FCC Radio Test Report

FCC ID: QWHLIVEMINI

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

Project No.	:	1711C027
Equipment	:	Portable Speaker
Test Model	:	LIVE MINI
Series Model	:	N/A
Applicant	:	MUSIC Group Manufacturing PH Ltd.
Address	:	17A Brunswick Street Hamilton HM 10 Bermuda

Date of Receipt	:	Nov. 06, 2017
Date of Test	:	Nov. 06, 2017 ~ Dec. 08, 2017
Issued Date	:	Dec. 11, 2017
Tested by	:	BTL Inc.

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NVLAP Lab Code: 200788-0

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1711C027	Original Issue.	Dec. 11, 2017

1. CERTIFICATION

Equipment	:	Portable Speaker
Brand Name	:	TANNOY
Test Model	:	LIVE MINI
Series Model		N/A
Applicant	:	MUSIC Group Manufacturing PH Ltd.
Manufacturer	:	MUSIC Group Manufacturing PH Ltd.
Address	:	17A Brunswick Street Hamilton HM 10 Bermuda
Factory	:	Zhongshan Eurotec Electronics Ltd.
Address	:	No.10 Wanmei Road, South China Modern Chinese Medicine Park, Nanlang Town, Zhongshan City, Guangdong Province, P.R. China
Date of Test	:	Nov. 06, 2017 ~ Dec. 08, 2017
Test Sample	:	Engineering Sample
Standard(s)	:	FCC Part15, Subpart C (15.247)/ ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1711C027) 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

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

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

A. Conducted Measurement :

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

B. Radiated Measurement :

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

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	Portable Speaker	
Brand Name	TANNOY	
Test Model	LIVE MINI	
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.	-2.50 dBm(1Mbps) -3.31 dBm(3Mbps)
Power Source	DC Voltage supplied from AC/DC adapter. #1 Model: GPE018A-050200-Z #2 Model: S018BAM0500200	
Power Rating	#1 I:P: 100-240V~50/60Hz 0.5A O/P:5.0V⎓2000mA #2 I:P: 100-240V~50/60Hz 500mA O/P:5.0V⎓2000mA	

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	TANNOY	N/A	PCB	N/A	1.5

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.

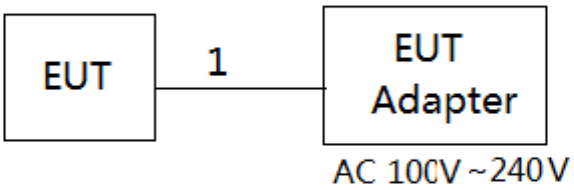
(2) The measurements for Hopping Channel Separation, Bandwidth and Peak Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

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			
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	60	60	60
Parameters(3Mbps)	60	60	60

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

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

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

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	N/A	1.5m	AC Cable

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

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

Frequency of Emission (MHz)	Conducted Limit (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

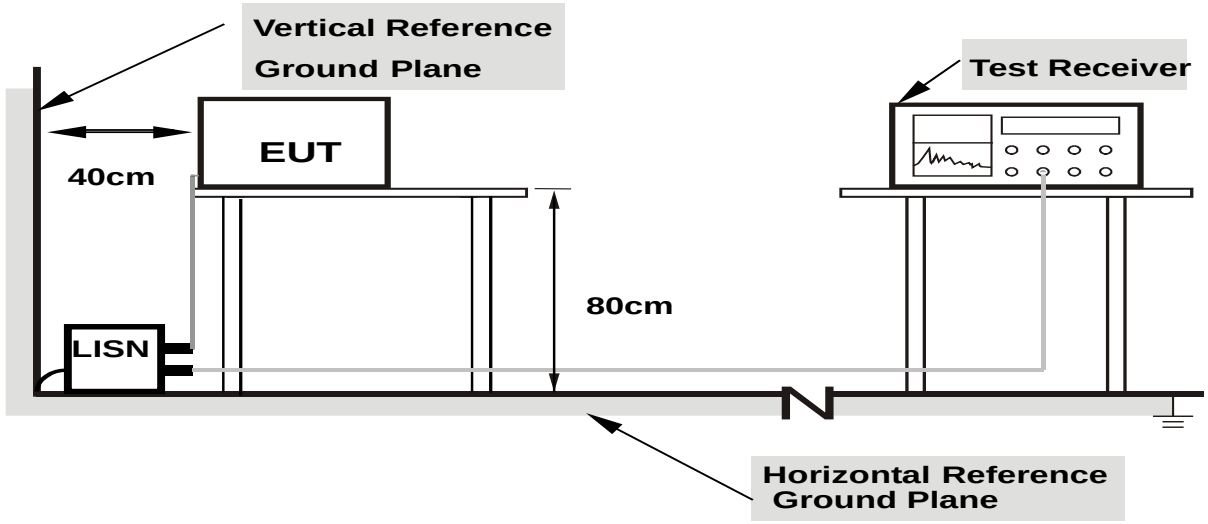
4.1.2 TEST PROCEDURE

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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

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

4.2.2 TEST PROCEDURE

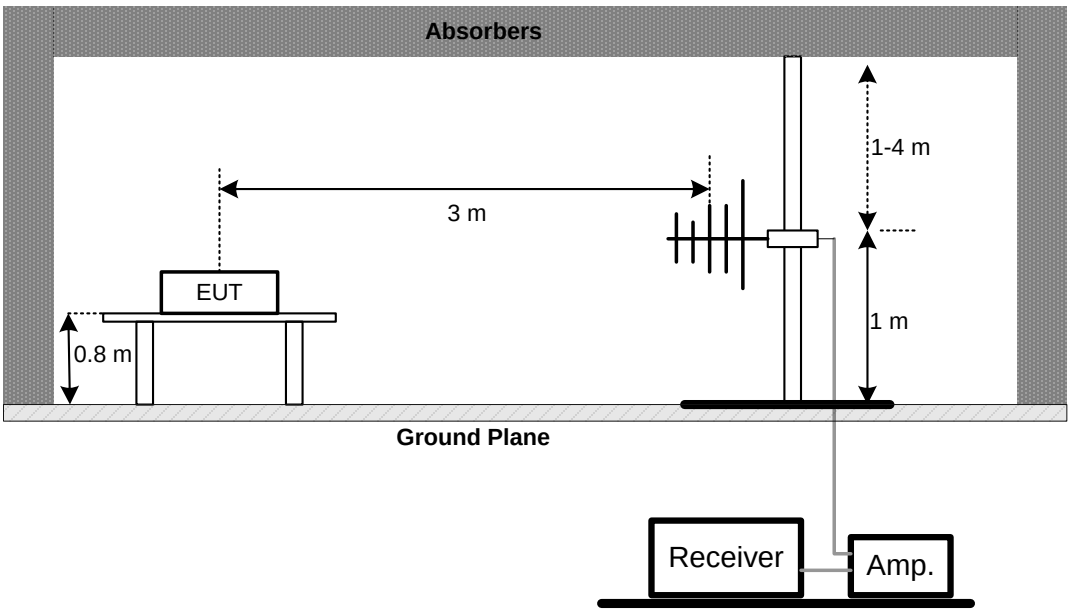
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance 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

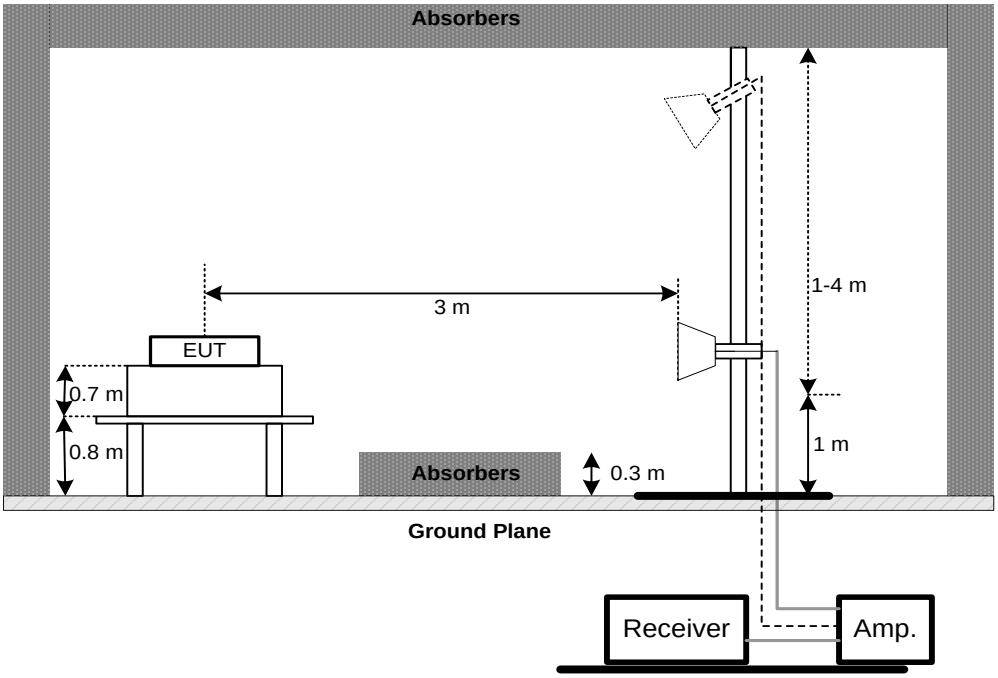
No deviation

4.2.4 TEST SETUP

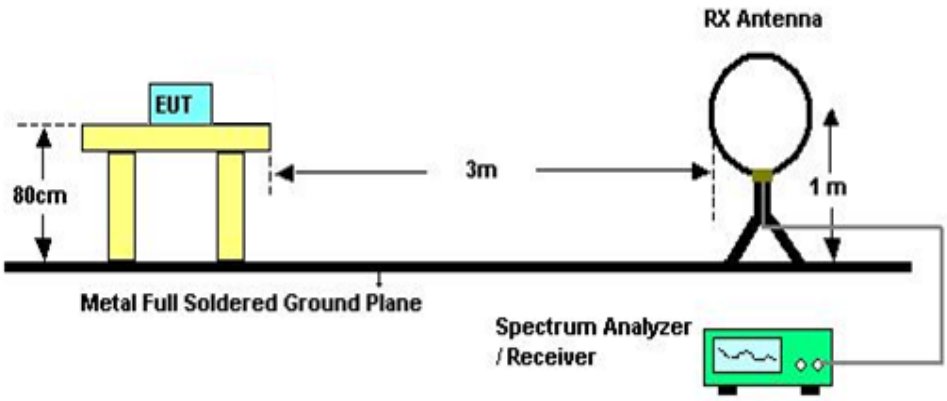
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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

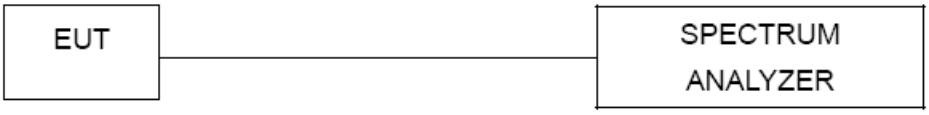
5.1.1 TEST PROCEDURE

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

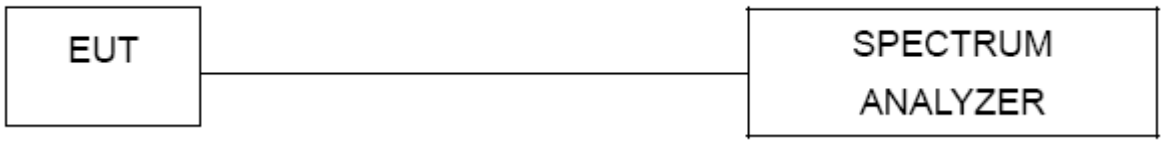
6.1.1 TEST PROCEDURE

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

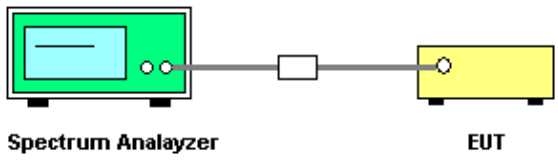
a. The EUT must have its hopping function enabled

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

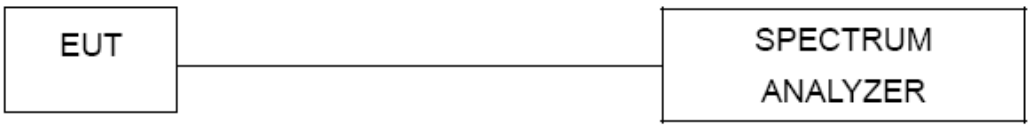
8.1.1 TEST PROCEDURE

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.

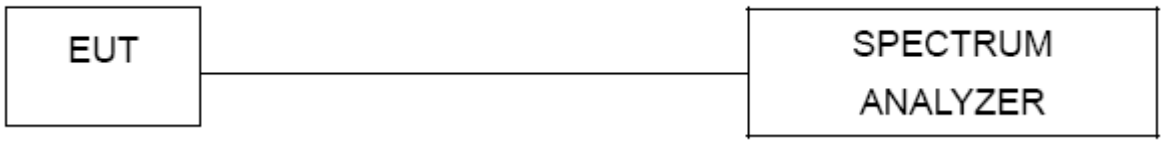
10.1.1 TEST PROCEDURE

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	EMI Test Receiver	R&S	ESCI	100382	Mar. 26, 2018
2	LISN	EMCO	3816/2	52765	Mar. 26, 2018
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 26, 2018
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 26, 2018
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	Cable	N/A	RG223	12m	Oct. 19, 2018

Radiated Emission Measurement - Below 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 26, 2018
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	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 05, 2018

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. 26, 2018
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 08, 2018
3	Amplifier	Agilent	8449B	3008A02274	May. 16, 2018
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 26, 2018
5	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018
6	Antenna	EM	EM-6876-1	230	Jul. 07, 2018
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

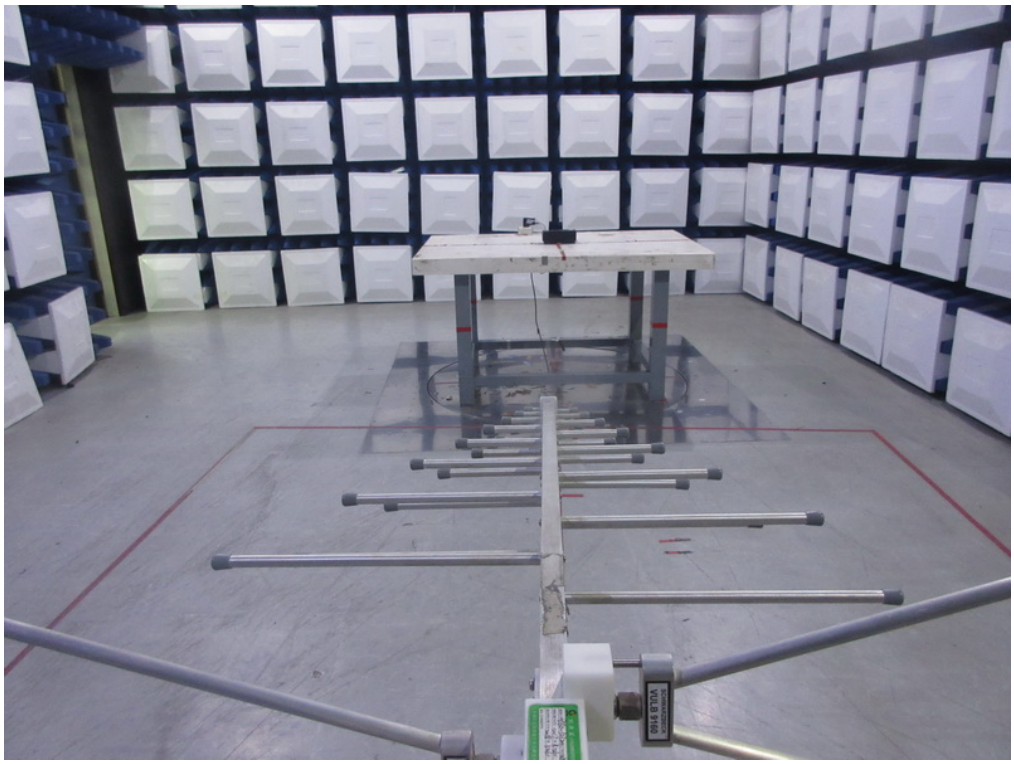
Conducted Measurement Photos

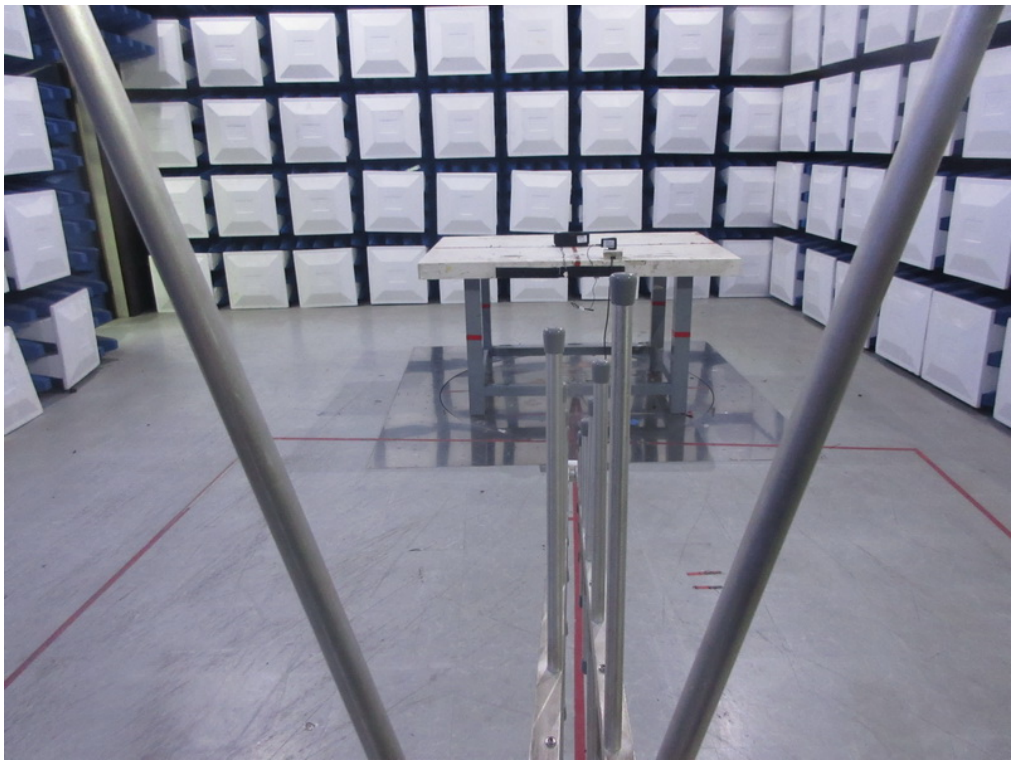
Radiated Measurement Photos

9KHz to 30MHz

Radiated Measurement Photos

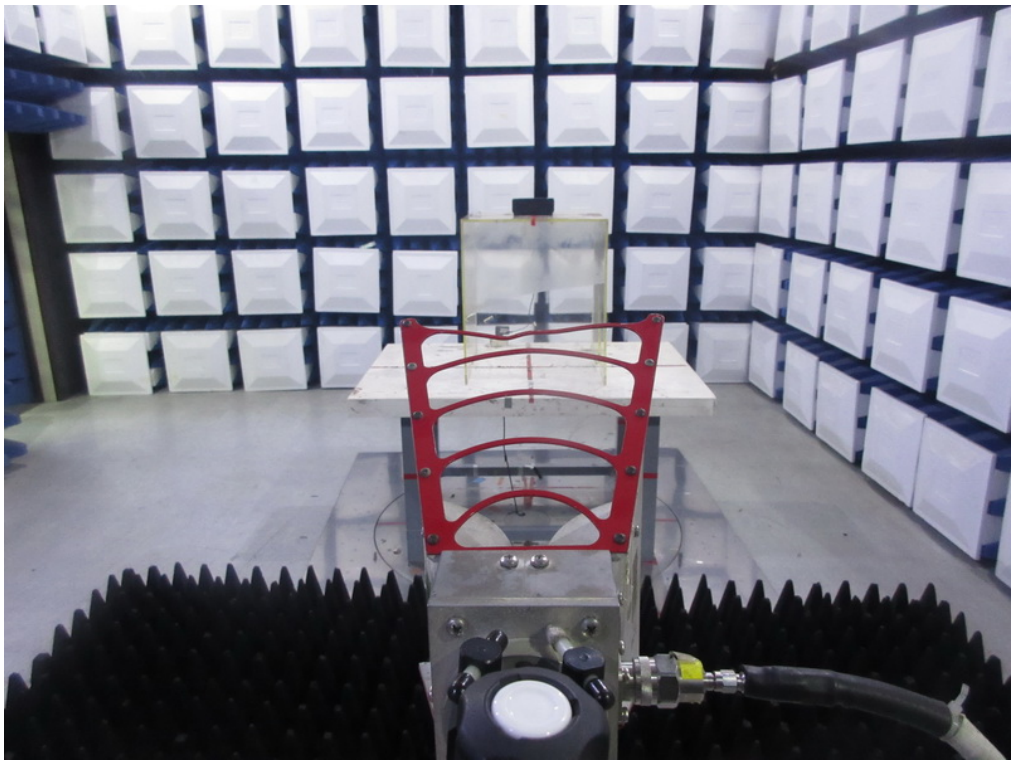
30MHz to 1000MHz

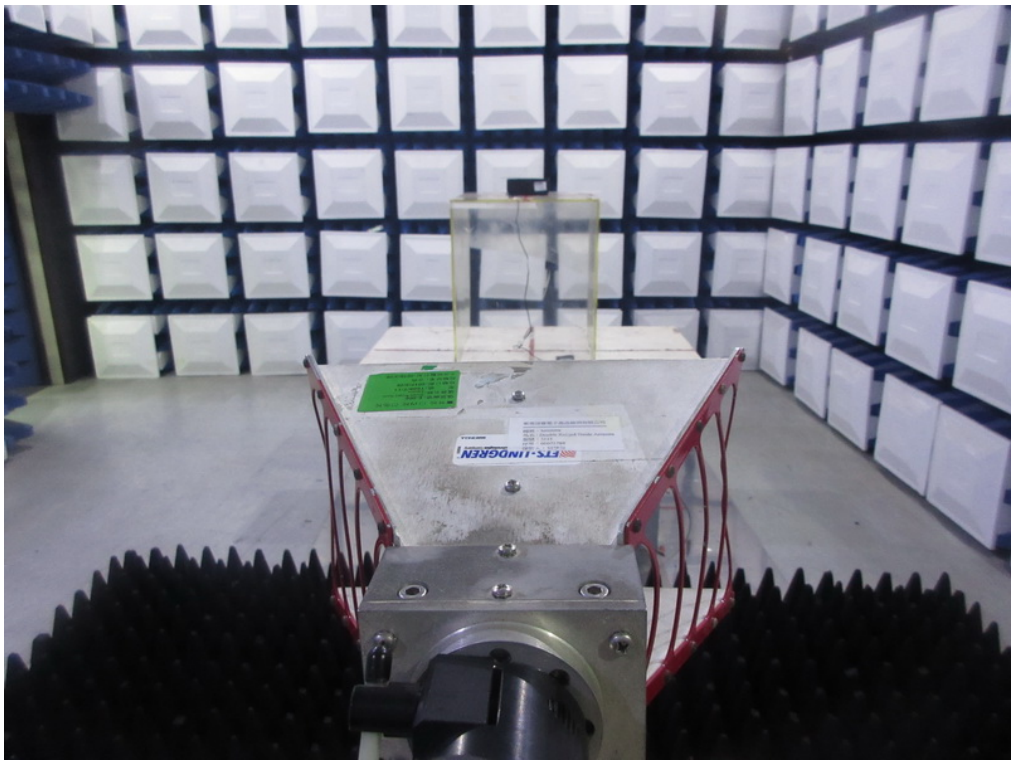




Radiated Measurement Photos

Above 1000MHz

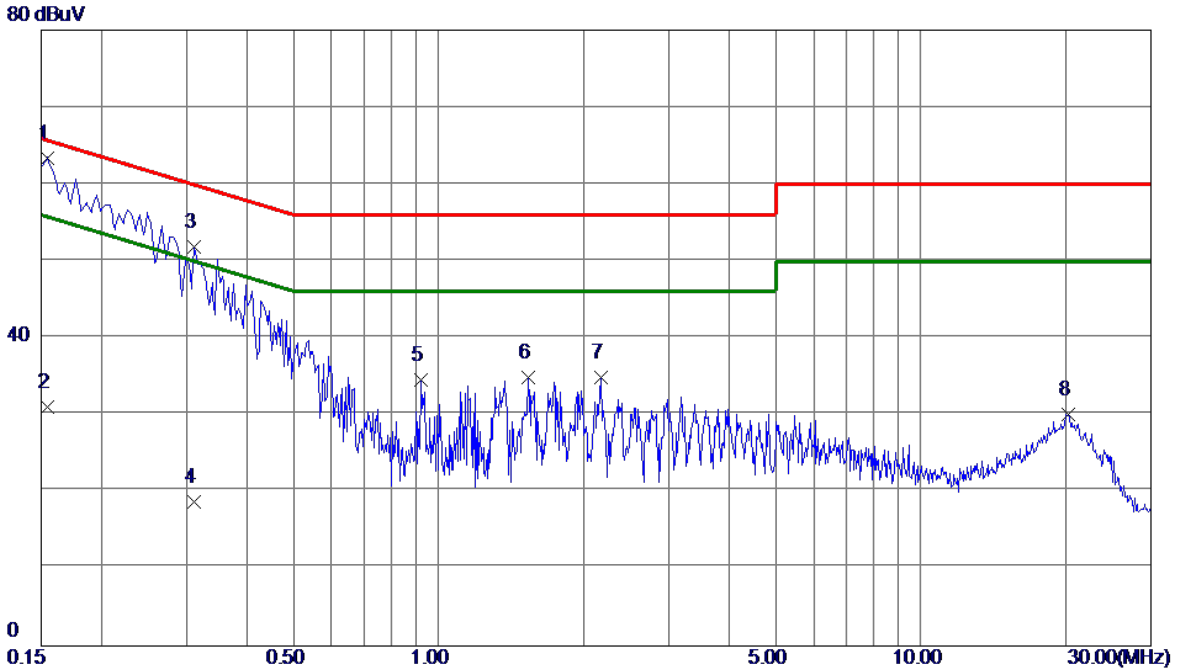




APPENDIX A - CONDUCTED EMISSION

Test Mode:	TX Mode(Adapter:GPE018A-050200-Z)

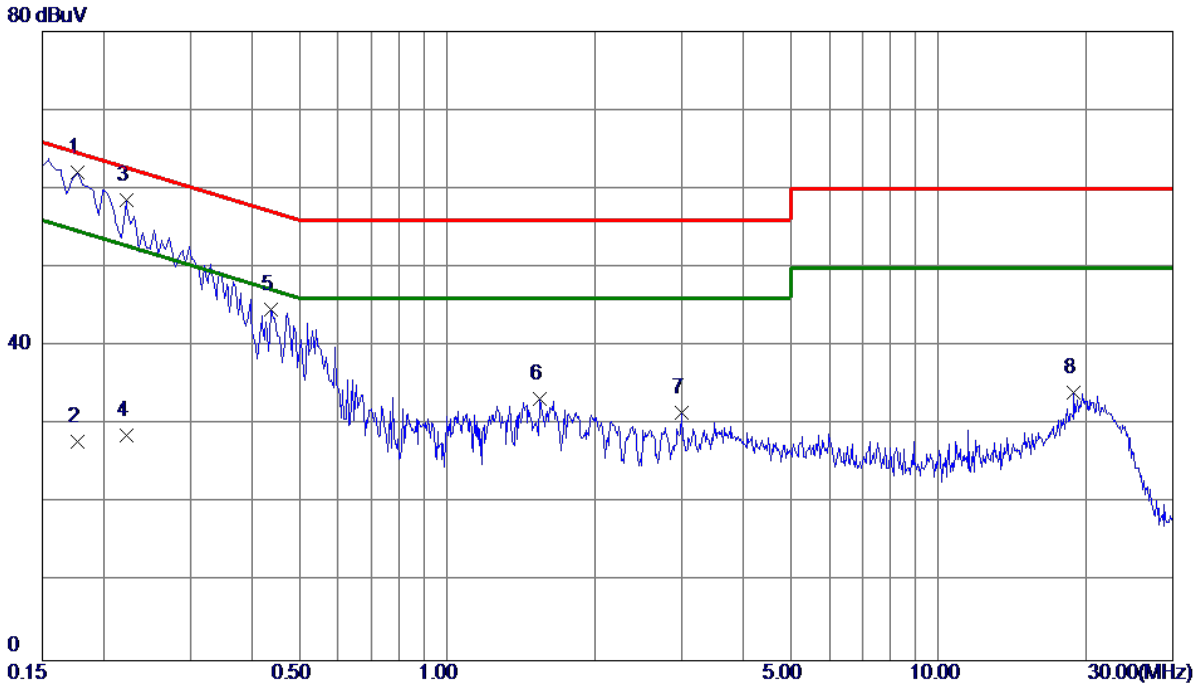
Line



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1548	53.52	9.79	63.31	65.74	-2.43	Peak	
2	0.1548	21.30	9.79	31.09	55.74	-24.65	AVG	
3	0.3120	42.16	9.76	51.92	59.92	-8.00	Peak	
4	0.3120	8.91	9.76	18.67	49.92	-31.25	AVG	
5	0.9195	24.76	9.85	34.61	56.00	-21.39	Peak	
6	1.5315	25.03	9.91	34.94	56.00	-21.06	Peak	
7	2.1705	24.89	9.94	34.83	56.00	-21.17	Peak	
8	20.2470	19.42	10.66	30.08	60.00	-29.92	Peak	

Test Mode:	TX Mode(Adapter:GPE018A-050200-Z)

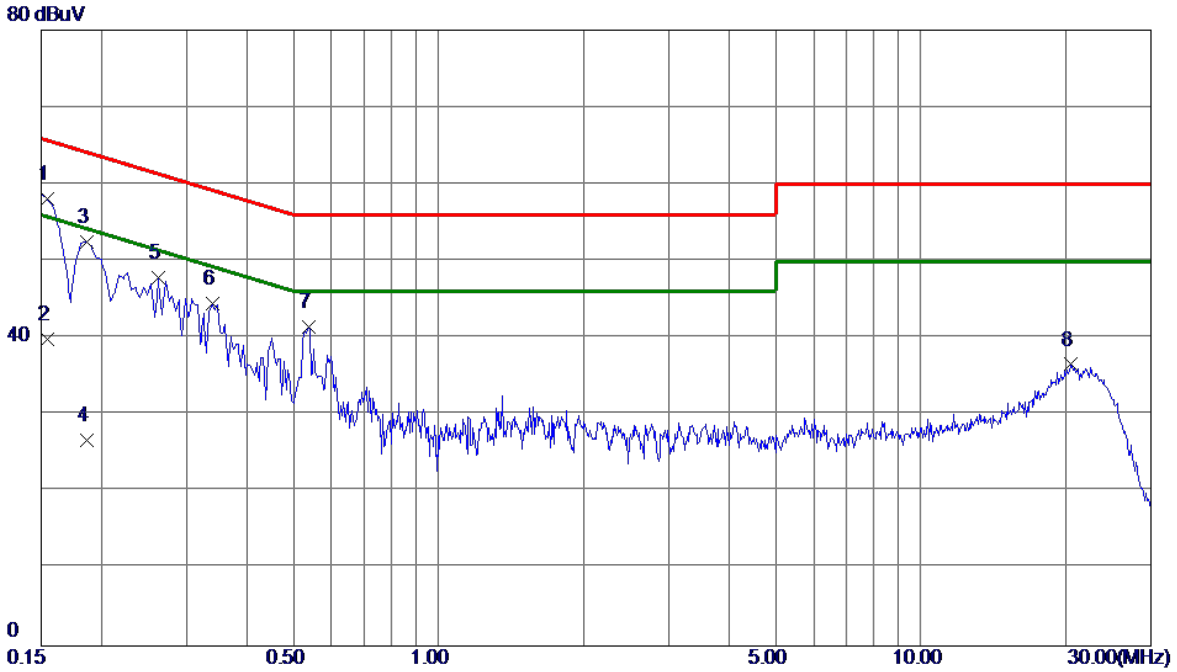
Neutral



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1770	52.36	9.68	62.04	64.63	-2.59	Peak	
2	0.1770	18.20	9.68	27.88	54.63	-26.75	AVG	
3	0.2220	48.81	9.68	58.49	62.74	-4.25	Peak	
4	0.2220	19.00	9.68	28.68	52.74	-24.06	AVG	
5	0.4380	34.96	9.69	44.65	57.10	-12.45	Peak	
6	1.5450	23.42	9.79	33.21	56.00	-22.79	Peak	
7	2.9985	21.55	9.90	31.45	56.00	-24.55	Peak	
8	18.8295	23.41	10.72	34.13	60.00	-25.87	Peak	

Test Mode:	TX Mode (Adapter:S018BAM0500200)

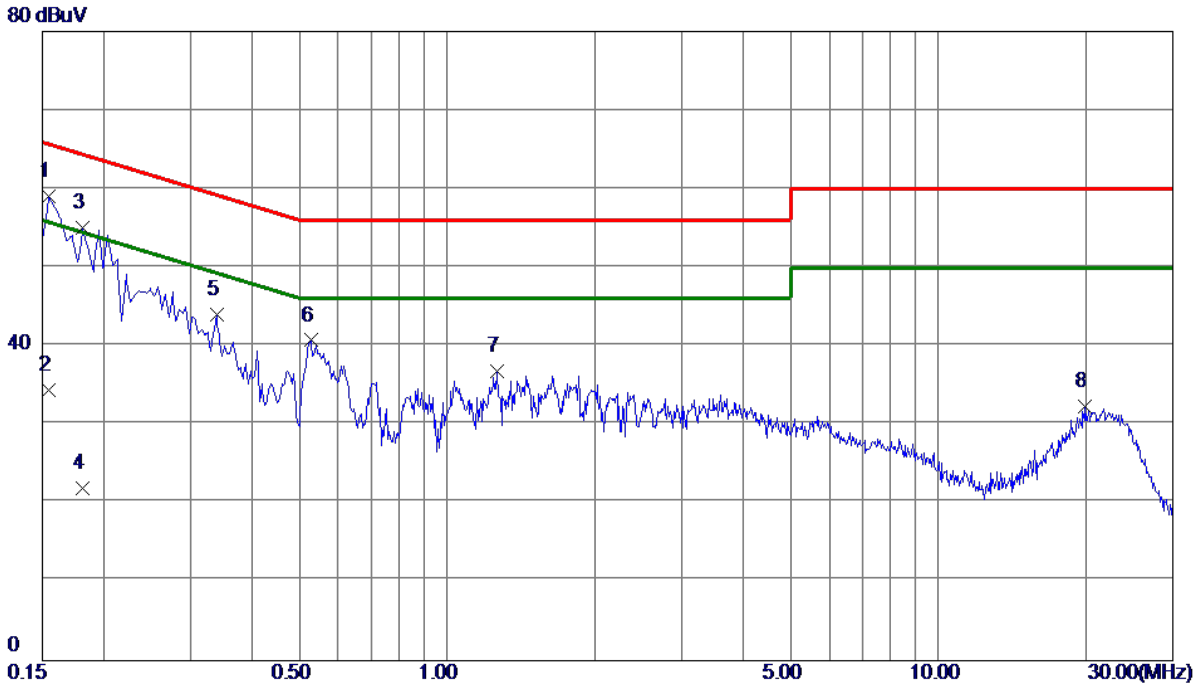
Line



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1548	48.25	9.79	58.04	65.74	-7.70	Peak	
2	0.1548	30.10	9.79	39.89	55.74	-15.85	AVG	
3	0.1860	42.72	9.77	52.49	64.21	-11.72	Peak	
4	0.1860	17.00	9.77	26.77	54.21	-27.44	AVG	
5	0.2625	38.11	9.76	47.87	61.35	-13.48	Peak	
6	0.3390	34.69	9.78	44.47	59.23	-14.76	Peak	
7	0.5370	31.69	9.80	41.49	56.00	-14.51	Peak	
8	20.4090	25.90	10.66	36.56	60.00	-23.44	Peak	

Test Mode:	TX Mode (Adapter:S018BAM0500200)

Neutral

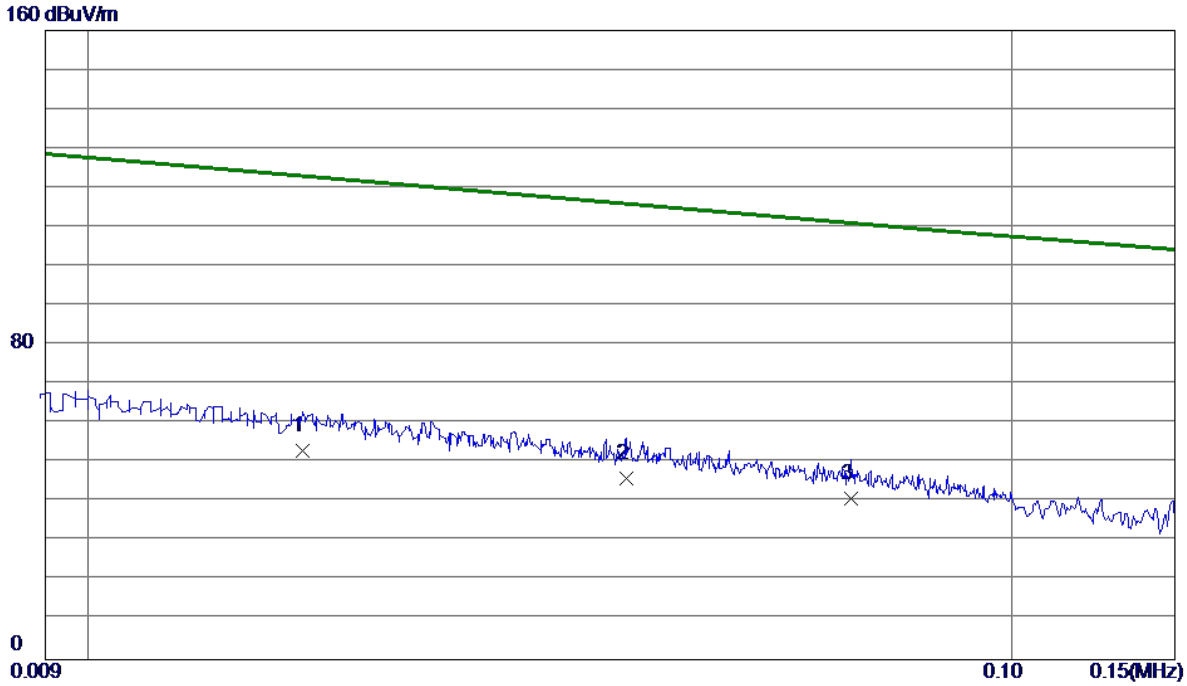


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1545	49.35	9.68	59.03	65.75	-6.72	Peak	
2	0.1545	24.70	9.68	34.38	55.75	-21.37	AVG	
3	0.1815	45.29	9.68	54.97	64.42	-9.45	Peak	
4	0.1815	12.30	9.68	21.98	54.42	-32.44	AVG	
5	0.3390	34.33	9.69	44.02	59.23	-15.21	Peak	
6	0.5280	31.02	9.70	40.72	56.00	-15.28	Peak	
7	1.2660	27.02	9.76	36.78	56.00	-19.22	Peak	
8	19.8645	21.58	10.75	32.33	60.00	-27.67	Peak	

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

Test Mode:	TX Mode(Adapter:GPE018A-050200-Z)

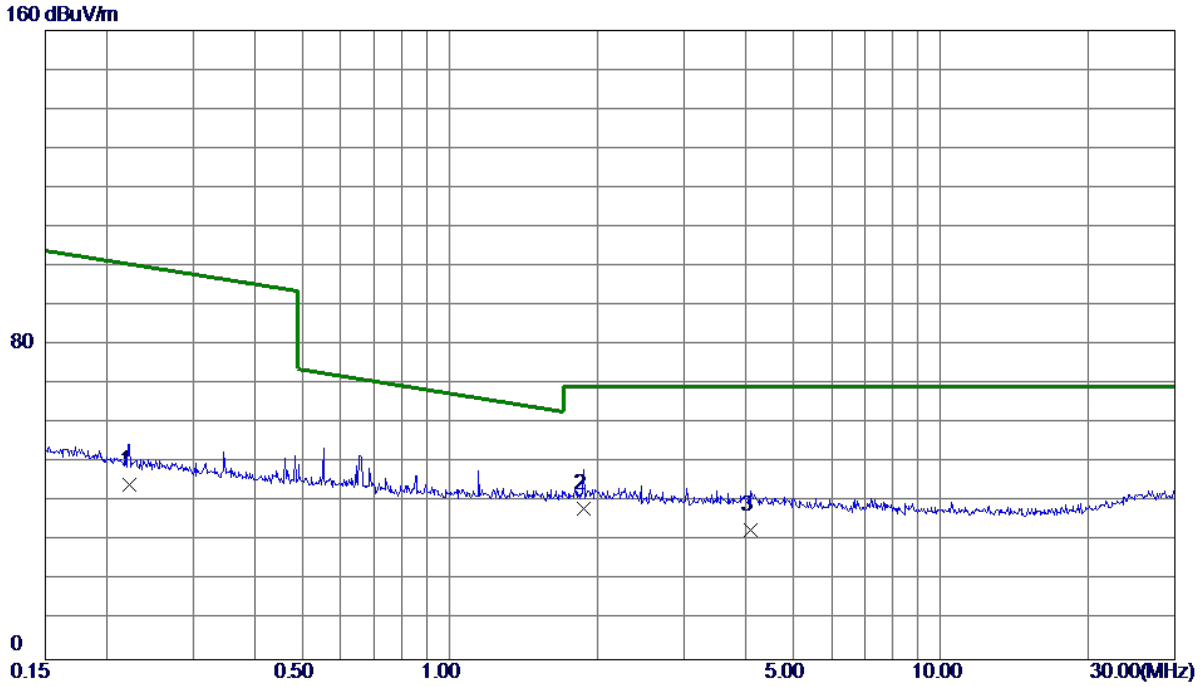
Ant 0°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.0171	33.06	20.00	53.06	126.50	-73.44	AVG	
2	0.0383	27.15	19.07	46.22	121.26	-75.04	AVG	
3 *	0.0670	22.52	18.38	40.90	114.17	-73.27	AVG	

Test Mode:	TX Mode(Adapter:GPE018A-050200-Z)

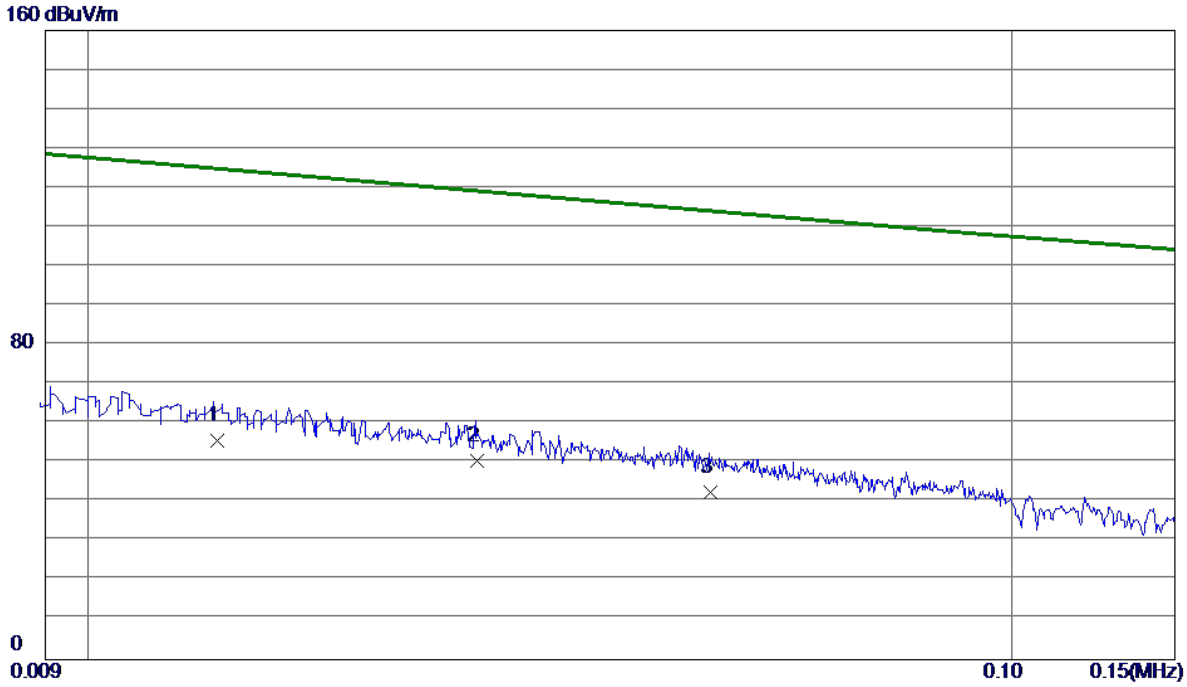
Ant 0°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.2220	27.83	16.74	44.57	102.95	-58.38	AVG	
2 *	1.8780	22.77	15.56	38.33	69.54	-31.21	QP	
3	4.1137	18.01	14.88	32.89	69.54	-36.65	QP	

Test Mode:	TX Mode(Adapter:GPE018A-050200-Z)

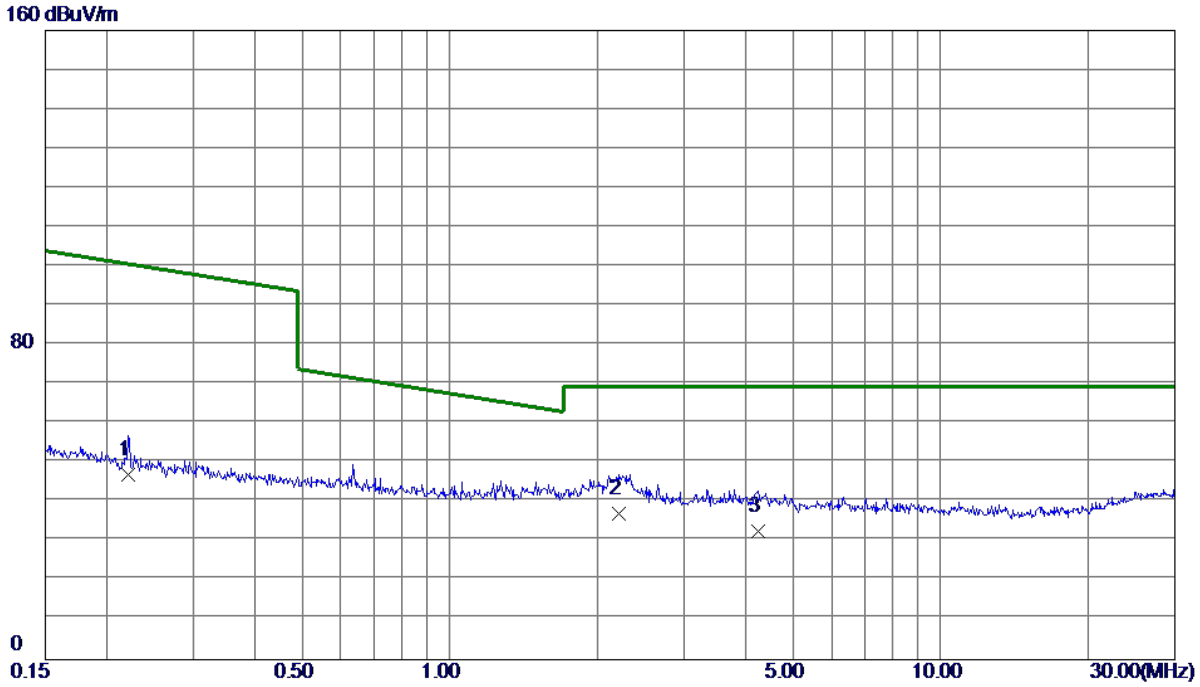
Ant 90°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	0.0138	35.19	20.43	55.62	127.31	-71.69	AVG	
2	0.0264	31.22	19.43	50.65	124.20	-73.55	AVG	
3	0.0472	23.65	18.81	42.46	119.06	-76.60	AVG	

Test Mode:	TX Mode(Adapter:GPE018A-050200-Z)

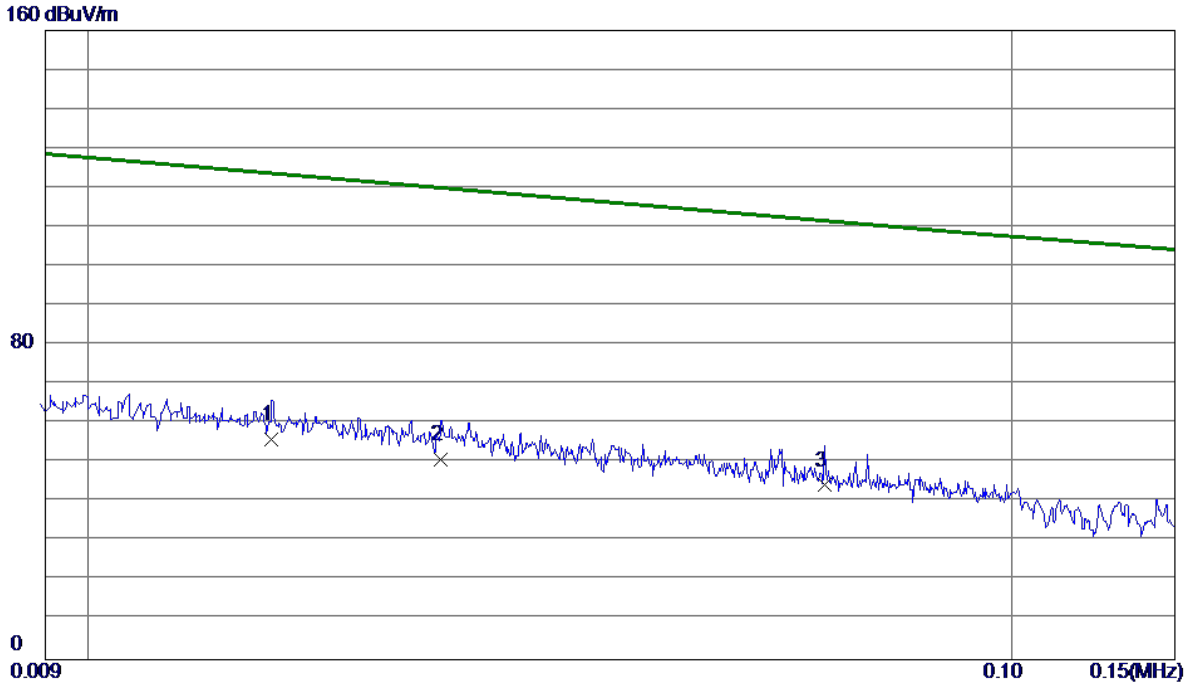
Ant 90°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.2208	30.31	16.74	47.05	102.99	-55.94	AVG	
2 *	2.2132	21.63	15.45	37.08	69.54	-32.46	QP	
3	4.2466	17.93	14.81	32.74	69.54	-36.80	QP	

Test Mode:	TX Mode (Adapter:S018BAM0500200)

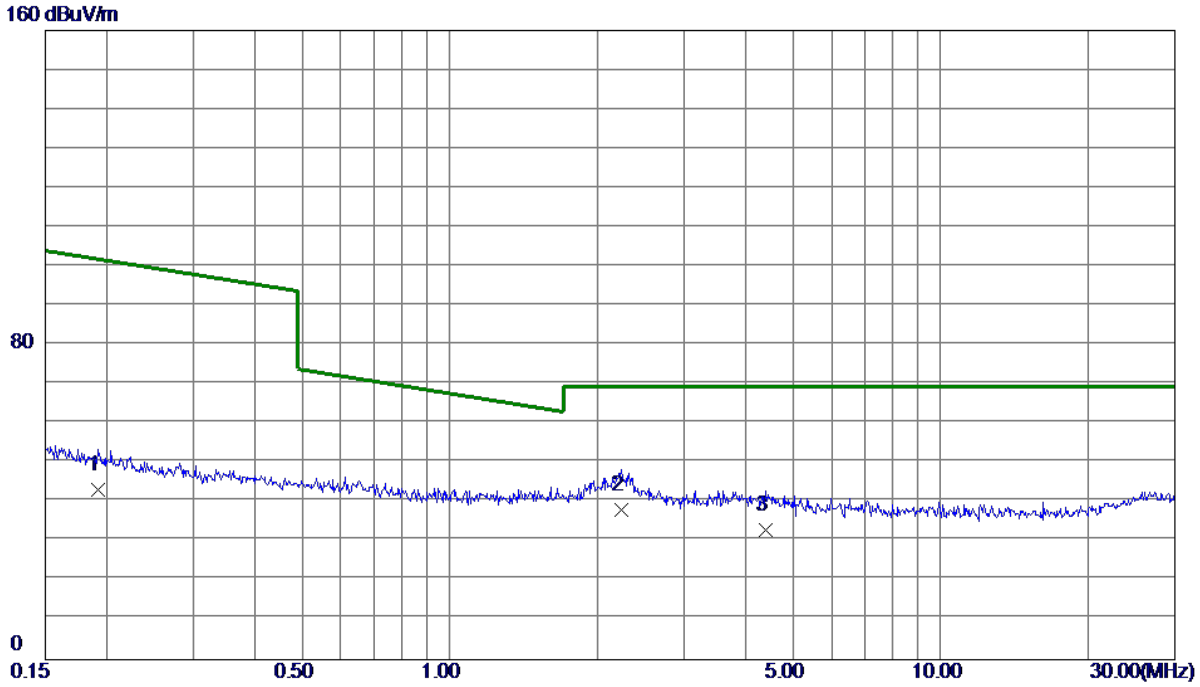
Ant 0°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.0158	35.69	20.17	55.86	126.82	-70.96	AVG	
2	0.0241	31.38	19.50	50.88	124.77	-73.89	AVG	
3 *	0.0627	25.85	18.47	44.32	115.24	-70.92	AVG	

Test Mode:	TX Mode (Adapter:S018BAM0500200)

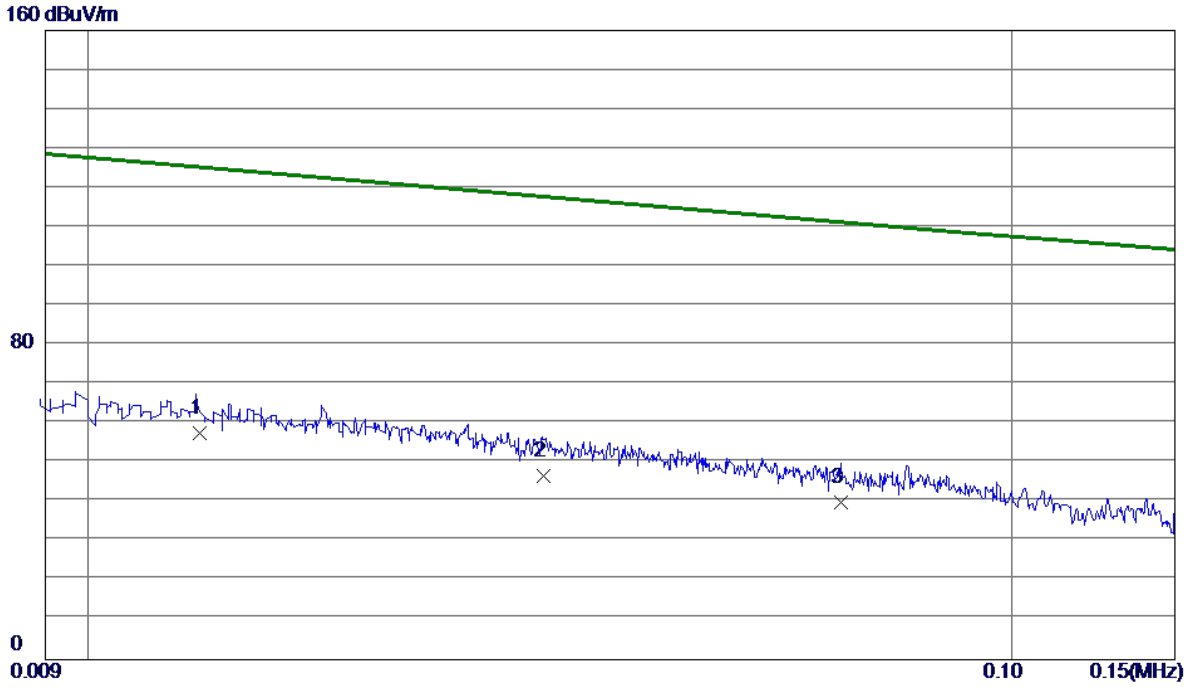
Ant 0°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.1924	26.47	16.82	43.29	103.96	-60.67	AVG	
2 *	2.2367	22.75	15.44	38.19	69.54	-31.35	QP	
3	4.4071	18.32	14.71	33.03	69.54	-36.51	QP	

Test Mode:	TX Mode (Adapter:S018BAM0500200)

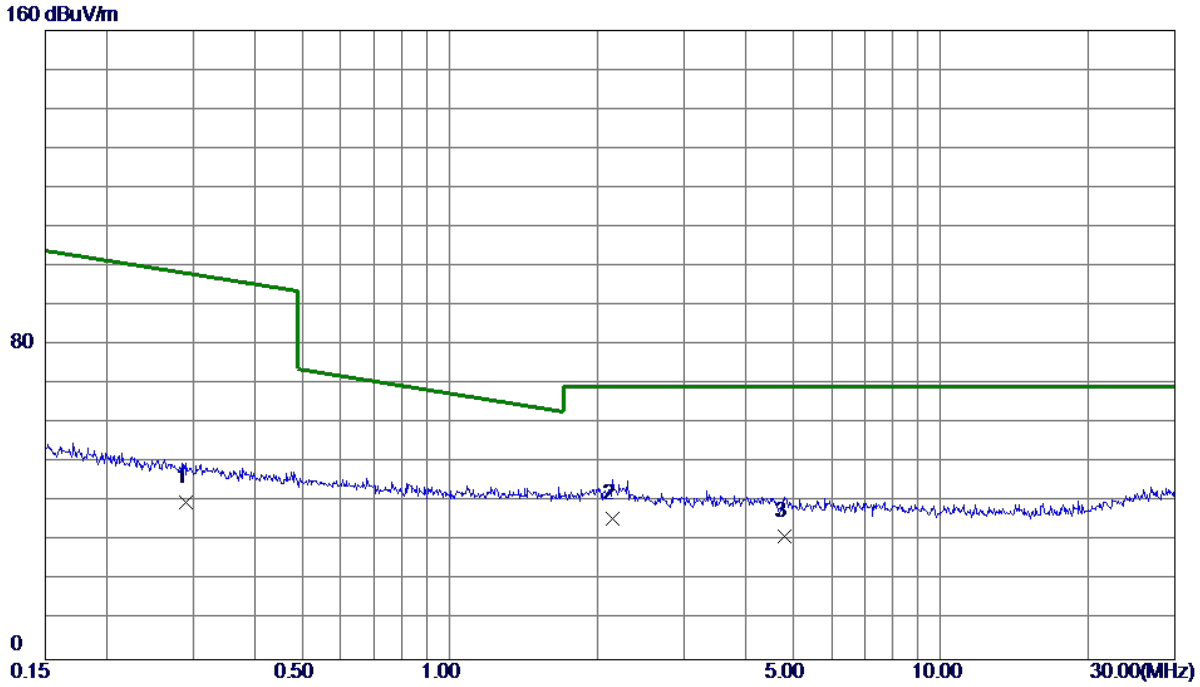
Ant 90°



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	0.0132	37.14	20.50	57.64	127.46	-69.82	AVG	
2	0.0311	27.50	19.29	46.79	123.04	-76.25	AVG	
3	0.0653	21.48	18.42	39.90	114.59	-74.69	AVG	

Test Mode:	TX Mode (Adapter:S018BAM0500200)

Ant 90°

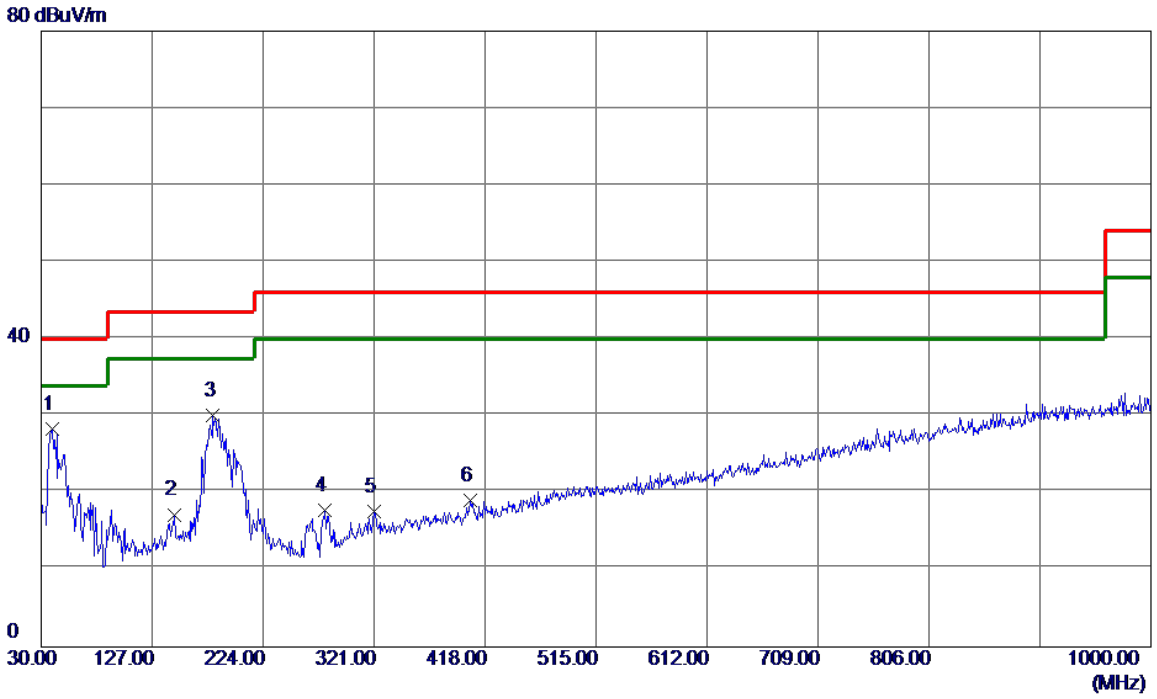


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.2893	23.33	16.63	39.96	100.65	-60.69	AVG	
2 *	2.1440	20.28	15.47	35.75	69.54	-33.79	QP	
3	4.7970	16.92	14.49	31.41	69.54	-38.13	QP	

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

Test Mode:	TX 2402MHz _CH00_1Mbps(Adapter:GPE018A-050200-Z)

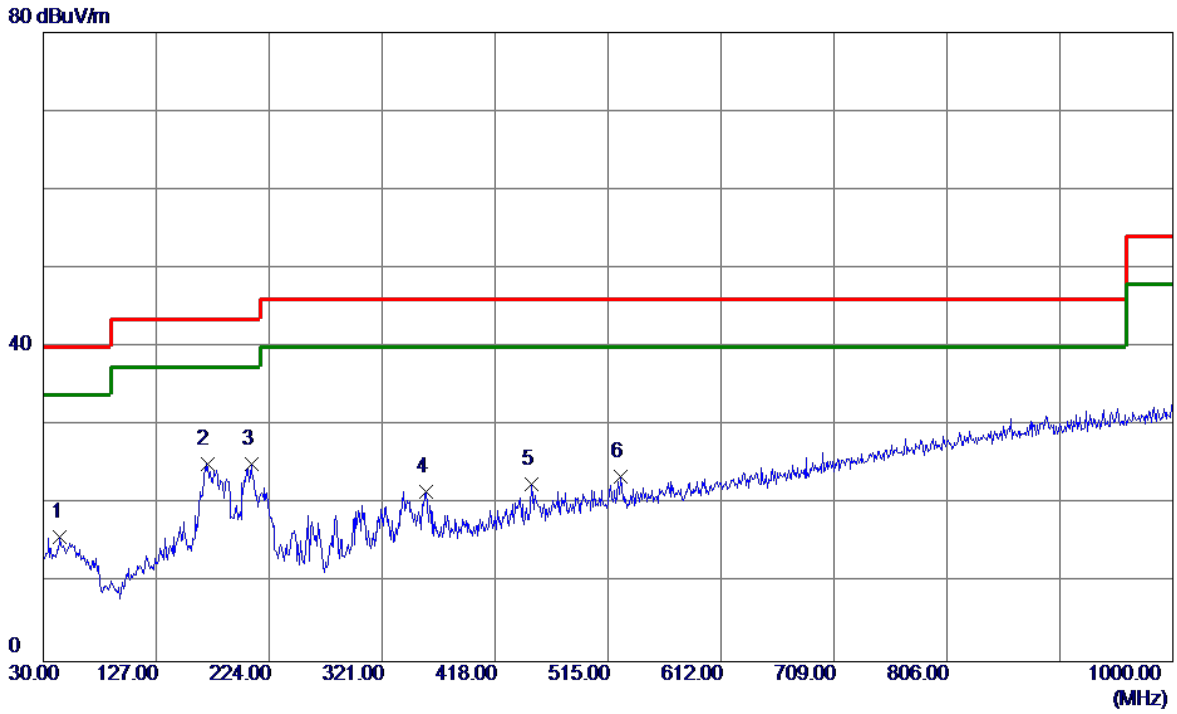
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	39.7000	42.32	-14.00	28.32	40.00	-11.68	Peak	
2	146.4000	30.97	-13.77	17.20	43.50	-26.30	Peak	
3	180.3500	42.19	-12.07	30.12	43.50	-13.38	Peak	
4	278.3200	32.78	-14.95	17.83	46.00	-28.17	Peak	
5	321.0000	30.07	-12.46	17.61	46.00	-28.39	Peak	
6	405.3900	30.26	-11.21	19.05	46.00	-26.95	Peak	

Test Mode:	TX 2402MHz _CH00_1Mbps(Adapter:GPE018A-050200-Z)

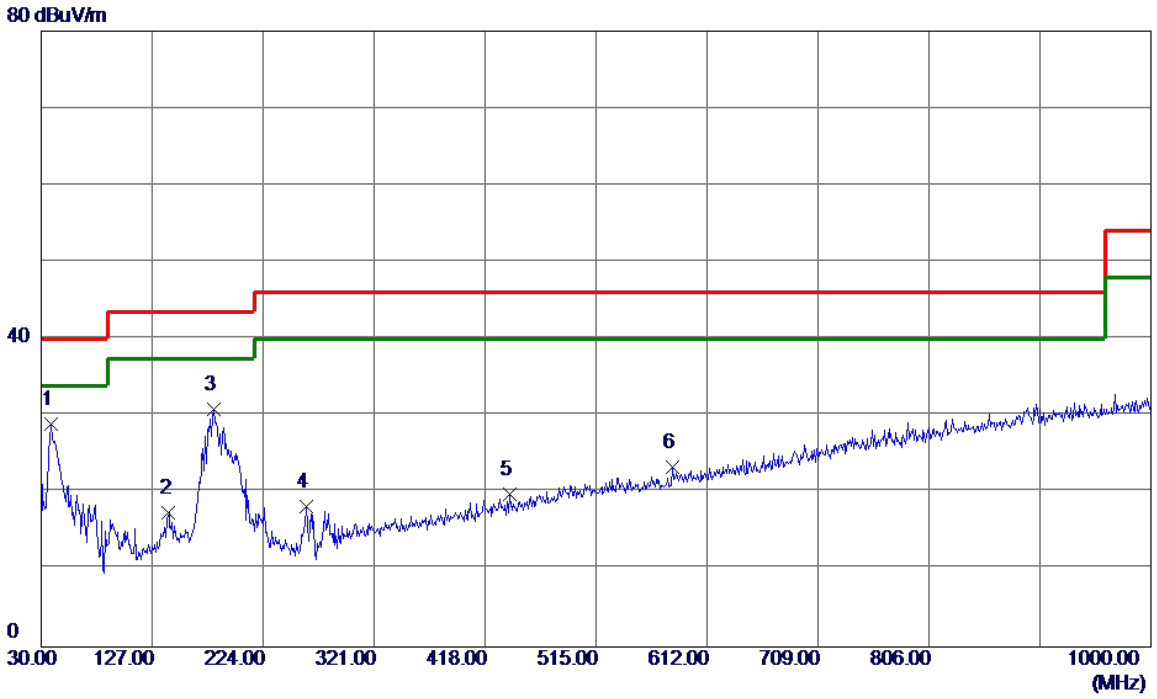
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	44.5500	29.26	-13.36	15.90	40.00	-24.10	Peak	
2 *	170.6500	37.44	-12.32	25.12	43.50	-18.38	Peak	
3	208.4800	38.99	-13.94	25.05	43.50	-18.45	Peak	
4	358.8299	33.49	-11.85	21.64	46.00	-24.36	Peak	
5	449.0400	32.49	-9.97	22.52	46.00	-23.48	Peak	
6	525.6700	31.66	-8.20	23.46	46.00	-22.54	Peak	

Test Mode:	TX 2441MHz _CH39_1Mbps(Adapter:GPE018A-050200-Z)

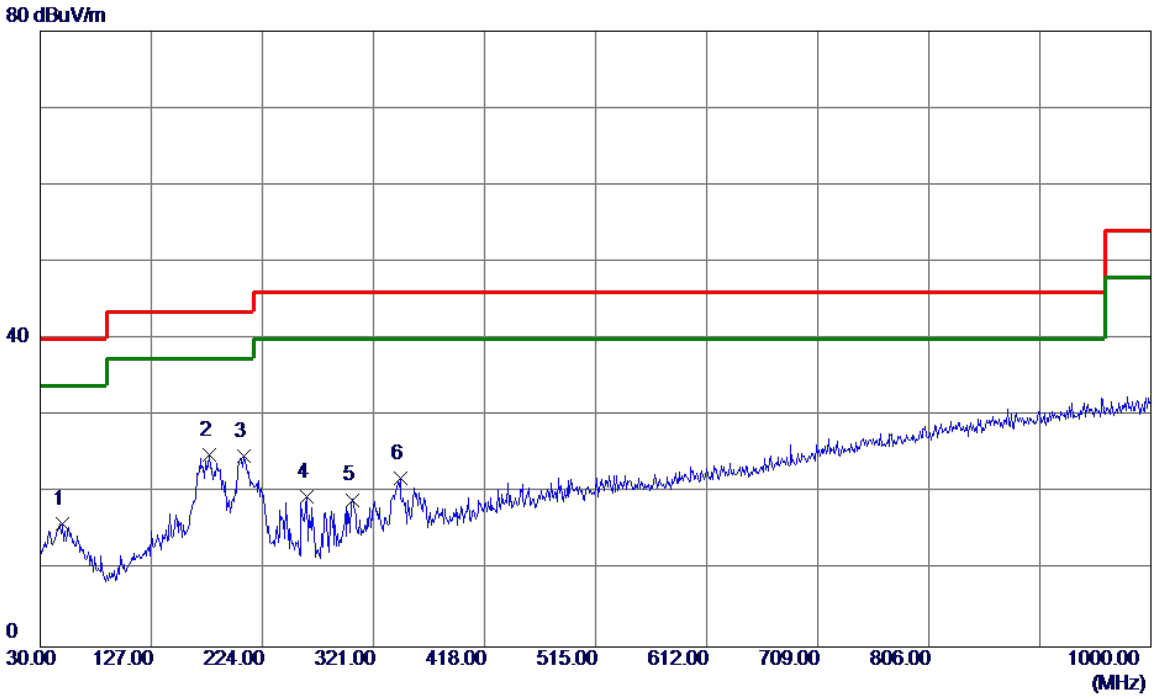
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	38.7300	43.09	-14.16	28.93	40.00	-11.07	Peak	
2	141.5500	31.55	-14.11	17.44	43.50	-26.06	Peak	
3	181.3200	42.97	-12.15	30.82	43.50	-12.68	Peak	
4	261.8299	33.97	-15.74	18.23	46.00	-27.77	Peak	
5	439.3400	30.09	-10.24	19.85	46.00	-26.15	Peak	
6	581.9300	30.22	-6.89	23.33	46.00	-22.67	Peak	

Test Mode:	TX 2441MHz _CH39_1Mbps(Adapter:GPE018A-050200-Z)

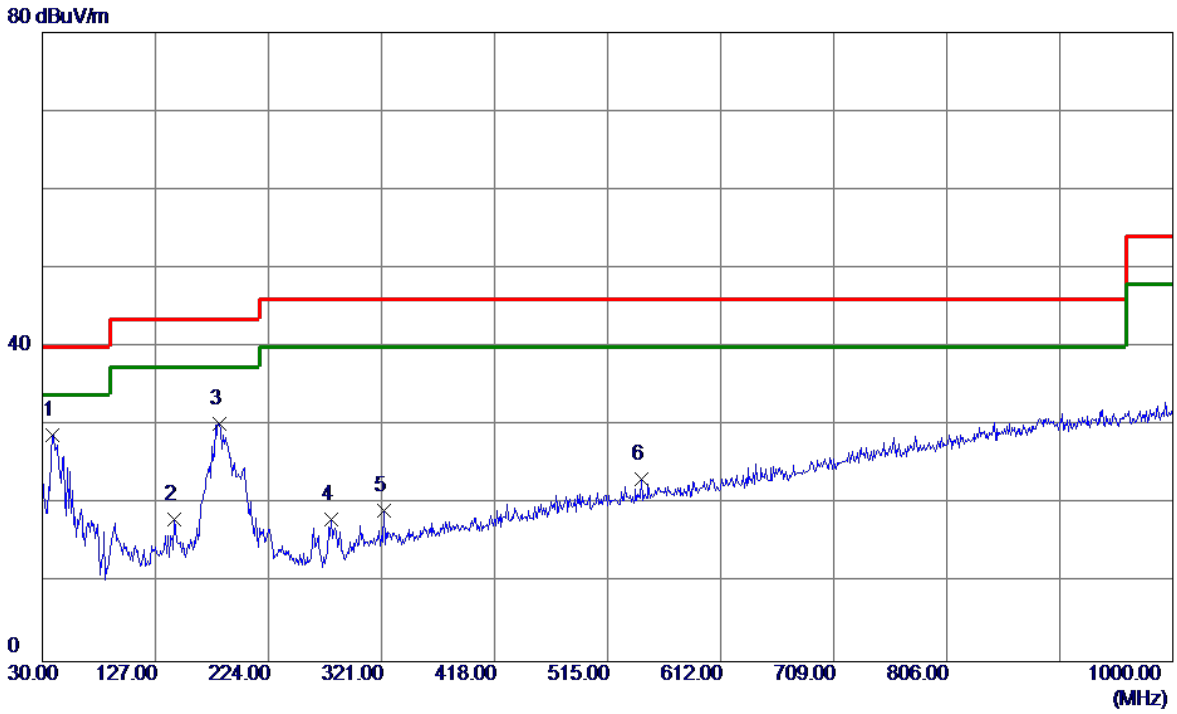
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	49.4000	29.43	-13.46	15.97	40.00	-24.03	Peak	
2 *	177.4400	37.14	-12.12	25.02	43.50	-18.48	Peak	
3	207.5100	38.68	-13.92	24.76	43.50	-18.74	Peak	
4	262.8000	35.21	-15.75	19.46	46.00	-26.54	Peak	
5	302.5700	31.90	-12.78	19.12	46.00	-26.88	Peak	
6	344.2800	33.91	-12.06	21.85	46.00	-24.15	Peak	

Test Mode:	TX 2480MHz _CH78_1Mbps (Adapter:GPE018A-050200-Z)

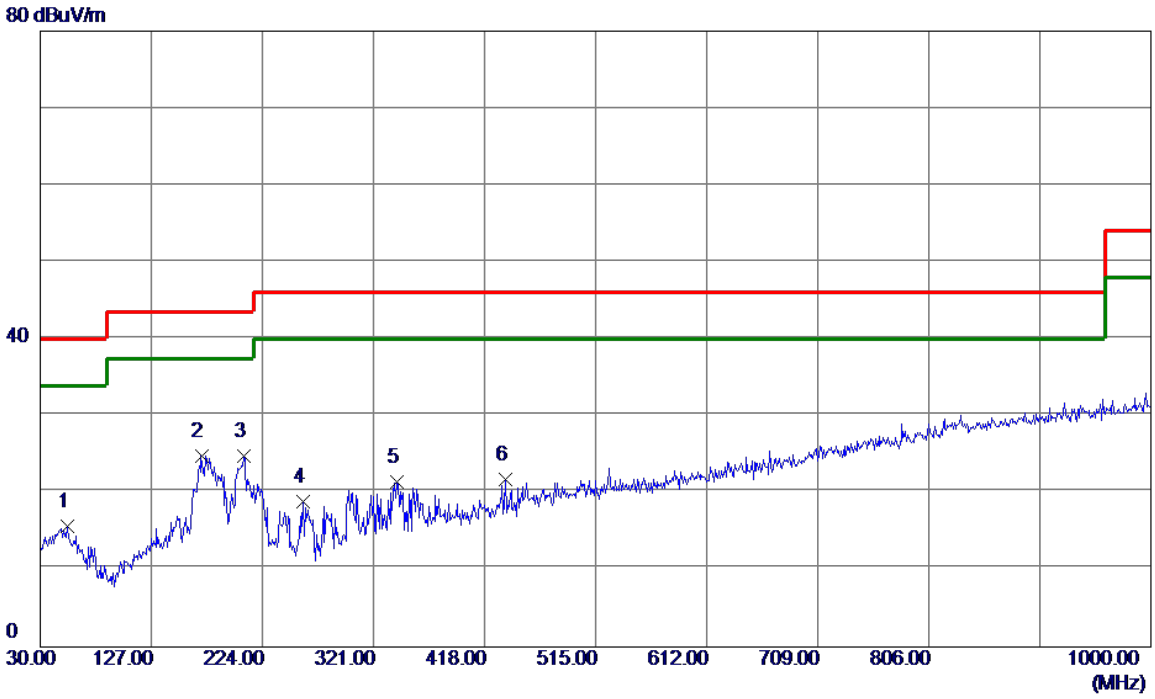
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	38.7300	43.00	-14.16	28.84	40.00	-11.16	Peak	
2	143.4900	32.08	-13.97	18.11	43.50	-25.39	Peak	
3	182.2899	42.44	-12.22	30.22	43.50	-13.28	Peak	
4	278.3200	33.10	-14.95	18.15	46.00	-27.85	Peak	
5	322.9400	31.65	-12.43	19.22	46.00	-26.78	Peak	
6	544.1000	30.97	-7.83	23.14	46.00	-22.86	Peak	

Test Mode:	TX 2480MHz _CH78_1Mbps (Adapter:GPE018A-050200-Z)

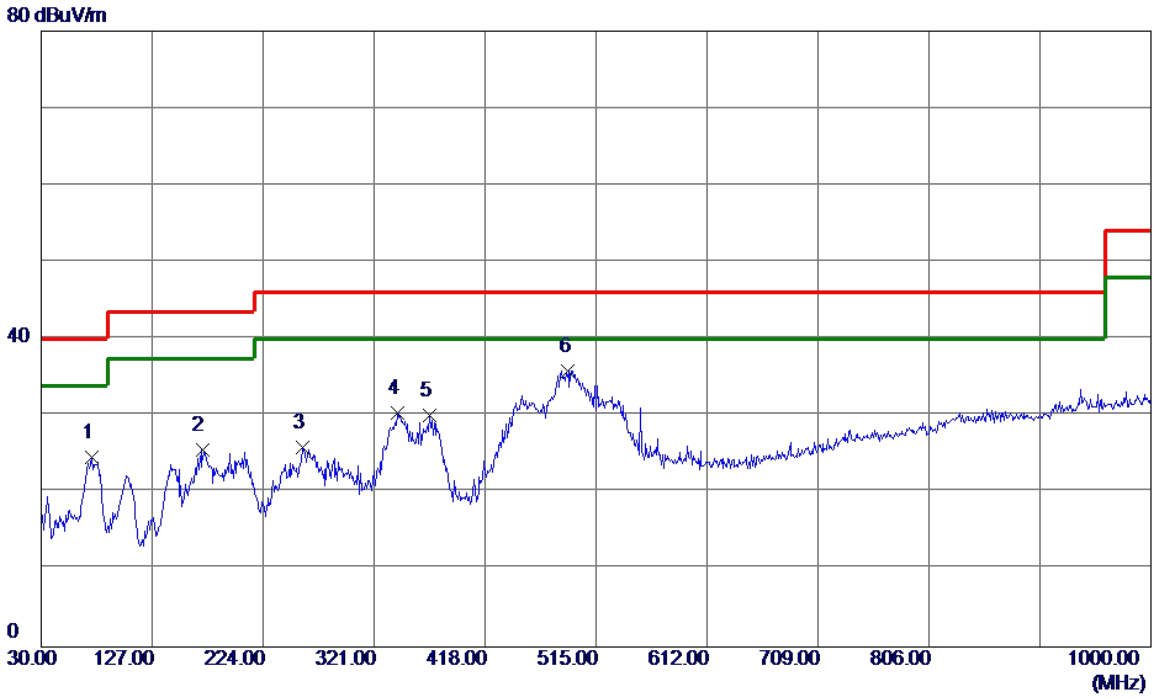
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	53.2800	29.59	-13.88	15.71	40.00	-24.29	Peak	
2	170.6500	37.12	-12.32	24.80	43.50	-18.70	Peak	
3 *	207.5100	38.79	-13.92	24.87	43.50	-18.63	Peak	
4	259.8900	34.64	-15.71	18.93	46.00	-27.07	Peak	
5	341.3700	33.52	-12.11	21.41	46.00	-24.59	Peak	
6	436.4300	32.10	-10.33	21.77	46.00	-24.23	Peak	

Test Mode:	TX 2402MHz_CH00_1Mbps (Adapter:S018BAM0500200)

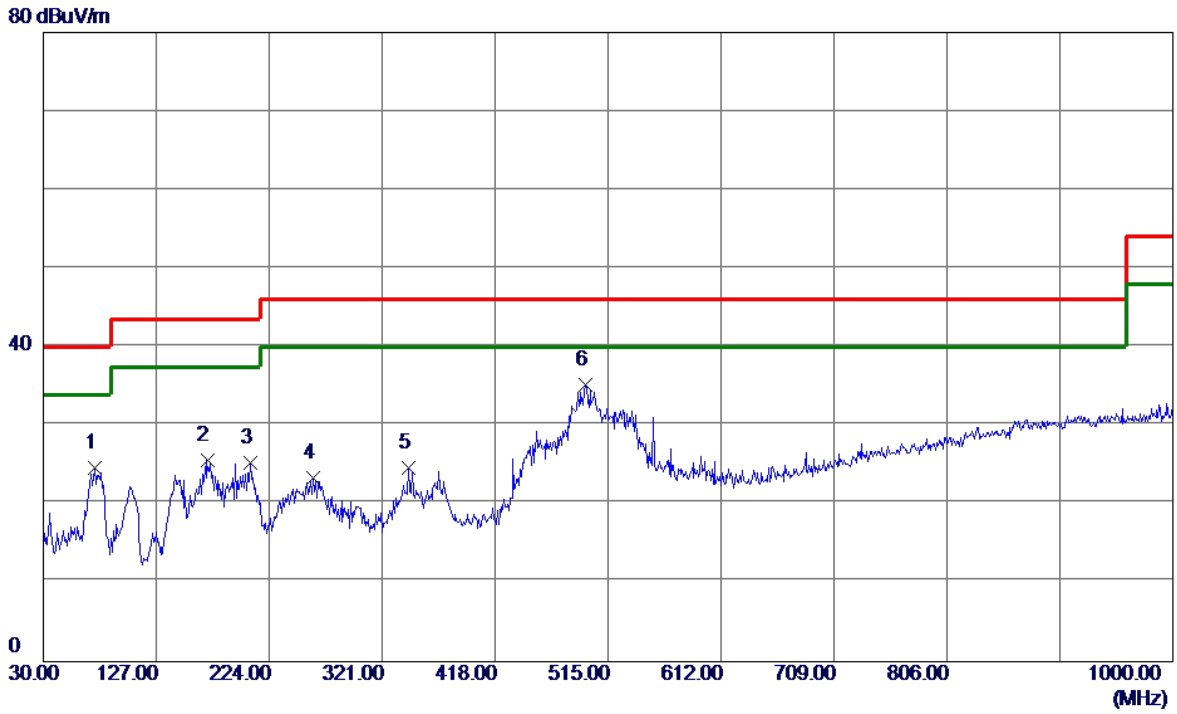
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	74.6200	41.66	-17.04	24.62	40.00	-15.38	Peak	
2	170.6500	37.85	-12.32	25.53	43.50	-17.97	Peak	
3	258.9200	41.49	-15.62	25.87	46.00	-20.13	Peak	
4	341.3700	42.46	-12.11	30.35	46.00	-15.65	Peak	
5	369.5000	41.77	-11.72	30.05	46.00	-15.95	Peak	
6 *	490.7500	44.85	-8.95	35.90	46.00	-10.10	Peak	

Test Mode:	TX 2402MHz_CH00_1Mbps (Adapter:S018BAM0500200)

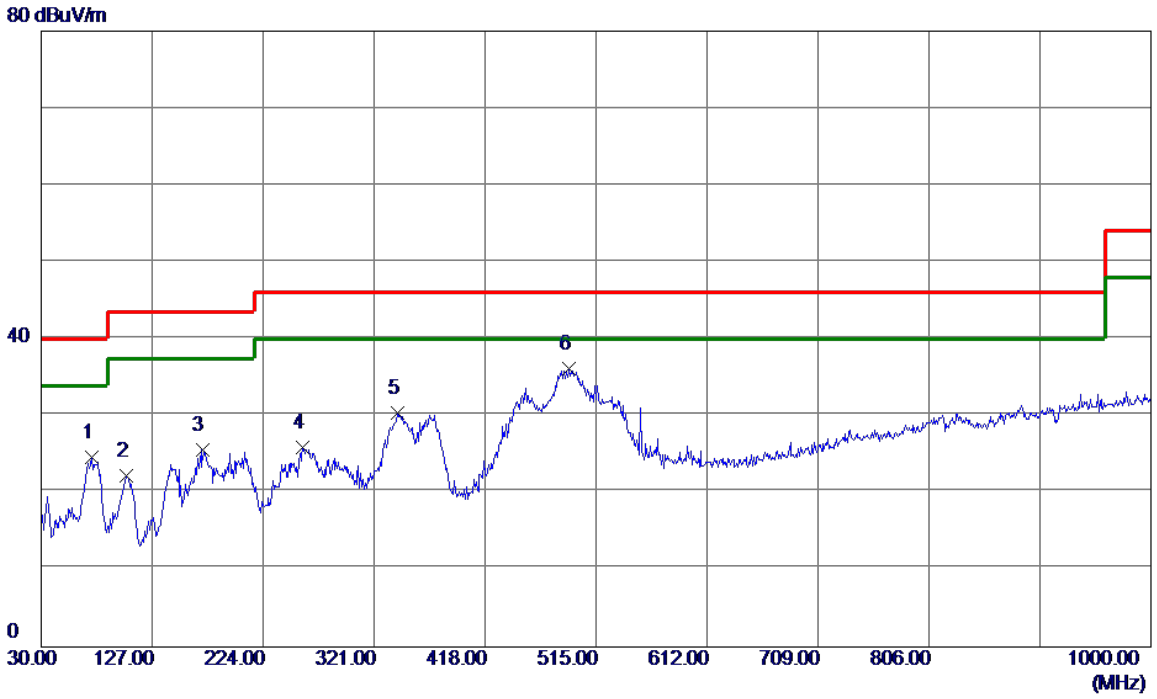
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	74.6200	41.66	-17.04	24.62	40.00	-15.38	Peak	
2	170.6500	37.85	-12.32	25.53	43.50	-17.97	Peak	
3	207.5100	39.16	-13.92	25.24	43.50	-18.26	Peak	
4	261.8299	39.12	-15.74	23.38	46.00	-22.62	Peak	
5	343.3100	36.77	-12.07	24.70	46.00	-21.30	Peak	
6 *	495.6000	44.02	-8.83	35.19	46.00	-10.81	Peak	

Test Mode:	TX 2441MHz_CH39_1Mbps (Adapter:S018BAM0500200)

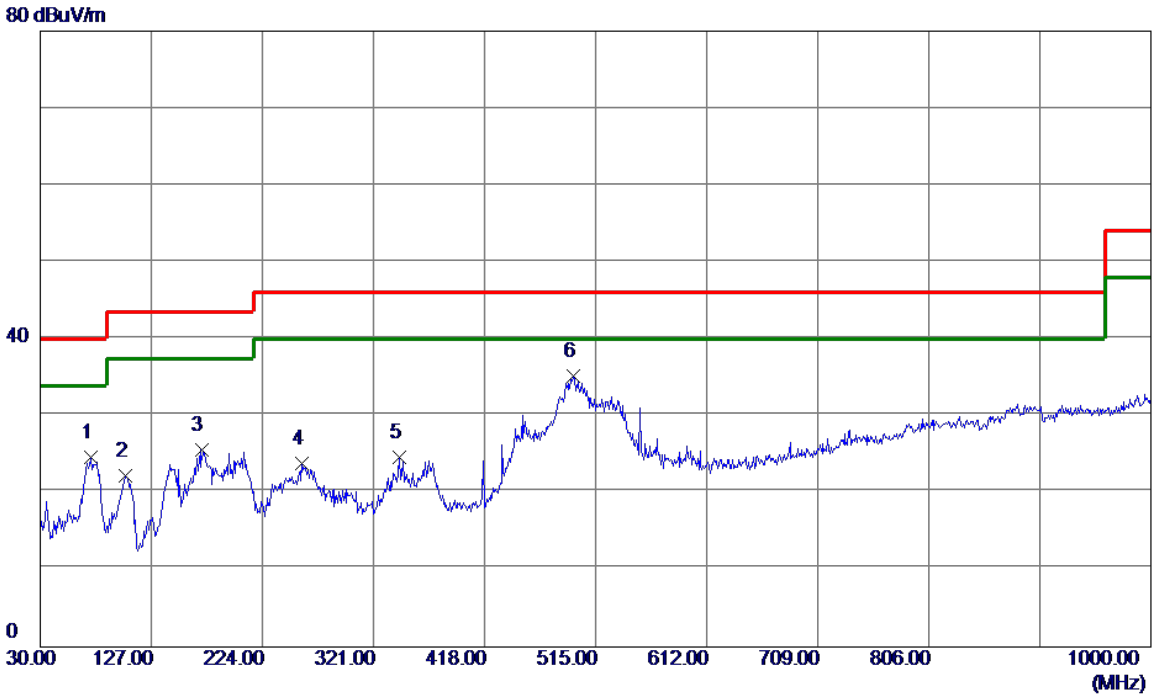
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	74.6200	41.66	-17.04	24.62	40.00	-15.38	Peak	
2	104.6900	39.15	-16.87	22.28	43.50	-21.22	Peak	
3	170.6500	37.85	-12.32	25.53	43.50	-17.97	Peak	
4	258.9200	41.49	-15.62	25.87	46.00	-20.13	Peak	
5	341.3700	42.46	-12.11	30.35	46.00	-15.65	Peak	
6 *	491.7200	45.08	-8.92	36.16	46.00	-9.84	Peak	

Test Mode:	TX 2441MHz_CH39_1Mbps (Adapter:S018BAM0500200)

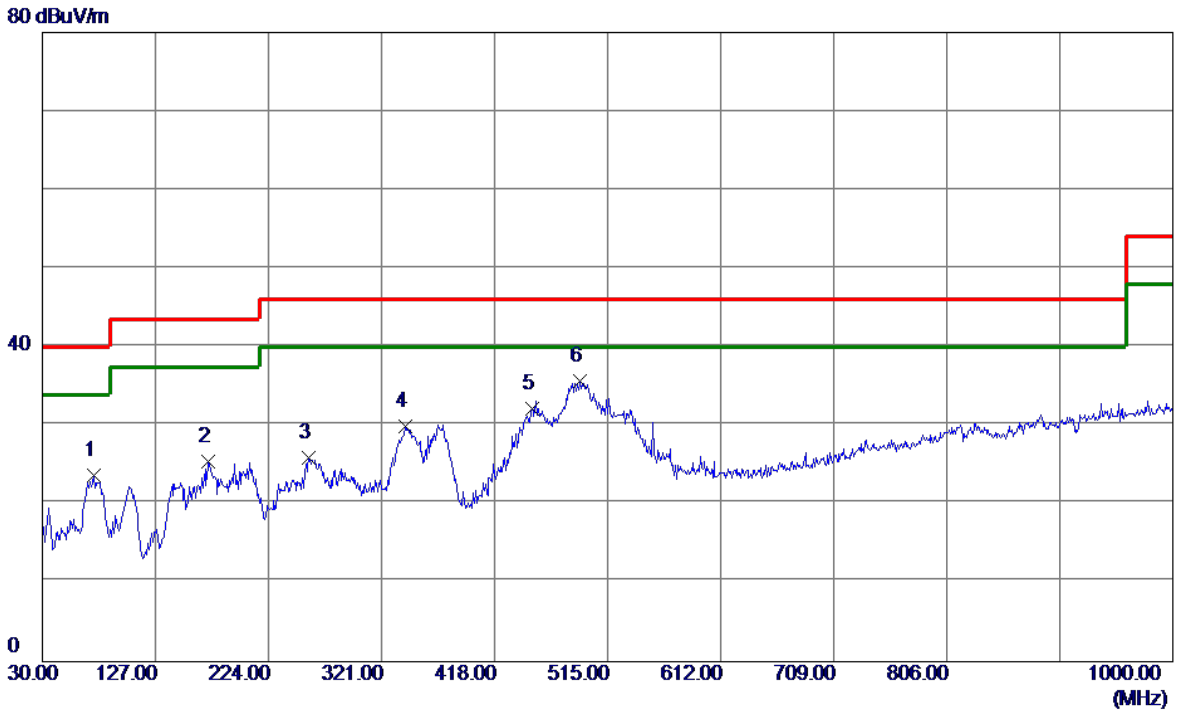
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	74.6200	41.66	-17.04	24.62	40.00	-15.38	Peak	
2	104.6900	39.15	-16.87	22.28	43.50	-21.22	Peak	
3	170.6500	37.85	-12.32	25.53	43.50	-17.97	Peak	
4	258.9200	39.44	-15.62	23.82	46.00	-22.18	Peak	
5	343.3100	36.77	-12.07	24.70	46.00	-21.30	Peak	
6 *	495.6000	44.02	-8.83	35.19	46.00	-10.81	Peak	

Test Mode:	TX 2480MHz_CH78_1Mbps (Adapter:S018BAM0500200)

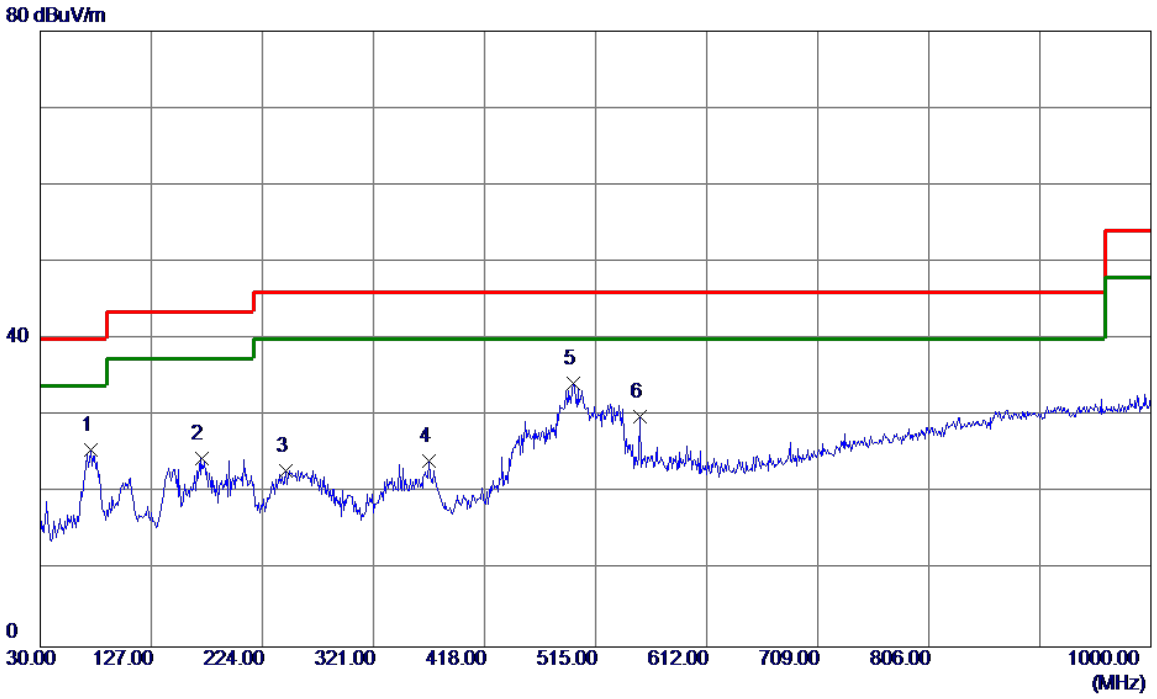
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	74.6200	40.66	-17.04	23.62	40.00	-16.38	Peak	
2	172.5900	37.69	-12.26	25.43	43.50	-18.07	Peak	
3	258.9200	41.49	-15.62	25.87	46.00	-20.13	Peak	
4	341.3700	41.96	-12.11	29.85	46.00	-16.15	Peak	
5	450.0100	42.15	-9.94	32.21	46.00	-13.79	Peak	
6 *	491.7200	44.58	-8.92	35.66	46.00	-10.34	Peak	

Test Mode:	TX 2480MHz_CH78_1Mbps (Adapter:S018BAM0500200)

Horizontal

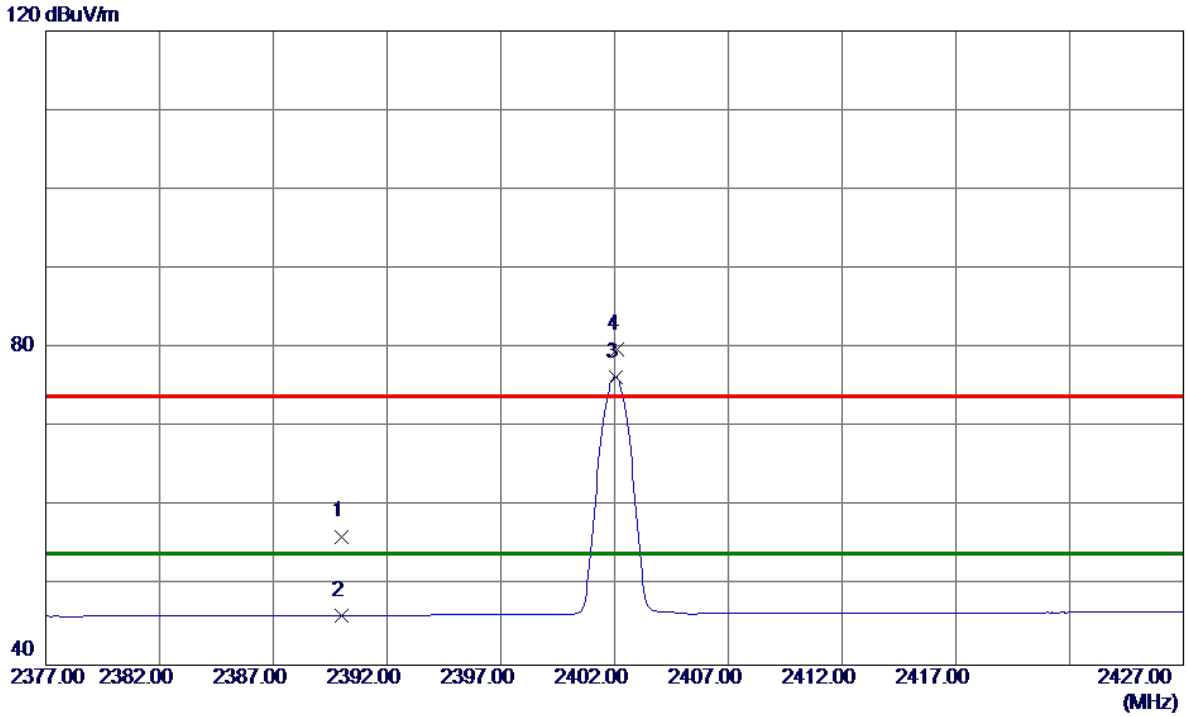


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	74.6200	42.66	-17.04	25.62	40.00	-14.38	Peak	
2	170.6500	36.85	-12.32	24.53	43.50	-18.97	Peak	
3	244.3700	37.54	-14.59	22.95	46.00	-23.05	Peak	
4	369.5000	35.81	-11.72	24.09	46.00	-21.91	Peak	
5 *	495.6000	43.02	-8.83	34.19	46.00	-11.81	Peak	
6	553.8000	37.59	-7.62	29.97	46.00	-16.03	Peak	

APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

Test Mode :	TX 2402MHz _CH00_1Mbps

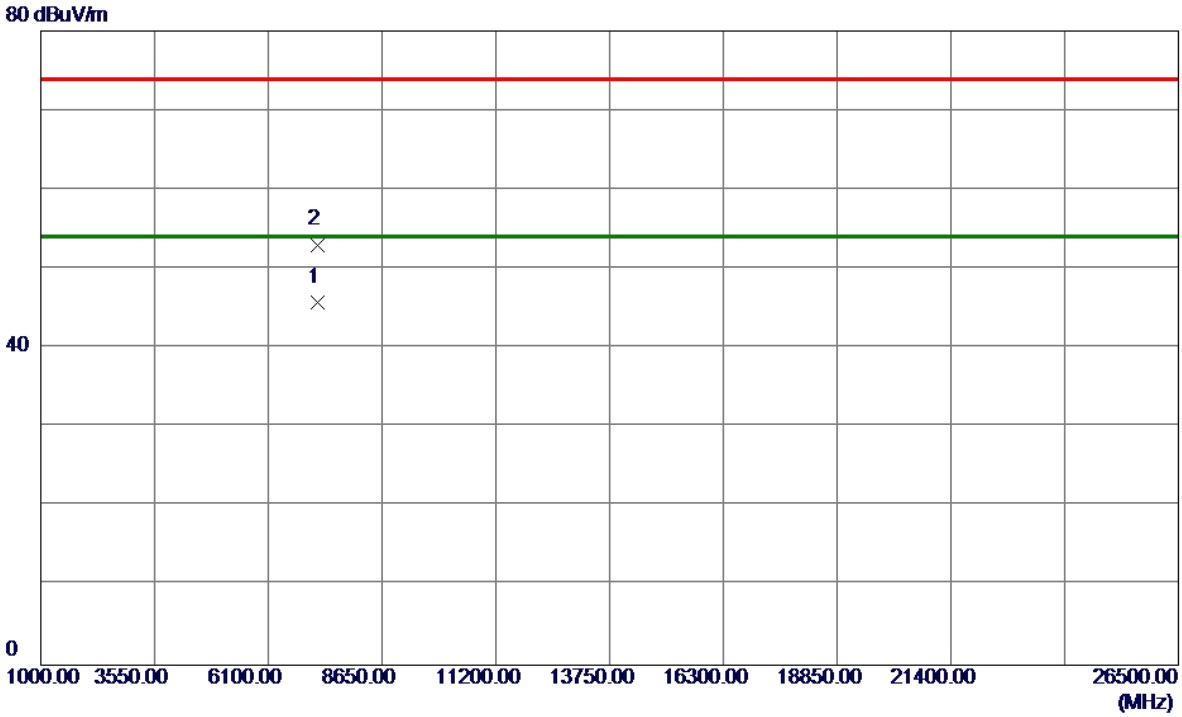
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	23.18	33.06	56.24	74.00	-17.76	Peak	
2	2390.0000	13.22	33.06	46.28	54.00	-7.72	AVG	
3 *	2402.0500	43.23	33.10	76.33	54.00	22.33	AVG	No Limit
4	2402.1000	46.68	33.10	79.78	74.00	5.78	Peak	No Limit

Test Mode :	TX 2402MHz _CH00_1Mbps

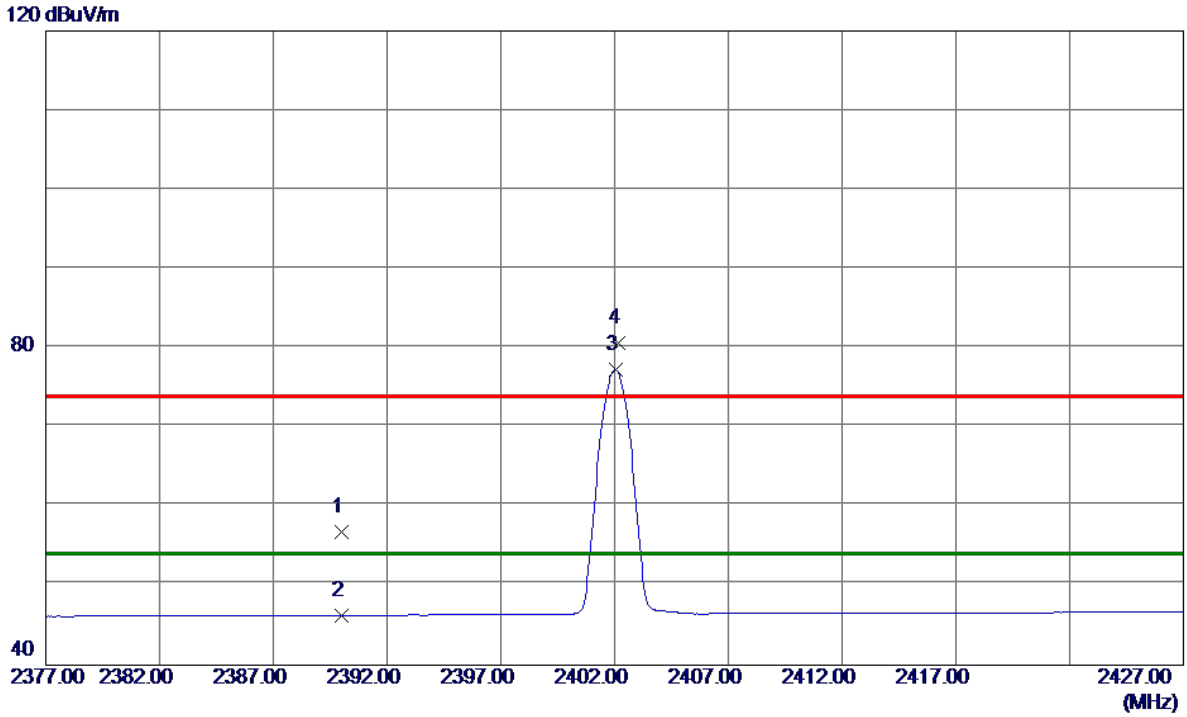
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7206.0900	32.57	13.13	45.70	54.00	-8.30	AVG	
2	7206.4080	39.91	13.13	53.04	74.00	-20.96	Peak	

Test Mode :	TX 2402MHz _CH00_1Mbps

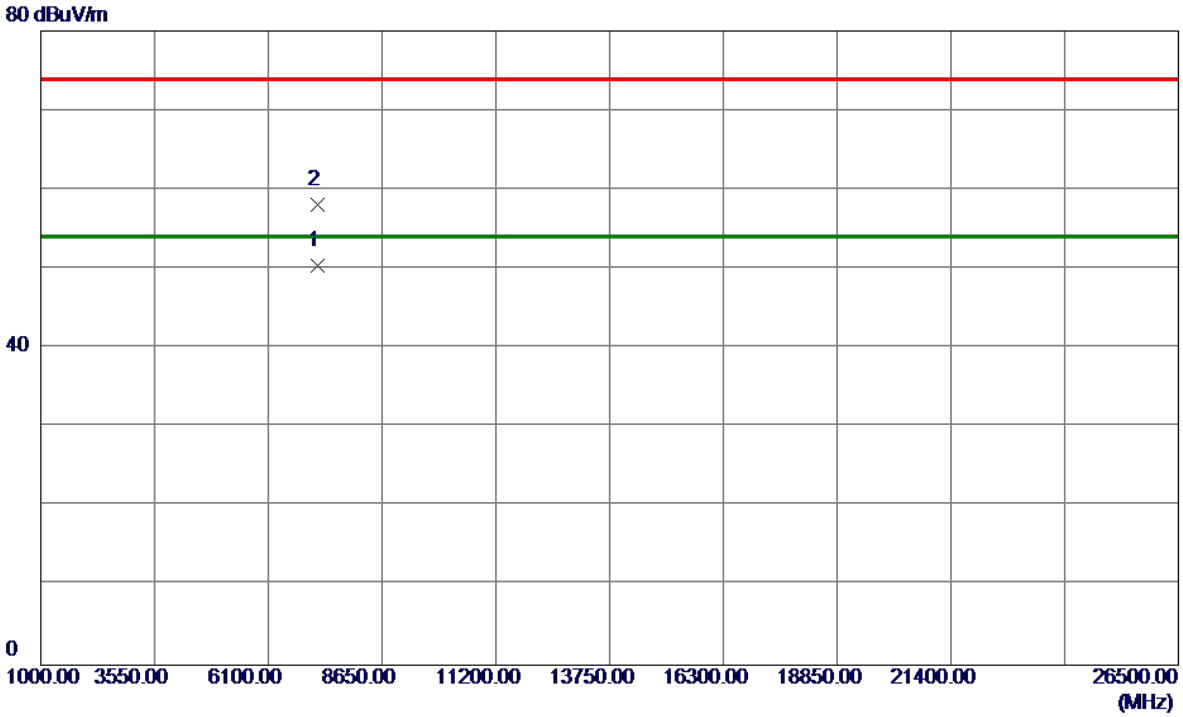
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	23.76	33.06	56.82	74.00	-17.18	Peak	
2	2390.0000	13.24	33.06	46.30	54.00	-7.70	AVG	
3 *	2402.0500	44.11	33.10	77.21	54.00	23.21	AVG	No Limit
4	2402.1500	47.55	33.10	80.65	74.00	6.65	Peak	No Limit

Test Mode :	TX 2402MHz _CH00_1Mbps

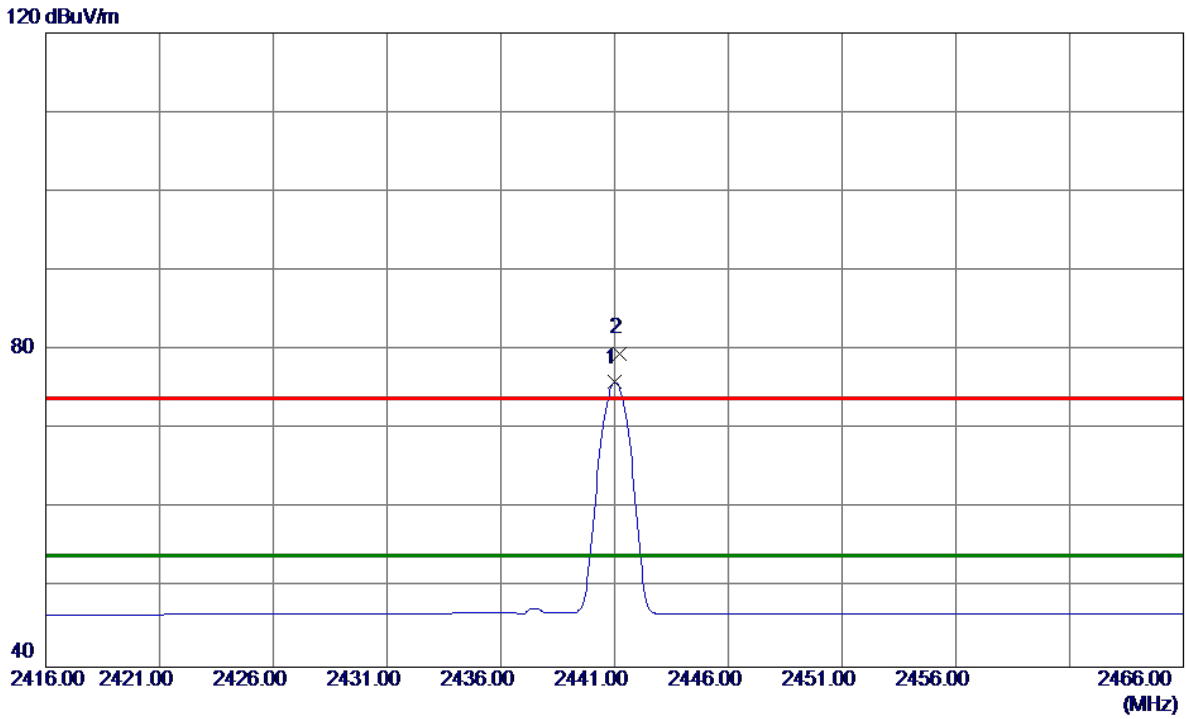
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7206.0080	37.32	13.13	50.45	54.00	-3.55	AVG	
2	7206.4560	44.94	13.13	58.07	74.00	-15.93	Peak	

Test Mode :	TX 2441MHz _CH39_1Mbps

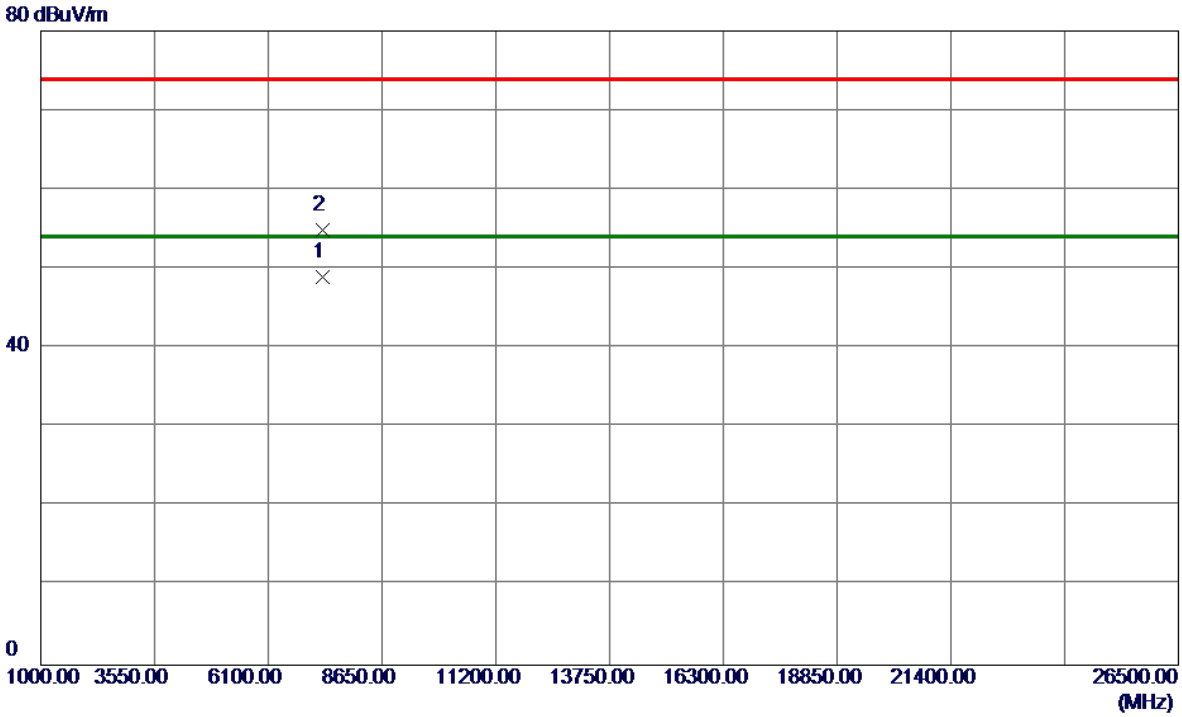
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2441.0000	42.67	33.25	75.92	54.00	21.92	AVG	No Limit
2	2441.2000	46.35	33.25	79.60	74.00	5.60	Peak	No Limit

Test Mode :	TX 2441MHz _CH39_1Mbps

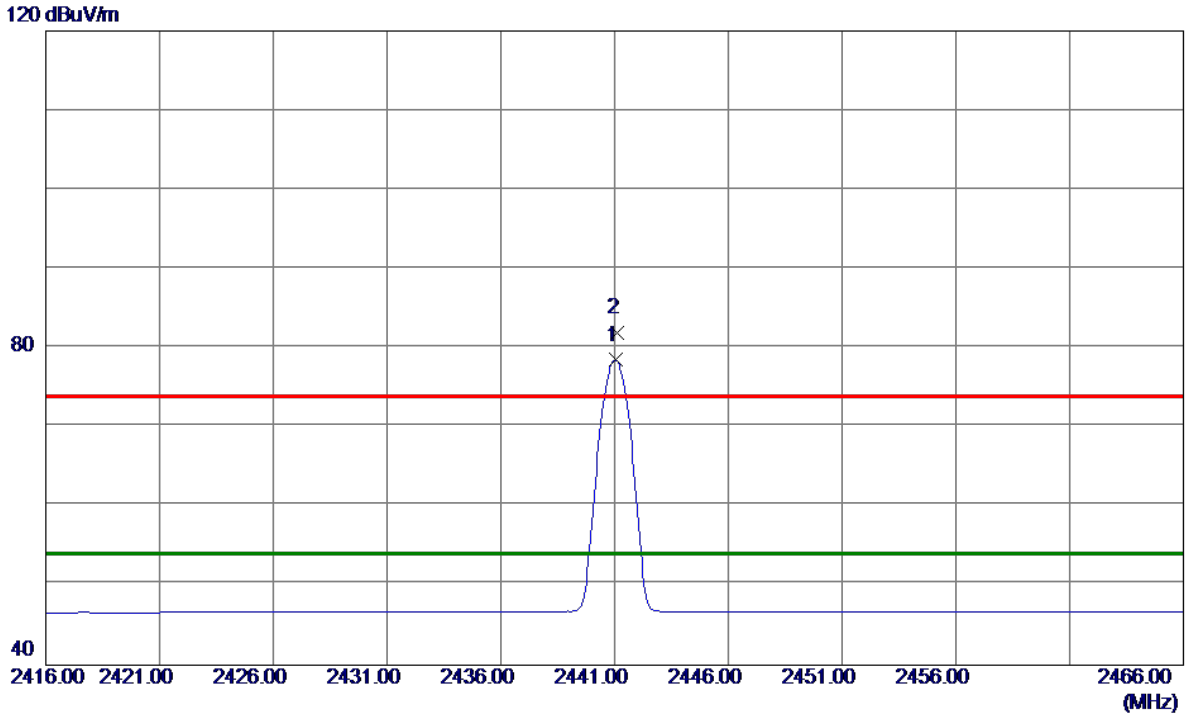
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7323.0720	35.80	13.22	49.02	54.00	-4.98	AVG	
2	7323.4820	41.68	13.22	54.90	74.00	-19.10	Peak	

Test Mode :	TX 2441MHz _CH39_1Mbps

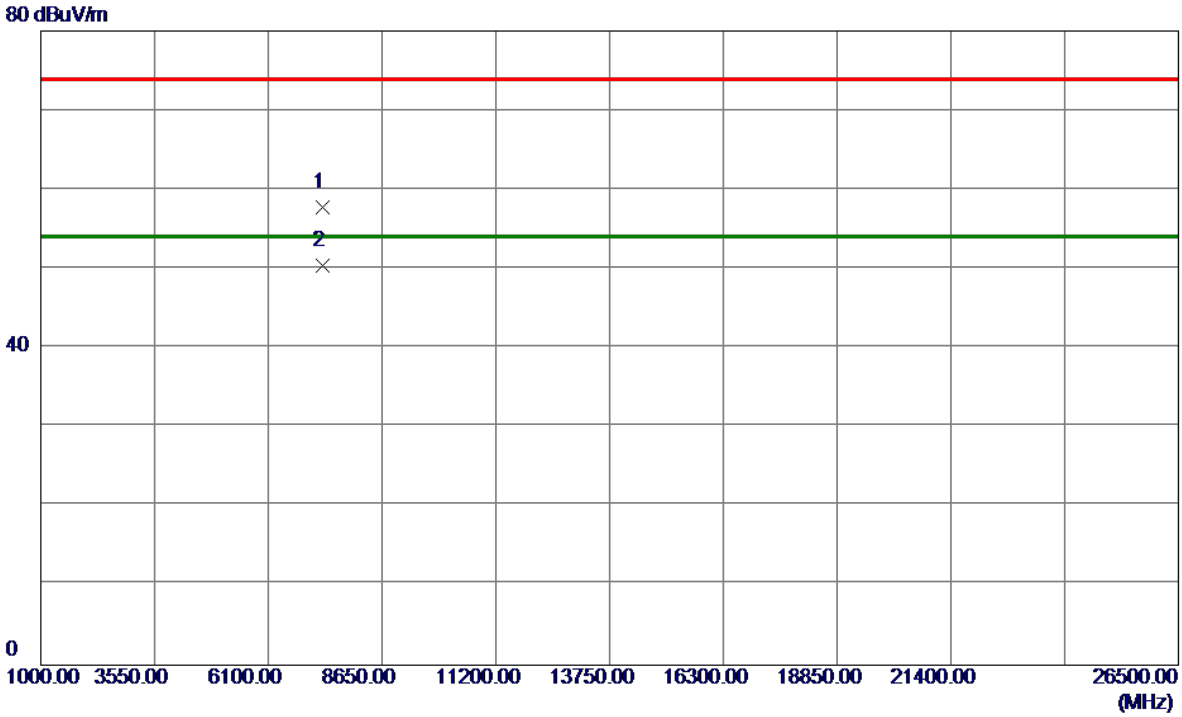
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2441.0500	45.23	33.25	78.48	54.00	24.48	AVG	No Limit
2	2441.1000	48.65	33.25	81.90	74.00	7.90	Peak	No Limit

Test Mode :	TX 2441MHz _CH39_1Mbps

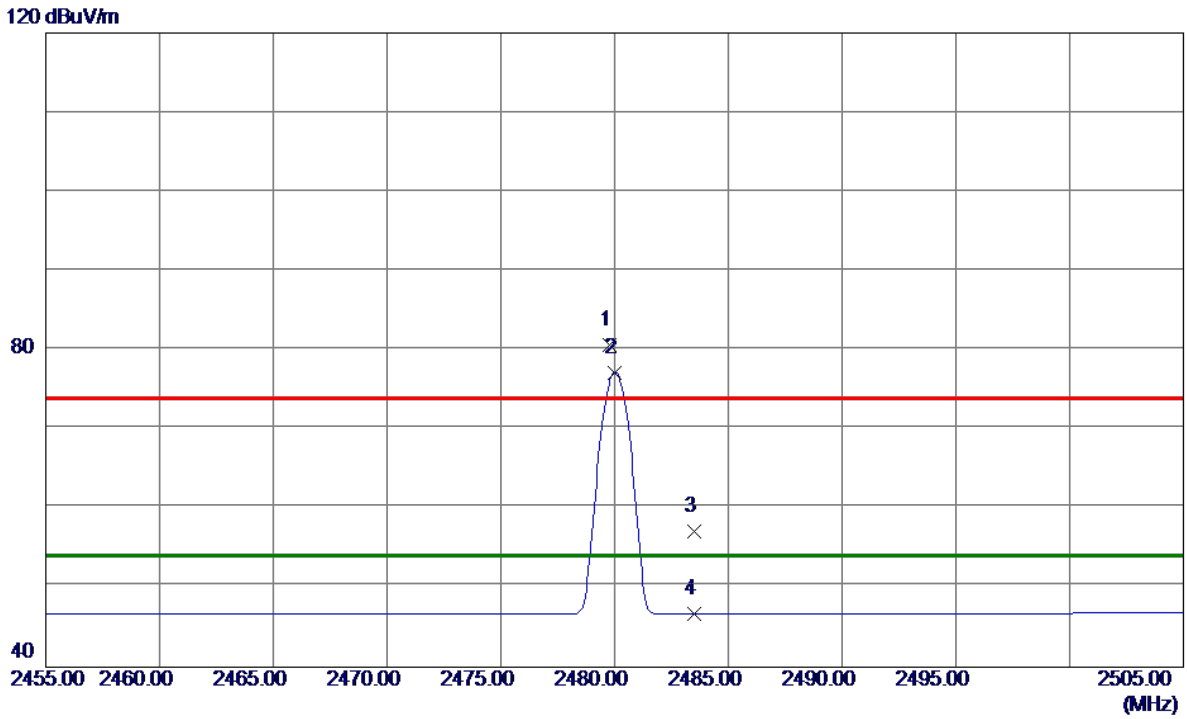
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7322.5500	44.57	13.22	57.79	74.00	-16.21	Peak	
2 *	7323.0060	37.20	13.22	50.42	54.00	-3.58	AVG	

Test Mode :	TX 2480MHz _CH78_1Mbps

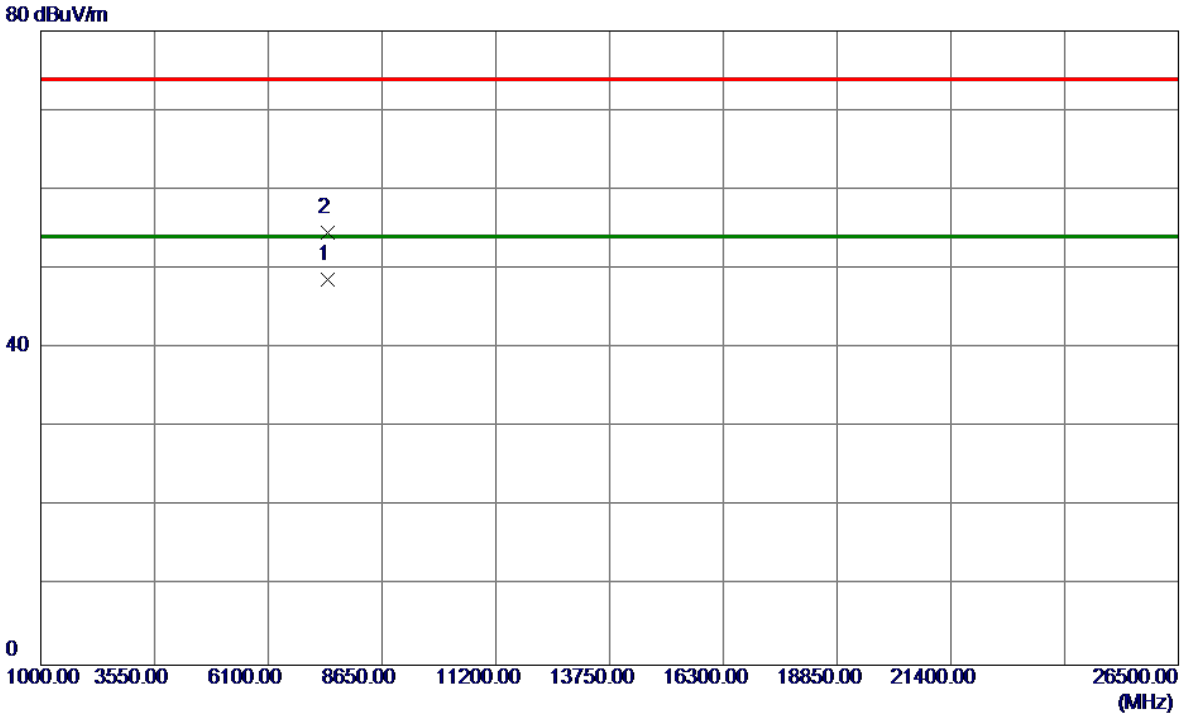
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479.8000	47.20	33.39	80.59	74.00	6.59	Peak	No Limit
2 *	2480.0000	43.78	33.39	77.17	54.00	23.17	AVG	No Limit
3	2483.5000	23.70	33.41	57.11	74.00	-16.89	Peak	
4	2483.5000	13.24	33.41	46.65	54.00	-7.35	AVG	

Test Mode :	TX 2480MHz _CH78_1Mbps

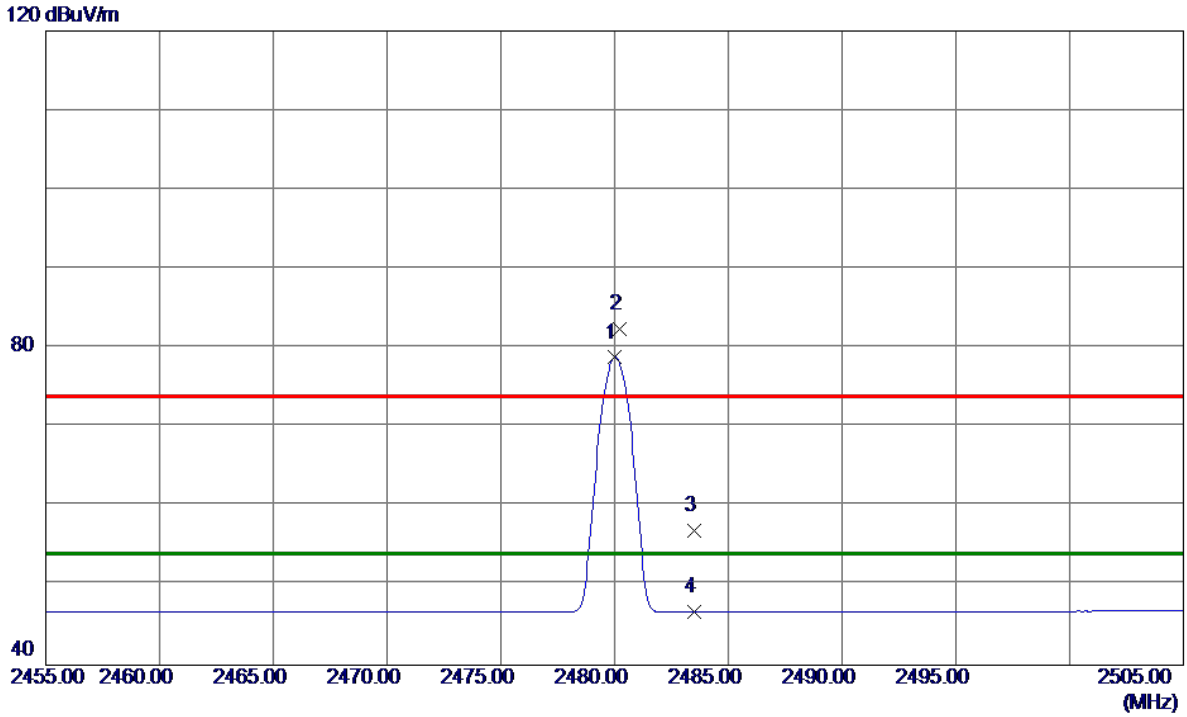
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7439.9720	35.38	13.31	48.69	54.00	-5.31	AVG	
2	7440.4780	41.20	13.31	54.51	74.00	-19.49	Peak	

Test Mode :	TX 2480MHz _CH78_1Mbps

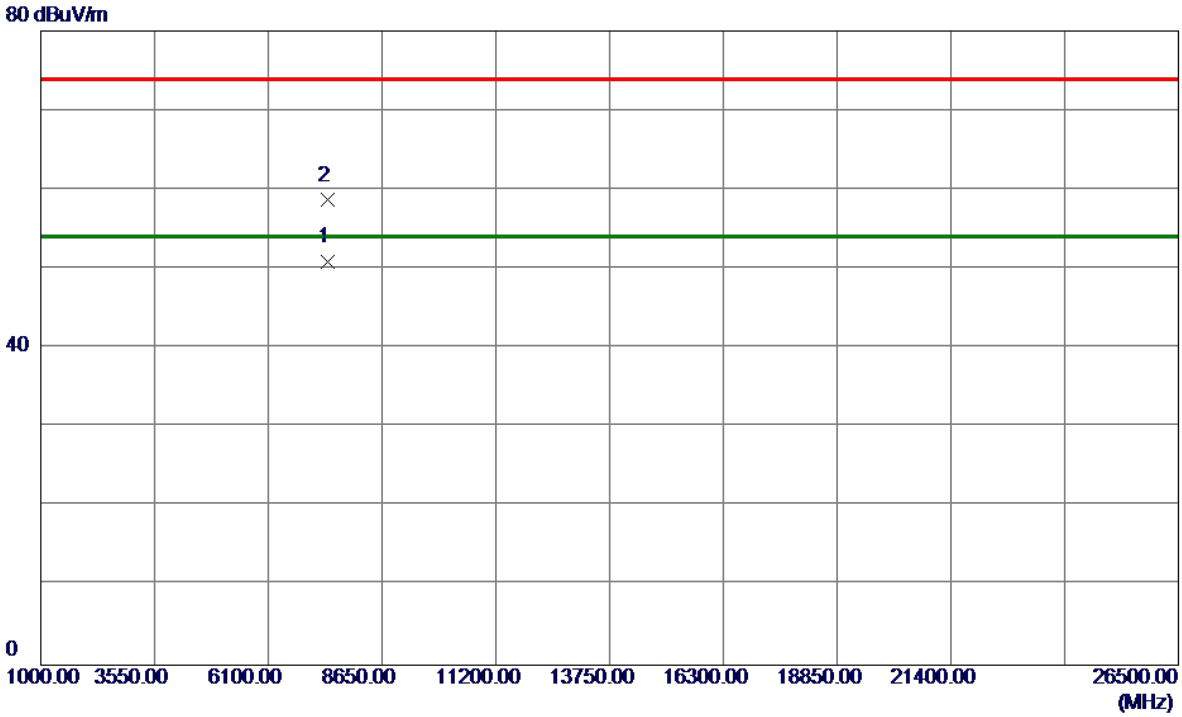
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480.0000	45.41	33.39	78.80	54.00	24.80	AVG	No Limit
2	2480.2000	48.94	33.40	82.34	74.00	8.34	Peak	No Limit
3	2483.5000	23.56	33.41	56.97	74.00	-17.03	Peak	
4	2483.5000	13.27	33.41	46.68	54.00	-7.32	AVG	

Test Mode :	TX 2480MHz _CH78_1Mbps

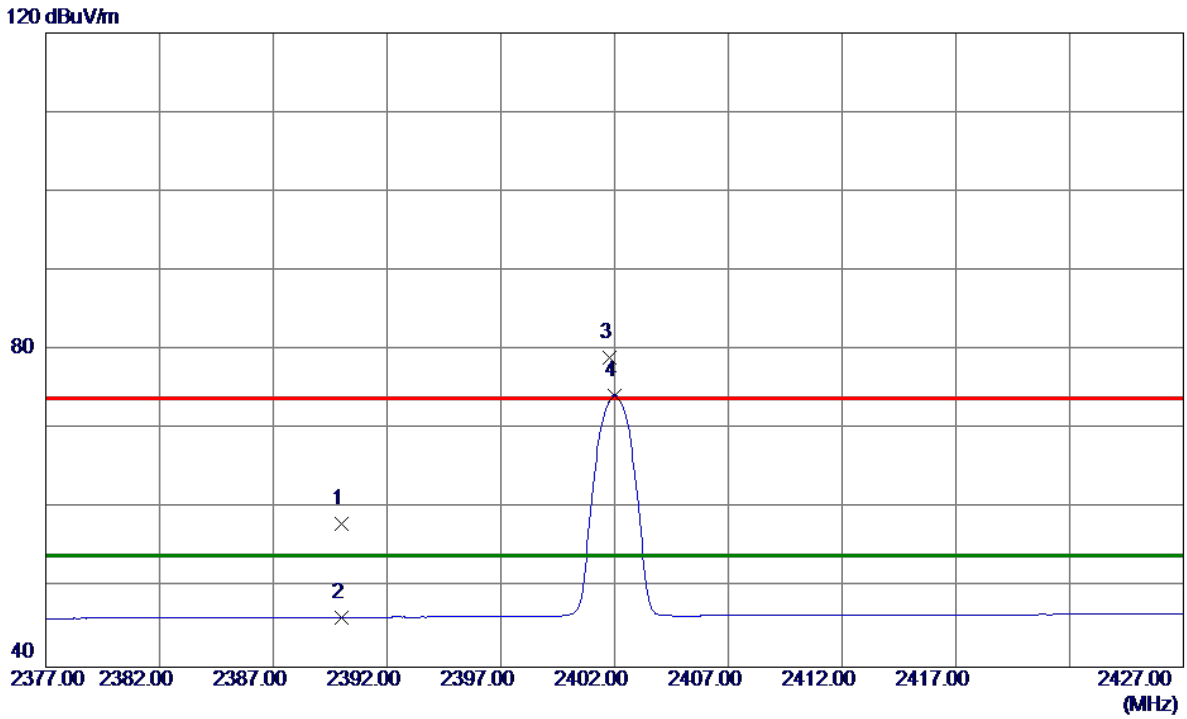
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7440.0020	37.50	13.31	50.81	54.00	-3.19	AVG	
2	7440.5560	45.33	13.31	58.64	74.00	-15.36	Peak	

Test Mode :	TX 2402MHz _CH00_3Mbps

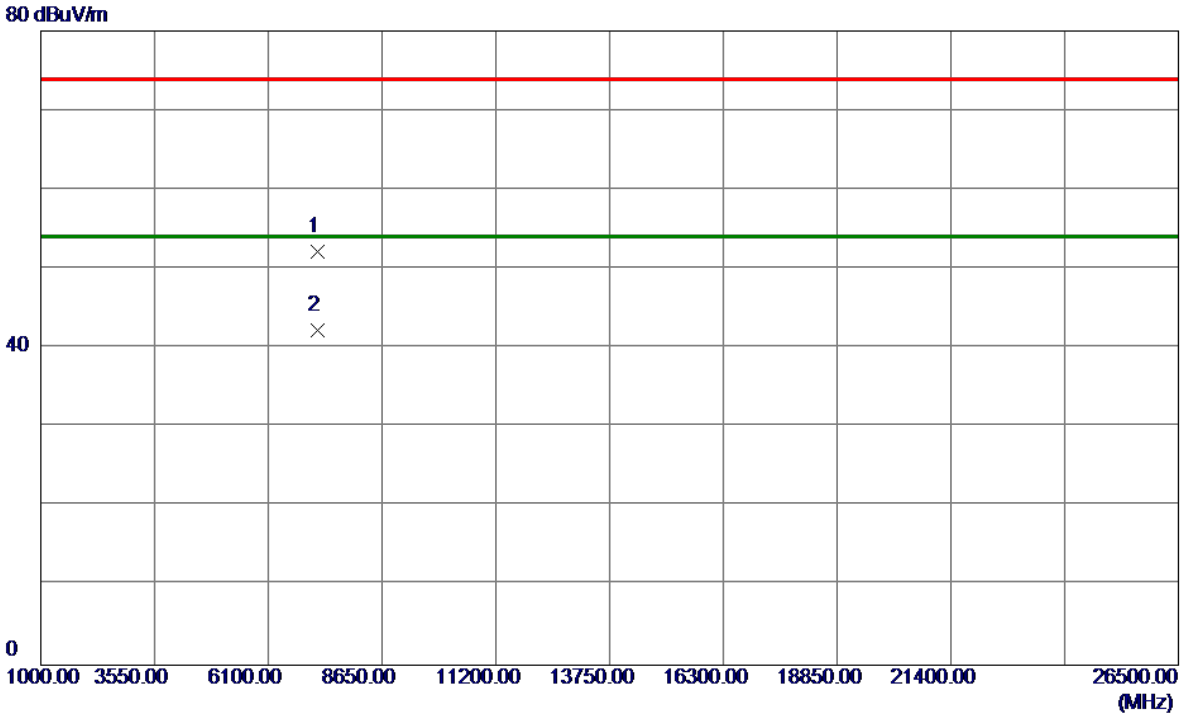
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	25.09	33.06	58.15	74.00	-15.85	Peak	
2	2390.0000	13.23	33.06	46.29	54.00	-7.71	AVG	
3	2401.8000	45.87	33.10	78.97	74.00	4.97	Peak	No Limit
4 *	2402.0000	41.22	33.10	74.32	54.00	20.32	AVG	No Limit

Test Mode :	TX 2402MHz _CH00_3Mbps

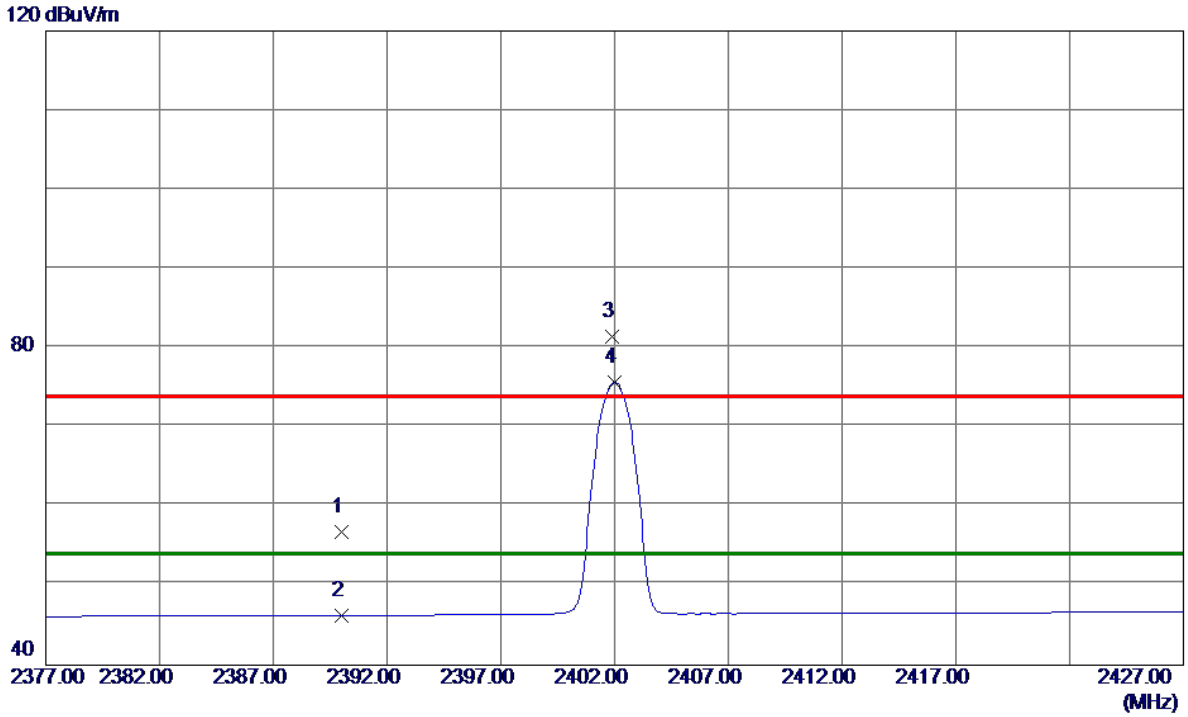
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7205.4960	38.99	13.13	52.12	74.00	-21.88	Peak	
2 *	7205.7780	29.11	13.13	42.24	54.00	-11.76	AVG	

Test Mode :	TX 2402MHz _CH00_3Mbps

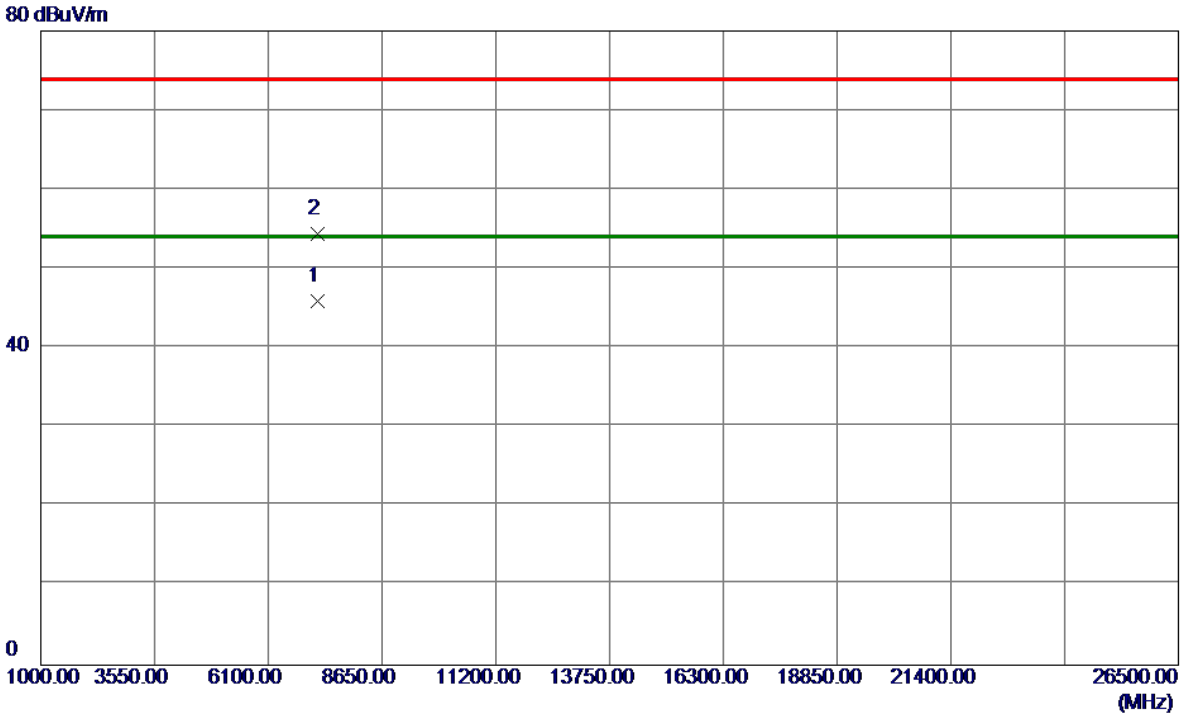
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	23.77	33.06	56.83	74.00	-17.17	Peak	
2	2390.0000	13.22	33.06	46.28	54.00	-7.72	AVG	
3	2401.9000	48.32	33.10	81.42	74.00	7.42	Peak	No Limit
4 *	2402.0000	42.56	33.10	75.66	54.00	21.66	AVG	No Limit

Test Mode :	TX 2402MHz _CH00_3Mbps

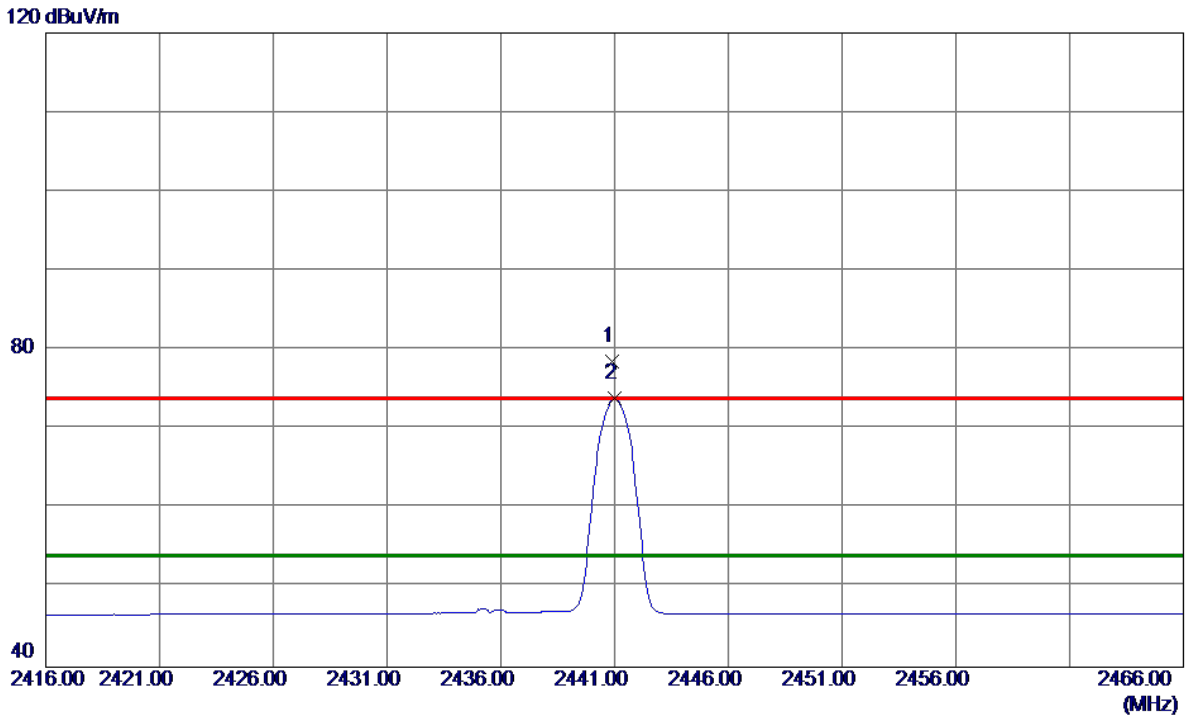
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7205.8920	32.81	13.13	45.94	54.00	-8.06	AVG	
2	7206.1700	41.22	13.13	54.35	74.00	-19.65	Peak	

Test Mode :	TX 2441MHz _CH39_3Mbps

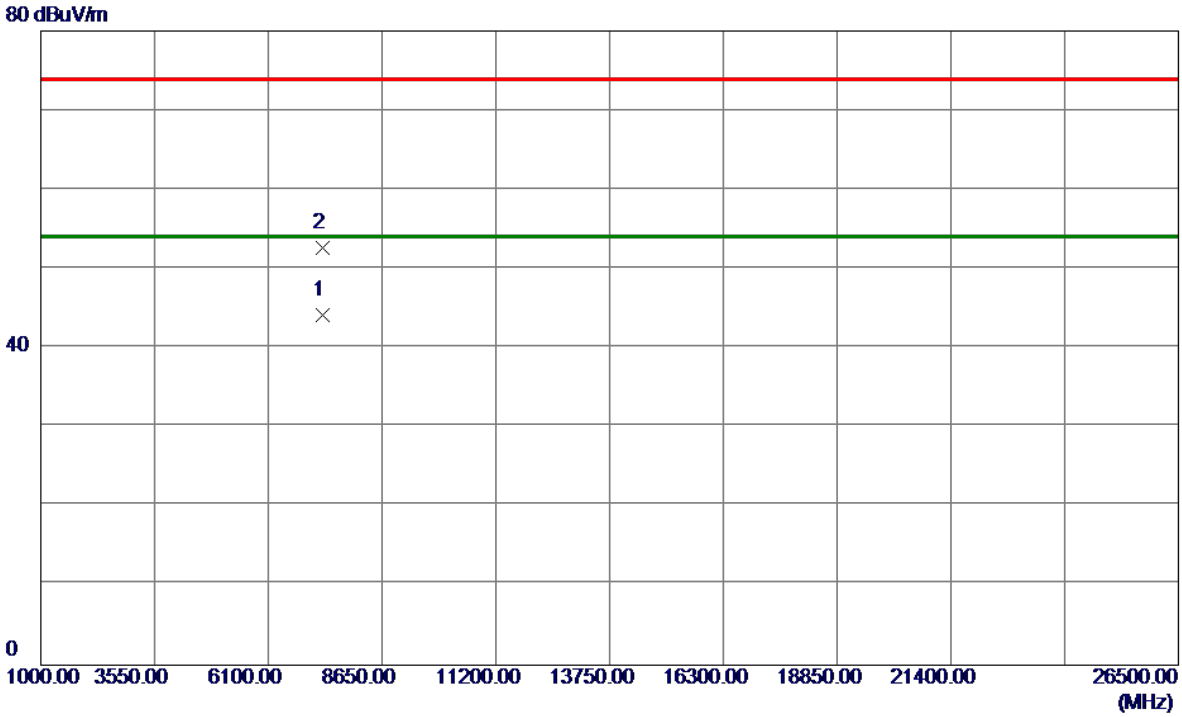
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2440.9000	45.33	33.25	78.58	74.00	4.58	Peak	No Limit
2 *	2441.0000	40.61	33.25	73.86	54.00	19.86	AVG	No Limit

Test Mode :	TX 2441MHz _CH39_3Mbps

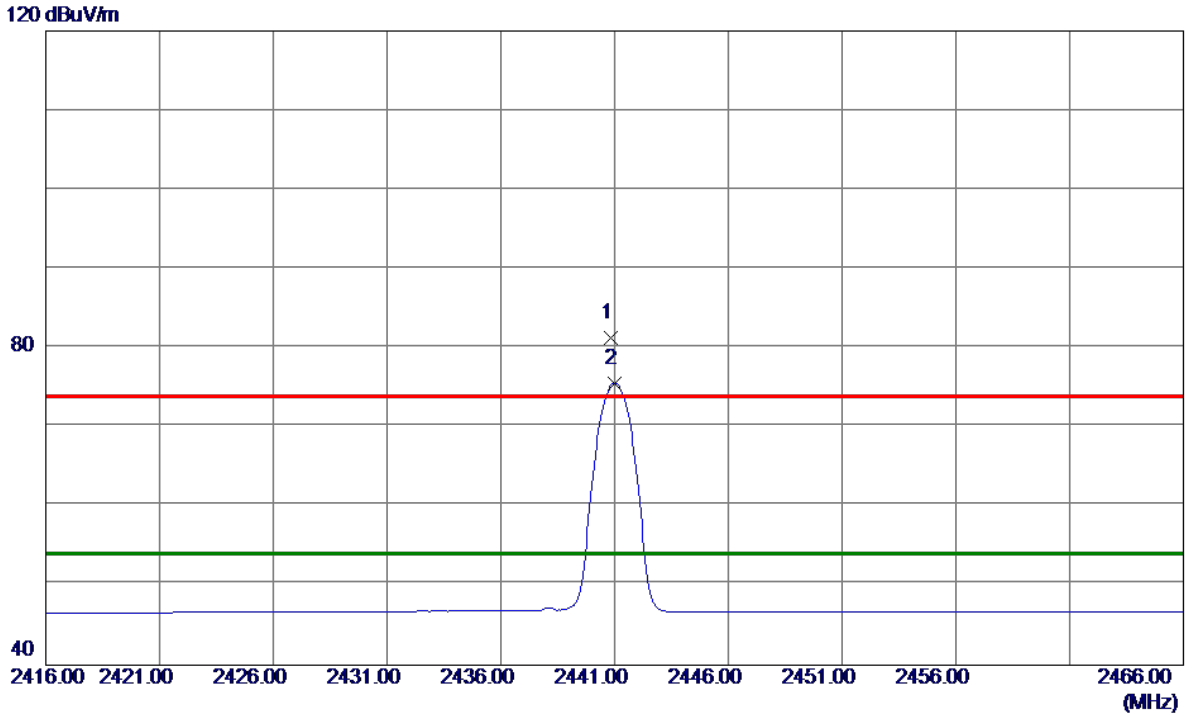
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7322.8580	31.00	13.22	44.22	54.00	-9.78	AVG	
2	7323.4900	39.39	13.22	52.61	74.00	-21.39	Peak	

Test Mode :	TX 2441MHz _CH39_3Mbps

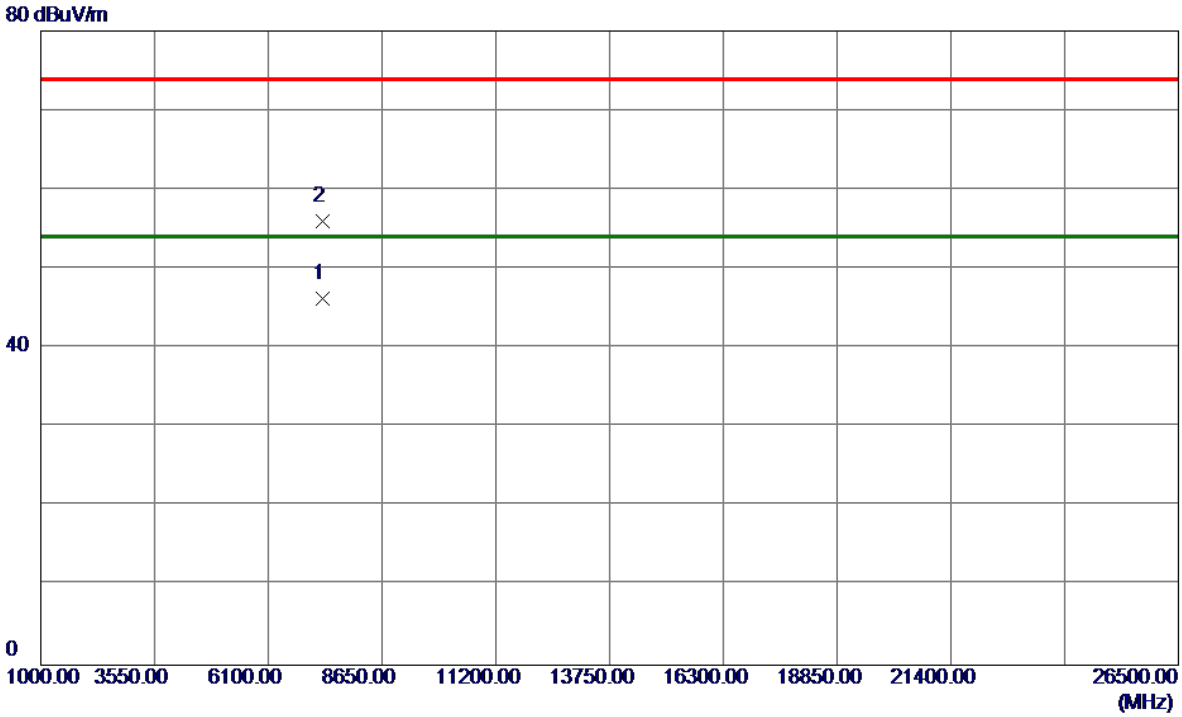
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2440.8500	47.99	33.25	81.24	74.00	7.24	Peak	No Limit
2 *	2441.0000	42.31	33.25	75.56	54.00	21.56	AVG	No Limit

Test Mode :	TX 2441MHz _CH39_3Mbps

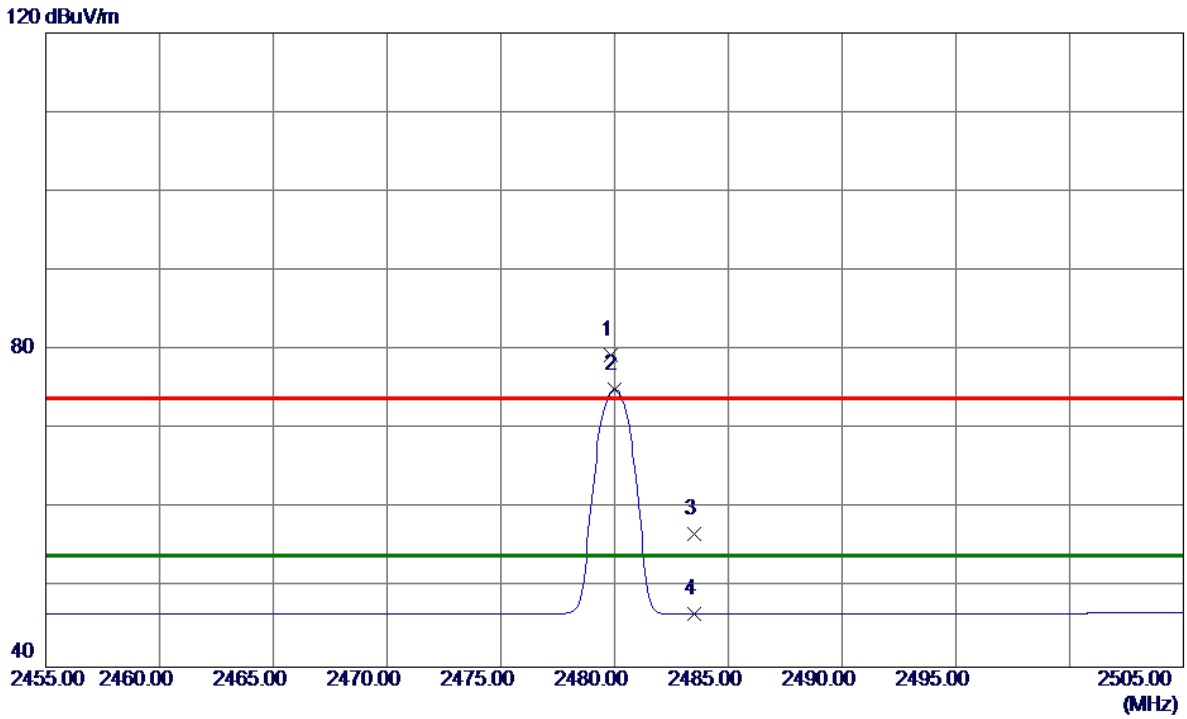
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7322.9460	33.03	13.22	46.25	54.00	-7.75	AVG	
2	7323.0640	42.72	13.22	55.94	74.00	-18.06	Peak	

Test Mode :	TX 2480MHz _CH78_3Mbps

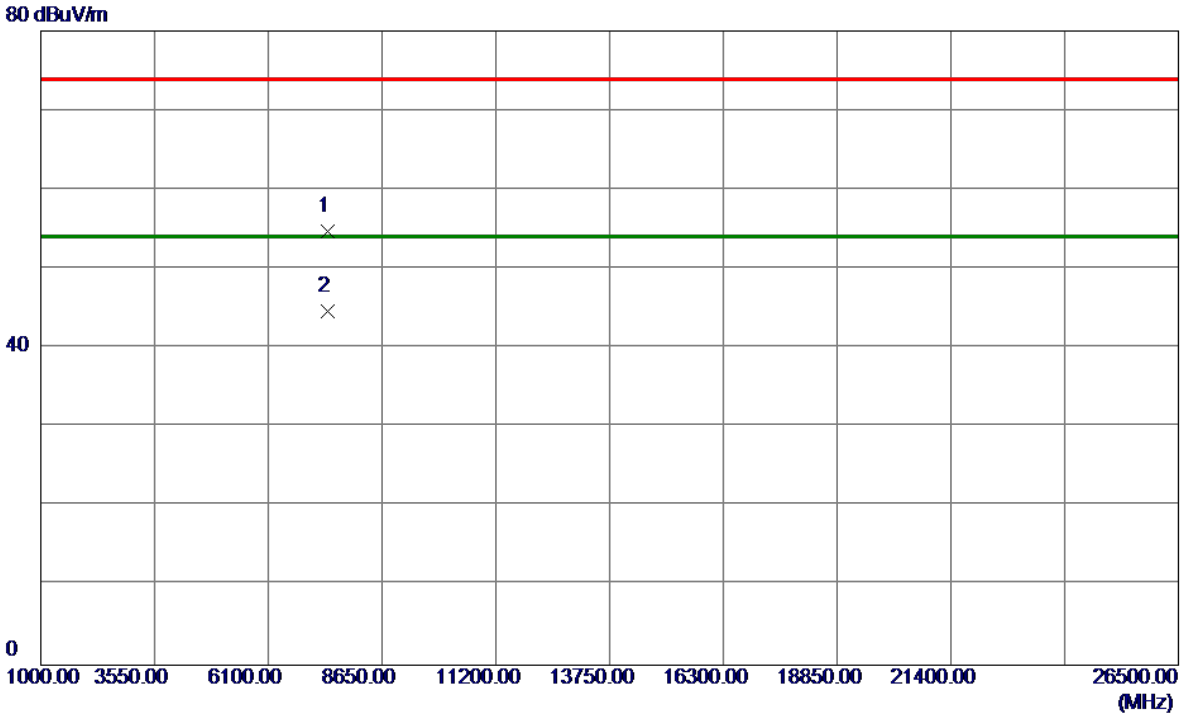
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479.8500	46.01	33.39	79.40	74.00	5.40	Peak	No Limit
2 *	2480.0000	41.63	33.39	75.02	54.00	21.02	AVG	No Limit
3	2483.5000	23.33	33.41	56.74	74.00	-17.26	Peak	
4	2483.5000	13.27	33.41	46.68	54.00	-7.32	AVG	

Test Mode :	TX 2480MHz _CH78_3Mbps

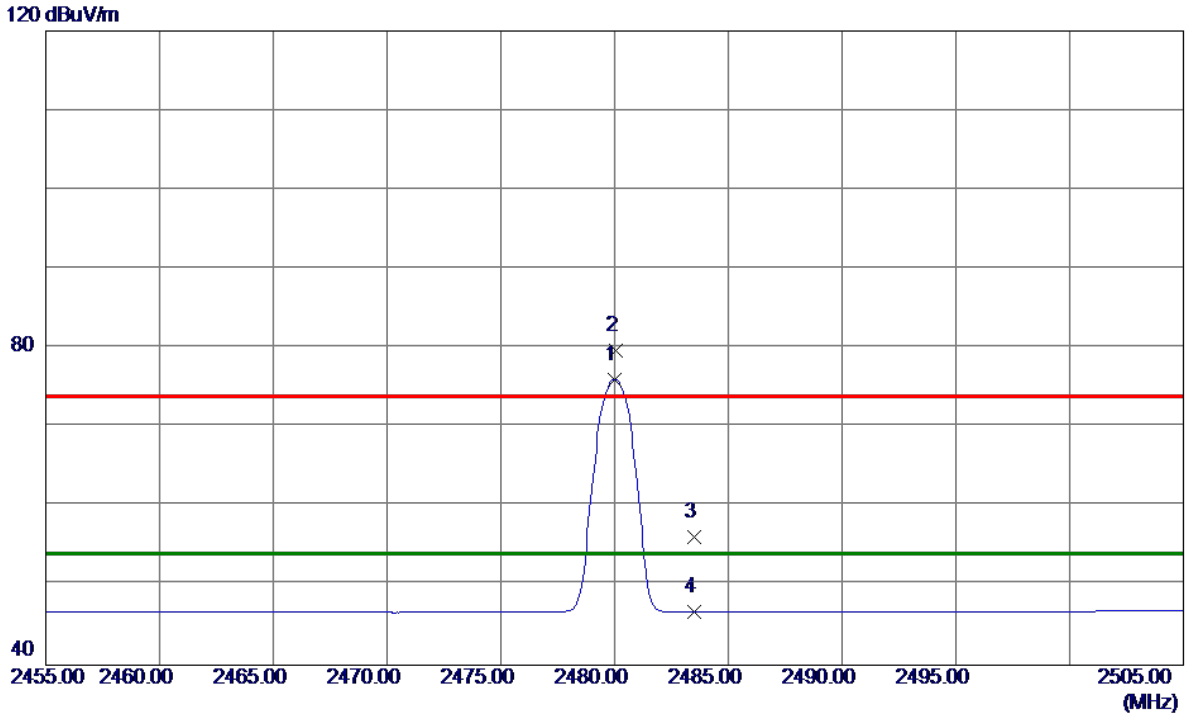
Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7439.4600	41.37	13.31	54.68	74.00	-19.32	Peak	
2 *	7439.9460	31.33	13.31	44.64	54.00	-9.36	AVG	

Test Mode :	TX 2480MHz _CH78_3Mbps

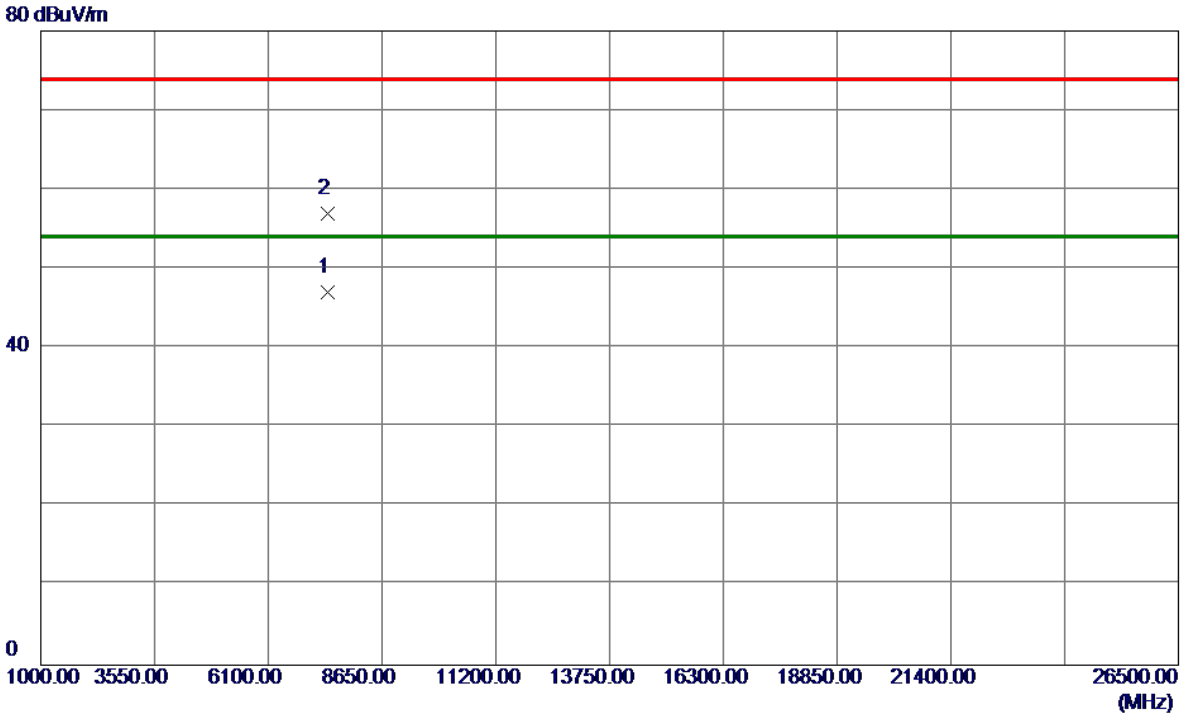
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480.0000	42.66	33.39	76.05	54.00	22.05	AVG	No Limit
2	2480.0500	46.23	33.39	79.62	74.00	5.62	Peak	No Limit
3	2483.5000	22.70	33.41	56.11	74.00	-17.89	Peak	
4	2483.5000	13.25	33.41	46.66	54.00	-7.34	AVG	

Test Mode :	TX 2480MHz _CH78_3Mbps

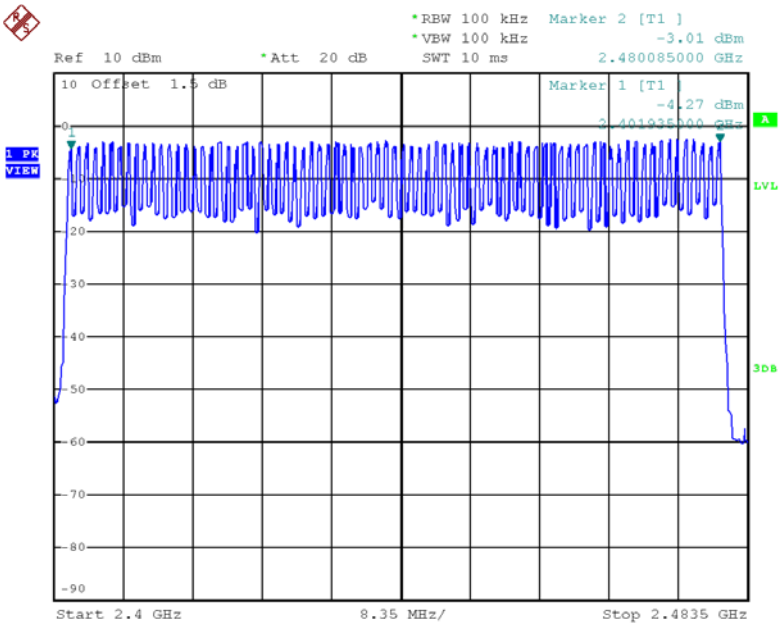
Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7439.9420	33.80	13.31	47.11	54.00	-6.89	AVG	
2	7440.0200	43.57	13.31	56.88	74.00	-17.12	Peak	

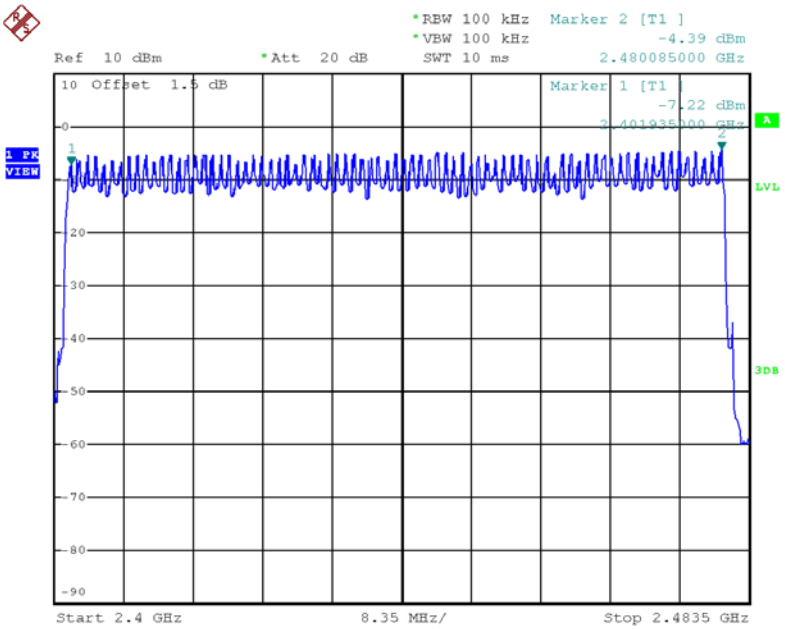
APPENDIX E - NUMBER OF HOPPING CHANNEL

Test Mode	Hopping Mode_1Mbps
Number of Hopping Channel	79



Date: 12.NOV.2017 17:34:03

Test Mode	Hopping Mode_3Mbps
Number of Hopping Channel	79



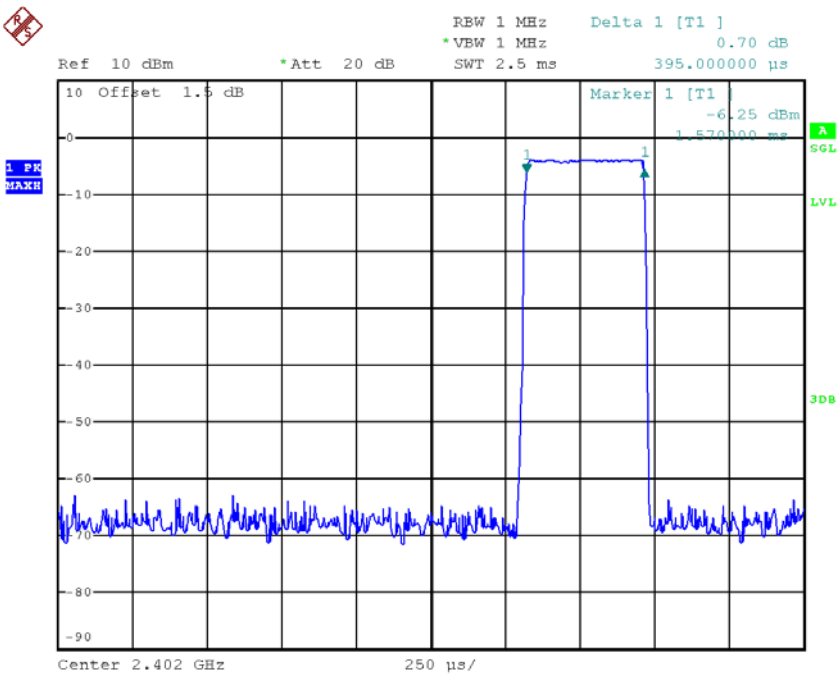
Date: 12.NOV.2017 17:49:54

APPENDIX F - AVERAGE TIME OF OCCUPANCY

Test Mode :	TX Mode_1Mbps

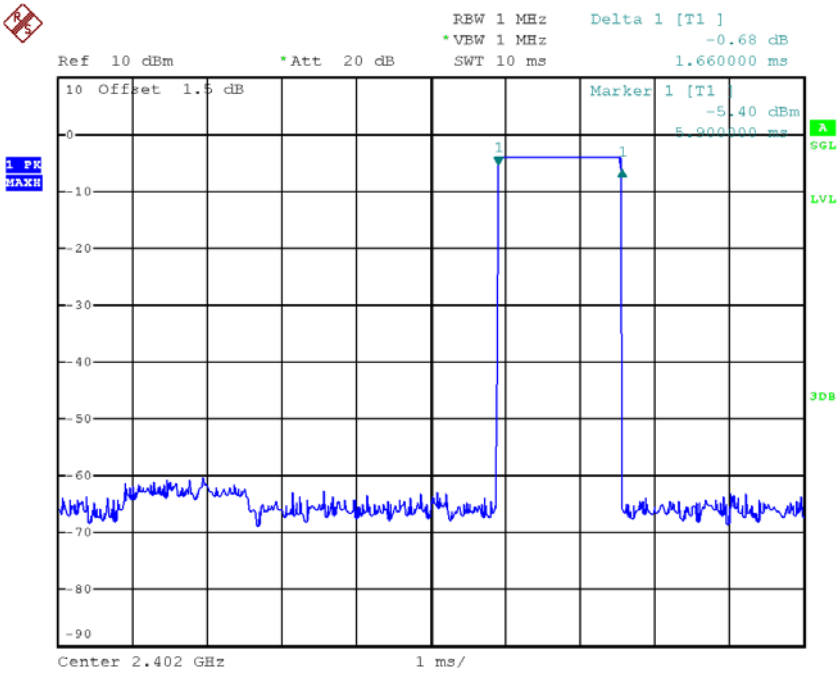
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.9200	0.3115	0.4000	Pass
DH3	2402	1.6600	0.2656	0.4000	Pass
DH1	2402	0.3950	0.1264	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH3	2441	1.6400	0.2624	0.4000	Pass
DH1	2441	0.4000	0.1280	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6400	0.2624	0.4000	Pass
DH1	2480	0.4000	0.1280	0.4000	Pass

CH00-DH1



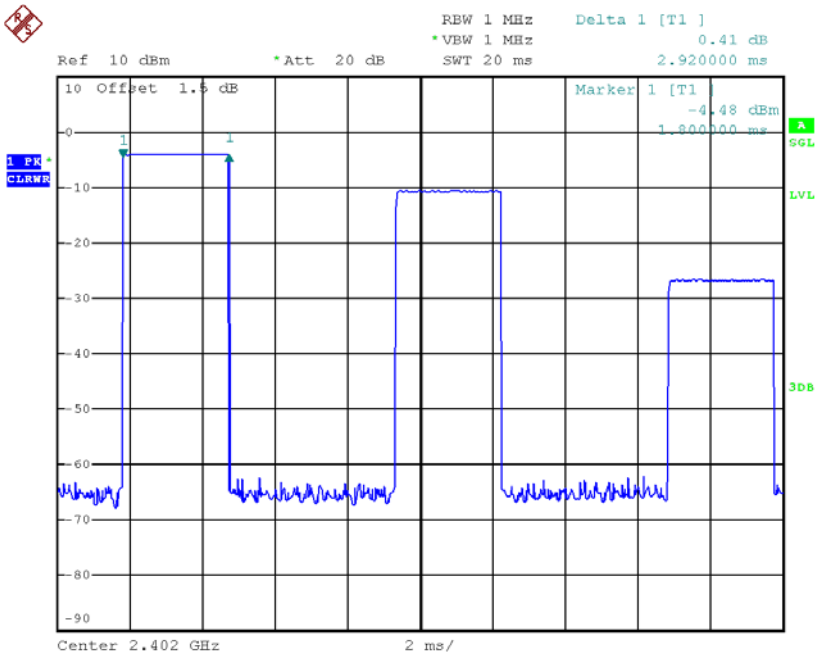
Date: 12.NOV.2017 17:24:28

CH00-DH3



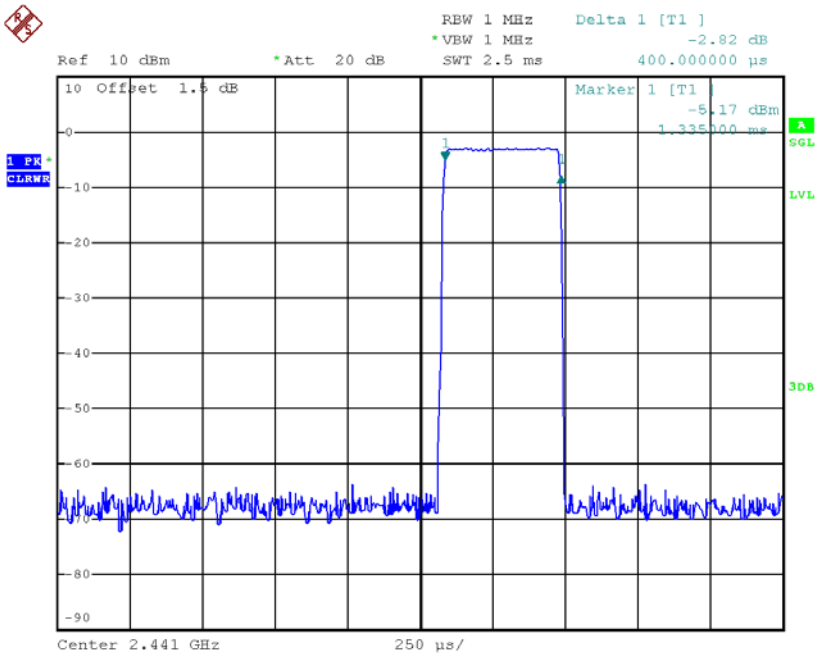
Date: 12.NOV.2017 17:36:32

CH00-DH5



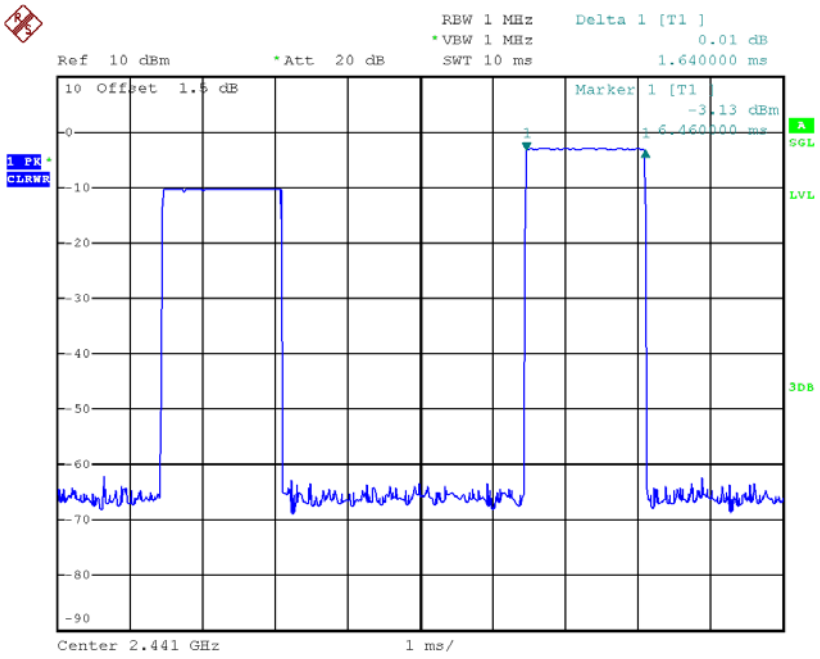
Date: 12.NOV.2017 17:37:44

CH39-DH1



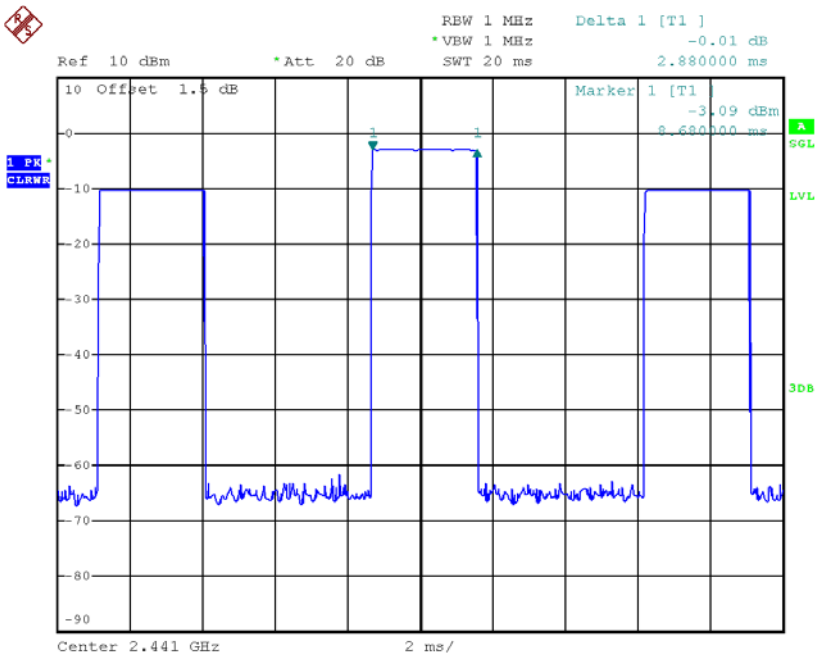
Date: 12.NOV.2017 17:24:40

CH39-DH3



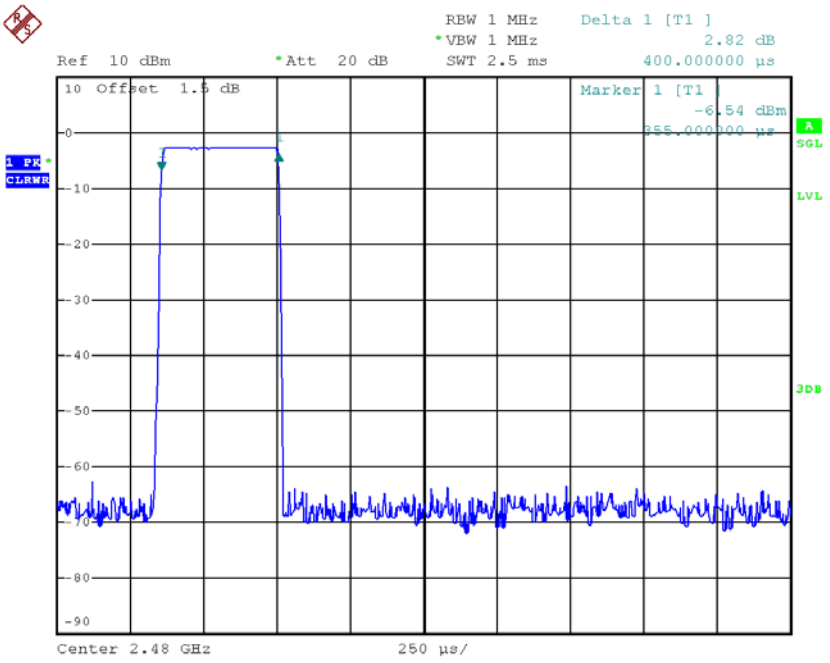
Date: 12.NOV.2017 17:36:38

CH39-DH5



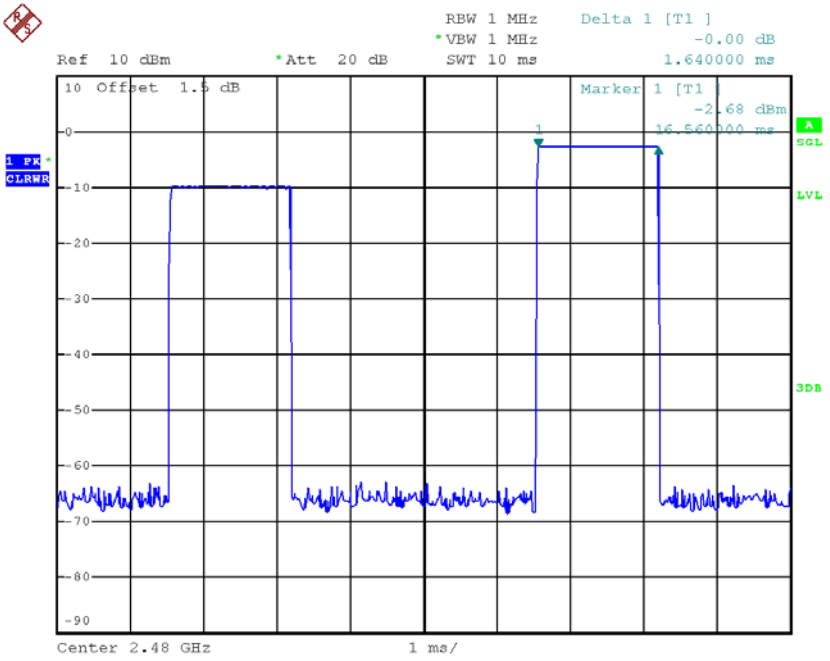
Date: 12.NOV.2017 17:37:54

CH78-DH1



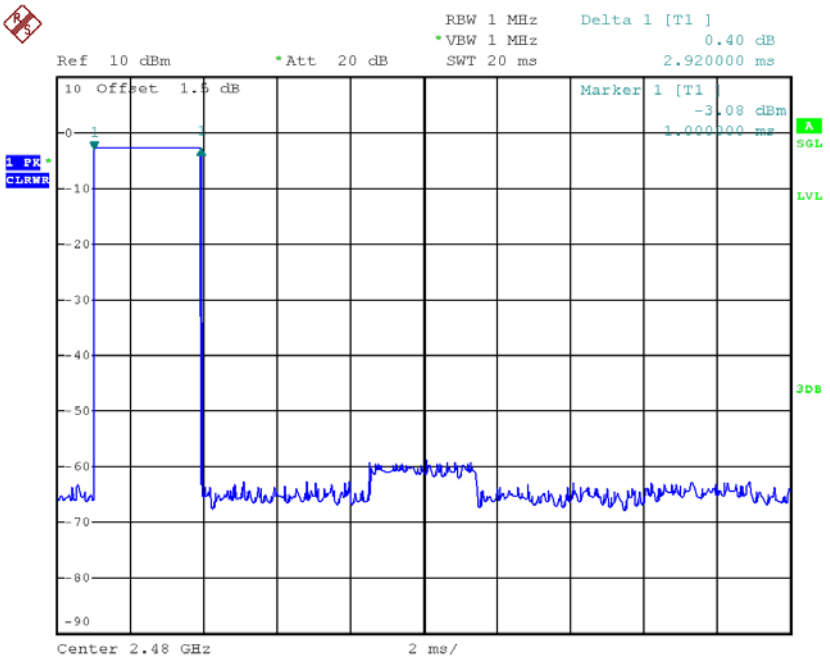
Date: 12.NOV.2017 17:25:32

CH78-DH3



Date: 12.NOV.2017 17:37:14

CH78-DH5

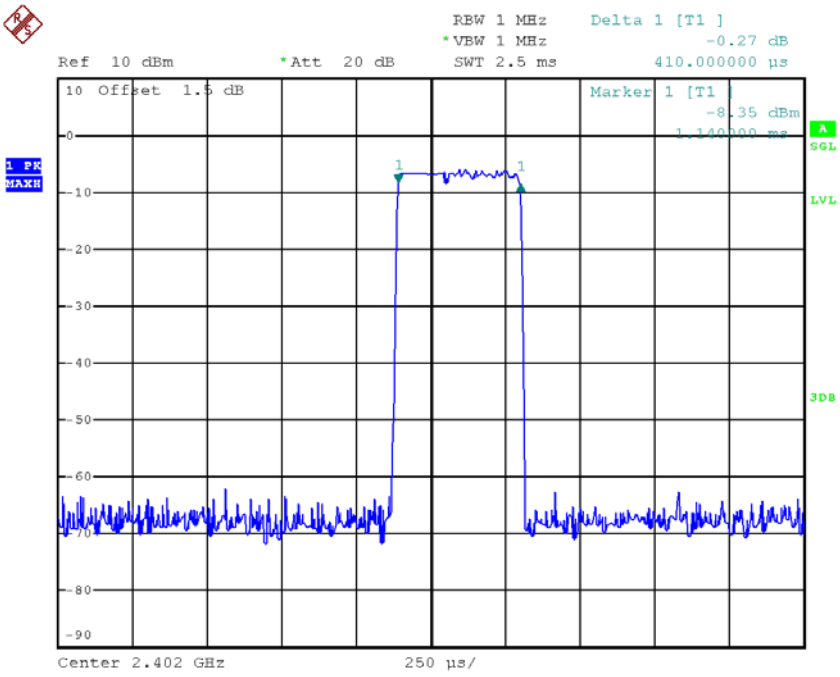


Date: 12.NOV.2017 17:37:58

Test Mode :	TX Mode_3Mbps

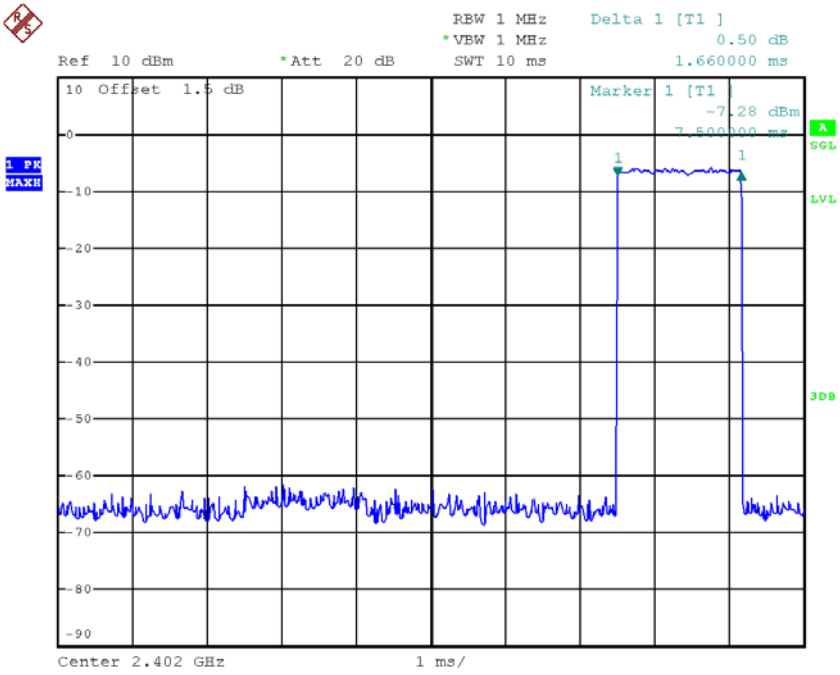
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
DH5	2402	2.9200	0.3115	0.4000	Pass
DH3	2402	1.6600	0.2656	0.4000	Pass
DH1	2402	0.4100	0.1312	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH3	2441	1.6600	0.2656	0.4000	Pass
DH1	2441	0.4100	0.1312	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6600	0.2656	0.4000	Pass
DH1	2480	0.4150	0.1328	0.4000	Pass

CH00-DH1



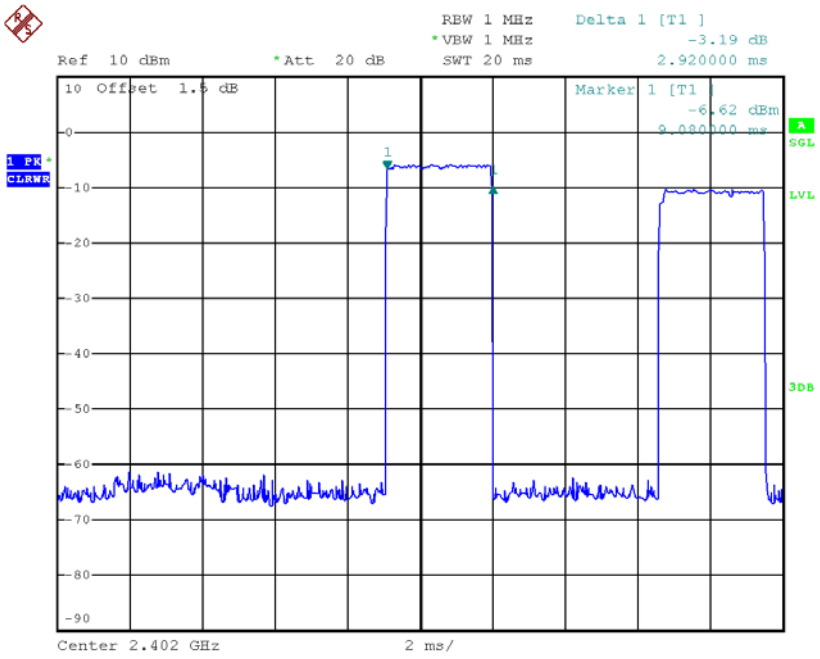
Date: 12.NOV.2017 17:43:22

CH00-DH3



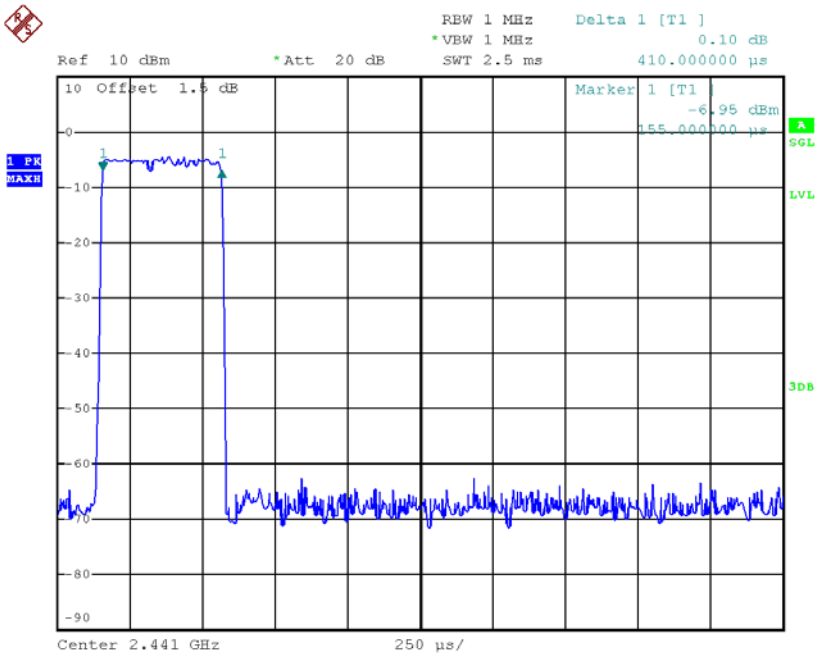
Date: 12.NOV.2017 17:57:45

CH00-DH5



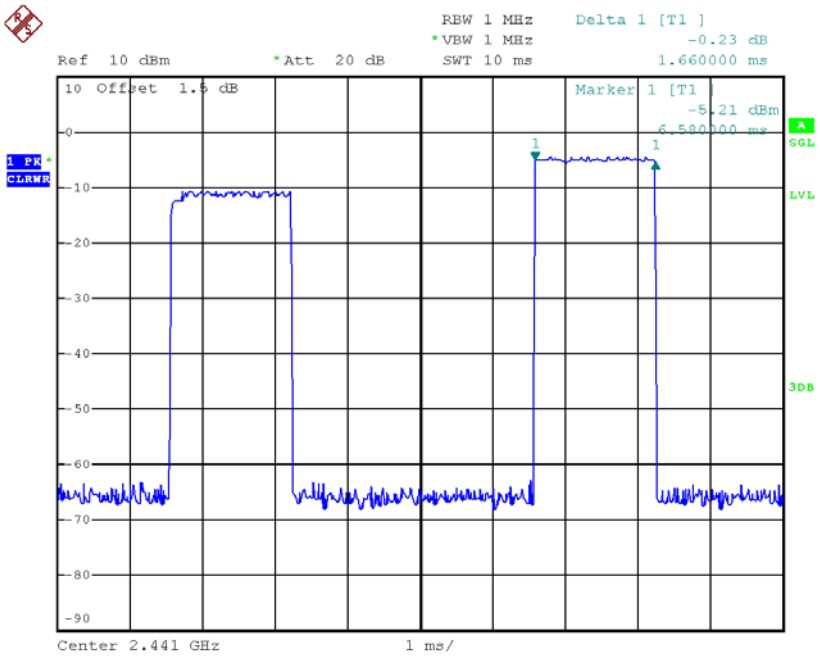
Date: 12.NOV.2017 17:58:39

CH39-DH1



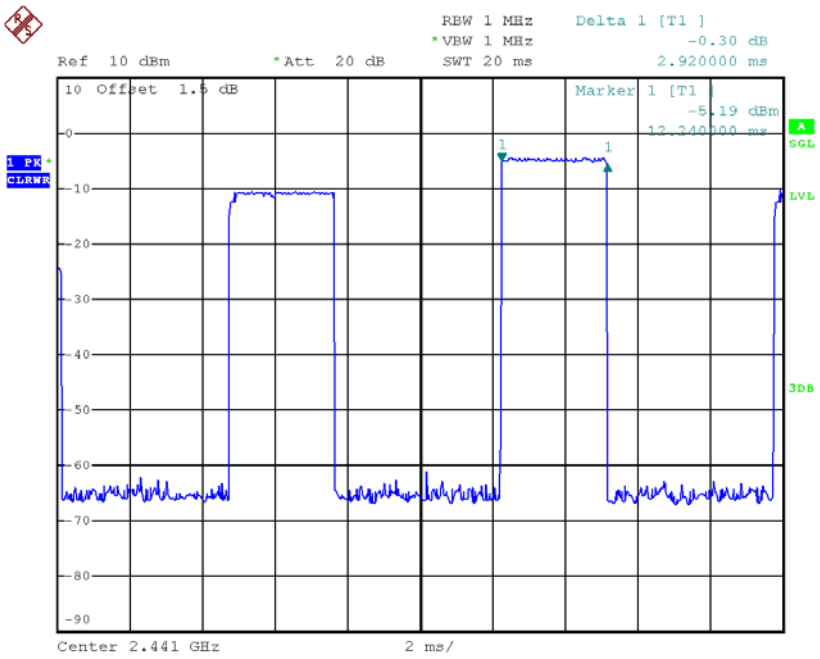
Date: 12.NOV.2017 17:44:11

CH39-DH3



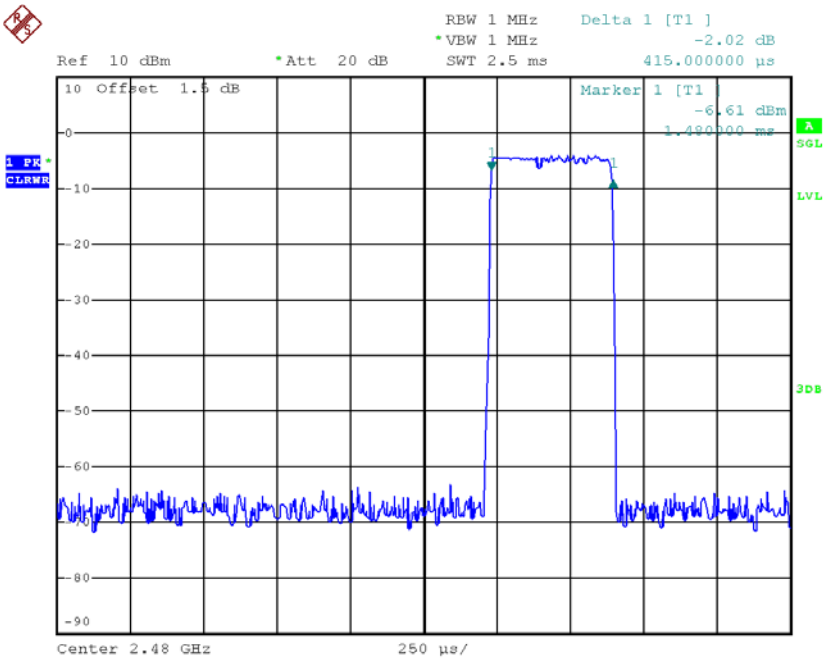
Date: 12.NOV.2017 17:58:12

CH39-DH5



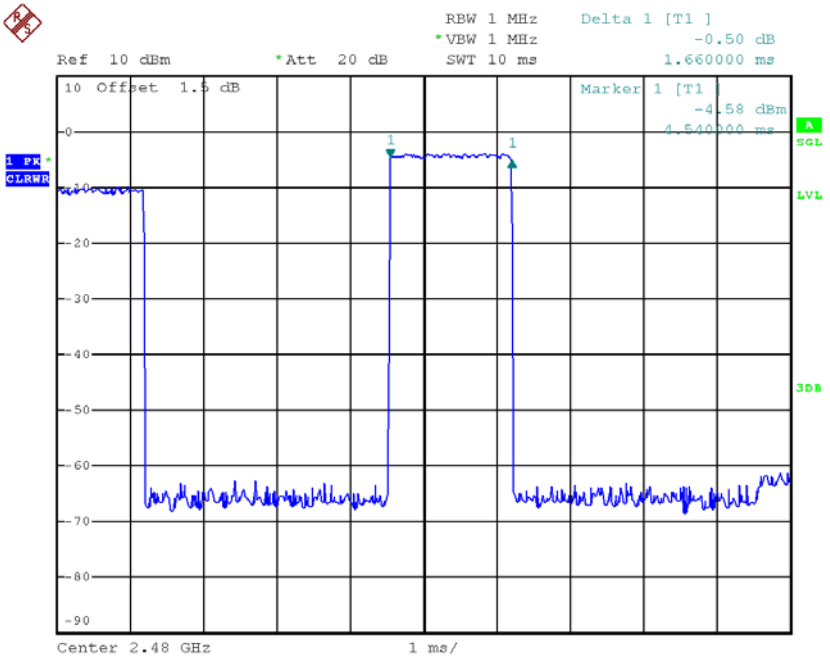
Date: 12.NOV.2017 17:58:43

CH78-DH1



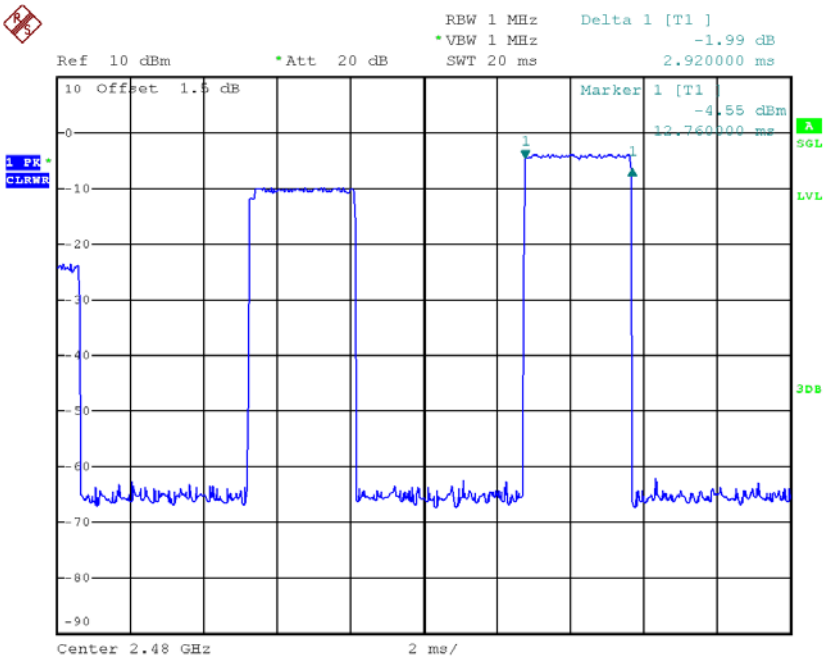
Date: 12.NOV.2017 17:43:58

CH78-DH3



Date: 12.NOV.2017 17:57:53

CH78-DH5



Date: 12.NOV.2017 17:58:49

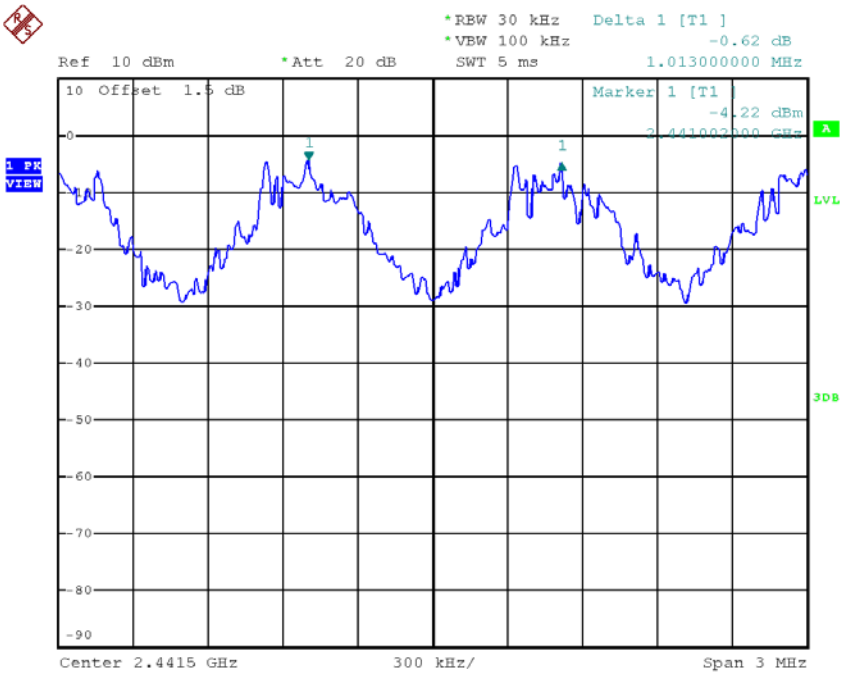
APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT

Test Mode :	Hopping on _1Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.019	0.628	Pass
2441	1.013	0.636	Pass
2480	1.173	0.637	Pass

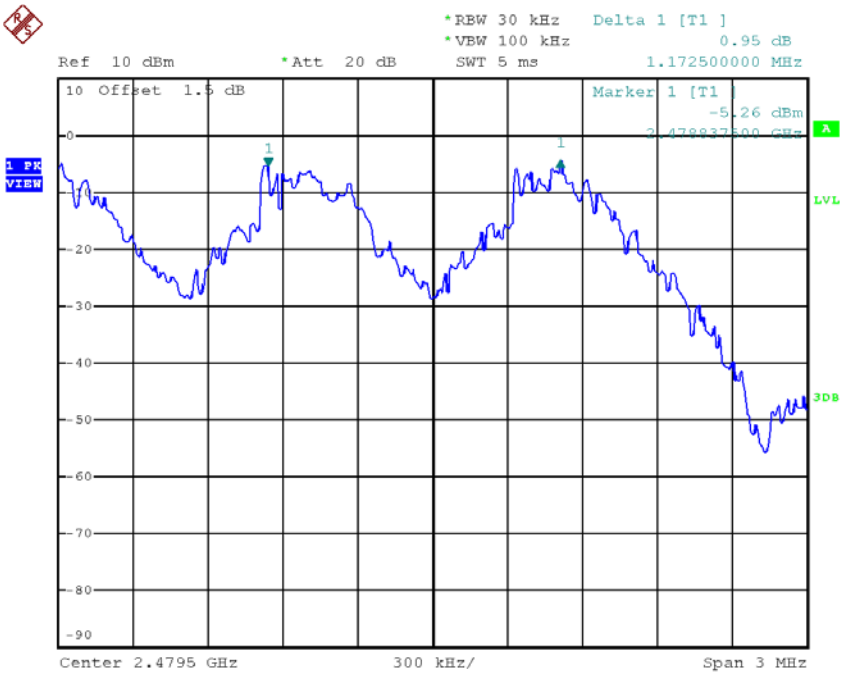
CH00

CH39



Date: 12.NOV.2017 17:30:02

CH78

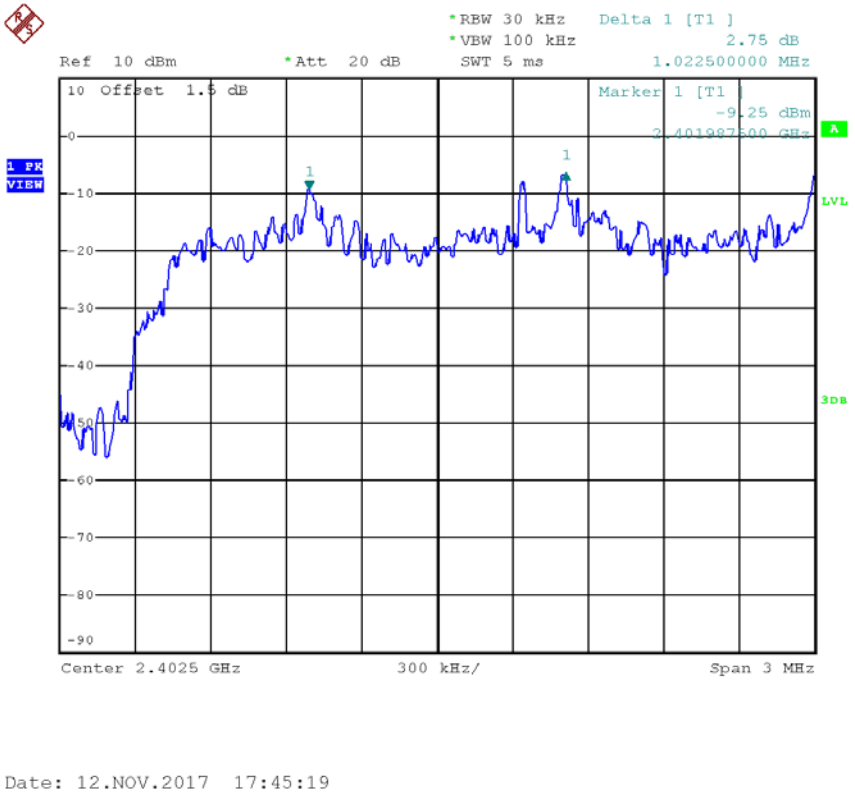


Date: 12.NOV.2017 17:32:16

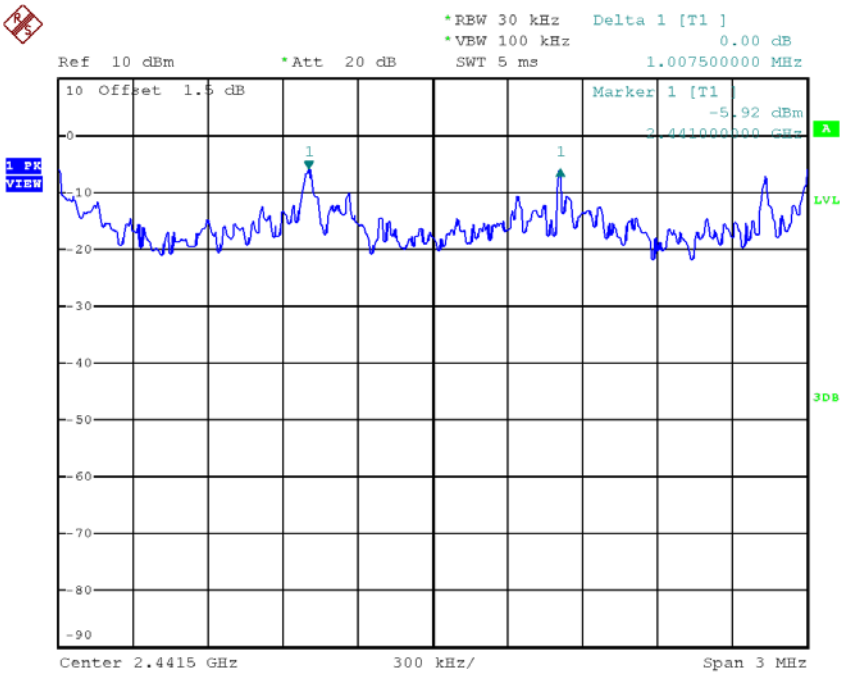
Test Mode :	Hopping on _3Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	1.023	0.841	Pass
2441	1.008	0.827	Pass
2480	1.012	0.843	Pass

CH00

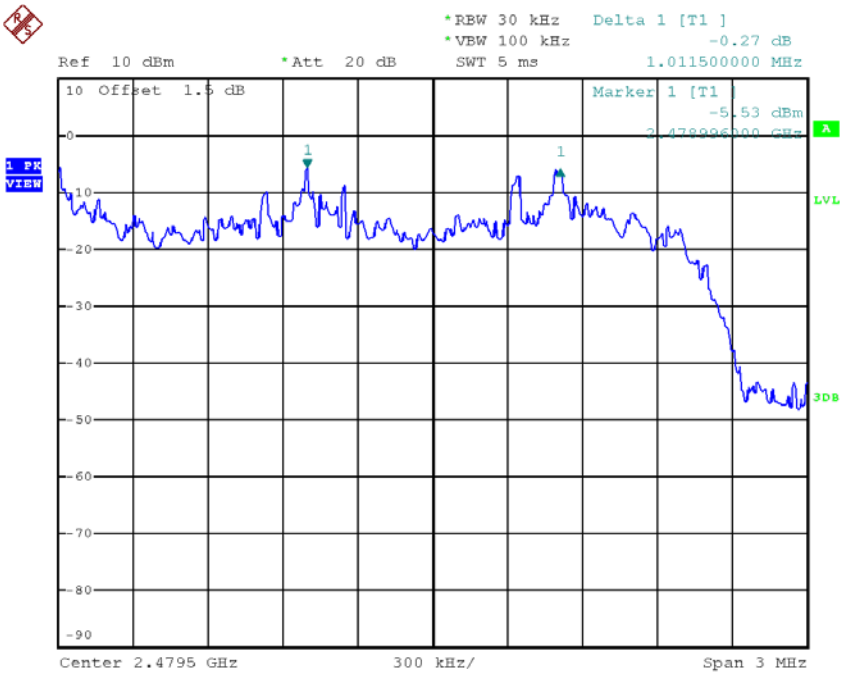


CH39



Date: 12.NOV.2017 17:46:29

CH78



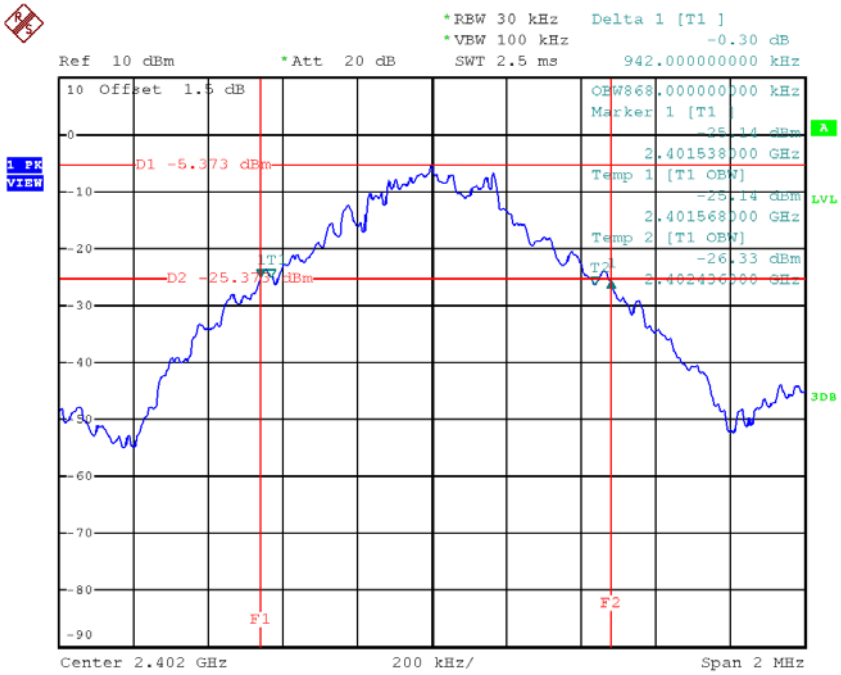
Date: 12.NOV.2017 17:48:07

APPENDIX H - BANDWIDTH

Test Mode :	TX Mode _1Mbps

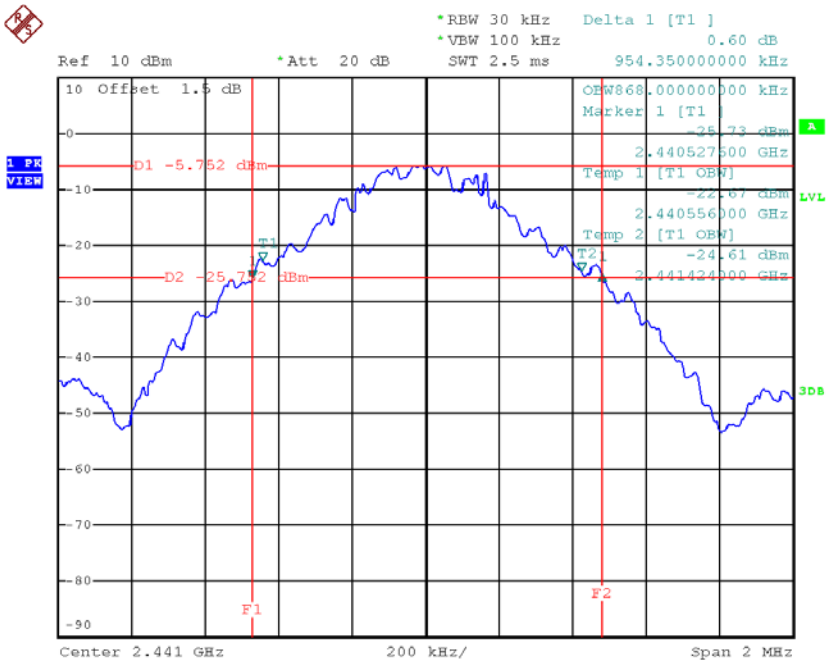
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.942	0.868	Pass
2441	0.954	0.868	Pass
2480	0.956	0.864	Pass

CH00



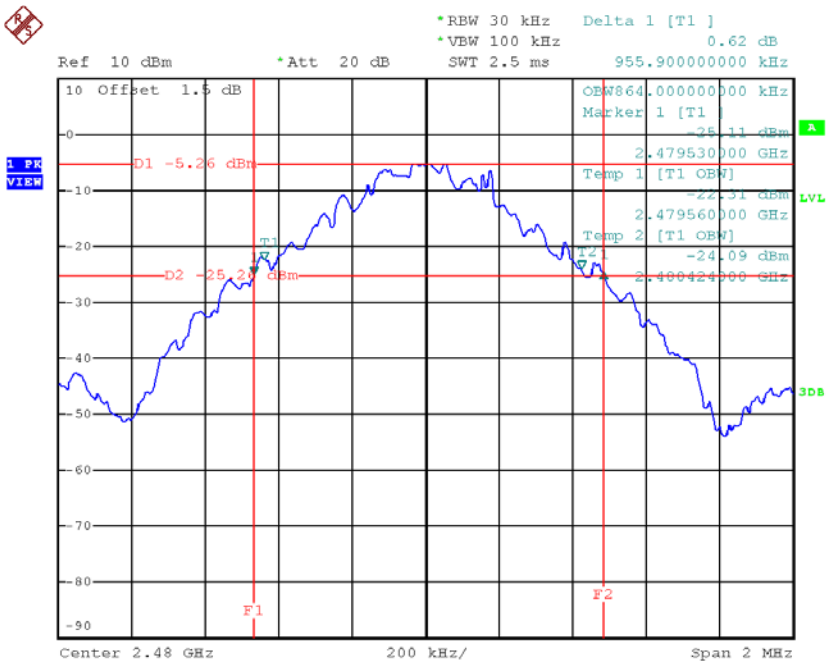
Date: 12.NOV.2017 17:20:42

CH39



Date: 12.NOV.2017 17:22:29

CH78

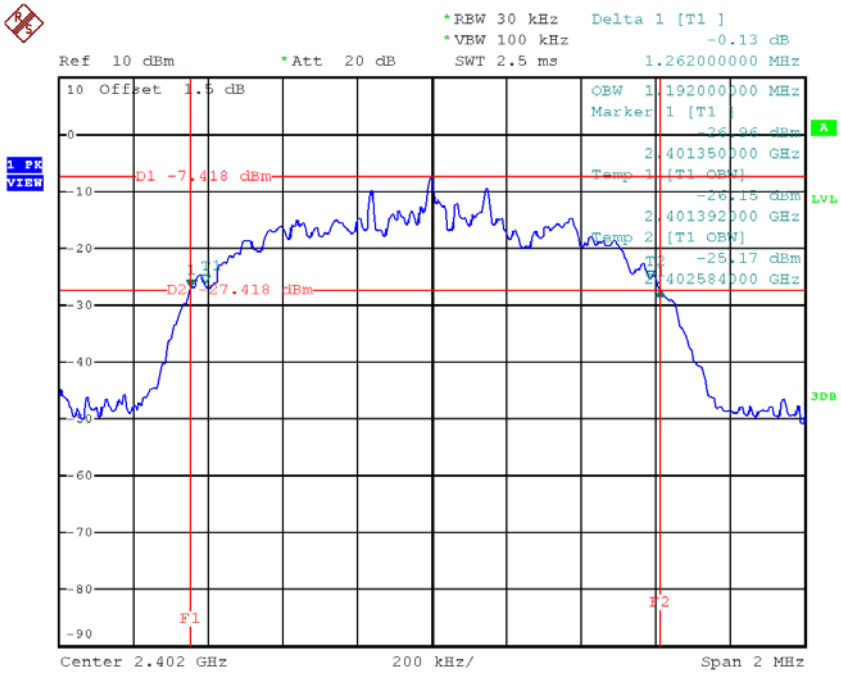


Date: 12.NOV.2017 17:23:20

Test Mode :	TX Mode _3Mbps

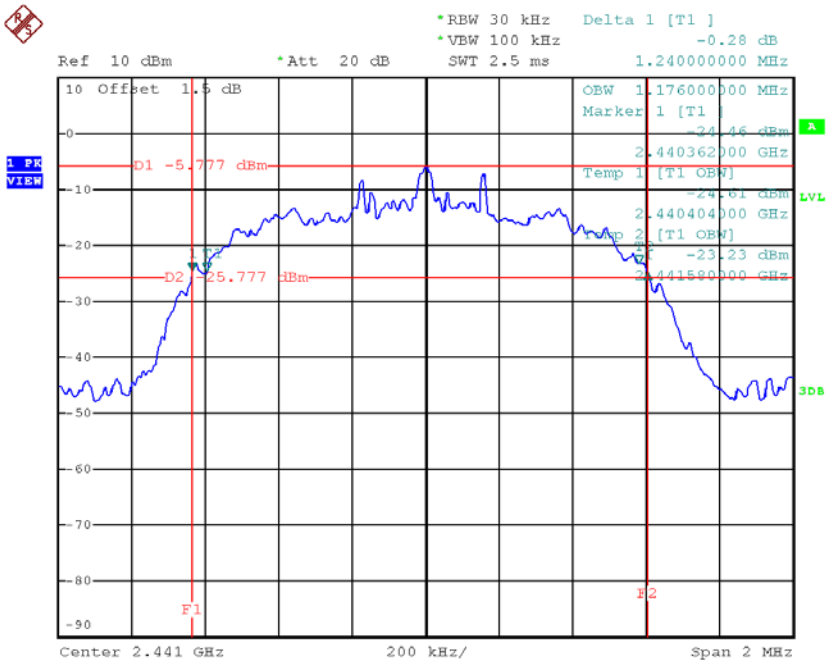
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	1.262	1.192	Pass
2441	1.240	1.176	Pass
2480	1.264	1.192	Pass

CH00



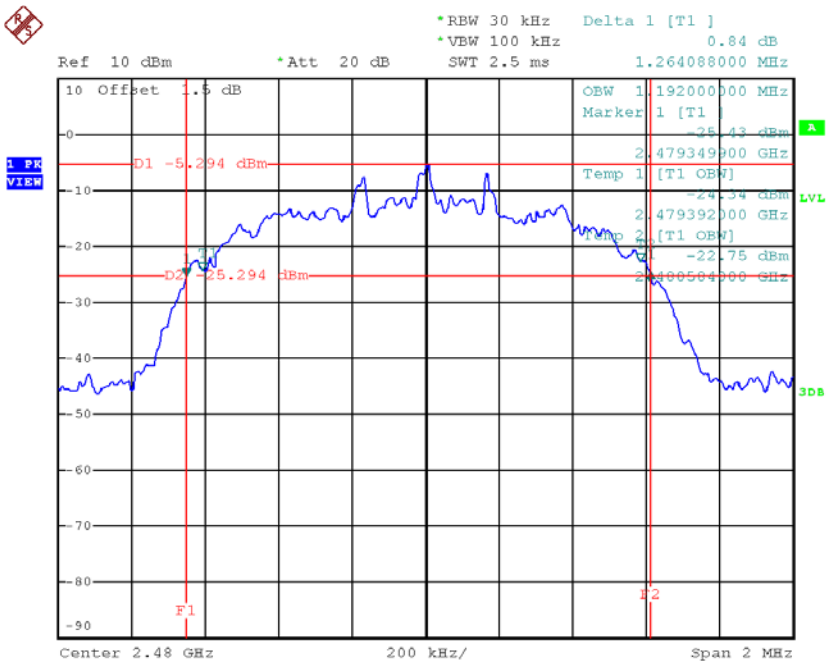
Date: 12.NOV.2017 17:39:05

CH39



Date: 12.NOV.2017 17:40:40

CH78



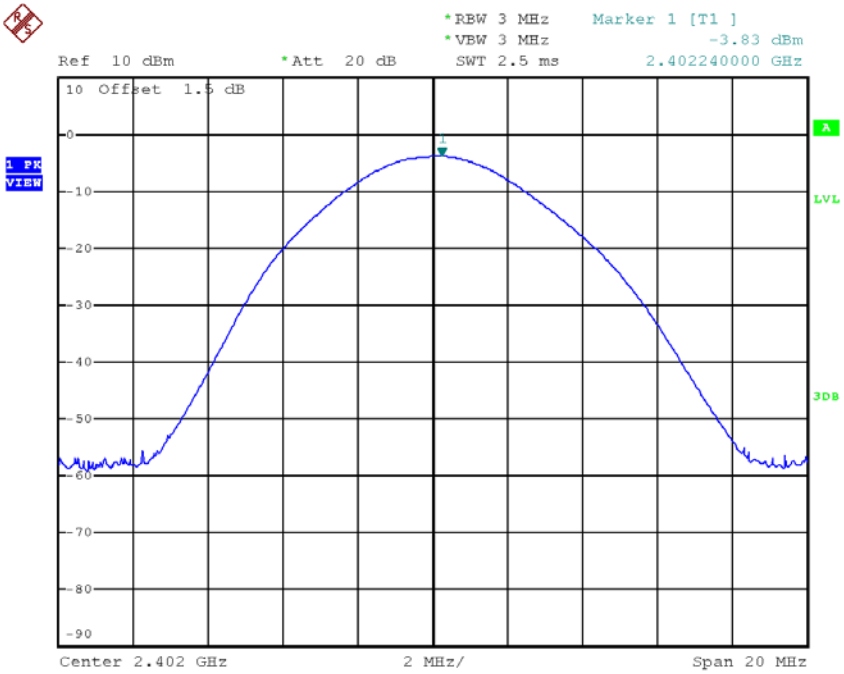
Date: 12.NOV.2017 17:41:22

APPENDIX I - PEAK OUTPUT POWER

Test Mode :	TX Mode _1Mbps

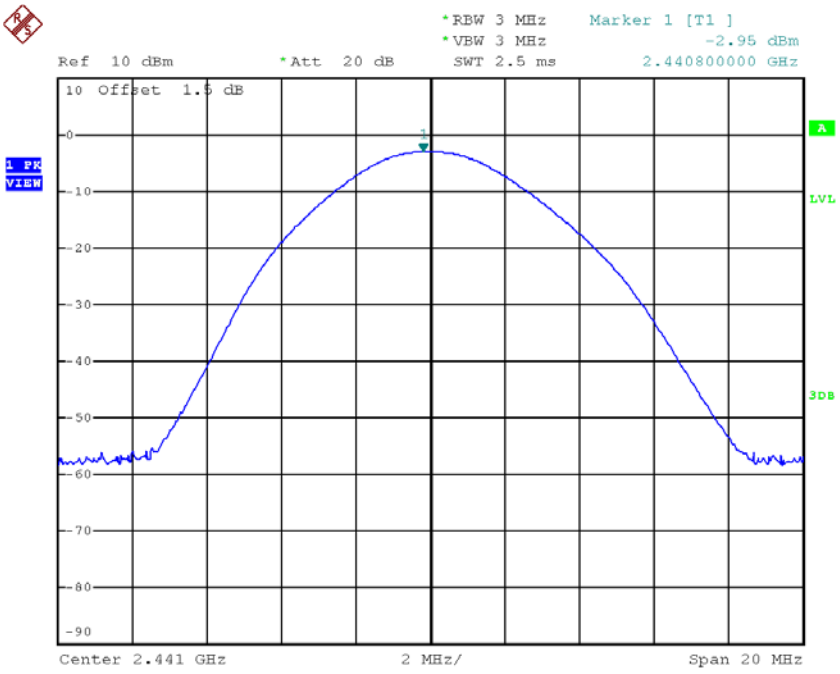
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	-3.83	0.0004	30.00	1.00	Pass
2441	-2.95	0.0005	30.00	1.00	Pass
2480	-2.50	0.0006	30.00	1.00	Pass

CH00



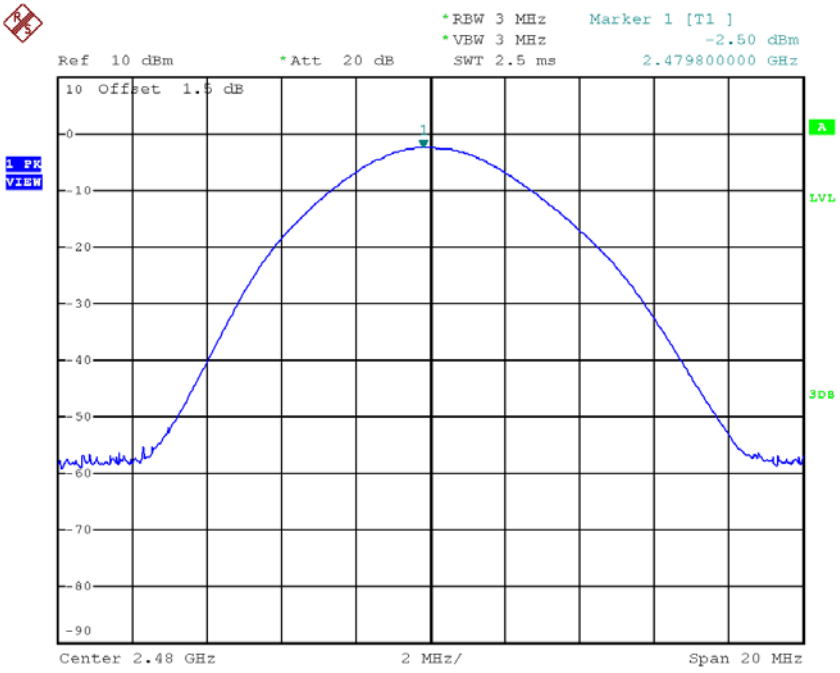
Date: 12.NOV.2017 17:21:18

CH39



Date: 12.NOV.2017 17:22:36

CH78

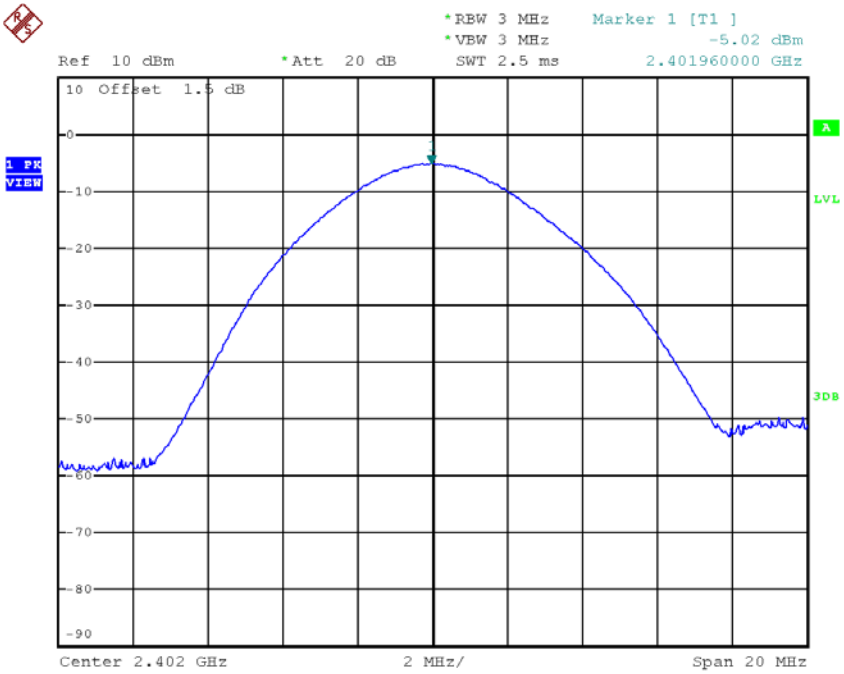


Date: 12.NOV.2017 17:23:57

Test Mode :	TX Mode _3Mbps

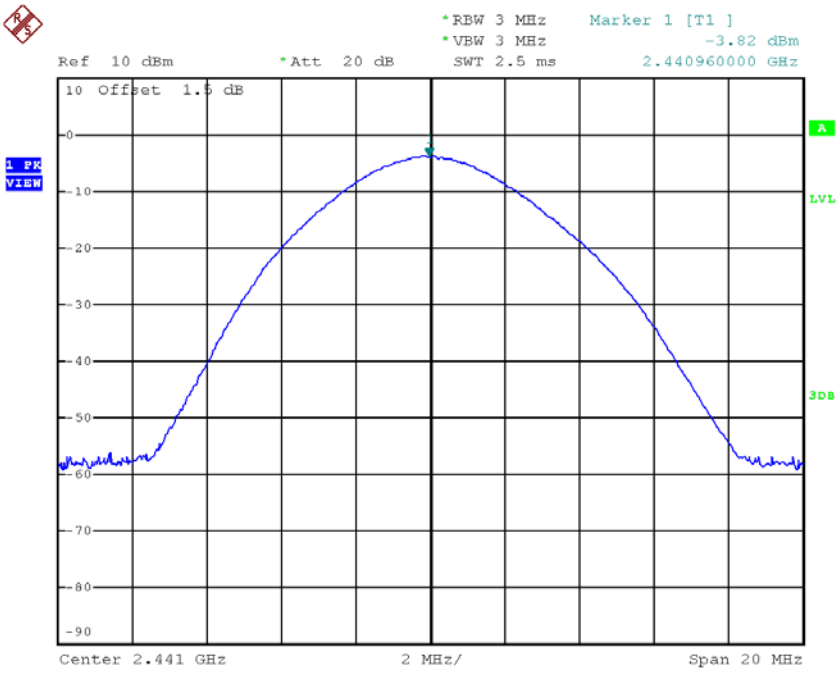
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	-5.02	0.0003	30.00	1.00	Pass
2441	-3.82	0.0004	30.00	1.00	Pass
2480	-3.31	0.0005	30.00	1.00	Pass

CH00



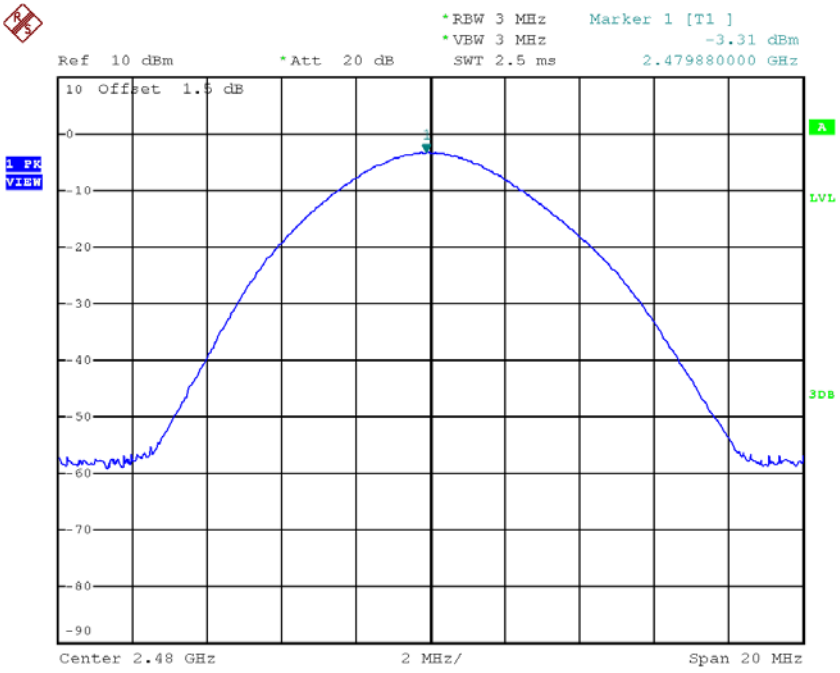
Date: 12.NOV.2017 17:39:41

CH39



Date: 12.NOV.2017 17:40:46

CH78



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