FCC Radio Test Report

FCC ID: 2AO5W-WOOFITGO

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

Project No.	:	1803C020
Equipment	:	Bluetooth Speaker
Test Model	:	WOOFit Go
Series Model	:	N/A
Applicant	:	SACKit ApS
Address	:	Lyngvej 1, 9000 Aalborg, Denmark

Date of Receipt	:	Mar. 06, 2018
Date of Test	:	Mar. 08, 2018 ~ Mar. 14, 2018
Issued Date	:	Mar. 28, 2018
Tested by	:	BTL Inc.

Testing Engineer : Jivey Jiang
(Jivey Jiang)

Technical Manager : Shawn Xiao
(Shawn Xiao)

Authorized Signatory : David Mao
(David Mao)

BTL INC.

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

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

NVLAP® TESTING
NVLAP LAB CODE 200788-0

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).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

BTL's report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL**'s authorized written approval.

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.

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.

Table of Contents Page

1 . CERTIFICATION 7

2 . SUMMARY OF TEST RESULTS 8

2.1 TEST FACILITY 9

2.2 MEASUREMENT UNCERTAINTY 9

3 . GENERAL INFORMATION 10

3.1 GENERAL DESCRIPTION OF EUT 10

3.2 DESCRIPTION OF TEST MODES 12

3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING 12

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 13

3.5 DESCRIPTION OF SUPPORT UNITS 13

4 . EMC EMISSION TEST 14

4.1 CONDUCTED EMISSION MEASUREMENT 14

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS 14

4.1.2 TEST PROCEDURE 14

4.1.3 DEVIATION FROM TEST STANDARD 14

4.1.4 TEST SETUP 15

4.1.5 EUT OPERATING CONDITIONS 15

4.1.6 EUT TEST CONDITIONS 15

4.1.7 TEST RESULTS 15

4.2 RADIATED EMISSION MEASUREMENT 16

4.2.1 RADIATED EMISSION LIMITS 16

4.2.2 TEST PROCEDURE 17

4.2.3 DEVIATION FROM TEST STANDARD 17

4.2.4 TEST SETUP 18

4.2.5 EUT OPERATING CONDITIONS 19

4.2.6 EUT TEST CONDITIONS 19

4.2.7 TEST RESULTS (9KHZ TO 30MHZ) 19

4.2.8 TEST RESULTS (30MHZ TO 1000MHZ) 19

4.2.9 TEST RESULTS (ABOVE 1000MHZ) 19

5 . NUMBER OF HOPPING CHANNEL 20

5.1 APPLIED PROCEDURES 20

5.1.1 TEST PROCEDURE 20

5.1.2 DEVIATION FROM STANDARD 20

5.1.3 TEST SETUP 20

5.1.4 EUT OPERATION CONDITIONS 20

5.1.5 EUT TEST CONDITIONS 20

5.1.6 TEST RESULTS 20

Table of Contents Page

6 . AVERAGE TIME OF OCCUPANCY 21
6.1 APPLIED PROCEDURES / LIMIT 21
6.1.1 TEST PROCEDURE 21
6.1.2 DEVIATION FROM STANDARD 21
6.1.3 TEST SETUP 21
6.1.4 EUT OPERATION CONDITIONS 22
6.1.5 EUT TEST CONDITIONS 22
6.1.6 TEST RESULTS 22
7 . HOPPING CHANNEL SEPARATION MEASUREMENT 23
7.1 APPLIED PROCEDURES / LIMIT 23
7.1.1 TEST PROCEDURE 23
7.1.2 DEVIATION FROM STANDARD 23
7.1.3 TEST SETUP 23
7.1.4 EUT TEST CONDITIONS 23
7.1.5 TEST RESULTS 23
8 . BANDWIDTH TEST 24
8.1 APPLIED PROCEDURES 24
8.1.1 TEST PROCEDURE 24
8.1.2 DEVIATION FROM STANDARD 24
8.1.3 TEST SETUP 24
8.1.4 EUT OPERATION CONDITIONS 24
8.1.5 EUT TEST CONDITIONS 24
8.1.6 TEST RESULTS 24
9 . PEAK OUTPUT POWER TEST 25
9.1 APPLIED PROCEDURES / LIMIT 25
9.1.1 TEST PROCEDURE 25
9.1.2 DEVIATION FROM STANDARD 25
9.1.3 TEST SETUP 25
9.1.4 EUT OPERATION CONDITIONS 25
9.1.5 EUT TEST CONDITIONS 25
9.1.6 TEST RESULTS 25
10 . ANTENNA CONDUCTED SPURIOUS EMISSION 26
10.1 APPLIED PROCEDURES / LIMIT 26
10.1.1 TEST PROCEDURE 26
10.1.2 DEVIATION FROM STANDARD 26
10.1.3 TEST SETUP 26
10.1.4 EUT OPERATION CONDITIONS 26
10.1.5 EUT TEST CONDITIONS 26
10.1.6 TEST RESULTS 26
11 . MEASUREMENT INSTRUMENTS LIST 27

Table of Contents | Page

12 . EUT TEST PHOTO	29
APPENDIX A - CONDUCTED EMISSION	33
APPENDIX B - RADIATED EMISSION (9KHZ-30MHZ)	36
APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)	48
APPENDIX E - NUMBER OF HOPPING CHANNEL	73
APPENDIX F - AVERAGE TIME OF OCCUPANCY	75
APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT	88
APPENDIX H - BANDWIDTH	93
APPENDIX I - PEAK OUTPUT POWER	98
APPENDIX J - ANTENNA CONDUCTED SPURIOUS EMISSION	103

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1803C020	Original Issue.	Mar. 28, 2018

1. CERTIFICATION

Equipment	:	Bluetooth Speaker
Brand Name	:	SACK^{it}
Test Model	:	WOOFit Go
Series Model	:	N/A
Applicant	:	SACKit ApS
Manufacturer	:	SACKit ApS
Address	:	Lyngvej 1, 9000 Aalborg, Denmark
Factory	:	#1 Guangzhou Singulargold Electronics Co.Ltd #2 Dah Dyi Audio Equipment Co., Ltd. #3 Dongguan Sonic Devices Electronics Co.,Ltd
Address	:	#1 NO.6 LianhuayanRoad,Sciencepark,guangZhou,China #2 Jin San Jiao Ind. Zone, Shi Bu Village,Liao Bu Town, Dong Guan City, Guang Dong Province, China #3 No.2 Bldg,Zone 2,Dalingshan science and Technology Industrial Park, Dongguan, Guangdong,China
Date of Test	:	Mar. 08, 2018 ~ Mar. 14, 2018
Test Sample	:	Engineering Sample NO.: D180301912
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-1-1803C020) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP 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)			
Standard(s) Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247 (a)(1)	Hopping Channel Separation	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.247 (b)(1)	Peak Output Power	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	Dwell Time	PASS	
15.205	Restricted Bands	PASS	
15.203	Antenna Requirement	PASS	

Note:

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

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.
BTL's test firm number for FCC: 854385
BTL's designation number for FCC: CN5020

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in t he 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 dist ributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).

The BTL measurement uncertainty as below table:

A. Conducted Measurement :

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

B. Radiated Measurement :

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

C. Other Measurement:

Test Item	Uncertainty
Conducted Spurious Emission	2.67dB
Hopping Channel Separation	53.46MHz
Peak Output Power	0.95dB
Number of Hopping Frequency	53.46MHz
Temperature	0.08℃
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	Bluetooth Speaker	
Brand Name	SACK^{it}	
Test Model	WOOFit Go	
Series Model	N/A	
Model Difference	N/A	
Output Power (Max.)	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps) π/4-DQPSK(2Mbps) 8-DPSK(3Mbps)
	Bit Rate of Transmitter	
	Output Power Max.	3.03 dBm(1Mbps) 3.08 dBm(3Mbps)
Power Source	#1 Battery supplied. #2 Suppild from Li-ion Battery	
Power Rating	#1 DC 5V 1A #2 DC 3.7V 950mAh	

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	N/A	N/A	Printed	N/A	2.3

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.

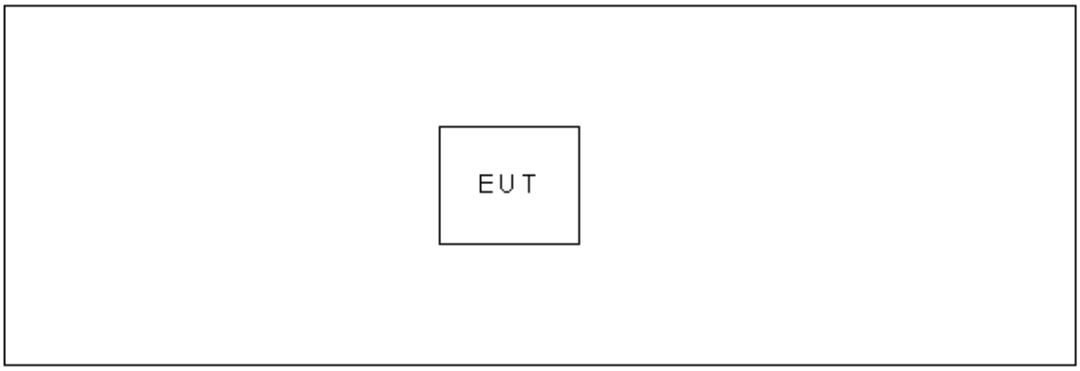
(2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

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	Airoha.AB152x_verC_LabTestTool		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	49	47	47
Parameters(3Mbps)	48	47	47

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

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

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

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

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

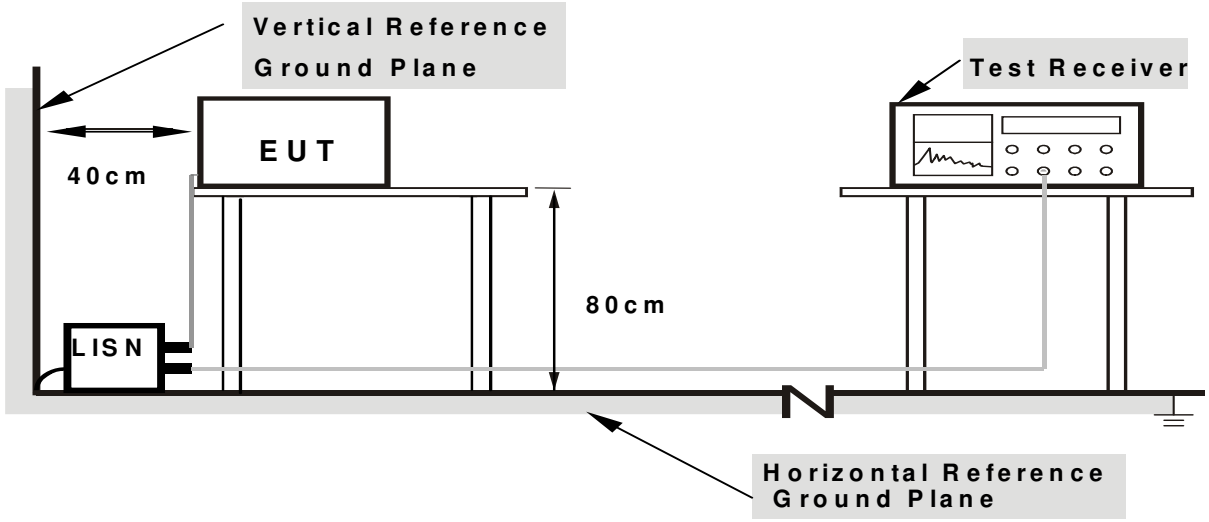
4.1.2 TEST PROCEDURE

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 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 150KHz to 30MHz.

4.2 RADIATED EMISSION MEASUREMENT

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

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

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

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

4.2.2 TEST PROCEDURE

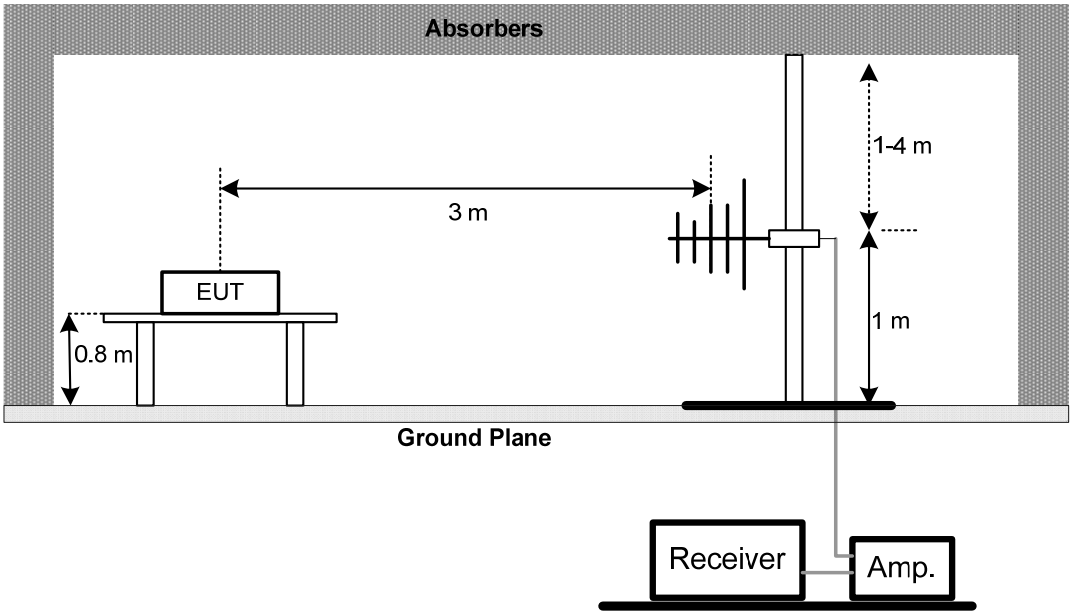
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

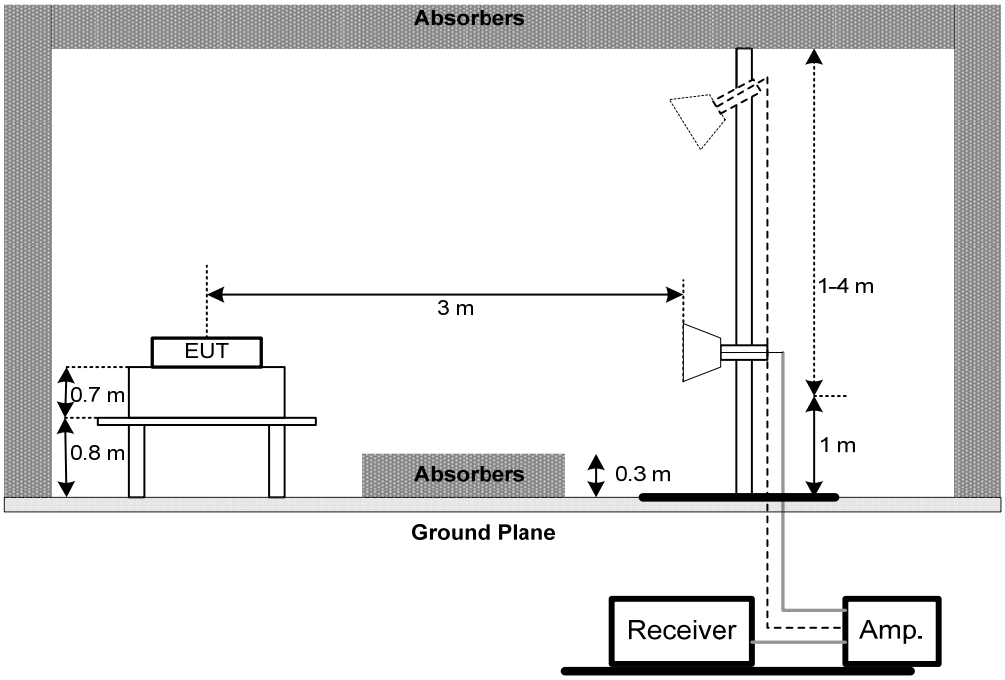
No deviation

4.2.4 TEST SETUP

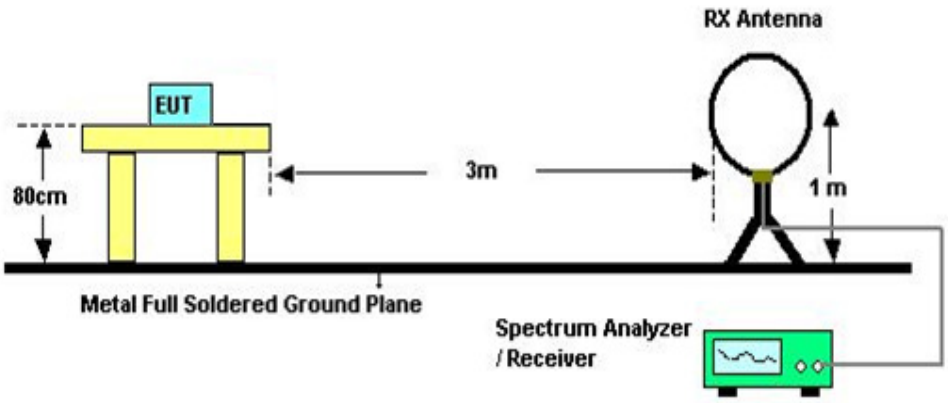
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For Radiated Emissions Below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.2.6 EUT TEST CONDITIONS

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

4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the 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 (specific distance / test distance) (dB).
(3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Appendix C.

4.2.9 TEST RESULTS (ABOVE 1000MHZ)

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

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

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

5.1.4 EUT OPERATION CONDITIONS

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

5.1.5 EUT TEST CONDITIONS

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

5.1.6 TEST RESULTS

Please refer to the 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

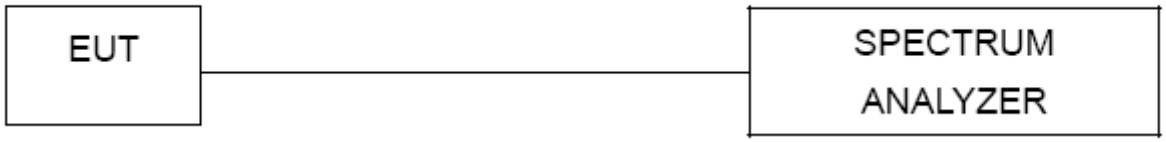
6.1.1 TEST PROCEDURE

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

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

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

6.1.5 EUT TEST CONDITIONS

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

6.1.6 TEST RESULTS

Please refer to the 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

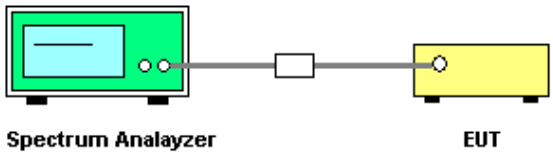
a. The EUT must have its hopping function enabled

b. Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = Auto
Detector function = Peak
Trace = Max Hold

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT TEST CONDITIONS

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

7.1.5 TEST RESULTS

Please refer to the 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

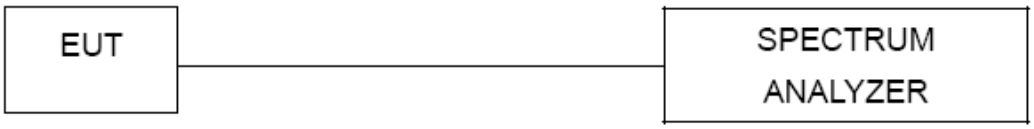
8.1.1 TEST PROCEDURE

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

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

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

8.1.5 EUT TEST CONDITIONS

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

8.1.6 TEST RESULTS

Please refer to the Appendix H

9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

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

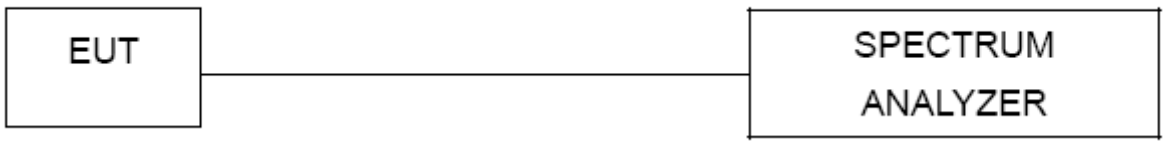
9.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 1MHz/3MHz, VBW= 1MHz/3MHz, Sweep time = Auto.

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



9.1.4 EUT OPERATION CONDITIONS

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

9.1.5 EUT TEST CONDITIONS

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

9.1.6 TEST RESULTS

Please refer to the 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 device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

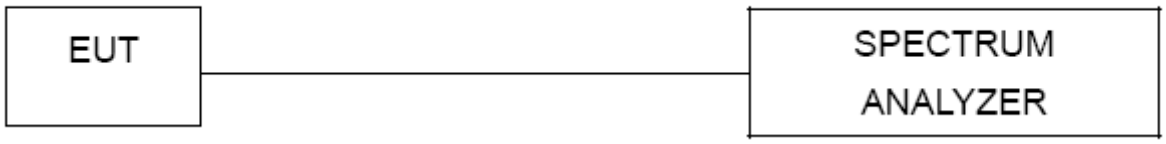
10.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 100KHz, VBW=100KHz, Sweep time = Auto.
c. Offset=antenna gain+cable loss

10.1.2 DEVIATION FROM STANDARD

No deviation.

10.1.3 TEST SETUP



10.1.4 EUT OPERATION CONDITIONS

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

10.1.5 EUT TEST CONDITIONS

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

10.1.6 TEST RESULTS

Please refer to the Appendix J

11. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 11, 2019
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 11, 2019
3	EMI Test Receiver	R&S	ESR3	101862	Aug. 15, 2018
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Aug. 20, 2018
5	Cable	N/A	RG400 12m	N/A	Mar. 06, 2019
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement - Below 1GHz					
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	Oct. 19, 2018
3	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	Jun. 26, 2018
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
8	Antenna	EM	EM-6876-1	230	Feb. 07, 2019

Radiated Emission Measurement - Above 1GHz					
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. 08, 2018
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. 20, 2018
6	Antenna	EM	EM-6876-1	230	Feb. 07, 2019
7	Controller	CT	SC100	N/A	N/A
8	Controller	MF	MF-7802	MF780208416	N/A
9	Cable	emci	EMC104-SM-SM-1 2000(12m)	N/A	Jun. 26, 2018
10	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. 20, 2018

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

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

12. EUT TEST PHOTO

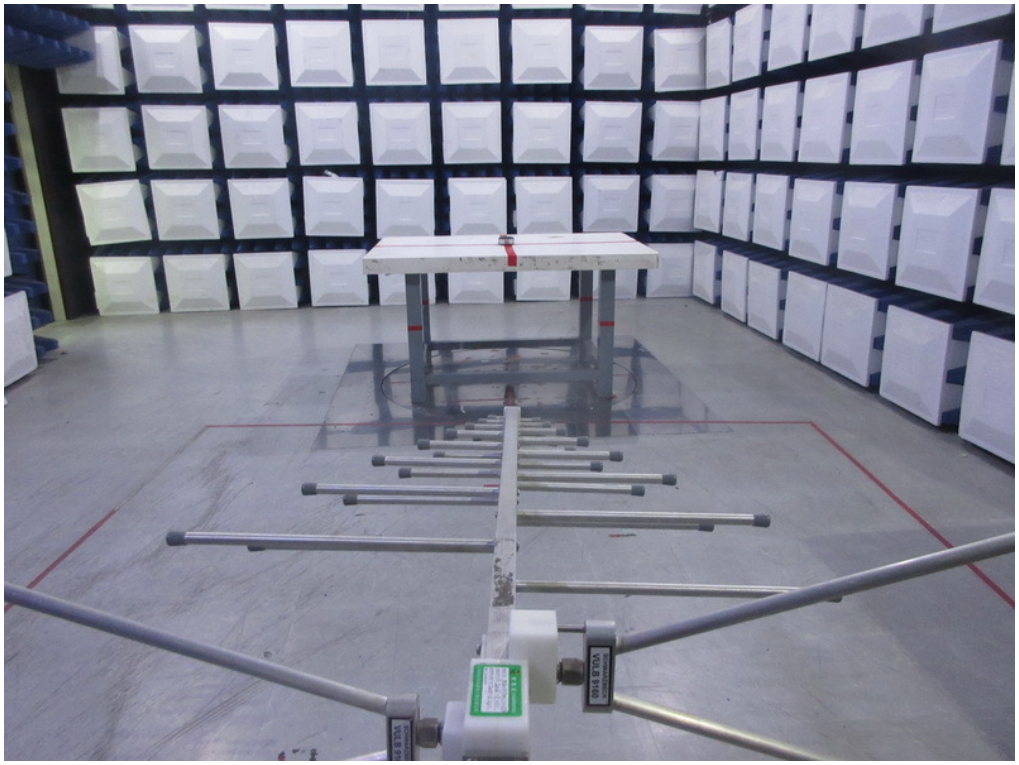
Conducted Measurement Photos

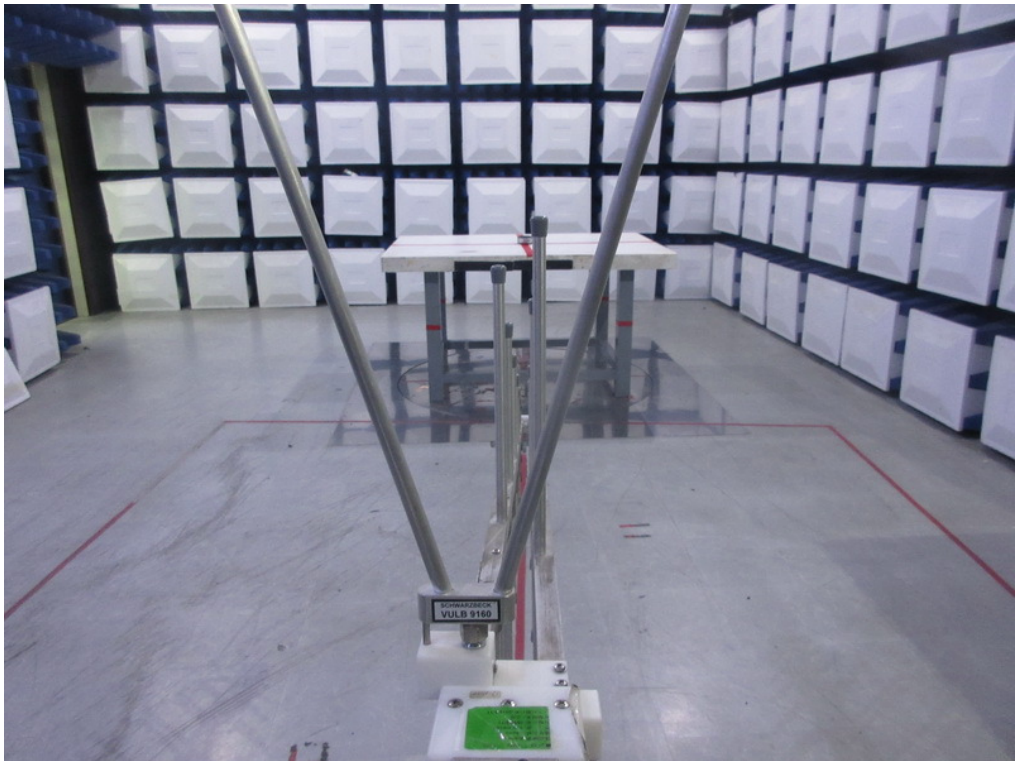
Radiated Measurement Photos

9KHz to 30MHz

Radiated Measurement Photos

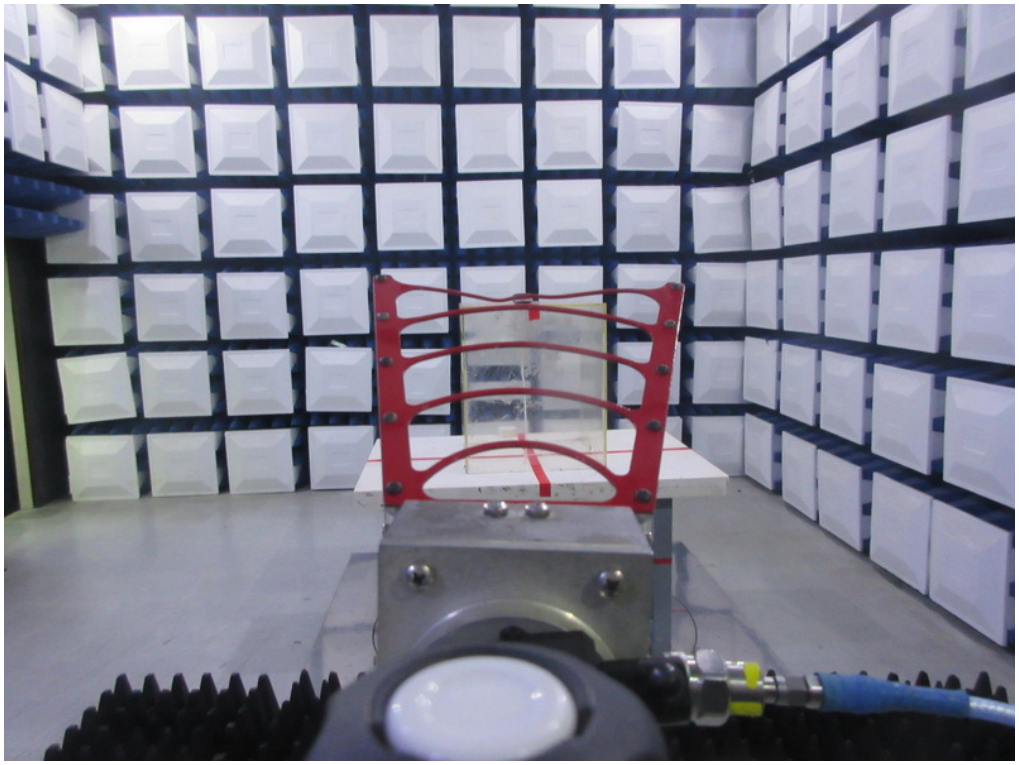
30MHz to 1000MHz

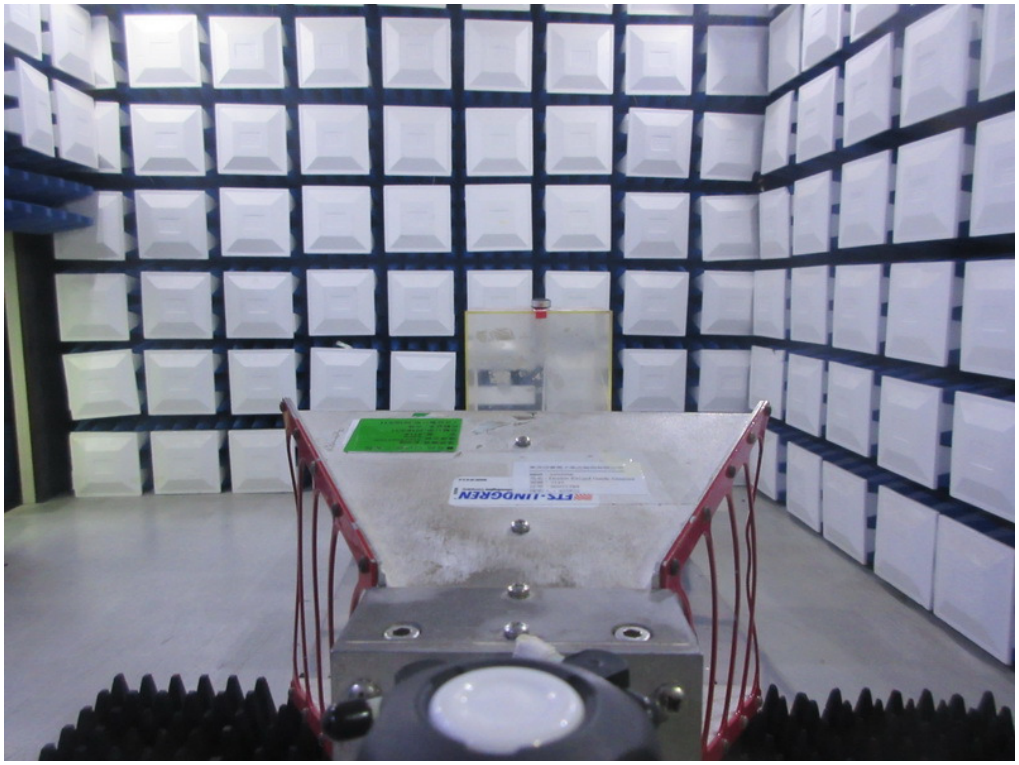




Radiated Measurement Photos

Above 1000MHz

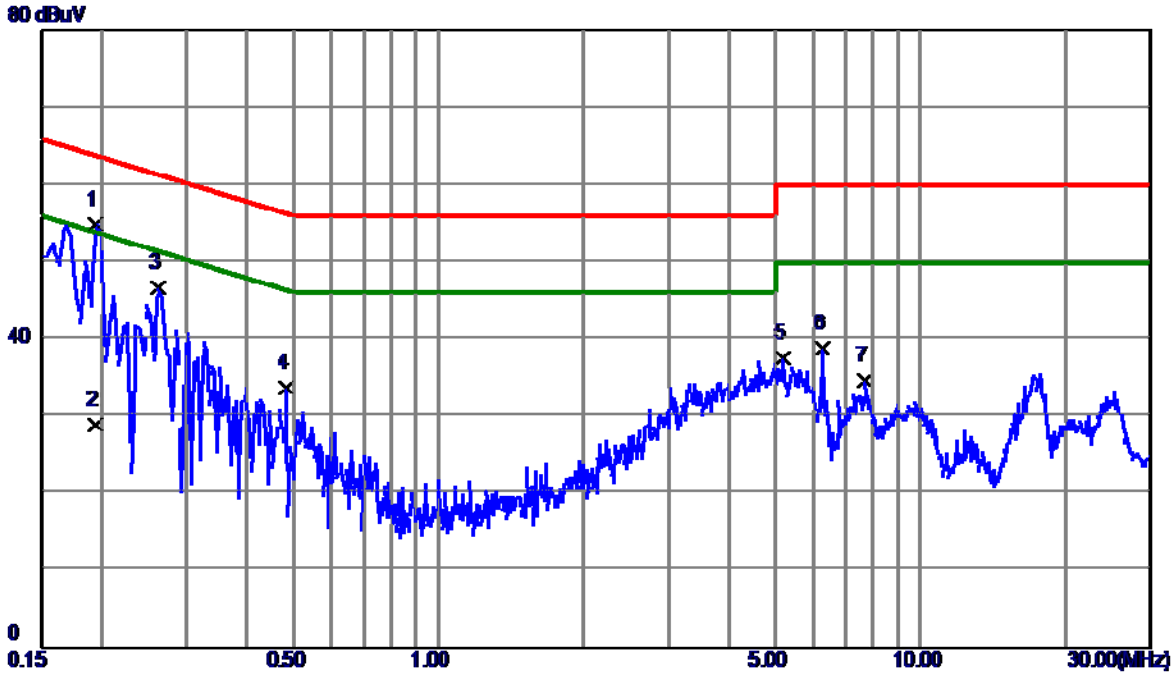




APPENDIX A - CONDUCTED EMISSION

Test Mode:	TX Mode

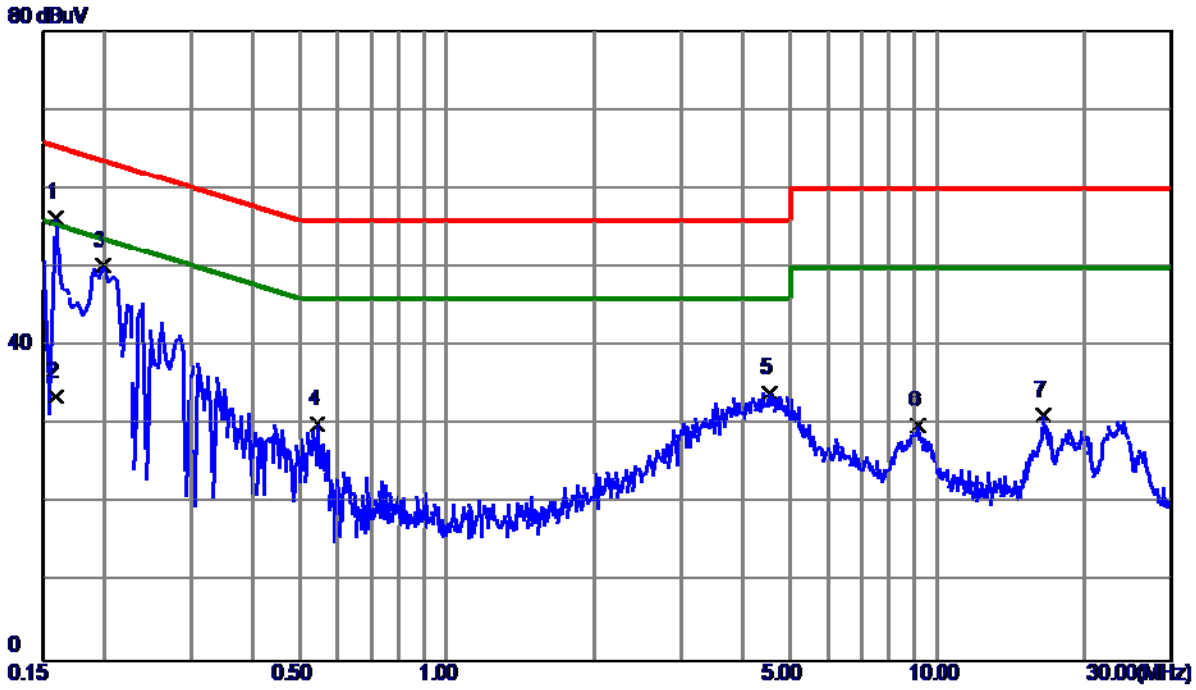
Line



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1949	45.19	9.73	54.92	63.83	-8.91	Peak	
2	0.1949	19.29	9.73	29.02	53.83	-24.81	AVG	
3	0.2625	36.93	9.72	46.65	61.35	-14.70	Peak	
4	0.4830	23.99	9.76	33.75	56.29	-22.54	Peak	
5	5.1900	27.62	9.92	37.54	60.00	22.46	Peak	
6	6.2745	28.91	9.96	38.87	60.00	-21.13	Peak	
7	7.6605	24.69	10.00	34.69	60.00	-25.31	Peak	

Test Mode:	TX Mode

Neutral

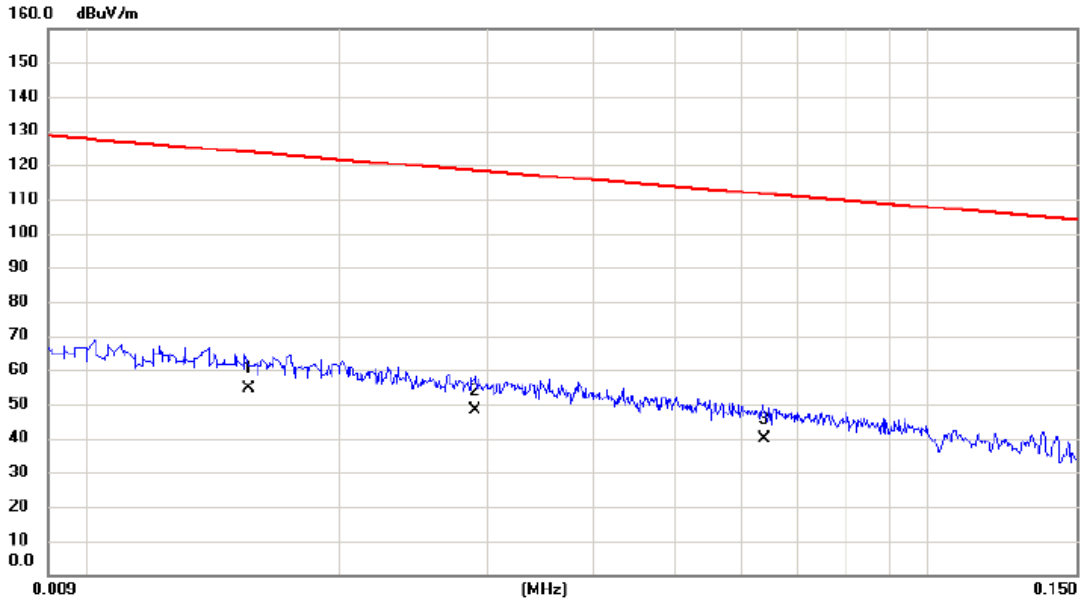


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1590	46.66	9.64	56.30	65.52	-9.22	Peak	
2	0.1590	23.90	9.64	33.54	55.52	-21.98	AVG	
3	0.1995	40.64	9.65	50.29	63.63	-13.34	Peak	
4	0.5460	20.35	9.66	30.01	56.00	-25.99	Peak	
5	4.5555	24.29	9.83	34.12	56.00	-21.88	Peak	
6	9.1230	19.99	9.99	29.98	60.00	-30.02	Peak	
7	16.4760	20.86	10.36	31.22	60.00	-28.78	Peak	

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

Test Mode:	TX Mode

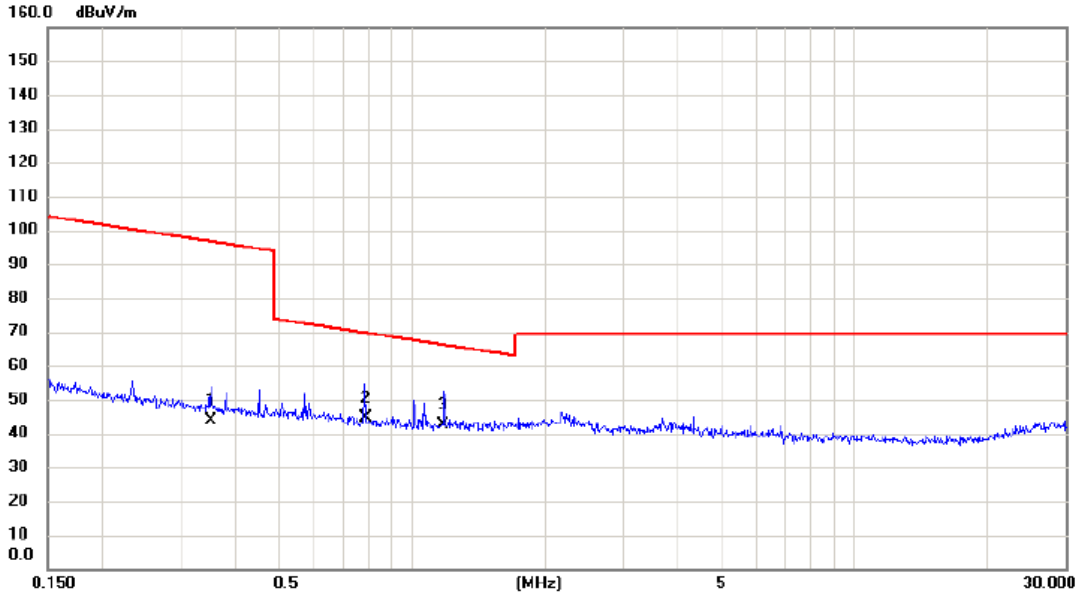
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0156	34.27	20.19	54.46	123.74	-69.28	AVG	
2		0.0290	28.86	19.35	48.21	118.36	-70.15	AVG	
3		0.0638	21.33	18.45	39.78	111.51	-71.73	AVG	

Test Mode:	TX Mode

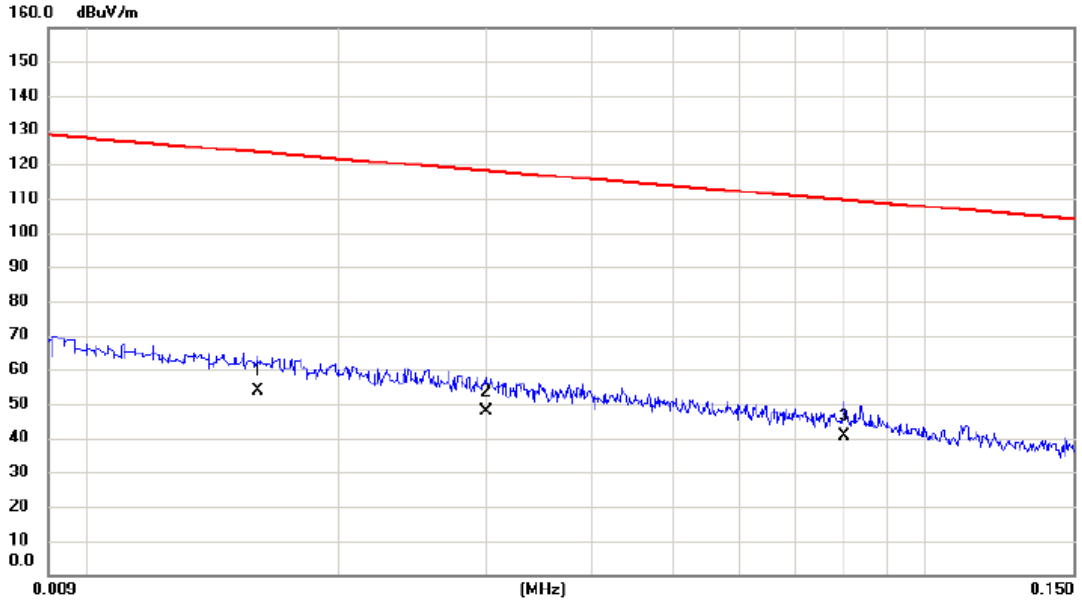
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.3502	27.12	16.58	43.70	96.72	-53.02	AVG	
2		0.7835	28.36	16.14	44.50	69.72	-25.22	QP	
3	*	1.1781	26.87	15.82	42.69	66.18	-23.49	QP	

Test Mode:	TX Mode

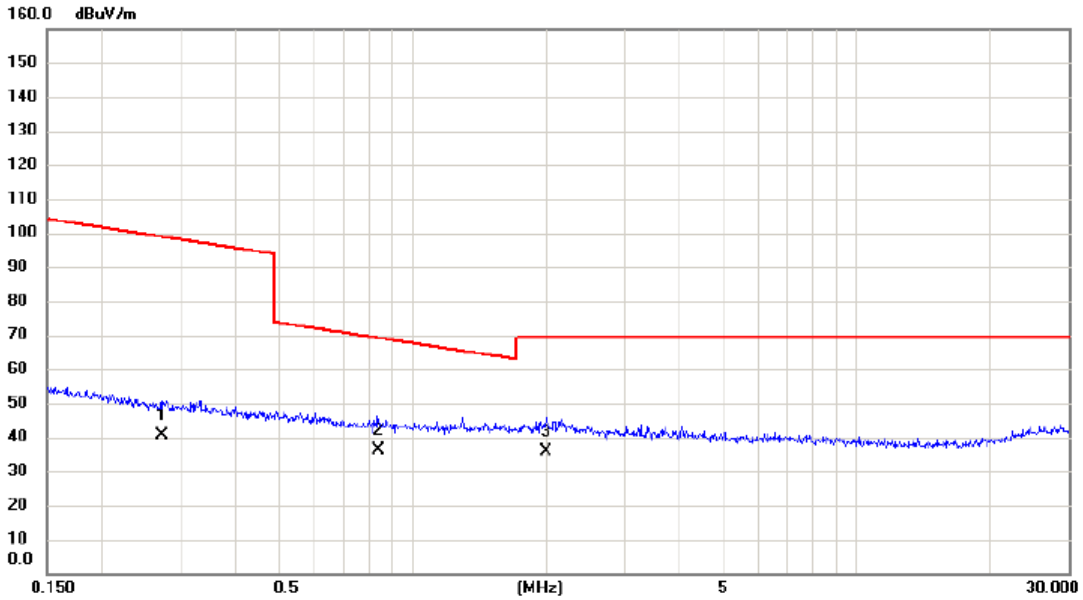
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0160	33.50	20.14	53.64	123.52	-69.88	AVG	
2		0.0300	28.41	19.32	47.73	118.06	-70.33	AVG	
3	*	0.0801	22.65	18.11	40.76	109.53	-68.77	AVG	

Test Mode:	TX Mode

Ant 90°

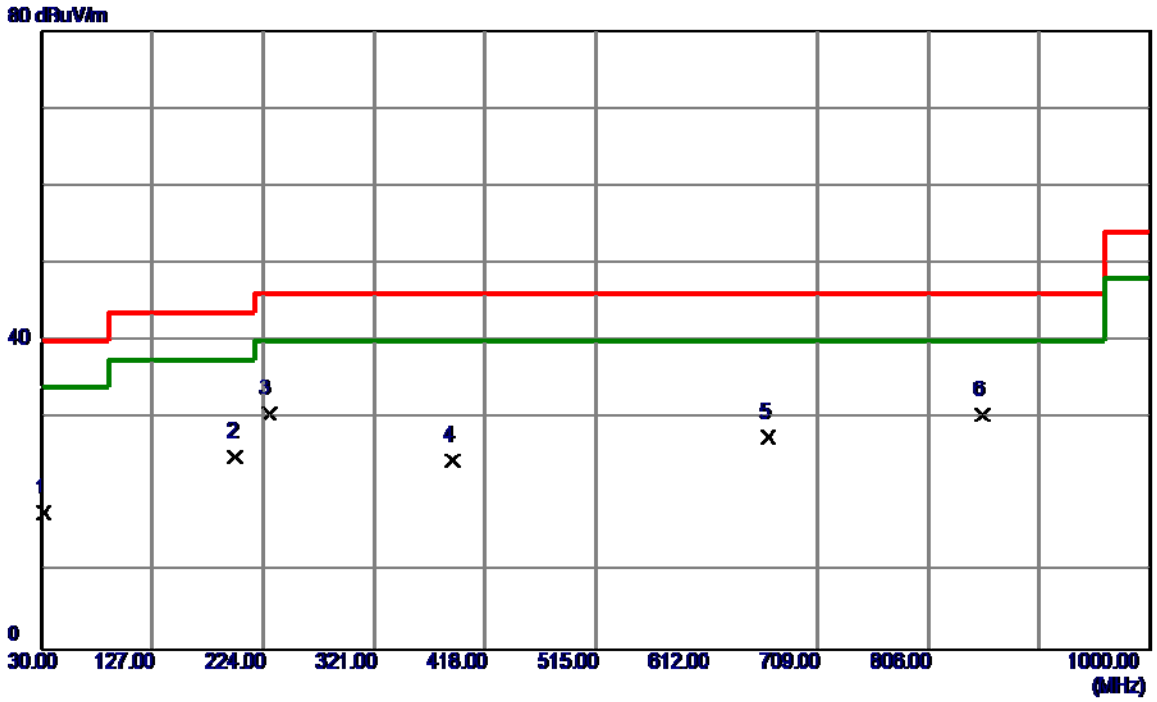


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.2730	24.13	16.64	40.77	98.88	-58.11	AVG	
2	*	0.8350	20.18	16.08	36.26	69.17	-32.91	QP	
3		2.0011	20.17	15.51	35.68	69.54	-33.86	QP	

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

Test Mode:	TX 2402MHz _CH00_1Mbps

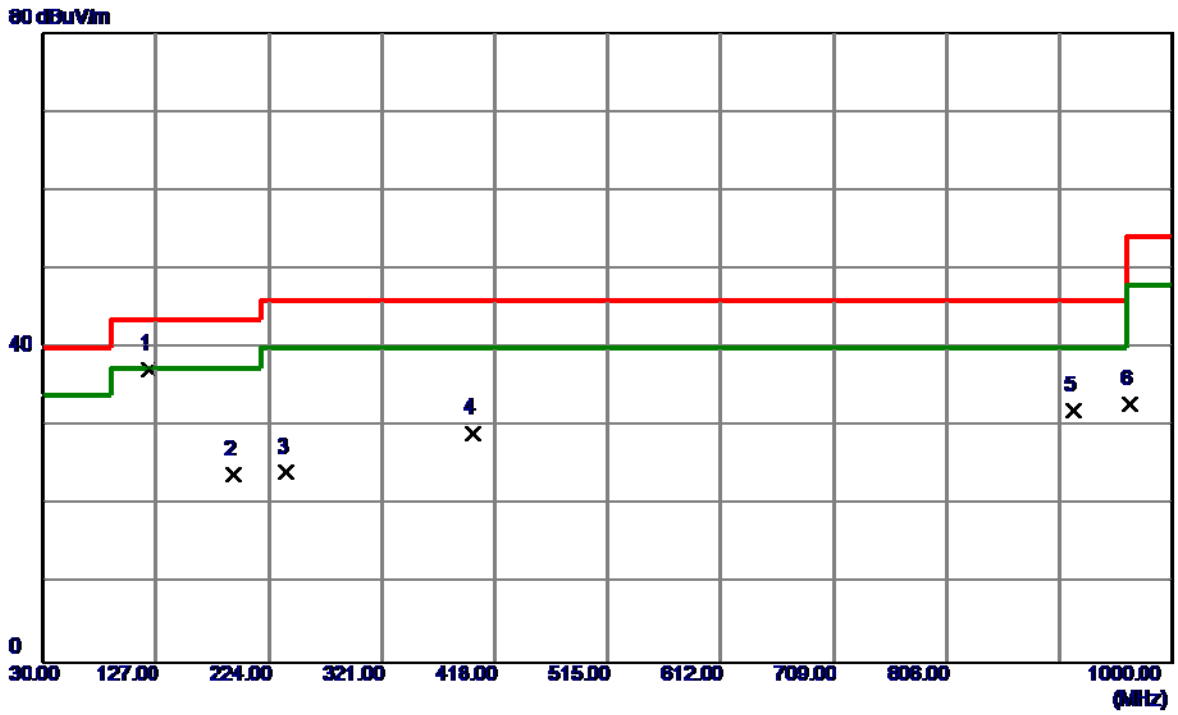
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	31.9400	32.75	-15.04	17.71	40.00	-22.29	Peak	
2	199.7500	38.73	-13.73	25.00	43.50	-18.50	Peak	
3 *	228.8500	44.64	-14.10	30.54	46.00	-15.46	Peak	
4	389.8700	35.98	-11.48	24.50	46.00	-21.50	Peak	
5	666.3200	32.50	-4.97	27.53	46.00	-18.47	Peak	
6	853.5300	30.30	0.07	30.37	46.00	-15.63	Peak	

Test Mode:	TX 2402MHz _CH00_1Mbps

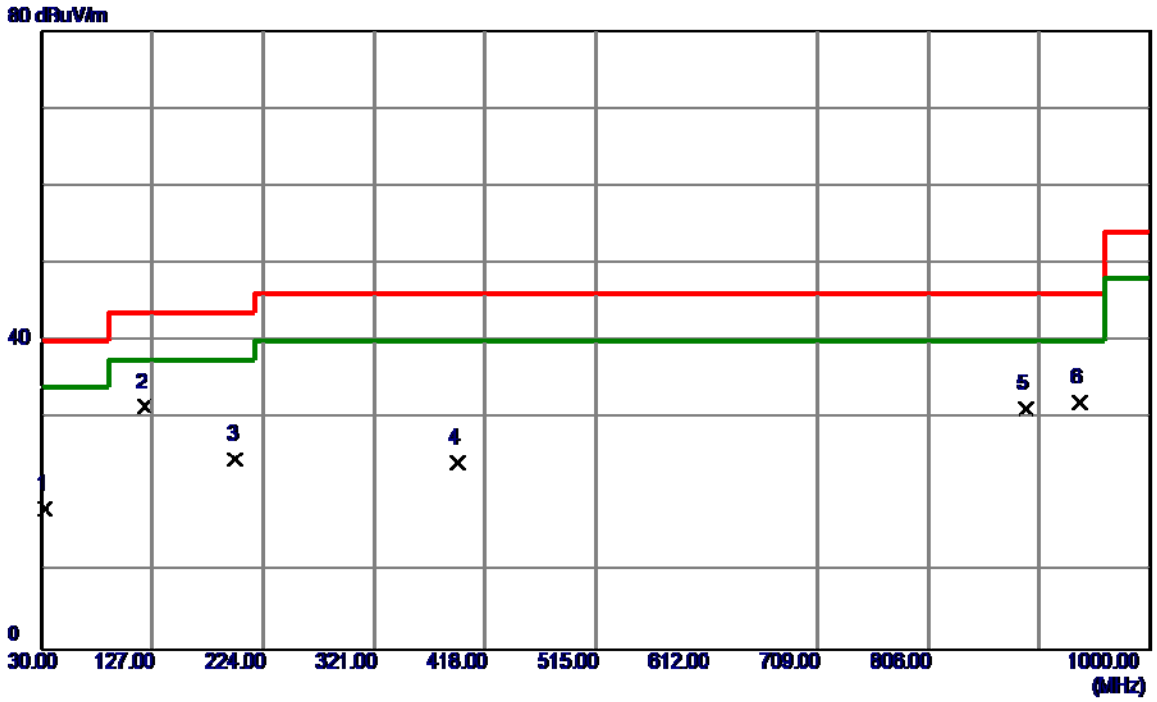
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	120.2100	52.59	-15.38	37.21	43.50	-6.29	Peak	
2	193.9299	37.11	-13.20	23.91	43.50	-19.59	Peak	
3	239.5200	38.58	-14.35	24.23	46.00	-21.77	Peak	
4	399.5700	40.53	-11.37	29.16	46.00	-16.84	Peak	
5	914.6400	30.72	1.31	32.03	46.00	13.97	Peak	
6	963.1400	30.53	2.25	32.78	54.00	-21.22	Peak	

Test Mode:	TX 2441MHz _CH39_1Mbps

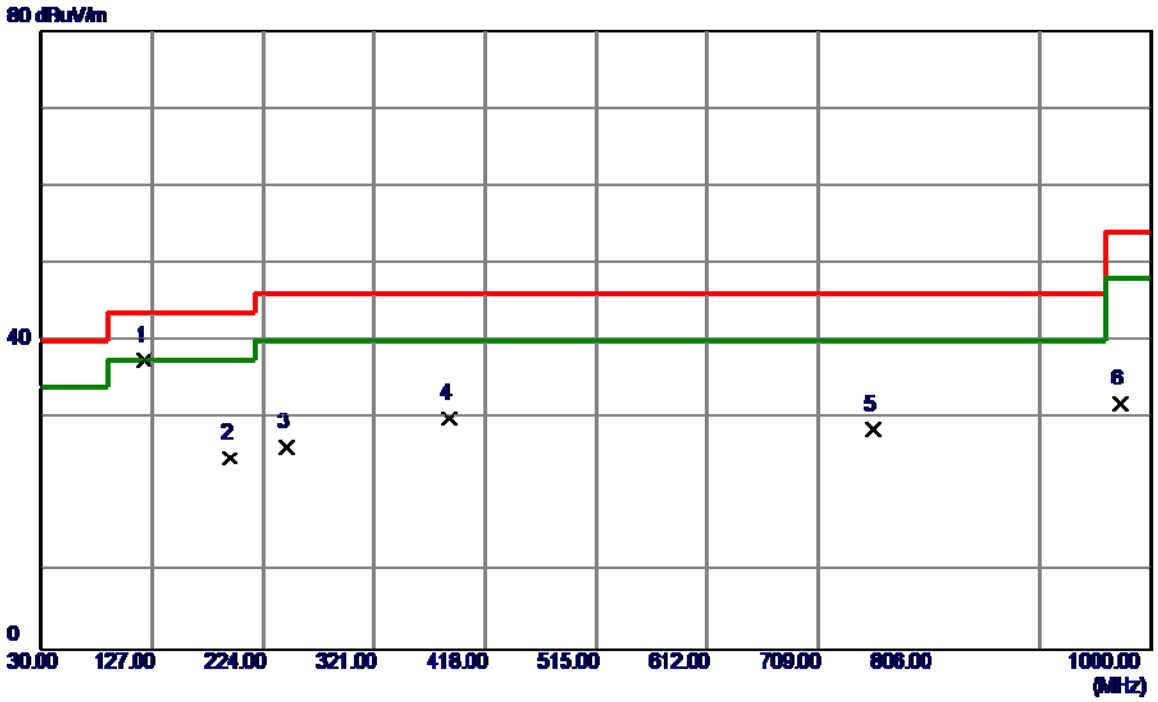
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	32.9100	33.15	-14.89	18.26	40.00	-21.74	Peak	
2 *	120.2100	46.82	-15.38	31.44	43.50	-12.06	Peak	
3	199.7500	38.32	-13.73	24.59	43.50	-18.91	Peak	
4	394.7200	35.62	-11.42	24.20	46.00	-21.80	Peak	
5	891.3600	30.39	0.85	31.24	46.00	-14.76	Peak	
6	938.8900	30.29	1.78	32.07	46.00	-13.93	Peak	

Test Mode:	TX 2441MHz _CH39_1Mbps

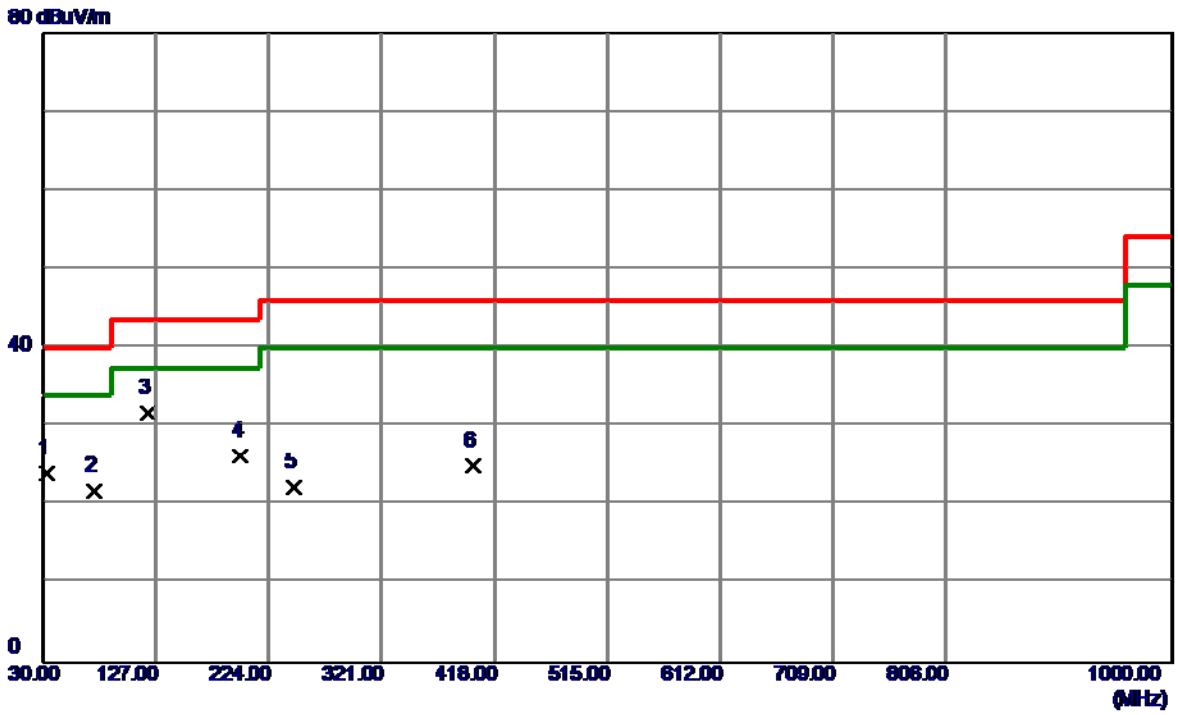
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	120.2100	52.77	-15.38	37.39	43.50	-6.11	Peak	
2	194.9000	38.15	-13.29	24.86	43.50	-18.64	Peak	
3	244.3700	40.87	-14.59	26.28	46.00	-19.72	Peak	
4	386.9600	41.45	-11.52	29.93	46.00	-16.07	Peak	
5	757.5000	30.75	-2.28	28.47	46.00	-17.53	Peak	
6	972.8400	29.46	2.44	31.90	54.00	-22.10	Peak	

Test Mode:	TX 2480MHz _CH78_1Mbps

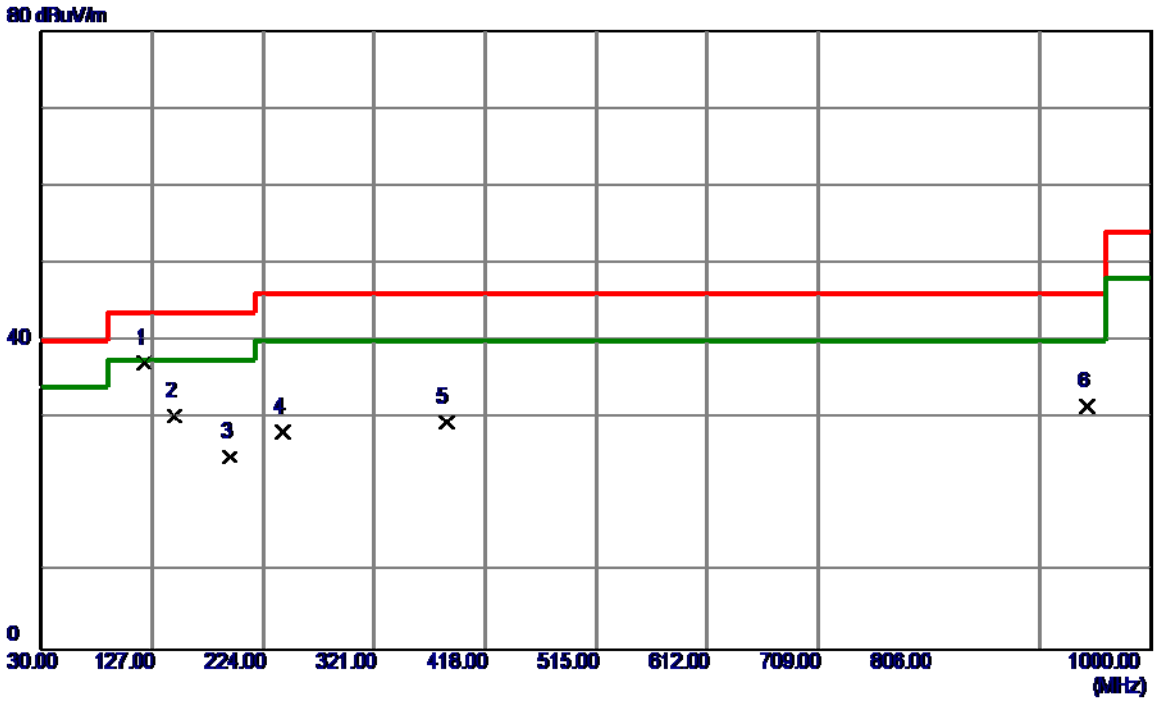
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	32.9100	38.93	-14.89	24.04	40.00	-15.96	Peak	
2	74.6200	38.85	-17.04	21.81	40.00	-18.19	Peak	
3 *	120.2100	47.03	-15.38	31.65	43.50	-11.85	Peak	
4	199.7500	39.90	-13.73	26.17	43.50	-17.33	Peak	
5	245.3400	36.92	14.64	22.28	46.00	23.72	Peak	
6	399.5700	36.33	-11.37	24.96	46.00	-21.04	Peak	

Test Mode:	TX 2480MHz _CH78_1Mbps

Horizontal

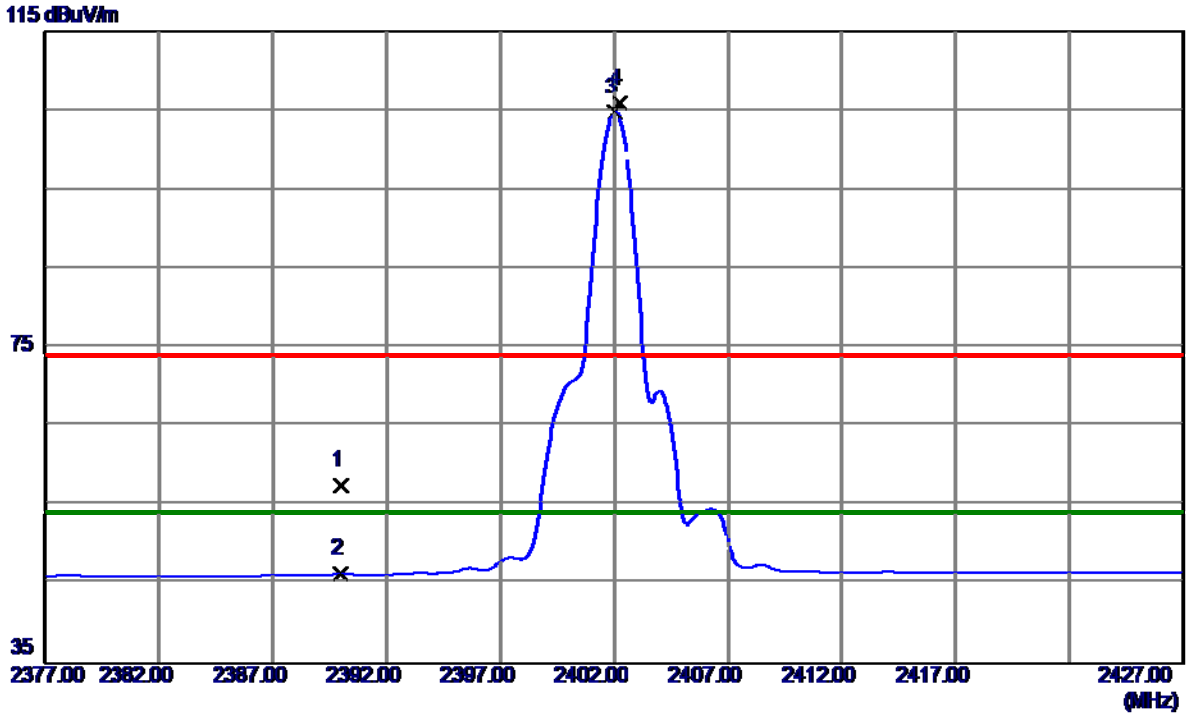


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	120.2100	52.57	-15.38	37.19	43.50	-6.31	Peak	
2	146.4000	44.07	-13.77	30.30	43.50	-13.20	Peak	
3	194.9000	38.26	-13.29	24.97	43.50	-18.53	Peak	
4	241.4600	42.62	-14.44	28.18	46.00	-17.82	Peak	
5	384.0500	40.94	-11.55	29.39	46.00	-16.61	Peak	
6	943.7400	29.62	1.87	31.49	46.00	-14.51	Peak	

APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

Test Mode :	TX 2402MHz _CH00_1Mbps

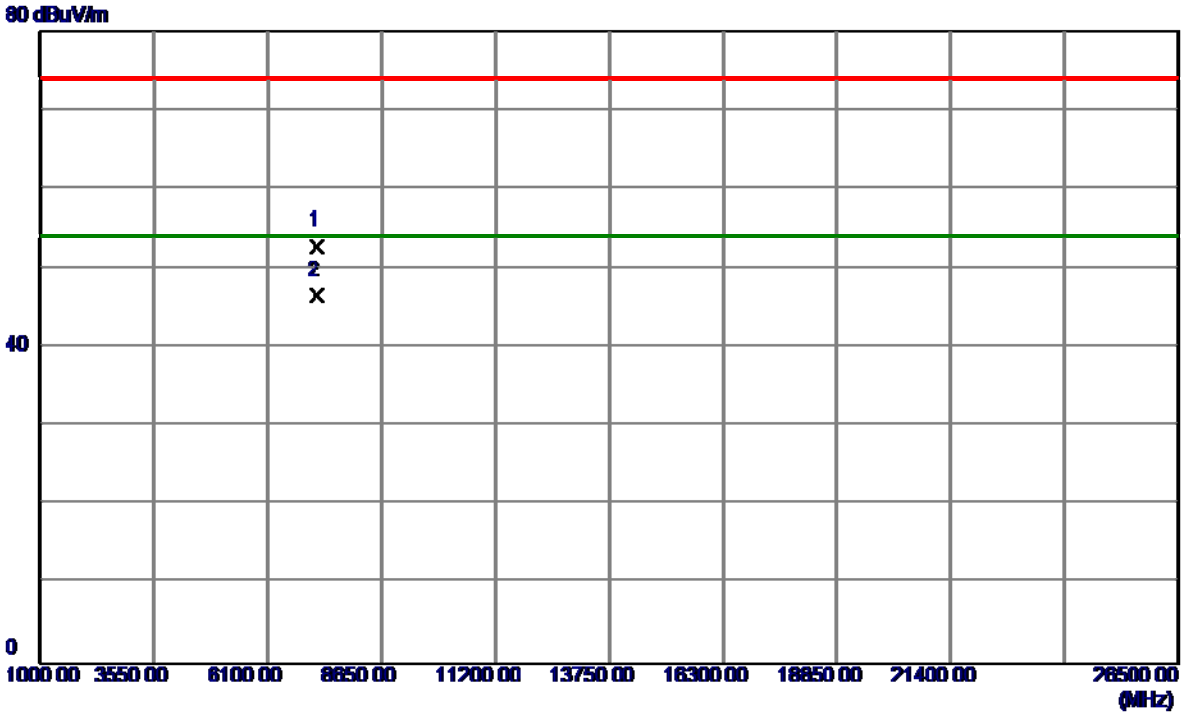
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	24.43	33.06	57.49	74.00	-16.51	Peak	
2	2390.0000	13.32	33.06	46.38	54.00	7.62	AVG	
3 *	2402.0000	71.63	33.10	104.73	54.00	50.73	AVG	No Limit
4	2402.2000	72.75	33.10	105.85	74.00	31.85	Peak	No Limit

Test Mode :	TX 2402MHz _CH00_1Mbps

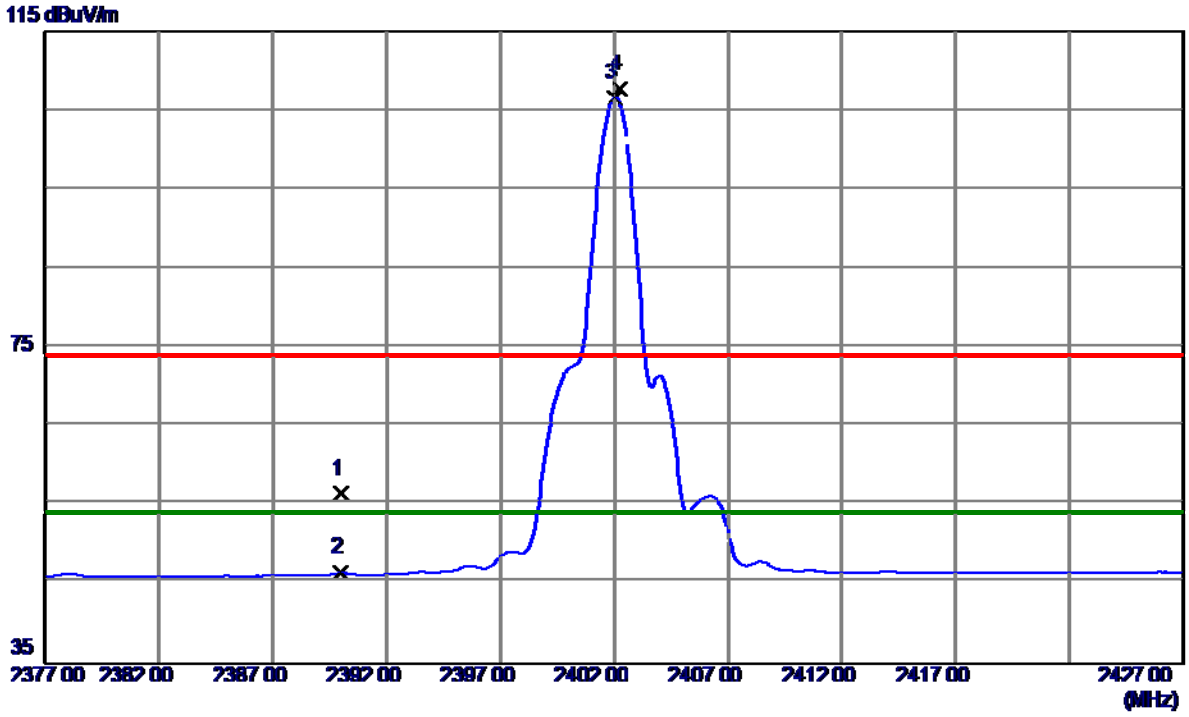
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7205.6800	39.74	13.13	52.87	74.00	-21.13	Peak	
2 *	7206.0400	33.49	13.13	46.62	54.00	-7.38	AVG	

Test Mode :	TX 2402MHz _CH00_1Mbps

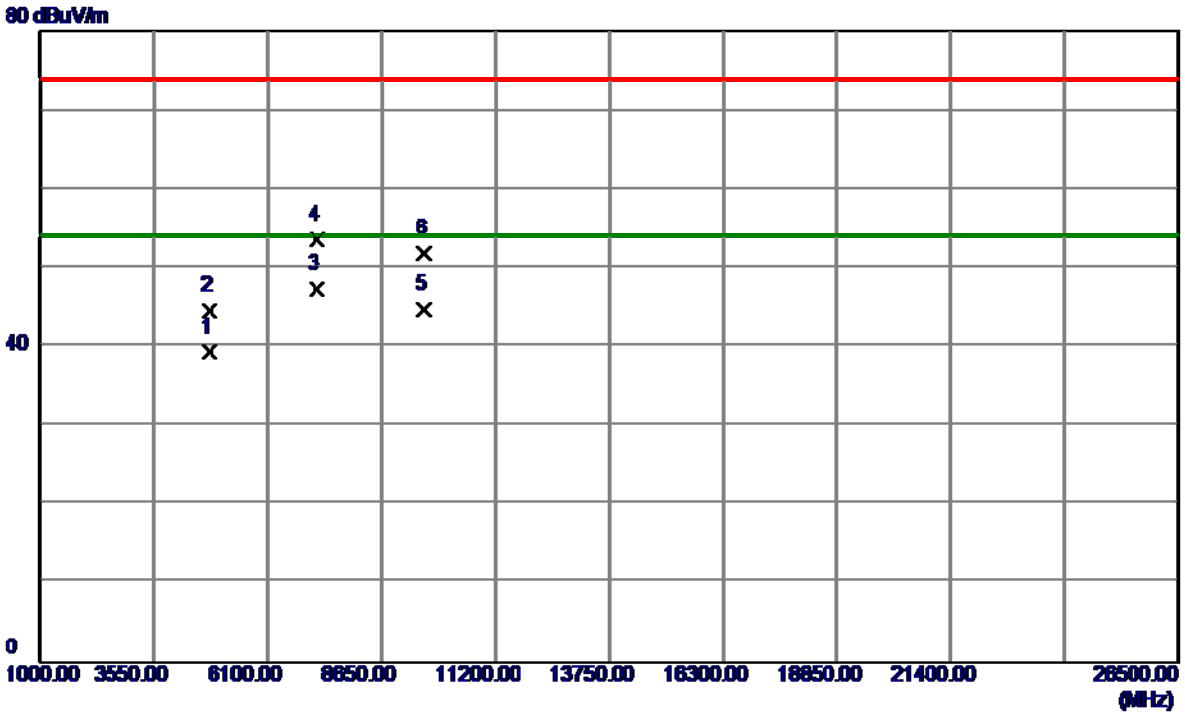
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	23.36	33.06	56.42	74.00	-17.58	Peak	
2	2390.0000	13.41	33.06	46.47	54.00	-7.53	AVG	
3 *	2402.0000	73.48	33.10	106.58	54.00	52.58	AVG	No Limit
4	2402.2000	74.56	33.10	107.66	74.00	33.66	Peak	No Limit

Test Mode :	TX 2402MHz _CH00_1Mbps

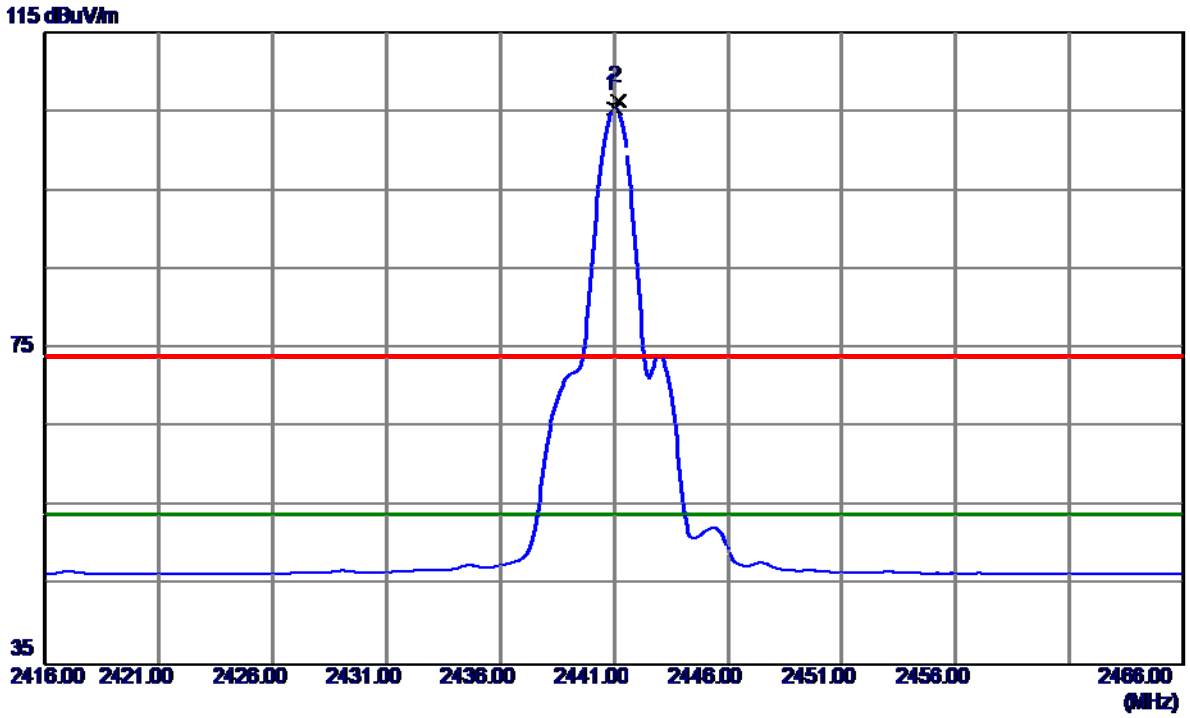
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	4806.0000	32.71	6.59	39.30	54.00	-14.70	AVG	
2	4806.0200	38.11	6.59	44.70	74.00	-29.30	Peak	
3 *	7205.9600	34.18	13.13	47.31	54.00	-6.69	AVG	
4	7206.5000	40.50	13.13	53.63	74.00	-20.37	Peak	
5	9608.4000	29.71	15.06	44.77	54.00	-9.23	AVG	
6	9608.5400	36.78	15.06	51.84	74.00	-22.16	Peak	

Test Mode :	TX 2441MHz _CH39_1Mbps

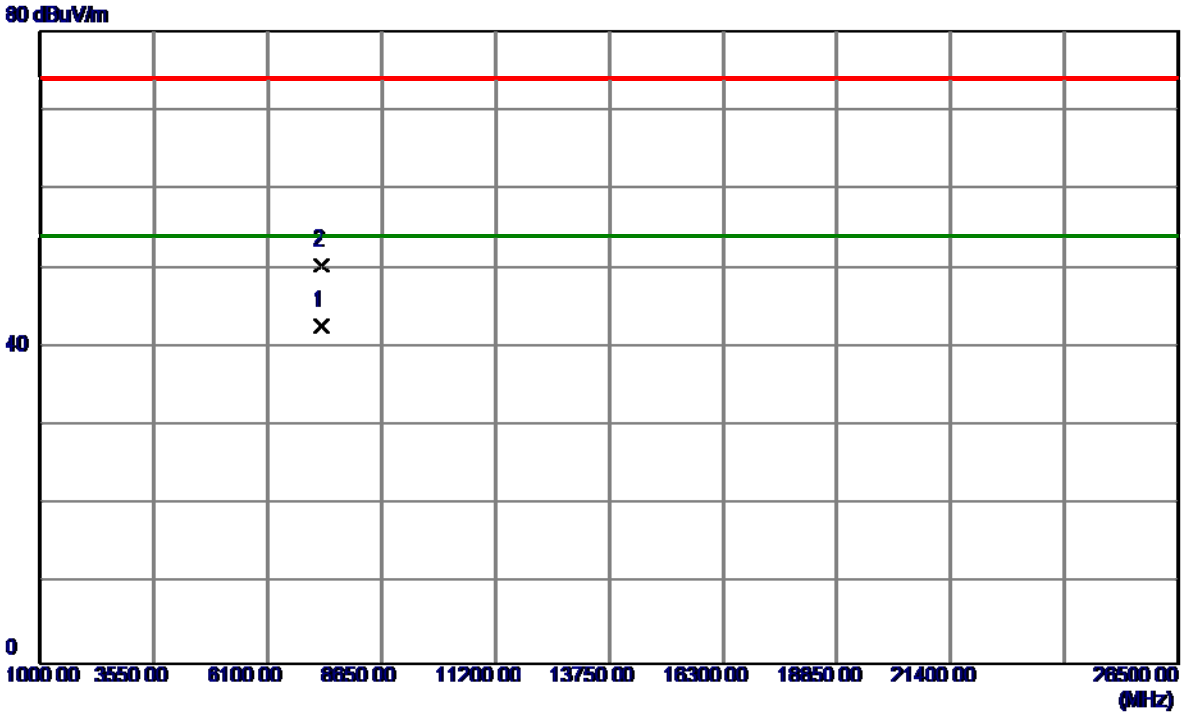
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2441.0000	72.08	33.25	105.33	54.00	51.33	AVG	No Limit
2	2441.1500	73.19	33.25	106.44	74.00	32.44	Peak	No Limit

Test Mode :	TX 2441MHz _CH39_1Mbps

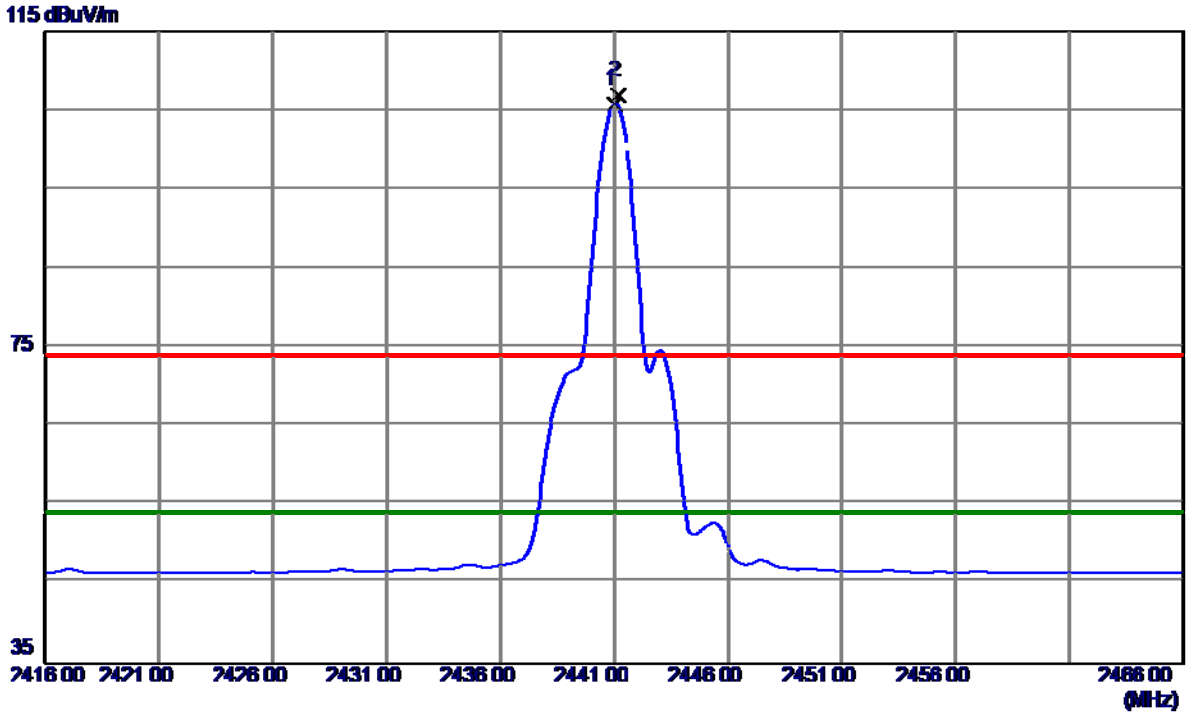
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7323.0200	29.55	13.22	42.77	54.00	-11.23	AVG	
2	7323.5000	37.15	13.22	50.37	74.00	-23.63	Peak	

Test Mode :	TX 2441MHz _CH39_1Mbps

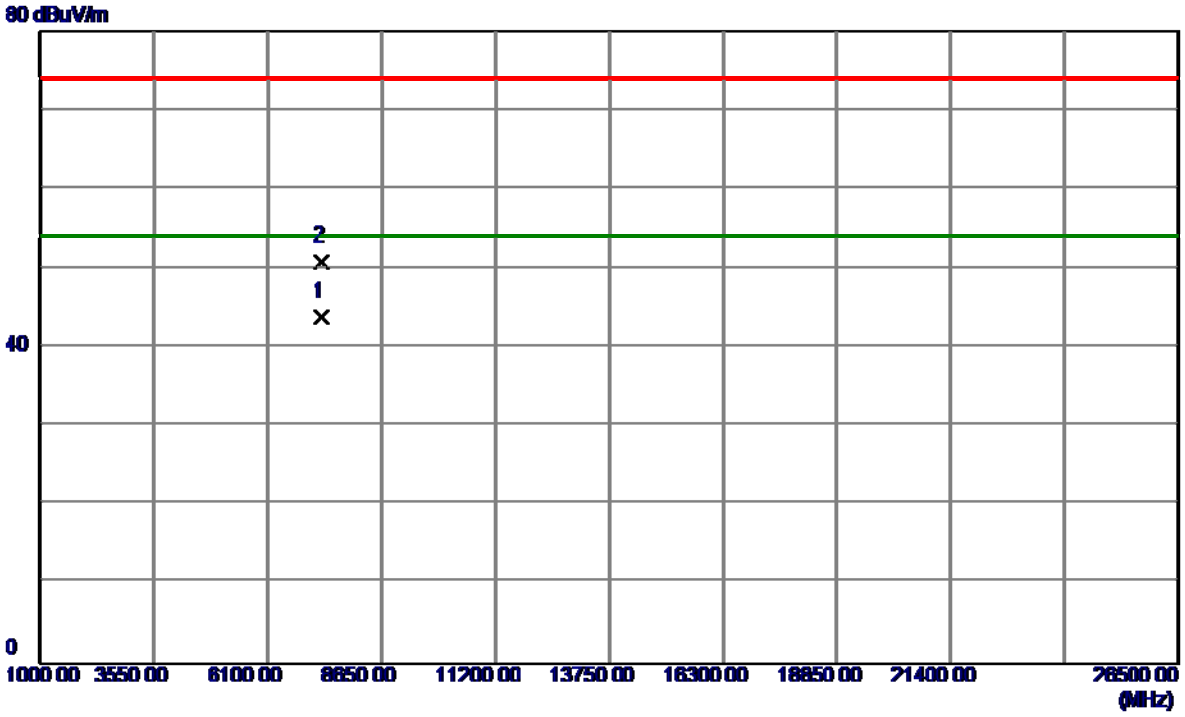
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2441.0000	72.53	33.25	105.78	54.00	51.78	AVG	No Limit
2	2441.1500	73.66	33.25	106.91	74.00	32.91	Peak	No Limit

Test Mode :	TX 2441MHz _CH39_1Mbps

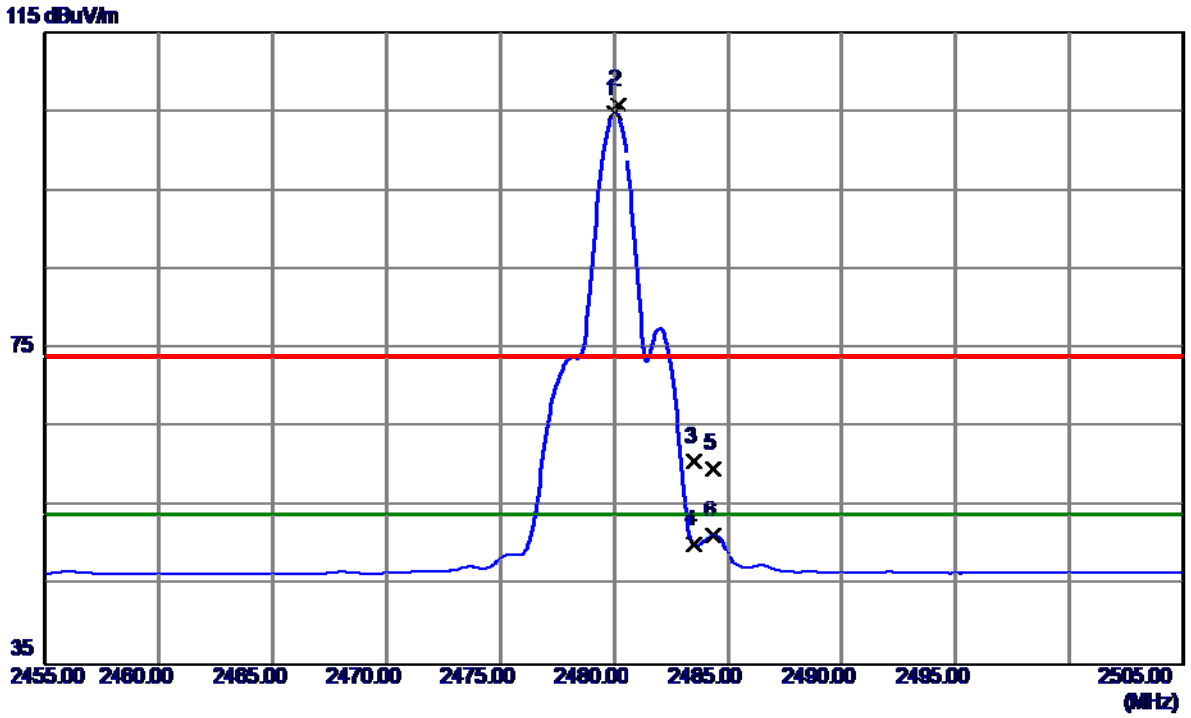
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7322.9200	30.66	13.22	43.88	54.00	-10.12	AVG	
2	7323.1200	37.68	13.22	50.90	74.00	-23.10	Peak	

Test Mode :	TX 2480MHz _CH78_1Mbps

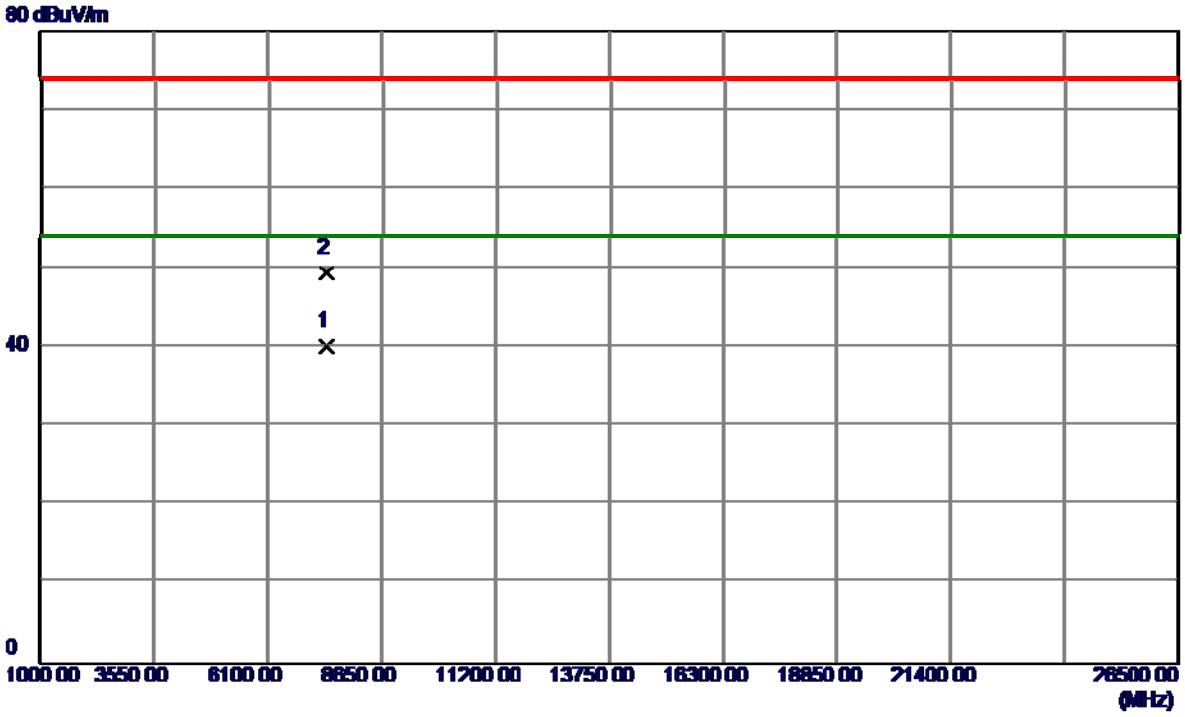
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480.0000	71.35	33.39	104.74	54.00	50.74	AVG	No Limit
2	2480.1500	72.48	33.40	105.88	74.00	31.88	Peak	No Limit
3	2483.5000	27.27	33.41	60.68	74.00	-13.32	Peak	
4	2483.5000	16.72	33.41	50.13	54.00	-3.87	AVG	
5	2484.3500	26.37	33.41	59.78	74.00	-14.22	Peak	
6	2484.3500	17.92	33.41	51.33	54.00	-2.67	AVG	

Test Mode :	TX 2480MHz _CH78_1Mbps

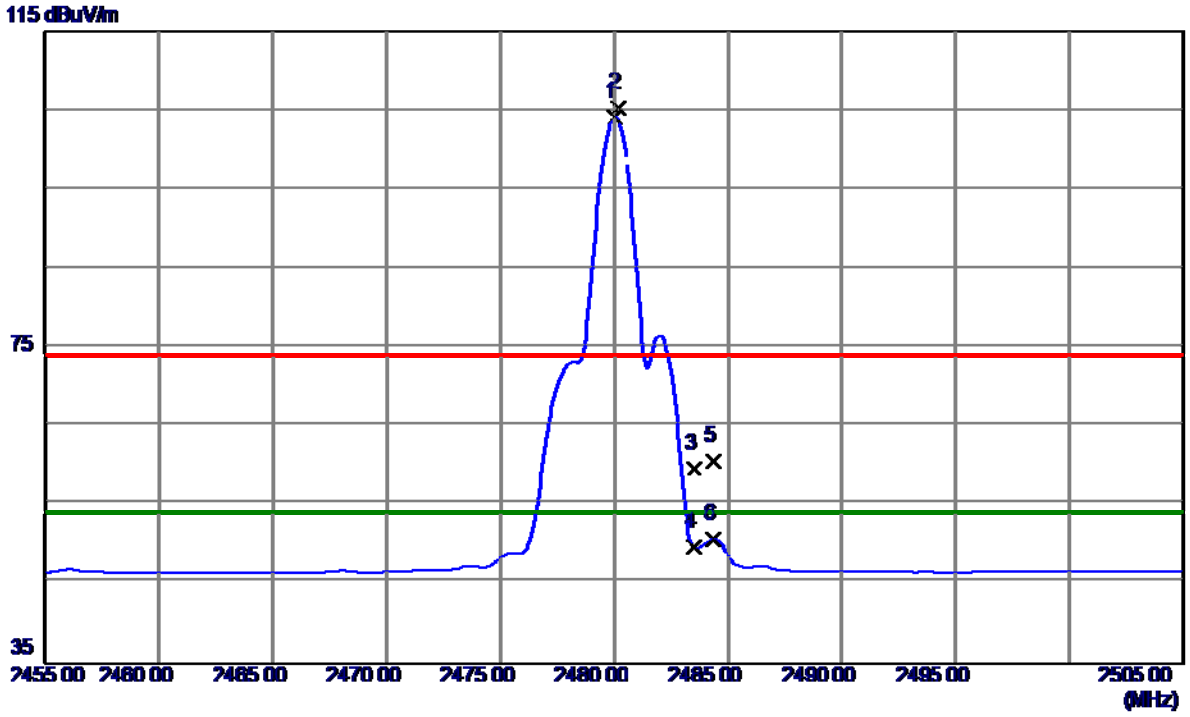
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7439.8400	26.92	13.31	40.23	54.00	-13.77	AVG	
2	7440.1400	36.13	13.31	49.44	74.00	-24.56	Peak	

Test Mode :	TX 2480MHz _CH78_1Mbps

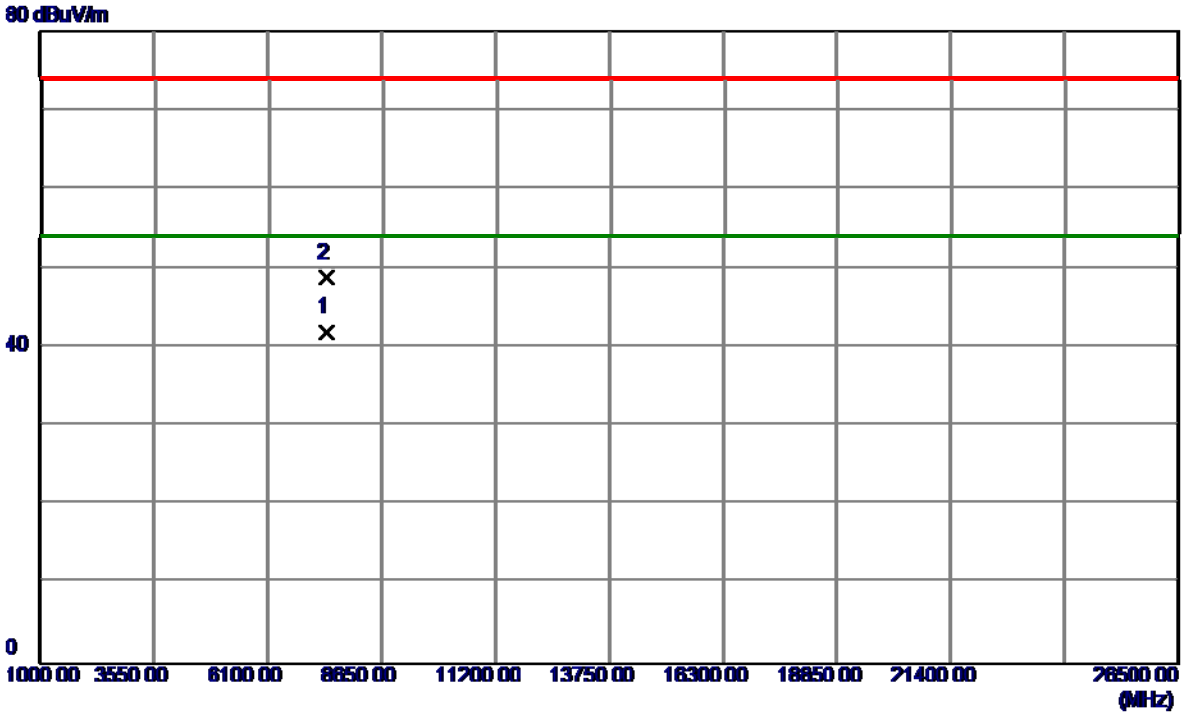
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480.0000	70.68	33.39	104.07	54.00	50.07	AVG	No Limit
2	2480.1500	71.78	33.40	105.18	74.00	31.18	Peak	No Limit
3	2483.5000	26.24	33.41	59.65	74.00	-14.35	Peak	
4	2483.5000	16.26	33.41	49.67	54.00	-4.33	AVG	
5	2484.3500	27.22	33.41	60.63	74.00	-13.37	Peak	
6	2484.3500	17.25	33.41	50.66	54.00	-3.34	AVG	

Test Mode :	TX 2480MHz _CH78_1Mbps

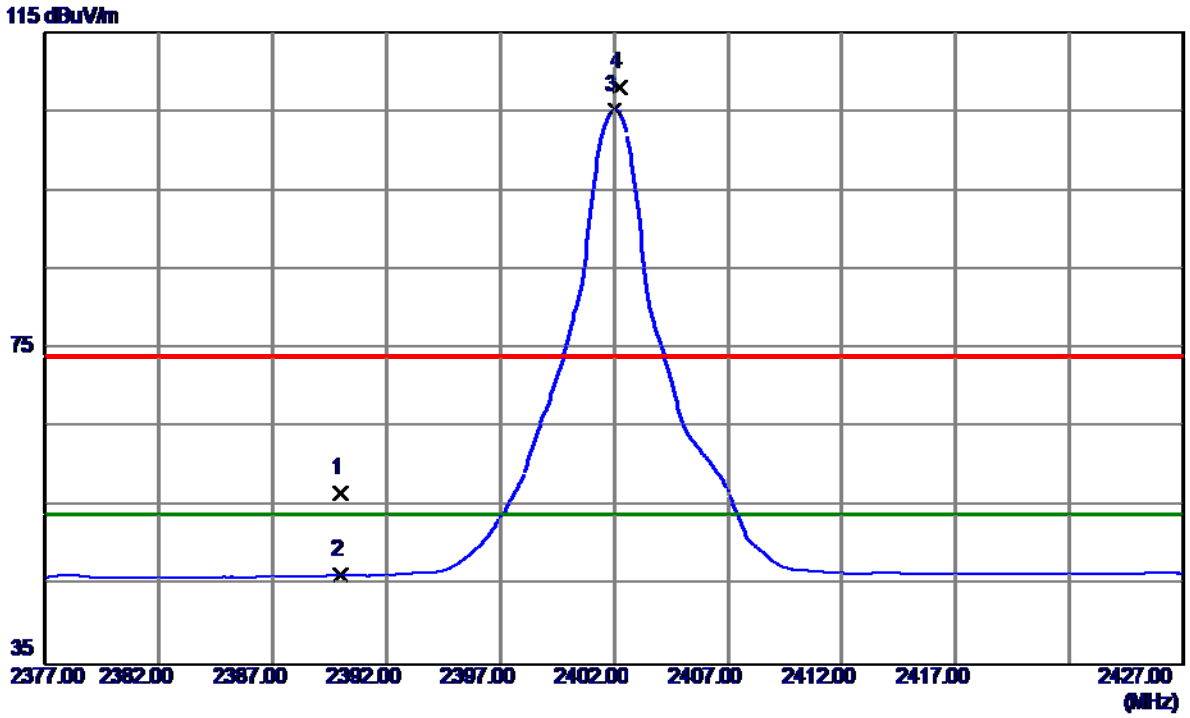
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7440.1400	28.60	13.31	41.91	54.00	-12.09	AVG	
2	7440.5400	35.51	13.31	48.82	74.00	-25.18	Peak	

Test Mode :	TX 2402MHz _CH00_3Mbps

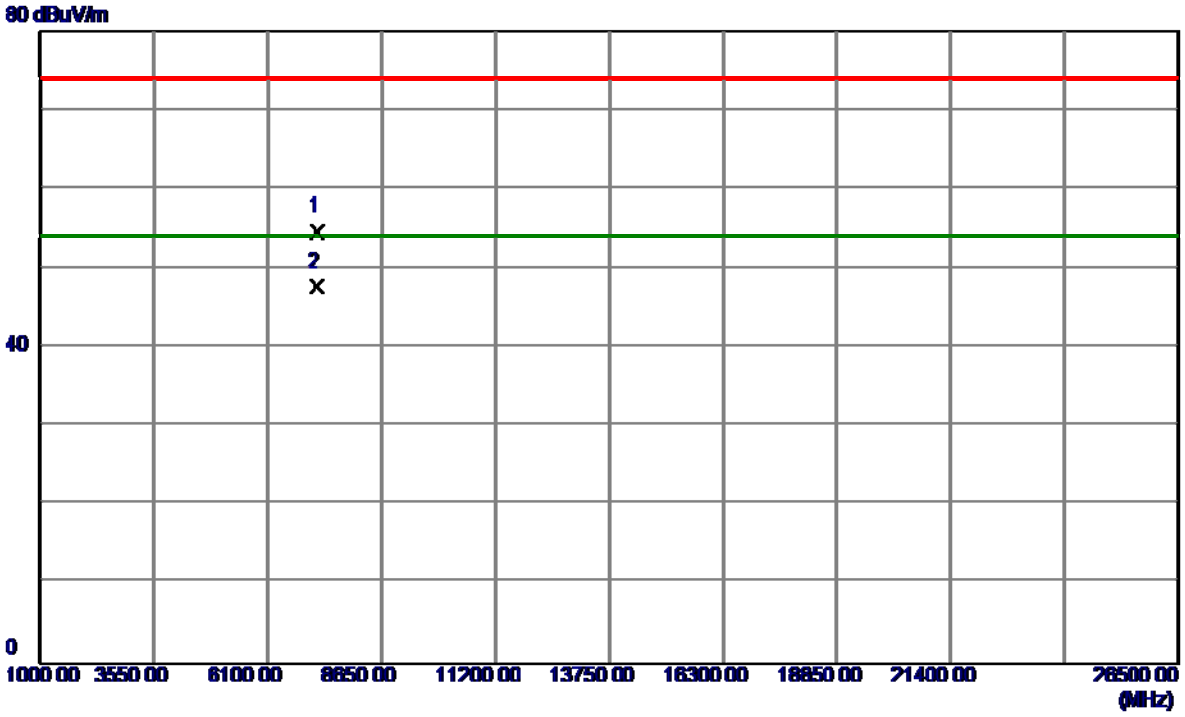
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	23.77	33.06	56.83	74.00	-17.17	Peak	
2	2390.0000	13.37	33.06	46.43	54.00	-7.57	AVG	
3 *	2402.0000	72.10	33.10	105.20	54.00	51.20	AVG	No Limit
4	2402.2000	75.04	33.10	108.14	74.00	34.14	Peak	No Limit

Test Mode :	TX 2402MHz _CH00_3Mbps

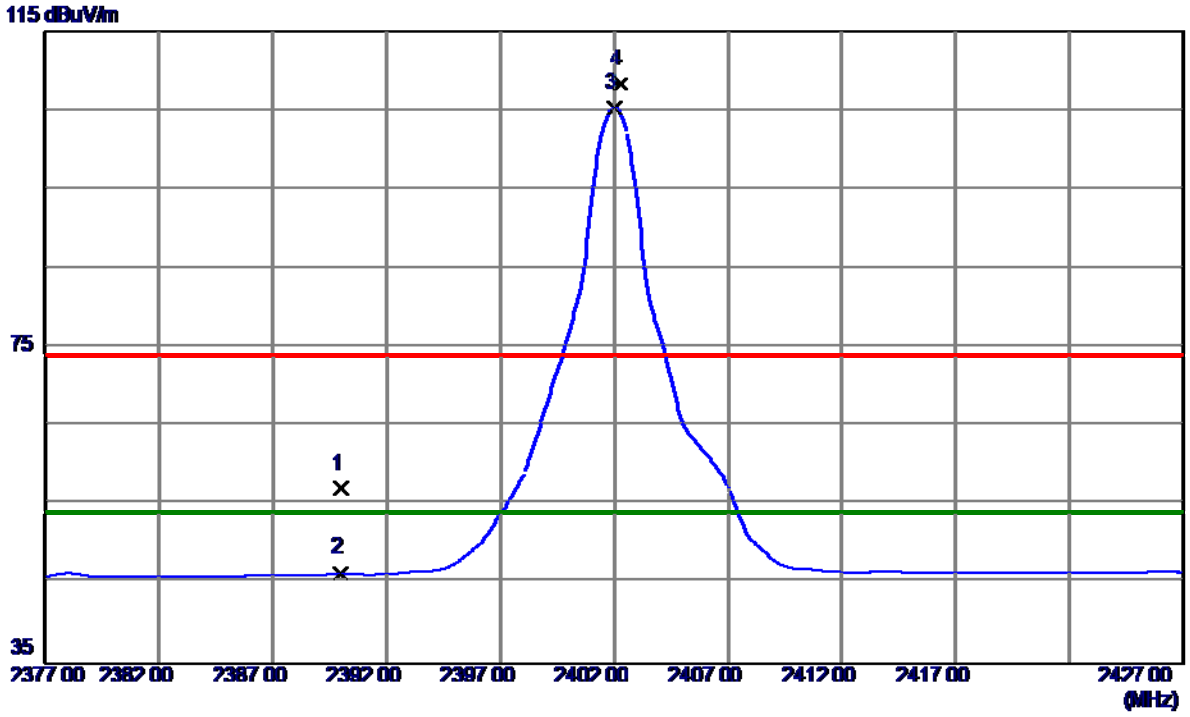
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7205.5400	41.37	13.13	54.50	74.00	-19.50	Peak	
2 *	7205.9600	34.61	13.13	47.74	54.00	-6.26	AVG	

Test Mode :	TX 2402MHz _CH00_3Mbps

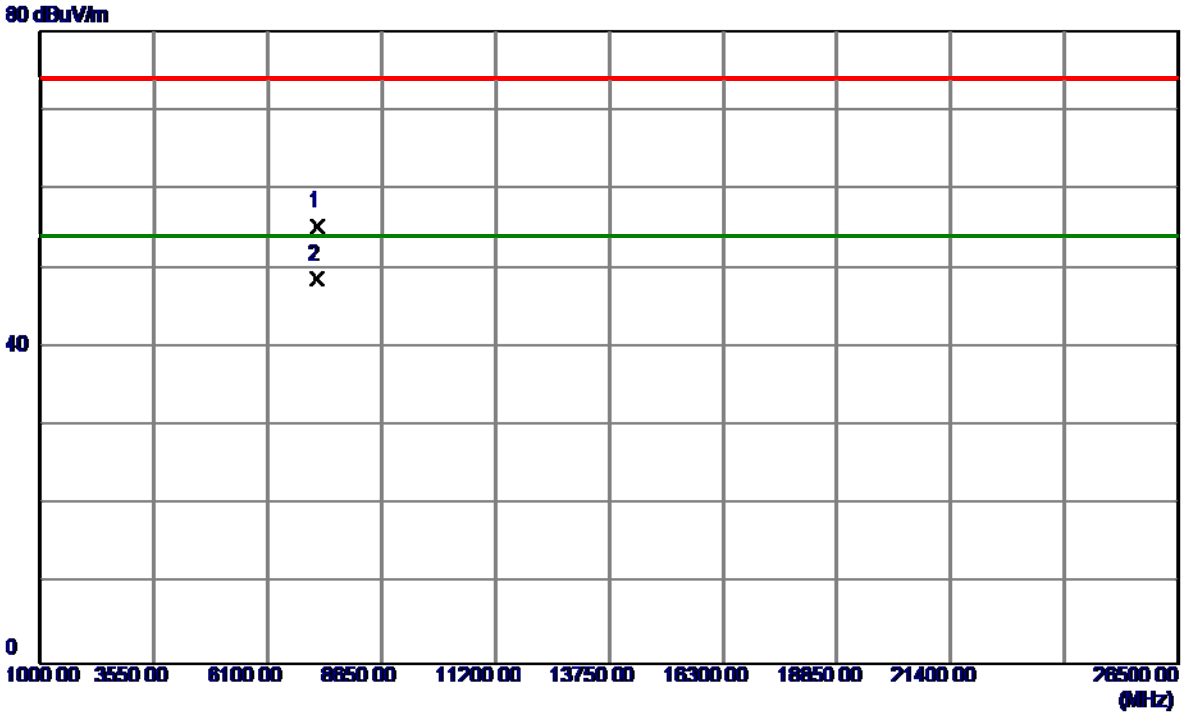
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	23.99	33.06	57.05	74.00	-16.95	Peak	
2	2390.0000	13.38	33.06	46.44	54.00	-7.56	AVG	
3 *	2402.0000	72.16	33.10	105.26	54.00	51.26	AVG	No Limit
4	2402.2500	75.13	33.10	108.23	74.00	34.23	Peak	No Limit

Test Mode :	TX 2402MHz _CH00_3Mbps

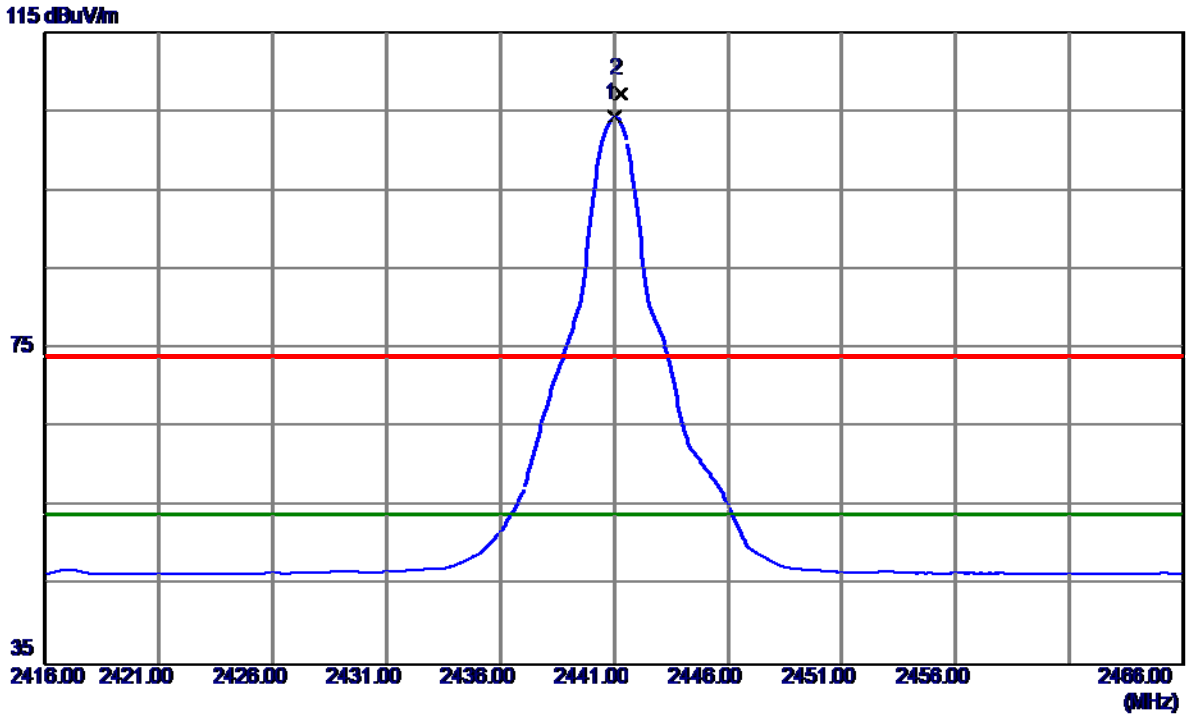
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7205.6600	42.01	13.13	55.14	74.00	-18.86	Peak	
2 *	7206.0000	35.50	13.13	48.63	54.00	-5.37	AVG	

Test Mode :	TX 2441MHz _CH39_3Mbps

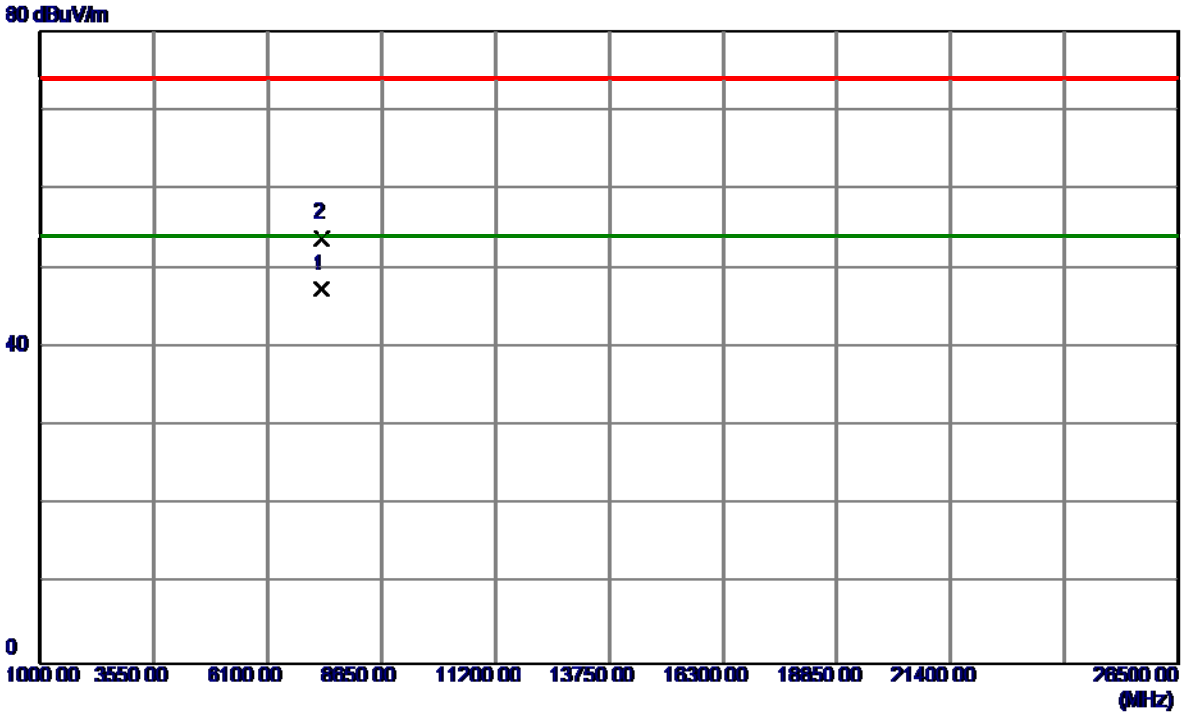
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2441.0000	70.98	33.25	104.23	54.00	50.23	AVG	No Limit
2	2441.2500	74.00	33.25	107.25	74.00	33.25	Peak	No Limit

Test Mode :	TX 2441MHz _CH39_3Mbps

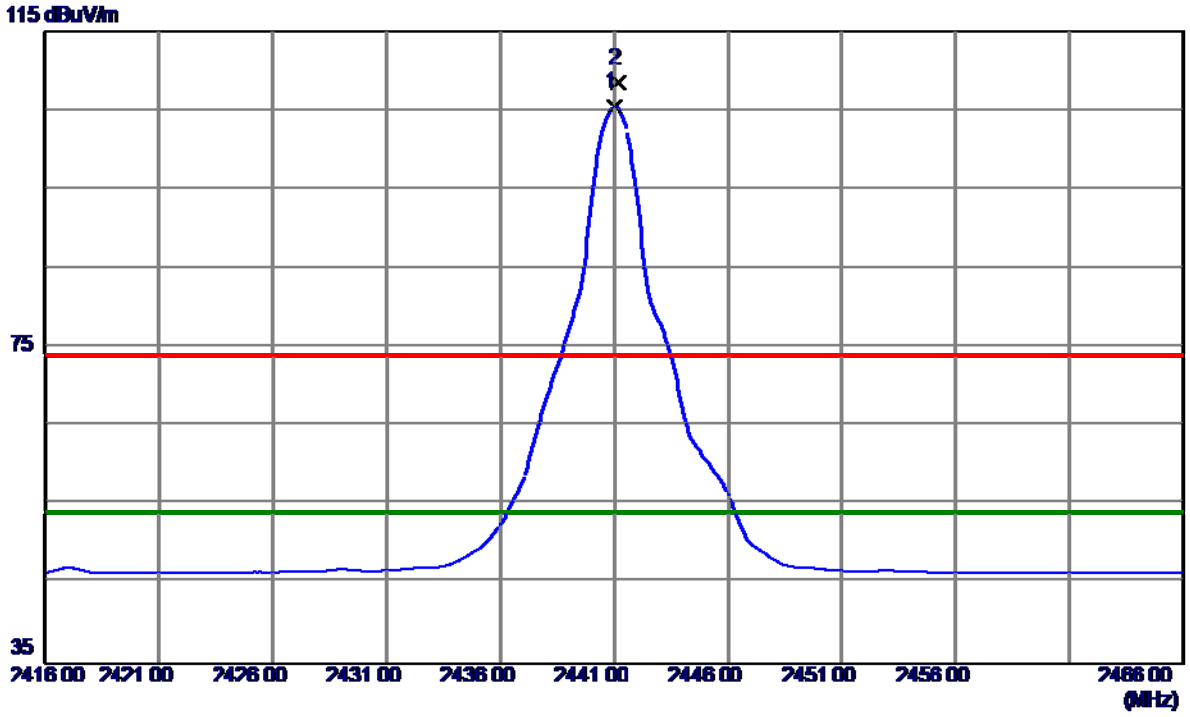
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7323.0400	34.10	13.22	47.32	54.00	-6.68	AVG	
2	7323.5000	40.51	13.22	53.73	74.00	-20.27	Peak	

Test Mode :	TX 2441MHz _CH39_3Mbps

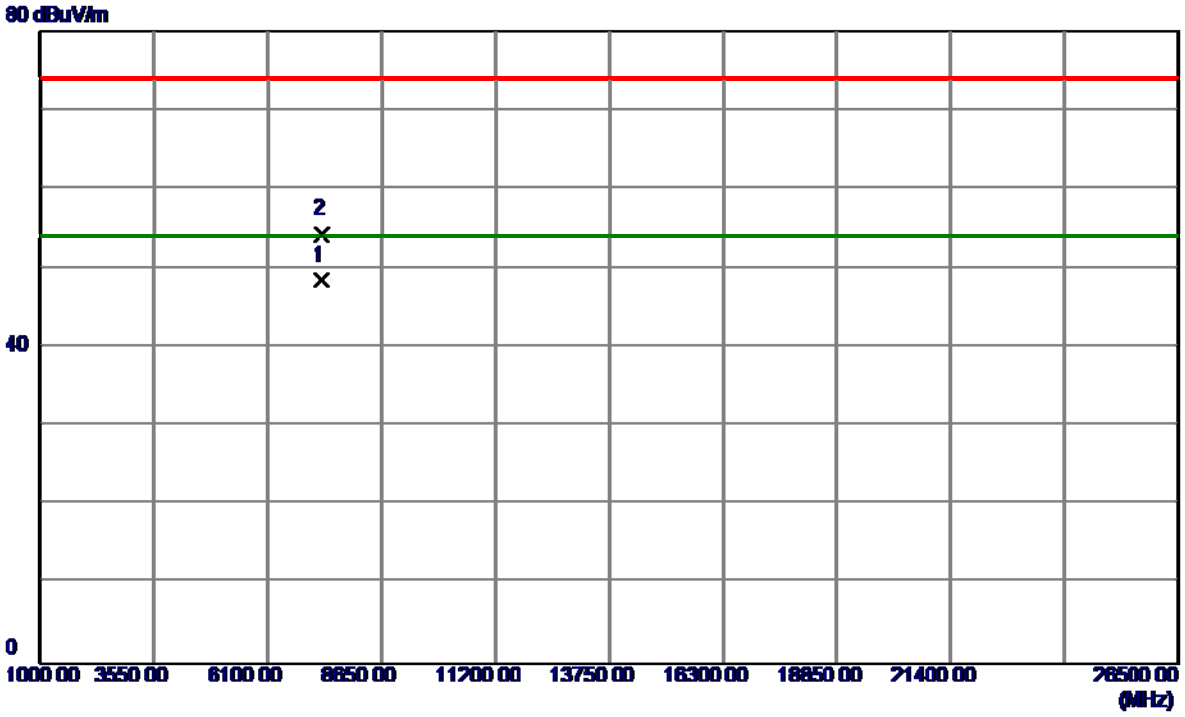
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2441.0000	72.15	33.25	105.40	54.00	51.40	AVG	No Limit
2	2441.1500	75.14	33.25	108.39	74.00	34.39	Peak	No Limit

Test Mode :	TX 2441MHz _CH39_3Mbps

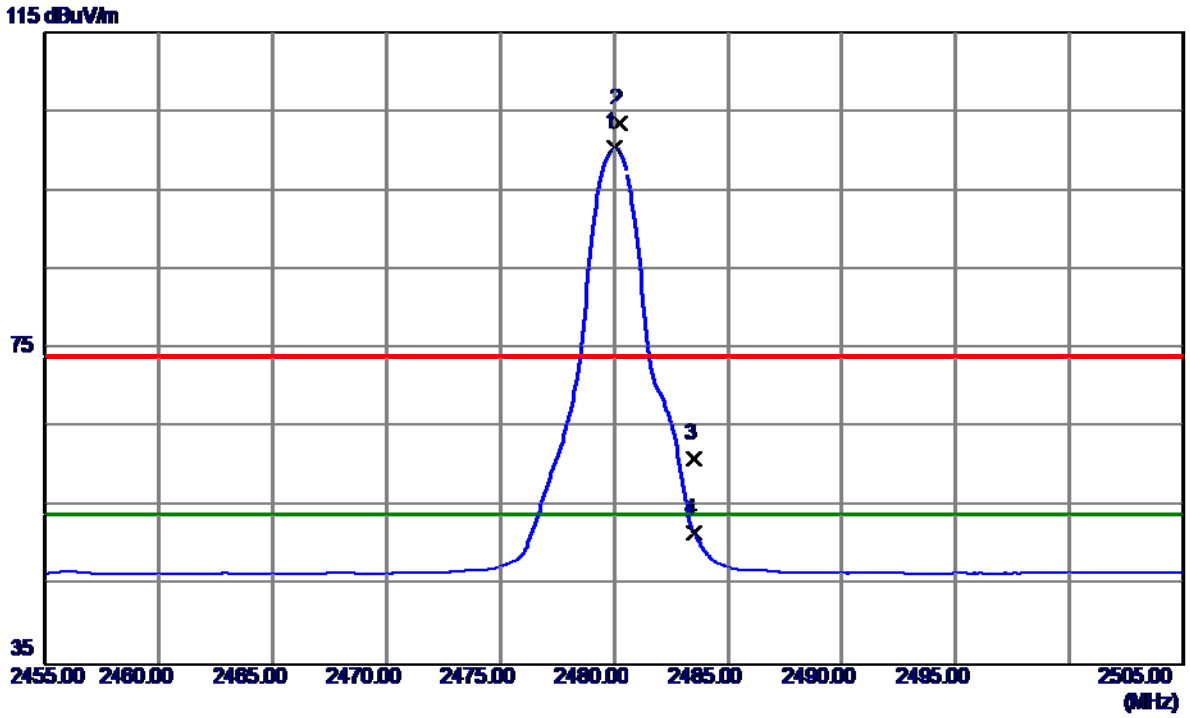
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7323.0800	35.31	13.22	48.53	54.00	-5.47	AVG	
2	7323.2400	41.09	13.22	54.31	74.00	-19.69	Peak	

Test Mode :	TX 2480MHz _CH78_3Mbps

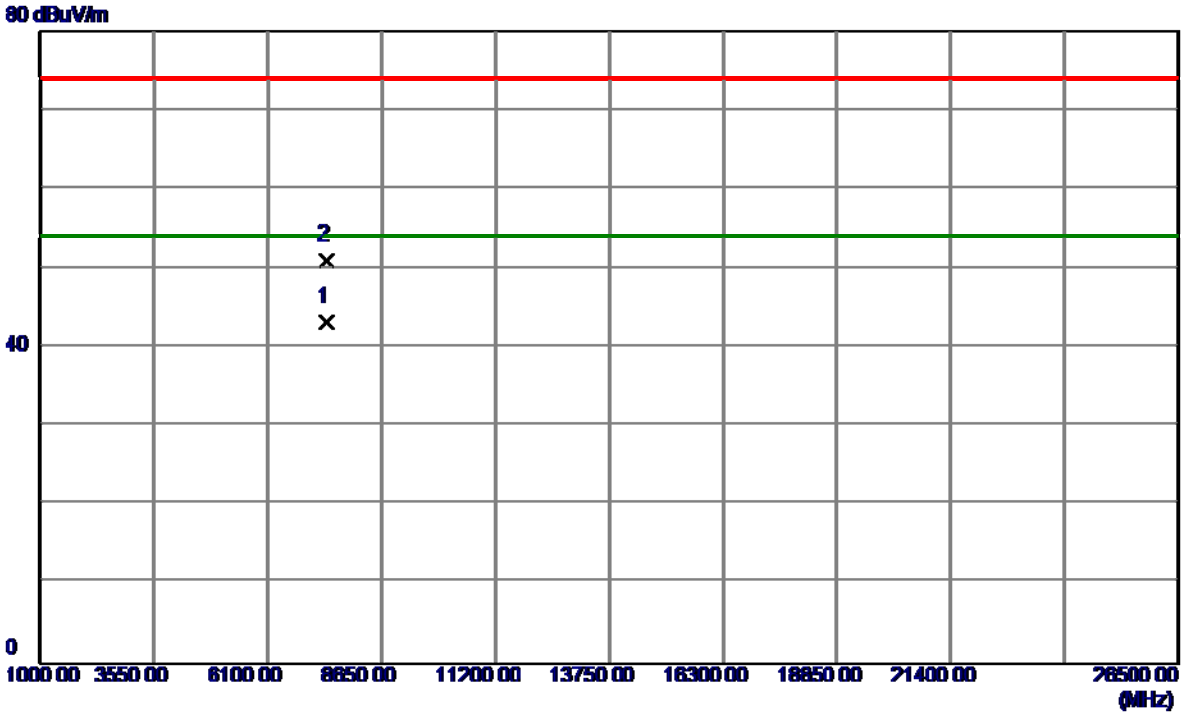
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480.0000	66.98	33.39	100.37	54.00	46.37	AVG	No Limit
2	2480.2000	70.05	33.40	103.45	74.00	29.45	Peak	No Limit
3	2483.5000	27.60	33.41	61.01	74.00	-12.99	Peak	
4	2483.5000	18.21	33.41	51.62	54.00	-2.38	AVG	

Test Mode :	TX 2480MHz _CH78_3Mbps

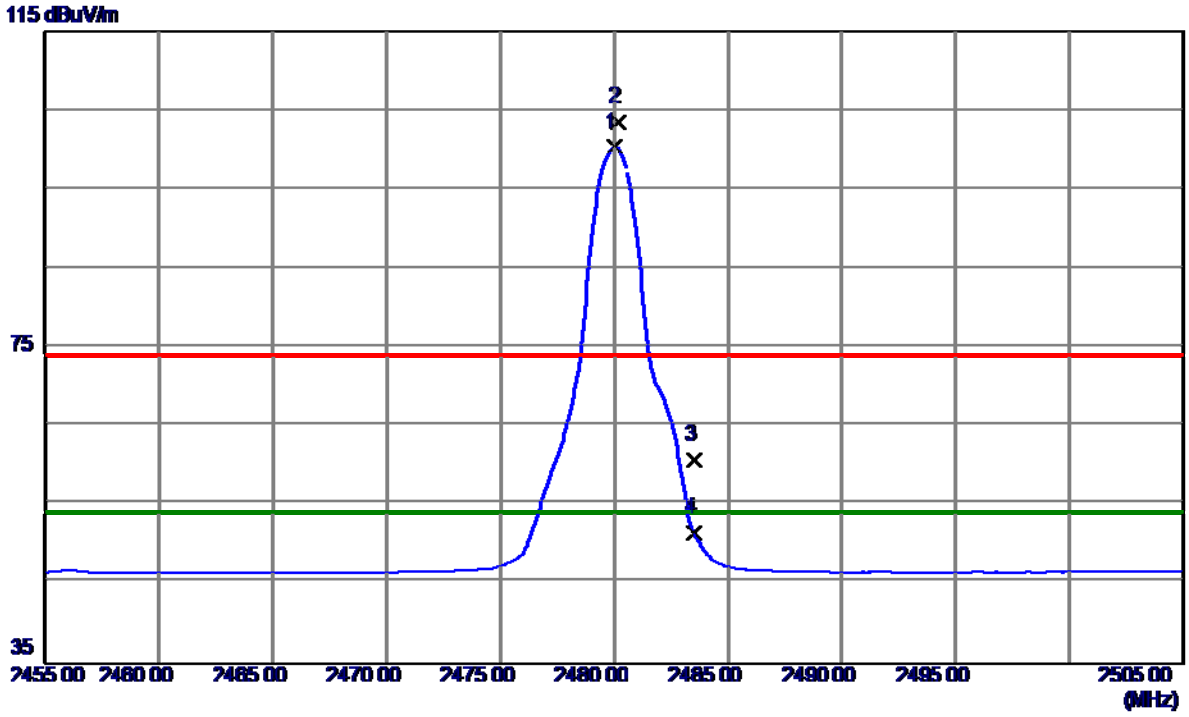
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7440.0600	29.86	13.31	43.17	54.00	-10.83	AVG	
2	7440.6600	37.77	13.31	51.08	74.00	-22.92	Peak	

Test Mode :	TX 2480MHz _CH78_3Mbps

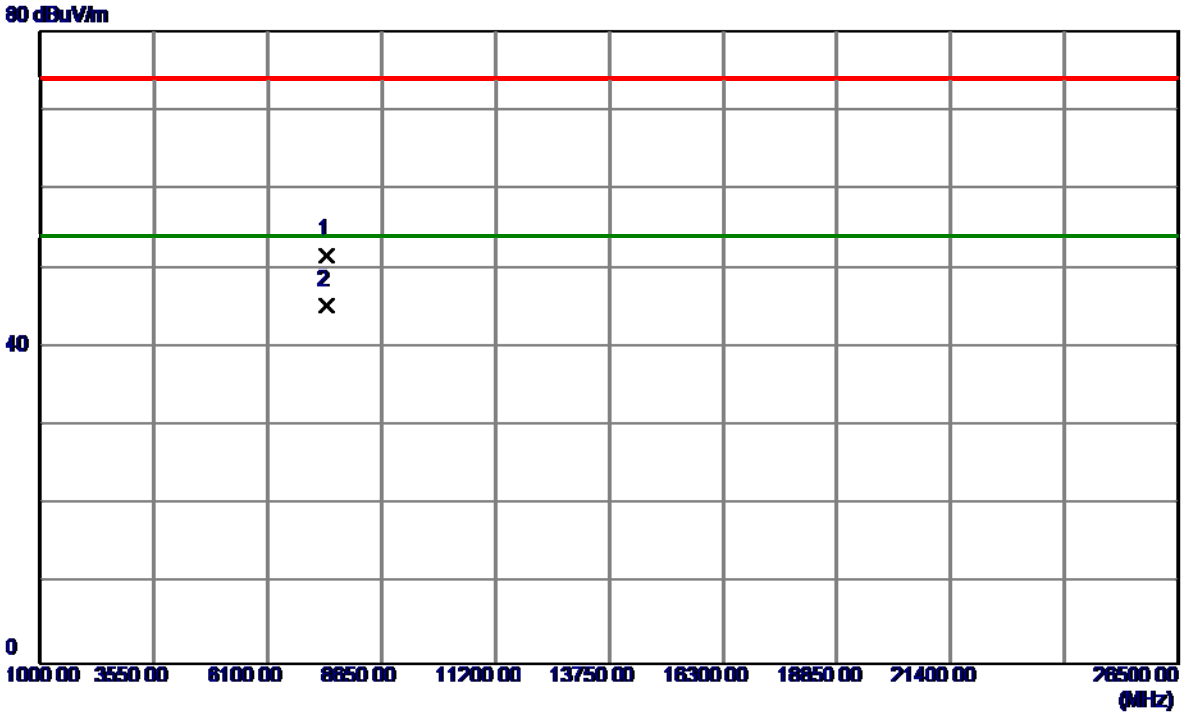
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480.0000	66.97	33.39	100.36	54.00	46.36	AVG	No Limit
2	2480.1500	70.06	33.40	103.46	74.00	29.46	Peak	No Limit
3	2483.5000	27.42	33.41	60.83	74.00	-13.17	Peak	
4	2483.5000	18.03	33.41	51.44	54.00	-2.56	AVG	

Test Mode :	TX 2480MHz _CH78_3Mbps

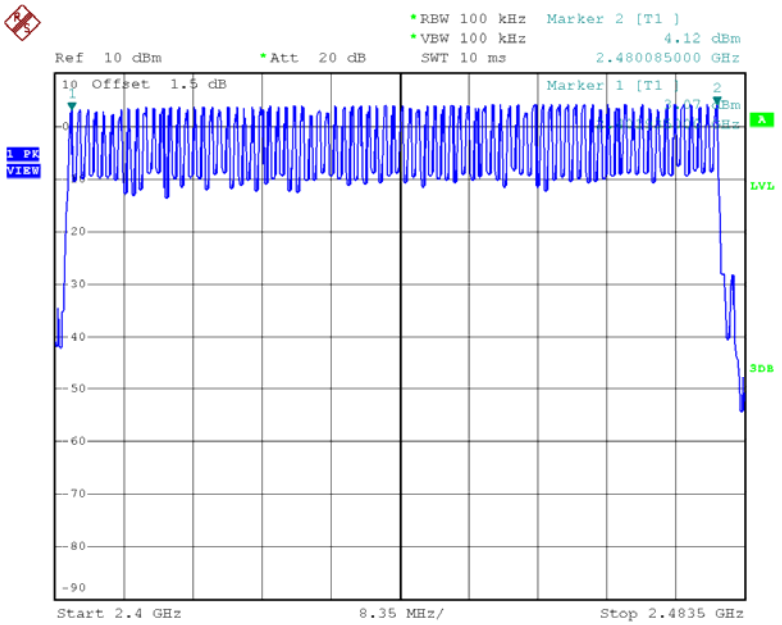
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7439.5000	38.39	13.31	51.70	74.00	-22.30	Peak	
2 *	7439.9000	32.04	13.31	45.35	54.00	-8.65	AVG	

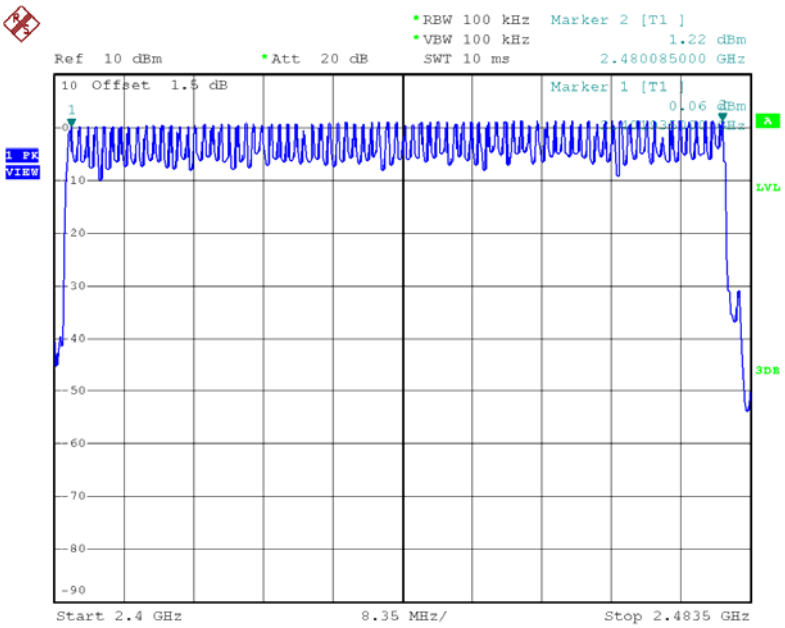
APPENDIX E - NUMBER OF HOPPING CHANNEL

Test Mode	Hopping Mode_1Mbps
Number of Hopping Channel	79



Date: 14.MAR.2018 14:16:37

Test Mode	Hopping Mode_3Mbps
Number of Hopping Channel	79



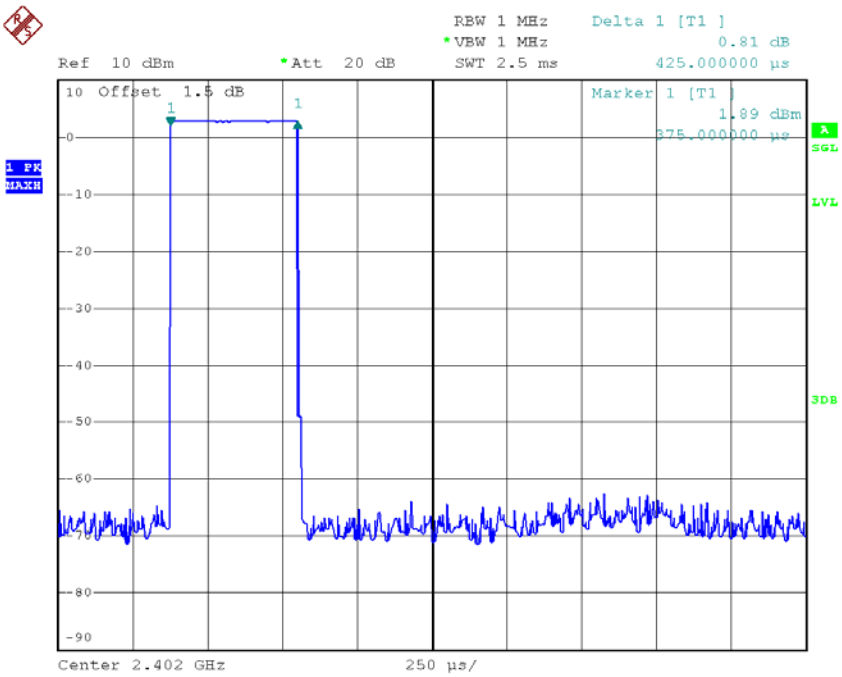
Date: 14.MAR.2018 14:40:54

APPENDIX F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps

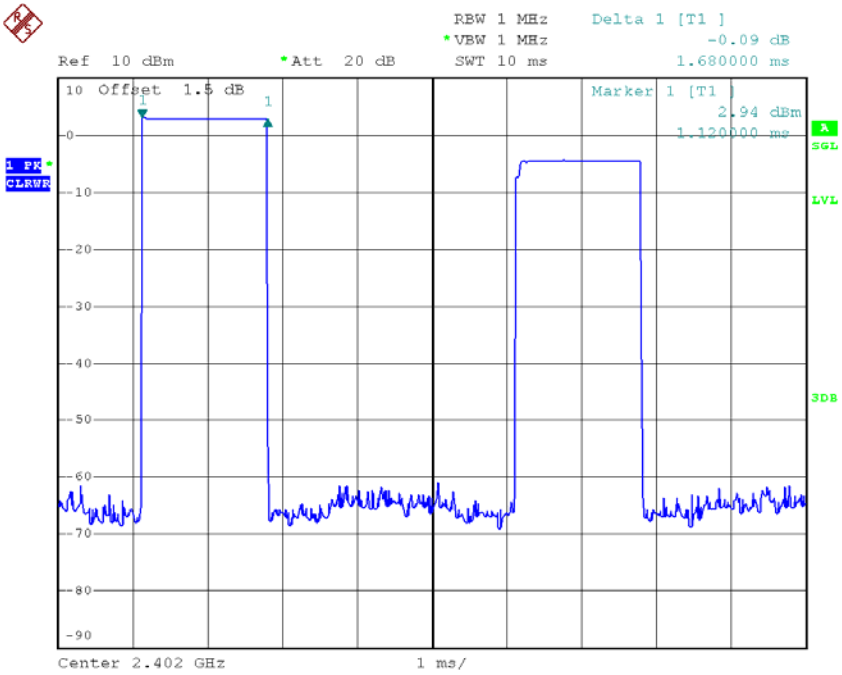
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.9600	0.3157	0.4000	Pass
DH3	2402	1.6800	0.2688	0.4000	Pass
DH1	2402	0.4250	0.1360	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH3	2441	1.6800	0.2688	0.4000	Pass
DH1	2441	0.4250	0.1360	0.4000	Pass
DH5	2480	2.9600	0.3157	0.4000	Pass
DH3	2480	1.6800	0.2688	0.4000	Pass
DH1	2480	0.4200	0.1344	0.4000	Pass

CH00-DH1



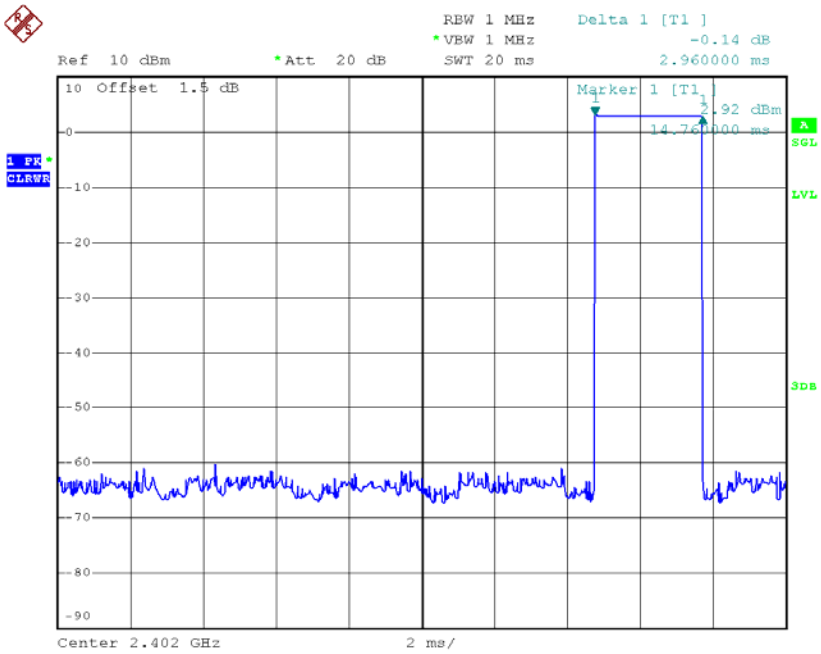
Date: 14.MAR.2018 14:11:34

CH00-DH3



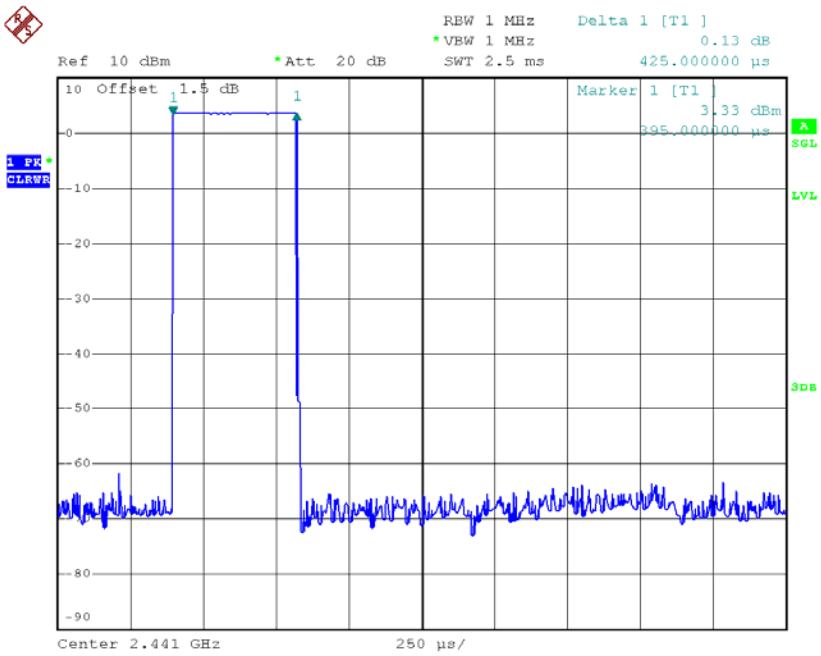
Date: 14.MAR.2018 14:23:04

CH00-DH5



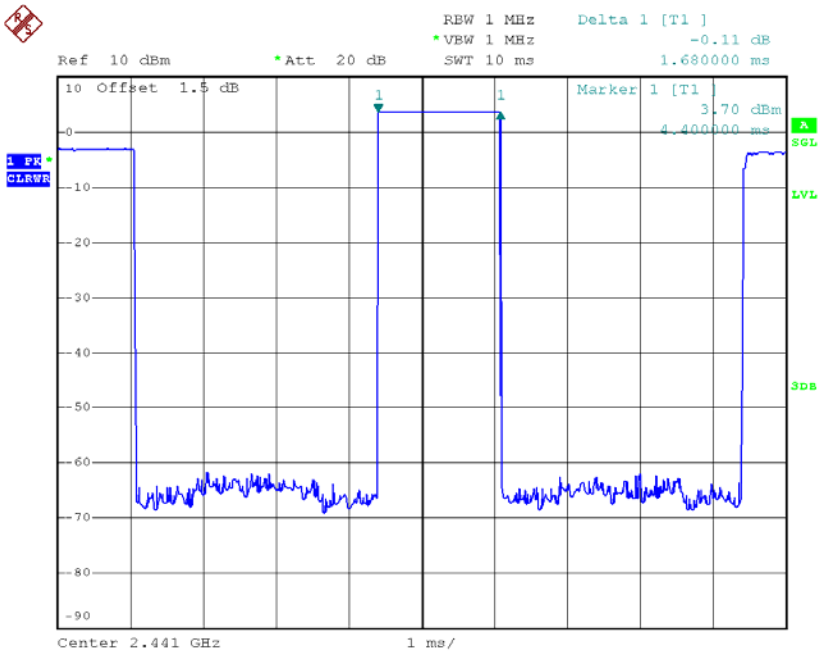
Date: 14.MAR.2018 14:23:32

CH39-DH1



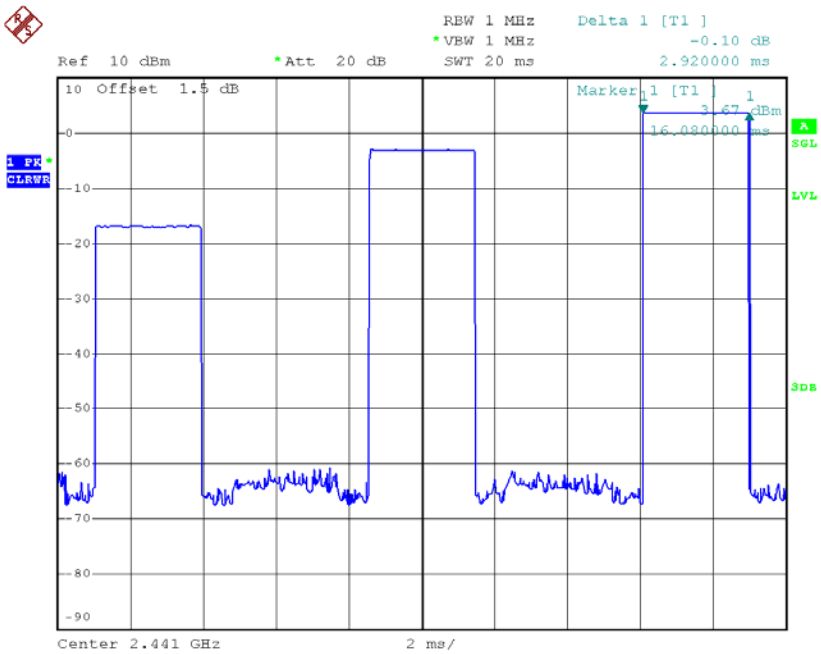
Date: 14.MAR.2018 14:11:14

CH39-DH3



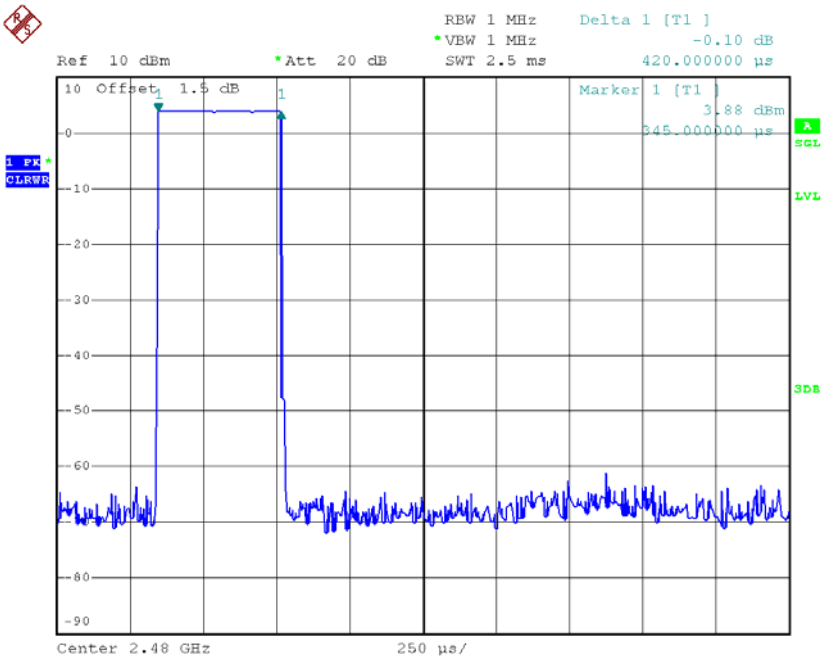
Date: 14.MAR.2018 14:23:08

CH39-DH5



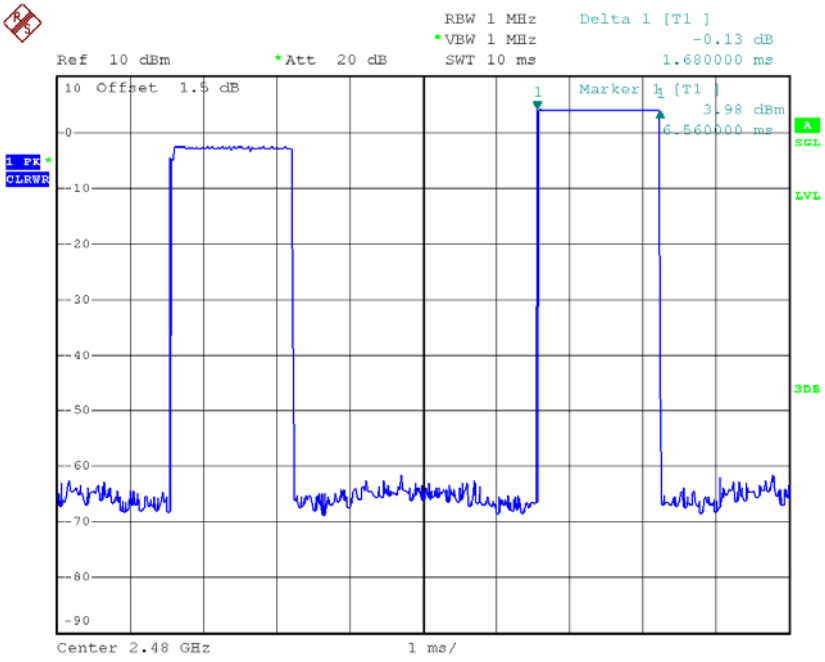
Date: 14.MAR.2018 14:23:37

CH78-DH1



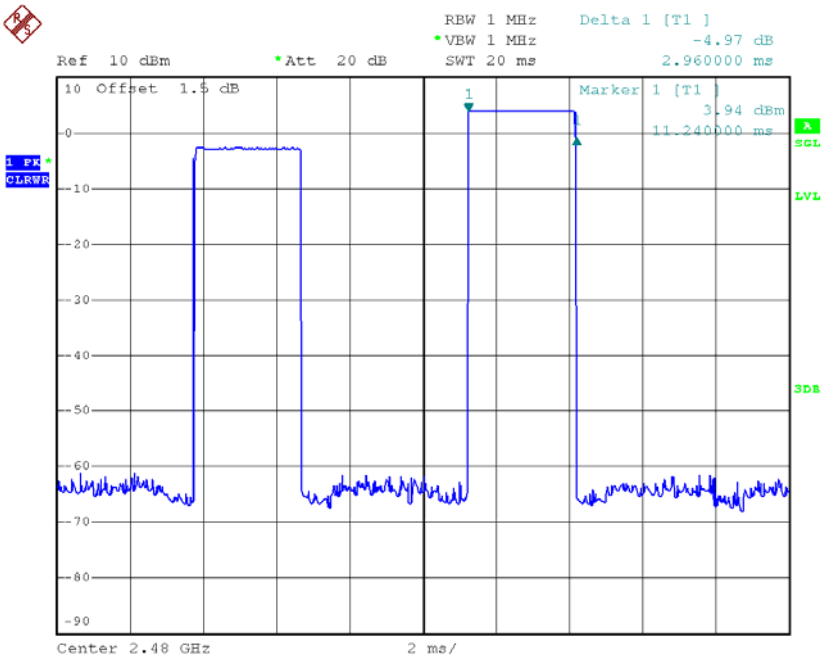
Date: 14.MAR.2018 14:11:19

CH78-DH3



Date: 14.MAR.2018 14:23:15

CH78-DH5

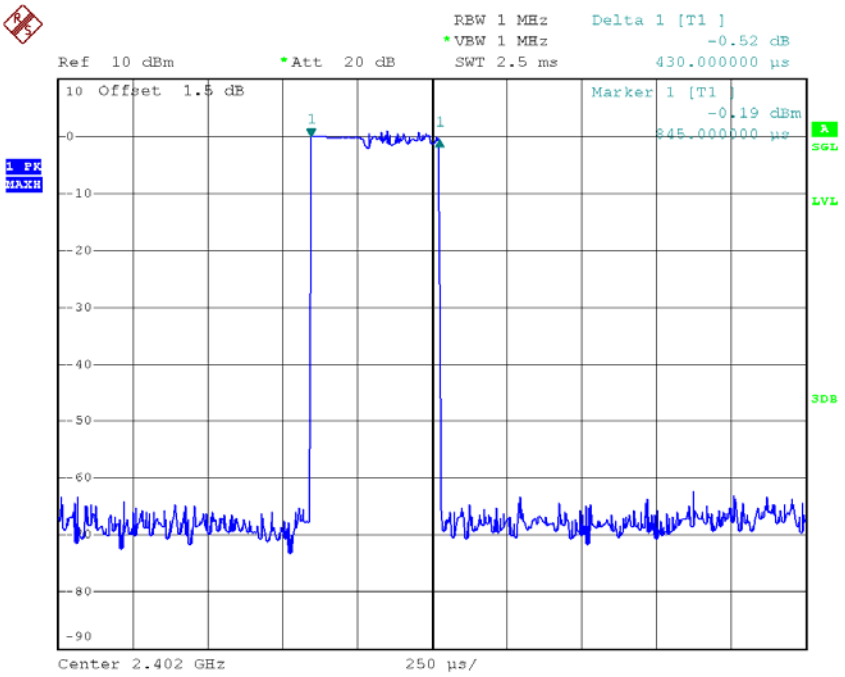


Date: 14.MAR.2018 14:23:45

Test Mode :	TX Mode_3Mbps

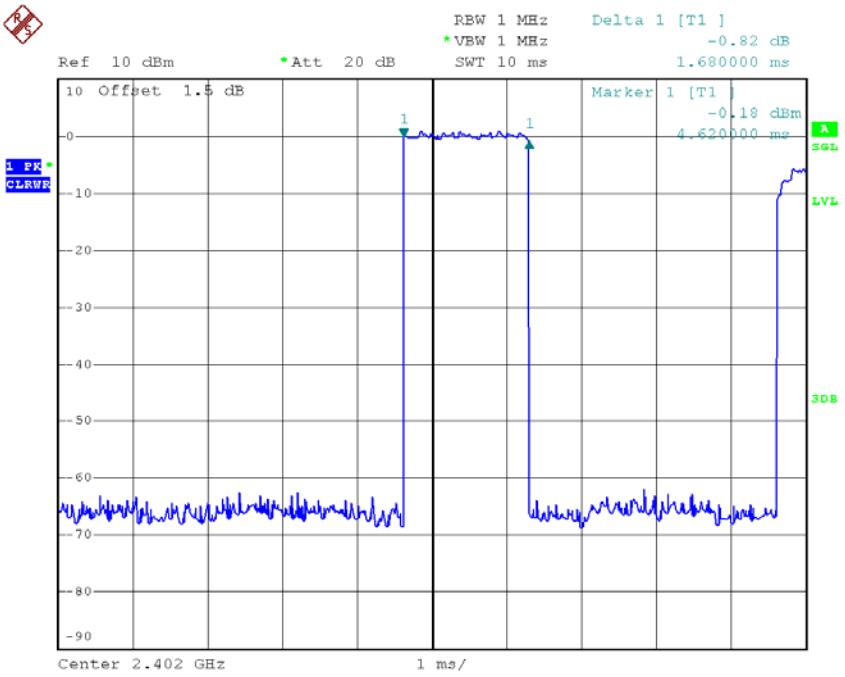
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
DH5	2402	2.9200	0.3115	0.4000	Pass
DH3	2402	1.6800	0.2688	0.4000	Pass
DH1	2402	0.4300	0.1376	0.4000	Pass
DH5	2441	2.9600	0.3157	0.4000	Pass
DH3	2441	1.6800	0.2688	0.4000	Pass
DH1	2441	0.4300	0.1376	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6800	0.2688	0.4000	Pass
DH1	2480	0.4350	0.1392	0.4000	Pass

CH00-DH1



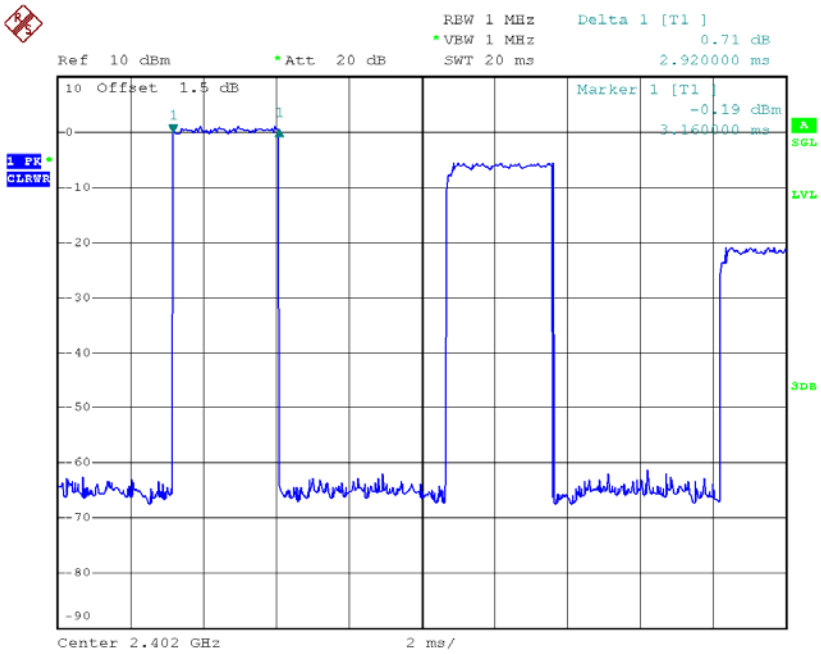
Date: 14.MAR.2018 14:35:22

CH00-DH3



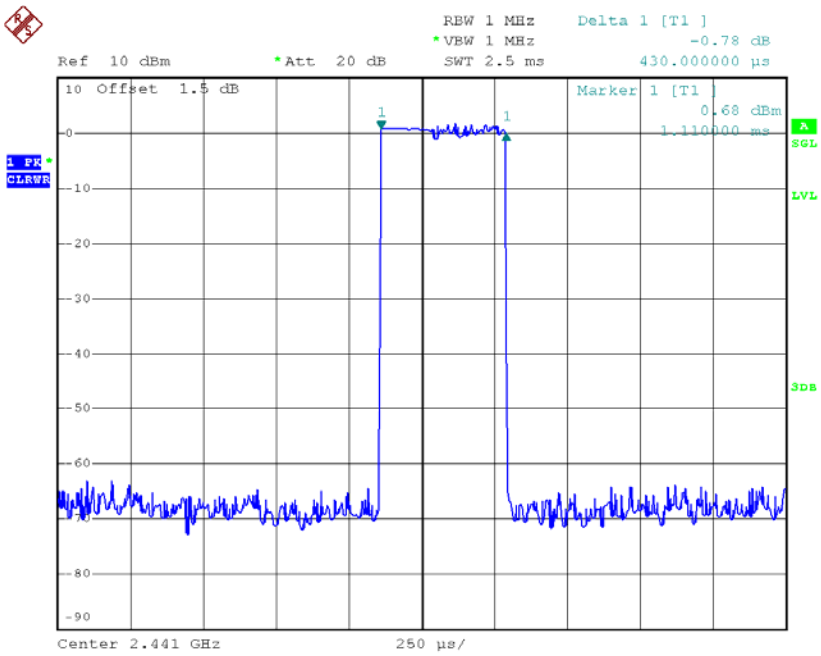
Date: 14.MAR.2018 14:45:04

CH00-DH5



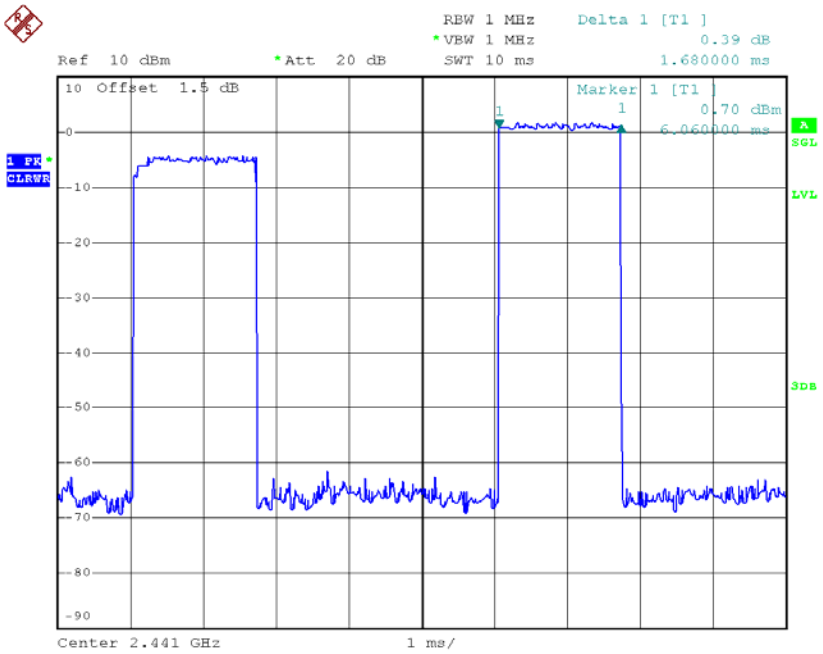
Date: 14.MAR.2018 14:46:39

CH39-DH1



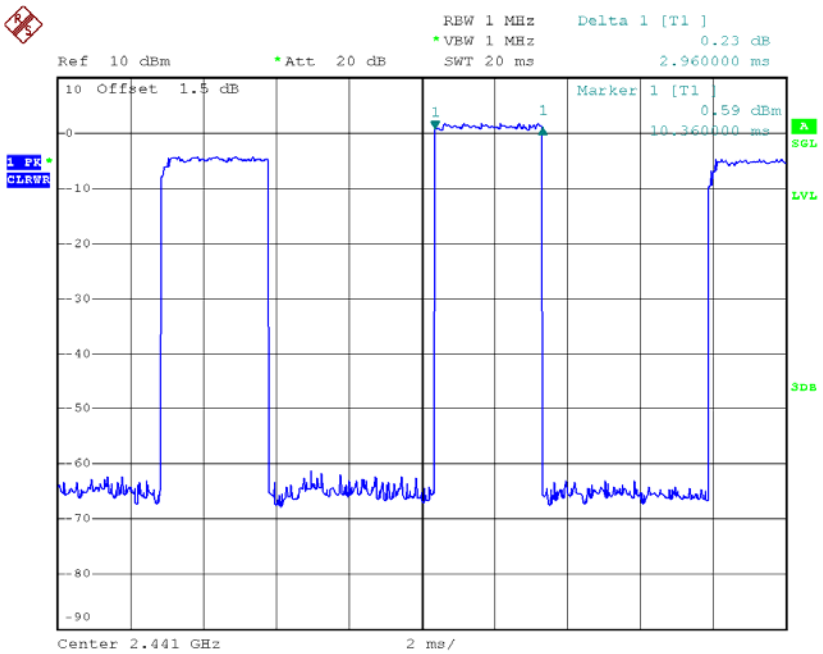
Date: 14.MAR.2018 14:35:26

CH39-DH3



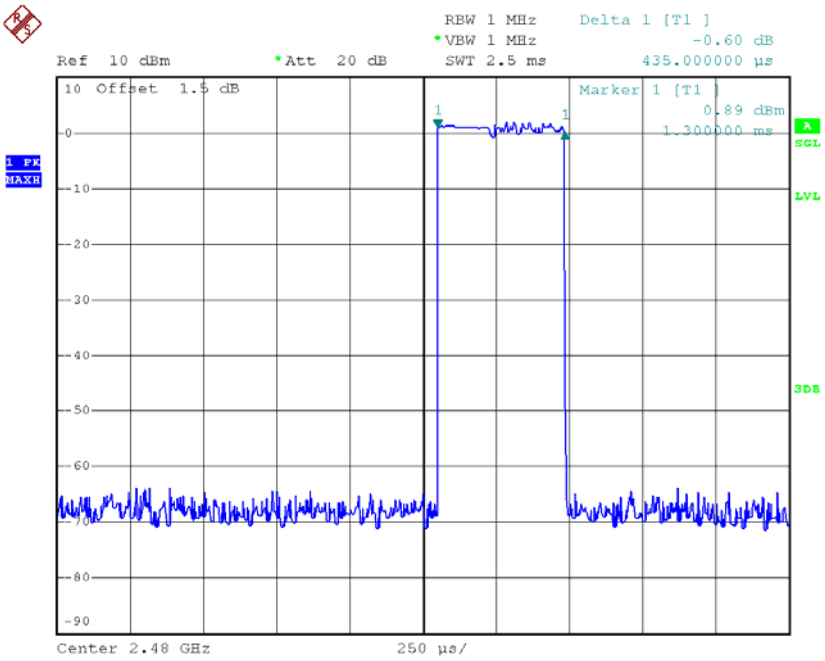
Date: 14.MAR.2018 14:46:26

CH39-DH5



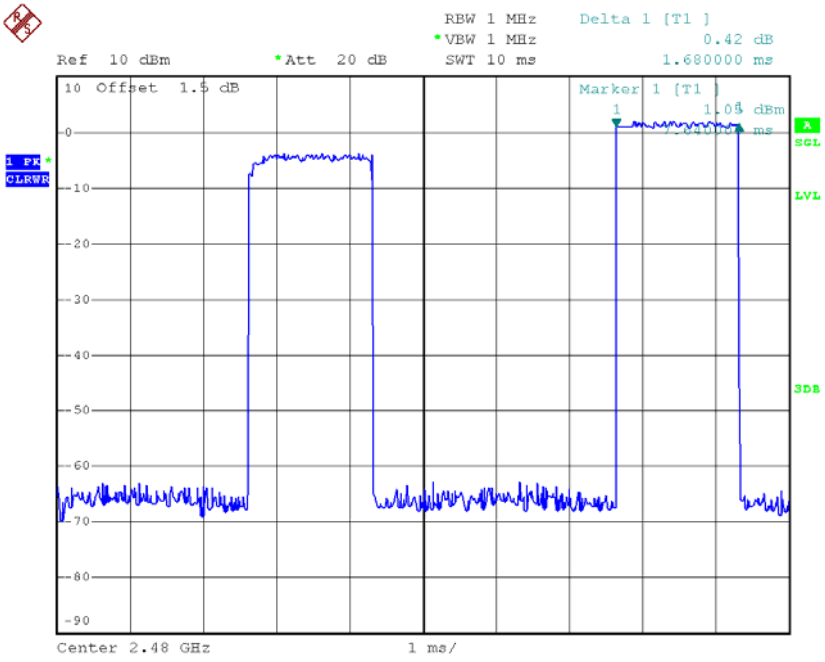
Date: 14.MAR.2018 14:47:27

CH78-DH1



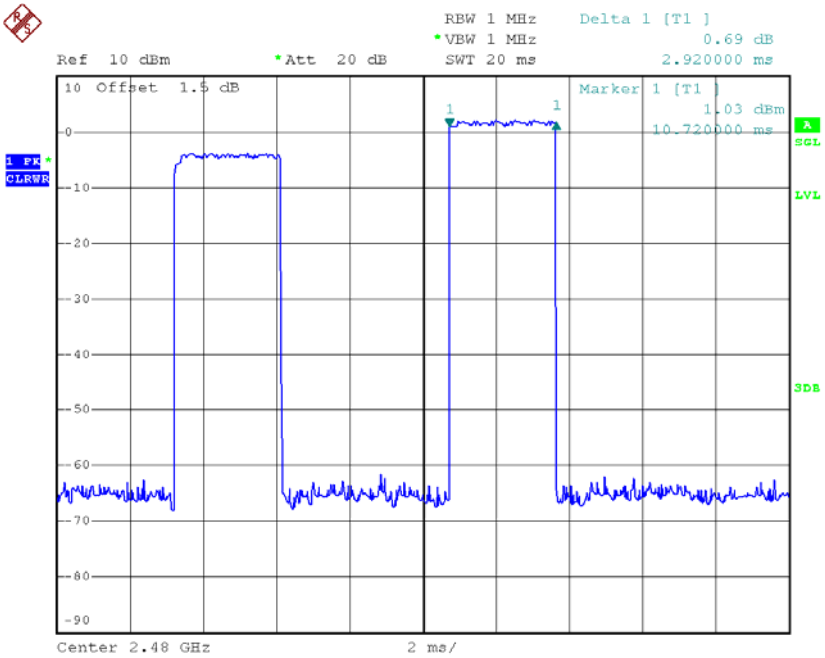
Date: 14.MAR.2018 14:35:46

CH78-DH3



Date: 14.MAR.2018 14:45:59

CH78-DH5



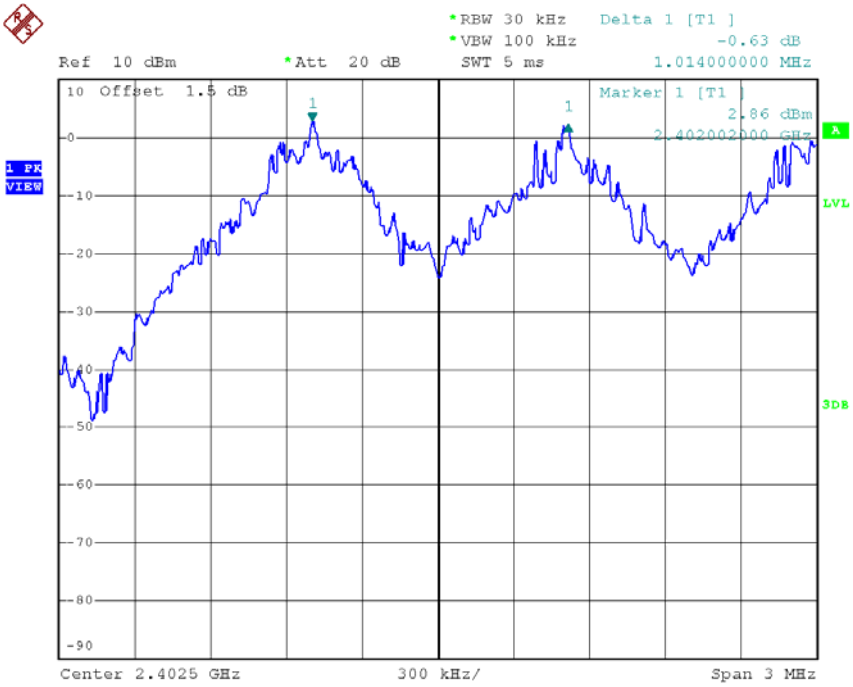
Date: 14.MAR.2018 14:46:55

APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT

Test Mode :	Hopping on _1Mbps

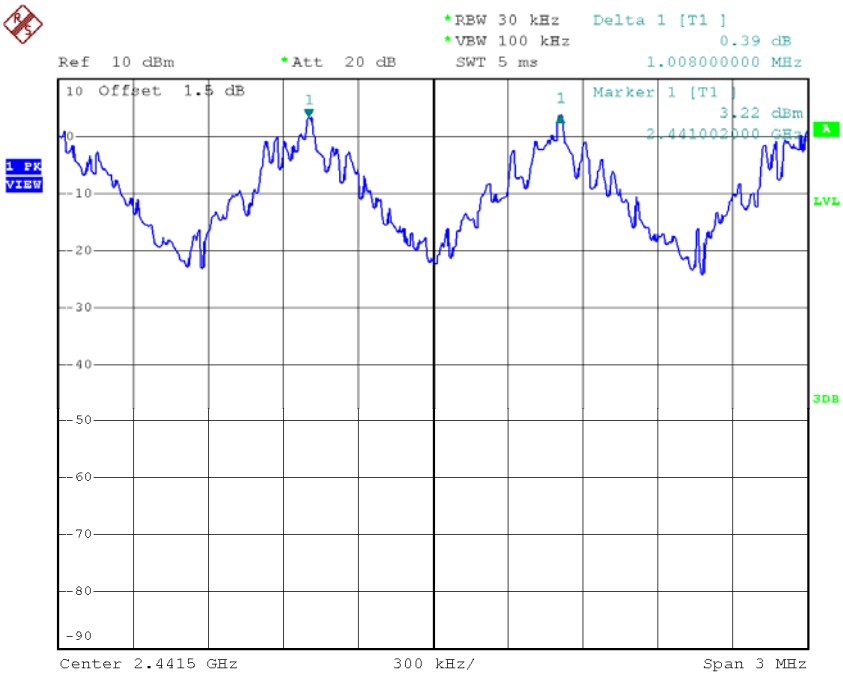
Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.014	0.637	Pass
2441	1.008	0.639	Pass
2480	1.014	0.640	Pass

CH00



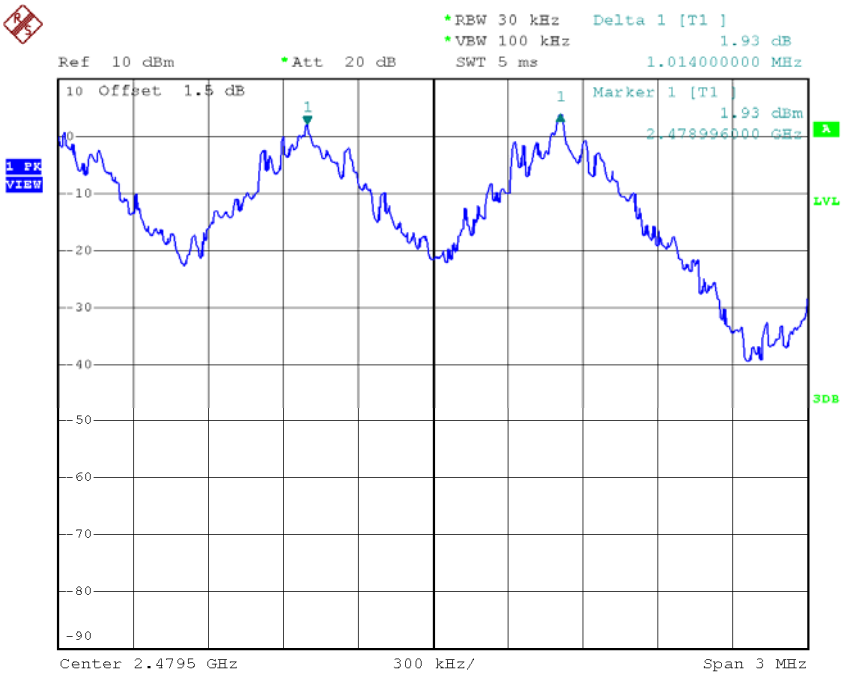
Date: 14.MAR.2018 14:12:40

CH39



Date: 14.MAR.2018 14:13:44

CH78

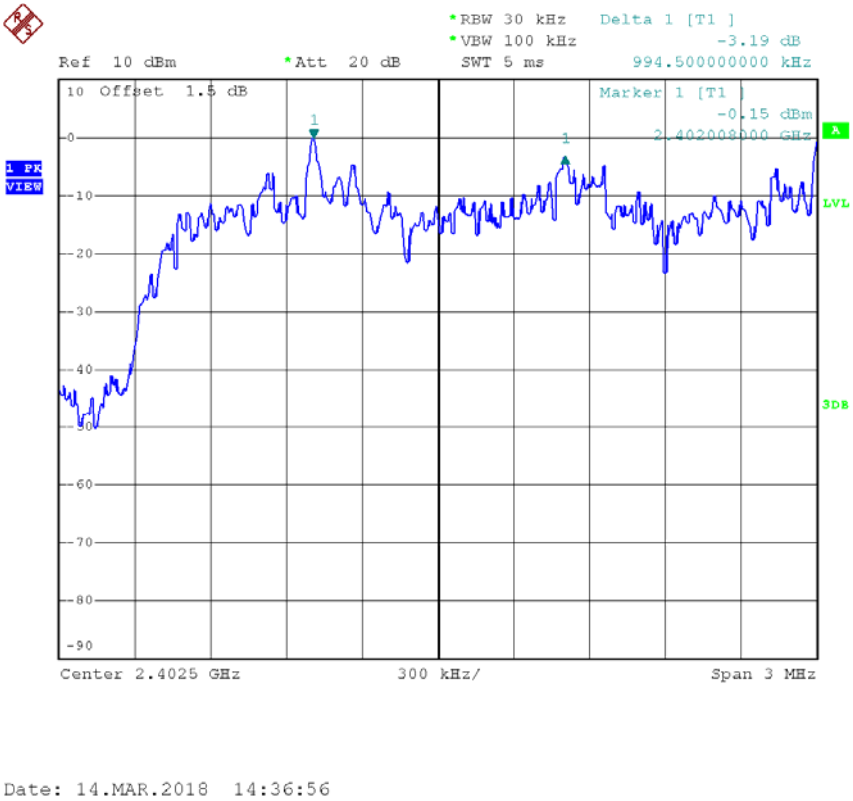


Date: 14.MAR.2018 14:14:48

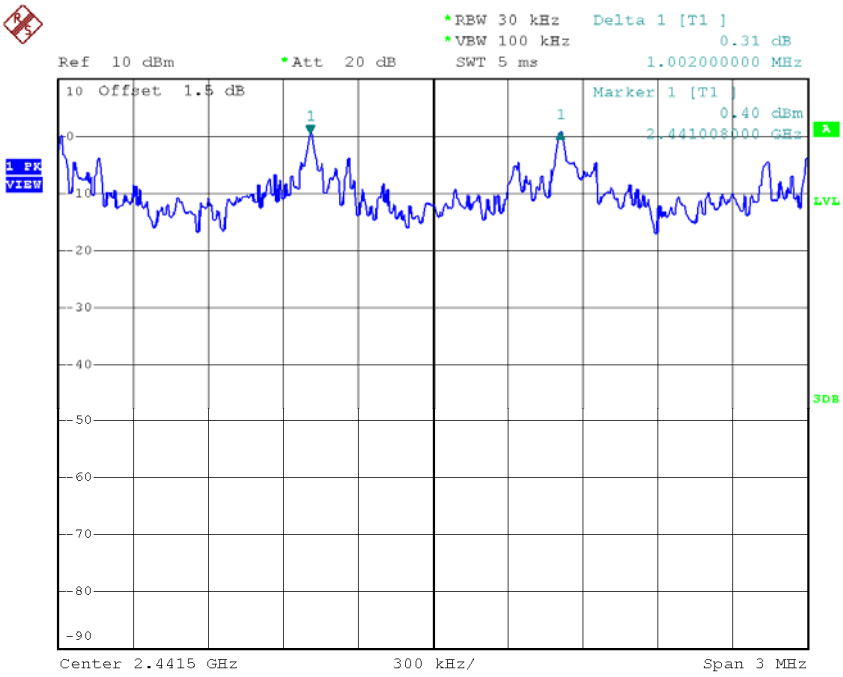
Test Mode :	Hopping on _3Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.995	0.639	Pass
2441	1.002	0.639	Pass
2480	1.002	0.641	Pass

CH00

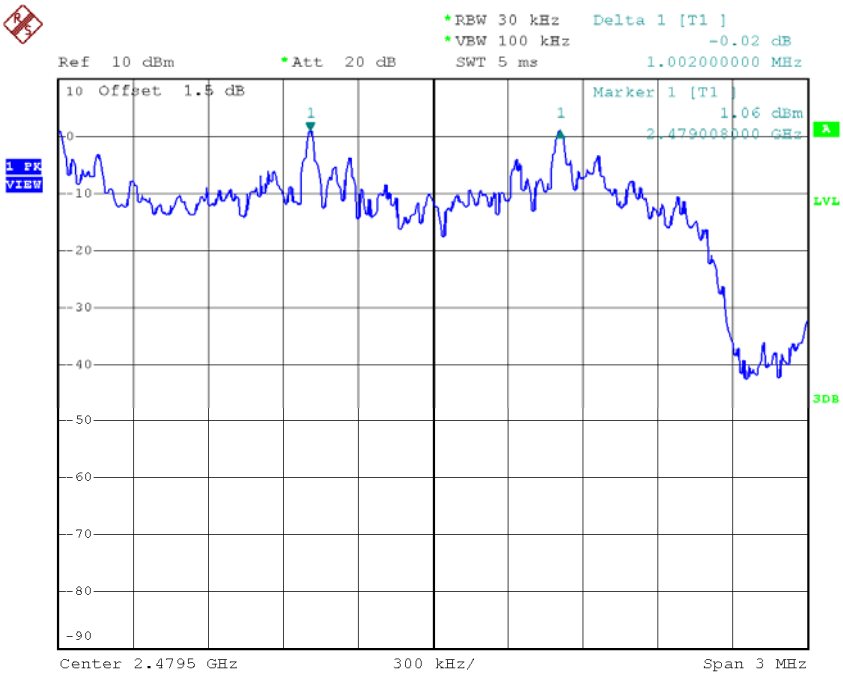


CH39



Date: 14.MAR.2018 14:38:00

CH78



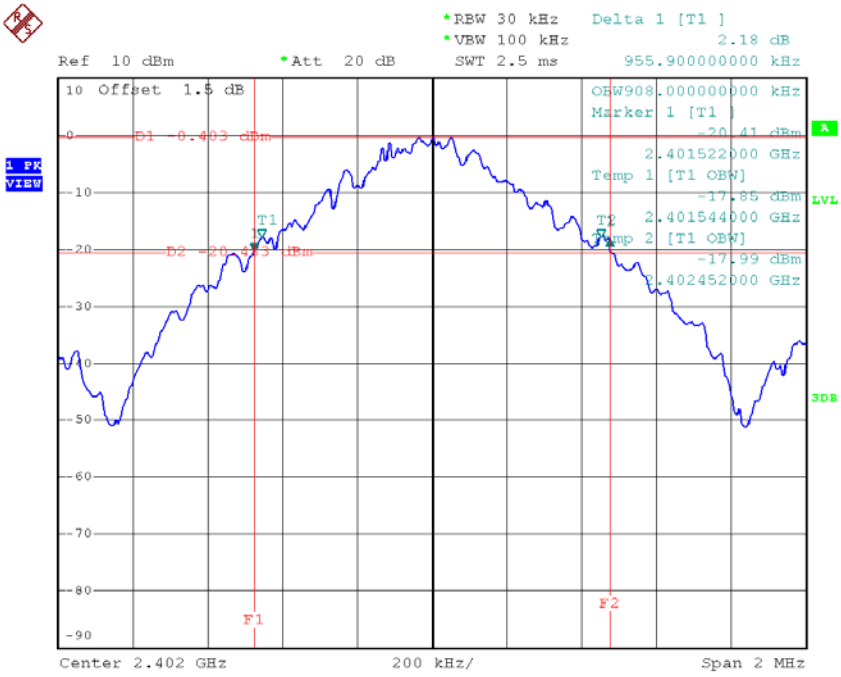
Date: 14.MAR.2018 14:39:05

APPENDIX H - BANDWIDTH

Test Mode :	TX Mode _1Mbps

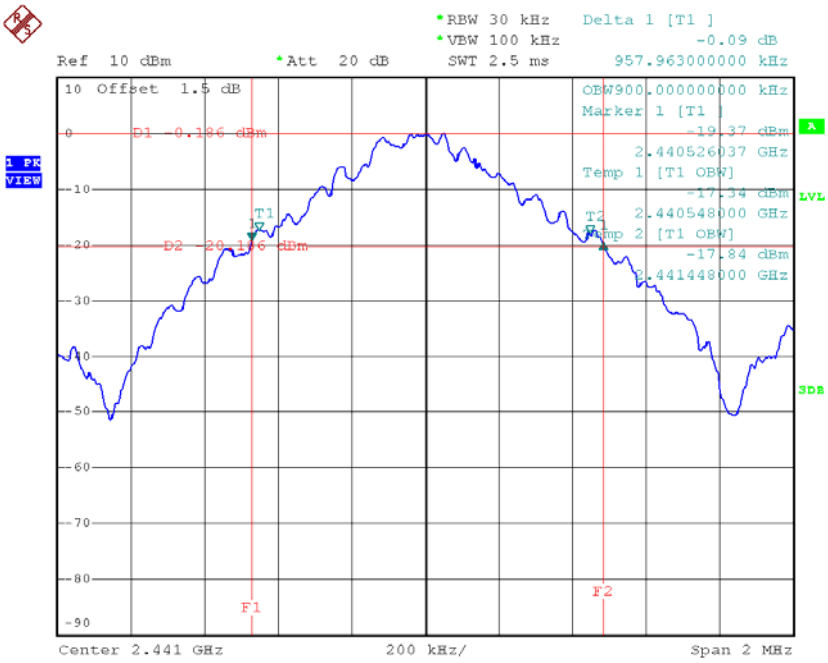
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.956	0.908	Pass
2441	0.958	0.900	Pass
2480	0.960	0.900	Pass

CH00



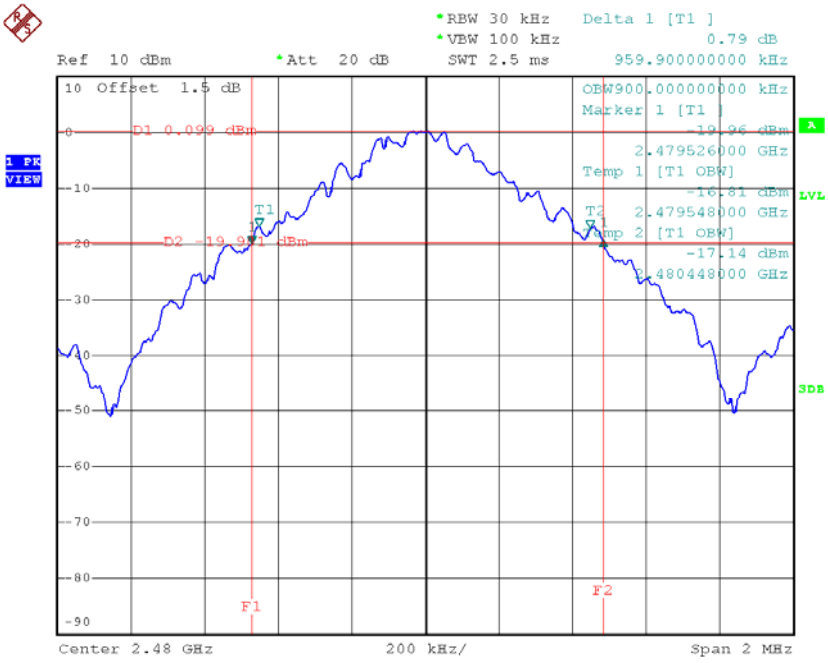
Date: 14.MAR.2018 19:57:18

CH39



Date: 14.MAR.2018 14:02:25

CH78

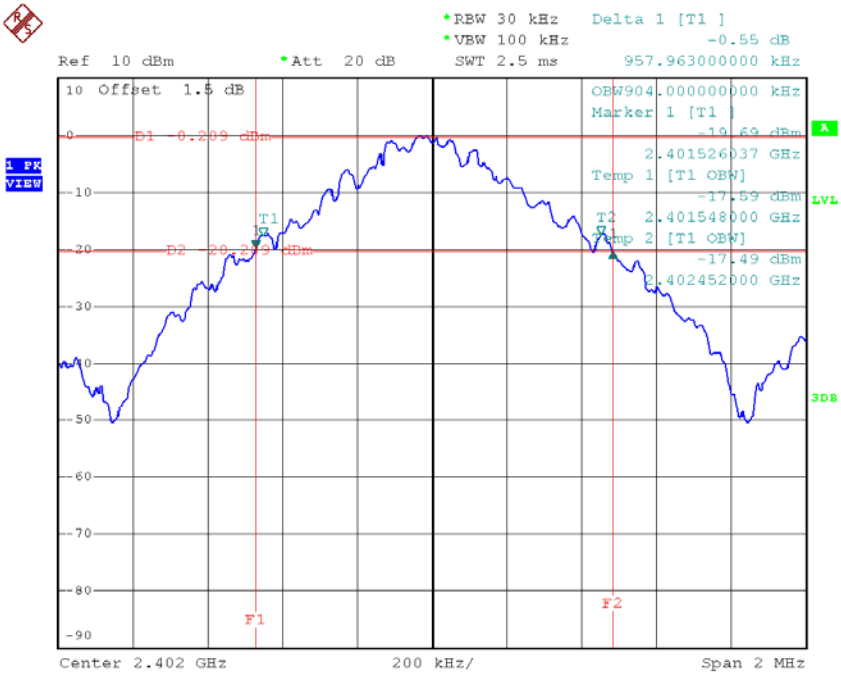


Date: 14.MAR.2018 14:08:08

Test Mode :	TX Mode _3Mbps

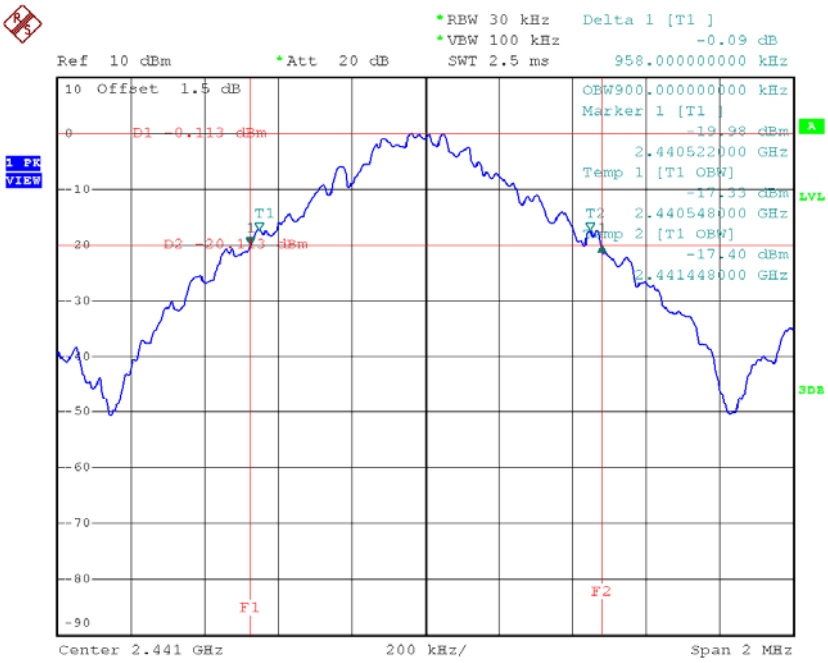
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.958	0.904	Pass
2441	0.958	0.900	Pass
2480	0.961	0.900	Pass

CH00



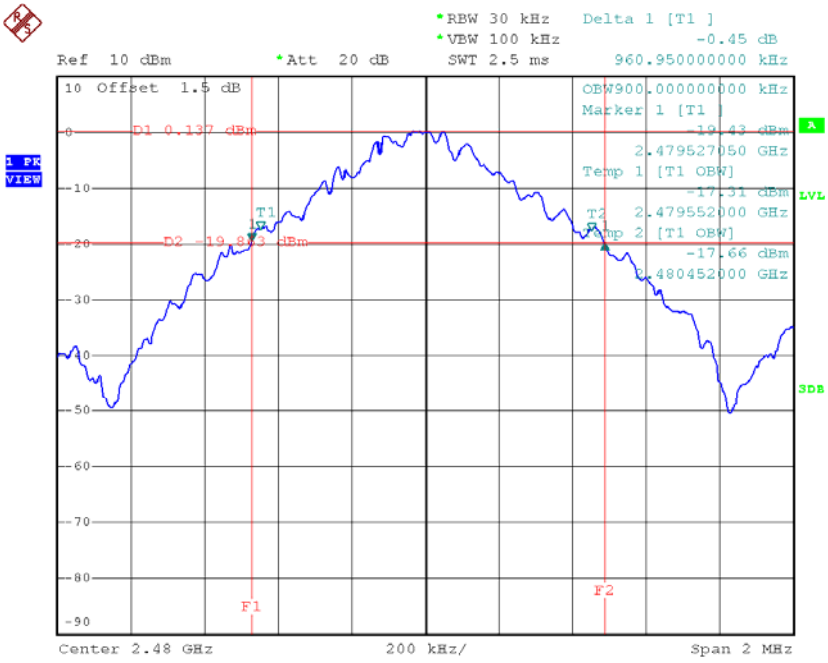
Date: 14.MAR.2018 14:26:21

CH39



Date: 14.MAR.2018 14:29:05

CH78



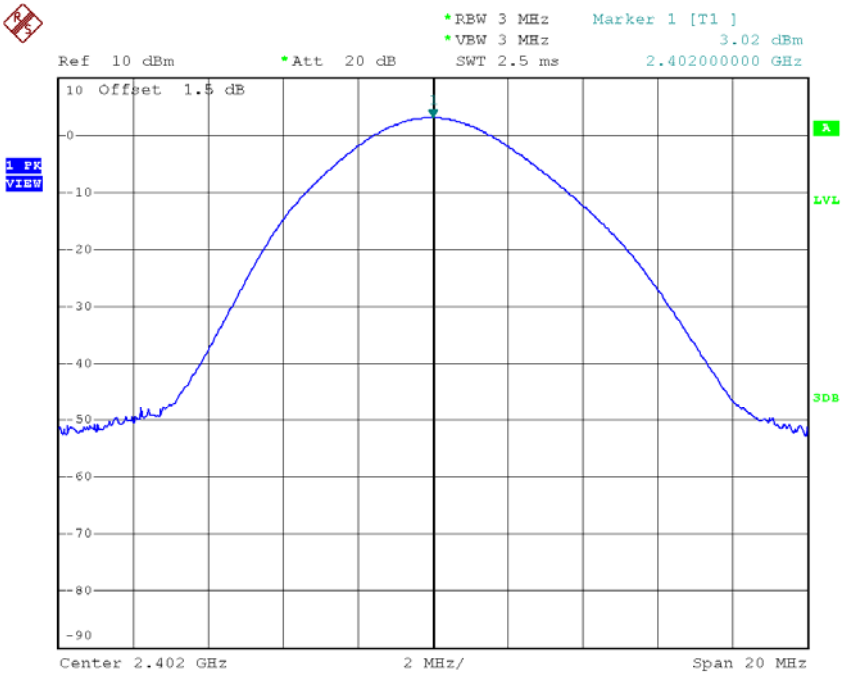
Date: 14.MAR.2018 14:29:56

APPENDIX I - PEAK OUTPUT POWER

Test Mode :	TX Mode _1Mbps

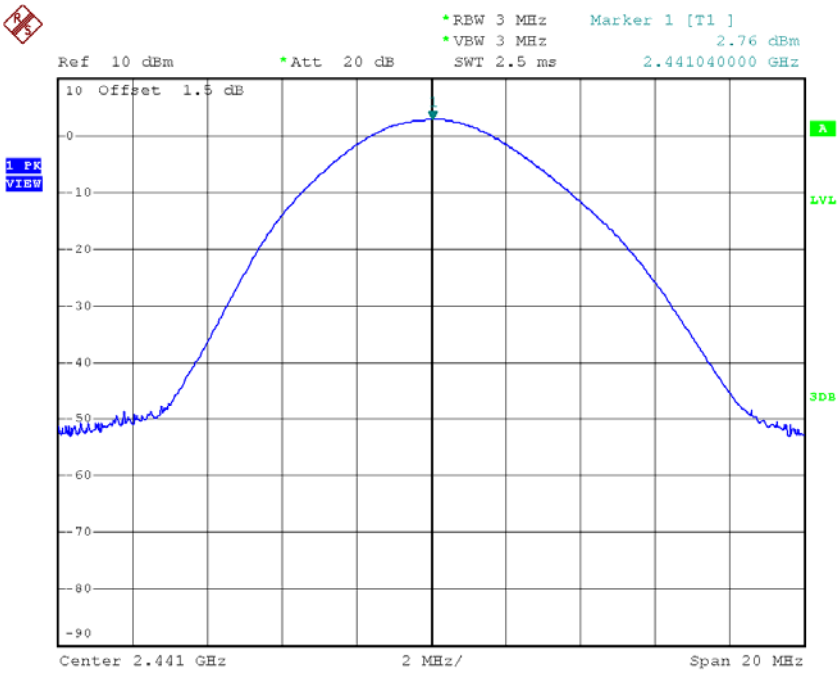
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	3.02	0.0020	30.00	1.00	Pass
2441	2.76	0.0019	30.00	1.00	Pass
2480	3.03	0.0020	30.00	1.00	Pass

CH00



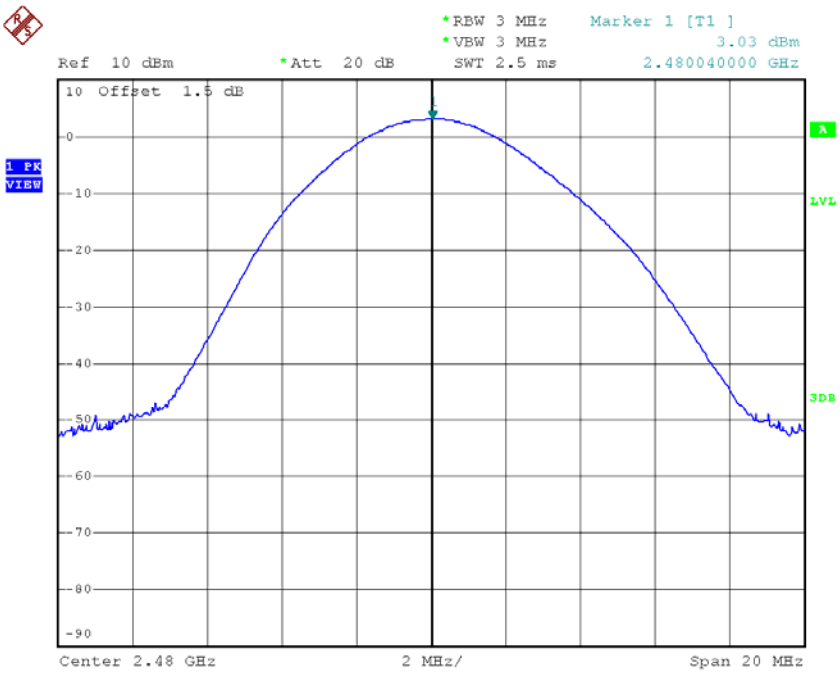
Date: 14.MAR.2018 13:49:03

CH39



Date: 14.MAR.2018 14:01:19

CH78

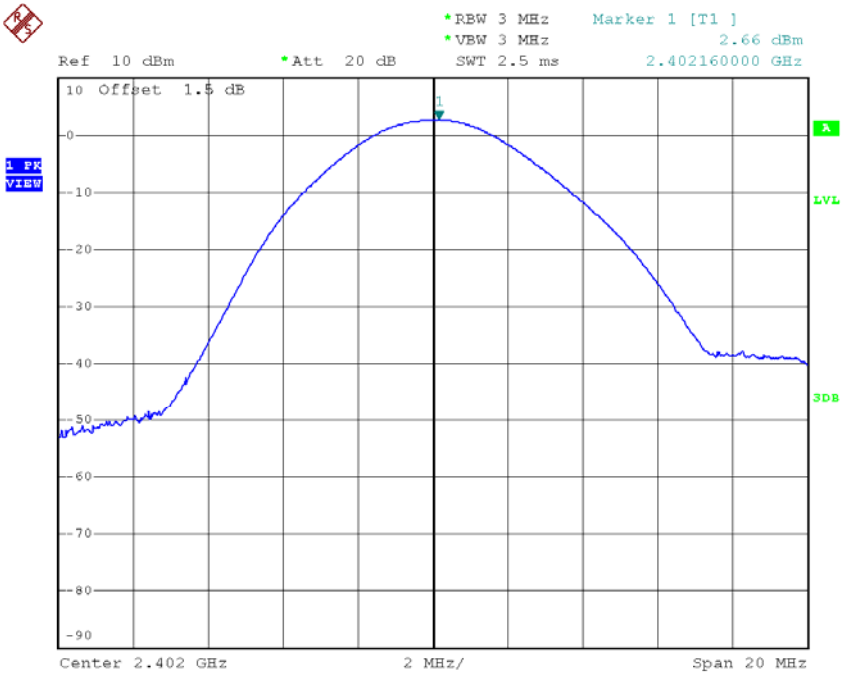


Date: 14.MAR.2018 14:07:33

Test Mode :	TX Mode _3Mbps

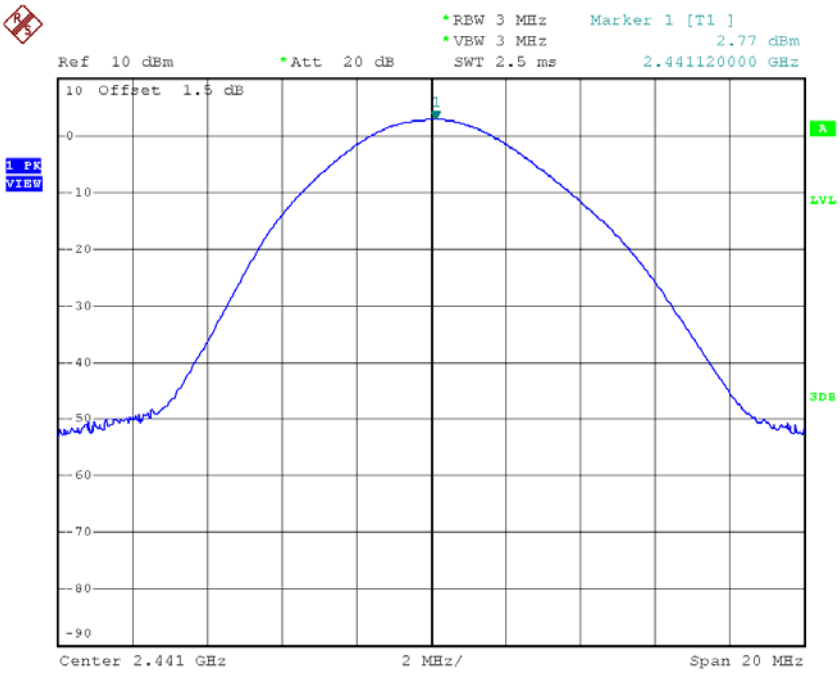
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	2.66	0.0018	30.00	1.00	Pass
2441	2.77	0.0019	30.00	1.00	Pass
2480	3.08	0.0020	30.00	1.00	Pass

CH00



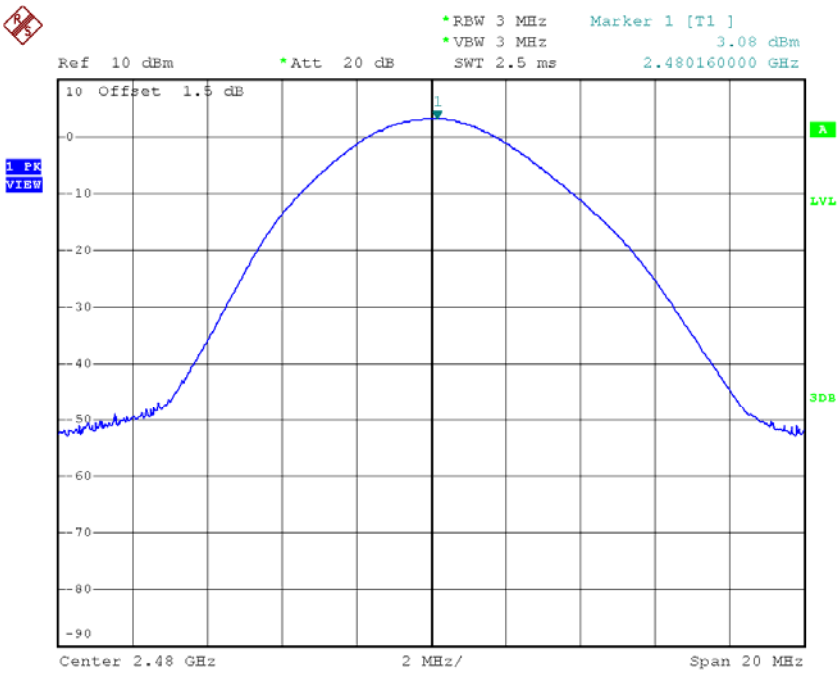
Date: 14.MAR.2018 14:25:45

CH39



Date: 14.MAR.2018 14:28:00

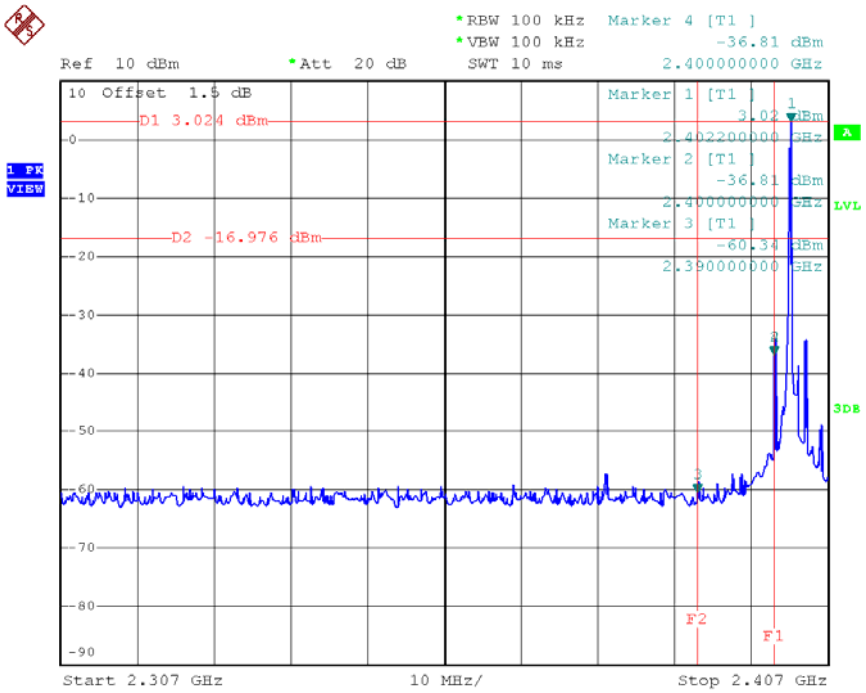
CH78



Date: 14.MAR.2018 14:29:23

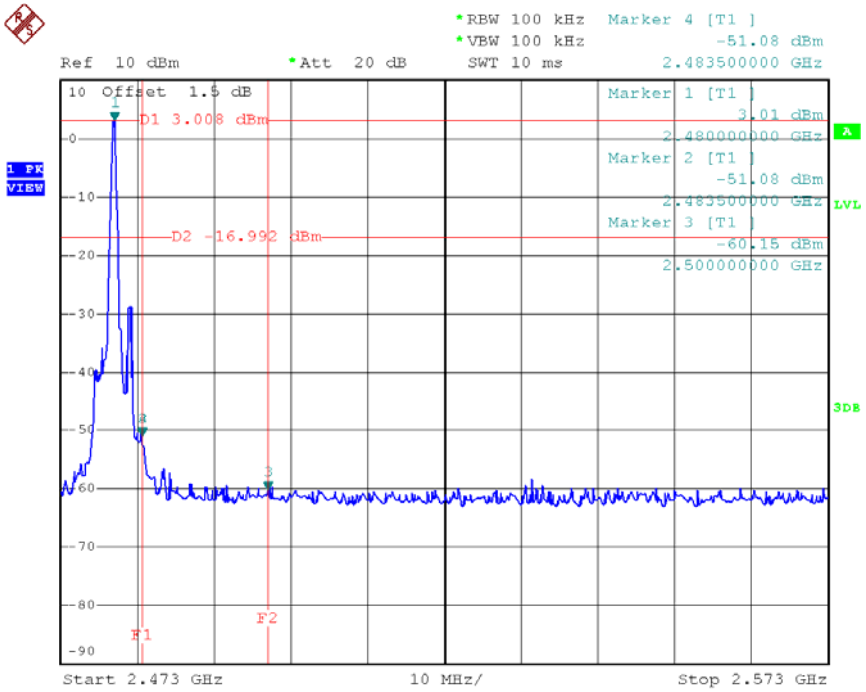
APPENDIX J - ANTENNA CONDUCTED SPURIOUS EMISSION

CH00 (Lower)_1Mbps



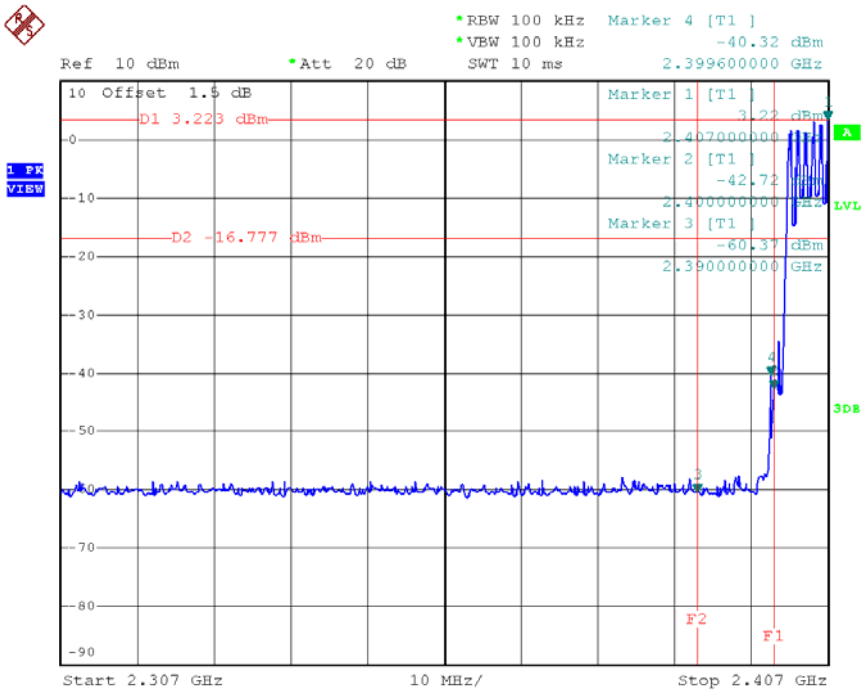
Date: 14.MAR.2018 13:49:12

CH78 (Upper) _1Mbps



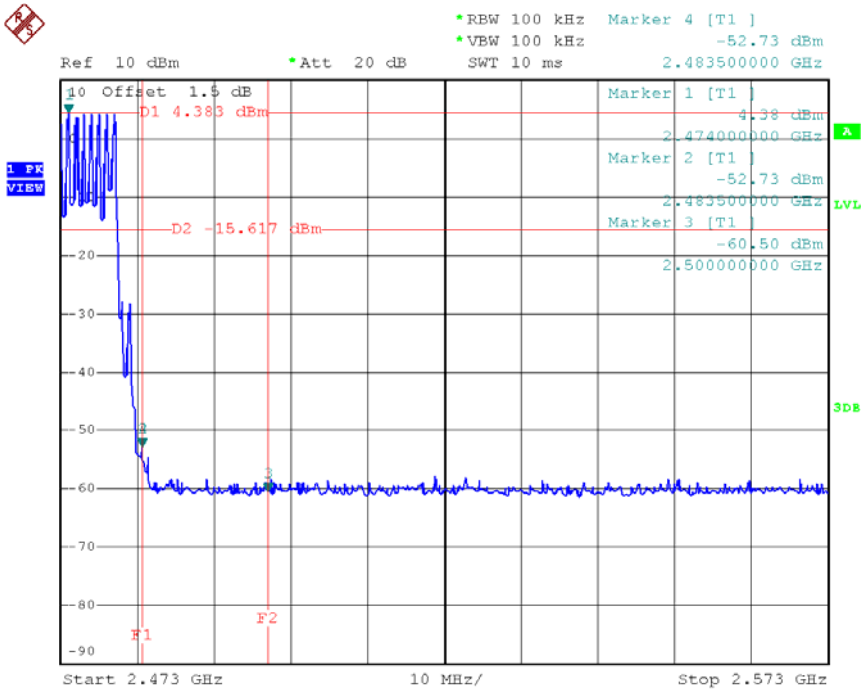
Date: 14.MAR.2018 14:07:41

CH00 Hopping on mode (Lower)_1Mbps



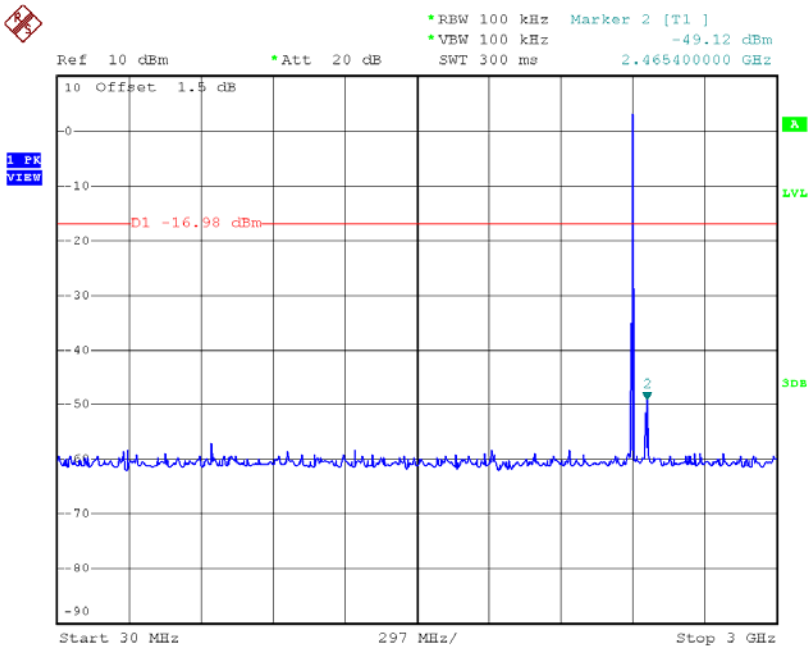
Date: 14.MAR.2018 14:17:12

CH78 Hopping on mode (Upper) _1Mbps

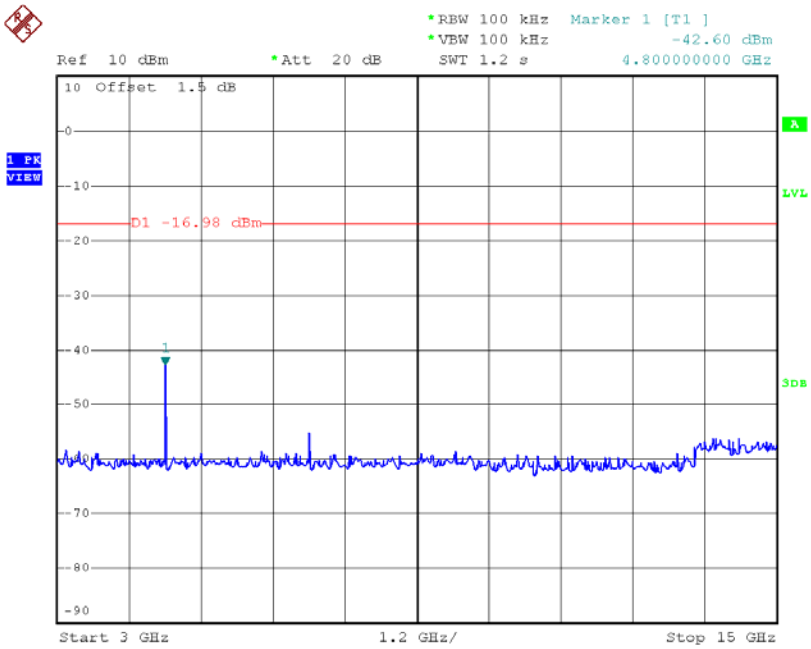


Date: 14.MAR.2018 14:17:47

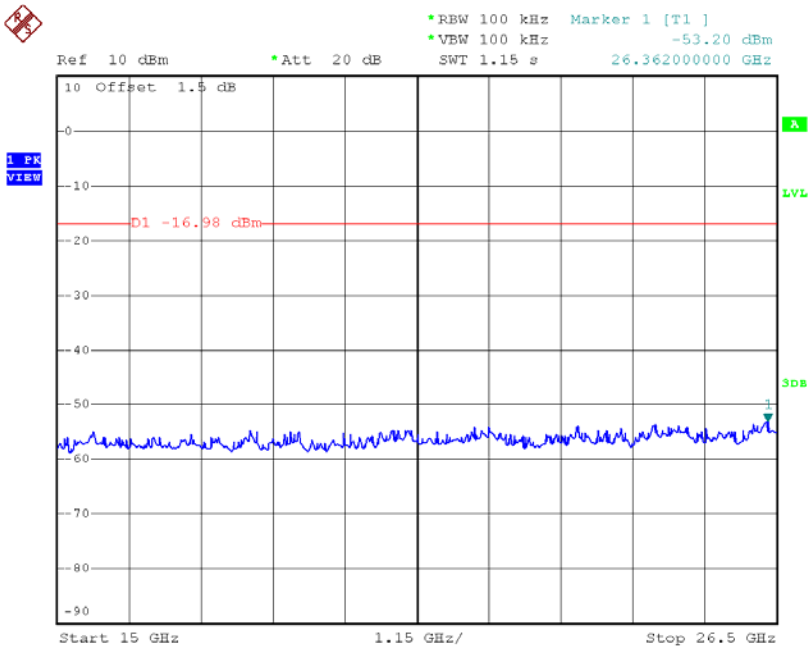
CH00 (10 Harmonic of the frequency) _1Mbps



Date: 14.MAR.2018 13:50:13

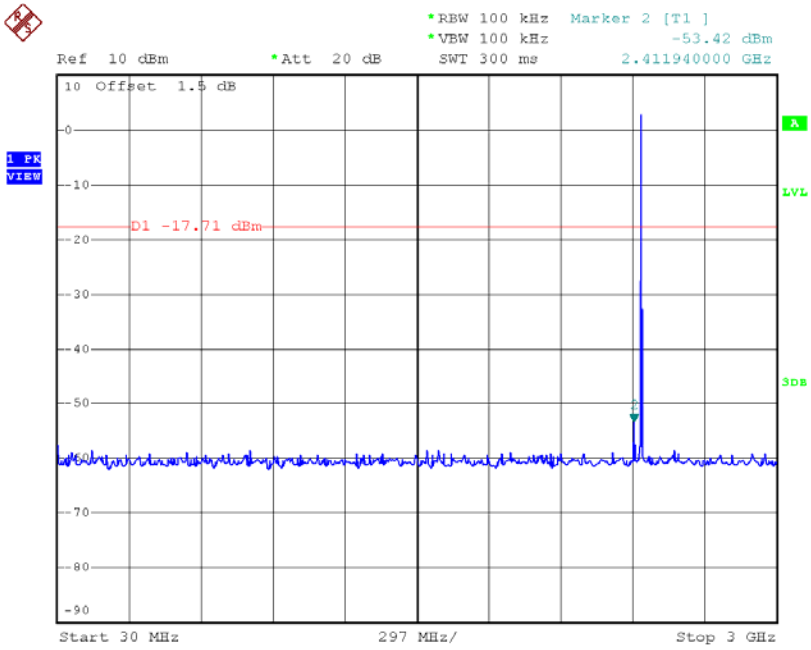


Date: 14.MAR.2018 13:50:21

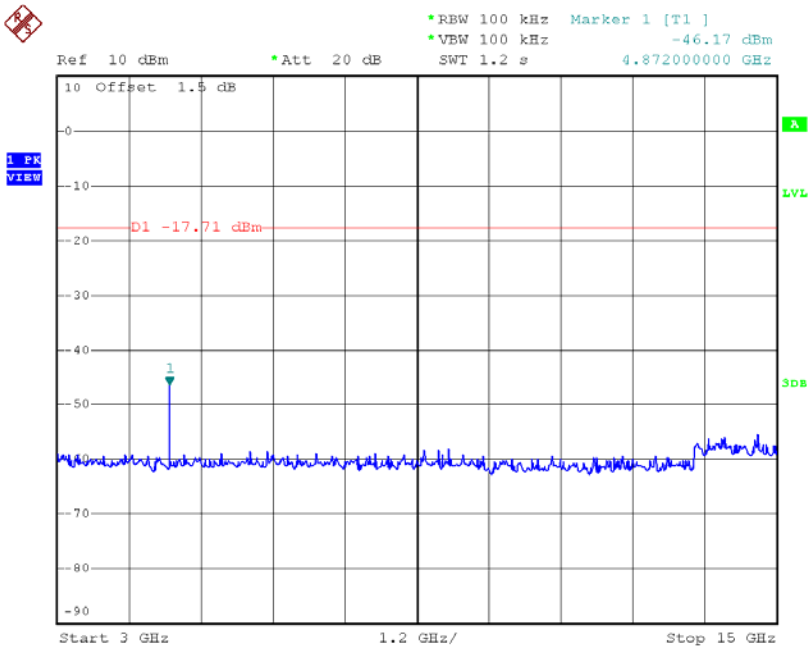


Date: 14.MAR.2018 13:50:30

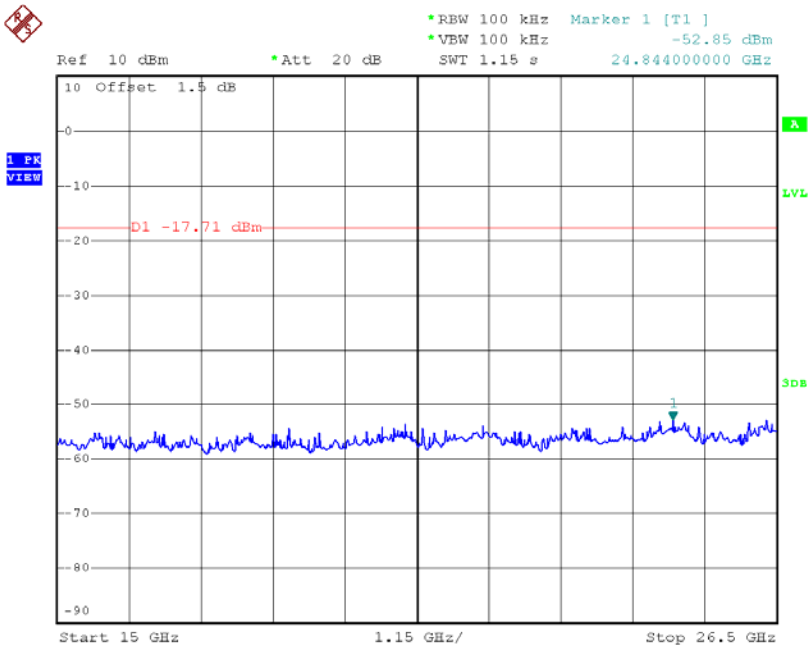
CH39 (10 Harmonic of the frequency) _1Mbps



Date: 14.MAR.2018 14:01:41

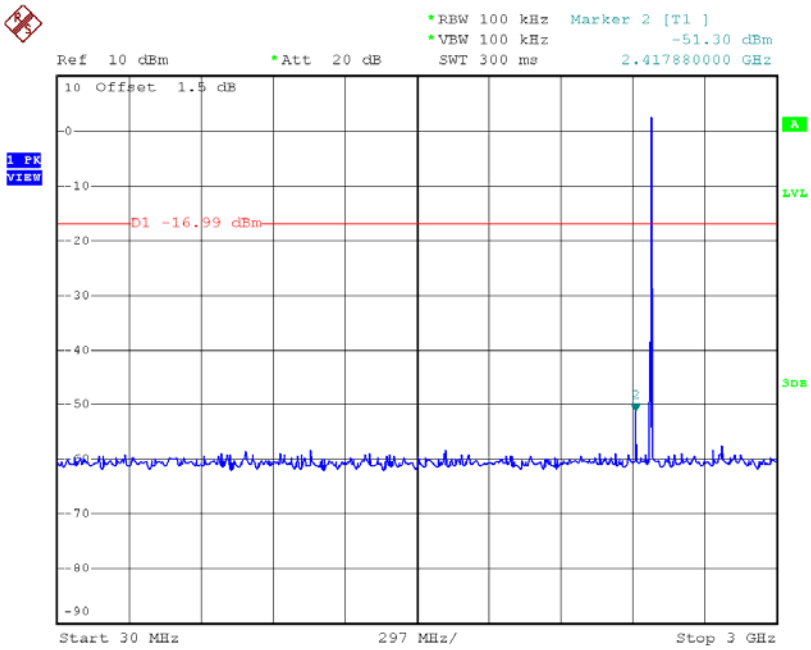


Date: 14.MAR.2018 14:01:49

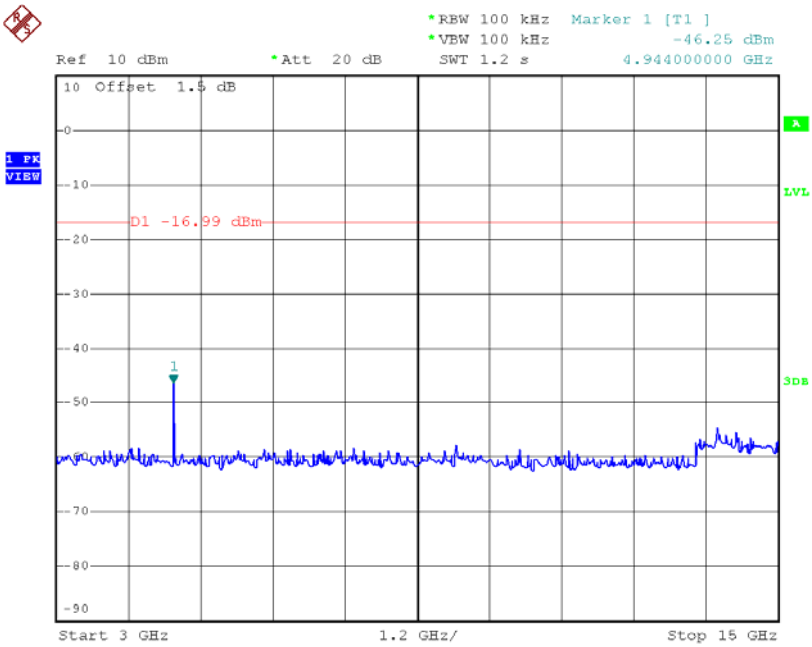


Date: 14.MAR.2018 14:01:58

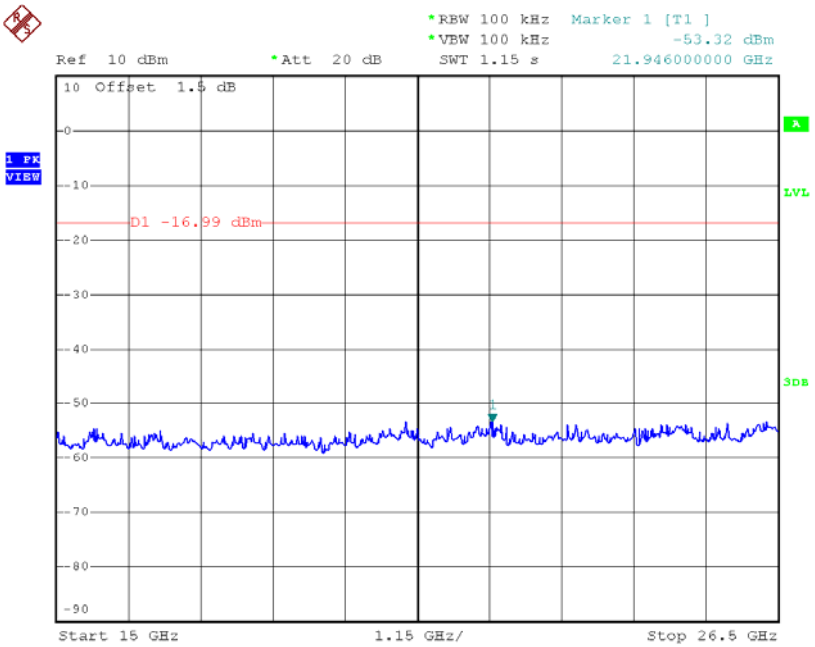
CH78 (10 Harmonic of the frequency) _1Mbps



Date: 14.MAR.2018 14:08:22

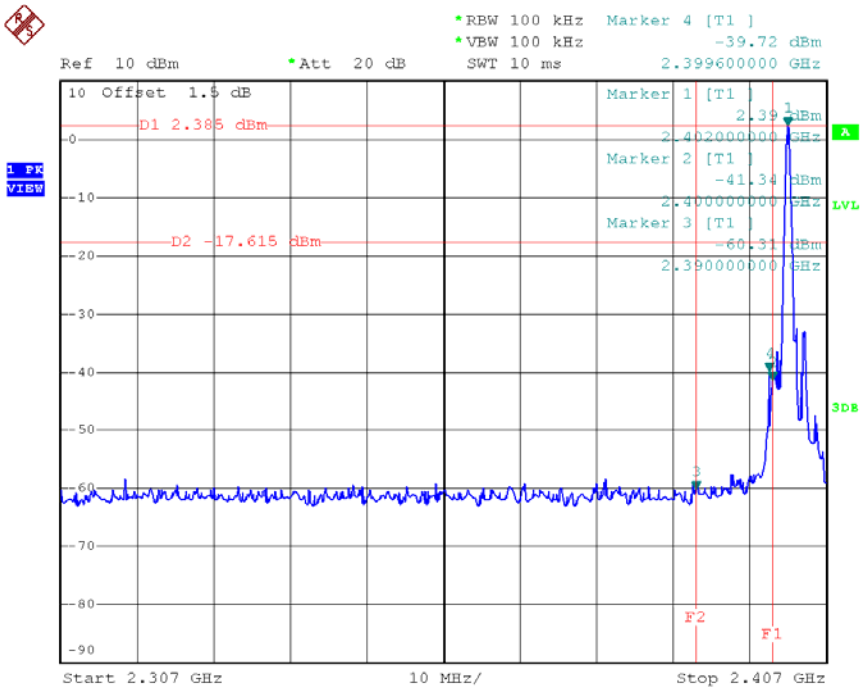


Date: 14.MAR.2018 14:08:30



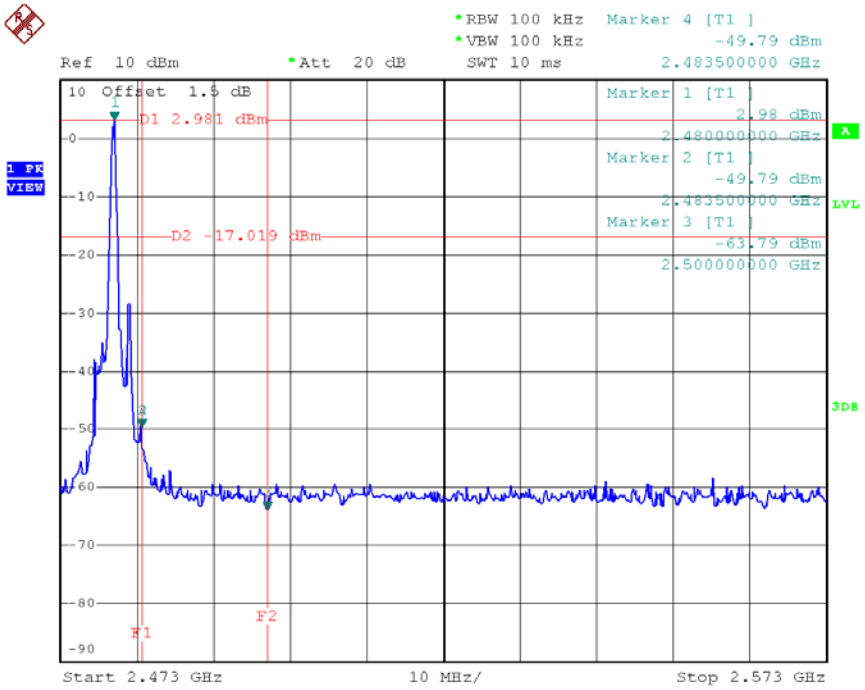
Date: 14.MAR.2018 14:08:39

CH00 (Lower) _3Mbps



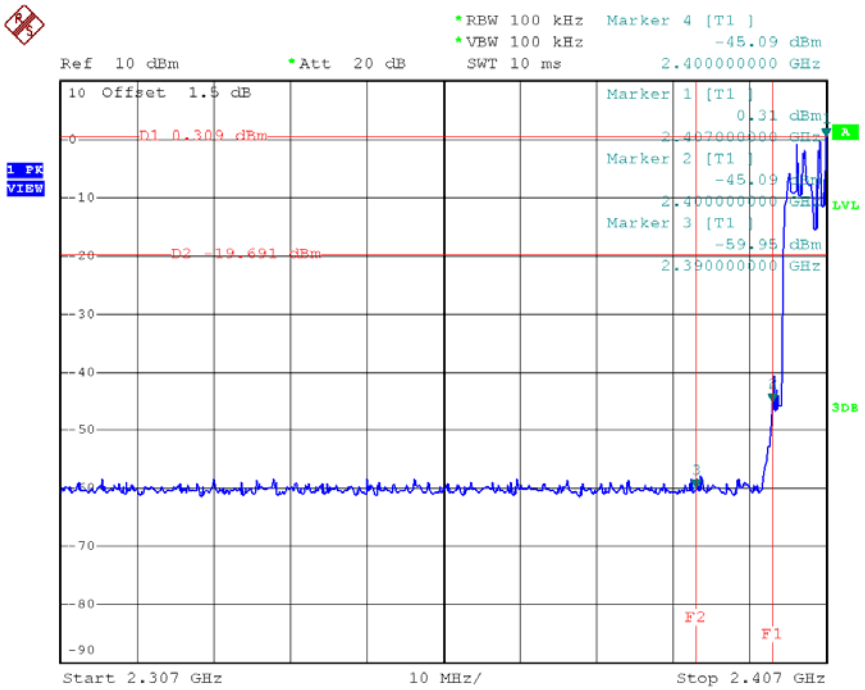
Date: 14.MAR.2018 14:25:53

CH78 (Upper) _3Mbps



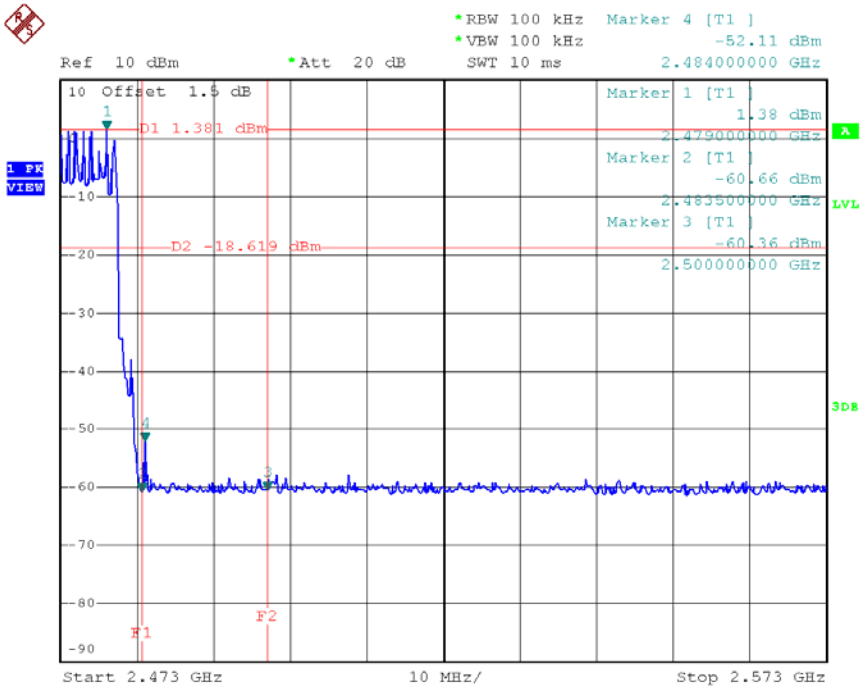
Date: 14.MAR.2018 14:29:31

CH00 Hopping on mode (Lower)_3Mbps



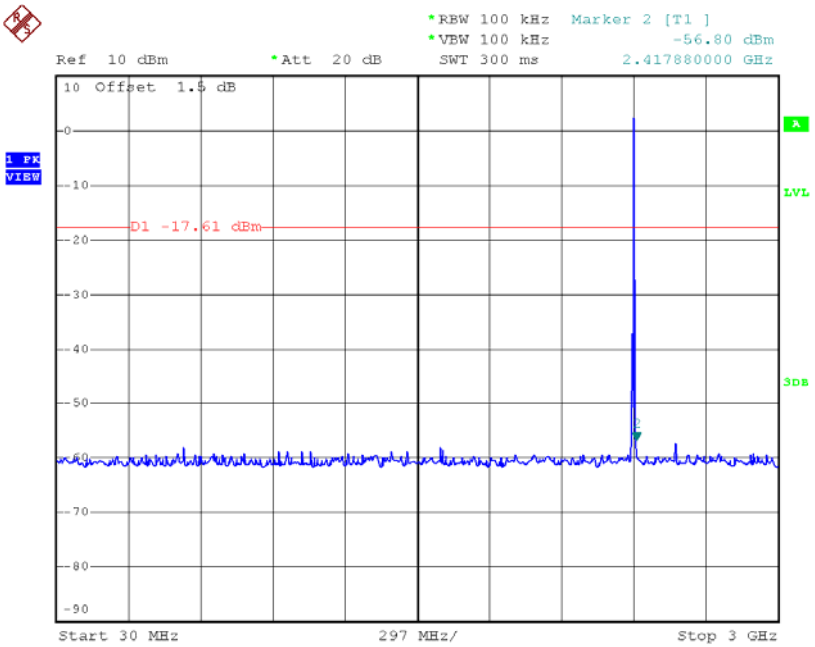
Date: 14.MAR.2018 14:41:29

CH78 Hopping on mode (Upper) _3Mbps

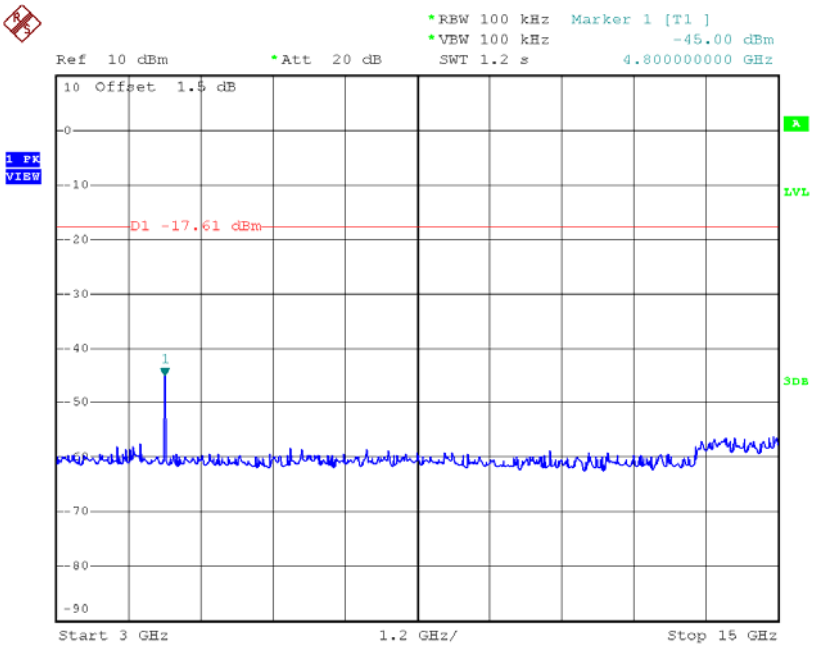


Date: 14.MAR.2018 14:42:04

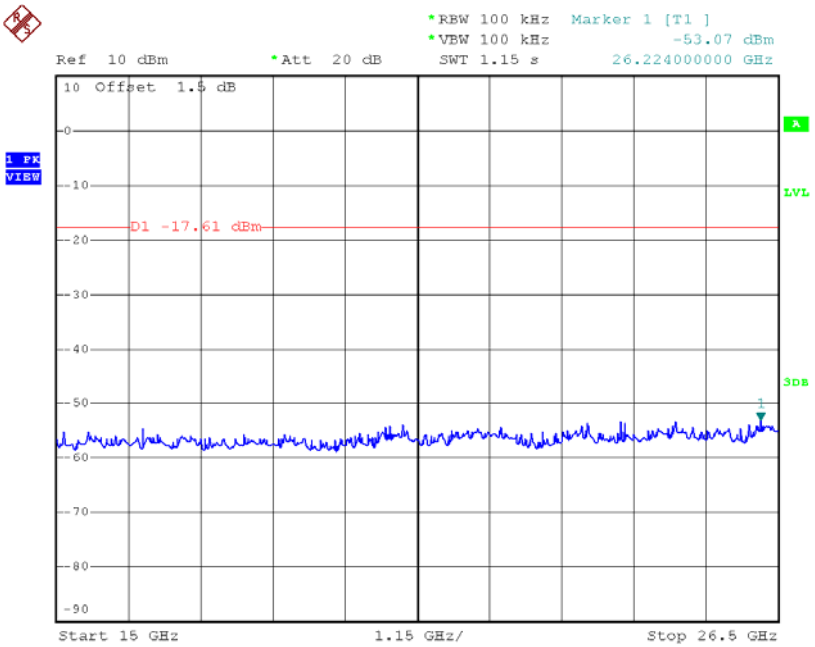
CH00 (10 Harmonic of the frequency) _3Mbps



Date: 14.MAR.2018 14:26:35

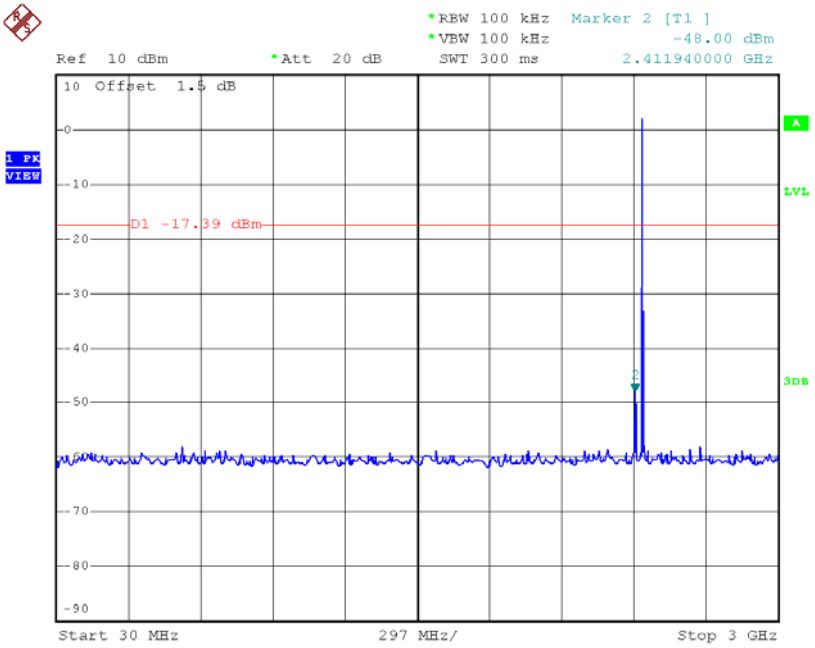


Date: 14.MAR.2018 14:26:44

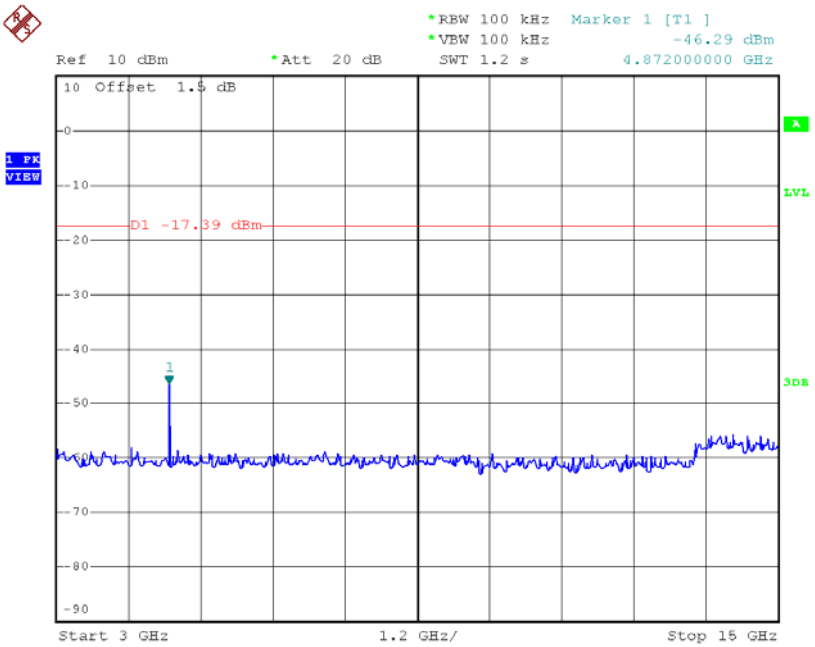


Date: 14.MAR.2018 14:26:52

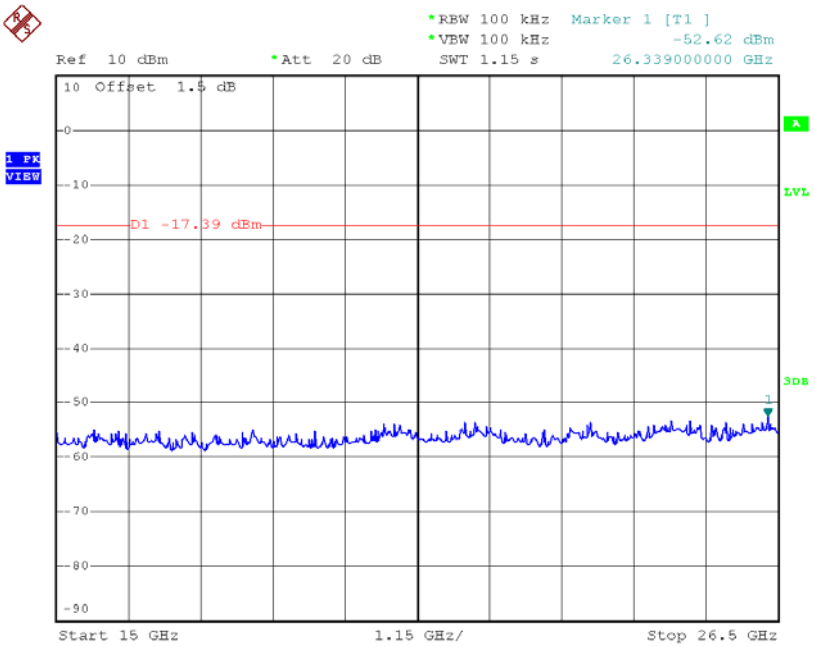
CH39 (10 Harmonic of the frequency) _3Mbps



Date: 14.MAR.2018 14:28:22

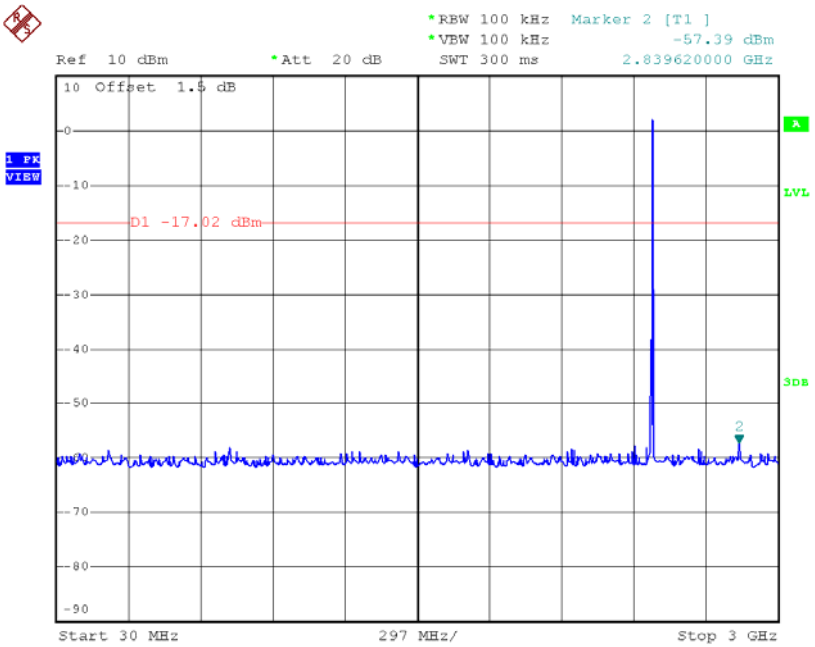


Date: 14.MAR.2018 14:28:30

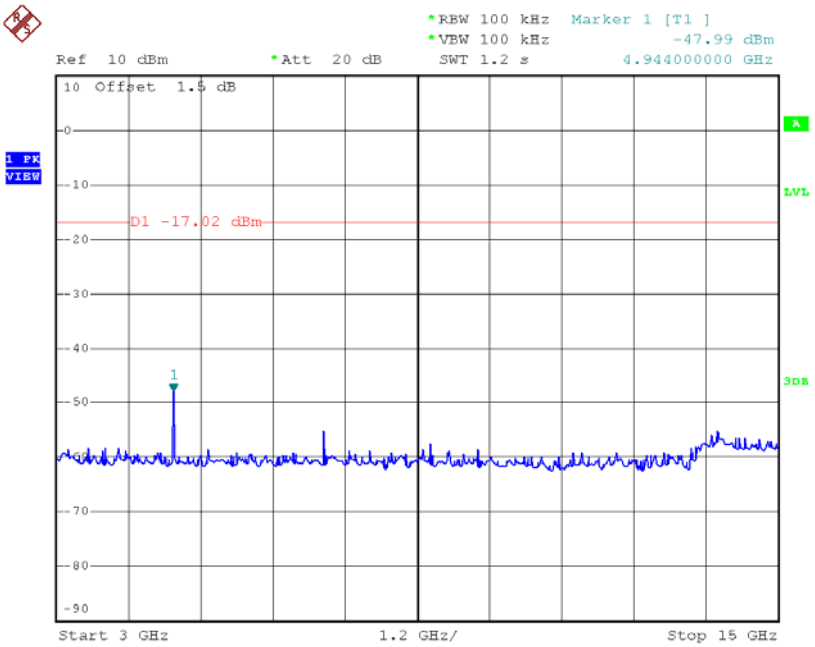


Date: 14.MAR.2018 14:28:38

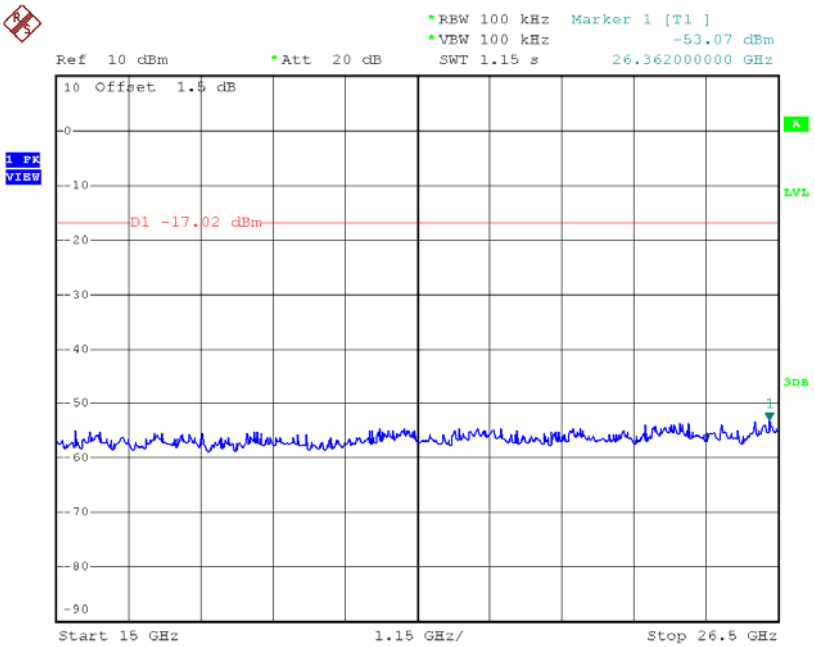
CH78 (10 Harmonic of the frequency) _3Mbps



Date: 14.MAR.2018 14:30:10



Date: 14.MAR.2018 14:30:19



Date: 14.MAR.2018 14:30:27