

# FCC&IC Radio Test Report

**FCC ID: Q3N-2564MR**

**IC: 5121A-2564MR**

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

**Project No.** : 1612075  
**Equipment** : BT Scanner  
**Test Model** : 2564MR  
**Series Model** : N/A  
**Applicant** : CIPHERLAB CO., LTD.  
**Address** : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan

**Date of Receipt** : Jan. 13, 2017  
**Date of Test** : Jan. 13, 2017 ~ Feb. 02, 2017  
**Issued Date** : Feb. 07, 2017  
**Tested by** : BTL Inc.

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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-FICP-1-1612075	Original Issue.	Feb. 07, 2017

## 1. CERTIFICATION

Equipment : BT Scanner  
Brand Name : CIPHERLAB  
Test Model : 2564MR  
Series Model : N/A  
Applicant : CIPHERLAB CO., LTD.  
Manufacturer : CIPHERLAB CO., LTD.  
Address : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan  
Factory : CIPHERLAB CO., LTD. 2nd  
Address : 7 F., No. 198 and 7F., No. 196, Sec. 3, Da Tong Rd., Shiji Dist., New Taipei City 221, Taiwan.  
Date of Test : Jan. 13, 2017 ~ Feb. 02, 2017  
Test Sample : Engineering Sample  
Standard(s) : FCC Part15, Subpart C (15.247)/ ANSI C63.10-2013  
RSS-247 Issue 1, May 2015  
RSS-GEN Issue 4, Nov 2014

The above equipment has been tested and found in 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-FICP-1-1612075) 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, Subpart C (15.247) ; RSS-247 Issue 1, May 2015; RSS-GEN Issue 4, Nov				
Standard(s) Section		Test Item	Judgment	Remark
FCC	IC			
15.207	RSS-GEN 8.8	Conducted Emission	PASS	
15.247(d)	RSS-247 5.5	Antenna conducted Spurious Emission	PASS	
15.247 (a)(1)	RSS-247 5.1 (2)	Hopping Channel Separation	PASS	
15.247(a)(1)	RSS-247 5.1 (1)	Bandwidth	PASS	
15.247 (b)(1)	RSS-247 5.4 (2)	Peak Output Power	PASS	
15.247(d) 15.209	RSS-247 5.5	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	RSS-247 5.1 (4)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	RSS-247 5.1 (4)	Dwell Time	PASS	
15.205	RSS-GEN 8.10	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:

### Conducted emission Test:

**C05:** (VCCI RN: C-4742; FCC RN:965108; FCC DN:TW1082)

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

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

**CB15:** (FCC RN:674415; FCC DN:TW0659)

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

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

**CB15:** (FCC RN:674415; FCC DN:TW0659)

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

## 2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{CISPR}$  requirement.

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

### A. Conducted emission test:

Test Site	Method	Measurement Frequency Range	$U$ ,(dB)
C05	CISPR	150 kHz ~ 30MHz	3.06

### B. Radiated emission test:

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

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

Test Site	Method	Measurement Frequency Range	Ant.	$U$ ,(dB)
CB15 (3m)	CISPR	1GHz ~ 6GHz	V	4.48
		1GHz ~ 6GHz	H	4.50
		6GHz ~ 18GHz	V	4.30
		6GHz ~ 18GHz	H	4.14

Test Site	Method	Measurement Frequency Range	$U$ ,(dB)
CB15 (1m)	CISPR	18 ~ 26.5 GHz	4.72
		26.5 ~ 40 GHz	5.20

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

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

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

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

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

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	BT Scanner	
Brand Name	CIPHERLAB	
Test Model	2564MR	
Series Model	N/A	
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.	1.61 dBm(1Mbps) 2.08 dBm(3Mbps)
Power Source	Battery supplied.(Li-ion Battery Pack: BA-010800)	
Power Rating	3.7V --- 800 mAh 2.96Wh	

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	<b>Quietek</b>	2560MB_20150 830A	Printed	N/A	3.54



### 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:**

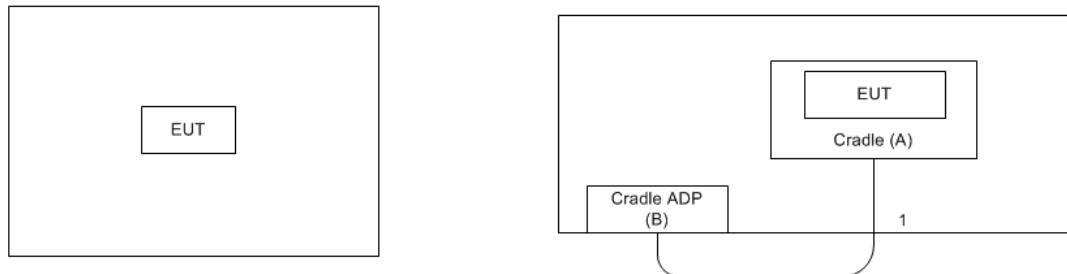
- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

### 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	CSR		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	DEF	DEF	DEF
Parameters(3Mbps)	DEF	DEF	DEF

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



### 3.5 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
A	Bluetooth Scanner Cradle	CIPHER LAB	2560 BT BASE	N/A	BSFDV00001054	
B	Cradle Adapter	I.T.E	A106-1050101E	DOC	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
1	Yes	No	1m	Power 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 (dBμV)	
	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

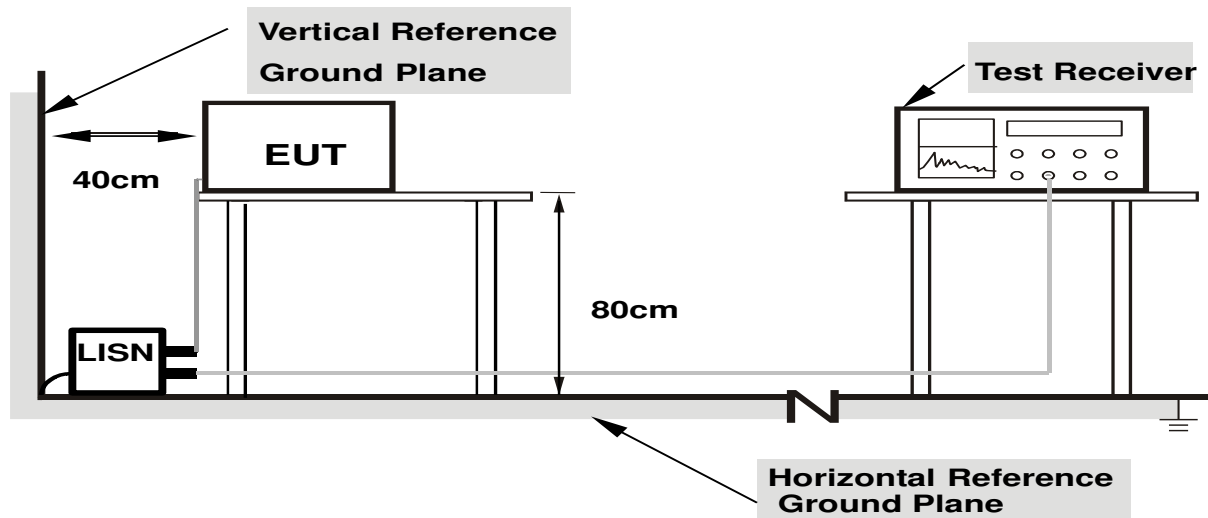
#### 4.1.2 TEST PROCEDURE

- 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) & RSS-247 5.5, then the 15.209(a) & RSS-Gen 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)	(dBuV/m) (at 3 meters)	
	PEAK	AVERAGE
Above 1000	74	54

#### Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C/RSS-247.
- (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

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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

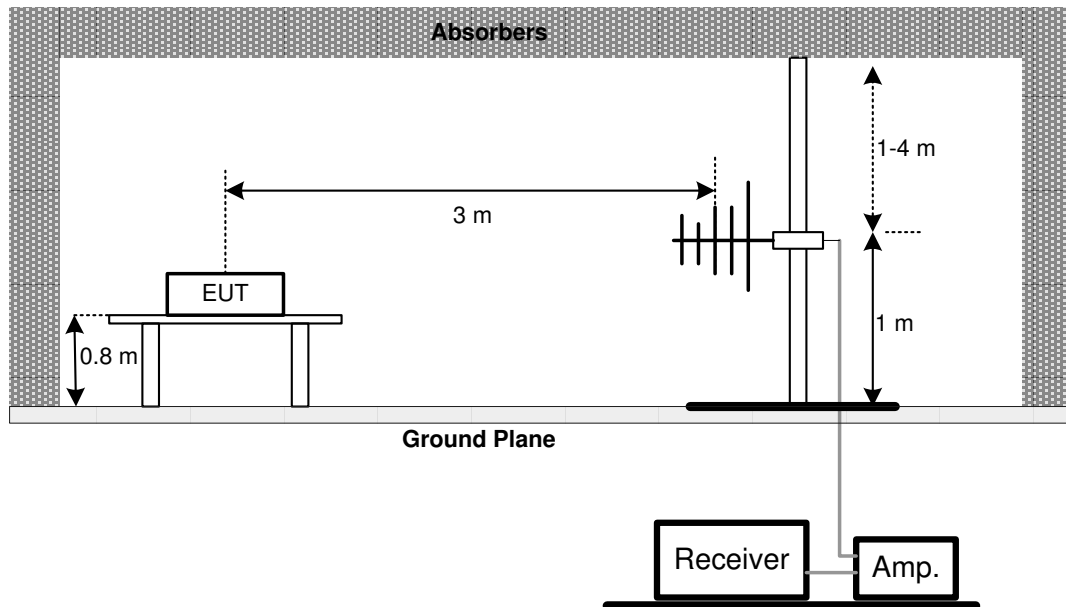
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of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

#### 4.2.3 DEVIATION FROM TEST STANDARD

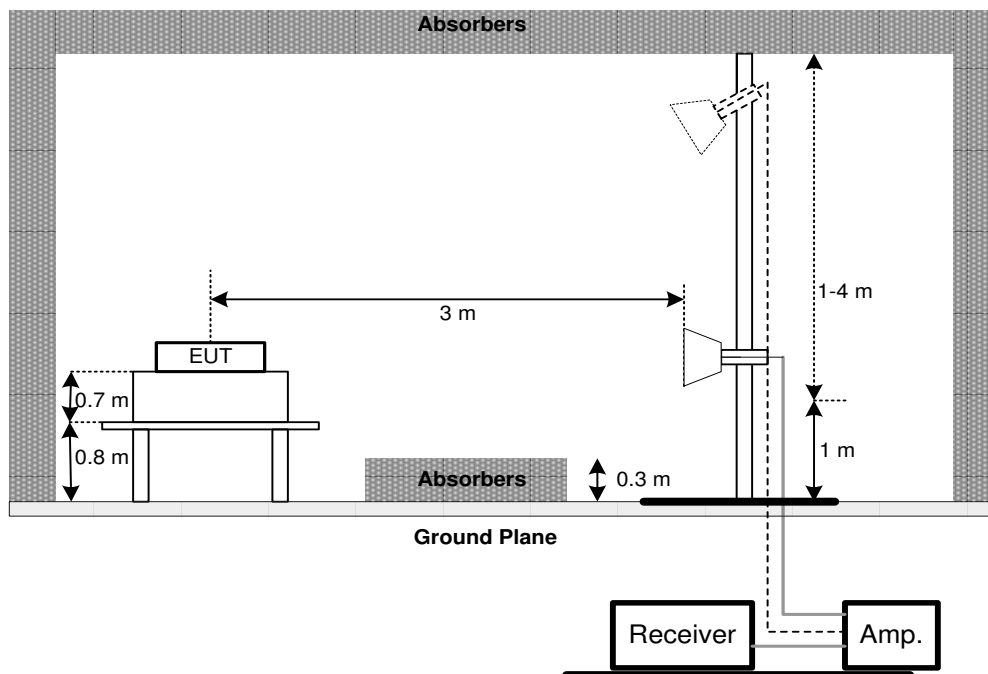
No deviation

#### 4.2.4 TEST SETUP

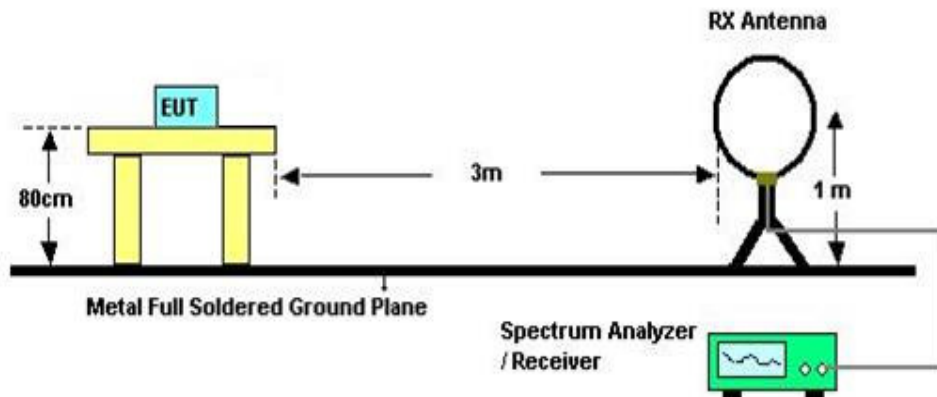
##### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For Radiated Emissions Below 30MHz



#### 4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.2.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: DC 3.7V

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

Please refer to the Attachment B

Remark:

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

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

Please refer to the Attachment C.

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

Please refer to the Attachment D.

Remark:

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



## 5. NUMBER OF HOPPING CHANNEL

### 5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(1)(iii) RSS-247 5.1 (4)	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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW=100KHz, VBW=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: DC 3.7V

#### 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/ RSS-GEN and RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)(iii) RSS-247 5.1 (4)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

#### 6.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Set the EUT for DH5, DH3 and DH1 packet transmitting.
- Measure the maximum time duration of one single pulse.
- 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.
- 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.
- 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: DC 3.7V

#### **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

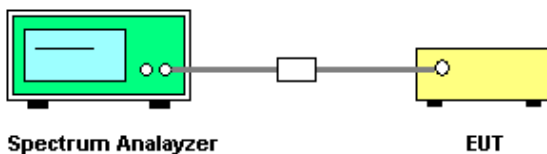
#### 7.1.1 TEST PROCEDURE

- The EUT must have its hopping function enabled
- 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: DC 3.7V

#### 7.1.5 TEST RESULTS

Please refer to the Attachment G

## 8. BANDWIDTH TEST

### 8.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247		
Section	Test Item	Frequency Range (MHz)
15.247(a)(2) RSS-GEN 6.6 RSS-247 5.1 (1)	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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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: DC 3.7V

#### 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/ RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(1) RSS-247 5.4 (2)	Peak Output Power	1 Watt or 30dBm ( hopping channel >75) 0.125Watt or 21dBm (hopping channel <75)	2400-2483.5	PASS

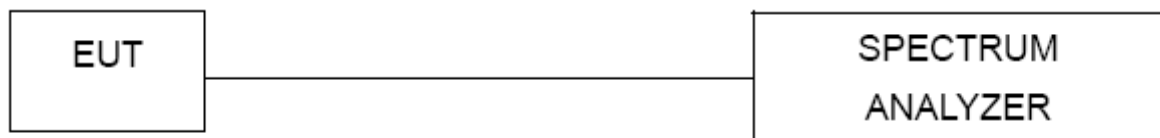
#### 9.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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: DC 3.7V

#### 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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW= 100KHz, VBW=100KHz, Sweep time = Auto.
- 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: DC 3.7V

#### 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-30 MHz)	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	Preamplifier	EMCI	012645B	980267	Mar. 01, 2017
2	Preamplifier	EMCI	EMC02325	980217	Dec. 29, 2017
3	Test Cable	EMCI	EMC104-SM-S M-8000	8m	Jan. 04, 2018
4	Test Cable	EMCI	EMC104-SM-S M-800	150207	Jan. 04, 2018
5	Test Cable	EMCI	EEMC104-SM-S M-3000	151205	Jan. 04, 2018
6	MXE EMI Receiver	Agilent	N9038A	MY55420127	Jan. 09, 2018
7	Signal Analyzer	Agilent	N9010A	MY52220990	Feb. 23, 2017
8	Loop Ant	EMCO	6502	42960	Nov. 24, 2017
9	Horn Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	Mar. 01, 2017
10	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-548	Jan. 16, 2018
11	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0623	Jan. 16, 2018
12	Horn Ant	SCHWARZBECK	BBHA 9170	187	May. 12, 2017



Number of Hopping Channel					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 26, 2017

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 26, 2017

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 26, 2017

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 26, 2017

Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 26, 2017

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 26, 2017

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

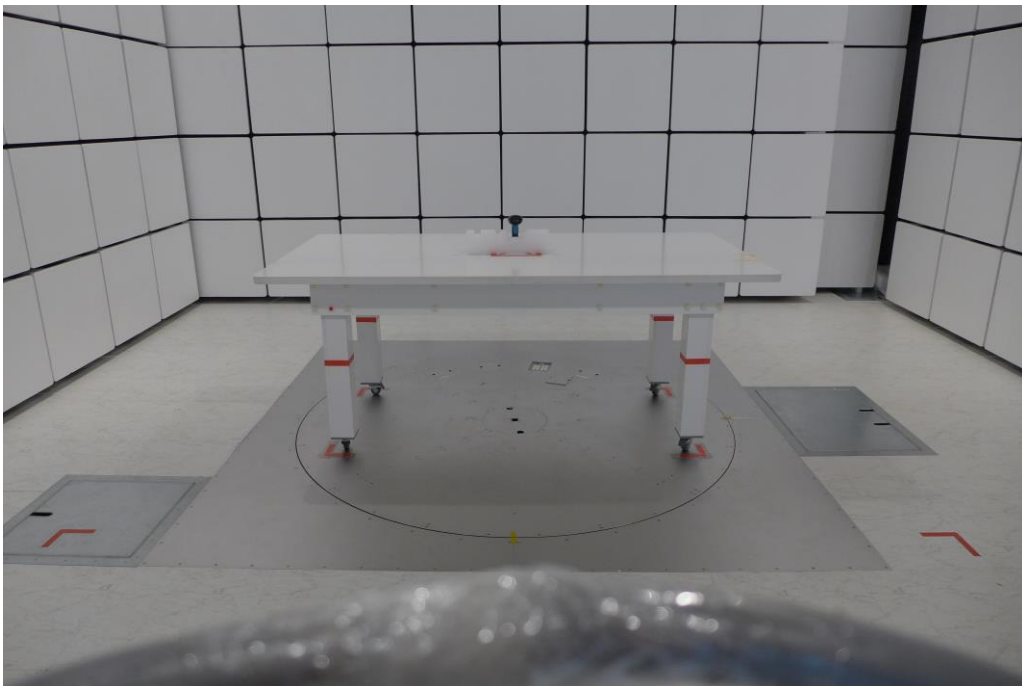
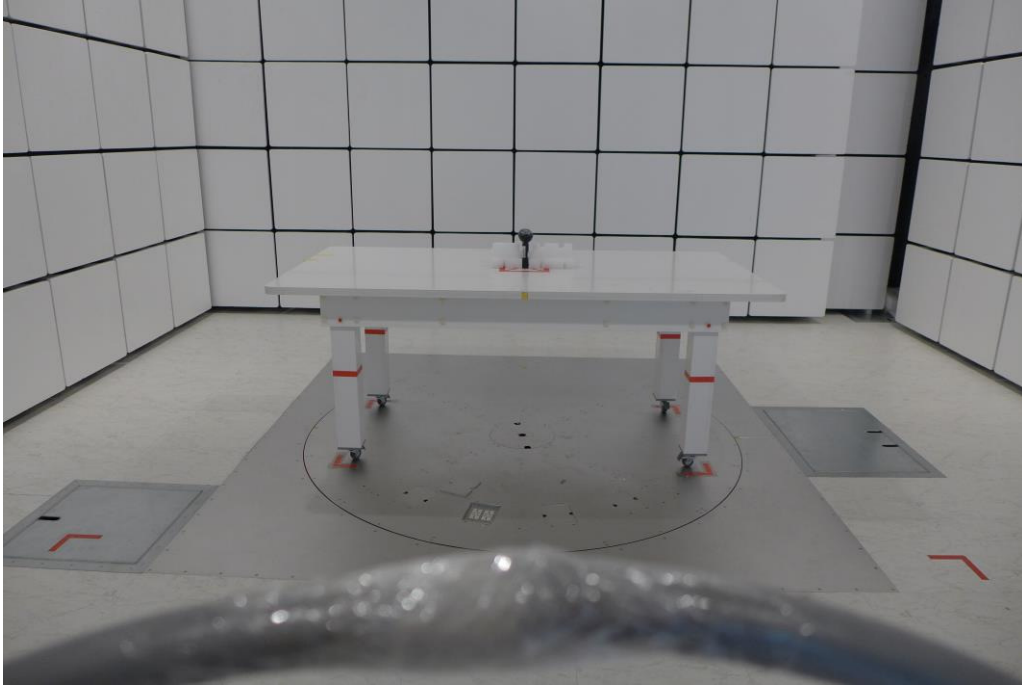
## 12. EUT TEST PHOTO

### Conducted Measurement Photos



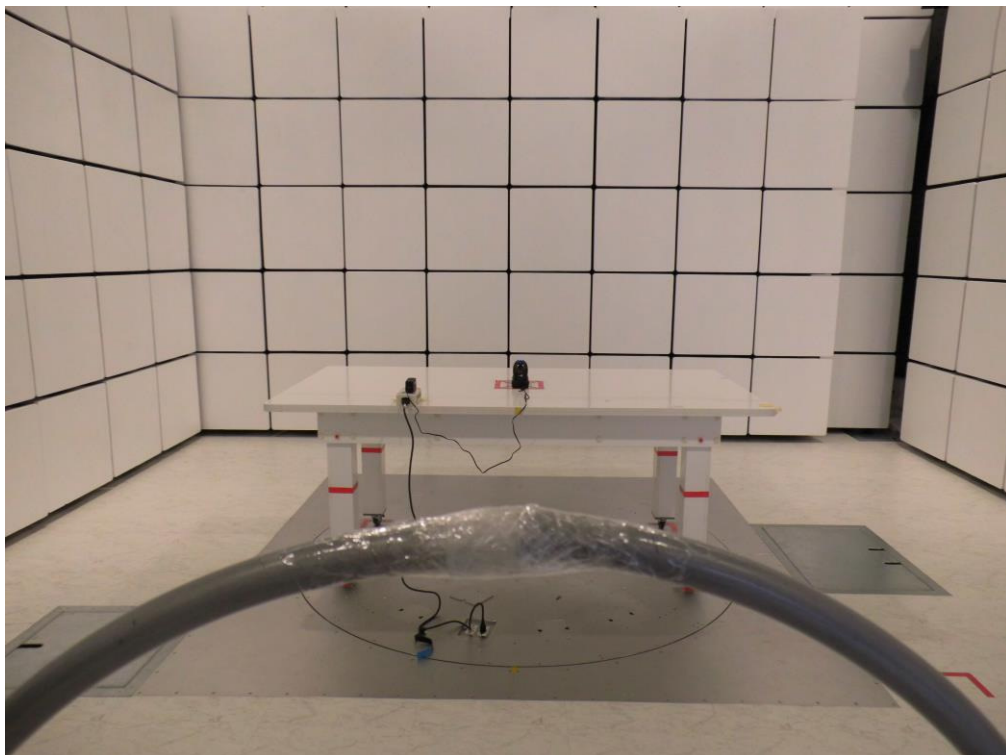
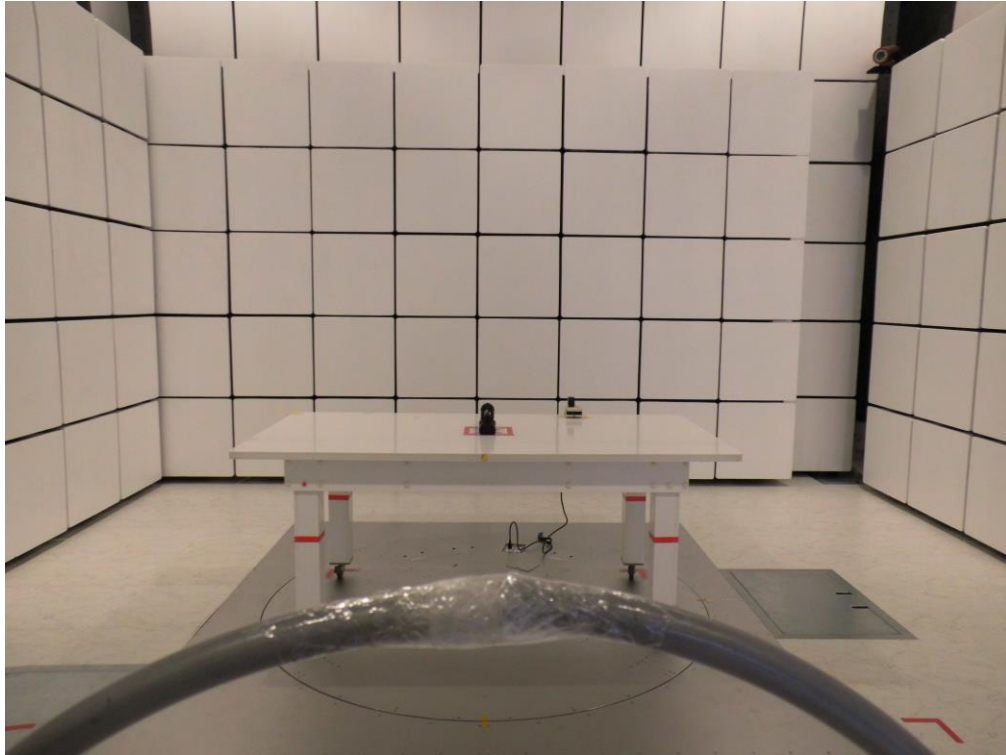
## Radiated Measurement Photos

**9KHz to 30MHz  
NORMAL OPERATION**



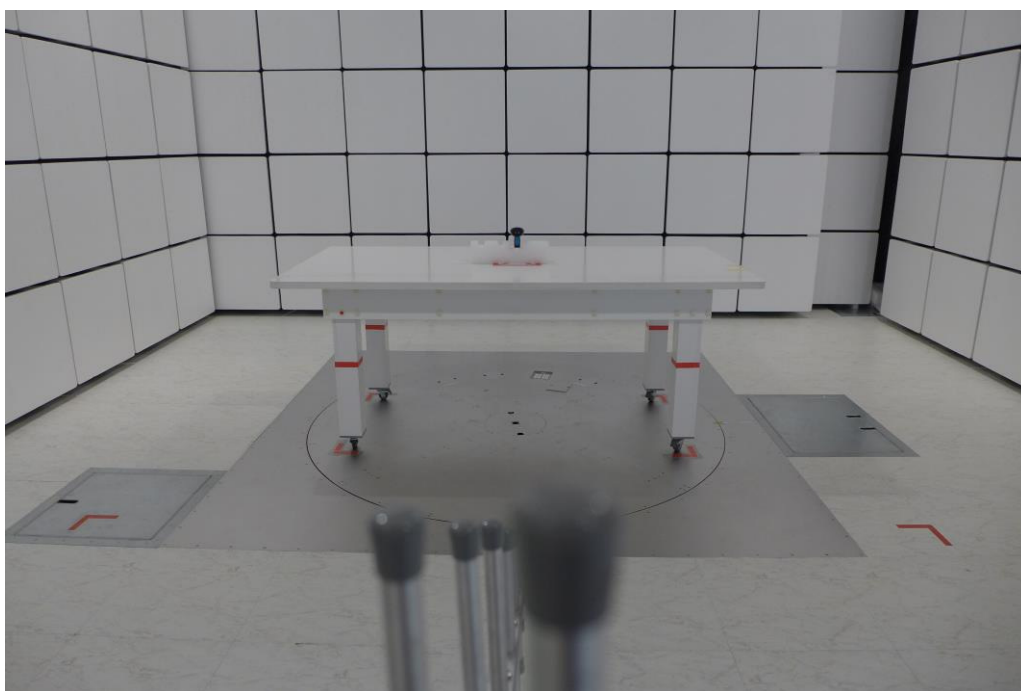
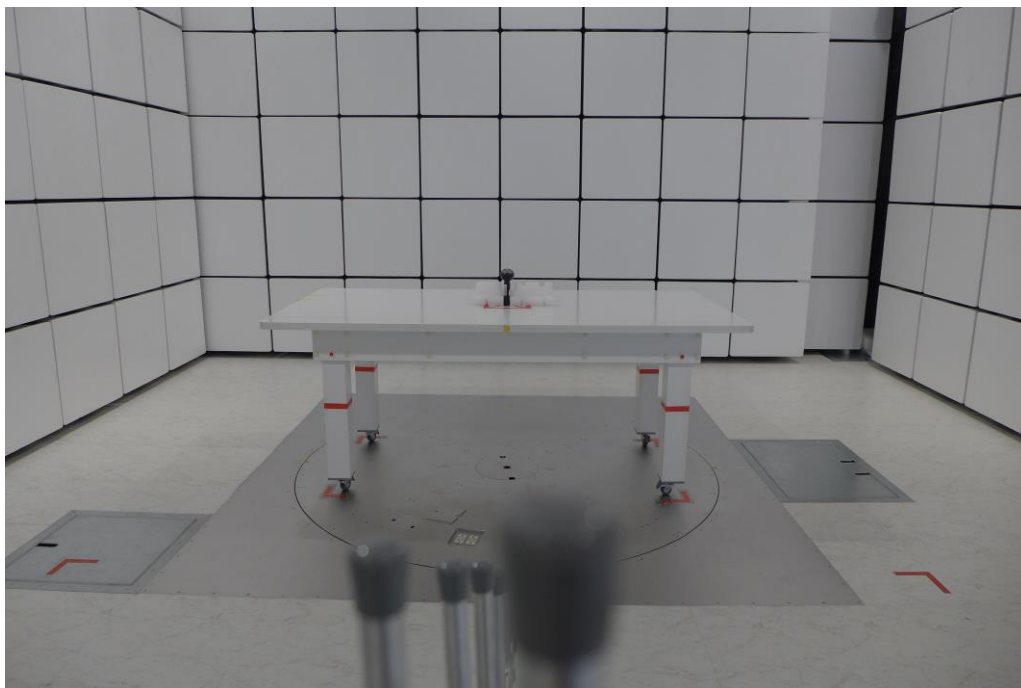
## Radiated Measurement Photos

9KHz to 30MHz  
CHARGE



## Radiated Measurement Photos

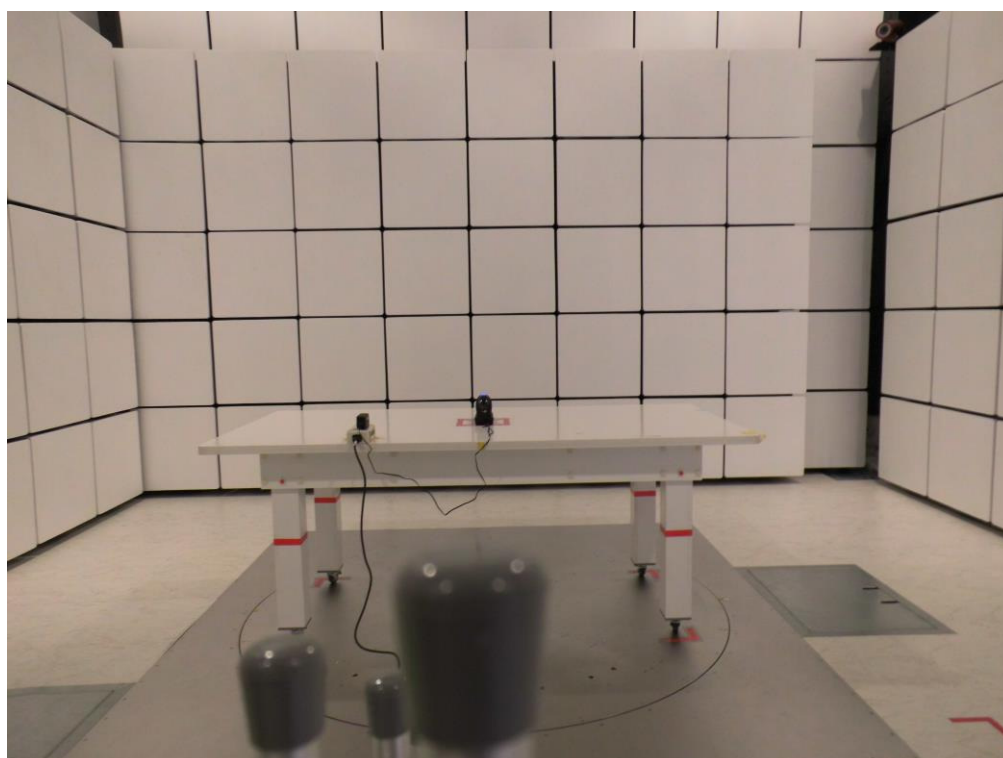
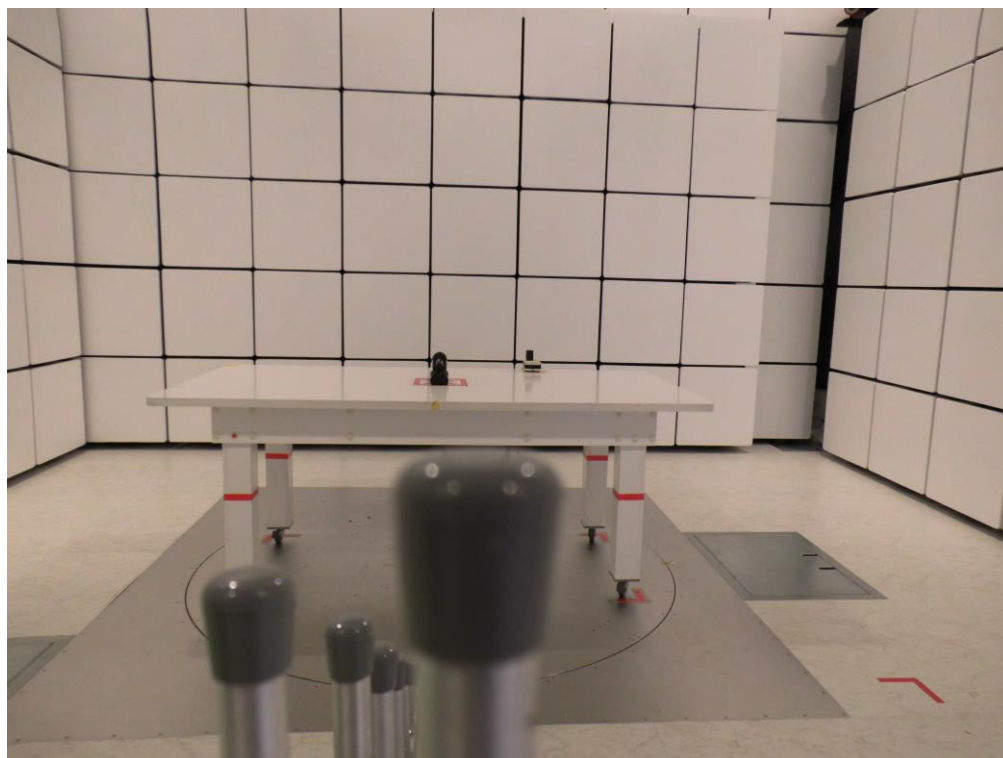
**30MHz to 1000MHz  
NORMAL OPERATION**





## Radiated Measurement Photos

30MHz to 1000MHz  
CHARGE



## Radiated Measurement Photos

### Above 1000MHz

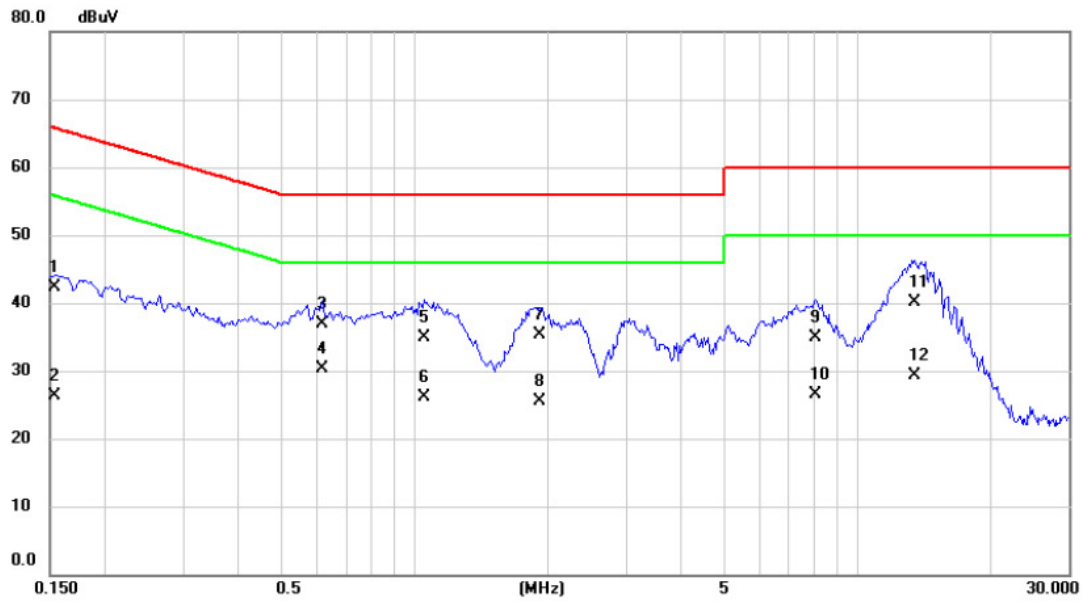


## ATTACHMENT A - CONDUCTED EMISSION



Test Mode: TX Mode

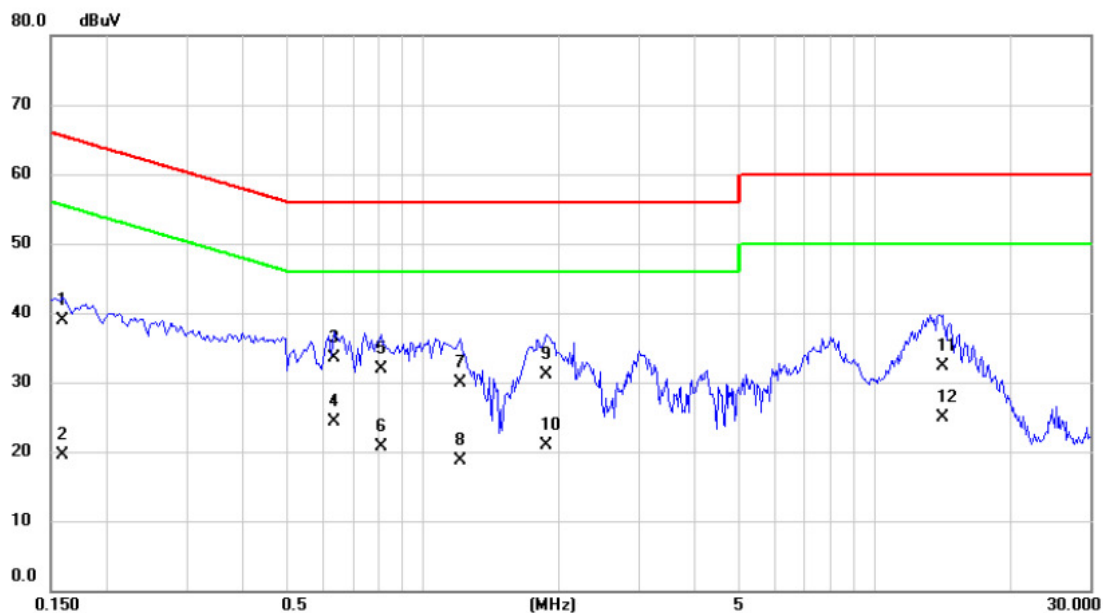
# Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1535	32.70	9.66	42.36	65.81	-23.45	QP	
2		0.1535	16.60	9.66	26.26	55.81	-29.55	AVG	
3		0.6170	27.20	9.67	36.87	56.00	-19.13	QP	
4	*	0.6170	20.70	9.67	30.37	46.00	-15.63	AVG	
5		1.0490	25.20	9.67	34.87	56.00	-21.13	QP	
6		1.0490	16.50	9.67	26.17	46.00	-19.83	AVG	
7		1.9130	25.60	9.73	35.33	56.00	-20.67	QP	
8		1.9130	15.80	9.73	25.53	46.00	-20.47	AVG	
9		8.0500	25.10	9.82	34.92	60.00	-25.08	QP	
10		8.0500	16.60	9.82	26.42	50.00	-23.58	AVG	
11		13.5000	30.20	9.90	40.10	60.00	-19.90	QP	
12		13.5000	19.40	9.90	29.30	50.00	-20.70	AVG	

Test Mode: TX Mode

### Neutral

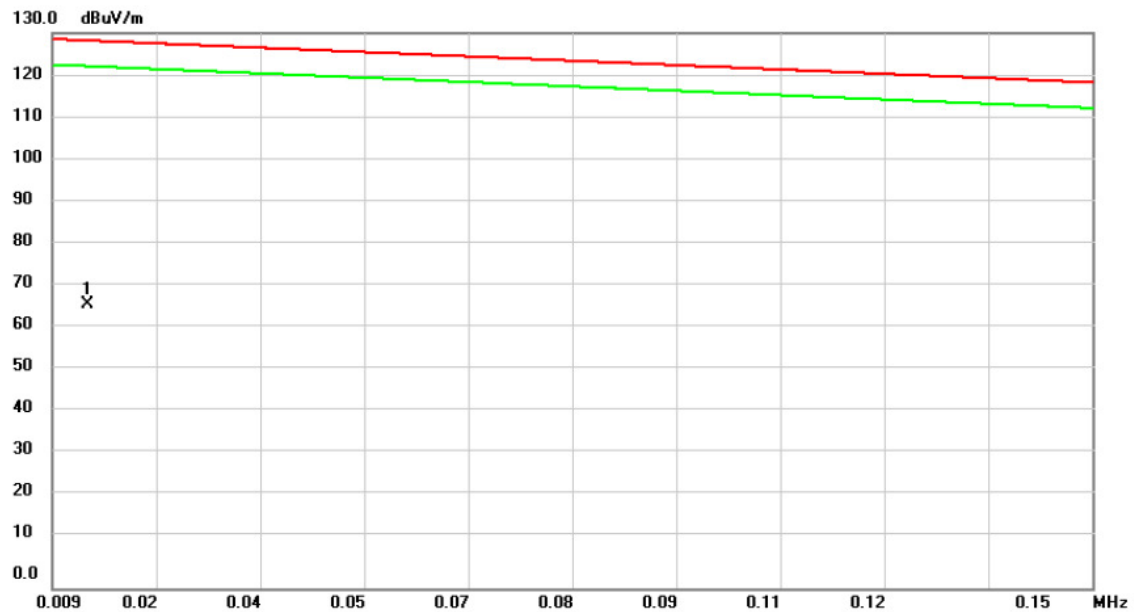


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1590	29.30	9.67	38.97	65.52	-26.55	QP	
2		0.1590	9.90	9.67	19.57	55.52	-35.95	AVG	
3		0.6350	23.90	9.67	33.57	56.00	-22.43	QP	
4	*	0.6350	14.60	9.67	24.27	46.00	-21.73	AVG	
5		0.8060	22.30	9.68	31.98	56.00	-24.02	QP	
6		0.8060	11.10	9.68	20.78	46.00	-25.22	AVG	
7		1.2110	20.20	9.69	29.89	56.00	-26.11	QP	
8		1.2110	9.10	9.69	18.79	46.00	-27.21	AVG	
9		1.8770	21.40	9.73	31.13	56.00	-24.87	QP	
10		1.8770	11.10	9.73	20.83	46.00	-25.17	AVG	
11		14.1000	22.40	9.92	32.32	60.00	-27.68	QP	
12		14.1000	14.90	9.92	24.82	50.00	-25.18	AVG	

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

Test Mode: TX Mode\_ NORMAL OPERATION

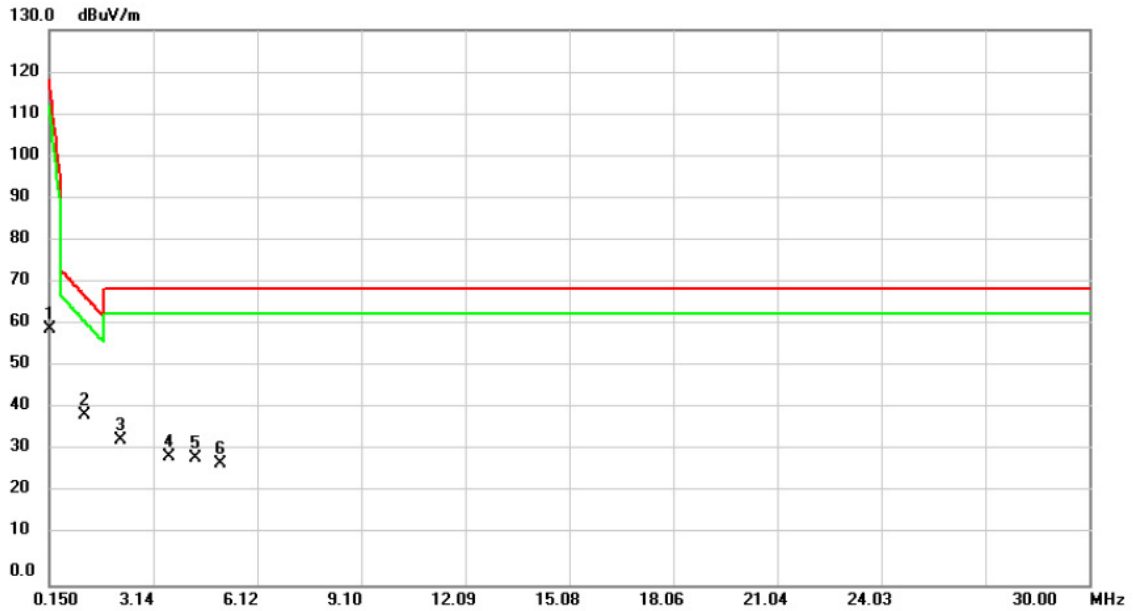
Ant 0°



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

Test Mode: TX Mode\_ NORMAL OPERATION

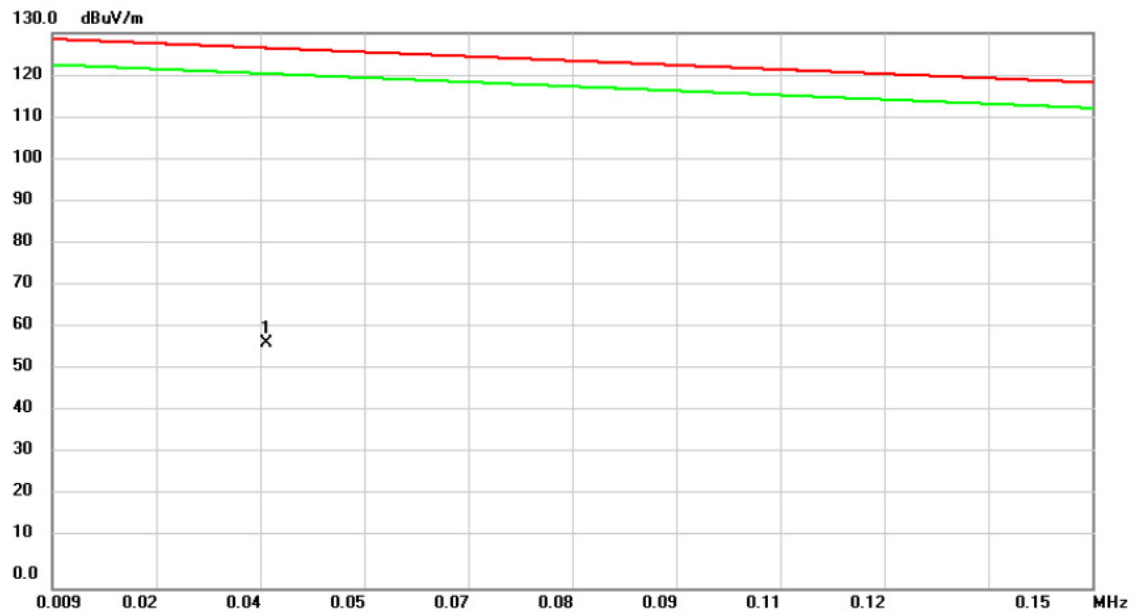
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.1500	47.93	12.03	59.96	118.34	-58.38	peak	
2	*	1.1650	28.03	11.93	39.96	67.78	-27.82	peak	
3		2.2096	22.66	11.46	34.12	69.54	-35.42	peak	
4		3.5825	18.91	11.19	30.10	69.54	-39.44	peak	
5		4.3290	18.38	11.30	29.68	69.54	-39.86	peak	
6		5.0750	16.98	11.40	28.38	69.54	-41.16	peak	

Test Mode: TX Mode\_ NORMAL OPERATION

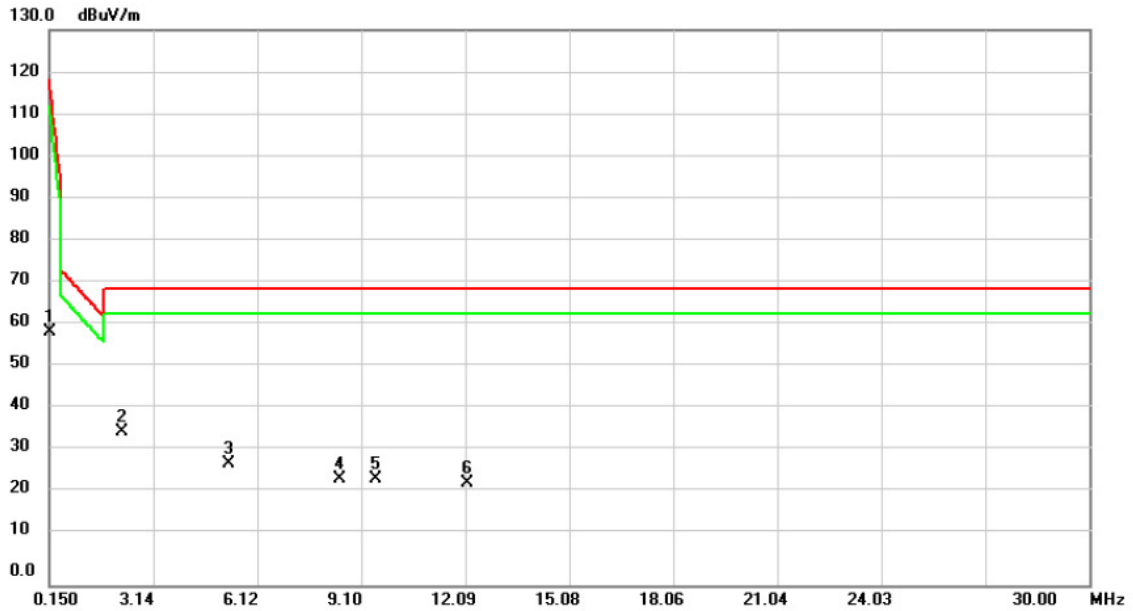
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0380	43.20	14.20	57.40	126.43	-69.03	peak	

Test Mode: TX Mode\_ NORMAL OPERATION

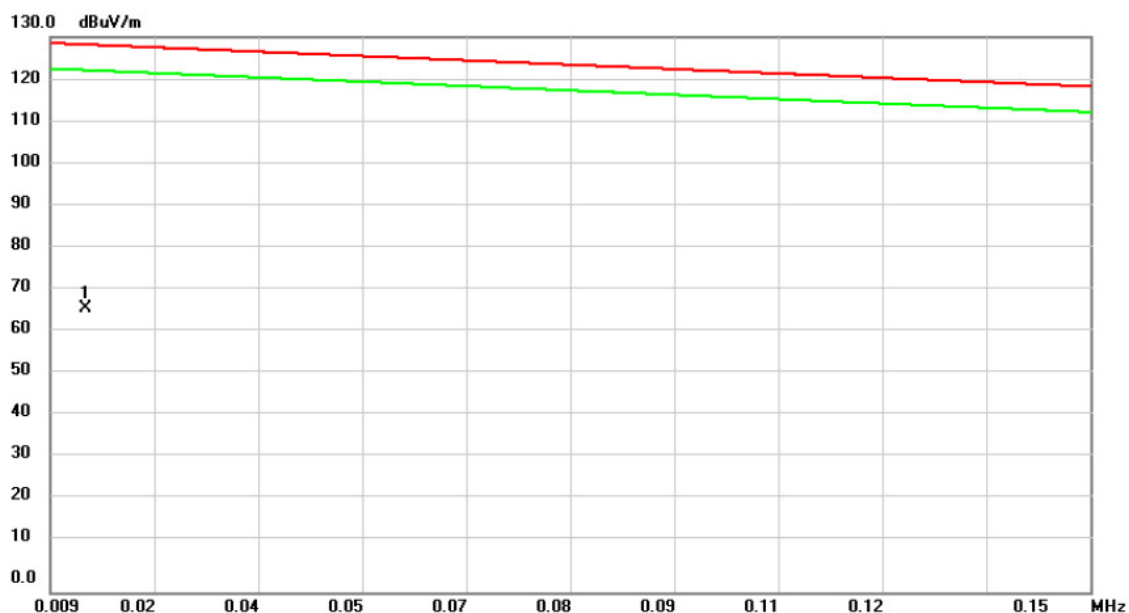
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.1500	47.16	12.03	59.19	118.34	-59.15	peak	
2	*	2.2395	24.62	11.44	36.06	69.54	-33.48	peak	
3		5.2842	16.97	11.39	28.36	69.54	-41.18	peak	
4		8.4780	13.54	11.33	24.87	69.54	-44.67	peak	
5		9.5228	13.44	11.31	24.75	69.54	-44.79	peak	
6		12.1493	12.61	11.24	23.85	69.54	-45.69	peak	

Test Mode: TX Mode\_ CHARGE

Ant 0°

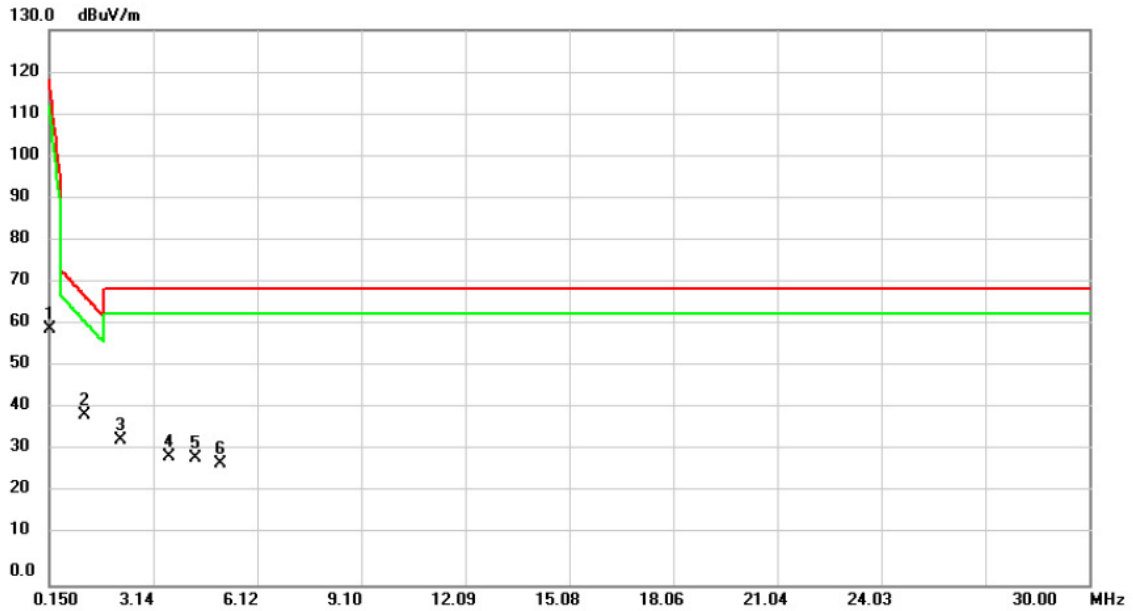


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0137	47.07	19.48	66.55	128.18	-61.63	peak	



Test Mode: TX Mode\_ CHARGE

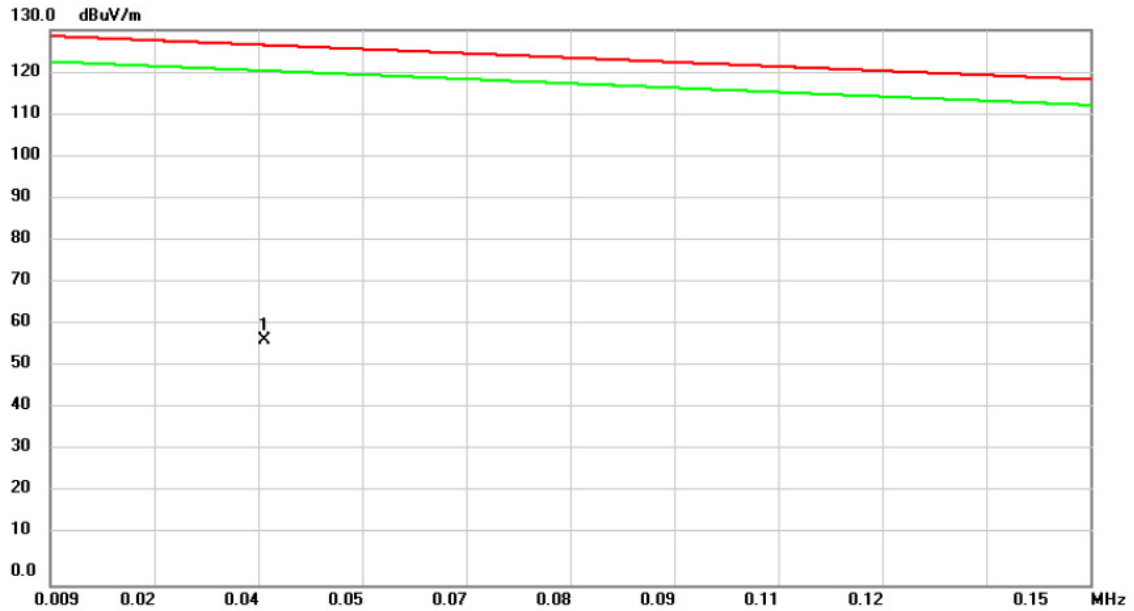
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.1500	47.93	12.03	59.96	118.34	-58.38	peak	
2	*	1.1650	28.03	11.93	39.96	67.78	-27.82	peak	
3		2.2096	22.66	11.46	34.12	69.54	-35.42	peak	
4		3.5825	18.91	11.19	30.10	69.54	-39.44	peak	
5		4.3290	18.38	11.30	29.68	69.54	-39.86	peak	
6		5.0750	16.98	11.40	28.38	69.54	-41.16	peak	

Test Mode: TX Mode\_ CHARGE

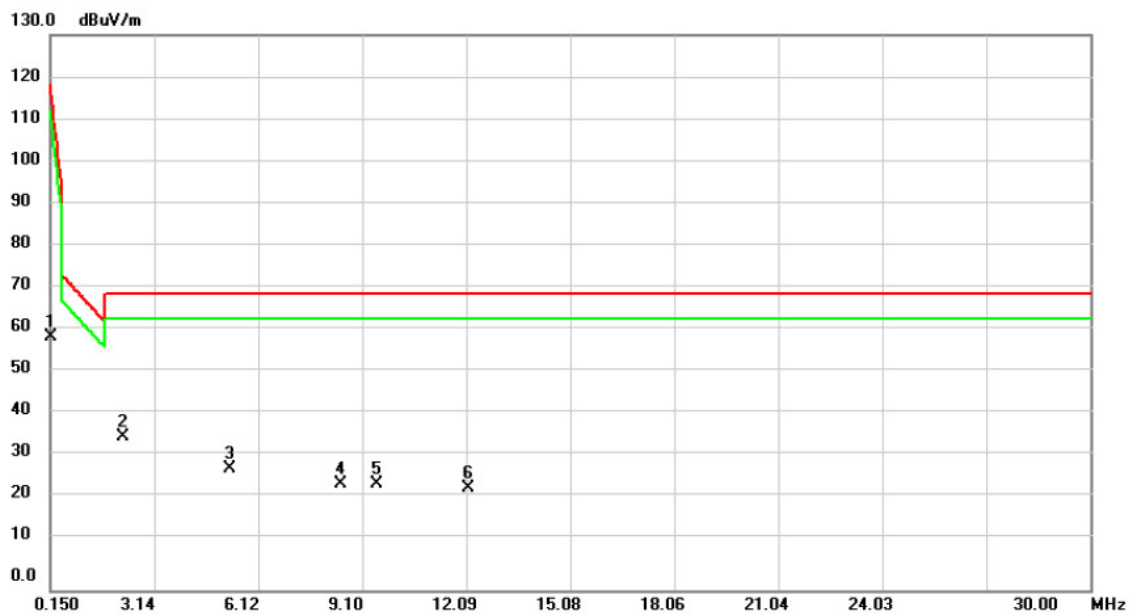
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0380	43.20	14.20	57.40	126.43	-69.03	peak	

Test Mode: TX Mode\_ CHARGE

Ant 90°

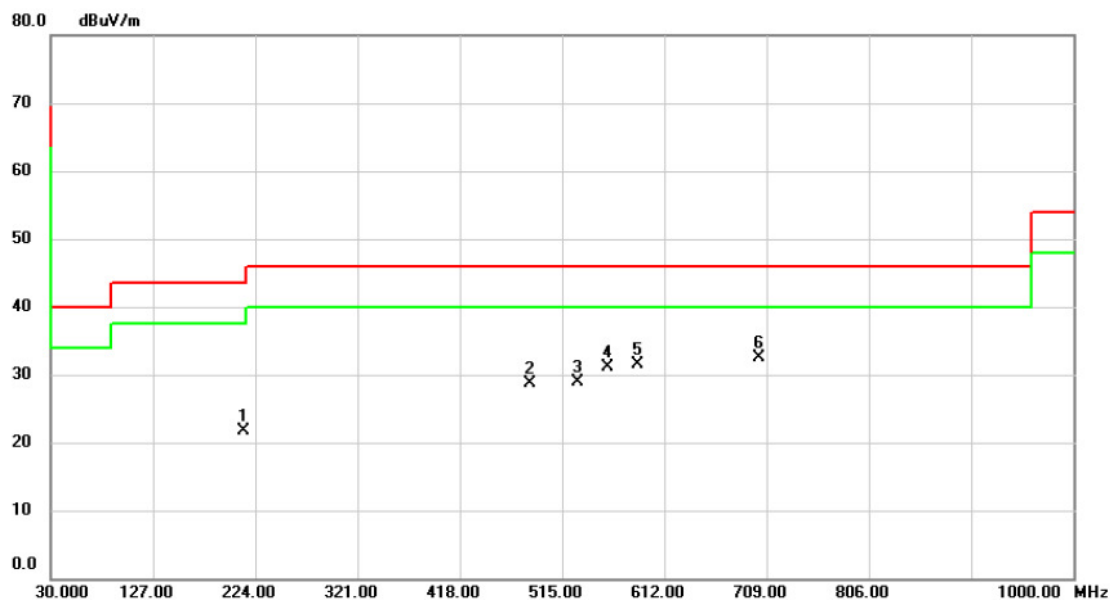


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.1500	47.16	12.03	59.19	118.34	-59.15	peak	
2	*	2.2395	24.62	11.44	36.06	69.54	-33.48	peak	
3		5.2842	16.97	11.39	28.36	69.54	-41.18	peak	
4		8.4780	13.54	11.33	24.87	69.54	-44.67	peak	
5		9.5228	13.44	11.31	24.75	69.54	-44.79	peak	
6		12.1493	12.61	11.24	23.85	69.54	-45.69	peak	

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

Test Mode: TX Mode\_ NORMAL OPERATION

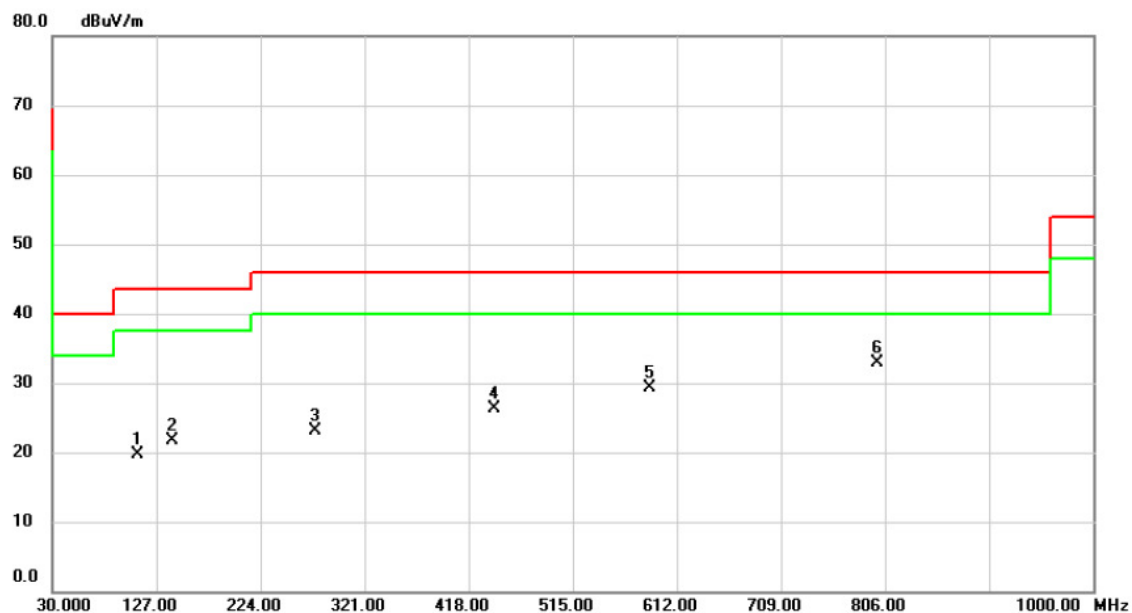
## Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		213.3300	32.80	-11.13	21.67	43.50	-21.83	peak	
2		484.9300	32.00	-3.28	28.72	46.00	-17.28	peak	
3		529.5500	31.21	-2.38	28.83	46.00	-17.17	peak	
4		558.6500	32.83	-1.69	31.14	46.00	-14.86	peak	
5		586.7800	32.47	-0.97	31.50	46.00	-14.50	peak	
6	*	701.2400	31.59	0.88	32.47	46.00	-13.53	peak	

Test Mode: TX Mode\_ NORMAL OPERATION

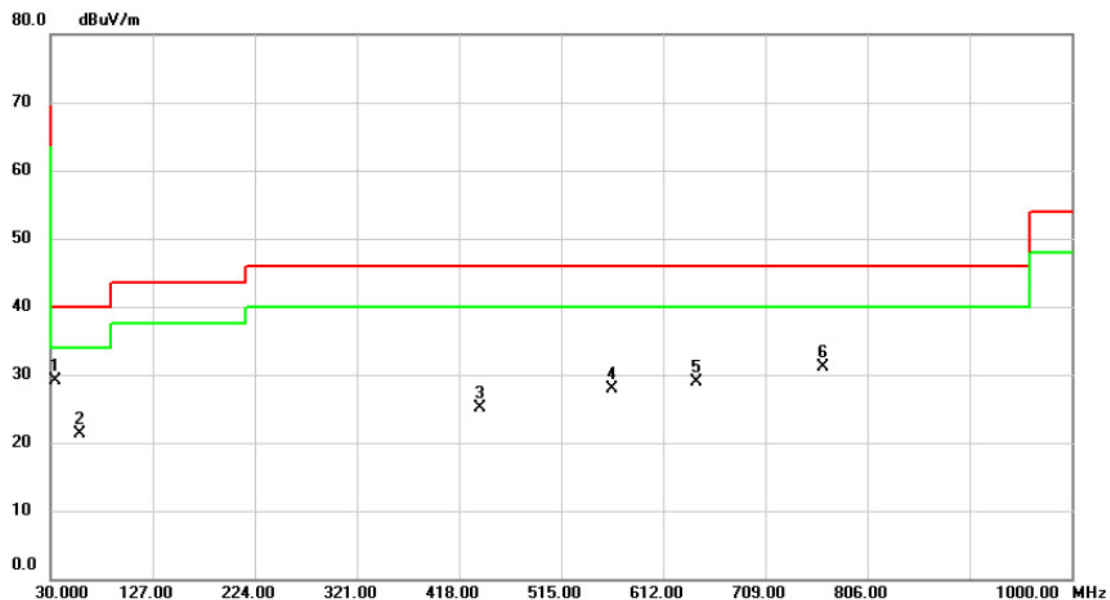
## Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		109.5400	31.08	-11.35	19.73	43.50	-23.77	peak	
2		141.5500	30.62	-8.89	21.73	43.50	-21.77	peak	
3		274.4400	31.61	-8.45	23.16	46.00	-22.84	peak	
4		441.2800	30.49	-4.10	26.39	46.00	-19.61	peak	
5		586.7800	30.30	-0.97	29.33	46.00	-16.67	peak	
6	*	798.2400	30.53	2.40	32.93	46.00	-13.07	peak	

Test Mode: TX Mode\_ CHARGE

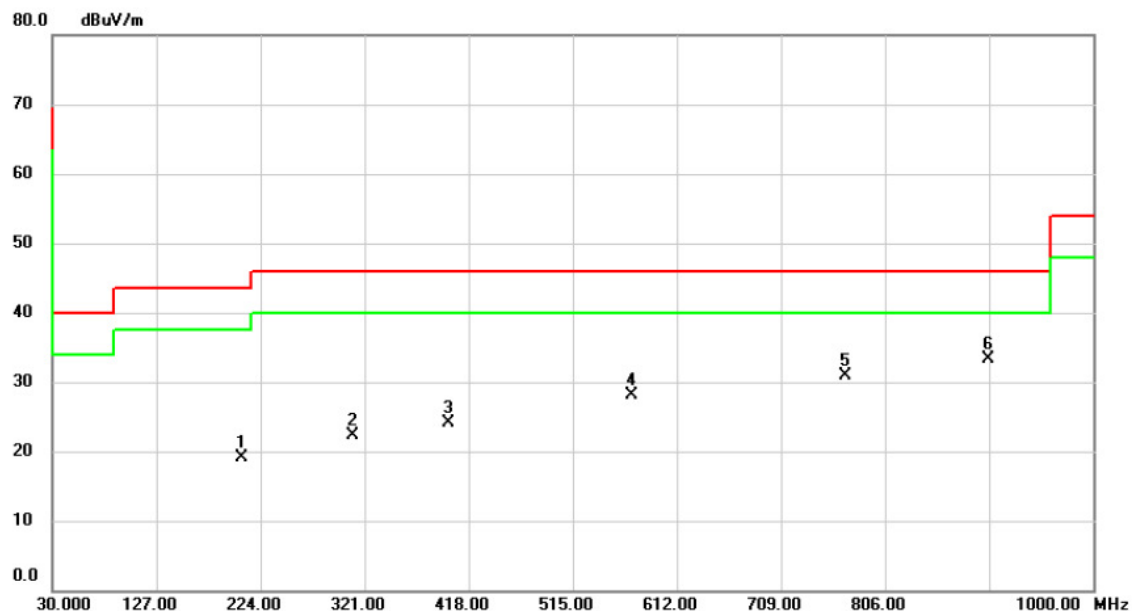
## Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	34.8500	38.11	-9.10	29.01	40.00	-10.99	peak	
2		57.1600	30.08	-8.83	21.25	40.00	-18.75	peak	
3		437.4000	29.39	-4.21	25.18	46.00	-20.82	peak	
4		563.5000	29.52	-1.57	27.95	46.00	-18.05	peak	
5		643.0400	29.27	-0.28	28.99	46.00	-17.01	peak	
6		764.2900	29.06	2.05	31.11	46.00	-14.89	peak	

Test Mode: TX Mode\_ CHARGE

# Horizontal



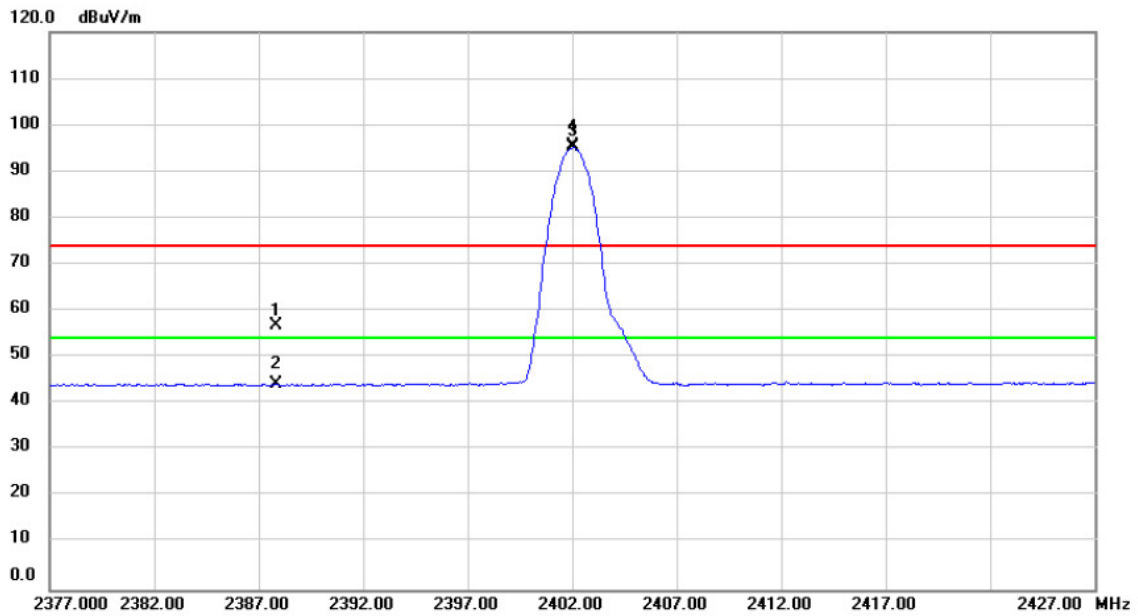
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		206.5400	30.22	-11.11	19.11	43.50	-24.39	peak	
2		310.3300	29.86	-7.49	22.37	46.00	-23.63	peak	
3		398.6000	29.47	-5.27	24.20	46.00	-21.80	peak	
4		570.2900	29.55	-1.39	28.16	46.00	-17.84	peak	
5		769.1400	28.75	2.09	30.84	46.00	-15.16	peak	
6	*	902.0300	29.22	4.15	33.37	46.00	-12.63	peak	



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

Test Mode : TX 2402MHz \_CH00\_1Mbps

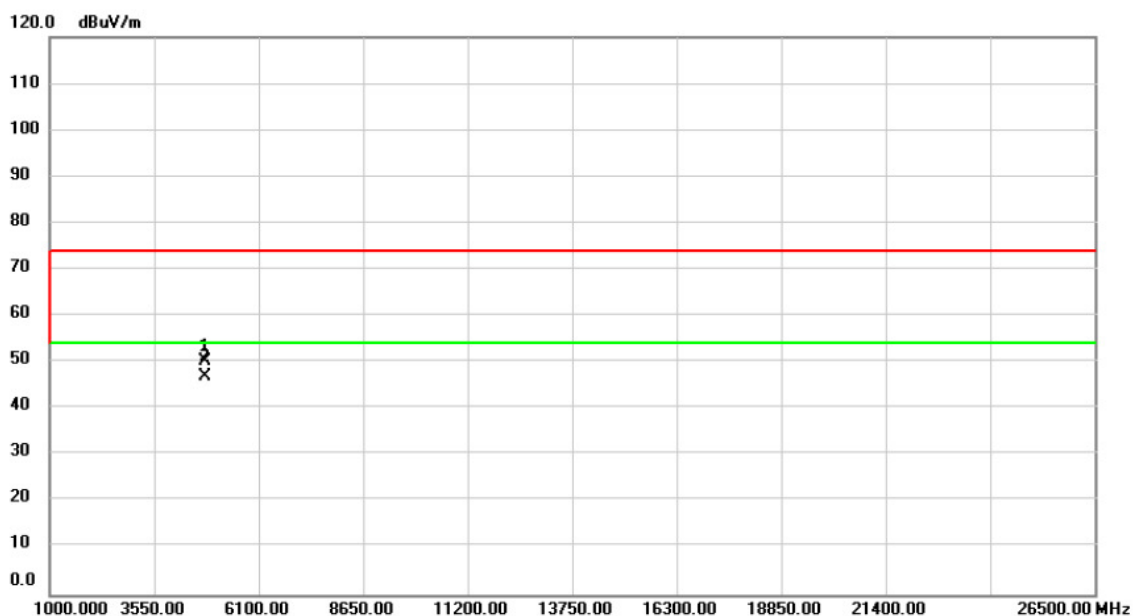
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2387.850	26.01	30.96	56.97	74.00	-17.03	peak	
2		2387.850	13.40	30.96	44.36	54.00	-9.64	AVG	
3	X	2402.000	64.49	31.01	95.50	74.00	21.50	peak	No Limit
4	*	2402.000	64.11	31.01	95.12	54.00	41.12	AVG	No Limit

Test Mode :	TX 2402MHz _CH00_1Mbps
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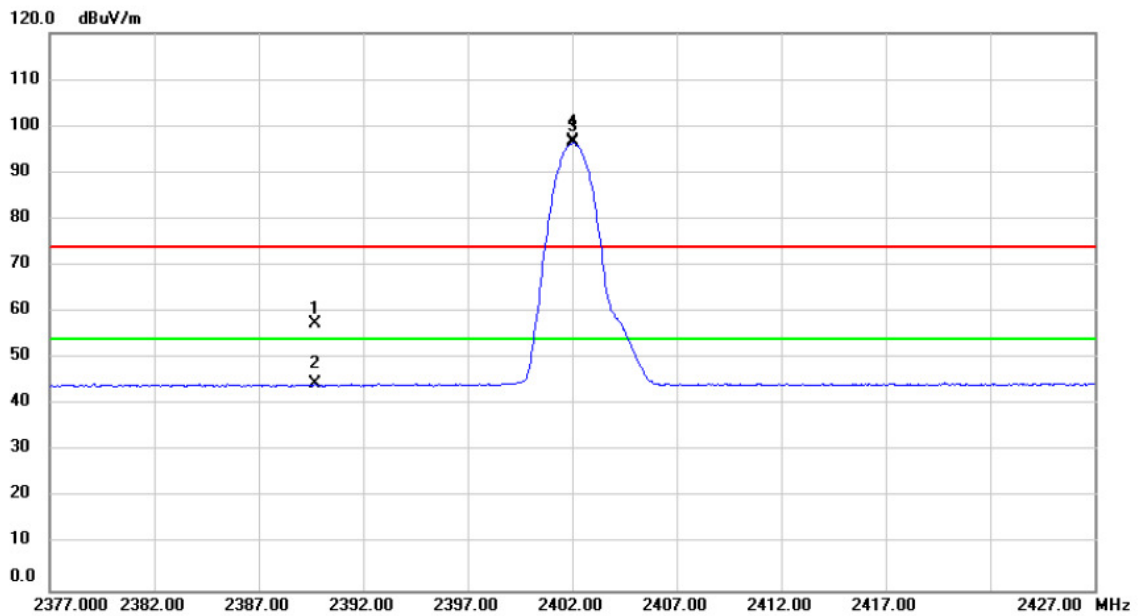
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	61.90	-11.50	50.40	74.00	-23.60	peak	
2	*	4804.000	58.53	-11.50	47.03	54.00	-6.97	AVG	

Test Mode : TX 2402MHz \_CH00\_1Mbps

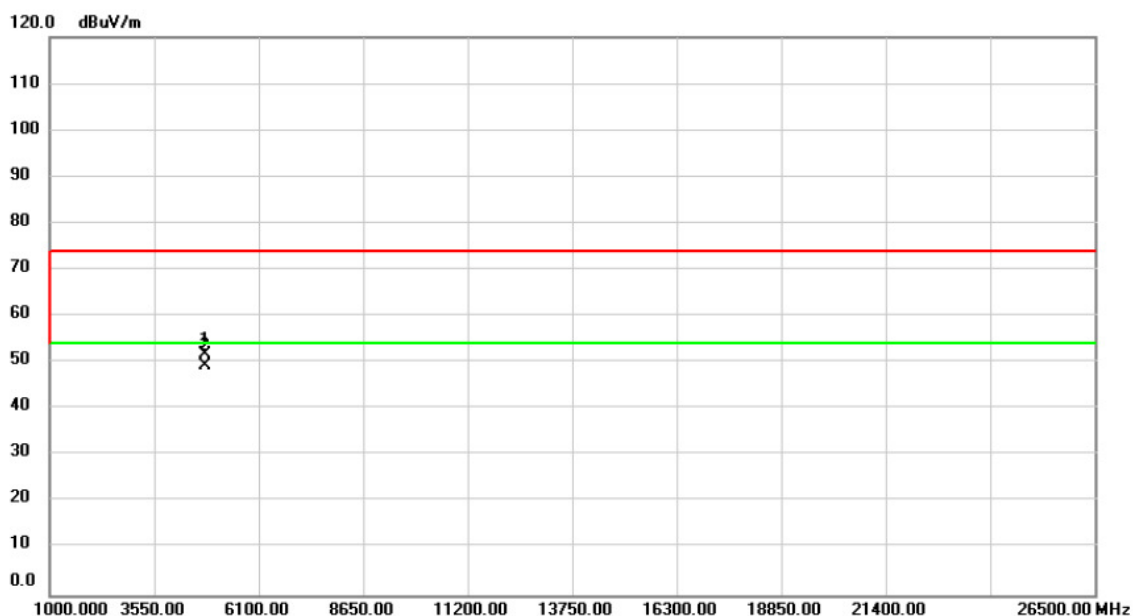
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2389.700	26.59	30.96	57.55	74.00	-16.45	peak	
2		2389.700	13.50	30.96	44.46	54.00	-9.54	A/G	
3	X	2402.000	65.71	31.01	96.72	74.00	22.72	peak	No Limit
4	*	2402.000	65.33	31.01	96.34	54.00	42.34	A/G	No Limit

Test Mode :	TX 2402MHz _CH00_1Mbps
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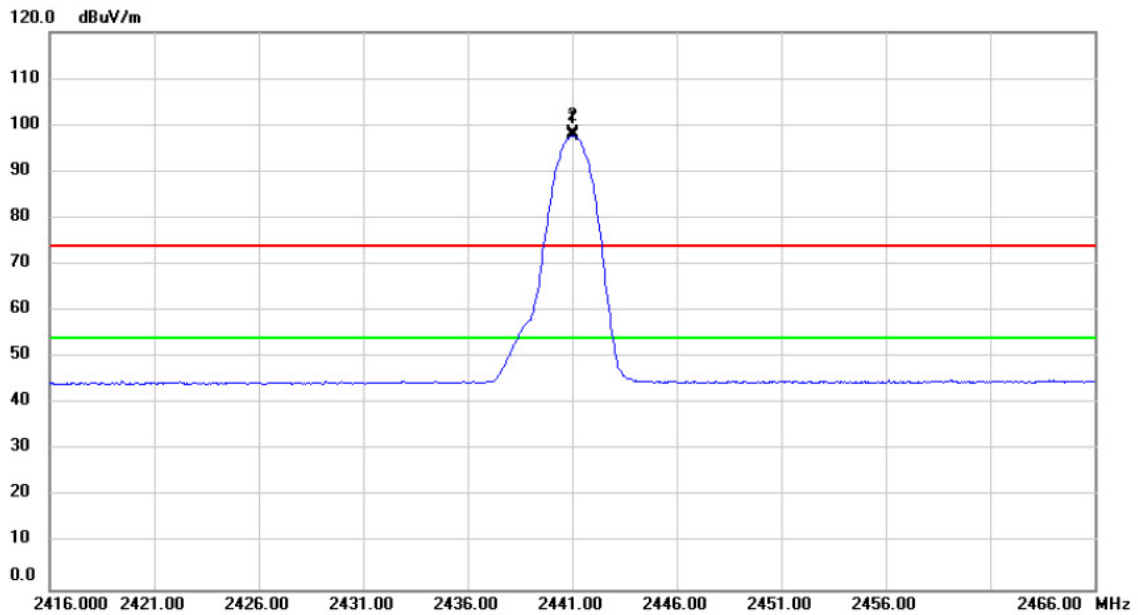
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4804.000	63.23	-11.50	51.73	74.00	-22.27	peak	
2	*	4804.000	60.80	-11.50	49.30	54.00	-4.70	AVG	

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

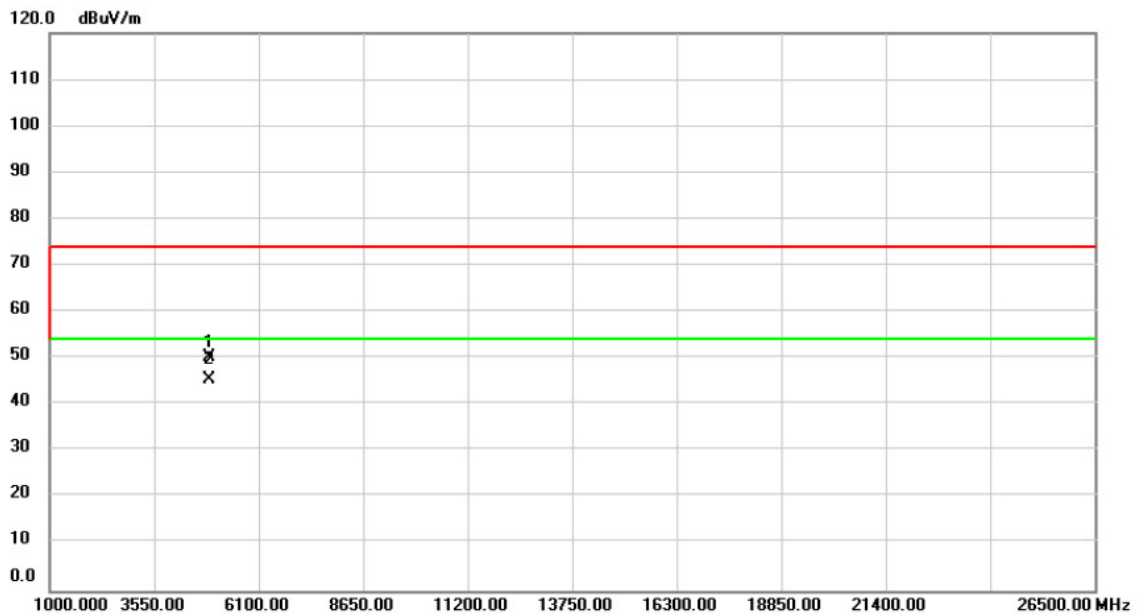
**Vertical**



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2441.000	66.97	31.15	98.12	74.00	24.12	peak	No Limit
2	*	2441.000	66.63	31.15	97.78	54.00	43.78	A/VG	No Limit

Test Mode :	TX 2441MHz _CH39_1Mbps
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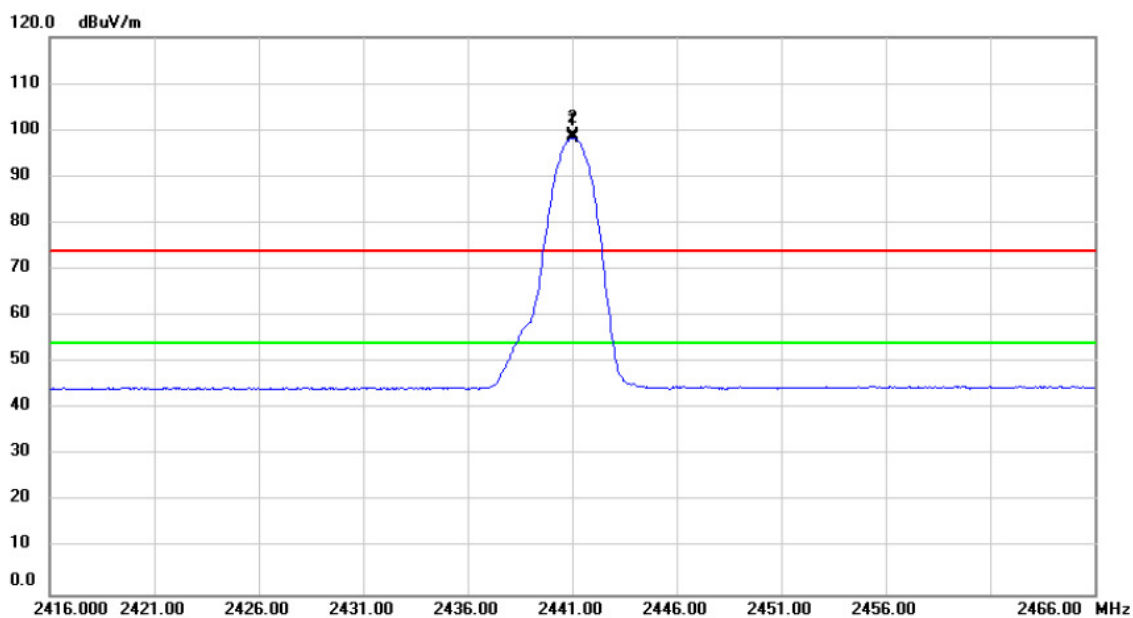
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.000	61.69	-11.38	50.31	74.00	-23.69	peak	
2	*	4882.000	56.72	-11.38	45.34	54.00	-8.66	AVG	

Test Mode : TX 2441MHz \_CH39\_1Mbps

### Horizontal

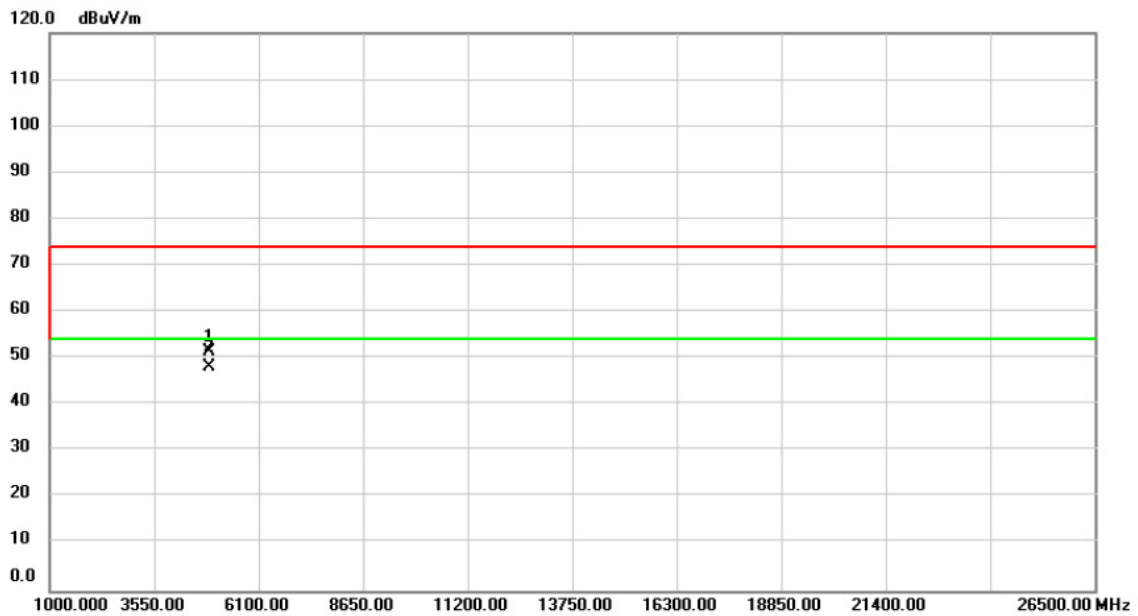


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2441.000	67.56	31.15	98.71	74.00	24.71	peak	No Limit
2	*	2441.000	67.22	31.15	98.37	54.00	44.37	A/VG	No Limit



Test Mode :	TX 2441MHz _CH39_1Mbps
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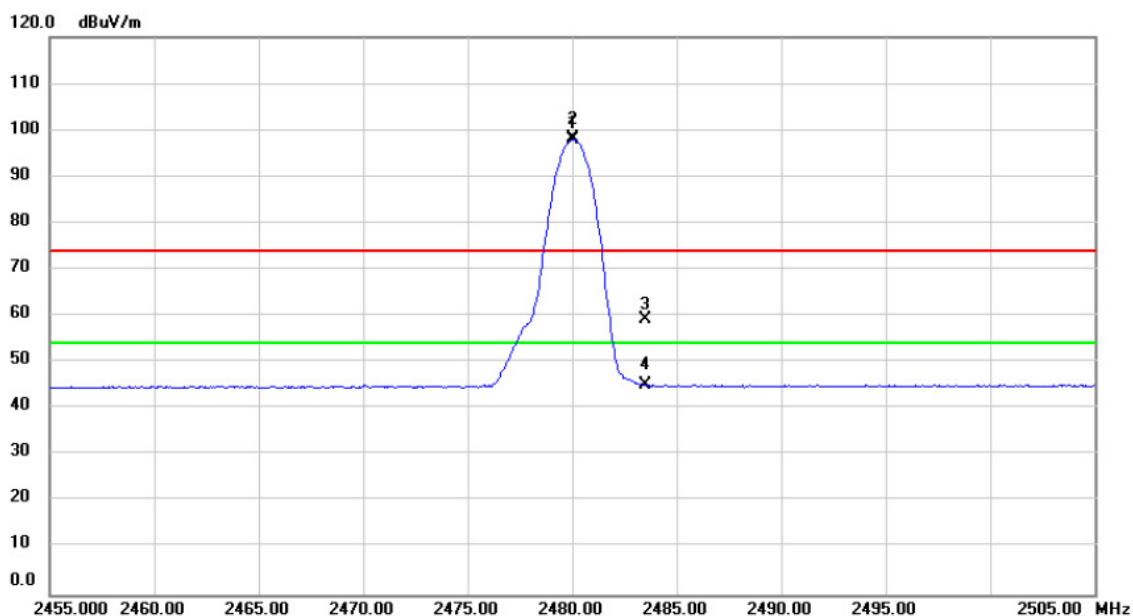
### Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.000	62.76	-11.38	51.38	74.00	-22.62	peak	
2	*	4882.000	59.49	-11.38	48.11	54.00	-5.89	AVG	

Test Mode : TX 2480MHz \_CH78\_1Mbps

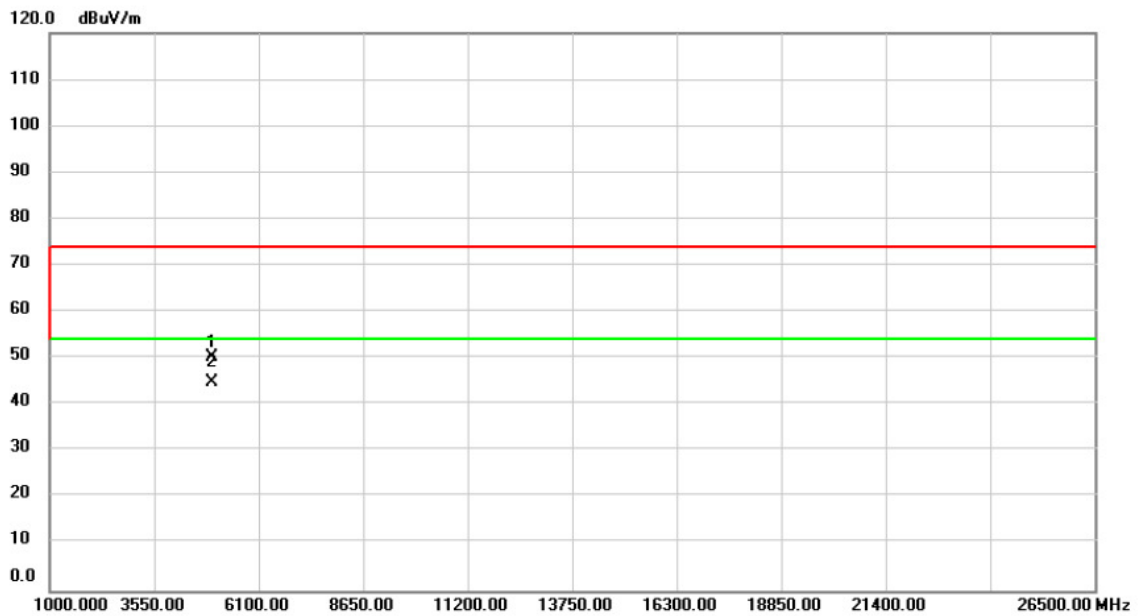
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.000	67.02	31.29	98.31	74.00	24.31	peak	No Limit
2	*	2480.050	66.62	31.29	97.91	54.00	43.91	A/G	No Limit
3		2483.500	28.07	31.31	59.38	74.00	-14.62	peak	
4		2483.500	13.93	31.31	45.24	54.00	-8.76	A/G	

Test Mode :	TX 2480MHz _CH78_1Mbps
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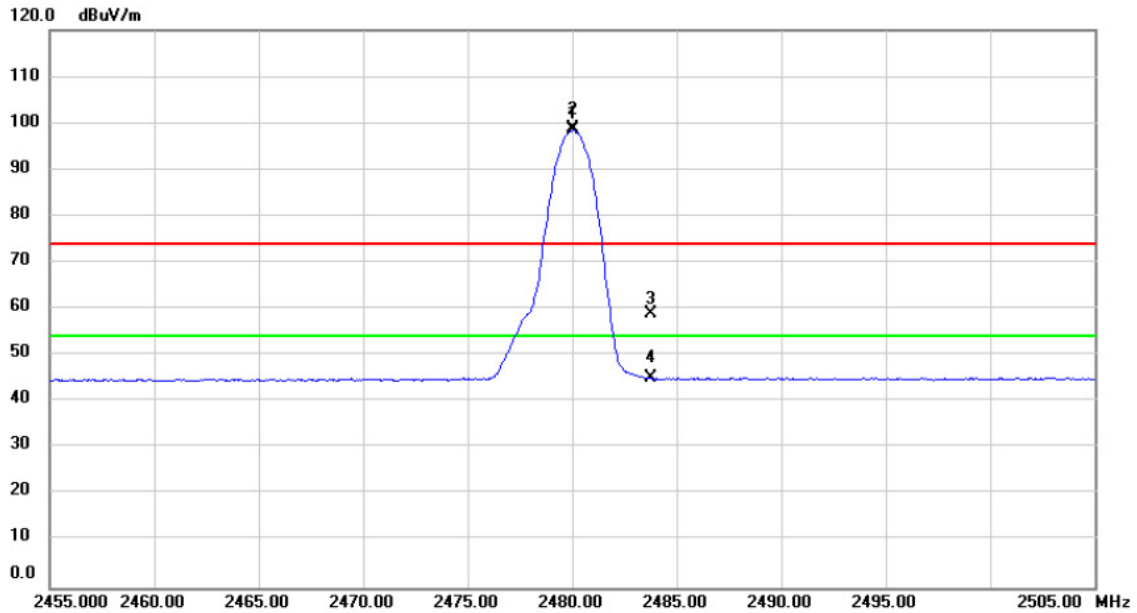
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4960.000	61.51	-11.25	50.26	74.00	-23.74	peak	
2	*	4960.000	56.23	-11.25	44.98	54.00	-9.02	AVG	

Test Mode : TX 2480MHz \_CH78\_1Mbps

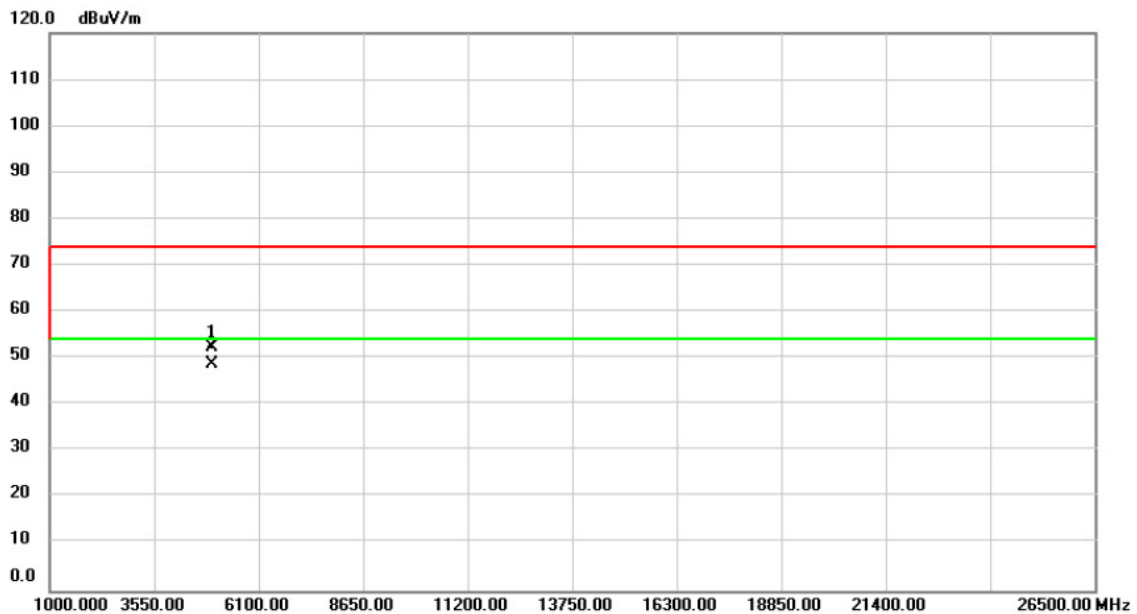
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.000	67.49	31.29	98.78	74.00	24.78	peak	No Limit
2	*	2480.000	67.15	31.29	98.44	54.00	44.44	AVG	No Limit
3		2483.750	27.52	31.31	58.83	74.00	-15.17	peak	
4		2483.750	13.94	31.31	45.25	54.00	-8.75	AVG	

Test Mode :	TX 2480MHz _CH78_1Mbps
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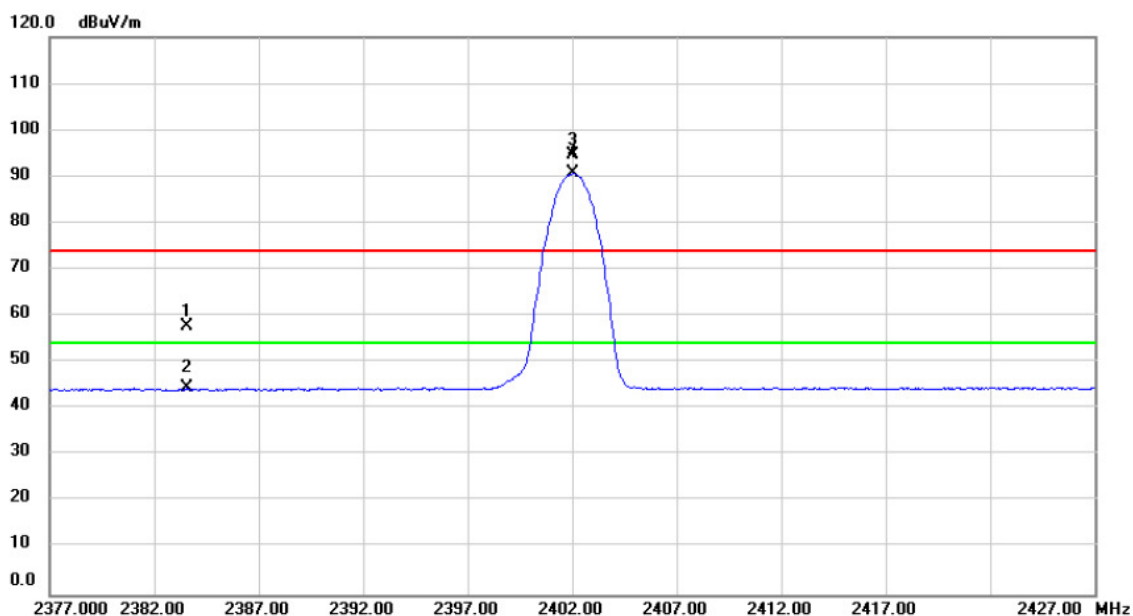
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4960.000	63.70	-11.25	52.45	74.00	-21.55	peak	
2	*	4960.000	60.09	-11.25	48.84	54.00	-5.16	AVG	

Test Mode : TX 2402MHz \_CH00\_3Mbps

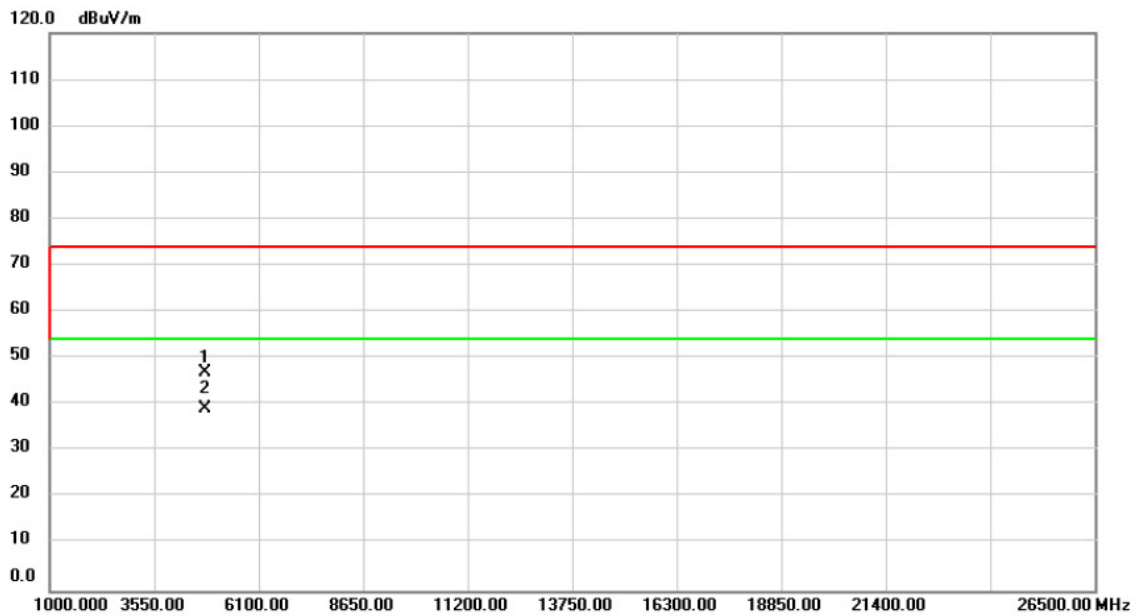
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2383.600	26.73	30.94	57.67	74.00	-16.33	peak	
2		2383.600	13.52	30.94	44.46	54.00	-9.54	A/G	
3	X	2402.000	63.71	31.01	94.72	74.00	20.72	peak	No Limit
4	*	2402.000	59.64	31.01	90.65	54.00	36.65	A/G	No Limit

Test Mode :	TX 2402MHz _CH00_3Mbps
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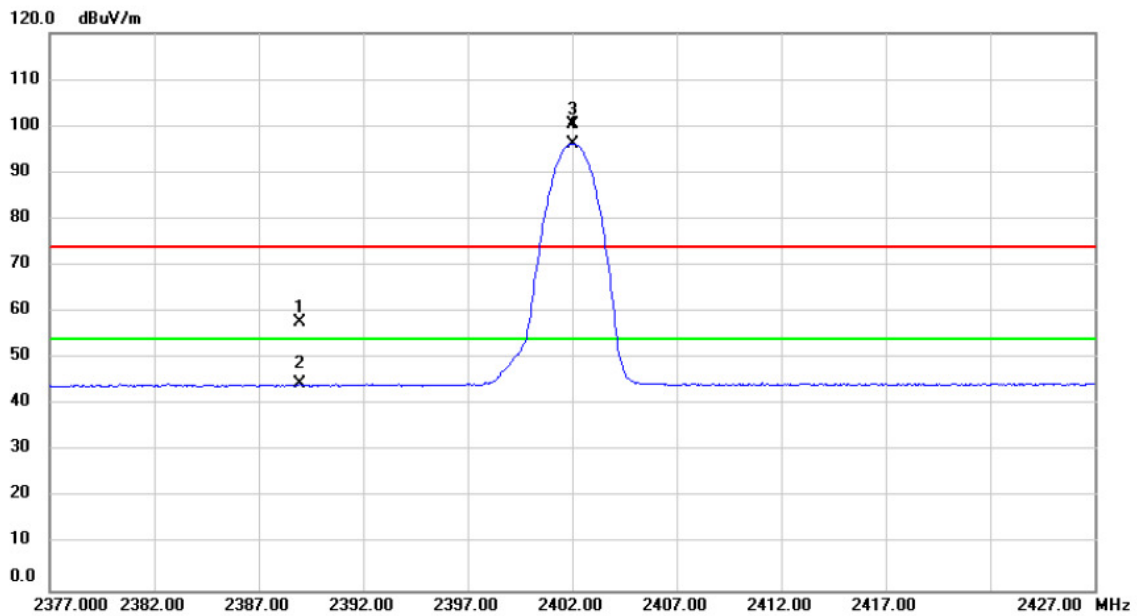
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	58.53	-11.50	47.03	74.00	-26.97	peak	
2	*	4804.000	50.66	-11.50	39.16	54.00	-14.84	AVG	

Test Mode : TX 2402MHz \_CH00\_3Mbps

### Horizontal

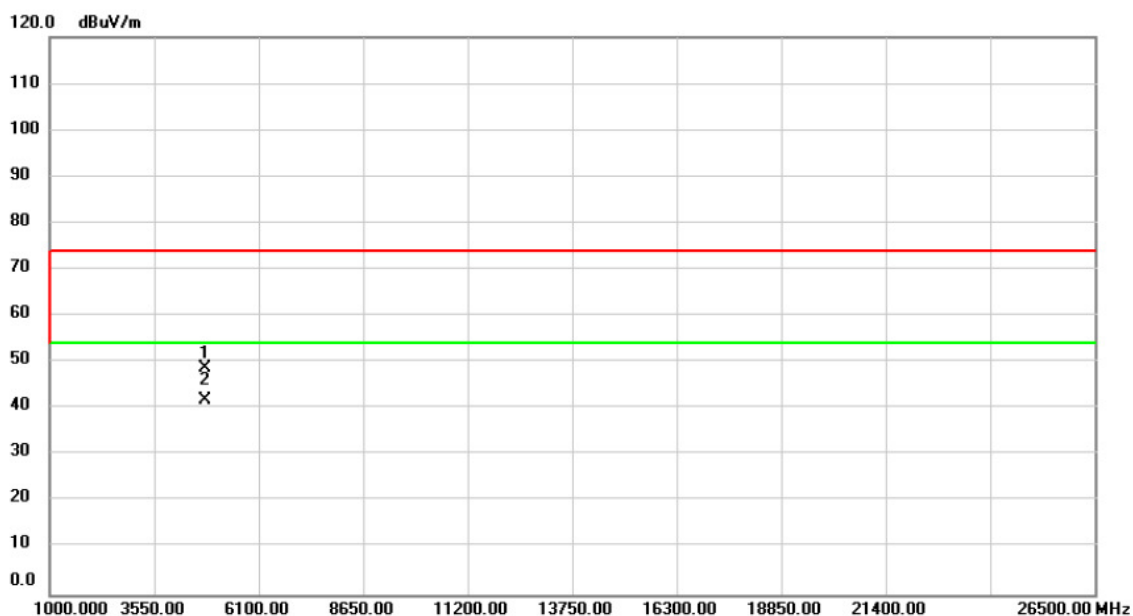


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2388.950	26.70	30.96	57.66	74.00	-16.34	peak	
2		2388.950	13.48	30.96	44.44	54.00	-9.56	AVG	
3	X	2402.000	69.30	31.01	100.31	74.00	26.31	peak	No Limit
4	*	2402.000	65.24	31.01	96.25	54.00	42.25	AVG	No Limit



Test Mode :	TX 2402MHz _CH00_3Mbps
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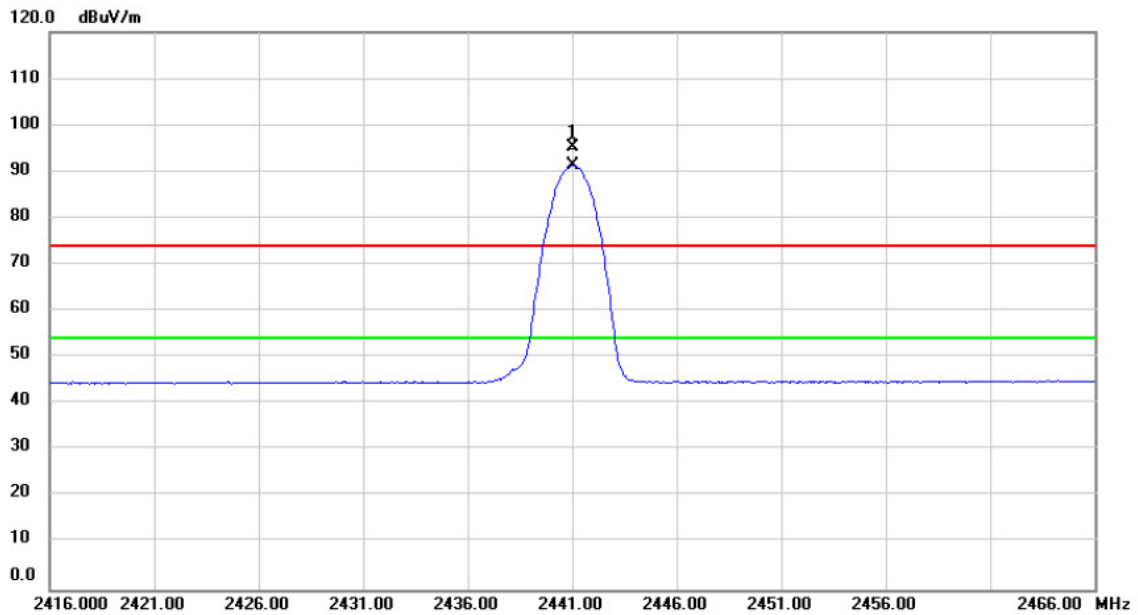
### Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	60.38	-11.50	48.88	74.00	-25.12	peak	
2	*	4804.000	53.28	-11.50	41.78	54.00	-12.22	AVG	

Test Mode : TX 2441MHz \_CH39\_3Mbps

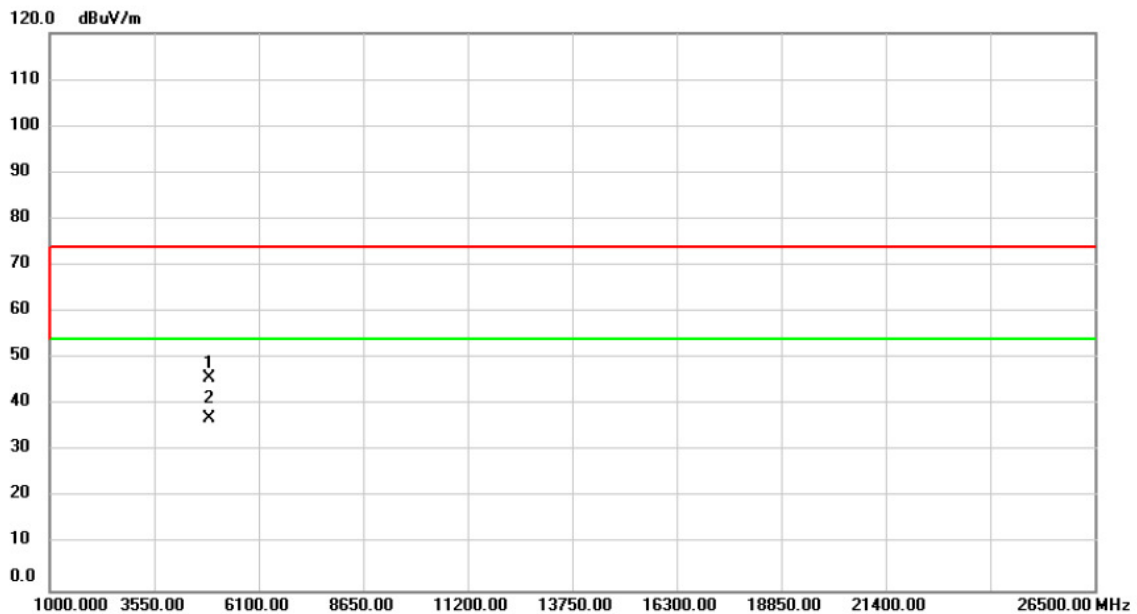
**Vertical**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	64.16	31.15	95.31	74.00	21.31	peak	No Limit
2	*	2441.000	60.15	31.15	91.30	54.00	37.30	A/VG	No Limit

Test Mode :	TX 2441MHz _CH39_3Mbps
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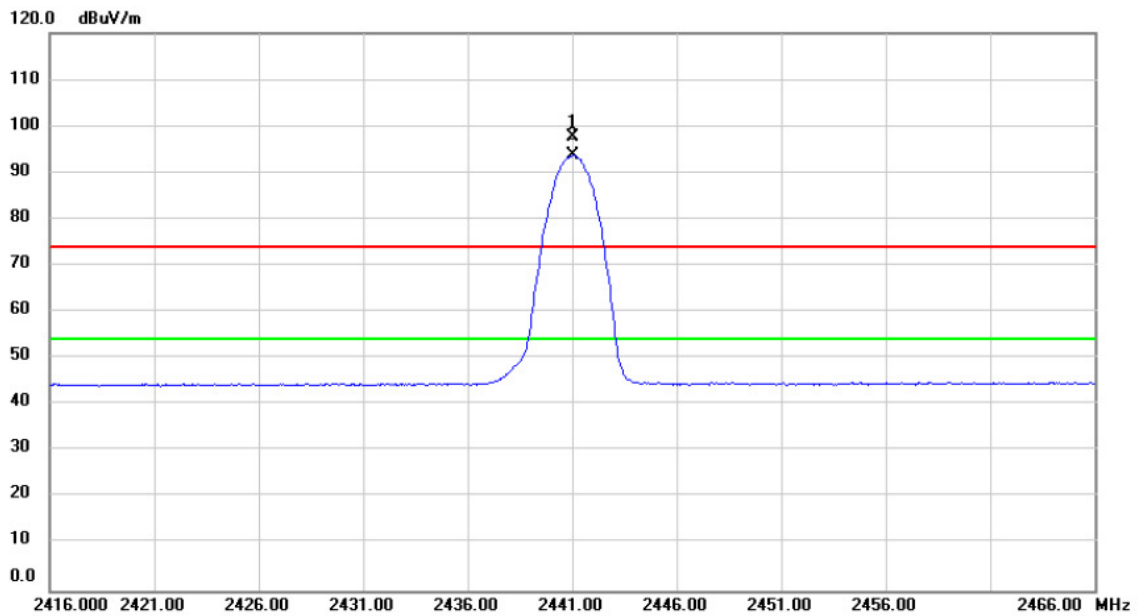
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.000	57.00	-11.38	45.62	74.00	-28.38	peak	
2	*	4882.000	48.48	-11.38	37.10	54.00	-16.90	AVG	

Test Mode : TX 2441MHz \_CH39\_3Mbps

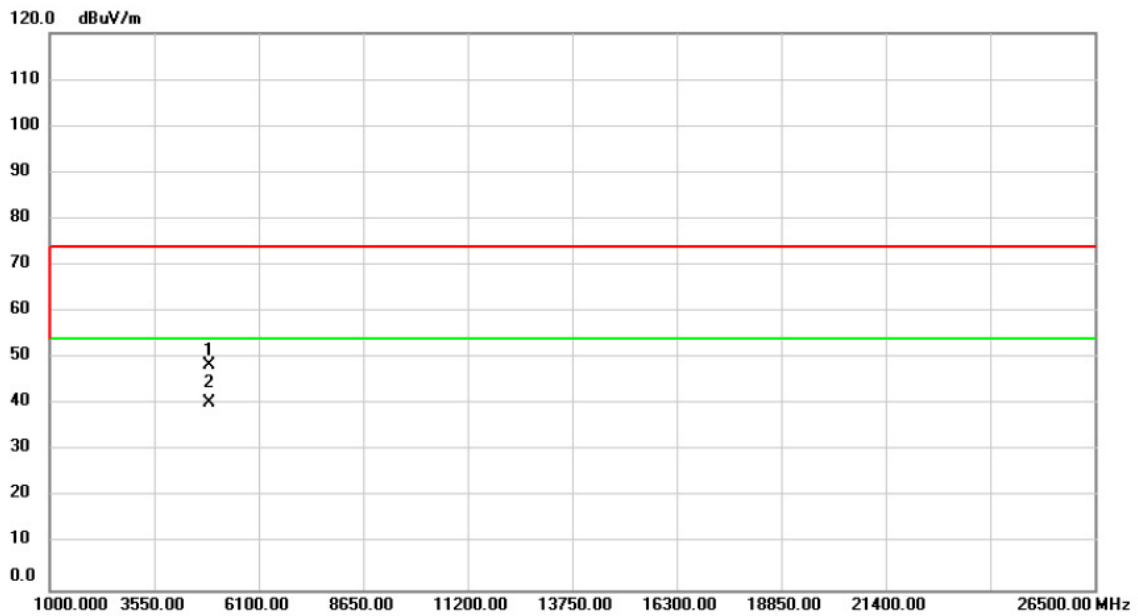
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2441.000	66.54	31.15	97.69	74.00	23.69	peak	No Limit
2	*	2441.000	62.50	31.15	93.65	54.00	39.65	A/VG	No Limit

Test Mode :	TX 2441MHz _CH39_3Mbps
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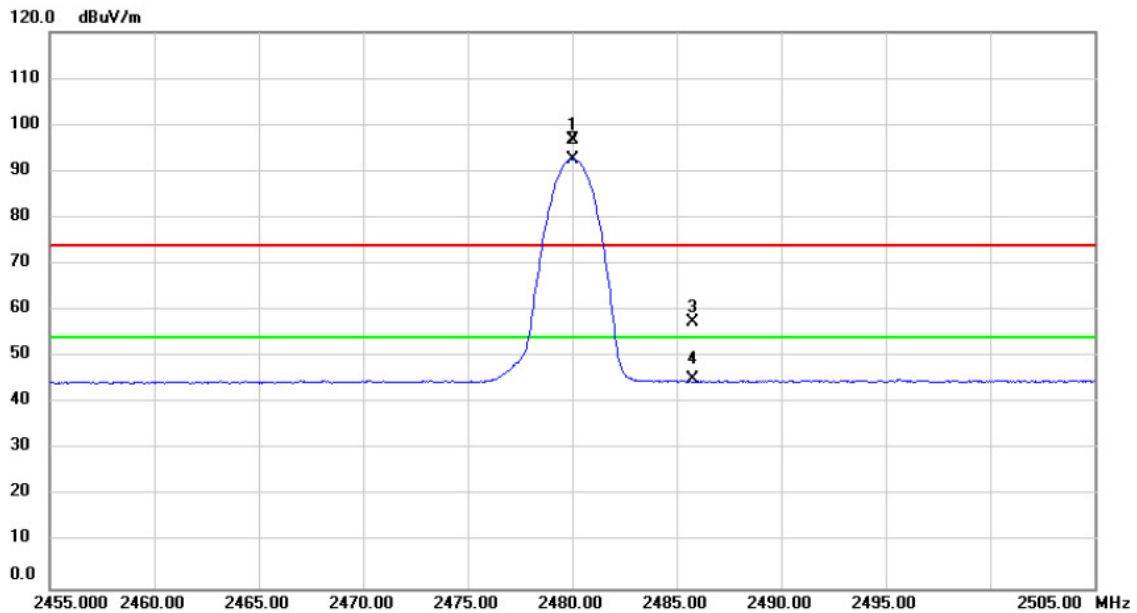
### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4882.000	59.73	-11.38	48.35	74.00	-25.65	peak	
2	*	4882.000	51.73	-11.38	40.35	54.00	-13.65	AVG	

Test Mode : TX 2480MHz \_CH78\_3Mbps

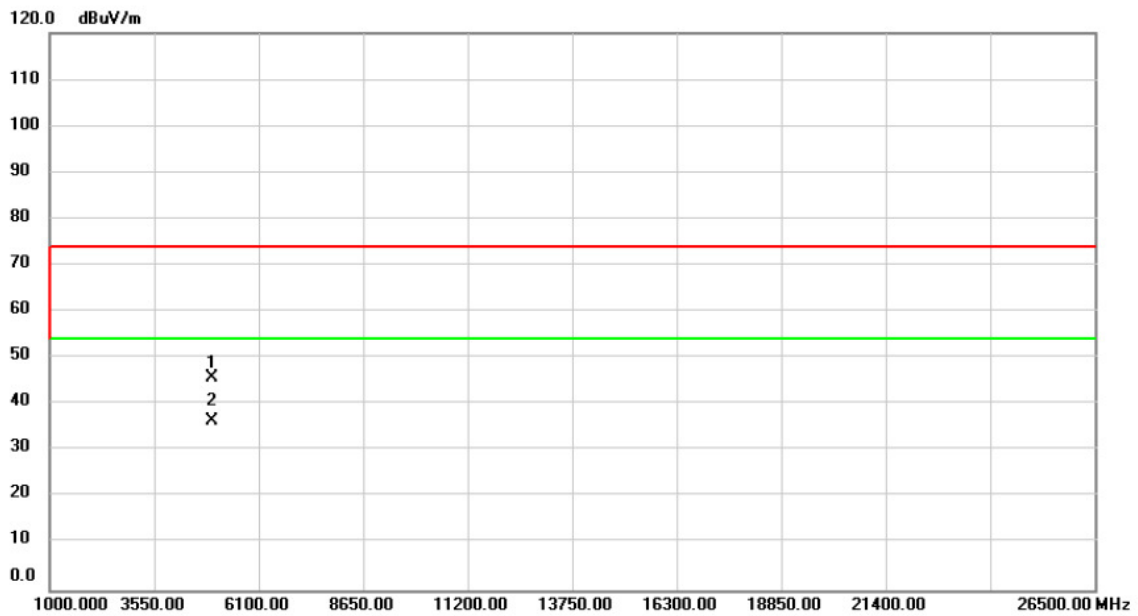
**Vertical**



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	65.35	31.29	96.64	74.00	22.64	peak	No Limit
2	*	2480.000	61.36	31.29	92.65	54.00	38.65	AVG	No Limit
3		2485.777	26.18	31.32	57.50	74.00	-16.50	peak	
4		2485.777	13.76	31.32	45.08	54.00	-8.92	AVG	

Test Mode :	TX 2480MHz _CH78_3Mbps
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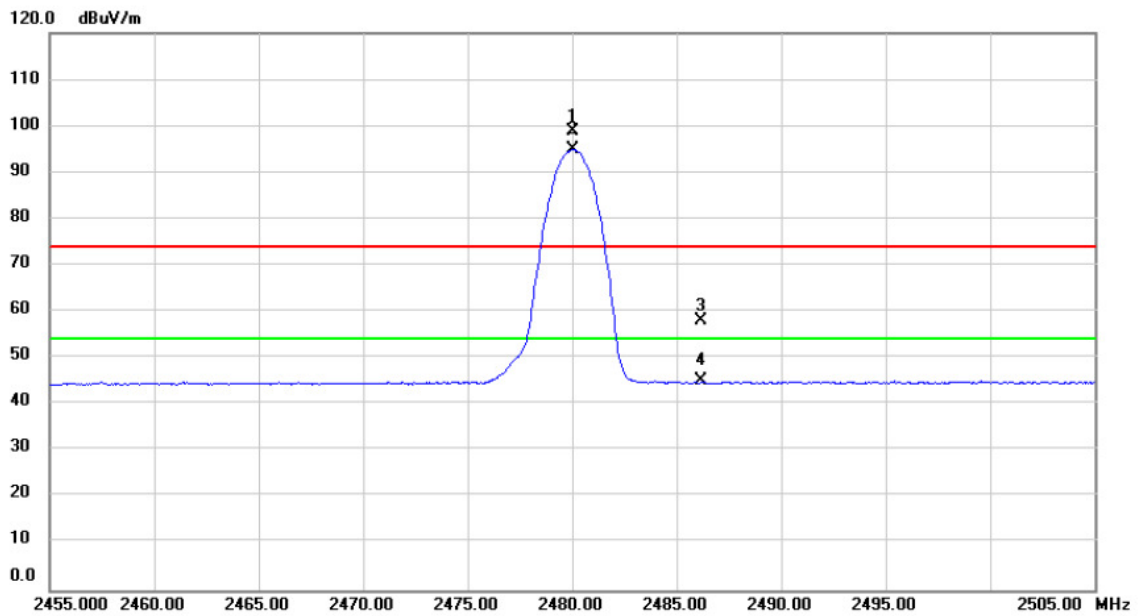
### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	57.10	-11.25	45.85	74.00	-28.15	peak	
2	*	4960.000	47.60	-11.25	36.35	54.00	-17.65	AVG	

Test Mode : TX 2480MHz \_CH78\_3Mbps

**Horizontal**

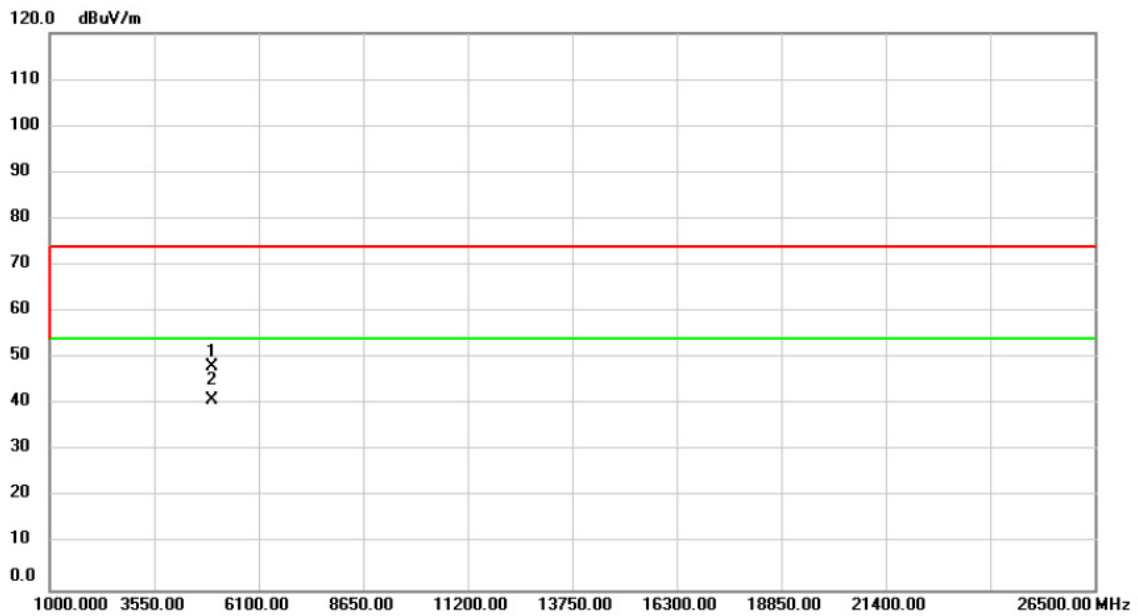


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.000	67.61	31.29	98.90	74.00	24.90	peak	No Limit
2	*	2480.000	63.60	31.29	94.89	54.00	40.89	AVG	No Limit
3		2486.157	26.59	31.32	57.91	74.00	-16.09	peak	
4		2486.157	13.83	31.32	45.15	54.00	-8.85	AVG	



Test Mode :	TX 2480MHz _CH78_3Mbps
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### Horizontal

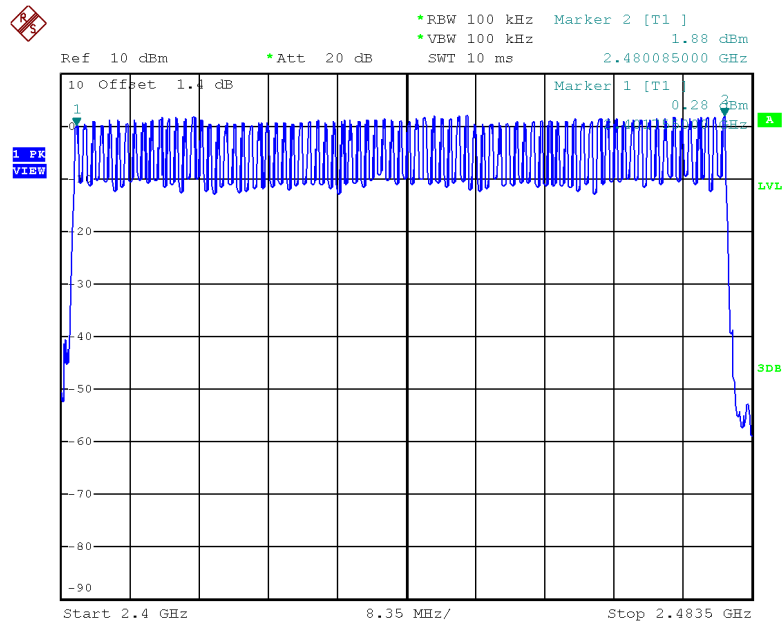


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	59.49	-11.25	48.24	74.00	-25.76	peak	
2	*	4960.000	52.10	-11.25	40.85	54.00	-13.15	AVG	

## ATTACHMENT E - NUMBER OF HOPPING CHANNEL

## Test Mode Hopping Mode\_1Mbps

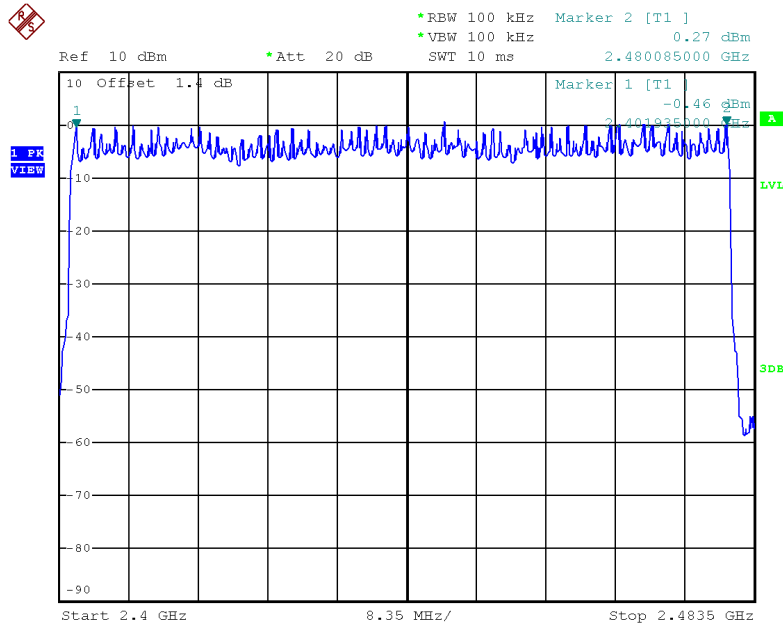
Number of Hopping Channel 79



Date: 22.JAN.2017 17:23:13

## Test Mode Hopping Mode\_3Mbps

Number of Hopping Channel 79



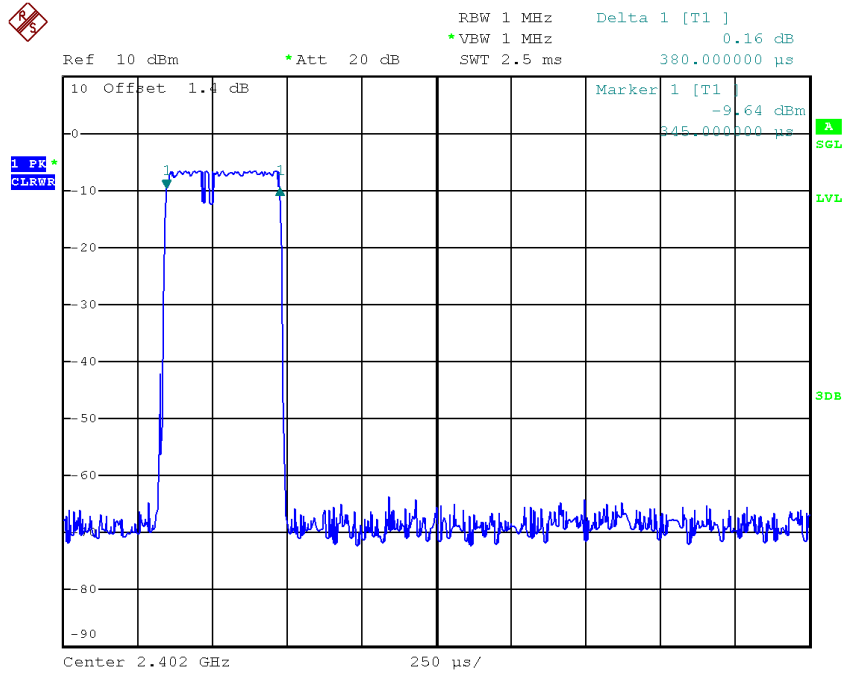
Date: 22.JAN.2017 18:00:58

## ATTACHMENT F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps
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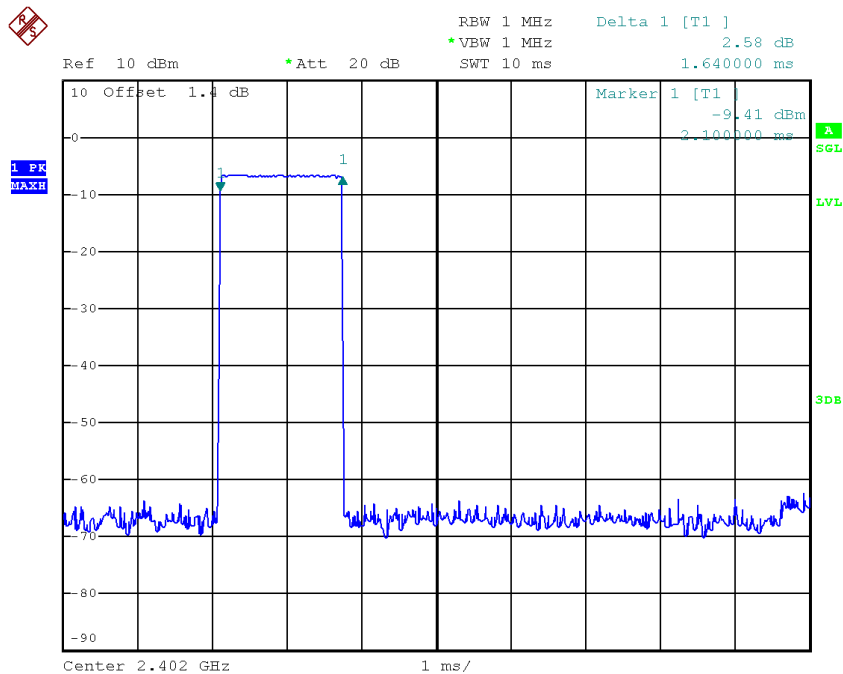
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.9200	0.3115	0.4000	Pass
DH3	2402	1.6400	0.2624	0.4000	Pass
DH1	2402	0.3800	0.1216	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH3	2441	1.6600	0.2656	0.4000	Pass
DH1	2441	0.3850	0.1232	0.4000	Pass
DH5	2480	2.8800	0.3072	0.4000	Pass
DH3	2480	1.6400	0.2624	0.4000	Pass
DH1	2480	0.3800	0.1216	0.4000	Pass

### CH00-DH1



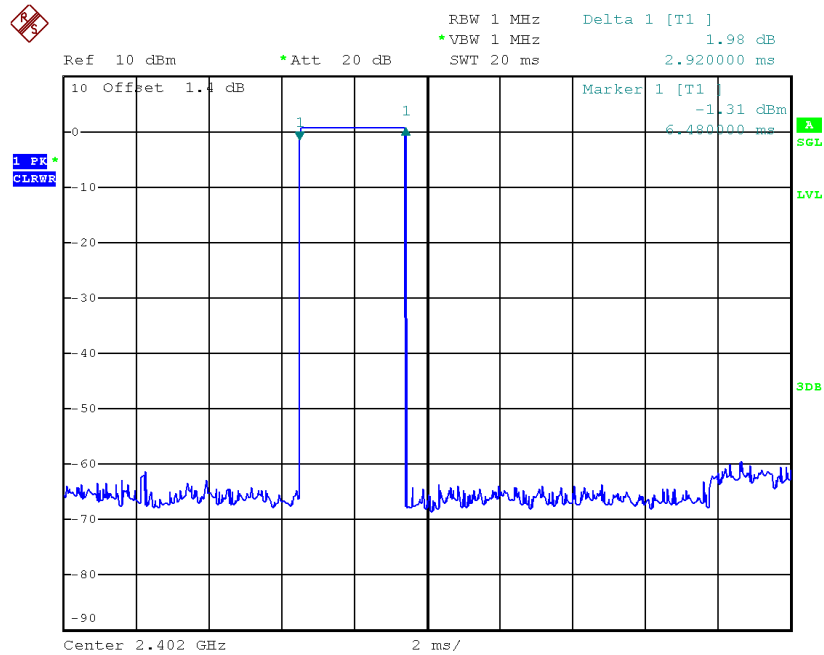
Date: 22.JAN.2017 17:18:16

### CH00-DH3



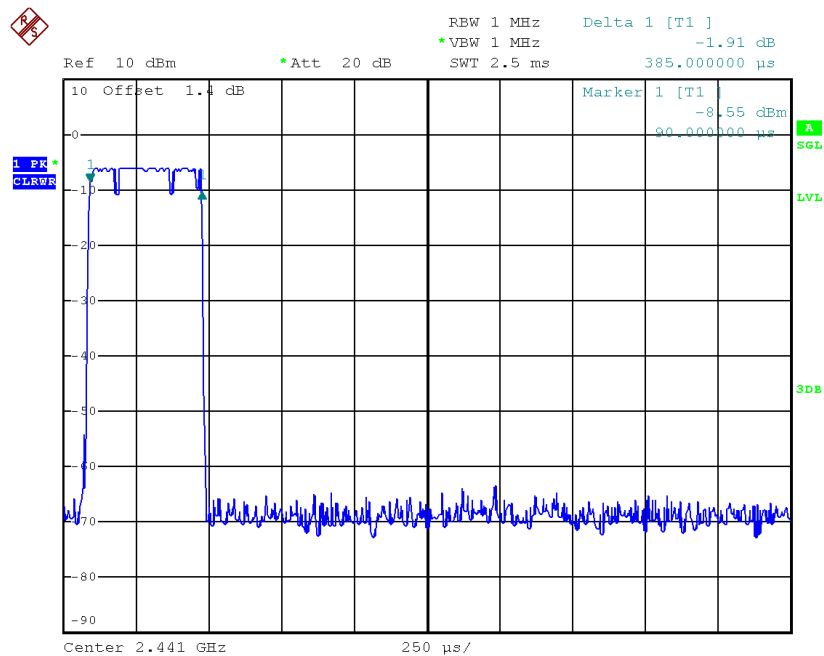
Date: 22.JAN.2017 17:24:42

### CH00-DH5



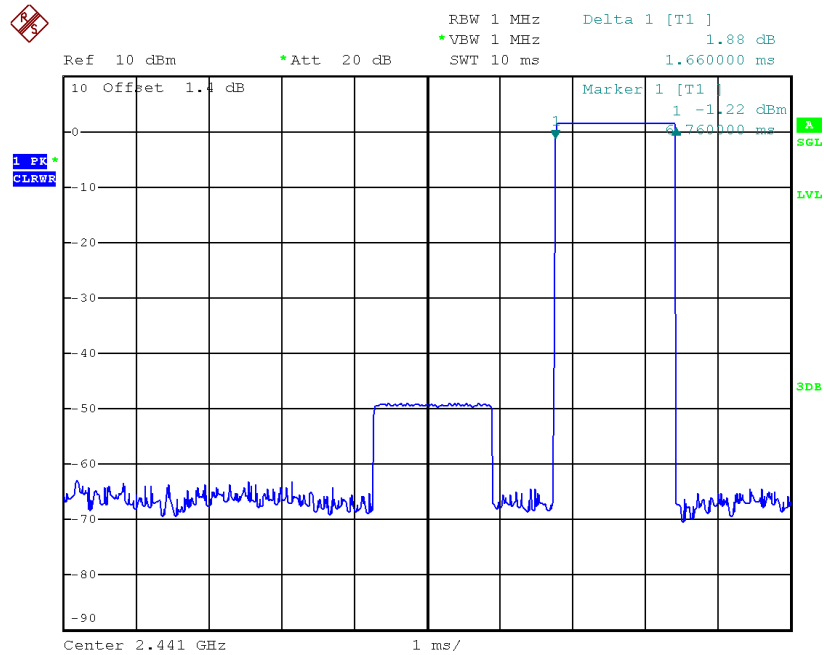
Date: 22.JAN.2017 17:25:43

### CH39-DH1



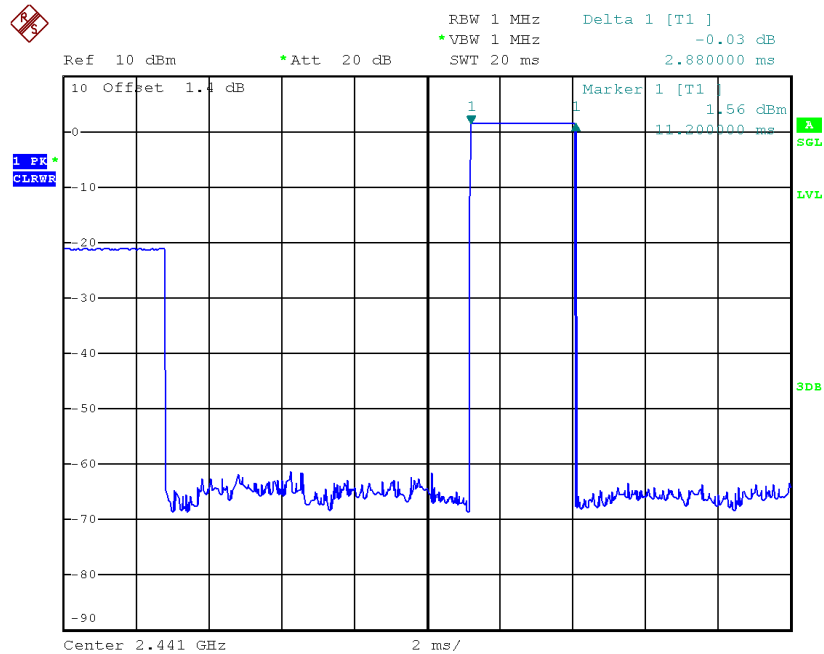
Date: 22.JAN.2017 17:18:21

### CH39-DH3



Date: 22.JAN.2017 17:24:45

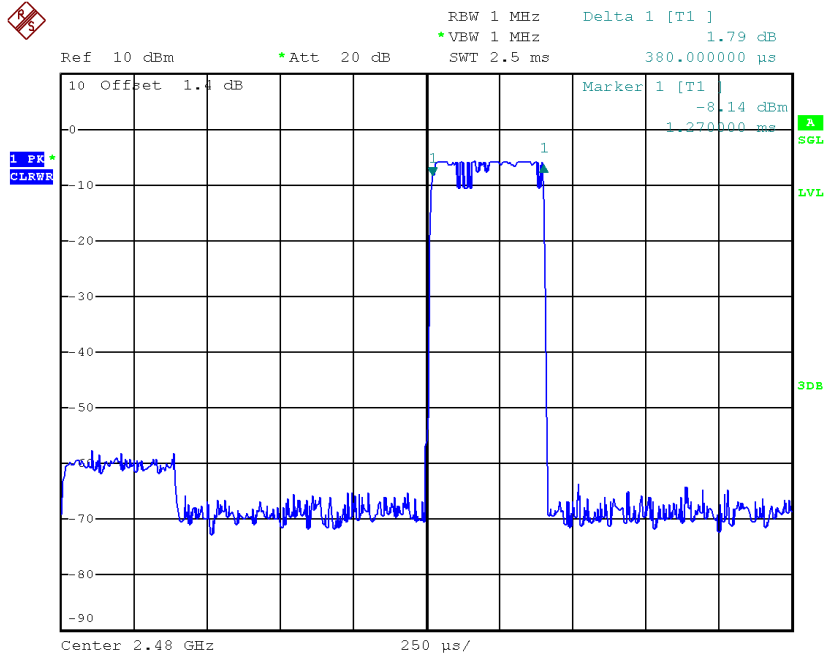
### CH39-DH5



Date: 22.JAN.2017 17:25:48

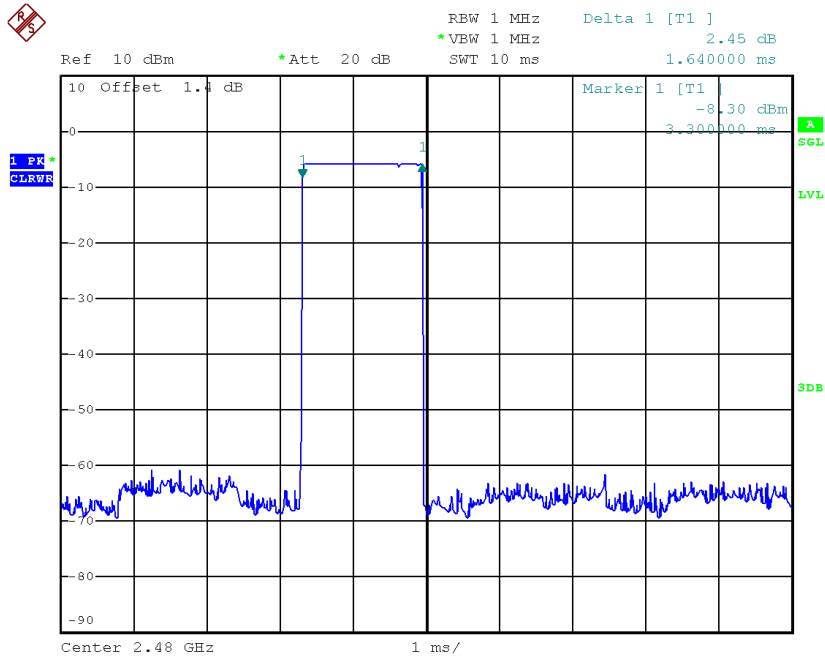


### CH78-DH1



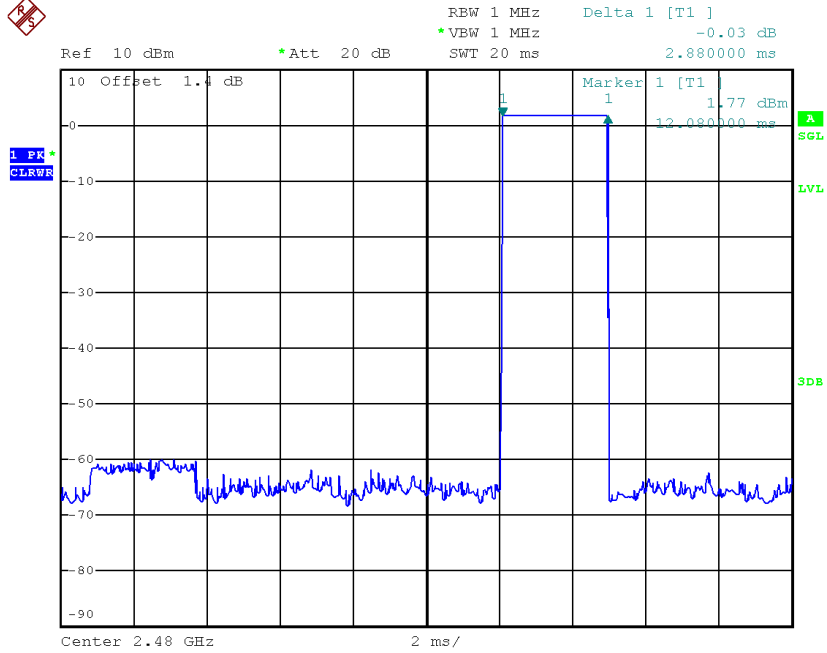
Date: 22.JAN.2017 17:18:25

### CH78-DH3



Date: 22.JAN.2017 17:24:49

# CH78-DH5

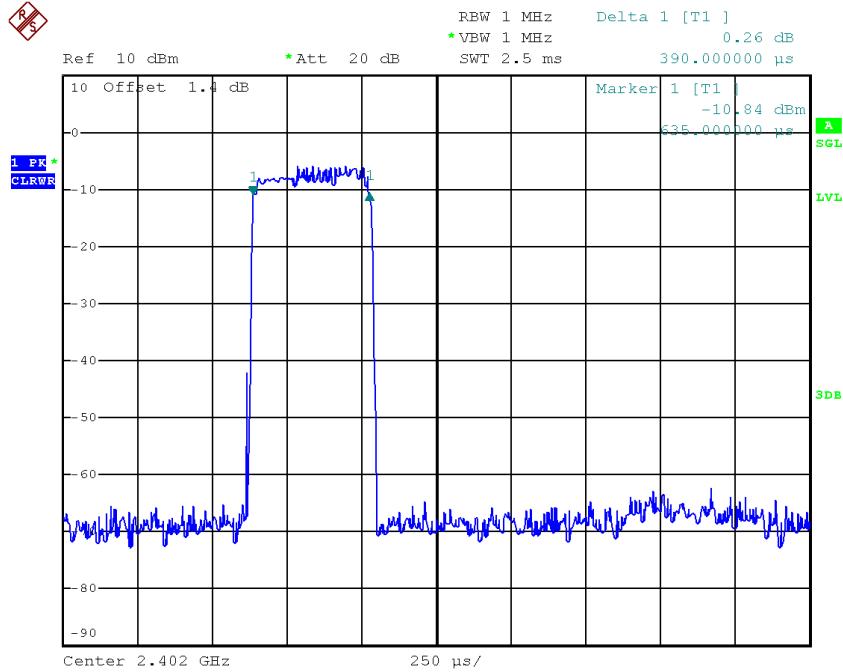


Date: 22.JAN.2017 17:25:52

Test Mode :	TX Mode_3Mbps
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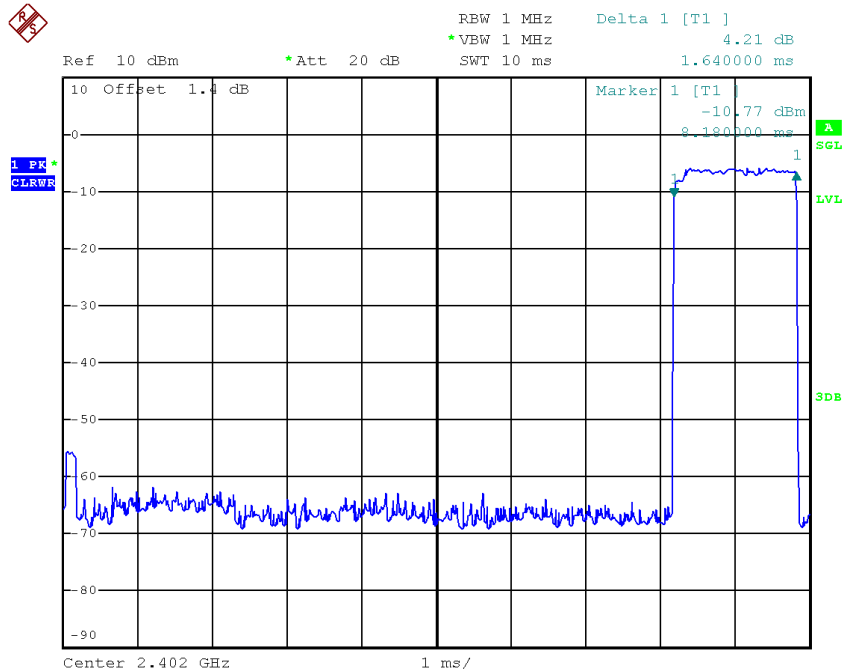
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Pass
DH3	2402	1.6400	0.2624	0.4000	Pass
DH1	2402	0.3900	0.1248	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH3	2441	1.6600	0.2656	0.4000	Pass
DH1	2441	0.3850	0.1232	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6400	0.2624	0.4000	Pass
DH1	2480	0.4000	0.1280	0.4000	Pass

### CH00-DH1



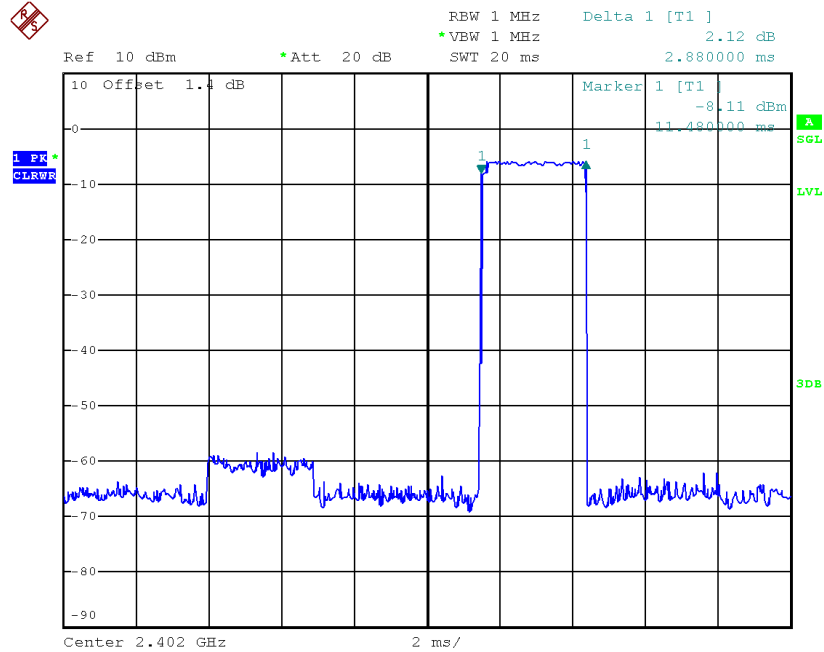
Date: 22.JAN.2017 17:58:09

### CH00-DH3



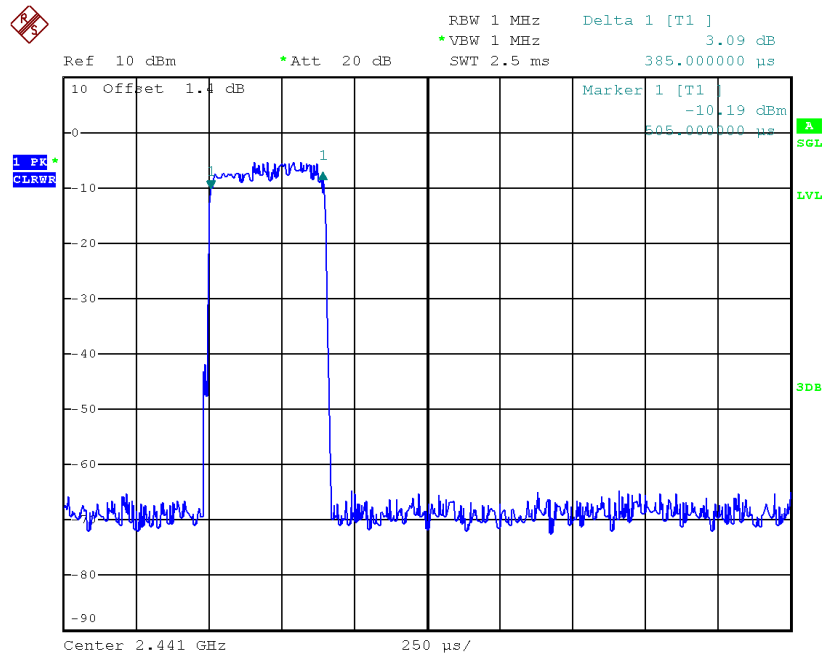
Date: 22.JAN.2017 17:58:30

### CH00-DH5



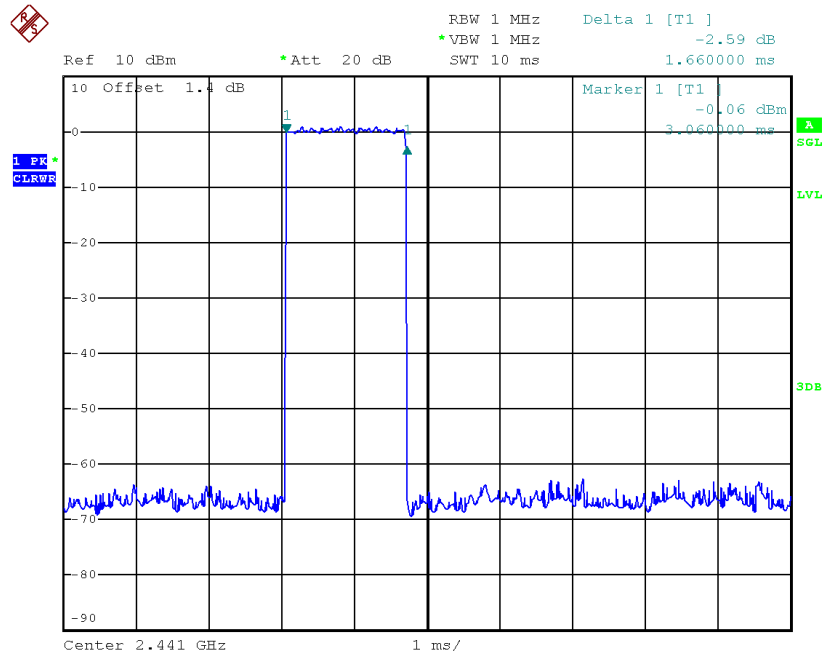
Date: 22.JAN.2017 17:58:51

### CH39-DH1



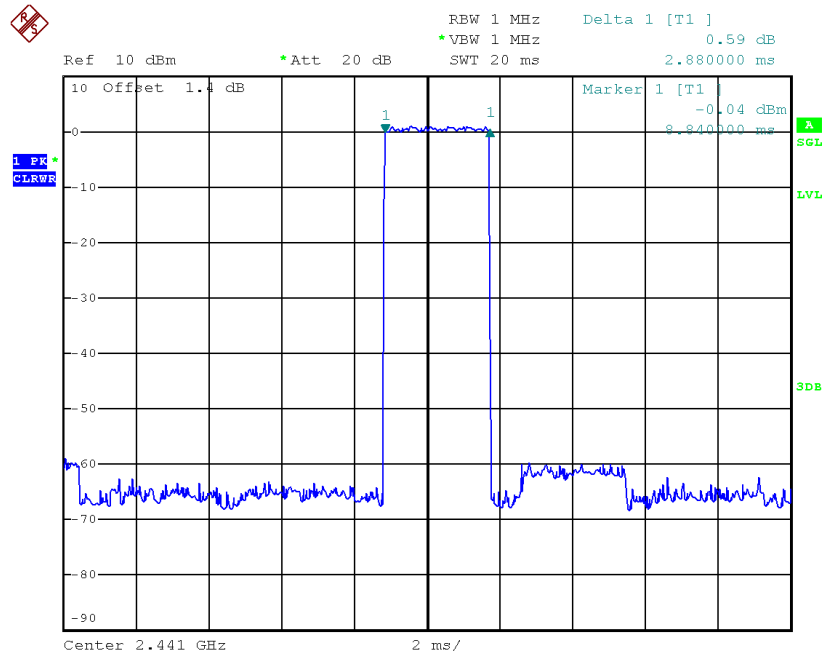
Date: 22.JAN.2017 17:58:13

### CH39-DH3



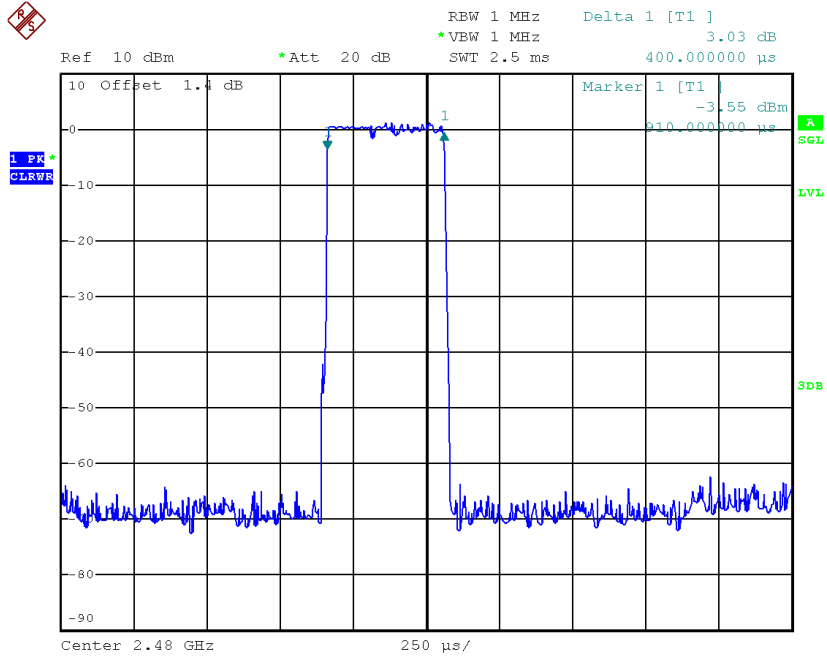
Date: 22.JAN.2017 17:58:34

### CH39-DH5



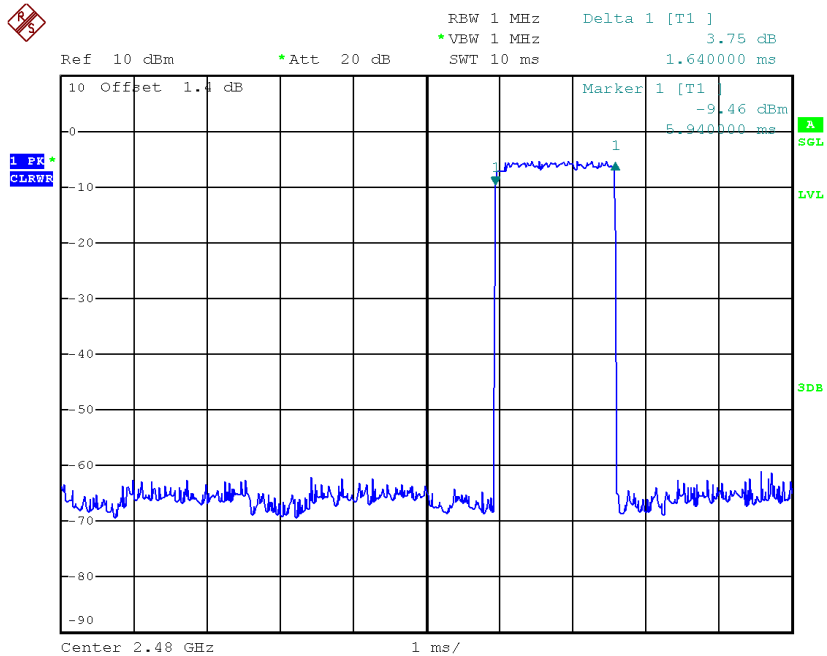
Date: 22.JAN.2017 17:58:55

### CH78-DH1



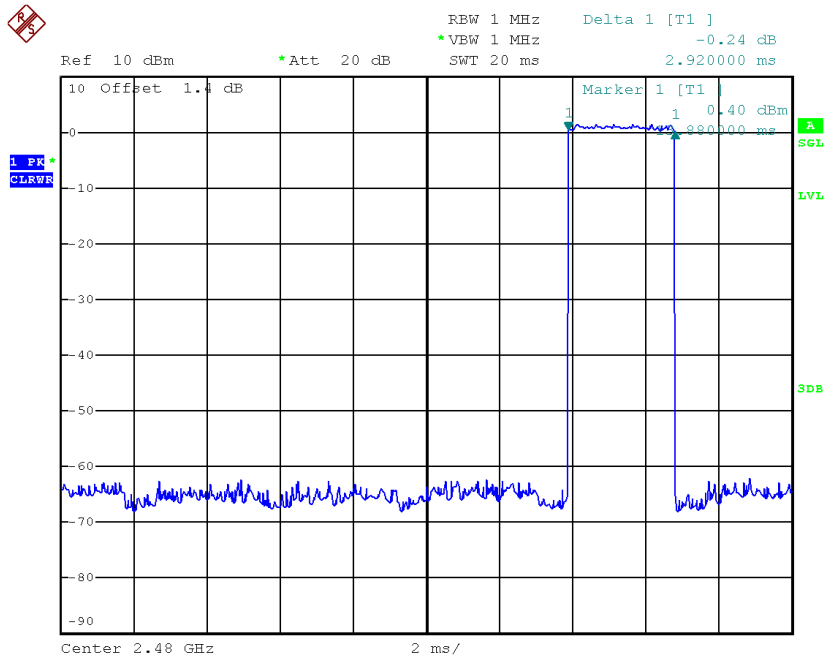
Date: 22.JAN.2017 17:58:18

### CH78-DH3



Date: 22.JAN.2017 17:58:39

# CH78-DH5



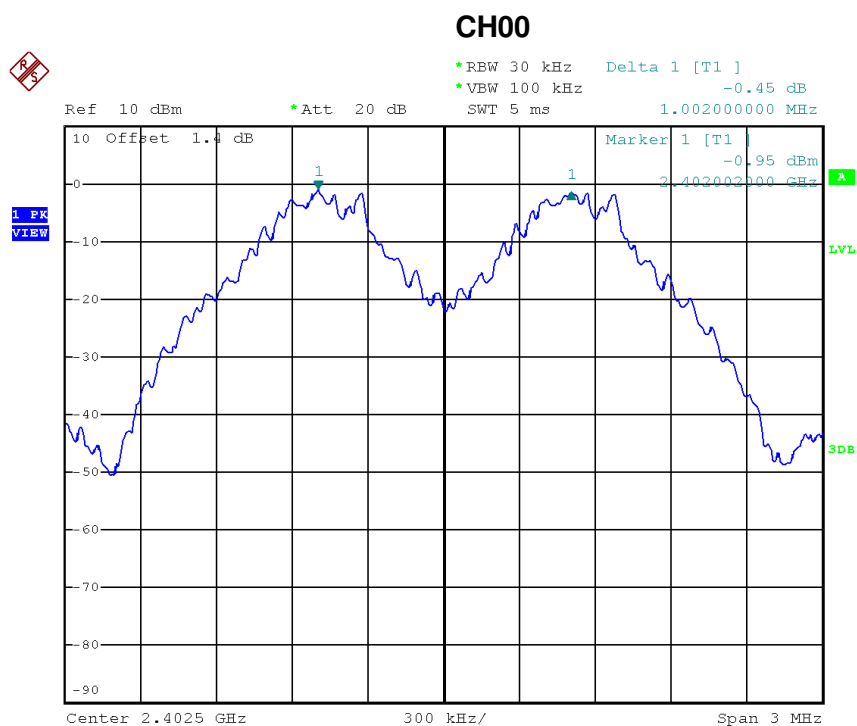
Date: 22.JAN.2017 17:59:00



## ATTACHMENT G - HOPPING CHANNEL SEPARATION MEASUREMENT

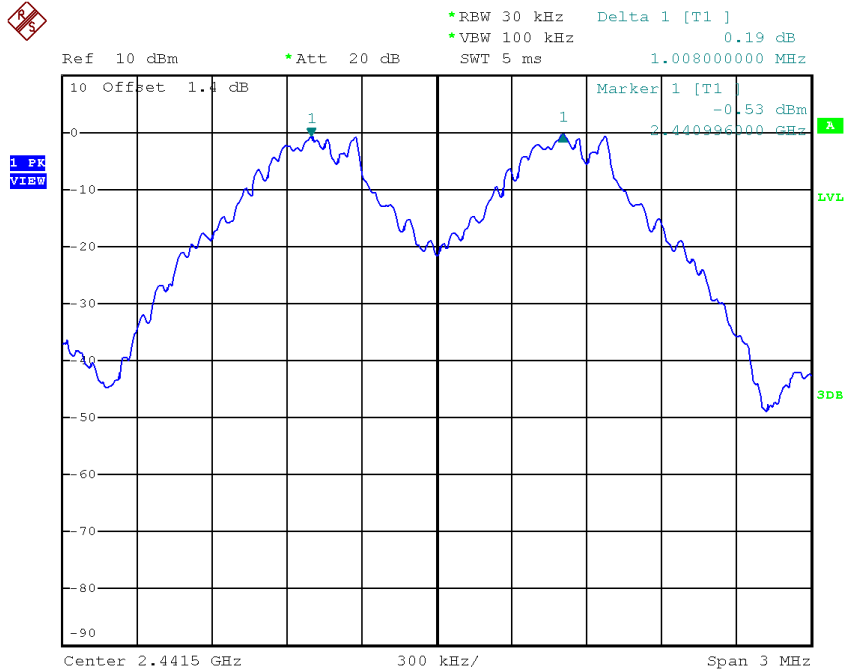
Test Mode :	Hopping on _1Mbps
-------------	-------------------

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.002	0.627	Pass
2441	1.008	0.679	Pass
2480	1.002	0.675	Pass



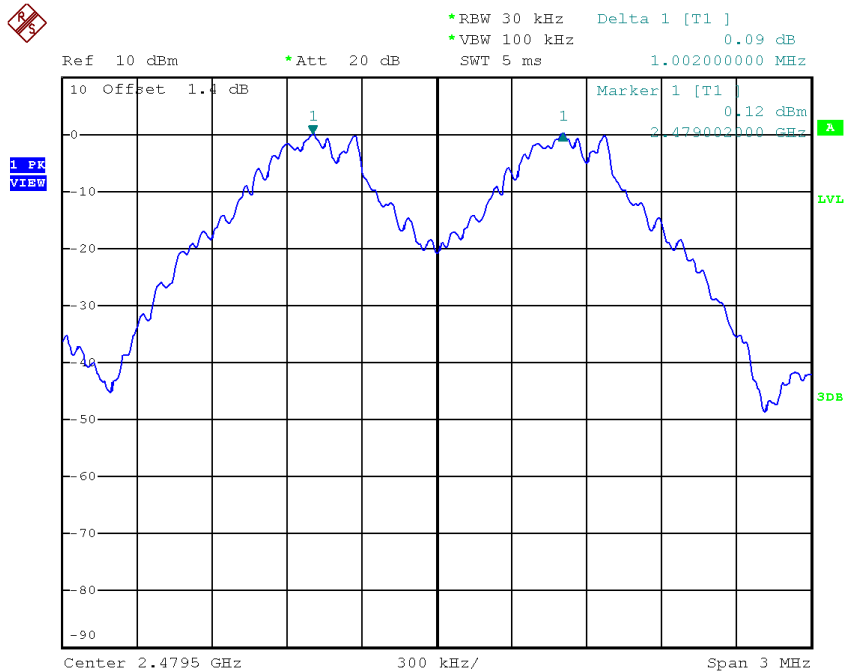
Date: 22.JAN.2017 16:59:02

### CH39



Date: 22.JAN.2017 17:04:30

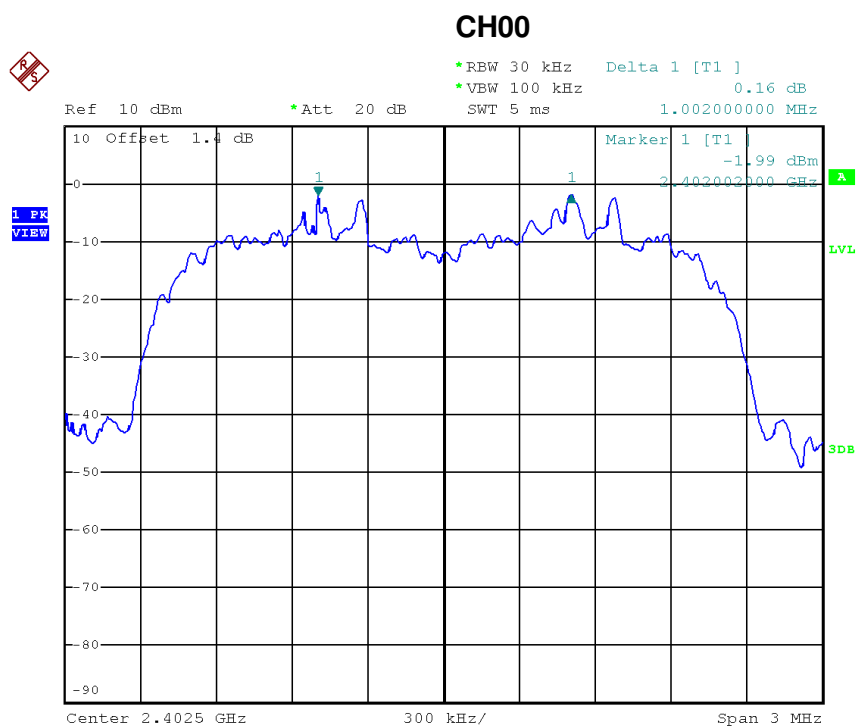
### CH78



Date: 22.JAN.2017 17:14:37

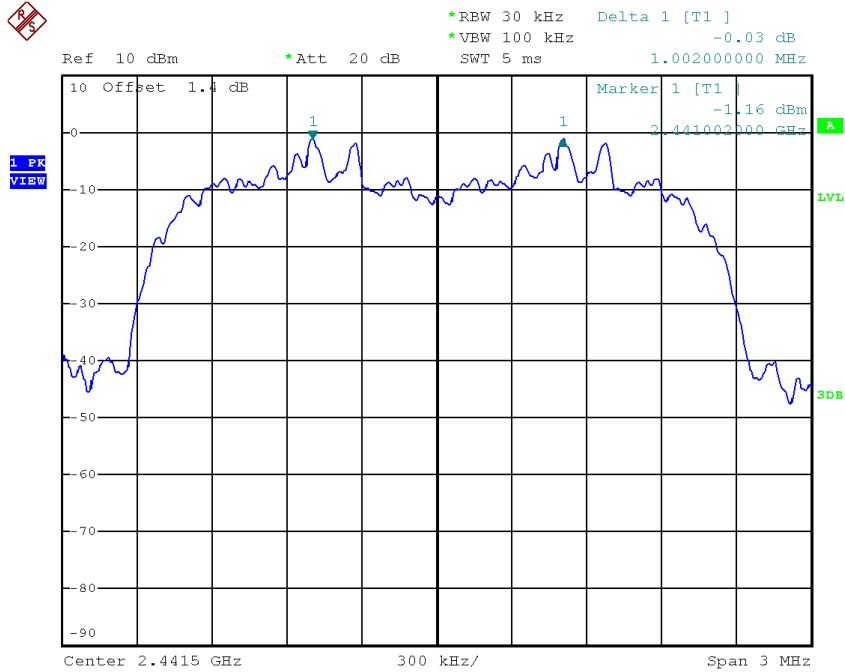
Test Mode :	Hopping on _3Mbps
-------------	-------------------

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.002	0.857	Pass
2441	1.002	0.840	Pass
2480	1.002	0.872	Pass



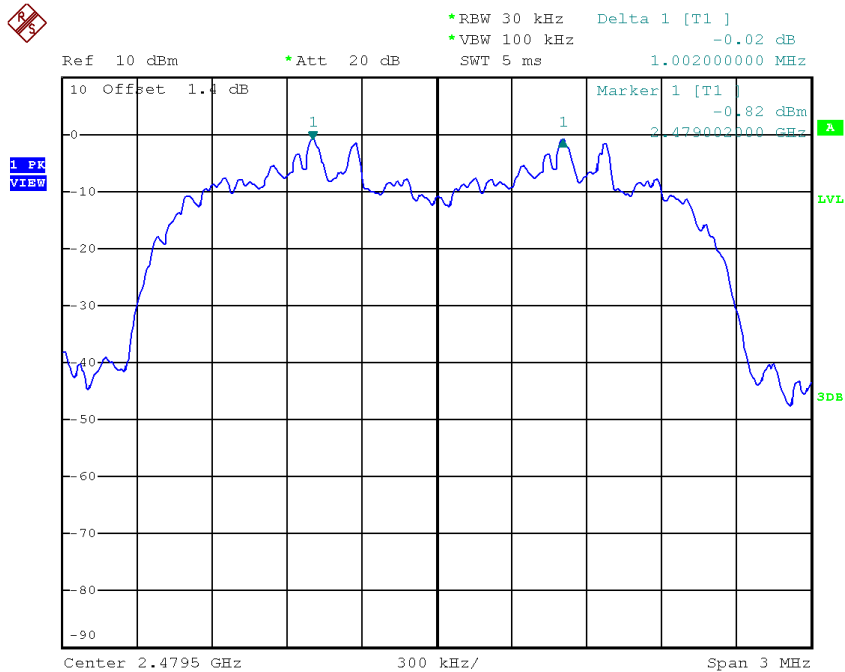
Date: 22.JAN.2017 17:48:02

### CH39



Date: 22.JAN.2017 17:54:44

### CH78

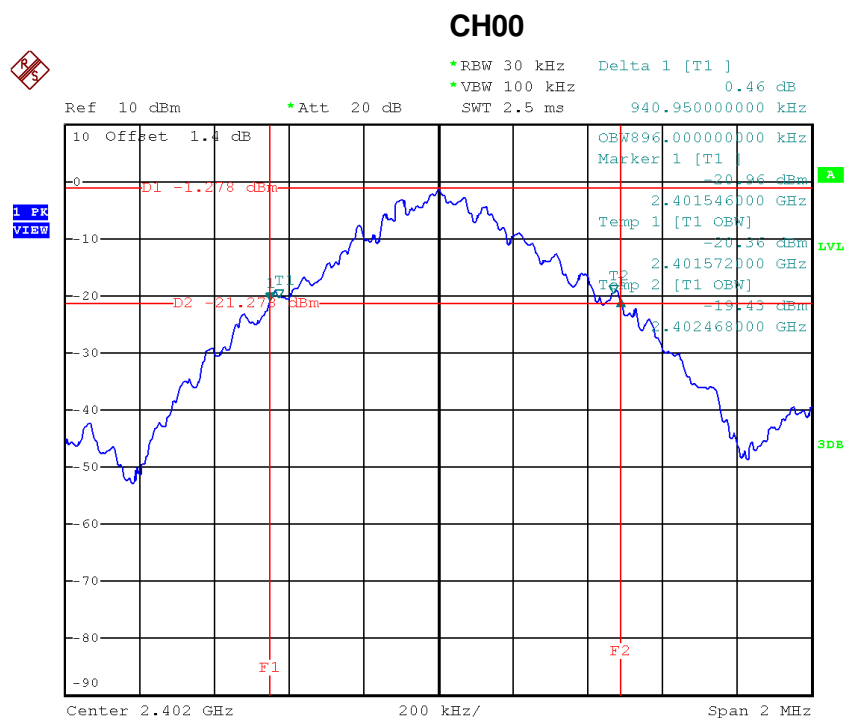


Date: 22.JAN.2017 17:56:52

## ATTACHMENT H - BANDWIDTH

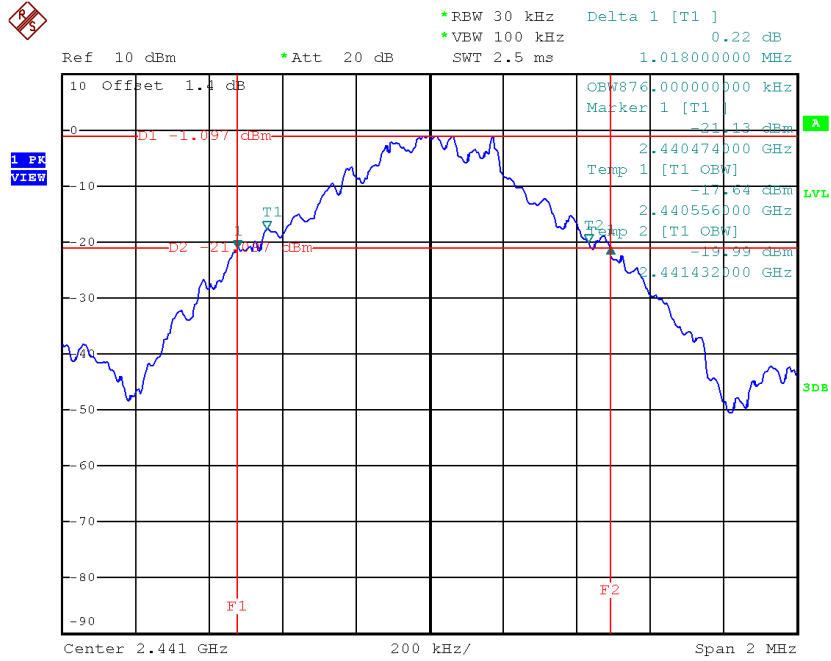
Test Mode :	TX Mode _1Mbps
-------------	----------------

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.941	0.896	Pass
2441	1.018	0.876	Pass
2480	1.012	0.872	Pass



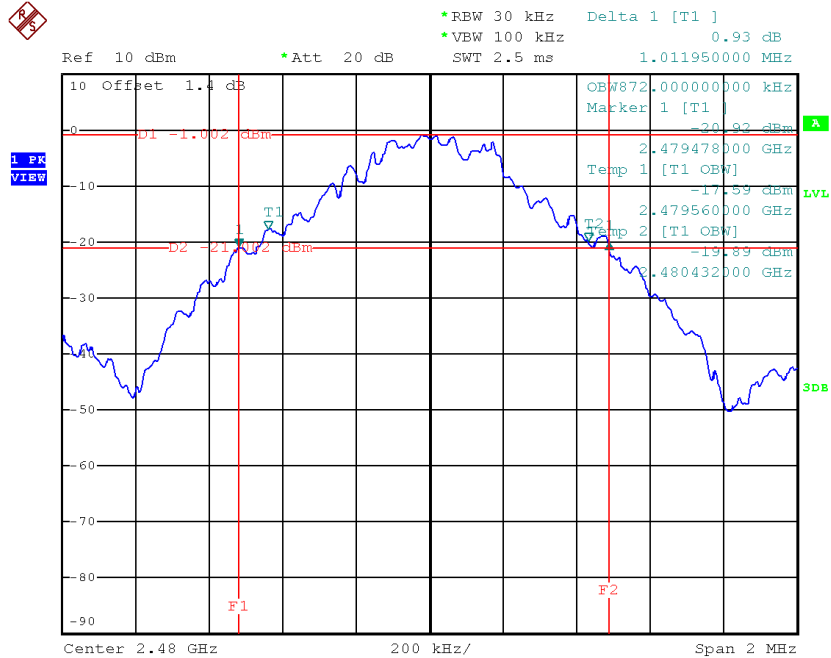
Date: 22.JAN.2017 16:47:08

### CH39



Date: 22.JAN.2017 16:50:56

### CH78

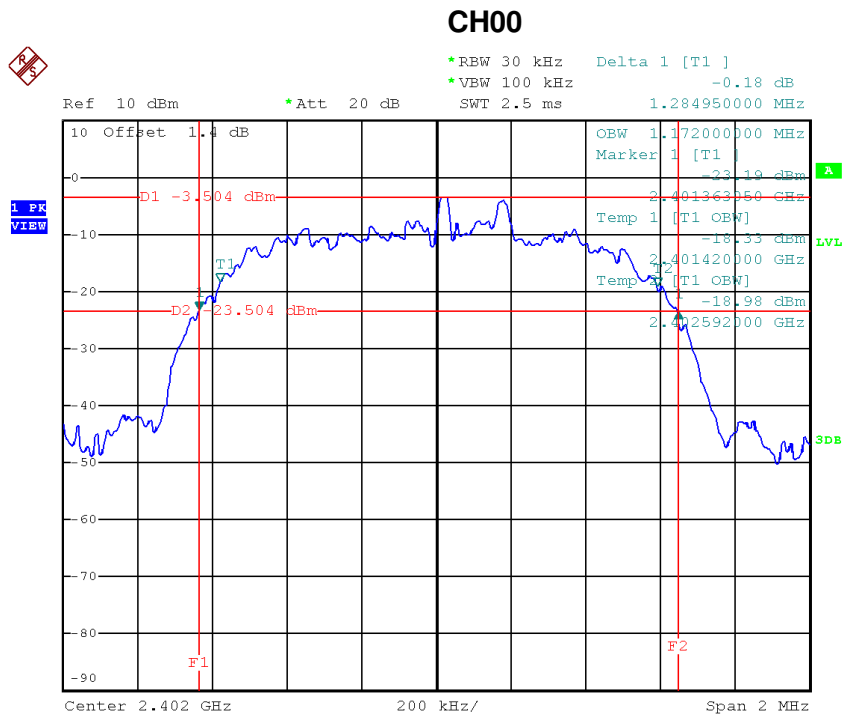


Date: 22.JAN.2017 16:52:47



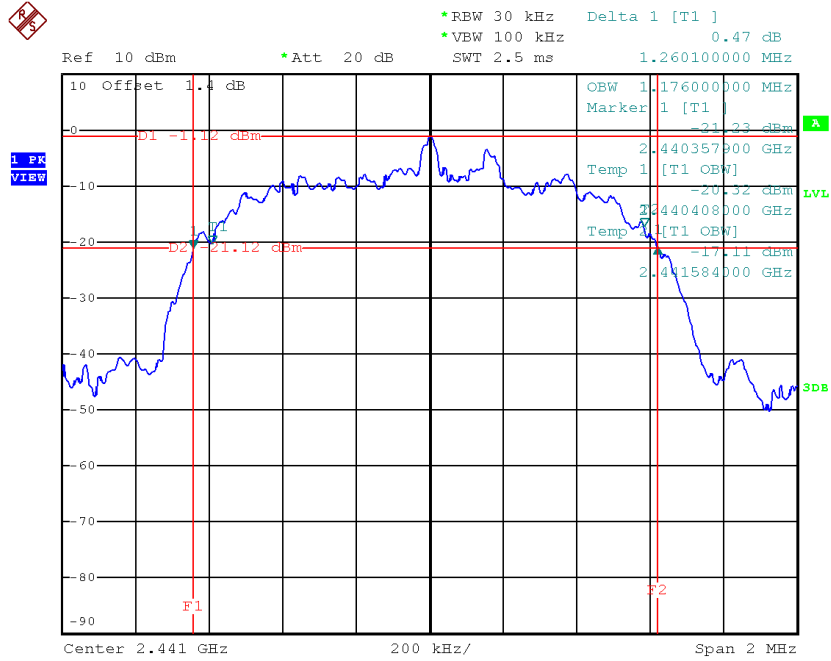
Test Mode :	TX Mode _3Mbps
-------------	----------------

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.285	1.172	Pass
2441	1.260	1.176	Pass
2480	1.308	1.188	Pass



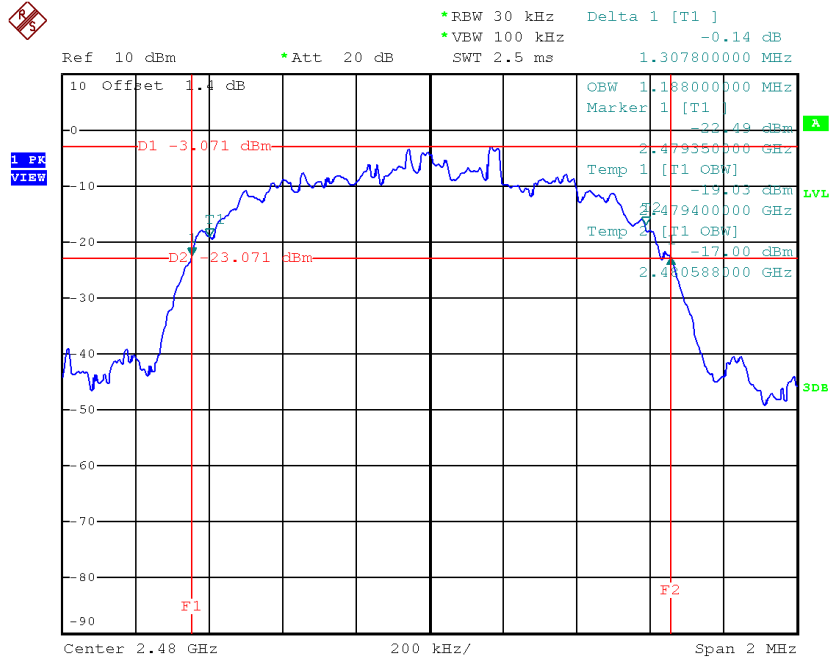
Date: 22.JAN.2017 17:31:10

### CH39



Date: 22.JAN.2017 17:33:17

### CH78

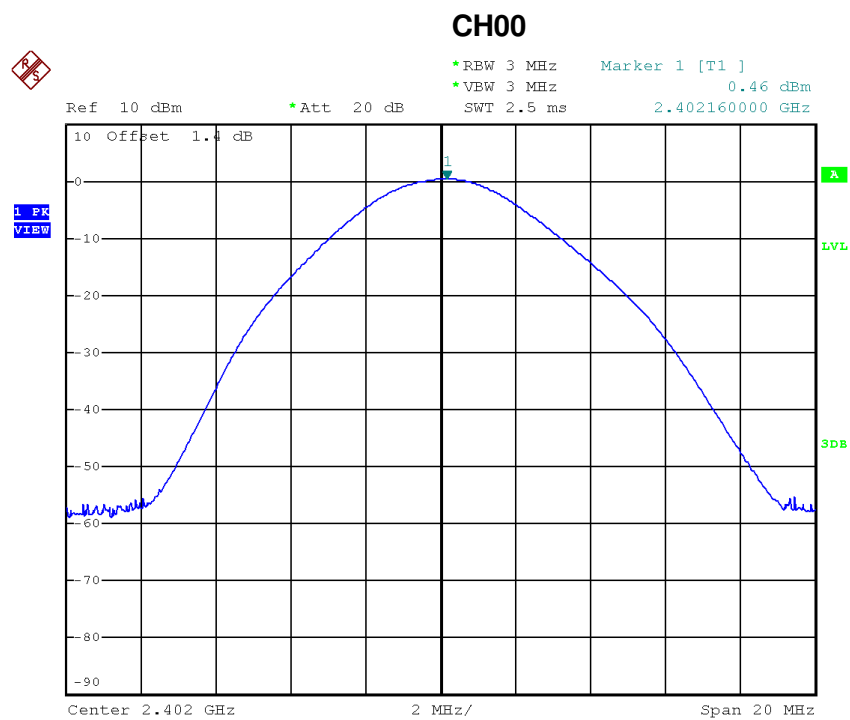


Date: 22.JAN.2017 17:34:11

## ATTACHMENT I - PEAK OUTPUT POWER

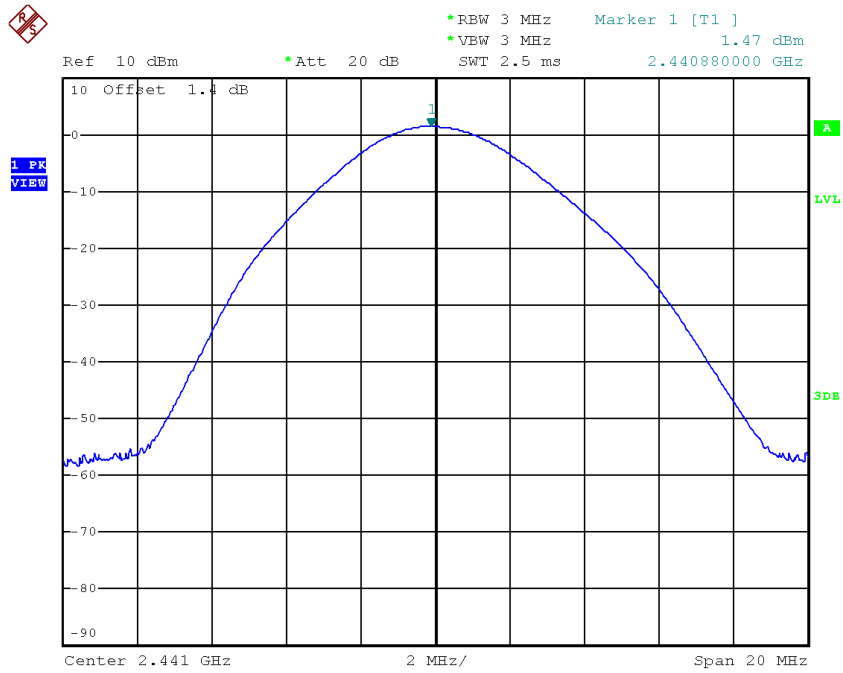
Test Mode :	TX Mode _1Mbps
-------------	----------------

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	0.46	0.0011	30.00	1.00	Pass
2441	1.47	0.0014	30.00	1.00	Pass
2480	1.61	0.0014	30.00	1.00	Pass



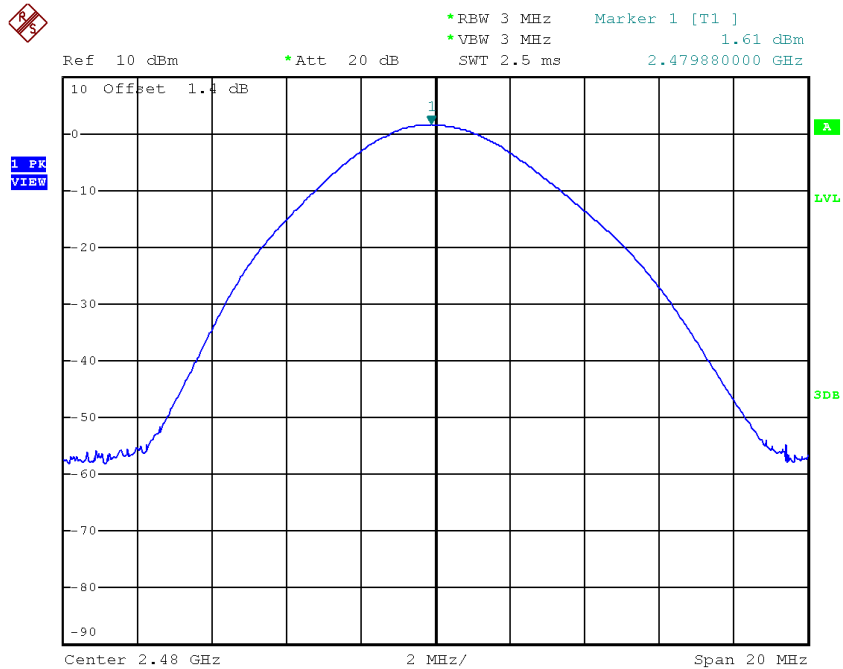
Date: 22.JAN.2017 16:47:42

### CH39



Date: 22.JAN.2017 16:51:03

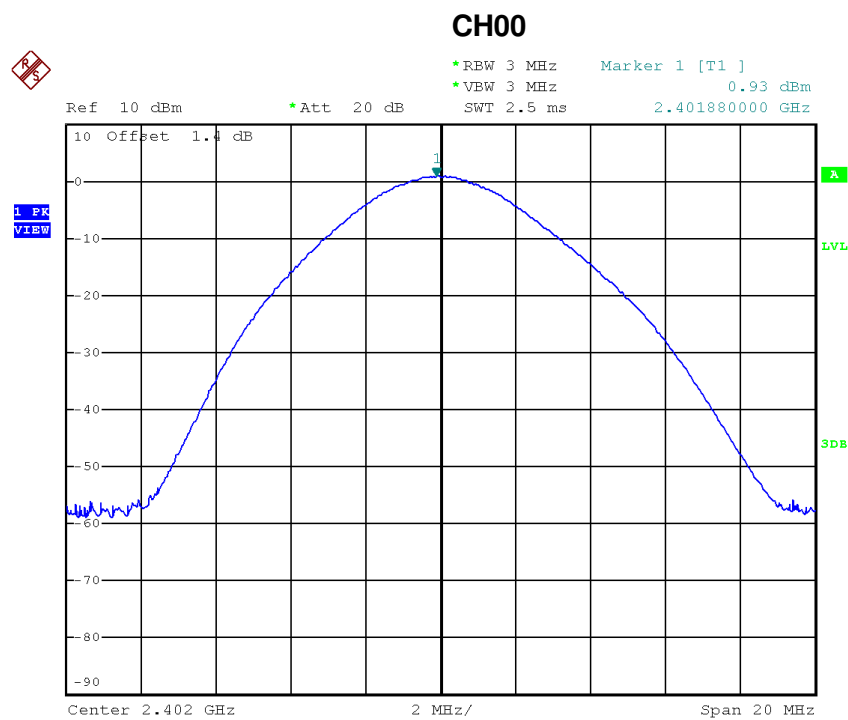
### CH78



Date: 22.JAN.2017 16:53:20

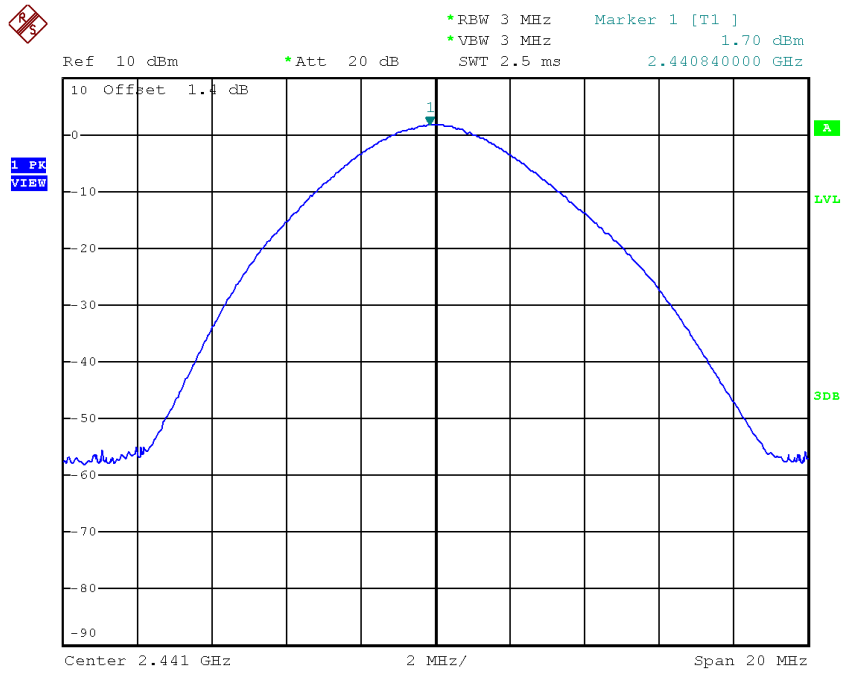
Test Mode :	TX Mode _3Mbps
-------------	----------------

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	0.93	0.0012	30.00	1.00	Pass
2441	1.70	0.0015	30.00	1.00	Pass
2480	2.08	0.0016	30.00	1.00	Pass



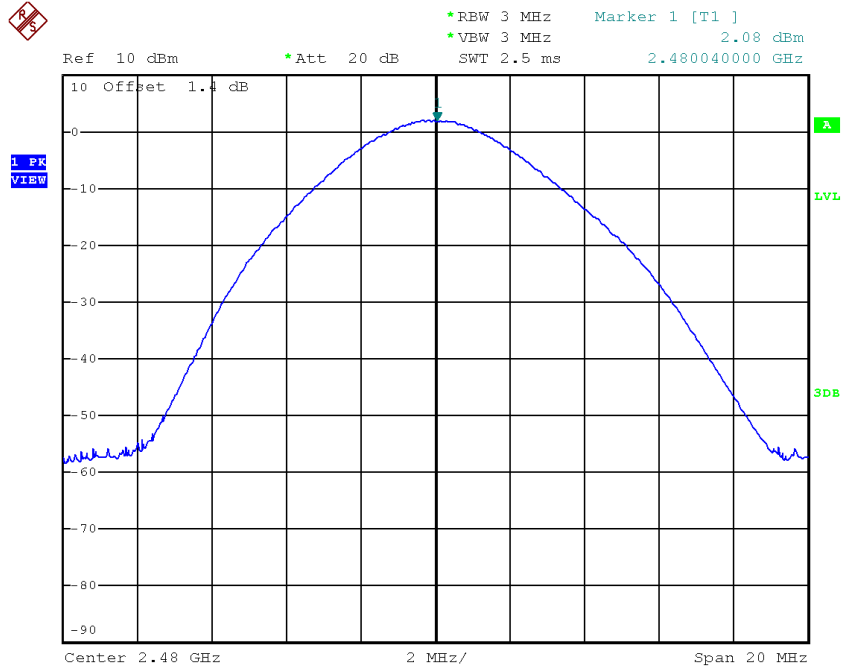
Date: 22.JAN.2017 17:31:44

### CH39



Date: 22.JAN.2017 17:33:23

### CH78

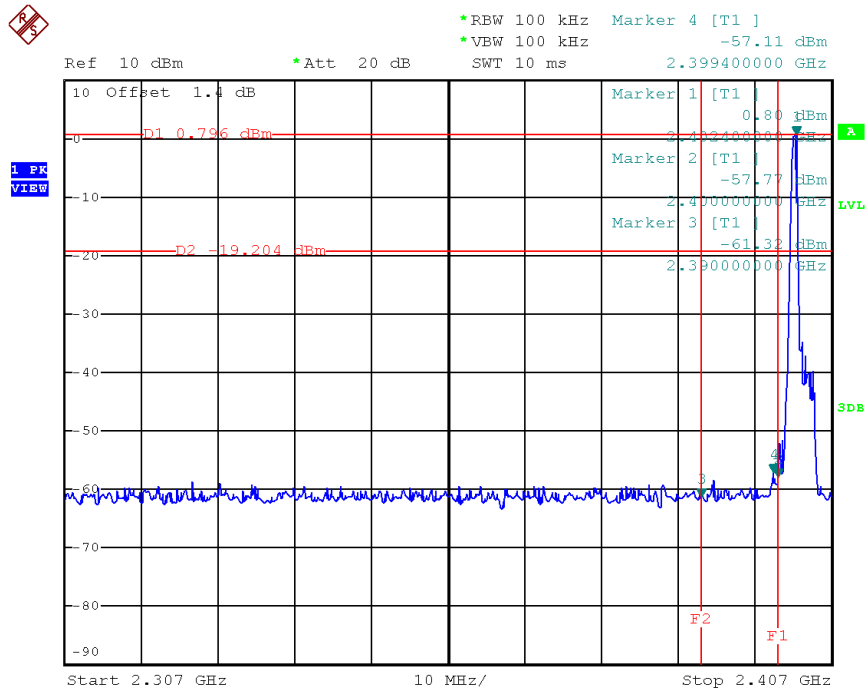


Date: 22.JAN.2017 17:34:45

## ATTACHMENT J - ANTENNA CONDUCTED SPURIOUS EMISSION

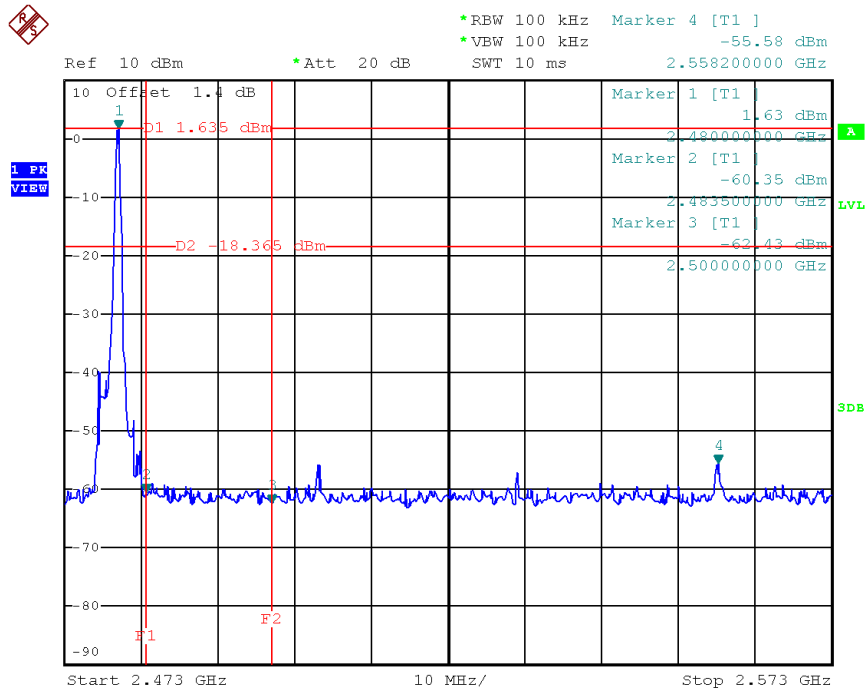


### CH00 (Lower)\_1Mbps



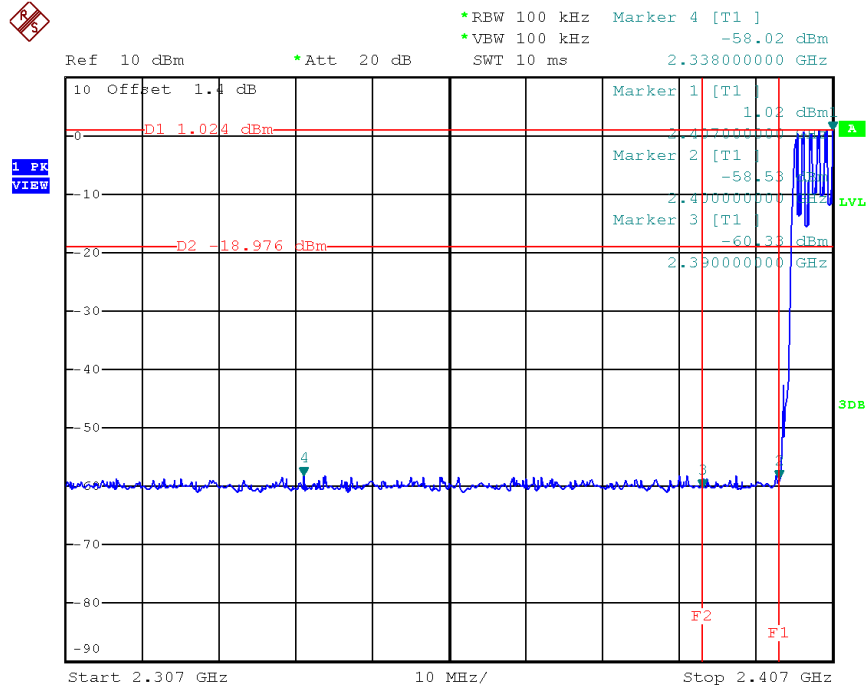
Date: 22.JAN.2017 16:46:34

### CH78 (Upper)\_1Mbps



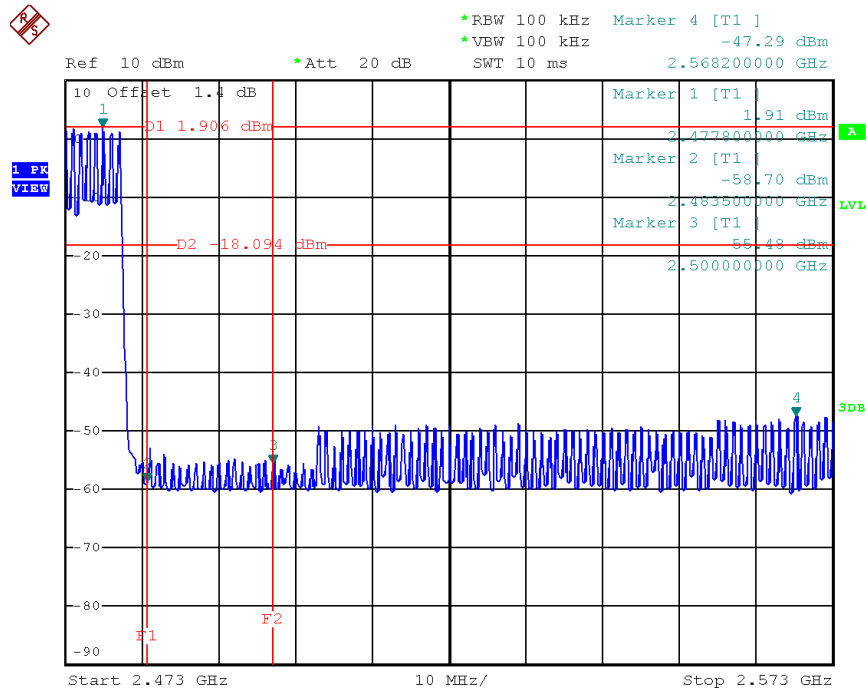
Date: 22.JAN.2017 16:52:18

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



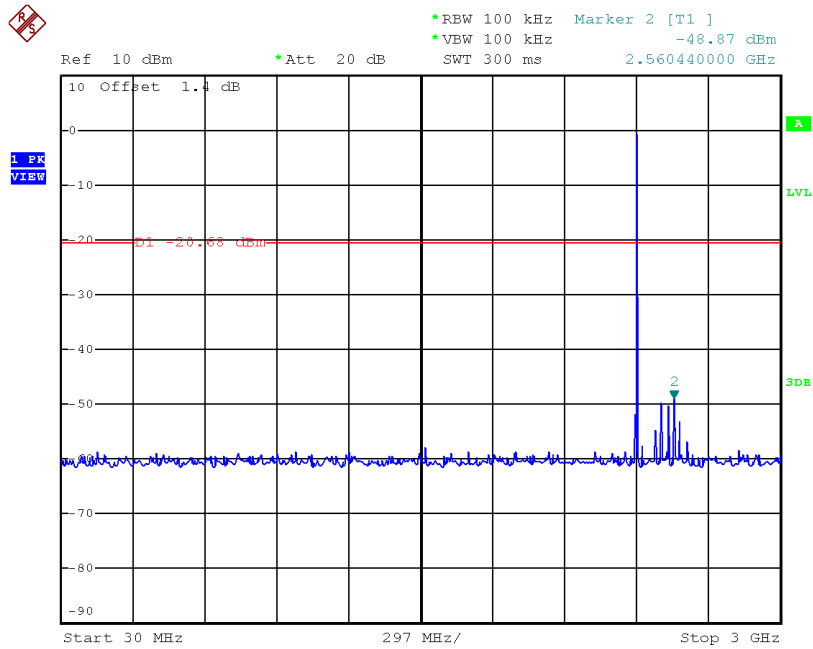
Date: 22.JAN.2017 17:23:48

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

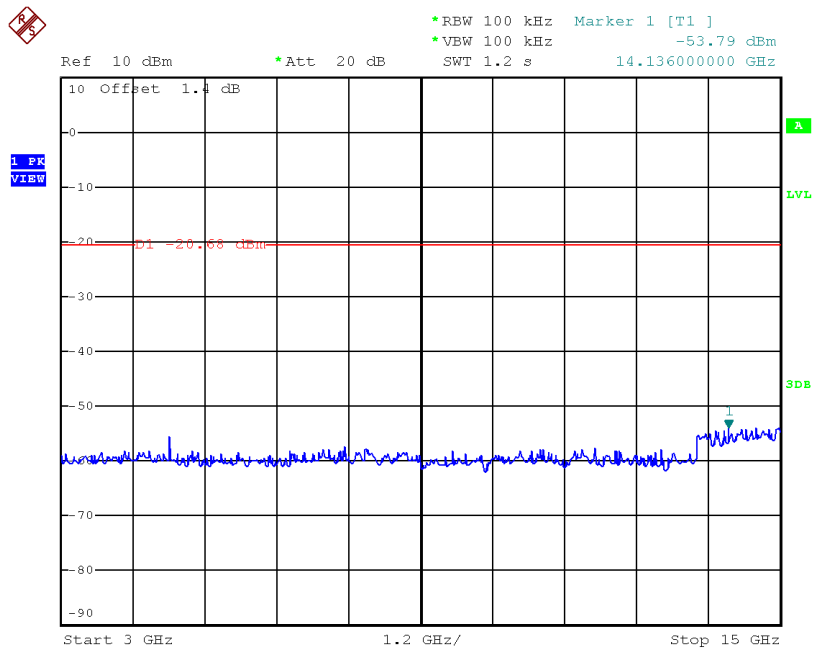


Date: 22.JAN.2017 17:24:26

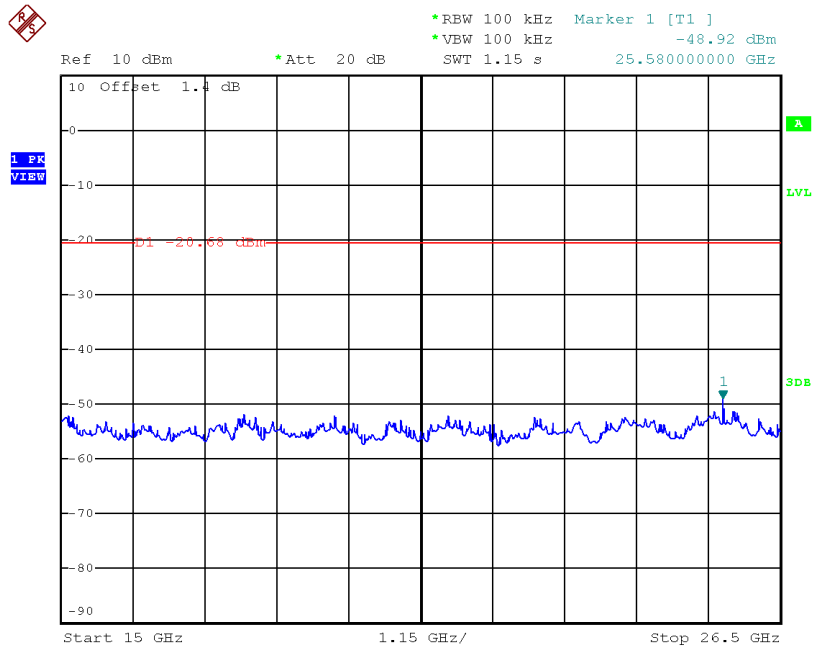
### CH00 (10 Harmonic of the frequency) \_1Mbps



Date: 22.JAN.2017 16:47:21

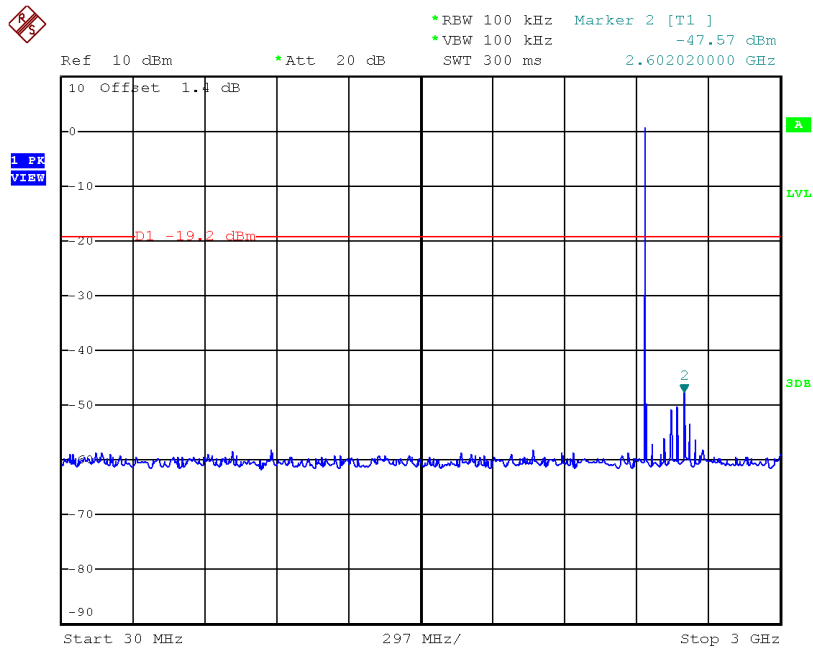


Date: 22.JAN.2017 16:47:29

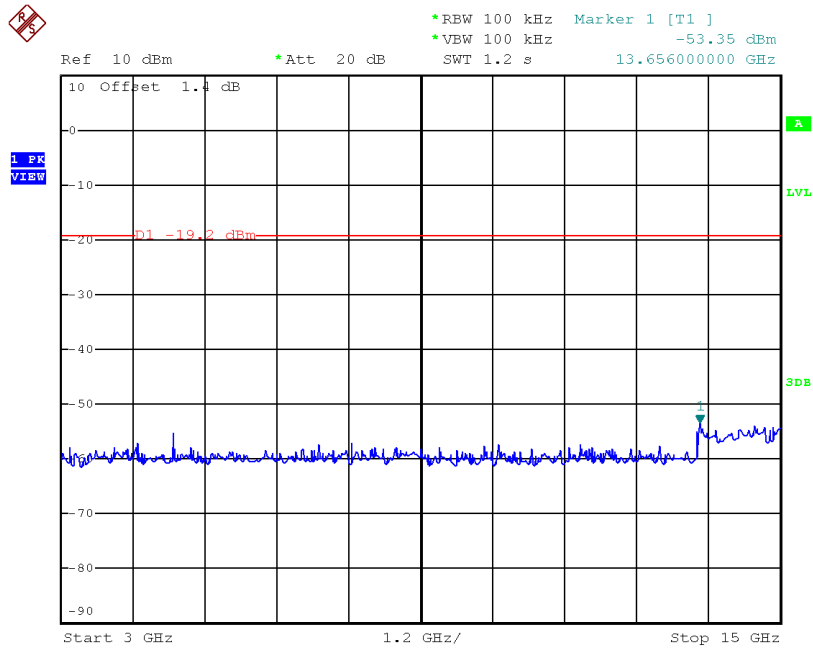


Date: 22.JAN.2017 16:47:36

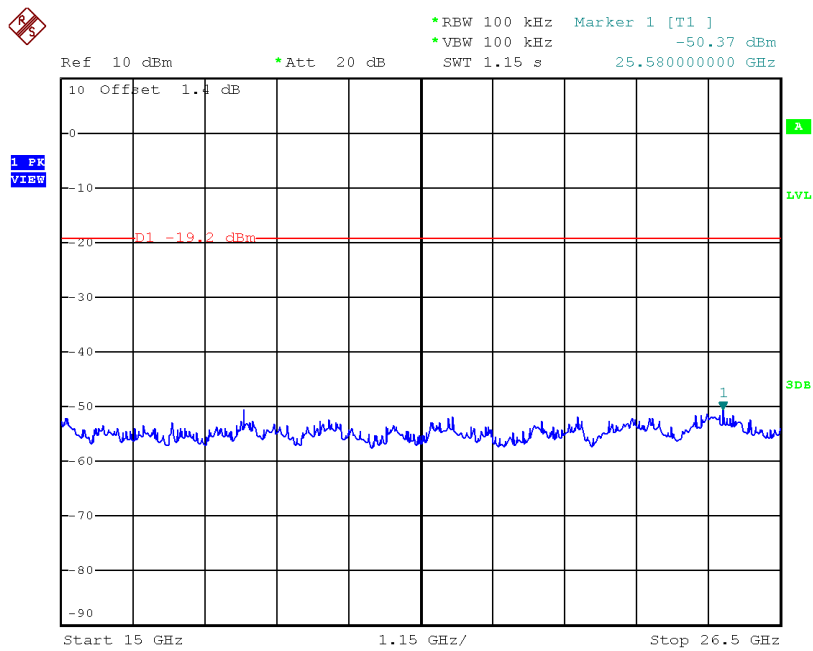
### CH39 (10 Harmonic of the frequency) \_1Mbps



Date: 22.JAN.2017 16:50:10

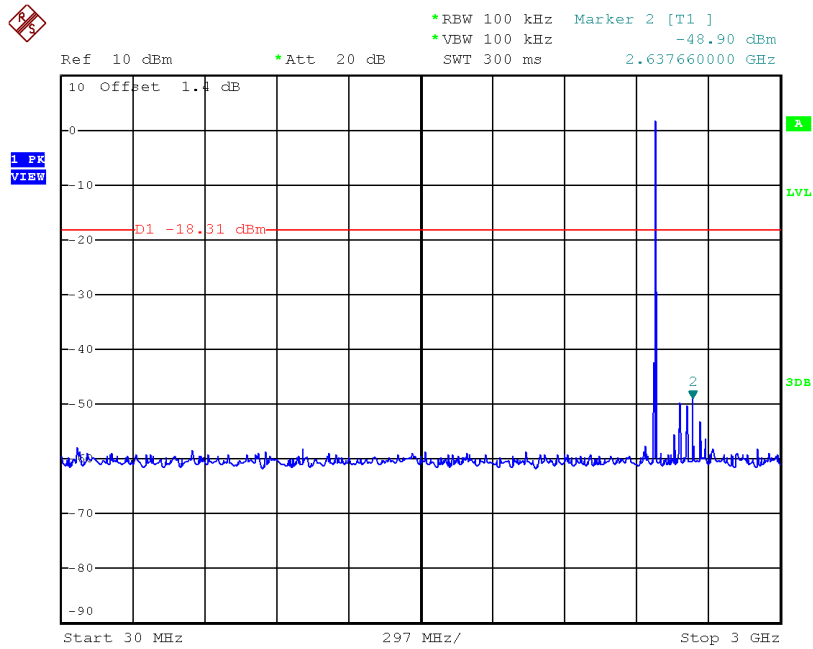


Date: 22.JAN.2017 16:50:18

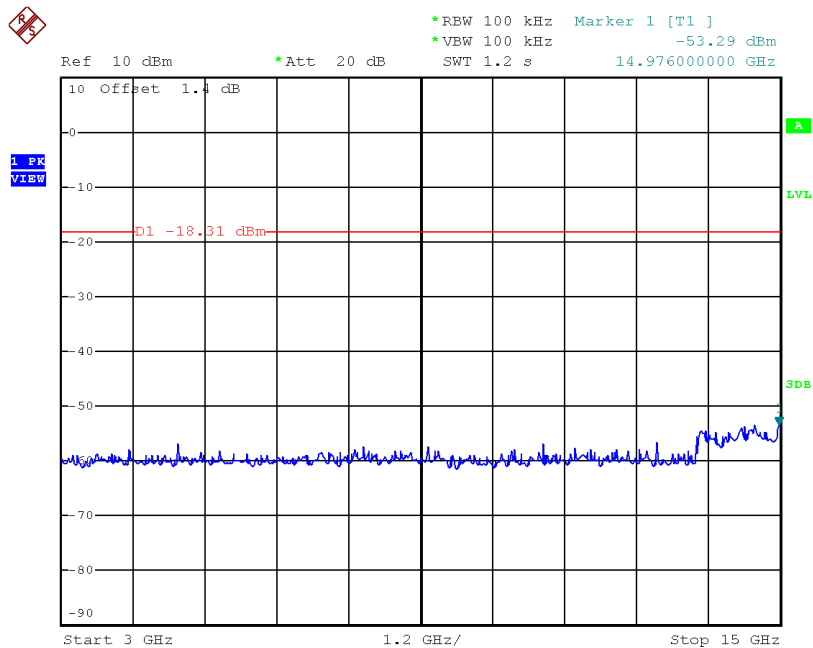


Date: 22.JAN.2017 16:50:25

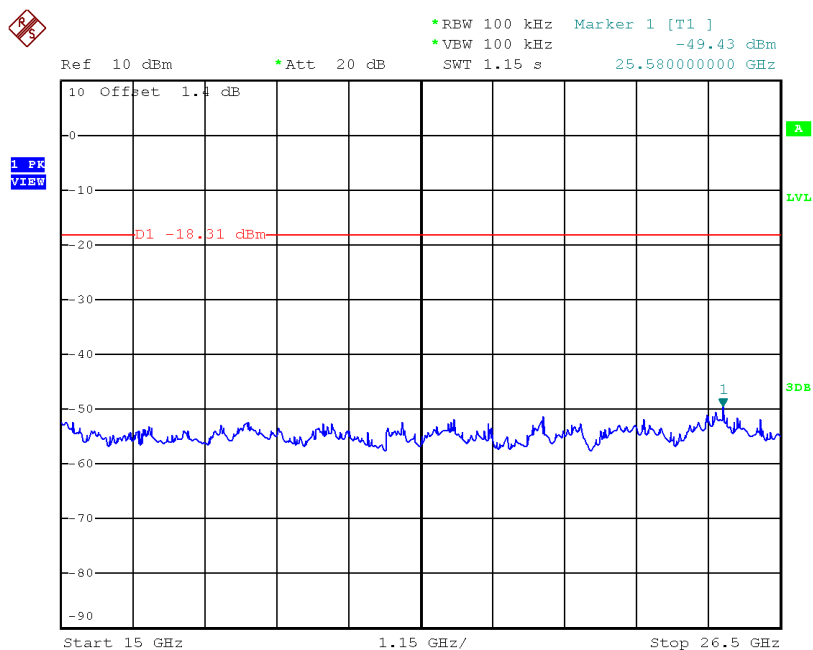
### CH78 (10 Harmonic of the frequency) \_1Mbps



Date: 22.JAN.2017 16:53:00

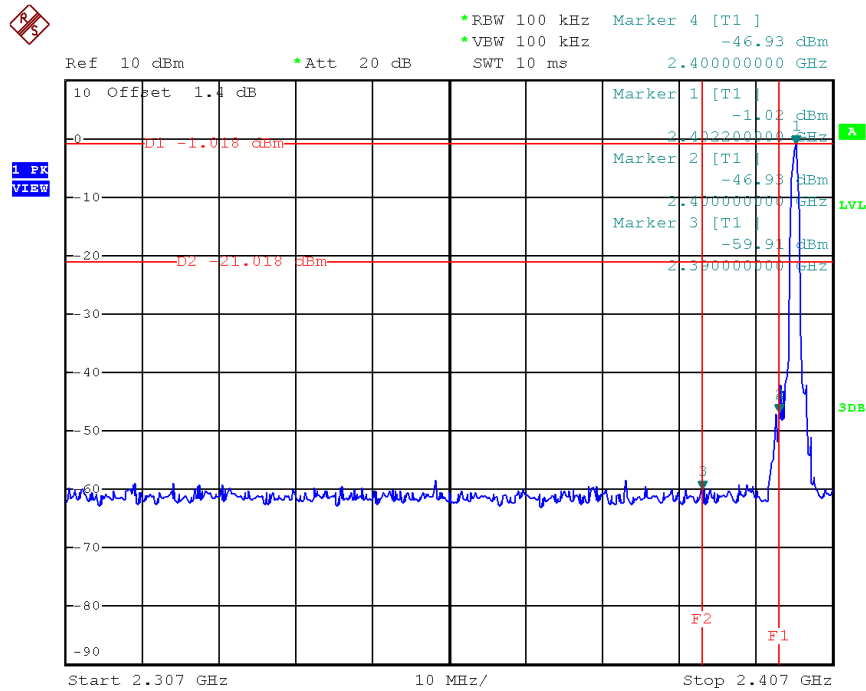


Date: 22.JAN.2017 16:53:07



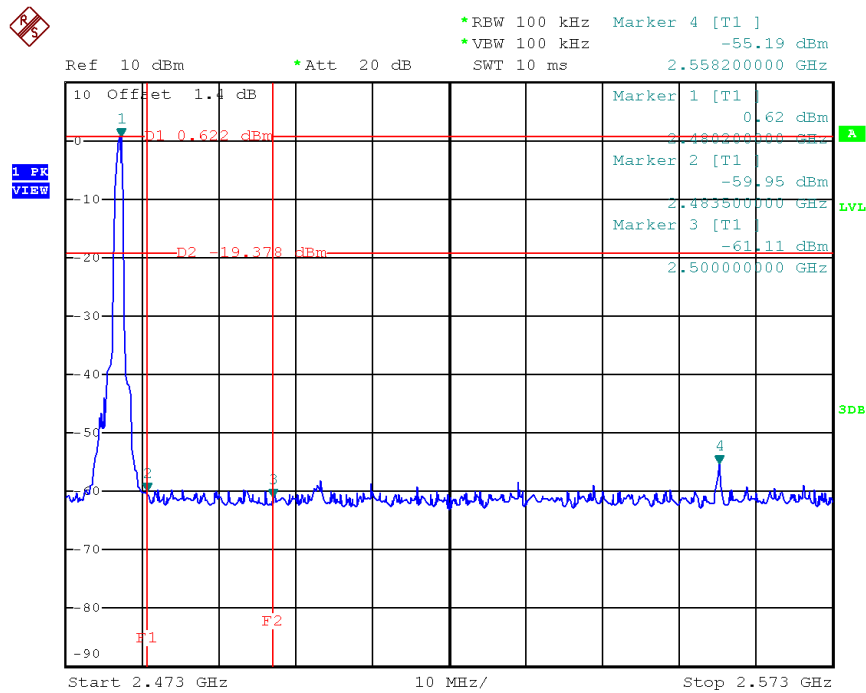
Date: 22.JAN.2017 16:53:14

### CH00 (Lower) \_3Mbps



Date: 22.JAN.2017 17:30:46

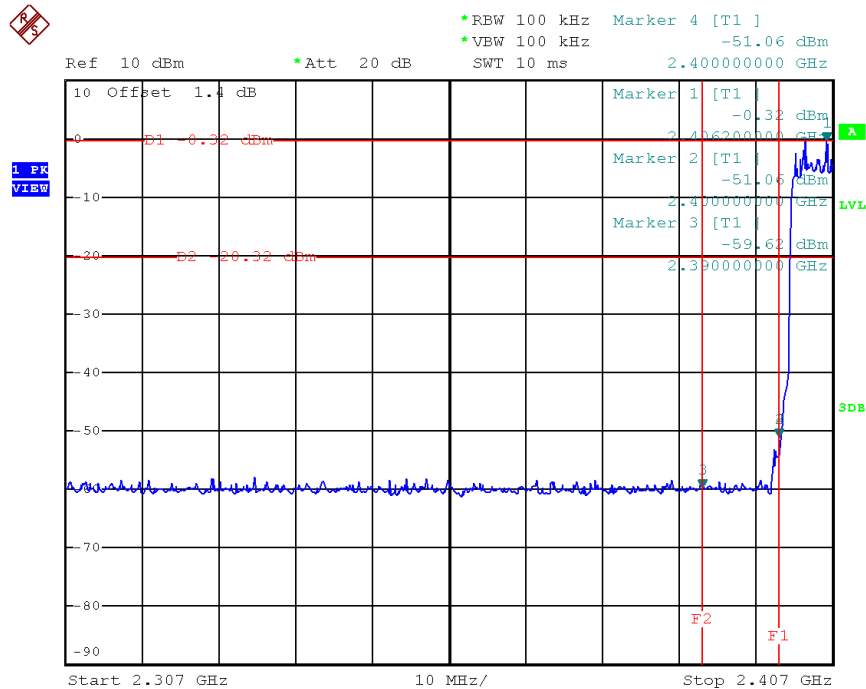
### CH78 (Upper) \_3Mbps



Date: 22.JAN.2017 17:33:44

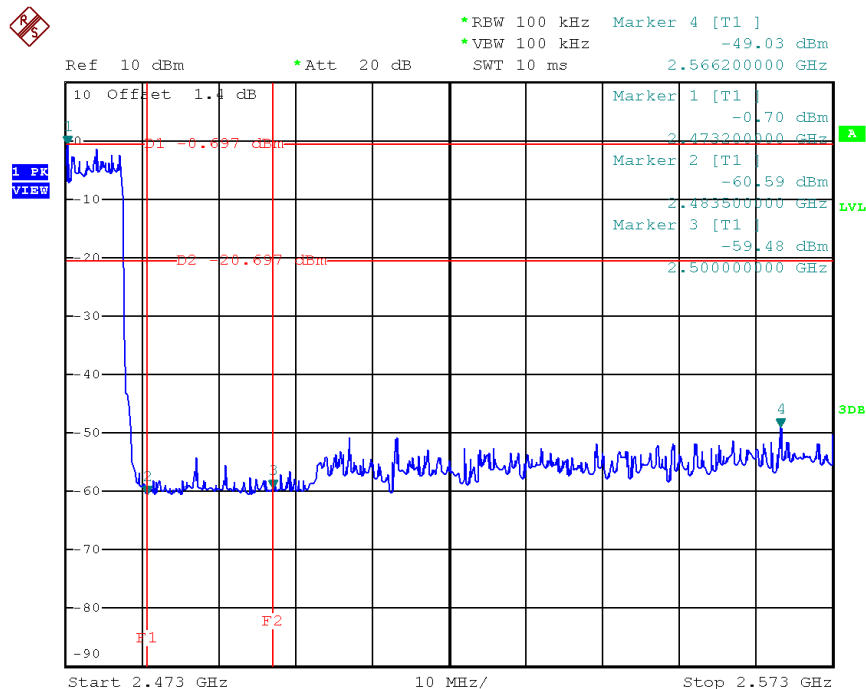


## CH00 Hopping on mode (Lower)\_3Mbps



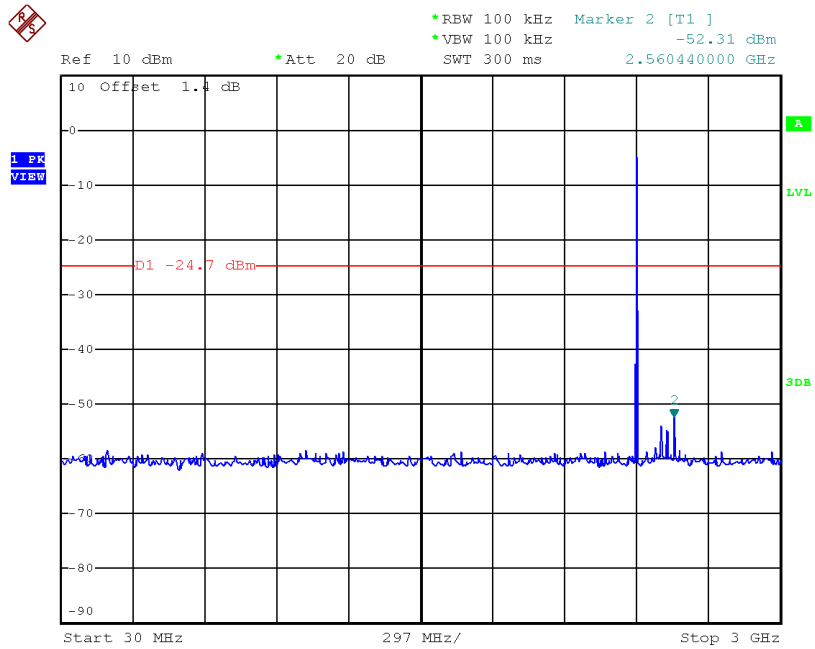
Date: 22.JAN.2017 18:01:33

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

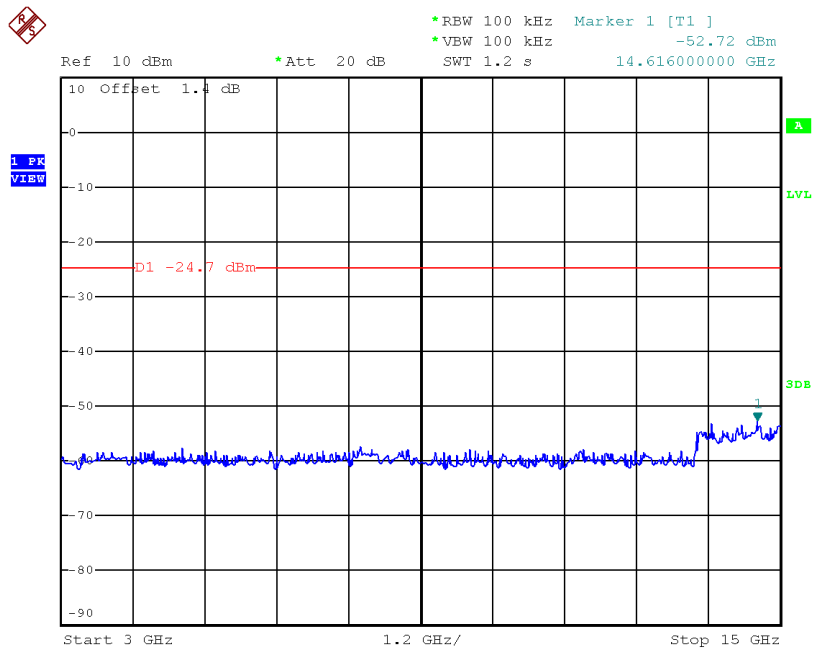


Date: 22.JAN.2017 18:02:07

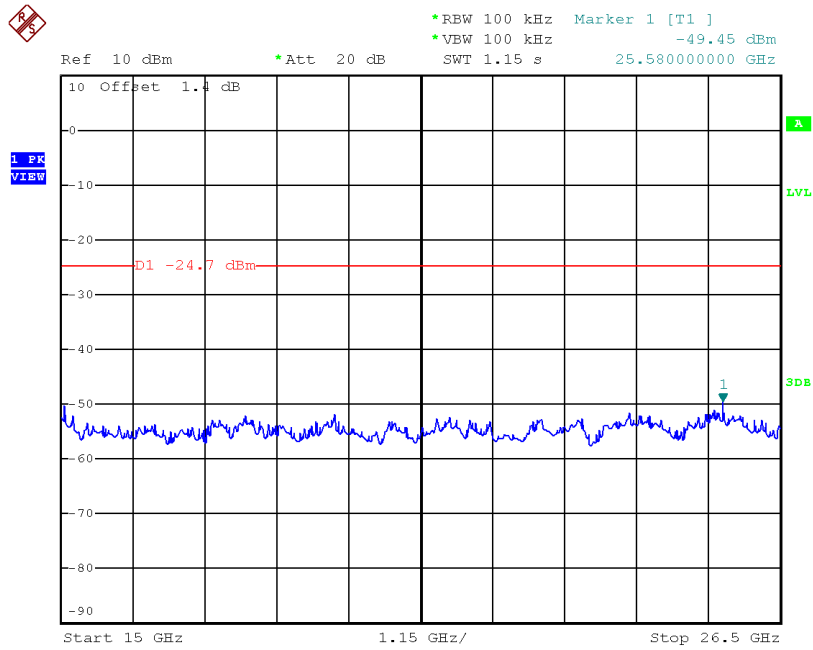
### CH00 (10 Harmonic of the frequency) \_3Mbps



Date: 22.JAN.2017 17:31:24

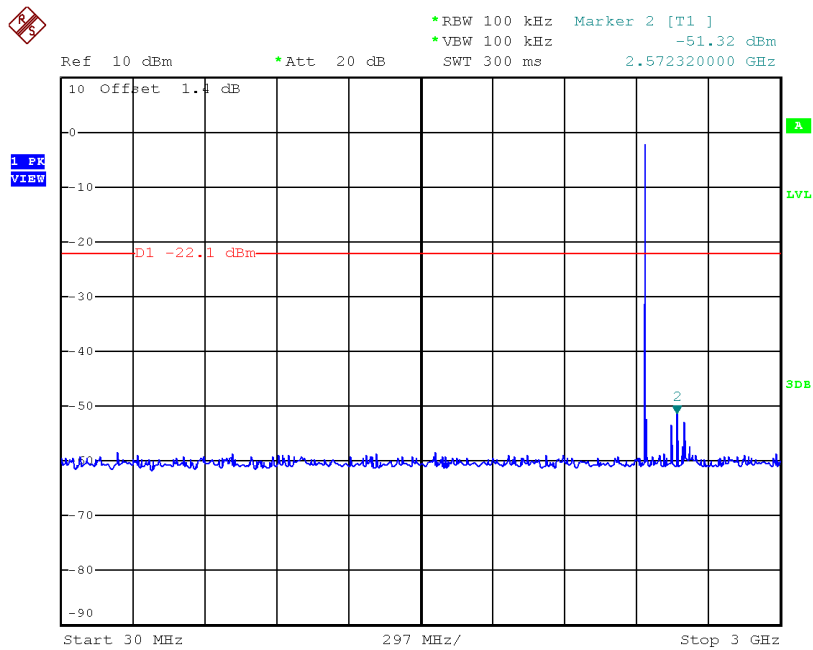


Date: 22.JAN.2017 17:31:31

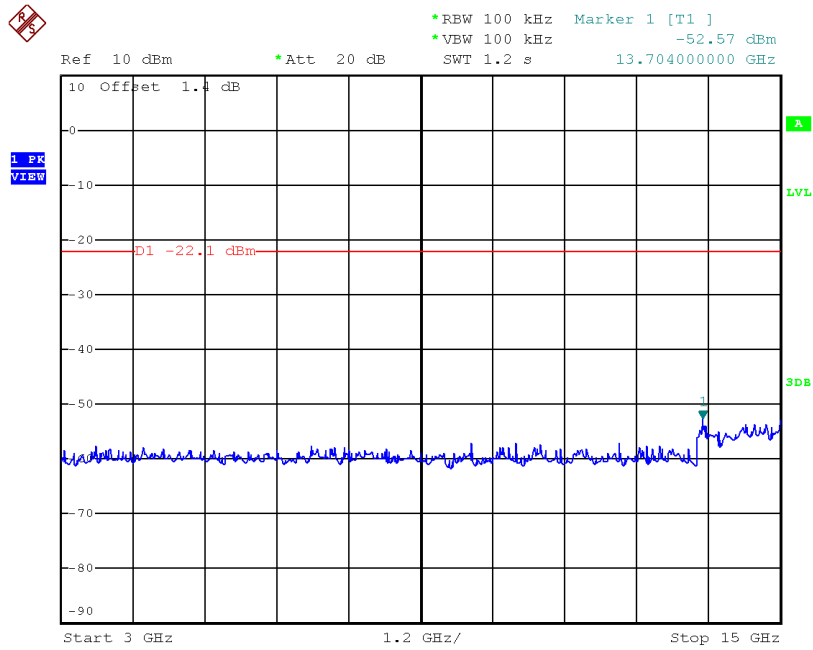


Date: 22.JAN.2017 17:31:38

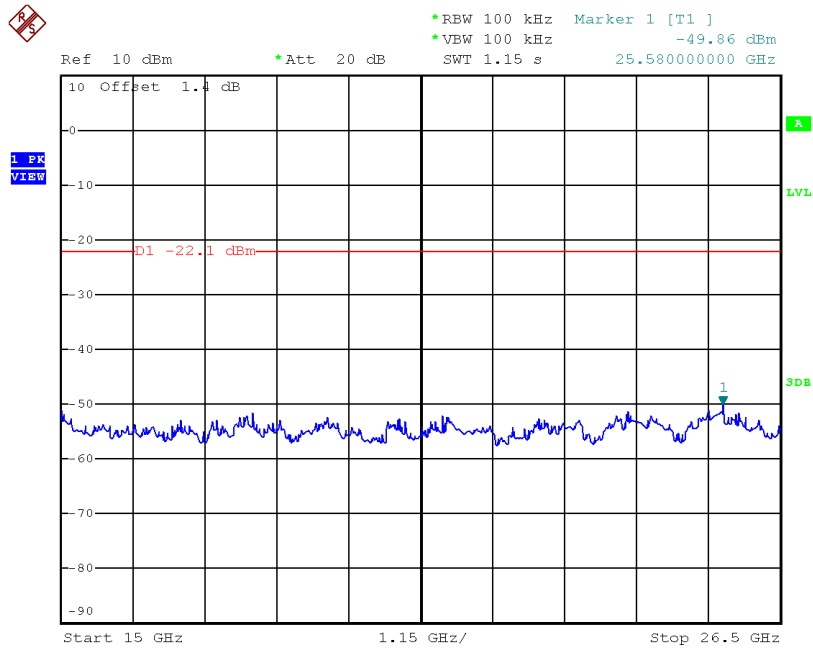
### CH39 (10 Harmonic of the frequency) \_3Mbps



Date: 22.JAN.2017 17:32:39

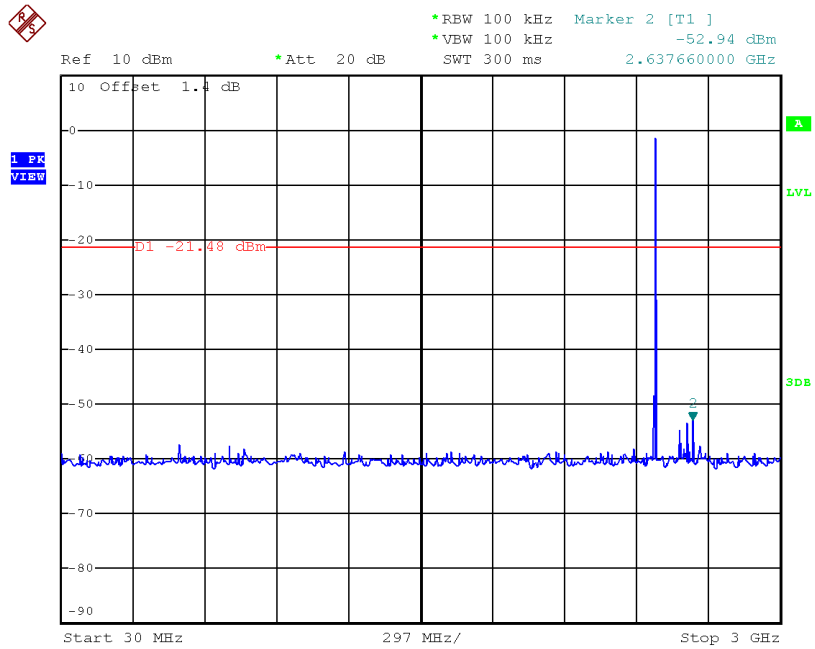


Date: 22.JAN.2017 17:32:47

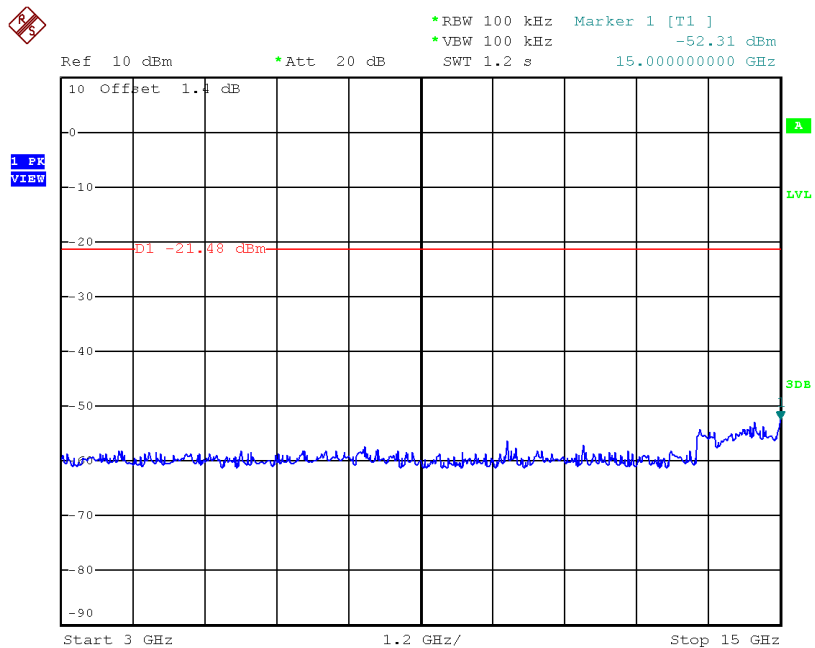


Date: 22.JAN.2017 17:32:54

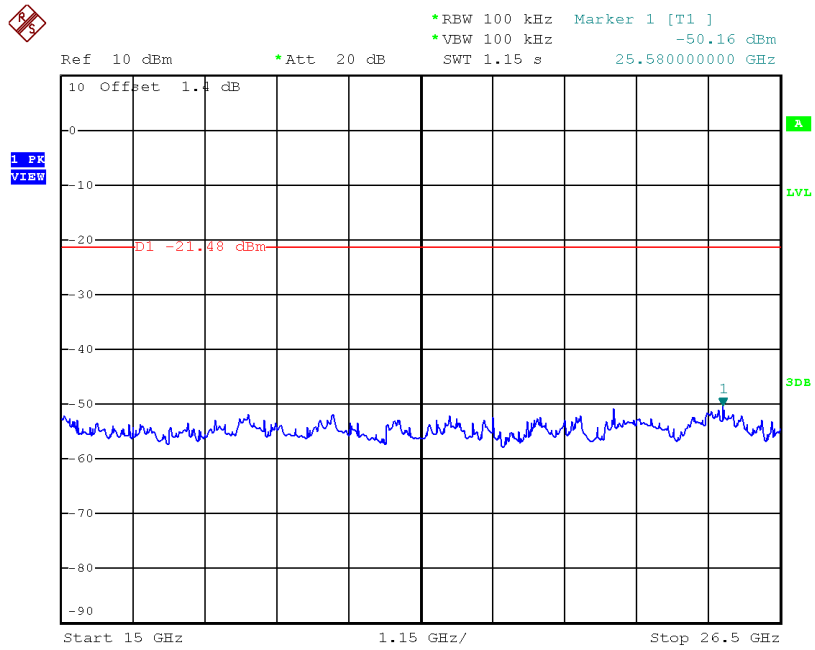
### CH78 (10 Harmonic of the frequency) \_3Mbps



Date: 22.JAN.2017 17:34:25



Date: 22.JAN.2017 17:34:32



Date: 22.JAN.2017 17:34:39