

# FCC Radio Test Report

## FCC ID: O57TB3710I

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

**Project No.** : 1512C068  
**Equipment** : Portable Tablet Computer  
**Model Name** : Lenovo TB3-710I  
**Applicant** : LENOVO (SHANGHAI) ELECTRONICS  
TECHNOLOGY CO LTD  
**Address** : NO 68 BUILDING 199 FENJU RD, CHINA  
(SHANGHAI) PILOT FREE TRADE ZONE,  
SHANGHAI, 200131 CHINA

**Date of Receipt** : Dec. 08, 2015  
**Date of Test** : Dec. 08, 2015~Dec. 24, 2015  
**Issued Date** : Dec. 25, 2015  
**Tested by** : BTL Inc.

**Technical Engineer** : Shawn Xiao  
(Shawn Xiao)

**Authorized Signatory** : Steven Lu  
(Steven Lu)

# **B T L I N C .**

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan,  
Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

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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-1-1512C068	Original Issue.	Dec. 25, 2015

## 1. CERTIFICATION

Equipment : Portable Tablet Computer  
Brand Name : Lenovo  
Model Name : Lenovo TB3-710I  
Applicant : LENOVO (SHANGHAI) ELECTRONICS TECHNOLOGY CO LTD  
Manufacturer : Lenovo PC HK Limited  
Address : 23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong  
Date of Test : Dec. 08, 2015~Dec. 24, 2015  
Test Sample : Engineering Sample  
Standard(s) : FCC Part15, Subpart C : 2014 (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-1-1512C068) 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).

**Test result included in this report is only for the BT part**

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

<b>Applied Standard(s): 47 CFR Part 15, Subpart C: 2014;</b>			
Standard(s) Section	Test Item	Judgment	Tested By
15.207	Conducted Emission	PASS	Robert Luo
15.247(d)	Antenna conducted Spurious Emission	PASS	Allen Li
15.247 (a)(1)	Hopping Channel Separation	PASS	Allen Li
15.247(a)(1)	Bandwidth	PASS	Allen Li
15.247 (b)(1)	Peak Output Power	PASS	Allen Li
15.247(d) 15.209	Radiated Spurious Emission	PASS	Robert Luo
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS	Allen Li
15.247 (a)(1)(iii)	Dwell Time	PASS	Allen Li
15.205	Restricted Bands	PASS	Allen Li
15.203	Antenna Requirement	PASS	-

Note:

(1) "N/A" denotes test is not applicable in this test report

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 319330

## 2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

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

### A. Conducted Measurement :

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

### B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03 (3m)	CISPR	9KHz~30MHz	V	3.79
		9KHz~30MHz	H	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	H	3.78
		200MHz ~ 1,000MHz	V	4.10
		200MHz ~ 1,000MHz	H	4.06
		1GHz~18GHz	V	3.12
		1GHz~18GHz	H	3.68
		18GHz~40GHz	V	4.15
		18GHz~40GHz	H	4.14

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

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	Portable Tablet Computer	
Brand Name	Lenovo	
Model Name	Lenovo TB3-710I	
Model Difference	This model has two configurations: main supply, secondary supply. Please refer to note 3.	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps) $\pi$ /4-DQPSK(2Mbps)
	Bit Rate of Transmitter	8-DPSK(3Mbps)
	Output Power Max.	2.15 dBm(1Mbps) 2.09 dBm(3Mbps)
Power Source	#1 DC voltage supplied from AC/DC adapter. #2 Supplied from USB port. #3 Supplied from rechargeable Li-Polymer battery.	
Power Rating	Please refer to note 2	

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Huntkey	C-P56	I/P: 100-240V~ 50/60Hz, 0.15A O/P: 5.0V, 1.0A
	Acbel	C-P56	I/P: 100-240V~ 50/60Hz, 0.13A O/P: 5.0V, 1.0A
Battery	lenovo (SUNWODA)	L13D1P31	3.8VDC, 3450mAh
	lenovo (SCUD)	L13D1P31	3.8VDC, 3450mAh
USB Cable	LIQI	L16B-05100070L	70cm shielded cable w/o core

3.

Main Supply			
Part Name	Model Name	Description	Supplier
PCB--MB	A1901_MB_PCB_V4.0_HF	A1901_PCB_V4.0	HUASHEN
Baseband chip	MT8321A/B	WCDMA	MTK
PMIC	MT6350V/A	-	MTK
PA	AP7169-R95MOG	RFPA_3G_two in one PA_BANDS I, II, III, IV, V, VIII	Airoha
	AP6690-R95MOG	RFPA_850/900/1800/1900/TD1900/TD2010	Airoha
Duplexer	RFDIP1608060TM7T62	Electromagnetic interference two-way stopband filters_ 1.575 GHz/2.4 GHz/5GHz	Walsin
	SAYFH897MHA0F00	Electromagnetic interference two-way stopband filters_ W900	MURATA
	SAYFH836MCC0F0A	Electromagnetic interference two-way stopband filters_ band5_ W850	MURATA
	SAYRF1G88CA0B0A	Electromagnetic interference two-way stopband filters_ band2_ W1900	MURATA
	SAYRF1G95HQ0F0A	Electromagnetic interference two-way stopband filters_ band1_ W2100	MURATA
	MDBF21L914H1897M-DB02H	Electromagnetic interference difference converter_ GSM850/GSM900/DCS1800/PCS1900	MICROGATE
G-sensor	KXTJ2-1009		Kionix
EMMC+DDR3	KMF820012M-B305	MCP_16GB-eMMC_8Gb-LPDDR3	Samsung
Crystal	7L26002009	26M_0.5ppm_2.8V_2520	TXC
audio frequency amplifier	AW8155AFCR	AB type/Dype_sigle-way	Awinic
RF Switch	SKY13489-001	RF Switch_SPDT	Skyworks
LNA	WS7916	GPS_LNA	Will
SAW FILTER	SAFFB1G56KB0F0A	GPS BEIDOU_RX1109	MURATA
TP	TTCT070121	A1900A	Top-Touch
LCD	TXDT700EPLA-68	7Inch_1024*600	TXD
Camera_Front	BLX0A20H-A1900-F	Camera_5x5x2.95mm_30w	BRODSANDS
Camera_Back	BLX2508H-A1900-B	Camera_6.5x6.5x4.2mm_200w	BRODSANDS
5M AF(3G)	O9B5-AW1507BHQ	Camera_8.5*8.5*4.66mm_500W	HUAQUAN
MIC	OB-F15LX42-1592-C10C33EP	-	HUAFENG
Motor(3G)	HZF-Z04B-RL126B20-90	-	HONGZHIFA
SPK	XHS151118SW43P38-02	-	HAOSHENG
Battery	L13D1P31	3450mAh	SUNWODA
Adapter(US)	C-P56	5V/1A	Huntkey
USB Cable	L16B-05100070L	70cm	LIQI

Secondary Supply			
Part Name	Model Name	Description	Supplier
PCB--MB	A1901_MB_PCB_V4.0_HF	A1901_PCB_V4.0	HUASHEN
G-sensor	BMA253		Bosch
EMMC+DDR3	H9TQ17A8GTMCUR-KUM	MCP_16GB-eMMC_8Gb-LPDDR3	Hynix
Crystal	X1E000021043400	26M_10ppm_7.4pF_3225	Epson Toyocom
TP	YCB0880700801A	A1900A	YEJI
LCD	KD070D54-39NH-B2	7Inch_1024*600	GUOXIAN
Camera_Front	GI5953A1D-1P0J0	Camera_5x5x2.95mm_30w	QUNHUI
Camera_Back	GV5954B1S-1P0J0	Camera_6.5x6.5x4.25_200w	QUNHUI
5M AF(3G)	HNW5889B1S-0P0J0	Camera_8.5*8.5*4.66mm_500W	QUNHUI
MIC	CM4015BC-423-WR138	-	JINZUN
Motor(3G)	CY0408L-021HB-047	-	KUNWANG
SPK	KFSC1115G3.5-08-0.7W-D	-	XICHUN
Battery	L13D1P31	3450mAh	SCUD
Adapter(US)	C-P56	5V/1A	Acbel
USB Cable	R16B-05100070	70cm	RIDONGSHENG

4. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

5 Table for Filed Antenna

Ant.	Mfr/Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	0.48

### 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 Emission	
Final Test Mode	Description
Mode 1	TX Mode

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

**Note:**

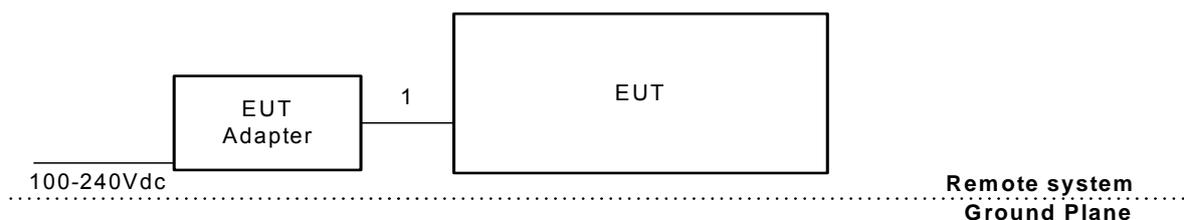
- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.
- (3) The EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test

### 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 FHSS

Test Software Version	NA		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	6	6	6
Parameters(3Mbps)	6	6	6

### 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
1	YES	NO	0.7m	USB Cable

## 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 pea	Quasi-peak
0.15 -0.5	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	50

Note:

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

The following table is the setting of the receiver

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

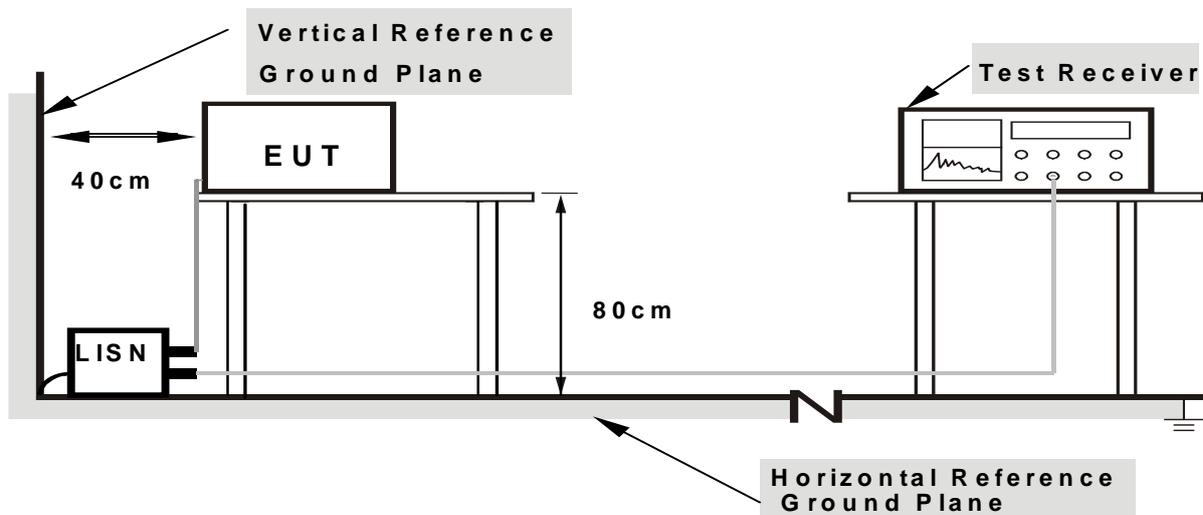
#### 4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support 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: 24°C

Relative Humidity: 56%

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.

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 RADIATED EMISSION LIMITS (Frequency Range 9KHz -1000MHz)

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.

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)	dB(uV/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)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

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

#### 4.2.2 TEST PROCEDURE

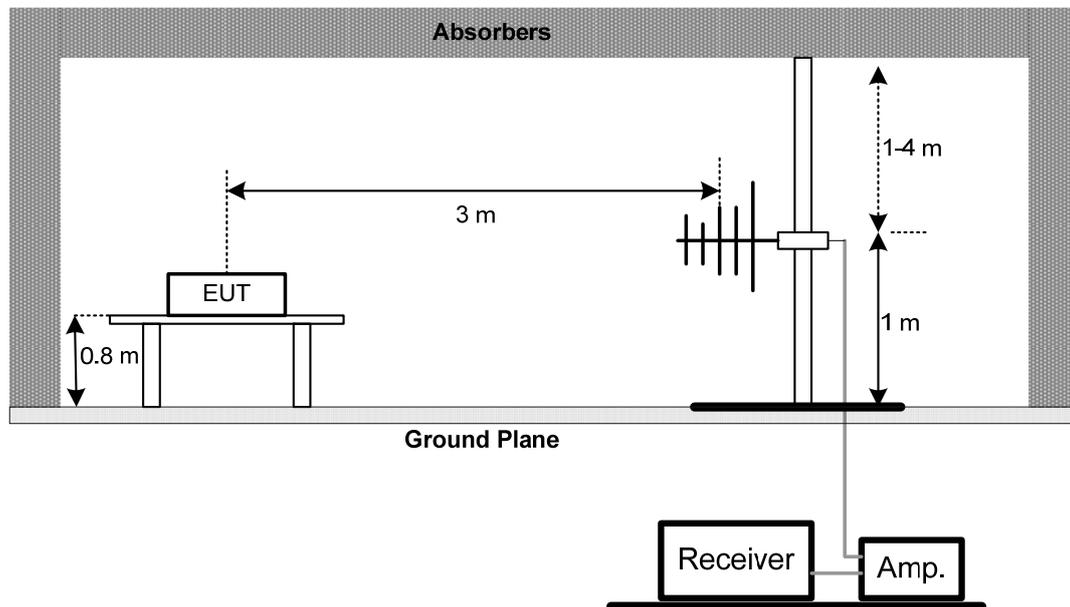
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance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

#### 4.2.3 DEVIATION FROM TEST STANDARD

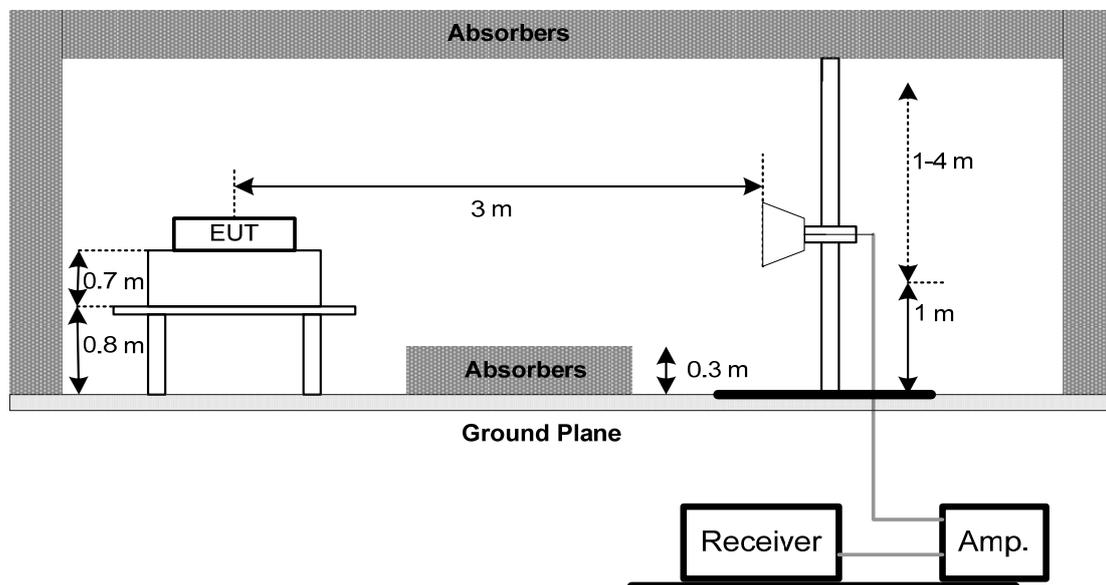
No deviation

#### 4.2.4 TEST SETUP

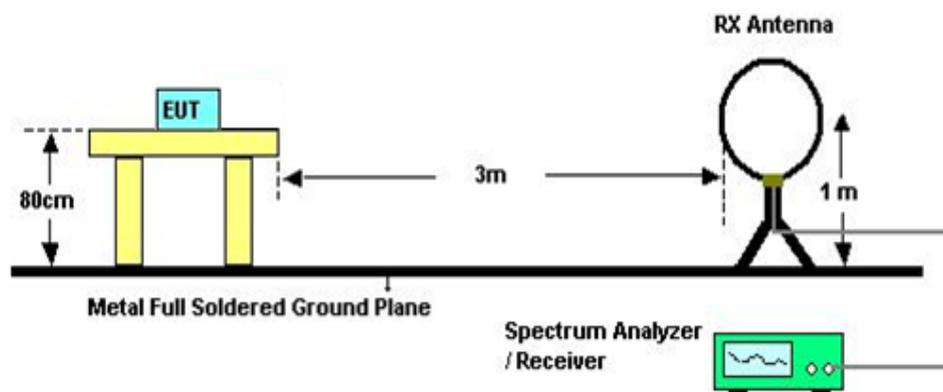
##### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



##### (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: 24°C

Relative Humidity: 56%

Test Voltage: AC 120V/60Hz

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

Please refer to the Attachment B

Remark:

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

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

Please refer to the Attachment C.

Remark:

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

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

Please refer to the Attachment D.

Remark:

- (1) 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. NUMBER OF HOPPING CHANNEL

### 5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(1)(iii)	Number of Hopping Channel	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	100 KHz
VBW	100 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

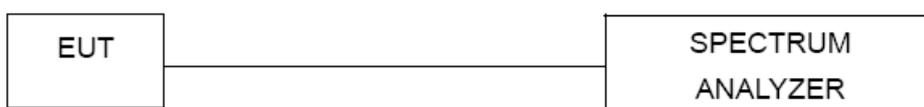
#### 5.1.1 TEST PROCEDURE

- 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=100KHz, Sweep time = Auto.

#### 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. AVERAGE TIME OF OCCUPANCY

### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

#### 6.1.1 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- h. Measure the maximum time duration of one single pulse.
- i. DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds.
- j. DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds.
- k. DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds.

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



#### **6.1.4 EUT OPERATION CONDITIONS**

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

#### **6.1.5 EUT TEST CONDITIONS**

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V/60Hz

#### **6.1.6 TEST RESULTS**

Please refer to the Attachment F

## 7. HOPPING CHANNEL SEPARATION MEASUREMENT

### 7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 KHz
VBW	100 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

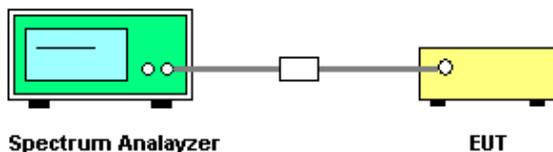
#### 7.1.1 TEST PROCEDURE

- a. The EUT must have its hopping function enabled
- b. Span = wide enough to capture the peaks of two adjacent channels  
 Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span  
 Video (or Average) Bandwidth (VBW)  $\geq$  RBW  
 Sweep = Auto  
 Detector function = Peak  
 Trace = Max Hold

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



#### 7.1.4 EUT TEST CONDITIONS

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

#### 7.1.5 TEST RESULTS

Please refer to the Attachment G

## 8. BANDWIDTH TEST

### 8.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Frequency Range (MHz)
15.247(a)(2)	Bandwidth	2400-2483.5

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 KHz (20dB Bandwidth) / 30 KHz (Channel Separation)
VBW	100 KHz (20dB Bandwidth) / 100 KHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 8.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, 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. PEAK OUTPUT POWER TEST

### 9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(1)	Peak Output Power	1 Watt or 30dBm ( hopping channel >75) 0.125Watt or 21dBm (hopping channel <75)	2400-2483.5	PASS

#### 9.1.1 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= 1MHz/3MHz, VBW= 1MHz/3MHz, Sweep time = Auto.

#### 9.1.2 DEVIATION FROM STANDARD

No deviation.

#### 9.1.3 TEST SETUP



#### 9.1.4 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.

#### 9.1.5 EUT TEST CONDITIONS

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

#### 9.1.6 TEST RESULTS

Please refer to the Attachment I

## 10. ANTENNA CONDUCTED SPURIOUS EMISSION

### 10.1 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.

#### 10.1.1 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=100KHz, Sweep time = Auto.
- c. Offset=antenna gain+cable loss

#### 10.1.2 DEVIATION FROM STANDARD

No deviation.

#### 10.1.3 TEST SETUP



#### 10.1.4 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.

#### 10.1.5 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V/60Hz

#### 10.1.6 TEST RESULTS

Please refer to the Attachment J

## 11. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	Mar. 28, 2016
2	LISN	R&S	ENV216	101447	Mar. 28, 2016
3	Test Cable	emci	RG223(9KHz-30 MHz)	C_17	Mar. 13, 2016
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 28, 2016
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 28, 2016
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 28, 2016
2	Amplifier	HP	8447D	2944A09673	Nov. 16, 2016
3	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
4	Test Cable	emci	LMR-400(30MHz-1GHz)	C-01	Jun. 28, 2016
5	Controller	CT	SC100	N/A	N/A
6	Antenna	ETS	3115	00075789	Mar. 28, 2016
7	Amplifier	Agilent	8449B	3008A02274	Nov. 01, 2016
8	Test Cable	emci	EMC104-SM-S M-10000(1GHz-26.5GHz)	C-68	Jun. 28, 2016
9	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
10	Microwave Pre-amplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
11	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 07, 2016
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Number of Hopping Channel					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

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

## 12. EUT TEST PHOTO

### Conducted Measurement Photos



## Radiated Measurement Photos

9KHz to 30MHz



## Radiated Measurement Photos

30MHz to 1000MHz



## Radiated Measurement Photos

Above 1000MHz



## ATTACHMENT A - CONDUCTED EMISSION

Test Mode: TX Mode(Adapter\_ Huntkey)

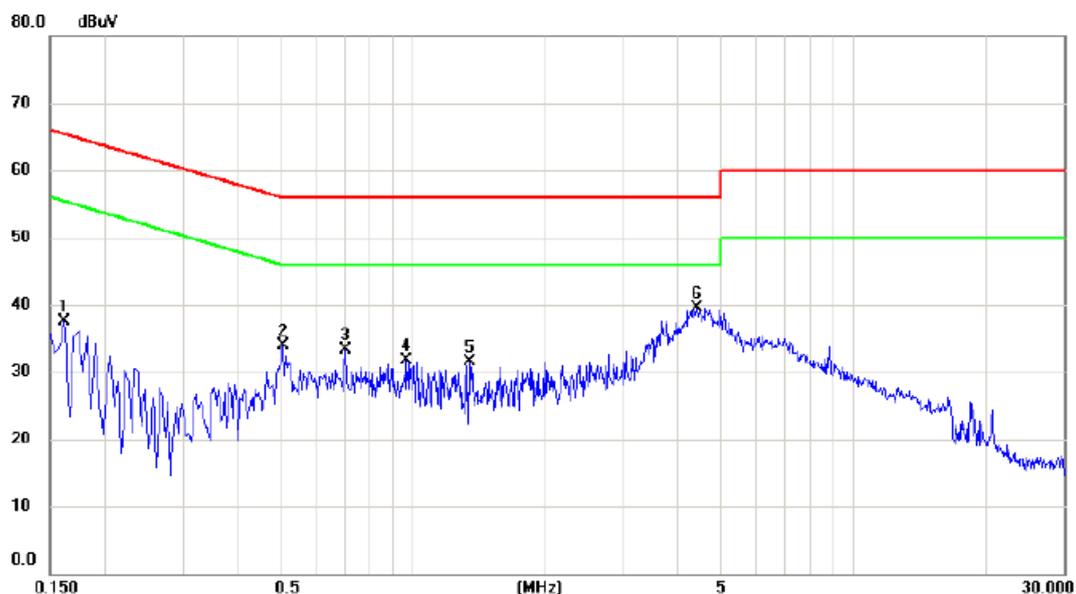
### Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1700	29.01	9.56	38.57	64.96	-26.39	peak	
2		0.5140	33.17	9.69	42.86	56.00	-13.14	peak	
3		1.7620	29.19	9.89	39.08	56.00	-16.92	peak	
4		2.7380	31.42	10.01	41.43	56.00	-14.57	peak	
5		3.8420	32.99	9.97	42.96	56.00	-13.04	peak	
6	*	4.4020	34.19	9.97	44.16	56.00	-11.84	peak	
7		4.4020	12.16	9.97	22.13	46.00	-23.87	AVG	

Test Mode: TX Mode(Adapter\_ Huntkey)

### Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1620	27.97	9.48	37.45	65.36	-27.91	peak	
2		0.5060	24.35	9.56	33.91	56.00	-22.09	peak	
3		0.7020	23.79	9.53	33.32	56.00	-22.68	peak	
4		0.9660	22.10	9.58	31.68	56.00	-24.32	peak	
5		1.3420	21.81	9.64	31.45	56.00	-24.55	peak	
6	*	4.4100	29.61	9.91	39.52	56.00	-16.48	peak	

Test Mode: TX Mode(Adapter\_ Acbel)

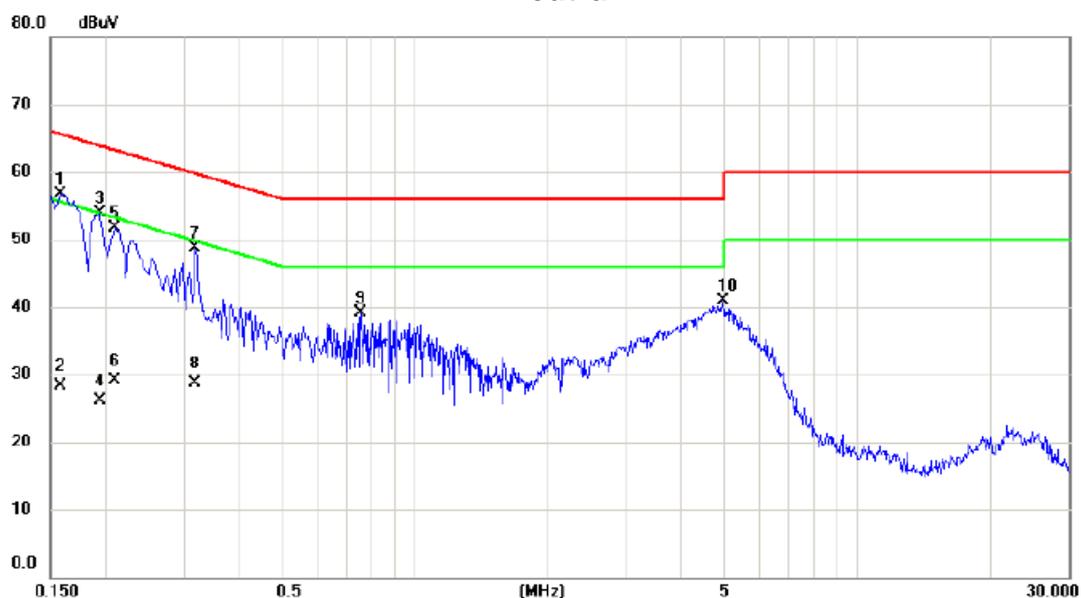
### Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1620	44.18	9.55	53.73	65.36	-11.63	peak	
2		0.1620	23.35	9.55	32.90	55.36	-22.46	AVG	
3		0.1780	43.28	9.56	52.84	64.58	-11.74	peak	
4		0.1780	24.72	9.56	34.28	54.58	-20.30	AVG	
5		0.3260	36.78	9.64	46.42	59.55	-13.13	peak	
6		0.7700	26.74	9.75	36.49	56.00	-19.51	peak	
7		1.0780	25.32	9.80	35.12	56.00	-20.88	peak	
8		4.6980	31.45	9.99	41.44	56.00	-14.56	peak	

Test Mode: TX Mode(Adapter\_ Acbel)

### Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1580	47.22	9.49	56.71	65.57	-8.86	peak	
2		0.1580	18.72	9.49	28.21	55.57	-27.36	AVG	
3		0.1940	44.31	9.50	53.81	63.86	-10.05	peak	
4		0.1940	16.51	9.50	26.01	53.86	-27.85	AVG	
5		0.2100	42.16	9.50	51.66	63.21	-11.55	peak	
6		0.2100	19.69	9.50	29.19	53.21	-24.02	AVG	
7		0.3180	39.22	9.52	48.74	59.76	-11.02	peak	
8		0.3180	19.21	9.52	28.73	49.76	-21.03	AVG	
9		0.7540	29.56	9.55	39.11	56.00	-16.89	peak	
10		4.9580	30.94	9.91	40.85	56.00	-15.15	peak	

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

Test Mode:	TX Mode(Adapter_ Huntkey)
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Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0093	0°	13.27	24.9777	38.2477	128.2346	-89.9869	AVG
0.0093	0°	14.15	24.9777	39.1277	148.2346	-109.1069	PEAK
0.0274	0°	6.60	23.8313	30.4313	118.8492	-88.4179	AVG
0.0274	0°	8.40	23.8313	32.2313	138.8492	-106.6179	PEAK
0.0353	0°	3.53	23.3310	26.8610	116.6487	-89.7877	AVG
0.0353	0°	5.56	23.3310	28.8910	136.6487	-107.7577	PEAK
0.0575	0°	1.20	22.2500	23.4500	112.4109	-88.9609	AVG
0.0575	0°	2.40	22.2500	24.6500	132.4109	-107.7609	PEAK
0.5088	0°	19.23	19.8282	39.0582	73.4733	-34.4151	QP
1.9636	0°	23.62	19.5036	43.1236	69.5400	-26.4164	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0123	90°	13.20	24.3000	37.5000	125.8061	-88.3061	AVG
0.0123	90°	14.60	24.3000	38.9000	145.8061	-106.9061	PEAK
0.0239	90°	7.74	24.0530	31.7930	120.0363	-88.2433	AVG
0.0239	90°	8.85	24.0530	32.9030	140.0363	-107.1333	PEAK
0.045	90°	5.37	22.7167	28.0867	114.5400	-86.4533	AVG
0.045	90°	6.29	22.7167	29.0067	134.5400	-105.5333	PEAK
0.0575	90°	1.63	22.2500	23.8800	112.4109	-88.5309	AVG
0.0575	90°	2.65	22.2500	24.9000	132.4109	-107.5109	PEAK
0.6235	90°	22.10	20.1952	42.2952	71.7075	-29.4123	QP
2.0576	90°	24.95	19.4654	44.4154	69.5400	-25.1246	QP

Test Mode:	TX Mode (Adapter_ Acbel)
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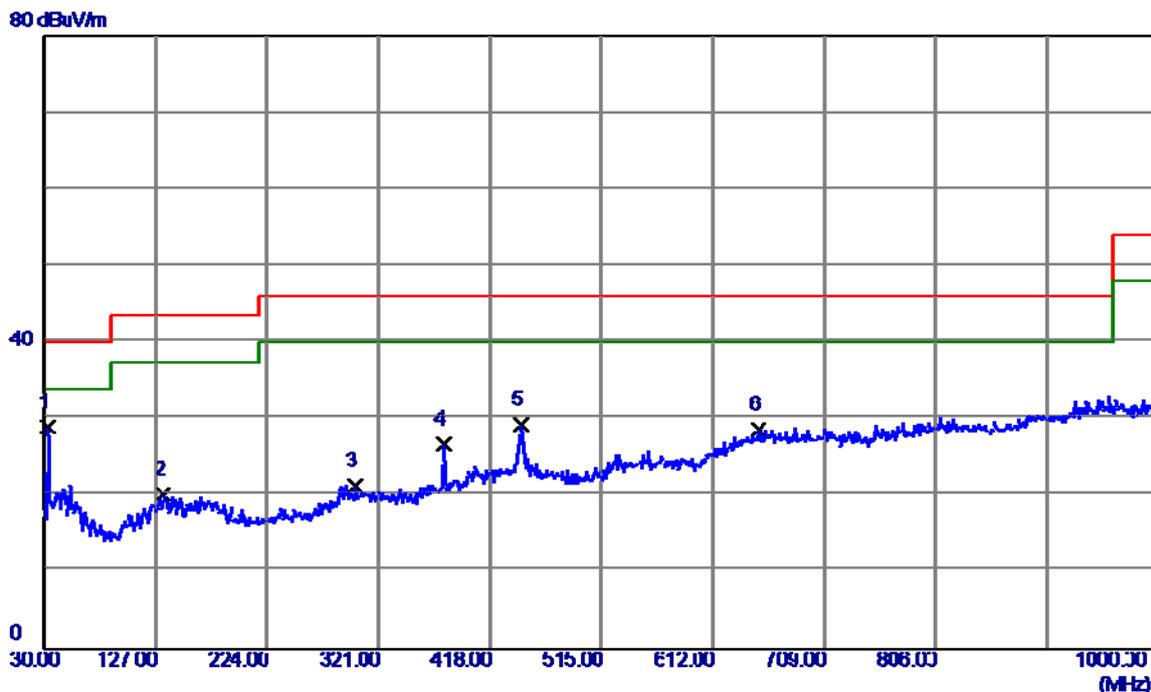
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0091	0°	13.50	24.9903	38.4903	128.4234	-89.9331	AVG
0.0091	0°	14.41	24.9903	39.4003	148.4234	-109.0231	PEAK
0.026	0°	6.80	23.9200	30.7200	119.3048	-88.5848	AVG
0.026	0°	8.51	23.9200	32.4300	139.3048	-106.8748	PEAK
0.0347	0°	3.46	23.3690	26.8290	116.7976	-89.9686	AVG
0.0347	0°	5.39	23.3690	28.7590	136.7976	-108.0386	PEAK
0.0553	0°	1.24	22.2940	23.5340	112.7497	-89.2157	AVG
0.0553	0°	2.49	22.2940	24.7840	132.7497	-107.9657	PEAK
0.5092	0°	19.48	19.8294	39.3094	73.4665	-34.1570	QP
1.9526	0°	23.36	19.5047	42.8647	69.5400	-26.6753	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0127	90°	13.51	24.3000	37.8100	125.5282	-87.7182	AVG
0.0127	90°	14.78	24.3000	39.0800	145.5282	-106.4482	PEAK
0.0284	90°	7.52	23.7680	31.2880	118.5379	-87.2499	AVG
0.0284	90°	8.63	23.7680	32.3980	138.5379	-106.1399	PEAK
0.036	90°	5.46	23.2867	28.7467	116.4782	-87.7315	AVG
0.036	90°	6.35	23.2867	29.6367	136.4782	-106.8415	PEAK
0.0561	90°	1.87	22.2780	24.1480	112.6250	-88.4770	AVG
0.0561	90°	2.64	22.2780	24.9180	132.6250	-107.7070	PEAK
0.6249	90°	22.49	20.1997	42.6897	71.6880	-28.9983	QP
2.0552	90°	24.50	19.4669	43.9669	69.5400	-25.5731	QP

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

Test Mode: TX 2402MHz\_CH00\_1Mbps(Adapter\_Huntkey)

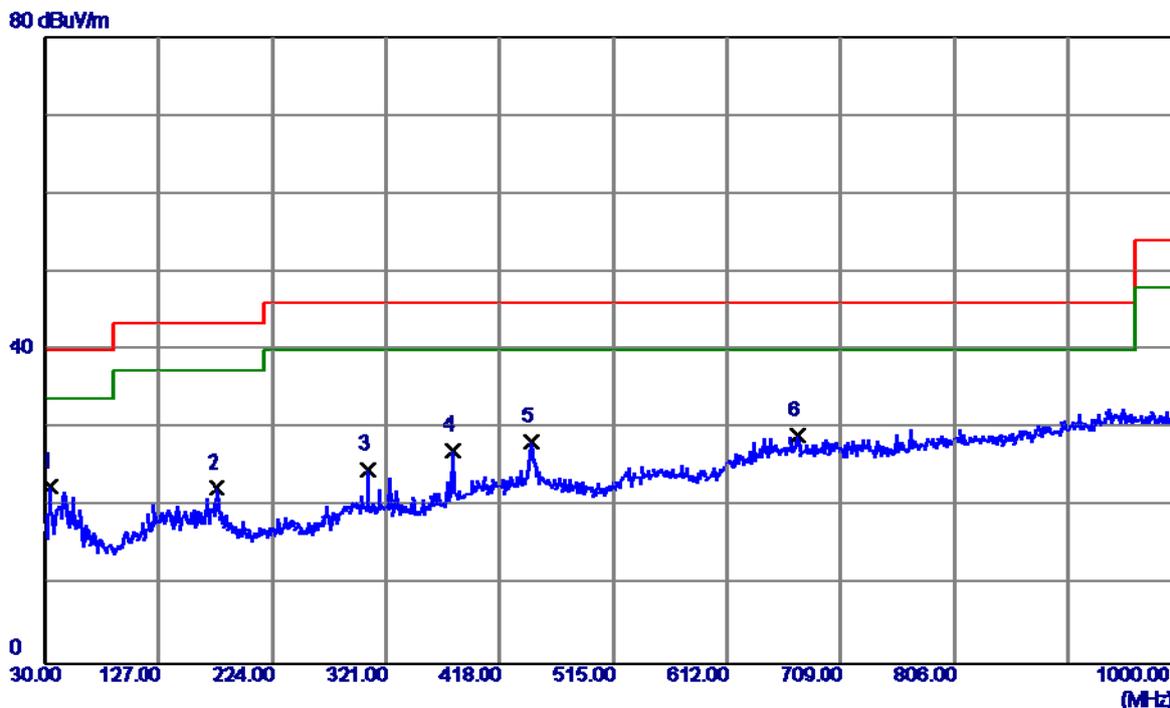
### Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	32.9100	42.63	-13.61	29.02	40.00	-10.98	Peak	
2	133.7899	31.67	-11.53	20.14	43.50	-23.36	Peak	
3	300.6300	30.93	-9.58	21.35	46.00	-24.65	Peak	
4	378.2300	35.14	-8.42	26.72	46.00	-19.28	Peak	
5	445.1600	35.24	-6.03	29.21	46.00	-16.79	Peak	
6	651.7700	30.23	-1.63	28.60	46.00	-17.40	Peak	

Test Mode: TX 2402MHz\_CH00\_1Mbps(Adapter\_Huntkey)

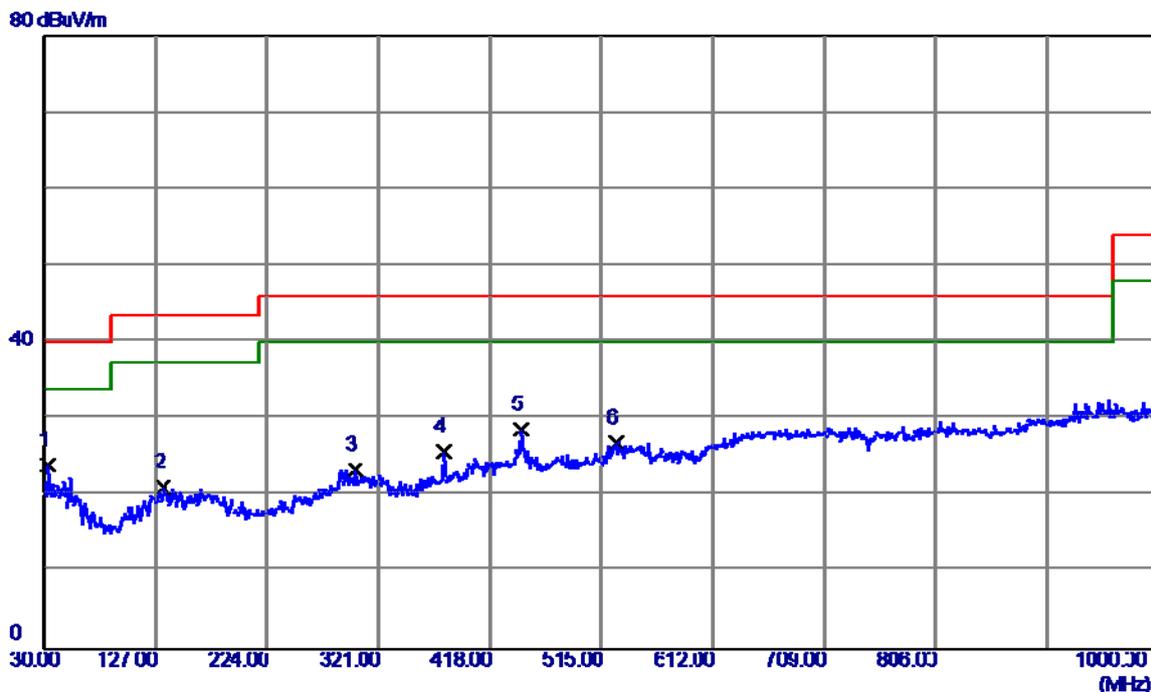
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	33.8800	35.94	-13.31	22.63	40.00	-17.37	Peak	
2	176.4700	33.75	-11.35	22.40	43.50	-21.10	Peak	
3	305.4800	34.43	-9.62	24.81	46.00	-21.19	Peak	
4	378.2300	35.65	-8.42	27.23	46.00	-18.77	Peak	
5	445.1600	34.39	-6.03	28.36	46.00	-17.64	Peak	
6	672.1400	30.70	-1.56	29.14	46.00	-16.86	Peak	

Test Mode: TX 2441MHz\_CH39\_1Mbps(Adapter\_Huntkey)

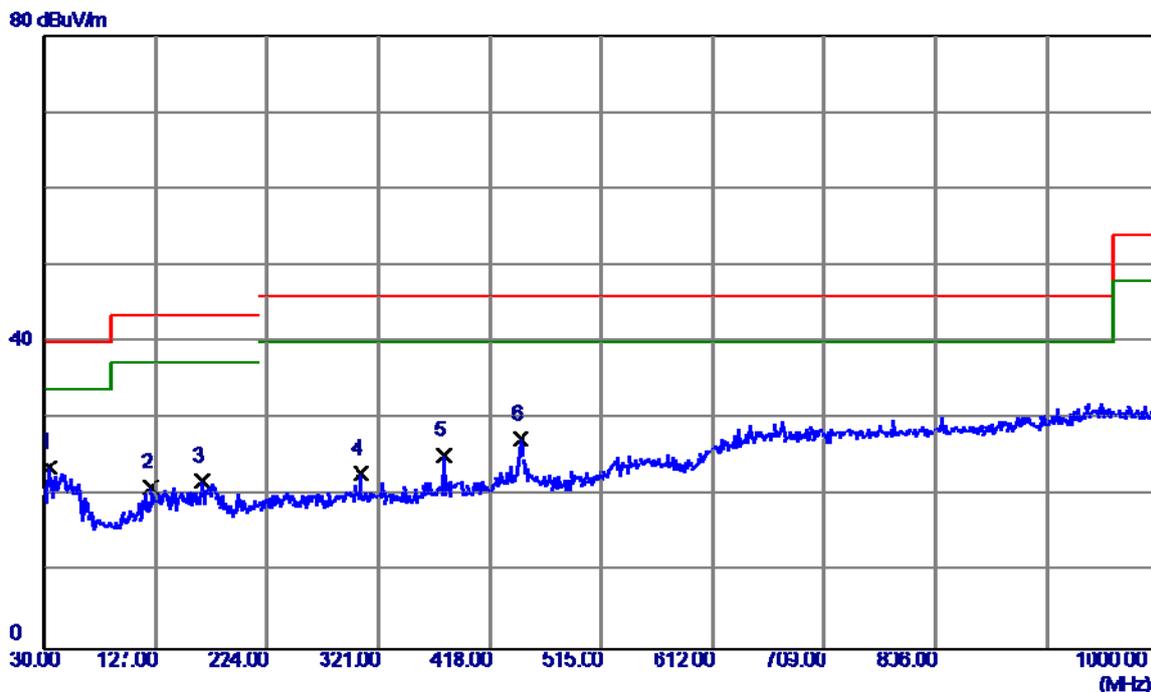
### Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	32.9100	37.63	-13.61	24.02	40.00	-15.98	Peak	
2	133.7899	32.67	-11.53	21.14	43.50	-22.36	Peak	
3	300.6300	32.93	-9.58	23.35	46.00	-22.65	Peak	
4	378.2300	34.14	-8.42	25.72	46.00	-20.28	Peak	
5	445.1600	34.74	-6.03	28.71	46.00	-17.29	Peak	
6	527.6100	32.70	-5.86	26.84	46.00	-19.16	Peak	

Test Mode: TX 2441MHz\_CH39\_1Mbps(Adapter\_Huntkey)

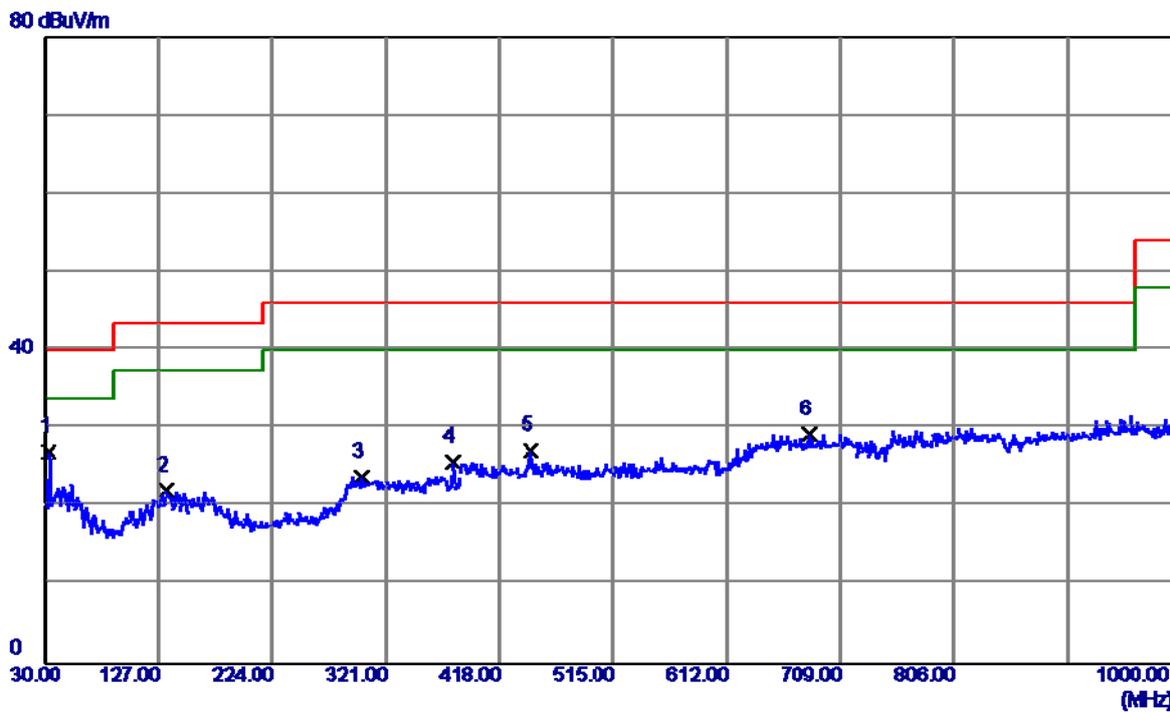
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	33.8800	36.94	-13.31	23.63	40.00	-16.37	Peak	
2	123.1200	33.37	-12.23	21.14	43.50	-22.36	Peak	
3	167.7400	33.37	-11.38	21.99	43.50	-21.51	Peak	
4	305.4800	32.43	-9.62	22.81	46.00	-23.19	Peak	
5	378.2300	33.65	-8.42	25.23	46.00	-20.77	Peak	
6	445.1600	33.39	-6.03	27.36	46.00	-18.64	Peak	

Test Mode: TX 2480MHz \_CH78\_1Mbps (Adapter\_ Huntkey)

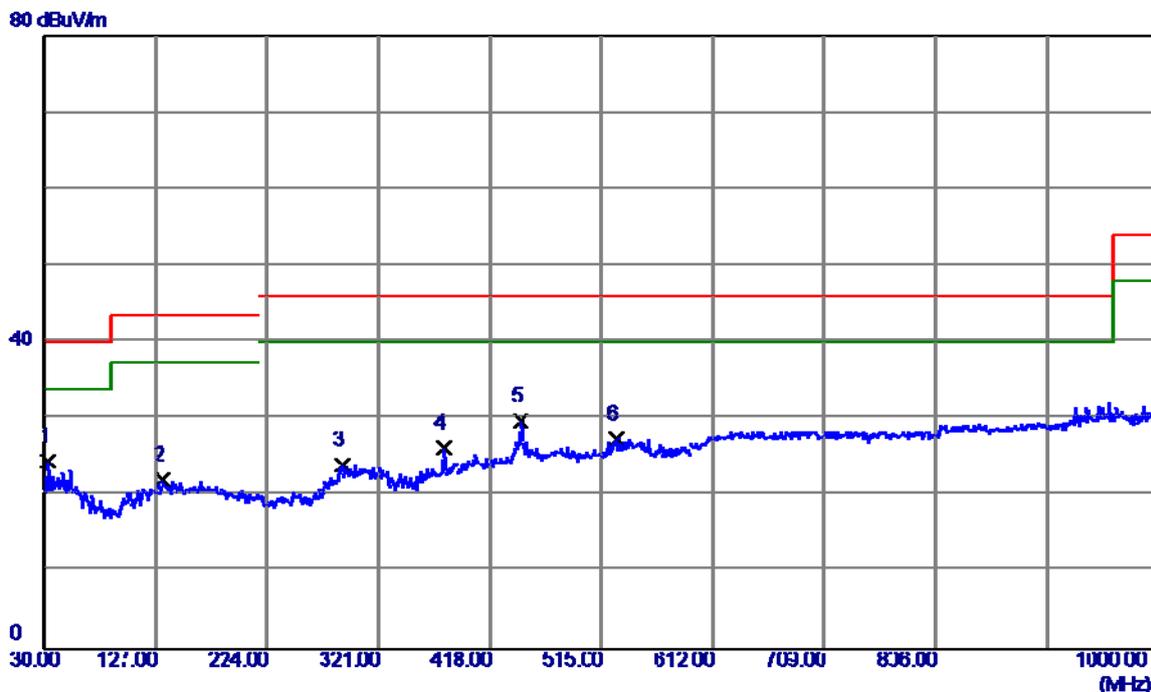
### Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	32.9100	40.63	-13.61	27.02	40.00	-12.98	Peak	
2	133.7899	33.67	-11.53	22.14	43.50	-21.36	Peak	
3	300.6300	33.43	-9.58	23.85	46.00	-22.15	Peak	
4	378.2300	34.14	-8.42	25.72	46.00	-20.28	Peak	
5	445.1600	33.24	-6.03	27.21	46.00	-18.79	Peak	
6	682.8100	30.78	-1.53	29.25	46.00	-16.75	Peak	

Test Mode: TX 2480MHz \_CH78\_ 1Mbps (Adapter\_ Huntkey)

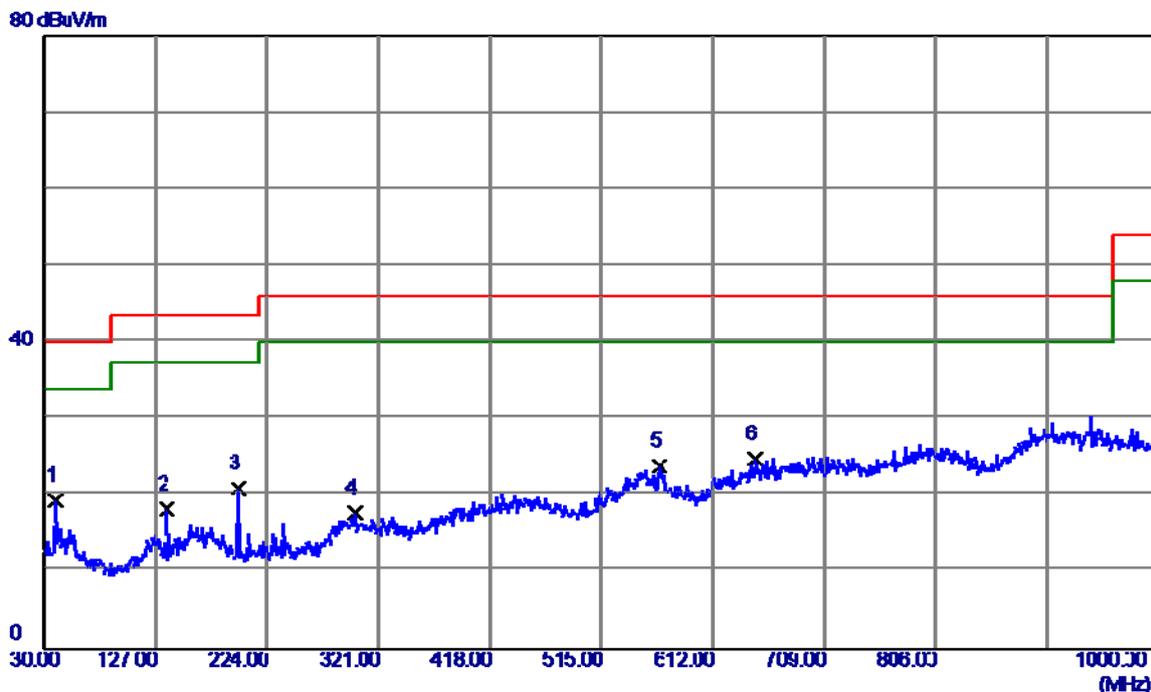
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	32.9100	38.13	-13.61	24.52	40.00	-15.48	Peak	
2	133.7899	33.67	-11.53	22.14	43.50	-21.36	Peak	
3	289.9600	33.77	-9.83	23.94	46.00	-22.06	Peak	
4	378.2300	34.64	-8.42	26.22	46.00	-19.78	Peak	
5	445.1600	35.74	-6.03	29.71	46.00	-16.29	Peak	
6	527.6100	33.20	-5.86	27.34	46.00	-18.66	Peak	

Test Mode: TX 2402MHz\_CH00\_1Mbps (Adapter\_Acbel)

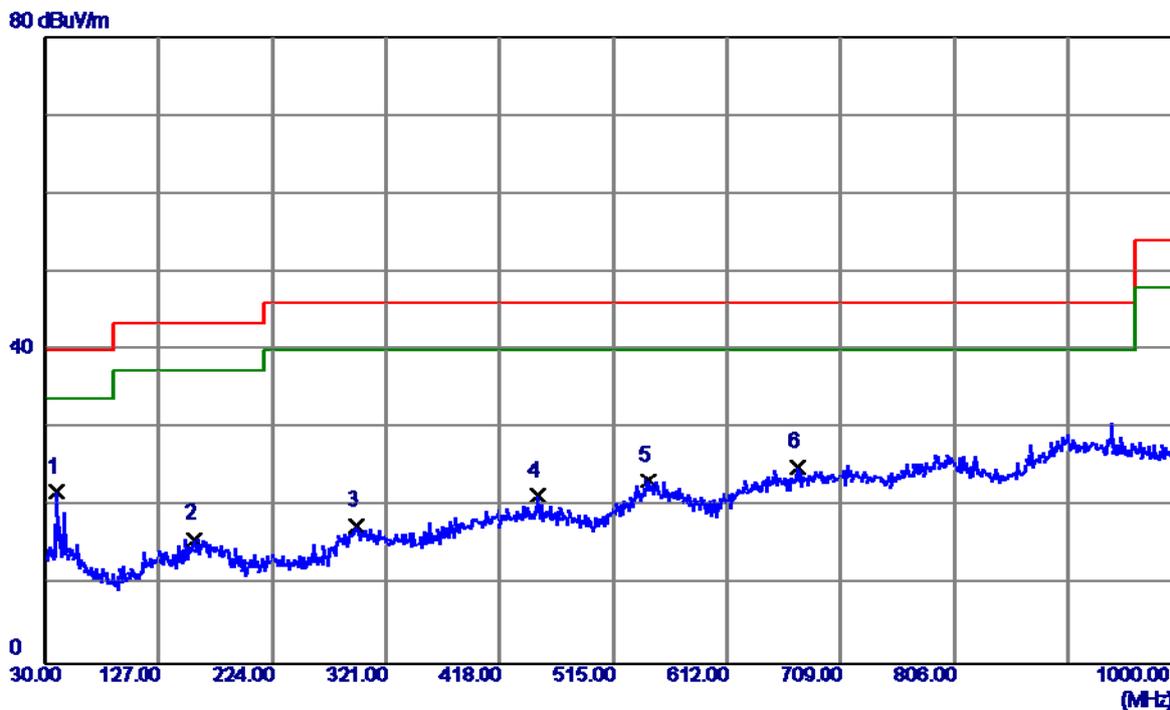
### Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	33.31	-13.99	19.32	40.00	-20.68	Peak	
2	136.7000	32.05	-13.75	18.30	43.50	-25.20	Peak	
3	198.7800	36.03	-15.05	20.98	43.50	-22.52	Peak	
4	300.6300	28.22	-10.51	17.71	46.00	-28.29	Peak	
5	565.4400	29.88	-5.98	23.90	46.00	-22.10	Peak	
6	648.8600	30.01	-5.17	24.84	46.00	-21.16	Peak	

Test Mode: TX 2402MHz\_CH00\_1Mbps (Adapter\_Acbel)

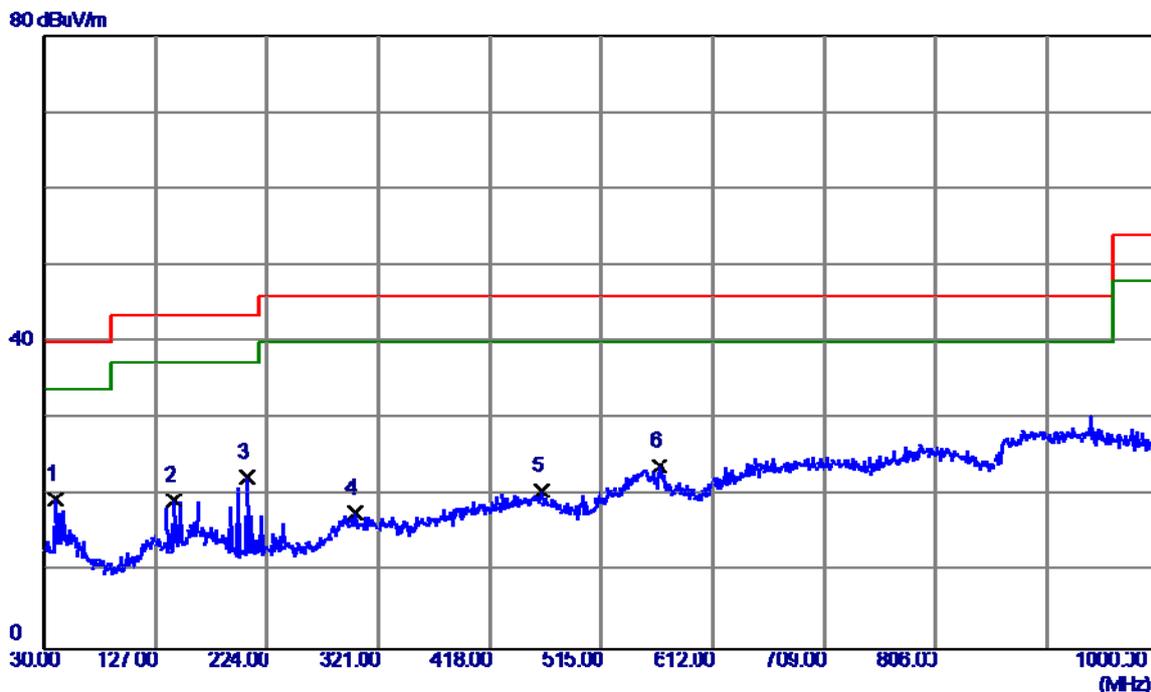
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	35.87	-13.99	21.88	40.00	-18.12	Peak	
2	157.0700	28.51	-12.59	15.92	43.50	-27.58	Peak	
3	295.7800	28.27	-10.71	17.56	46.00	-28.44	Peak	
4	450.0100	29.49	-8.05	21.44	46.00	-24.56	Peak	
5	545.0700	28.94	-5.62	23.32	46.00	-22.68	Peak	
6	672.1400	29.79	-4.70	25.09	46.00	-20.91	Peak	

Test Mode: TX 2441MHz\_CH39\_1Mbps (Adapter\_Acbel)

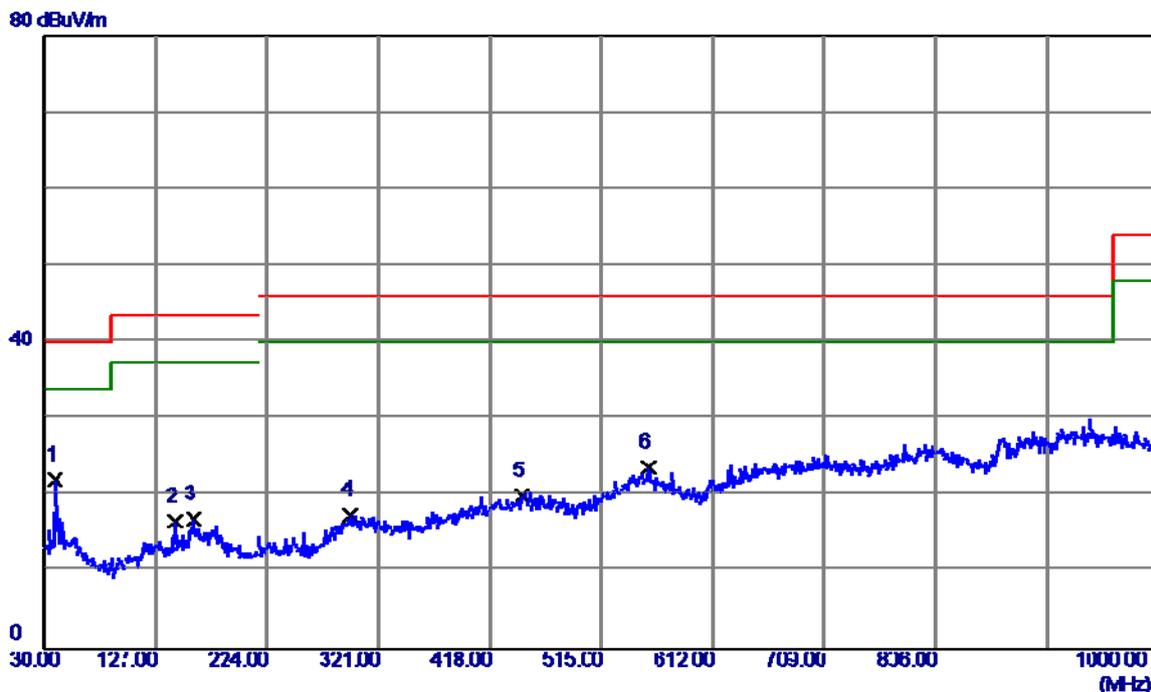
### Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	33.44	-13.99	19.45	40.00	-20.55	Peak	
2	143.4900	33.06	-13.71	19.35	43.50	-24.15	Peak	
3	206.5399	37.38	-14.95	22.43	43.50	-21.07	Peak	
4	300.6300	28.22	-10.51	17.71	46.00	-28.29	Peak	
5	463.5900	29.27	-8.58	20.69	46.00	-25.31	Peak	
6	565.4400	29.88	-5.98	23.90	46.00	-22.10	Peak	

Test Mode: TX 2441MHz\_CH39\_1Mbps (Adapter\_Acbel)

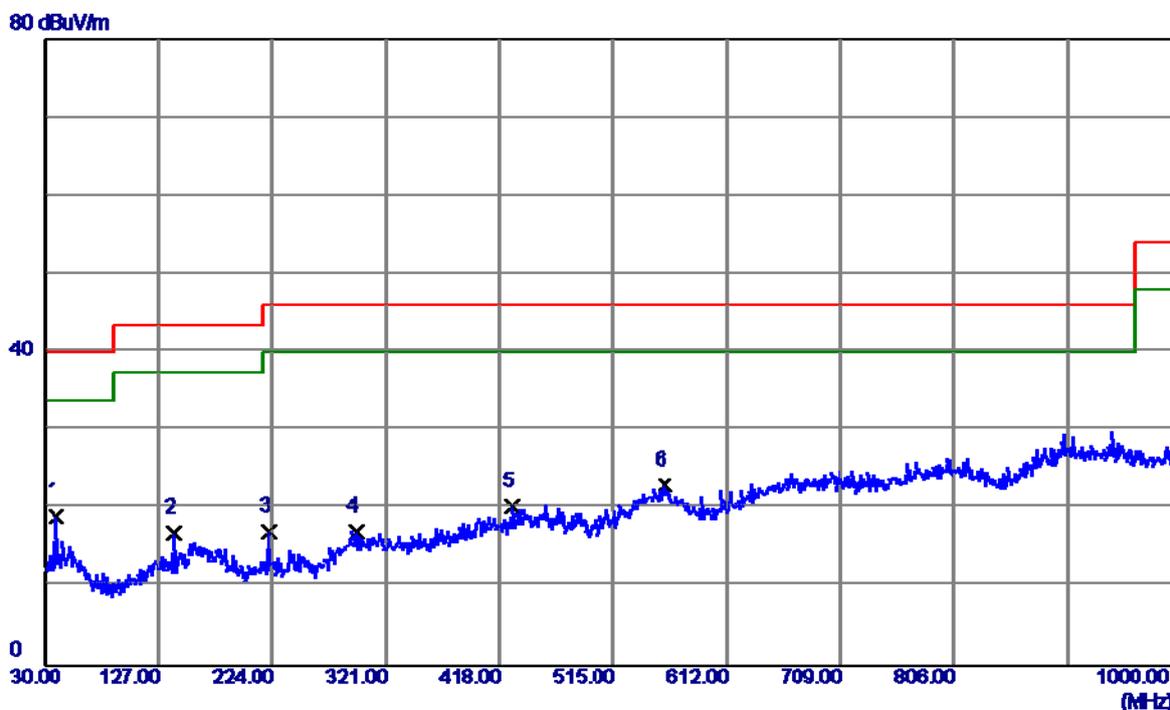
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	36.09	-13.99	22.10	40.00	-17.90	Peak	
2	144.4600	30.30	-13.60	16.70	43.50	-26.80	Peak	
3	159.9800	29.37	-12.42	16.95	43.50	-26.55	Peak	
4	296.7500	28.18	-10.66	17.52	46.00	-28.48	Peak	
5	446.1300	28.10	-8.15	19.95	46.00	-26.05	Peak	
6	555.7400	29.16	-5.45	23.71	46.00	-22.29	Peak	

Test Mode: TX 2480MHz\_CH78\_1Mbps (Adapter\_Acbel)

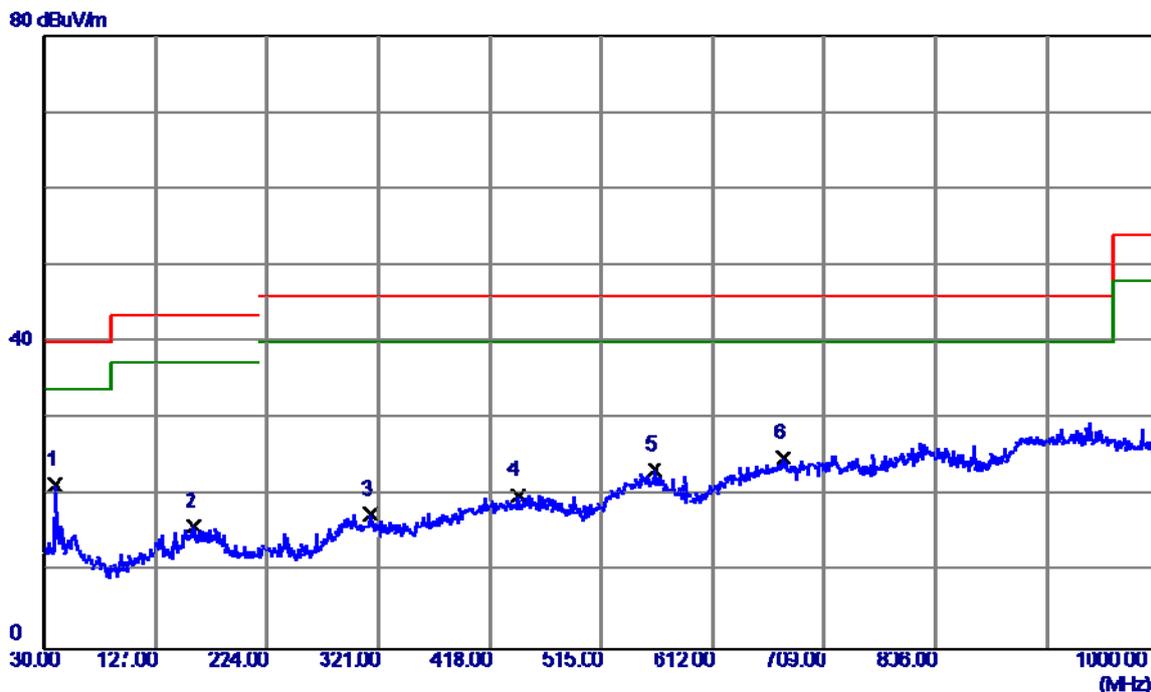
### Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	33.03	-13.99	19.04	40.00	-20.96	Peak	
2	139.6100	30.96	-14.04	16.92	43.50	-26.58	Peak	
3	222.0600	31.44	-14.31	17.13	46.00	-28.87	Peak	
4	295.7800	27.80	-10.71	17.09	46.00	-28.91	Peak	
5	428.6700	28.94	-8.59	20.35	46.00	-25.65	Peak	
6	559.6200	28.74	-5.66	23.08	46.00	-22.92	Peak	

Test Mode: TX 2480MHz\_CH78\_1Mbps (Adapter\_Acbel)

### Horizontal

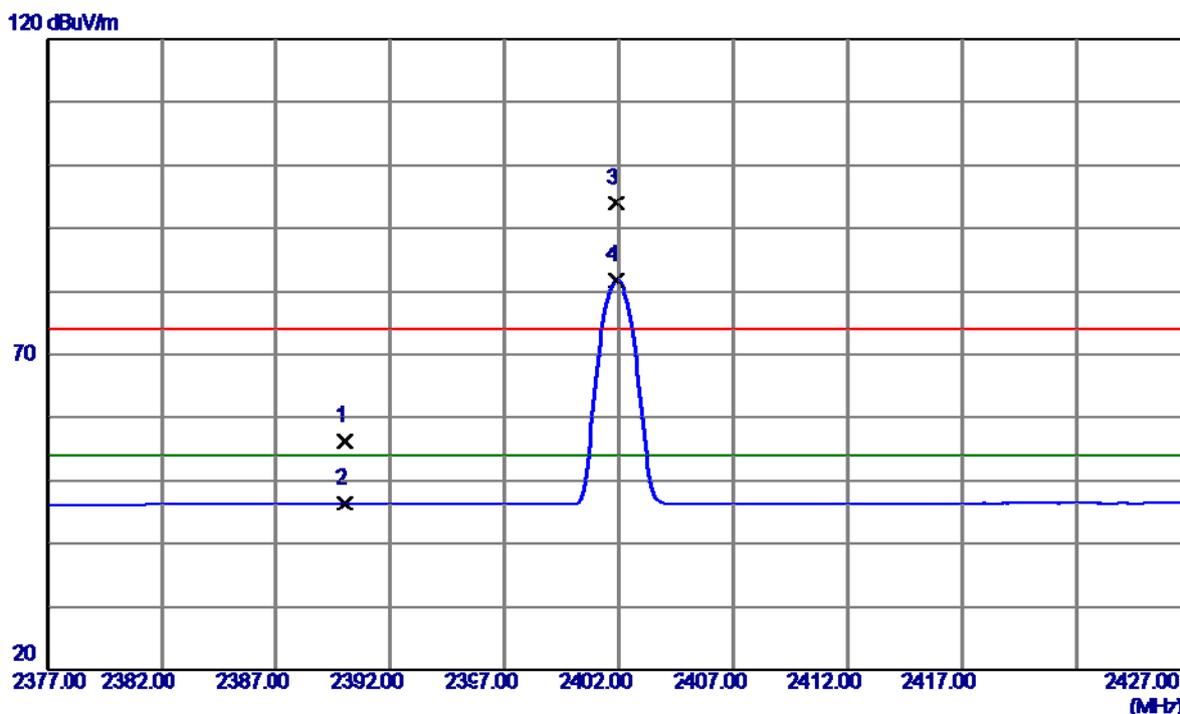


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	35.44	-13.99	21.45	40.00	-18.55	Peak	
2	159.9800	28.45	-12.42	16.03	43.50	-27.47	Peak	
3	314.2100	28.28	-10.74	17.54	46.00	-28.46	Peak	
4	442.2500	28.33	-8.25	20.08	46.00	-25.92	Peak	
5	561.5600	29.20	-5.77	23.43	46.00	-22.57	Peak	
6	673.1100	29.62	-4.69	24.93	46.00	-21.07	Peak	

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

Test Mode : TX 2402MHz\_CH00\_1Mbps

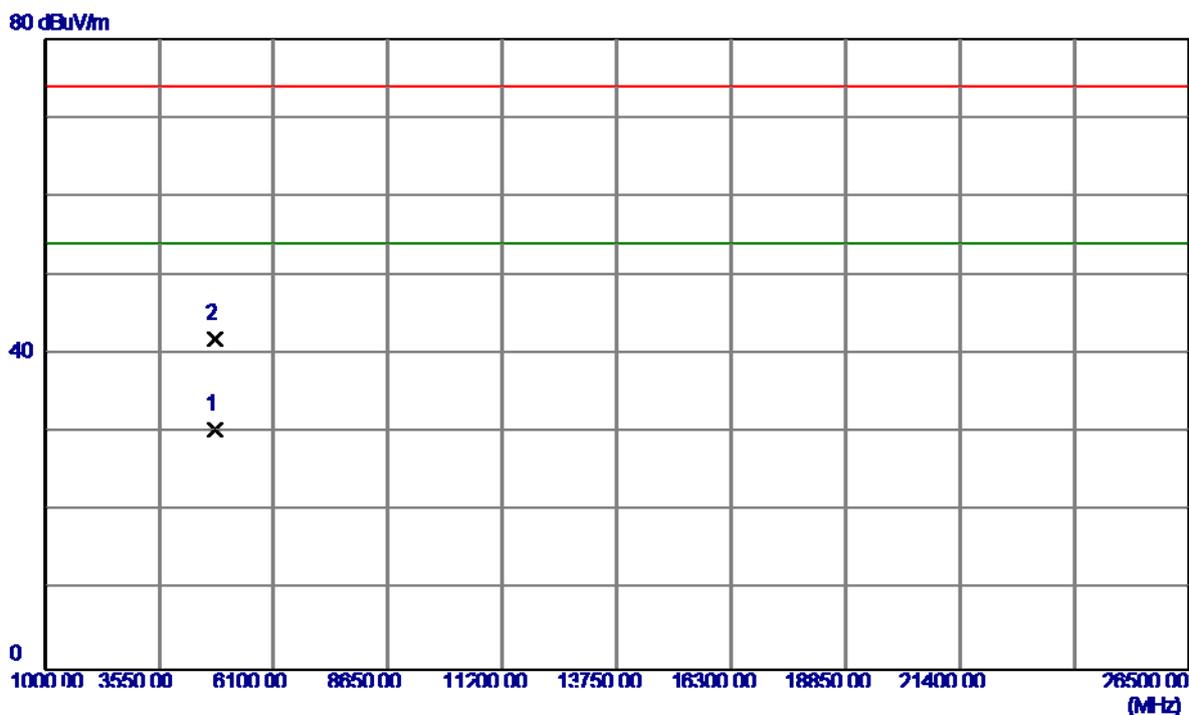
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	21.93	34.23	56.16	74.00	-17.84	Peak	
2	2390.0000	12.13	34.23	46.36	54.00	-7.64	AVG	
3	2401.9000	59.62	34.30	93.92	74.00	19.92	Peak	No Limit
4	2401.9000	47.54	34.30	81.84	54.00	27.84	AVG	No Limit

Test Mode : TX 2402MHz \_CH00\_1Mbps

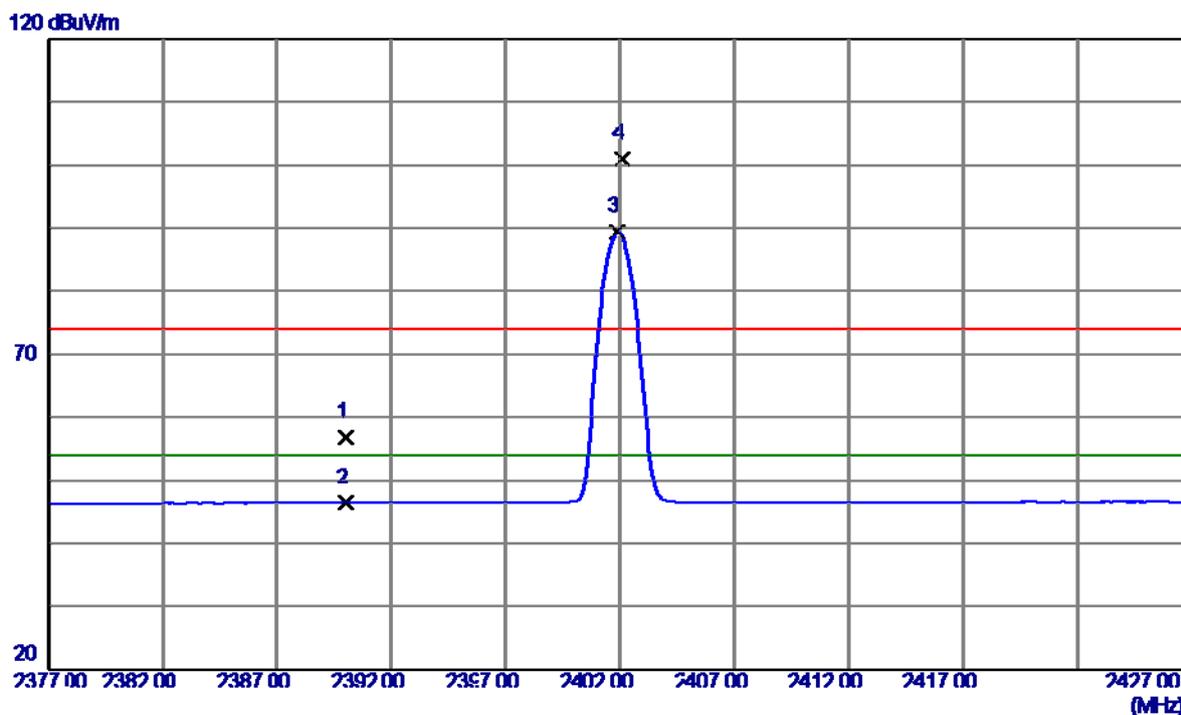
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4804.2000	23.65	6.76	30.41	54.00	-23.59	AVG	
2	4804.5099	35.20	6.76	41.96	74.00	-32.04	Peak	

Test Mode : TX 2402MHz\_CH00\_1Mbps

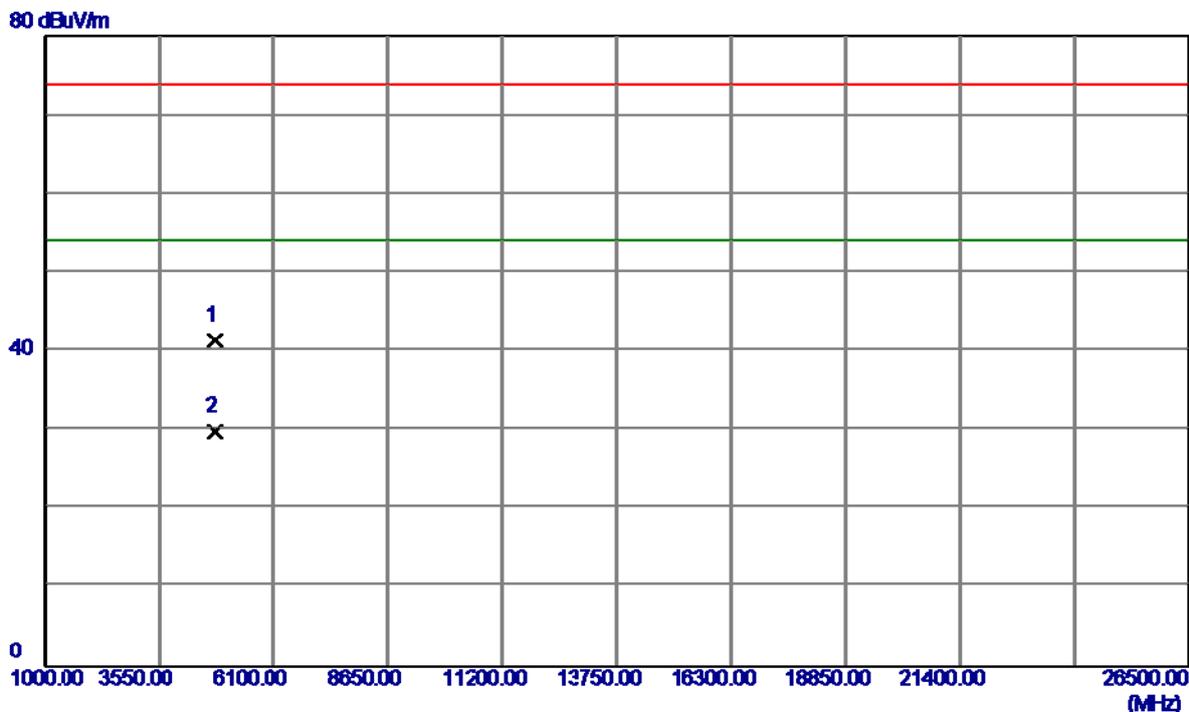
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	22.49	34.23	56.72	74.00	-17.28	Peak	
2	2390.0000	12.11	34.23	46.34	54.00	-7.66	AVG	
3	2401.9000	55.01	34.30	89.31	54.00	35.31	AVG	No Limit
4	2402.1000	66.68	34.30	100.98	74.00	26.98	Peak	No Limit

Test Mode : TX 2402MHz \_CH00\_1Mbps

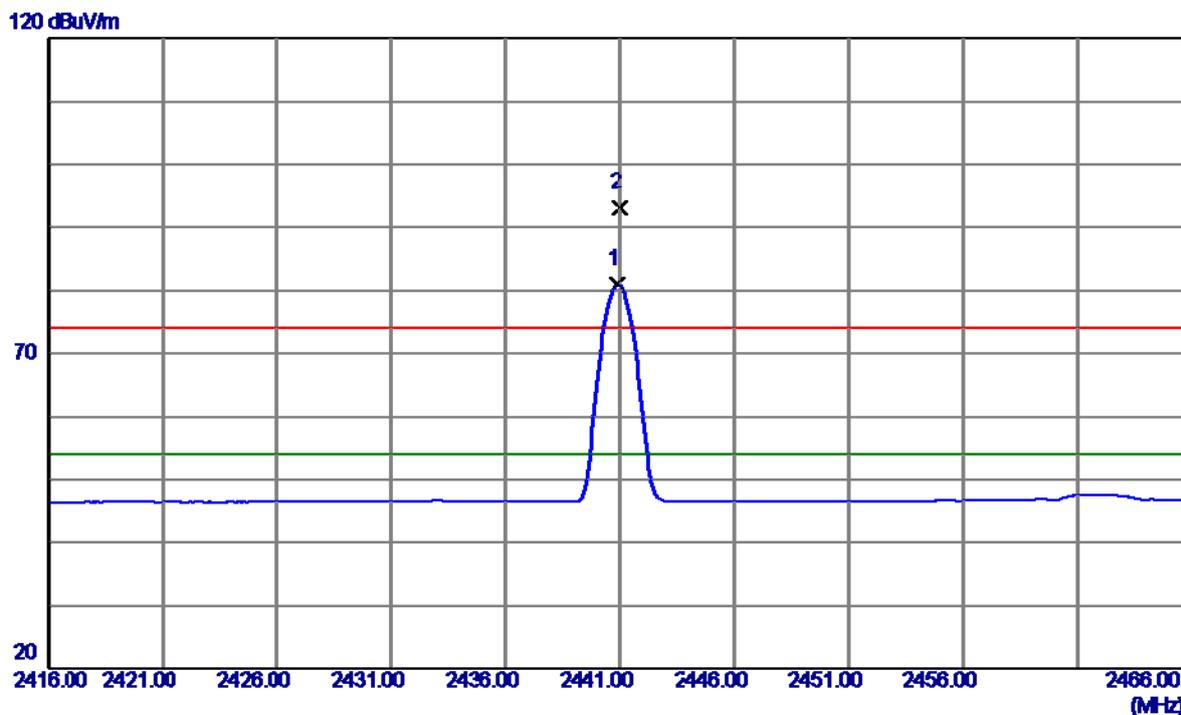
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4804.5099	34.68	6.76	41.44	74.00	-32.56	Peak	
2	4805.2100	23.10	6.76	29.86	54.00	-24.14	AVG	

Test Mode : TX 2441MHz \_CH39\_1Mbps

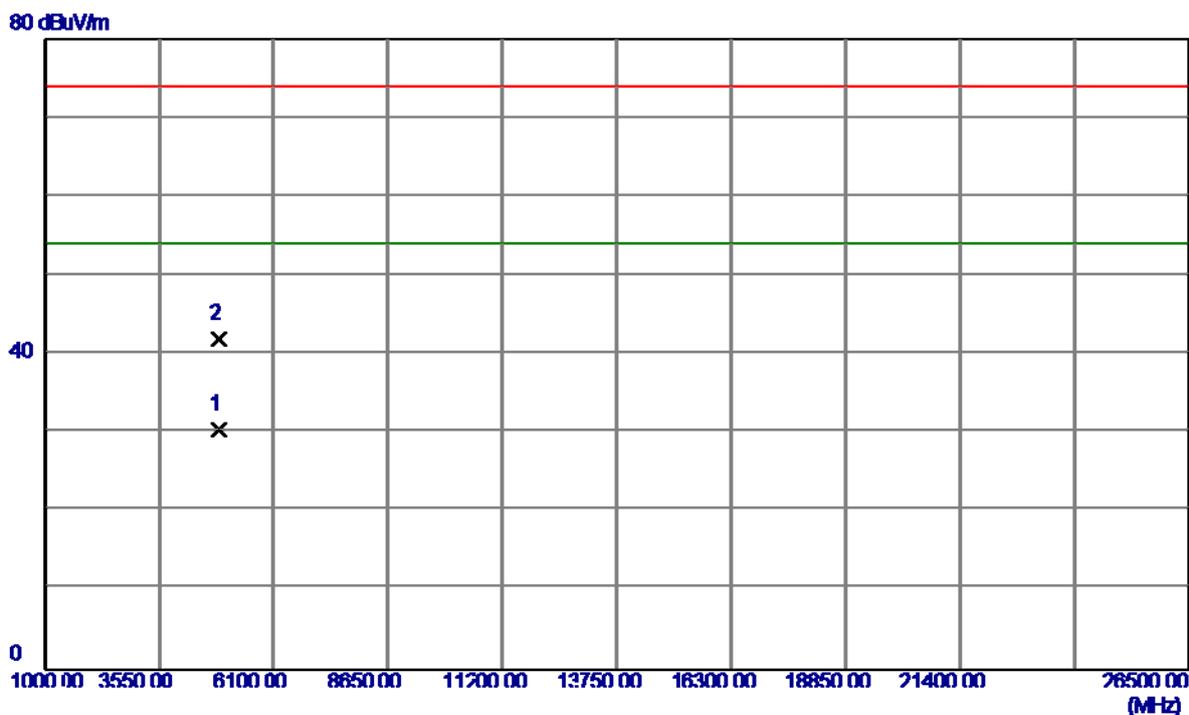
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2440.9000	46.46	34.53	80.99	54.00	26.99	AVG	No Limit
2	2441.0000	58.62	34.53	93.15	74.00	19.15	Peak	No Limit

Test Mode : TX 2441MHz \_CH39\_1Mbps

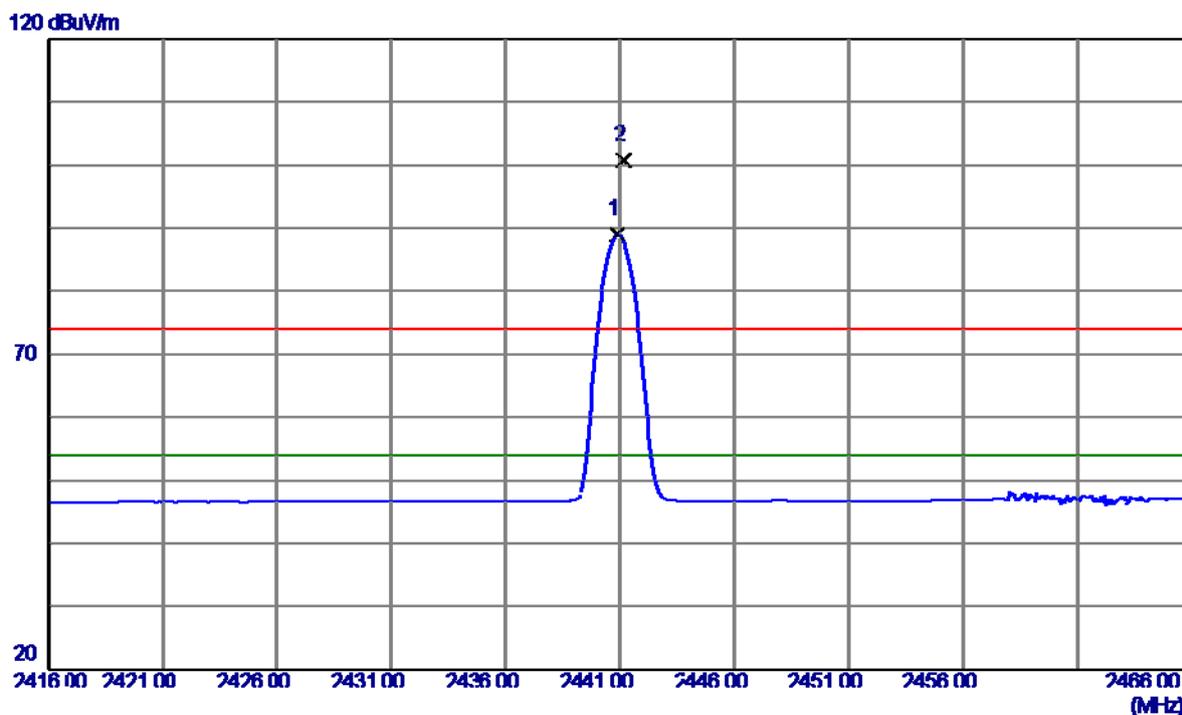
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4883.2000	23.41	7.00	30.41	54.00	-23.59	AVG	
2	4884.5600	34.96	7.00	41.96	74.00	-32.04	Peak	

Test Mode : TX 2441MHz \_CH39\_1Mbps

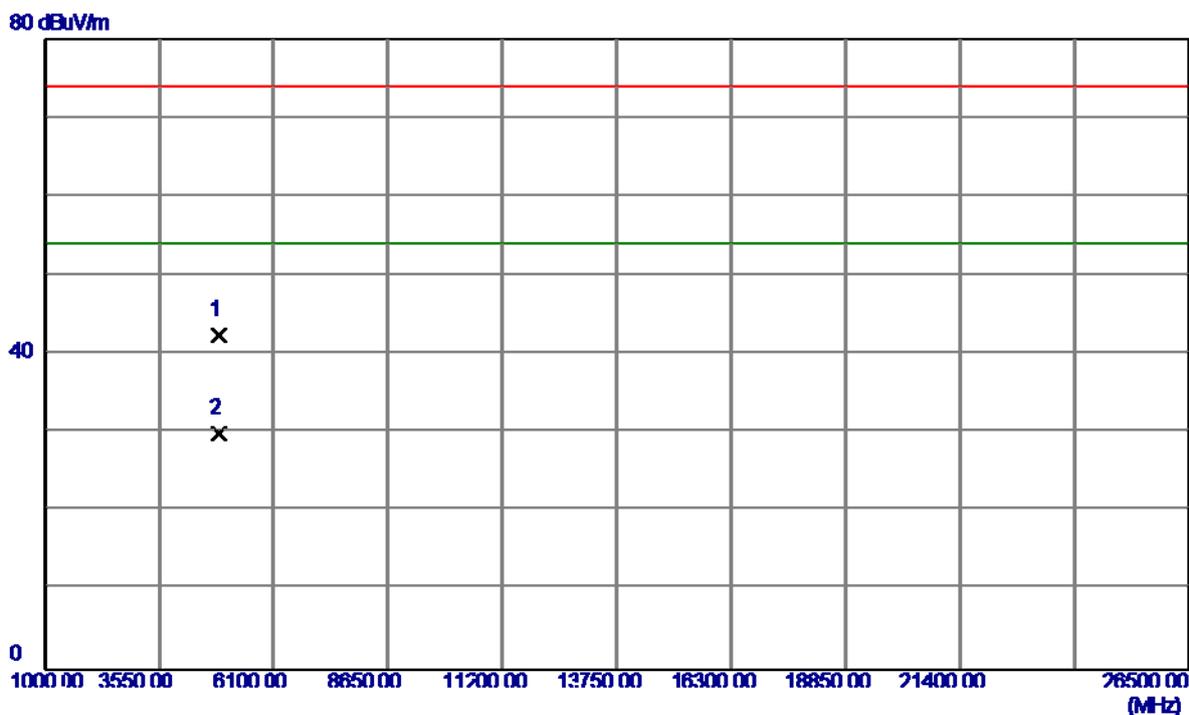
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2440.9000	54.45	34.53	88.98	54.00	34.98	AVG	No Limit
2	2441.1500	66.33	34.53	100.86	74.00	26.86	Peak	No Limit

Test Mode : TX 2441MHz \_CH39\_1Mbps

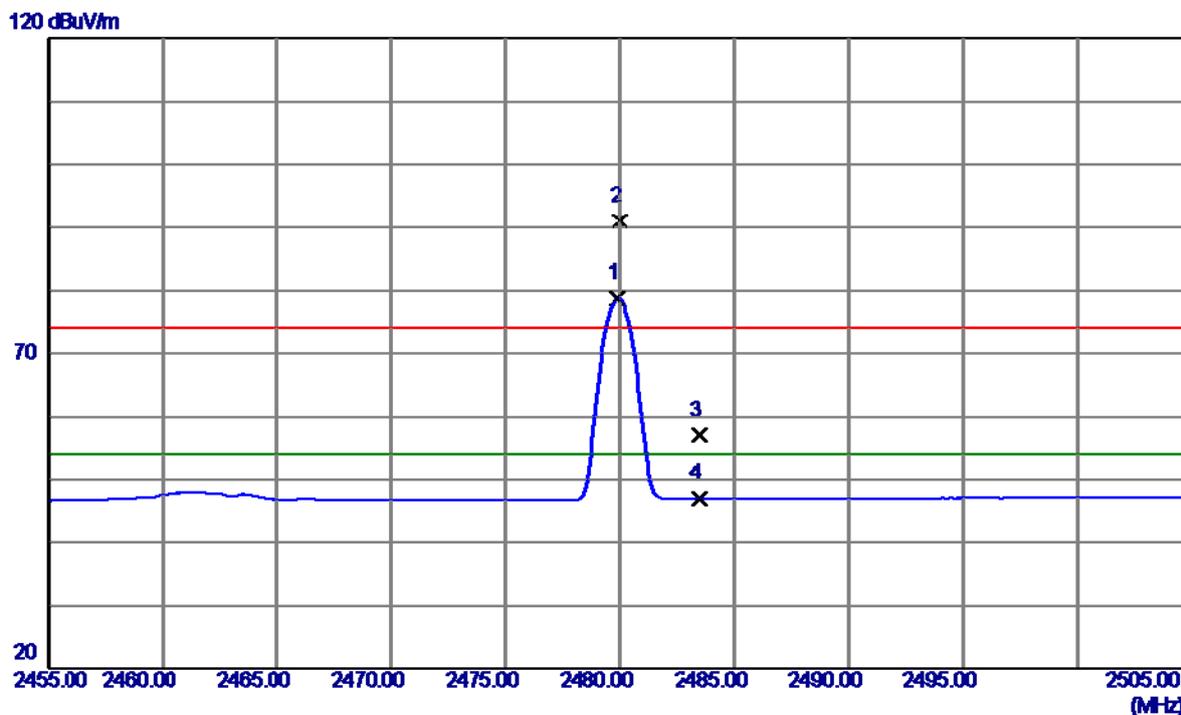
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4882.3400	35.45	7.00	42.45	74.00	-31.55	Peak	
2	4882.5200	22.86	7.00	29.86	54.00	-24.14	AVG	

Test Mode : TX 2480MHz \_CH78\_1Mbps

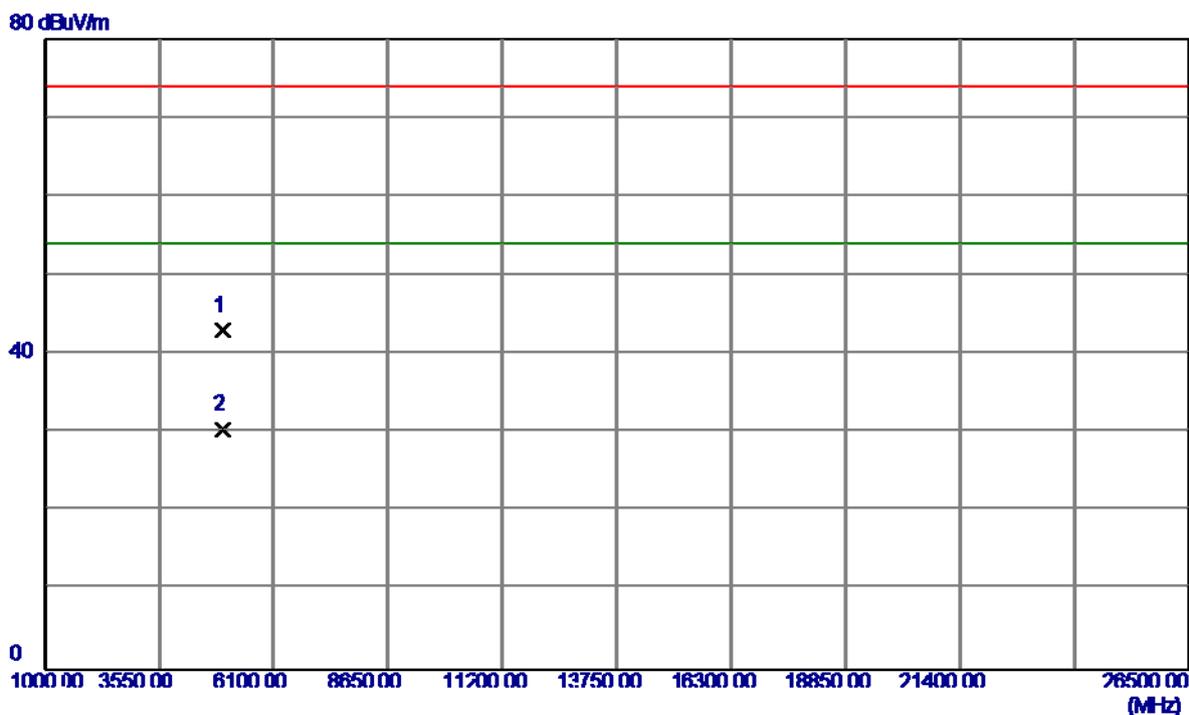
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2479.9000	44.08	34.75	78.83	54.00	24.83	AVG	No Limit
2	2480.0000	56.30	34.75	91.05	74.00	17.05	Peak	No Limit
3	2483.5000	22.22	34.77	56.99	74.00	-17.01	Peak	
4	2483.5000	12.14	34.77	46.91	54.00	-7.09	AVG	

Test Mode : TX 2480MHz \_CH78\_1Mbps

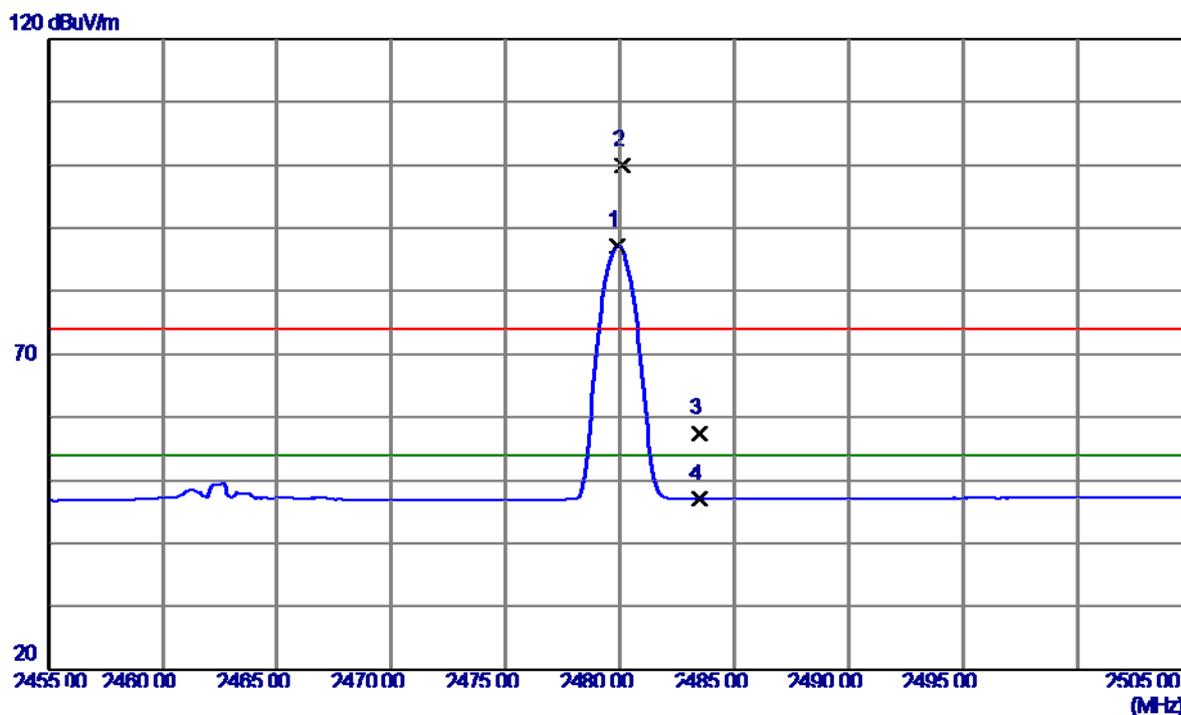
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4961.1400	35.73	7.23	42.96	74.00	-31.04	Peak	
2	4961.5000	23.18	7.23	30.41	54.00	-23.59	AVG	

Test Mode : TX 2480MHz \_CH78\_1Mbps

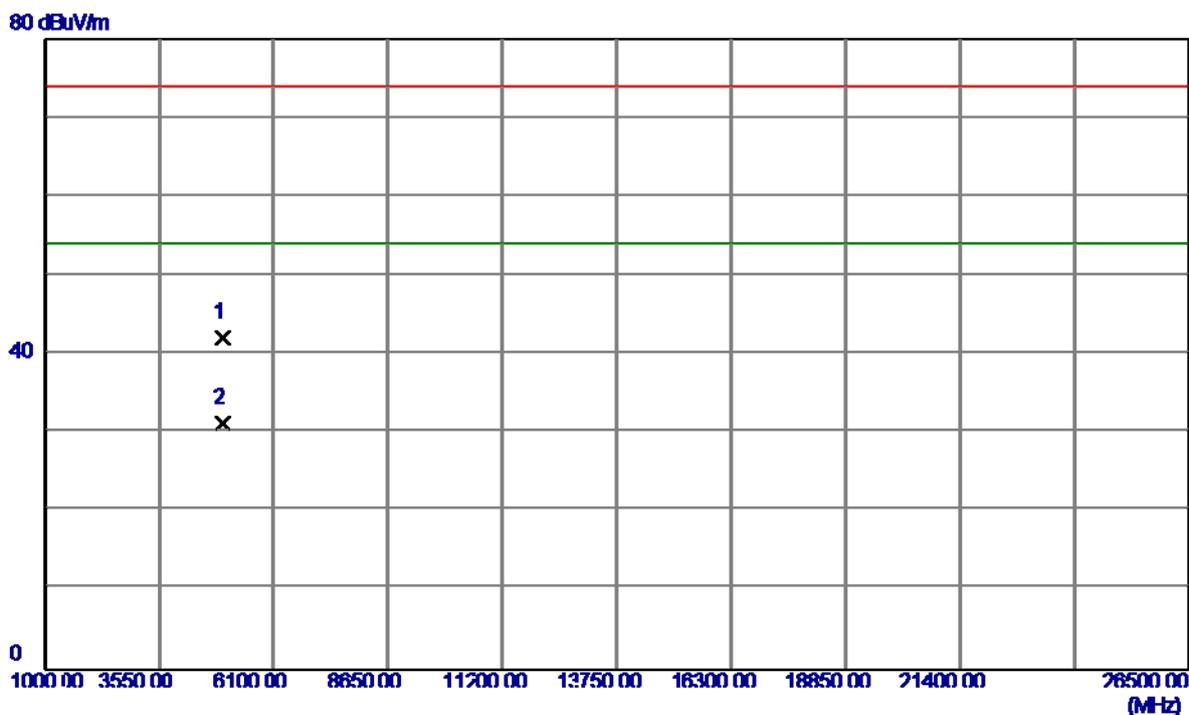
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2479.9000	52.43	34.75	87.18	54.00	33.18	AVG	No Limit
2	2480.1000	65.27	34.75	100.02	74.00	26.02	Peak	No Limit
3	2483.5000	22.71	34.77	57.48	74.00	-16.52	Peak	
4	2483.5000	12.17	34.77	46.94	54.00	-7.06	AVG	

Test Mode : TX 2480MHz \_CH78\_1Mbps

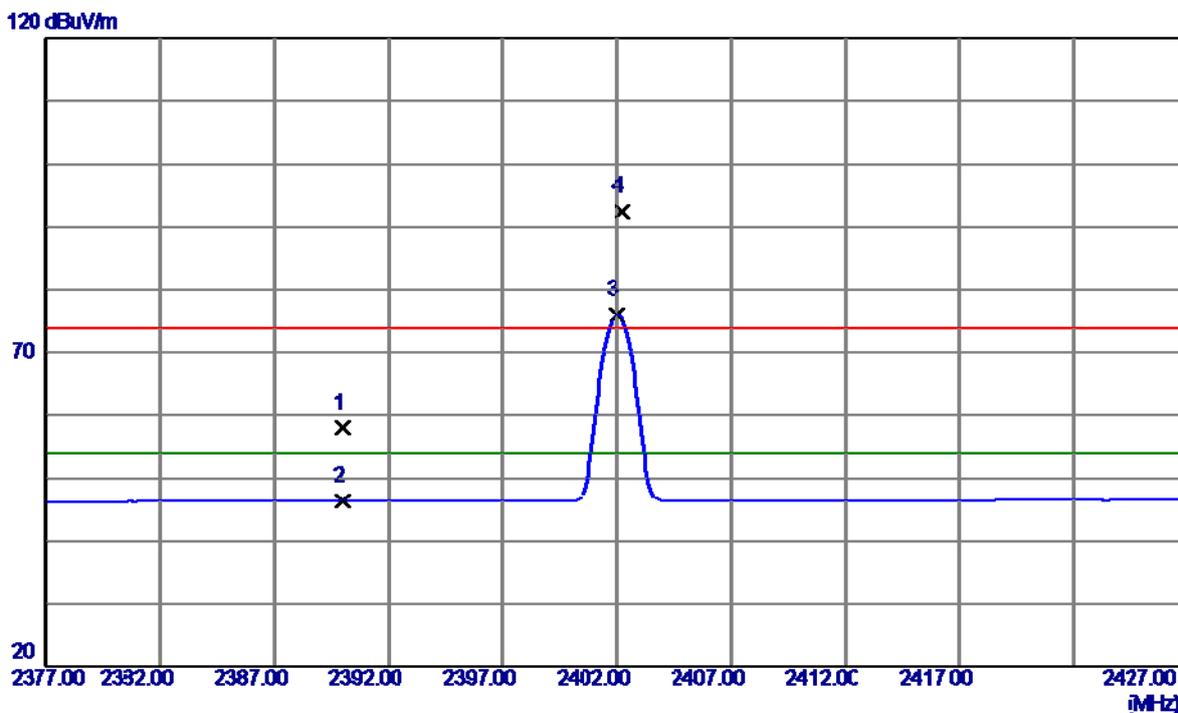
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4960.3000	34.84	7.23	42.07	74.00	-31.93	Peak	
2	4960.7400	23.94	7.23	31.17	54.00	-22.83	AVG	

Test Mode : TX 2402MHz\_CH00\_3Mbps

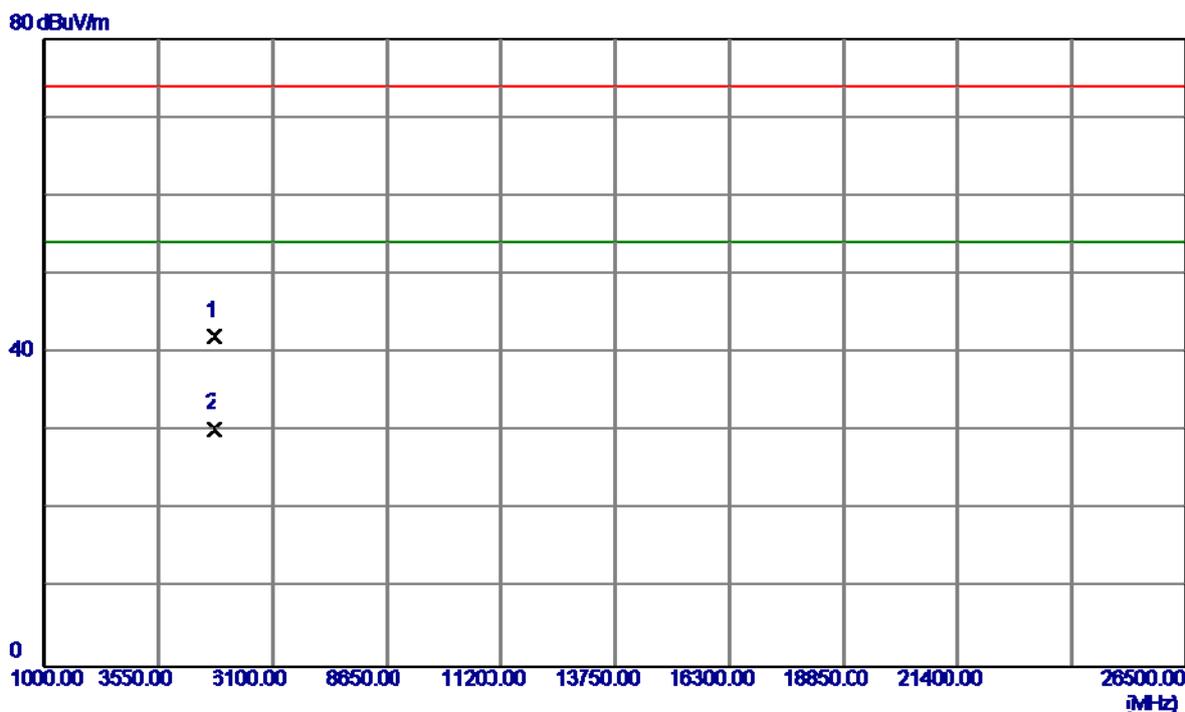
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	23.71	34.23	57.94	74.00	-16.06	Peak	
2	2390.0000	12.12	34.23	46.35	54.00	-7.65	AVG	
3	2402.0000	41.72	34.30	76.02	54.00	22.02	AVG	No Limit
4	2402.2000	58.17	34.30	92.47	74.00	18.47	Peak	No Limit

Test Mode : TX 2402MHz \_CH00\_3Mbps

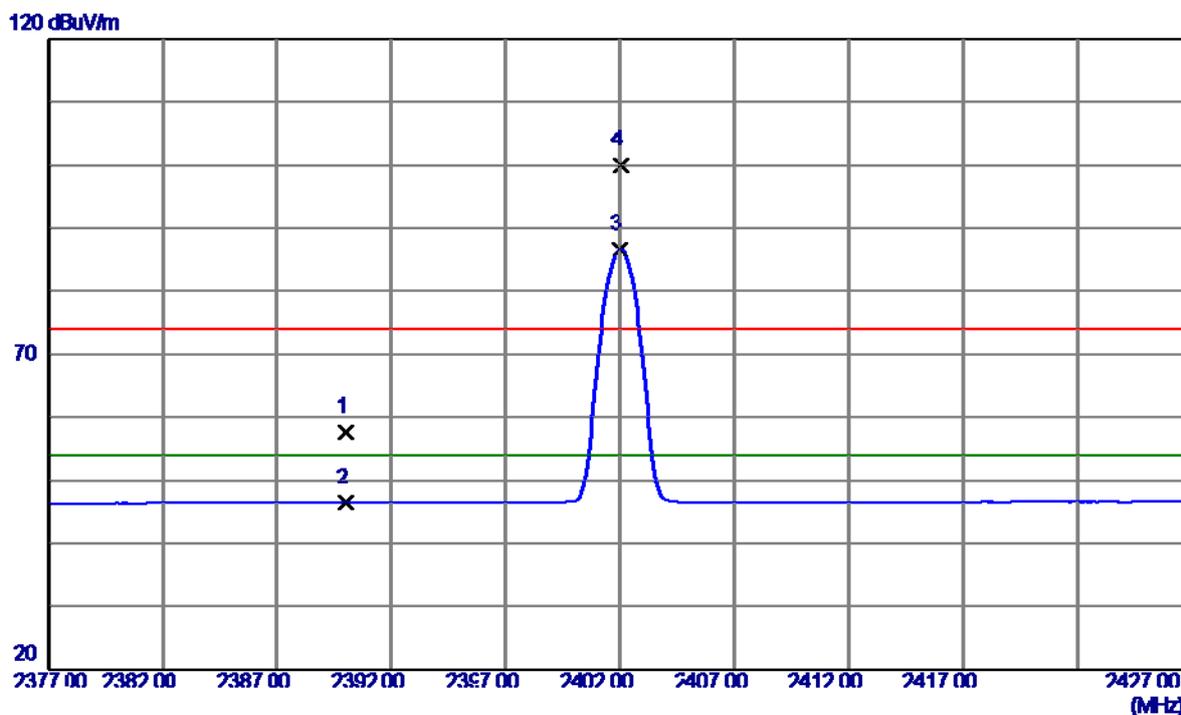
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4804.5200	35.36	6.76	42.12	74.00	-31.88	Peak	
2	4804.6100	23.56	6.76	30.32	54.00	-23.68	AVG	

Test Mode : TX 2402MHz \_CH00\_3Mbps

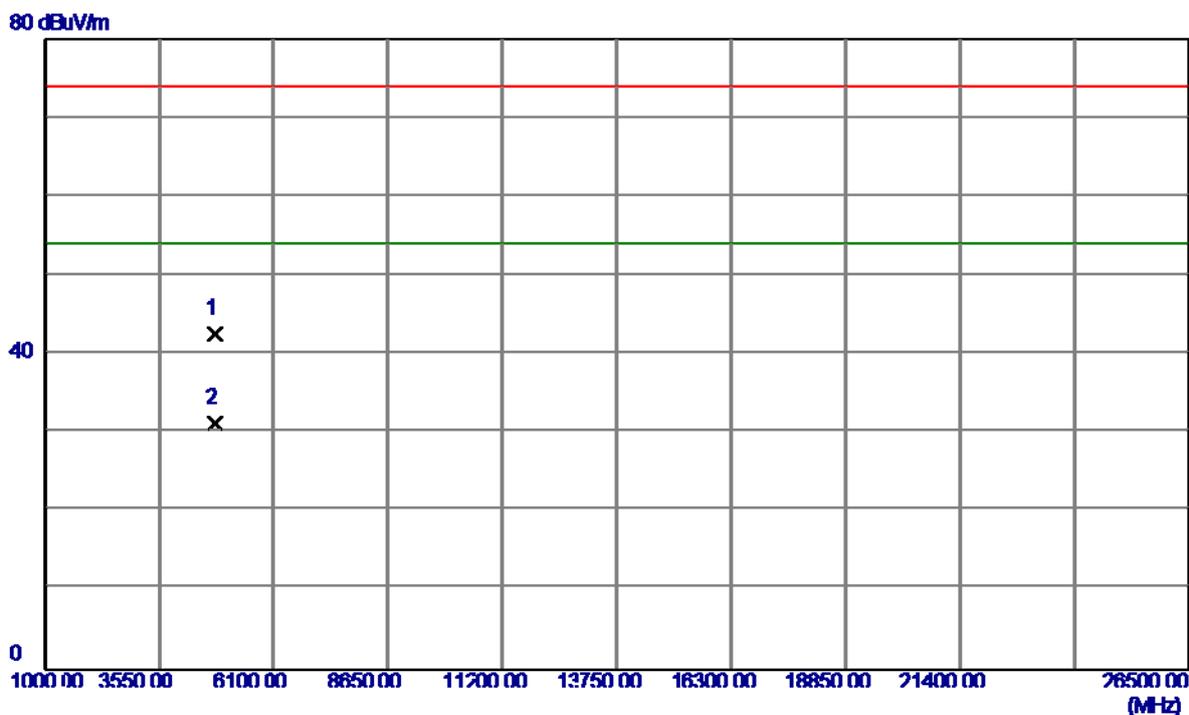
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	23.40	34.23	57.63	74.00	-16.37	Peak	
2	2390.0000	12.13	34.23	46.36	54.00	-7.64	AVG	
3	2402.0000	52.35	34.30	86.65	54.00	32.65	AVG	No Limit
4	2402.0500	65.77	34.30	100.07	74.00	26.07	Peak	No Limit

Test Mode : TX 2402MHz \_CH00\_3Mbps

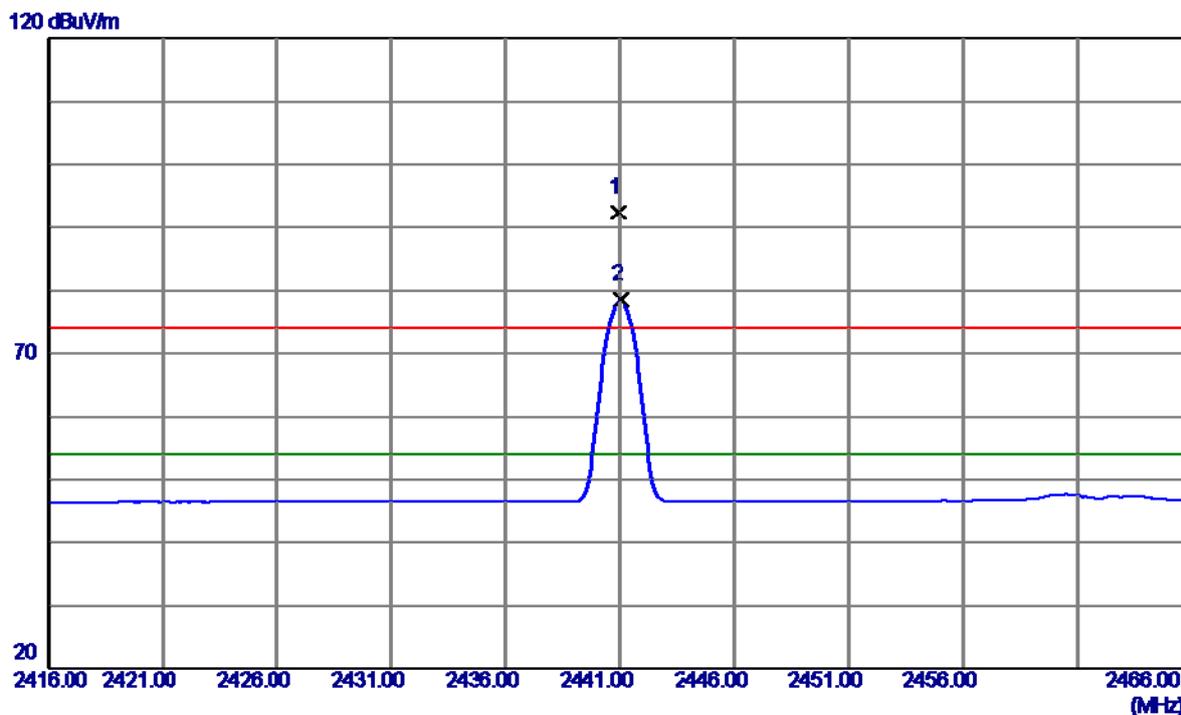
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4805.2799	35.75	6.76	42.51	74.00	-31.49	Peak	
2	4805.7599	24.39	6.77	31.16	54.00	-22.84	AVG	

Test Mode : TX 2441MHz \_CH39\_3Mbps

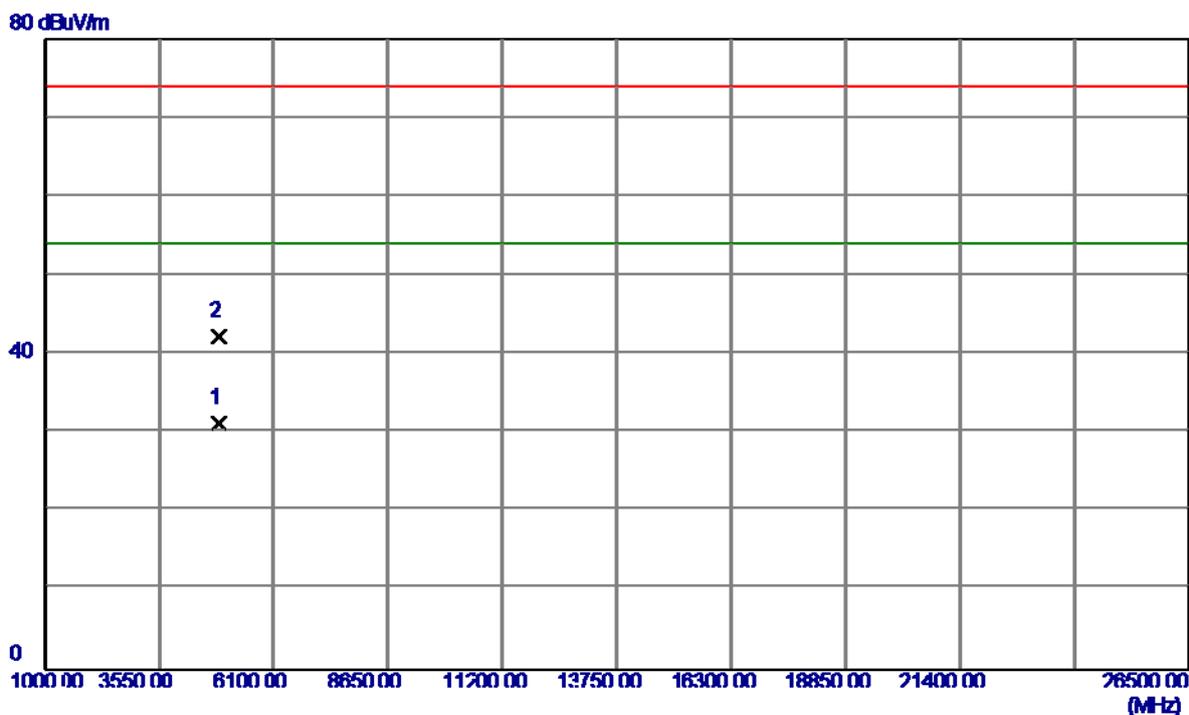
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2440.9500	57.96	34.53	92.49	74.00	18.49	Peak	No Limit
2	2441.0500	44.00	34.53	78.53	54.00	24.53	AVG	No Limit

Test Mode : TX 2441MHz \_CH39\_3Mbps

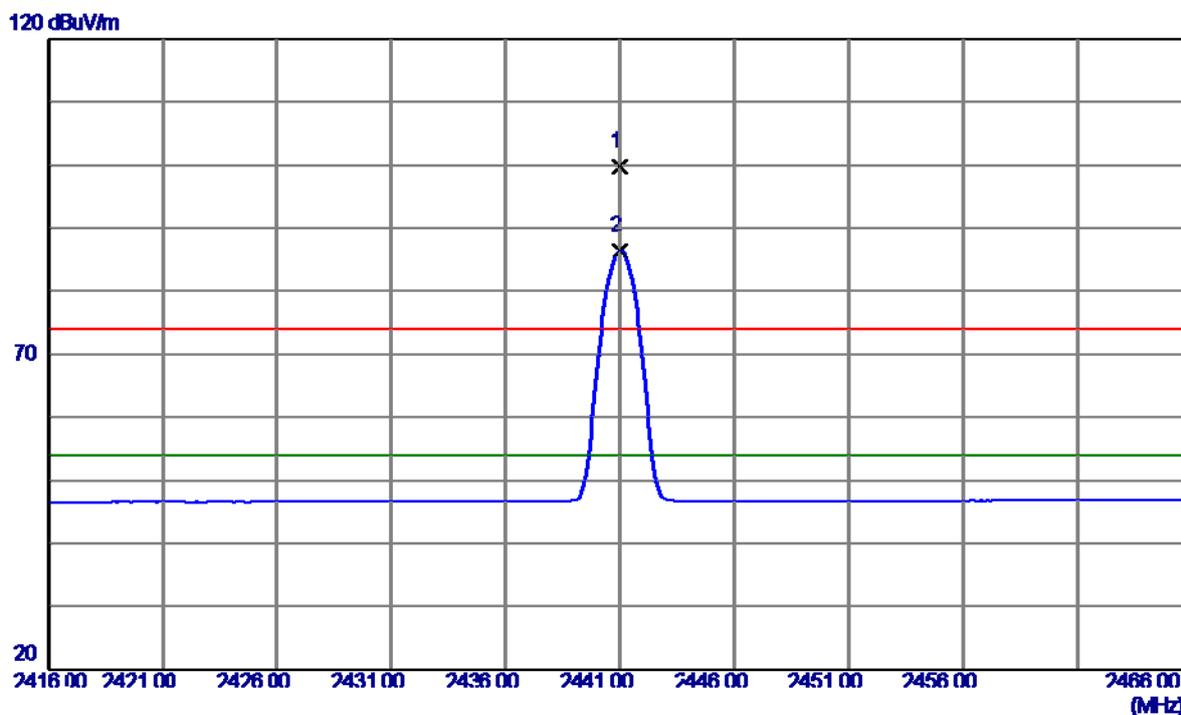
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4882.7000	24.25	7.00	31.25	54.00	-22.75	AVG	
2	4883.6000	35.30	7.00	42.30	74.00	-31.70	Peak	

Test Mode : TX 2441MHz \_CH39\_3Mbps

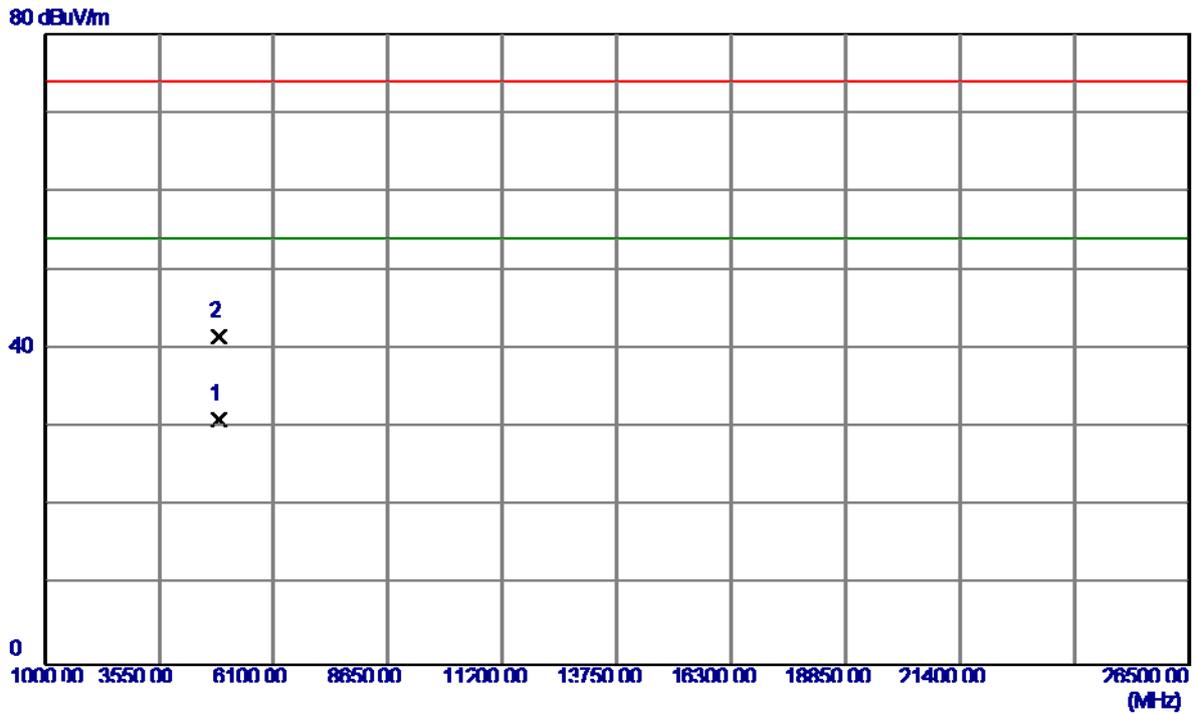
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2441.0000	65.34	34.53	99.87	74.00	25.87	Peak	No Limit
2	2441.0000	51.91	34.53	86.44	54.00	32.44	AVG	No Limit

Test Mode : TX 2441MHz \_CH39\_3Mbps

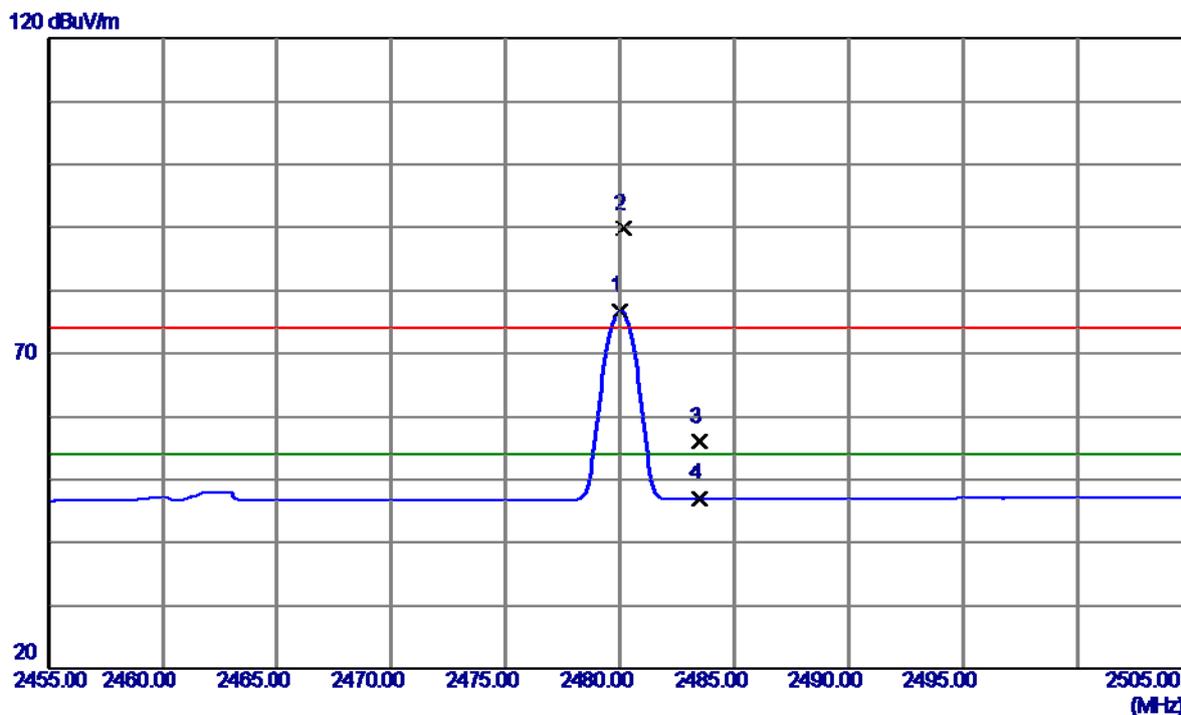
Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4883.2500	24.11	7.00	31.11	54.00	-22.89	AVG	
2	4883.5000	34.57	7.00	41.57	74.00	-32.43	Peak	

Test Mode : TX 2480MHz \_CH78\_3Mbps

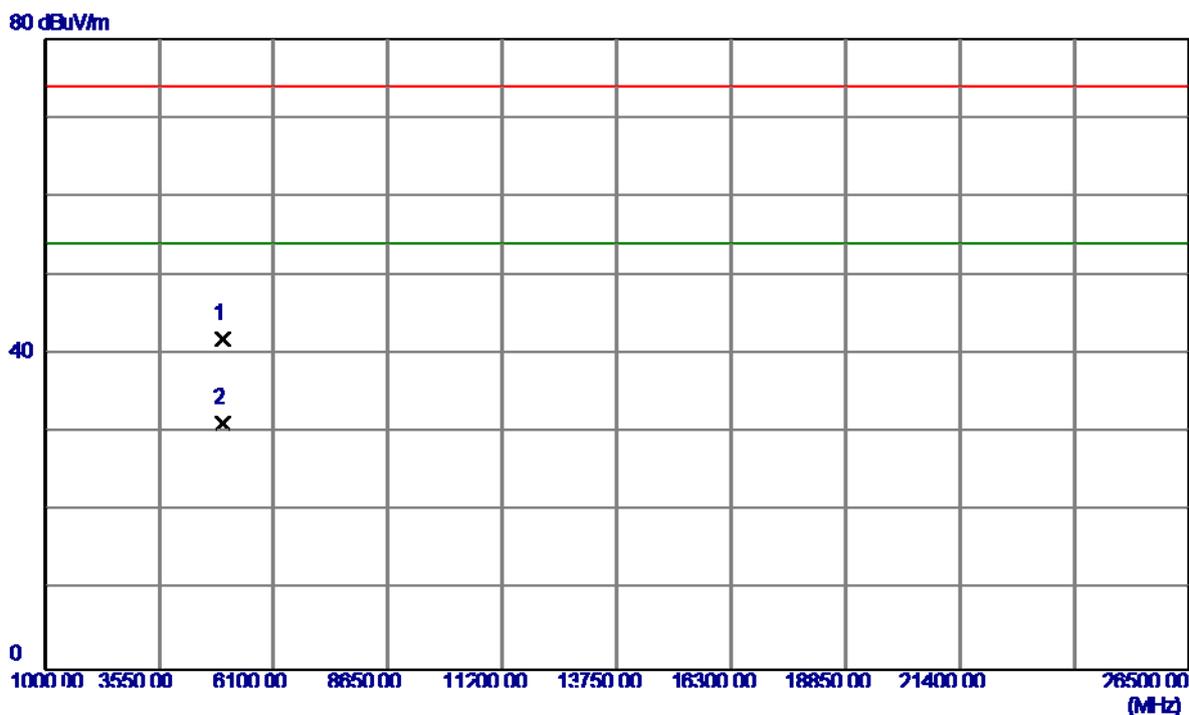
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2480.0000	42.10	34.75	76.85	54.00	22.85	AVG	No Limit
2	2480.1500	54.99	34.75	89.74	74.00	15.74	Peak	No Limit
3	2483.5000	21.32	34.77	56.09	74.00	-17.91	Peak	
4	2483.5000	12.15	34.77	46.92	54.00	-7.08	AVG	

Test Mode : TX 2480MHz \_CH78\_3Mbps

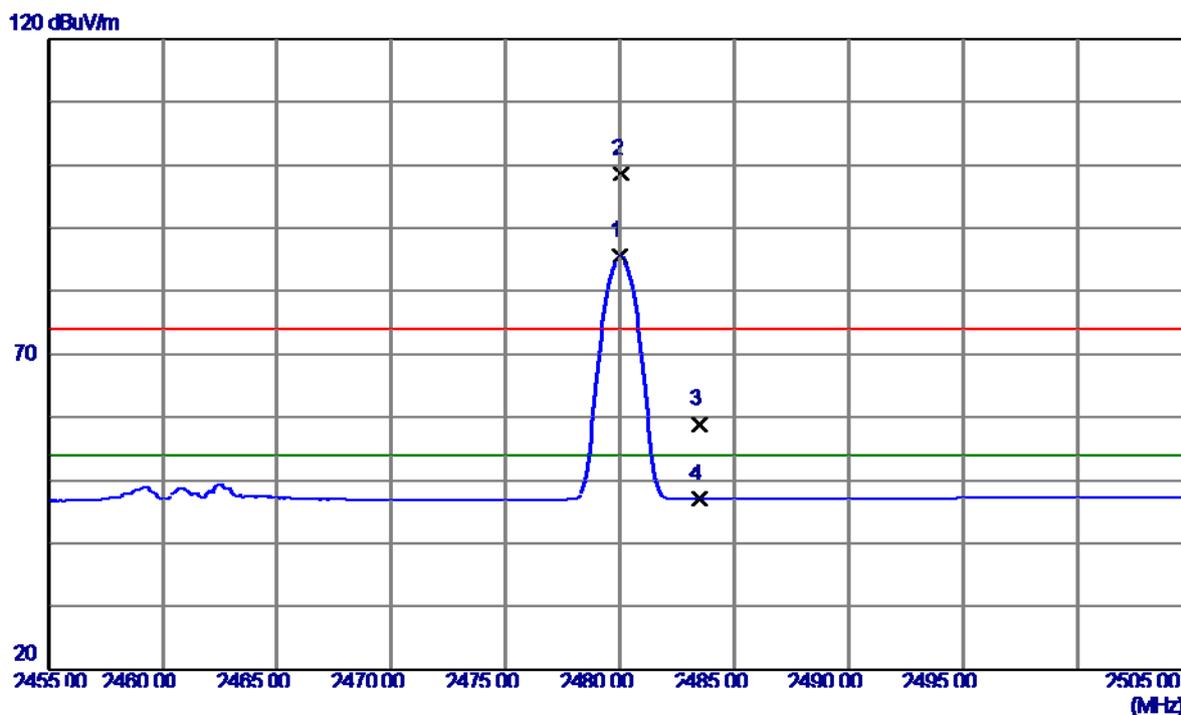
Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4961.2400	34.70	7.23	41.93	74.00	-32.07	Peak	
2	4961.3800	24.02	7.23	31.25	54.00	-22.75	AVG	

Test Mode : TX 2480MHz \_CH78\_3Mbps

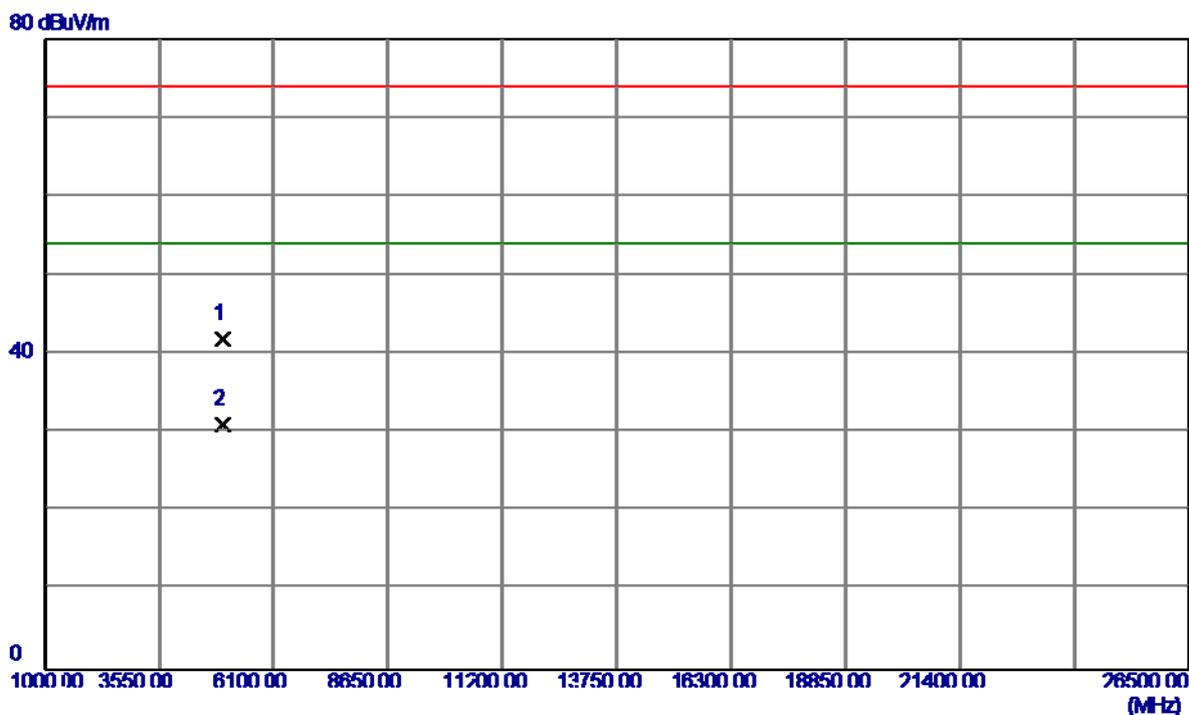
### Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2480.0000	50.82	34.75	85.57	54.00	31.57	AVG	No Limit
2	2480.0500	63.84	34.75	98.59	74.00	24.59	Peak	No Limit
3	2483.5000	24.06	34.77	58.83	74.00	-15.17	Peak	
4	2483.5000	12.16	34.77	46.93	54.00	-7.07	AVG	

Test Mode : TX 2480MHz \_CH78\_3Mbps

Horizontal

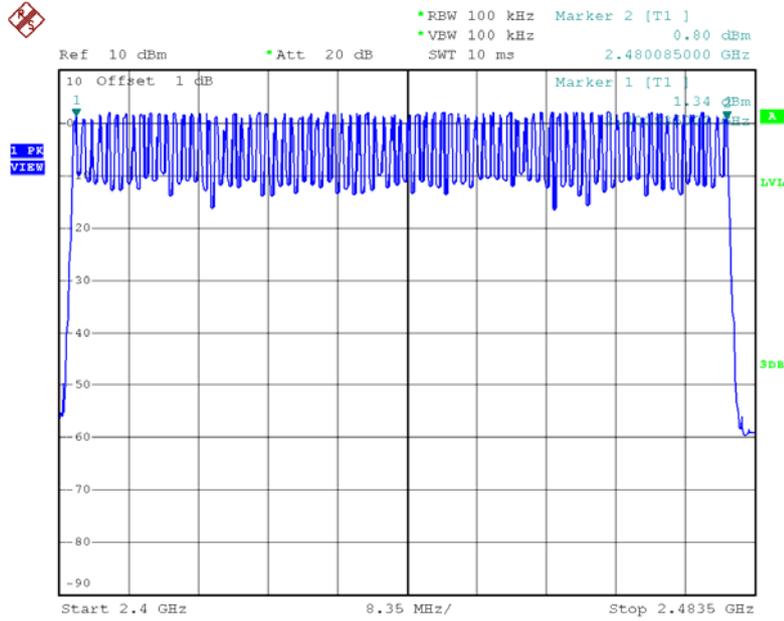


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	4961.2000	34.75	7.23	41.98	74.00	-32.02	Peak	
2	4961.6300	23.88	7.23	31.11	54.00	-22.89	AVG	

## **ATTACHMENT E - NUMBER OF HOPPING CHANNEL**

**Test Mode**      **Hopping Mode\_1Mbps**

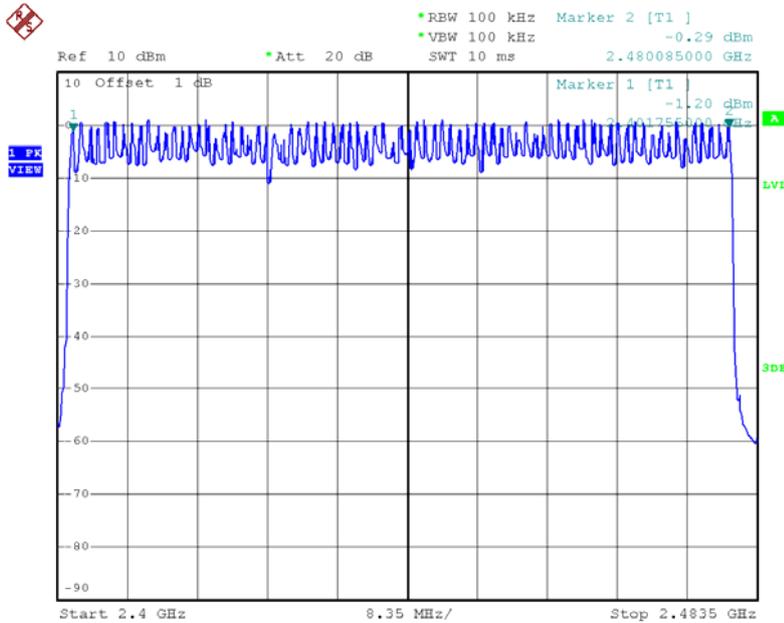
Number of Hopping Channel      79



Date: 14.DEC.2015 17:23:37

**Test Mode**      **Hopping Mode\_3Mbps**

Number of Hopping Channel      79



Date: 14.DEC.2015 18:30:59

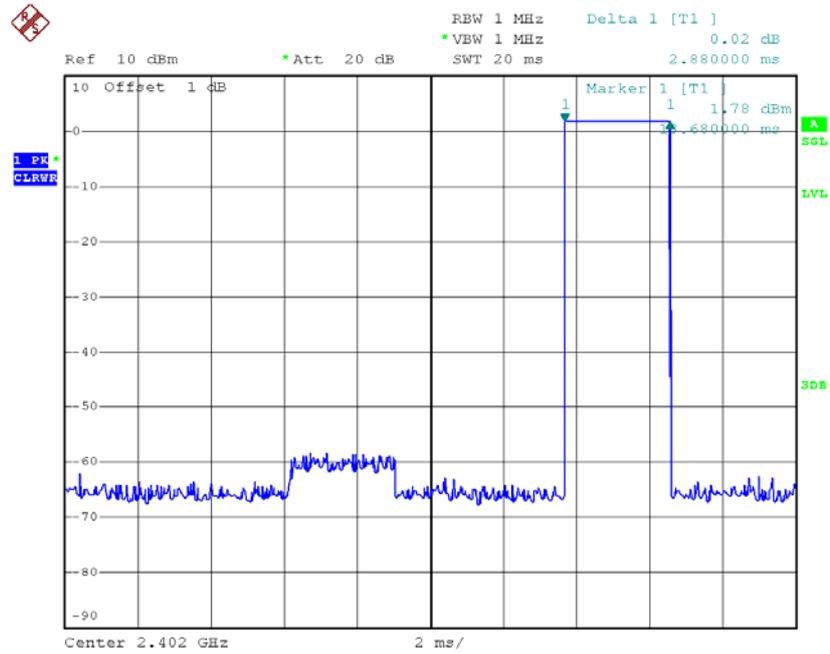
## ATTACHMENT F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps
-------------	---------------

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Pass
DH3	2402	1.6400	0.1749	0.4000	Pass
DH1	2402	0.3700	0.0395	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH3	2441	1.6400	0.1749	0.4000	Pass
DH1	2441	0.3700	0.0395	0.4000	Pass
DH5	2480	2.8800	0.3072	0.4000	Pass
DH3	2480	1.6200	0.1728	0.4000	Pass
DH1	2480	0.3750	0.0400	0.4000	Pass

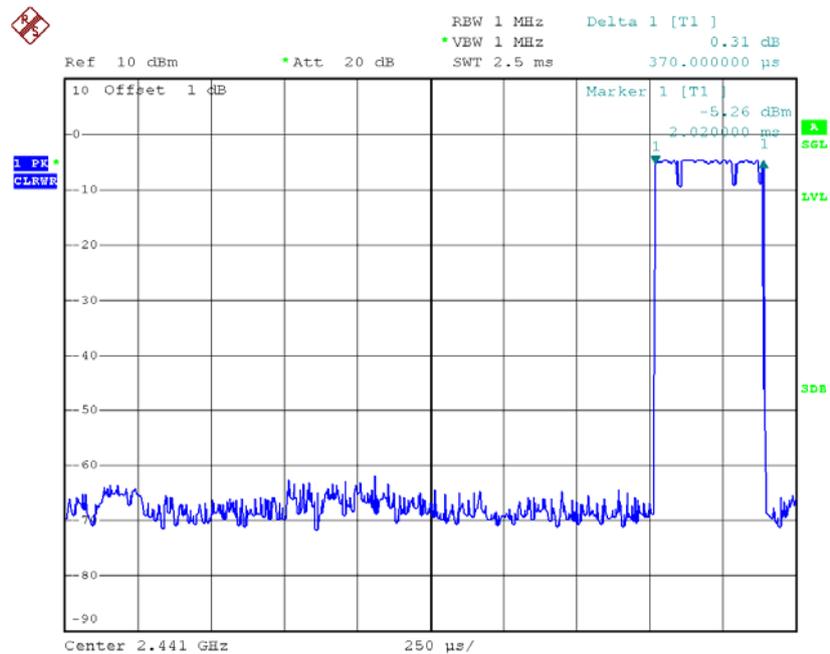


### CH00-DH5



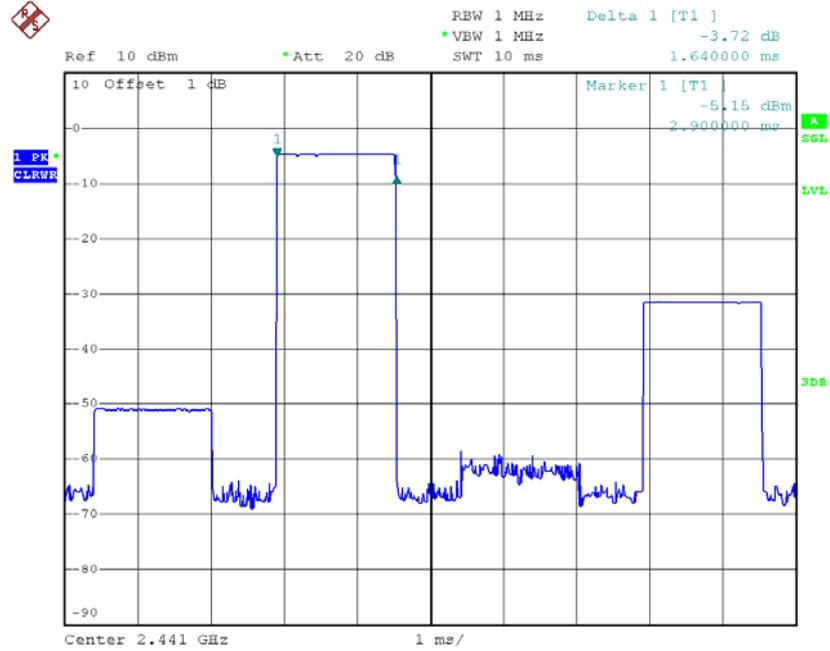
Date: 14.DEC.2015 18:01:00

### CH39-DH1



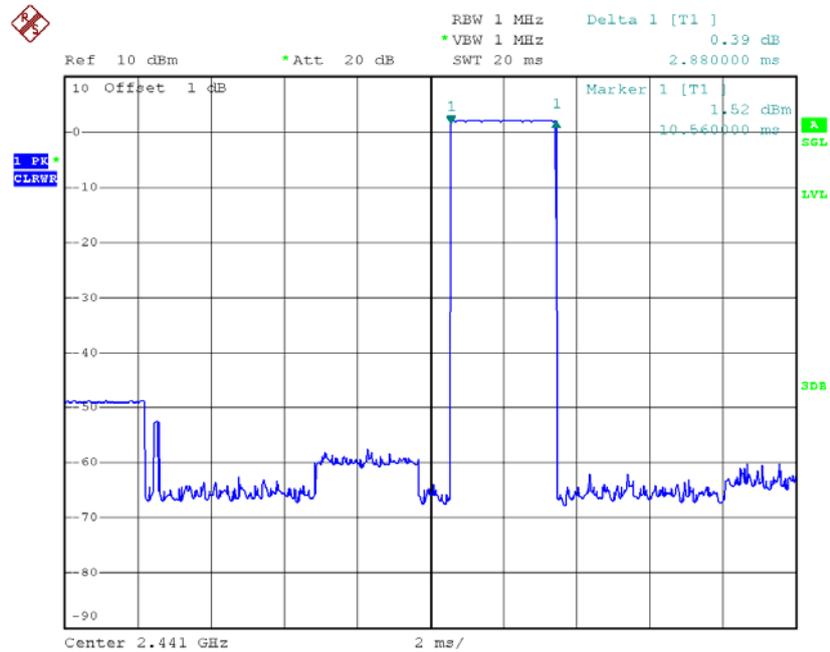
Date: 14.DEC.2015 17:18:23

### CH39-DH3



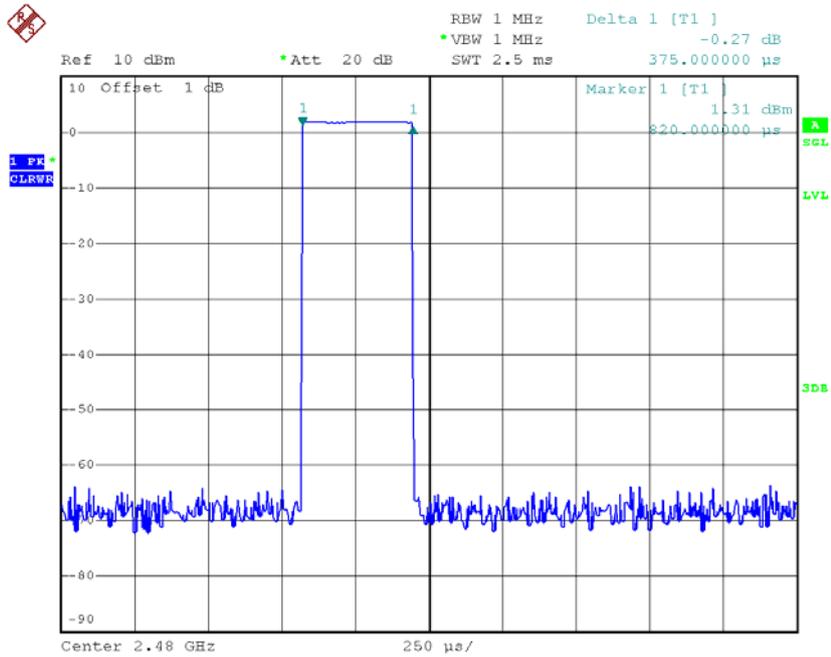
Date: 14.DEC.2015 17:27:49

### CH39-DH5



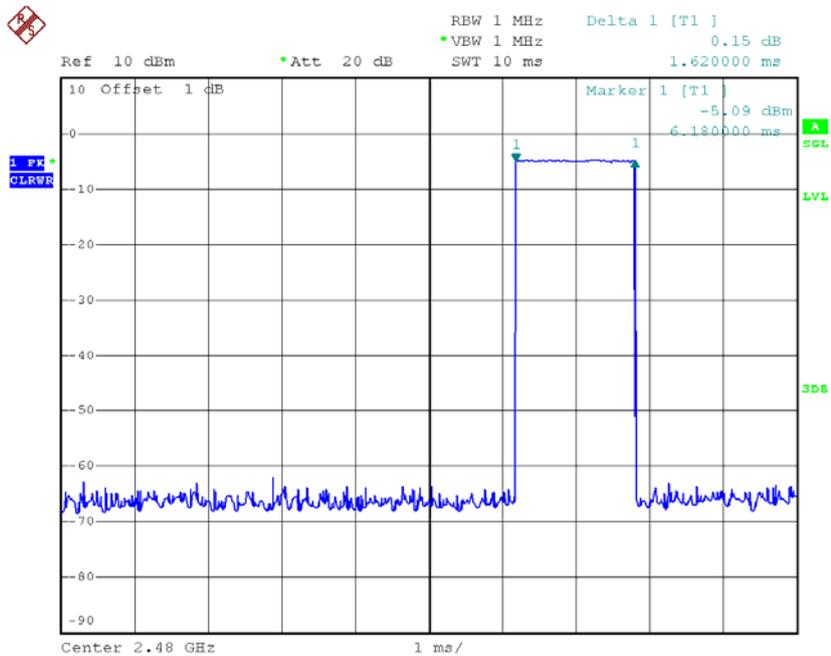
Date: 14.DEC.2015 18:01:09

### CH78-DH1



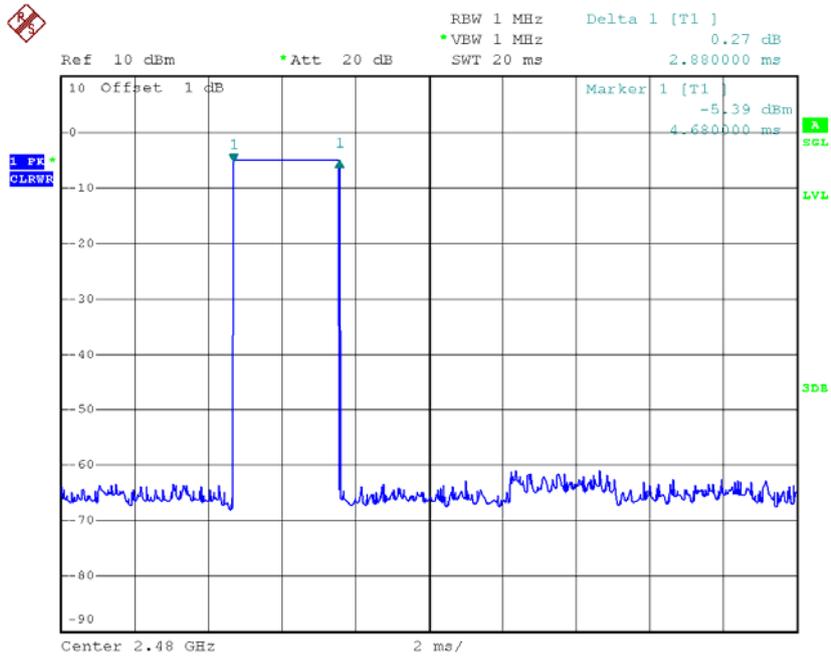
Date: 14.DEC.2015 17:18:28

### CH78-DH3



Date: 14.DEC.2015 17:27:54

### CH78-DH5



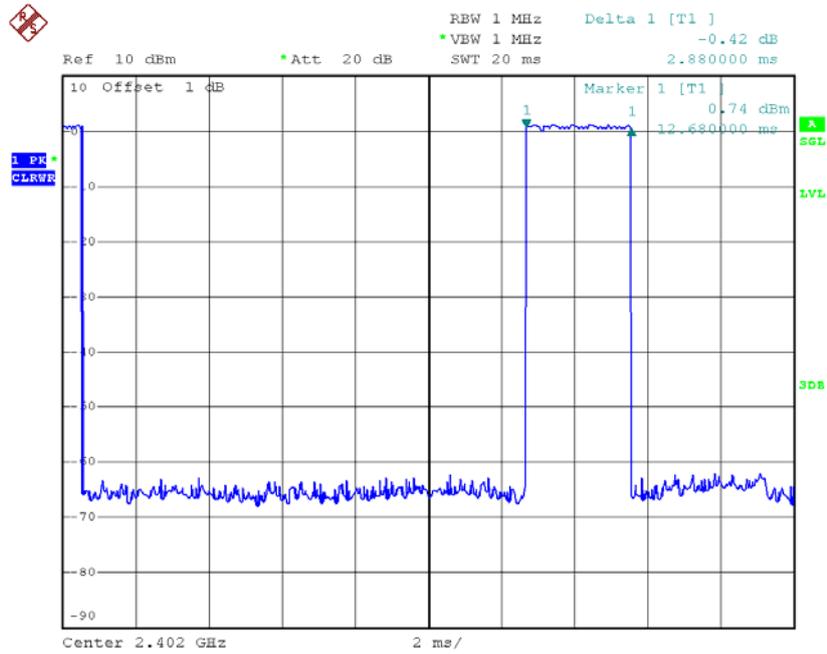
Date: 14.DEC.2015 18:01:13

Test Mode :	TX Mode_3Mbps
-------------	---------------

Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Pass
DH3	2402	1.6400	0.1749	0.4000	Pass
DH1	2402	0.3800	0.0405	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH3	2441	1.6400	0.1749	0.4000	Pass
DH1	2441	0.3800	0.0405	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6200	0.1728	0.4000	Pass
DH1	2480	0.3750	0.0400	0.4000	Pass

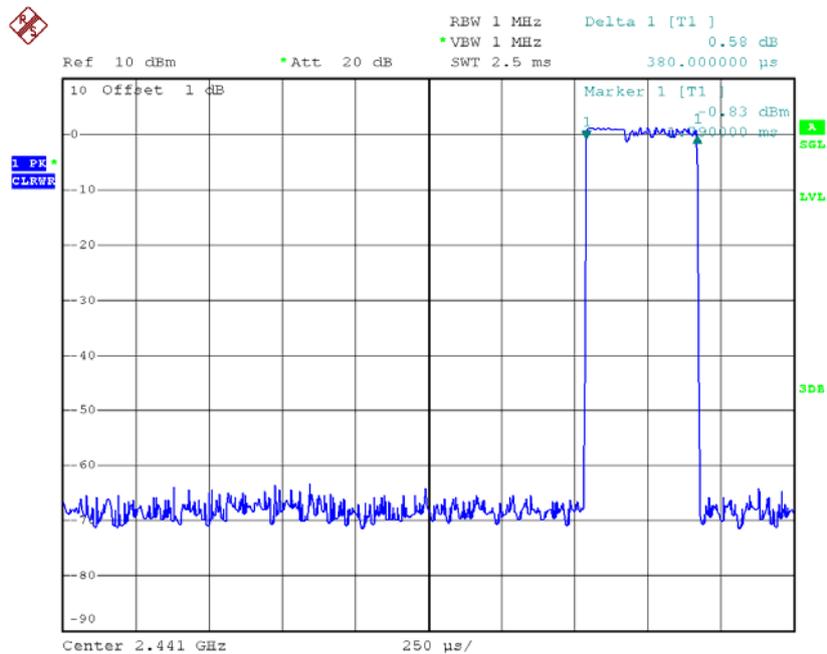


### CH00-DH5



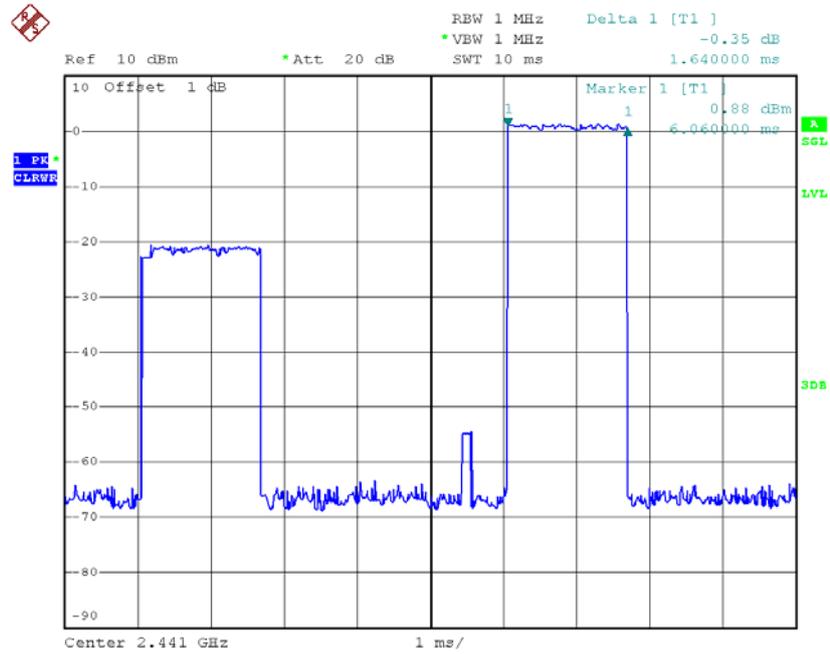
Date: 14.DEC.2015 18:25:39

### CH39-DH1



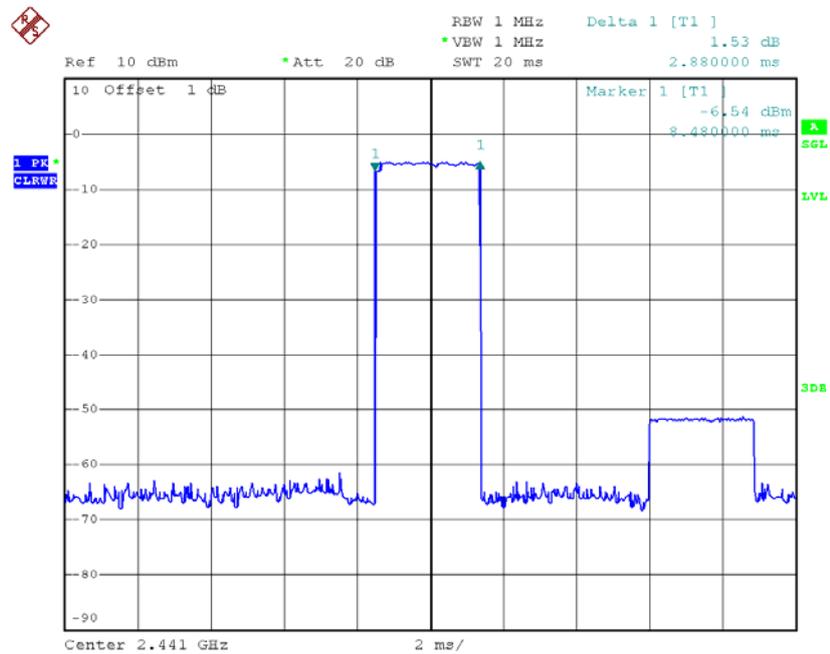
Date: 14.DEC.2015 18:14:19

### CH39-DH3



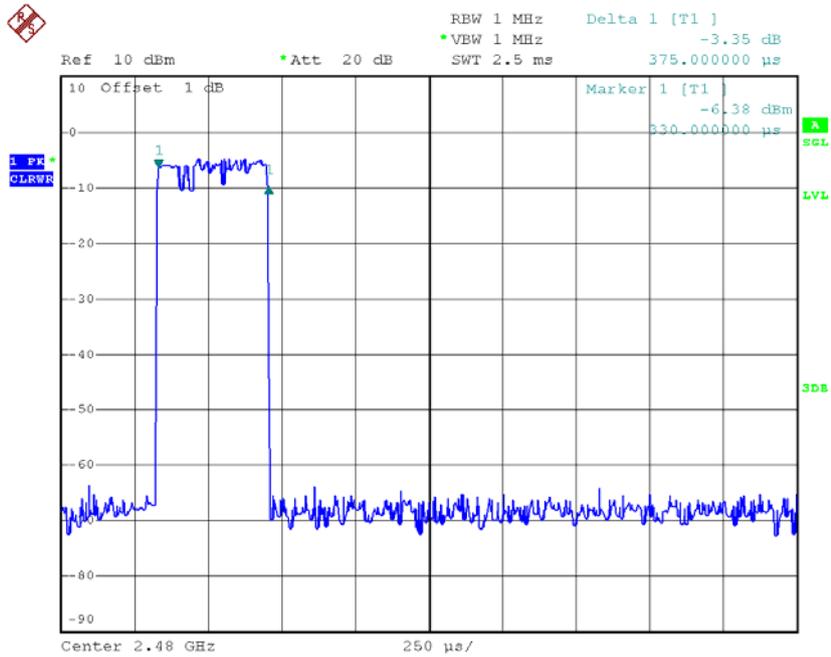
Date: 14.DEC.2015 18:25:18

### CH39-DH5



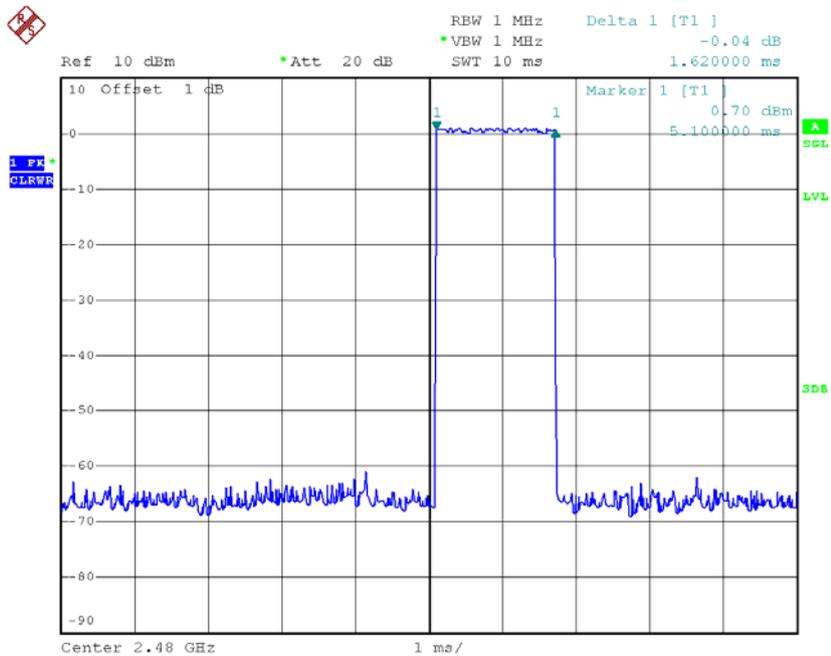
Date: 14.DEC.2015 18:25:44

### CH78-DH1



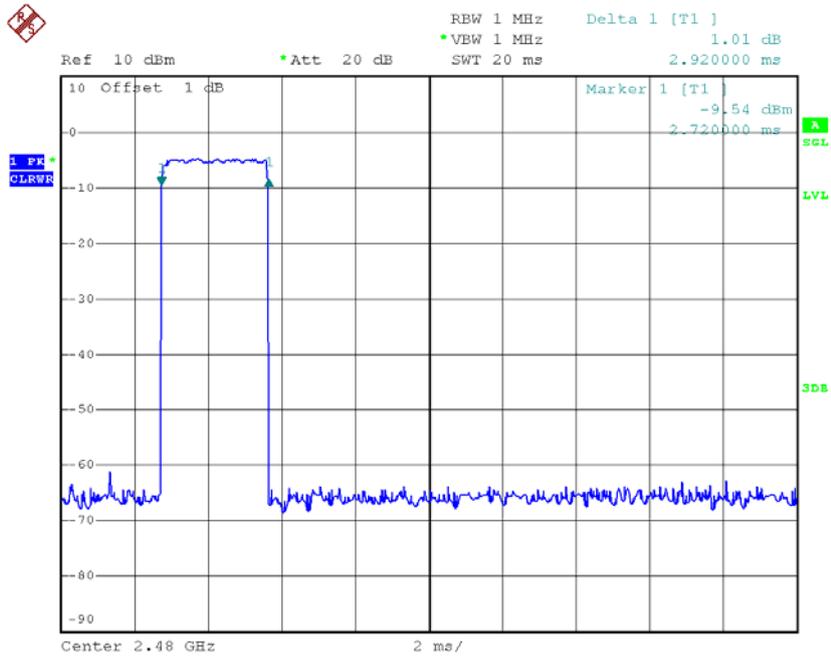
Date: 14.DEC.2015 18:14:26

### CH78-DH3



Date: 14.DEC.2015 18:25:23

### CH78-DH5

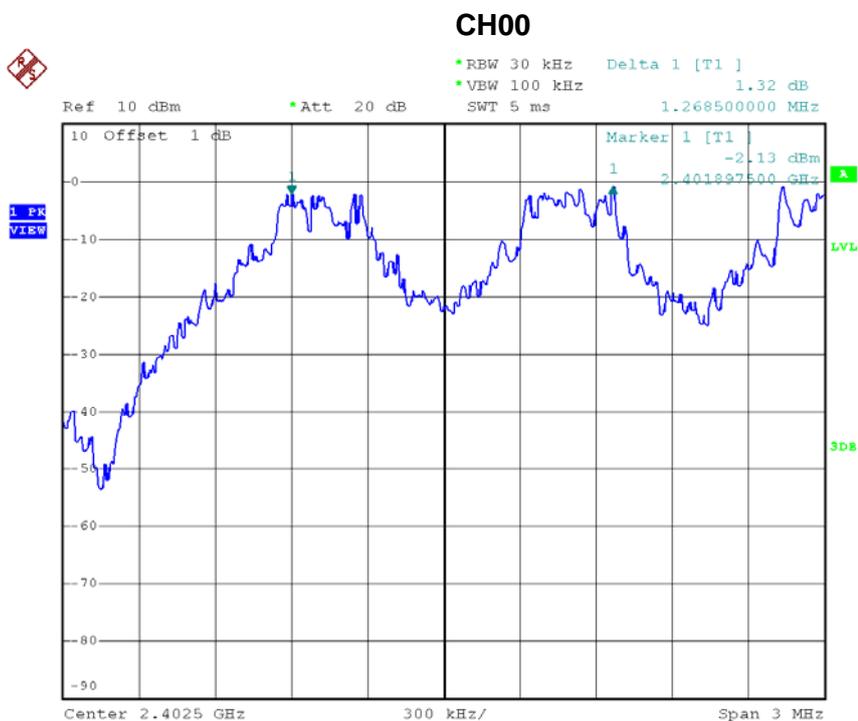


Date: 14.DEC.2015 18:25:48

## **ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT**

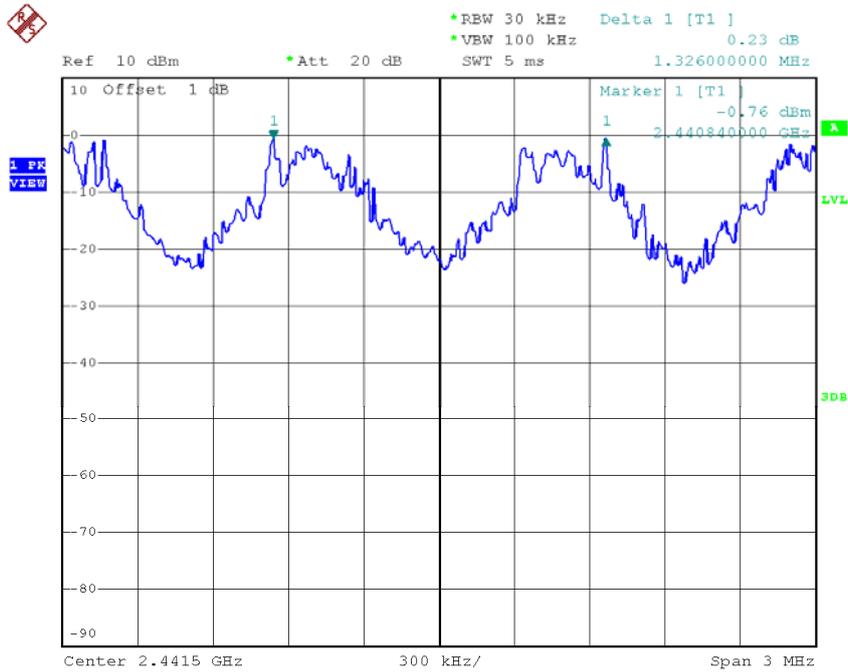
Test Mode : Hopping on \_1Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.269	0.628	Pass
2441	1.326	0.624	Pass
2480	1.190	0.633	Pass



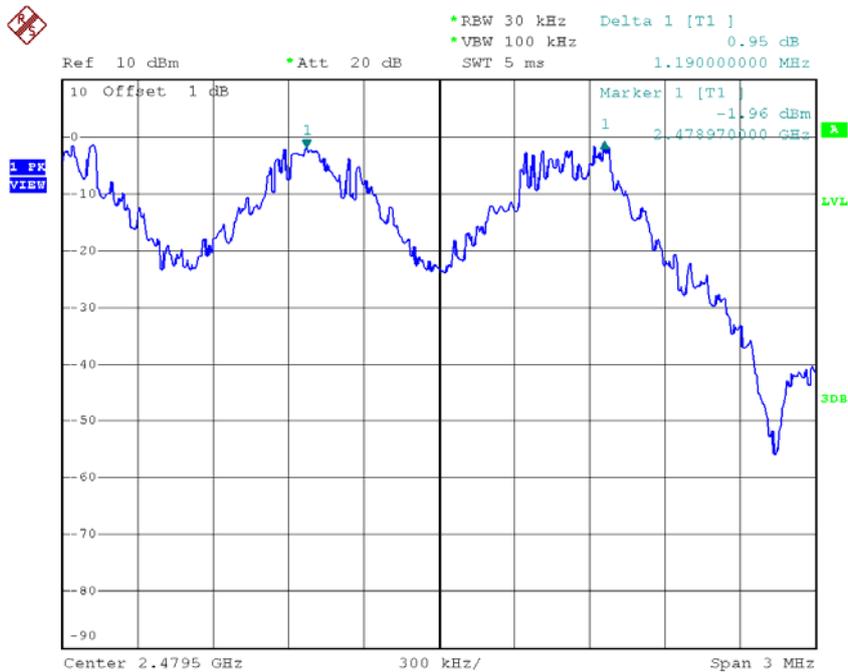
Date: 14.DEC.2015 17:19:37

### CH39



Date: 14.DEC.2015 17:20:41

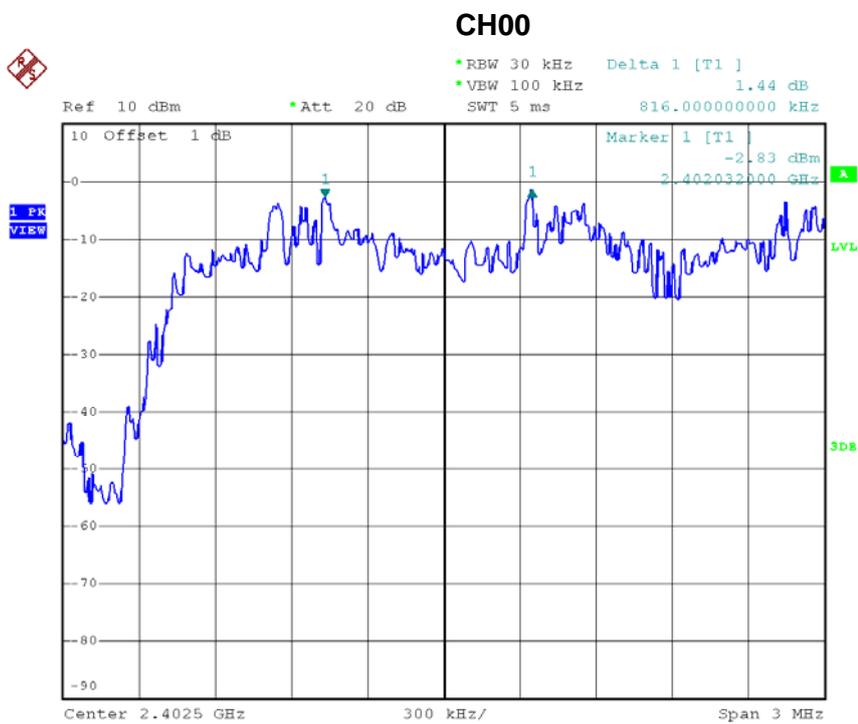
### CH78



Date: 14.DEC.2015 17:21:48

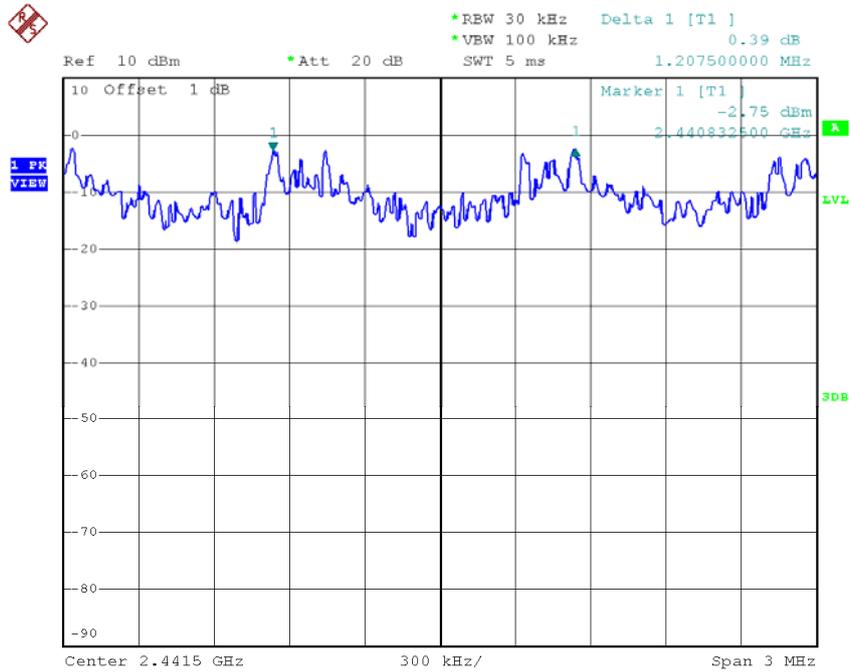
Test Mode : Hopping on \_3Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.816	0.809	Pass
2441	1.208	0.809	Pass
2480	1.006	0.805	Pass



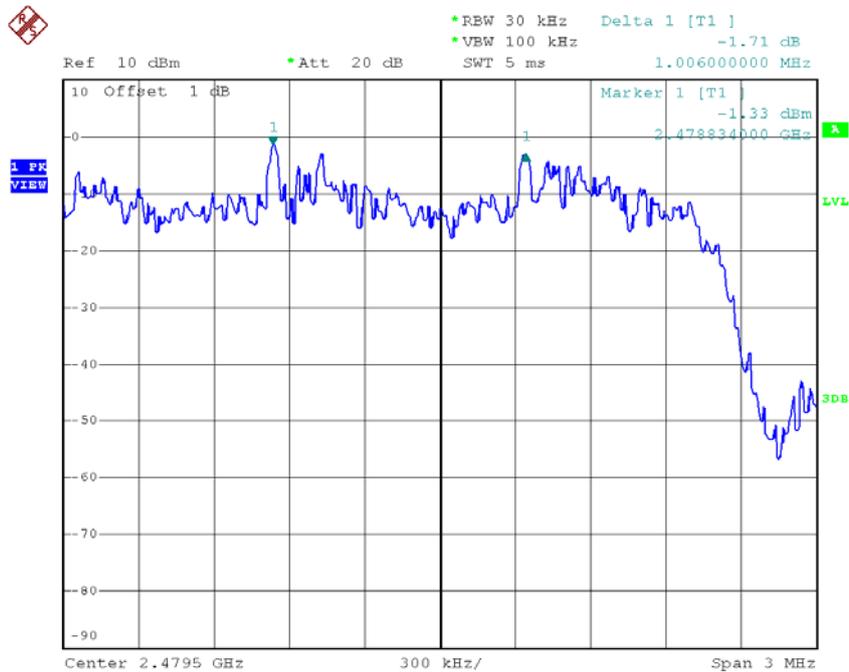
Date: 14.DEC.2015 18:15:31

### CH39



Date: 14.DEC.2015 18:16:38

### CH78

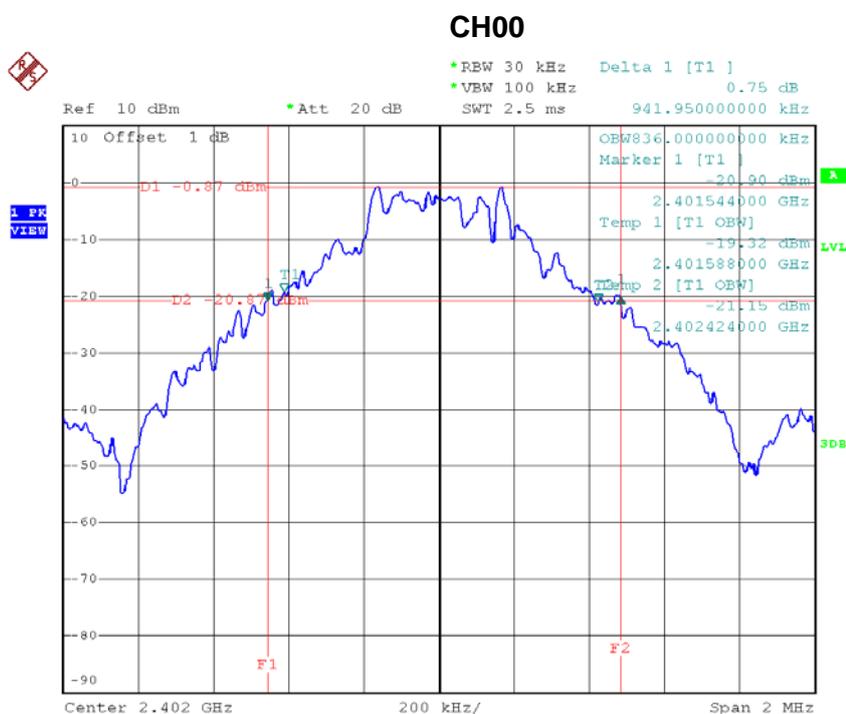


Date: 14.DEC.2015 18:17:46

## ATTACHMENT H - BANDWIDTH

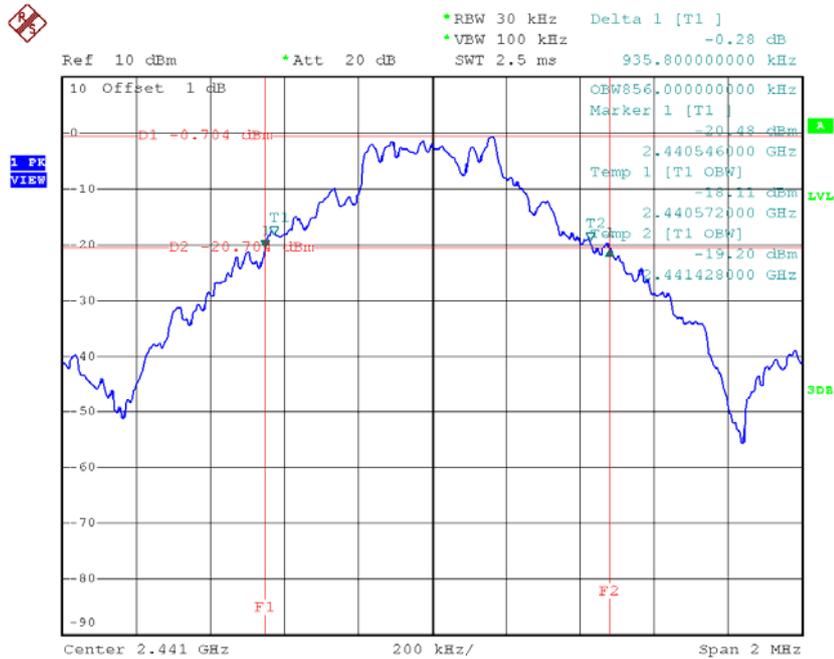
Test Mode : TX Mode \_1Mbps

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.942	0.836	Pass
2441	0.936	0.856	Pass
2480	0.950	0.860	Pass



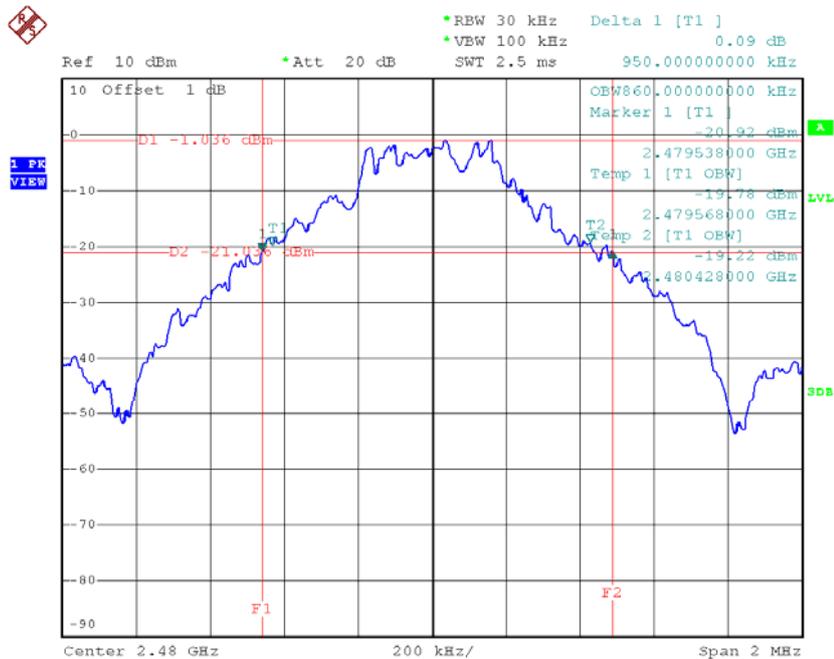
Date: 14.DEC.2015 17:15:11

### CH39



Date: 14.DEC.2015 17:16:30

### CH78

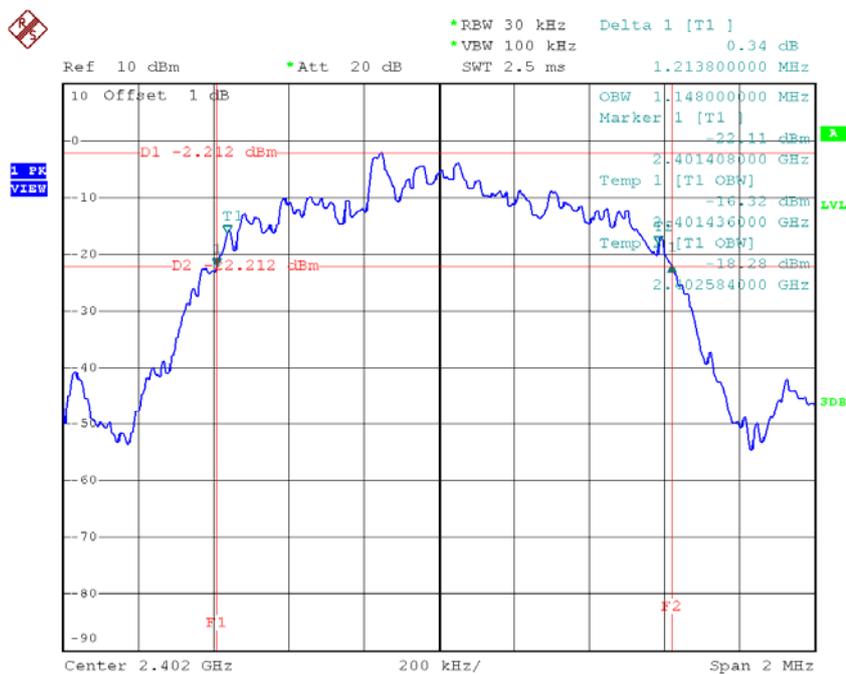


Date: 14.DEC.2015 17:17:15

Test Mode : TX Mode\_3Mbps

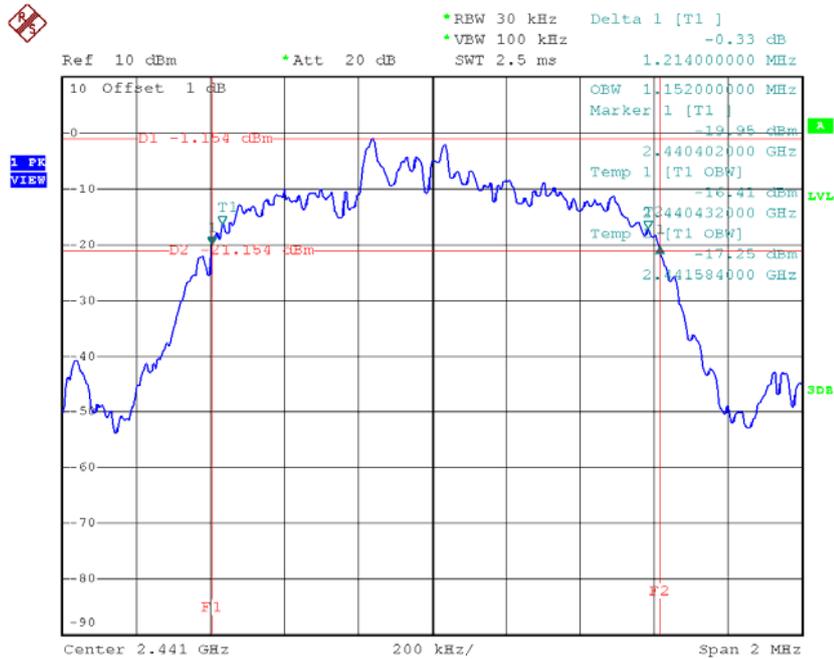
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.214	1.148	Pass
2441	1.214	1.152	Pass
2480	1.208	1.152	Pass

### CH00



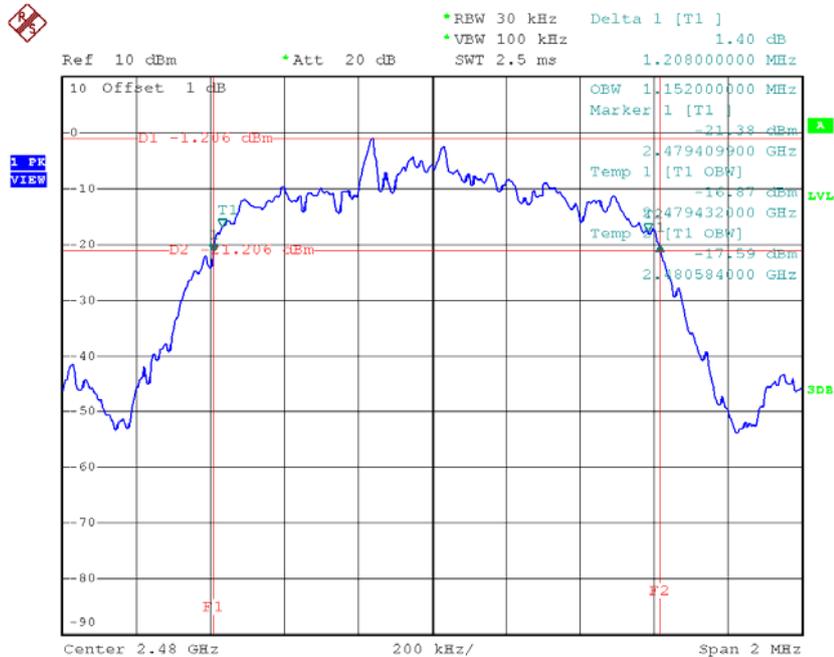
Date: 14.DEC.2015 18:02:49

### CH39



Date: 14.DEC.2015 18:04:36

### CH78

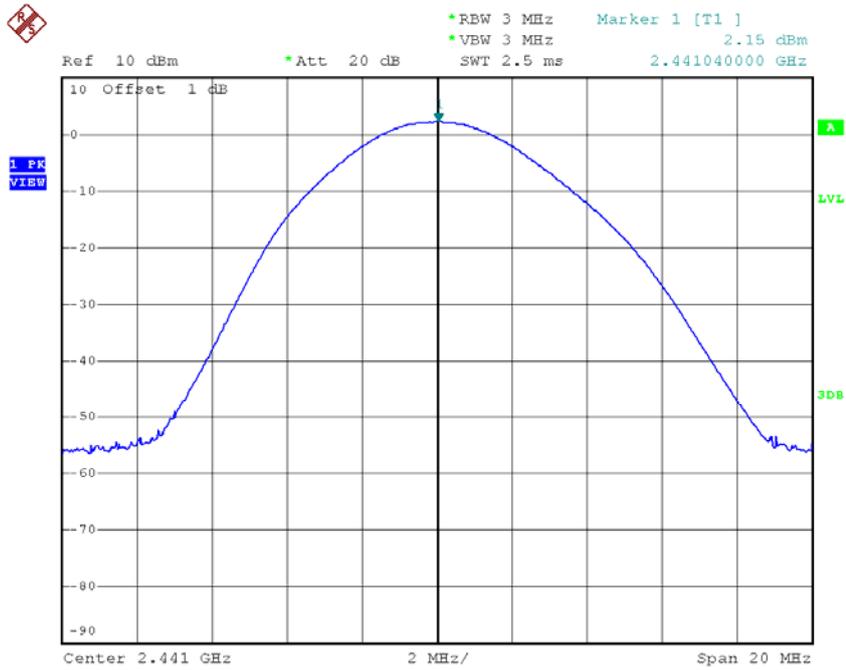


Date: 14.DEC.2015 18:06:10

## ATTACHMENT I - PEAK OUTPUT POWER

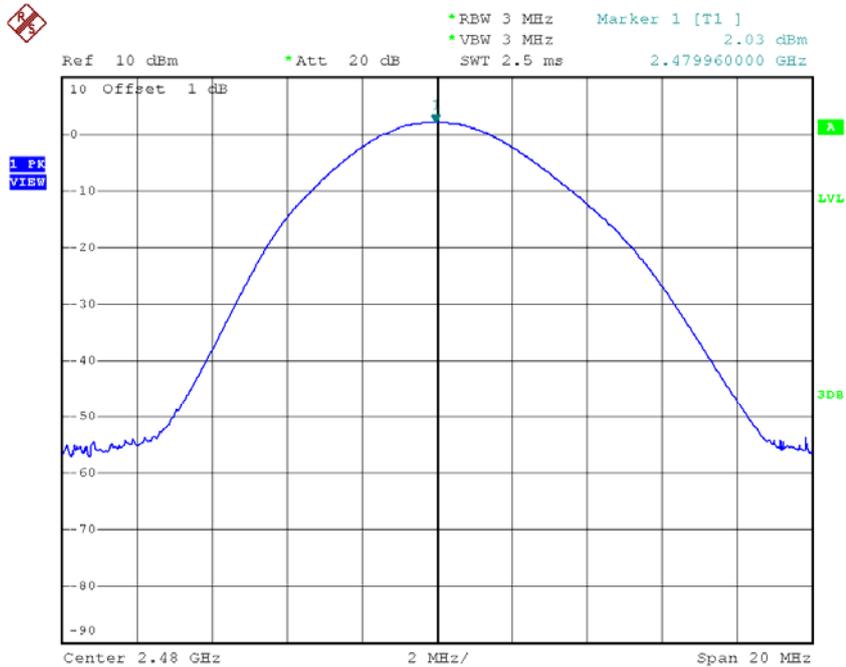


### CH39



Date: 14.DEC.2015 17:13:26

### CH78



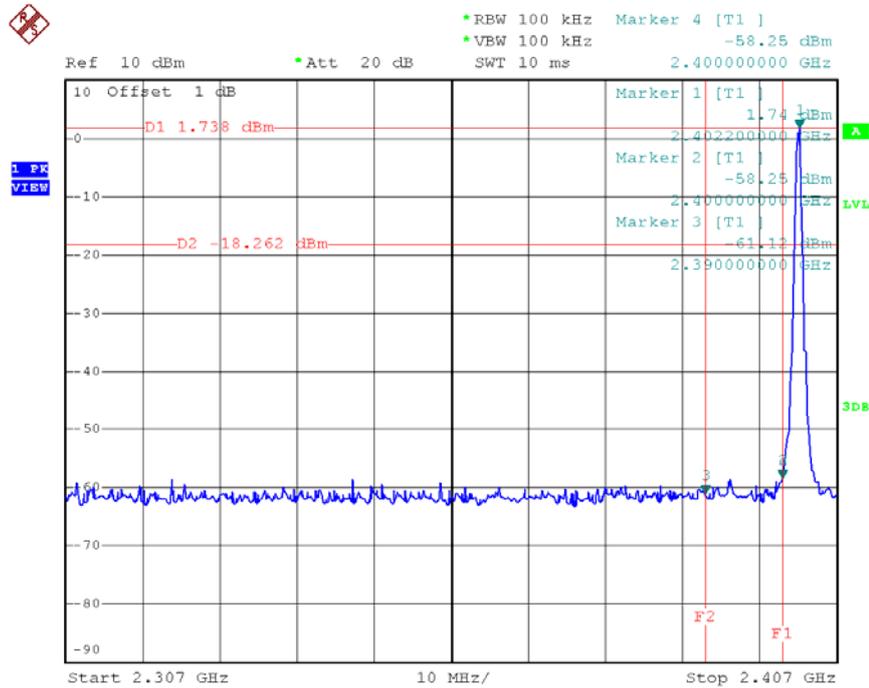
Date: 14.DEC.2015 17:13:57





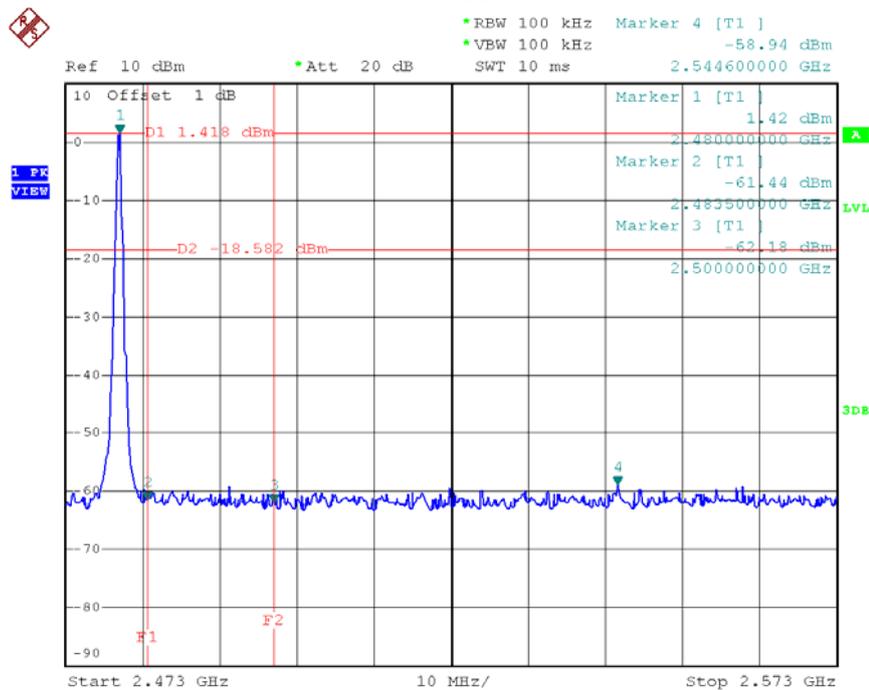
**ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS  
EMISSION**

### CH00 (Lower)\_1Mbps



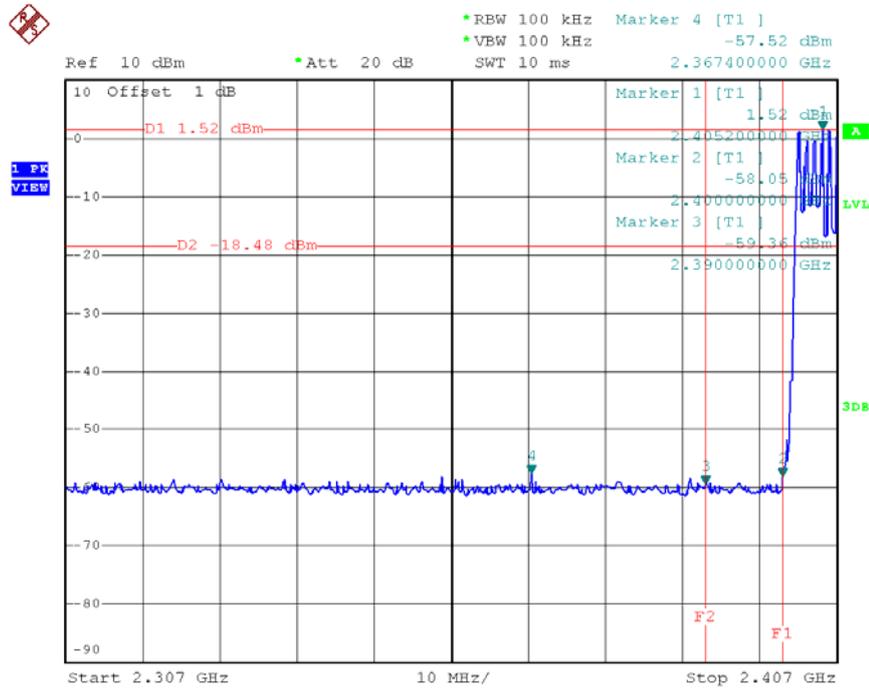
Date: 14.DEC.2015 17:14:44

### CH78 (Upper)\_1Mbps



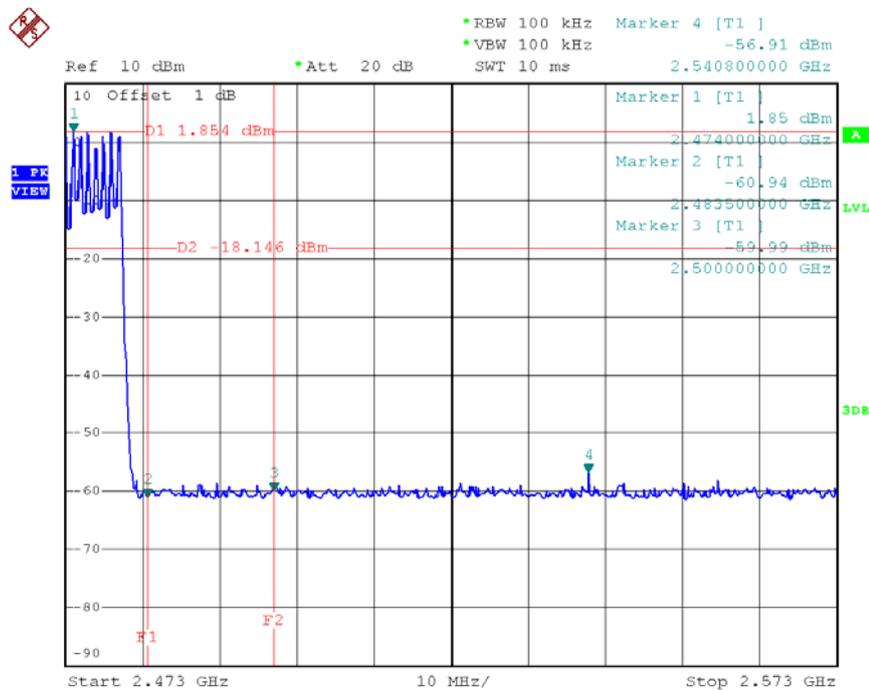
Date: 14.DEC.2015 17:16:49

### CH00 Hopping on mode (Lower)\_1Mbps



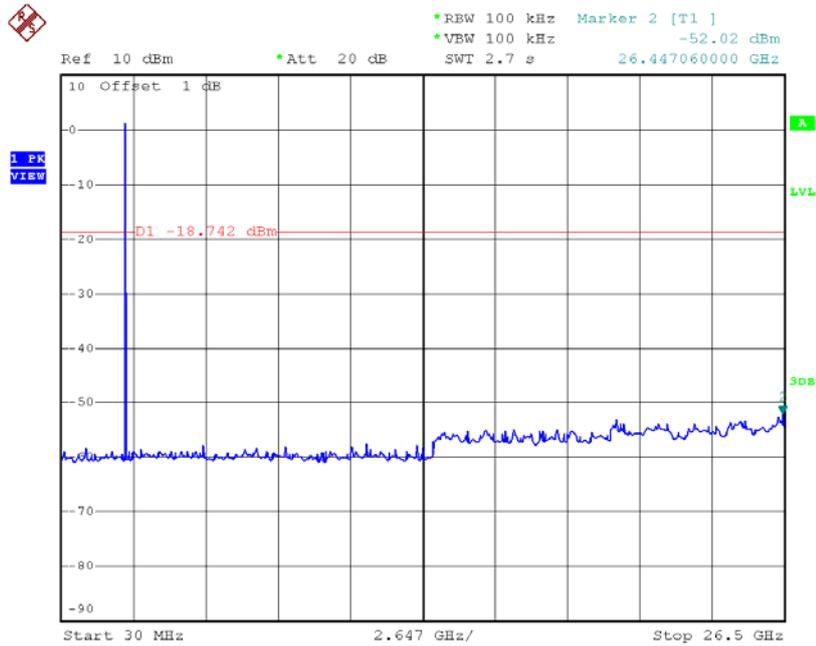
Date: 14.DEC.2015 17:24:12

### CH78 Hopping on mode (Upper)\_1Mbps



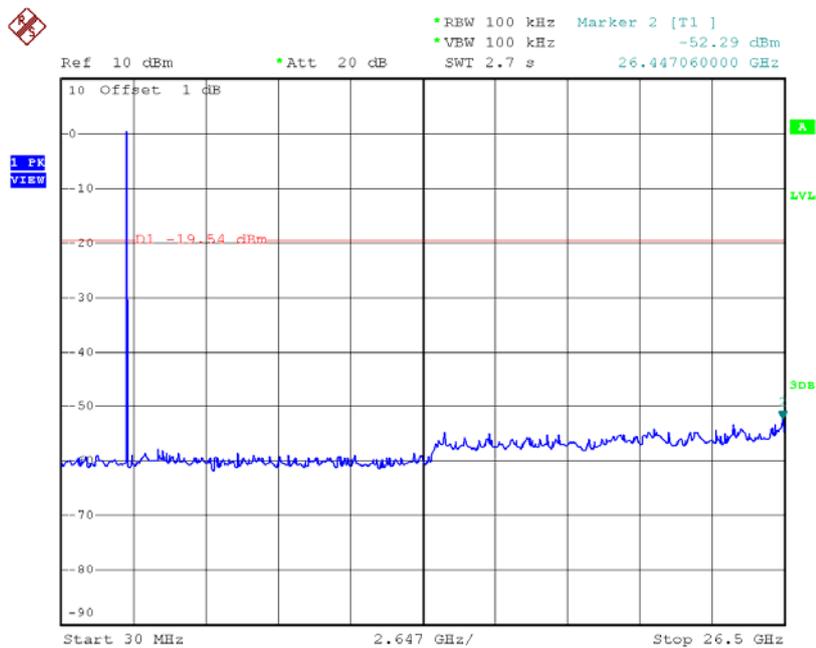
Date: 14.DEC.2015 17:24:47

### CH00 (10 Harmonic of the frequency) \_1Mbps



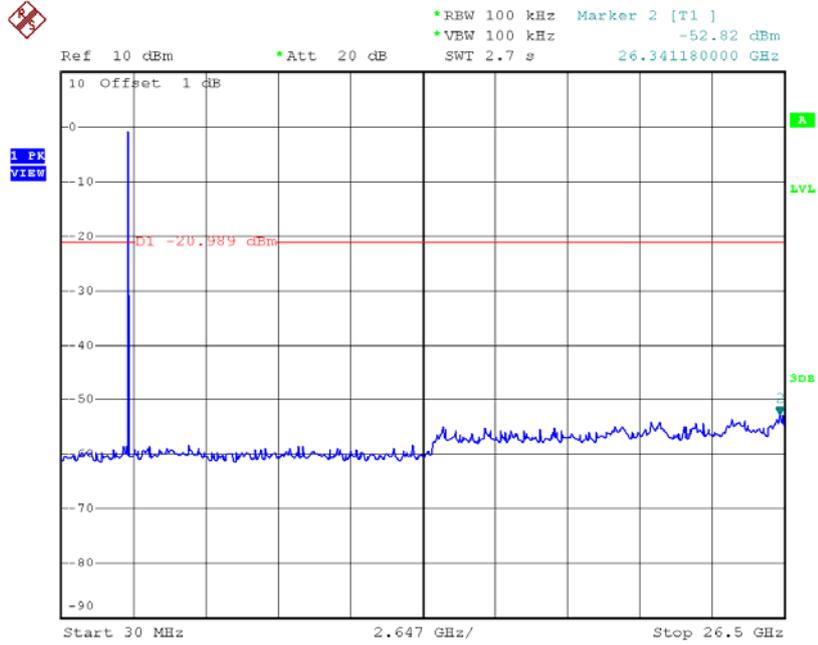
Date: 14.DEC.2015 17:15:37

### CH39 (10 Harmonic of the frequency) \_1Mbps



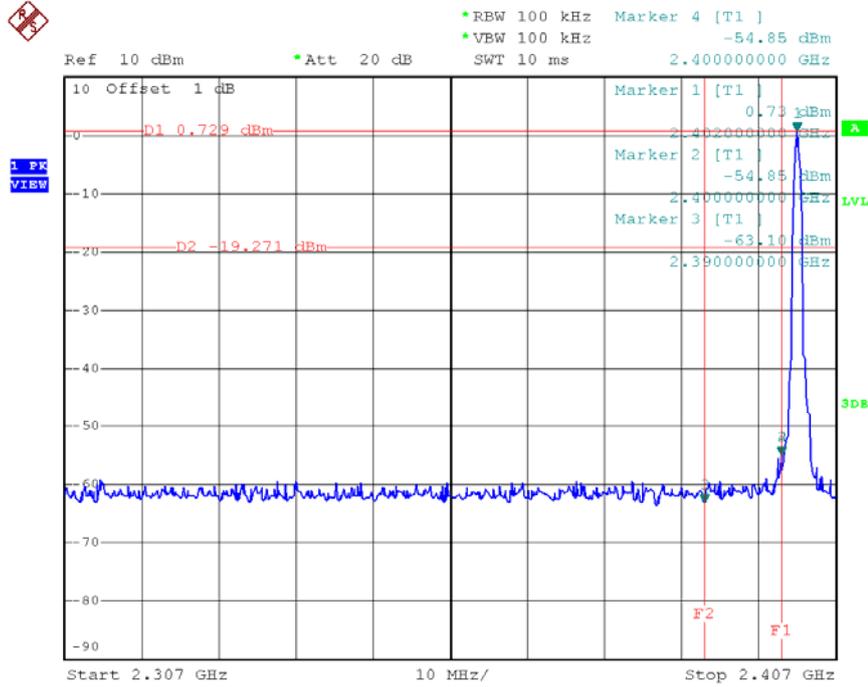
Date: 14.DEC.2015 17:16:02

### CH78 (10 Harmonic of the frequency) \_1Mbps



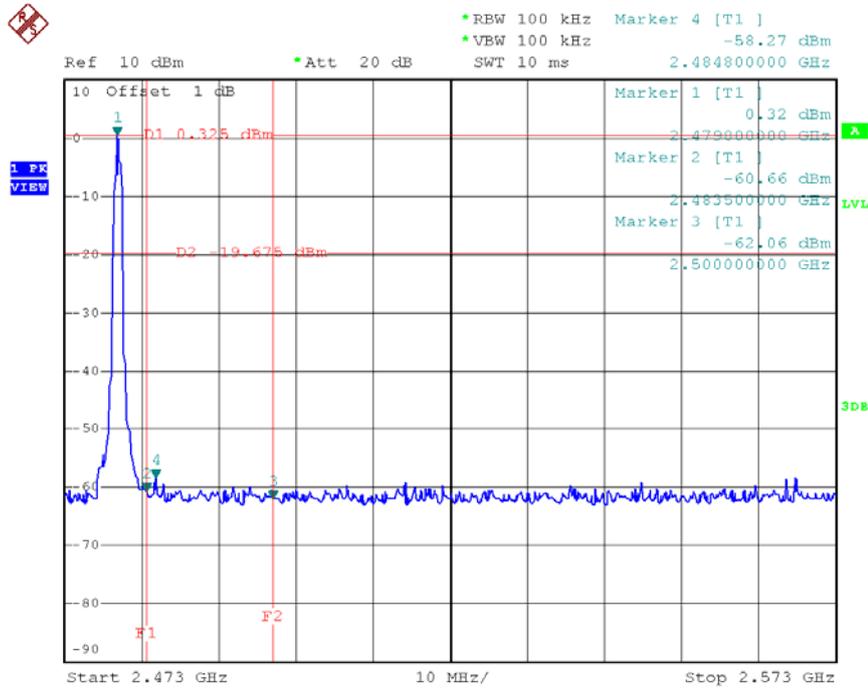
Date: 14.DEC.2015 17:17:28

### CH00 (Lower) \_3Mbps



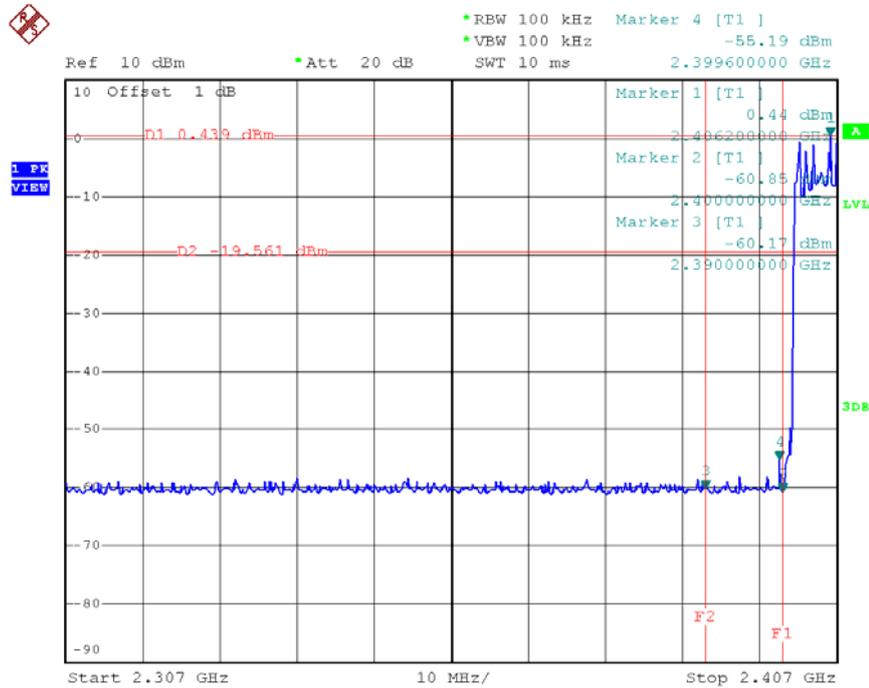
Date: 14.DEC.2015 18:02:27

### CH78 (Upper) \_3Mbps



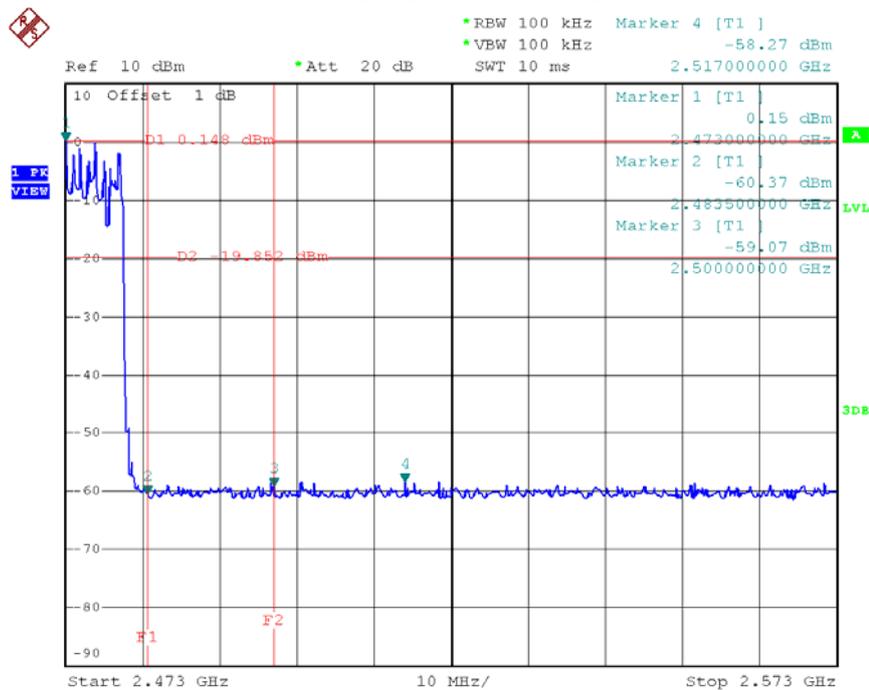
Date: 14.DEC.2015 18:05:47

### CH00 Hopping on mode (Lower)\_3Mbps



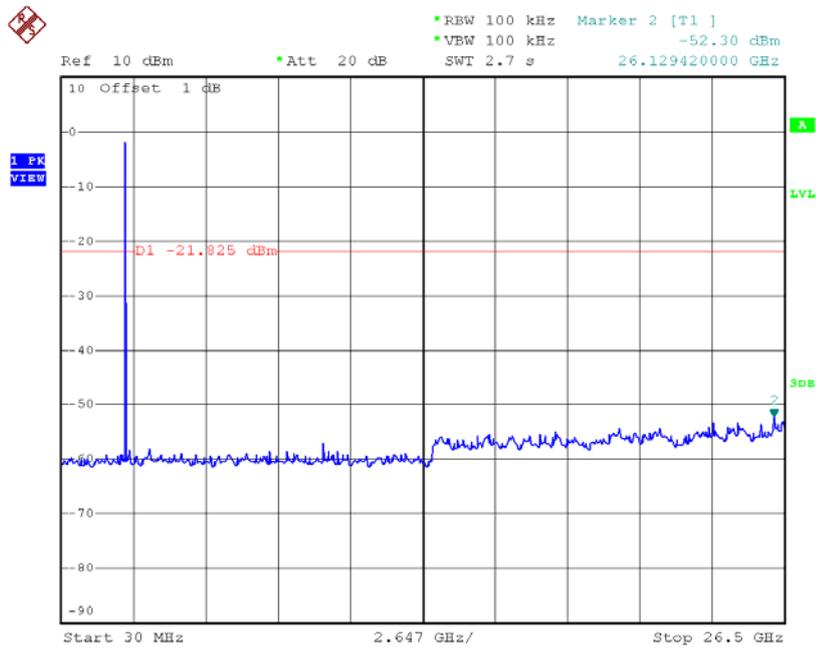
Date: 14.DEC.2015 18:24:10

### CH78 Hopping on mode (Upper)\_3Mbps



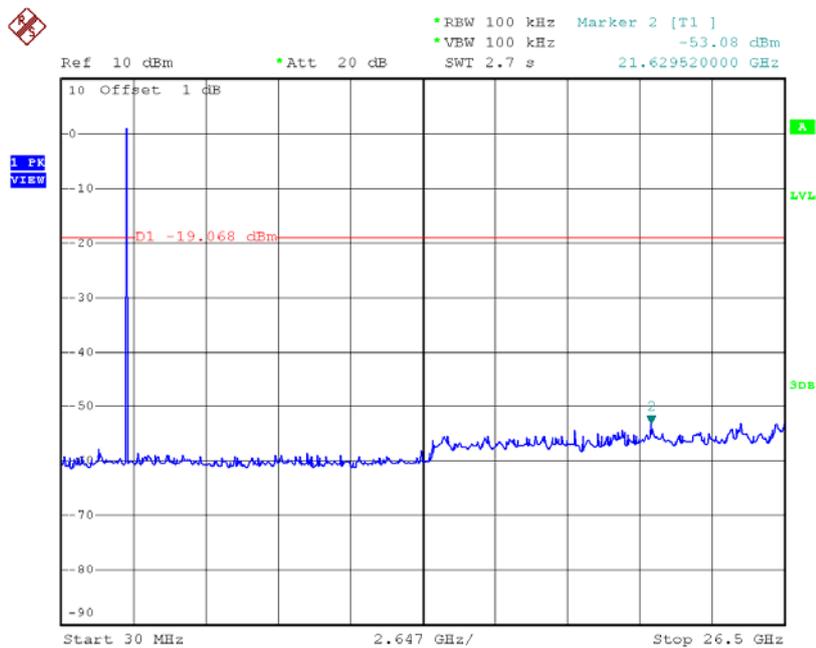
Date: 14.DEC.2015 18:24:44

### CH00 (10 Harmonic of the frequency) \_3Mbps



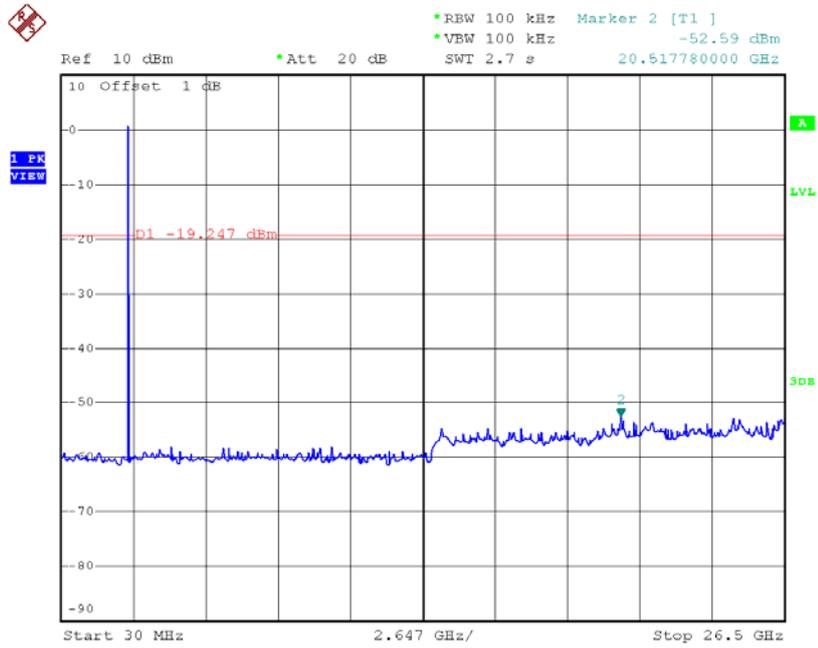
Date: 14.DEC.2015 18:03:02

### CH39 (10 Harmonic of the frequency) \_3Mbps



Date: 14.DEC.2015 18:04:14

### CH78 (10 Harmonic of the frequency) \_3Mbps



Date: 14.DEC.2015 18:06:27