

# FCC Radio Test Report

## FCC ID: APIHKOMNI20P

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

**Project No.** : 1603C095  
**Equipment** : Streaming wireless speaker  
**Model Name** : HK OMNI 20+  
**Applicant** : Harman International Industries, Incorporated  
**Address** : 8500 Balboa Blvd, Northridge, CA 91329, UNITED STATES

**Date of Receipt** : Mar. 08, 2016  
**Date of Test** : Mar. 08, 2016 ~ Jul. 06, 2016  
**Issued Date** : Jul. 07, 2016  
**Tested by** : BTL Inc.

**Testing Engineer** : Shawn Xiao  
(Shawn Xiao)

**Technical Manager** : David Mao  
(David Mao)

**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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### REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1603C095	Original Issue.	Jul. 07, 2016

## 1. CERTIFICATION

Equipment : Streaming wireless speaker  
Brand Name : harman/Kardon  
Model Name : HK OMNI 20+  
Applicant : Harman International Industries, Incorporated  
Manufacturer : Harman International Industries, Incorporated  
Address : 8500 Balboa Blvd, Northridge, CA 91329, UNITED STATES  
Factory : Guoguang Electric Co.,Ltd  
Address : No.8 Jinghu Road, Xinhua Street, Huadu Reg, Guangzhou, China  
Date of Test : Mar. 08, 2016 ~ Jul. 06, 2016  
Test Sample : Engineering Sample  
Standard(s) : FCC Part15, Subpart C (15.247)/ ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1603C095) 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 results included in this report is only for the Bluetooth EDR part.**

## 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)(1)	Hopping Channel Separation	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.247 (b)(1)	Peak Output Power	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	Dwell Time	PASS	
15.205	Restricted Bands	PASS	
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

BTL's test firm number for IC: 4428B-1

## 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	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	Streaming wireless speaker	
Brand Name	harman/Kardon	
Model Name	HK OMNI 20+	
Model Difference	N/A	
Output Power (Max.)	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps) $\pi$ /4-DQPSK(2Mbps)
	Bit Rate of Transmitter	8-DPSK(3Mbps)
	Output Power Max.	2.26 dBm(1Mbps) -0.11 dBm(3Mbps)
Power Source	AC mains.	
Power Rating	I/P: 100-240V~50/60Hz, 60W	

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)
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		

3 Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	harman/Kardon	N/A	Internal	N/A	2.56

### 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:**

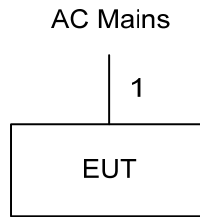
- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

### 3.3 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	CMD		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	N/A	N/A	N/A
Parameters(3Mbps)	N/A	N/A	N/A

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



### 3.5 DESCRIPTION OF SUPPORT UNITS

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

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

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.5m	AC 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-peak	Average
0.15 -0.50	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

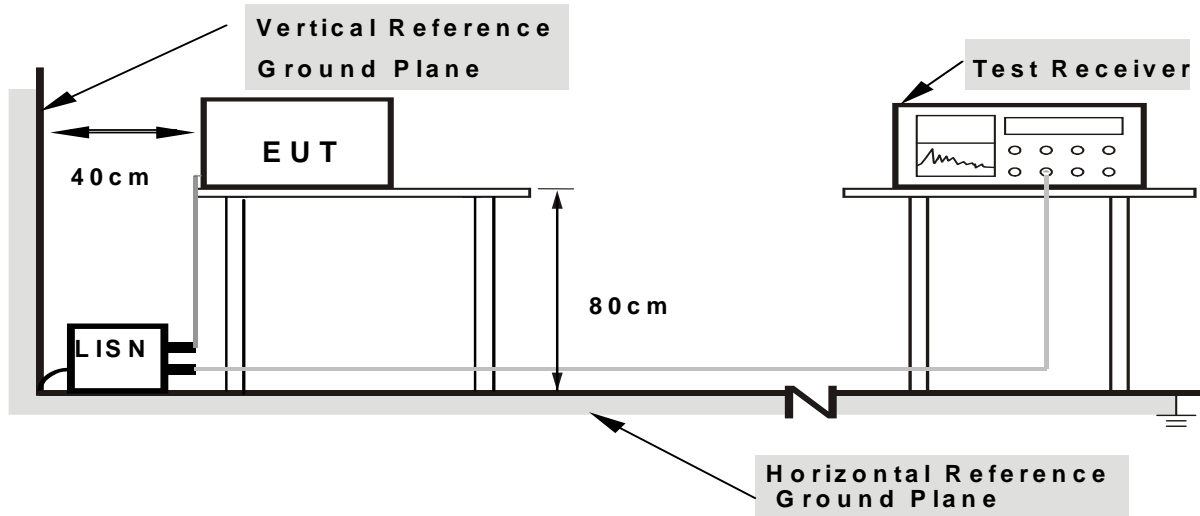
#### 4.1.2 TEST PROCEDURE

- 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: 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.

## 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

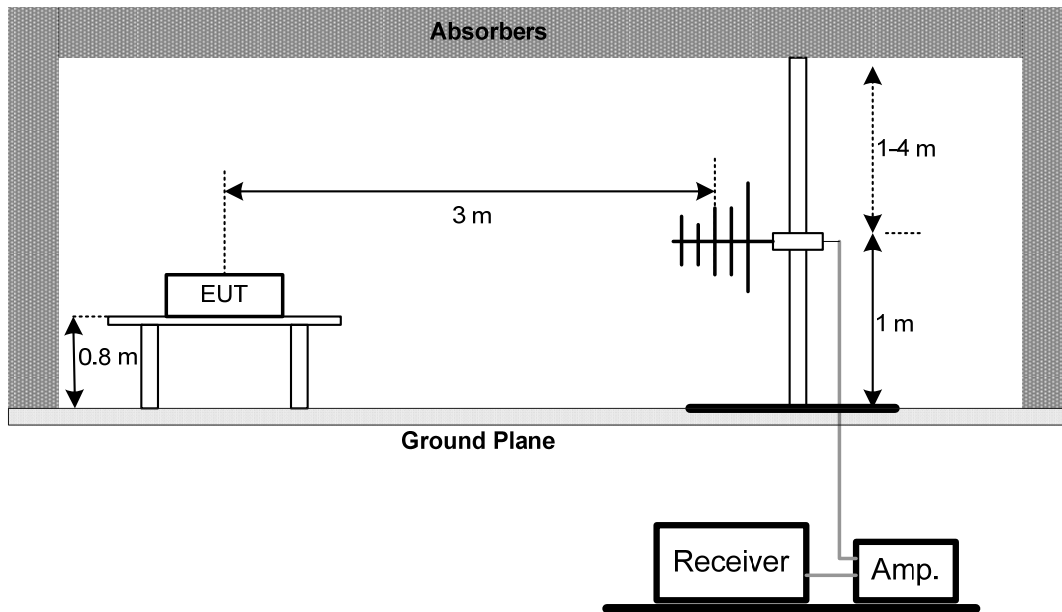
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance 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 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. 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.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.3 DEVIATION FROM TEST STANDARD

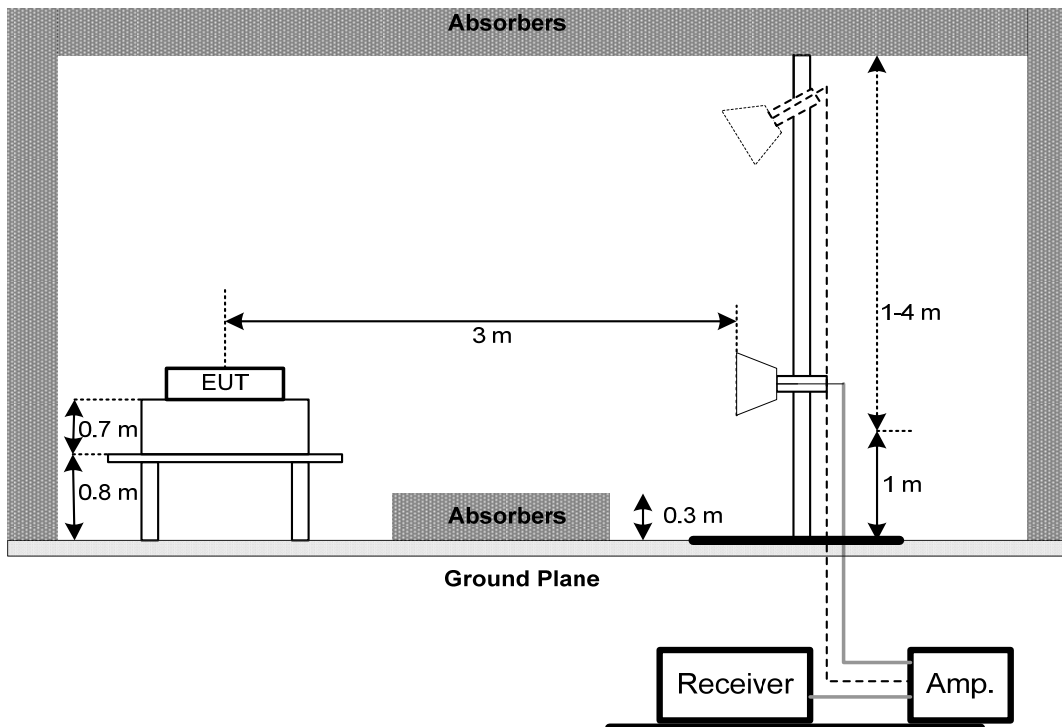
No deviation

**4.2.4 TEST SETUP**

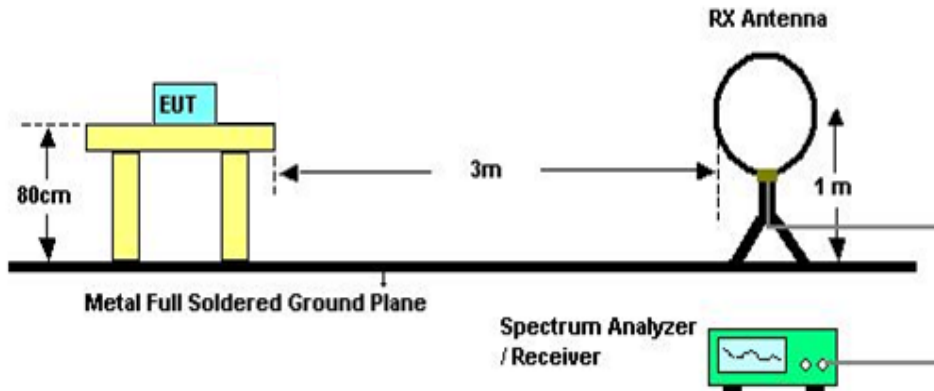
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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 (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: ERR

#### **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

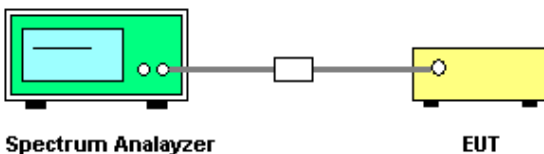
#### 7.1.1 TEST PROCEDURE

- 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

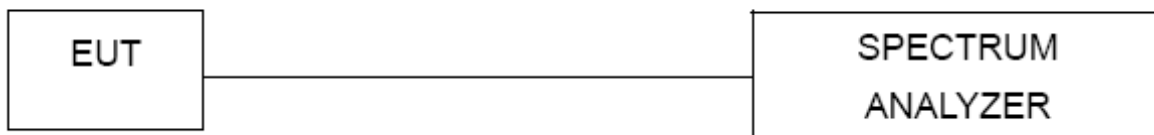
#### 9.1.1 TEST PROCEDURE

- 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	0052765	Mar. 27, 2017
2	LISN	R&S	ENV216	101447	Mar. 27, 2017
3	Test Cable	emci	RG223(9KHz-30MHz)	C_17	Mar. 10, 2017
4	EMI Test Receiver	R&S	ESCI	100382	Mar. 27, 2017
5	50Ω Terminator	SHX	TF2-3G-A	08122901	Mar. 27, 2017
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. 27, 2017
2	Amplifier	HP	8447D	2944A09673	Nov. 09, 2016
3	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
4	Test Cable	emci	LMR-400(30MHz-1GHz)	C-01	Jun. 27, 2017
5	Control	CT	SC100	N/A	N/A
6	Position Control	MF	MF-7802	MF780208416	N/A
7	Antenna	ETS	3115	00075789	Mar. 27, 2017
8	Amplifier	Agilent	8449B	3008A02274	Nov. 01, 2016
9	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
10	Test Cable	emci	EMC104-SM-S M-10000(1GHz-26.5GHz)	C-68	Jun. 27, 2017
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2017
12	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 27, 2017
13	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 07, 2016
14	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

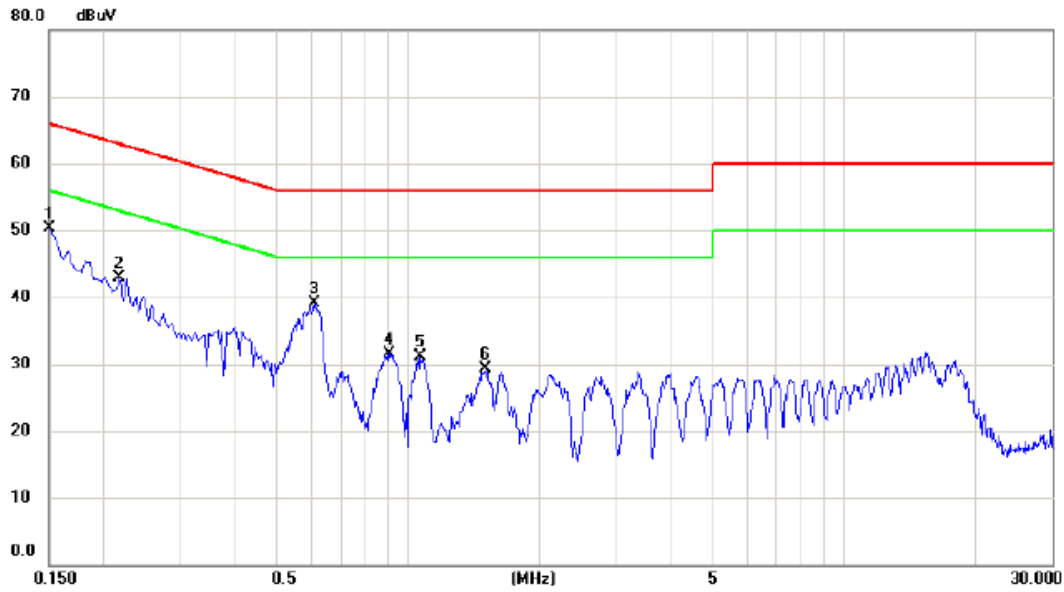
Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016

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

## ATTACHMENT A - CONDUCTED EMISSION

Test Mode: TX Mode

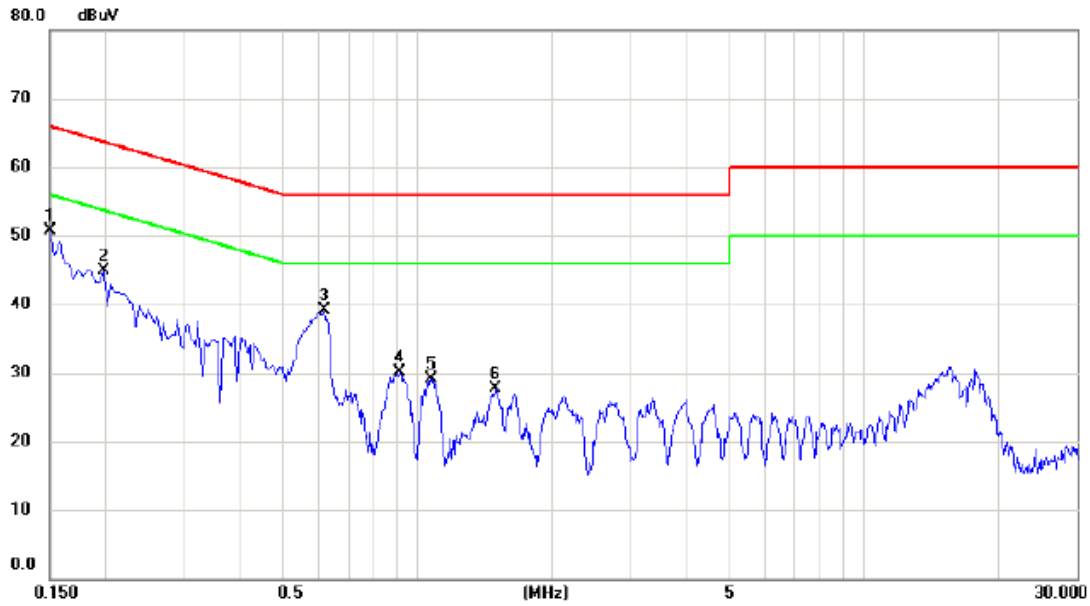
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1500	40.69	9.52	50.21	66.00	-15.79	peak	
2		0.2180	33.31	9.57	42.88	62.89	-20.01	peak	
3		0.6100	29.47	9.71	39.18	56.00	-16.82	peak	
4		0.9060	21.81	9.78	31.59	56.00	-24.41	peak	
5		1.0660	21.23	9.79	31.02	56.00	-24.98	peak	
6		1.5060	19.45	9.84	29.29	56.00	-26.71	peak	

Test Mode: TX Mode

### Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1500	41.33	9.47	50.80	66.00	-15.20	peak	
2		0.1980	35.46	9.49	44.95	63.69	-18.74	peak	
3		0.6180	29.49	9.55	39.04	56.00	-16.96	peak	
4		0.9100	20.50	9.59	30.09	56.00	-25.91	peak	
5		1.0740	19.61	9.58	29.19	56.00	-26.81	peak	
6		1.4980	18.14	9.65	27.79	56.00	-28.21	peak	

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

Test Mode: TX Mode

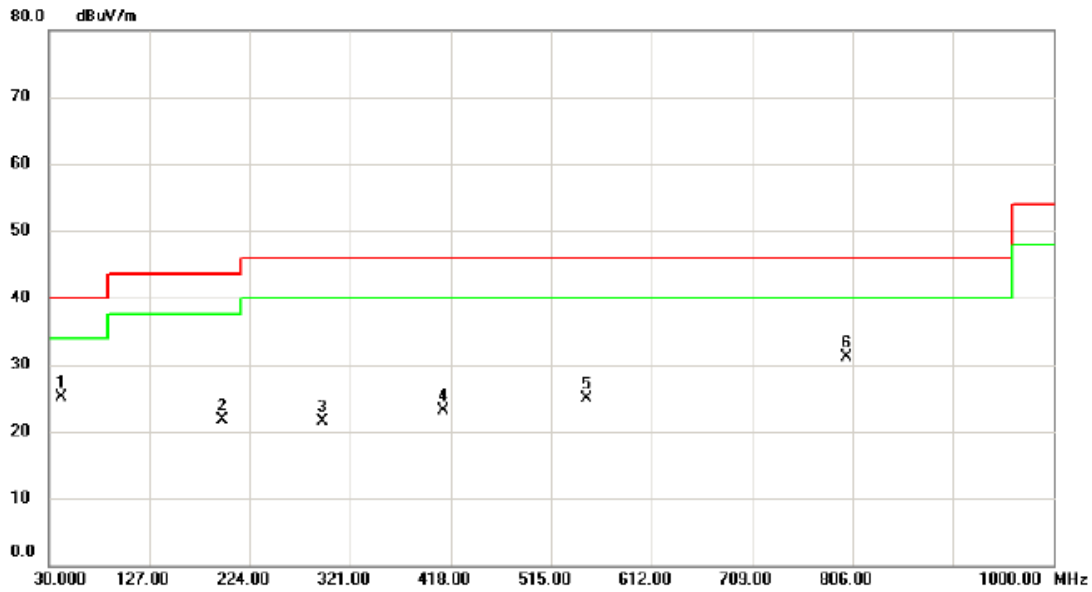
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0102	0°	13.52	24.9207	38.4407	127.4322	-88.9916	AVG
0.0102	0°	14.36	24.9207	39.2807	147.4322	-108.1516	PEAK
0.0296	0°	6.95	23.6920	30.6420	118.1784	-87.5364	AVG
0.0296	0°	8.36	23.6920	32.0520	138.1784	-106.1264	PEAK
0.0385	0°	3.25	23.1283	26.3783	115.8950	-89.5167	AVG
0.0385	0°	5.69	23.1283	28.8183	135.8950	-107.0767	PEAK
0.0592	0°	1.74	22.2160	23.9560	112.1578	-88.2018	AVG
0.0592	0°	2.76	22.2160	24.9760	132.1578	-107.1818	PEAK
0.5133	0°	19.73	19.8426	39.5726	73.3968	-33.8242	QP
1.9821	0°	23.79	19.5018	43.2918	69.5400	-26.2482	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0139	90°	13.46	24.3000	37.7600	124.7439	-86.9839	AVG
0.0139	90°	14.95	24.3000	39.2500	144.7439	-105.4939	PEAK
0.0275	90°	7.35	23.8250	31.1750	118.8176	-87.6426	AVG
0.0275	90°	9.01	23.8250	32.8350	138.8176	-105.9826	PEAK
0.0461	90°	5.33	22.6470	27.9770	114.3302	-86.3532	AVG
0.0461	90°	6.92	22.6470	29.5670	134.3302	-104.7632	PEAK
0.0595	90°	1.62	22.2100	23.8300	112.1139	-88.2839	AVG
0.0595	90°	2.97	22.2100	25.1800	132.1139	-106.9339	PEAK
0.6341	90°	22.31	20.2291	42.5391	71.5611	-29.0219	QP
2.0633	90°	24.16	19.4620	43.6220	69.5400	-25.9180	QP

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

Test Mode: TX 2402MHz \_CH00\_1Mbps

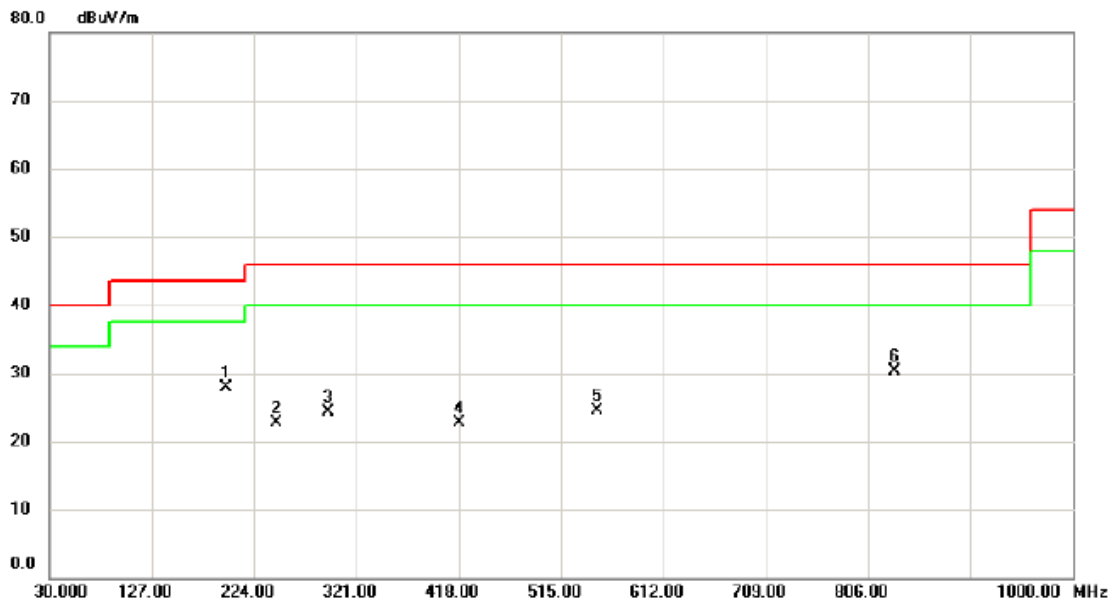
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		42.6100	38.37	-13.32	25.05	40.00	-14.95	peak	
2		196.8400	36.10	-14.38	21.72	43.50	-21.78	peak	
3		294.8100	32.50	-11.01	21.49	46.00	-24.51	peak	
4		410.7250	31.41	-8.33	23.08	46.00	-22.92	peak	
5		548.9500	30.23	-5.37	24.86	46.00	-21.14	peak	
6	*	800.1800	31.87	-0.75	31.12	46.00	-14.88	peak	

Test Mode: TX 2402MHz \_CH00\_1Mbps

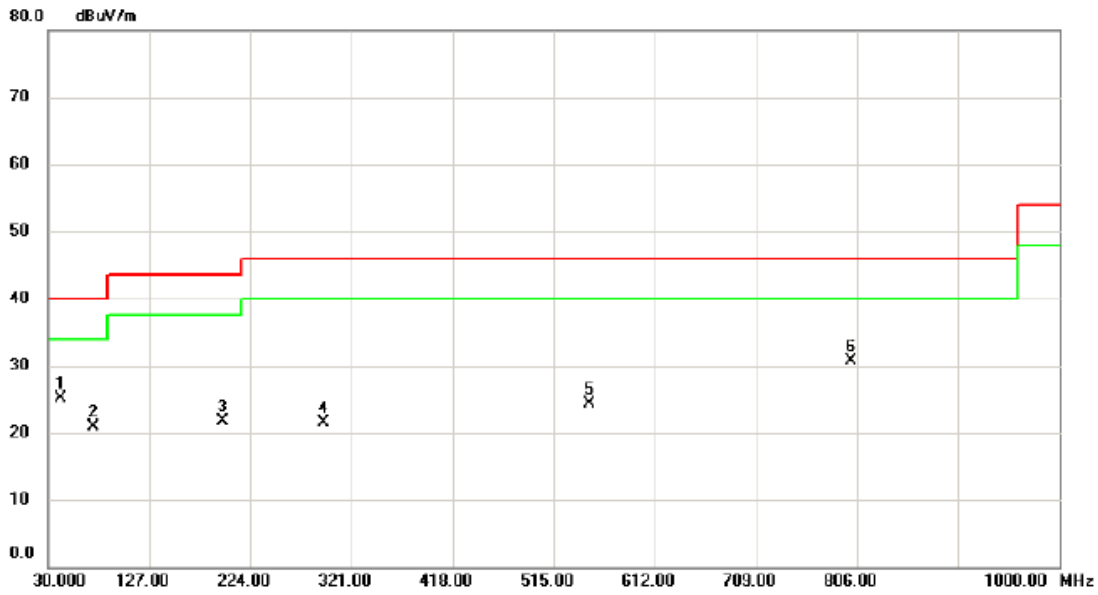
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	196.8400	42.27	-14.38	27.89	43.50	-15.61	peak	
2		245.8250	36.99	-14.22	22.77	46.00	-23.23	peak	
3		294.8100	35.39	-11.01	24.38	46.00	-21.62	peak	
4		418.0000	31.04	-8.37	22.67	46.00	-23.33	peak	
5		548.9500	29.81	-5.37	24.44	46.00	-21.56	peak	
6		830.7350	32.01	-1.70	30.31	46.00	-15.69	peak	

Test Mode: TX 2441MHz \_CH39\_1Mbps

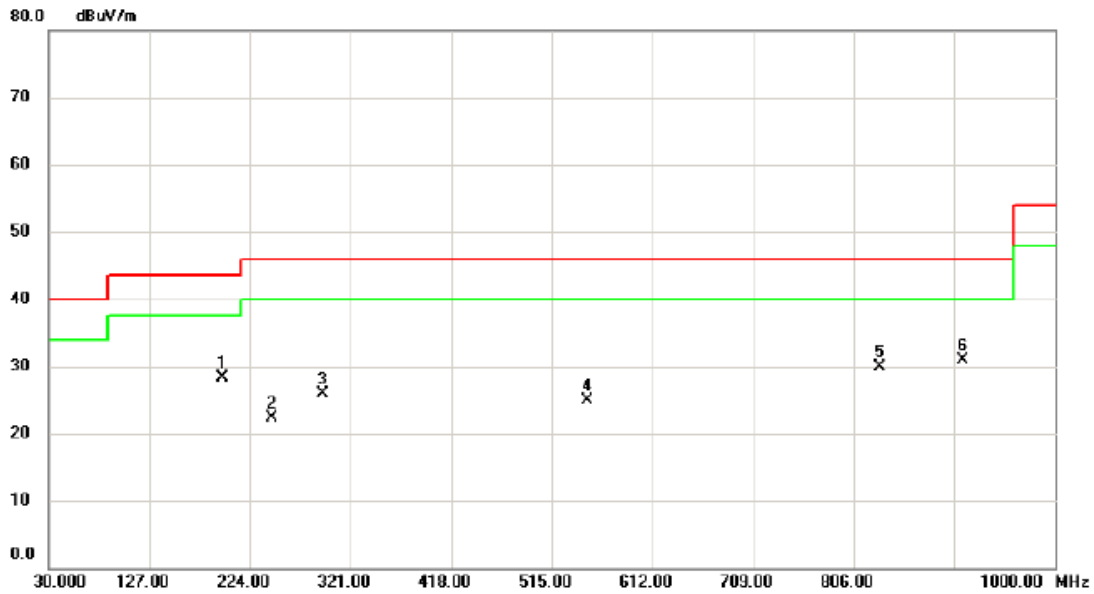
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	42.6100	38.37	-13.32	25.05	40.00	-14.95	peak	
2		73.6500	37.33	-16.50	20.83	40.00	-19.17	peak	
3		196.8400	36.10	-14.38	21.72	43.50	-21.78	peak	
4		294.8100	32.50	-11.01	21.49	46.00	-24.51	peak	
5		548.9500	29.73	-5.37	24.36	46.00	-21.64	peak	
6		800.1800	31.37	-0.75	30.62	46.00	-15.38	peak	

Test Mode: TX 2441MHz \_CH39\_1Mbps

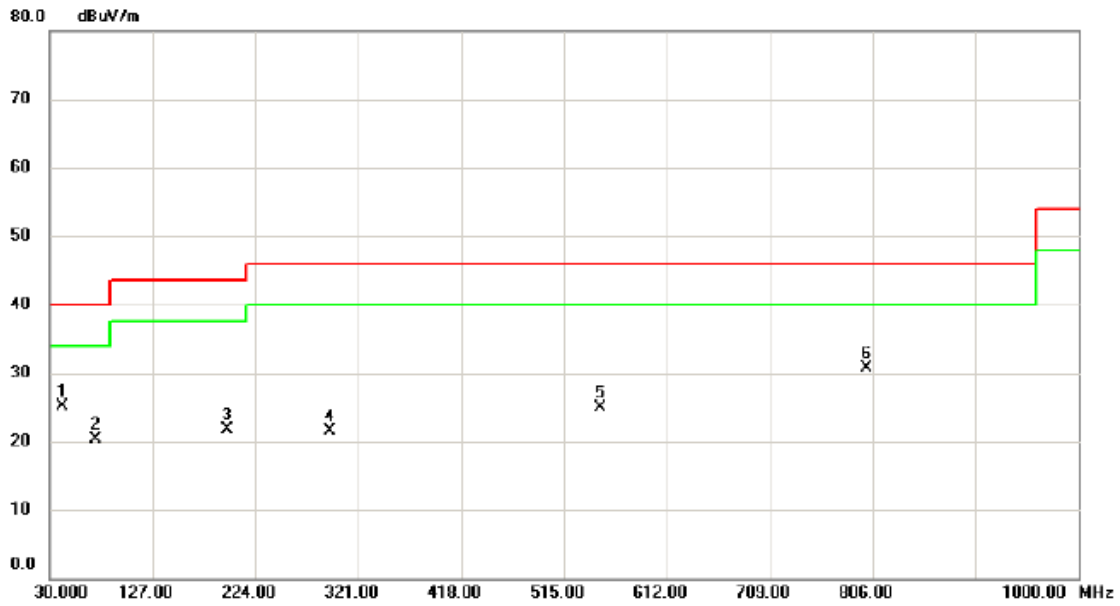
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		196.8400	42.77	-14.38	28.39	43.50	-15.11	peak	
2		245.8250	36.49	-14.22	22.27	46.00	-23.73	peak	
3		294.8100	36.89	-11.01	25.88	46.00	-20.12	peak	
4		548.9500	30.31	-5.37	24.94	46.00	-21.06	peak	
5		830.7350	31.51	-1.70	29.81	46.00	-16.19	peak	
6	*	911.2450	29.51	1.49	31.00	46.00	-15.00	peak	

Test Mode: TX 2480MHz \_CH78\_1Mbps

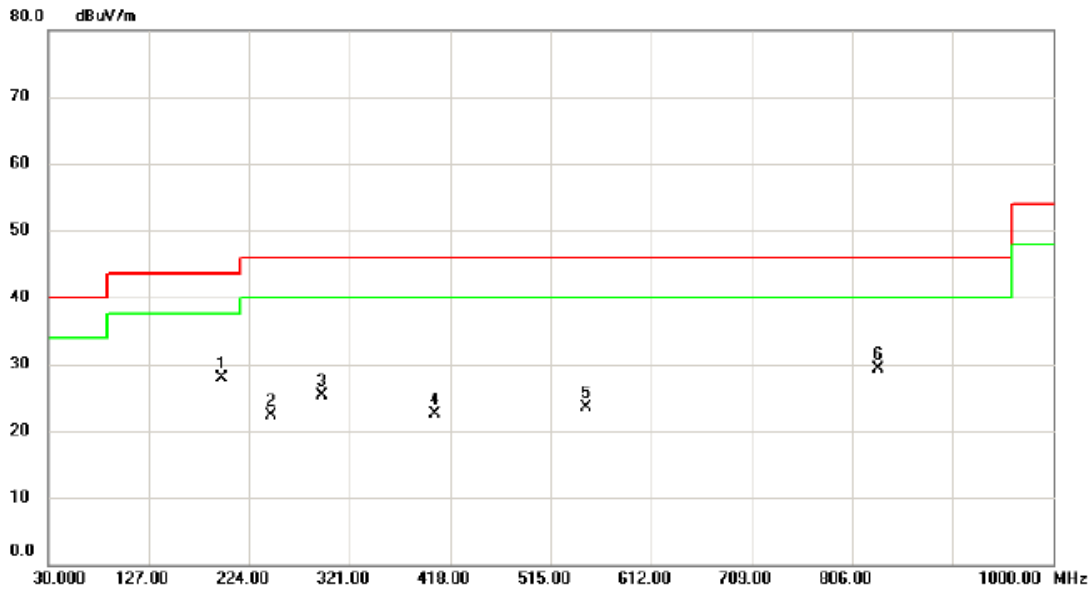
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	42.6100	38.37	-13.32	25.05	40.00	-14.95	peak	
2		73.6500	36.83	-16.50	20.33	40.00	-19.67	peak	
3		196.8400	36.10	-14.38	21.72	43.50	-21.78	peak	
4		294.8100	32.50	-11.01	21.49	46.00	-24.51	peak	
5		548.9500	30.23	-5.37	24.86	46.00	-21.14	peak	
6		800.1800	31.37	-0.75	30.62	46.00	-15.38	peak	

Test Mode: TX 2480MHz \_CH78\_1Mbps

### Horizontal

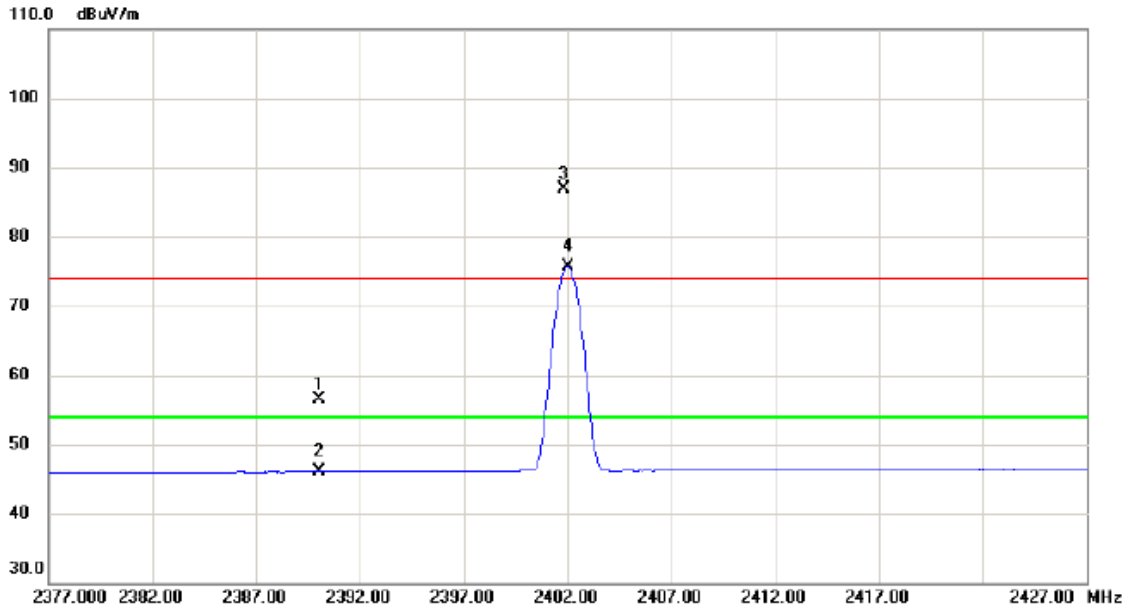


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	196.8400	42.27	-14.38	27.89	43.50	-15.61	peak	
2		245.8250	36.49	-14.22	22.27	46.00	-23.73	peak	
3		294.8100	36.39	-11.01	25.38	46.00	-20.62	peak	
4		402.9650	30.79	-8.29	22.50	46.00	-23.50	peak	
5		548.9500	28.81	-5.37	23.44	46.00	-22.56	peak	
6		830.7350	31.01	-1.70	29.31	46.00	-16.69	peak	

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

Test Mode : TX 2402MHz \_CH00\_1Mbps

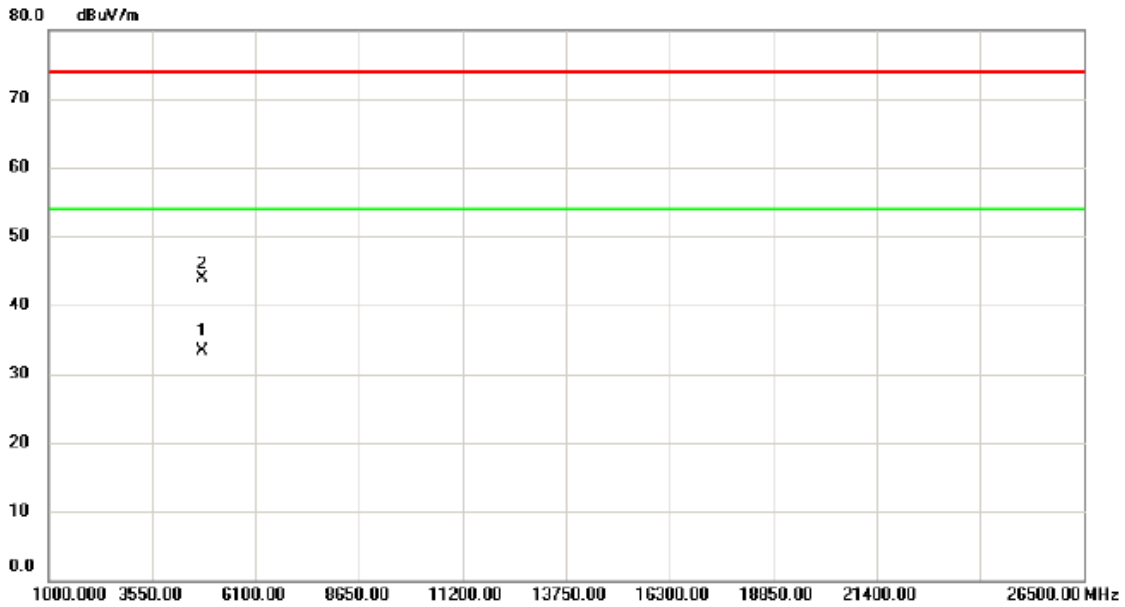
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	23.65	32.77	56.42	74.00	-17.58	peak	
2		2390.000	13.26	32.77	46.03	54.00	-7.97	AVG	
3	X	2401.825	54.01	32.82	86.83	74.00	12.83	peak	No Limit
4	*	2402.025	42.87	32.82	75.69	54.00	21.69	AVG	No Limit

Test Mode : TX 2402MHz \_CH00\_ 1Mbps

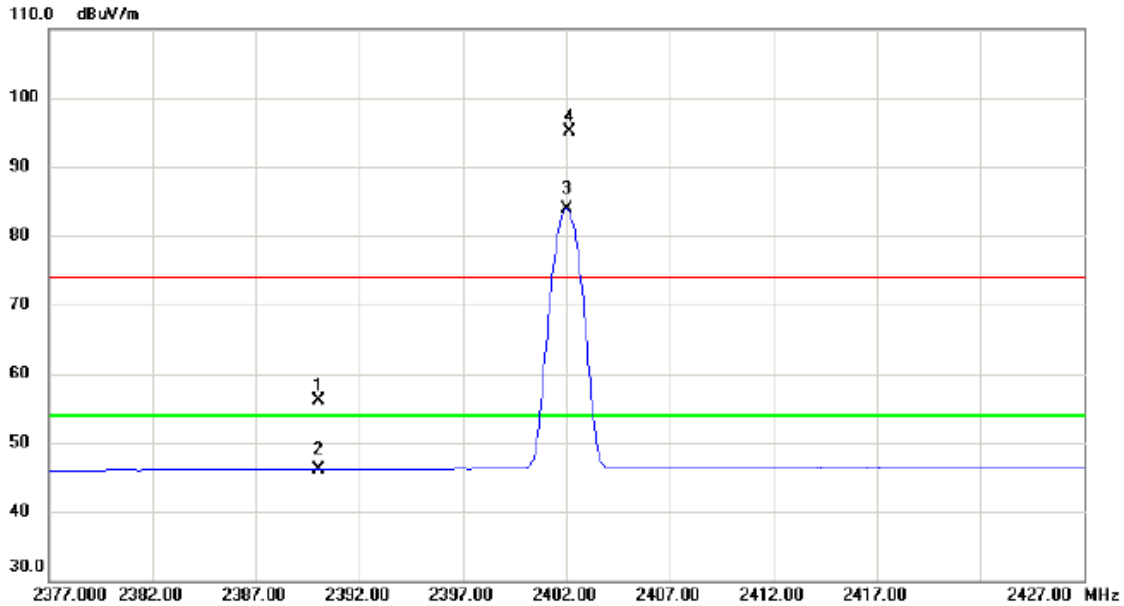
**Vertical**



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4804.122	28.72	4.62	33.34	54.00	-20.66	AVG	
2		4804.136	39.21	4.62	43.83	74.00	-30.17	peak	

Test Mode : TX 2402MHz \_CH00\_ 1Mbps

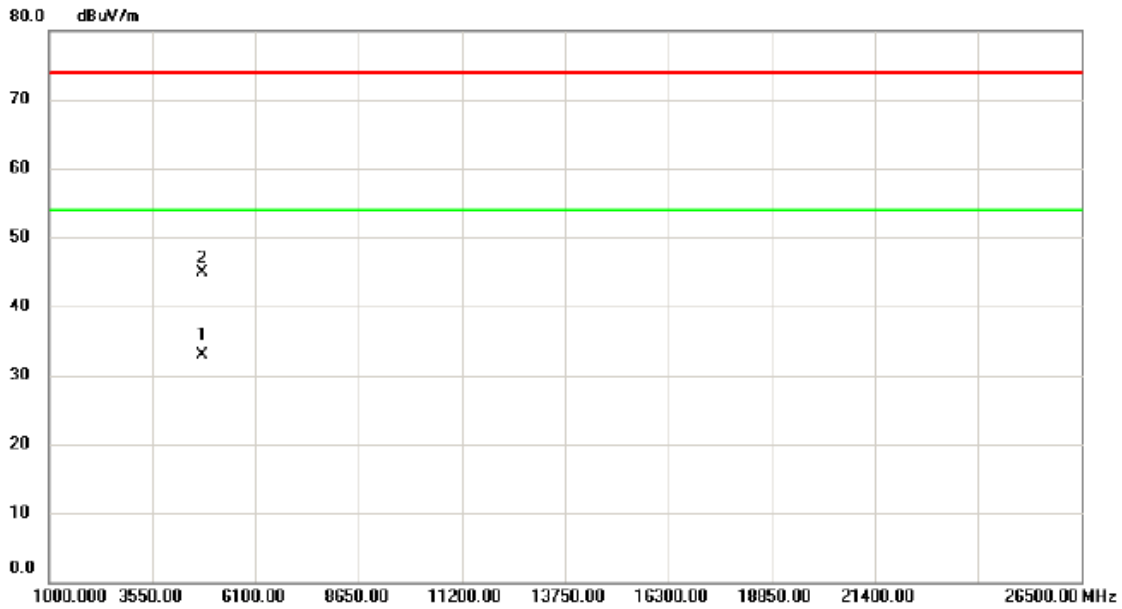
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	23.27	32.77	56.04	74.00	-17.96	peak	
2		2390.000	13.34	32.77	46.11	54.00	-7.89	AVG	
3	*	2402.000	51.06	32.82	83.88	54.00	29.88	AVG	No Limit
4	X	2402.175	62.20	32.82	95.02	74.00	21.02	peak	No Limit

Test Mode : TX 2402MHz \_CH00\_ 1Mbps

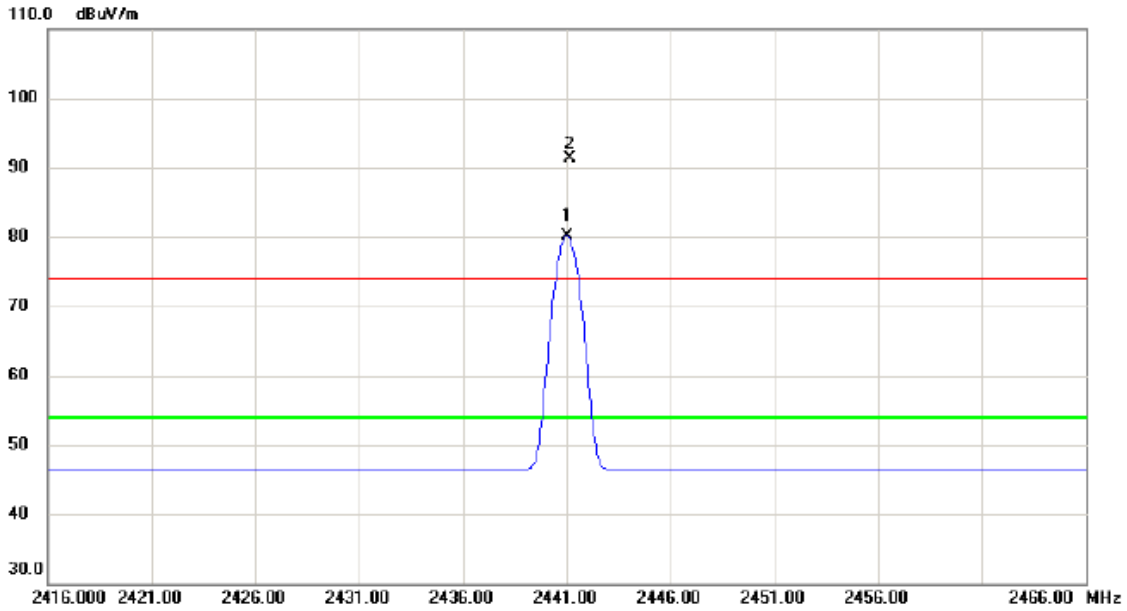
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4803.836	28.36	4.62	32.98	54.00	-21.02	AVG	
2		4804.712	40.29	4.63	44.92	74.00	-29.08	peak	

Test Mode : TX 2441MHz \_CH39\_1Mbps

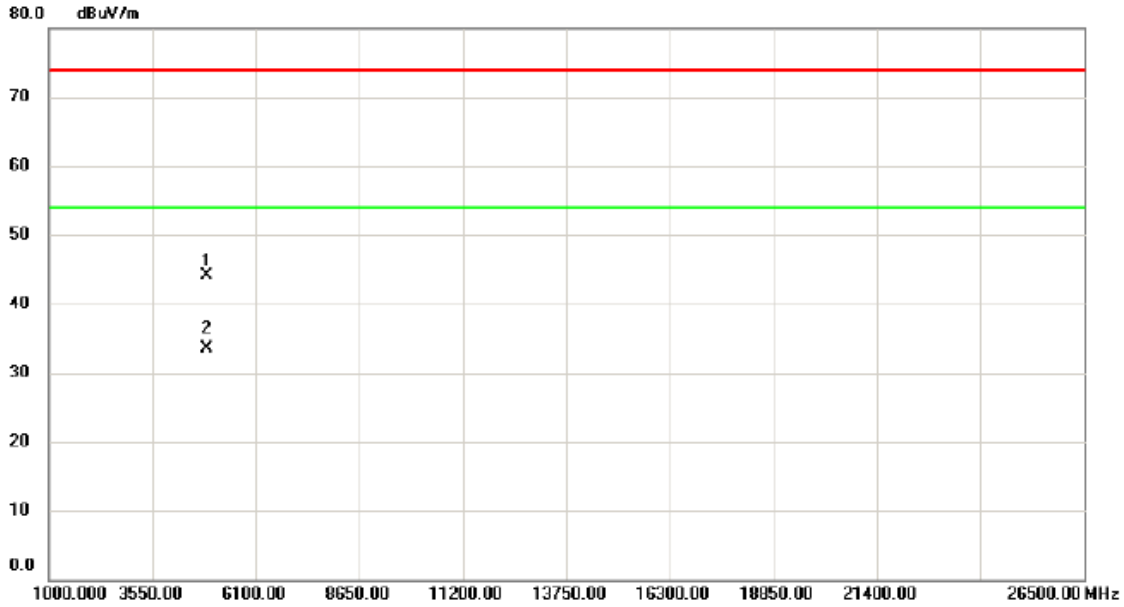
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2441.000	47.15	32.98	80.13	54.00	26.13	AVG	No Limit
2	X	2441.150	58.33	32.98	91.31	74.00	17.31	peak	No Limit

Test Mode : TX 2441MHz \_CH39\_ 1Mbps

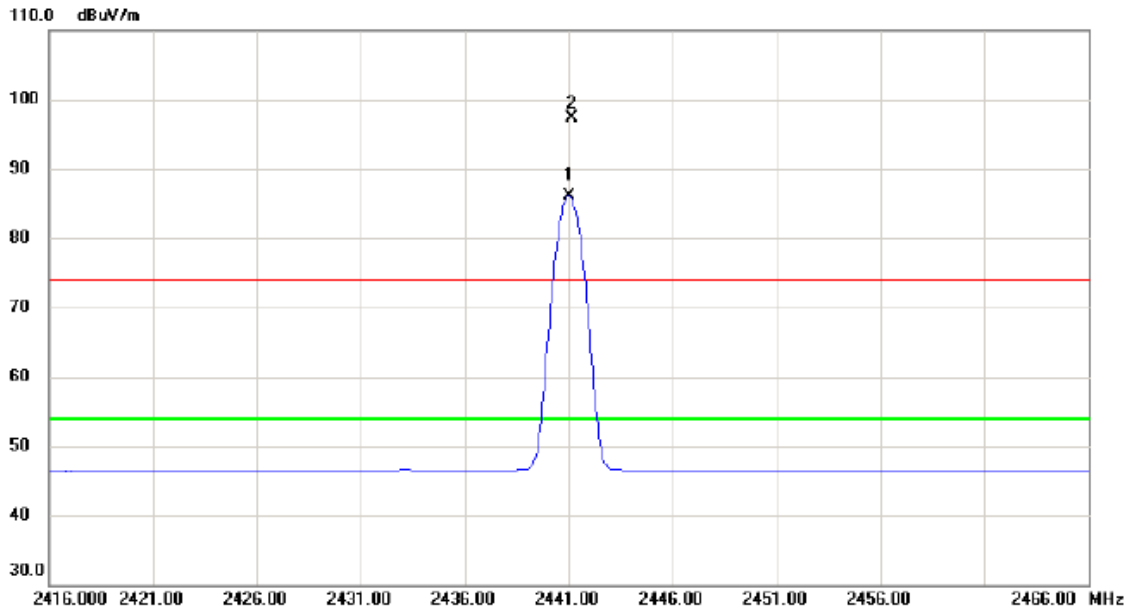
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4881.571	39.24	4.92	44.16	74.00	-29.84	peak	
2	*	4881.957	28.63	4.92	33.55	54.00	-20.45	AVG	

Test Mode : TX 2441MHz \_CH39\_ 1Mbps

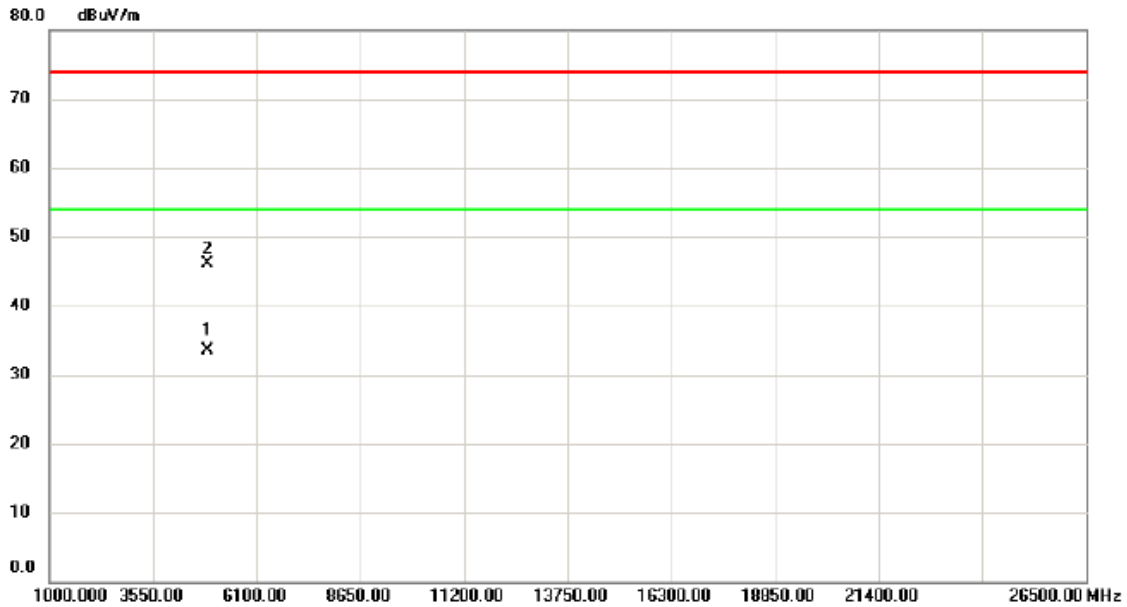
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2441.000	53.15	32.98	86.13	54.00	32.13	AVG	No Limit
2	X	2441.175	64.27	32.98	97.25	74.00	23.25	peak	No Limit

Test Mode : TX 2441MHz \_CH39\_ 1Mbps

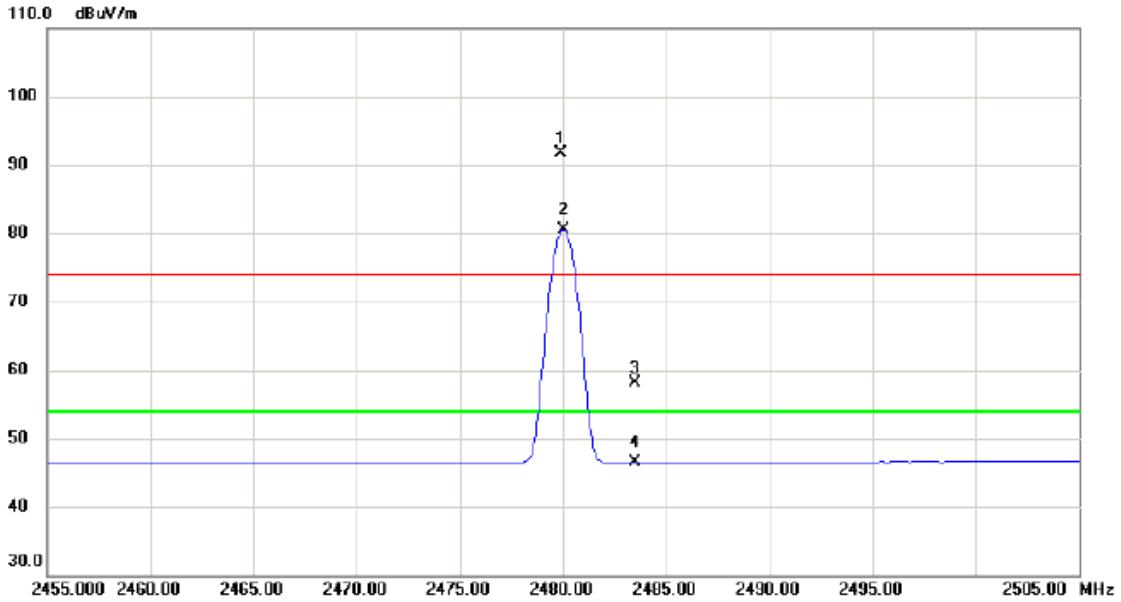
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4883.040	28.62	4.92	33.54	54.00	-20.46	AVG	
2		4883.121	41.25	4.92	46.17	74.00	-27.83	peak	

Test Mode : TX 2480MHz \_CH78\_1Mbps

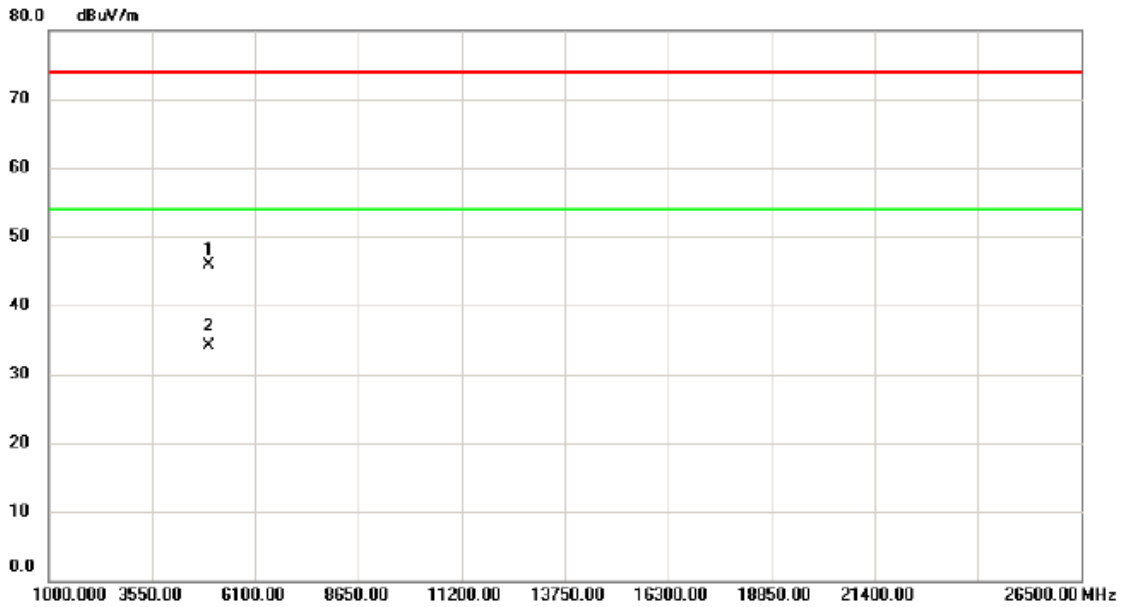
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2479.875	58.58	33.14	91.72	74.00	17.72	peak	No Limit
2	*	2480.000	47.44	33.14	80.58	54.00	26.58	AVG	No Limit
3		2483.500	25.05	33.15	58.20	74.00	-15.80	peak	
4		2483.500	13.32	33.15	46.47	54.00	-7.53	AVG	

Test Mode : TX 2480MHz \_CH78\_ 1Mbps

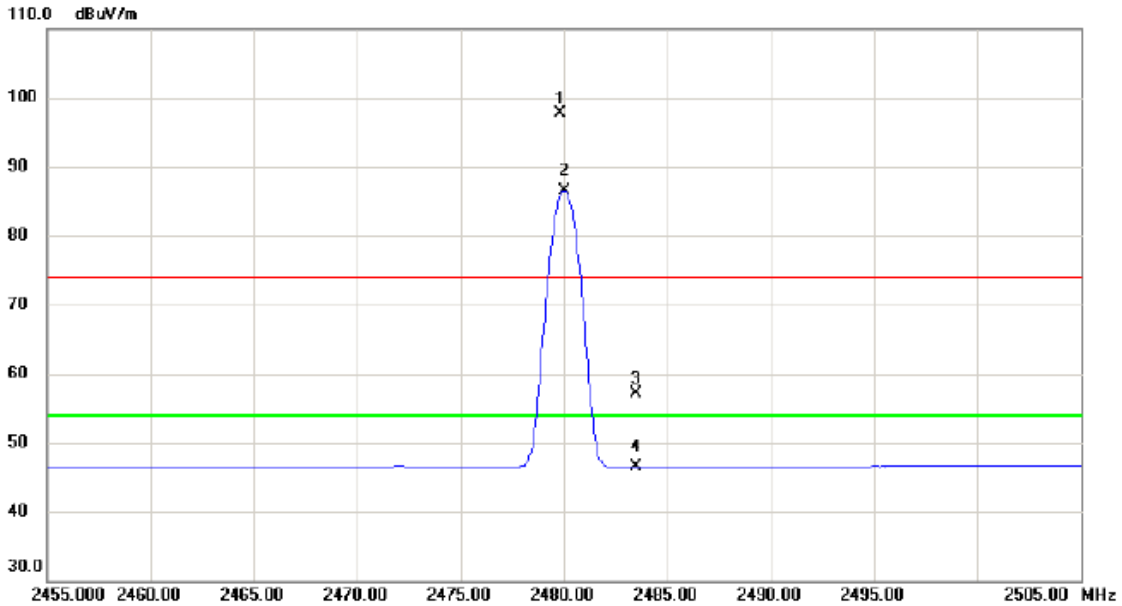
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4960.140	40.78	5.22	46.00	74.00	-28.00	peak	
2	*	4960.270	28.95	5.22	34.17	54.00	-19.83	AVG	

Test Mode : TX 2480MHz \_CH78\_ 1Mbps

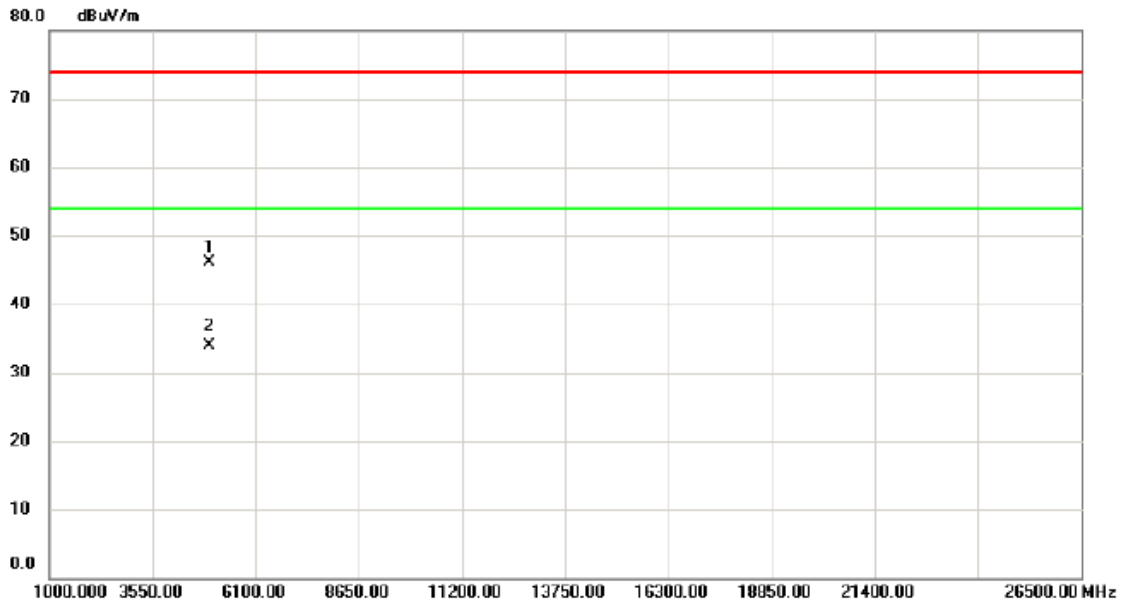
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2479.850	64.64	33.14	97.78	74.00	23.78	peak	No Limit
2	*	2480.000	53.46	33.14	86.60	54.00	32.60	AVG	No Limit
3		2483.500	23.90	33.15	57.05	74.00	-16.95	peak	
4		2483.500	13.36	33.15	46.51	54.00	-7.49	AVG	

Test Mode : TX 2480MHz \_CH78\_ 1Mbps

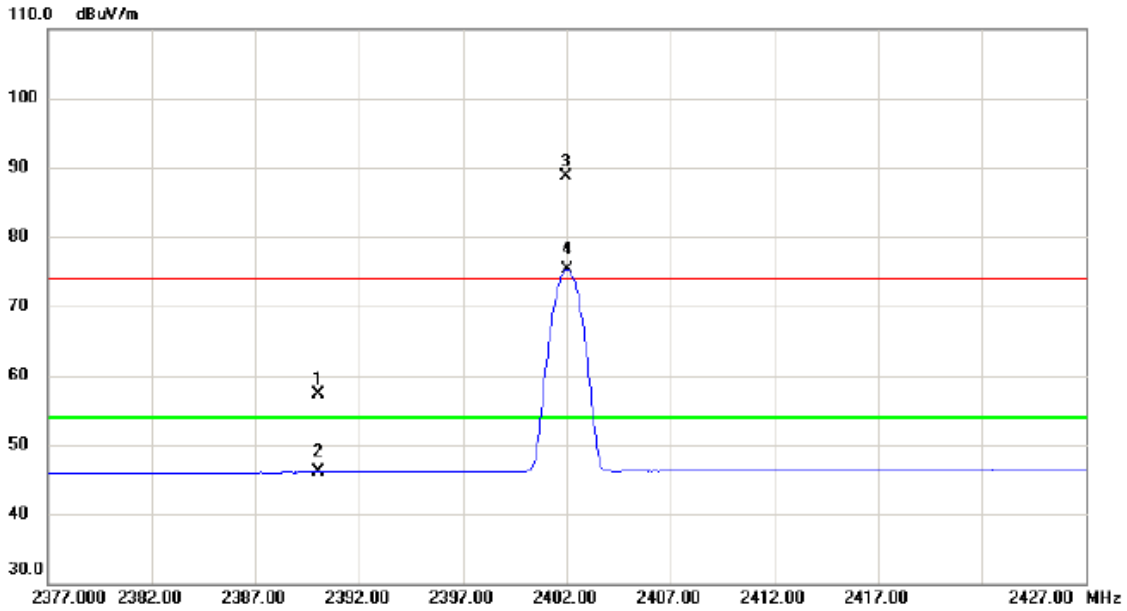
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4960.850	40.94	5.23	46.17	74.00	-27.83	peak	
2	*	4961.023	28.73	5.23	33.96	54.00	-20.04	AVG	

Test Mode : TX 2402MHz \_CH00\_3Mbps

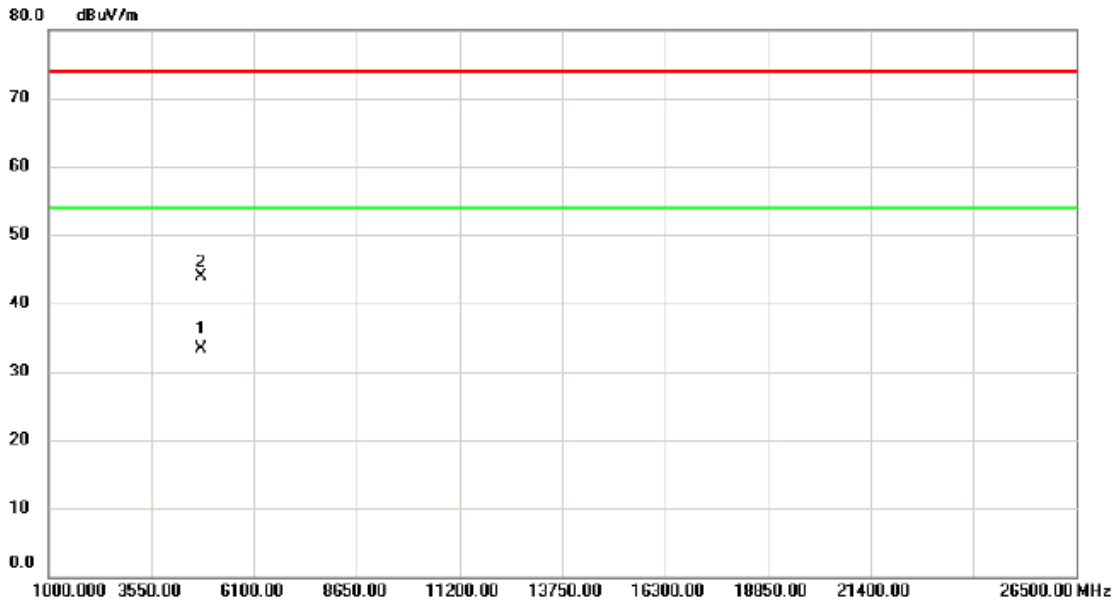
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	24.62	32.77	57.39	74.00	-16.61	peak	
2		2390.000	13.26	32.77	46.03	54.00	-7.97	AVG	
3	X	2401.950	55.89	32.82	88.71	74.00	14.71	peak	No Limit
4	*	2402.025	42.51	32.82	75.33	54.00	21.33	AVG	No Limit

Test Mode : TX 2402MHz \_CH00\_ 3Mbps

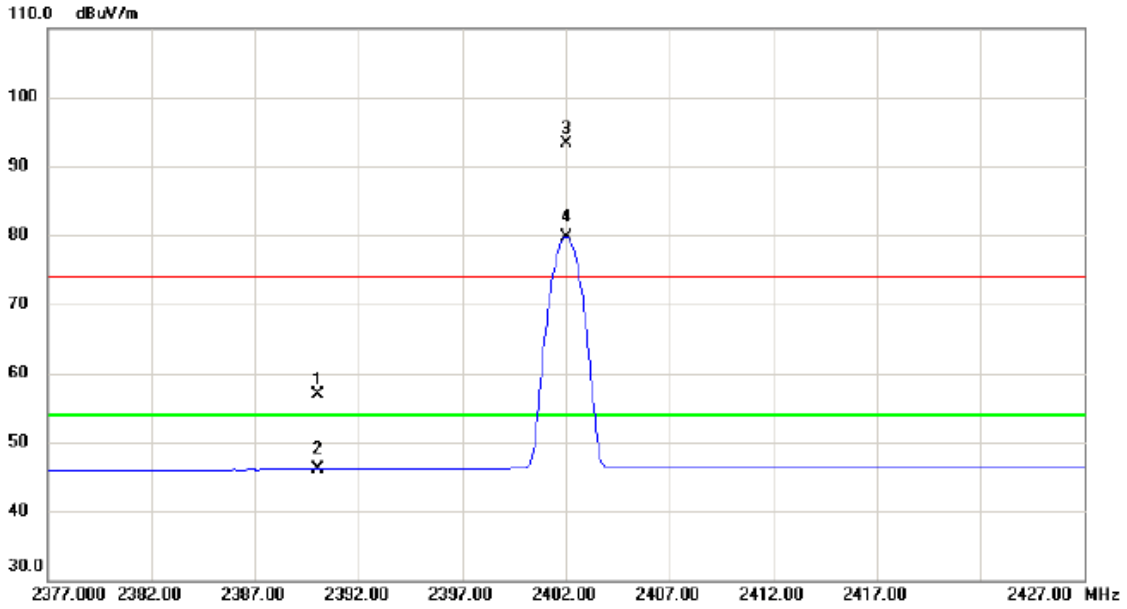
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4804.369	28.64	4.62	33.26	54.00	-20.74	AVG	
2		4804.704	39.21	4.63	43.84	74.00	-30.16	peak	

Test Mode : TX 2402MHz \_CH00\_ 3Mbps

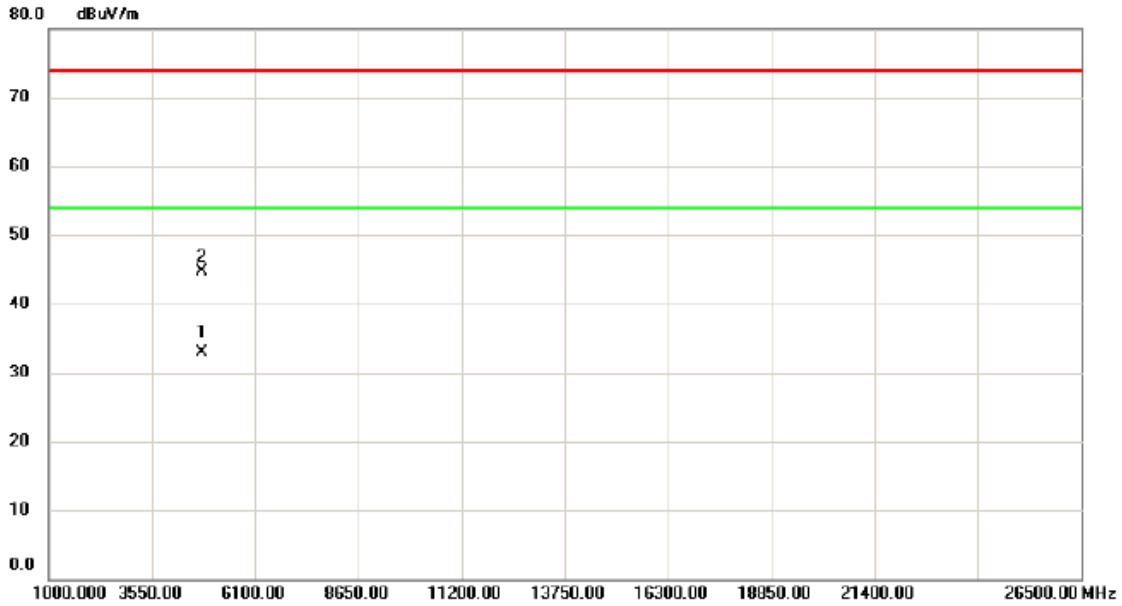
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	24.17	32.77	56.94	74.00	-17.06	peak	
2		2390.000	13.29	32.77	46.06	54.00	-7.94	AVG	
3	X	2402.000	60.47	32.82	93.29	74.00	19.29	peak	No Limit
4	*	2402.000	46.94	32.82	79.76	54.00	25.76	AVG	No Limit

Test Mode : TX 2402MHz \_CH00\_ 3Mbps

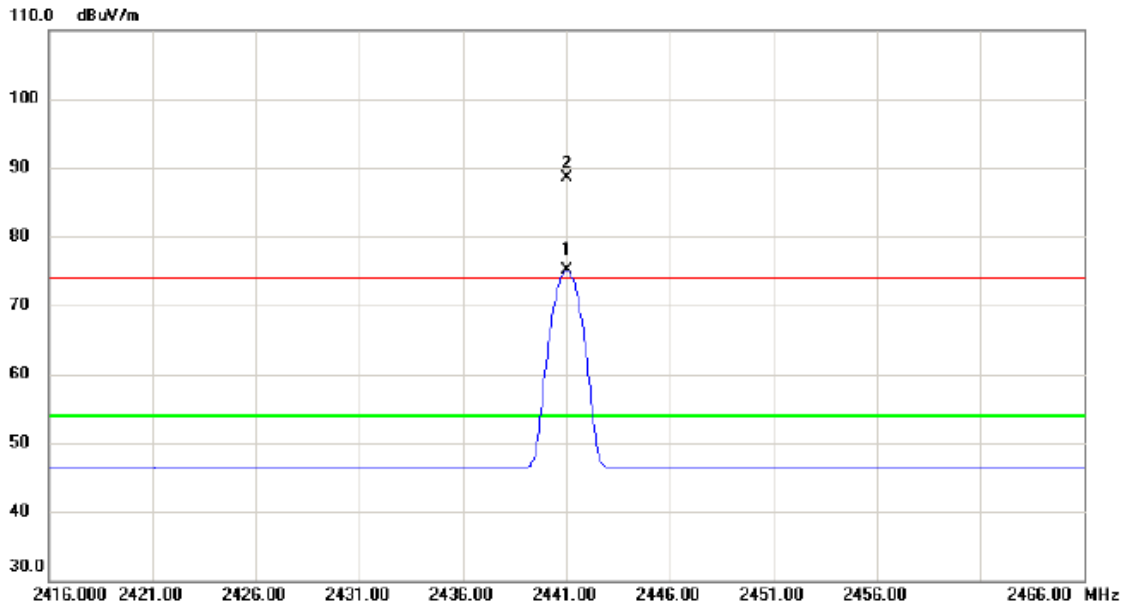
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4803.836	28.22	4.62	32.84	54.00	-21.16	AVG	
2		4803.940	40.12	4.62	44.74	74.00	-29.26	peak	

Test Mode : TX 2441MHz \_CH39\_3Mbps

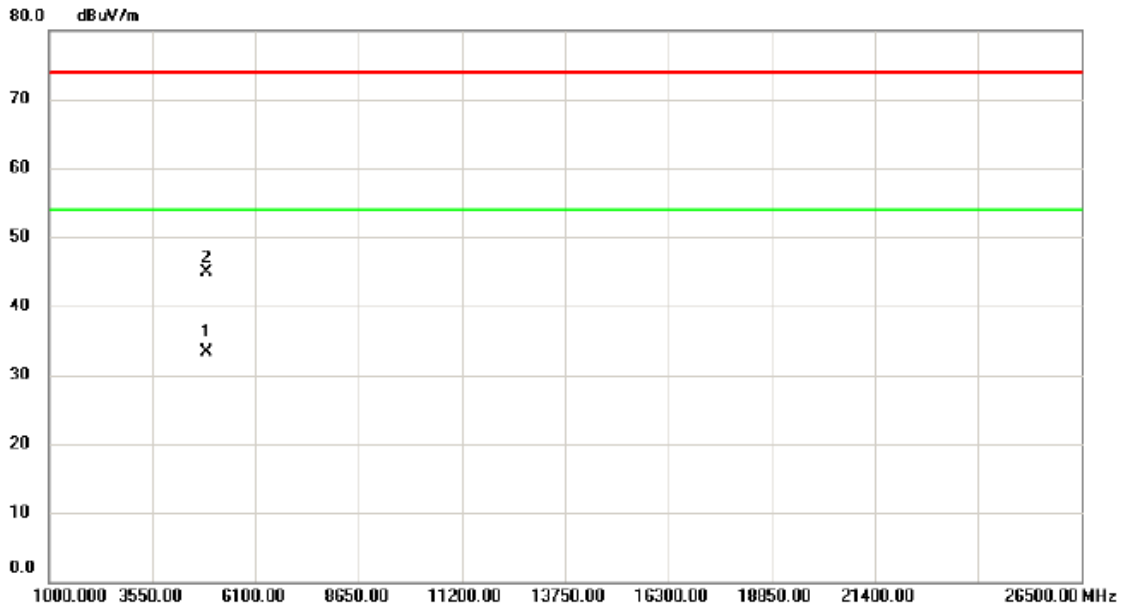
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2441.025	42.09	32.98	75.07	54.00	21.07	AVG	No Limit
2	X	2441.050	55.49	32.98	88.47	74.00	14.47	peak	No Limit

Test Mode : TX 2441MHz \_CH39\_ 3Mbps

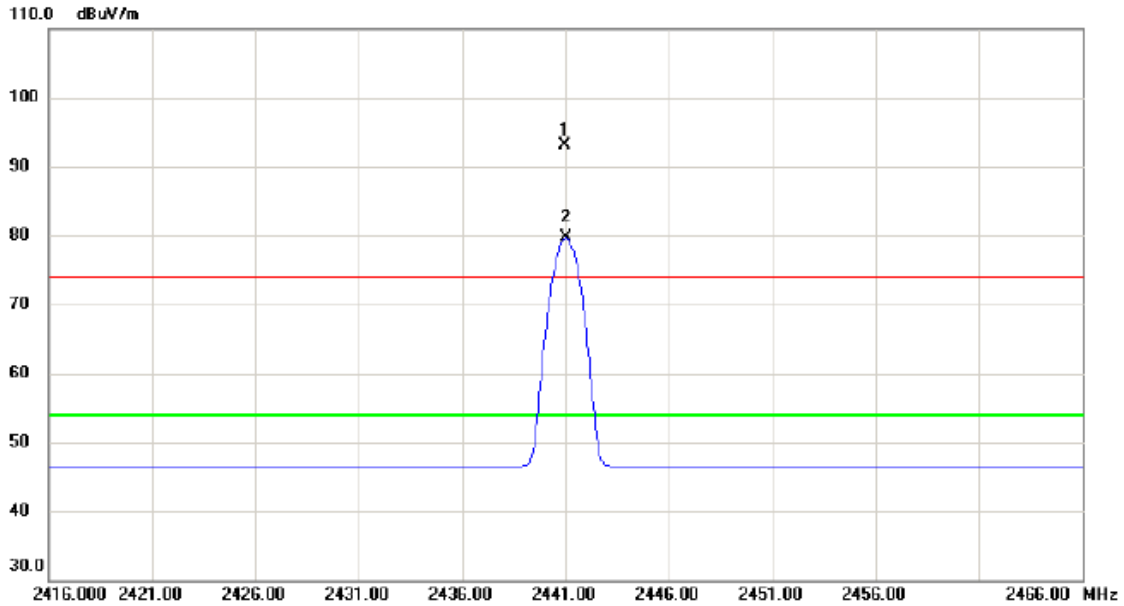
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4882.080	28.33	4.92	33.25	54.00	-20.75	AVG	
2		4882.410	39.97	4.92	44.89	74.00	-29.11	peak	

Test Mode : TX 2441MHz \_CH39\_ 3Mbps

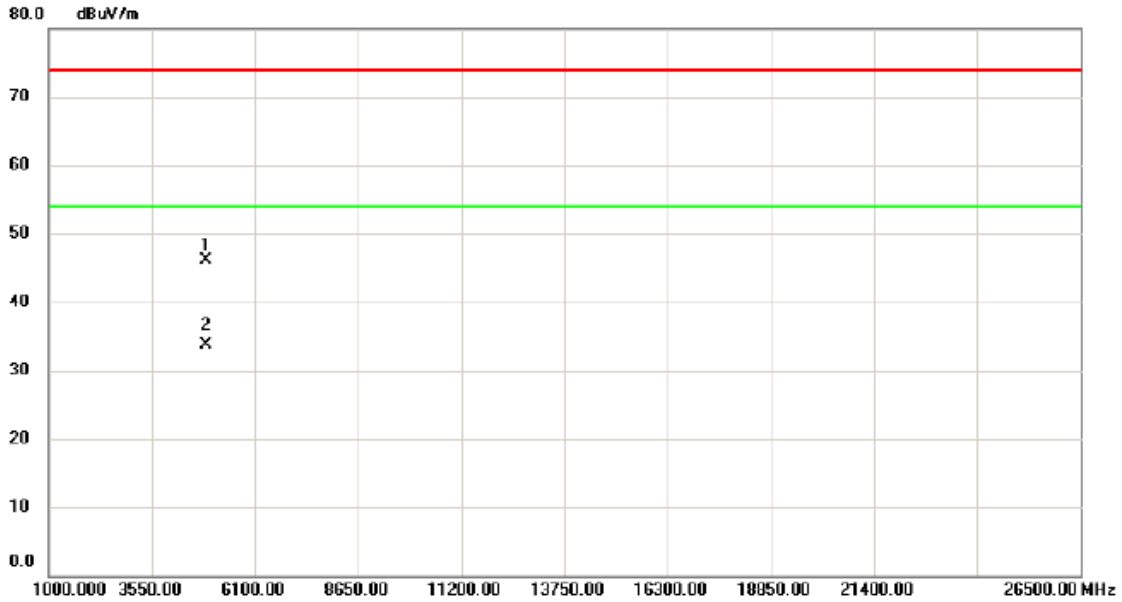
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2440.975	60.09	32.98	93.07	74.00	19.07	peak	No Limit
2	*	2441.025	46.64	32.98	79.62	54.00	25.62	AVG	No Limit

Test Mode : TX 2441MHz \_CH39\_ 3Mbps

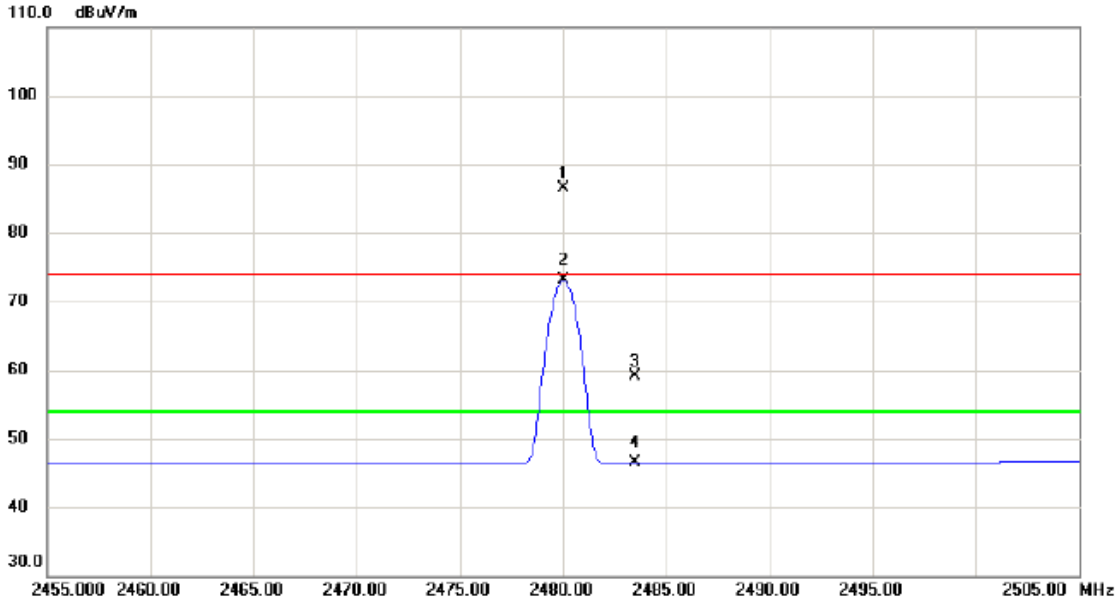
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4883.350	41.26	4.92	46.18	74.00	-27.82	peak	
2	*	4884.620	28.73	4.93	33.66	54.00	-20.34	AVG	

Test Mode : TX 2480MHz \_CH78\_ 3Mbps

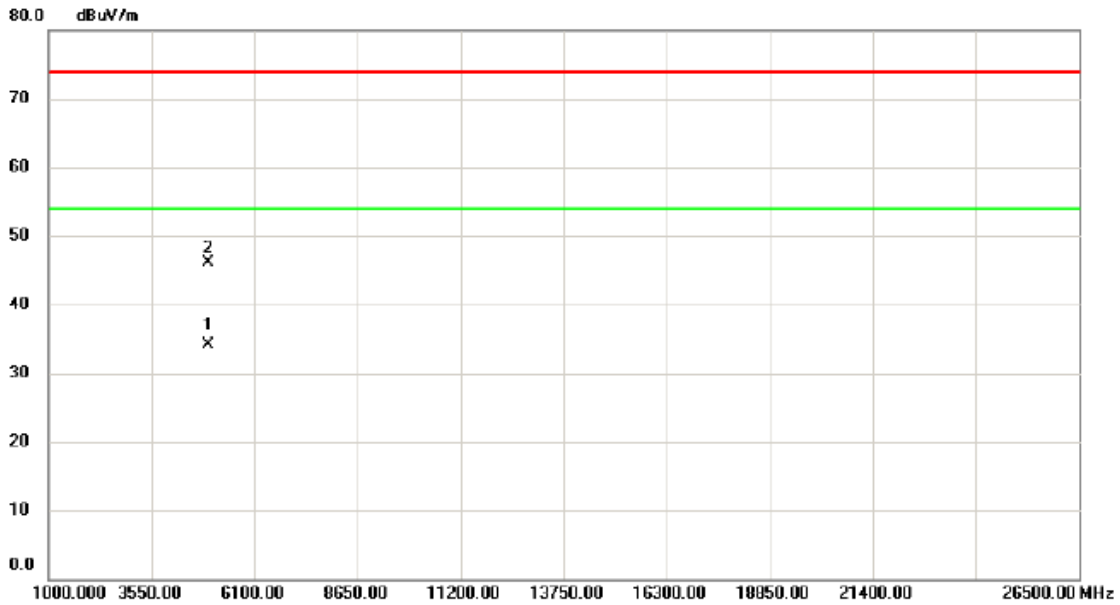
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.000	53.33	33.14	86.47	74.00	12.47	peak	No Limit
2	*	2480.025	39.96	33.14	73.10	54.00	19.10	AVG	No Limit
3		2483.500	26.05	33.15	59.20	74.00	-14.80	peak	
4		2483.500	13.27	33.15	46.42	54.00	-7.58	AVG	

Test Mode : TX 2480MHz \_CH78\_ 3Mbps

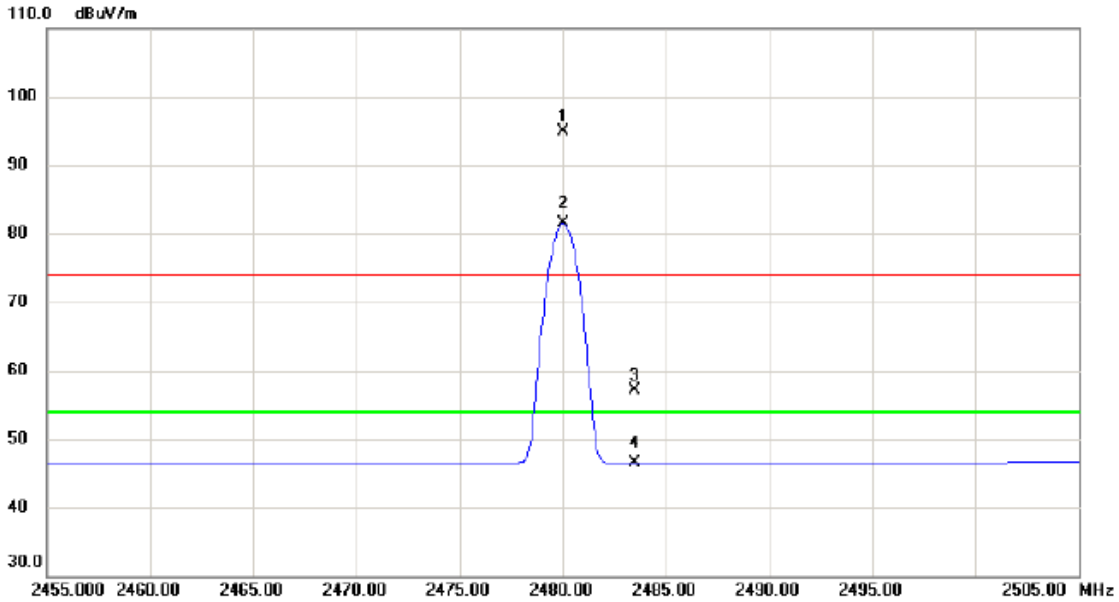
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	4960.987	28.94	5.23	34.17	54.00	-19.83	AVG	
2		4961.055	40.83	5.23	46.06	74.00	-27.94	peak	

Test Mode : TX 2480MHz \_CH78\_ 3Mbps

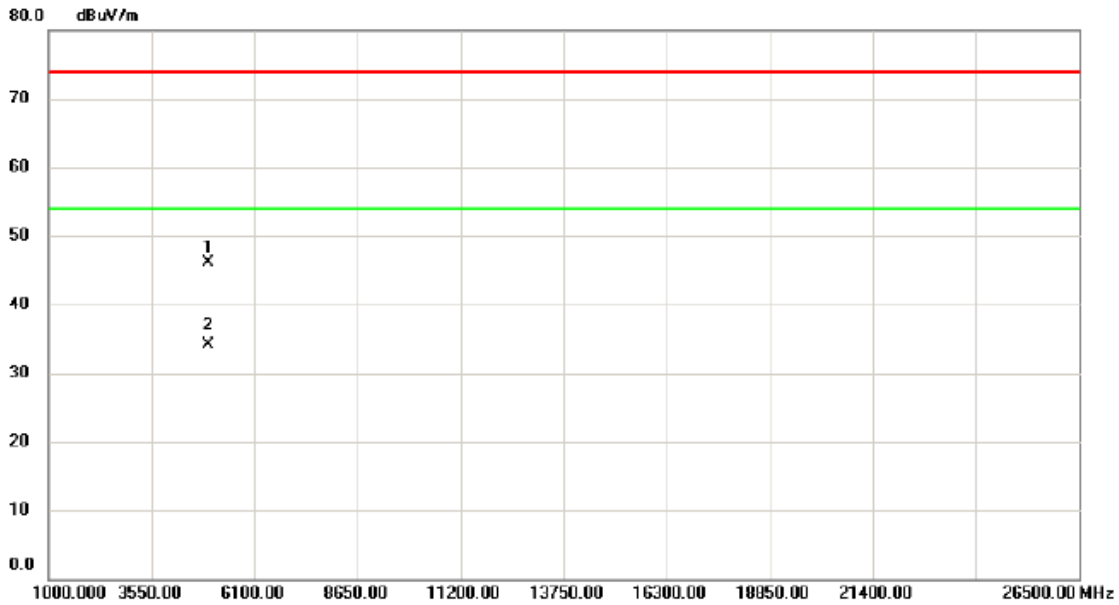
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.025	61.74	33.14	94.88	74.00	20.88	peak	No Limit
2	*	2480.025	48.30	33.14	81.44	54.00	27.44	AVG	No Limit
3		2483.500	24.00	33.15	57.15	74.00	-16.85	peak	
4		2483.500	13.29	33.15	46.44	54.00	-7.56	AVG	

Test Mode : TX 2480MHz \_CH78\_ 3Mbps

### Horizontal

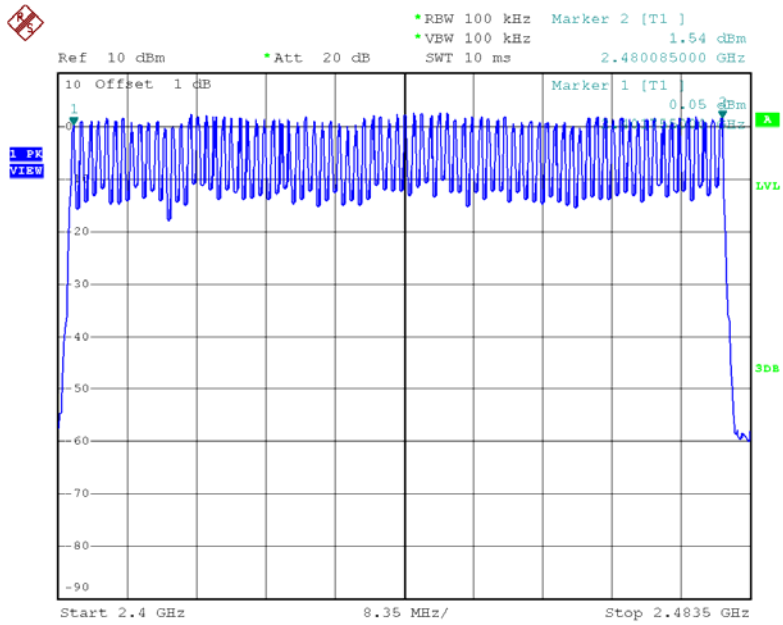


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4960.420	40.85	5.23	46.08	74.00	-27.92	peak	
2	*	4961.340	28.92	5.23	34.15	54.00	-19.85	AVG	

## ATTACHMENT E - NUMBER OF HOPPING CHANNEL

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

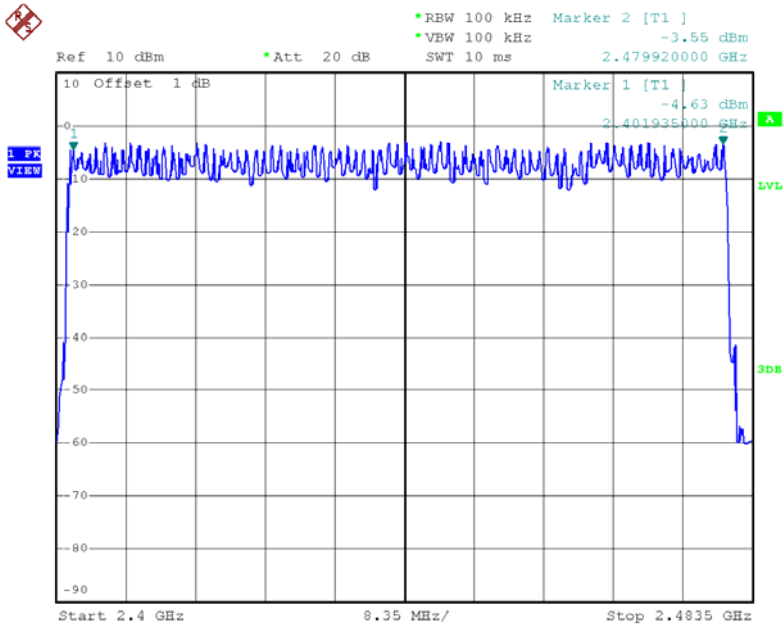
Number of Hopping Channel      79



Date: 28.JUN.2016 16:35:38

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

Number of Hopping Channel      79



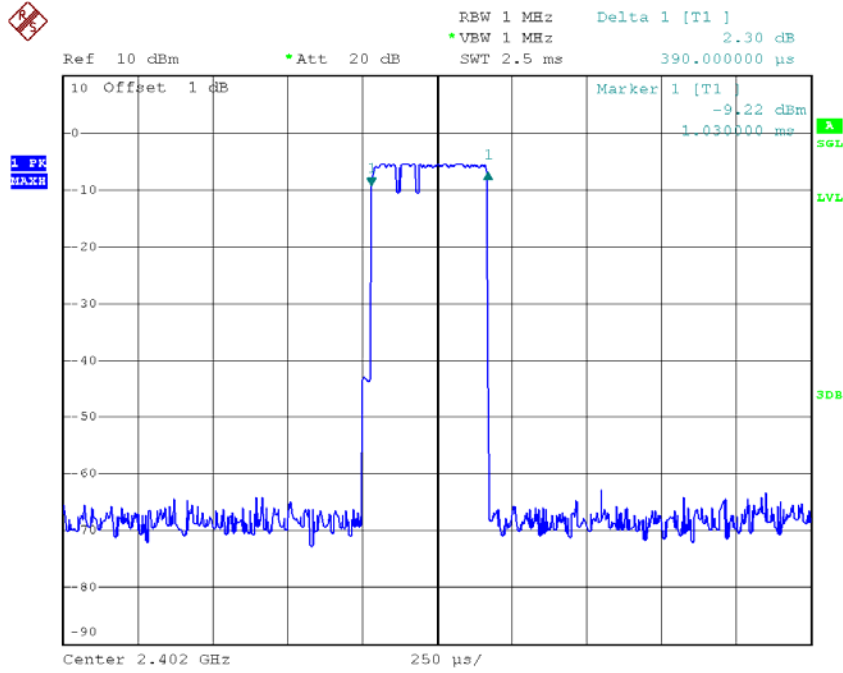
Date: 28.JUN.2016 16:53:09

## ATTACHMENT F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps
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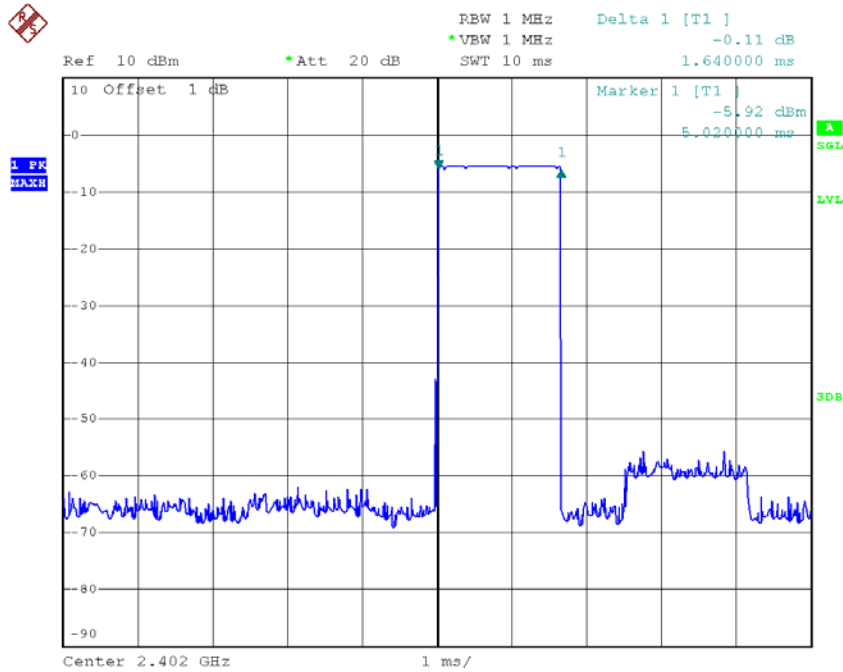
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Pass
DH3	2402	1.6400	0.1749	0.4000	Pass
DH1	2402	0.3900	0.0416	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH3	2441	1.6600	0.1771	0.4000	Pass
DH1	2441	0.3850	0.0411	0.4000	Pass
DH5	2480	2.8800	0.3072	0.4000	Pass
DH3	2480	1.6400	0.1749	0.4000	Pass
DH1	2480	0.3850	0.0411	0.4000	Pass

### CH00-DH1



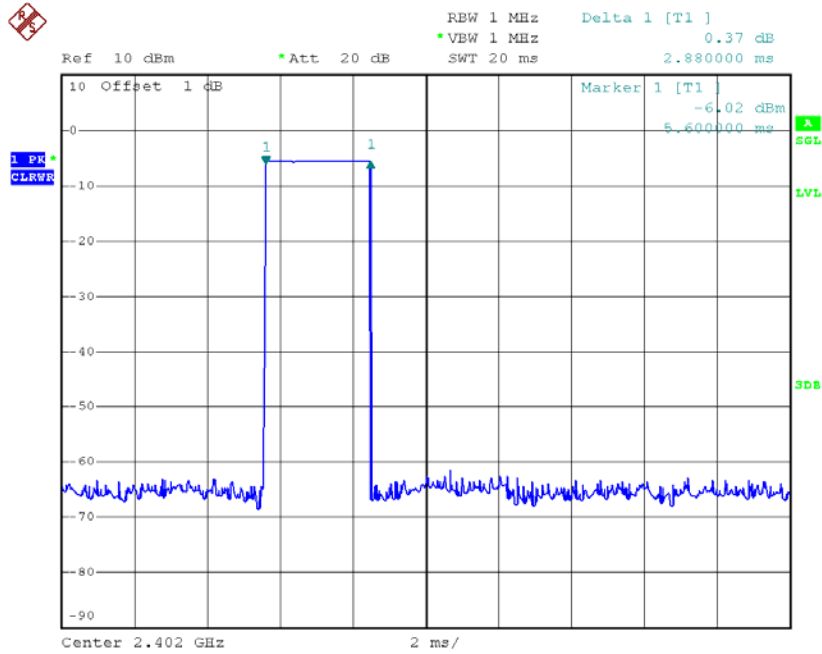
Date: 28.JUN.2016 16:30:07

### CH00-DH3



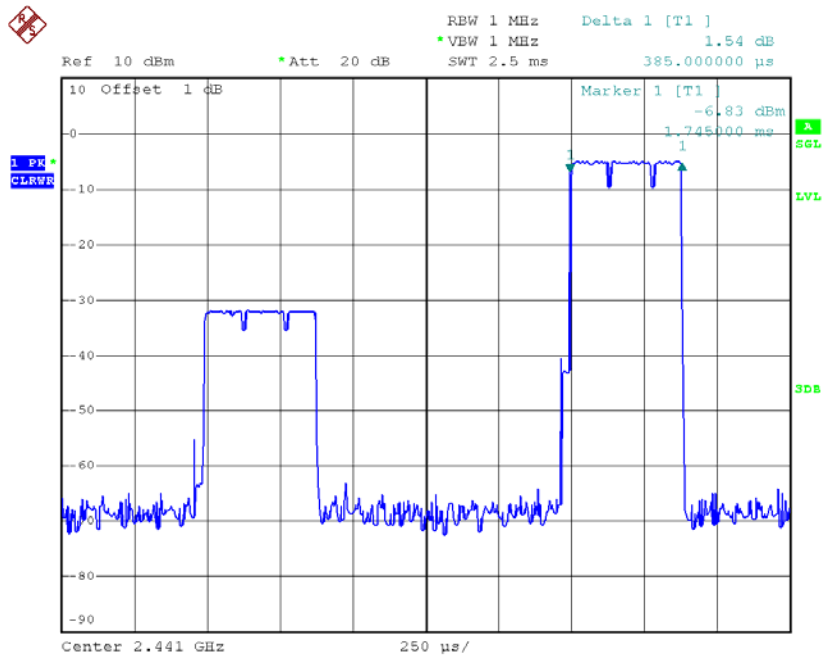
Date: 28.JUN.2016 16:37:53

### CH00-DH5



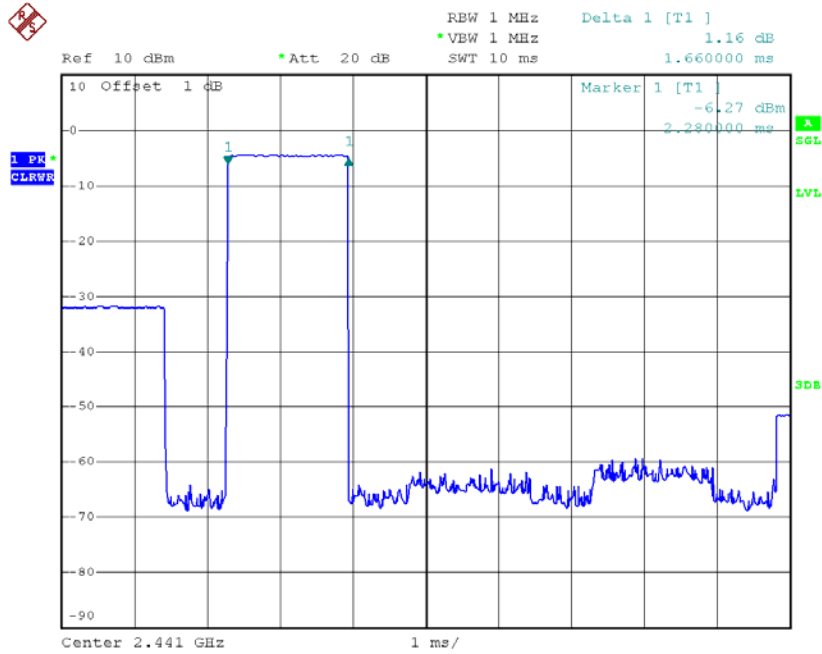
Date: 28.JUN.2016 16:38:51

### CH39-DH1



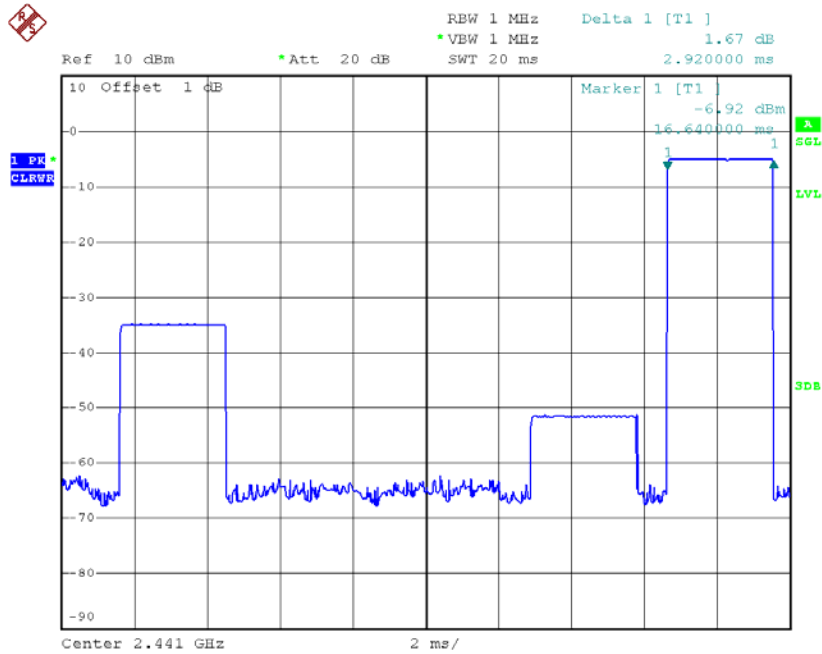
Date: 28.JUN.2016 16:30:12

**CH39-DH3**



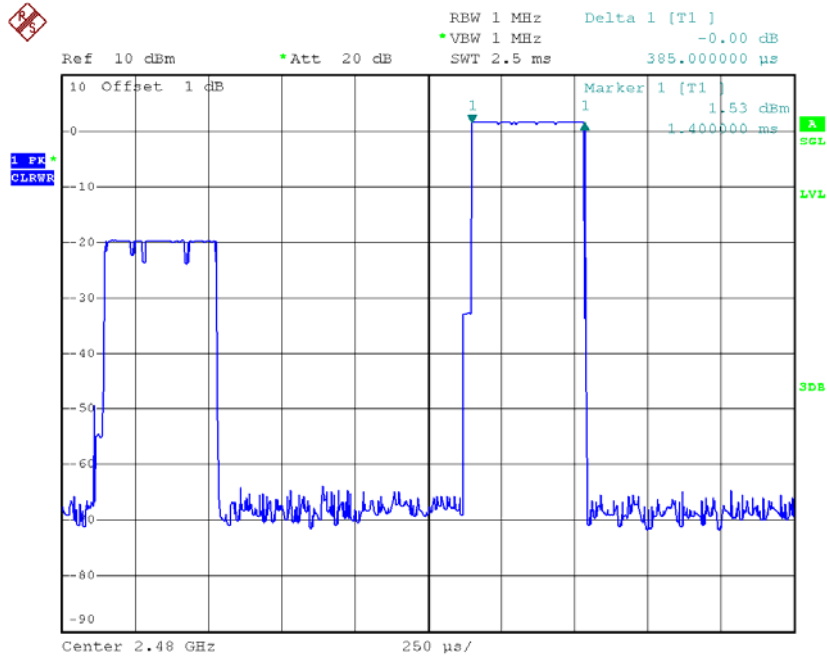
Date: 28.JUN.2016 16:37:59

**CH39-DH5**



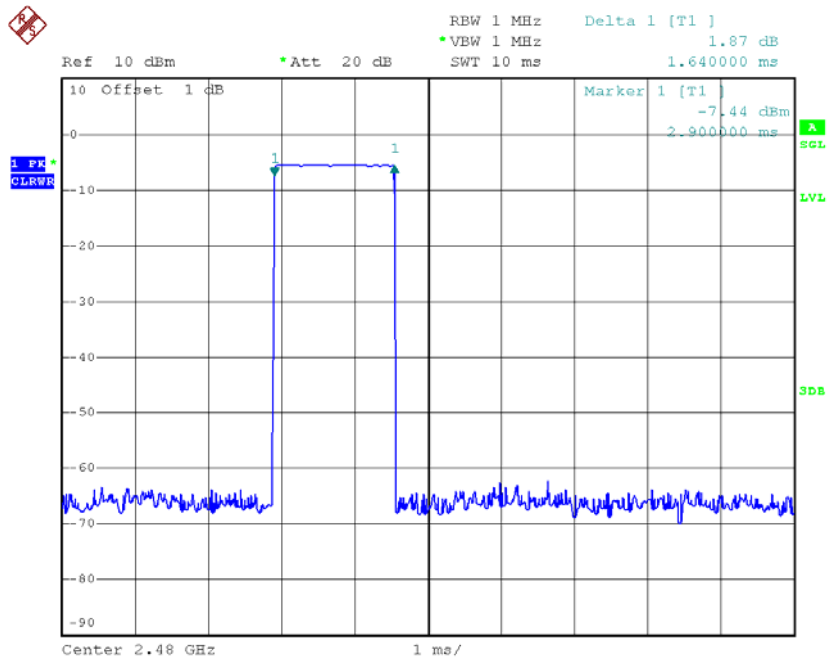
Date: 28.JUN.2016 16:38:56

### CH78-DH1



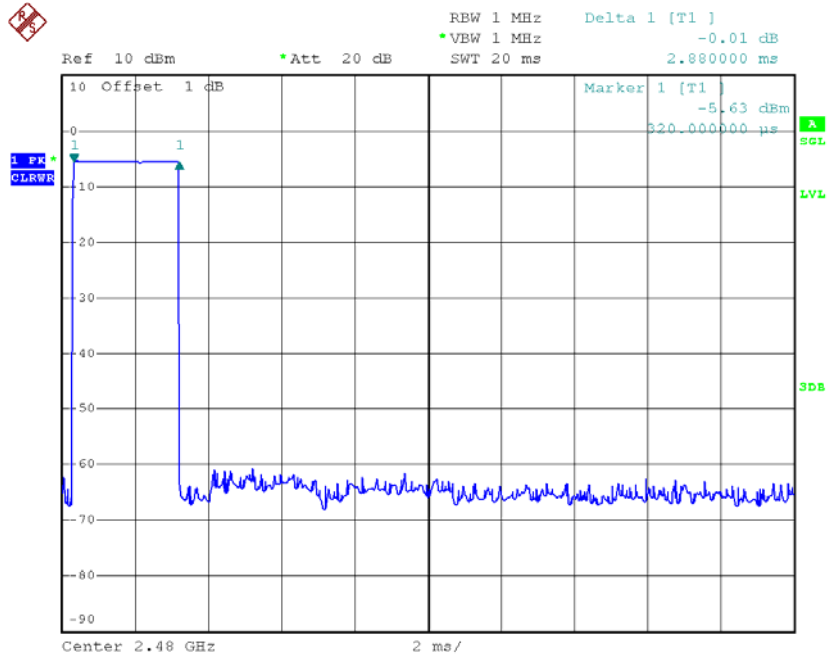
Date: 28.JUN.2016 16:30:28

### CH78-DH3



Date: 28.JUN.2016 16:38:04

### CH78-DH5

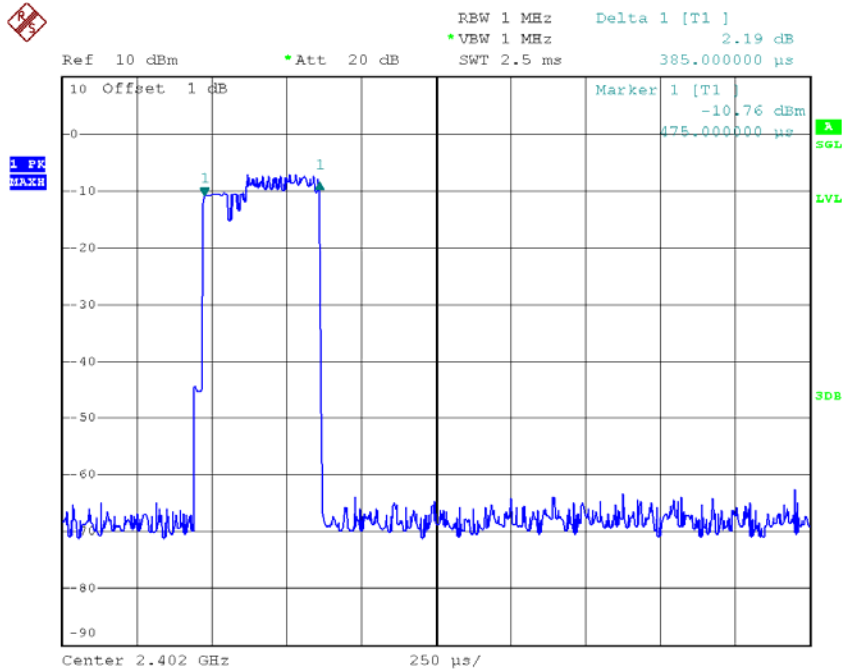


Date: 28.JUN.2016 16:39:01

Test Mode :	TX Mode_3Mbps
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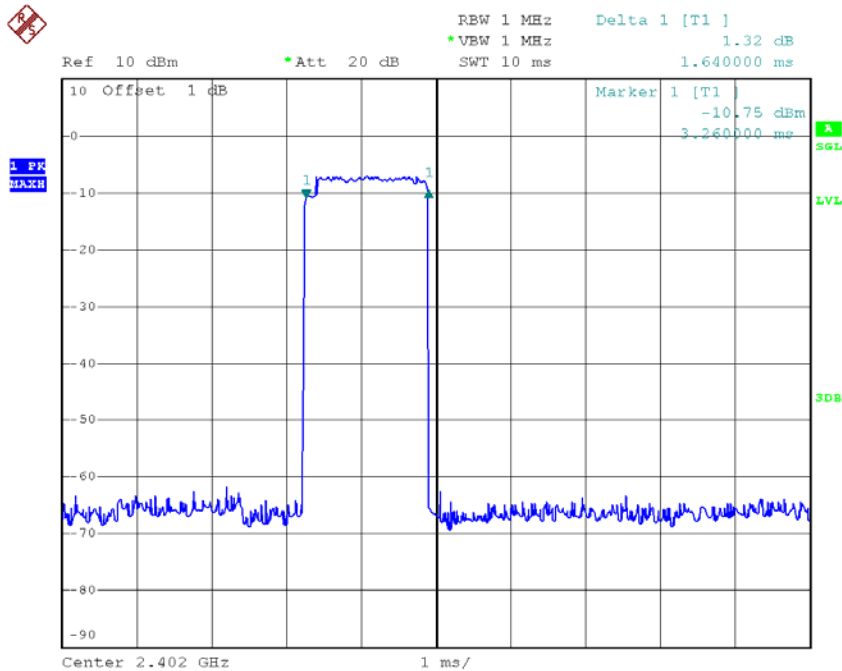
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
DH5	2402	2.8400	0.3029	0.4000	Pass
DH3	2402	1.6400	0.1749	0.4000	Pass
DH1	2402	0.3850	0.0411	0.4000	Pass
DH5	2441	2.8400	0.3029	0.4000	Pass
DH3	2441	1.6400	0.1749	0.4000	Pass
DH1	2441	0.3850	0.0411	0.4000	Pass
DH5	2480	2.8400	0.3029	0.4000	Pass
DH3	2480	1.6200	0.1728	0.4000	Pass
DH1	2480	0.3900	0.0416	0.4000	Pass

**CH00-DH1**



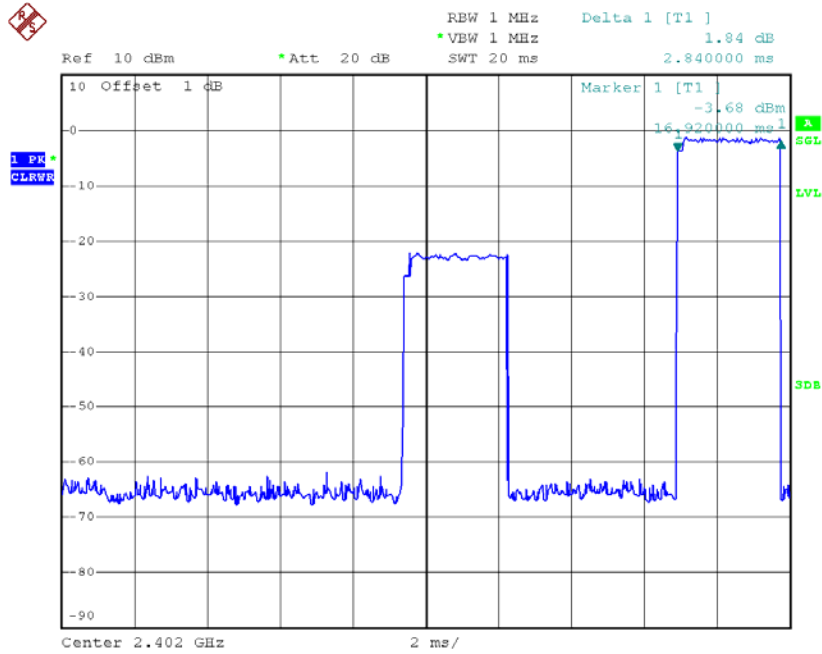
Date: 28.JUN.2016 16:47:49

**CH00-DH3**



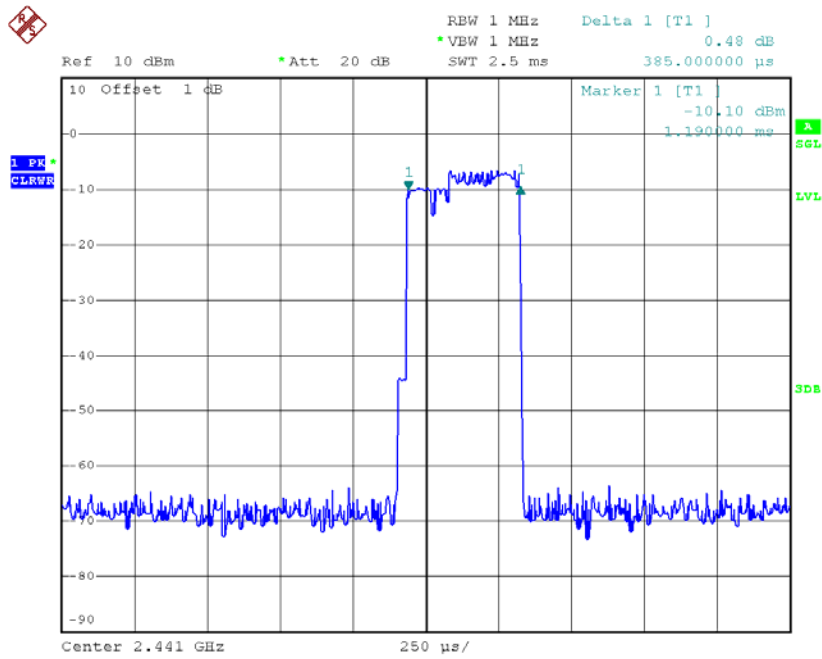
Date: 28.JUN.2016 16:55:58

### CH00-DH5



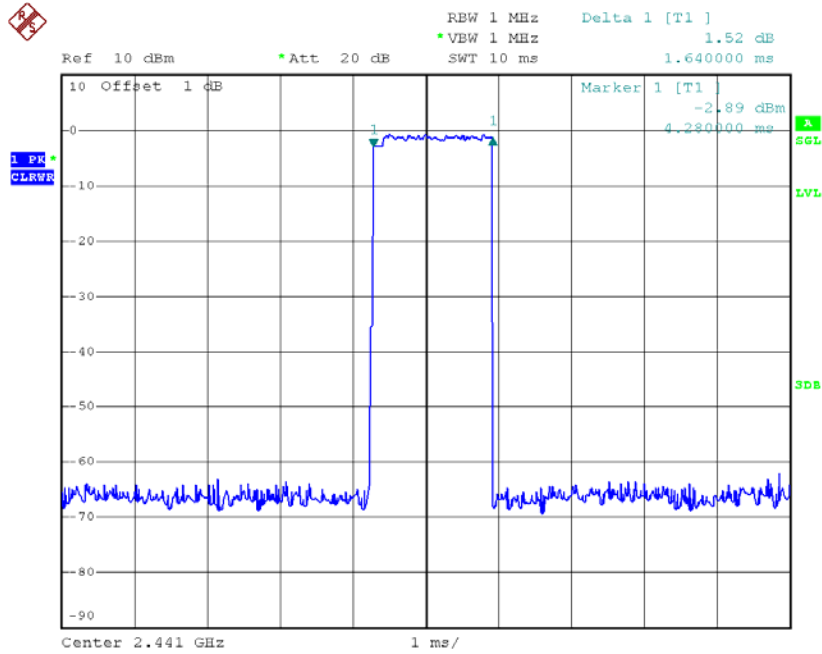
Date: 28.JUN.2016 16:57:27

### CH39-DH1



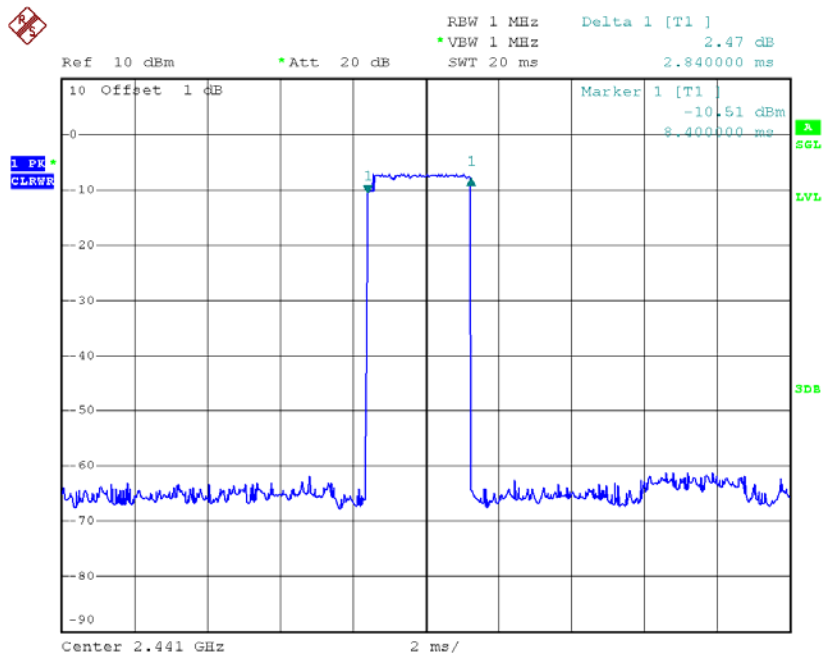
Date: 28.JUN.2016 16:47:54

### CH39-DH3



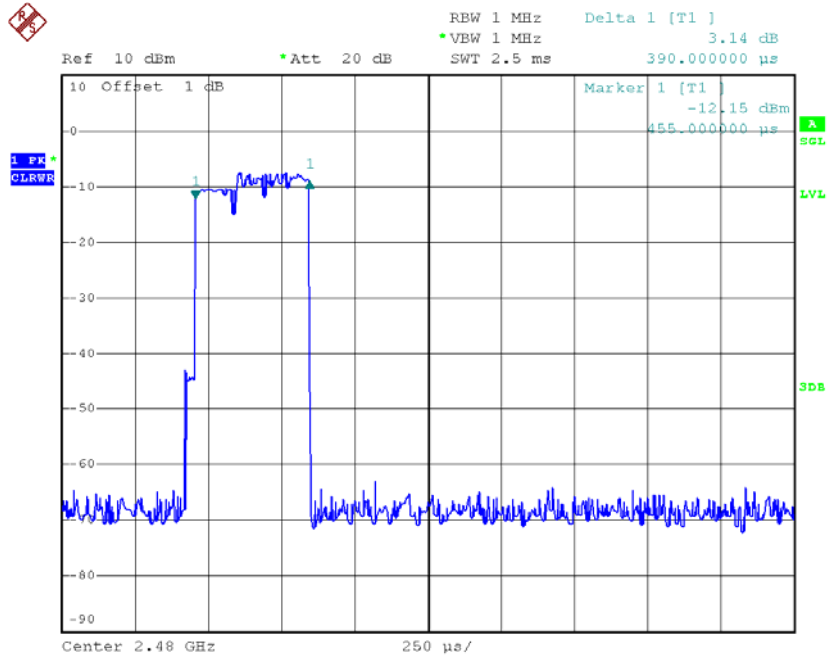
Date: 28.JUN.2016 16:56:03

### CH39-DH5



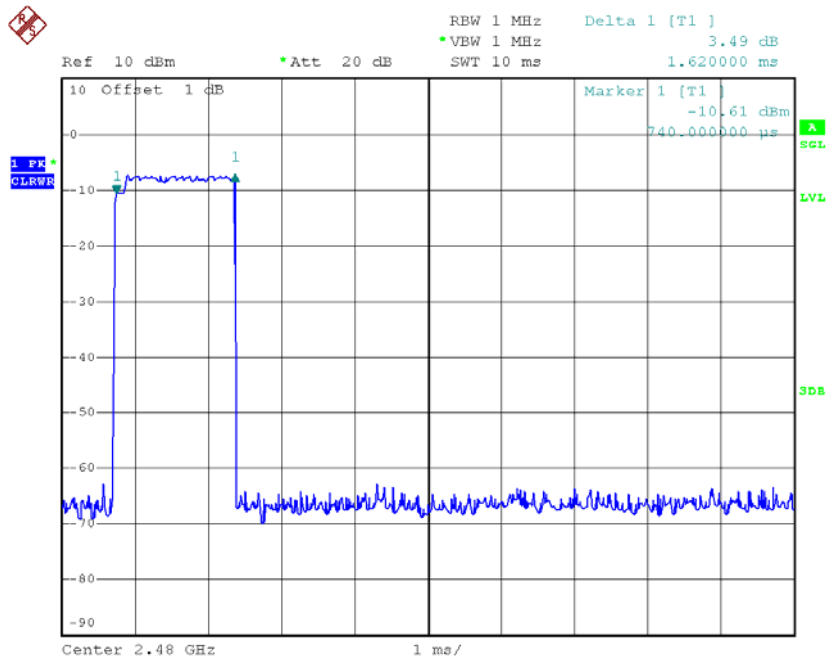
Date: 28.JUN.2016 16:57:31

### CH78-DH1



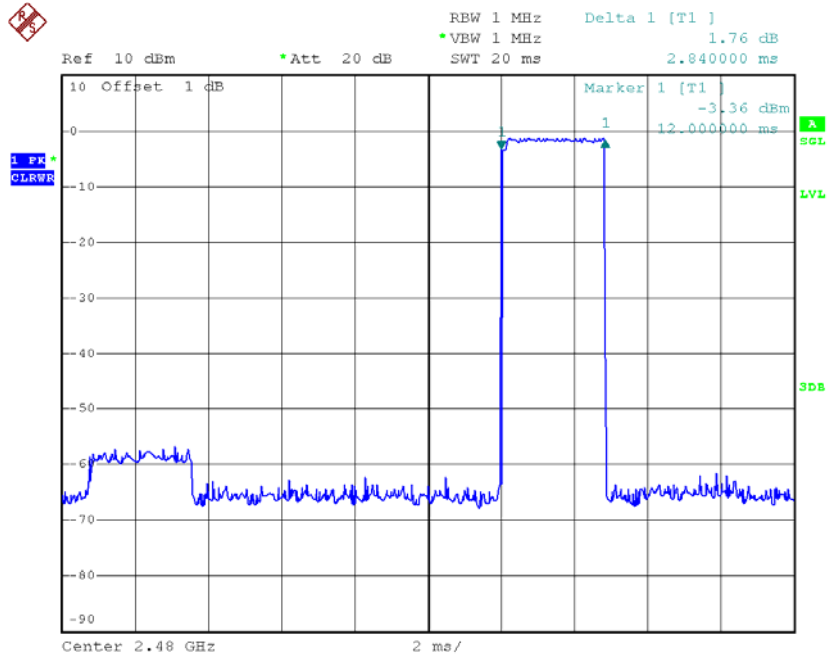
Date: 28.JUN.2016 16:48:01

### CH78-DH3



Date: 28.JUN.2016 16:56:07

### CH78-DH5

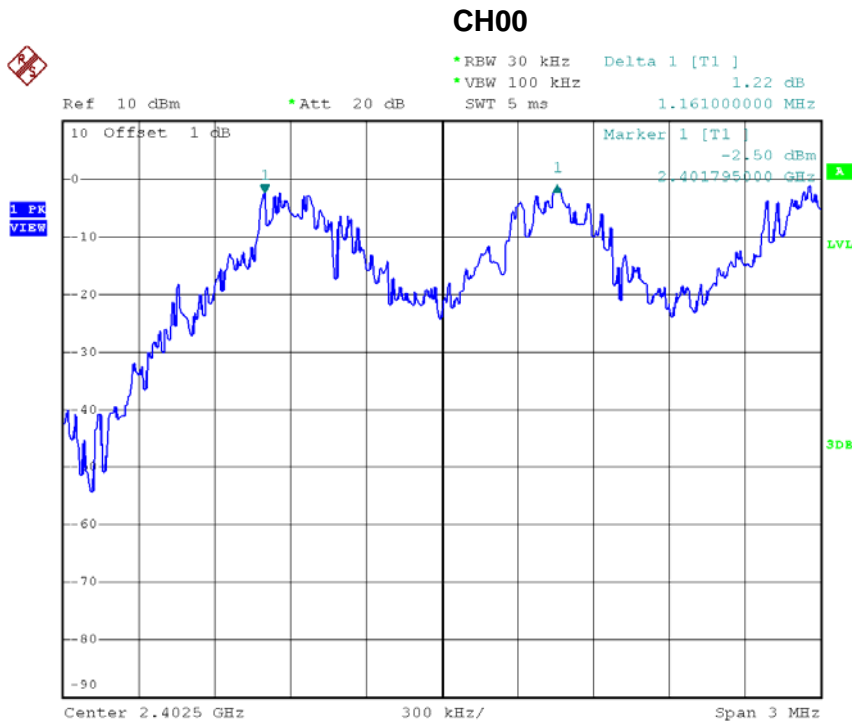


Date: 28.JUN.2016 16:57:35

# ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT

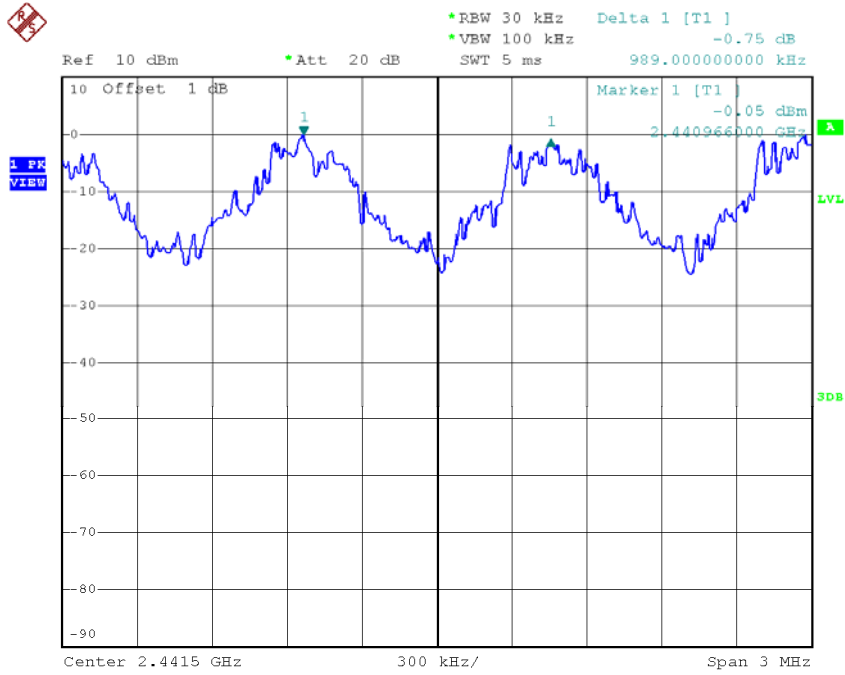
Test Mode : Hopping on \_1Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.161	0.697	Pass
2441	0.989	0.699	Pass
2480	0.996	0.700	Pass



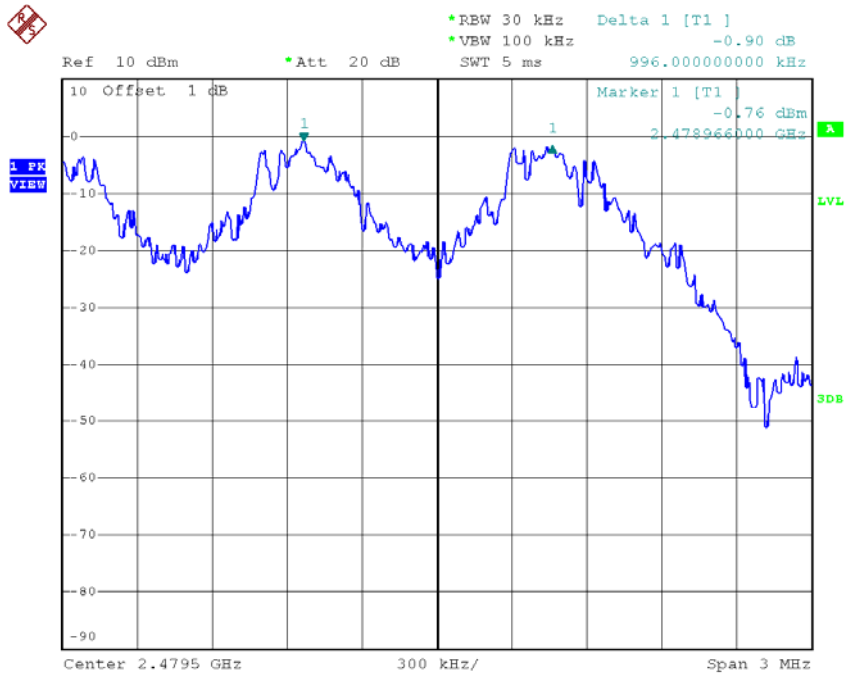
Date: 28.JUN.2016 16:31:36

### CH39



Date: 28.JUN.2016 16:32:45

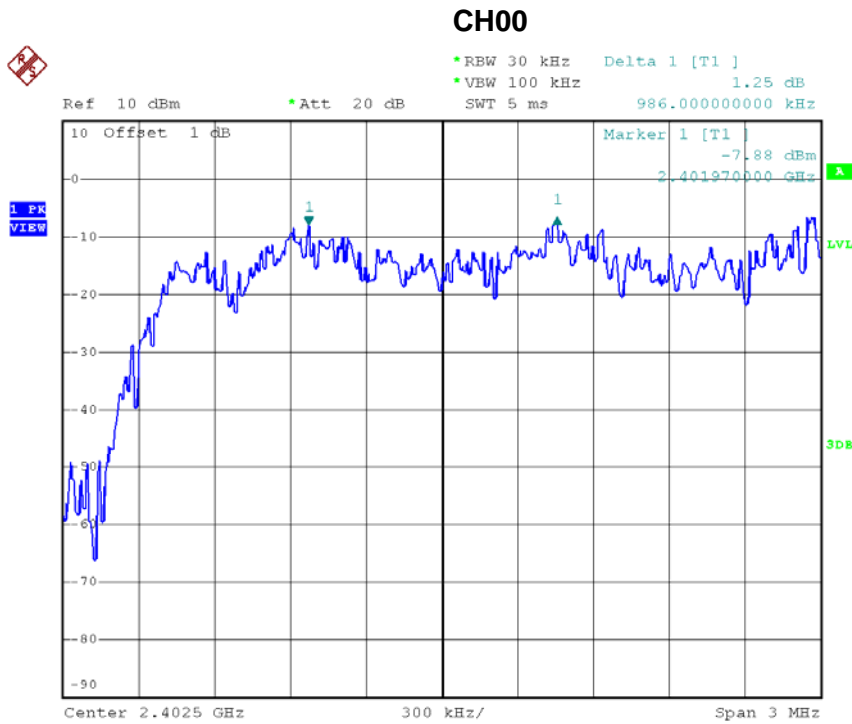
### CH78



Date: 28.JUN.2016 16:33:49

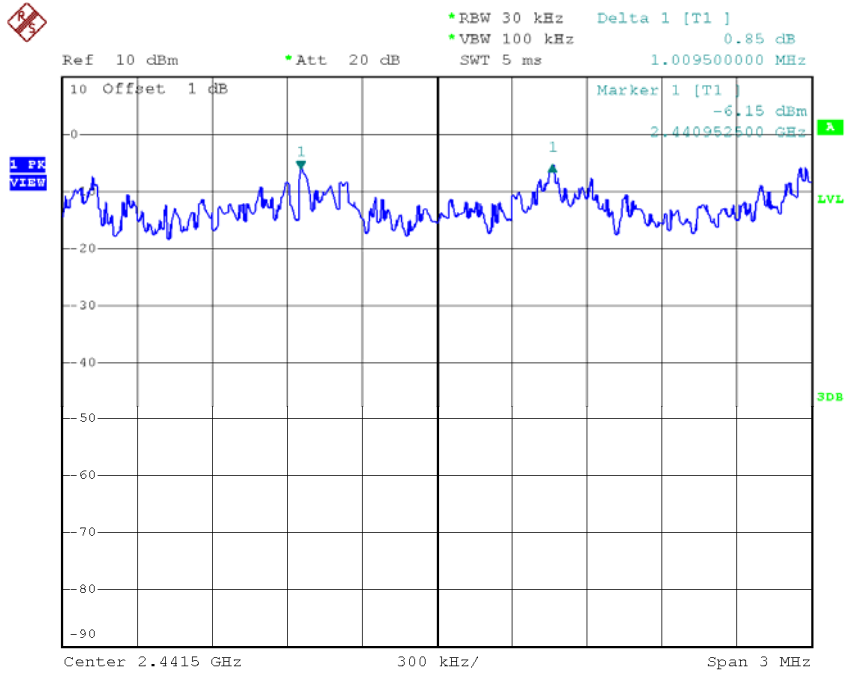
Test Mode : Hopping on \_3Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.986	0.852	Pass
2441	1.010	0.862	Pass
2480	1.008	0.851	Pass



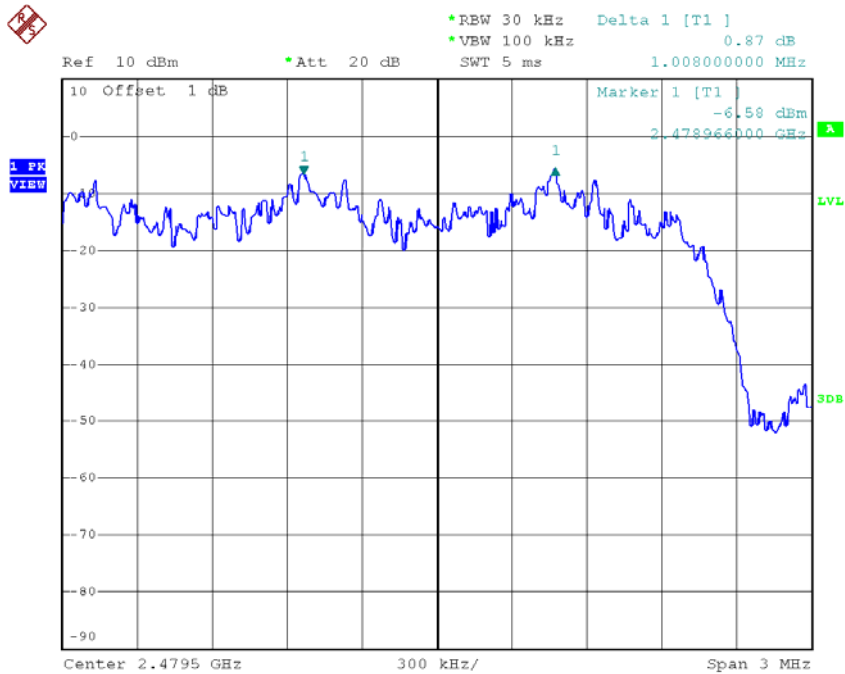
Date: 28.JUN.2016 16:49:09

### CH39



Date: 28.JUN.2016 16:50:17

### CH78



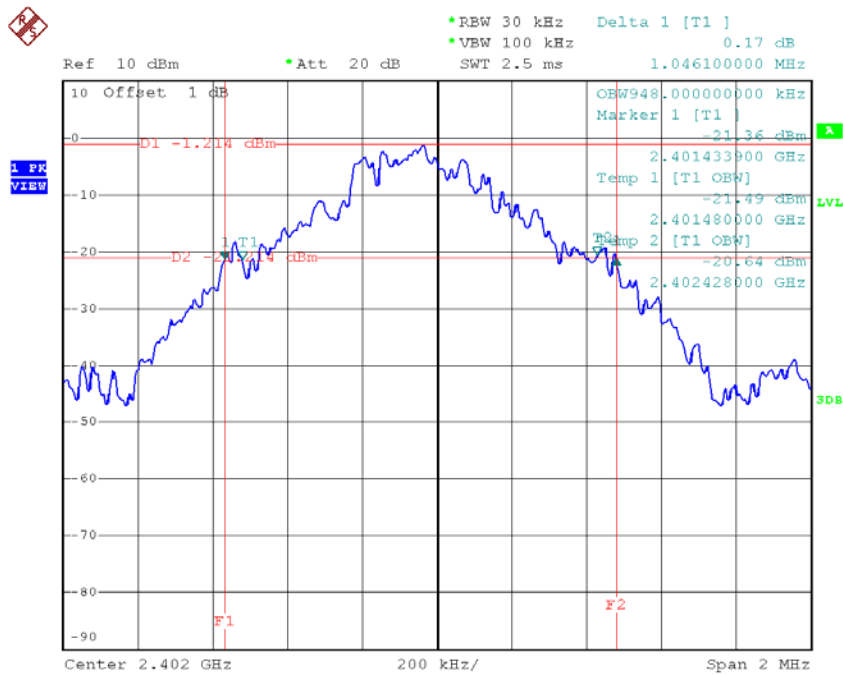
Date: 28.JUN.2016 16:51:21

## ATTACHMENT H - BANDWIDTH

Test Mode : TX Mode \_1Mbps

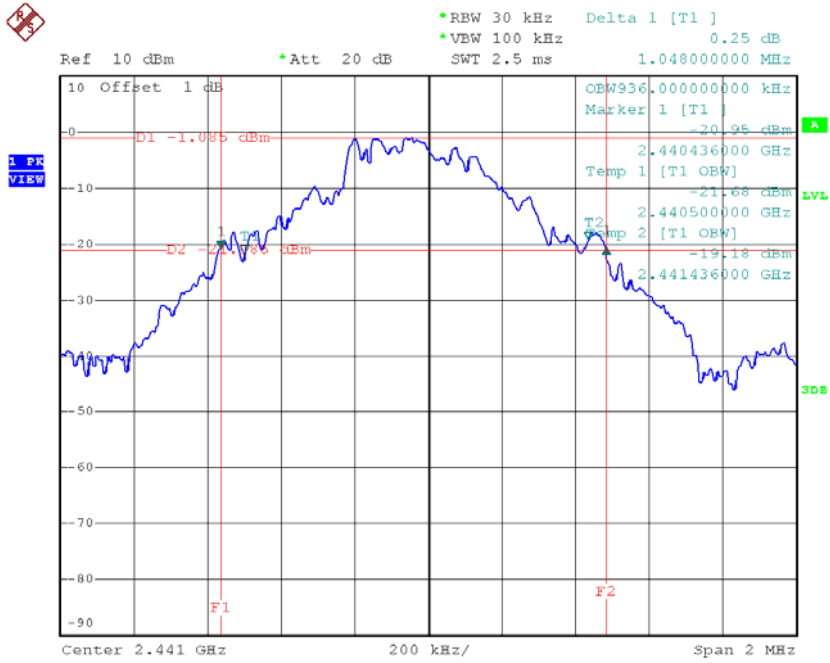
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.046	0.948	Pass
2441	1.048	0.936	Pass
2480	1.050	0.956	Pass

### CH00



Date: 28.JUN.2016 16:24:29

### CH39



Date: 28.JUN.2016 16:26:40

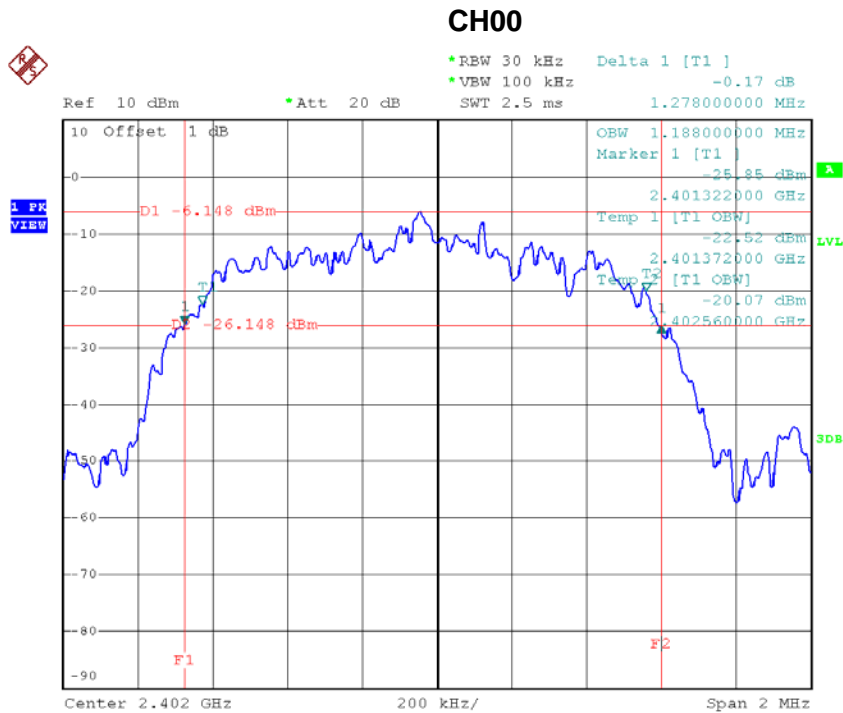
### CH78



Date: 28.JUN.2016 16:27:54

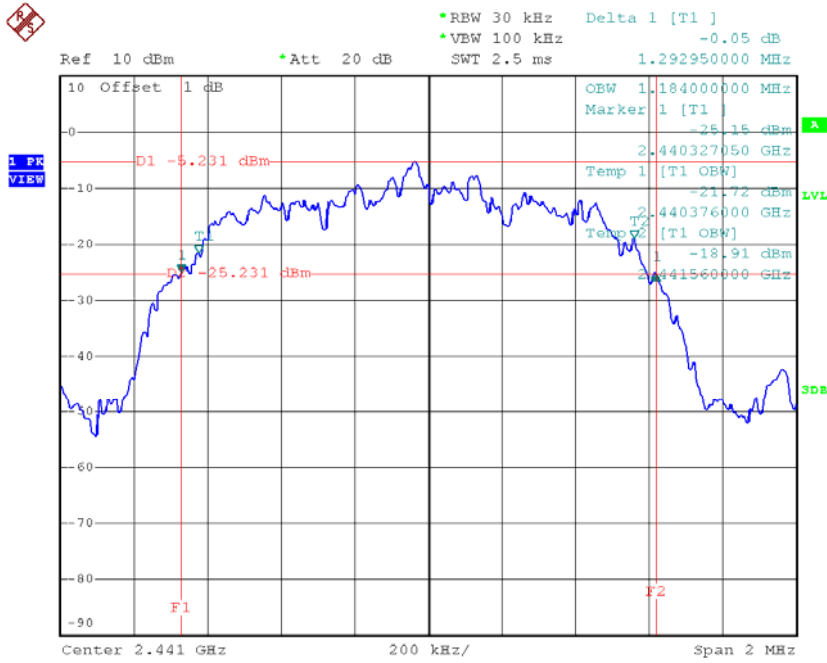
Test Mode : TX Mode \_3Mbps

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.278	1.188	Pass
2441	1.293	1.184	Pass
2480	1.276	1.180	Pass



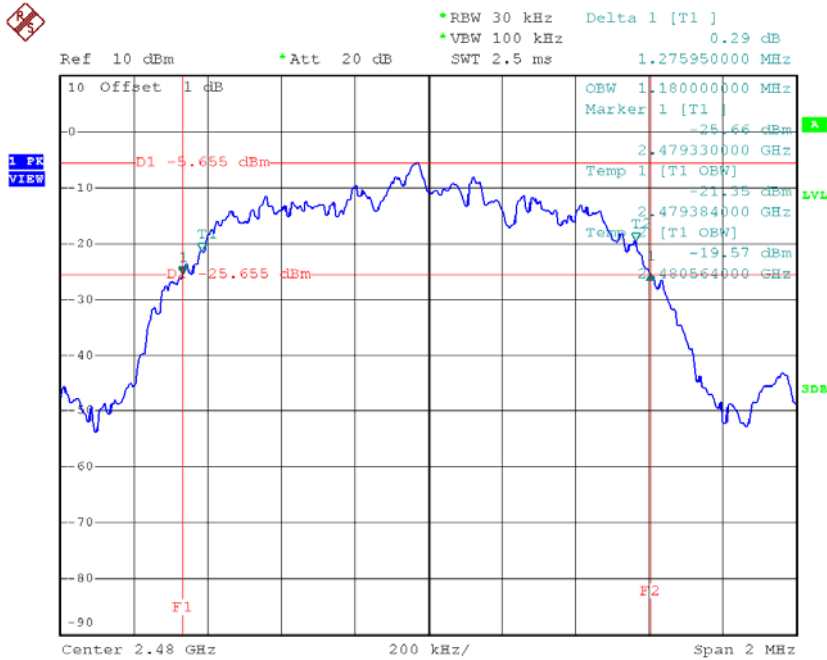
Date: 28.JUN.2016 16:40:18

**CH39**



Date: 28.JUN.2016 16:42:07

**CH78**

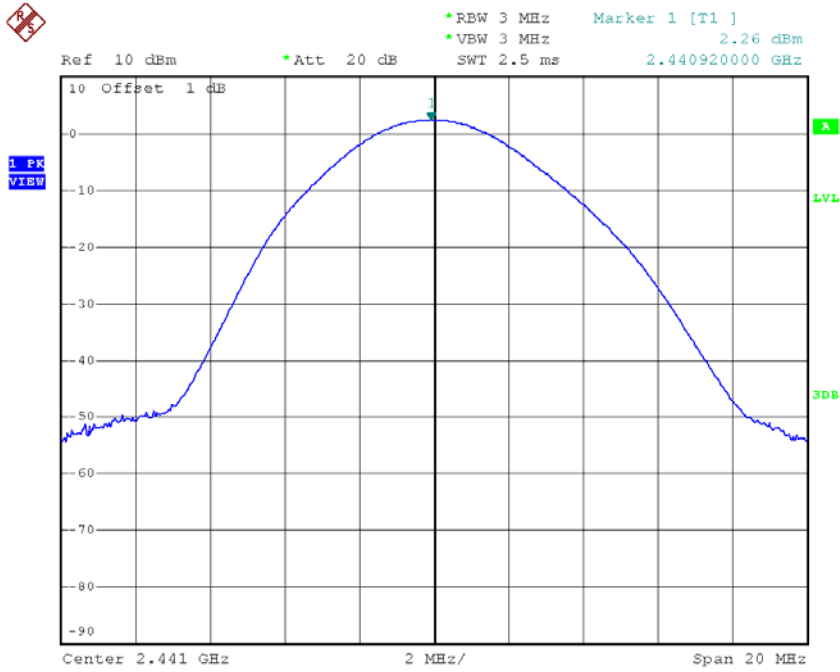


Date: 28.JUN.2016 16:46:33

## ATTACHMENT I - PEAK OUTPUT POWER

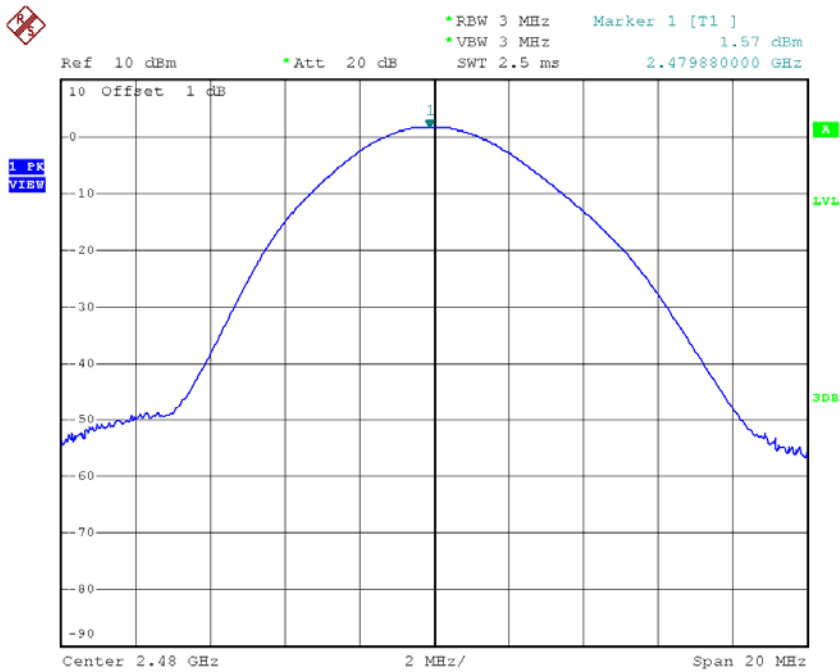


### CH39



Date: 28.JUN.2016 16:26:46

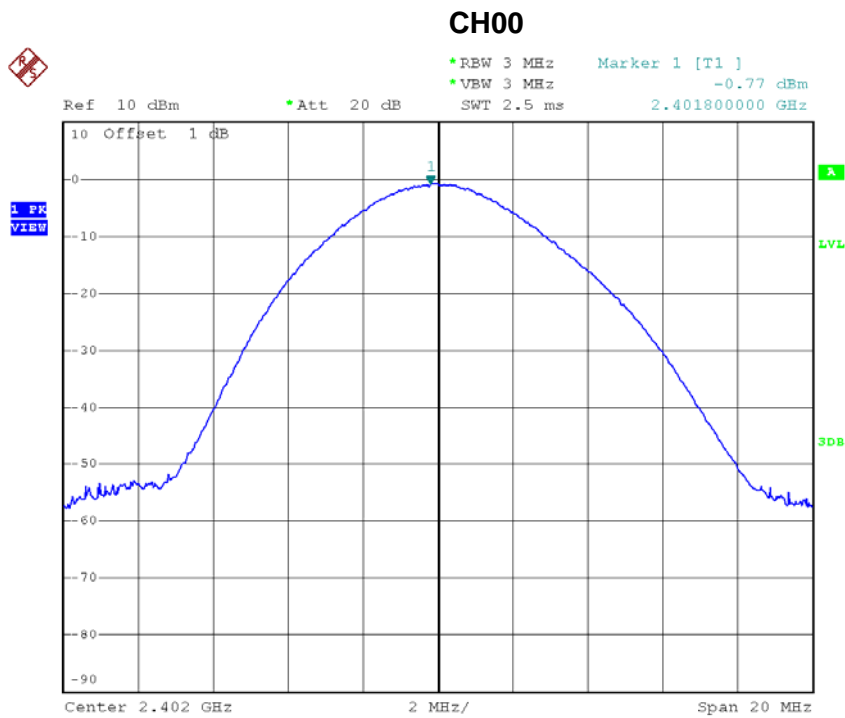
### CH78



Date: 28.JUN.2016 16:28:31

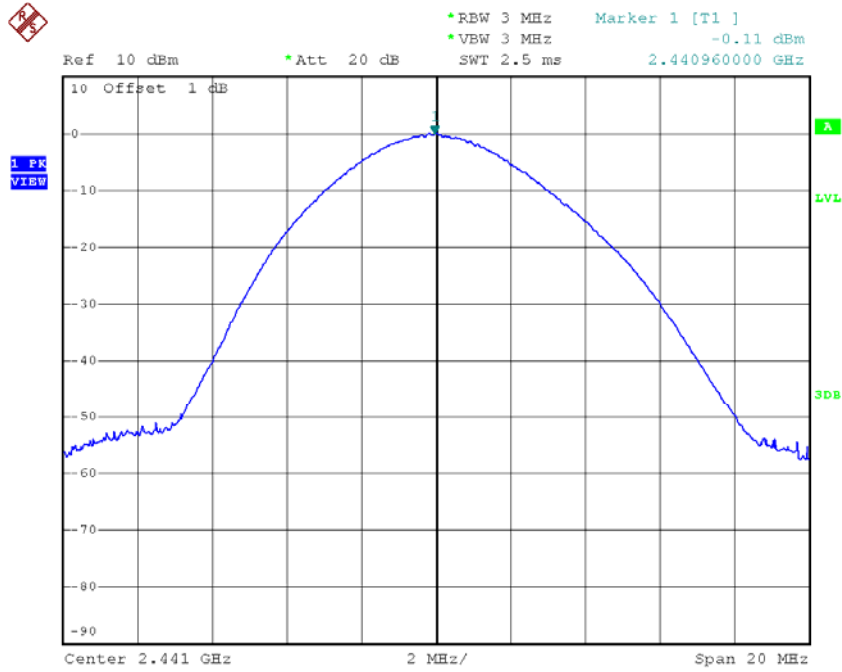
Test Mode : TX Mode \_3Mbps

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	-0.77	0.0008	30.00	1.00	Pass
2441	-0.11	0.0010	30.00	1.00	Pass
2480	-0.64	0.0009	30.00	1.00	Pass



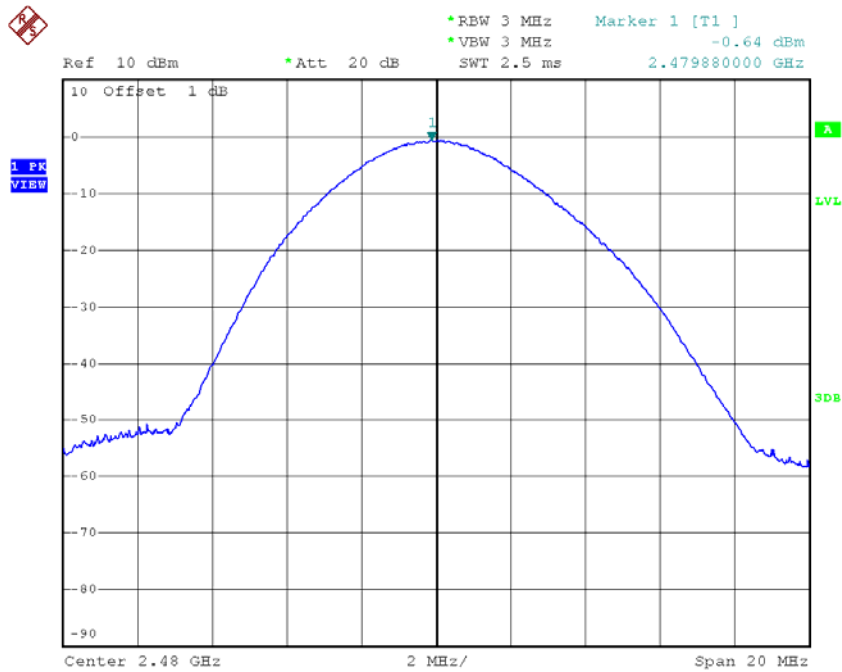
Date: 28.JUN.2016 16:40:55

### CH39



Date: 28.JUN.2016 16:42:13

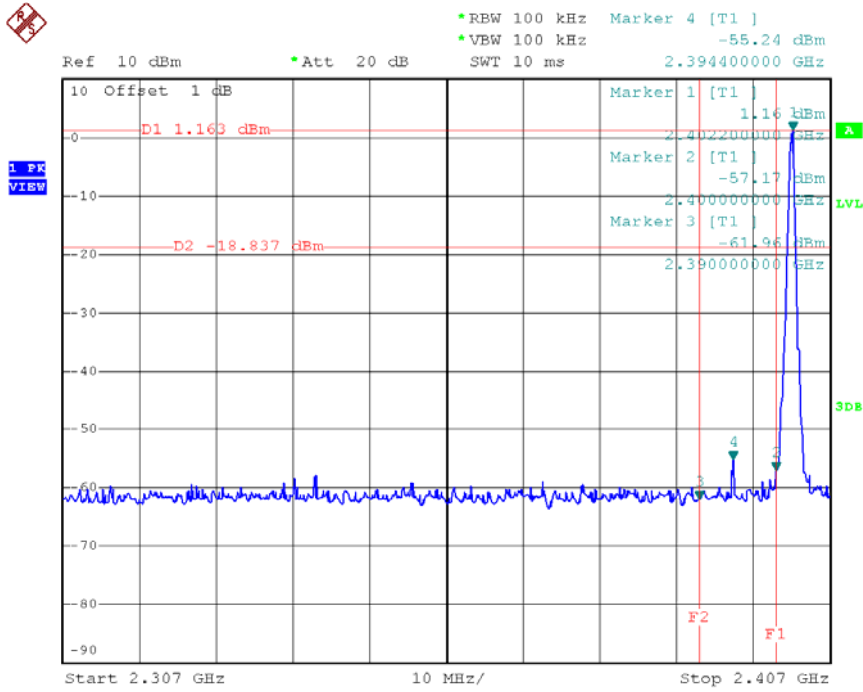
### CH78



Date: 28.JUN.2016 16:47:10

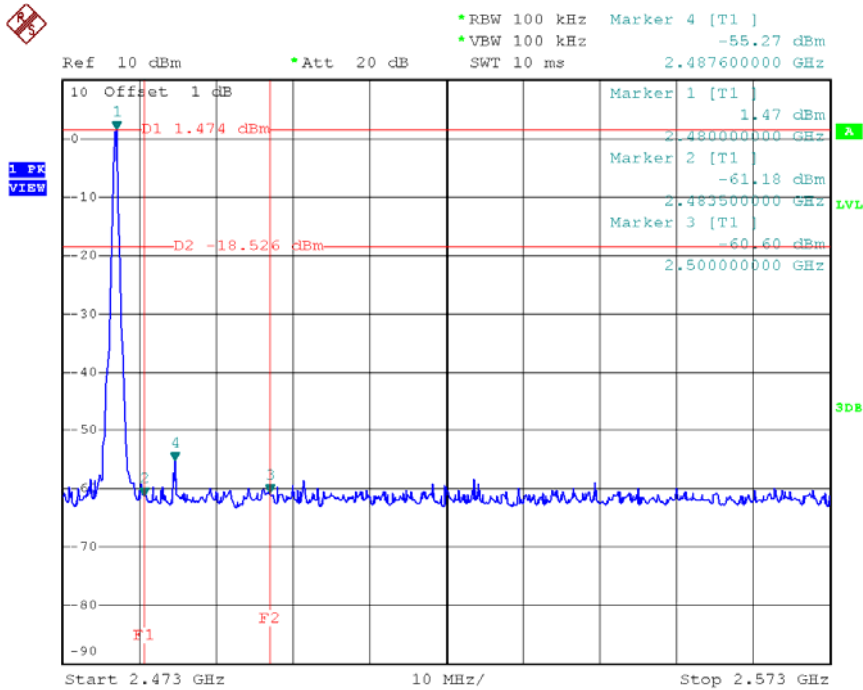
# ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION

### CH00 (Lower)\_1Mbps



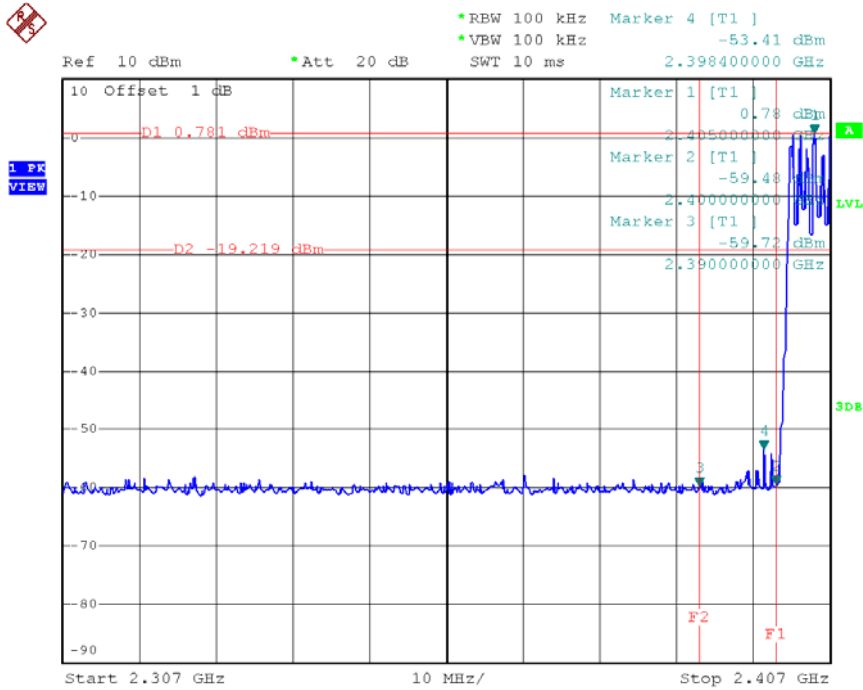
Date: 28.JUN.2016 16:24:03

### CH78 (Upper)\_1Mbps



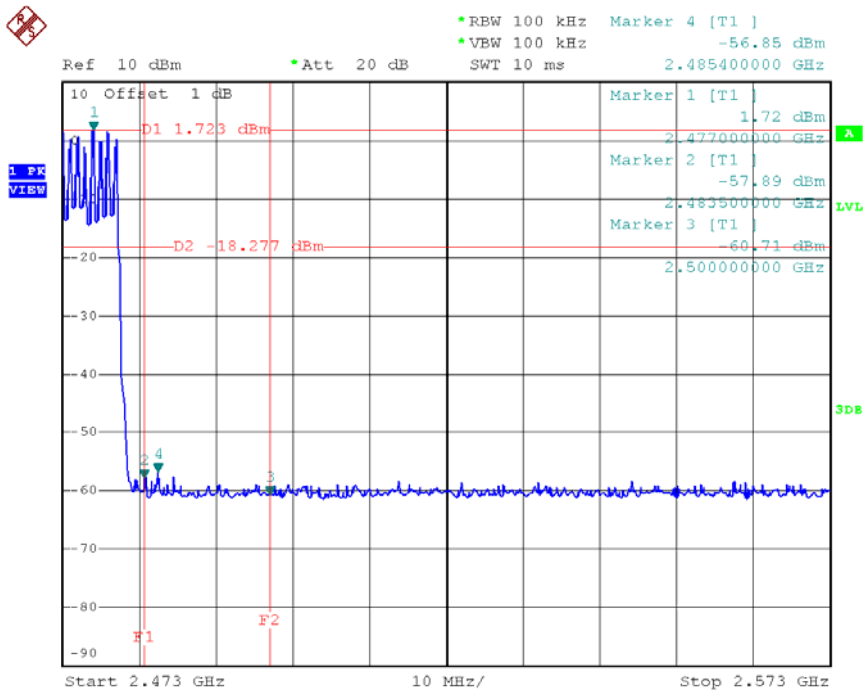
Date: 28.JUN.2016 16:27:29

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



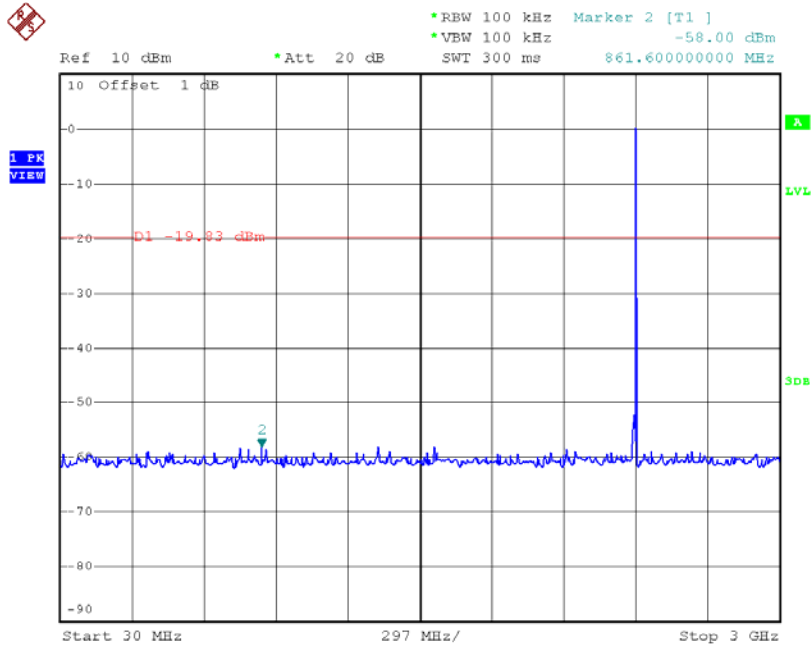
Date: 28.JUN.2016 16:36:13

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

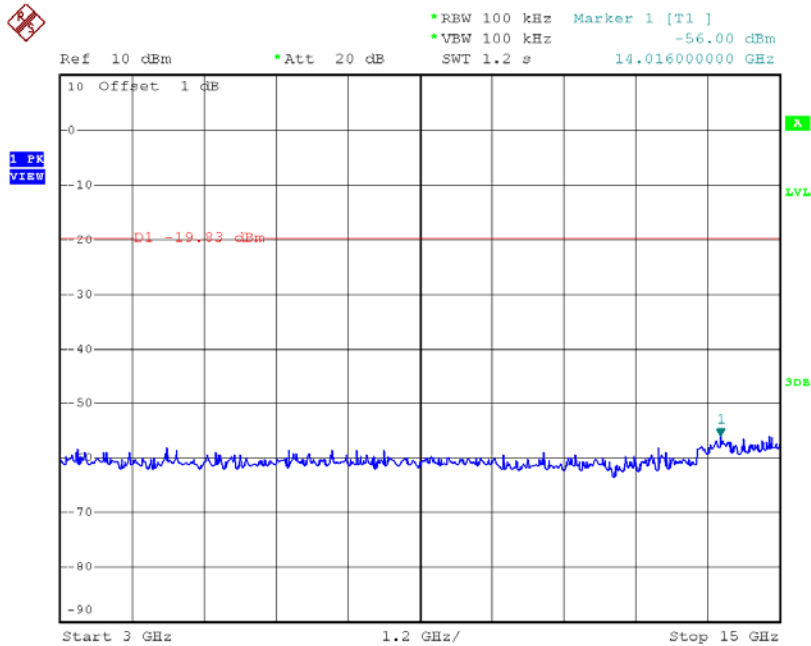


Date: 28.JUN.2016 16:36:48

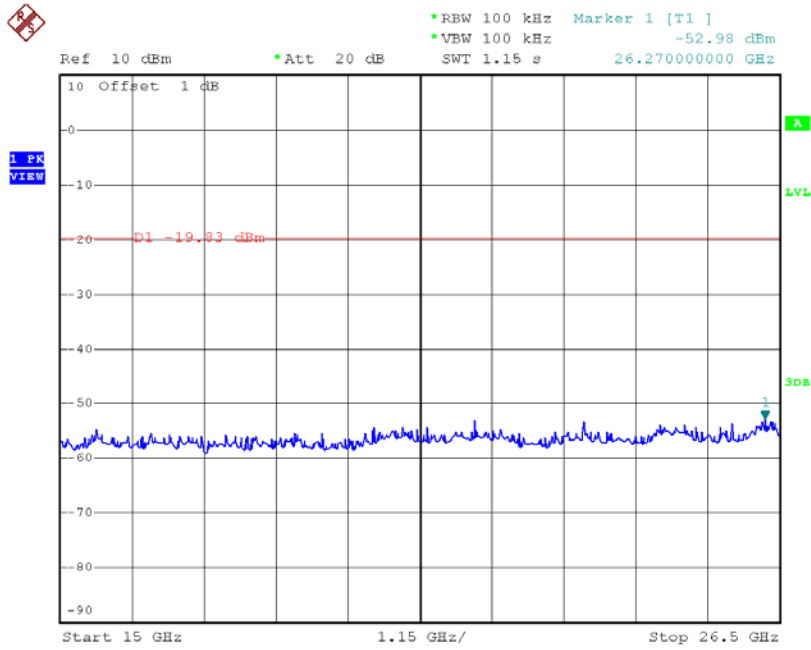
### CH00 (10 Harmonic of the frequency) \_1Mbps



Date: 28.JUN.2016 16:24:43

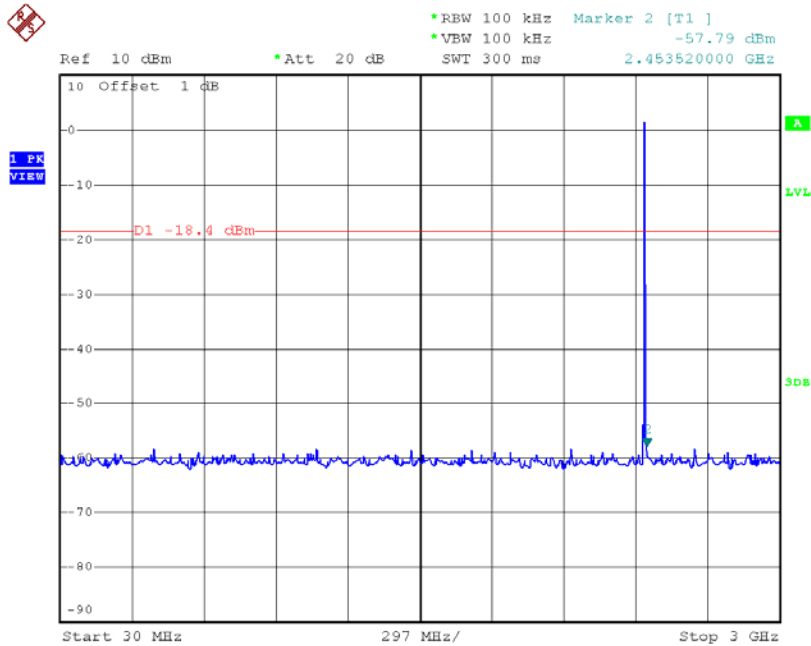


Date: 28.JUN.2016 16:24:52

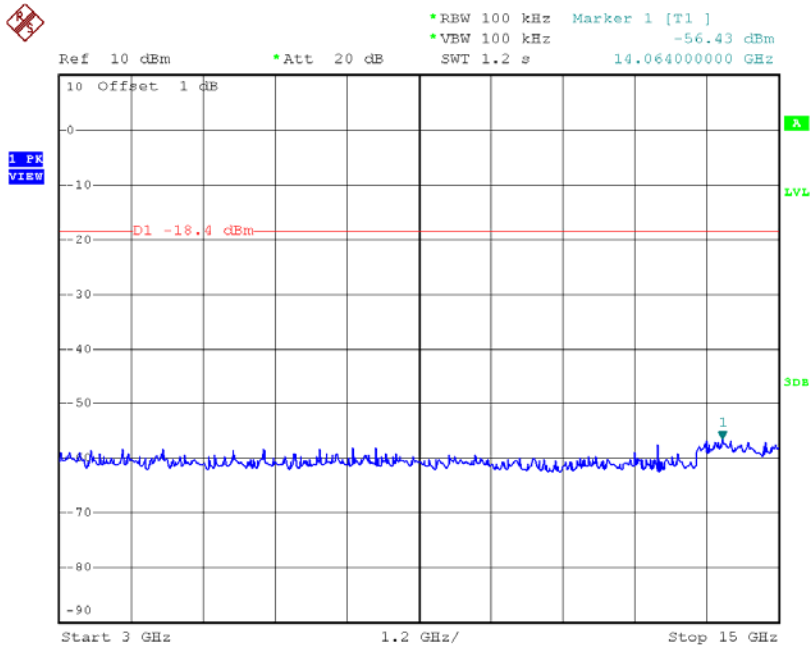


Date: 28.JUN.2016 16:25:00

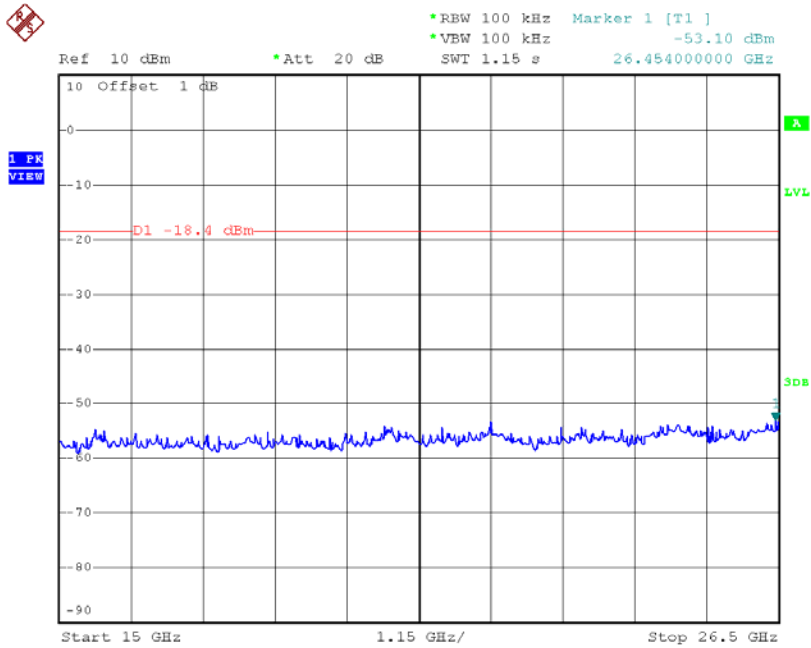
### CH39 (10 Harmonic of the frequency) \_1Mbps



Date: 28.JUN.2016 16:25:57

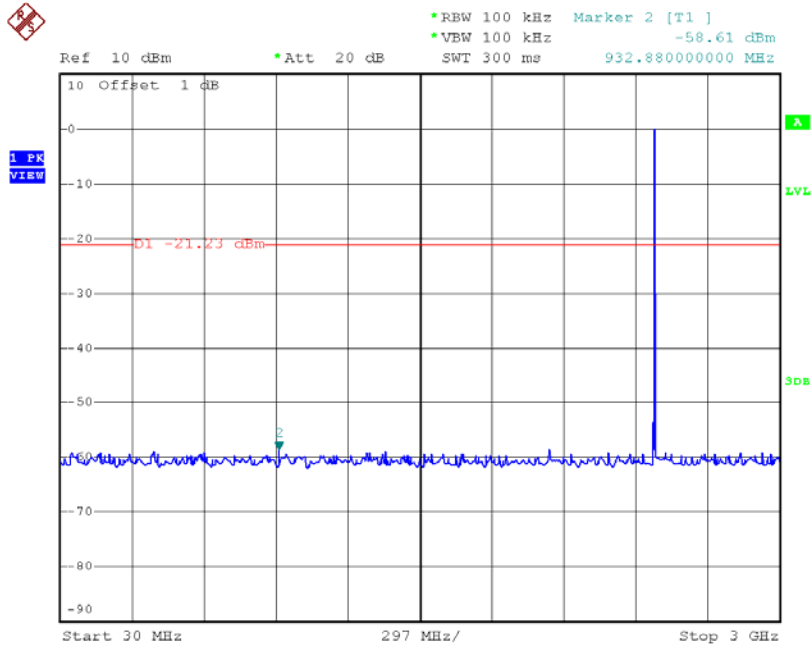


Date: 28.JUN.2016 16:26:06

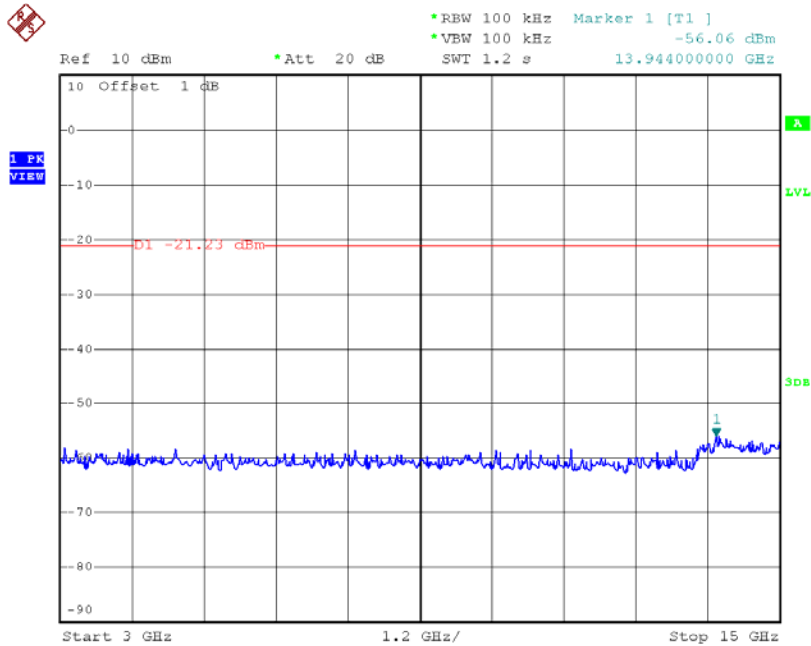


Date: 28.JUN.2016 16:26:15

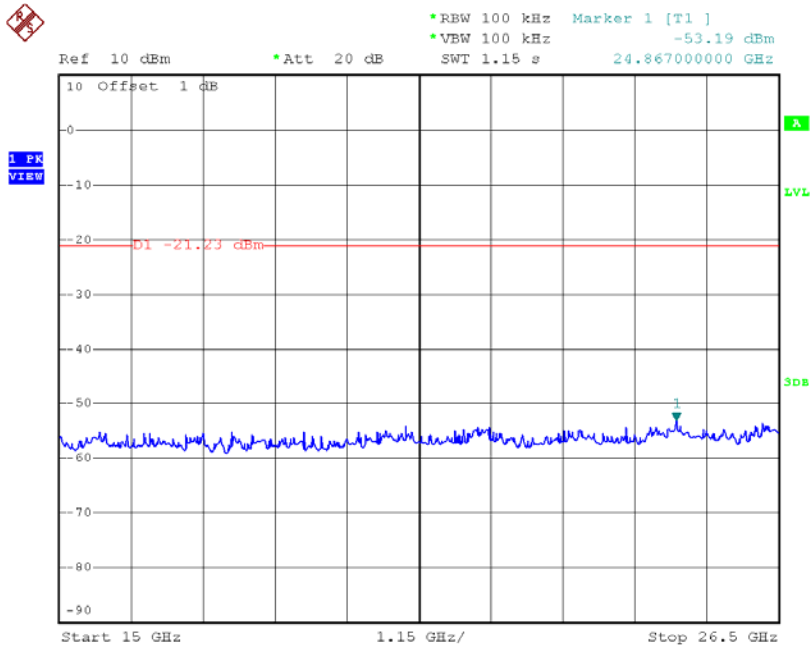
### CH78 (10 Harmonic of the frequency) \_1Mbps



Date: 28.JUN.2016 16:28:07

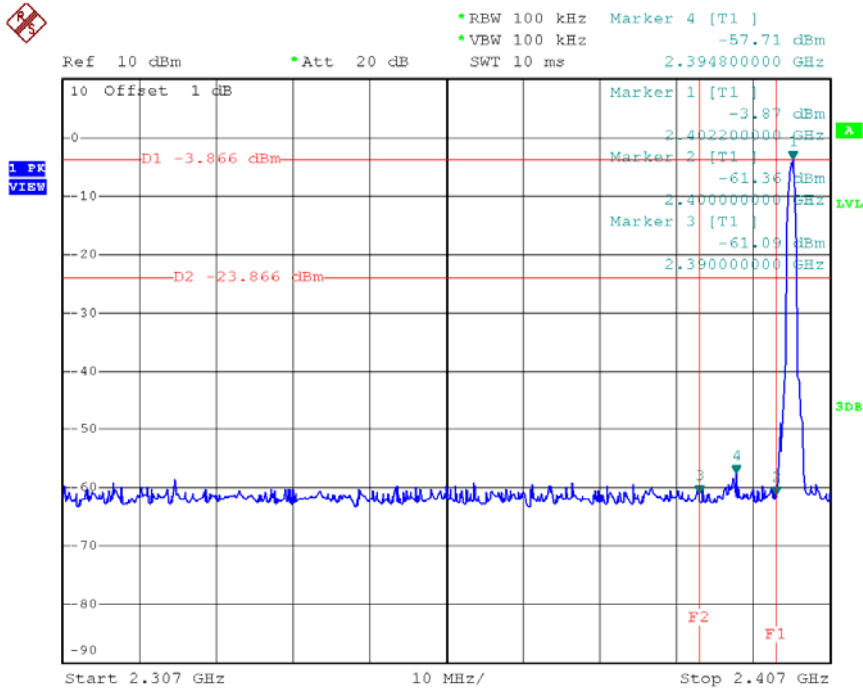


Date: 28.JUN.2016 16:28:16



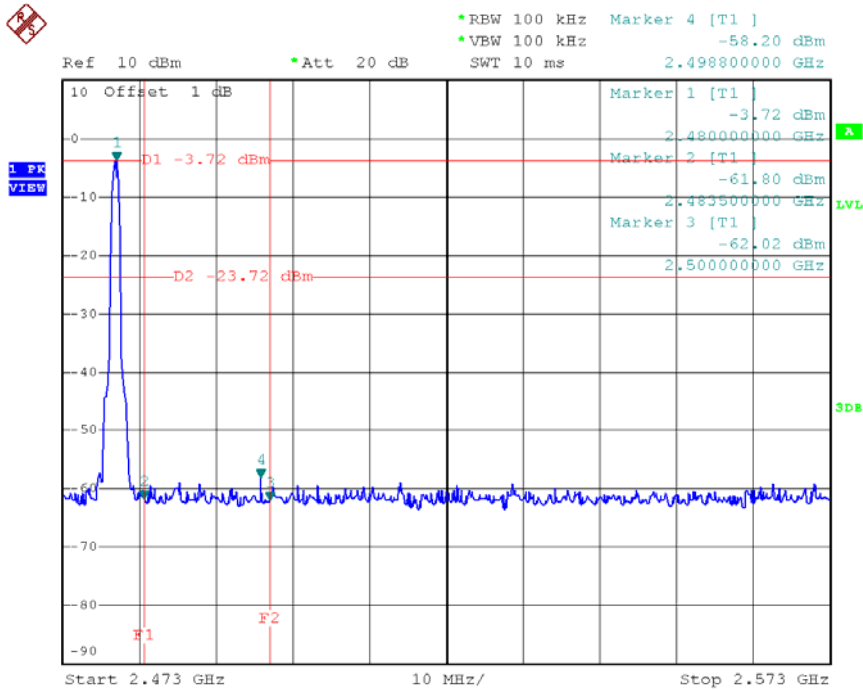
Date: 28.JUN.2016 16:28:25

### CH00 (Lower) \_3Mbps



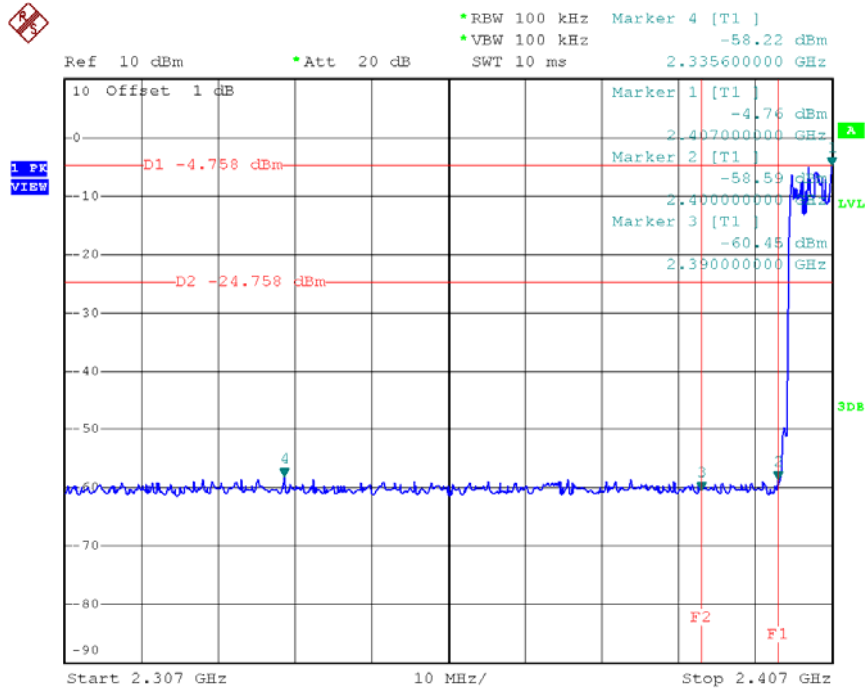
Date: 28.JUN.2016 16:39:57

### CH78 (Upper) \_3Mbps



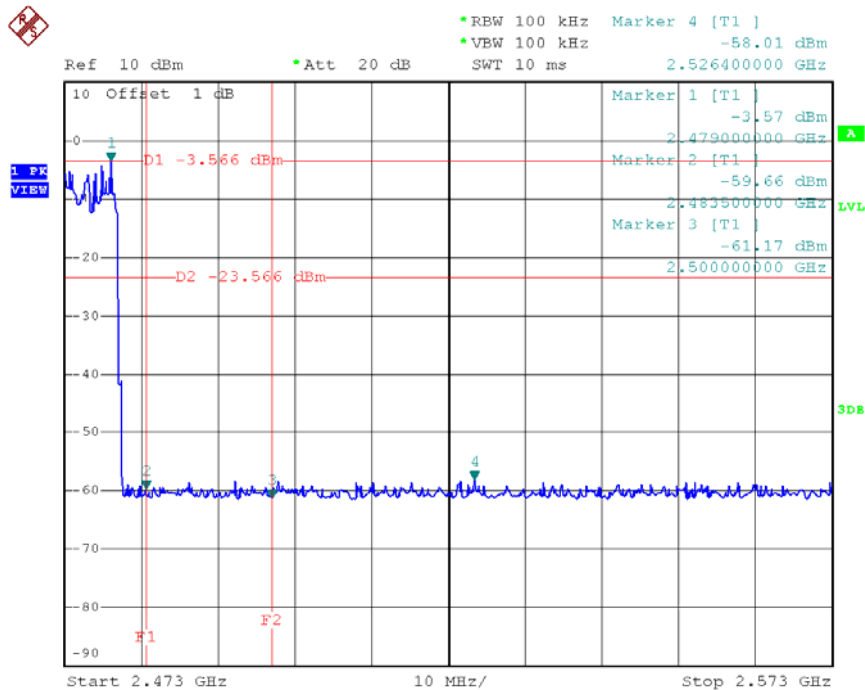
Date: 28.JUN.2016 16:46:13

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



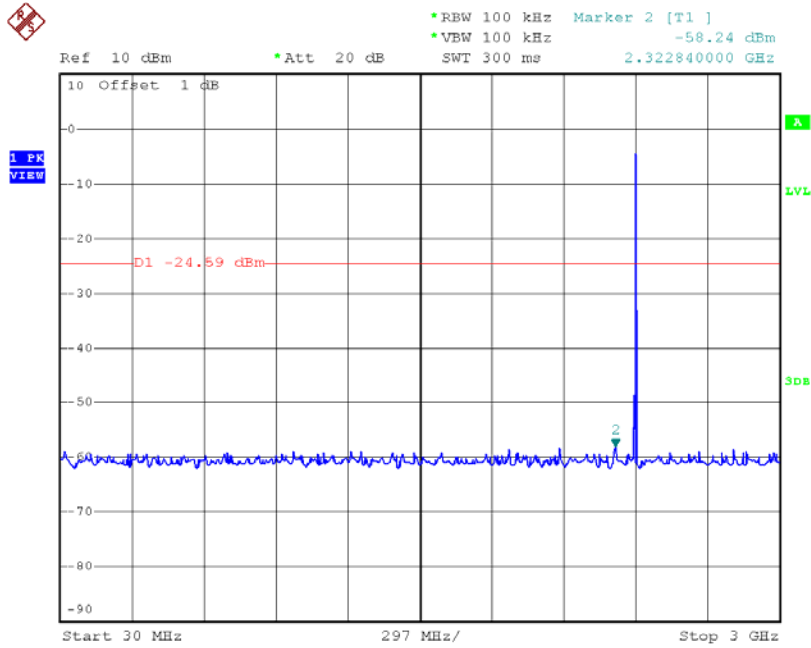
Date: 28.JUN.2016 16:53:45

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

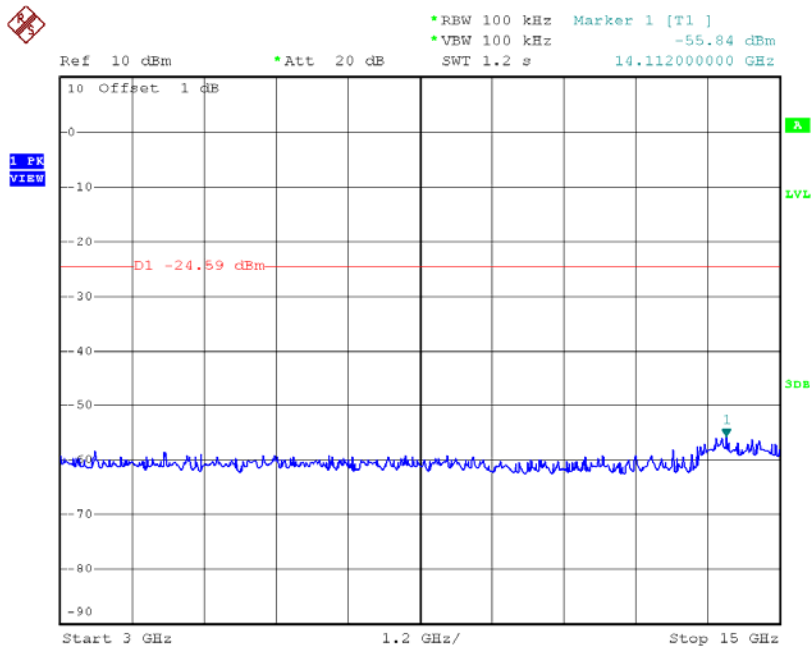


Date: 28.JUN.2016 16:54:20

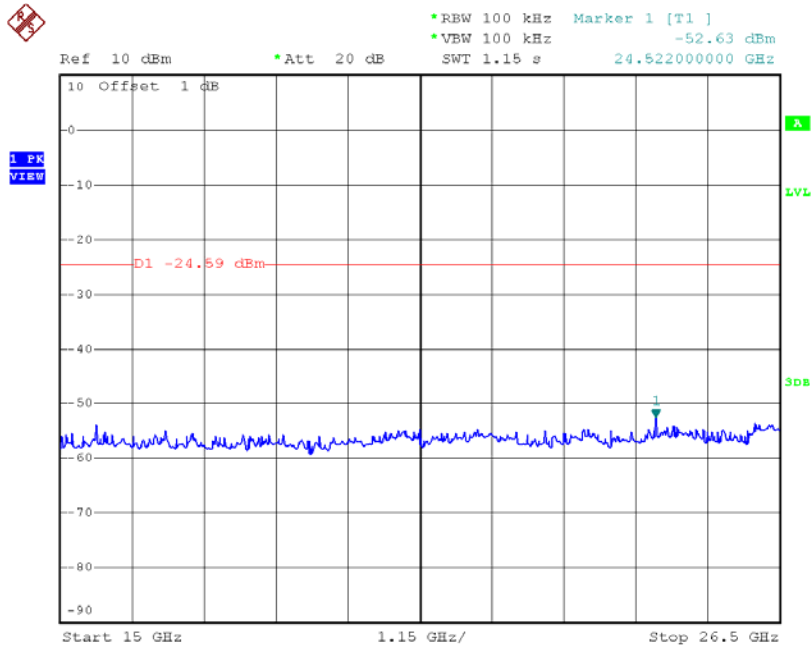
### CH00 (10 Harmonic of the frequency) \_3Mbps



Date: 28.JUN.2016 16:40:32

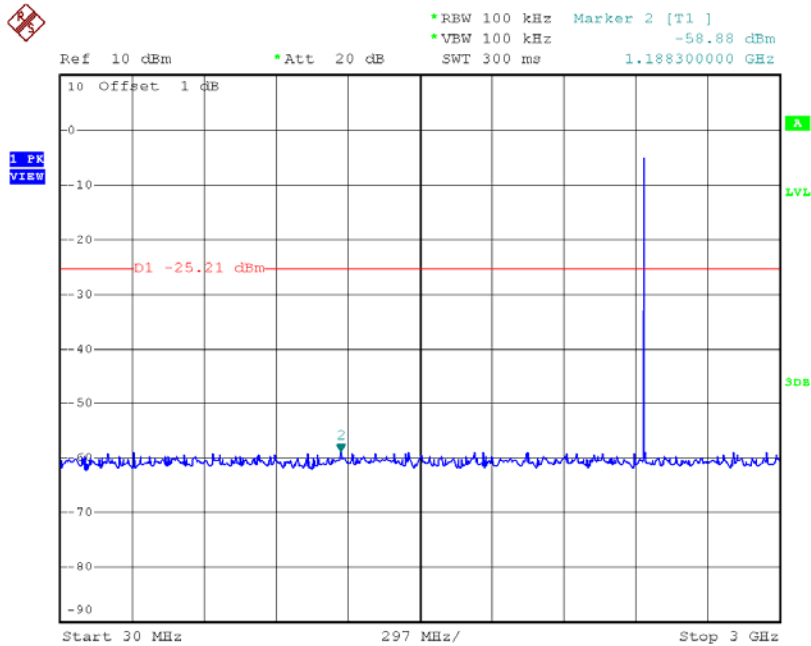


Date: 28.JUN.2016 16:40:40

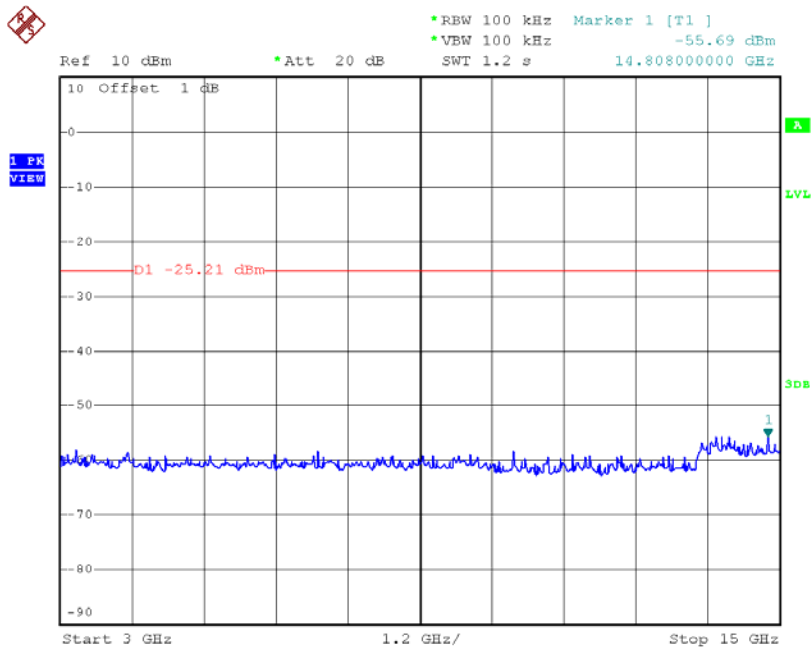


Date: 28.JUN.2016 16:40:48

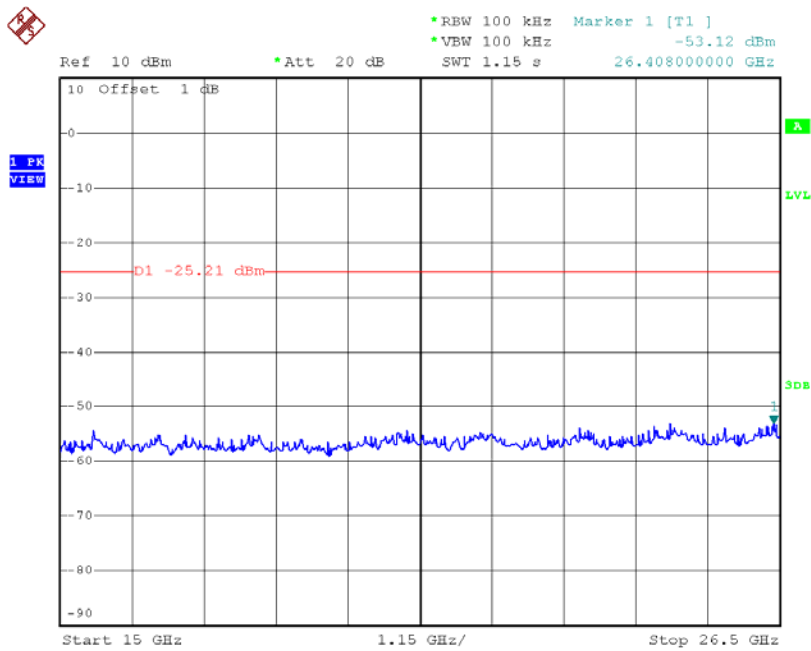
### CH39 (10 Harmonic of the frequency) \_3Mbps



Date: 28.JUN.2016 16:41:31

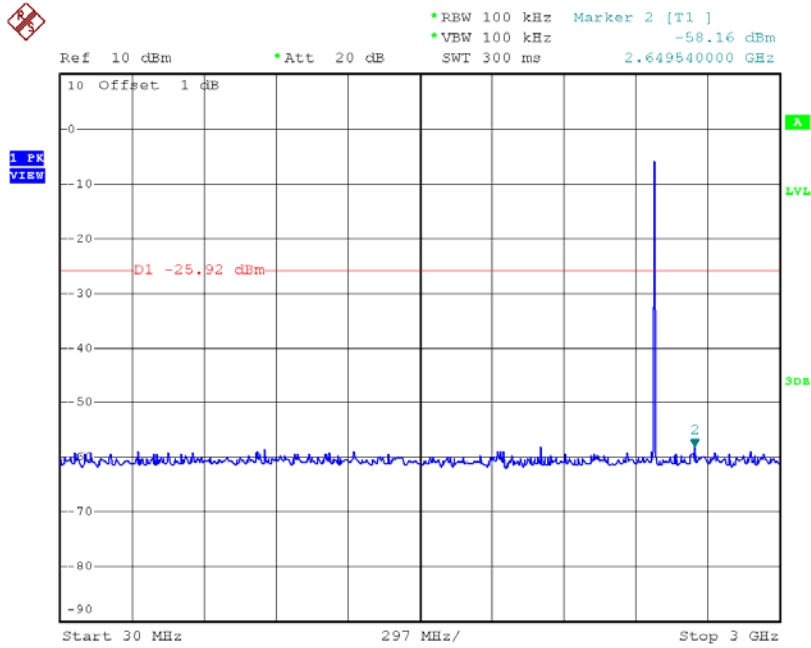


Date: 28.JUN.2016 16:41:39

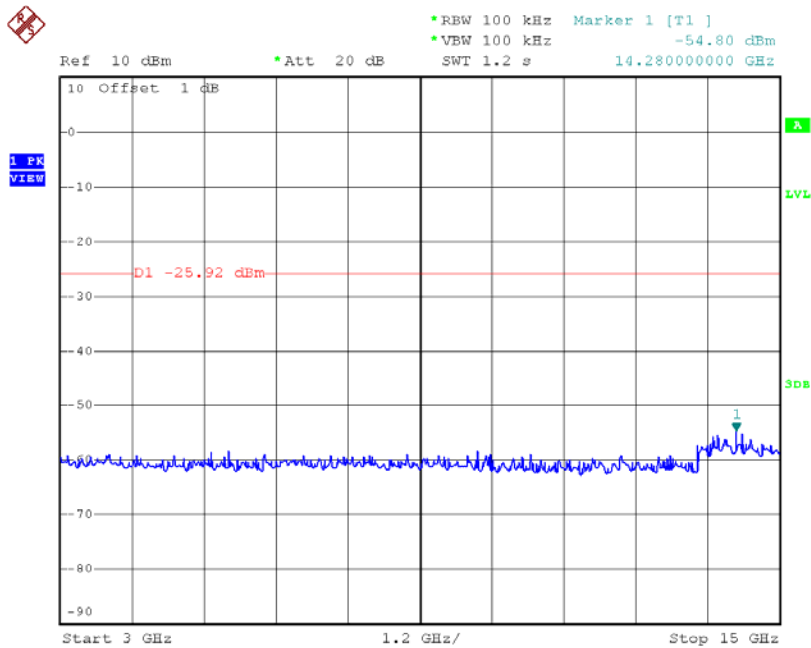


Date: 28.JUN.2016 16:41:47

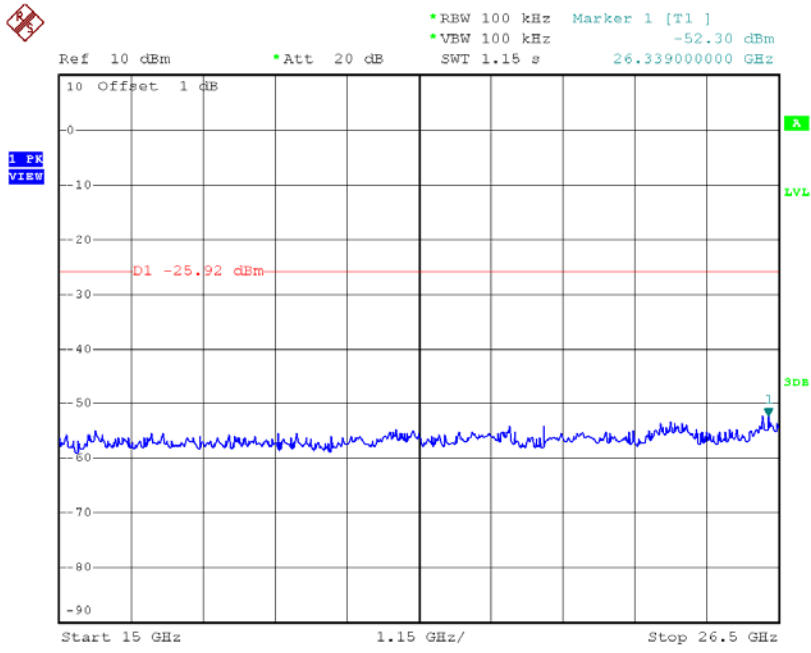
### CH78 (10 Harmonic of the frequency) \_3Mbps



Date: 28.JUN.2016 16:46:47



Date: 28.JUN.2016 16:46:56



Date: 28.JUN.2016 16:47:04