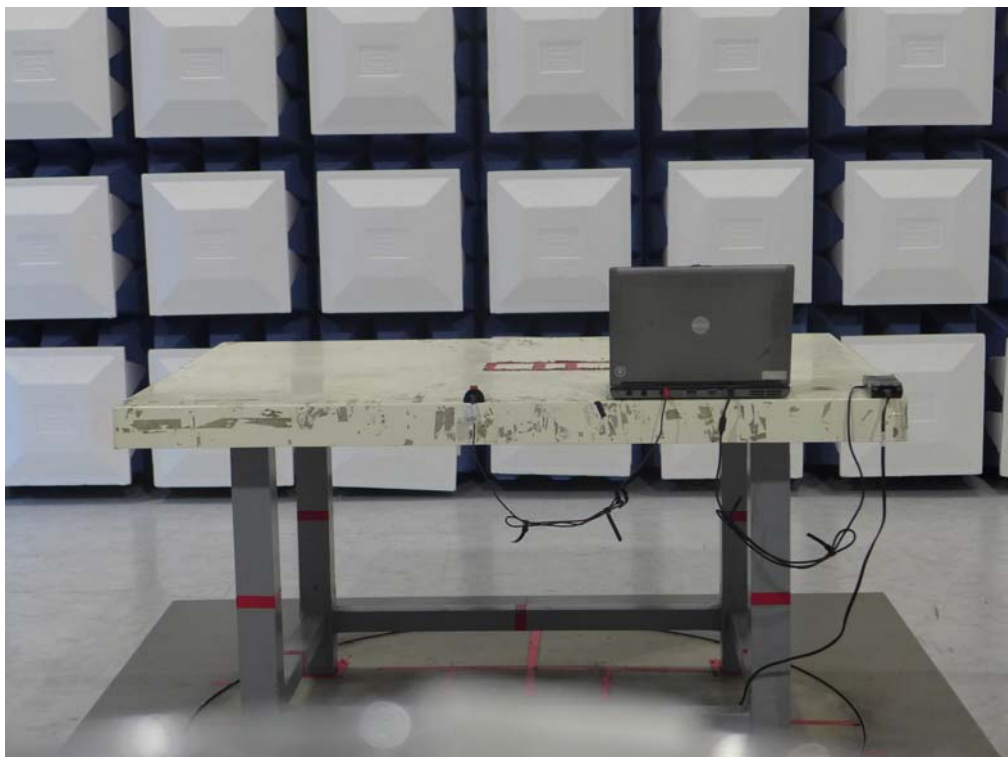
## 10. EUT TEST PHOTO

### Conducted Measurement Photos



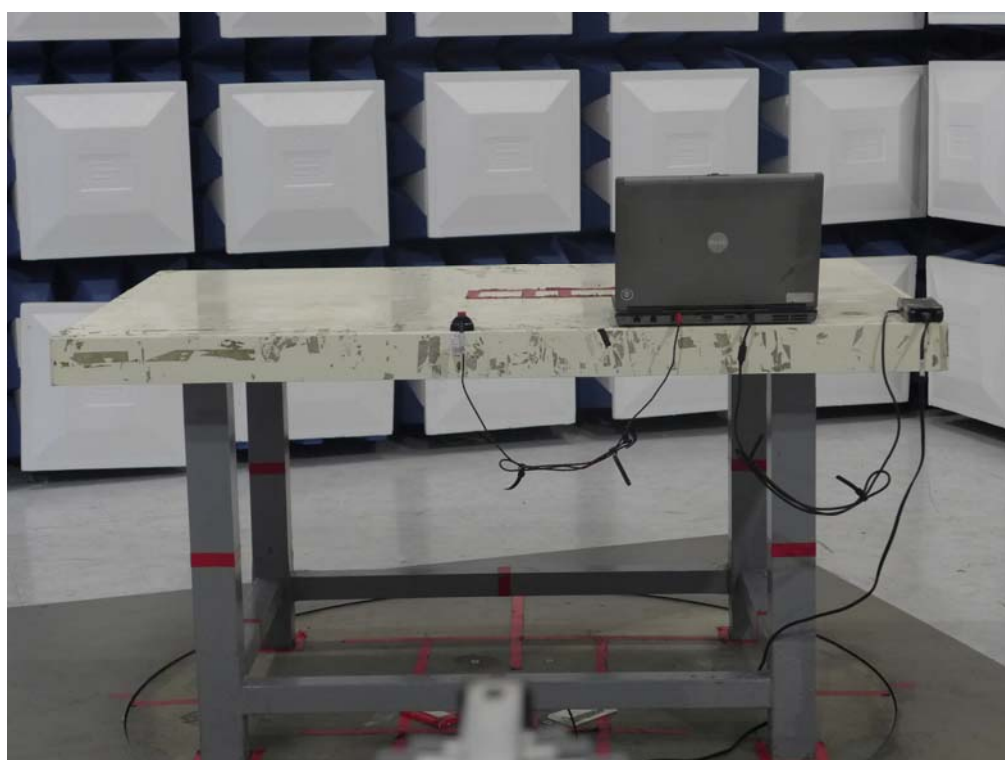
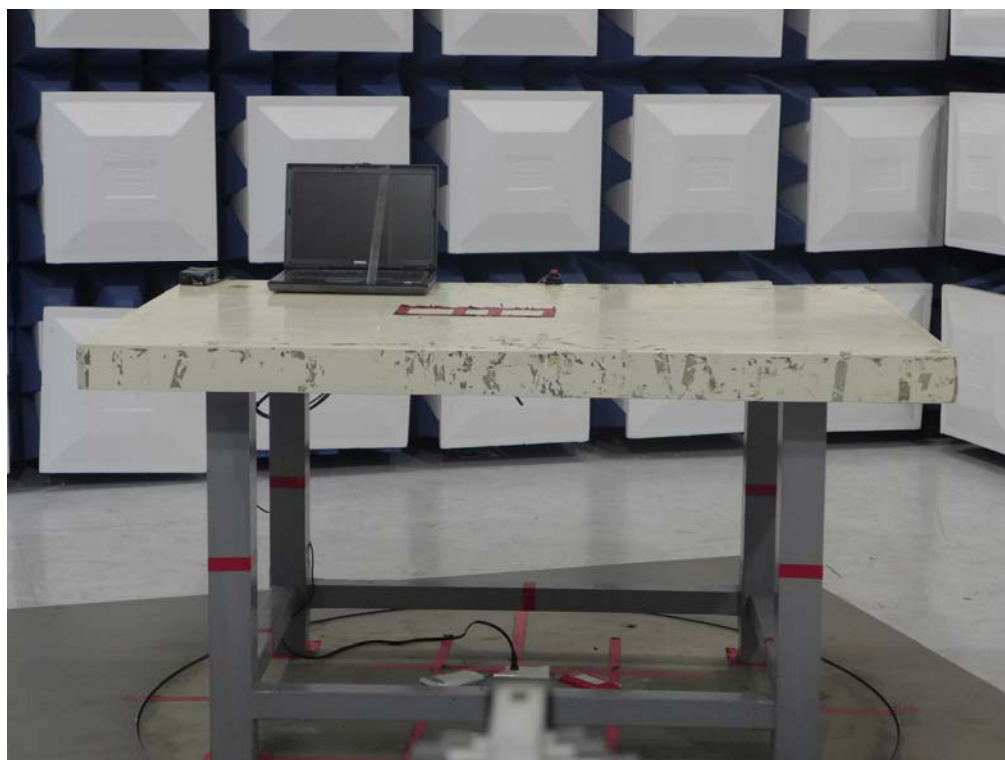
## Radiated Measurement Photos

9KHz to 30MHz



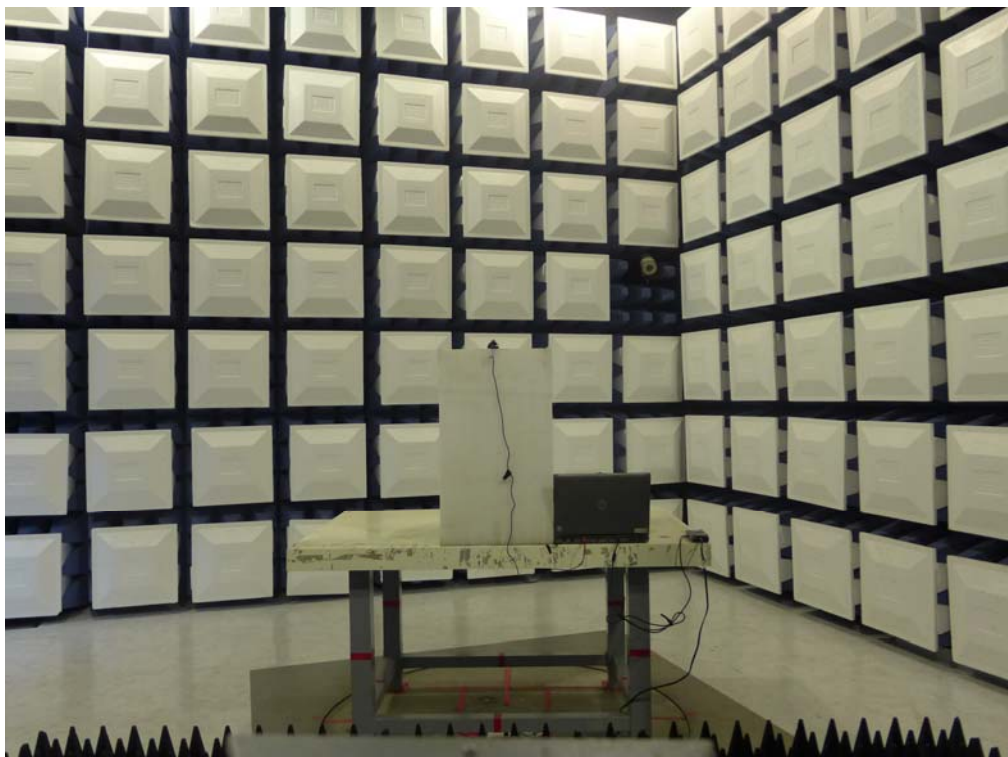
## Radiated Measurement Photos

30M to 1000MHz



## Radiated Measurement Photos

Above 1000MHz

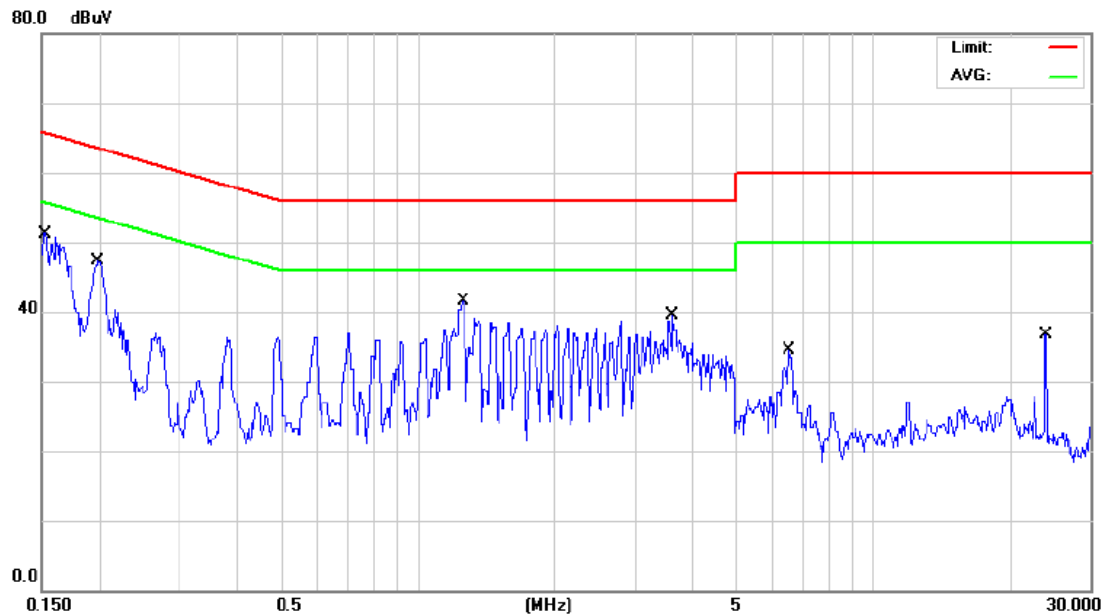


## **ATTACHMENT A - CONDUCTED EMISSION**



Test Mode: TX Mode

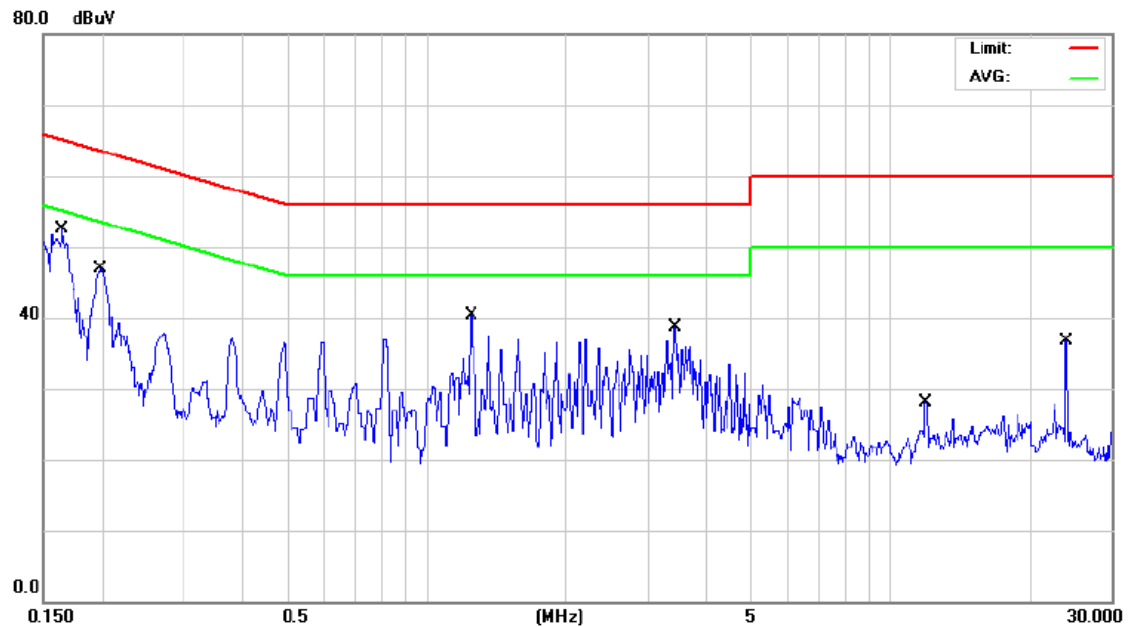
### Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1521	33.90	9.64	43.54	65.88	-22.34	QP	
2		0.1521	32.60	9.64	42.24	55.88	-13.64	AVG	
3		0.1983	34.90	9.63	44.53	63.68	-19.15	QP	
4	*	0.1983	32.70	9.63	42.33	53.68	-11.35	AVG	
5		1.2560	25.00	9.68	34.68	56.00	-21.32	QP	
6		1.2560	13.70	9.68	23.38	46.00	-22.62	AVG	
7		3.6140	24.10	9.80	33.90	56.00	-22.10	QP	
8		3.6140	22.50	9.80	32.30	46.00	-13.70	AVG	
9		6.5500	24.10	9.88	33.98	60.00	-26.02	QP	
10		6.5500	22.50	9.88	32.38	50.00	-17.62	AVG	
11		23.9000	26.30	9.88	36.18	60.00	-23.82	QP	
12		23.9000	26.20	9.88	36.08	50.00	-13.92	AVG	

Test Mode: TX Mode

### Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1640	38.00	9.63	47.63	65.25	-17.62	QP	
2	*	0.1640	37.60	9.63	47.23	55.25	-8.02	AVG	
3		0.1983	35.00	9.63	44.63	63.68	-19.05	QP	
4		0.1983	32.50	9.63	42.13	53.68	-11.55	AVG	
5		1.2470	26.80	9.68	36.48	56.00	-19.52	QP	
6		1.2470	14.10	9.68	23.78	46.00	-22.22	AVG	
7		3.4250	22.50	9.78	32.28	56.00	-23.72	QP	
8		3.4250	20.50	9.78	30.28	46.00	-15.72	AVG	
9		11.9000	14.80	9.88	24.68	60.00	-35.32	QP	
10		11.9000	14.40	9.88	24.28	50.00	-25.72	AVG	
11		23.9000	26.30	9.91	36.21	60.00	-23.79	QP	
12		23.9000	26.20	9.91	36.11	50.00	-13.89	AVG	

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



Test Mode:	TX Mode
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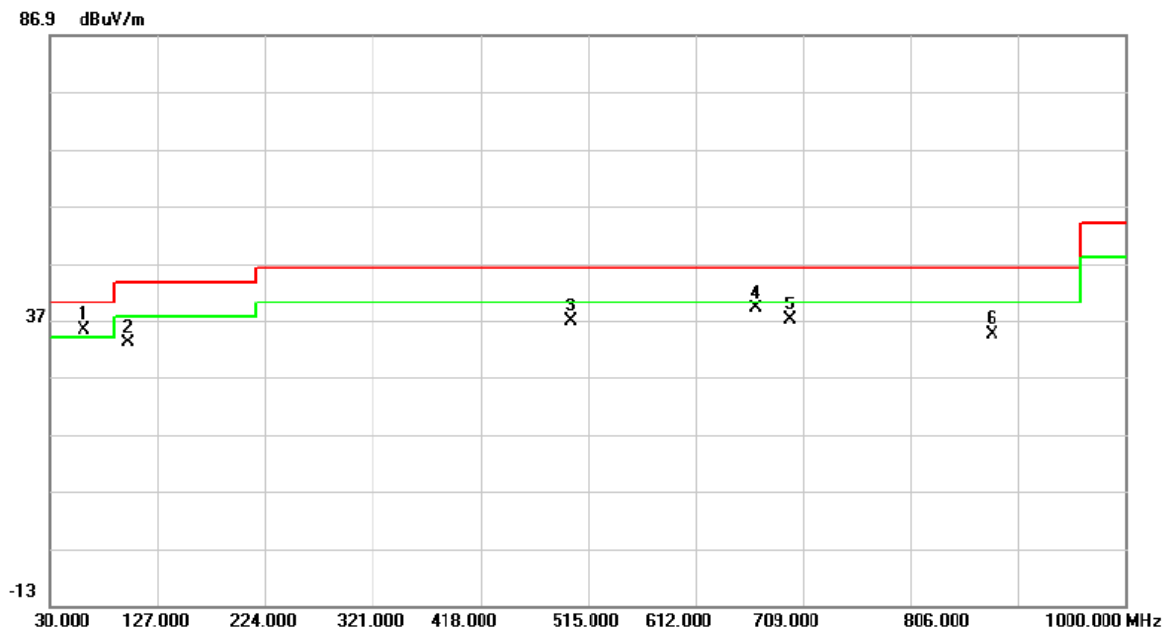
Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Note
0.1230	0°	41.64	11.99	53.63	85.81	-32.17	AVG
0.1230	0°	50.54	11.99	62.53	105.81	-43.27	PK
0.2940	0°	40.24	11.93	52.17	78.24	-26.07	AVG
0.2940	0°	45.25	11.93	57.18	98.24	-41.06	PK
0.4530	0°	38.52	11.95	50.47	74.48	-24.01	AVG
0.4530	0°	49.92	11.95	61.87	94.48	-32.61	PK
0.7430	0°	43.20	12.01	55.21	70.18	-14.97	QP
0.7530	0°	41.25	12.01	53.26	90.18	-36.92	QP
1.3680	0°	38.83	11.93	50.76	64.88	-14.12	QP

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Note
0.1210	90°	40.63	11.99	52.62	85.95	-33.33	AVG
0.1210	90°	53.20	11.99	65.19	105.95	-40.76	PK
0.3040	90°	35.39	11.93	47.32	77.95	-30.63	AVG
0.3040	90°	44.29	11.93	56.22	97.95	-41.73	PK
0.4130	90°	39.50	11.95	51.45	75.29	-23.84	AVG
0.4130	90°	46.38	11.95	58.33	95.29	-36.96	PK
0.6930	90°	43.28	12.00	55.28	70.79	-15.51	QP
0.7490	90°	43.20	12.00	55.20	90.79	-35.59	QP
1.3330	90°	38.58	11.95	50.53	65.11	-14.58	QP

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

Test Mode:	TX 2442MHz
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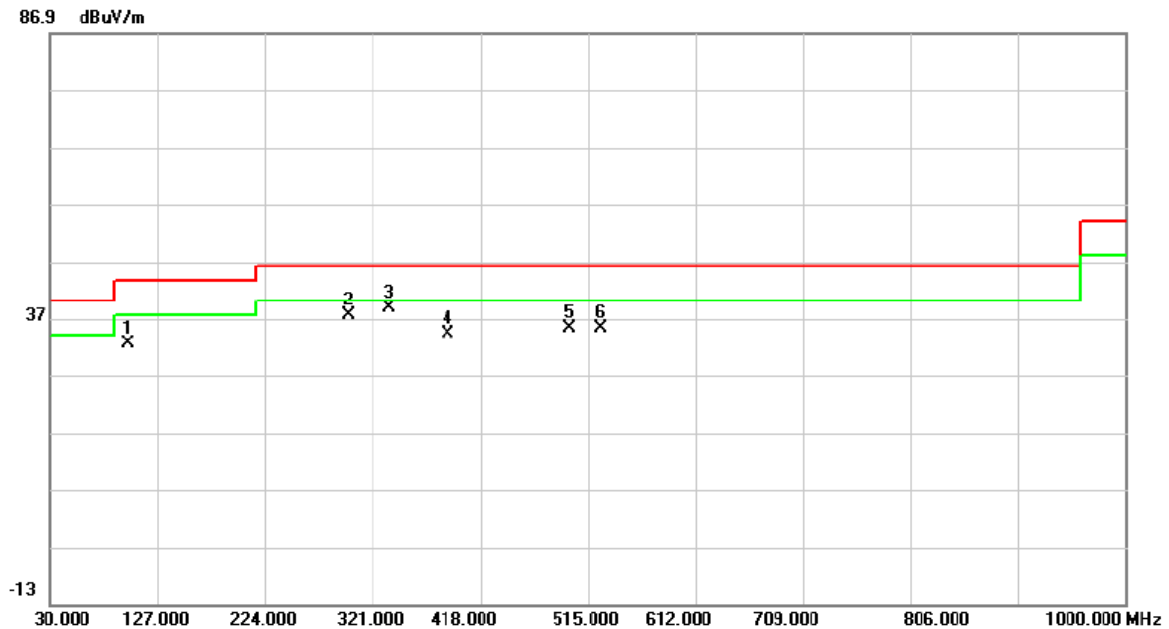
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	60.0700	49.08	-13.85	35.23	40.00	-4.77	peak	
2		99.8400	49.97	-16.91	33.06	43.50	-10.44	peak	
3		500.4500	45.08	-8.21	36.87	46.00	-9.13	peak	
4		666.3200	44.27	-5.21	39.06	46.00	-6.94	peak	
5		698.3300	41.62	-4.53	37.09	46.00	-8.91	peak	
6		879.7200	36.49	-1.91	34.58	46.00	-11.42	peak	

Test Mode:	TX 2442MHz
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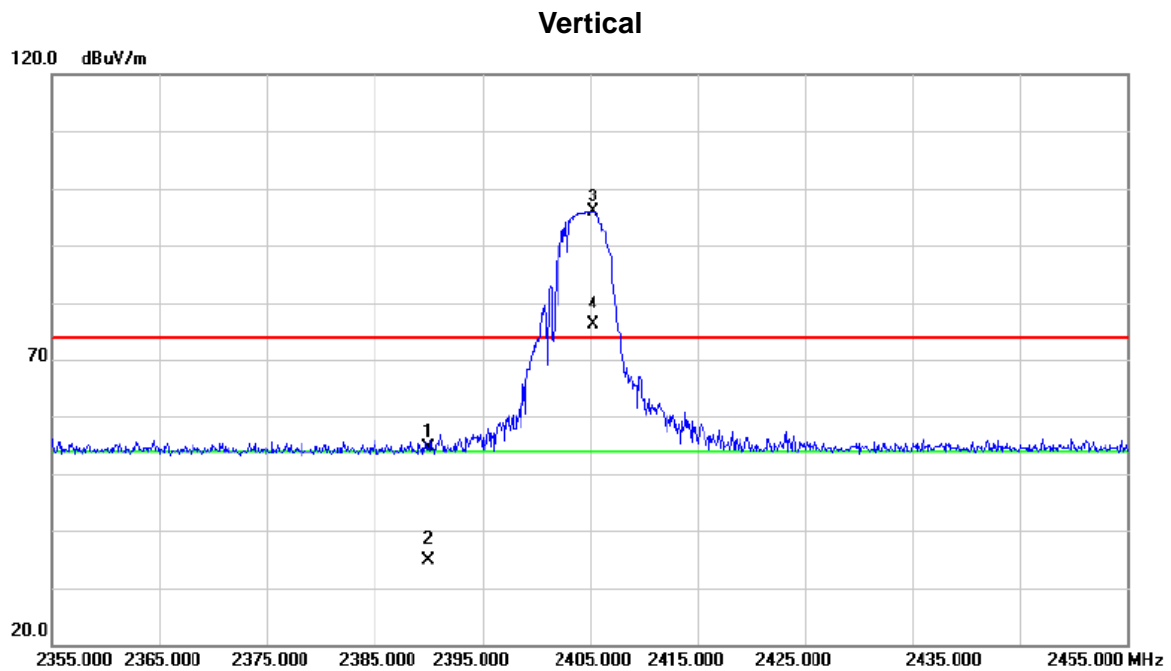
### Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		99.8400	49.43	-16.91	32.52	43.50	-10.98	peak	
2		299.6600	48.86	-11.41	37.45	46.00	-8.55	peak	
3	*	335.5500	49.55	-10.67	38.88	46.00	-7.12	peak	
4		388.9000	44.04	-9.88	34.16	46.00	-11.84	peak	
5		498.5100	43.56	-8.24	35.32	46.00	-10.68	peak	
6		527.6100	43.09	-7.93	35.16	46.00	-10.84	peak	

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

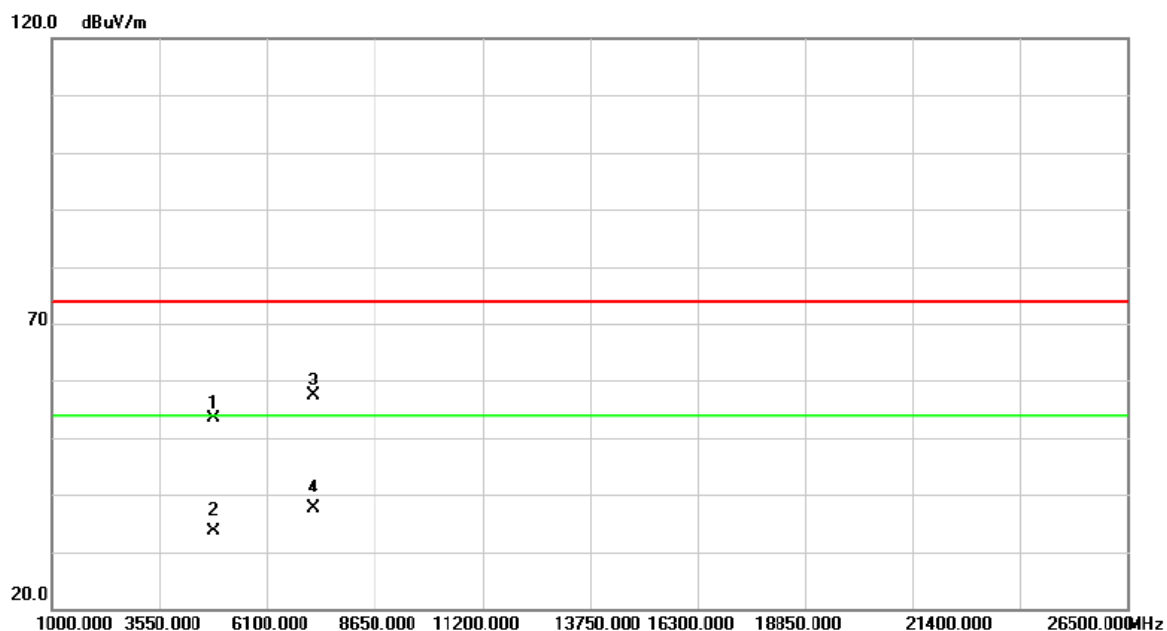
Orthogonal Axis :	X
Test Mode :	TX 2405MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	23.73	30.79	54.52	74.00	-19.48	peak	
2		2390.000	3.98	30.79	34.77	54.00	-19.23	AVG	
3	X	2405.300	65.02	30.84	95.86	74.00	21.86	peak	No limit
4	*	2405.300	45.27	30.84	76.11	54.00	22.11	AVG	No limit

Orthogonal Axis :	X
Test Mode :	TX 2405MHz

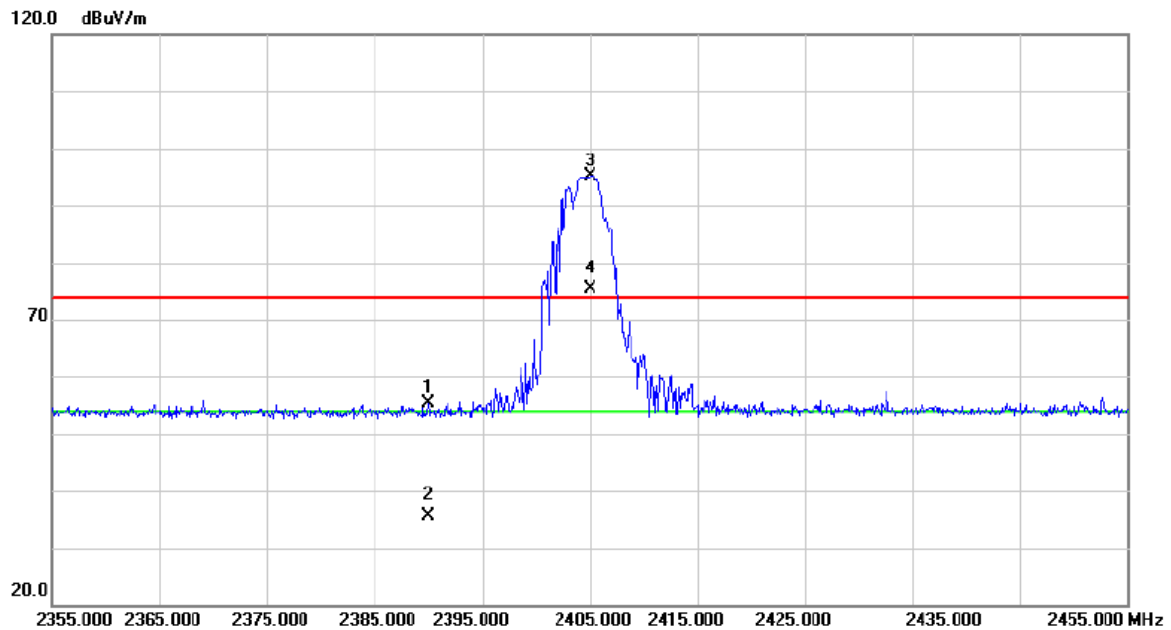
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4810.080	50.02	3.34	53.36	74.00	-20.64	peak	
2		4810.080	30.27	3.34	33.61	54.00	-20.39	AVG	
3		7214.320	49.02	8.41	57.43	74.00	-16.57	peak	
4	*	7214.320	29.27	8.41	37.68	54.00	-16.32	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2405MHz

### Horizontal

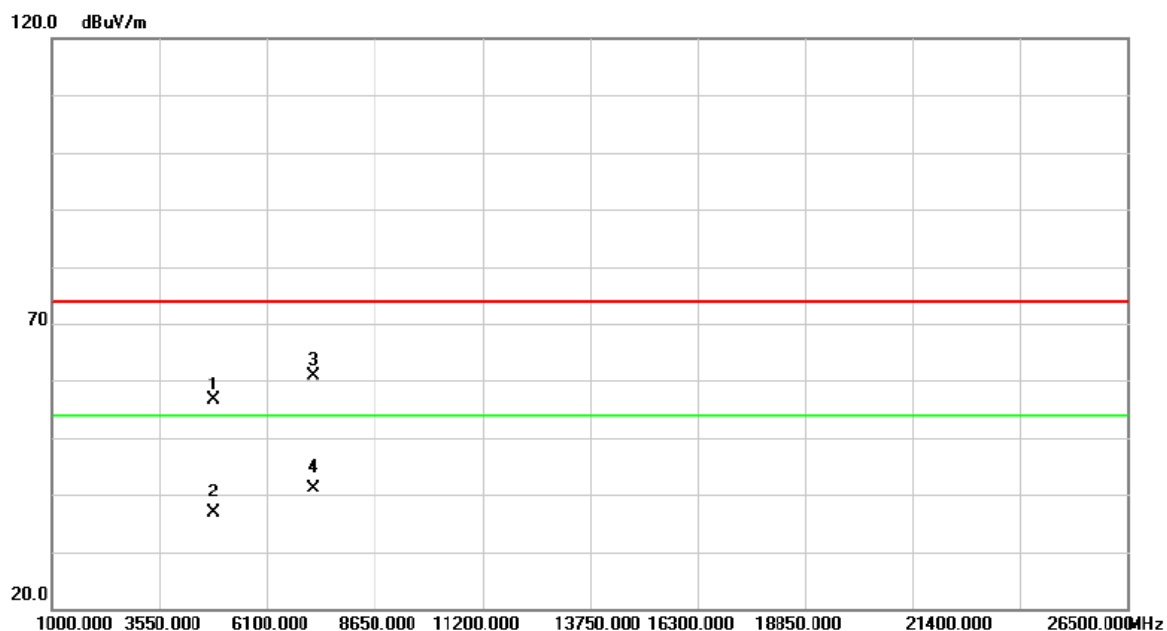


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	24.58	30.79	55.37	74.00	-18.63	peak	
2		2390.000	4.83	30.79	35.62	54.00	-18.38	AVG	
3	X	2405.000	64.20	30.84	95.04	74.00	21.04	peak	No limit
4	*	2405.000	44.45	30.84	75.29	54.00	21.29	AVG	No limit



Orthogonal Axis :	X
Test Mode :	TX 2405MHz

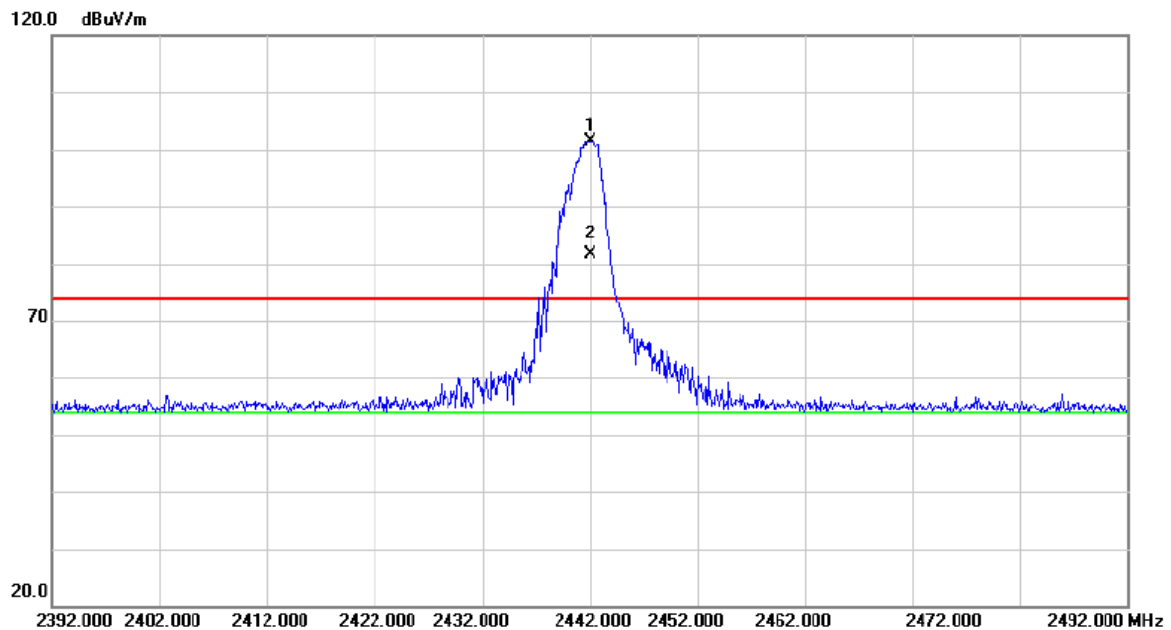
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4809.280	53.18	3.34	56.52	74.00	-17.48	peak	
2		4809.280	33.43	3.34	36.77	54.00	-17.23	AVG	
3		7213.820	52.44	8.41	60.85	74.00	-13.15	peak	
4	*	7213.820	32.69	8.41	41.10	54.00	-12.90	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2442MHz

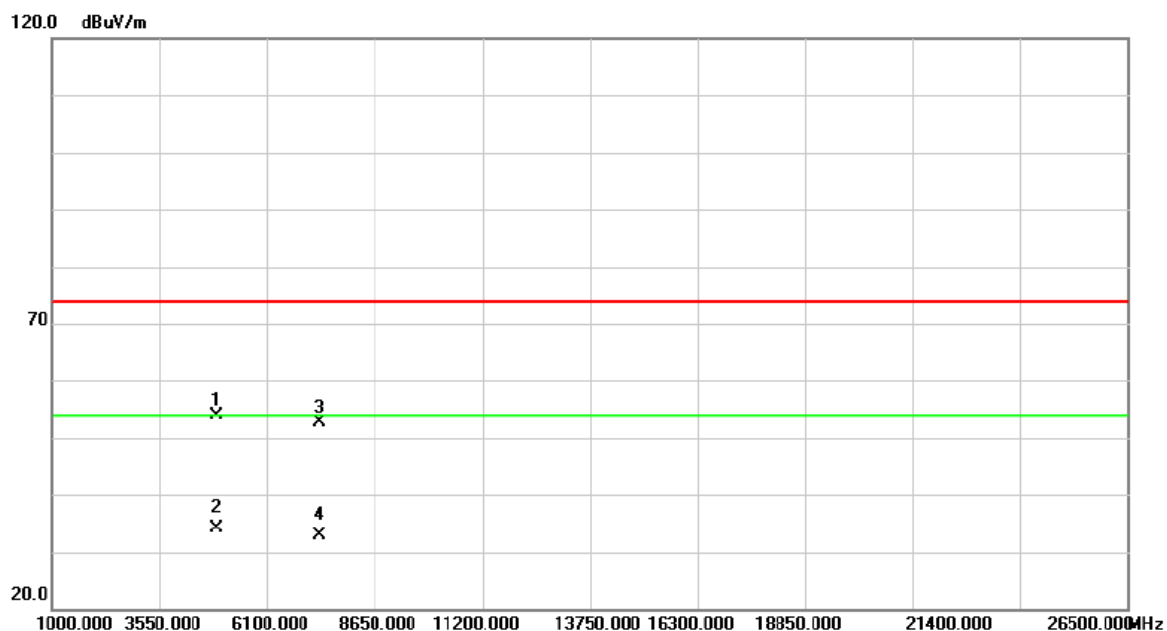
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2442.000	70.50	30.97	101.47	74.00	27.47	peak	No limit
2	*	2442.000	50.75	30.97	81.72	54.00	27.72	AVG	No limit

Orthogonal Axis :	X
Test Mode :	TX 2442MHz

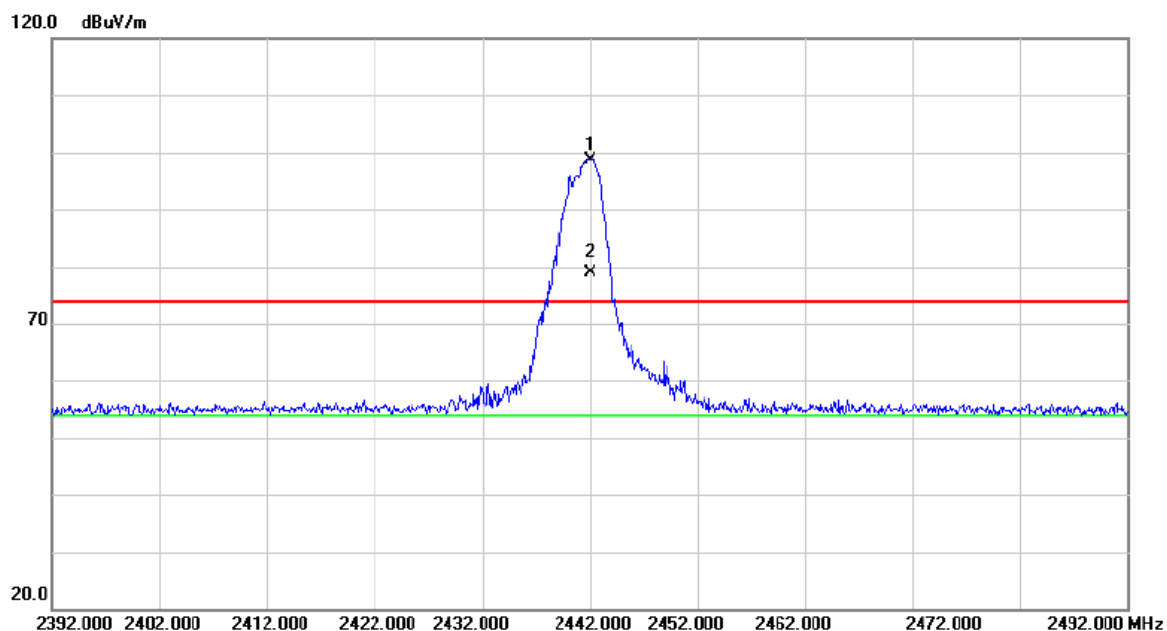
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4884.165	50.40	3.57	53.97	74.00	-20.03	peak	
2	*	4884.165	30.65	3.57	34.22	54.00	-19.78	AVG	
3		7324.895	43.94	8.58	52.52	74.00	-21.48	peak	
4		7324.895	24.19	8.58	32.77	54.00	-21.23	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2442MHz

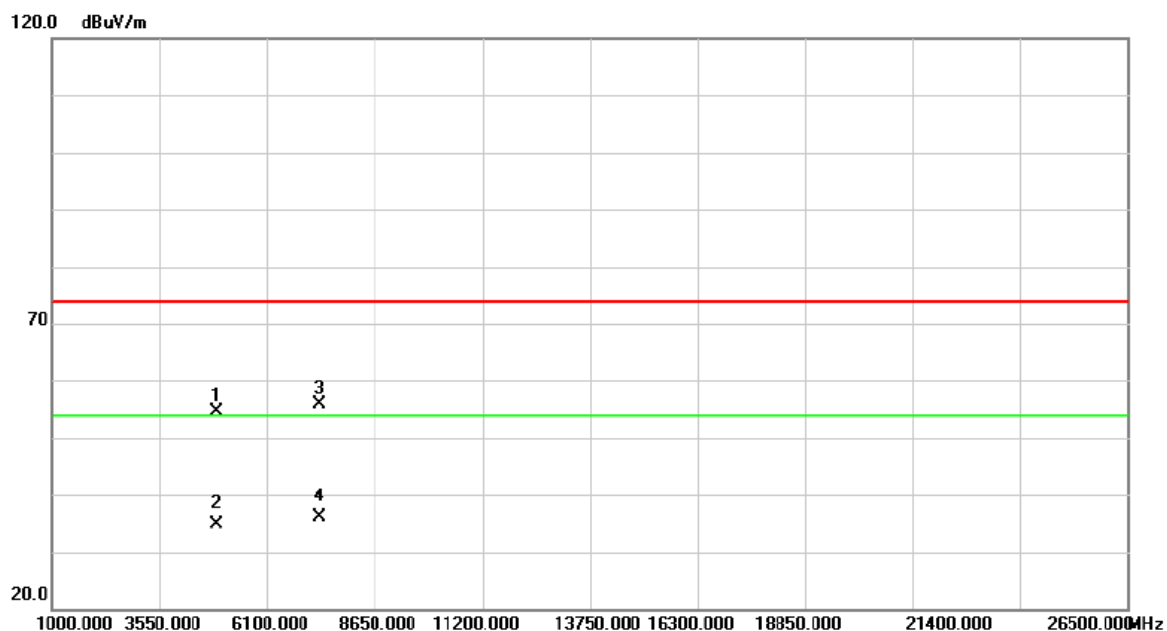
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2442.000	67.78	30.97	98.75	74.00	24.75	peak	No limit
2	*	2442.000	48.03	30.97	79.00	54.00	25.00	AVG	No limit

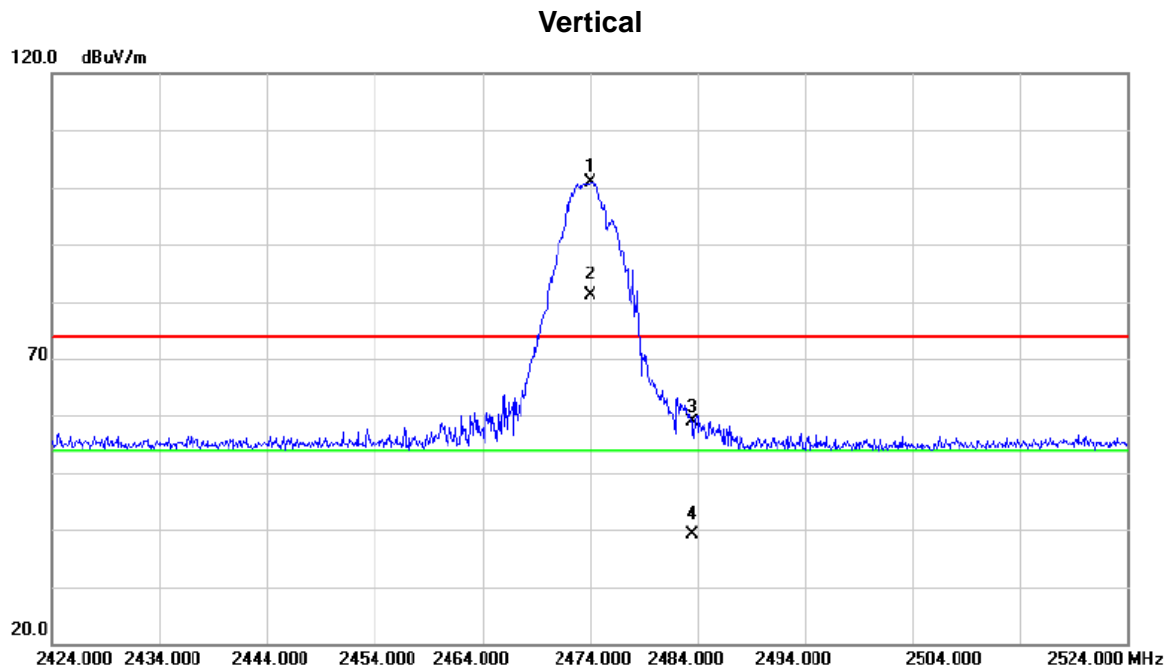
Orthogonal Axis :	X
Test Mode :	TX 2442MHz

### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4883.325	51.06	3.57	54.63	74.00	-19.37	peak	
2		4883.325	31.31	3.57	34.88	54.00	-19.12	AVG	
3		7325.985	47.32	8.58	55.90	74.00	-18.10	peak	
4	*	7325.985	27.57	8.58	36.15	54.00	-17.85	AVG	

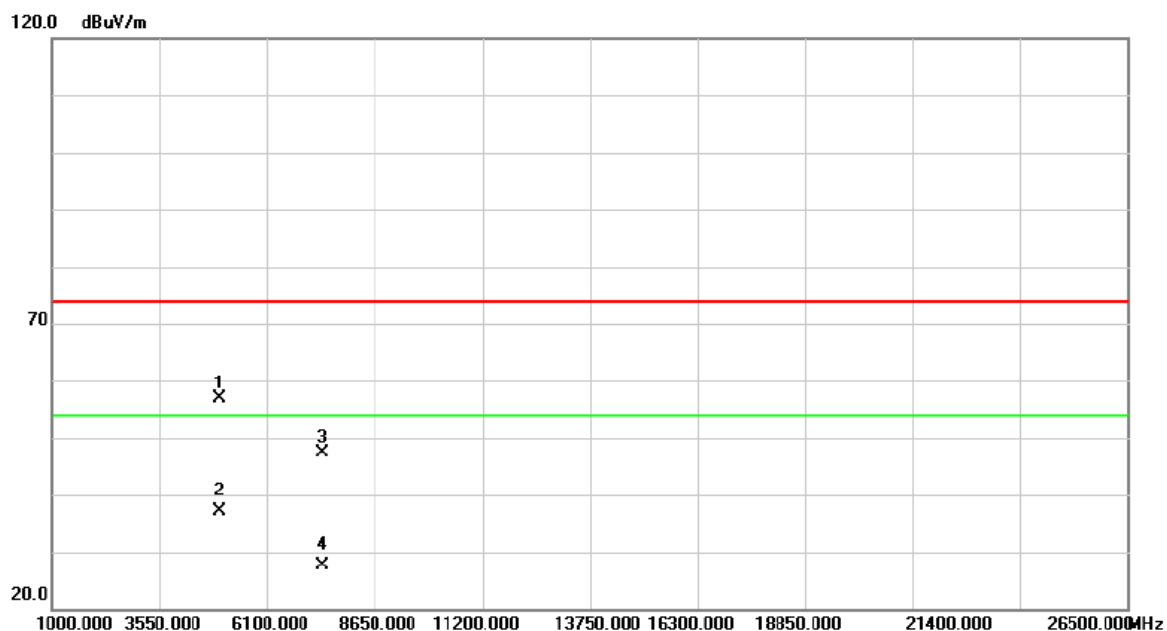
Orthogonal Axis :	X
Test Mode :	TX 2474MHz



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1	X	2474.000	69.70	31.08	100.78	74.00	26.78	peak	No limit
2	*	2474.000	49.95	31.08	81.03	54.00	27.03	AVG	No limit
3		2483.500	27.65	31.11	58.76	74.00	-15.24	peak	
4		2483.500	7.90	31.11	39.01	54.00	-14.99	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2474MHz

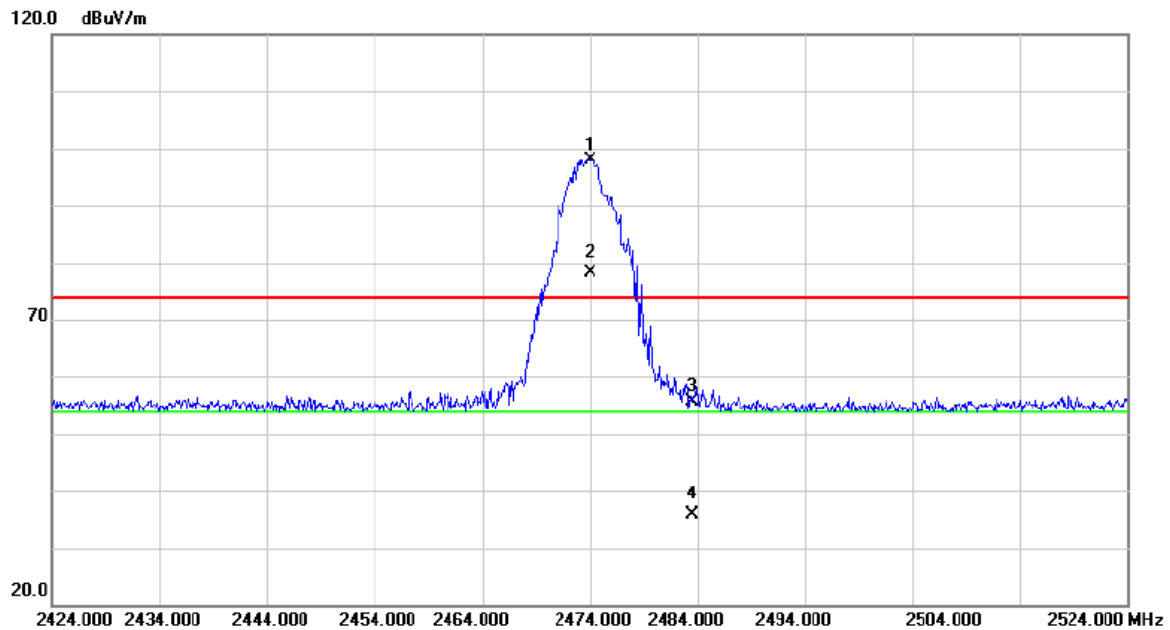
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4947.435	53.13	3.78	56.91	74.00	-17.09	peak	
2	*	4947.435	33.38	3.78	37.16	54.00	-16.84	AVG	
3		7422.070	38.69	8.72	47.41	74.00	-26.59	peak	
4		7422.070	18.94	8.72	27.66	54.00	-26.34	AVG	

Orthogonal Axis :	X
Test Mode :	TX 2474MHz

### Horizontal

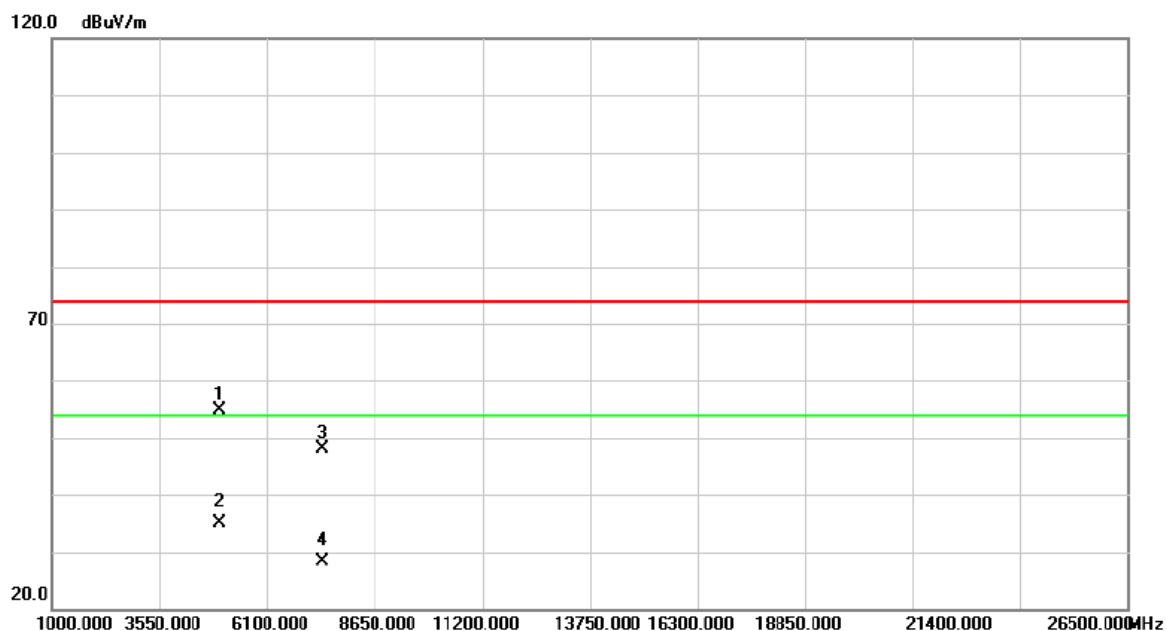


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2474.100	66.87	31.08	97.95	74.00	23.95	peak	No limit
2	*	2474.100	47.12	31.08	78.20	54.00	24.20	AVG	No limit
3		2483.500	24.45	31.11	55.56	74.00	-18.44	peak	
4		2483.500	4.70	31.11	35.81	54.00	-18.19	AVG	



Orthogonal Axis :	X
Test Mode :	TX 2474MHz

### Horizontal

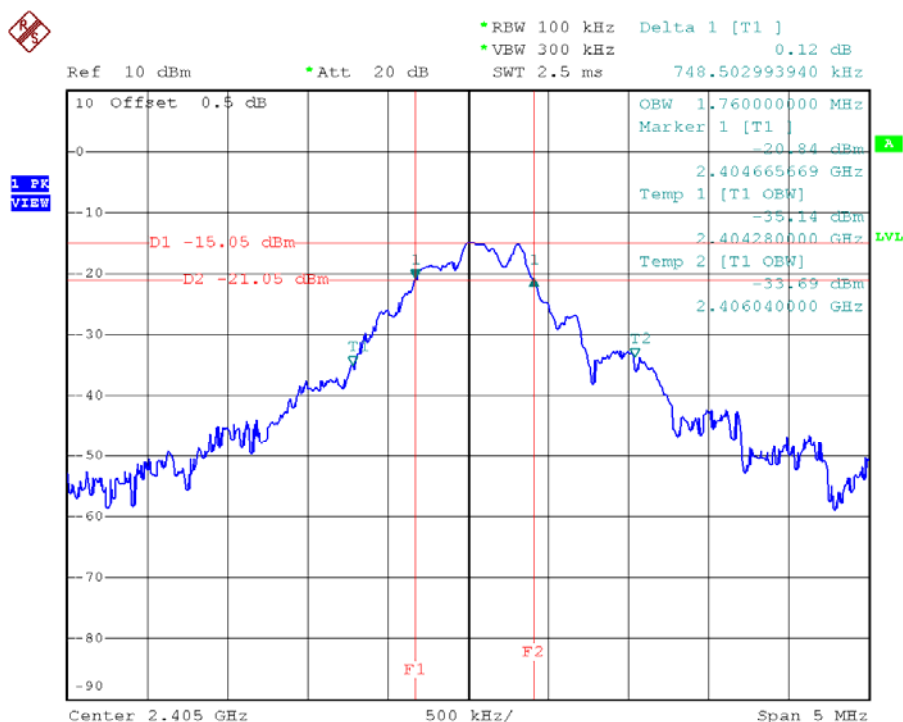


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4948.135	51.19	3.79	54.98	74.00	-19.02	peak	
2	*	4948.135	31.44	3.79	35.23	54.00	-18.77	AVG	
3		7422.205	39.41	8.72	48.13	74.00	-25.87	peak	
4		7422.205	19.66	8.72	28.38	54.00	-25.62	AVG	

## **ATTACHMENT E - BANDWIDTH**

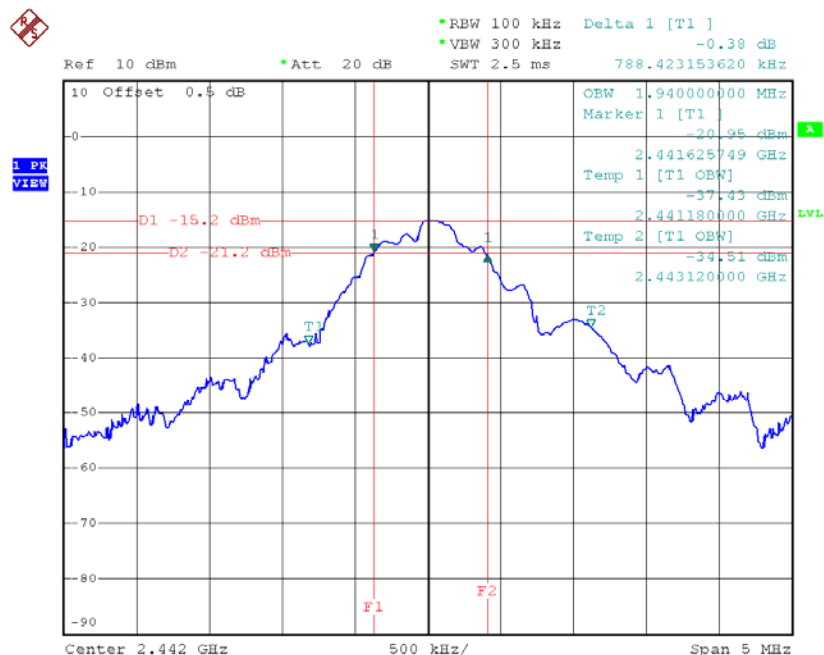
Frequency	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
2405 MHz	0.75	1.76	$\geq 500$ kHz	PASS
2442 MHz	0.79	1.94	$\geq 500$ kHz	PASS
2474 MHz	0.82	1.72	$\geq 500$ kHz	PASS

### TX CH01



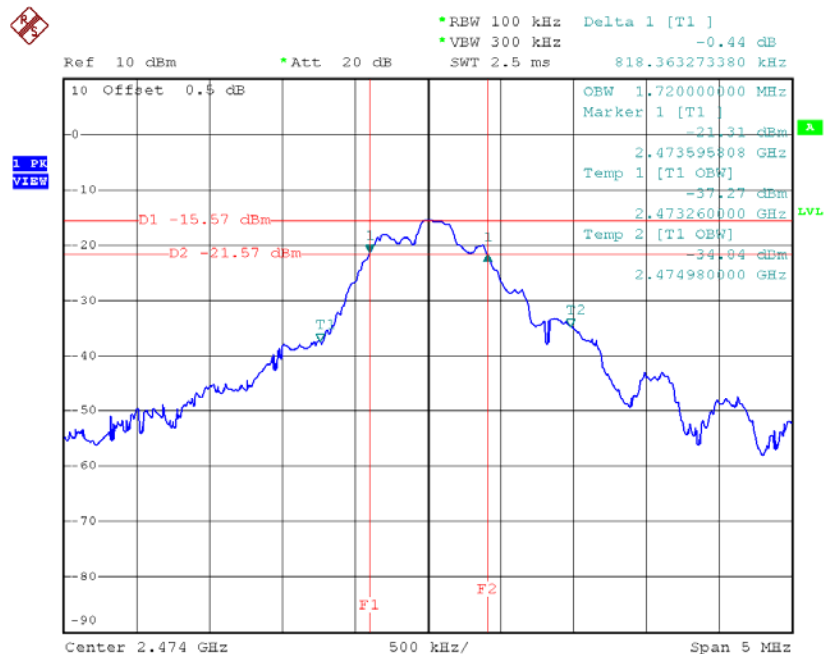
Date: 17.JUN.2015 12:32:10

# TX CH07



Date: 17.JUN.2015 12:38:32

# TX CH12



Date: 17.JUN.2015 12:41:38

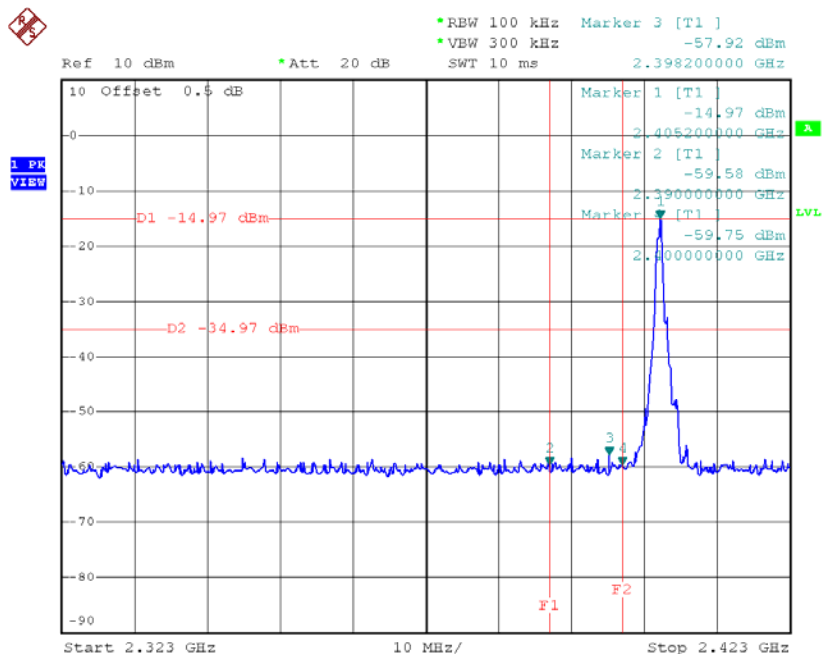
## **ATTACHMENT F - MAXIMUM OUTPUT POWER TEST**

Frequency	Output Power (dBm)	LIMIT (dBm)	Result
2405 MHz	-1.66	30	PASS
2442 MHz	-1.74	30	PASS
2474 MHz	-1.88	30	PASS

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

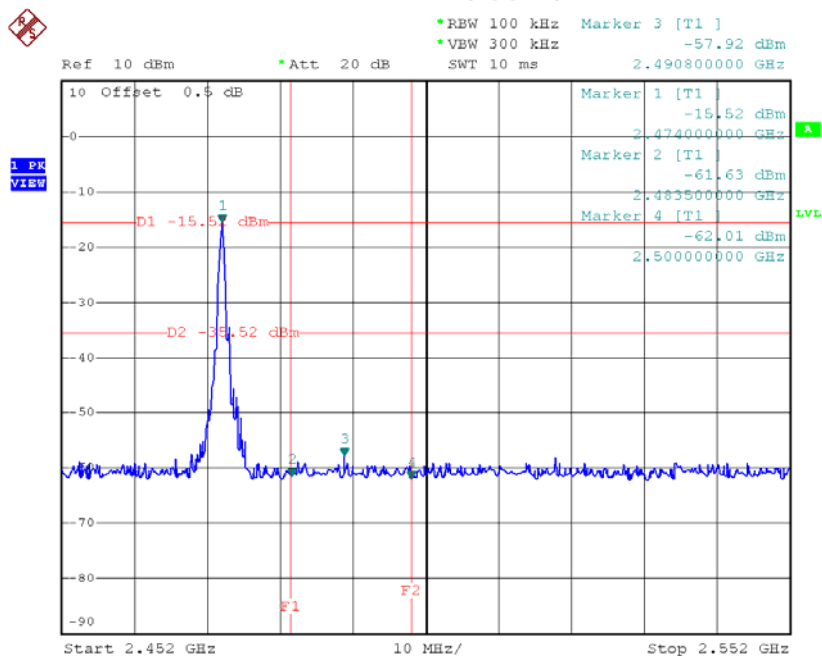
Test Mode : CH01, CH07 , CH12

### CH01 (Lower)



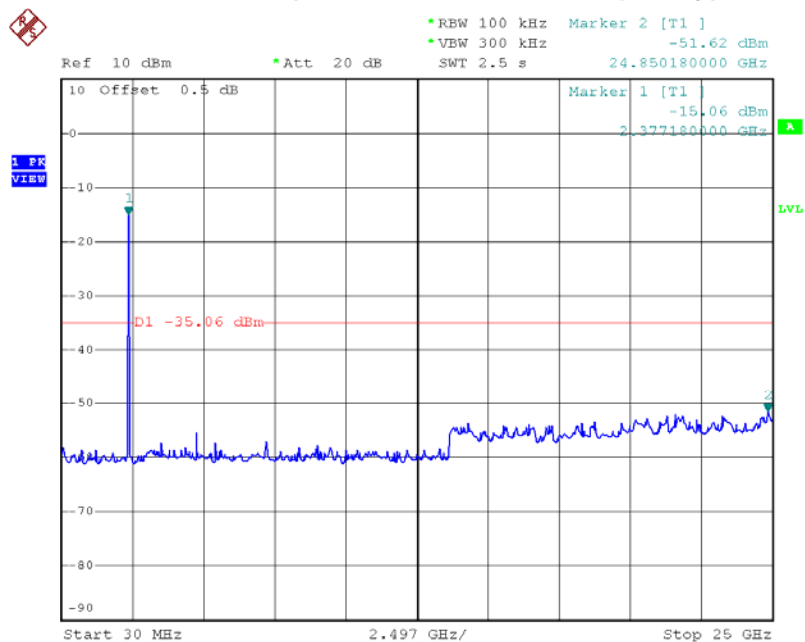
Date: 17.JUN.2015 12:32:35

### CH12 (upper)



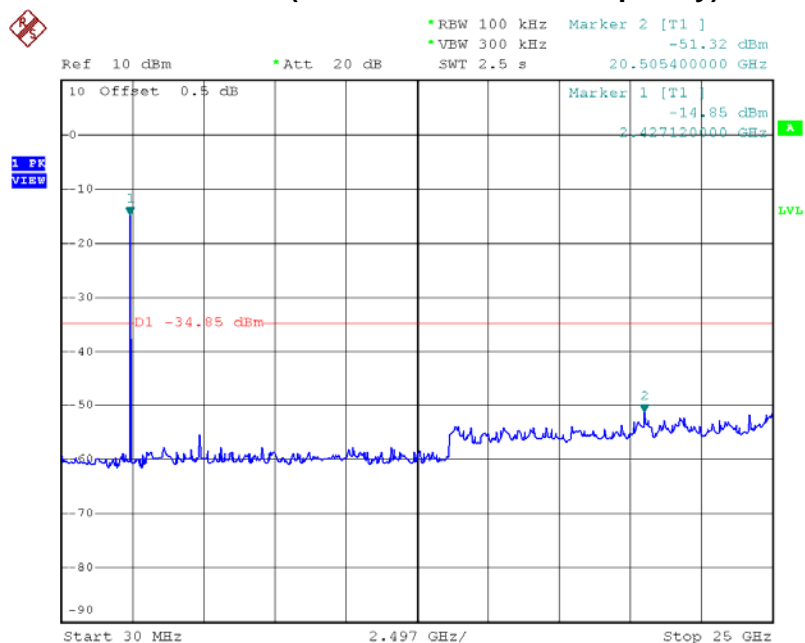
Date: 17.JUN.2015 12:41:57

### CH01 (10 Harmonic of the frequency)



Date: 17.JUN.2015 12:23:56

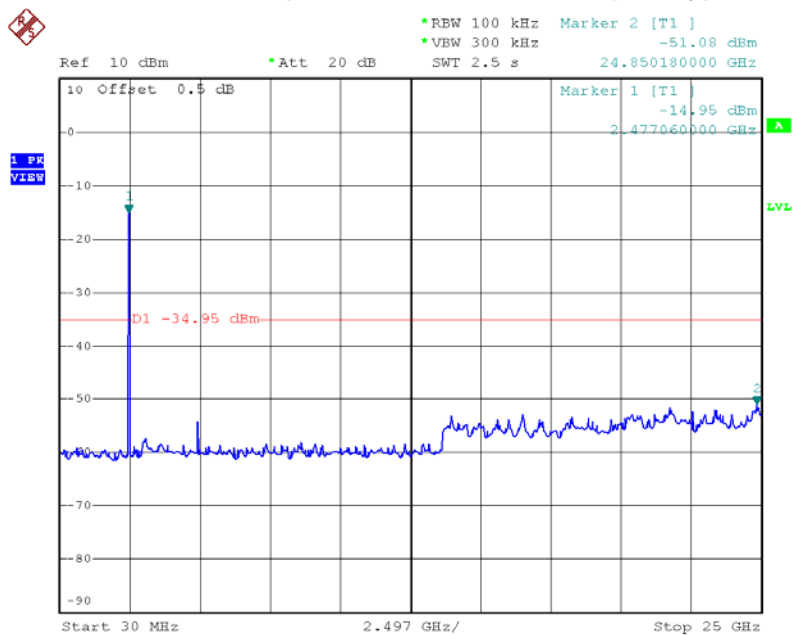
### CH07 (10 Harmonic of the frequency)



Date: 17.JUN.2015 12:24:42



# CH12 (10 Harmonic of the frequency)

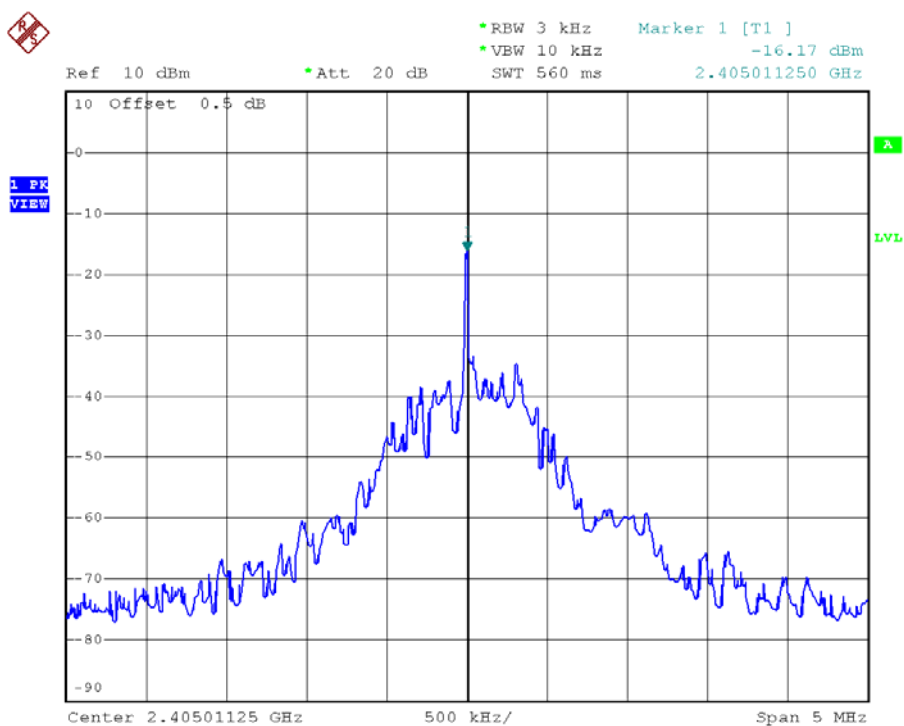


Date: 17.JUN.2015 12:25:16

## **ATTACHMENT H - POWER SPECTRAL DENSITY TEST**

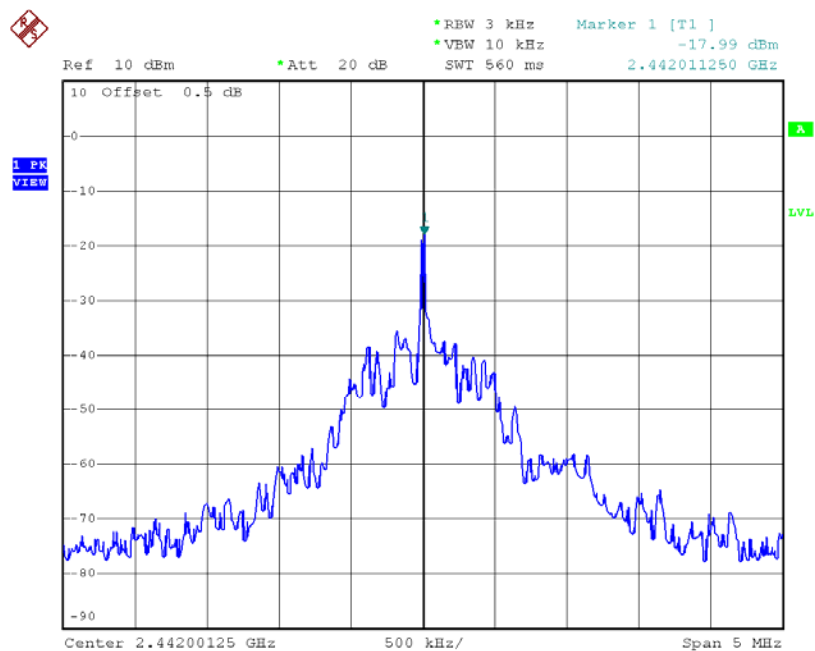
Frequency	Power Density (dBm)	Limit (dBm)	Result
2405 MHz	-16.17	8	PASS
2442 MHz	-17.99	8	PASS
2474 MHz	-19.59	8	PASS

### TX CH01



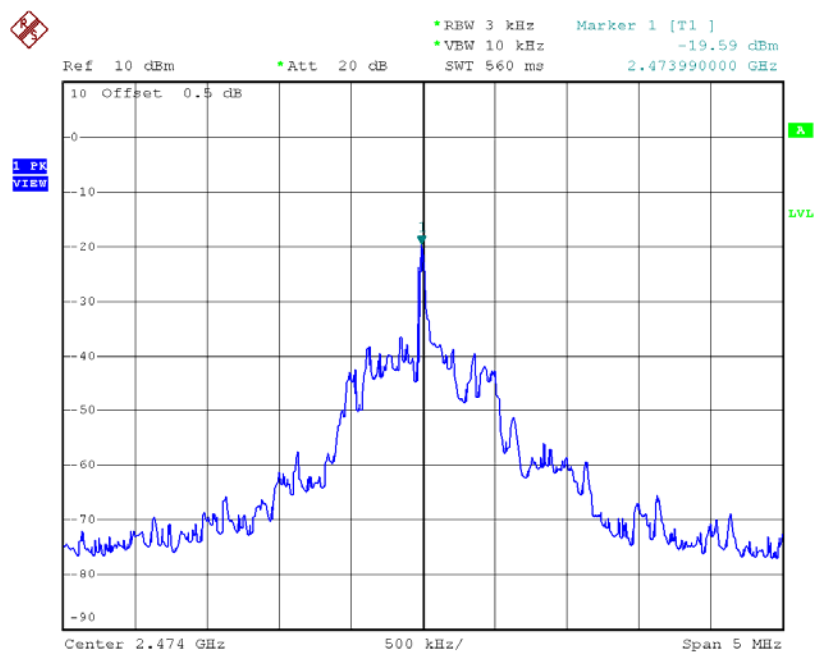
Date: 17.JUN.2015 12:34:06

# TX CH07



Date: 17.JUN.2015 12:40:48

# TX CH12



Date: 17.JUN.2015 12:42:41