

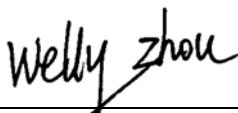
# FCC Radio Test Report

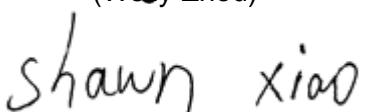
## FCC ID: 2AC23-WT21M2610

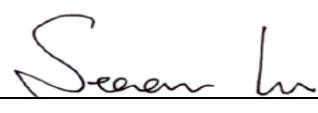
This report concerns (check one): Original Grant Class I Change Class II Change

**Project No.** : 1808C159A  
**Equipment** : WIFI+BT Module  
**Test Model** : WT21M2610  
**Series Model** : N/A  
**Applicant** : Hui Zhou Gaoshengda Technology Co.,LTD  
**Address** : NO.75 Zhongkai Development Area, Huizhou, Guangdong

**Date of Receipt** : Aug. 16, 2018  
**Date of Test** : Aug. 17, 2018 ~ Nov. 09, 2018  
**Issued Date** : Dec. 05, 2018  
**Tested by** : BTL Inc.

**Testing Engineer** :   
(Welly Zhou)

**Technical Manager** :   
(Shawn Xiao)

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Certificate #5123.02

## **Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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**BTL's laboratory quality assurance procedures are in compliance with the ISO Guide 17025 requirements, and accredited by the conformity assessment authorities listed in this test report.**

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements in all the possible configurations as representative of its intended use.

### **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**

Report Version	Description	Issued Date
R00	Original Issue.	Nov. 30, 2018
R01	1. Update the description of the power source. 2. Update Conduction Test Photo.	Dec. 05, 2018

## 1. CERTIFICATION

Equipment : WIFI+BT Module  
Brand Name : GSD  
Test Model : WT21M2610  
Series Model : N/A  
Applicant : Hui Zhou Gaoshengda Technology Co.,LTD  
Manufacturer : Hui Zhou Gaoshengda Technology Co.,LTD  
Address : NO.75 Zhongkai Development Area, Huizhou, Guangdong  
Factory : Hui Zhou Gaoshengda Technology Co.,LTD  
Address : NO.75 Zhongkai Development Area, Huizhou, Guangdong  
Date of Test : Aug. 17, 2018 ~ Nov. 09, 2018  
Test Sample : Engineering Sample No.: D180806941  
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-1-1808C159A) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO-17025 quality assessment standard and technical standard(s).

**Test results included in this report is only for the Bluetooth part.**

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15, Subpart C (15.247)			
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 (a)(1)	Maximum output power	PASS	
15.247(d) 15.209 15.205	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	Average Time Of Occupancy	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: 854385

BTL's designation number for FCC: CN5020

## 2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor)  $k=1.96$  or  $k=2$ (which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %,  $U=2xU_{\text{C}}(y)$ .

The BTL measurement uncertainty as below table:

#### A. Conducted Measurement :

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

#### B. Radiated Measurement :

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

#### C. Other Measurement:

Test Item	Uncertainty
Conducted Spurious Emission	2.67 dB
Hopping Channel Separation	53.46 MHz
Output Power	0.95 dB
Number of Hopping Frequency	53.46 MHz
Temperature	0.08 °C
Humidity	1.5%

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	WIFI+BT Module	
Brand Name	GSD	
Test Model	WT21M2610	
Series Model	N/A	
Model Difference(s)	N/A	
Software Version	Ulv1.92_DLLv3.92_20171201	
Hardware Version	v1.0	
Output Power (Max.)	Operation Frequency	2402 MHz ~2480 MHz
	Modulation Technology	GFSK(1Mbps) $\pi/4$ -DQPSK(2Mbps) 8-DPSK(3Mbps)
	Bit Rate of Transmitter	
	Output Power Max.	5.11 dBm(1Mbps) 4.39 dBm(3Mbps)
Power Source	#1 DC voltage supplied from AC/DC adapter(support unit).	
Power Rating	#1 I/P: 100-240V, 50/60Hz,0.3A Max    O/P: 5.0V == 500mA #2 DC 5V	

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.	Mfr.	P/N	Antenna Type	Connector	Gain (dBi)
1	SHENZHEN ZHONGTIAN XUN Communication Technology Co.,Ltd.	WC0D-60	PIFA	N/A	1.72

### 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 Note (1)

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 Note (1)

Note:

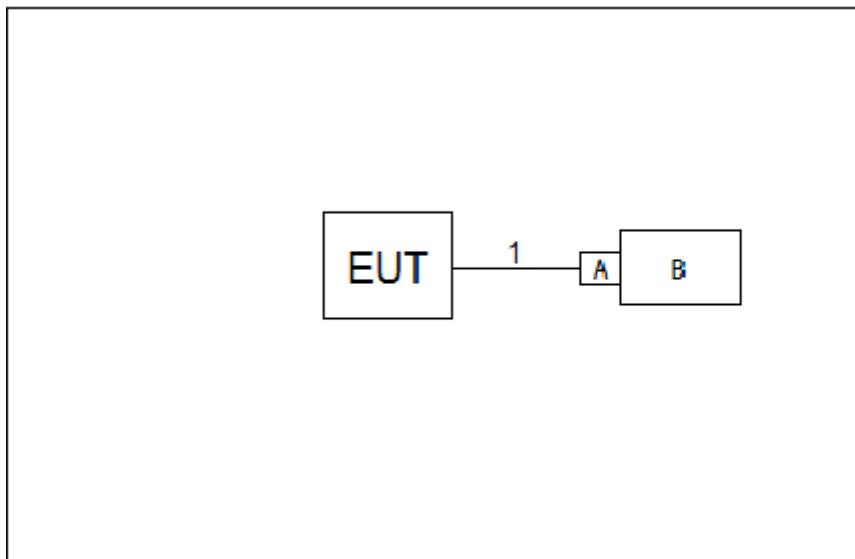
- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

### 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	WCN_Combo_Tool		
Frequency (MHz)	2402	2441	2480
Parameters(1Mbps)	5	5	5
Parameters(3Mbps)	4	4	4

### 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.
A	Test Fixture	N/A	N/A	N/A	N/A
B	Notebook	Lenovo	G410	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	0.5m	Data Cable

## 4. EMC EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

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

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:  

$$\text{Measurement Value} = \text{Reading Level} + \text{Correct Factor}$$

$$\text{Correct Factor} = \text{Insertion Loss} + \text{Cable Loss} + \text{Attenuator Factor(if use)}$$

$$\text{Margin Level} = \text{Measurement Value} - \text{Limit Value}$$

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

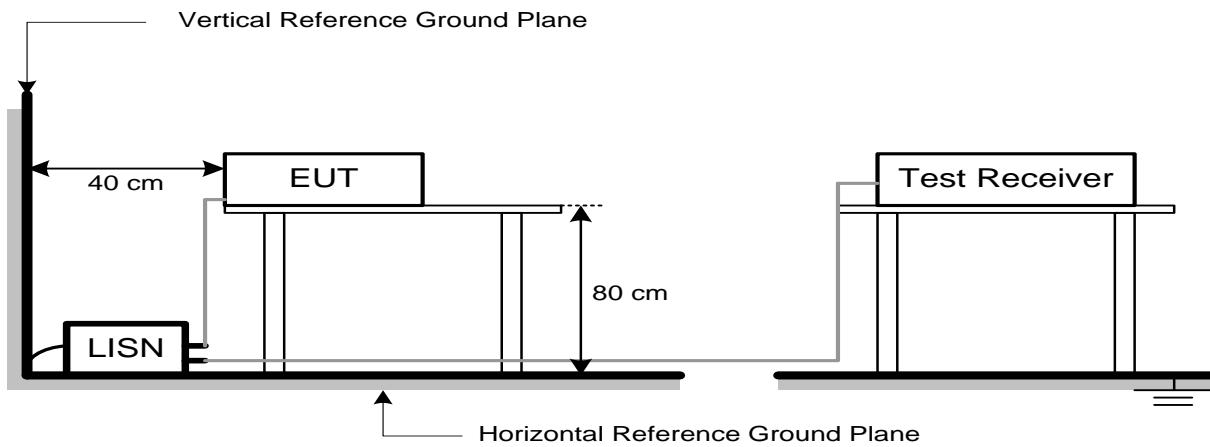
#### 4.1.2 TEST PROCEDURE

- 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



#### 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: 53%    Test Voltage: AC 120V/60Hz

#### 4.1.7 TEST RESULTS

Please refer to the Appendix 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 150 kHz to 30 MHz.

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

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 1000 MHz)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

Note:

- (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	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector

#### 4.2.2 TEST PROCEDURE

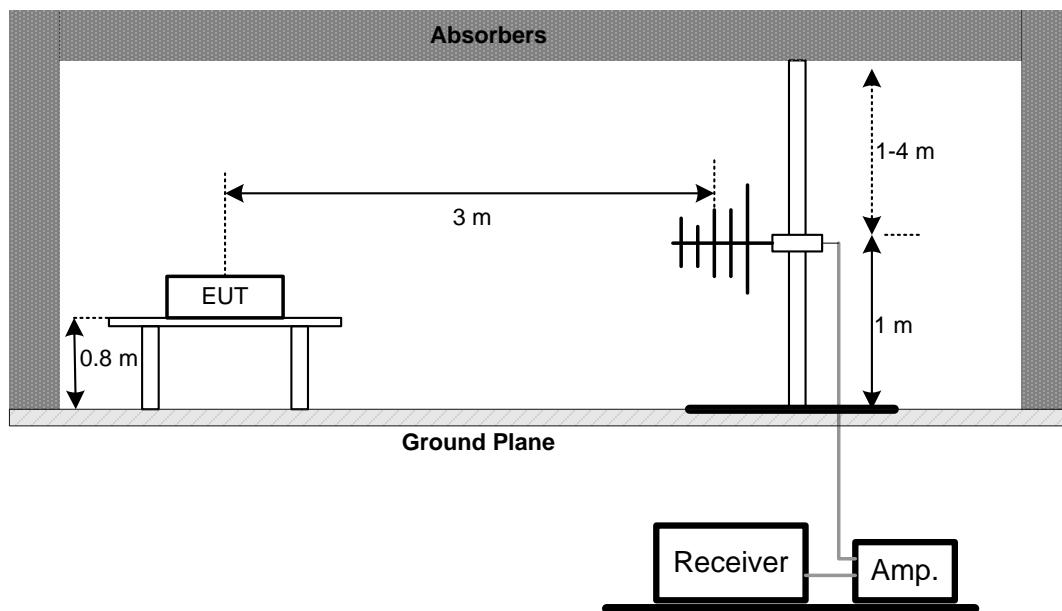
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- The measuring distance 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 1 GHz)
- 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 1 GHz.
- 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 1 GHz)
- 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 1 GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.3 DEVIATION FROM TEST STANDARD

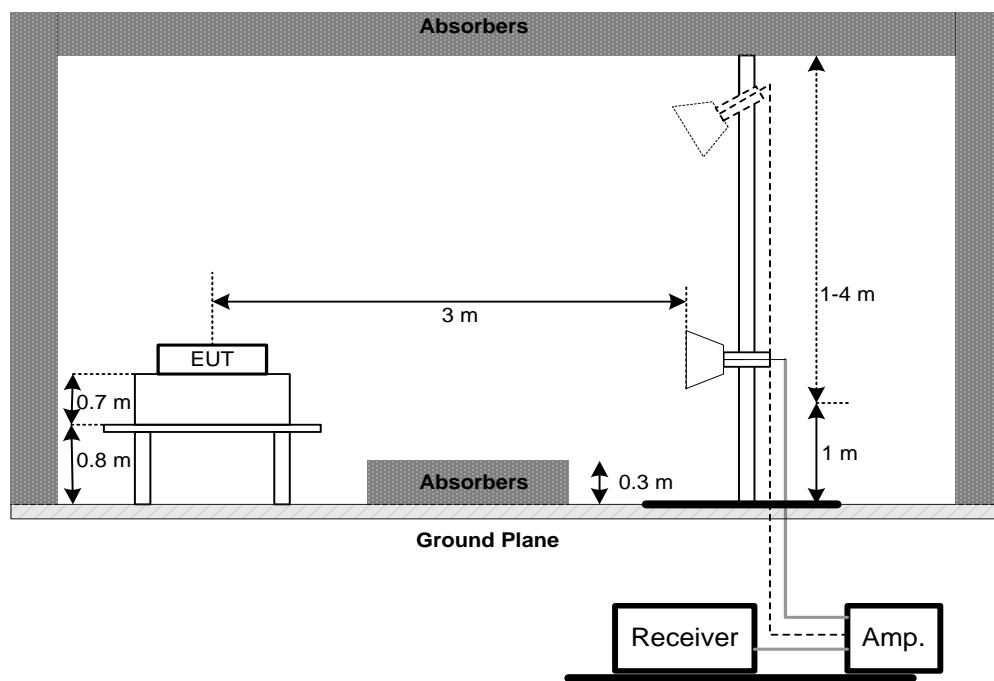
No deviation

#### 4.2.4 TEST SETUP

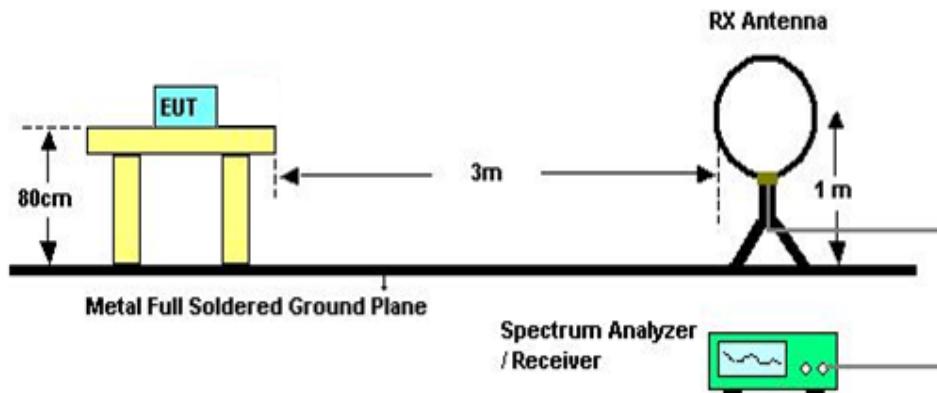
(A) Radiated Emission Test Set-Up Frequency 30 MHz-1000 MHz



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



(C) For Radiated Emissions 9 kHz-30 MHz



#### 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: 60%    Test Voltage: DC 5V

#### 4.2.7 TEST RESULTS (9 kHz TO 30 MHz)

Please refer to the Appendix 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 (dB<sub>UV</sub>) + distance extrapolation factor.

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

Please refer to the Appendix C.

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

Please refer to the Appendix 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			
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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting: RBW=100 kHz, VBW=100 kHz, 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: 26°C    Relative Humidity: 58%    Test Voltage: DC 5V

#### 5.1.6 TEST RESULTS

Please refer to the Appendix 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 1 MHz and VBW to 1 MHz
- 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: 26°C    Relative Humidity: 58%    Test Voltage: DC 5V

#### 6.1.6 TEST RESULTS

Please refer to the Appendix 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: 26°C    Relative Humidity: 58%    Test Voltage: DC 5V

#### 7.1.5 TEST RESULTS

Please refer to the Appendix 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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting: RBW= 30 kHz, VBW=100 kHz, Sweep Time = Auto.

#### 8.1.2 DEVIATION FROM STANDARD

No deviation.

#### 8.1.3 TEST SETUP



#### 8.1.4 EUT OPERATION CONDITIONS

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

#### 8.1.5 EUT TEST CONDITIONS

Temperature: 26°C    Relative Humidity: 58%    Test Voltage: DC 5V

#### 8.1.6 TEST RESULTS

Please refer to the Appendix H

## 9. MAXIMUM OUTPUT POWER

### 9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)	Maximum Output Power	0.125Watt or 21dBm	2400-2483.5	PASS

Note: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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, provided the systems operate with an output power no greater than 125 mW.

#### 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= 1 MHz/3 MHz, VBW= 1 MHz/3 MHz, 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: 26°C    Relative Humidity: 58%    Test Voltage: DC 5V

#### 9.1.6 TEST RESULTS

Please refer to the Appendix 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 intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

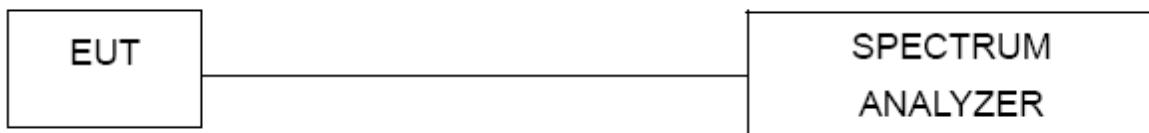
#### 10.1.1 TEST PROCEDURE

- 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= 100 kHz, VBW=100 kHz, Sweep time = Auto.

#### 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: 26°C    Relative Humidity: 58%    Test Voltage: DC 5V

#### 10.1.6 TEST RESULTS

Please refer to the Appendix J

## 11. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 11, 2019
2	LISN	EMCO	3816/2	52765	Mar. 11, 2019
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 11, 2019
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 11, 2019
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	Cable	N/A	RG223	12m	Mar. 23, 2019

Radiated Emission Measurement - 9kHz TO 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EM	EM-6876-1	230	Feb. 07, 2019
2	Cable	N/A	RG 213/U	C-102	Jun. 01, 2019
3	EMI Test Receiver	R&S	ESCI	100382	Mar. 11, 2019
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement – 30 MHz TO 1000 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 11, 2019
2	Amplifier	HP	8447D	2944A09673	Aug. 11, 2019
3	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019
4	Cable	emci	LMR-400(30MHz-1GHz)(8m+5m)	N/A	May 25, 2019
5	Controller	CT	SC100	N/A	N/A
6	Controller	MF	MF-7802	MF780208416	N/A
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 11, 2019
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2019
3	Amplifier	Agilent	8449B	3008A02274	Mar. 11, 2019
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019
5	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019
6	Controller	CT	SC100	N/A	N/A
7	Controller	MF	MF-7802	MF780208416	N/A
8	Cable	mitron	B10-01-01-12M	18072744	Jul. 30, 2019
9	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	FSP40	100185	Aug. 11, 2019

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

**Antenna Conducted Spurious Emission**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

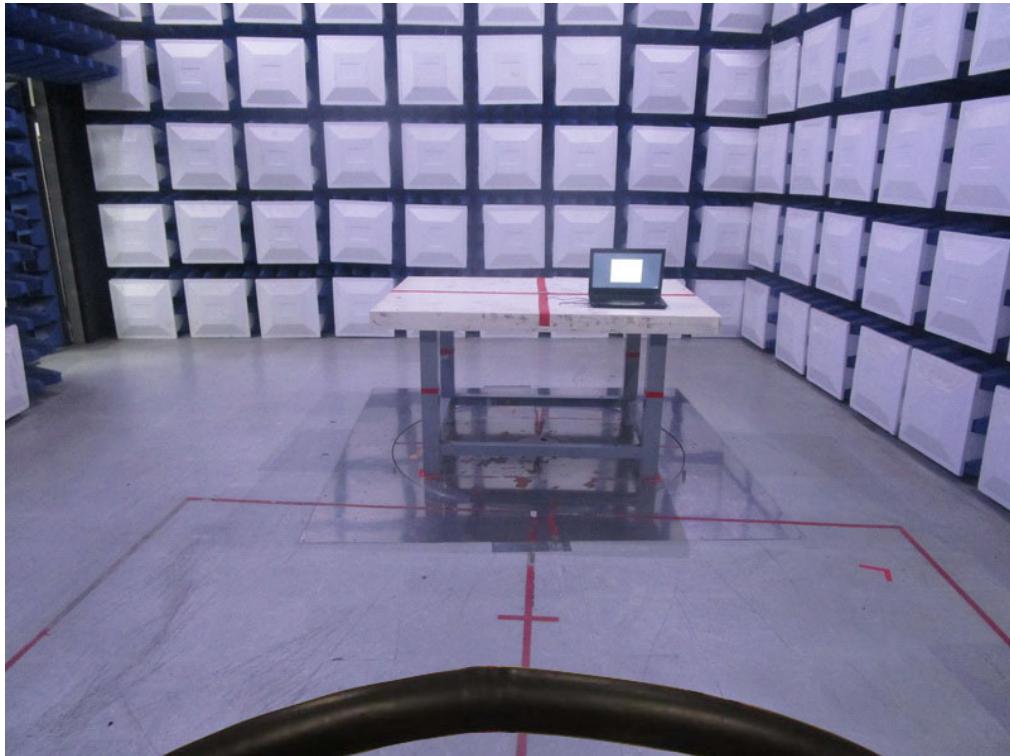
Remark "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

**12. EUT TEST PHOTO****Conducted Measurement Photos**

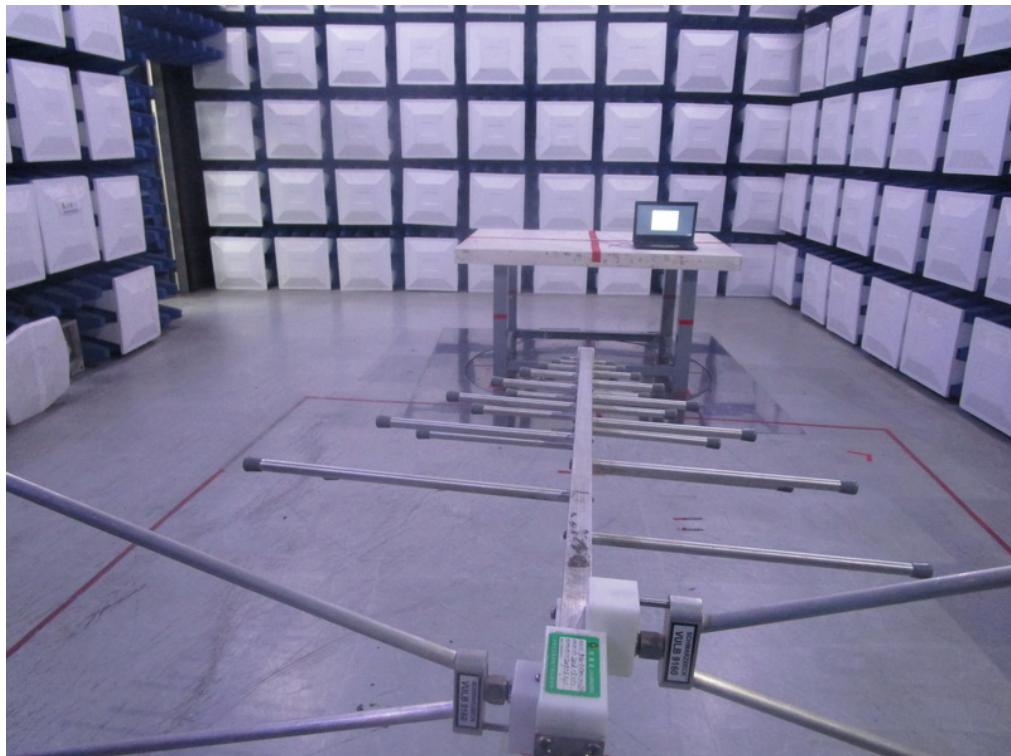
## Radiated Measurement Photos

**9 kHz to 30 MHz**



## Radiated Measurement Photos

30 MHz to 1000 MHz



## Radiated Measurement Photos

Above 1000 MHz

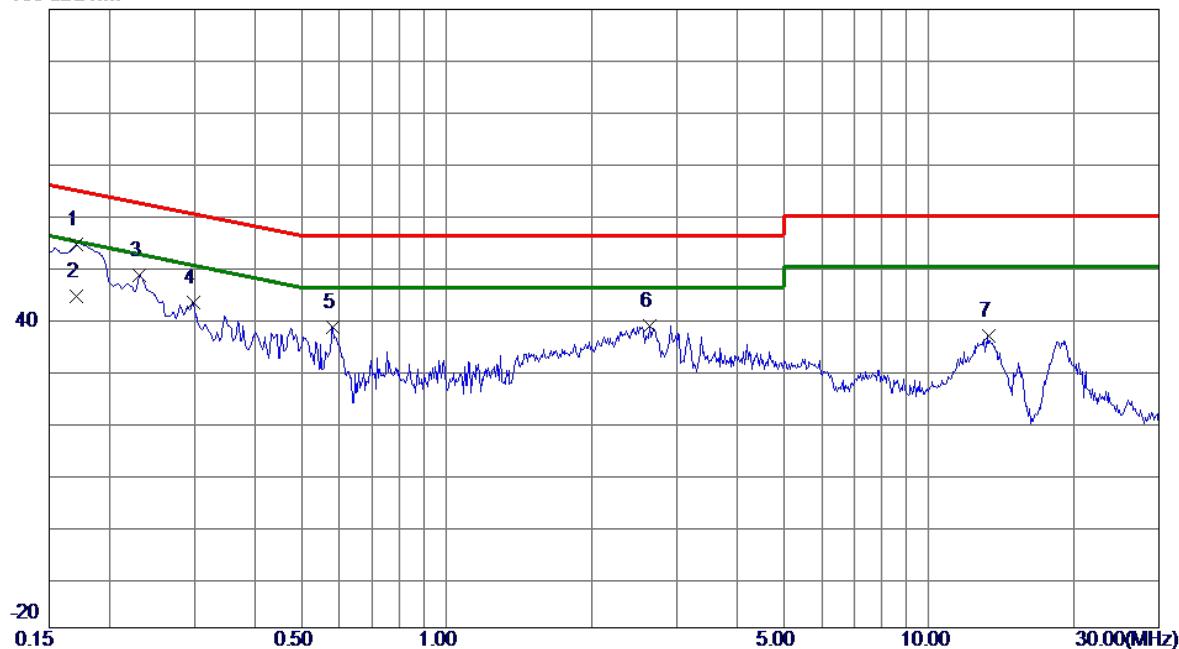


## APPENDIX A - CONDUCTED EMISSION

Test Mode: TX Mode

## Line

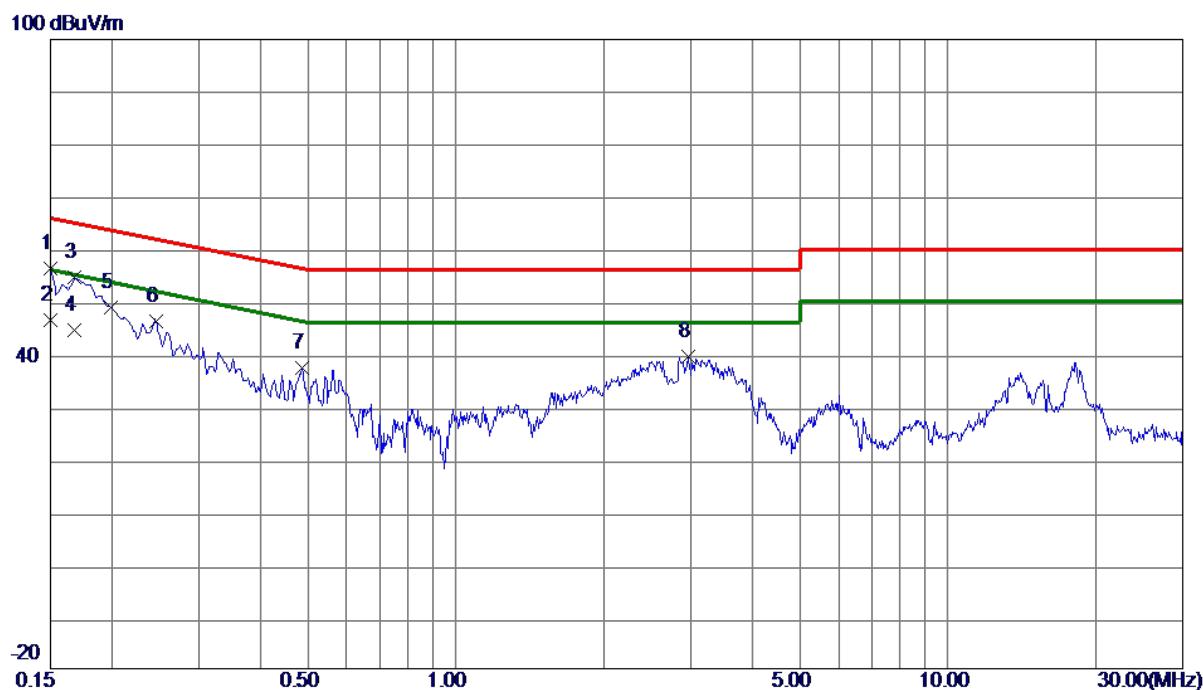
100 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	0.1712	44.80	9.69	54.49	64.90	-10.41	Peak	
2	0.1712	34.73	9.69	44.42	54.90	-10.48	AVG	
3	0.2310	38.78	9.68	48.46	62.41	-13.95	Peak	
4	0.2985	33.42	9.68	43.10	60.28	-17.18	Peak	
5	0.5820	28.54	9.70	38.24	56.00	-17.76	Peak	
6	2.6385	28.86	9.80	38.66	56.00	-17.34	Peak	
7	13.3125	26.83	9.90	36.73	60.00	-23.27	Peak	

Test Mode: TX Mode

## Neutral

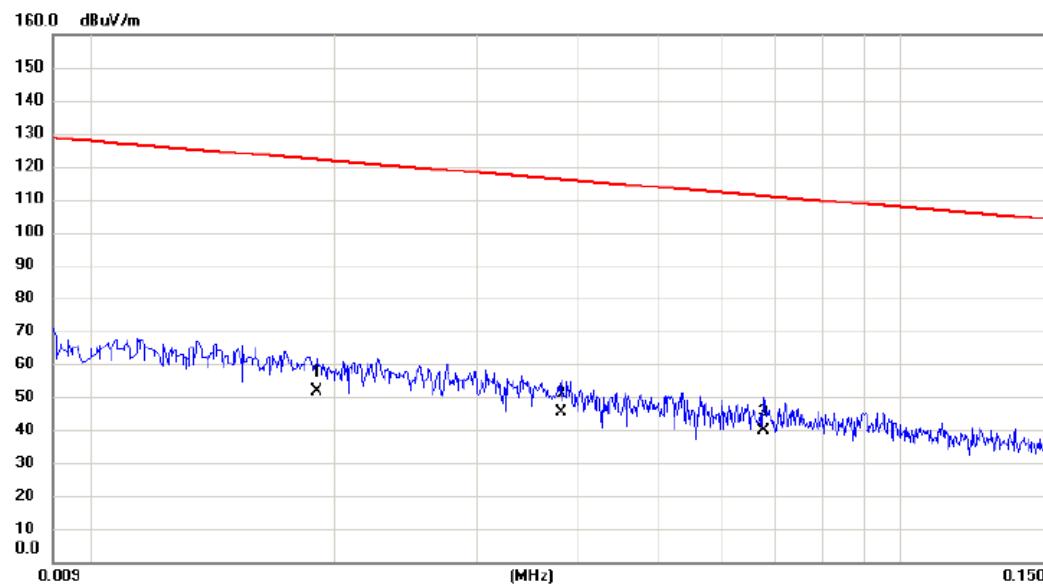


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Margin	
							Detector	Comment
1	0.1500	46.68	9.69	56.37	66.00	-9.63	Peak	
2 *	0.1500	36.72	9.69	46.41	56.00	-9.59	AVG	
3	0.1680	44.83	9.69	54.52	65.06	-10.54	Peak	
4	0.1680	34.82	9.69	44.51	55.06	-10.55	AVG	
5	0.1995	39.29	9.68	48.97	63.63	-14.66	Peak	
6	0.2455	36.45	9.68	46.13	61.91	-15.78	Peak	
7	0.4875	27.62	9.69	37.31	56.21	-18.90	Peak	
8	2.9625	29.75	9.82	39.57	56.00	-16.43	Peak	

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

Test Mode: TX Mode

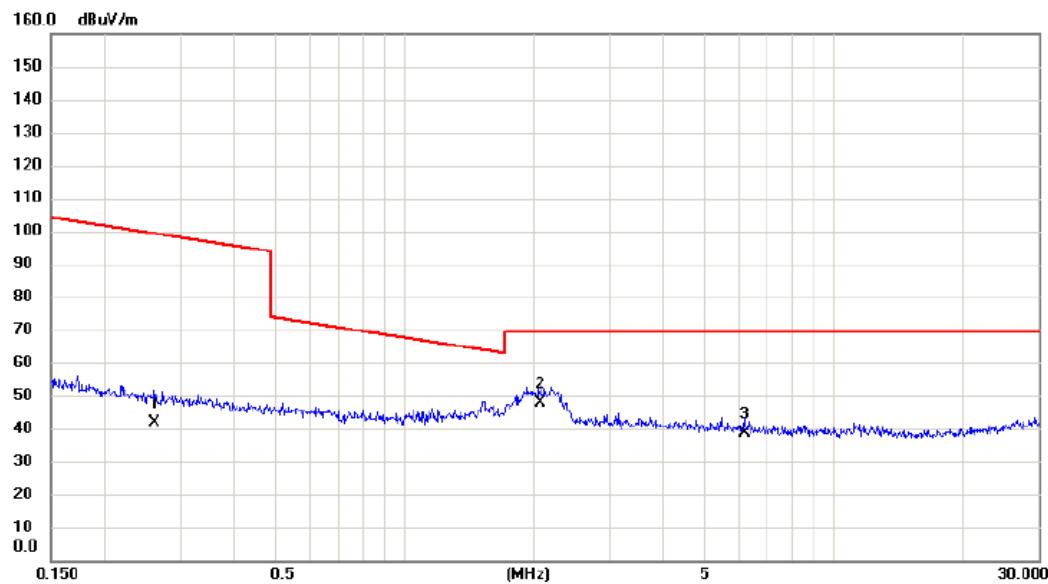
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dB			
1	*	0.0190	31.60	20.16	51.76	122.03	-70.27	AVG	
2		0.0381	25.60	19.73	45.33	115.99	-70.66	AVG	
3		0.0677	20.70	19.18	39.88	110.99	-71.11	AVG	

Test Mode: TX Mode

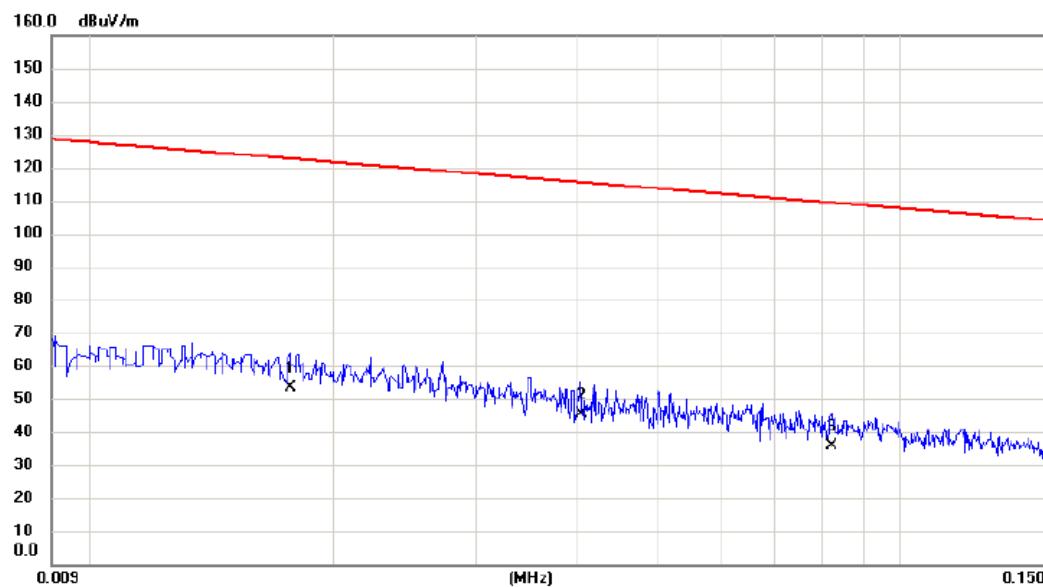
Ant 0°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor	Measure- ment dBuV/m	Limit dB	Margin	Detector	Comment
1		0.2603	24.70	17.06	41.76	99.30	-57.54	AVG	
2	*	2.0660	30.70	17.08	47.78	69.54	-21.76	QP	
3		6.1860	23.50	14.97	38.47	69.54	-31.07	QP	

Test Mode: TX Mode

Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor	Measure- ment dBuV/m	Limit dB	Margin	Detector	Comment
1	*	0.0177	33.20	20.34	53.54	122.65	-69.11	AVG	
2		0.0404	25.70	19.69	45.39	115.48	-70.09	AVG	
3		0.0820	17.10	18.87	35.97	109.33	-73.36	AVG	

Test Mode: TX Mode

Ant 90°



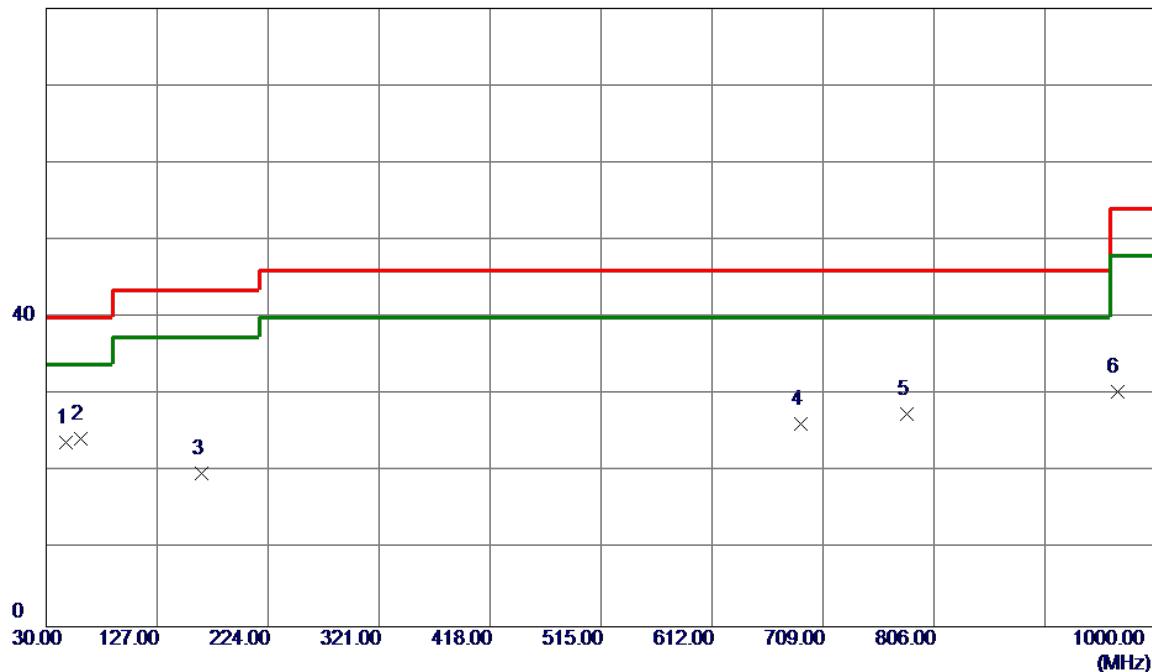
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2955	22.16	17.04	39.20	98.19	-58.99	AVG	
2 *		1.9490	31.80	17.08	48.88	69.54	-20.66	QP	
3		3.7198	23.80	15.96	39.76	69.54	-29.78	QP	

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

Test Mode: TX 2402 MHz \_CH00\_1Mbps

## Vertical

80 dBuV/m

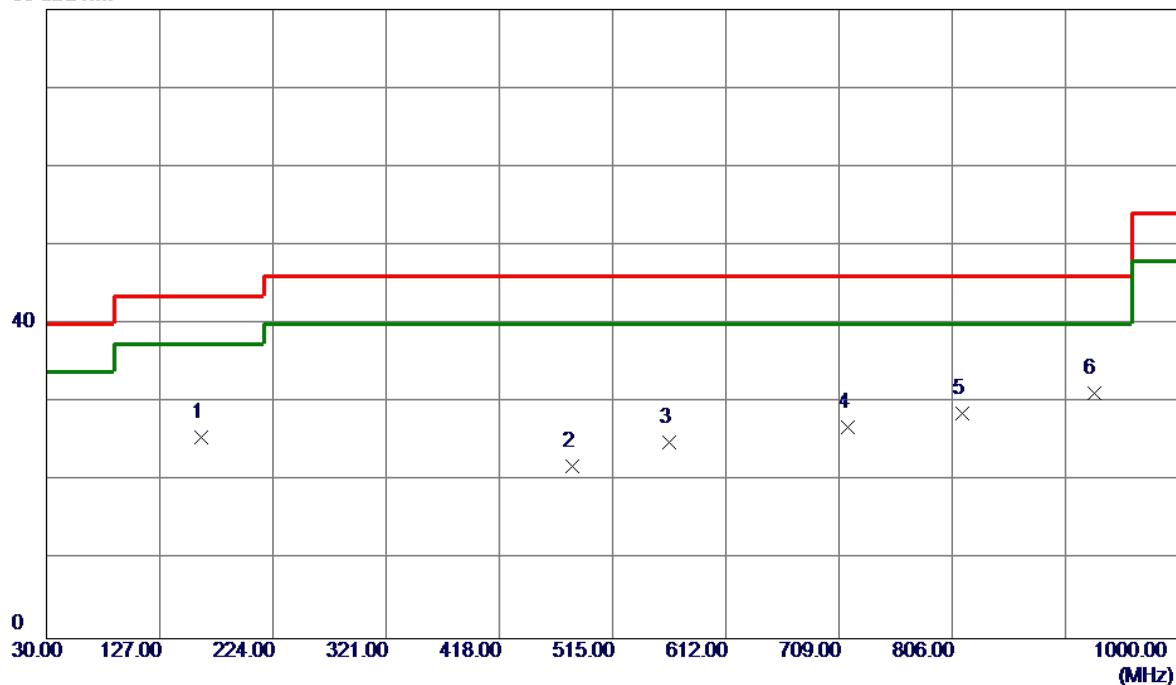


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector		Comment
							Detector		
1	47.4600	38.69	-14.81	23.88	40.00	-16.12	Peak		
2 *	60.0700	40.03	-15.69	24.34	40.00	-15.66	Peak		
3	165.8000	30.82	-10.95	19.87	43.50	-23.63	Peak		
4	689.6000	29.42	-3.25	26.17	46.00	-19.83	Peak		
5	782.7199	29.63	-2.08	27.55	46.00	-18.45	Peak		
6	966.0500	29.37	1.03	30.40	54.00	-23.60	Peak		

Test Mode: TX 2402 MHz \_CH00\_1Mbps

## Horizontal

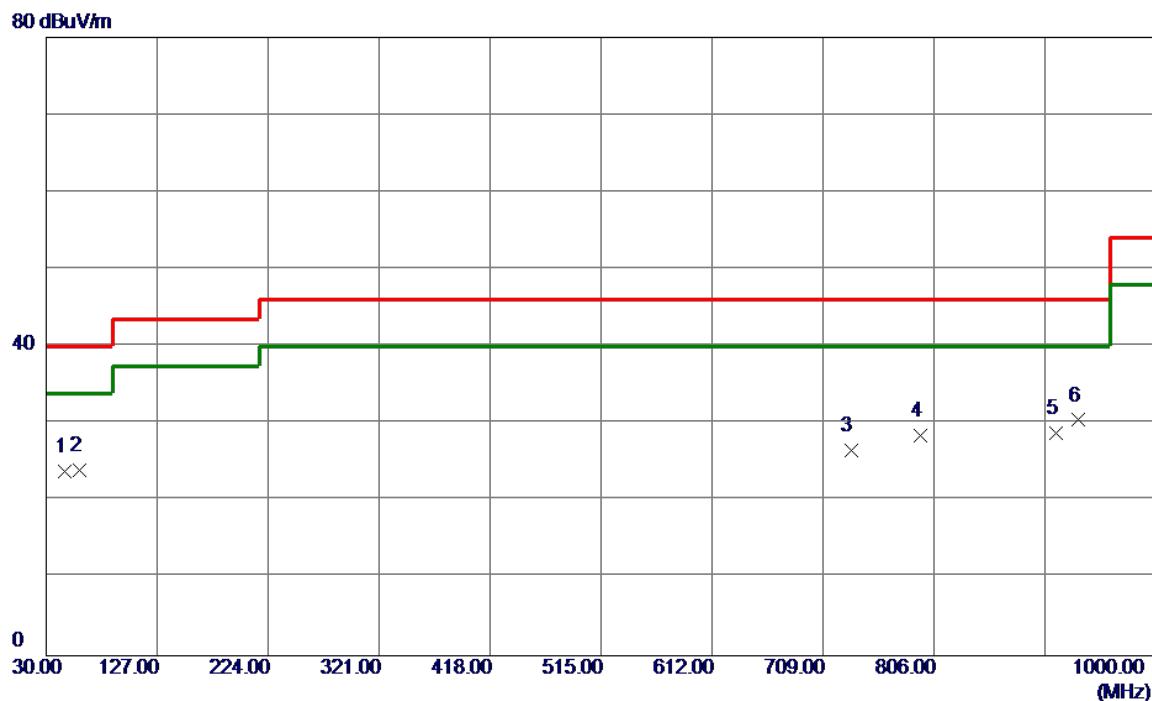
80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	162.8900	36.43	-10.77	25.66	43.50	-17.84	Peak	
2	480.0800	29.96	-8.08	21.88	46.00	-24.12	Peak	
3	563.5000	30.68	-5.69	24.99	46.00	-21.01	Peak	
4	716.7600	30.06	-3.18	26.88	46.00	-19.12	Peak	
5	814.7300	29.88	-1.27	28.61	46.00	-17.39	Peak	
6 *	927.2500	30.75	0.50	31.25	46.00	-14.75	Peak	

Test Mode: TX 2441 MHz \_CH39\_1Mbps

## Vertical

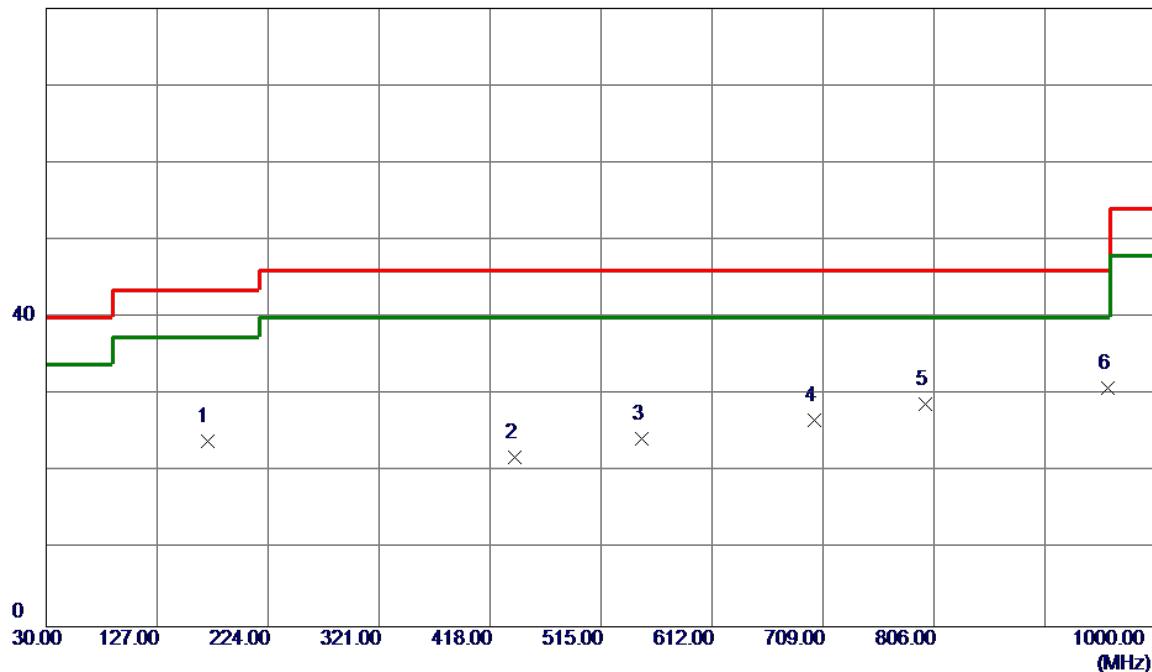


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment			
								Measurement	Limit	Margin	Detector
1	46.4900	38.57	-14.77	23.80	40.00	-16.20	Peak				
2	59.1000	39.51	-15.56	23.95	40.00	-16.05	Peak				
3	733.2500	30.24	-3.61	26.63	46.00	-19.37	Peak				
4	794.3600	29.81	-1.38	28.43	46.00	-17.57	Peak				
5	912.7000	28.91	-0.09	28.82	46.00	-17.18	Peak				
6 *	932.1000	29.79	0.69	30.48	46.00	-15.52	Peak				

Test Mode: TX 2441 MHz \_CH39\_1Mbps

## Horizontal

80 dBuV/m

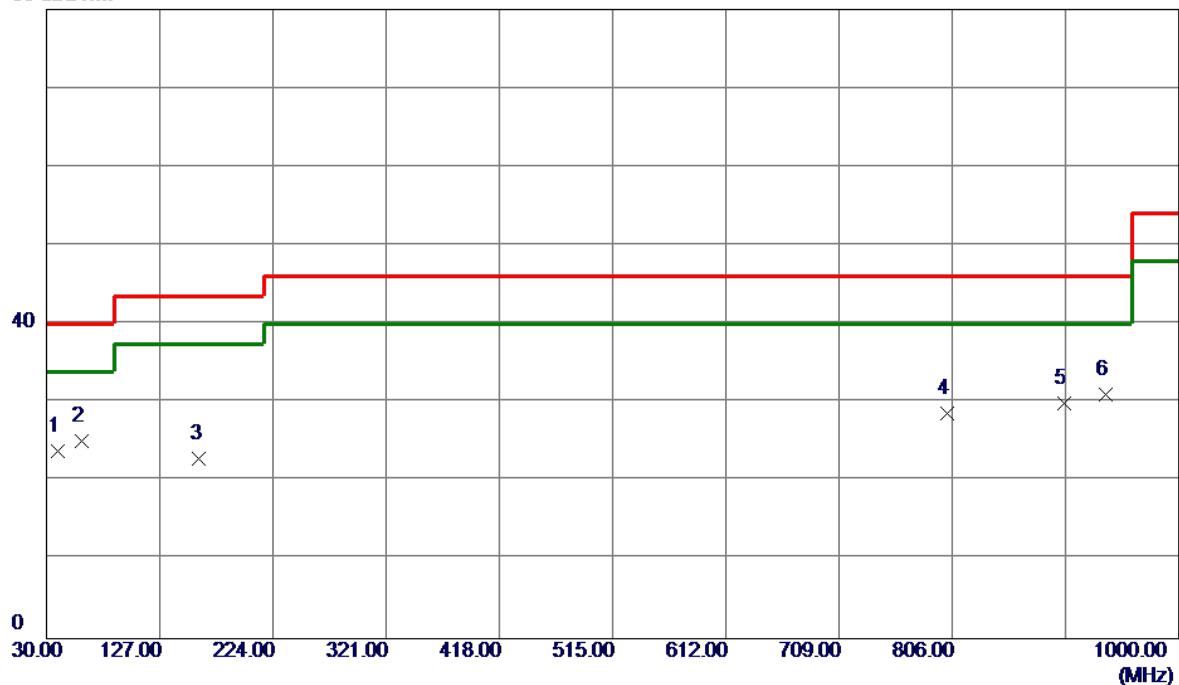


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment	
								Measurement	Limit
1	170.6500	35.26	-11.31	23.95	43.50	-19.55	Peak		
2	439.3400	29.82	-7.83	21.99	46.00	-24.01	Peak		
3	550.8900	29.84	-5.48	24.36	46.00	-21.64	Peak		
4	701.2400	29.57	-2.78	26.79	46.00	-19.21	Peak		
5	798.2400	29.91	-1.15	28.76	46.00	-17.24	Peak		
6 *	958.2900	29.66	1.21	30.87	46.00	-15.13	Peak		

Test Mode: TX 2480 MHz \_CH78\_1Mbps

### Vertical

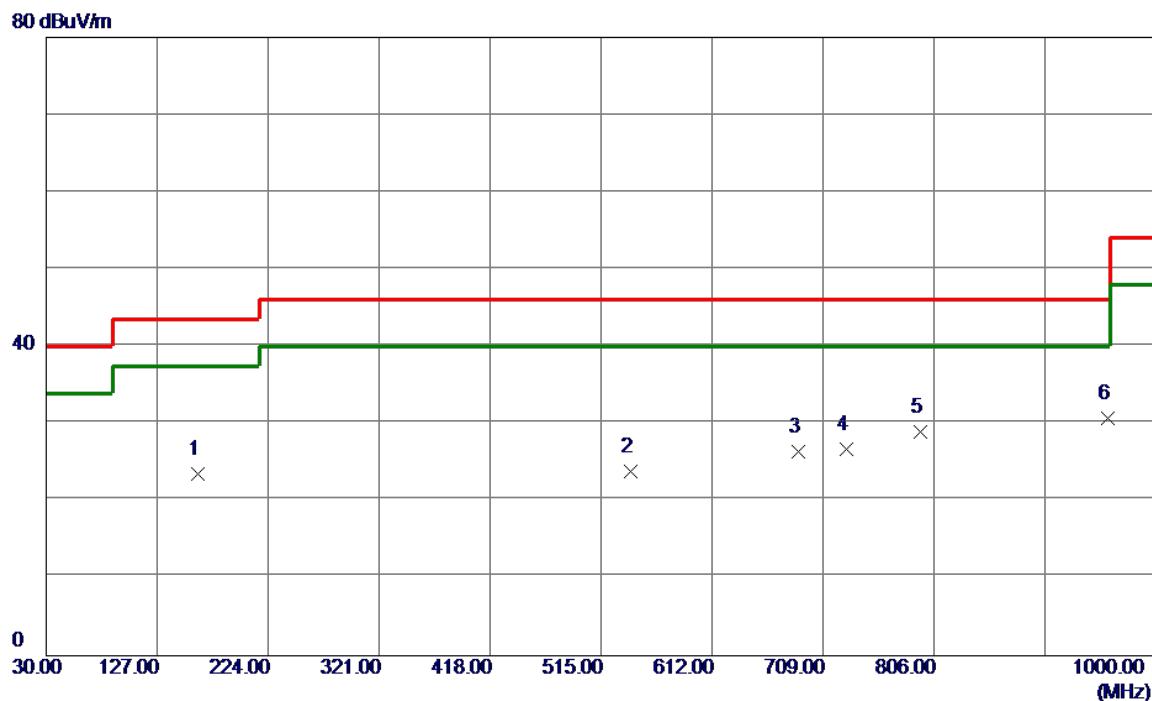
80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	39.7000	38.41	-14.64	23.77	40.00	-16.23	Peak	
2	60.0700	40.74	-15.69	25.05	40.00	-14.95	Peak	
3	160.9500	33.50	-10.66	22.84	43.50	-20.66	Peak	
4	802.1200	29.67	-1.07	28.60	46.00	-17.40	Peak	
5	902.0300	30.47	-0.52	29.95	46.00	-16.05	Peak	
6 *	937.9200	30.17	0.92	31.09	46.00	-14.91	Peak	

Test Mode: TX 2480 MHz \_CH78\_1Mbps

## Horizontal



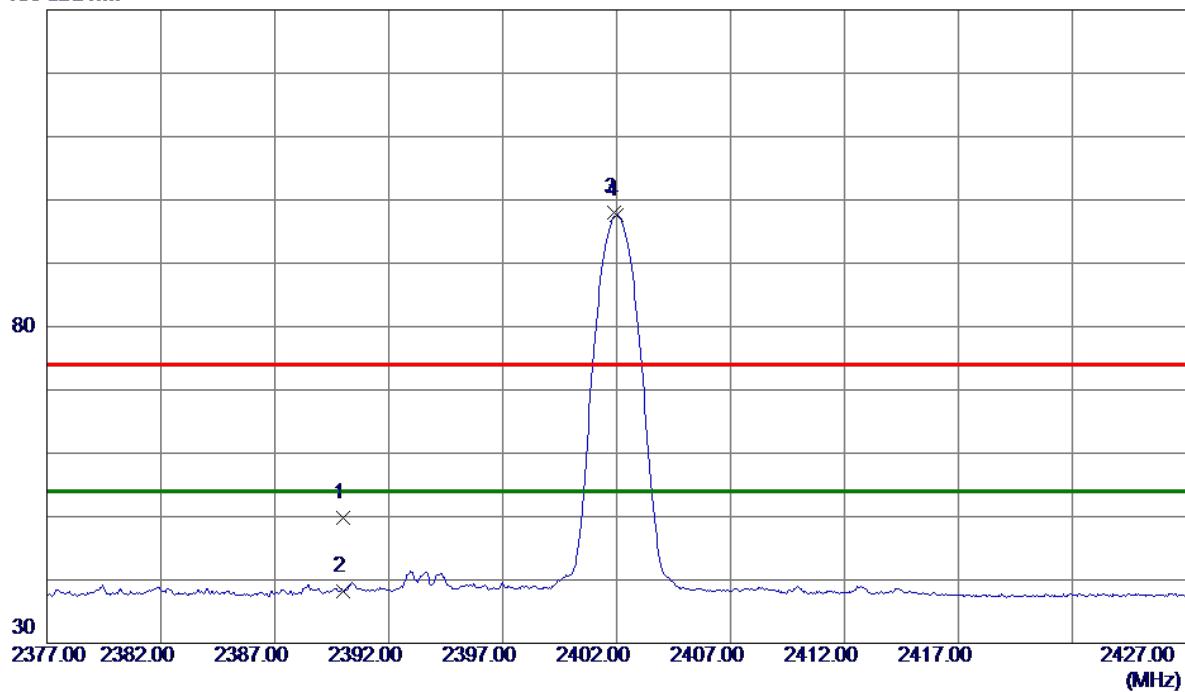
No.	Freq. (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Measurement (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Comment
1	162.8900	34.36	-10.77	23.59	43.50	-19.91	Peak	
2	541.1900	29.79	-6.00	23.79	46.00	-22.21	Peak	
3	687.6599	29.73	-3.34	26.39	46.00	-19.61	Peak	
4	729.3700	30.18	-3.51	26.67	46.00	-19.33	Peak	
5	794.3600	30.30	-1.38	28.92	46.00	-17.08	Peak	
6 *	958.2900	29.52	1.21	30.73	46.00	-15.27	Peak	

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

Test Mode: TX 2402 MHz \_CH00\_1Mbps

## Vertical

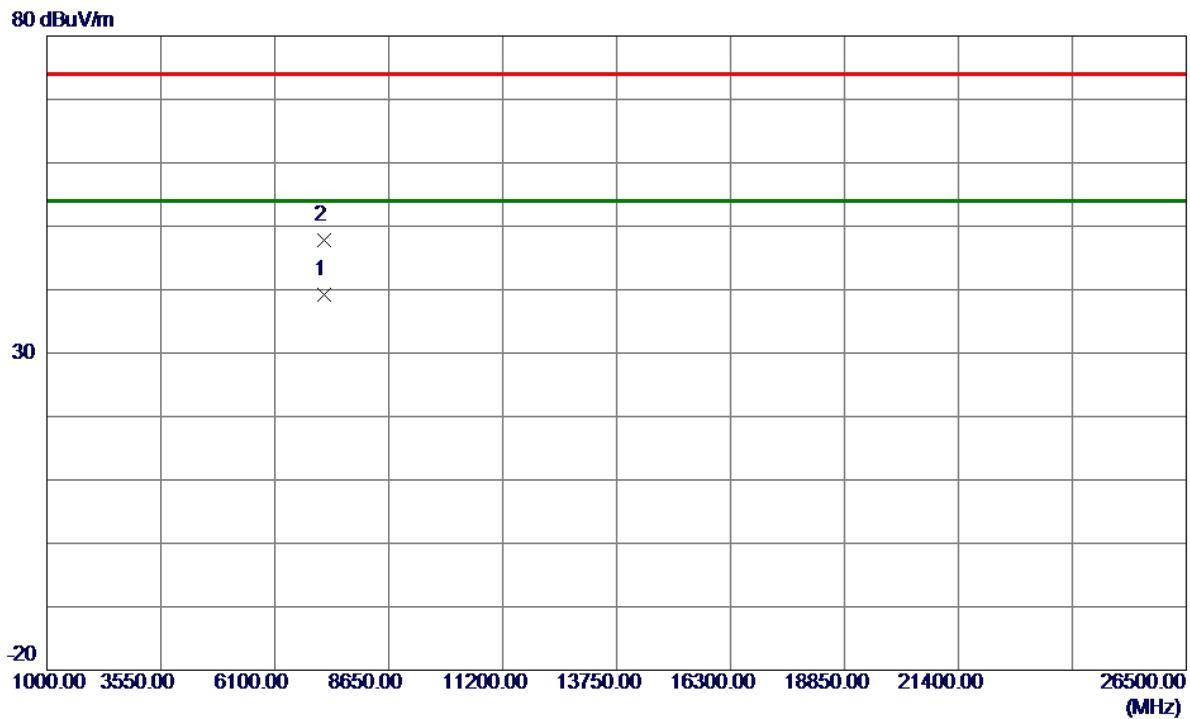
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	42.35	7.39	49.74	74.00	-24.26	Peak	
2	2390.0000	30.83	7.39	38.22	54.00	-15.78	AVG	
3	2401.9000	90.68	7.38	98.06	74.00	24.06	Peak	No Limit
4 *	2402.0000	90.14	7.38	97.52	54.00	43.52	AVG	No Limit

Test Mode: TX 2402 MHz \_CH00\_1Mbps

## Vertical

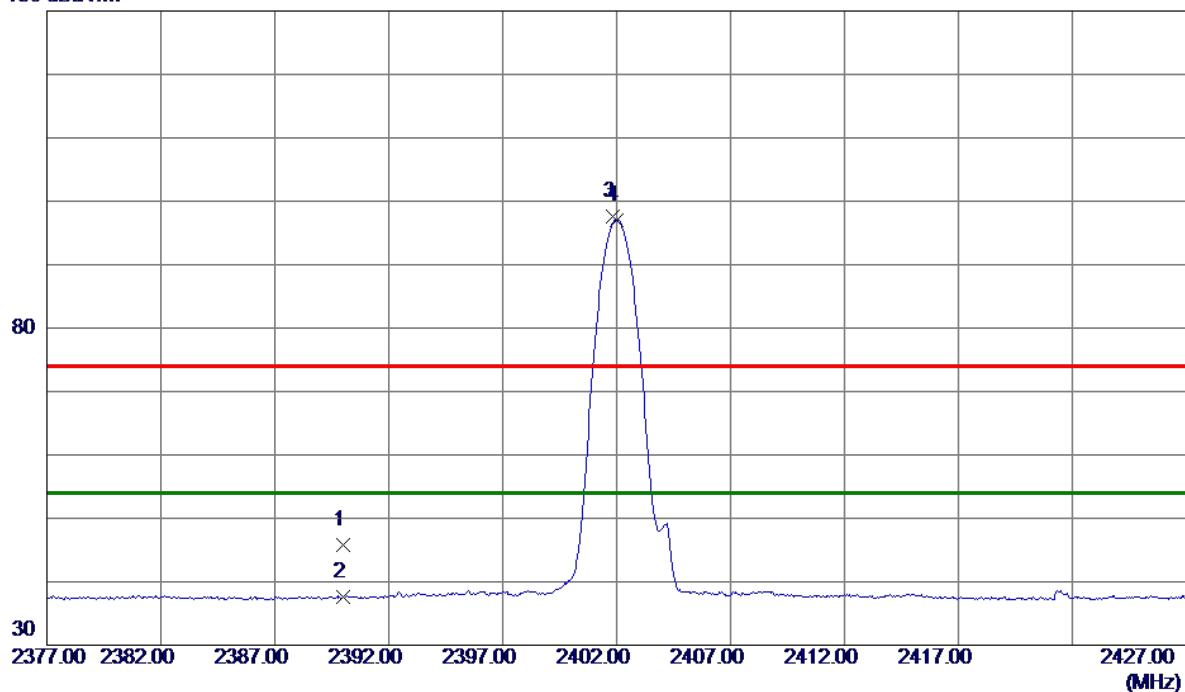


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7205.9250	29.75	9.36	39.11	54.00	-14.89	AVG	
2	7205.9900	38.46	9.36	47.82	74.00	-26.18	Peak	

Test Mode: TX 2402 MHz \_CH00\_1Mbps

## Horizontal

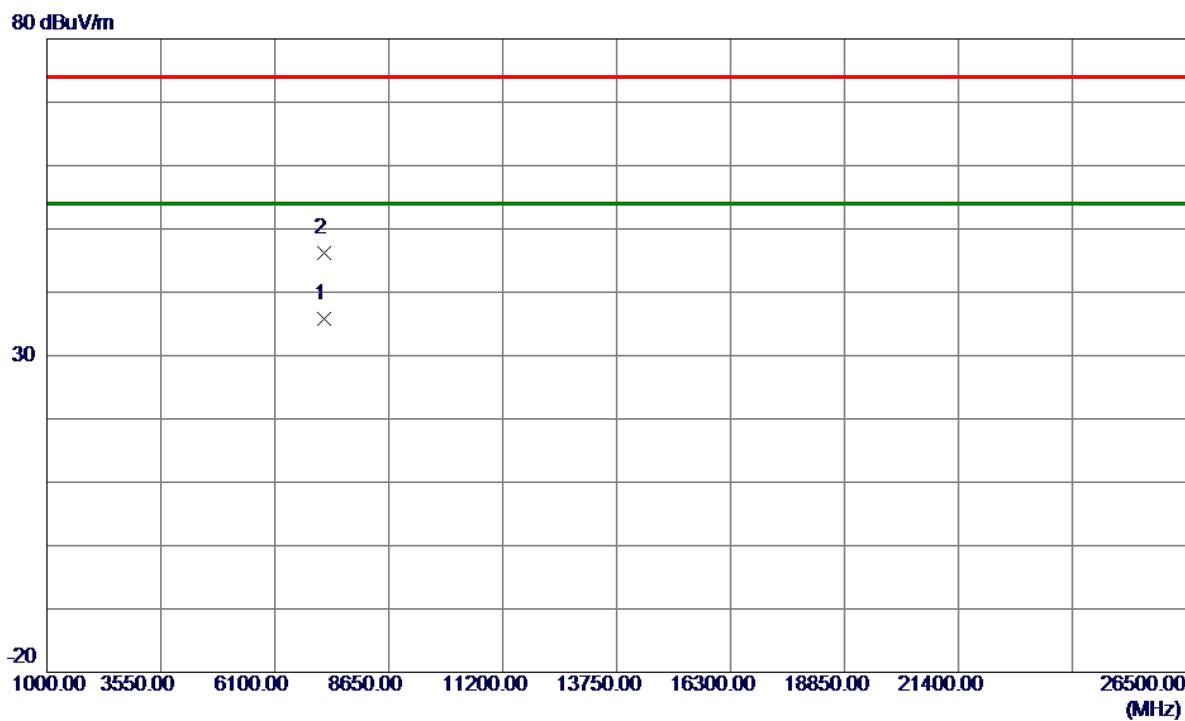
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	38.41	7.39	45.80	74.00	-28.20	Peak	
2	2390.0000	30.13	7.39	37.52	54.00	-16.48	AVG	
3	2401.8500	90.19	7.38	97.57	74.00	23.57	Peak	No Limit
4 *	2402.0000	89.67	7.38	97.05	54.00	43.05	AVG	No Limit

Test Mode: TX 2402 MHz \_CH00\_1Mbps

## Horizontal

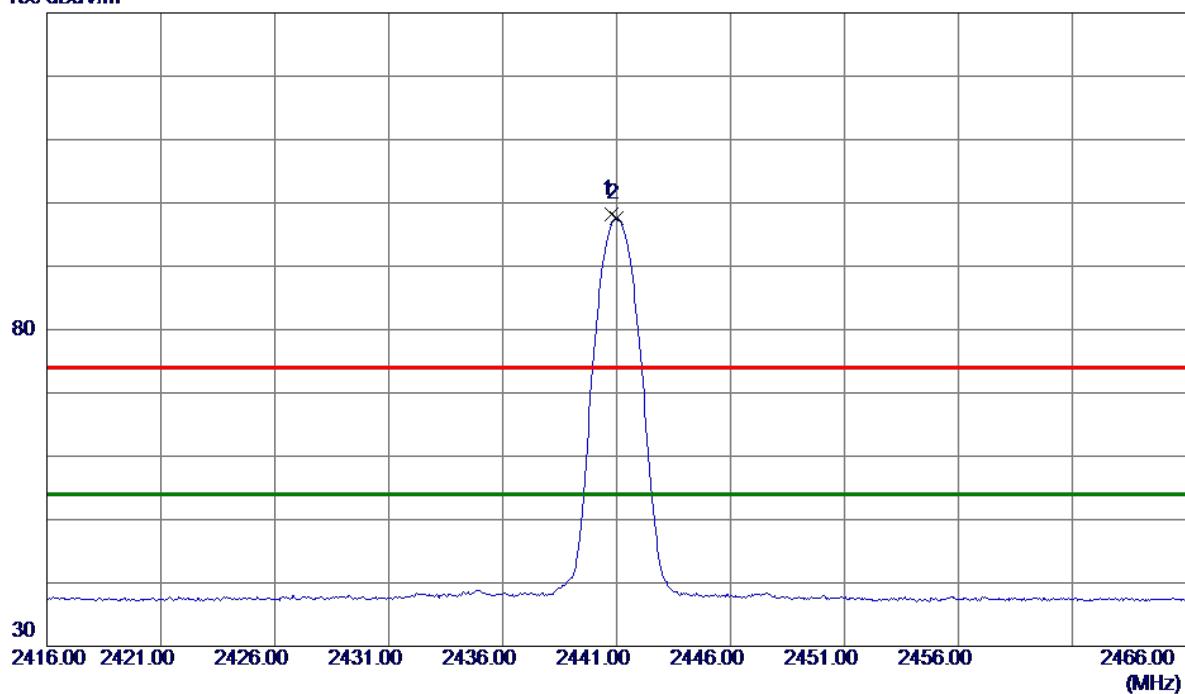


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dB	Margin Detector	Comment
1 *	7206.2450	26.41	9.36	35.77	54.00	-18.23	AVG
2	7206.4550	36.81	9.36	46.17	74.00	-27.83	Peak

Test Mode: TX 2441 MHz \_CH39\_1Mbps

## Vertical

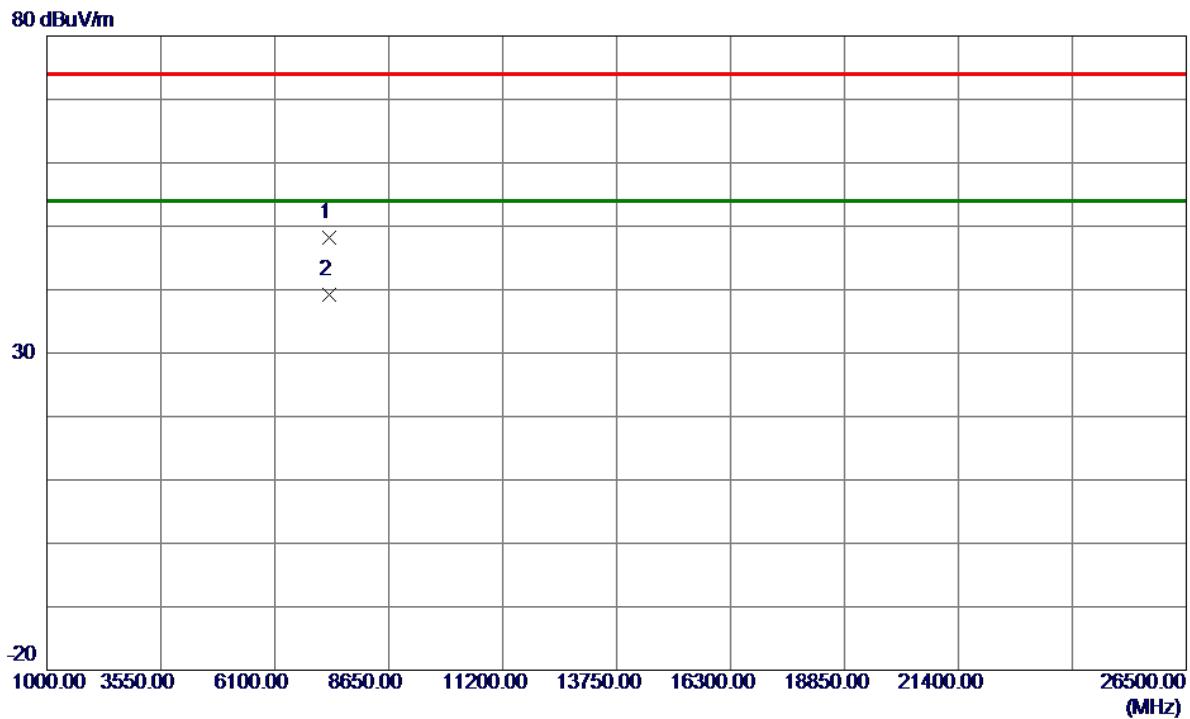
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2440.8000	90.80	7.35	98.15	74.00	24.15	Peak	No Limit
2 *	2441.0000	90.26	7.35	97.61	54.00	43.61	AVG	No Limit

Test Mode: TX 2441 MHz \_CH39\_1Mbps

## Vertical

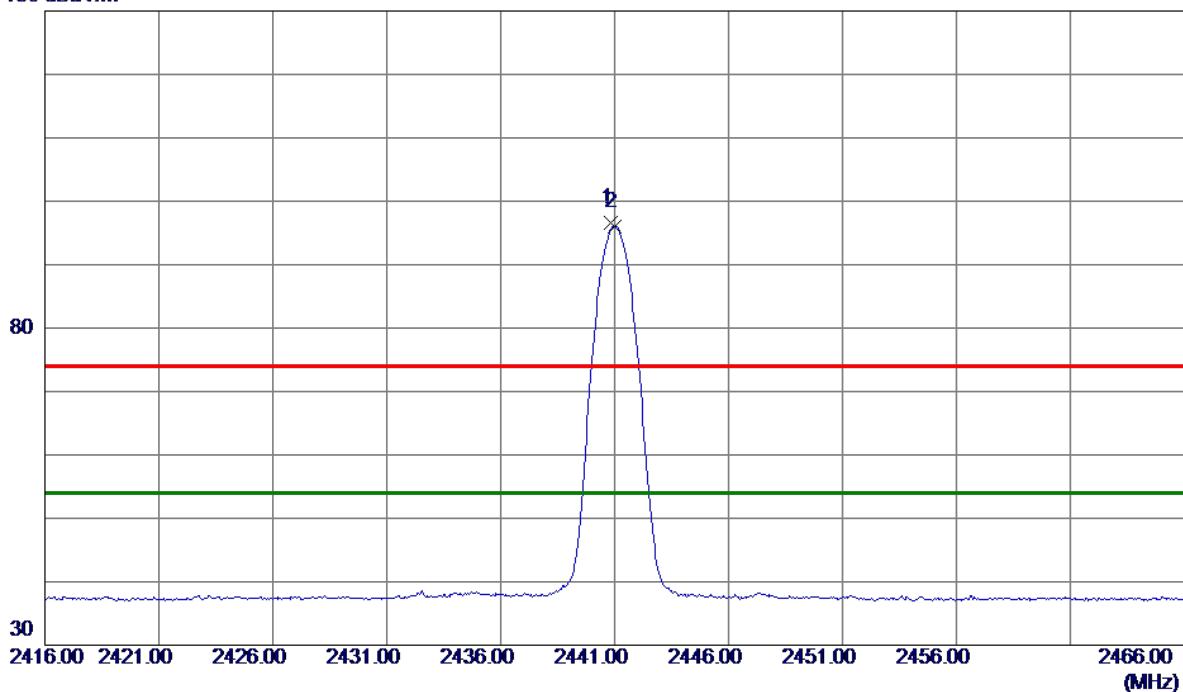


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m dB	Margin Detector	Comment
1	7322.8500	38.59	9.64	48.23	74.00	-25.77	Peak
2 *	7322.9650	29.48	9.64	39.12	54.00	-14.88	AVG

Test Mode: TX 2441 MHz \_CH39\_1Mbps

## Horizontal

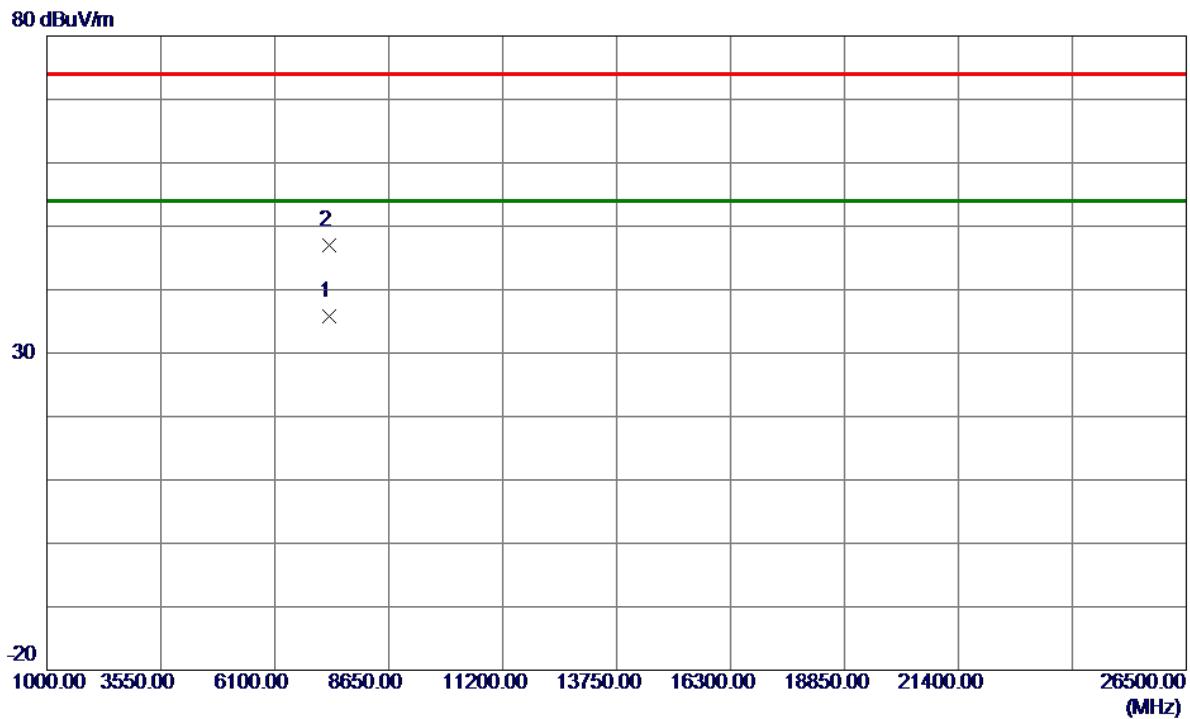
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2440.8500	89.23	7.35	96.58	74.00	22.58	Peak	No Limit
2 *	2441.0000	88.72	7.35	96.07	54.00	42.07	AVG	No Limit

Test Mode: TX 2441 MHz \_CH39\_1Mbps

## Horizontal

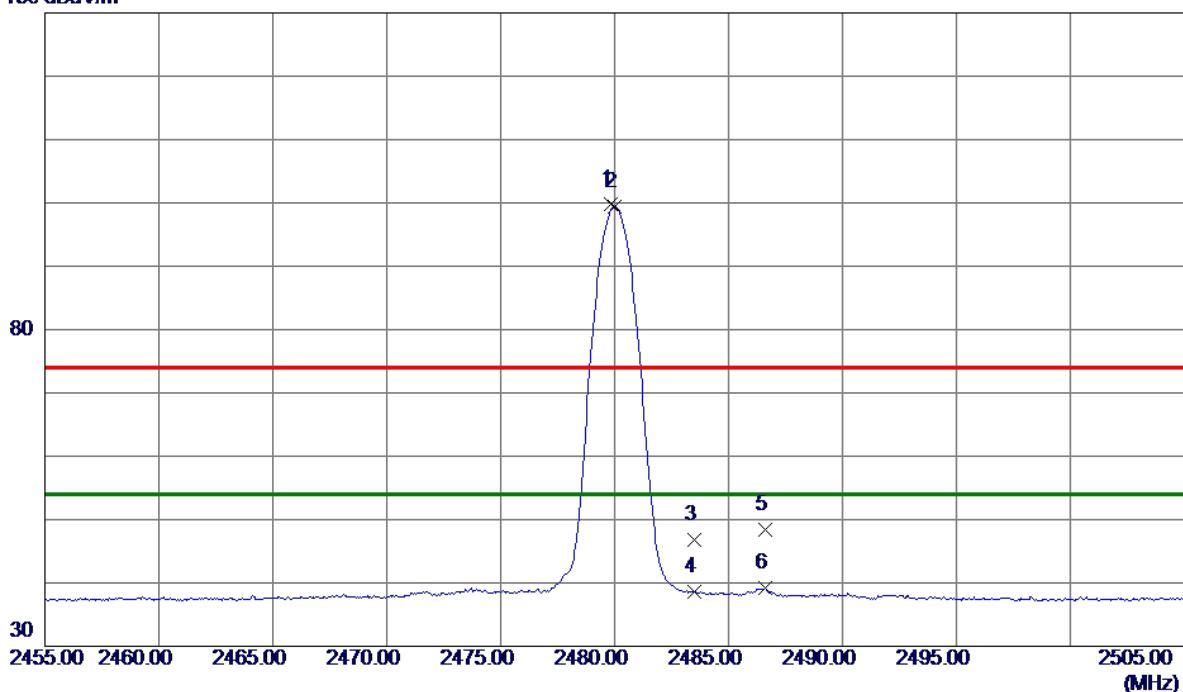


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7322.9550	26.21	9.64	35.85	54.00	-18.15	AVG	
2	7323.0350	37.37	9.64	47.01	74.00	-26.99	Peak	

Test Mode: TX 2480 MHz \_CH78\_1Mbps

## Vertical

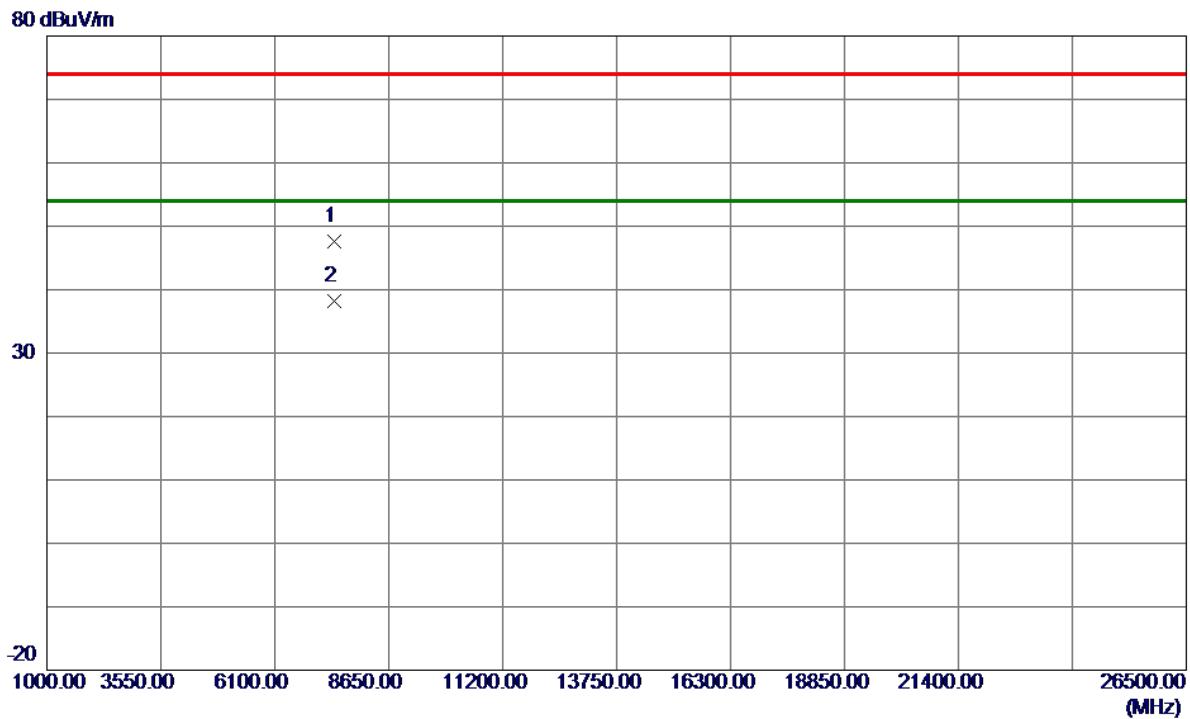
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2479.8500	92.53	7.32	99.85	74.00	25.85	Peak	No Limit
2 *	2480.0000	92.01	7.32	99.33	54.00	45.33	AVG	No Limit
3	2483.5000	39.52	7.32	46.84	74.00	-27.16	Peak	
4	2483.5000	31.30	7.32	38.62	54.00	-15.38	AVG	
5	2486.6000	41.13	7.32	48.45	74.00	-25.55	Peak	
6	2486.6000	31.85	7.32	39.17	54.00	-14.83	AVG	

Test Mode: TX 2480 MHz \_CH78\_1Mbps

## Vertical

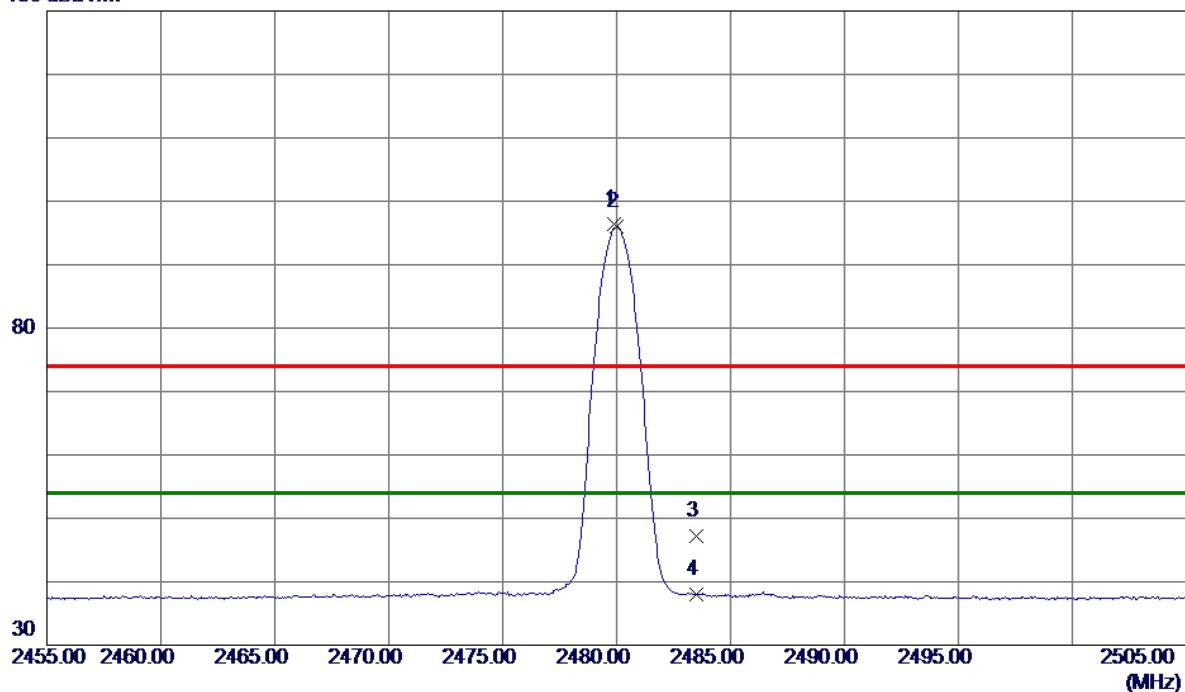


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	7437.6450	37.67	9.91	47.58	74.00	-26.42	Peak	
2 *	7439.9900	28.28	9.92	38.20	54.00	-15.80	AVG	

Test Mode: TX 2480 MHz \_CH78\_1Mbps

## Horizontal

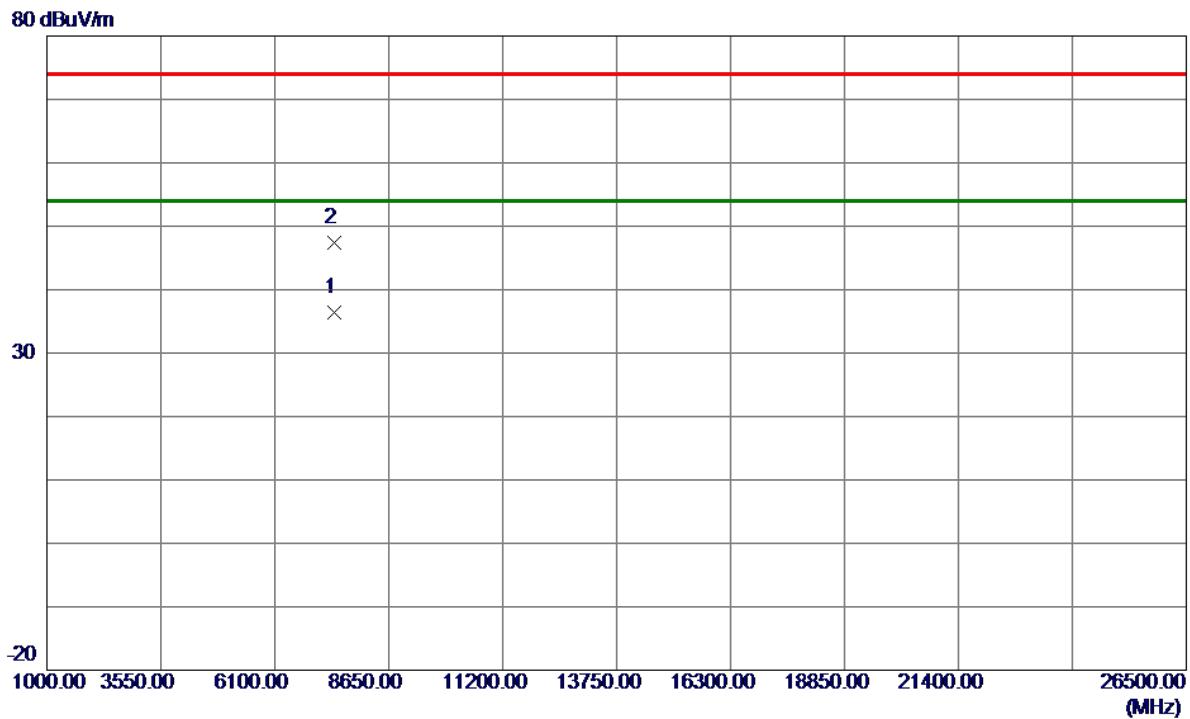
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2479.9000	89.09	7.32	96.41	74.00	22.41	Peak	No Limit
2 *	2480.0000	88.60	7.32	95.92	54.00	41.92	AVG	No Limit
3	2483.5000	39.93	7.32	47.25	74.00	-26.75	Peak	
4	2483.5000	30.77	7.32	38.09	54.00	-15.91	AVG	

Test Mode: TX 2480 MHz \_CH78\_1Mbps

## Horizontal

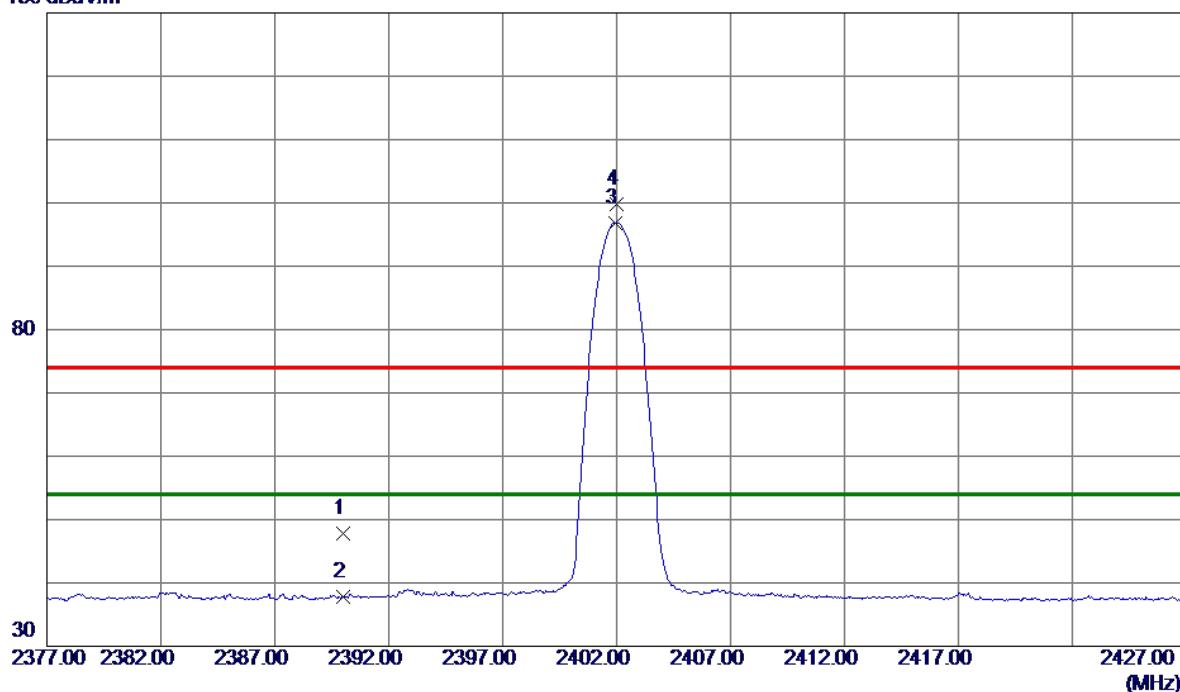


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7440.1000	26.40	9.92	36.32	54.00	-17.68	AVG	
2	7441.4000	37.42	9.92	47.34	74.00	-26.66	Peak	

Test Mode: TX 2402 MHz \_CH00\_3Mbps

## Vertical

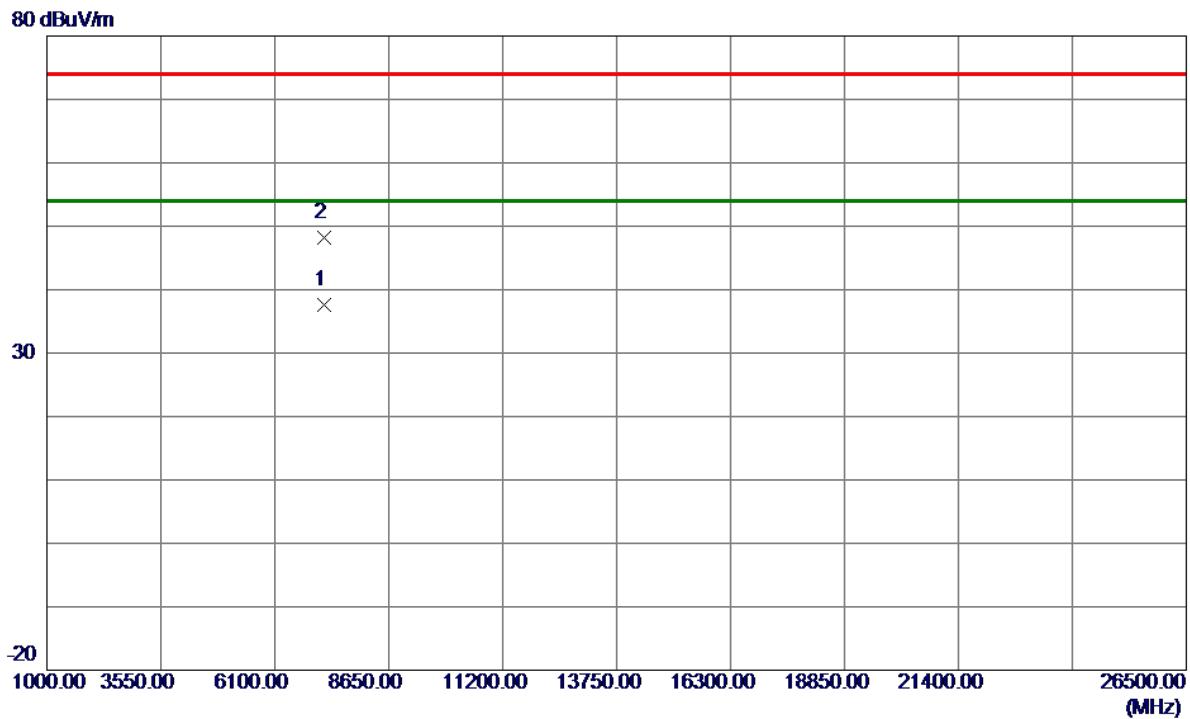
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	40.48	7.39	47.87	74.00	-26.13	Peak	
2	2390.0000	30.34	7.39	37.73	54.00	-16.27	AVG	
3 *	2401.9500	89.51	7.38	96.89	54.00	42.89	AVG	No Limit
4	2402.0000	92.47	7.38	99.85	74.00	25.85	Peak	No Limit

Test Mode: TX 2402 MHz \_CH00\_3Mbps

## Vertical

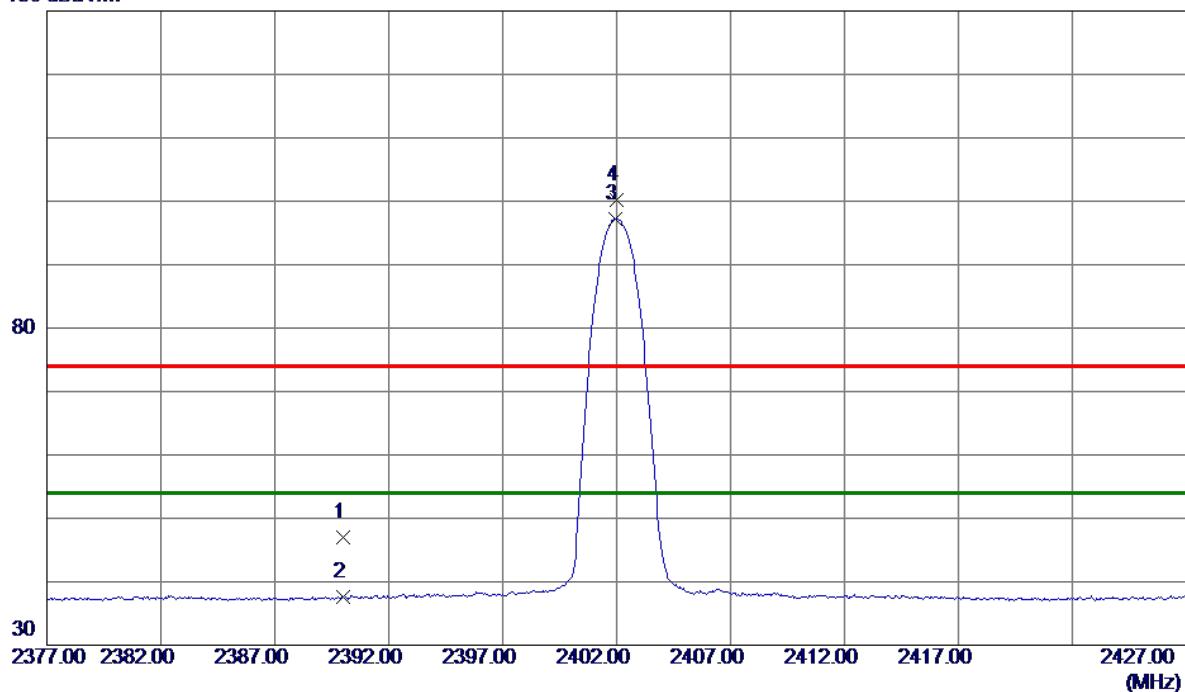


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7206.0800	28.17	9.36	37.53	54.00	-16.47	AVG	
2	7206.0950	38.84	9.36	48.20	74.00	-25.80	Peak	

Test Mode: TX 2402 MHz \_CH00\_3Mbps

## Horizontal

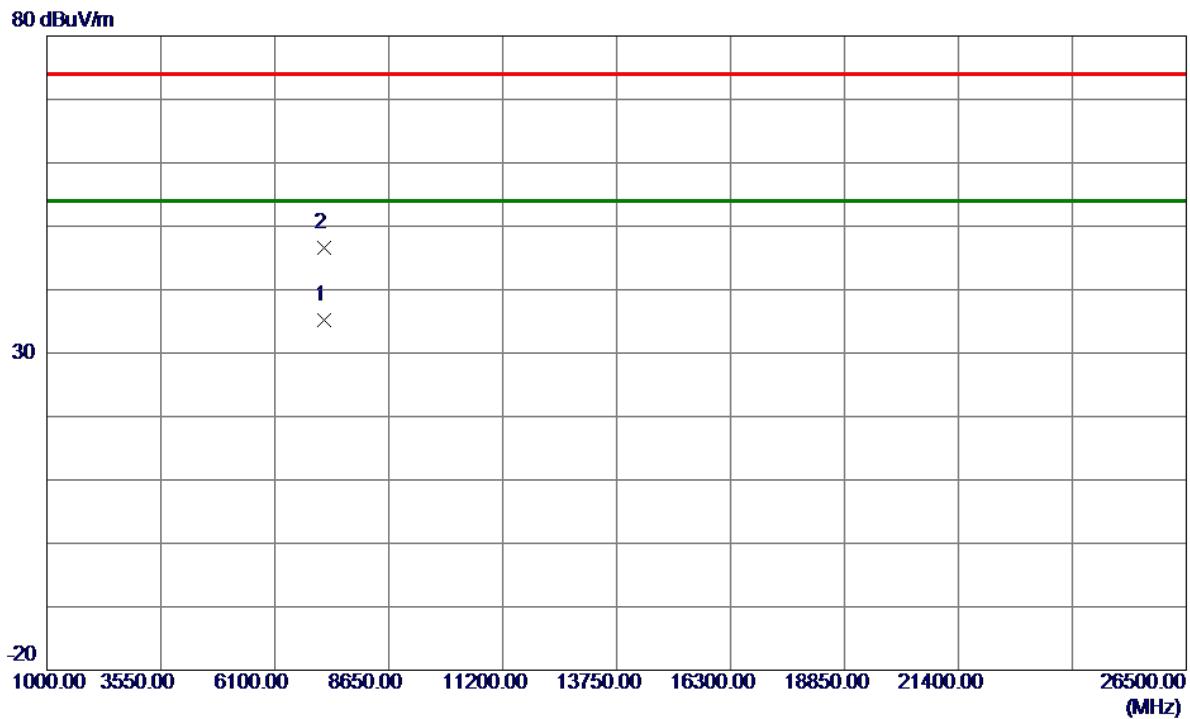
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	39.61	7.39	47.00	74.00	-27.00	Peak	
2	2390.0000	30.15	7.39	37.54	54.00	-16.46	AVG	
3 *	2401.9500	89.78	7.38	97.16	54.00	43.16	AVG	No Limit
4	2402.0000	92.76	7.38	100.14	74.00	26.14	Peak	No Limit

Test Mode: TX 2402 MHz \_CH00\_3Mbps

## Horizontal

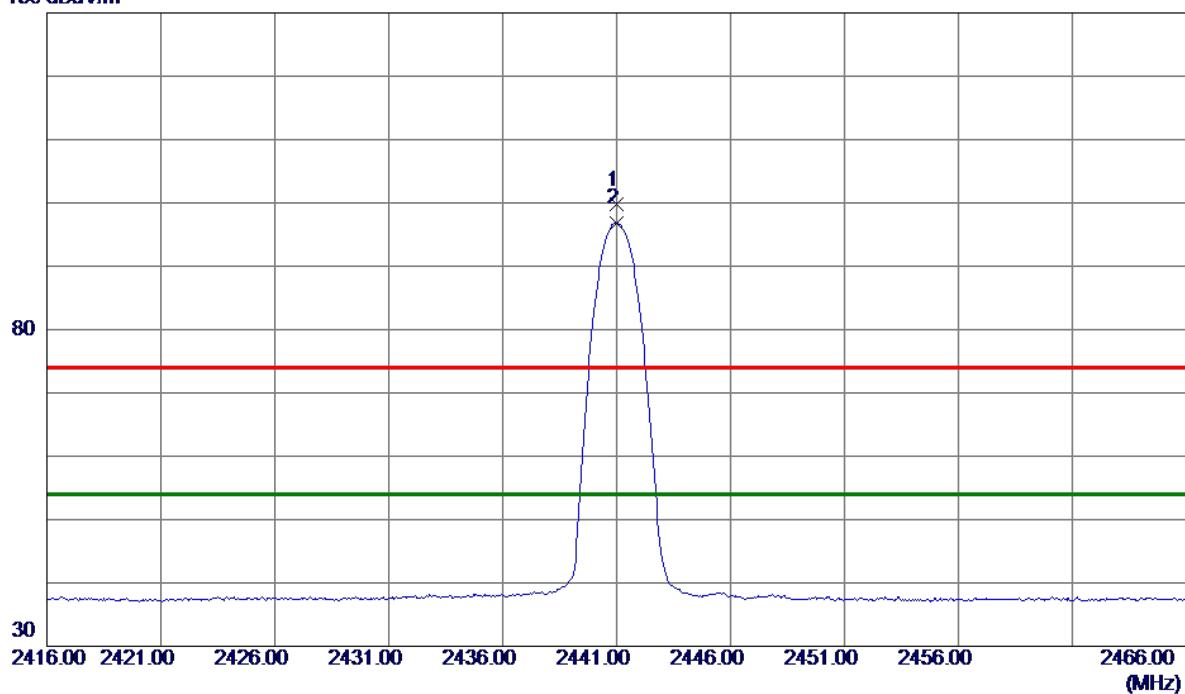


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7205.5500	25.92	9.36	35.28	54.00	-18.72	AVG	
2	7205.9350	37.29	9.36	46.65	74.00	-27.35	Peak	

Test Mode: TX 2441 MHz \_CH39\_3Mbps

## Vertical

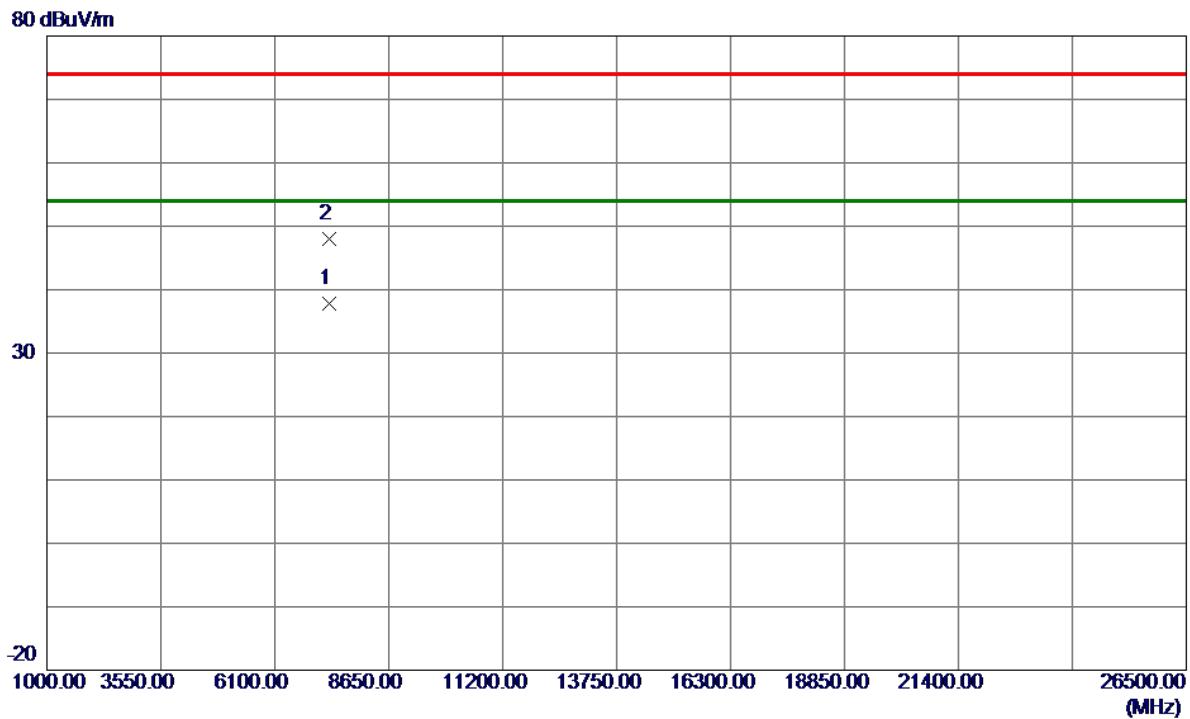
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2441.0000	92.35	7.35	99.70	74.00	25.70	Peak	No Limit
2 *	2441.0000	89.46	7.35	96.81	54.00	42.81	AVG	No Limit

Test Mode: TX 2441 MHz \_CH39\_3Mbps

## Vertical

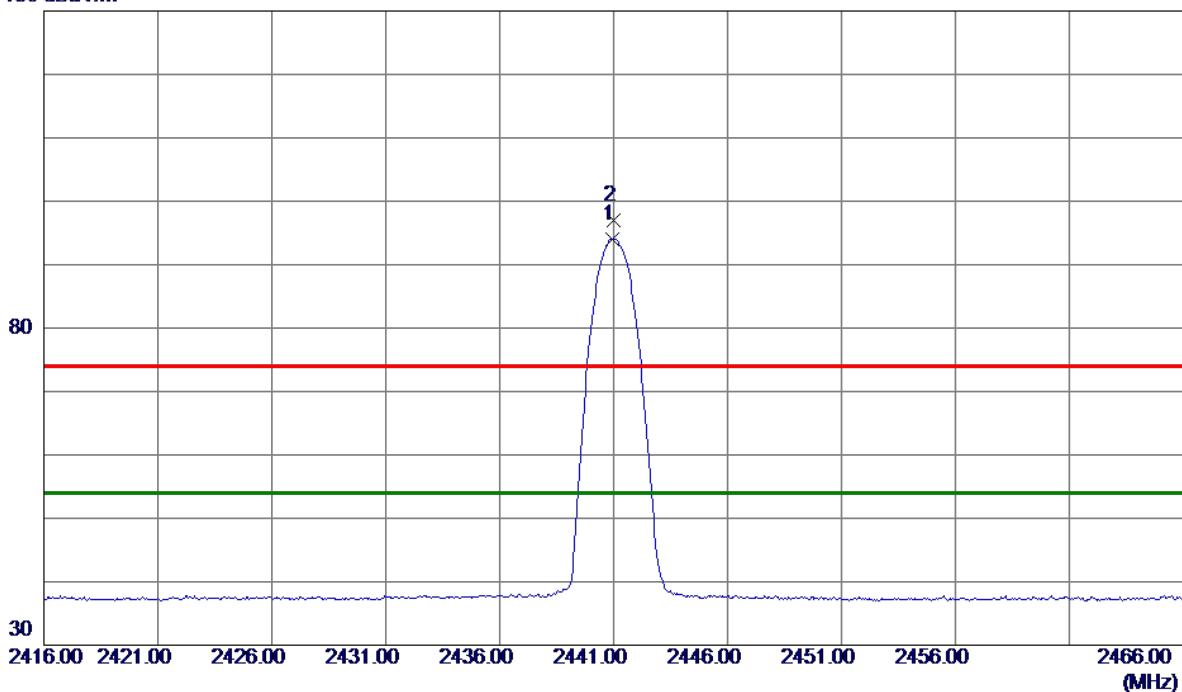


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7323.0300	28.17	9.64	37.81	54.00	-16.19	AVG	
2	7323.0550	38.42	9.64	48.06	74.00	-25.94	Peak	

Test Mode: TX 2441 MHz \_CH39\_3Mbps

## Horizontal

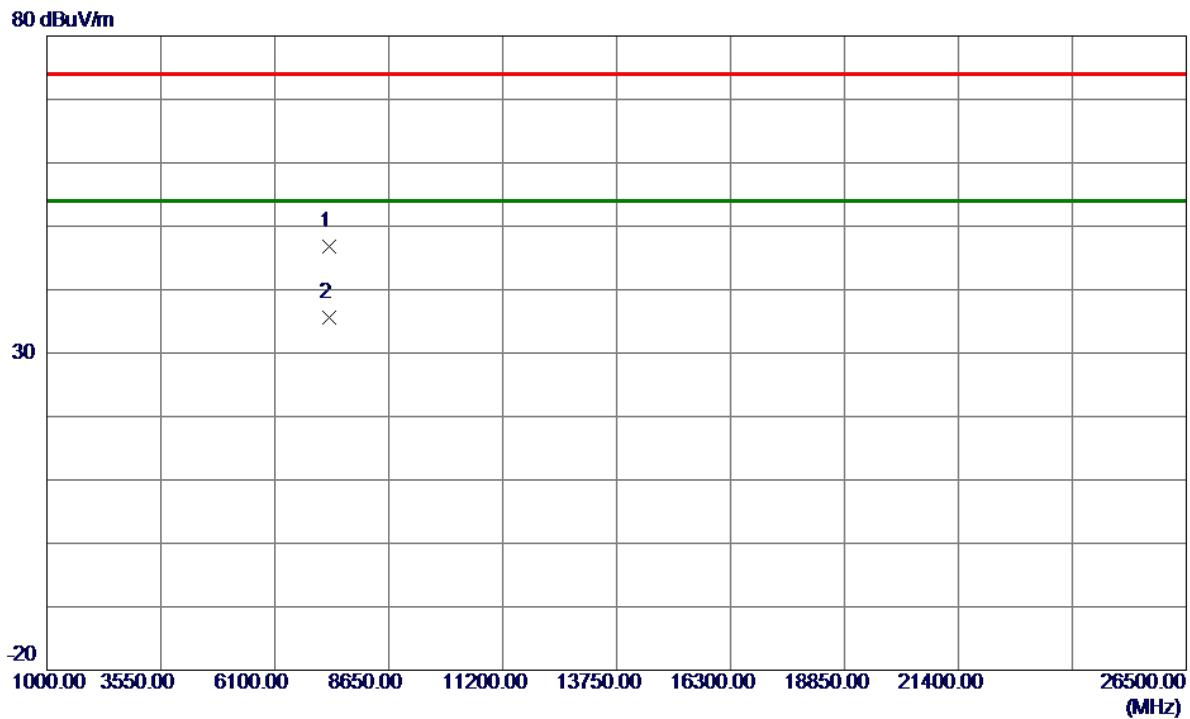
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2440.9500	86.71	7.35	94.06	54.00	40.06	AVG	No Limit
2	2441.0000	89.62	7.35	96.97	74.00	22.97	Peak	No Limit

Test Mode: TX 2441 MHz \_CH39\_3Mbps

## Horizontal

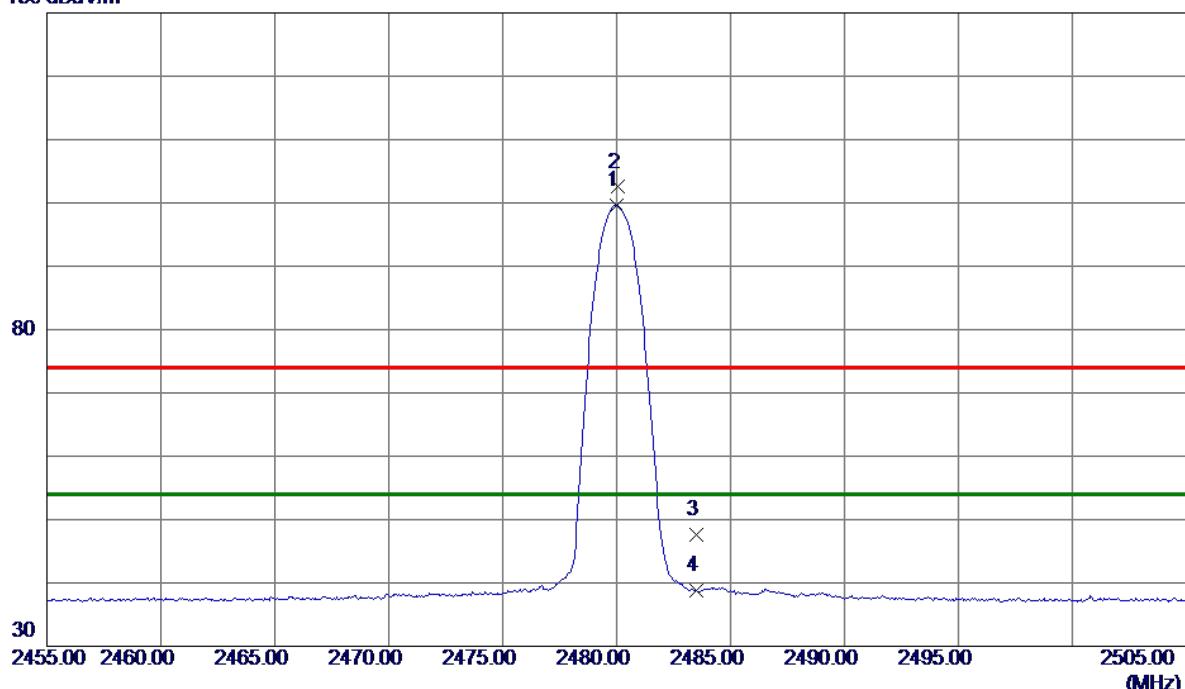


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	7322.4400	37.13	9.64	46.77	74.00	-27.23	Peak	
2 *	7324.6250	25.92	9.64	35.56	54.00	-18.44	AVG	

Test Mode: TX 2480 MHz \_CH78\_3Mbps

## Vertical

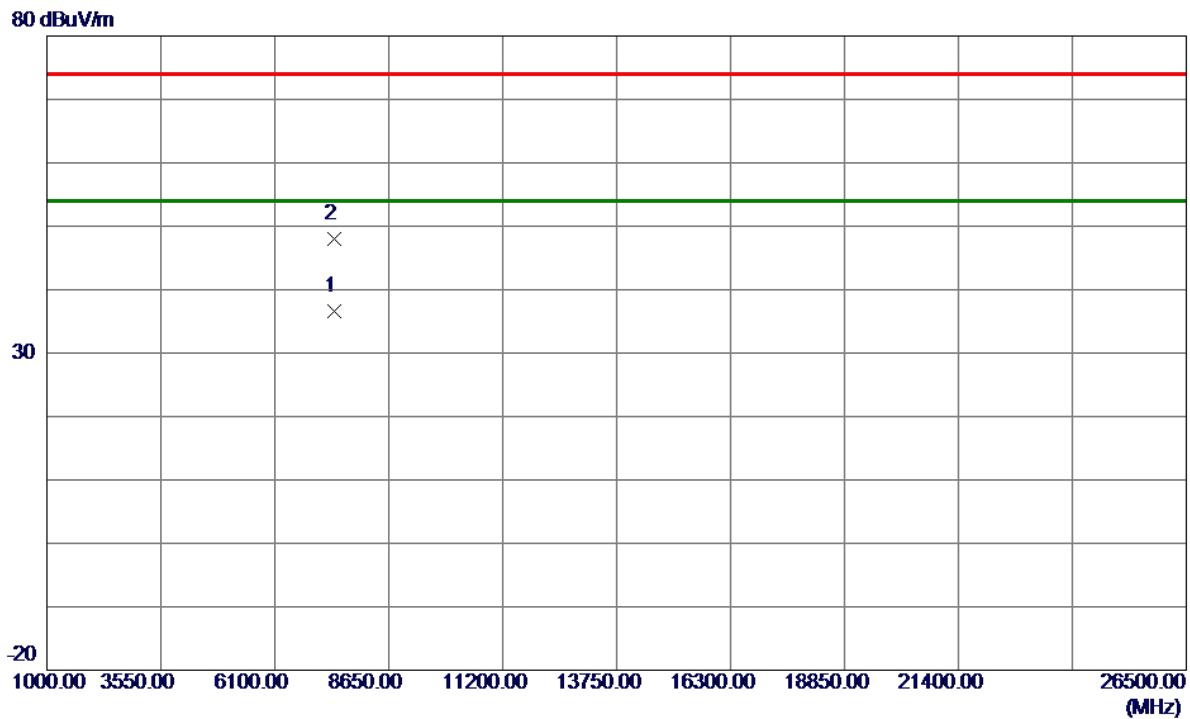
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2480.0000	92.27	7.32	99.59	54.00	45.59	AVG	No Limit
2	2480.0500	95.18	7.32	102.50	74.00	28.50	Peak	No Limit
3	2483.5000	40.19	7.32	47.51	74.00	-26.49	Peak	
4	2483.5000	31.48	7.32	38.80	54.00	-15.20	AVG	

Test Mode: TX 2480 MHz \_CH78\_3Mbps

## Vertical

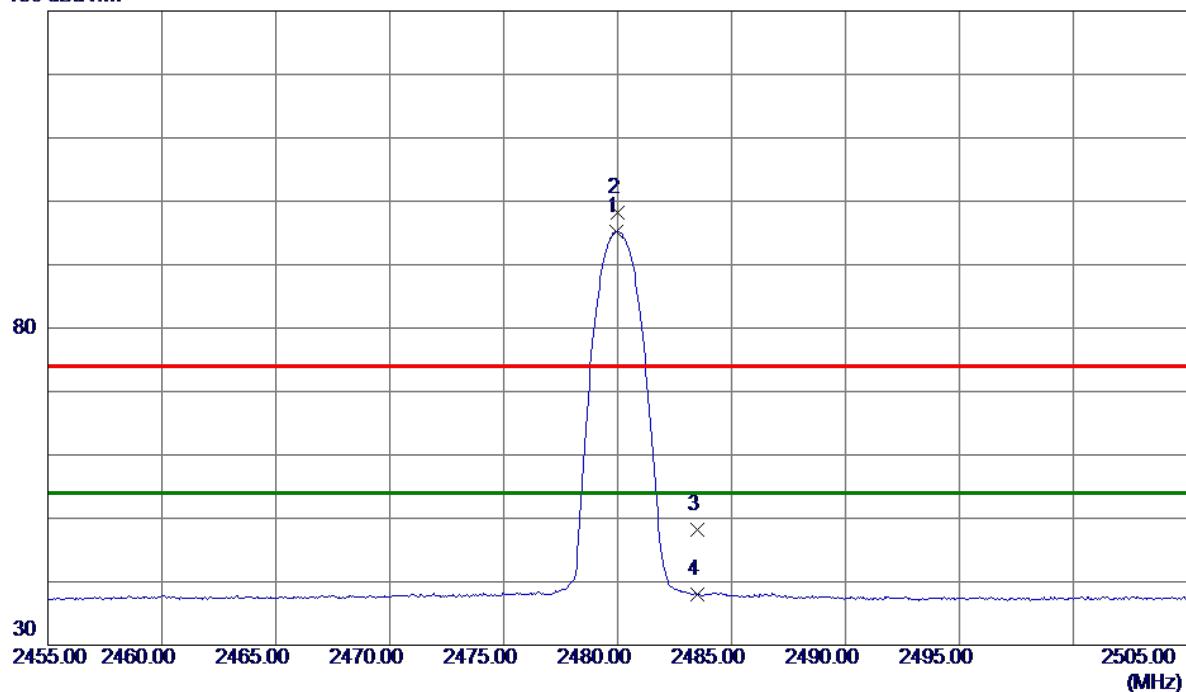


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7440.0700	26.72	9.92	36.64	54.00	-17.36	AVG	
2	7442.2800	38.13	9.92	48.05	74.00	-25.95	Peak	

Test Mode: TX 2480 MHz \_CH78\_3Mbps

## Horizontal

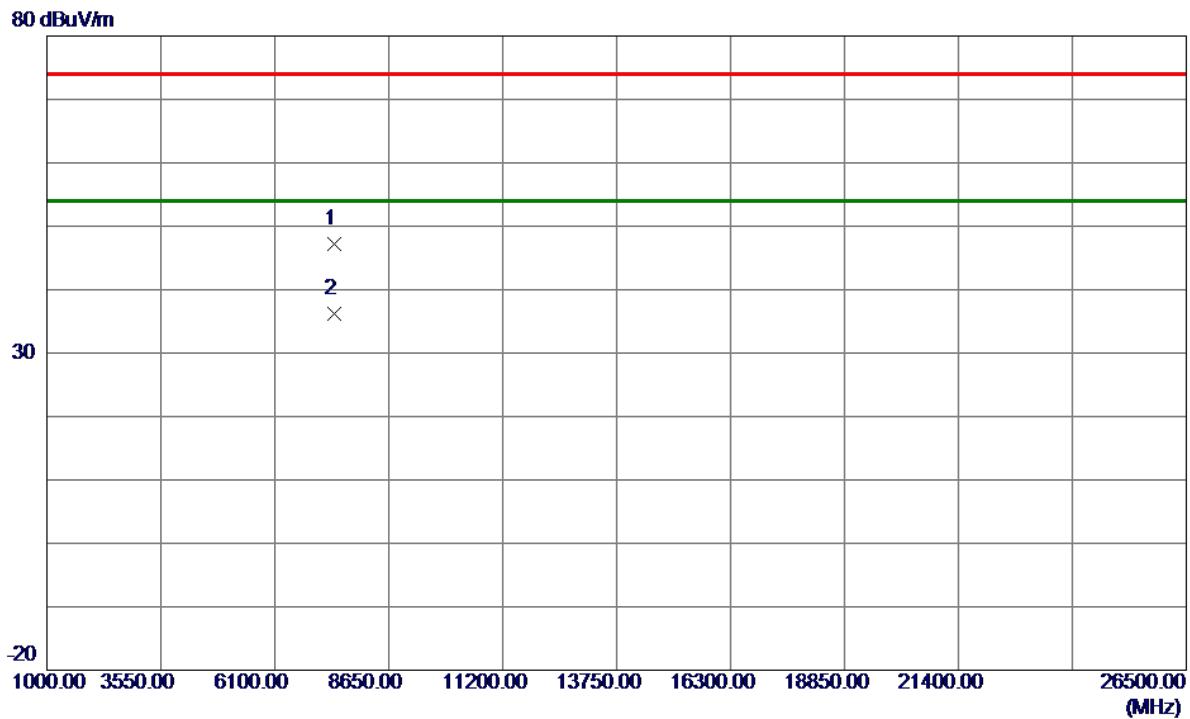
130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2479.9500	87.92	7.32	95.24	54.00	41.24	AVG	No Limit
2	2480.0000	90.79	7.32	98.11	74.00	24.11	Peak	No Limit
3	2483.5000	40.85	7.32	48.17	74.00	-25.83	Peak	
4	2483.5000	30.65	7.32	37.97	54.00	-16.03	AVG	

Test Mode: TX 2480 MHz \_CH78\_3Mbps

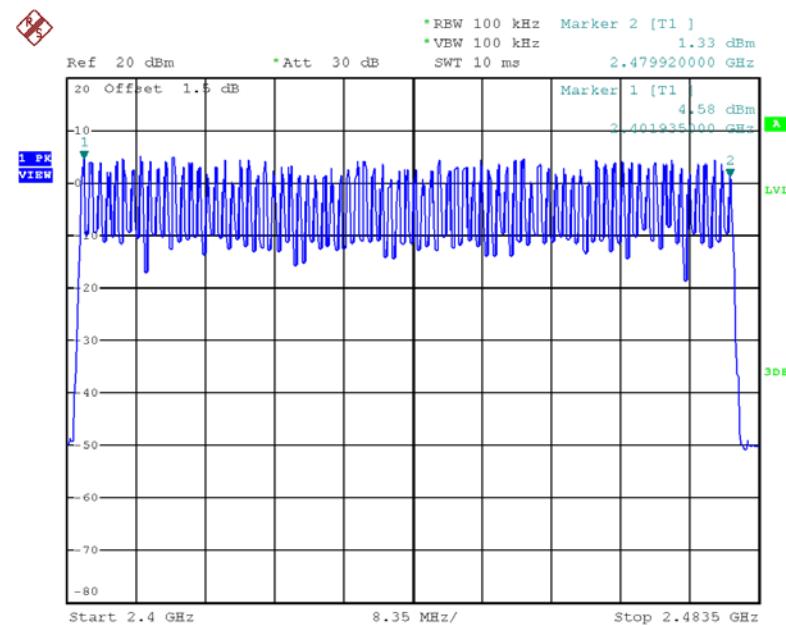
## Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	7442.0200	37.27	9.92	47.19	74.00	-26.81	Peak	
2 *	7442.0700	26.25	9.92	36.17	54.00	-17.83	AVG	

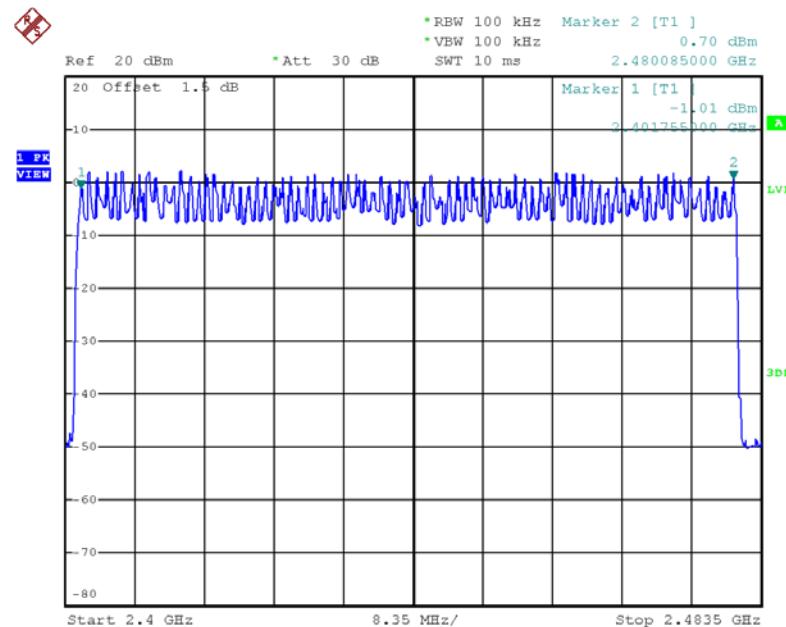
## APPENDIX E - NUMBER OF HOPPING CHANNEL

Test Mode	Hopping Mode_1Mbps
Number of Hopping Channel	79



Date: 28.AUG.2018 14:15:16

Test Mode	Hopping Mode_3Mbps
Number of Hopping Channel	79



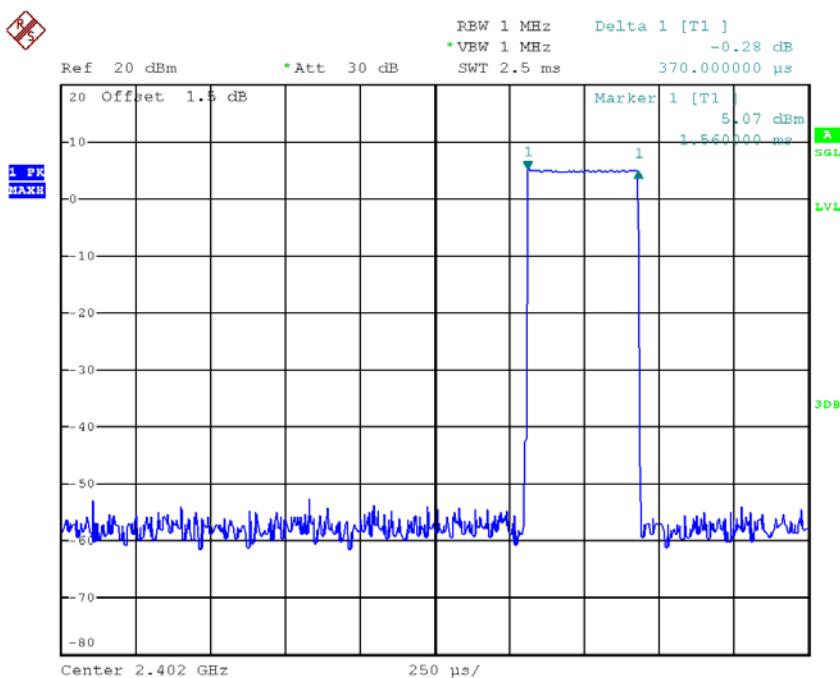
Date: 28.AUG.2018 15:43:08

## APPENDIX F - AVERAGE TIME OF OCCUPANCY

Test Mode:	TX Mode_1Mbps
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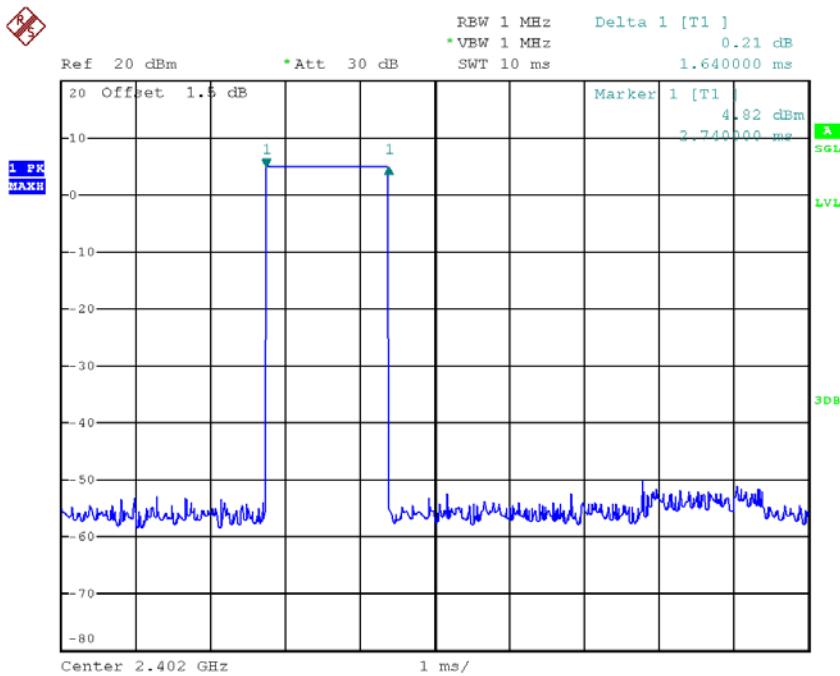
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Pass
DH3	2402	1.6400	0.2624	0.4000	Pass
DH1	2402	0.3700	0.1184	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH3	2441	1.6200	0.2592	0.4000	Pass
DH1	2441	0.3700	0.1184	0.4000	Pass
DH5	2480	2.8800	0.3072	0.4000	Pass
DH3	2480	1.6400	0.2624	0.4000	Pass
DH1	2480	0.3700	0.1184	0.4000	Pass

## CH00-DH1

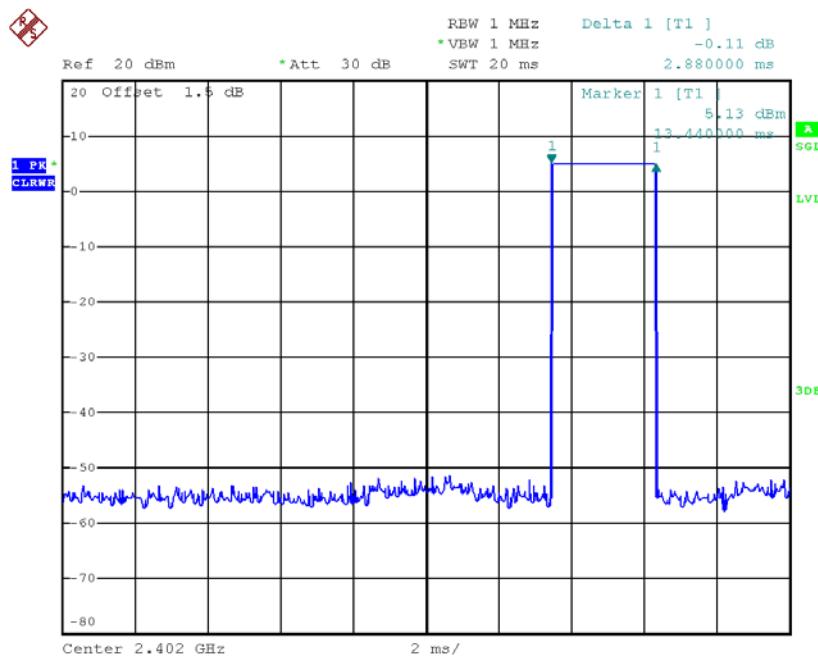


Date: 28.AUG.2018 14:09:28

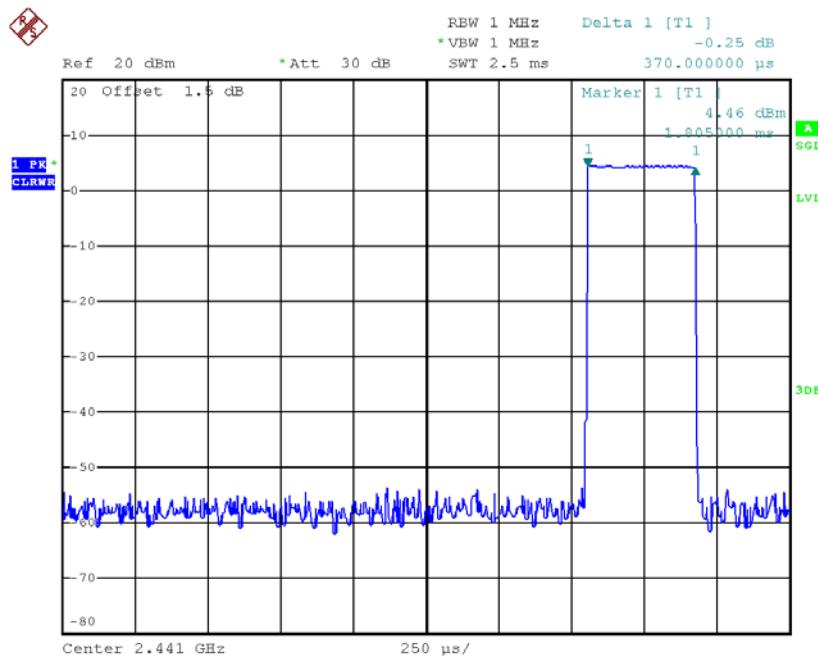
## CH00-DH3



Date: 28.AUG.2018 14:17:35

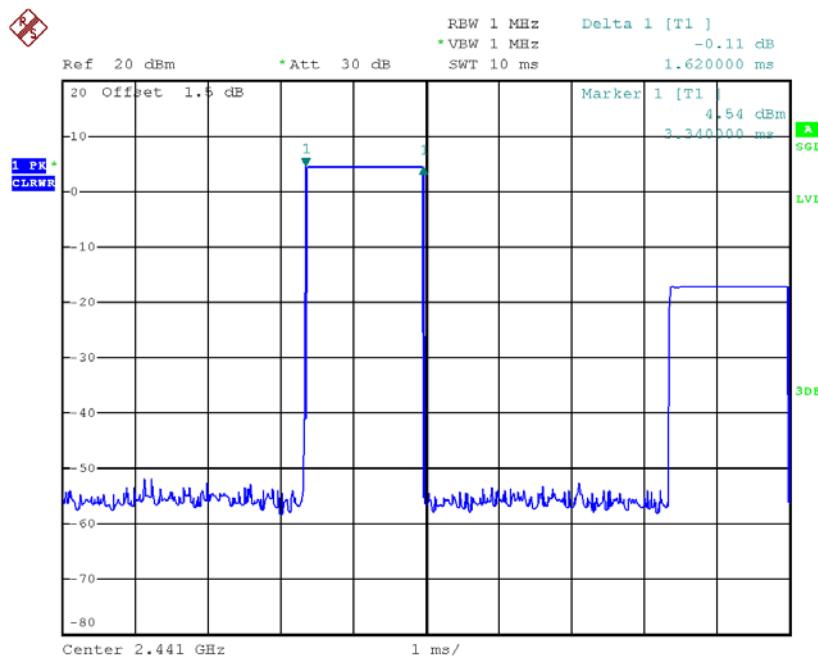
**CH00-DH5**

Date: 28.AUG.2018 14:18:34

**CH39-DH1**

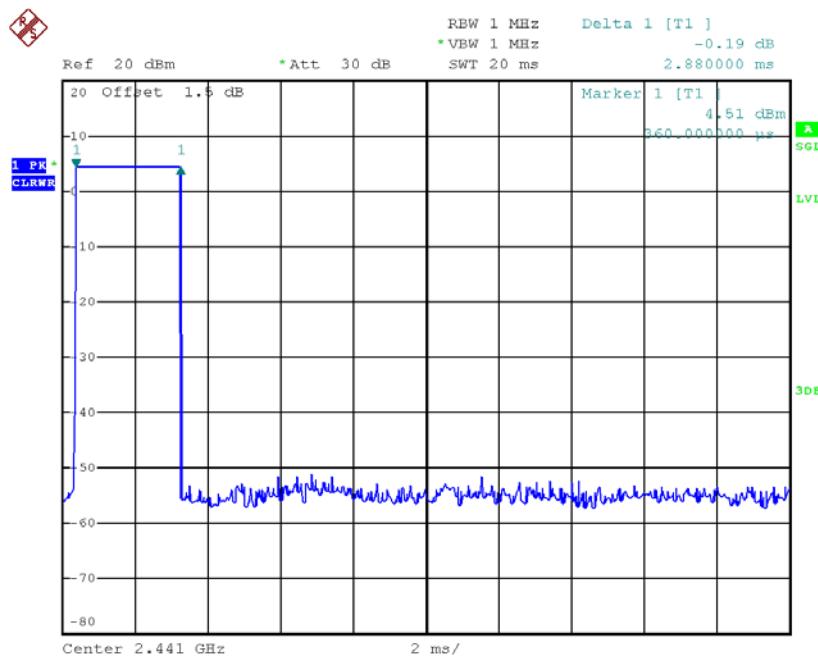
Date: 28.AUG.2018 14:22:44

## CH39-DH3



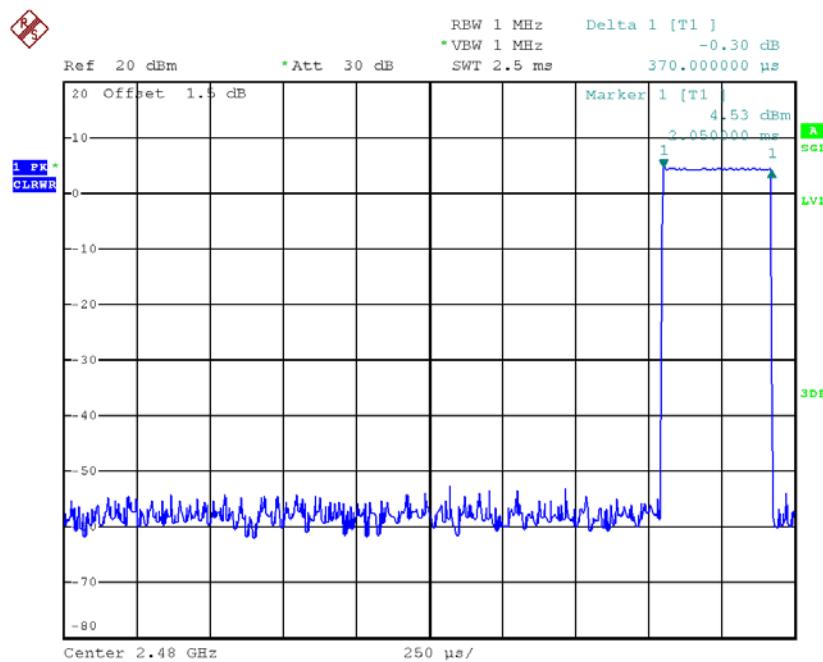
Date: 28.AUG.2018 14:21:08

## CH39-DH5



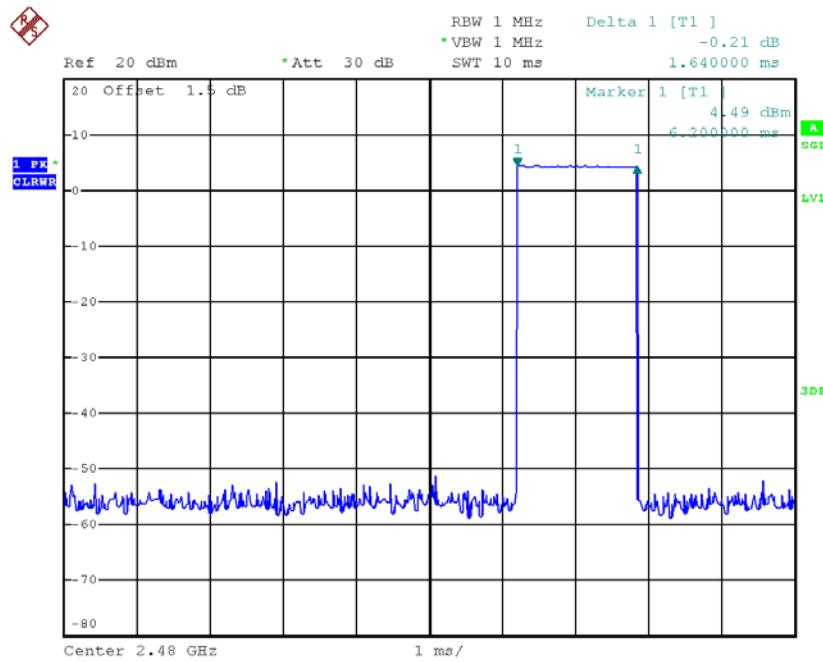
Date: 28.AUG.2018 14:20:14

## CH78-DH1



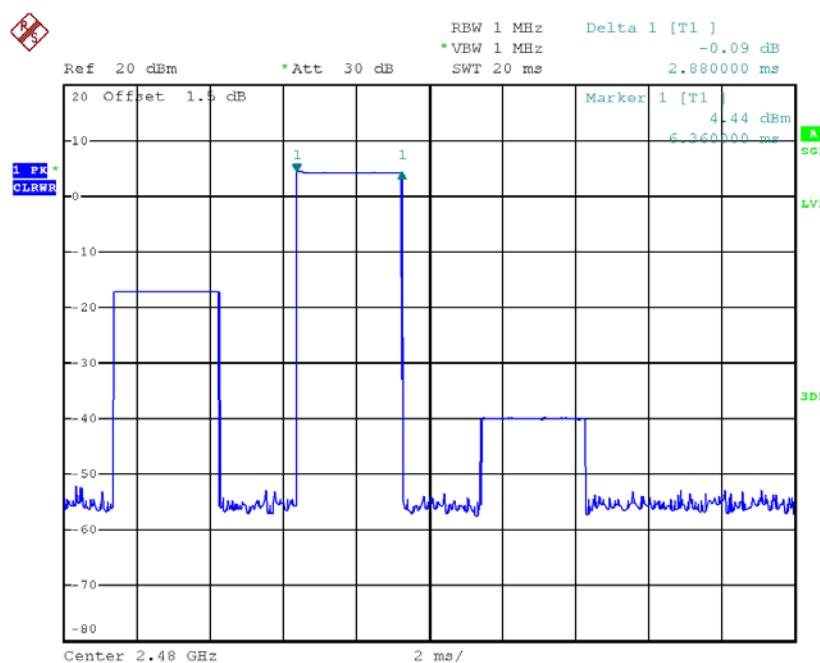
Date: 28.AUG.2018 14:22:24

## CH78-DH3



Date: 28.AUG.2018 14:20:56

## CH78-DH5

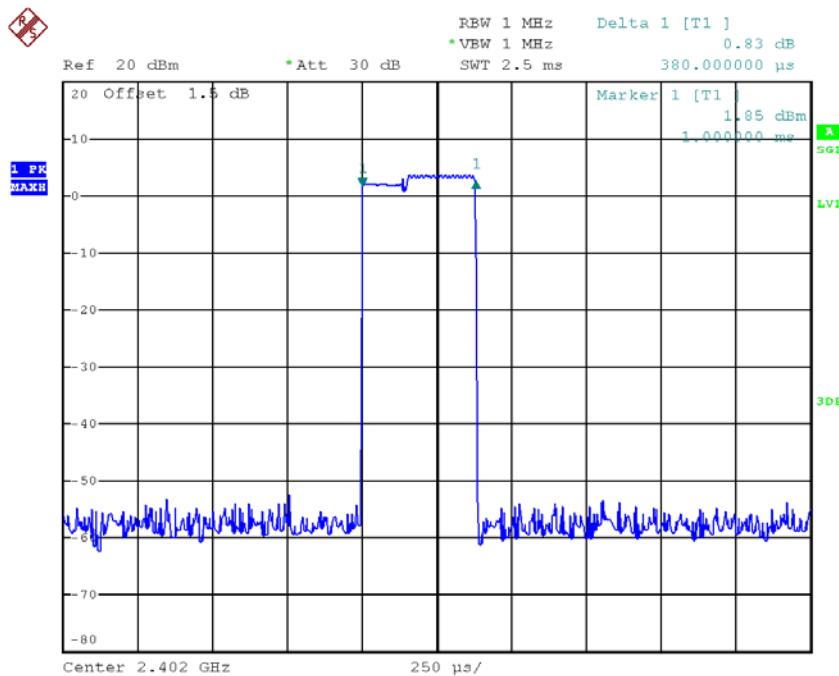


Date: 28.AUG.2018 14:18:46

Test Mode: TX Mode\_3Mbps

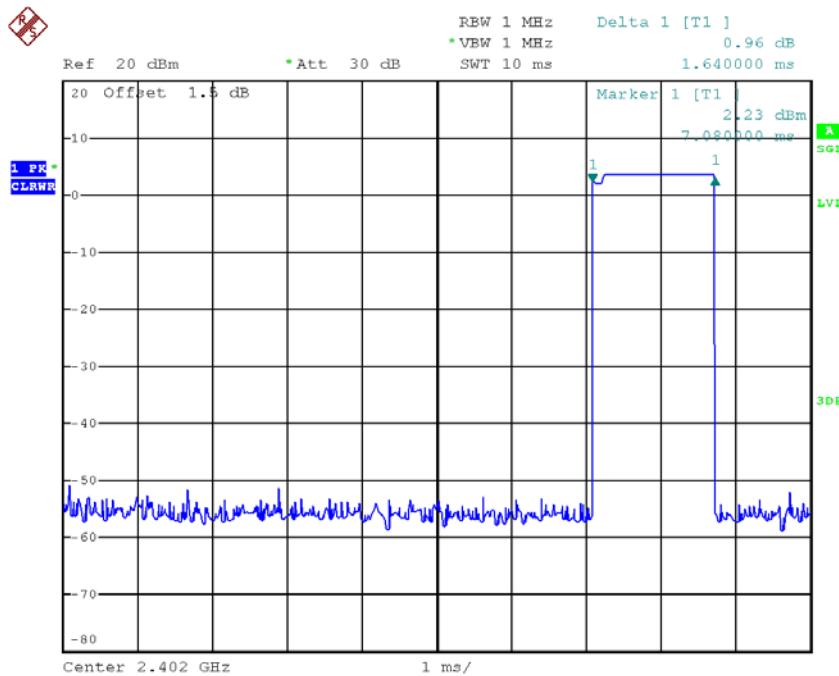
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
DH5	2402	2.8800	0.3072	0.4000	Pass
DH3	2402	1.6400	0.2624	0.4000	Pass
DH1	2402	0.3800	0.1216	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH3	2441	1.6200	0.2592	0.4000	Pass
DH1	2441	0.3800	0.1200	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6200	0.2592	0.4000	Pass
DH1	2480	0.3800	0.1216	0.4000	Pass

## CH00-DH1



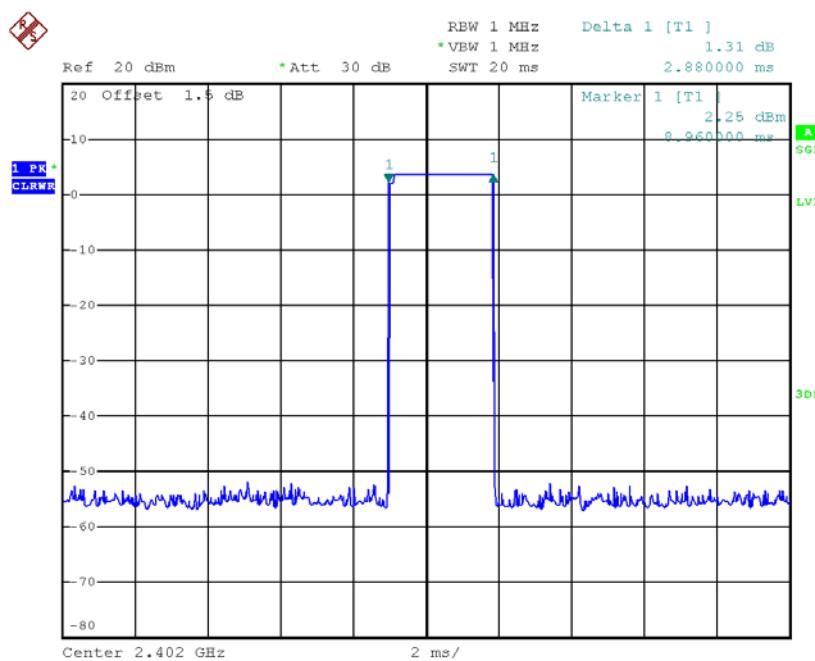
Date: 28.AUG.2018 15:30:25

## CH00-DH3



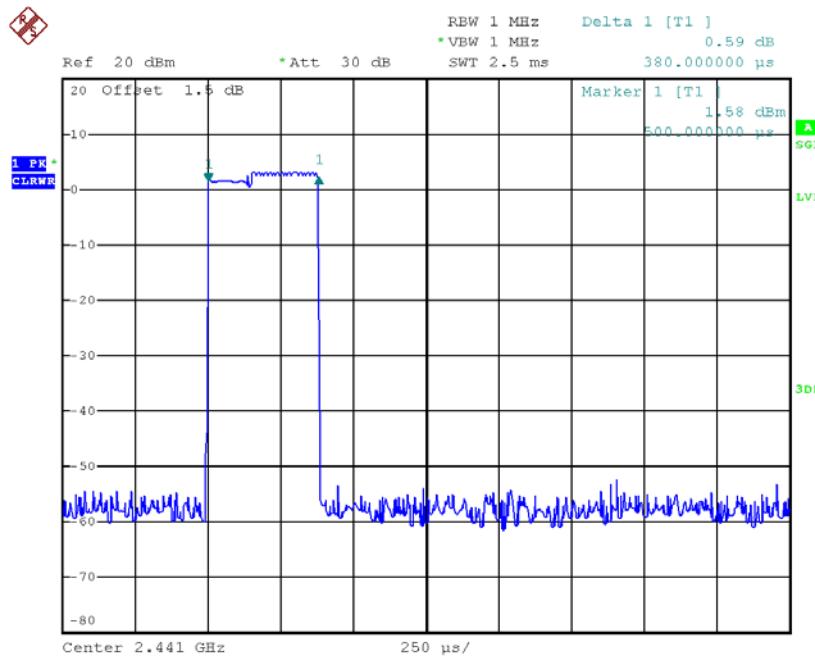
Date: 28.AUG.2018 16:04:49

## CH00-DH5



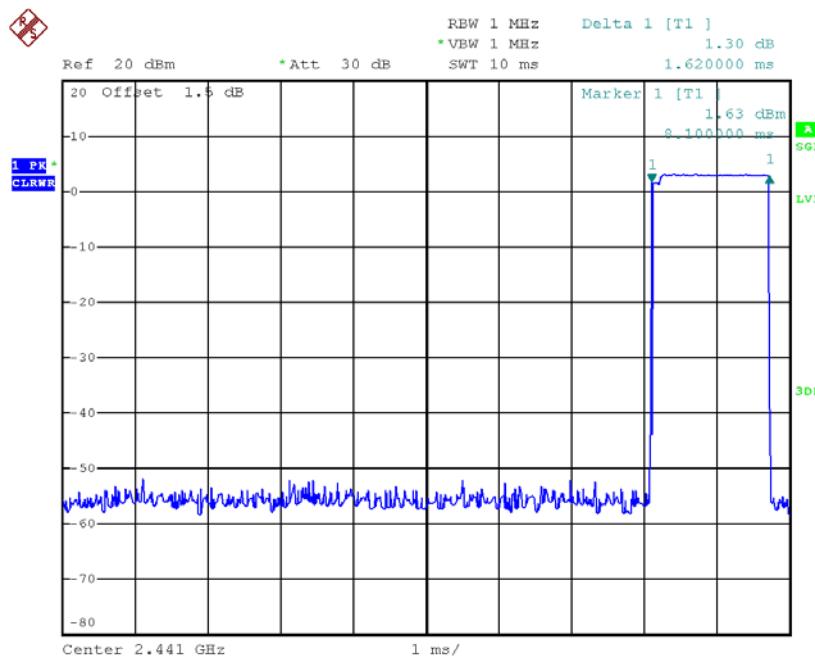
Date: 28.AUG.2018 16:01:13

## CH39-DH1



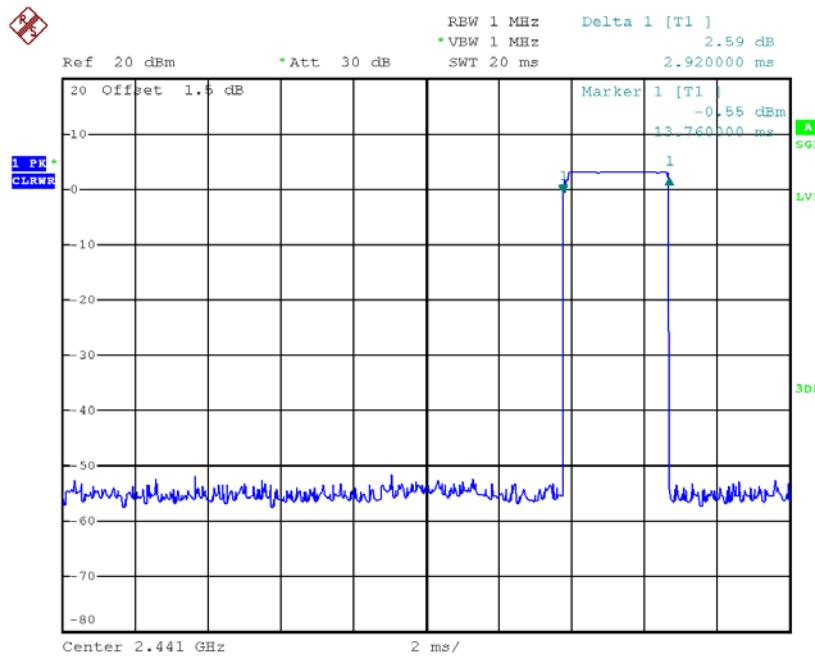
Date: 28.AUG.2018 16:08:09

## CH39-DH3



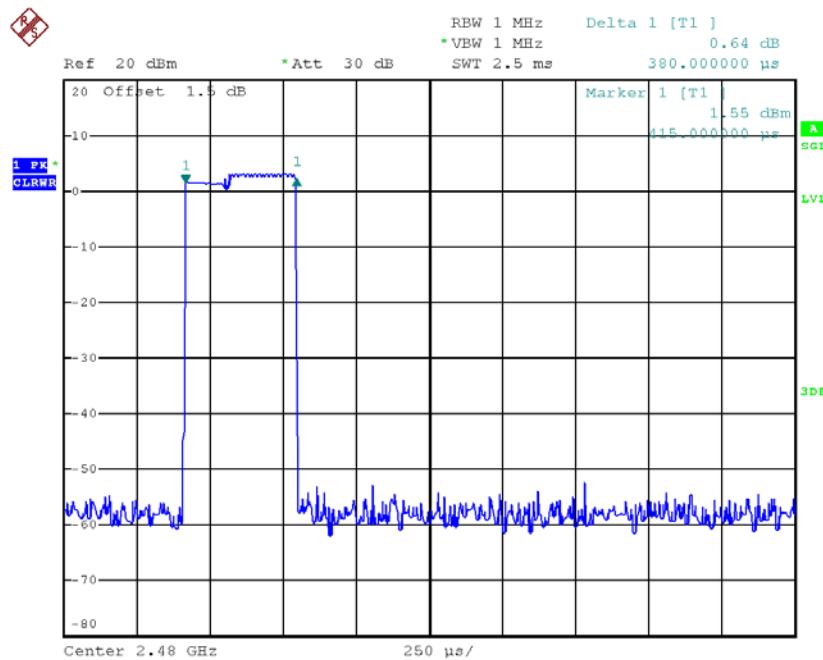
Date: 28.AUG.2018 16:00:38

## CH39-DH5



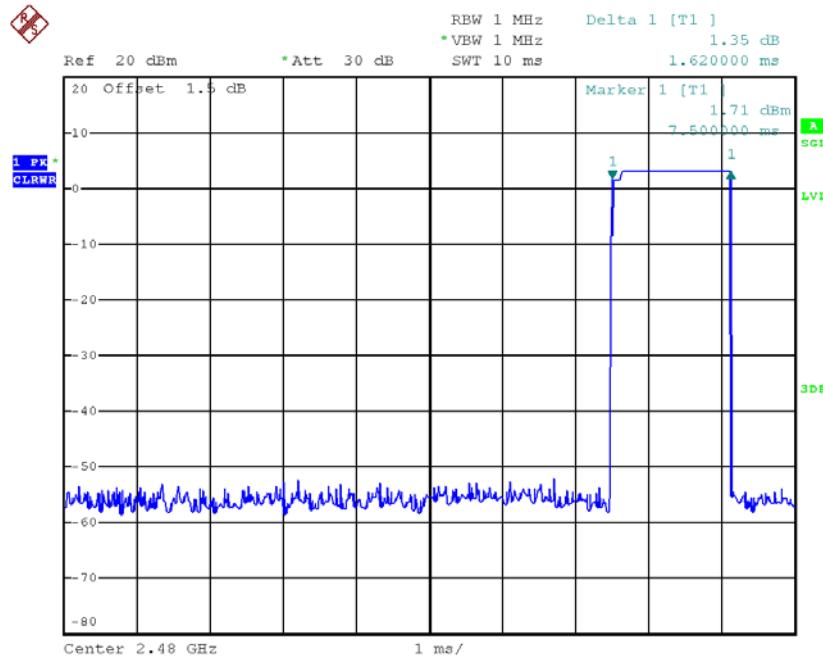
Date: 28.AUG.2018 16:02:12

## CH78-DH1



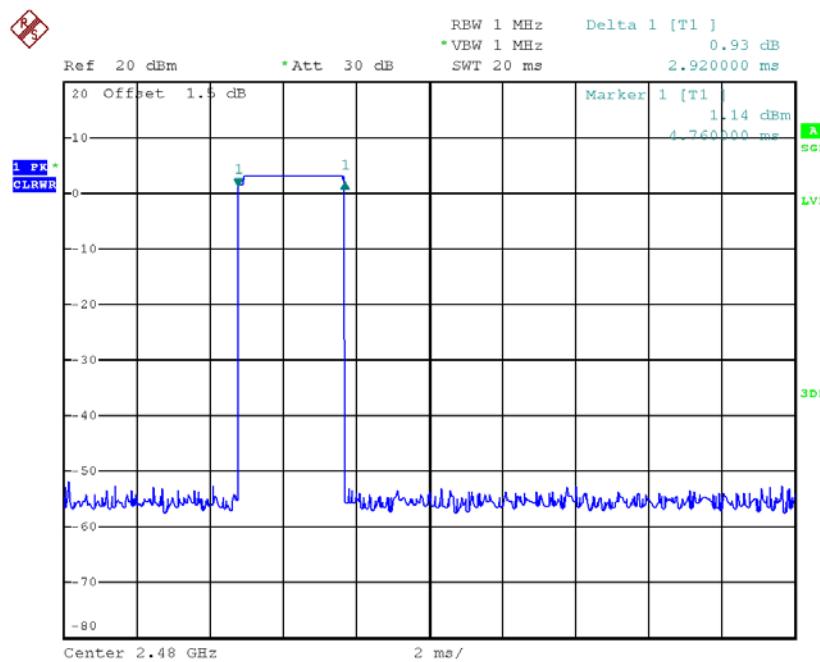
Date: 28.AUG.2018 15:31:10

## CH78-DH3



Date: 28.AUG.2018 16:00:43

## CH78-DH5

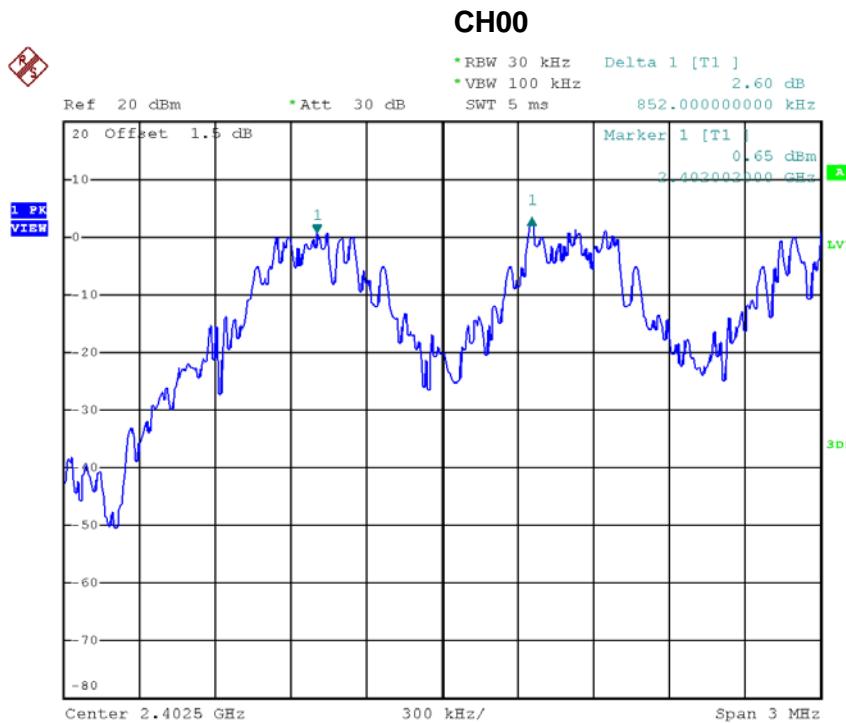


Date: 28.AUG.2018 16:02:50

## APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT

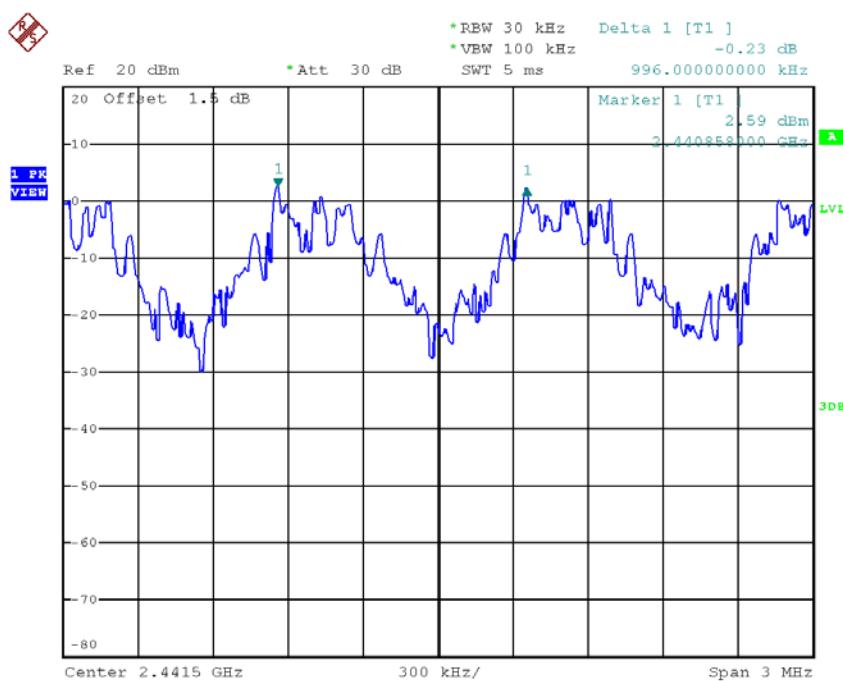
Test Mode: Hopping on \_1Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
2402	0.852	0.568	Pass
2441	0.996	0.595	Pass
2480	1.002	0.592	Pass



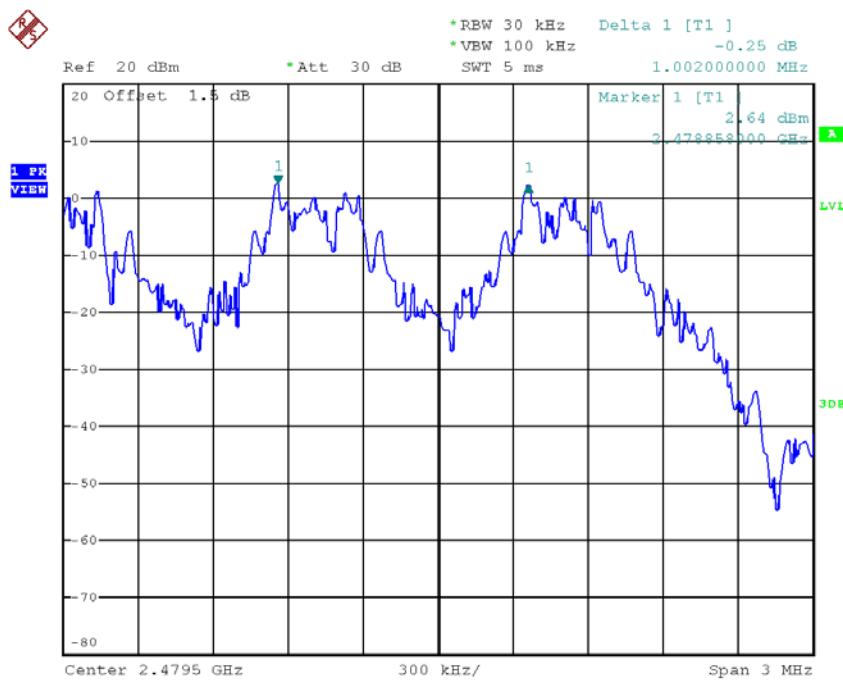
Date: 28.AUG.2018 14:59:11

## CH39



Date: 28.AUG.2018 14:26:49

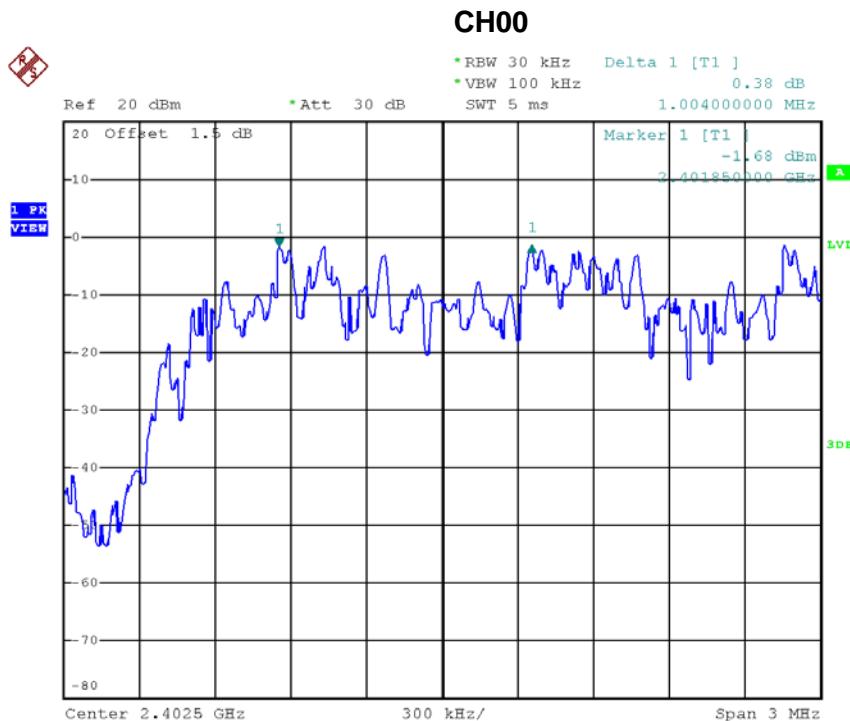
## CH78



Date: 28.AUG.2018 14:28:23

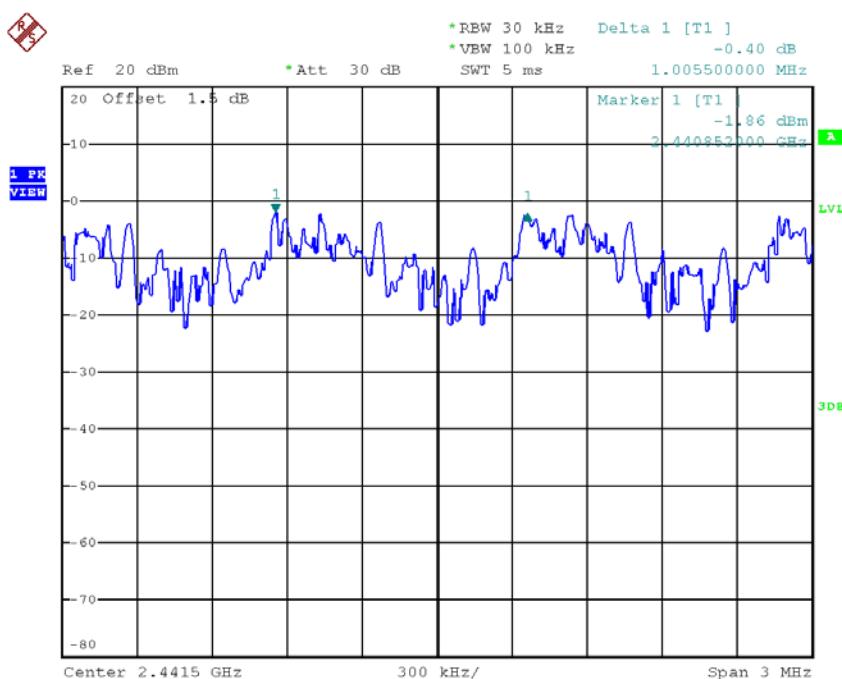
Test Mode: Hopping on \_3Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
2402	1.004	0.807	Pass
2441	1.006	0.807	Pass
2480	0.998	0.809	Pass



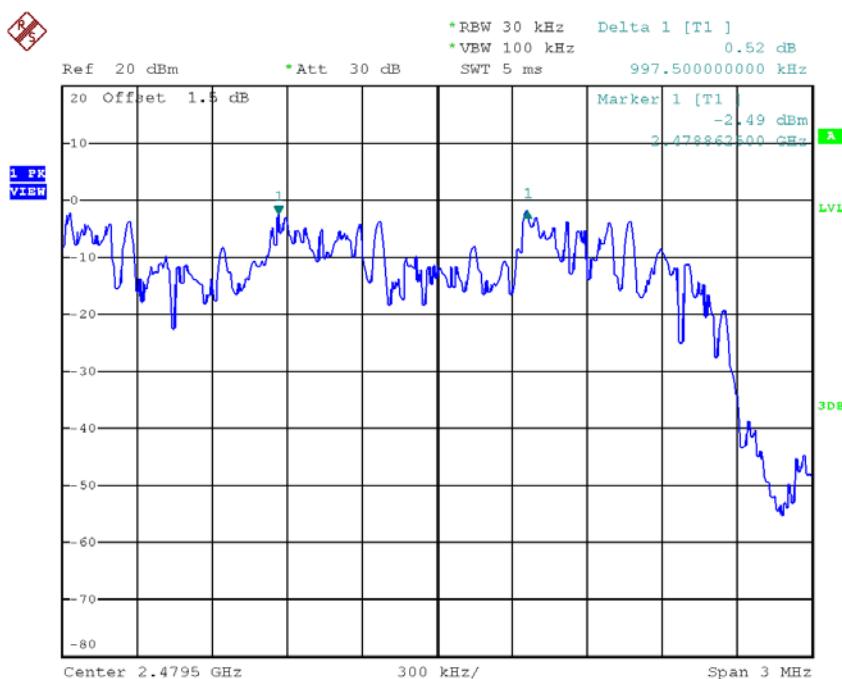
Date: 28.AUG.2018 15:33:50

## CH39



Date: 28.AUG.2018 15:36:01

## CH78

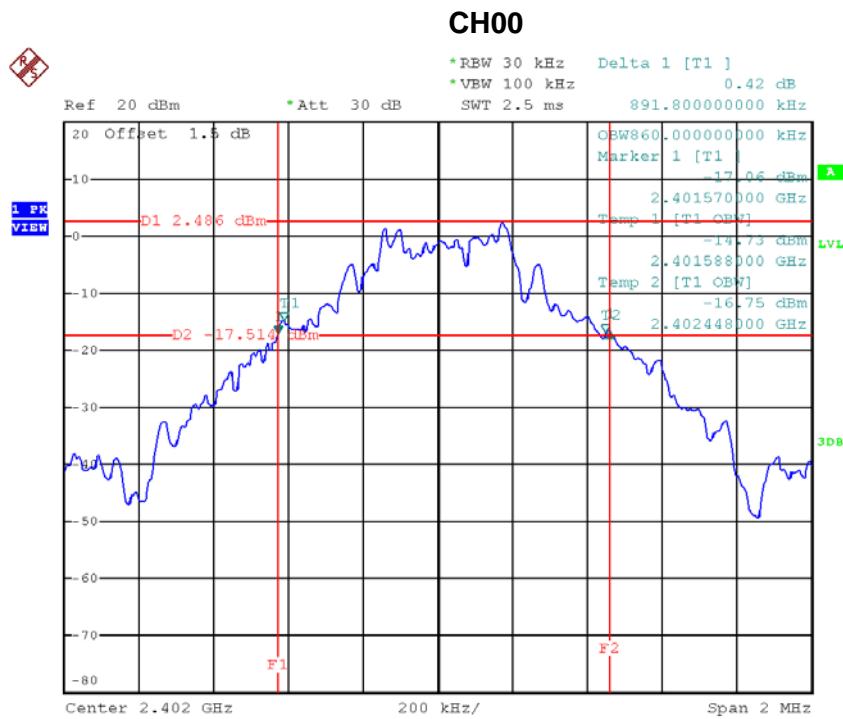


Date: 28.AUG.2018 15:38:11

## APPENDIX H - BANDWIDTH

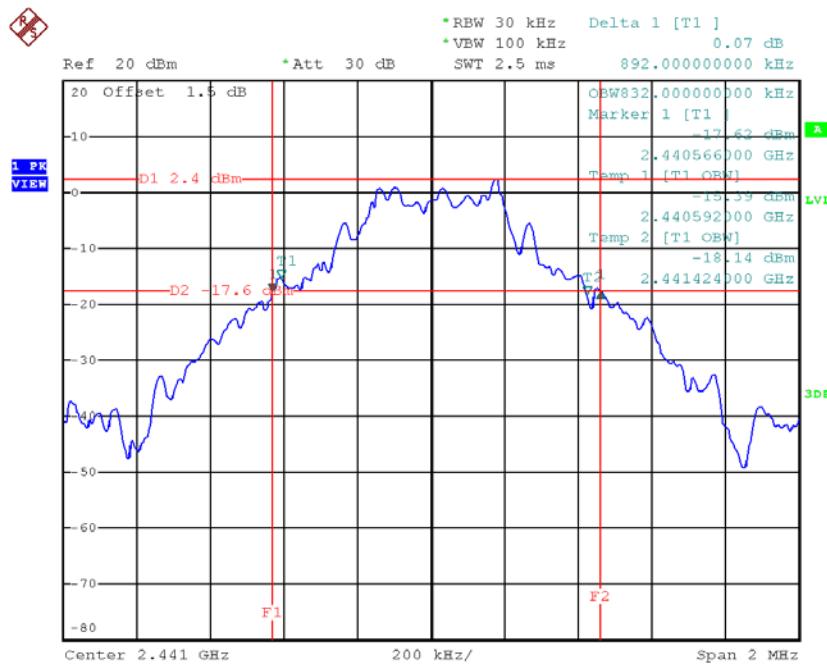
Test Mode:	TX Mode _1Mbps
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Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.892	0.860	Pass
2441	0.892	0.832	Pass
2480	0.888	0.836	Pass



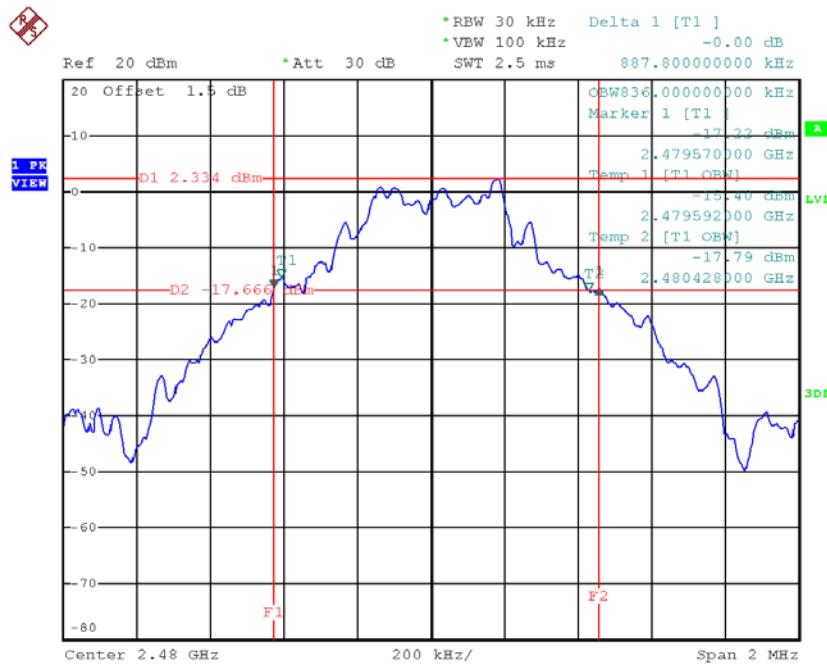
Date: 28.AUG.2018 16:28:30

## CH39



Date: 28.AUG.2018 16:29:56

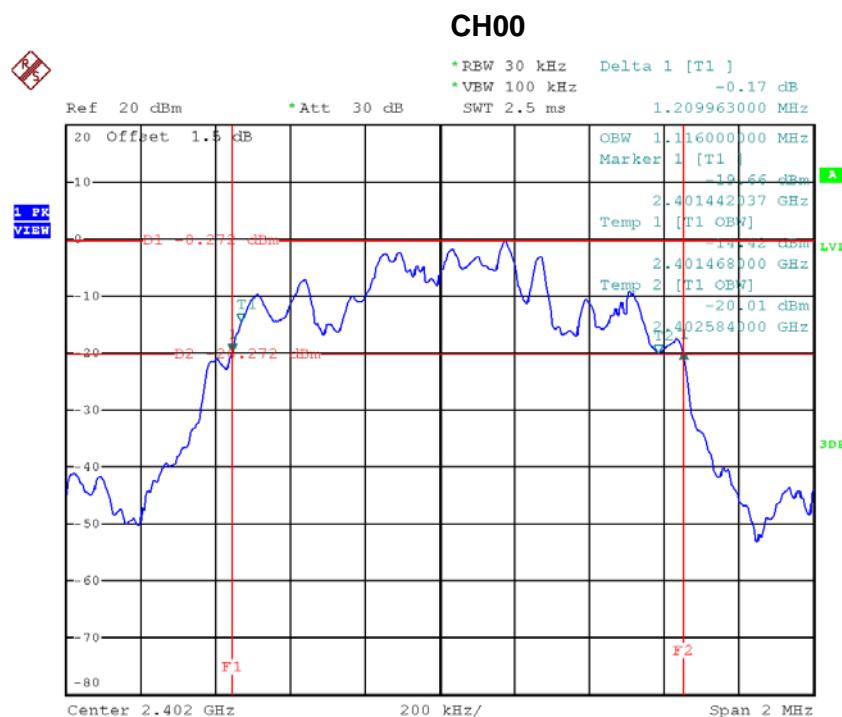
## CH78



Date: 28.AUG.2018 16:31:34

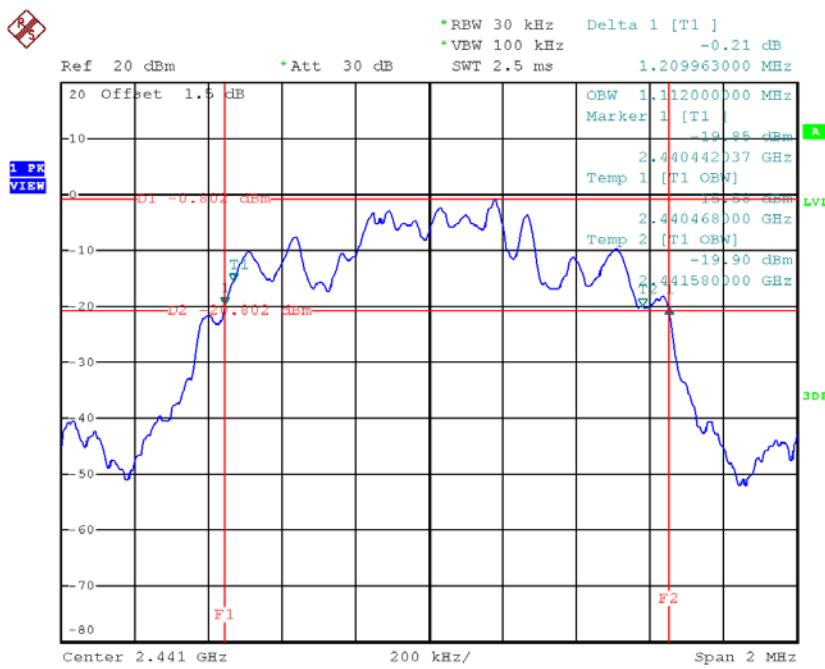
Test Mode: TX Mode \_3Mbps

Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.210	1.116	Pass
2441	1.210	1.112	Pass
2480	1.214	1.108	Pass



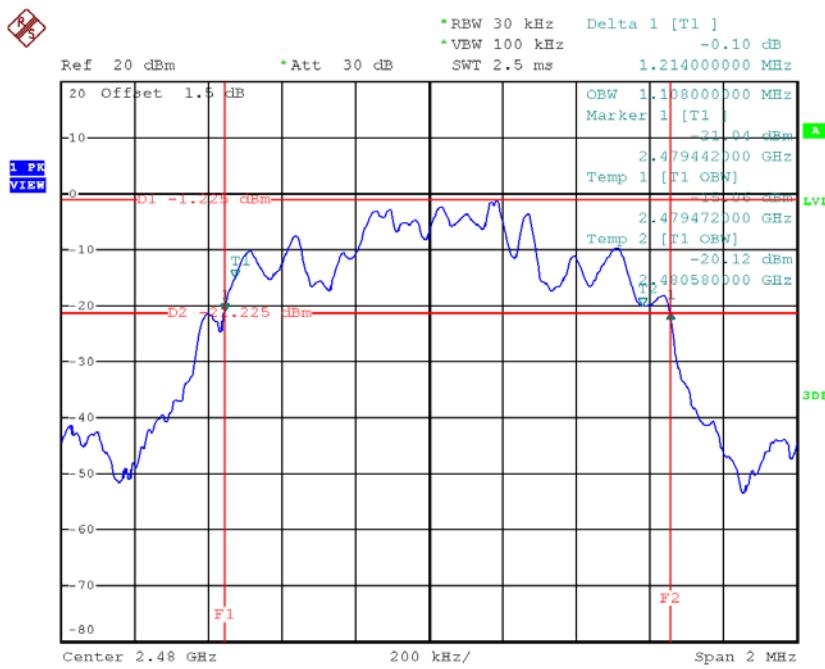
Date: 28.AUG.2018 15:28:02

## CH39



Date: 28.AUG.2018 15:29:21

## CH78



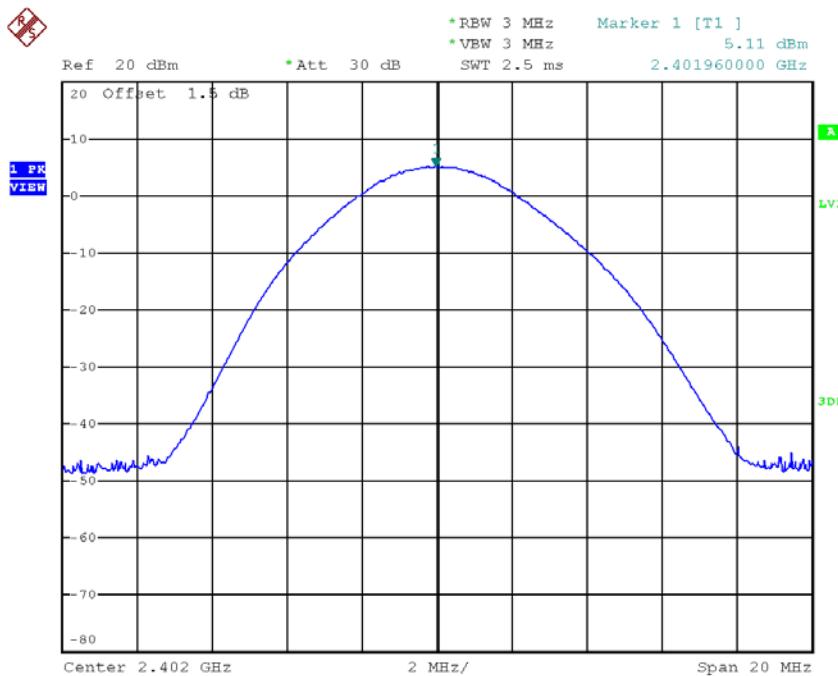
Date: 28.AUG.2018 15:25:45

## APPENDIX I - MAXIMUM OUTPUT POWER

Test Mode:	TX Mode _1Mbps
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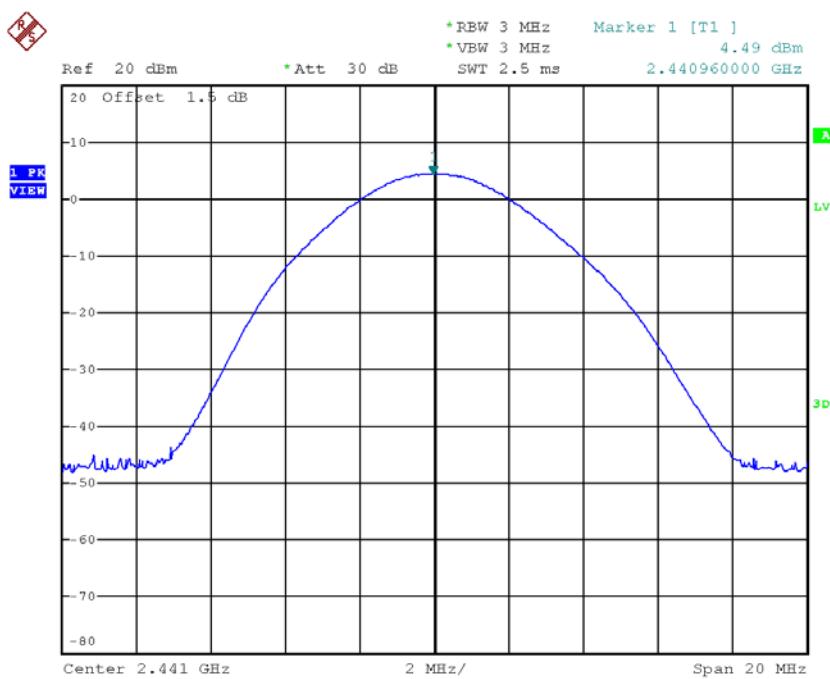
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.11	0.0032	21.00	0.125	Pass
2441	4.49	0.0028	21.00	0.125	Pass
2480	4.53	0.0028	21.00	0.125	Pass

### CH00



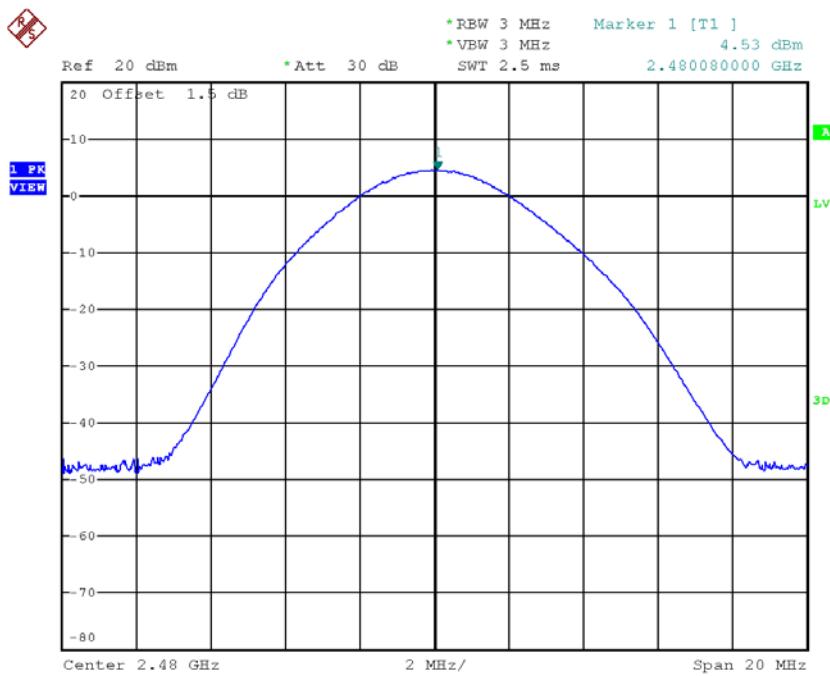
Date: 28.AUG.2018 14:00:33

## CH39



Date: 28.AUG.2018 14:04:32

## CH78

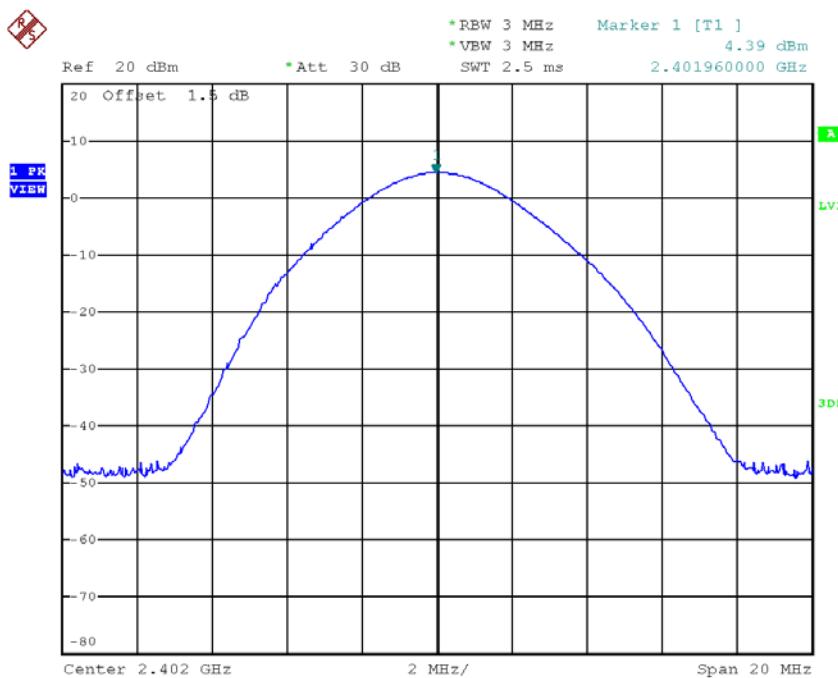


Date: 28.AUG.2018 14:08:23

Test Mode: TX Mode \_3Mbps

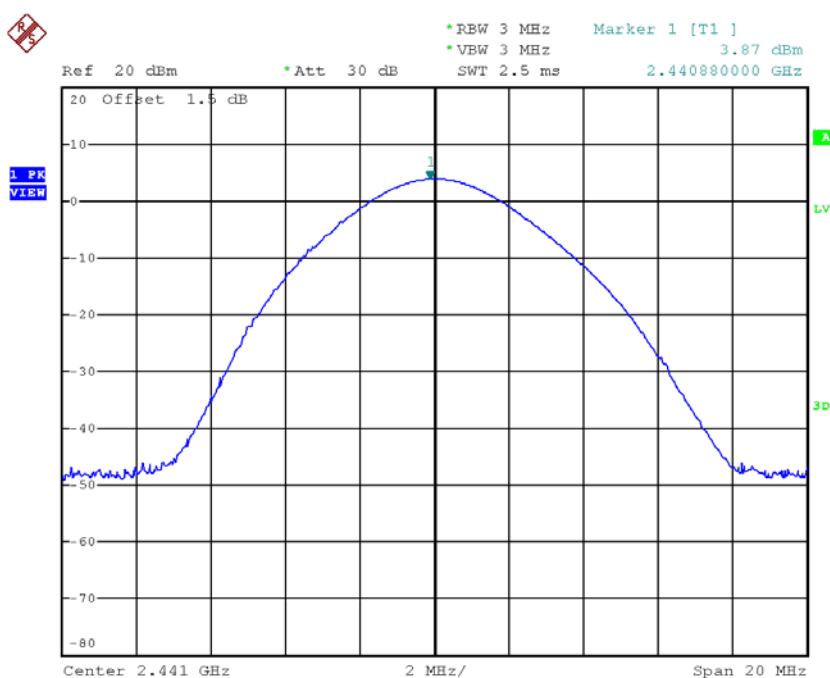
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	4.39	0.0027	21.00	0.125	Pass
2441	3.87	0.0024	21.00	0.125	Pass
2480	3.97	0.0025	21.00	0.125	Pass

## CH00



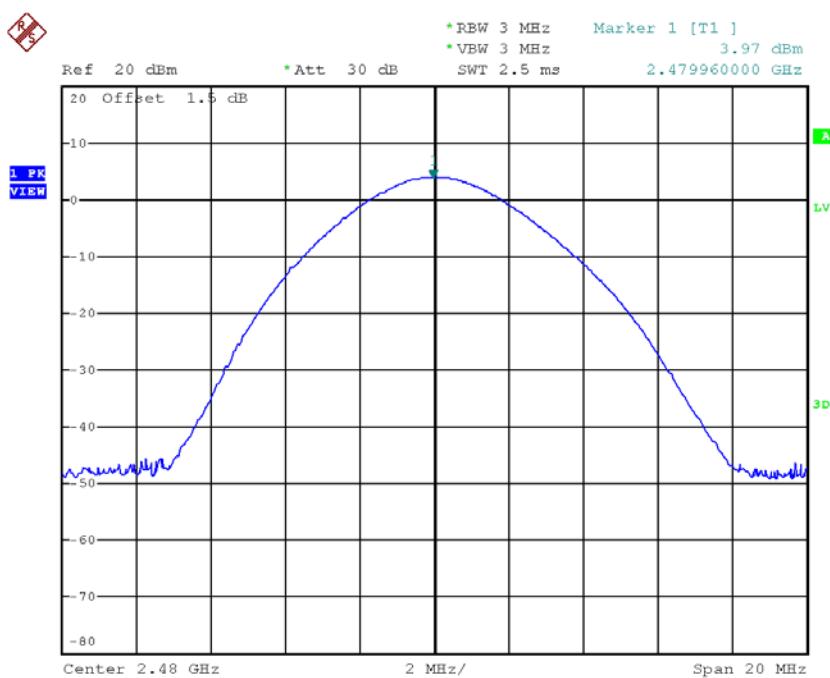
Date: 28.AUG.2018 15:02:55

## CH39



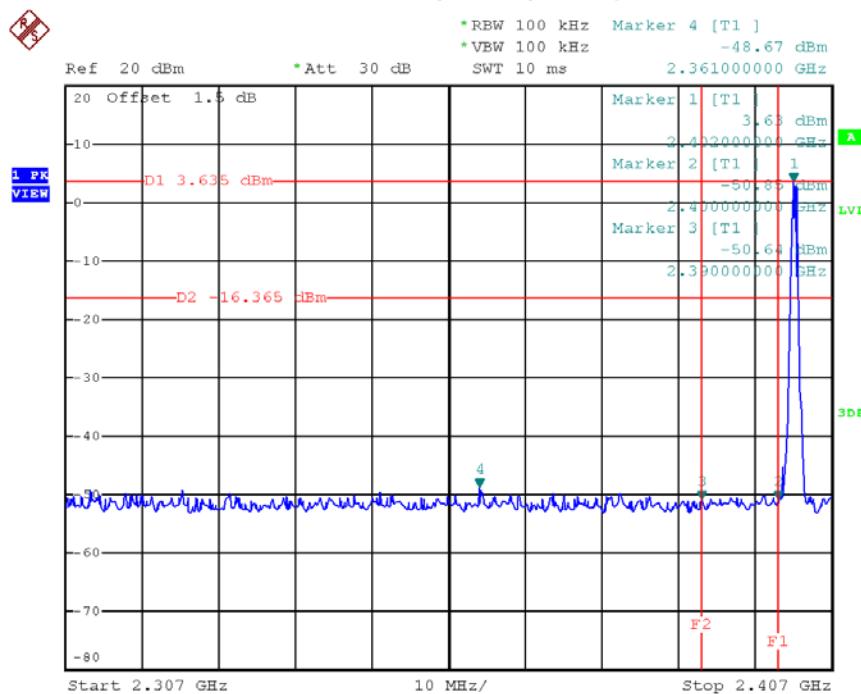
Date: 28.AUG.2018 15:16:16

## CH78

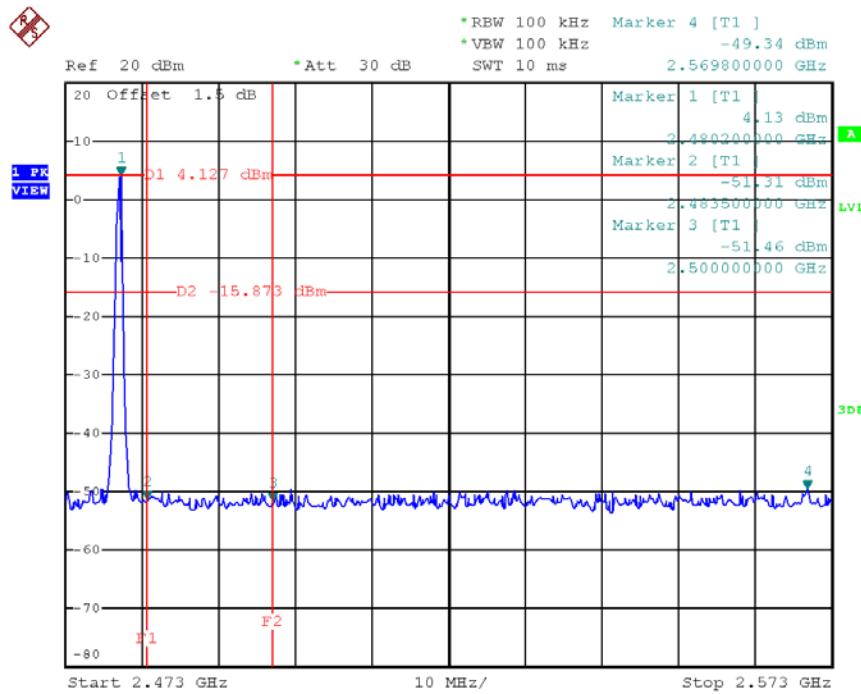


Date: 28.AUG.2018 15:24:12

## APPENDIX J - ANTENNA CONDUCTED SPURIOUS EMISSION

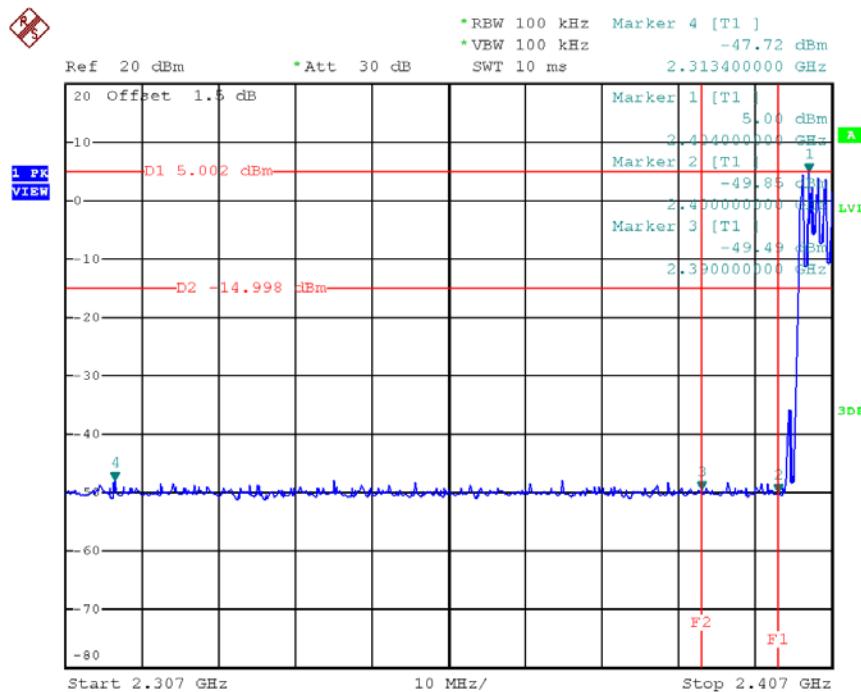
**CH00 (Lower) \_1Mbps**

Date: 28.AUG.2018 14:00:57

**CH78 (Upper) \_1Mbps**

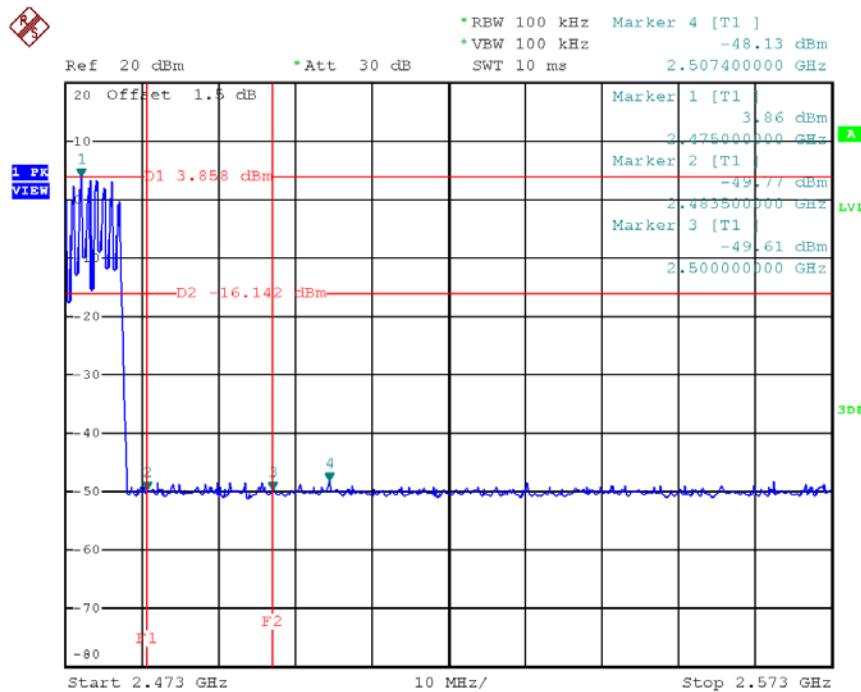
Date: 28.AUG.2018 14:06:39

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



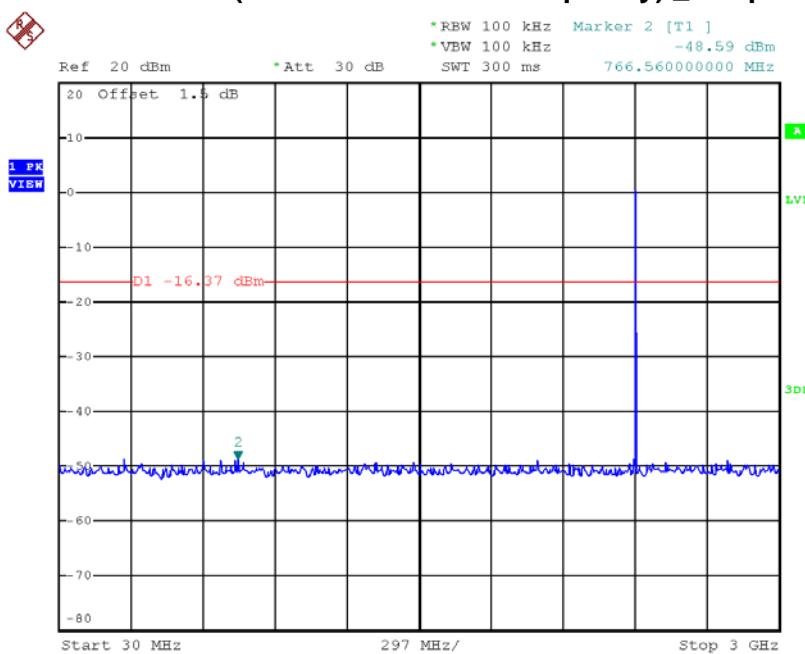
Date: 28.AUG.2018 14:31:41

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

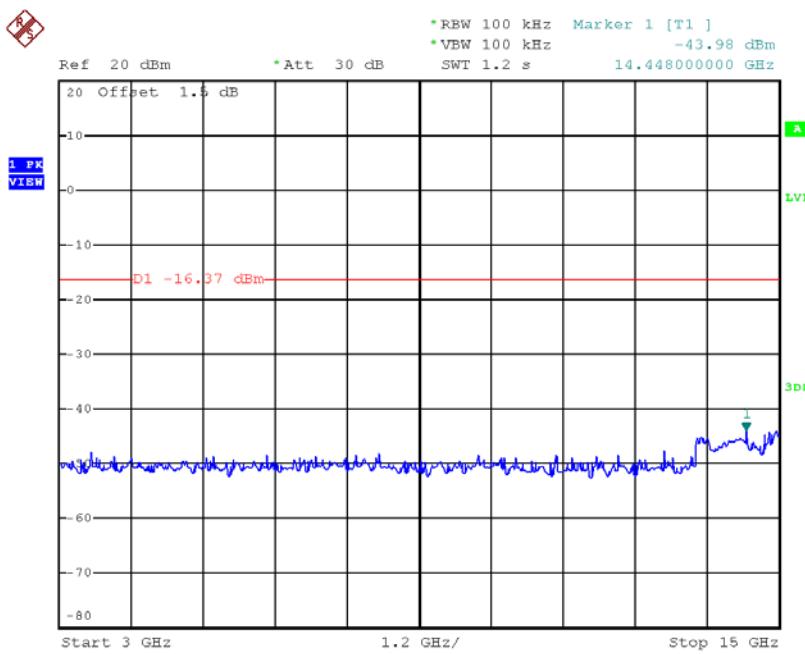


Date: 28.AUG.2018 14:33:03

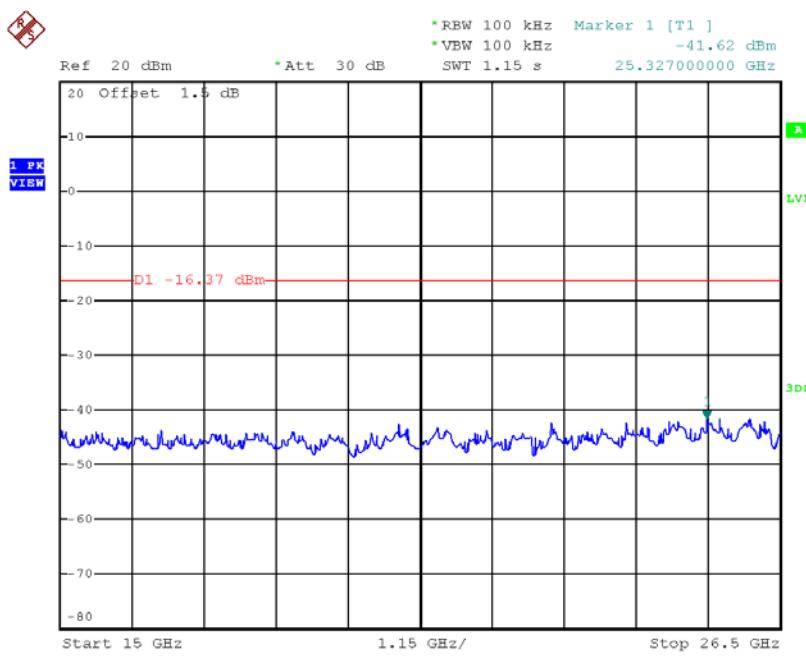
## CH00 (10 Harmonic of the frequency) \_1Mbps



Date: 28.AUG.2018 14:01:50

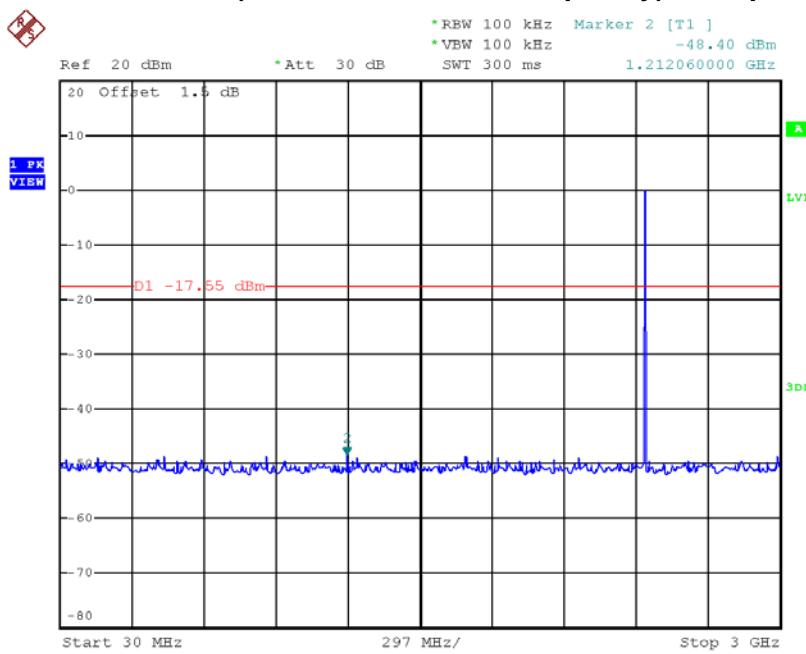


Date: 28.AUG.2018 14:01:58

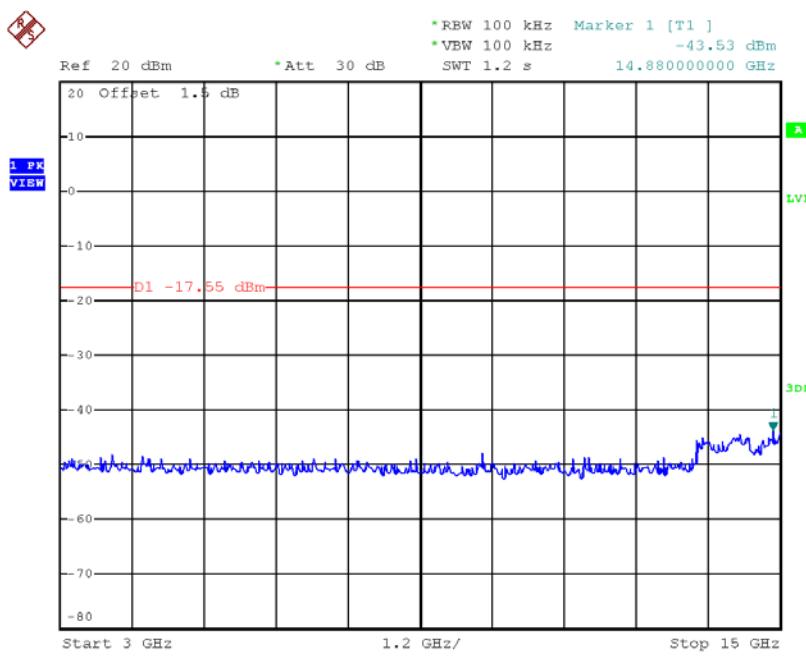


Date: 28.AUG.2018 14:02:05

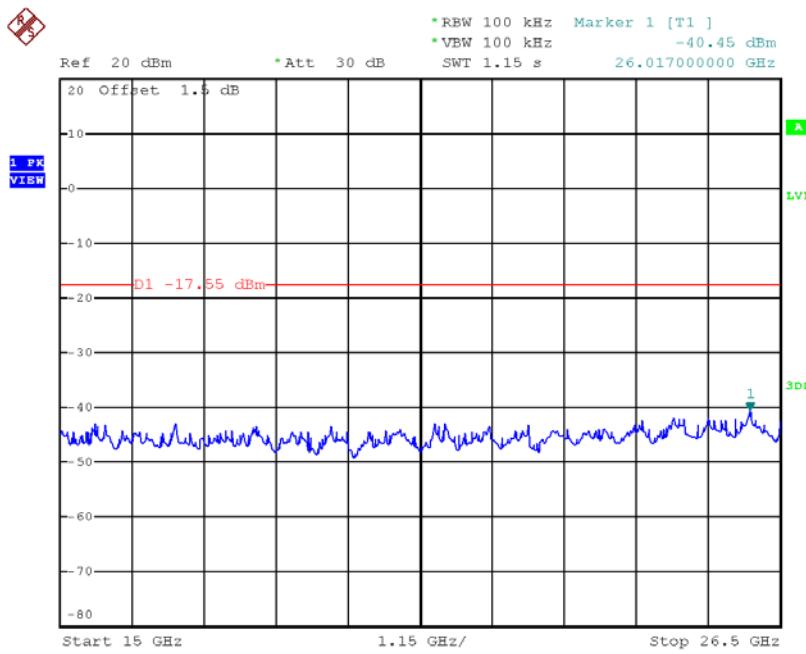
### CH39 (10 Harmonic of the frequency) \_1Mbps



Date: 28.AUG.2018 14:04:52

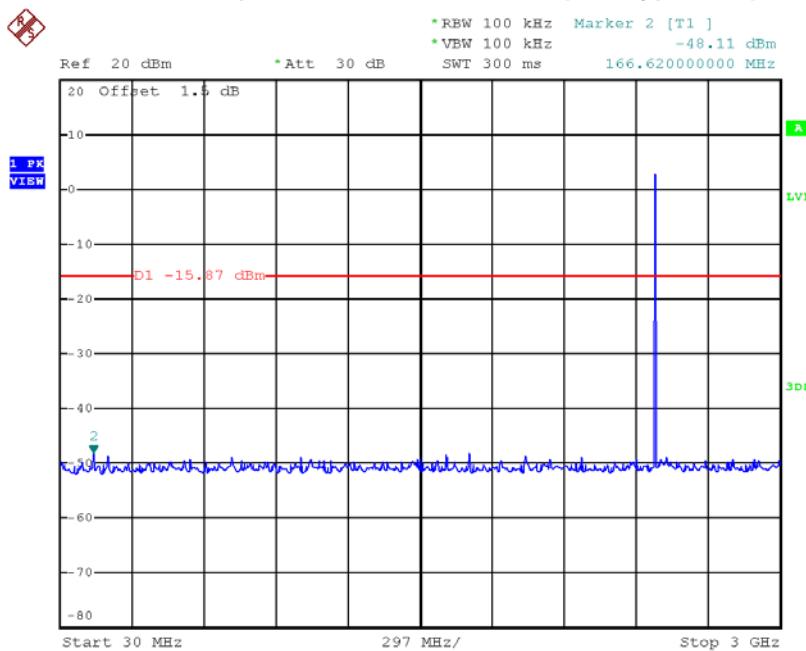


Date: 28.AUG.2018 14:05:00

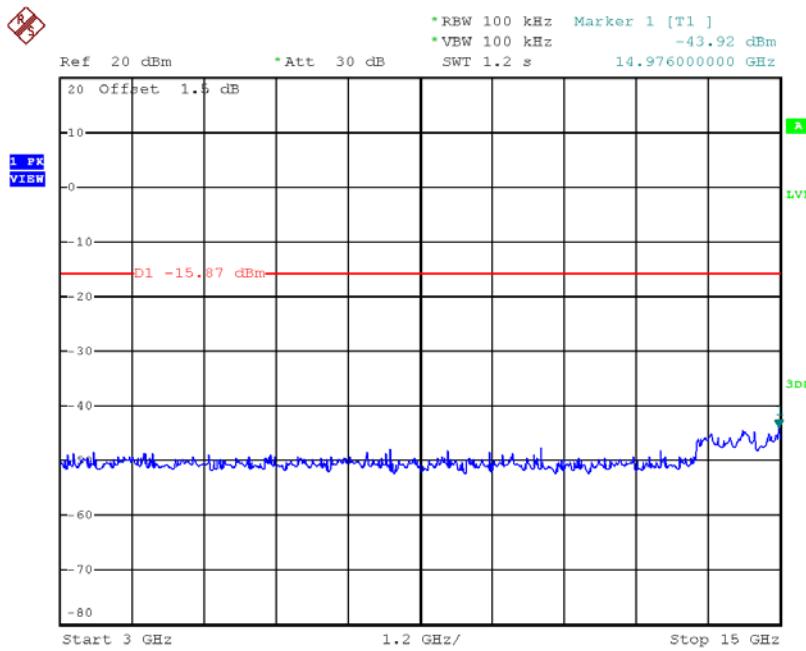


Date: 28.AUG.2018 14:05:07

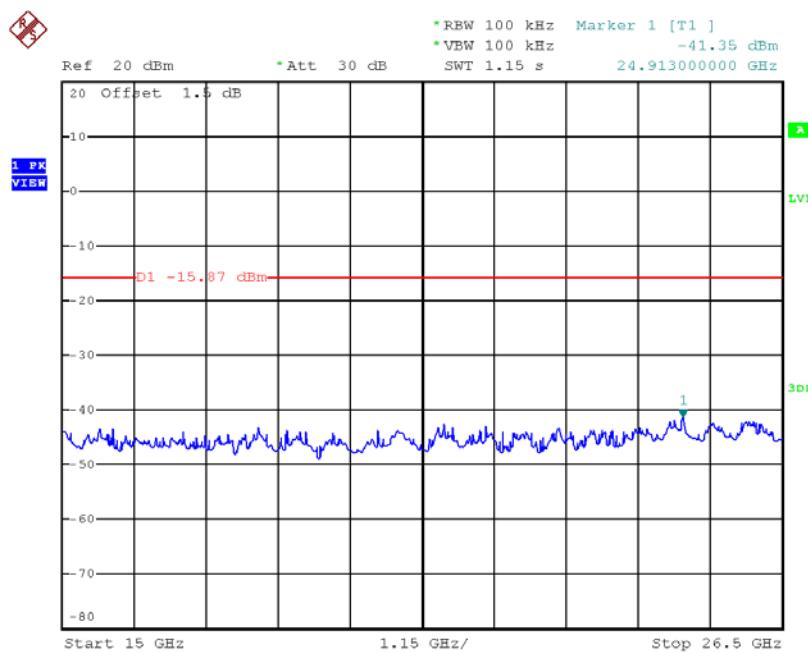
## CH78 (10 Harmonic of the frequency) \_1Mbps



Date: 28.AUG.2018 14:07:44

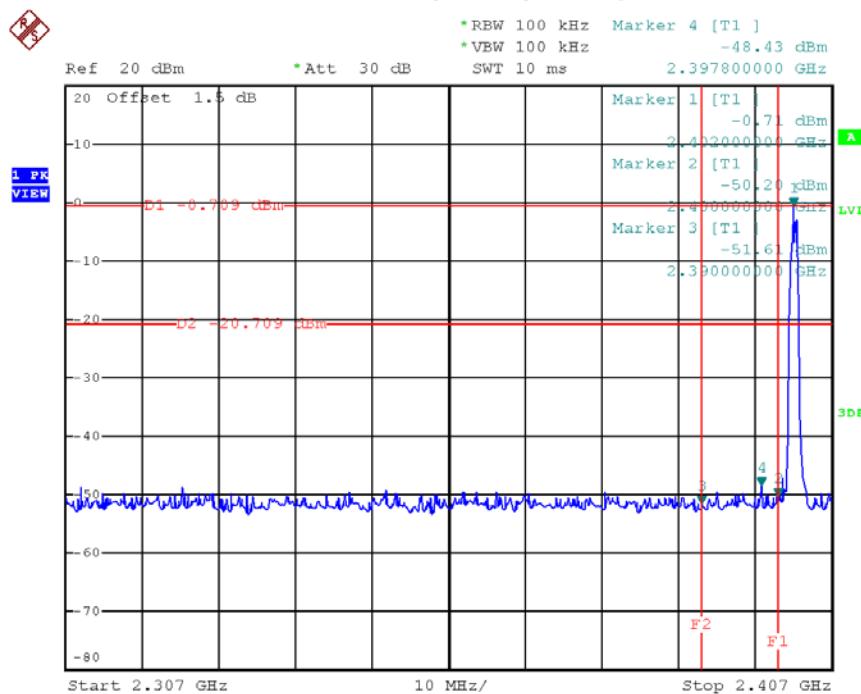


Date: 28.AUG.2018 14:07:51



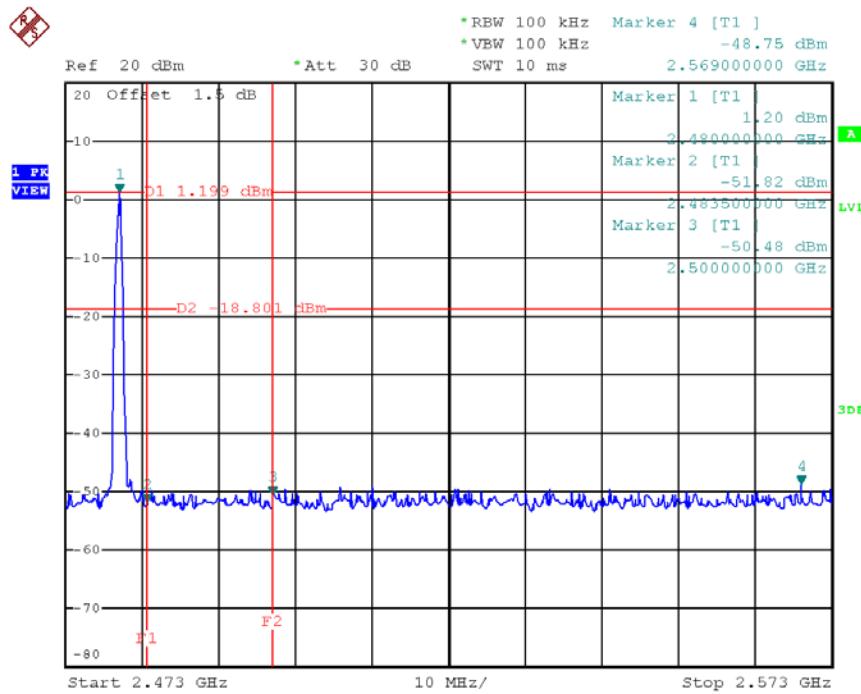
Date: 28.AUG.2018 14:07:58

### CH00 (Lower) \_3Mbps



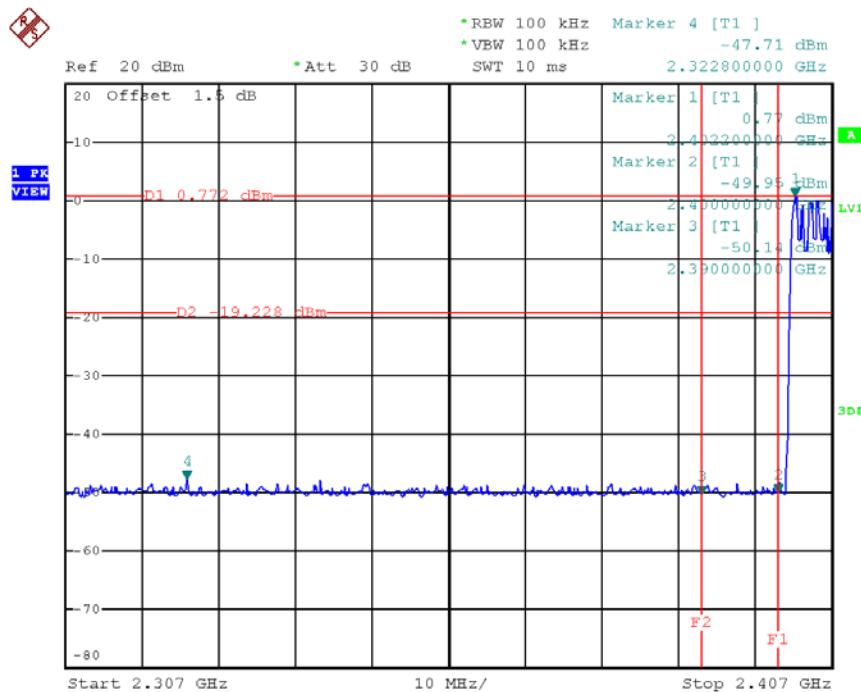
Date: 28.AUG.2018 15:03:03

### CH78 (Upper) \_3Mbps



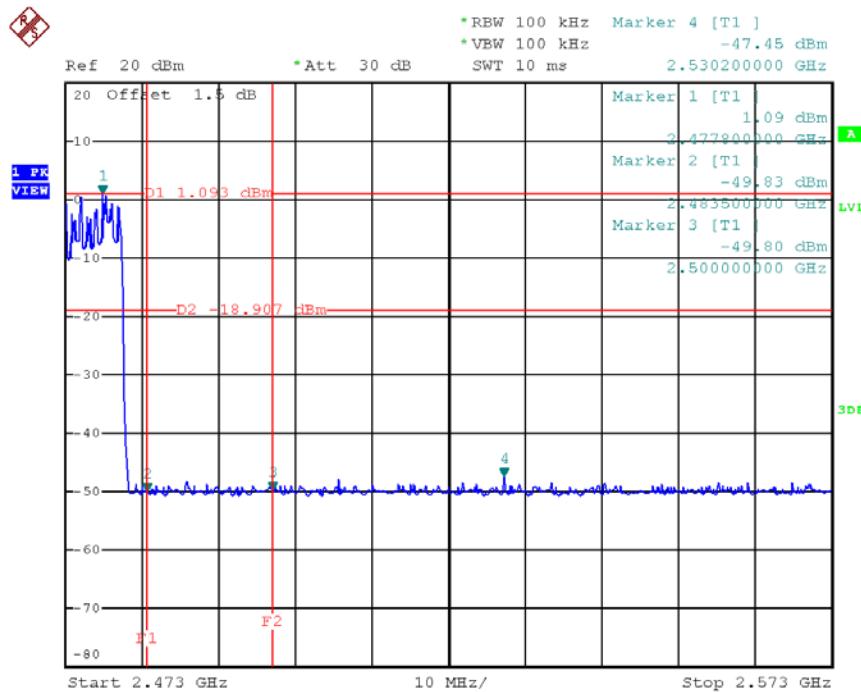
Date: 28.AUG.2018 15:24:37

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



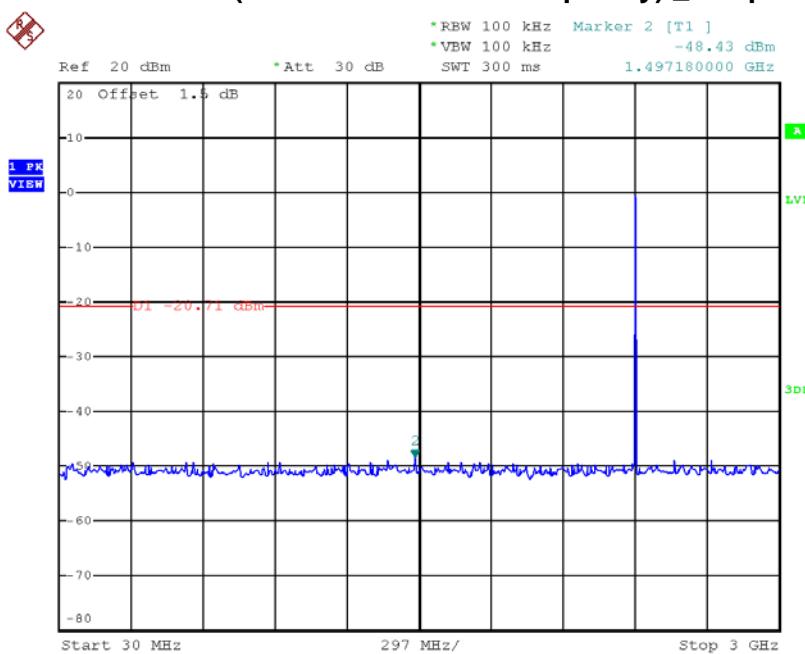
Date: 28.AUG.2018 15:44:43

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

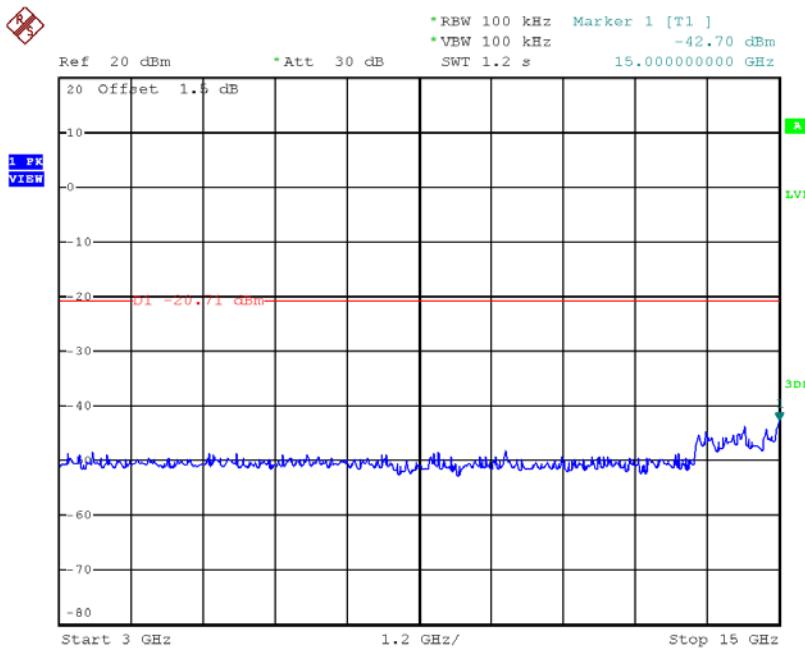


Date: 28.AUG.2018 15:46:35

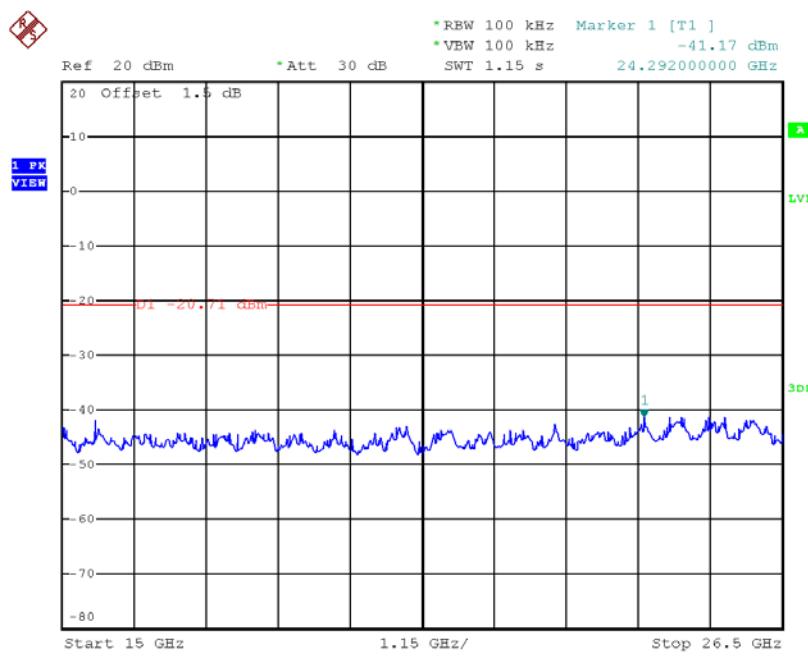
## CH00 (10 Harmonic of the frequency) \_3Mbps



Date: 28.AUG.2018 15:03:56

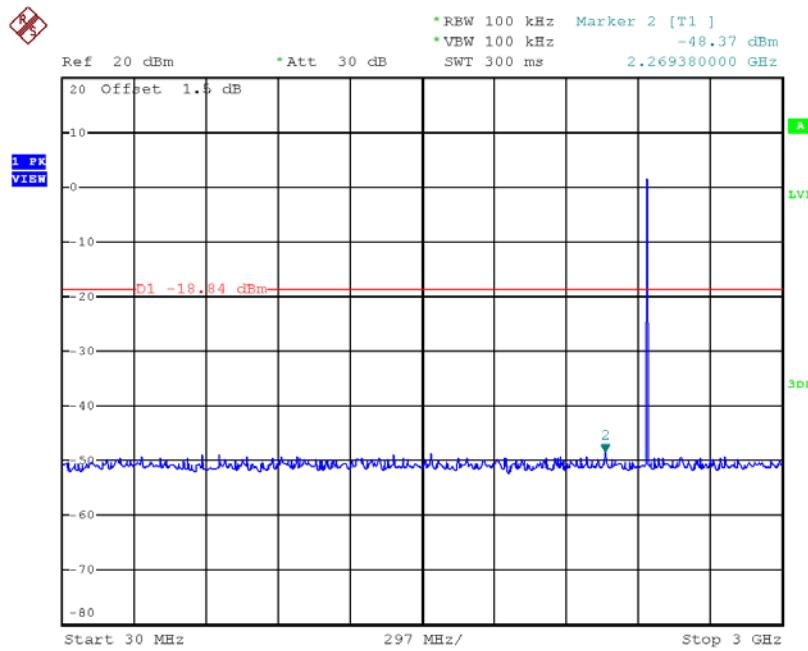


Date: 28.AUG.2018 15:04:04

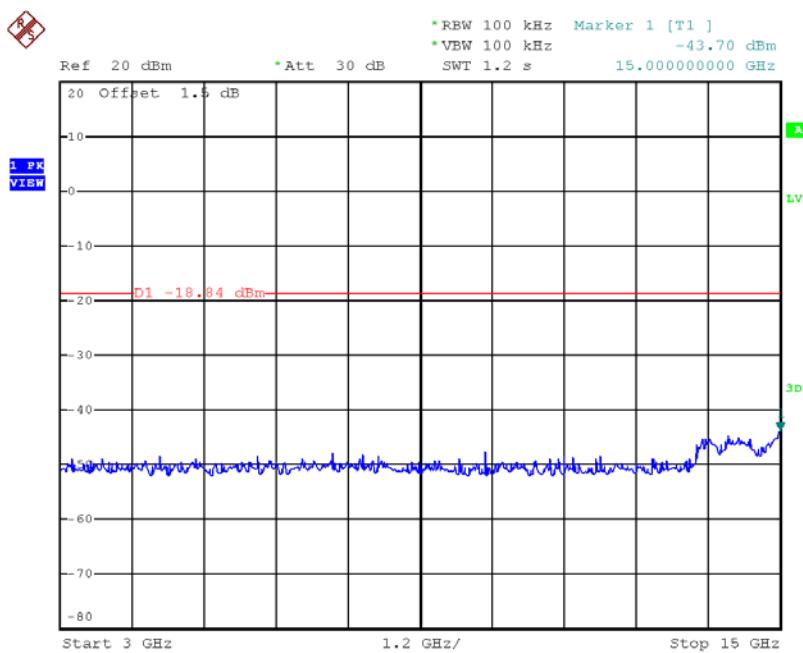


Date: 28.AUG.2018 15:04:12

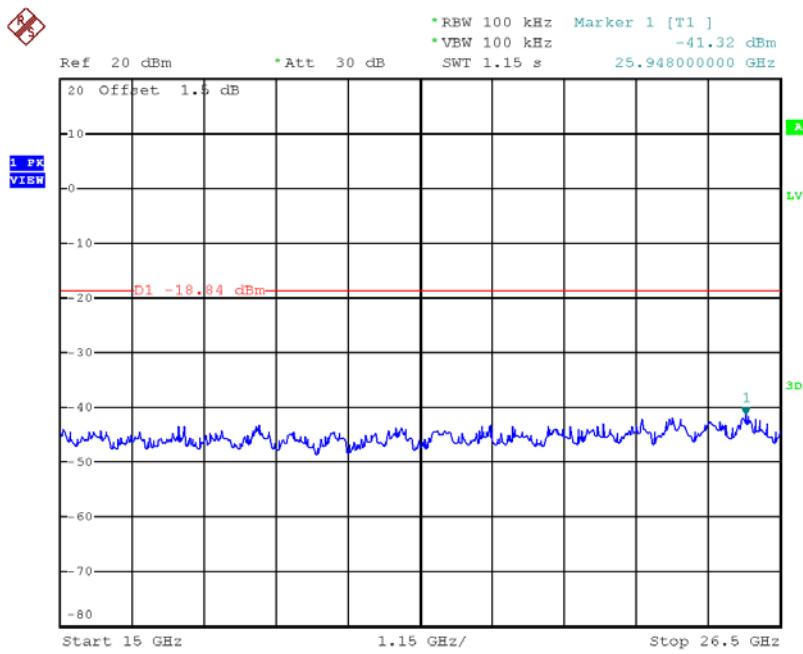
### CH39 (10 Harmonic of the frequency) \_3Mbps



Date: 28.AUG.2018 15:16:39

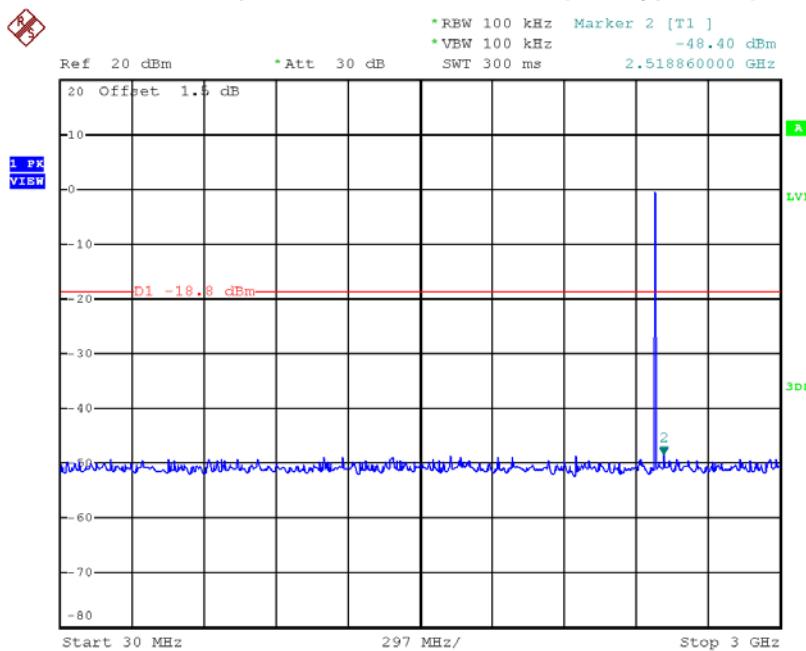


Date: 28.AUG.2018 15:16:47

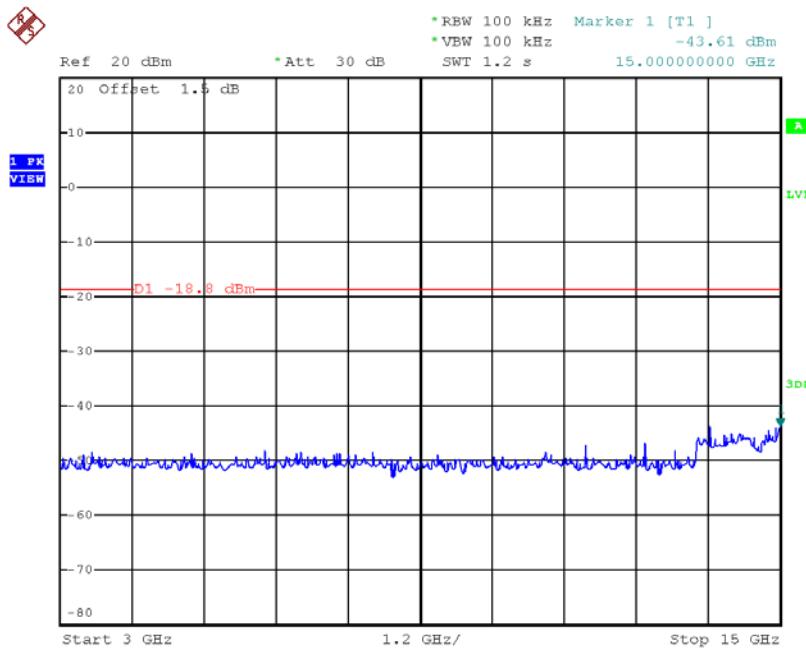


Date: 28.AUG.2018 15:16:55

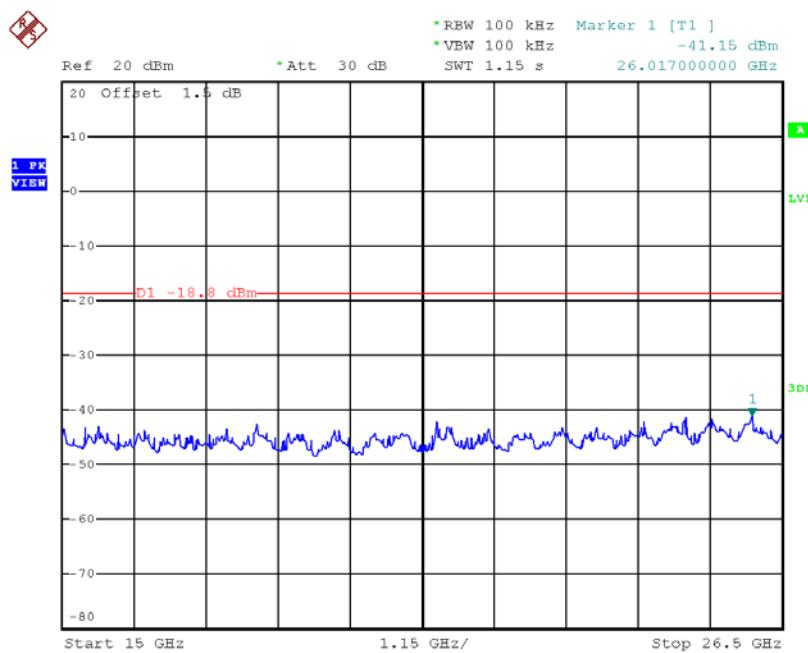
## CH78 (10 Harmonic of the frequency) \_3Mbps



Date: 28.AUG.2018 15:26:00



Date: 28.AUG.2018 15:26:08



Date: 28.AUG.2018 15:26:17

**End of Test Report**