

FCC Radio Test Report

FCC ID: 2APPZ-X5U

This report concerns: Original Grant

Project No. : 1908C039
Equipment : IP Phone
Brand Name : Fanvil
Test Model : X5U
Series Model : N/A
Applicant : Fanvil Technology Co., Ltd.
Address : 4F, Block A, Building 1#, GaoXinQi Hi-Tech Park (Phase-II), 67th District, Bao'An, Shenzhen, China
Manufacturer : Fanvil Technology Co., Ltd.
Address : 4F, Block A, Building 1#, GaoXinQi Hi-Tech Park (Phase-II), 67th District, Bao'An, Shenzhen, China
Factory : Fanvil Technology Co., Ltd.
Address : 4F, Block A, Building 1#, GaoXinQi Hi-Tech Park (Phase-II), 67th District, Bao'An, Shenzhen, China
Date of Receipt : Aug. 05, 2019
Date of Test : Aug. 19, 2019 ~ Sep. 19, 2019
Issued Date : Sep. 27, 2019
Report Version : R00
Test Sample : Engineering Sample No.: DG19081916 for conducted, DG19081917 for radiated
Standard(s) : FCC Part15, Subpart C (15.247)
ANSI C63.10-2013
KDB 558074 D01 15.247 Meas Guidance v05r02

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

Vincent Tan

Prepared by : Vincent Tan

Ethan Ma

Approved by : Ethan Ma



Certificate #5123.02

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

Tel: +86-769-8318-3000

Web: www.newbtl.com

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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, A2LA, or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

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

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

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

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

Table of Contents	Page
REPORT ISSUED HISTORY	6
1 . SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 MEASUREMENT UNCERTAINTY	9
2 . GENERAL INFORMATION	10
2.1 GENERAL DESCRIPTION OF EUT	10
2.2 DESCRIPTION OF TEST MODES	12
2.3 PARAMETERS OF TEST SOFTWARE	13
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	14
2.5 SUPPORT UNITS	14
3 . AC POWER LINE CONDUCTED EMISSIONS TEST	15
3.1 LIMIT	15
3.2 TEST PROCEDURE	15
3.3 DEVIATION FROM TEST STANDARD	15
3.4 TEST SETUP	16
3.5 EUT OPERATING CONDITIONS	16
3.6 TEST RESULTS	16
4 . RADIATED EMISSION TEST	17
4.1 LIMIT	17
4.2 TEST PROCEDURE	18
4.3 DEVIATION FROM TEST STANDARD	18
4.4 TEST SETUP	19
4.5 EUT OPERATING CONDITIONS	21
4.6 TEST RESULTS - 9 KHZ TO 30 MHZ	21
4.7 TEST RESULTS - 30 MHZ TO 1000 MHZ	21
4.8 TEST RESULTS - ABOVE 1000 MHZ	21
5 . NUMBER OF HOPPING FREQUENCY	22
5.1 LIMIT	22
5.2 TEST PROCEDURE	22
5.3 DEVIATION FROM STANDARD	22
5.4 TEST SETUP	22
5.5 EUT OPERATION CONDITIONS	22

Table of Contents	Page
5.6 TEST RESULTS	22
6 . AVERAGE TIME OF OCCUPANCY	23
6.1 LIMIT	23
6.2 TEST PROCEDURE	23
6.3 DEVIATION FROM STANDARD	23
6.4 TEST SETUP	23
6.5 EUT OPERATION CONDITIONS	23
6.6 TEST RESULTS	23
7 . HOPPING CHANNEL SEPARATION MEASUREMENT	24
7.1 LIMIT	24
7.2 TEST PROCEDURE	24
7.3 DEVIATION FROM STANDARD	24
7.4 TEST SETUP	24
7.5 EUT OPERATION CONDITIONS	24
7.6 TEST RESULTS	24
8 . BANDWIDTH TEST	25
8.1 LIMIT	25
8.2 TEST PROCEDURE	25
8.3 DEVIATION FROM STANDARD	25
8.4 TEST SETUP	25
8.5 EUT OPERATION CONDITIONS	25
8.6 TEST RESULTS	25
9 . MAXIMUM OUTPUT POWER	26
9.1 LIMIT	26
9.2 TEST PROCEDURE	26
9.3 DEVIATION FROM STANDARD	26
9.4 TEST SETUP	26
9.5 EUT OPERATION CONDITIONS	26
9.6 TEST RESULTS	26
10 . CONDUCTED SPURIOUS EMISSION	27
10.1 LIMIT	27
10.2 TEST PROCEDURE	27
10.3 DEVIATION FROM STANDARD	27
10.4 TEST SETUP	27

Table of Contents	Page
10.5 EUT OPERATION CONDITIONS	27
10.6 TEST RESULTS	27
11 . MEASUREMENT INSTRUMENTS LIST	28
12 . EUT TEST PHOTO	30
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	34
APPENDIX B - RADIATED EMISSION - 9 KHZ-30 MHZ	37
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	42
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ	45
APPENDIX E - NUMBER OF HOPPING FREQUENCY	70
APPENDIX F - AVERAGE TIME OF OCCUPANCY	72
APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT	77
APPENDIX H - BANDWIDTH	80
APPENDIX I - MAXIMUM OUTPUT POWER	83
APPENDIX J - CONDUCTED SPURIOUS EMISSION	85

REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Sep. 27, 2019

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart C (15.247)				
Standard(s) Section	Test Item	Test Result	Judgment	Remark
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS	-----
15.247(d) 15.205(a) 15.209(a)	Radiated Emission	APPENDIX B APPENDIX C APPENDIX D	PASS	-----
15.247 (a)(1)(iii)	Number of Hopping Frequency	APPENDIX E	PASS	-----
15.247 (a)(1)(iii)	Average Time Of Occupancy	APPENDIX F	PASS	-----
15.247(a)(1)	Hopping Channel Separation	APPENDIX G	PASS	-----
15.247(a)(1)	Bandwidth	APPENDIX H	PASS	-----
15.247(a)(1)	Maximum Output Power	APPENDIX I	PASS	-----
15.247(d)	Conducted Spurious Emission	APPENDIX J	PASS	-----
15.203	Antenna Requirement	-----	PASS	Note (2)

Note:

- (1) "N/A" denotes test is not applicable in this test report
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

1.1 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 Registration Number for FCC: 357015
 BTL's Designation Number for FCC: CN1240

1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

The BTL measurement uncertainty as below table:

A. AC power line conducted emissions test:

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

B. Radiated emissions test:

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	4.88
		30MHz ~ 200MHz	H	4.14
		200MHz ~ 1,000MHz	V	4.62
		200MHz ~ 1,000MHz	H	4.80
		1GHz ~ 6GHz	-	4.58
		6GHz ~ 18GHz	-	5.18
		18GHz ~ 26.5GHz	-	3.80
		26.5GHz ~ 40GHz	-	4.30

C. Other Measurement:

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

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 MEASUREMENT UNCERTAINTY

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	25°C	53%	AC 120V/60Hz	Sheldon Ou
Radiated Emissions-9K-30MHz	25°C	60%	AC 120V/60Hz	Sheldon Ou
Radiated Emissions-30 MHz to 1GHz	24°C	68%	AC 120V/60Hz	Sheldon Ou
Radiated Emissions-Above 1000 MHz	24°C	68%	AC 120V/60Hz	Sheldon Ou
Number of Hopping Frequency	24°C	60%	AC 120V/60Hz	Jonas Chen
Average Time Of Occupancy	24°C	60%	AC 120V/60Hz	Jonas Chen
Hopping Channel Separation	24°C	60%	AC 120V/60Hz	Jonas Chen
Bandwidth	24°C	60%	AC 120V/60Hz	Jonas Chen
Maximum Output Power	24°C	60%	AC 120V/60Hz	Jonas Chen
Conducted Spurious Emission	24°C	60%	AC 120V/60Hz	Jonas Chen

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	IP Phone
Brand Name	Fanvil
Test Model	X5U
Series Model	N/A
Model Difference(s)	N/A
Power Source	1# DC voltage supplied from AC/DC adapter. Model: F12W8-050200SPA U L.P.S. 2# Supplied form PoE.
Power Rating	1# I/P: 100-240V~ 50/60Hz 0.3A O/P: 5V---2A 2# DC48V
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Technology	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Bit Rate of Transmitter	1/2/3Mbps
Max. Output Power	7.45 dBm (0.0056 W) For 1Mbps 6.28 dBm (0.0042 W) For 3Mbps

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		YJL01.106.001.301B	Internal	N/A	2.7

2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode NOTE (1)
Mode 2	TX Mode Channel 00 _1Mbps

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test	
Final Test Mode	Description
Mode 1	TX Mode Channel 00 _1Mbps

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	TX Mode Channel 00 _1Mbps

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Conducted test	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Note:

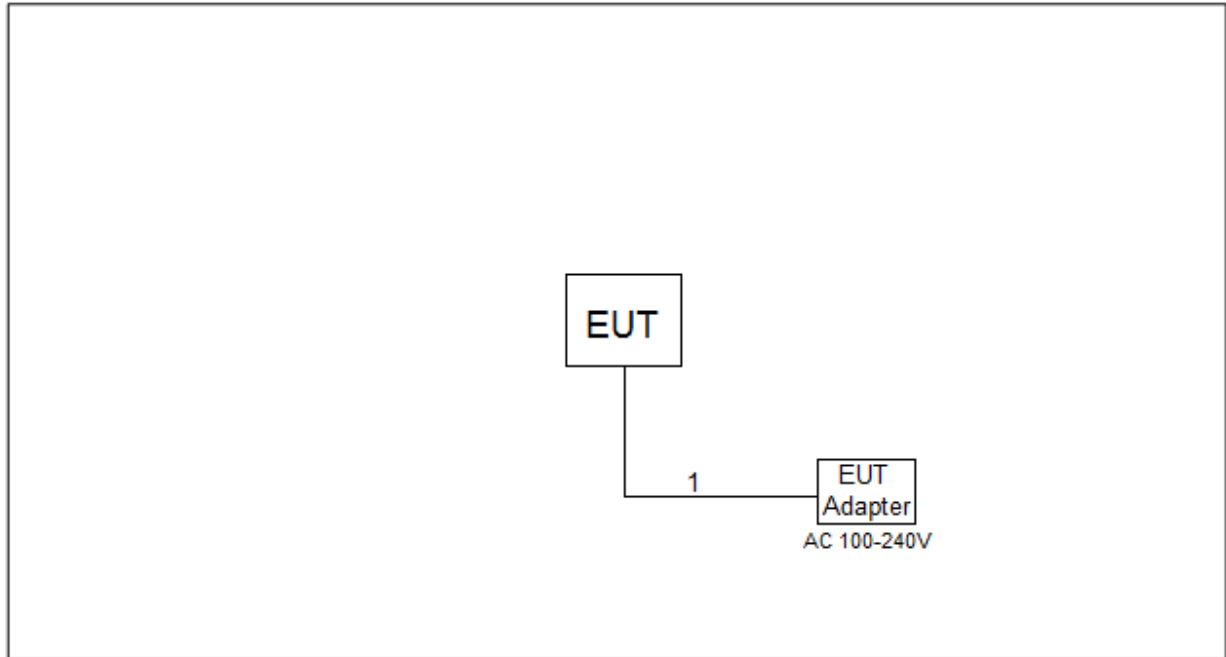
- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation, Bandwidth and Maximum Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.
- (3) For radiated emission above 1 GHz test, 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

2.3 PARAMETERS OF TEST SOFTWARE

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	HC_Data_Test		
Frequency (MHz)	2402	2441	2480
Parameters(1Mbps)	15	15	15
Parameters(3Mbps)	15	15	15

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.5m

3. AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

Frequency of Emission (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

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

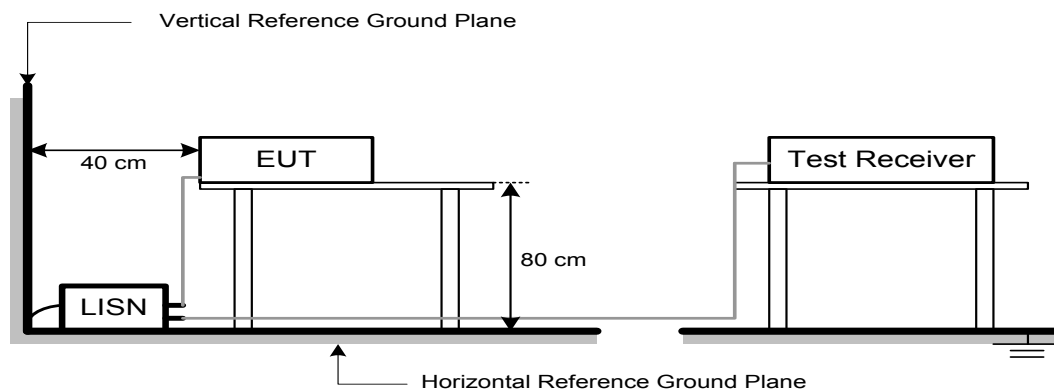
3.2 TEST PROCEDURE

- 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.

3.3 DEVIATION FROM TEST STANDARD

No deviation

3.4 TEST SETUP



3.5 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 data or hopping on mode.

3.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform in this case, a "*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.

4. RADIATED EMISSION TEST

4.1 LIMIT

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

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

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

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

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1 MHz VBW 3 MHz peak detector for Pk value RMS detector for AV value

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

4.2 TEST PROCEDURE

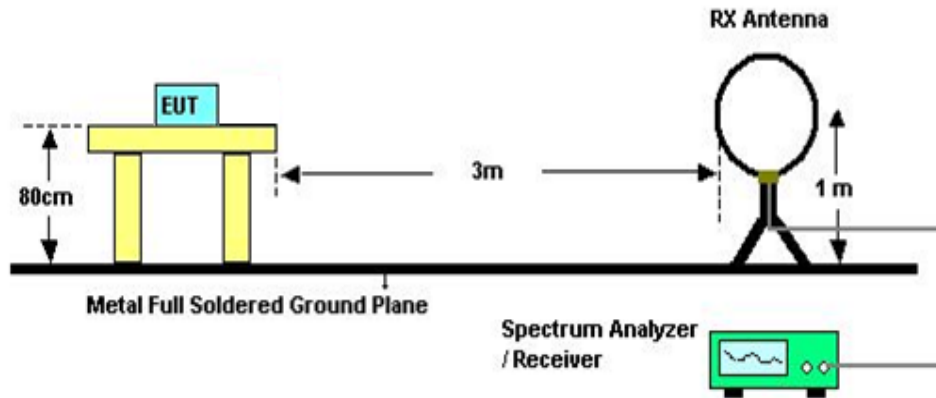
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- The measuring distance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

4.3 DEVIATION FROM TEST STANDARD

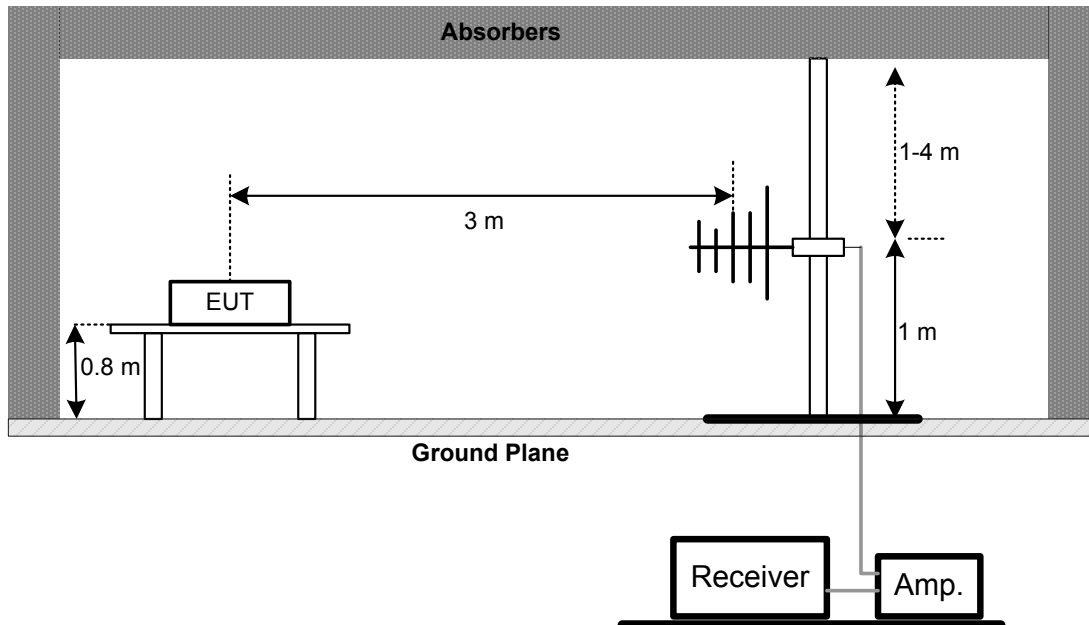
No deviation

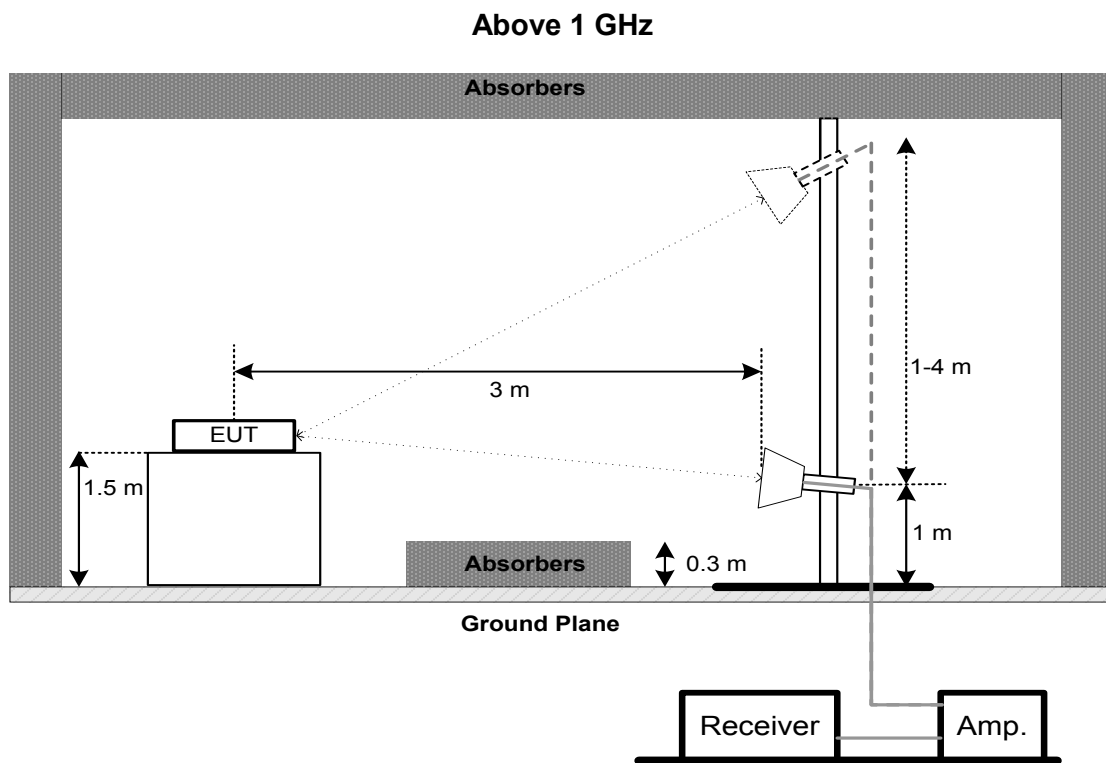
4.4 TEST SETUP

9 kHz-30 MHz



30 MHz to 1 GHz





4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULTS - 9 kHz TO 30 MHz

Please refer to the APPENDIX B

Remark:

- (1) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.7 TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

4.8 TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX D.

Remark:

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

5. NUMBER OF HOPPING FREQUENCY

5.1 LIMIT

FCC Part15, Subpart C (15.247)	
Section	Test Item
15.247(a)(1)(iii)	Number of Hopping Frequency

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	100 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

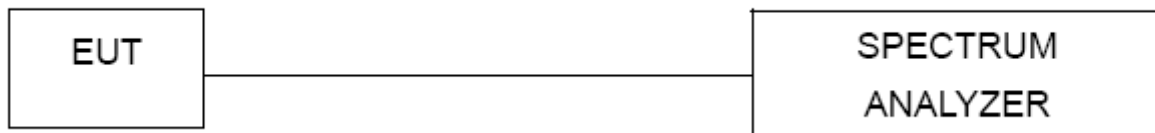
5.2 TEST PROCEDURE

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

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

Please refer to the APPENDIX E

6. AVERAGE TIME OF OCCUPANCY

6.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)(1)(iii)	Average Time of Occupancy	0.4sec

6.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz
- Use a video trigger with the trigger level set to enable triggering only on full pulses
- Sweep Time is more than once pulse time
- Set the center frequency on any frequency would be measure and set the frequency span to zero span
- Measure the maximum time duration of one single pulse
- Set the EUT for DH1, DH3 and DH5 packet transmitting
- Measure the maximum time duration of one single pulse
- DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds
- DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds
- DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Please refer to the APPENDIX F

7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 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, provided the systems operate with an output power no greater than 125 mW.

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

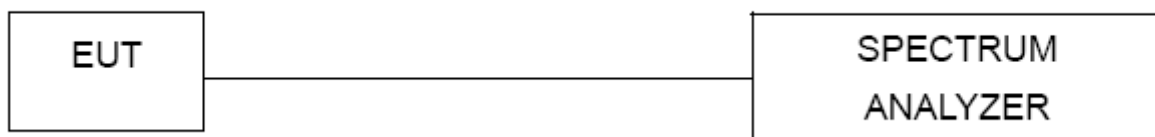
7.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) $\geq 1\%$ of the span
Video (or Average) Bandwidth (VBW) $\geq$ RBW
Sweep = Auto
Detector function = Peak
Trace = Max Hold

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Please refer to the APPENDIX G

8. BANDWIDTH TEST

8.1 LIMIT

FCC Part15, Subpart C (15.247)	
Section	Test Item
15.247(a)(1)	Bandwidth

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE

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

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

Please refer to the APPENDIX H

9. MAXIMUM OUTPUT POWER

9.1 LIMIT

FCC Part15 , Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)(1)	Maximum Output Power	0.125 Watt or 21 dBm

Note: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

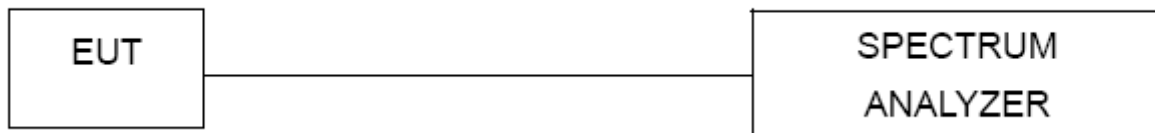
9.2 TEST PROCEDURE

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

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP



9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

Please refer to the APPENDIX I

10. CONDUCTED SPURIOUS EMISSION

10.1 LIMIT

For FCC

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

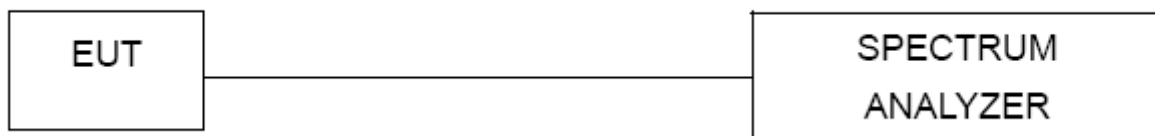
10.2 TEST PROCEDURE

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

10.3 DEVIATION FROM STANDARD

No deviation.

10.4 TEST SETUP



10.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

10.6 TEST RESULTS

Please refer to the APPENDIX J

11. MEASUREMENT INSTRUMENTS LIST

AC Power Line Conducted Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 10, 2020
2	LISN	EMCO	3816/2	52765	Mar. 10, 2020
3	50ohm Terminator	SHX	TF5-3	15041305	Mar. 10, 2020
4	Artificial-Mains Network	Schwarzbeck	NSLK 8127	8127685	Mar. 10, 2020
5	TRANSIENT LIMITER	EM	EM-7600	772	Mar. 10, 2020
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	Cable	N/A	RG223	12m	Mar. 12, 2020

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EM	EM-6876-1	230	Jan. 15, 2020
2	Cable	N/A	RG 213/U	C-102	May 31, 2020
3	EMI Test Receiver	R&S	ESCI	100895	Mar. 10, 2020
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 09, 2020
2*	Amplifier*	HP	8447D	2944A09673	Aug. 11, 2021
3	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020
4	Cable	emci	LMR-400(30MHz-1GHz)(8m+5m)	N/A	May 24, 2020
5	Controller	CT	SC100	N/A	N/A
6	Controller	MF	MF-7802	MF780208416	N/A
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 09, 2020
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 23, 2020
3	Amplifier	Agilent	8449B	3008A02333	Mar. 10, 2020
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 10, 2020
5	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020
6	Controller	CT	SC100	N/A	N/A
7	Controller	MF	MF-7802	MF780208416	N/A
8	Cable	mitron	B10-01-01-12M	18072744	Jun. 29, 2020
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Number of Hopping Frequency

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

Average Time of Occupancy

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

Hopping Channel Separation Measurement

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

Bandwidth

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

Maximum Output Power

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

Antenna Conducted Spurious Emission

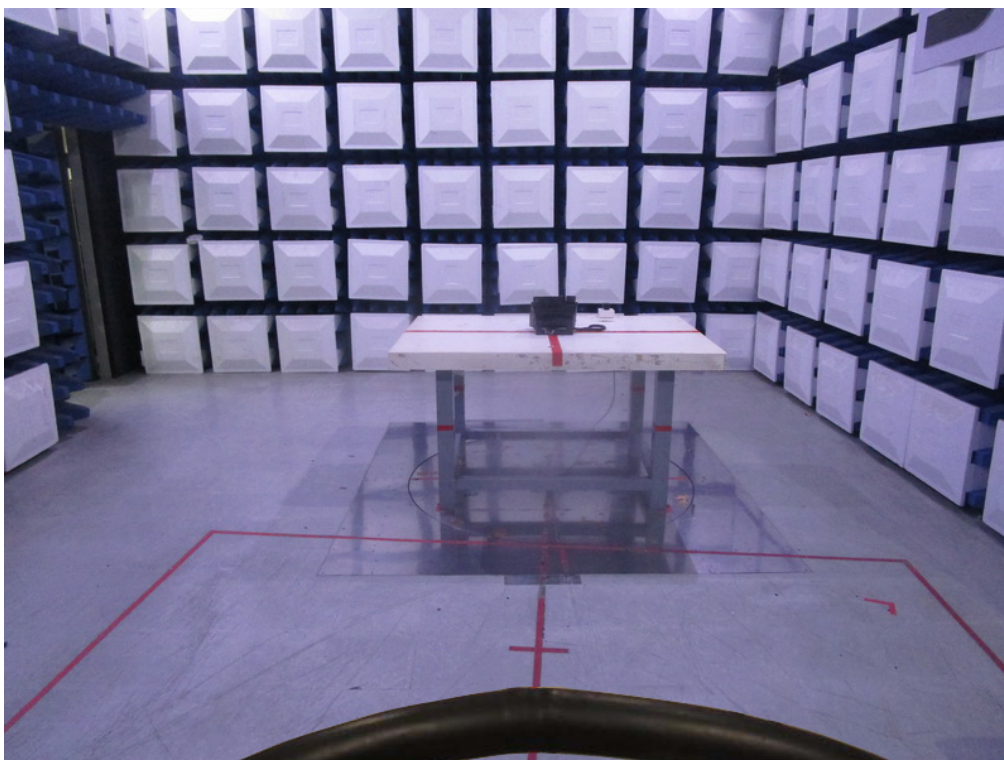
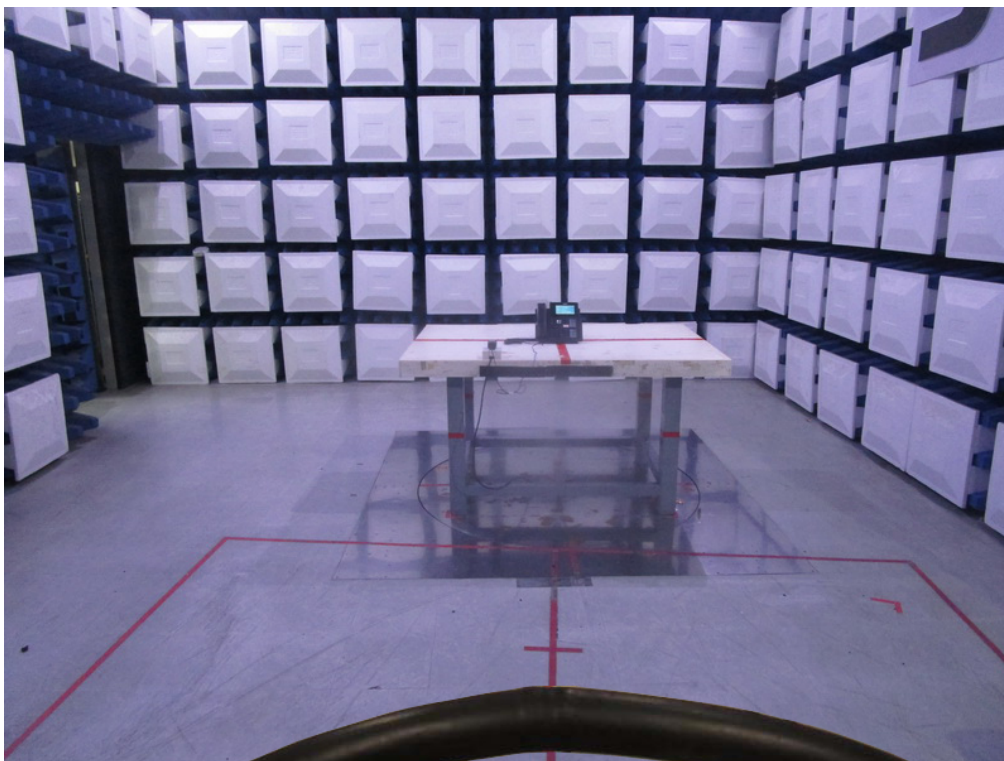
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

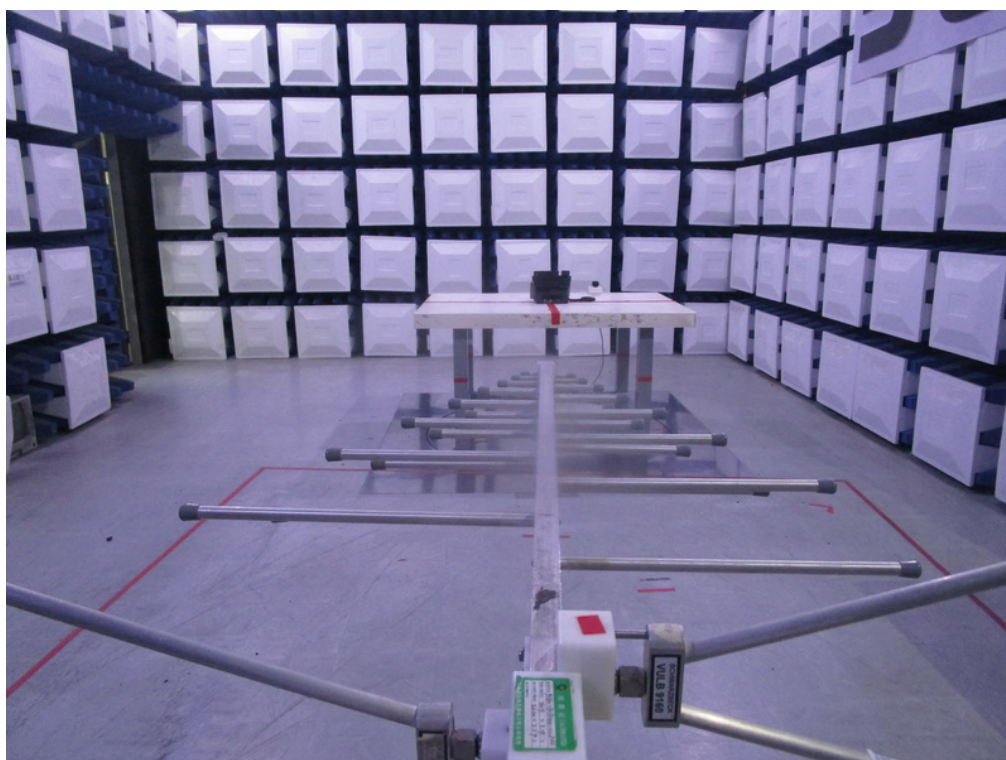
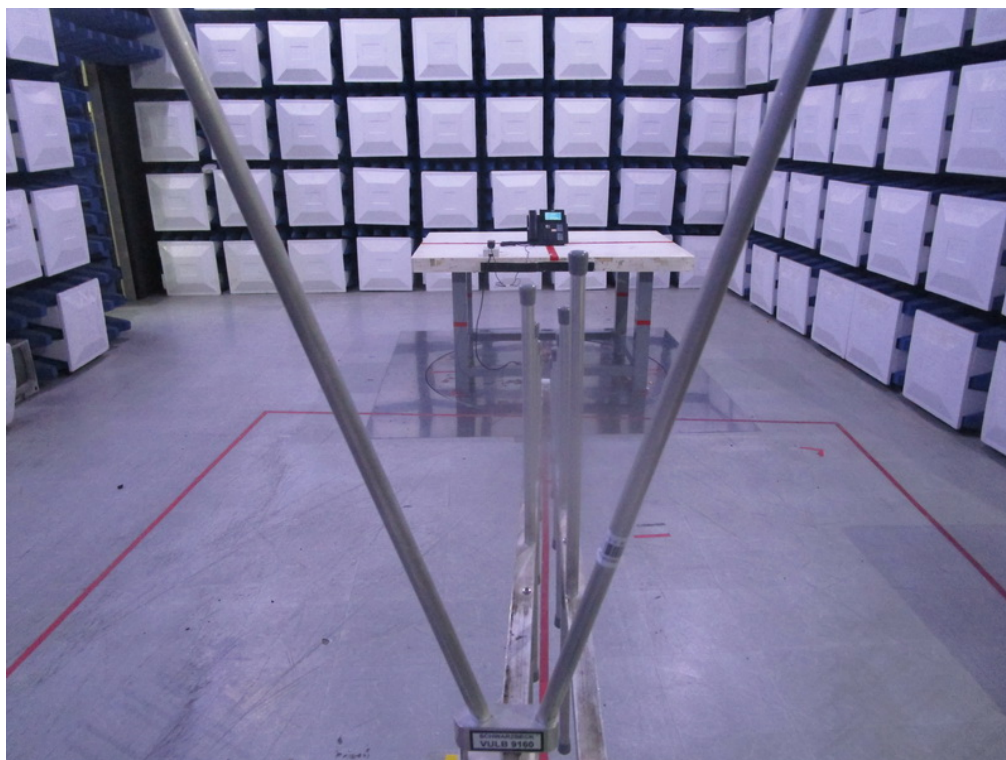
Remark "N/A" denotes no model name, serial no. or calibration specified.

"*" calibration period of equipment list is three year.

Except * item, all calibration period of equipment list is one year.

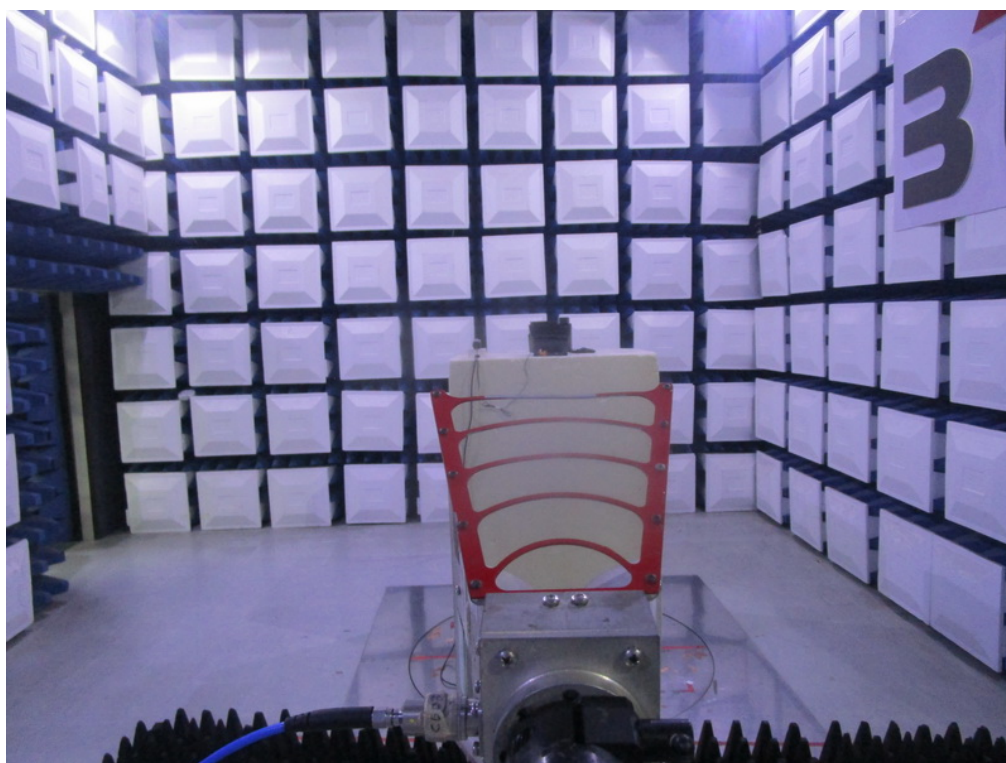
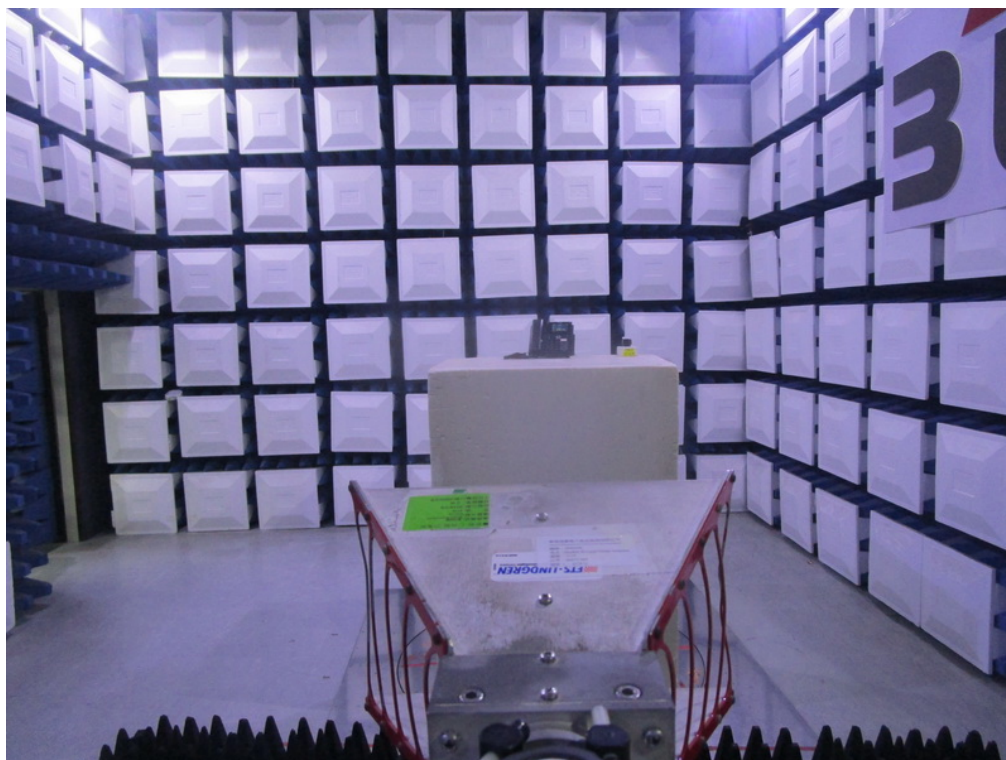
12. EUT TEST PHOTO**AC Power Line Conducted Emissions Test Photos**

Radiated Emissions Test Photos**9 kHz to 30 MHz**

Radiated Emissions Test Photos**30 MHz to 1000 MHz**

Radiated Emissions Test Photos

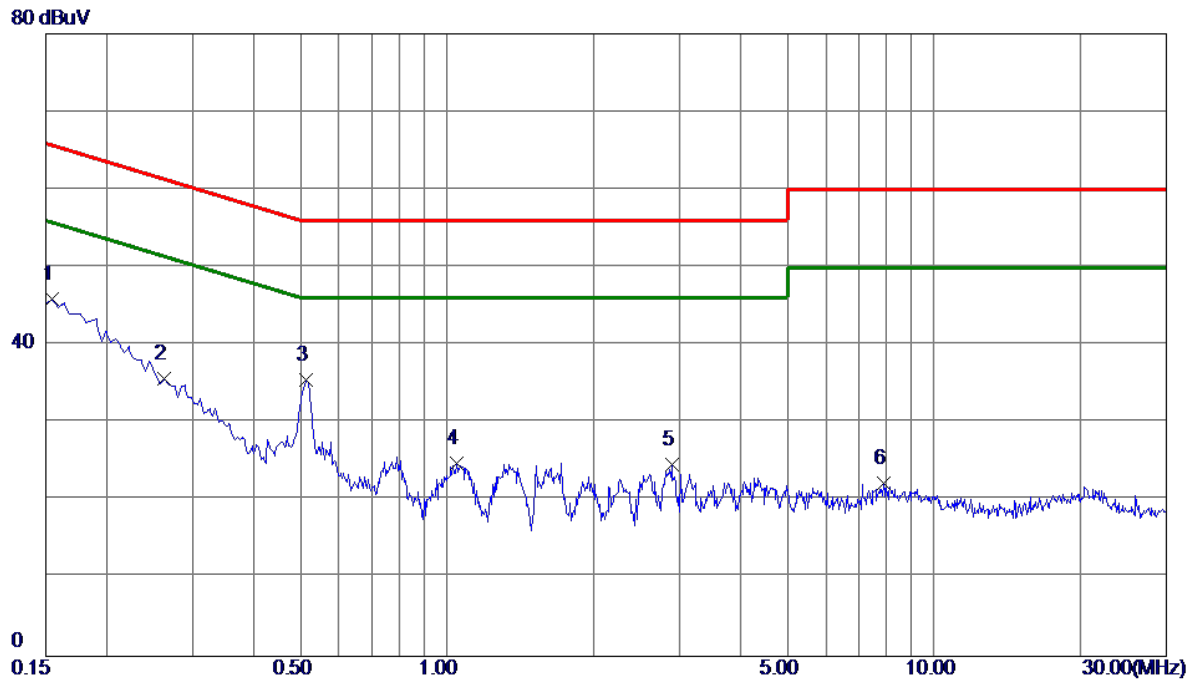
Above 1 GHz



APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

Test Mode: TX 2402 MHz _CH00_1Mbps

Line



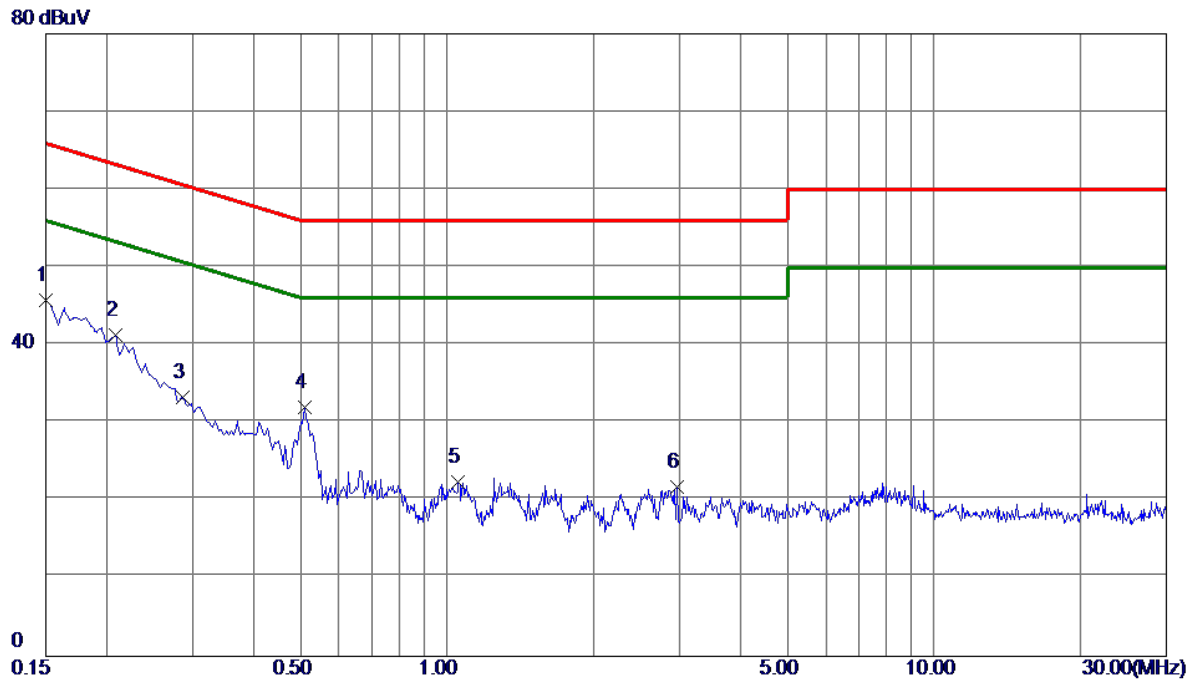
No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1 *	0.1545	36.06	9.82	45.88	65.75	-19.87	Peak	
2	0.2625	25.92	9.83	35.75	61.35	-25.60	Peak	
3	0.5144	25.63	9.88	35.51	56.00	-20.49	Peak	
4	1.0455	14.89	9.92	24.81	56.00	-31.19	Peak	
5	2.8905	14.65	10.05	24.70	56.00	-31.30	Peak	
6	7.8720	11.80	10.38	22.18	60.00	-37.82	Peak	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_1Mbps

Neutral



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1 *	0.1500	35.86	9.91	45.77	66.00	-20.23	Peak	
2	0.2085	31.40	9.90	41.30	63.26	-21.96	Peak	
3	0.2862	23.28	9.95	33.23	60.63	-27.40	Peak	
4	0.5100	21.98	10.03	32.01	56.00	-23.99	Peak	
5	1.0544	12.28	10.12	22.40	56.00	-33.60	Peak	
6	2.9625	11.51	10.25	21.76	56.00	-34.24	Peak	

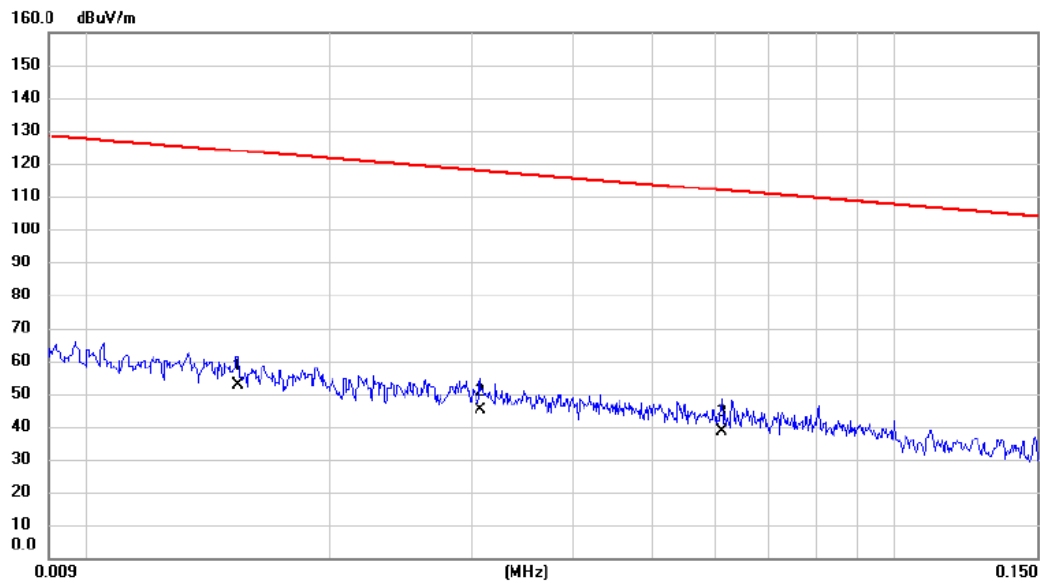
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B - RADIATED EMISSION - 9 KHZ-30 MHZ

Test Mode: TX 2402 MHz _CH00_1Mbps

Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0154	37.52	15.20	52.72	123.85	-71.13	AVG	
2		0.0308	31.28	13.86	45.14	117.83	-72.69	AVG	
3		0.0611	24.85	13.75	38.60	111.88	-73.28	AVG	

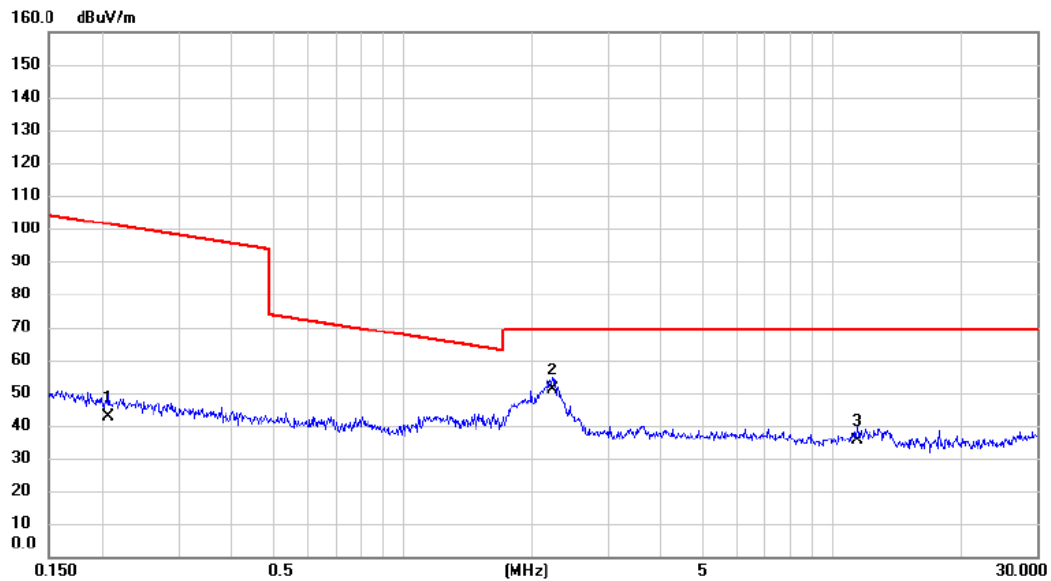
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_1Mbps

Ant 0°



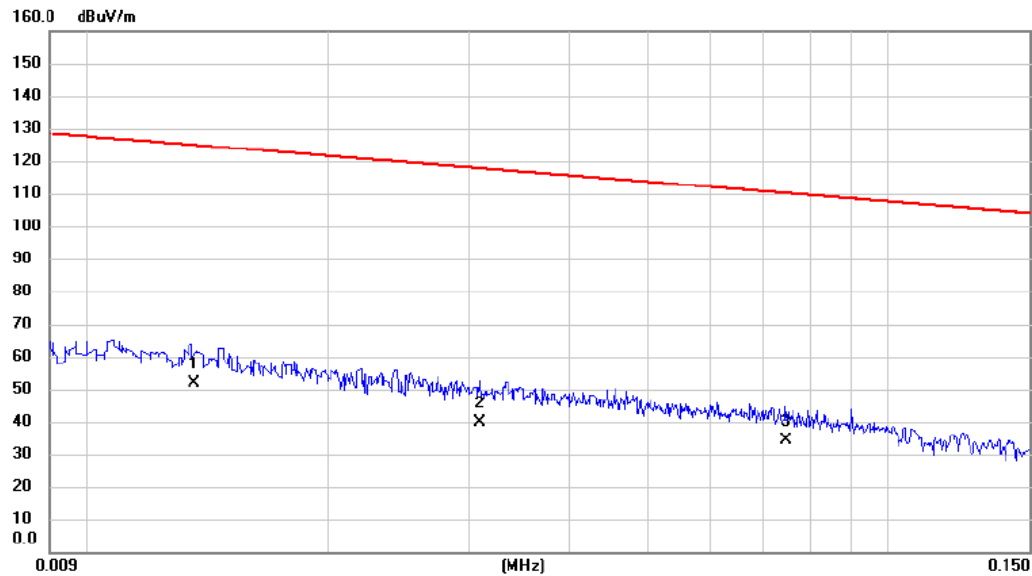
No.	Mk.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.2061	28.90	13.62	42.52	101.32	-58.80	AVG	
2	*	2.2367	39.50	11.68	51.18	69.54	-18.36	QP	
3		11.4376	23.70	11.61	35.31	69.54	-34.23	QP	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_1Mbps

Ant 90°

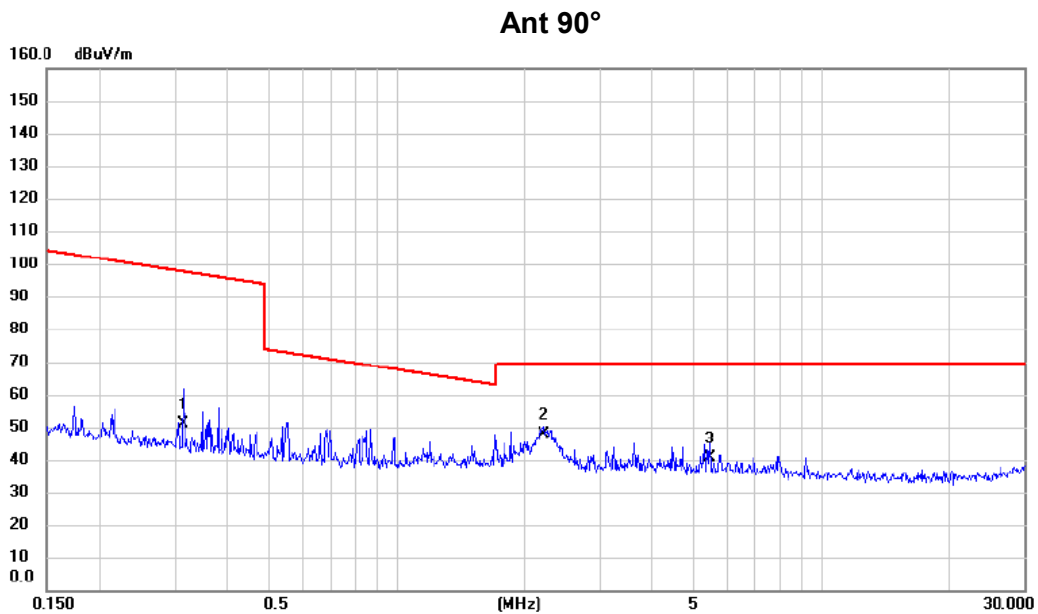


No.	Mk.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0136	36.20	15.74	51.94	124.93	-72.99	AVG	
2		0.0310	25.80	13.86	39.66	117.78	-78.12	AVG	
3		0.0744	20.50	13.54	34.04	110.17	-76.13	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_1Mbps



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.3133	37.50	13.51	51.01	97.69	-46.68	AVG	
2	*	2.2250	36.20	11.68	47.88	69.54	-21.66	QP	
3		5.4474	29.70	10.93	40.63	69.54	-28.91	QP	

REMARKS:

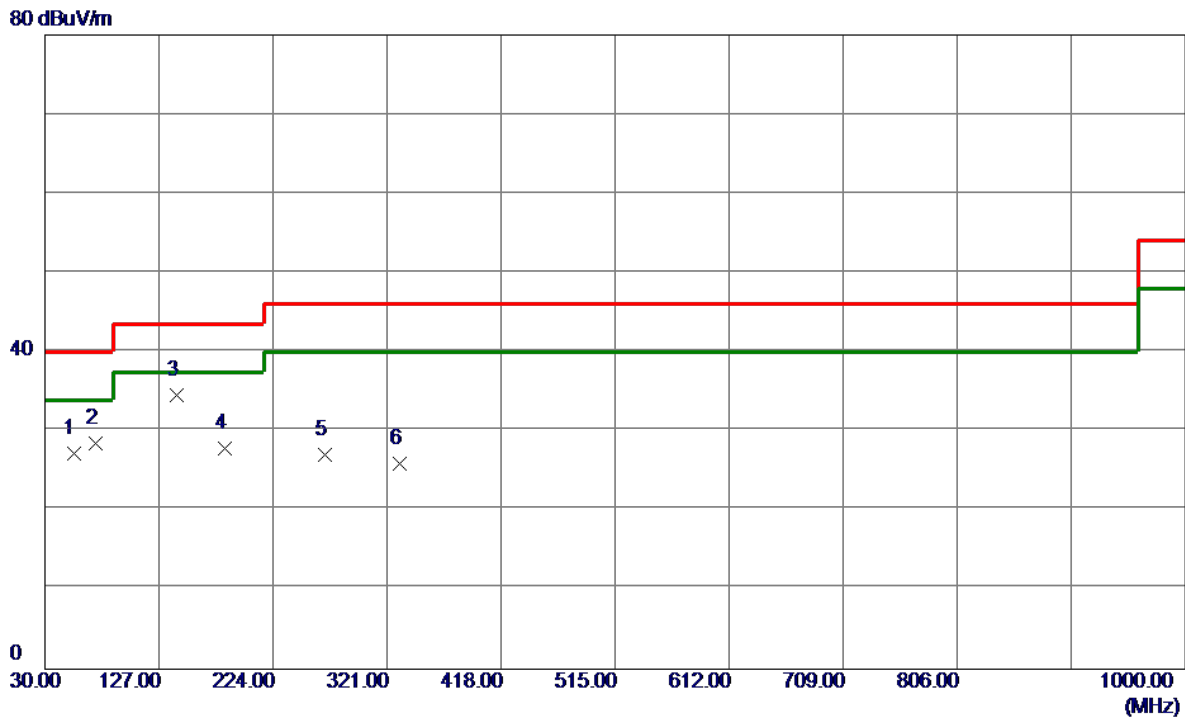
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

Test Mode: TX 2402 MHz _CH00_1Mbps

Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	54.2500	41.12	-13.91	27.21	40.00	-12.79	Peak	
2	73.1650	45.33	-16.82	28.51	40.00	-11.49	Peak	
3 *	142.0350	47.34	-12.75	34.59	43.50	-8.91	Peak	
4	182.7750	41.30	-13.51	27.79	43.50	-15.71	Peak	
5	268.6200	40.10	-13.02	27.08	46.00	-18.92	Peak	
6	331.6700	36.84	-10.97	25.87	46.00	-20.13	Peak	

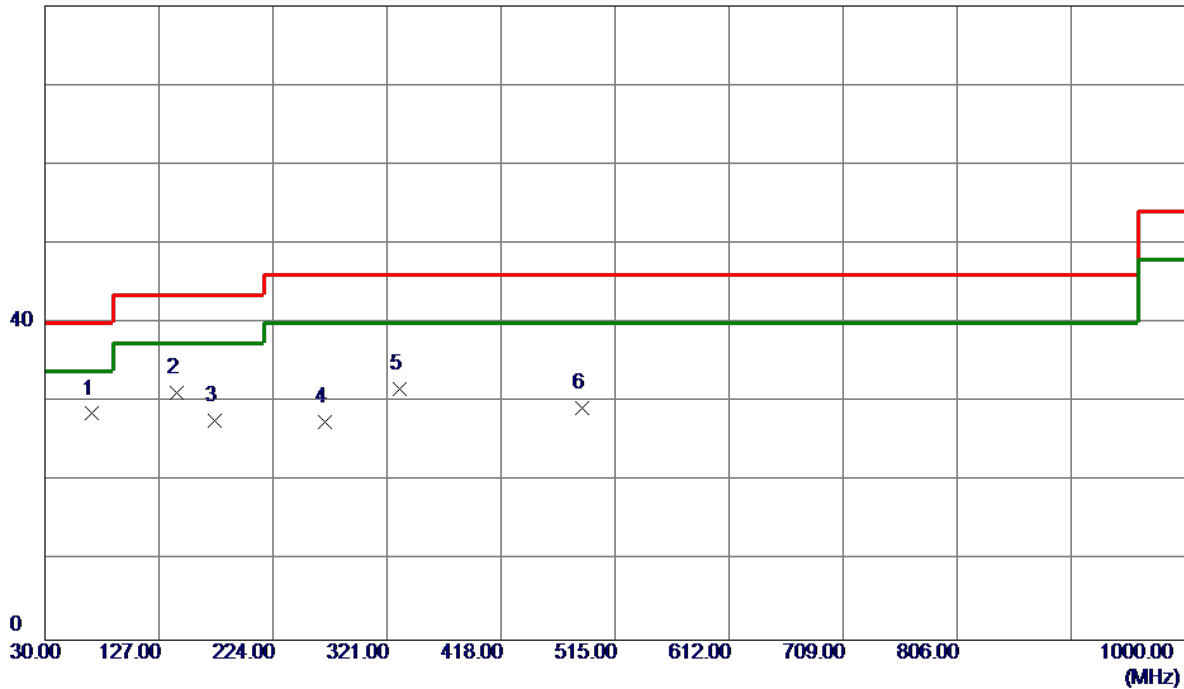
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_1Mbps

Horizontal

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	69.7699	44.73	-16.17	28.56	40.00	-11.44	Peak	
2	142.0350	44.02	-12.75	31.27	43.50	-12.23	Peak	
3	174.5300	40.45	-12.75	27.70	43.50	-15.80	Peak	
4	268.6200	40.54	-13.02	27.52	46.00	-18.48	Peak	
5	331.6700	42.67	-10.97	31.70	46.00	-14.30	Peak	
6	487.3550	37.10	-7.78	29.32	46.00	-16.68	Peak	

REMARKS:

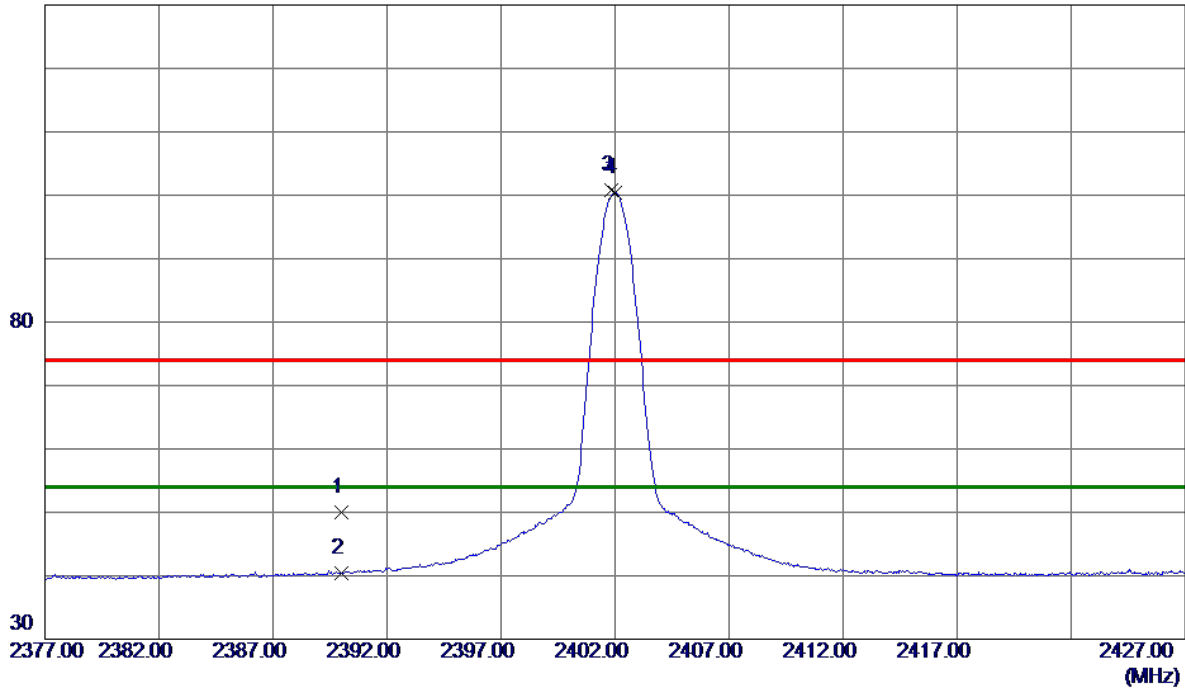
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ

Test Mode: TX 2402 MHz _CH00_1Mbps

Vertical

130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	43.67	6.24	49.91	74.00	-24.09	Peak	
2	2390.0000	34.19	6.24	40.43	54.00	-13.57	AVG	
3	2401.8250	94.53	6.22	100.75	74.00	26.75	Peak	No Limit
4 *	2402.0000	94.25	6.22	100.47	54.00	46.47	AVG	No Limit

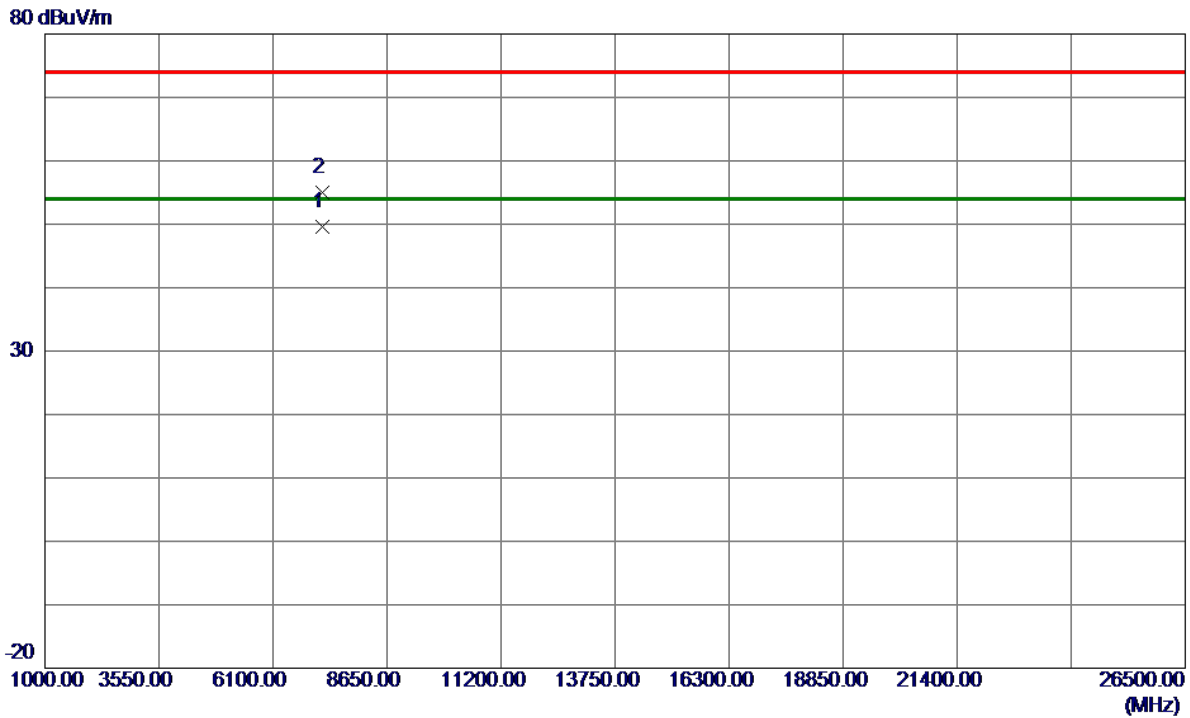
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2402 MHz _CH00_1Mbps
------------	-------------------------

Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7205.9440	41.28	8.31	49.59	54.00	-4.41	AVG	
2	7206.4720	46.59	8.32	54.91	74.00	-19.09	Peak	

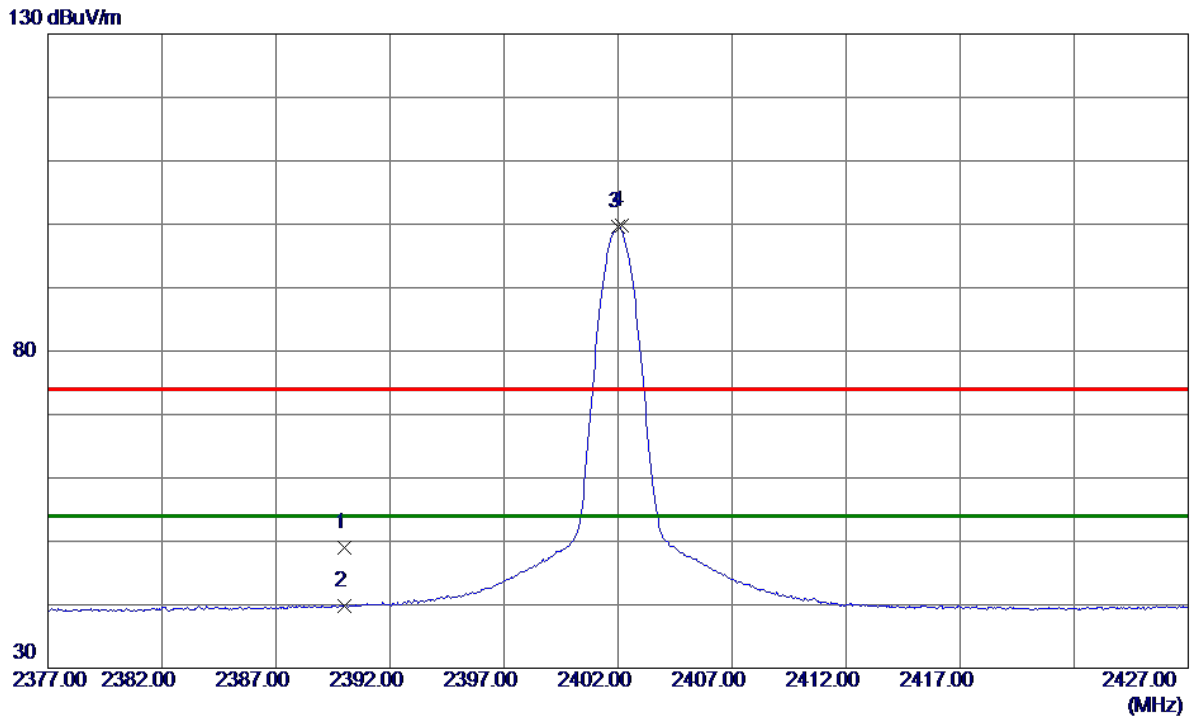
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2402 MHz _CH00_1Mbps
------------	-------------------------

Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	42.68	6.24	48.92	74.00	-25.08	Peak	
2	2390.0000	33.54	6.24	39.78	54.00	-14.22	AVG	
3 *	2401.9750	93.30	6.22	99.52	54.00	45.52	AVG	No Limit
4	2402.1500	93.54	6.22	99.76	74.00	25.76	Peak	No Limit

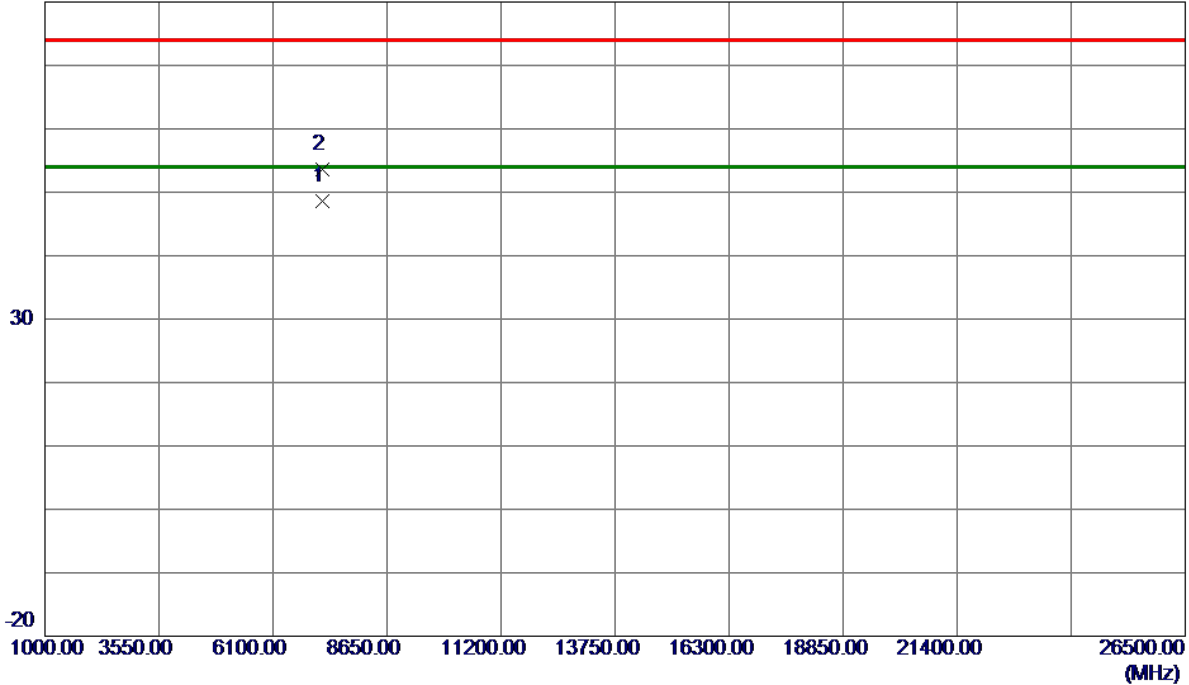
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_1Mbps

Horizontal

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7205.9130	40.31	8.31	48.62	54.00	-5.38	AVG	
2	7206.3510	45.22	8.32	53.54	74.00	-20.46	Peak	

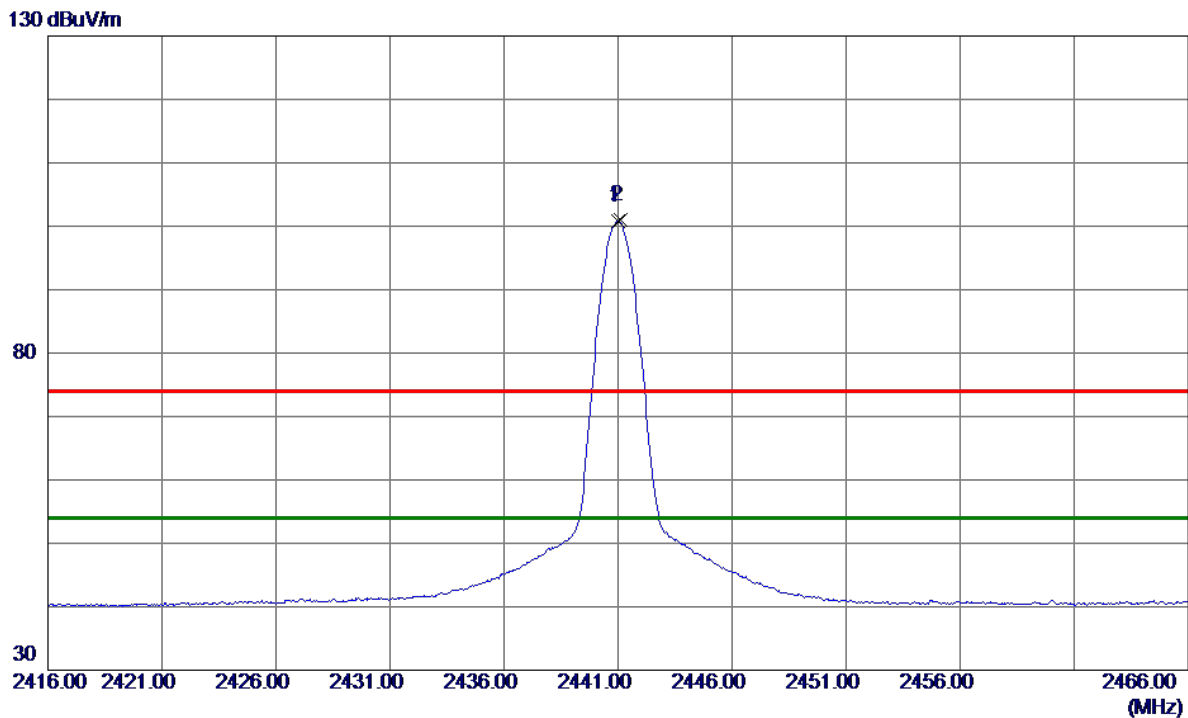
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2441 MHz _CH39_ 1Mbps

Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2441.0000	94.63	6.15	100.78	54.00	46.78	AVG	No Limit
2	2441.1250	94.92	6.15	101.07	74.00	27.07	Peak	No Limit

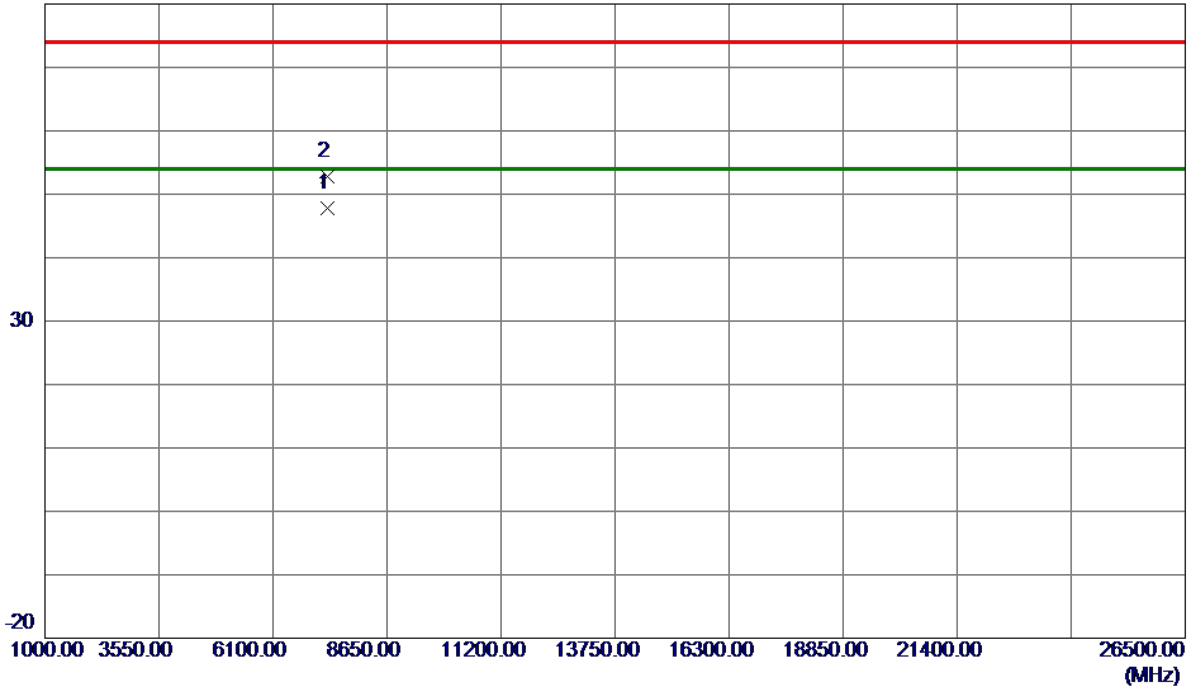
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2441 MHz _CH39_ 1Mbps
------------	--------------------------

Vertical

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7323.0210	39.28	8.48	47.76	54.00	-6.24	AVG	
2	7323.4480	44.39	8.48	52.87	74.00	-21.13	Peak	

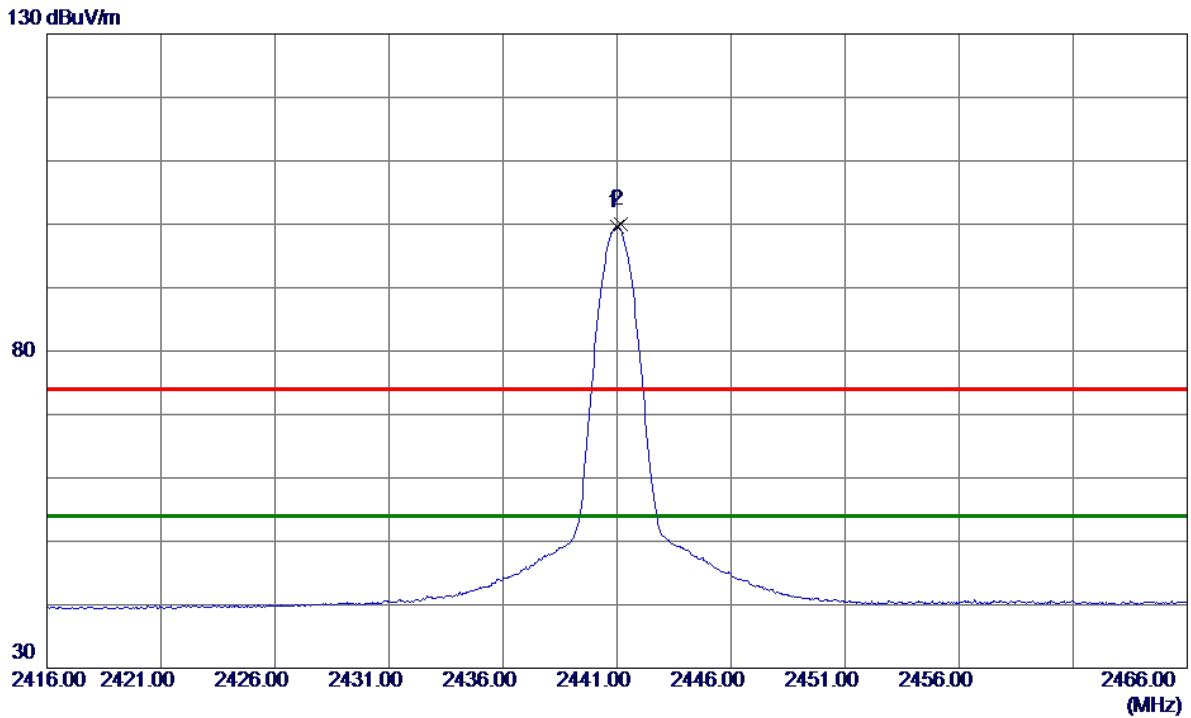
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2441 MHz _CH39_ 1Mbps
------------	--------------------------

Horizontal



No.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2440.9750	93.51	6.15	99.66	54.00	45.66	AVG	No Limit
2	2441.1500	93.77	6.15	99.92	74.00	25.92	Peak	No Limit

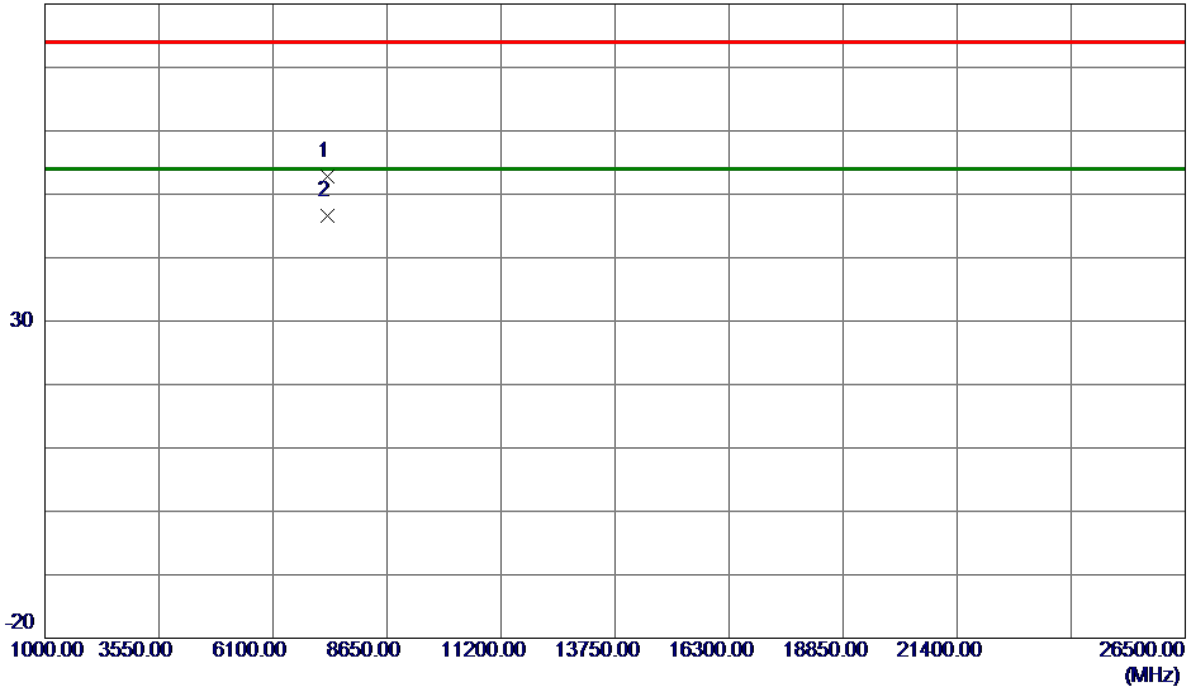
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2441 MHz _CH39_ 1Mbps
------------	--------------------------

Horizontal

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	7322.4540	44.23	8.48	52.71	74.00	-21.29	Peak	
2 *	7322.9550	38.14	8.48	46.62	54.00	-7.38	AVG	

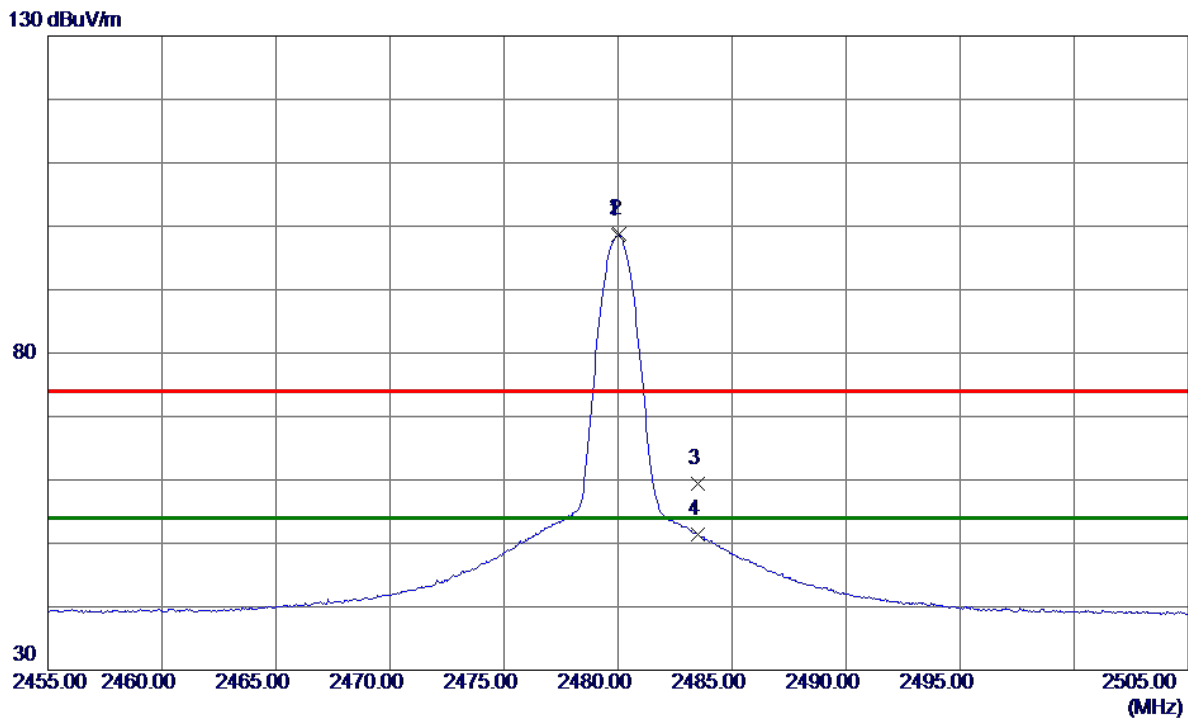
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz _CH78_1Mbps

Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2479.9750	92.48	6.09	98.57	54.00	44.57	AVG	No Limit
2	2480.0500	92.69	6.09	98.78	74.00	24.78	Peak	No Limit
3	2483.5000	53.36	6.08	59.44	74.00	-14.56	Peak	
4	2483.5000	45.30	6.08	51.38	54.00	-2.62	AVG	

REMARKS:

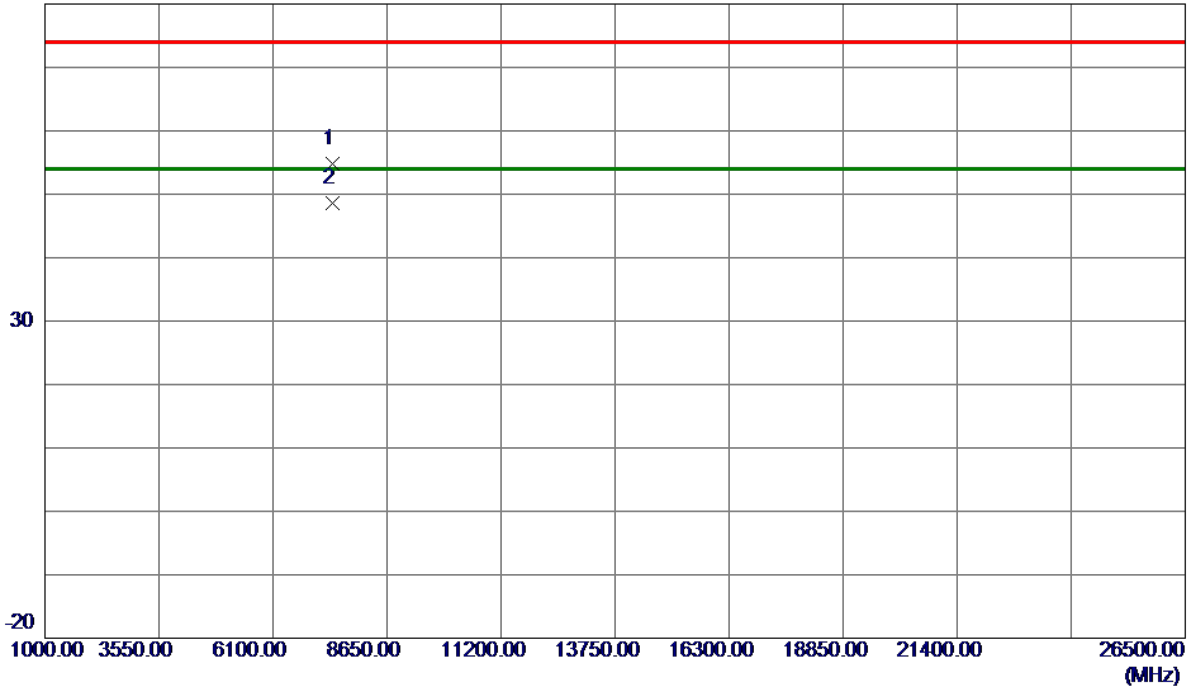
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2480 MHz _CH78_1Mbps
------------	-------------------------

Vertical

80 dBuV/m



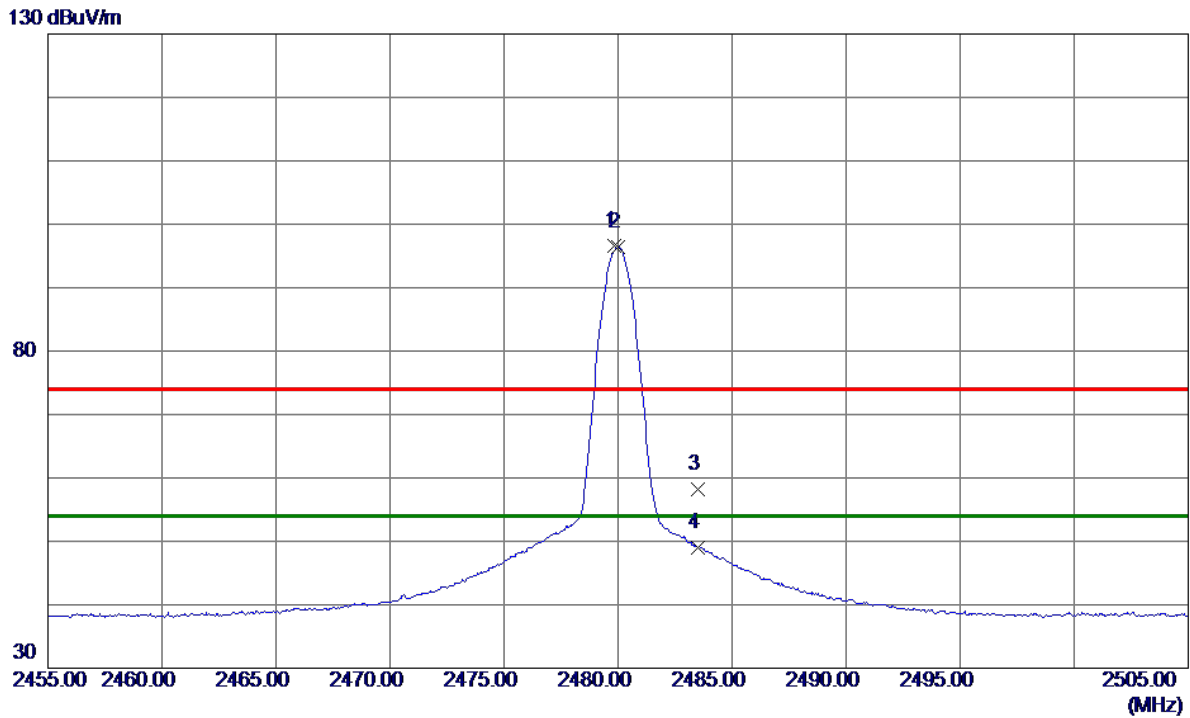
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	7439.4000	46.21	8.65	54.86	74.00	-19.14	Peak	
2 *	7439.9850	40.02	8.65	48.67	54.00	-5.33	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2480 MHz _CH78_1Mbps
------------	-------------------------

Horizontal



No.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479.8250	90.60	6.09	96.69	74.00	22.69	Peak	No Limit
2 *	2480.0000	90.29	6.09	96.38	54.00	42.38	AVG	No Limit
3	2483.5000	52.11	6.08	58.19	74.00	-15.81	Peak	
4	2483.5000	42.90	6.08	48.98	54.00	-5.02	AVG	

REMARKS:

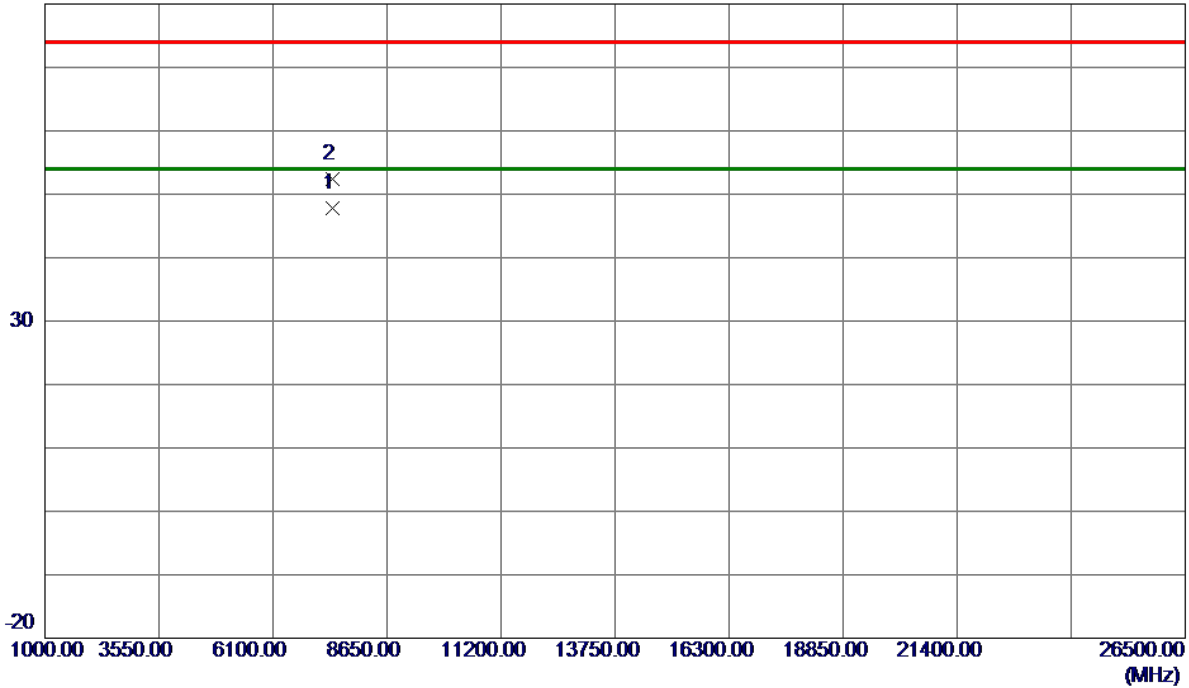
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2480 MHz _CH78_1Mbps
------------	-------------------------

Horizontal

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7439.9340	39.22	8.65	47.87	54.00	-6.13	AVG	
2	7440.4030	43.71	8.65	52.36	74.00	-21.64	Peak	

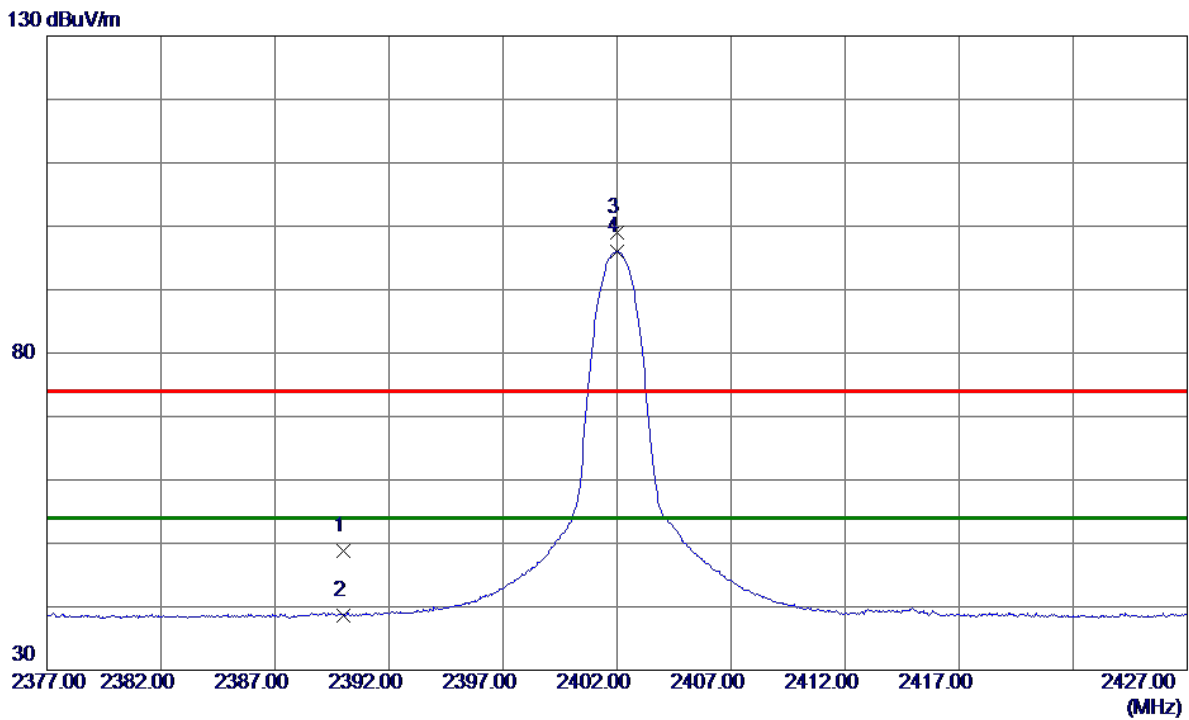
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2402 MHz _CH00_3Mbps
------------	-------------------------

Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	42.61	6.24	48.85	74.00	-25.15	Peak	
2	2390.0000	32.38	6.24	38.62	54.00	-15.38	AVG	
3	2401.9750	92.87	6.22	99.09	74.00	25.09	Peak	No Limit
4 *	2402.0250	89.75	6.22	95.97	54.00	41.97	AVG	No Limit

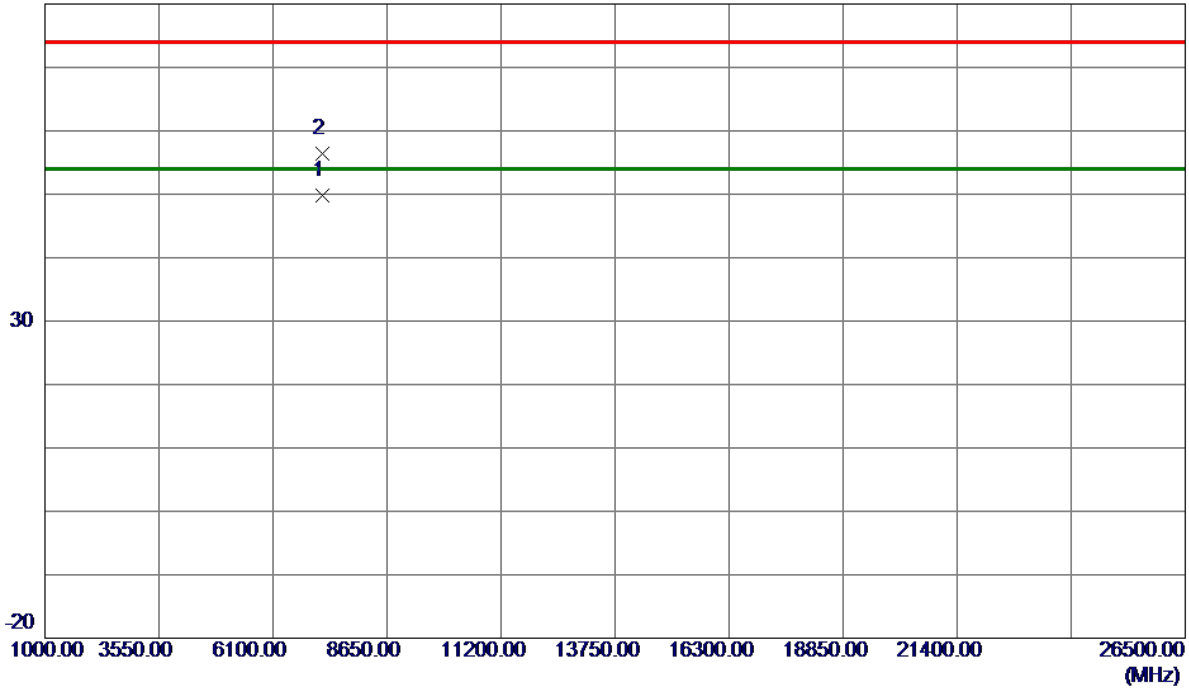
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2402 MHz _CH00_ 3Mbps
------------	--------------------------

Vertical

80 dBuV/m



No.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7206.0000	41.57	8.31	49.88	54.00	-4.12	AVG	
2	7206.6630	48.02	8.32	56.34	74.00	-17.66	Peak	

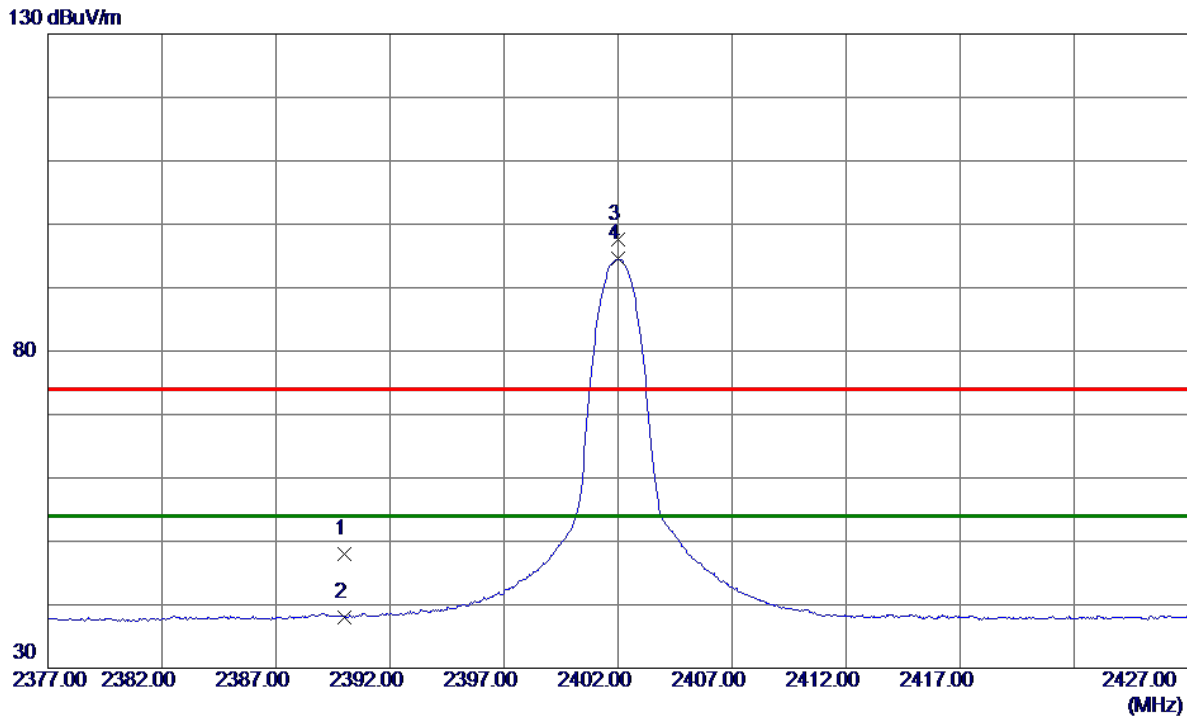
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz _CH00_3Mbps

Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	41.78	6.24	48.02	74.00	-25.98	Peak	
2	2390.0000	31.83	6.24	38.07	54.00	-15.93	AVG	
3	2402.0250	91.36	6.22	97.58	74.00	23.58	Peak	No Limit
4 *	2402.0250	88.29	6.22	94.51	54.00	40.51	AVG	No Limit

REMARKS:

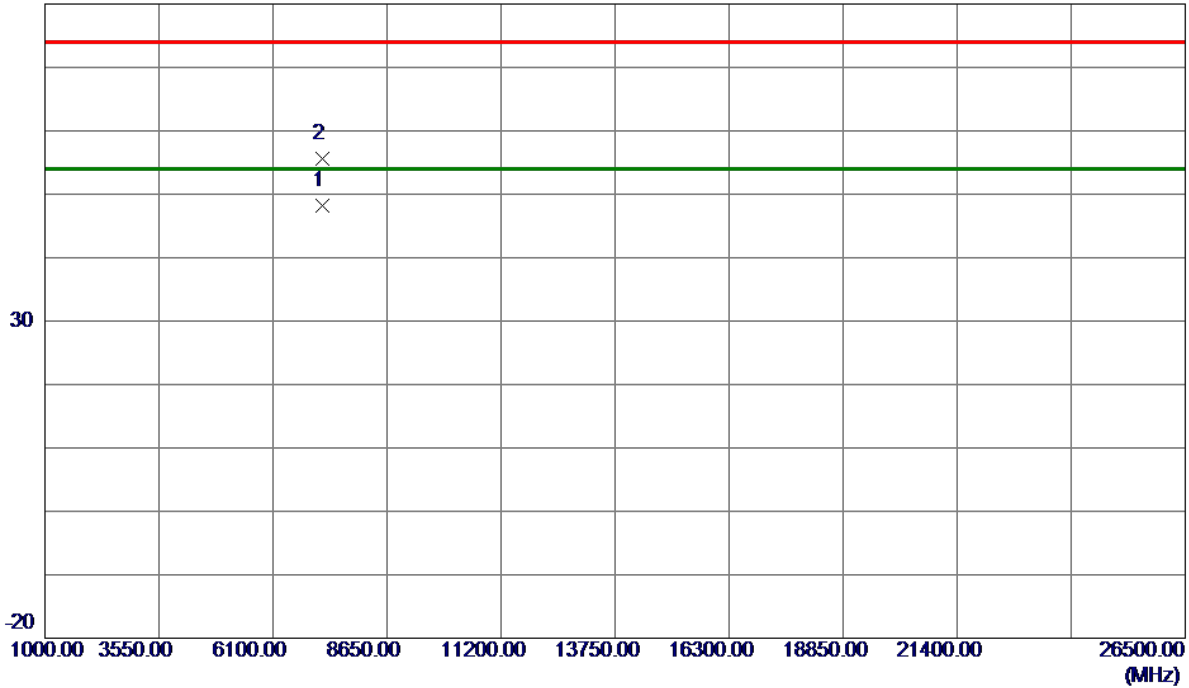
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2402 MHz _CH00_3Mbps
------------	-------------------------

Horizontal

80 dBuV/m



No.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7206.1060	39.98	8.31	48.29	54.00	-5.71	AVG	
2	7206.3170	47.23	8.31	55.54	74.00	-18.46	Peak	

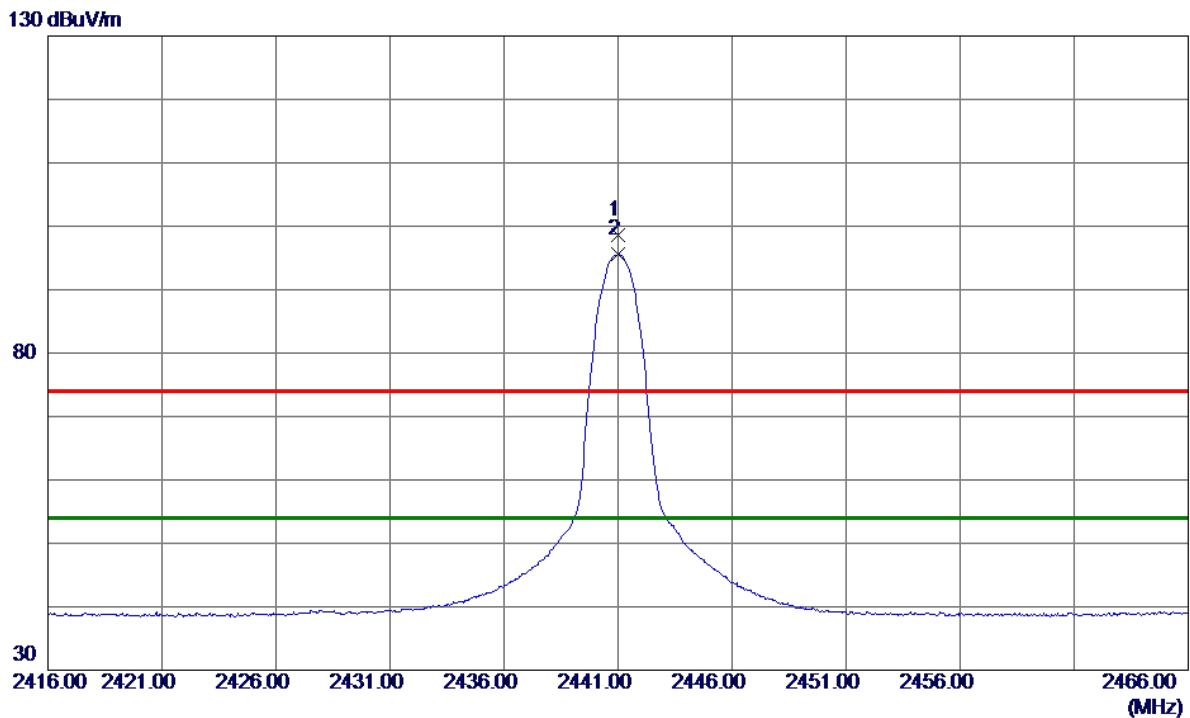
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2441 MHz _CH39_3Mbps

Vertical



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2441.0250	92.54	6.15	98.69	74.00	24.69	Peak	No Limit
2 *	2441.0250	89.40	6.15	95.55	54.00	41.55	AVG	No Limit

REMARKS:

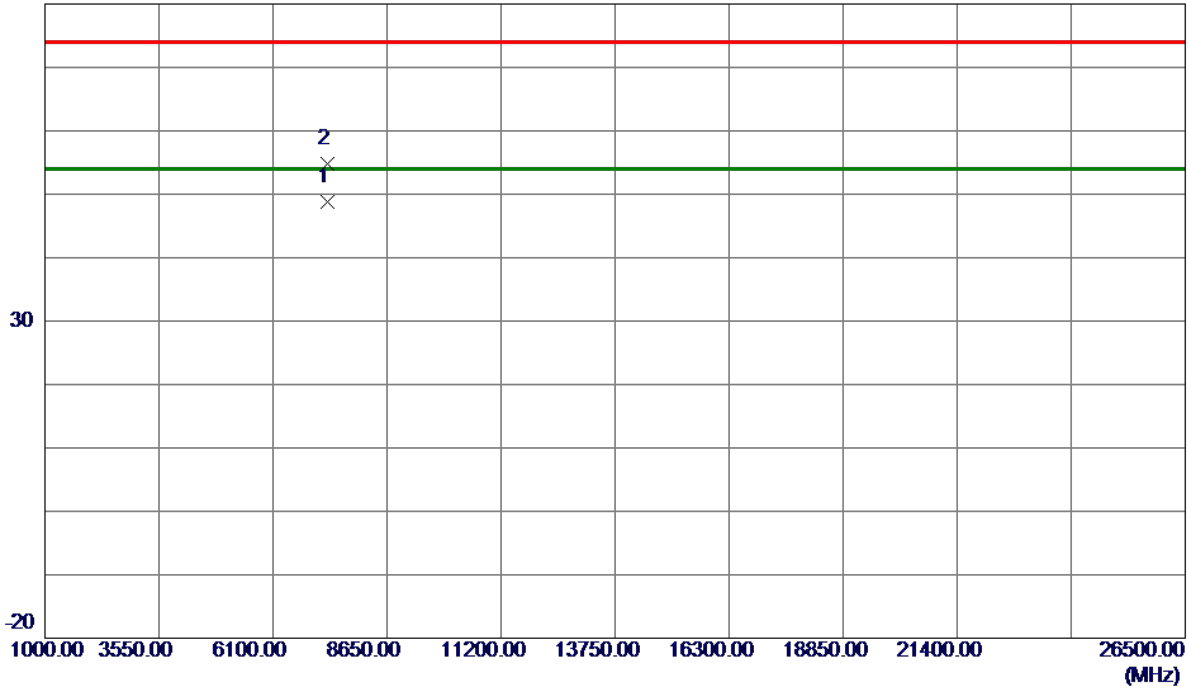
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2441 MHz _CH39_3Mbps
------------	-------------------------

Vertical

80 dBuV/m



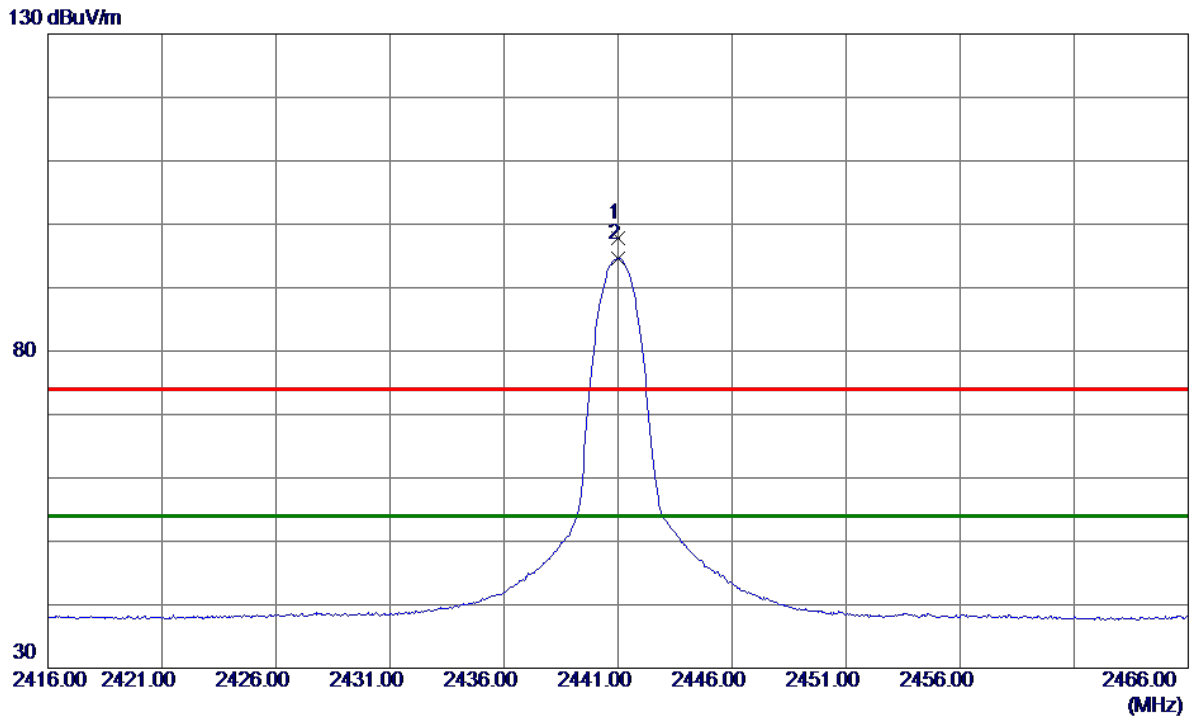
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7323.0500	40.27	8.48	48.75	54.00	-5.25	AVG	
2	7323.2400	46.40	8.48	54.88	74.00	-19.12	Peak	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2441 MHz _CH39_ 3Mbps
------------	--------------------------

Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2441.0000	91.58	6.15	97.73	74.00	23.73	Peak	No Limit
2 *	2441.0000	88.44	6.15	94.59	54.00	40.59	AVG	No Limit

REMARKS:

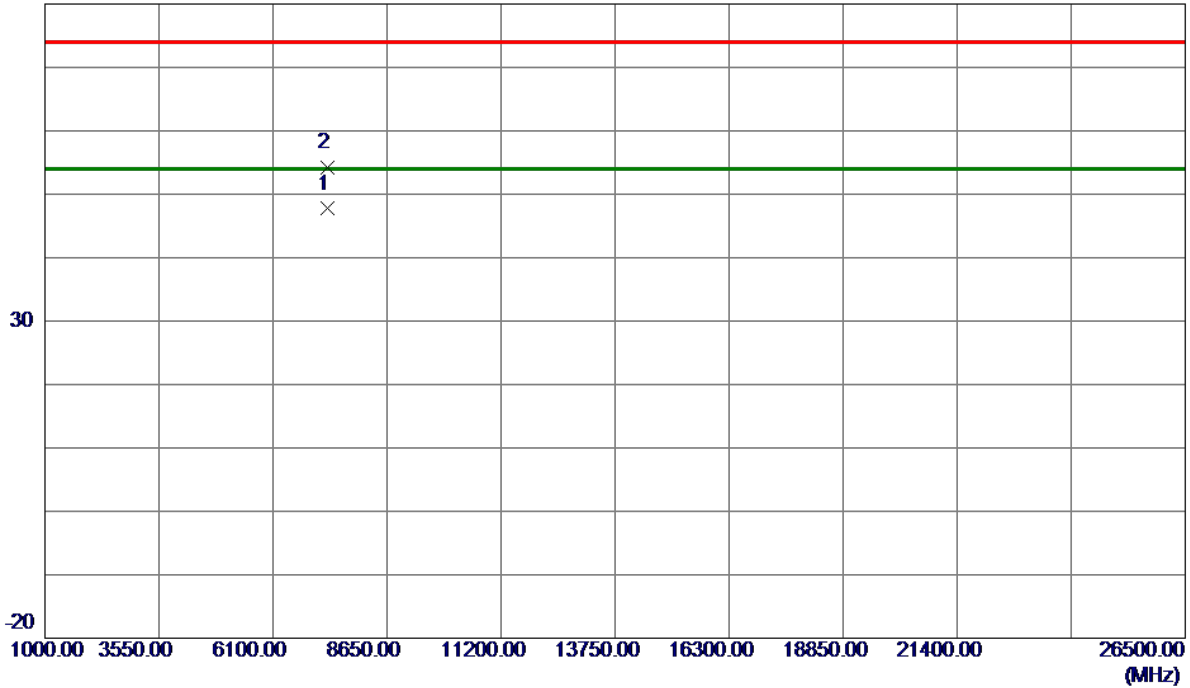
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2441 MHz _CH39_3Mbps
------------	-------------------------

Horizontal

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7322.8730	39.22	8.48	47.70	54.00	-6.30	AVG	
2	7323.2950	45.67	8.48	54.15	74.00	-19.85	Peak	

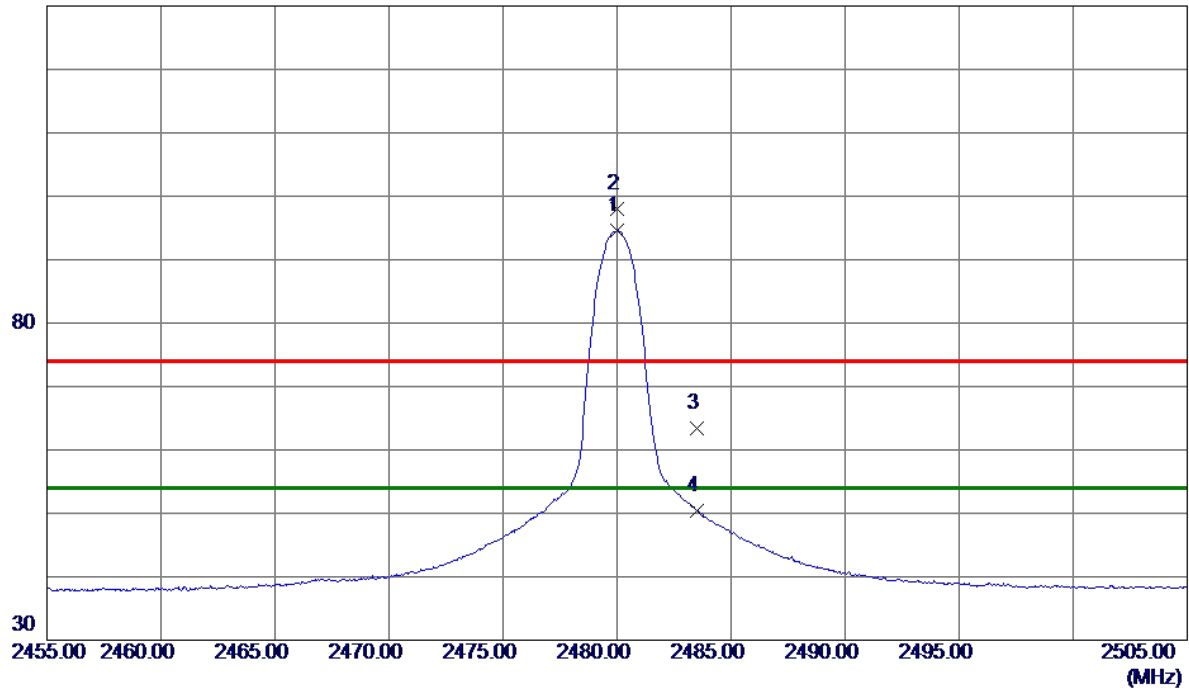
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz _CH78_3Mbps

Vertical

130 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2480.0000	88.45	6.09	94.54	54.00	40.54	AVG	No Limit
2	2480.0250	91.94	6.09	98.03	74.00	24.03	Peak	No Limit
3	2483.5000	57.37	6.08	63.45	74.00	-10.55	Peak	
4	2483.5000	44.39	6.08	50.47	54.00	-3.53	AVG	

REMARKS:

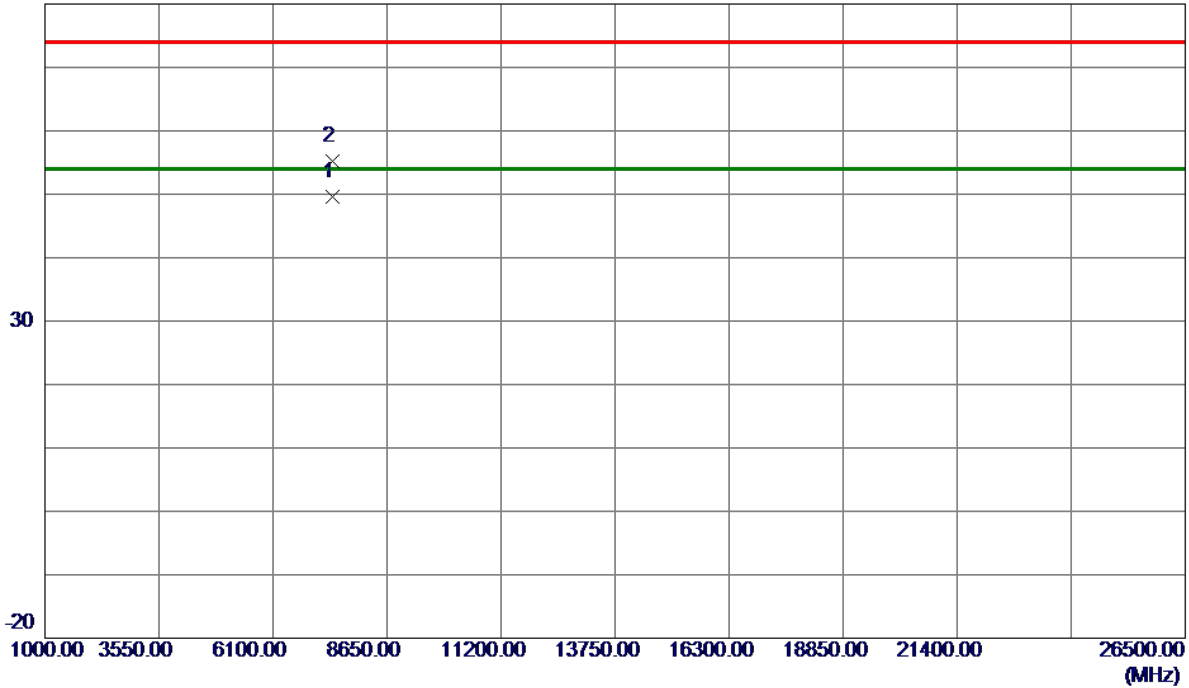
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz _CH78_3Mbps

Vertical

80 dBuV/m



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	7440.0100	40.86	8.65	49.51	54.00	-4.49	AVG	
2	7440.3870	46.52	8.65	55.17	74.00	-18.83	Peak	

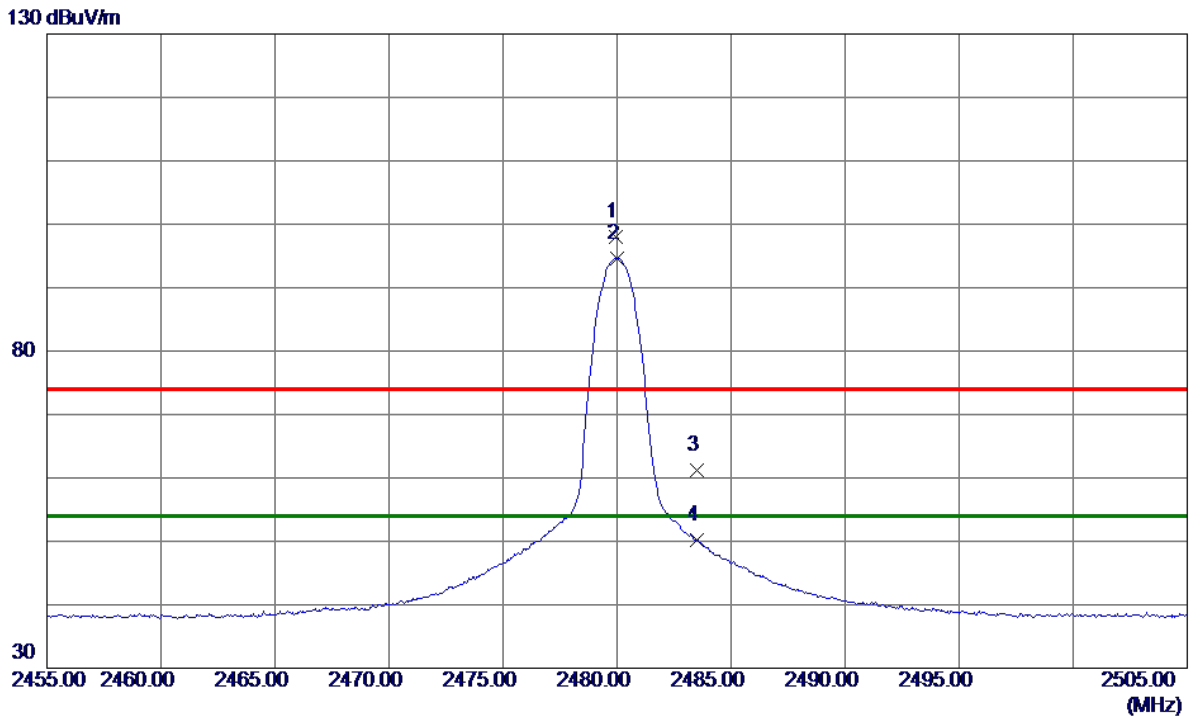
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz _CH78_ 3Mbps

Horizontal



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2479.9500	91.81	6.09	97.90	74.00	23.90	Peak	No Limit
2 *	2480.0250	88.60	6.09	94.69	54.00	40.69	AVG	No Limit
3	2483.5000	55.12	6.08	61.20	74.00	-12.80	Peak	
4	2483.5000	44.18	6.08	50.26	54.00	-3.74	AVG	

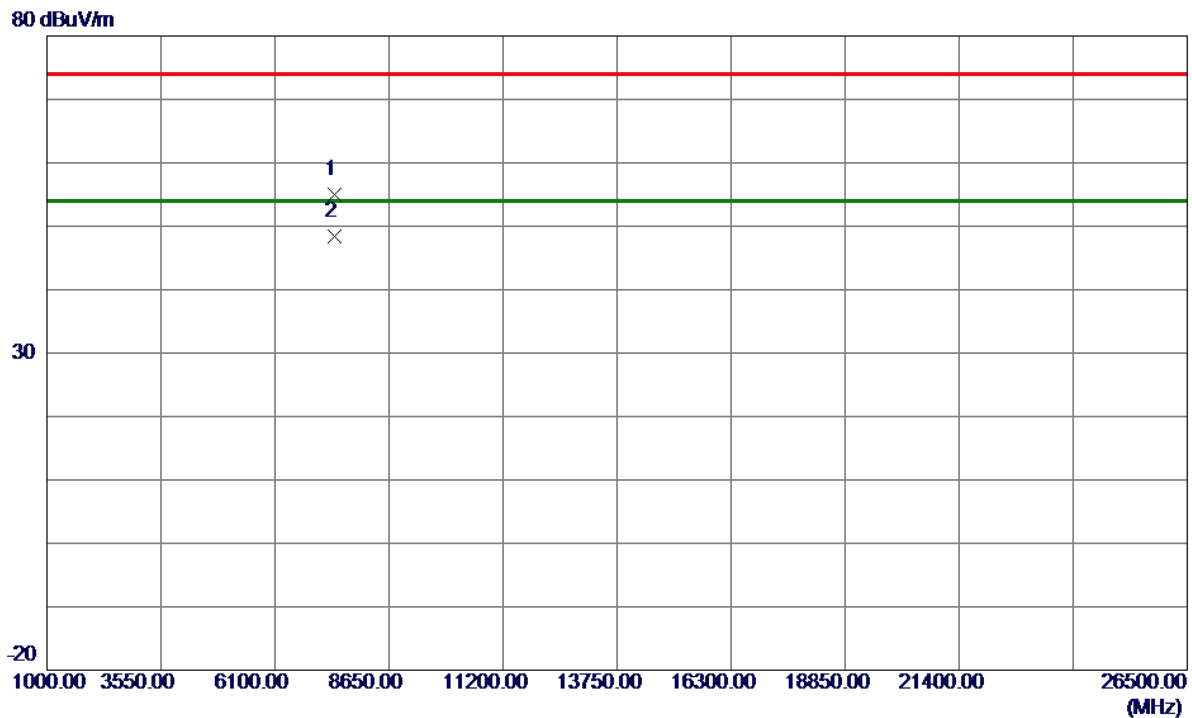
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	TX 2480 MHz _CH78_3Mbps
------------	-------------------------

Horizontal



No.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7440.0650	46.34	8.65	54.99	74.00	-19.01	Peak	
2 *	7440.1550	39.72	8.65	48.37	54.00	-5.63	AVG	

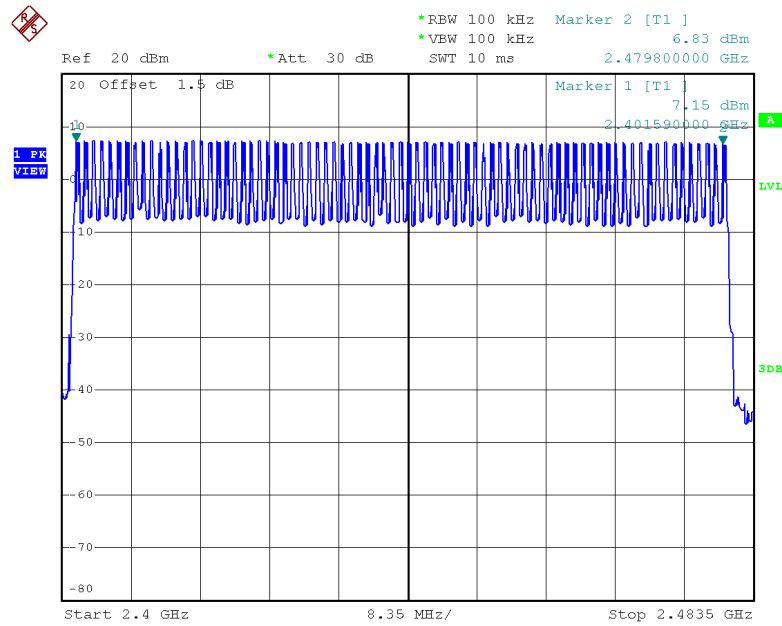
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

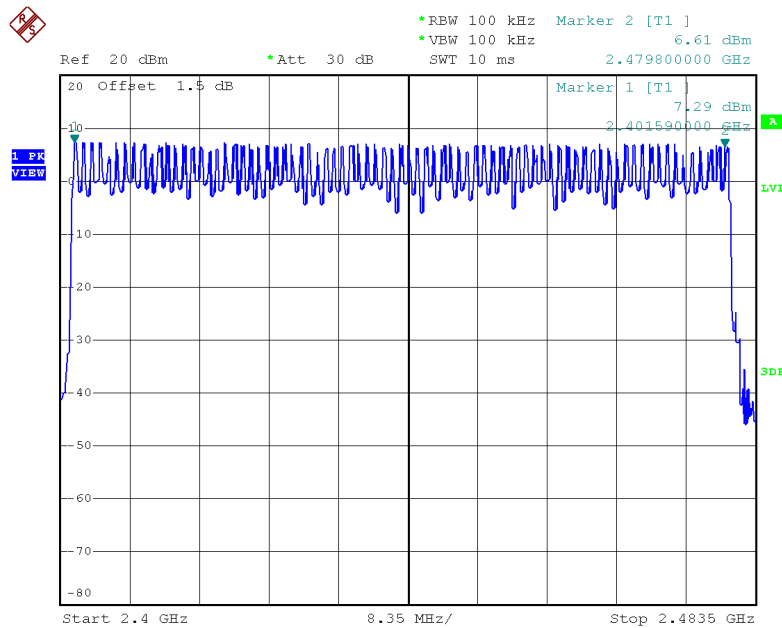
APPENDIX E - NUMBER OF HOPPING FREQUENCY

Test Mode	Hopping Mode_1Mbps
Number of Hopping Frequency	79



Date: 10.SEP.2019 19:54:30

Test Mode	Hopping Mode_3Mbps
Number of Hopping Frequency	79

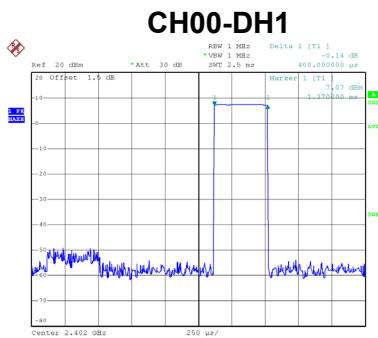


Date: 10.SEP.2019 19:37:36

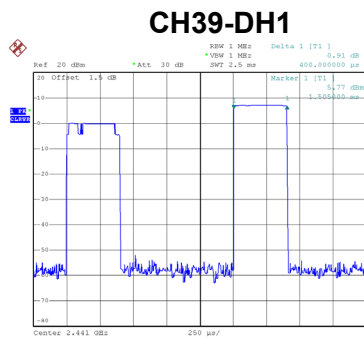
APPENDIX F - AVERAGE TIME OF OCCUPANCY

Test Mode:	TX Mode_1Mbps
------------	---------------

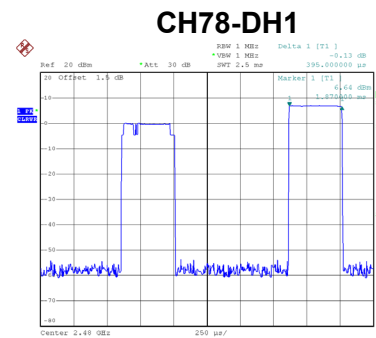
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH1	2402	0.4000	0.1280	0.4000	Pass
DH3	2402	1.6600	0.2656	0.4000	Pass
DH5	2402	2.9200	0.3115	0.4000	Pass
DH1	2441	0.4000	0.1280	0.4000	Pass
DH3	2441	1.6600	0.2656	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH1	2480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



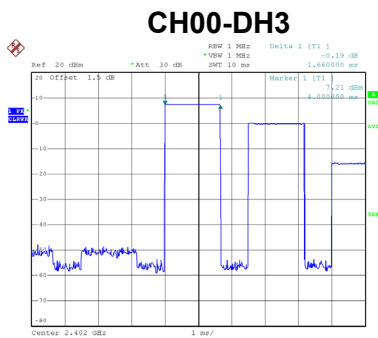
Date: 10.SEP.2019 19:57:27



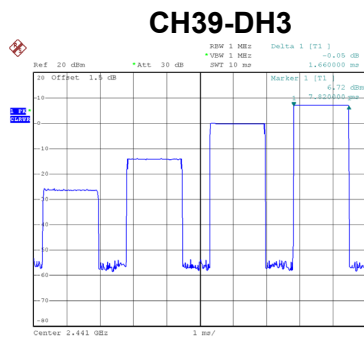
Date: 10.SEP.2019 19:57:33



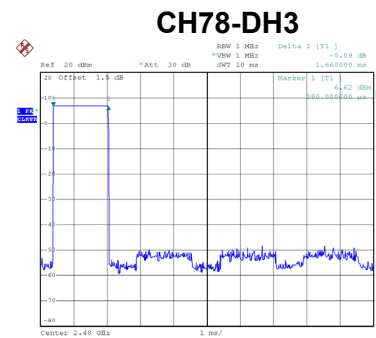
Date: 10.SEP.2019 19:57:41



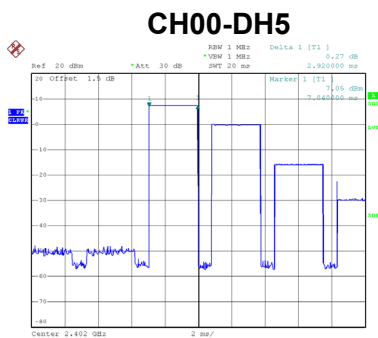
Date: 10.SEP.2019 19:59:01



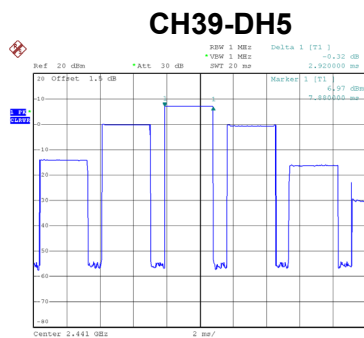
Date: 10.SEP.2019 19:59:09



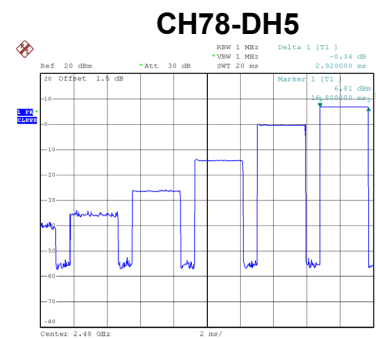
Date: 10.SEP.2019 19:59:14



Date: 10.SEP.2019 19:59:39



Date: 10.SEP.2019 19:59:47

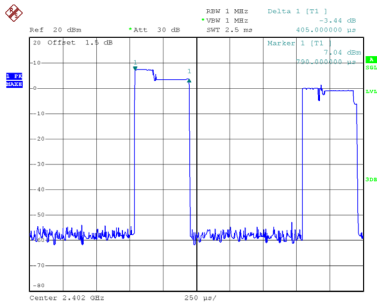


Date: 10.SEP.2019 19:59:52

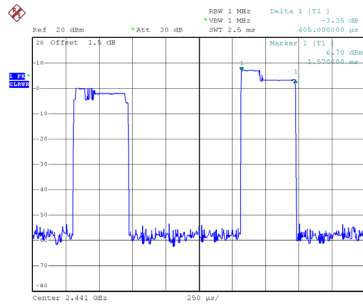
Test Mode:	TX Mode_3Mbps
------------	---------------

Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
3DH1	2402	0.4050	0.1296	0.4000	Pass
3DH3	2402	1.6800	0.2688	0.4000	Pass
3DH5	2402	2.9200	0.3115	0.4000	Pass
3DH1	2441	0.4050	0.1296	0.4000	Pass
3DH3	2441	1.6600	0.2656	0.4000	Pass
3DH5	2441	2.9200	0.3115	0.4000	Pass
3DH1	2480	0.4100	0.1312	0.4000	Pass
3DH3	2480	1.6600	0.2656	0.4000	Pass
3DH5	2480	2.9200	0.3115	0.4000	Pass

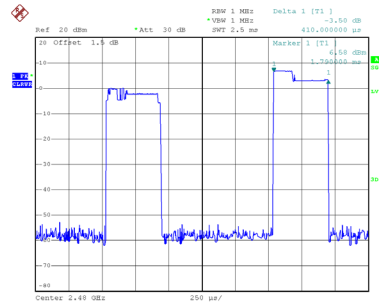
CH00-3DH1



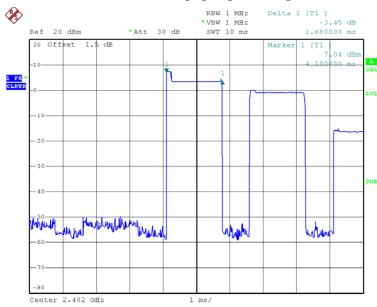
CH39-3DH1



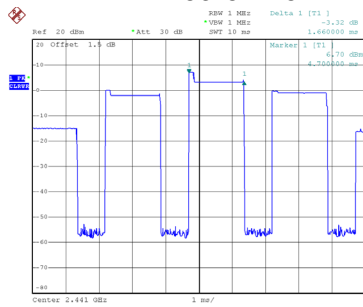
CH78-3DH1



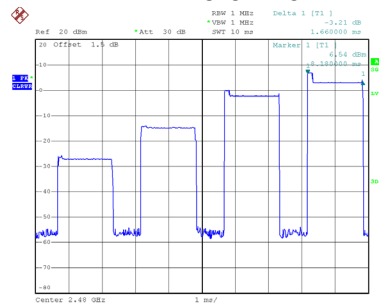
CH00-3DH3



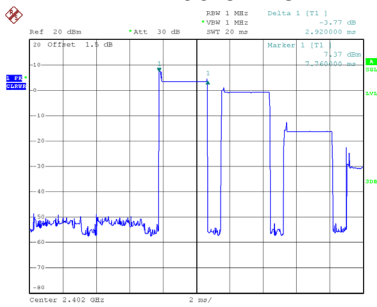
CH39-3DH3



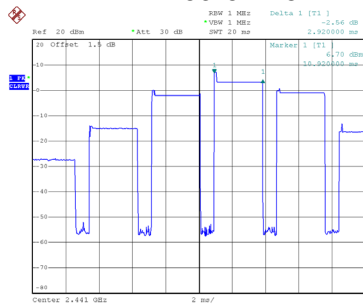
CH78-3DH3



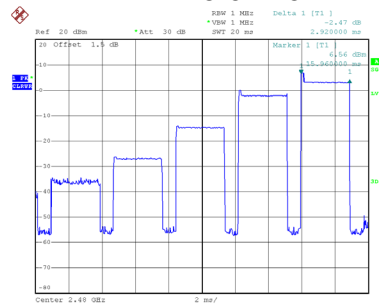
CH00-3DH5



CH39-3DH5



CH78-3DH5

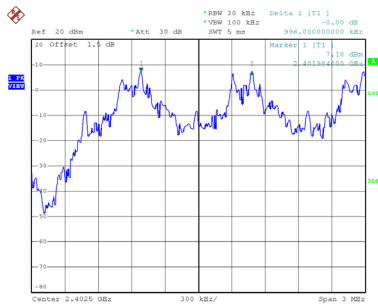


APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT

Test Mode: Hopping on _1Mbps

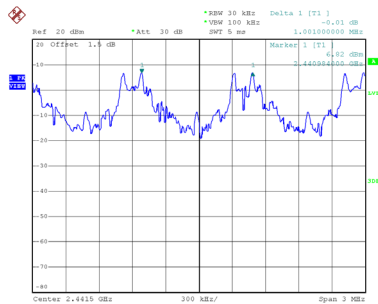
Channel	Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
00	2402	0.996	0.688	Pass
39	2441	1.001	0.676	Pass
78	2480	1.002	0.639	Pass

CH00



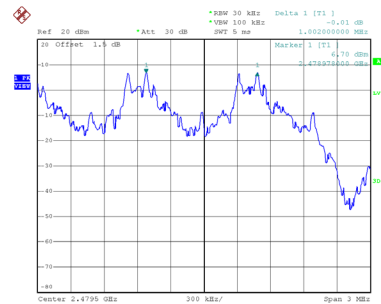
Date: 10.SEP.2019 19:47:52

CH39



Date: 10.SEP.2019 19:49:53

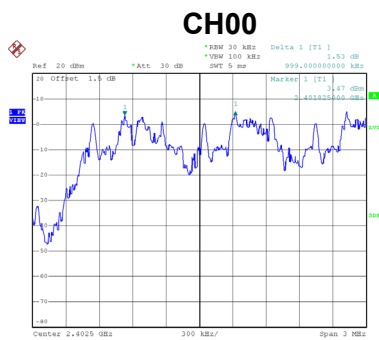
CH78



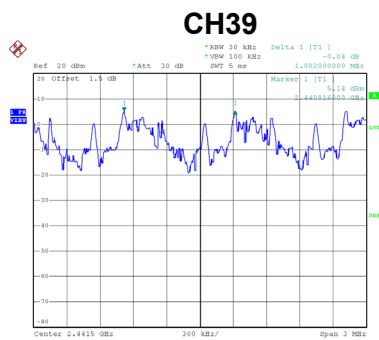
Date: 10.SEP.2019 19:51:48

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

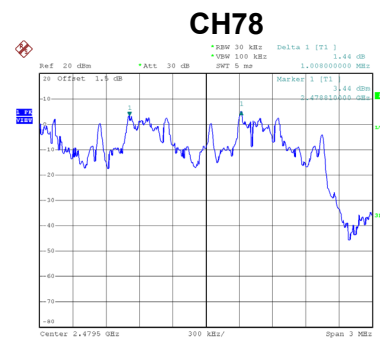
Channel	Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
00	2402	0.999	0.895	Pass
39	2441	1.002	0.895	Pass
78	2480	1.008	0.894	Pass



Date: 10.SEP.2019 19:31:05



Date: 10.SEP.2019 19:33:01

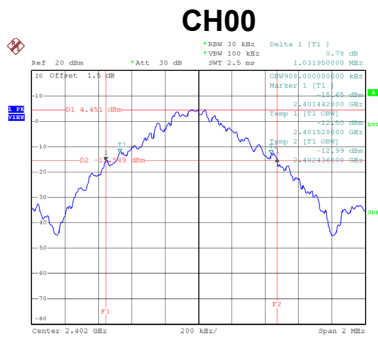


Date: 10.SEP.2019 19:34:56

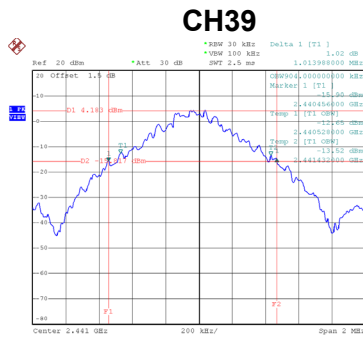
APPENDIX H - BANDWIDTH

Test Mode: TX Mode _1Mbps

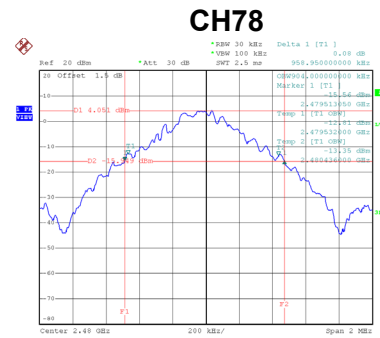
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
00	2402	1.032	0.908
39	2441	1.014	0.904
78	2480	0.959	0.904



Date: 10.SEP.2019 20:35:59



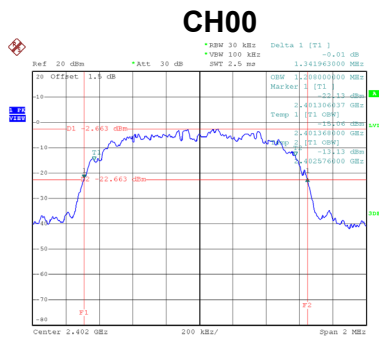
Date: 10.SEP.2019 20:37:40



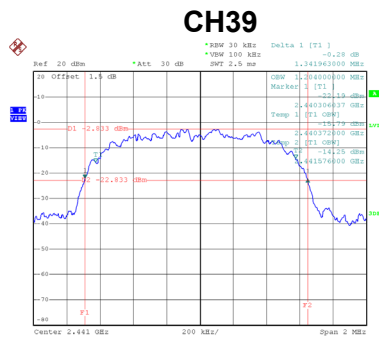
Date: 10.SEP.2019 20:39:41

Test Mode:	TX Mode_3Mbps
------------	---------------

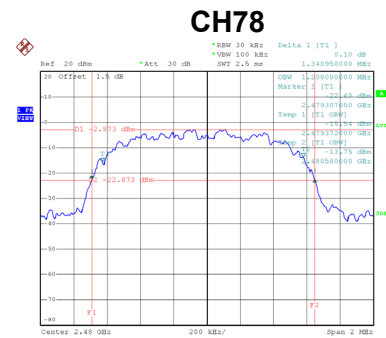
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
00	2402	1.342	1.208
39	2441	1.342	1.204
78	2480	1.341	1.208



Date: 10.SEP.2019 19:22:09



Date: 10.SEP.2019 19:24:16

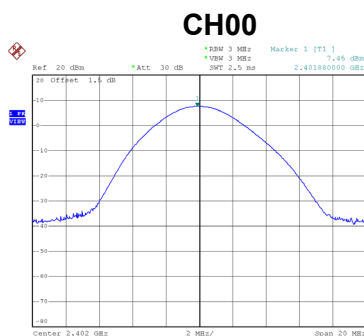


Date: 10.SEP.2019 19:25:37

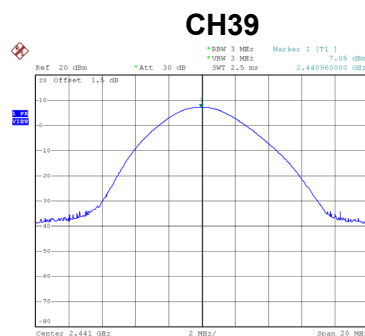
APPENDIX I - MAXIMUM OUTPUT POWER

Test Mode: TX Mode _1Mbps

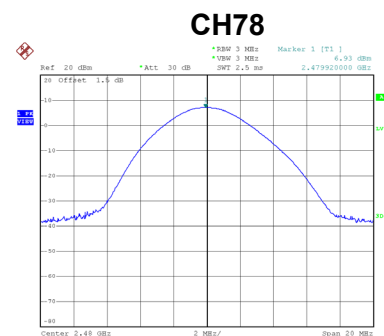
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	7.45	0.0056	21.00	0.125	Pass
39	2441	7.05	0.0051	21.00	0.125	Pass
78	2480	6.93	0.0049	21.00	0.125	Pass



Date: 10.SEP.2019 20:36:47



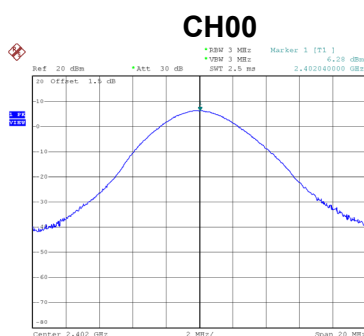
Date: 10.SEP.2019 20:38:27



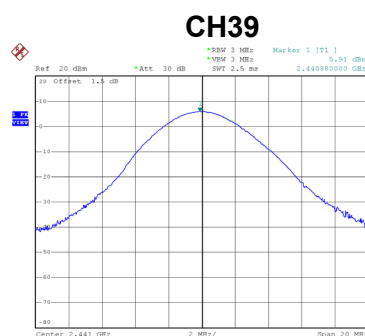
Date: 10.SEP.2019 20:40:29

Test Mode: TX Mode _3Mbps

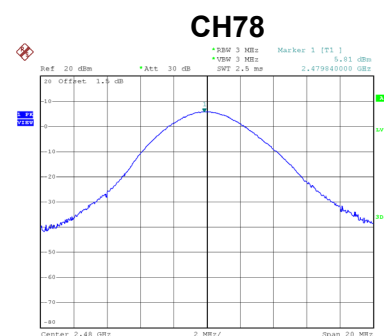
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	6.28	0.0042	21.00	0.125	Pass
39	2441	5.91	0.0039	21.00	0.125	Pass
78	2480	5.81	0.0038	21.00	0.125	Pass



Date: 10.SEP.2019 19:22:56



Date: 10.SEP.2019 19:24:22

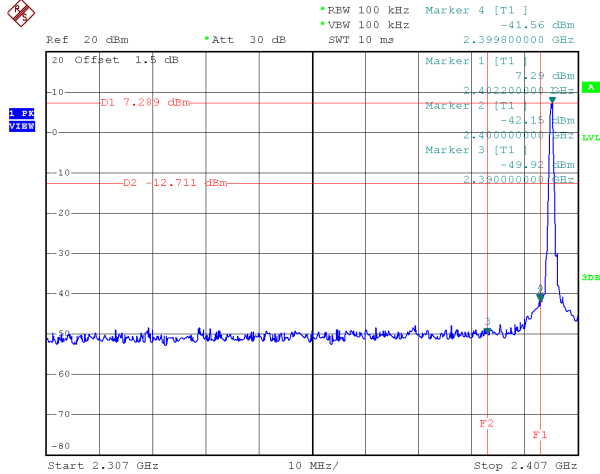


Date: 10.SEP.2019 19:26:23

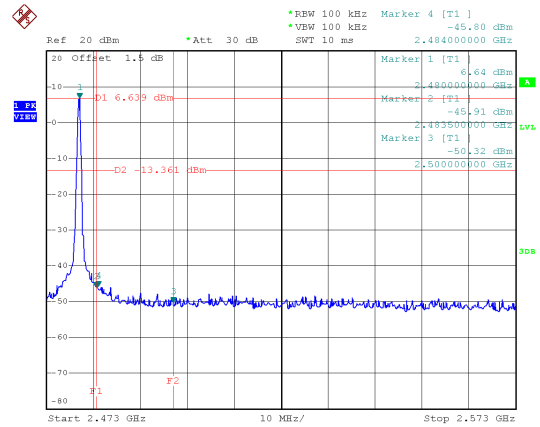
APPENDIX J - CONDUCTED SPURIOUS EMISSION

Test Mode : TX Mode _1Mbps

Bandedge- CH00 (Lower)



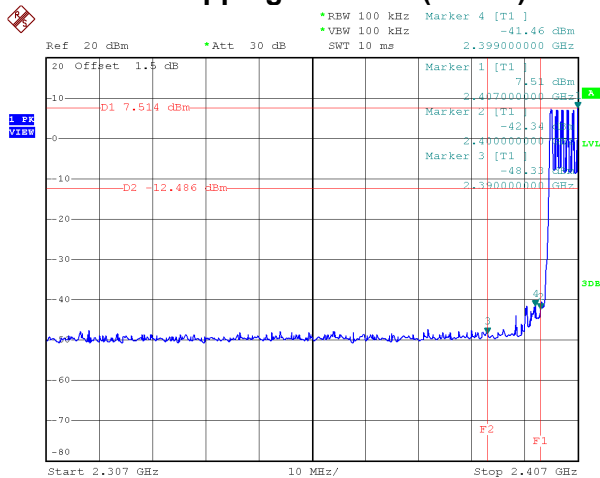
Bandedge CH78 (Upper)



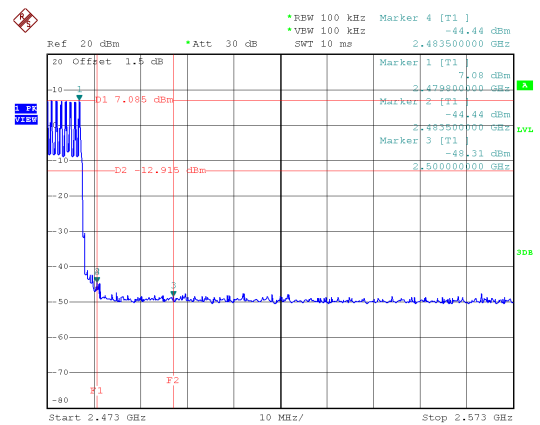
Date: 10.SEP.2019 20:39:50

Date: 10.SEP.2019 20:36:08

Hopping on mode (Lower)



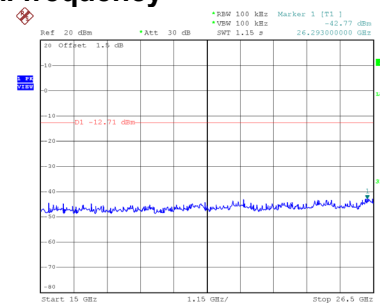
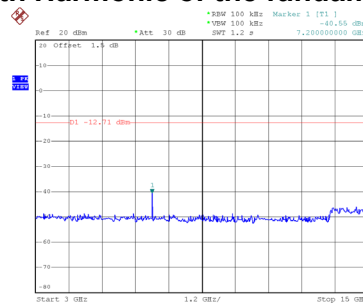
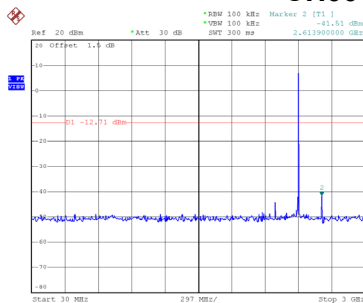
Hopping on mode (Upper)



Date: 10.SEP.2019 19:57:22

Date: 10.SEP.2019 19:55:56

CH00 – 10th Harmonic of the fundamental frequency

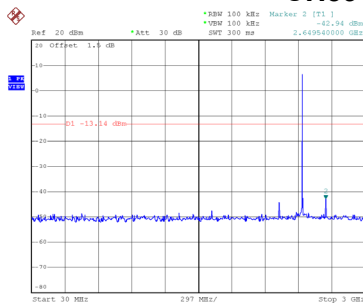


Date: 10.SEP.2019 20:36:23

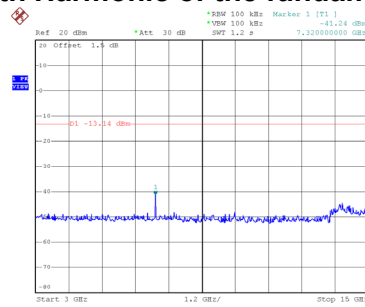
Date: 10.SEP.2019 20:36:31

Date: 10.SEP.2019 20:36:40

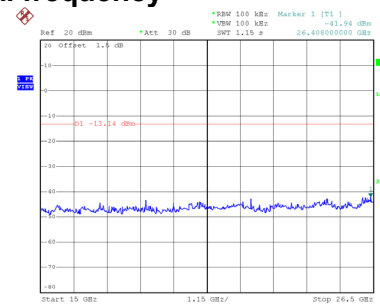
CH39 – 10th Harmonic of the fundamental frequency



Date: 10.SEP.2019 20:38:03

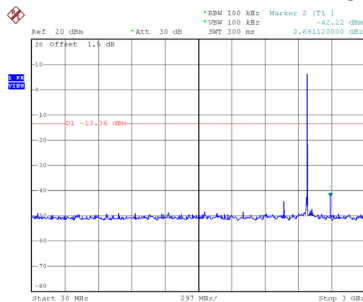


Date: 10.SEP.2019 20:38:12

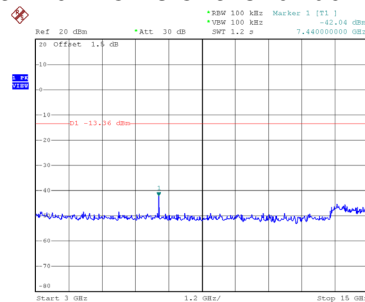


Date: 10.SEP.2019 20:38:20

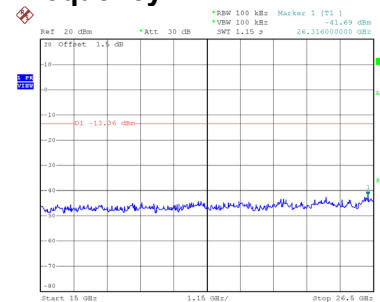
CH78 – 10th Harmonic of the fundamental frequency



Date: 10.SEP.2019 20:40:04



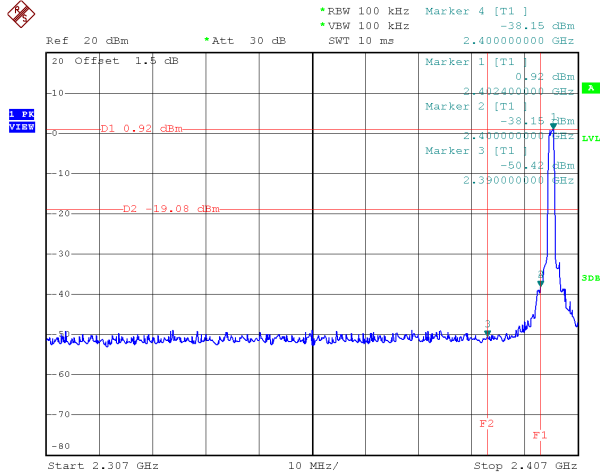
Date: 10.SEP.2019 20:40:13



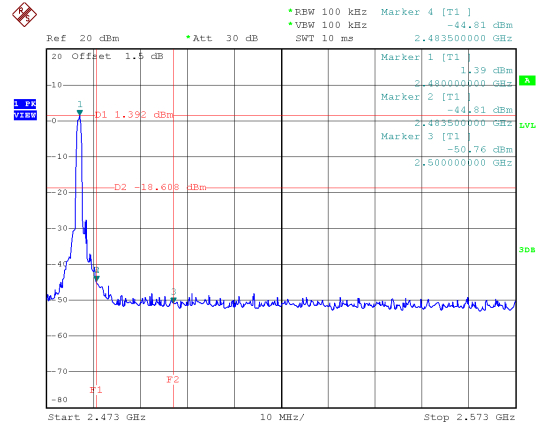
Date: 10.SEP.2019 20:40:22

Test Mode : TX Mode _3Mbps

Bandedge- CH00 (Lower)



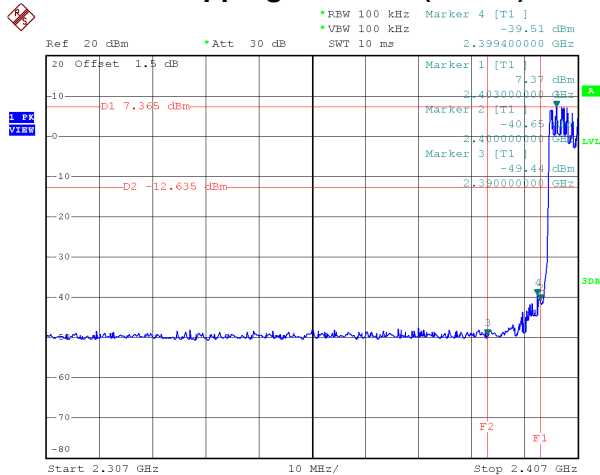
Bandedge CH78 (Upper)



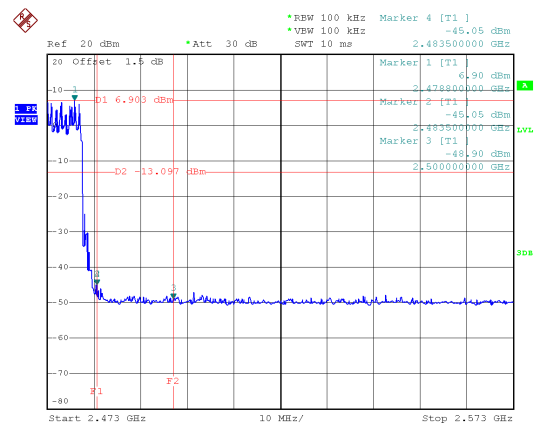
Date: 10.SEP.2019 19:25:46

Date: 10.SEP.2019 19:22:18

Hopping on mode (Lower)



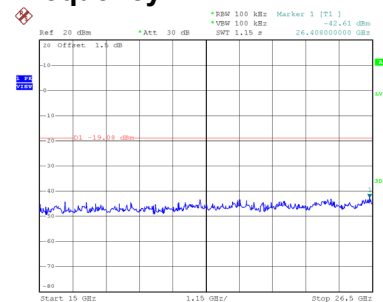
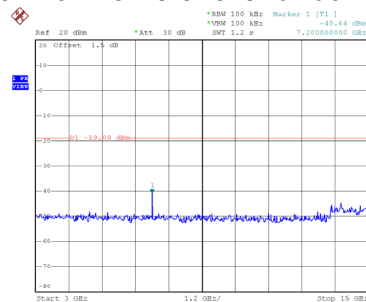
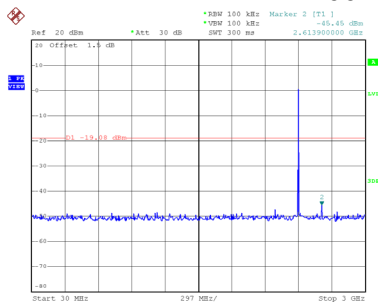
Hopping on mode (Upper)



Date: 10.SEP.2019 19:40:28

Date: 10.SEP.2019 19:39:02

CH00 – 10th Harmonic of the fundamental frequency

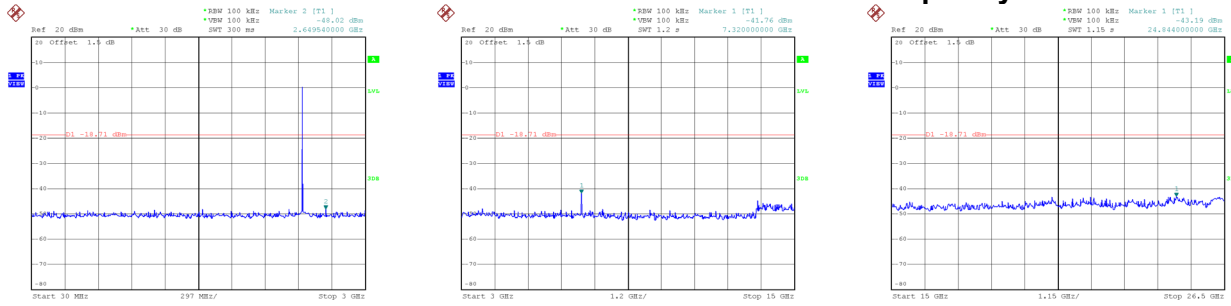


Date: 10.SEP.2019 19:22:32

Date: 10.SEP.2019 19:22:40

Date: 10.SEP.2019 19:22:49

CH39 – 10th Harmonic of the fundamental frequency

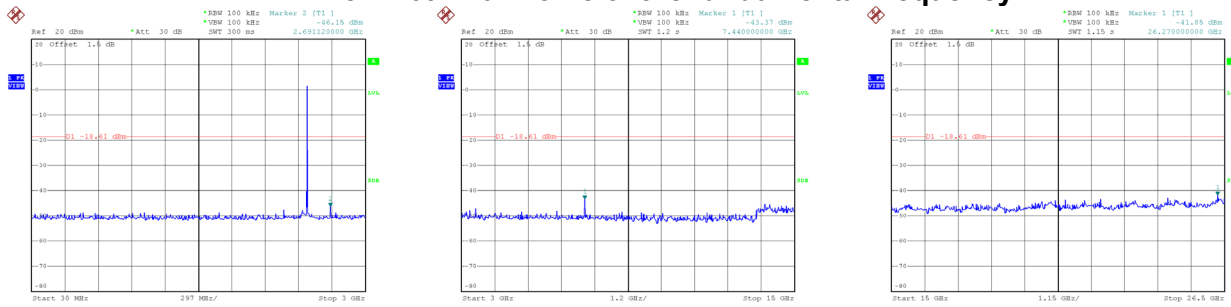


Date: 10.SEP.2019 19:23:34

Date: 10.SEP.2019 19:23:42

Date: 10.SEP.2019 19:23:51

CH78 – 10th Harmonic of the fundamental frequency



Date: 10.SEP.2019 19:26:00

Date: 10.SEP.2019 19:26:08

Date: 10.SEP.2019 19:26:17

End of Test Report