FCC Radio Test Report

FCC ID: 2ABVN-M98

This report concerns: Original Grant

Project No.	:	2008C013
Equipment	:	MSI Bluetooth Mouse
Brand Name	:	MSI
Test Model	:	M98
Series Model	:	N/A
Applicant	:	Verico International Co., Ltd
Address	:	12F-6., No.872, Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)
Manufacturer	:	Verico International Co., Ltd
Address	:	12F-6., No.872, Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)
Factory	:	Dongguan You Hong Plastic Electronics Co.,Ltd.
Address	:	Zhen Hua Road, Tie Lu Keng Village, Qi Shi Town, Dong Guan City, Guang Dong Province, China
Date of Receipt	:	Aug. 18, 2020
Date of Test	:	Aug. 18, 2020 ~ Sep. 03, 2020
Issued Date	:	Sep. 15, 2020
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG2020081716
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.

Nick Chen

Prepared by : Nick Chen

Ethan Ma

Approved by : Ethan Ma

Certificate #5123.02

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

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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.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Sep. 15, 2020

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC CFR Title 47, Part 15, Subpart C				
Standard(s) Section	**Test Item**	**Test Result**	**Judgment**	**Remark**
15.207	AC Power Line Conducted Emissions	------	N/A	------
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX A APPENDIX B APPENDIX C	PASS	------
15.247(a)(2)	Bandwidth	APPENDIX D	PASS	------
15.247(b)(3)	Maximum Output Power	APPENDIX E	PASS	------
15.247(d)	Conducted Spurious Emission	APPENDIX F	PASS	------
15.247(e)	Power Spectral Density	APPENDIX G	PASS	------
15.203	Antenna Requirement	------	PASS	Note(2)

Note:

(1) “N/A” denotes test is not applicable to this device.

(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. Radiated emissions 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	4.56
		30MHz ~ 200MHz	H	3.90
		200MHz ~ 1,000MHz	V	4.64
		200MHz ~ 1,000MHz	H	4.38
		1GHz ~ 6GHz	-	4.46
		6GHz ~ 18GHz	-	4.40
		18GHz ~ 26.5GHz	-	3.95
		26.5GHz ~ 40GHz	-	3.95

B. Other Measurement:

Test Item	Uncertainty
Bandwidth	±3.8 %
Maximum Output Power	±0.95 dB
Conducted Spurious Emission	±2.71 dB
Power Spectral Density	±0.86 dB
Temperature	±0.08 °C
Time	±0.58 %
Supply voltages	±0.3 %

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 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Radiated Emissions-9K-30MHz	25°C	60%	DC 3V	Kwok Guo
Radiated Emissions-30 MHz to 1GHz	26°C	52%	DC 3V	Kwok Guo
Radiated Emissions-Above 1000 MHz	24°C	60%	DC 3V	Kwok Guo
Bandwidth	25°C	57%	DC 3V	Hayden Chen
Maximum Output Power	25°C	57%	DC 3V	Laughing Zhang
Conducted Spurious Emission	25°C	57%	DC 3V	Hayden Chen
Power Spectral Density	25°C	57%	DC 3V	Hayden Chen

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	MSI Bluetooth Mouse
Brand Name	MSI
Test Model	M98
Series Model	N/A
Model Difference(s)	N/A
Software Version	V02
Hardware Version	V1.1
Power Source	Supplied from 2*AAA battery.
Power Rating	DC 3V⎓6mA
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Technology	GFSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Max. Output Power	1Mbps : -1.57 dBm (0.0007 W) 2Mbps : -1.55 dBm (0.0007 W)

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)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	-1.66

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 39 _2Mbps

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

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	TX Mode Channel 39 _2Mbps

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) 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.

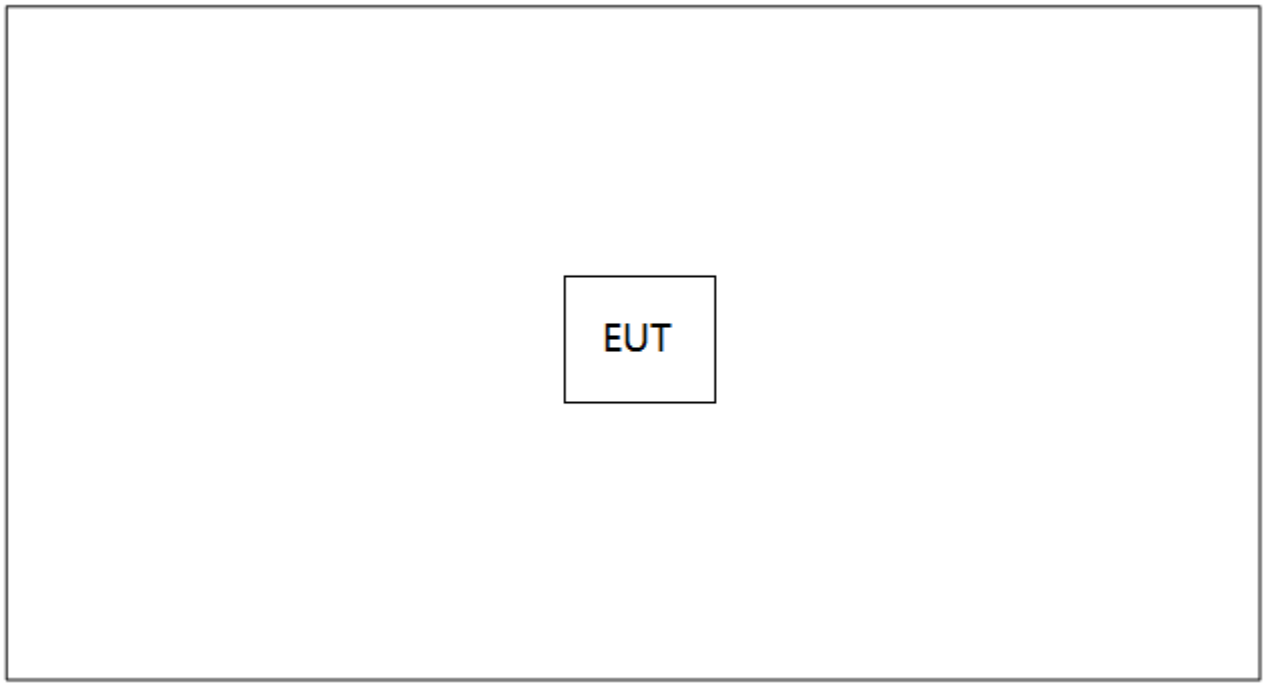
(3) For radiated spurious emissions below 1 GHz test, the 2Mbps channel 39 are found to be the worst case and recorded

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 BT LE

Test Software	EMI_Test_Tool		
Frequency (MHz)	2402	2440	2480
Parameters(1Mbps)	5	5	5
Parameters(2Mbps)	5	5	5

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
-	-	-	-	-

3. RADIATED EMISSION TEST

3.1 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 Part15, Subpart C (15.247).

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

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

3.2 TEST PROCEDURE

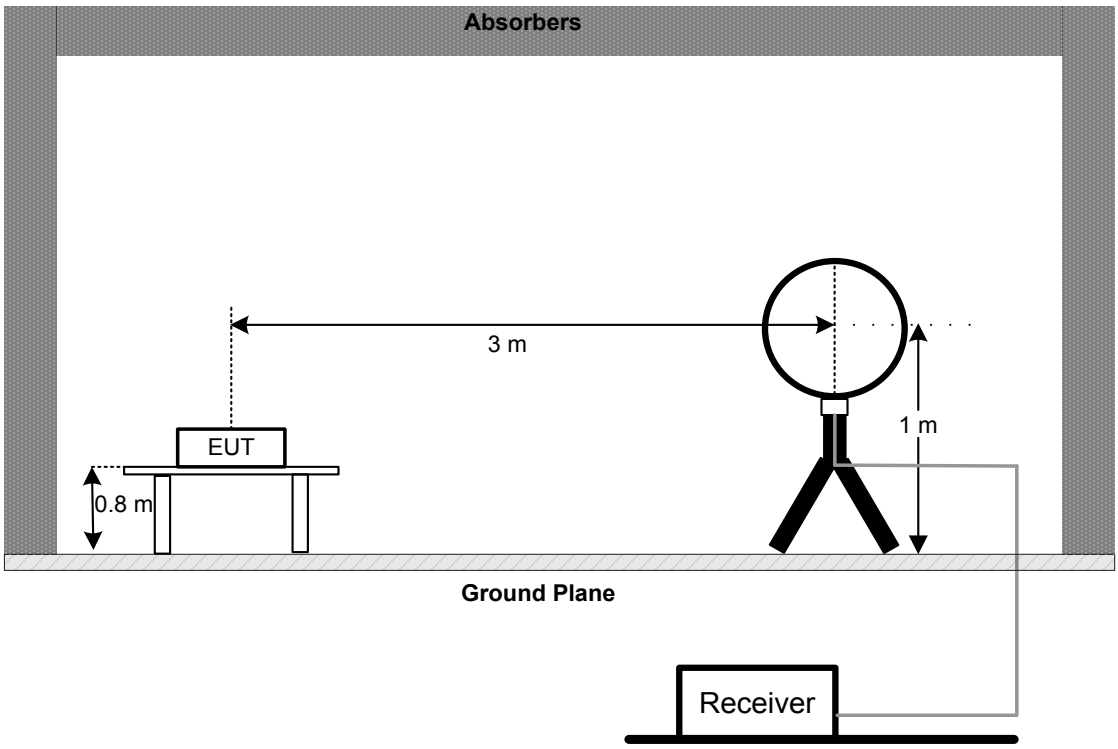
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
b. The measuring distance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

3.3 DEVIATION FROM TEST STANDARD

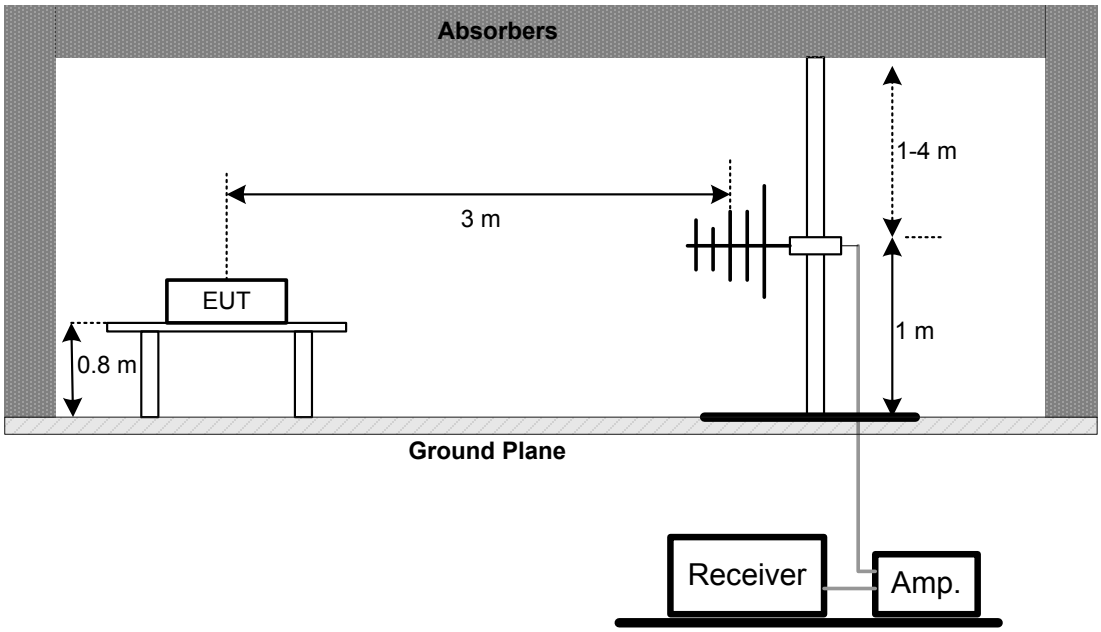
No deviation

3.4 TEST SETUP

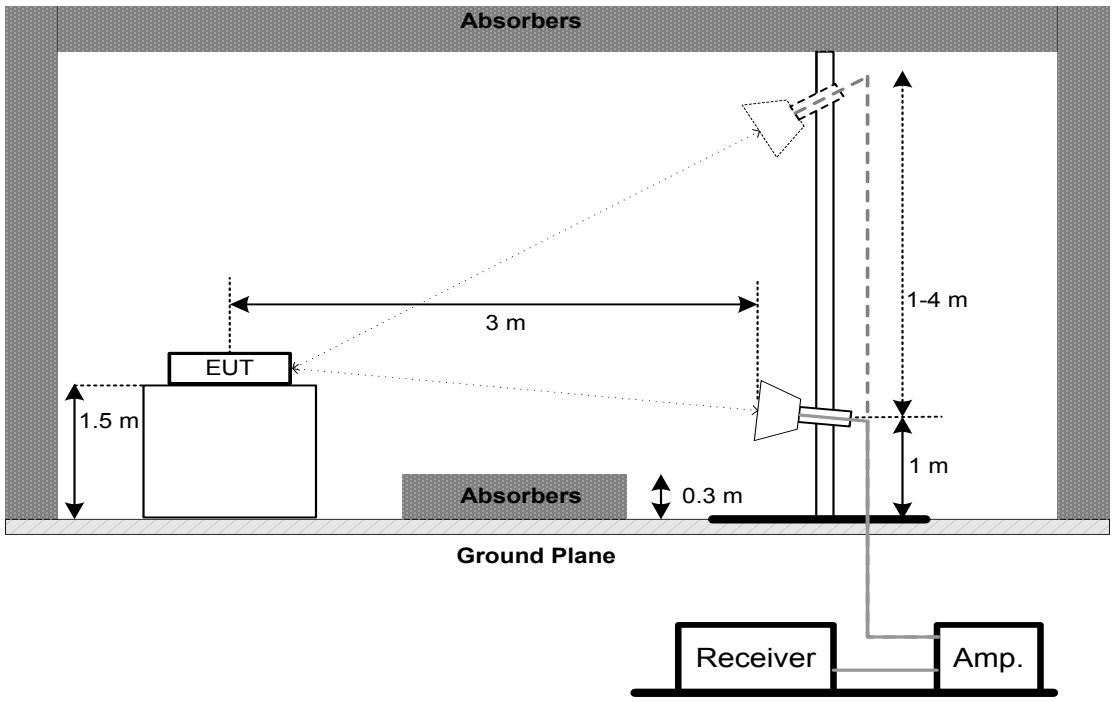
9 kHz-30 MHz



30 MHz to 1 GHz



Above 1 GHz



3.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.6 TEST RESULT - 9 kHz TO 30 MHz

Please refer to the APPENDIX A.

Remark:

(1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
(2) Limit line = specific limits (dBuV) + distance extrapolation factor.

3.7 TEST RESULT - 30 MHz TO 1000 MHz

Please refer to the APPENDIX B.

3.8 TEST RESULT - ABOVE 1000 MHz

Please refer to the APPENDIX C.

Remark:

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

4. BANDWIDTH TEST

4.1 LIMIT

Section	Test Item	Limit
FCC 15.247(a)(2)	6 dB Bandwidth	>= 500 kHz
	99% Emission Bandwidth	-

4.2 TEST PROCEDURE

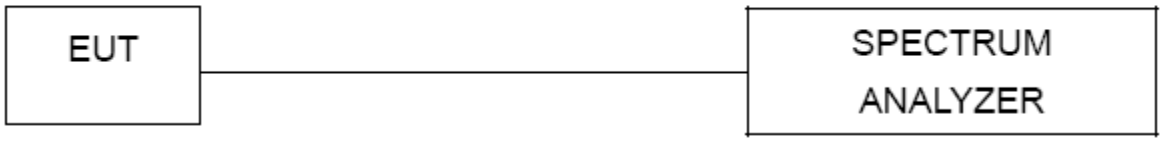
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting :
For 6 dB Bandwidth: RBW= 100 kHz, VBW=300 kHz, Sweep time = 2.5 ms
For 99 % Emission Bandwidth: RBW= 30 kHz, VBW=100 kHz, Sweep time = 2.5 ms.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 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.

4.6 TEST RESULTS

Please refer to the APPENDIX D.

5. MAXIMUM OUTPUT POWER

5.1 LIMIT

Section	Test Item	Limit
FCC 15.247(b)(3)	Maximum Output Power	1 watt or 30 dBm

5.2 TEST PROCEDURE

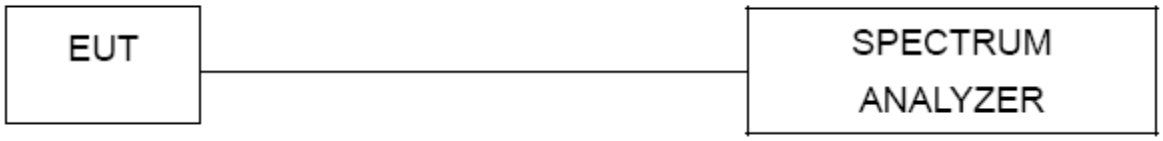
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. The maximum conducted output power was performed in accordance with method 11.9.1.1 of ANSI C63.10-2013.

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. CONDUCTED SPURIOUS EMISSION

6.1 LIMIT

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

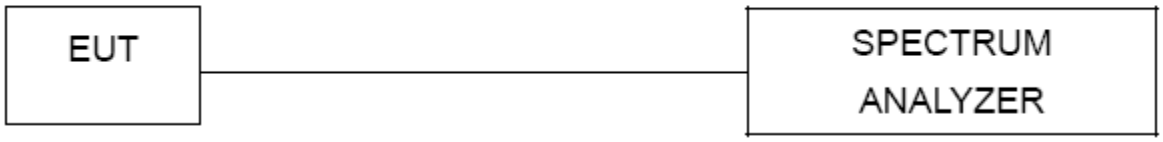
6.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting : RBW= 100 kHz, VBW=300 kHz, Sweep time = 10 ms.

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. POWER SPECTRAL DENSITY TEST

7.1 LIMIT

Section	Test Item	Limit
FCC 15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

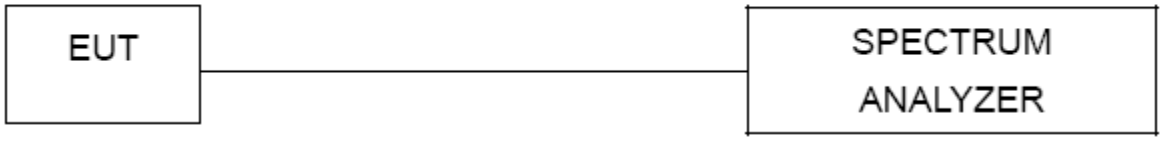
7.2 TEST PROCEDURE

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=3 kHz, VBW=10 kHz, Sweep time = auto.

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. MEASUREMENT INSTRUMENTS LIST

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	EM	EM-6876-1	230	Apr. 16, 2021
2	Cable	N/A	RG 213/U	N/A	May 29, 2021
3	EMI Test Receiver	R&S	ESCI	100895	Feb. 28, 2021
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
5	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021

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, 2021
2*	Amplifier	HP	8447D	2944A09673	Aug. 11, 2021
3	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 22, 2021
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	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021

Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Guide Antenna	ETS	3115	75789	May 12, 2021
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jul. 07, 2021
3	Amplifier	Agilent	8449B	3008A02333	Mar. 01, 2021
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 07, 2021
5	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021
6	Controller	CT	SC100	N/A	N/A
7	Controller	MF	MF-7802	MF780208416	N/A
8	Cable	N/A	EMC104-SM-SM-6 000	N/A	May 09, 2021
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
10	Filter	STI	STI15-9912	N/A	Jul. 25, 2021
11	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021

Bandwidth & Conducted Output Power & Power Spectral Density & Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 25, 2021
2	DC Block	Mini	N/A	N/A	N/A
3	RF Cable	Tongkaichuan	N/A	N/A	N/A

Remark: “N/A” denotes no model name, serial no. or calibration specified.

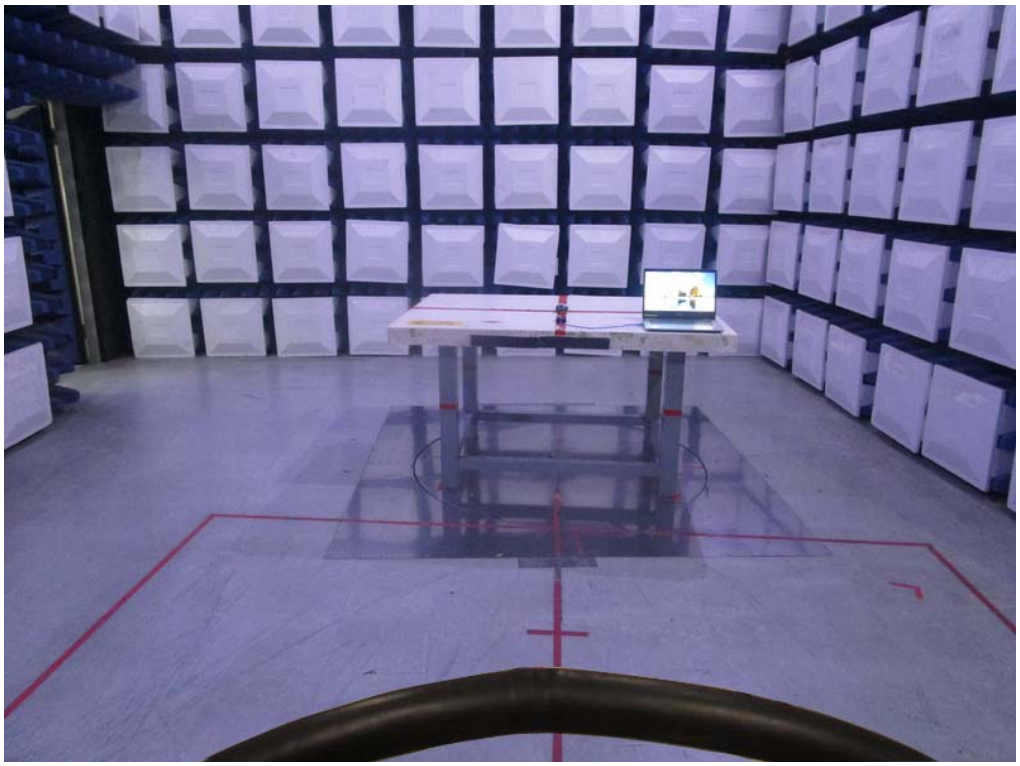
“*” calibration period of equipment list is three year.

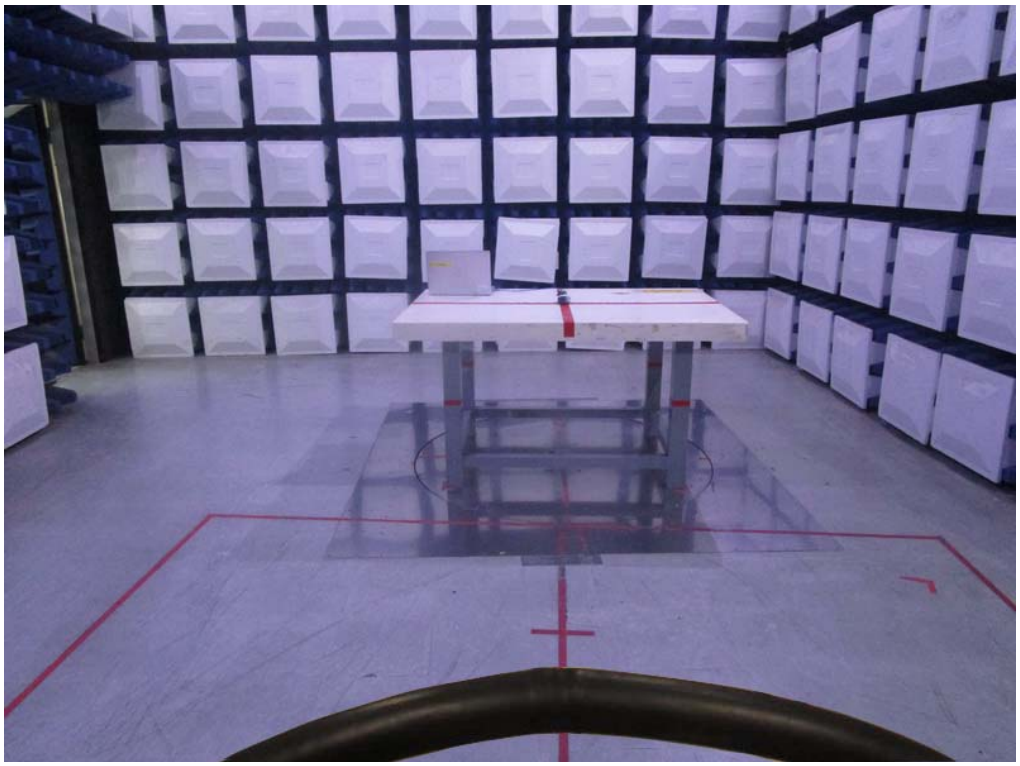
Except * item, all calibration period of equipment list is one year.

9. EUT TEST PHOTO

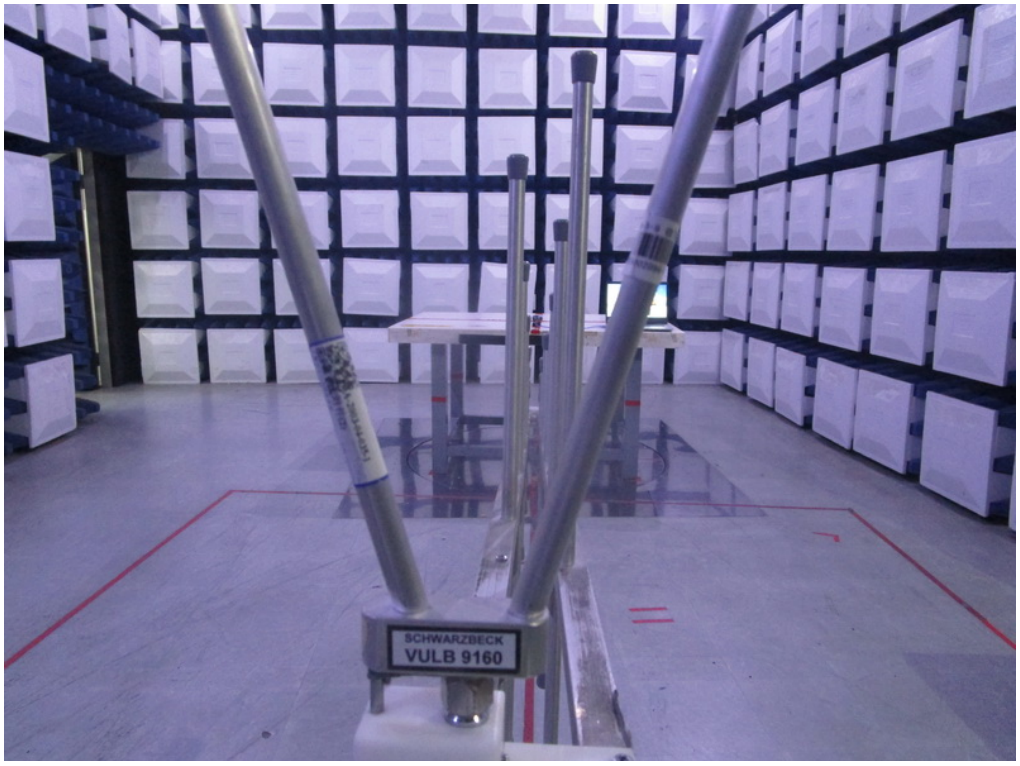
Radiated Emissions Test Photos

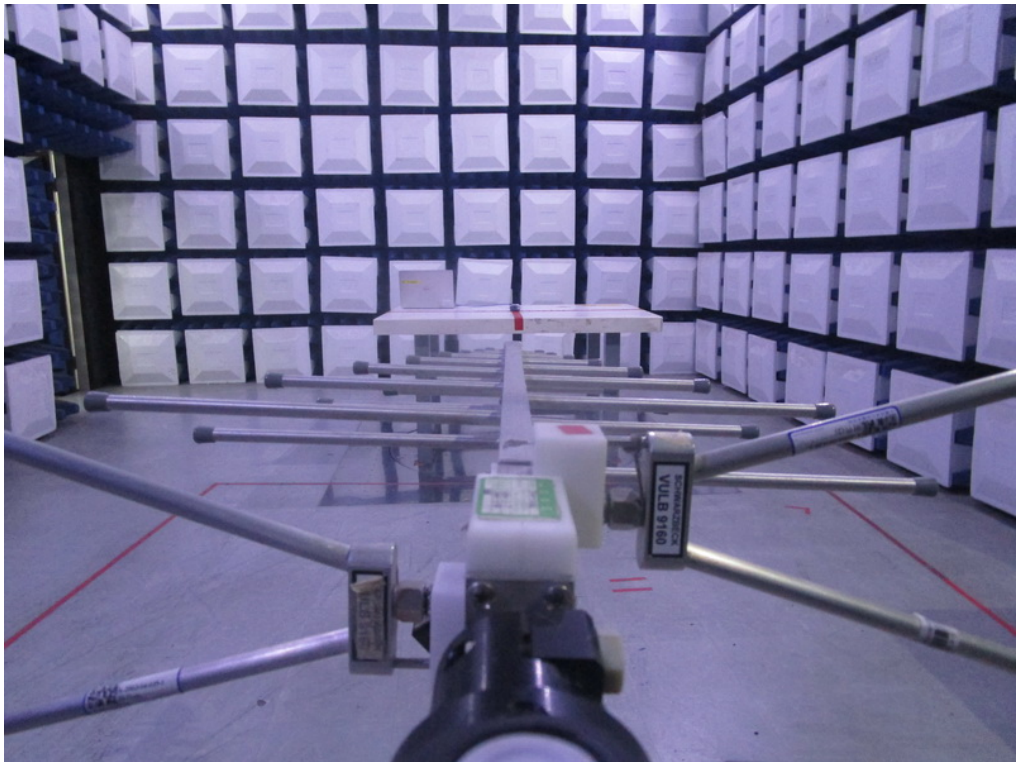
9 kHz to 30 MHz



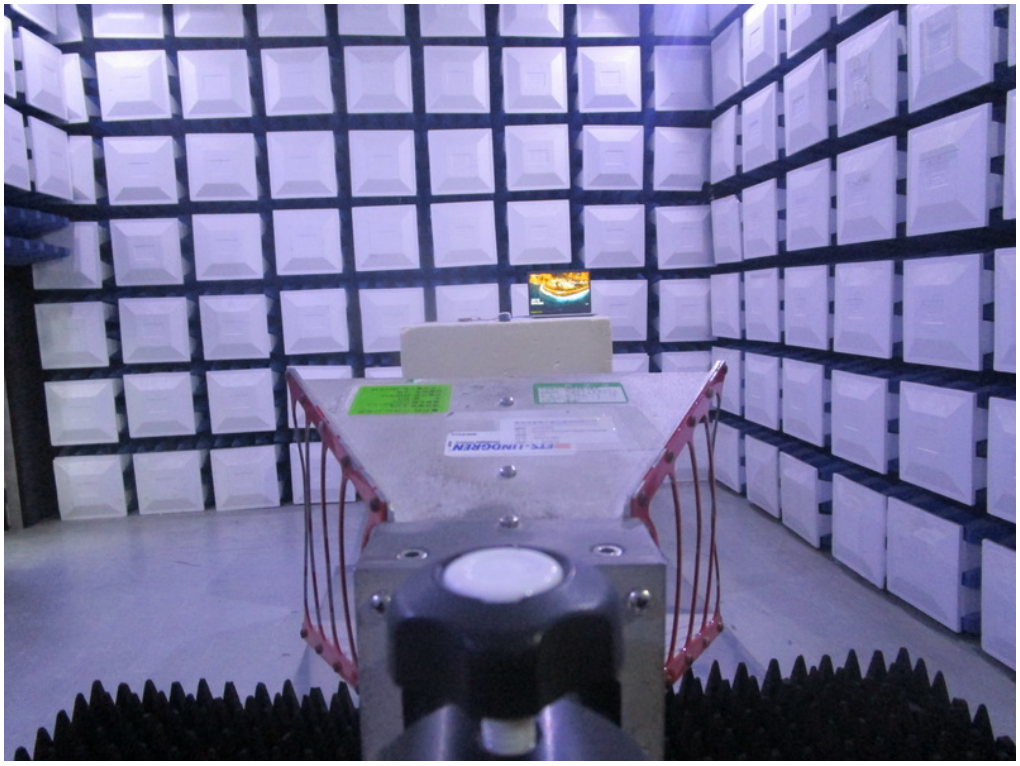


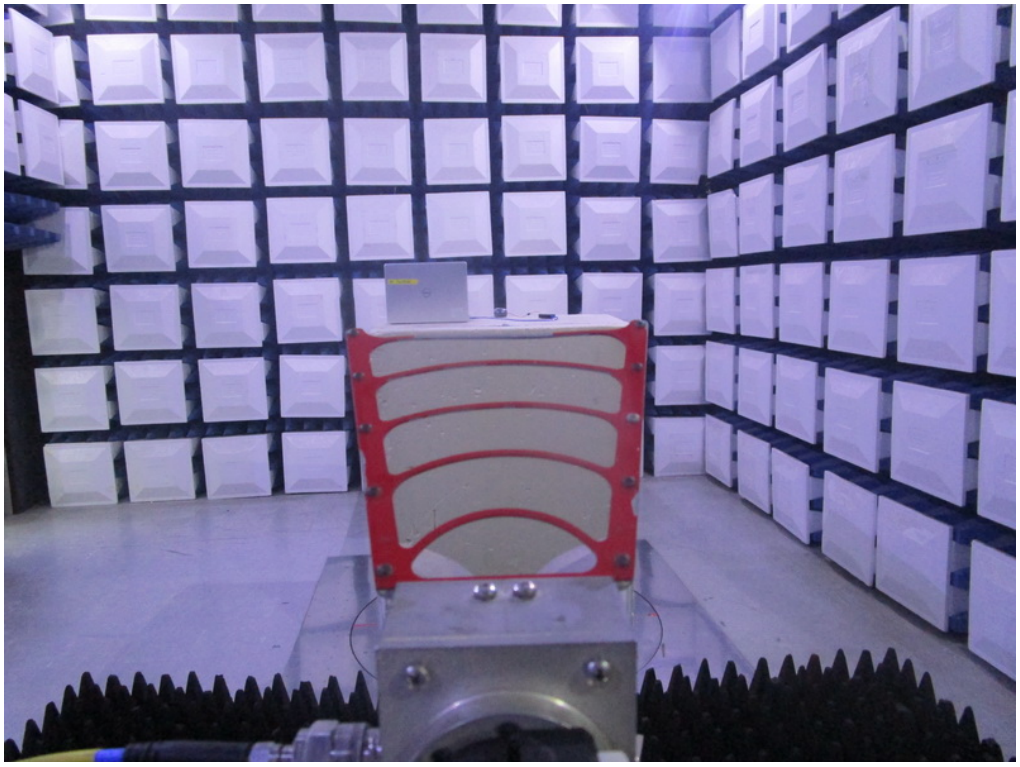
30 MHz to 1000 MHz





Above 1 GHz





APPENDIX A - RADIATED EMISSION - 9 KHZ TO 30 MHZ

Test Mode:	TX Mode Channel 39 _2Mbps

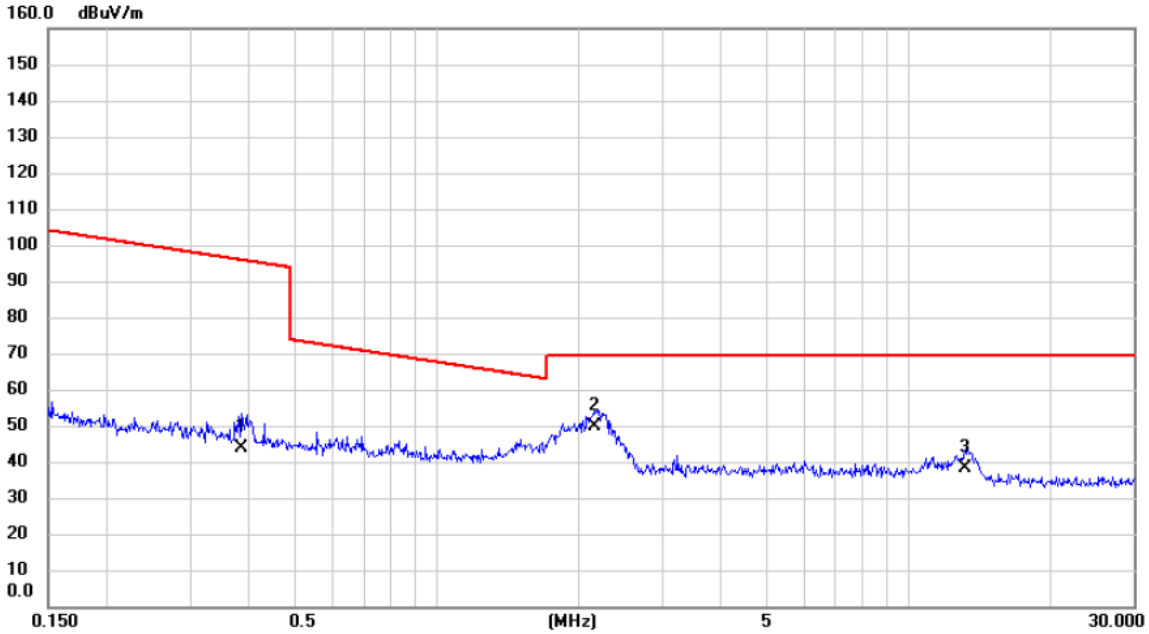
Ant 0°

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0180	54.26	13.84	68.10	122.50	-54.40	AVG	
2		0.0360	40.25	12.79	53.04	116.48	-63.44	AVG	
3		0.0726	31.58	12.56	44.14	110.39	-66.25	AVG	

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

Test Mode:	TX Mode Channel 39 _2Mbps

Ant 0°

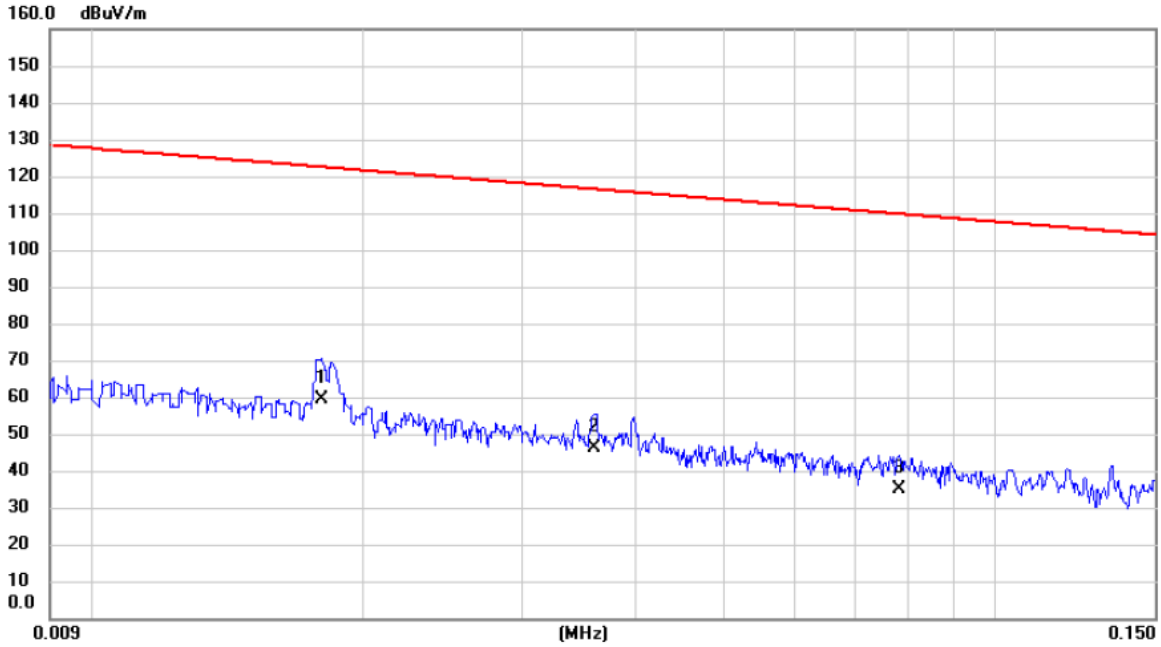


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.3852	31.58	12.29	43.87	95.89	-52.02	AVG	
2	*	2.1552	38.58	11.23	49.81	69.54	-19.73	QP	
3		13.1966	26.55	11.56	38.11	69.54	-31.43	QP	

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

Test Mode:	TX Mode Channel 39 _2Mbps

Ant 90°

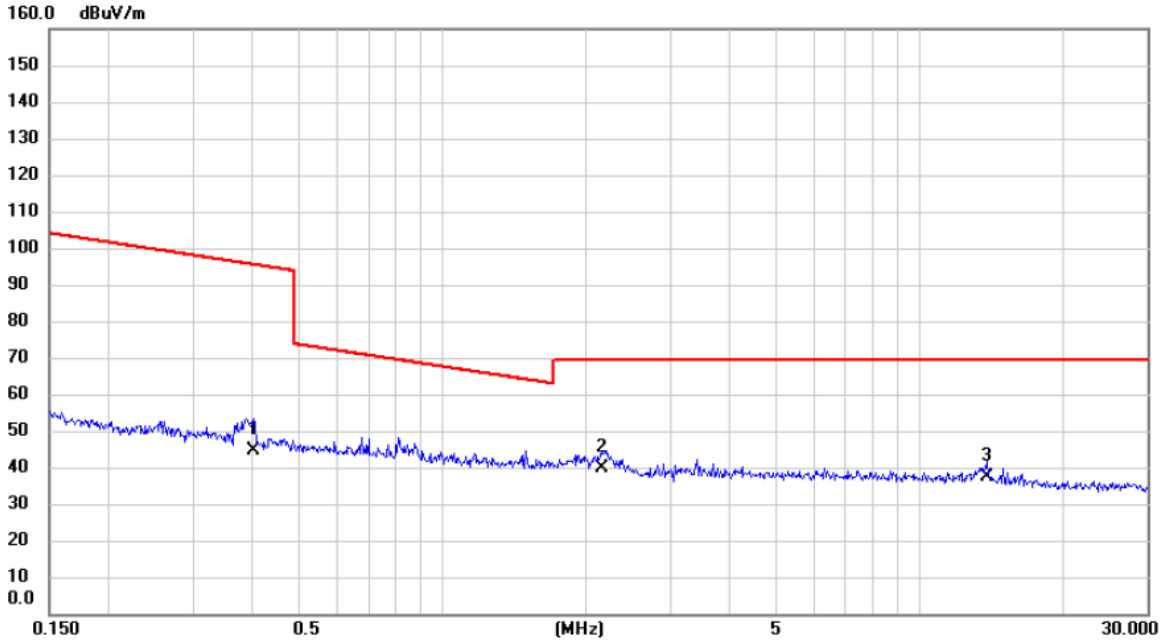


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0180	45.58	13.84	59.42	122.50	-63.08	AVG	
2		0.0360	33.58	12.79	46.37	116.48	-70.11	AVG	
3		0.0783	22.48	12.59	35.07	109.73	-74.66	AVG	

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

Test Mode:	TX Mode Channel 39 _2Mbps

Ant 90°



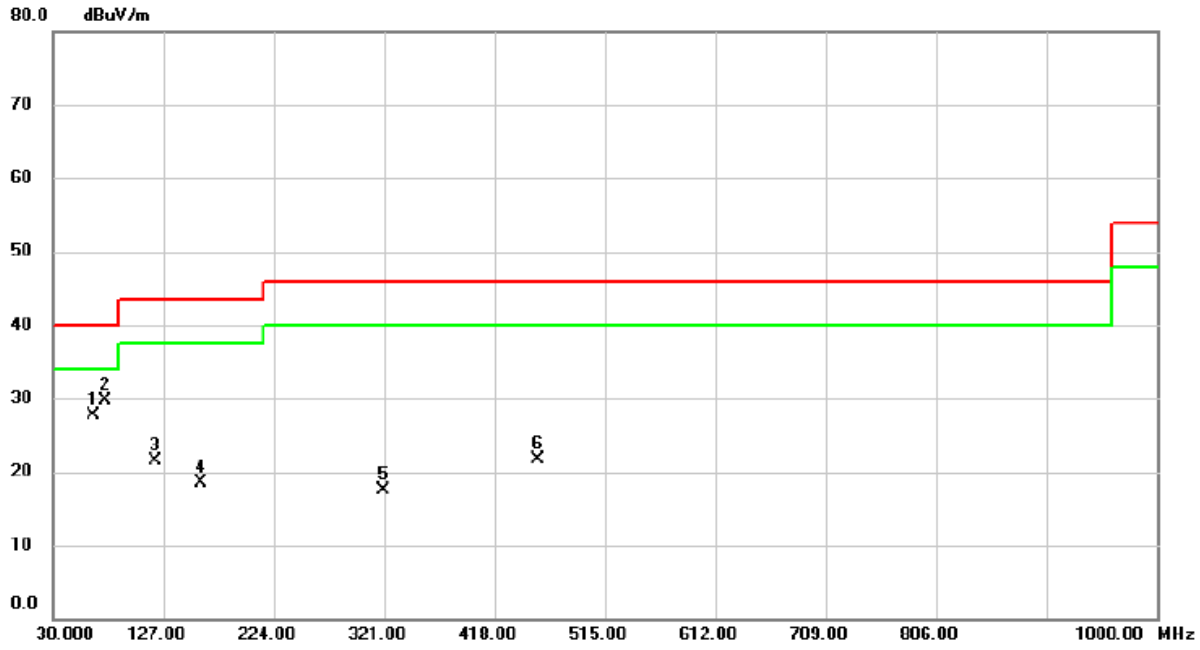
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4018	32.25	12.25	44.50	95.52	-51.02	AVG	
2	*	2.1552	28.45	11.23	39.68	69.54	-29.86	QP	
3		13.8411	25.86	11.58	37.44	69.54	-32.10	QP	

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

APPENDIX B - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

Test Mode:	TX Mode Channel 39 _2Mbps

Vertical

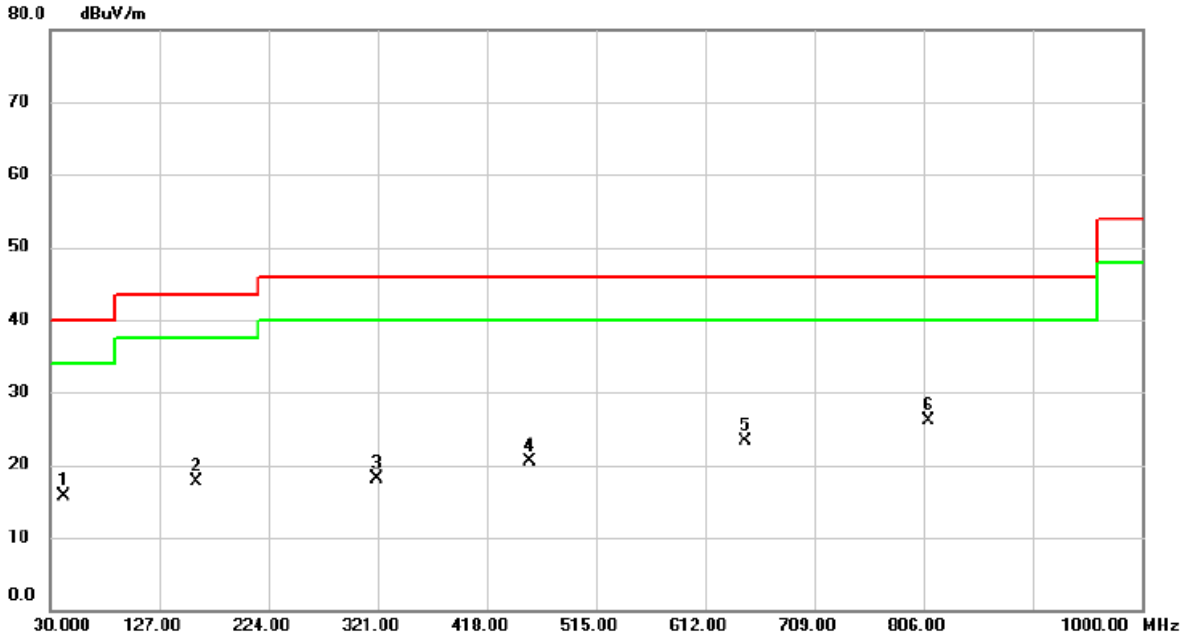


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		64.920	42.46	-14.85	27.61	40.00	-12.39	peak	
2	*	75.590	46.61	-16.96	29.65	40.00	-10.35	peak	
3		120.210	34.19	-12.74	21.45	43.50	-22.05	peak	
4		159.980	29.12	-10.67	18.45	43.50	-25.05	peak	
5		320.030	28.11	-10.68	17.43	46.00	-28.57	peak	
6		455.830	29.20	-7.59	21.61	46.00	-24.39	peak	

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

Test Mode:	TX Mode Channel 39 _2Mbps

Horizontal



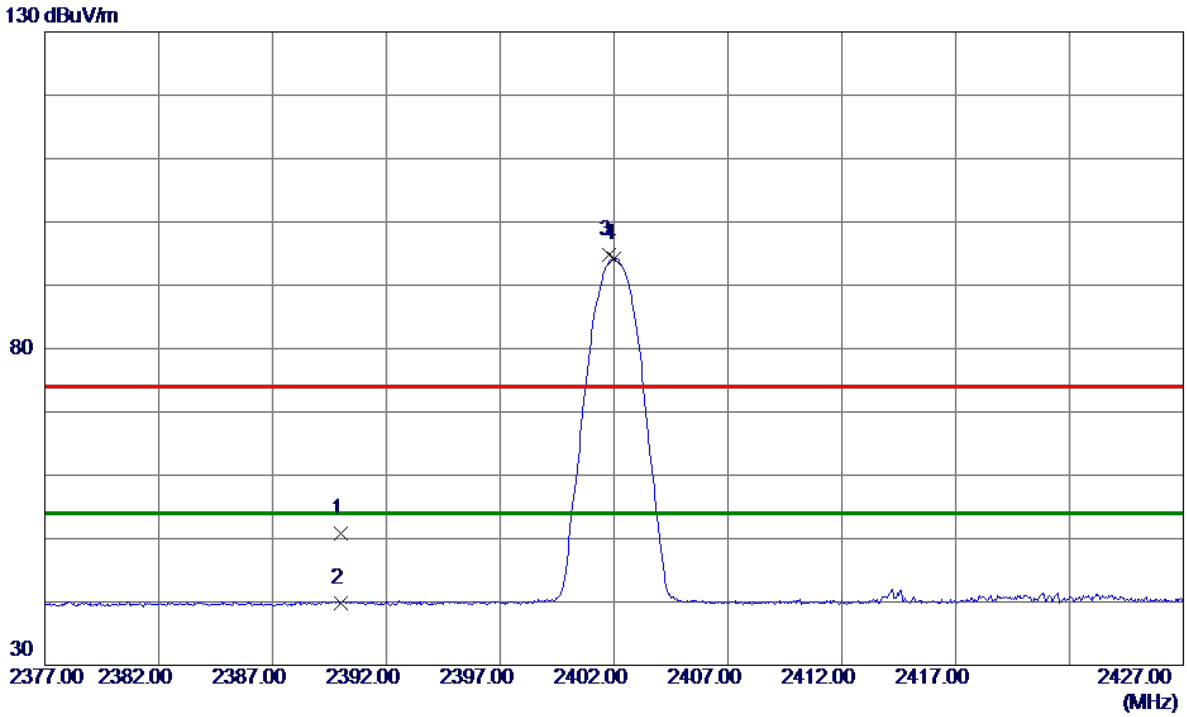
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		42.610	29.87	-14.18	15.69	40.00	-24.31	peak	
2		159.980	28.32	-10.67	17.65	43.50	-25.85	peak	
3		320.030	28.85	-10.68	18.17	46.00	-27.83	peak	
4		455.830	28.04	-7.59	20.45	46.00	-25.55	peak	
5		647.890	27.69	-4.32	23.37	46.00	-22.63	peak	
6	*	809.880	28.51	-2.37	26.14	46.00	-19.86	peak	

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

APPENDIX C - RADIATED EMISSION - ABOVE 1000 MHZ

Test Mode :	TX 2402 MHz _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	40.25	10.62	50.87	74.00	-23.13	Peak	
2	2390.0000	29.19	10.62	39.81	54.00	-14.19	AVG	
3	2401.8000	84.07	10.66	94.73	74.00	20.73	Peak	No Limit
4 *	2402.0250	83.60	10.66	94.26	54.00	40.26	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

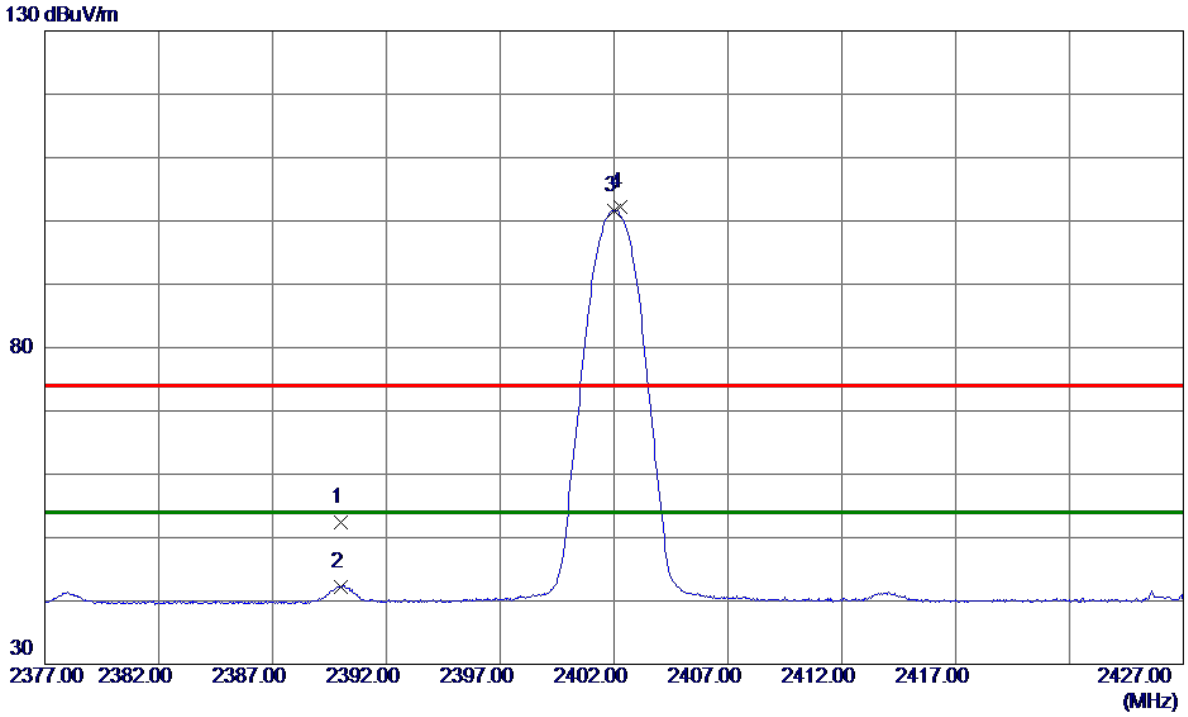
Vertical

No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4804.2080	44.06	7.78	51.84	54.00	-2.16	AVG	
2	4804.6549	47.51	7.78	55.29	74.00	-18.71	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.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390.0000	41.83	10.62	52.45	74.00	-21.55	Peak	
2	2390.0000	31.67	10.62	42.29	54.00	-11.71	AVG	
3 *	2402.0250	91.02	10.66	101.68	54.00	47.68	AVG	No Limit
4	2402.2750	91.50	10.66	102.16	74.00	28.16	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

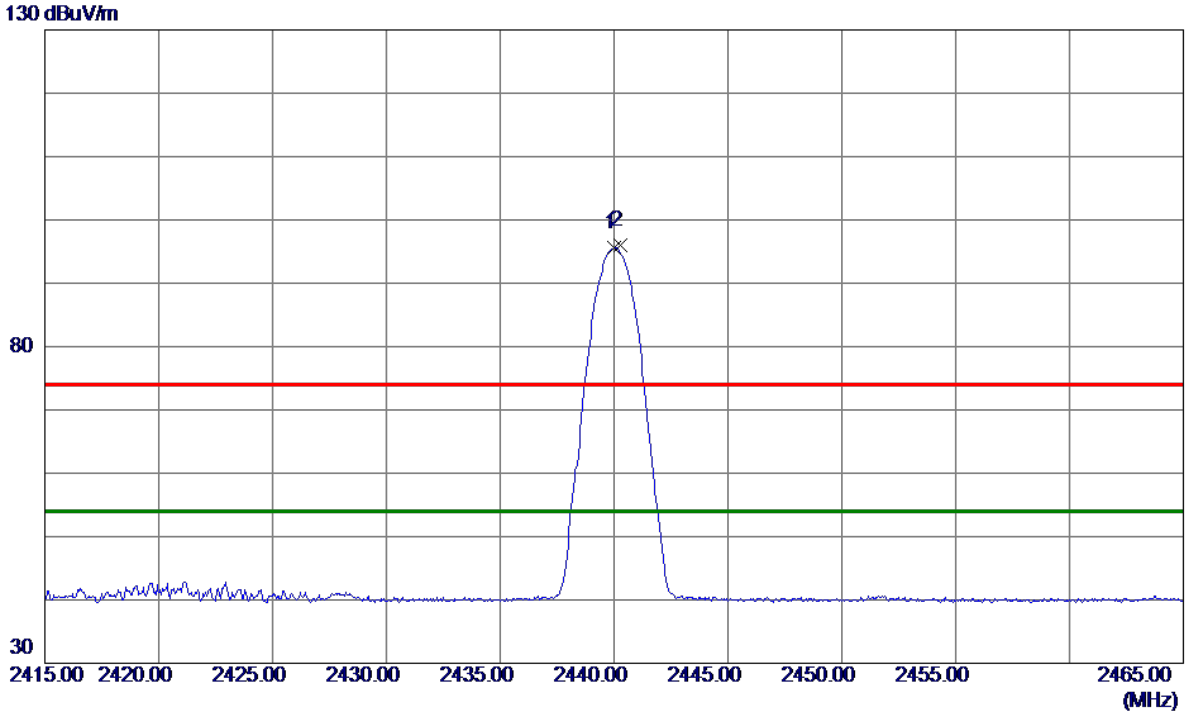
Horizontal

No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4804.1750	46.11	7.78	53.89	54.00	-0.11	AVG	
2	4804.6100	48.95	7.78	56.73	74.00	-17.27	Peak	

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

Test Mode :	TX 2440 MHz _CH19_1Mbps

Vertical



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2440.0000	84.78	10.77	95.55	54.00	41.55	AVG	No Limit
2	2440.3000	85.30	10.77	96.07	74.00	22.07	Peak	No Limit

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

Test Mode :	TX 2440 MHz _CH19_1Mbps

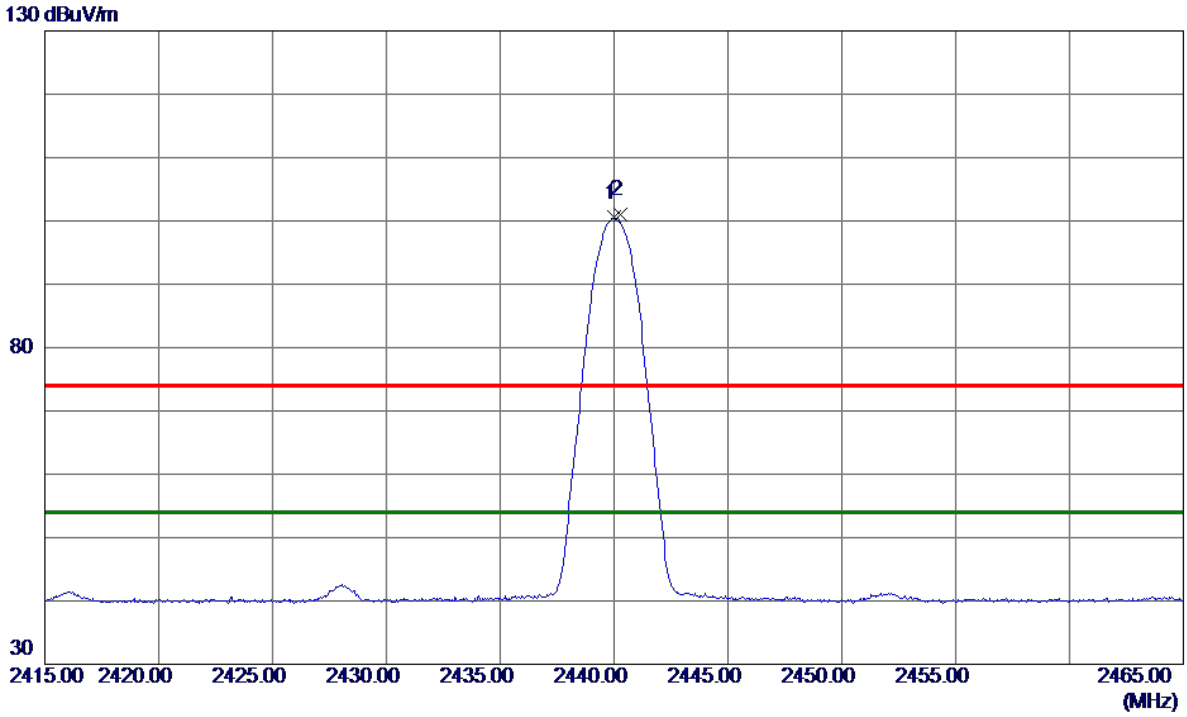
Vertical

No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4880.2380	43.51	8.08	51.59	54.00	-2.41	AVG	
2	4880.4750	45.40	8.08	53.48	74.00	-20.52	Peak	

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

Test Mode :	TX 2440 MHz _CH19_1Mbps

Horizontal



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2440.0000	89.73	10.77	100.50	54.00	46.50	AVG	No Limit
2	2440.2750	90.23	10.77	101.00	74.00	27.00	Peak	No Limit

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

Test Mode :	TX 2440 MHz _CH19_1Mbps

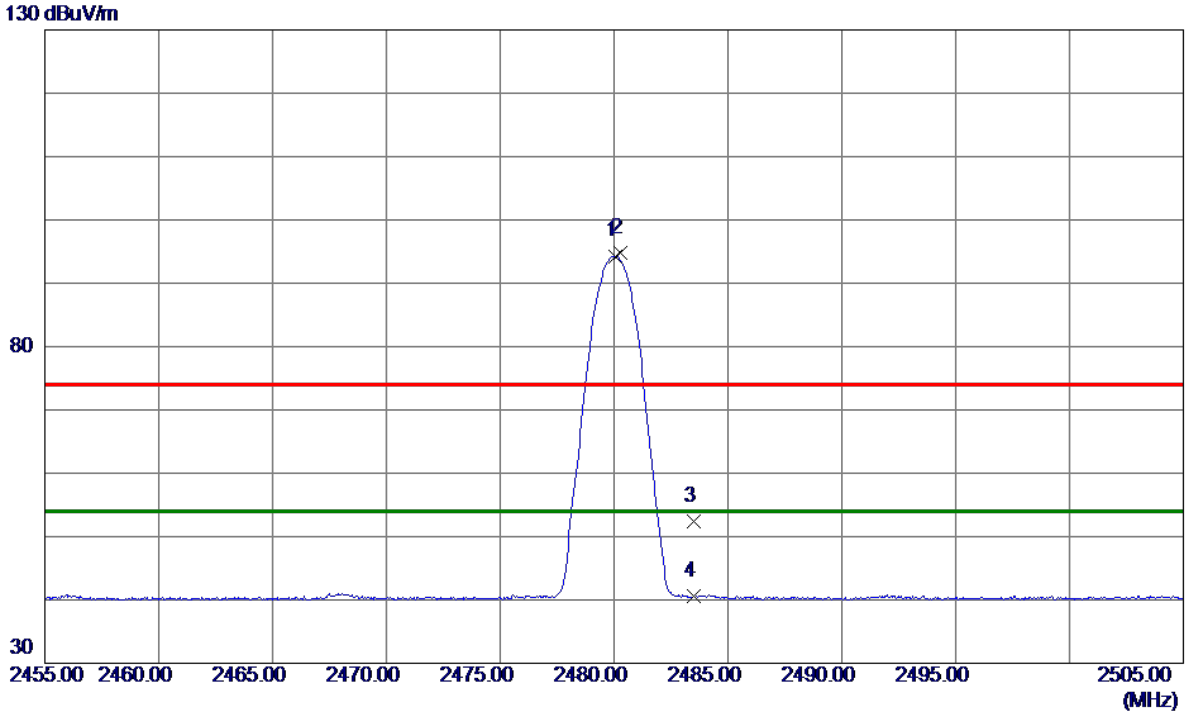
Horizontal

No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	4879.5350	45.51	8.08	53.59	74.00	-20.41	Peak	
2 *	4880.1770	44.92	8.08	53.00	54.00	-1.00	AVG	

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

Test Mode :	TX 2480 MHz _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 *	2480.0500	83.41	10.89	94.30	54.00	40.30	AVG	No Limit
2	2480.2750	83.98	10.89	94.87	74.00	20.87	Peak	No Limit
3	2483.5000	41.43	10.90	52.33	74.00	-21.67	Peak	
4	2483.5000	29.65	10.90	40.55	54.00	-13.45	AVG	

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

Test Mode :	TX 2480 MHz _CH39_1Mbps

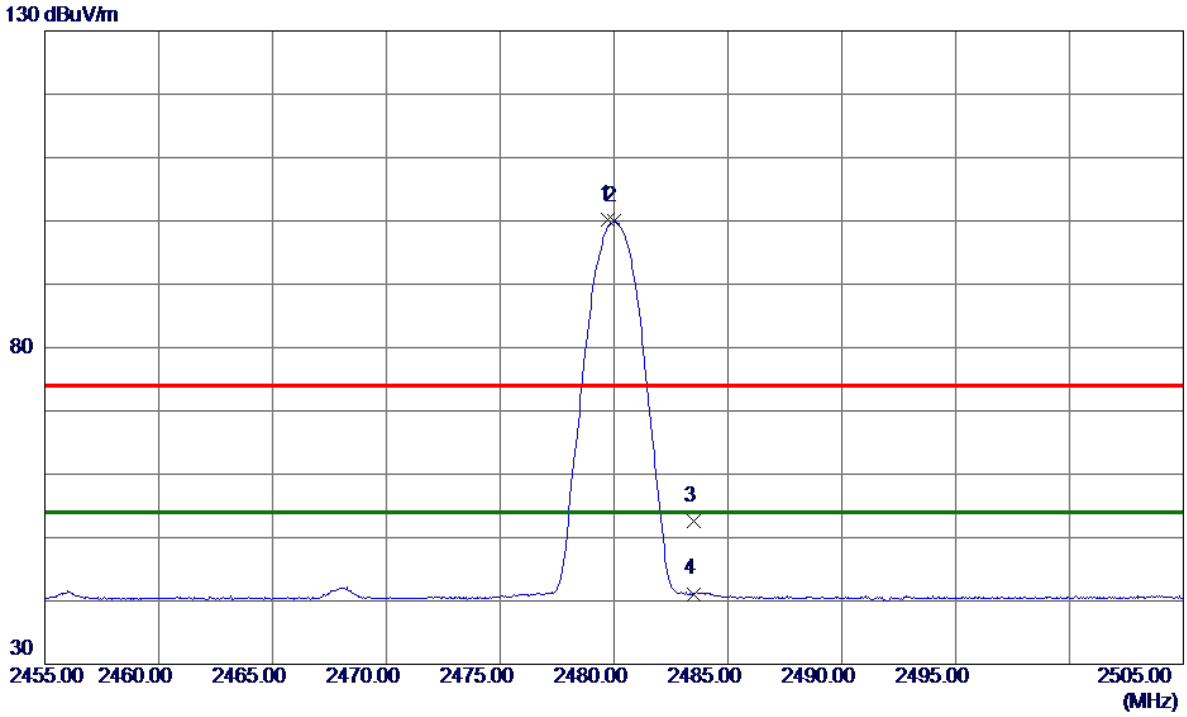
Vertical

No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4960.1850	40.10	8.40	48.50	54.00	-5.50	AVG	
2	4960.6150	44.88	8.40	53.28	74.00	-20.72	Peak	

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

Test Mode :	TX 2480 MHz _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	2479.7500	89.31	10.89	100.20	74.00	26.20	Peak	No Limit
2 *	2480.0250	89.03	10.89	99.92	54.00	45.92	AVG	No Limit
3	2483.5000	41.72	10.90	52.62	74.00	-21.38	Peak	
4	2483.5000	30.20	10.90	41.10	54.00	-12.90	AVG	

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

Test Mode :	TX 2480 MHz _CH39_1Mbps

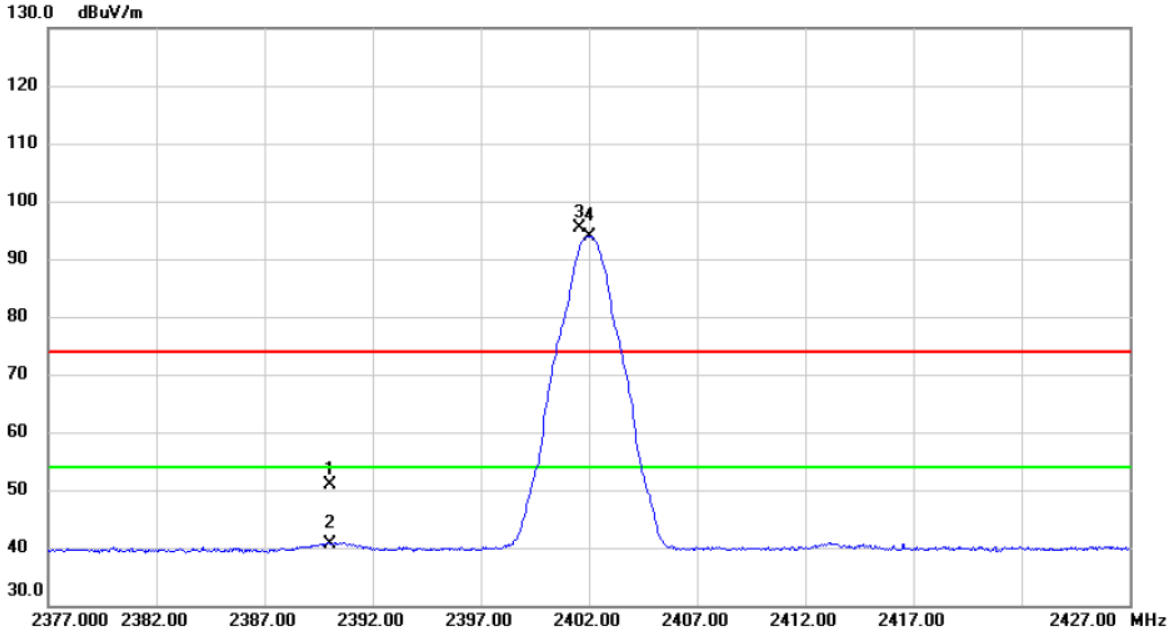
Horizontal

No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4960.2380	43.11	8.40	51.51	54.00	-2.49	AVG	
2	4960.7050	44.41	8.40	52.81	74.00	-21.19	Peak	

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

Test Mode :	TX 2402 MHz _CH00_2Mbps

Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	40.33	10.63	50.96	74.00	-23.04	peak	
2		2390.000	29.96	10.63	40.59	54.00	-13.41	AVG	
3	X	2401.575	84.68	10.65	95.33	74.00	21.33	peak	No Limit
4	*	2402.025	83.30	10.65	93.95	54.00	39.95	AVG	No Limit

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

Test Mode :	TX 2402 MHz _CH00_2Mbps

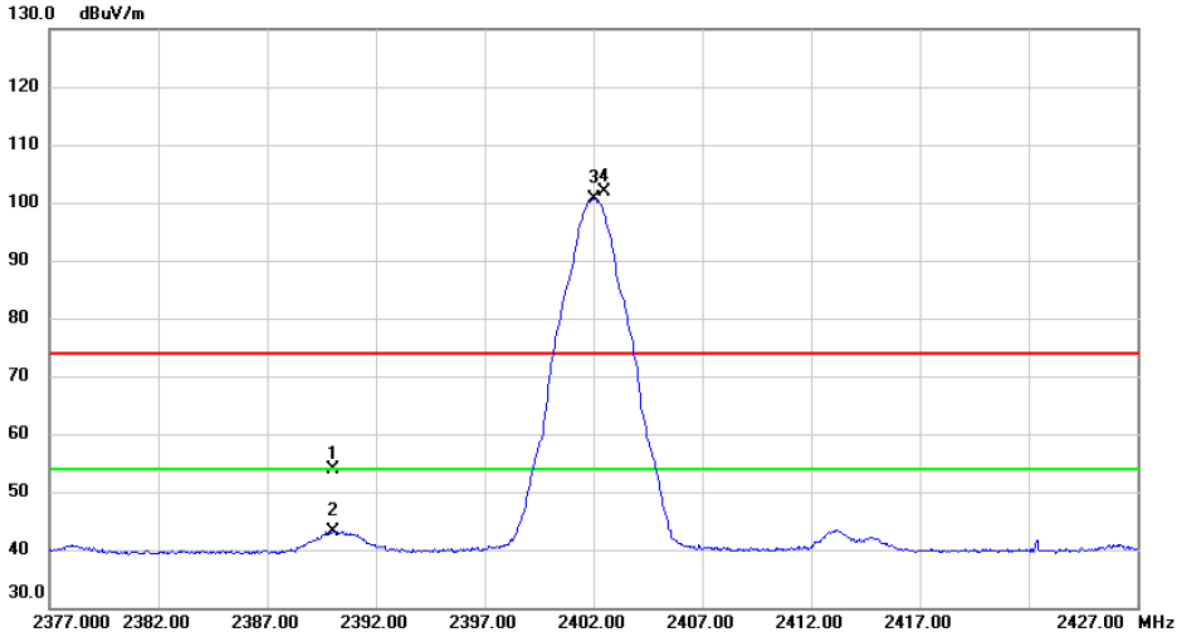
Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.038	44.98	7.78	52.76	74.00	-21.24	peak	
2	*	4804.188	37.70	7.78	45.48	54.00	-8.52	AVG	

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

Test Mode :	TX 2402 MHz _CH00_2Mbps

Horizontal

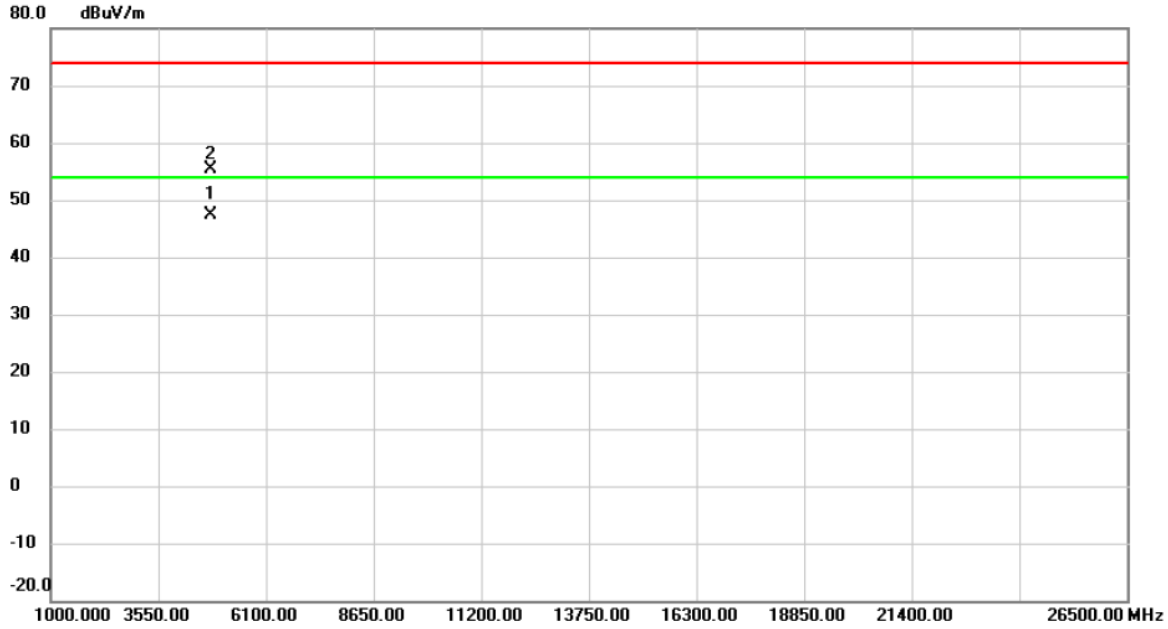


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	43.28	10.63	53.91	74.00	-20.09	peak	
2		2390.000	32.40	10.63	43.03	54.00	-10.97	AVG	
3	*	2402.000	89.98	10.65	100.63	54.00	46.63	AVG	No Limit
4	X	2402.500	91.26	10.67	101.93	74.00	27.93	peak	No Limit

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

Test Mode :	TX 2402 MHz _CH00_2Mbps

Horizontal

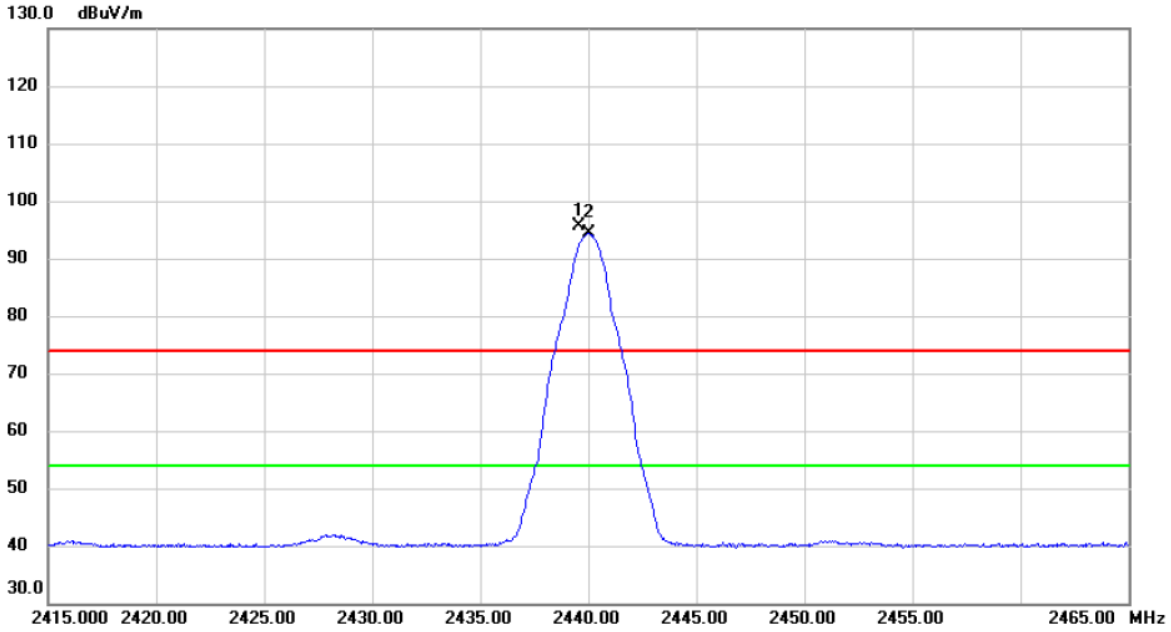


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4803.500	39.72	7.78	47.50	54.00	-6.50	AVG	
2		4804.190	47.54	7.78	55.32	74.00	-18.68	peak	

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

Test Mode :	TX 2440 MHz _CH19_2Mbps

Vertical

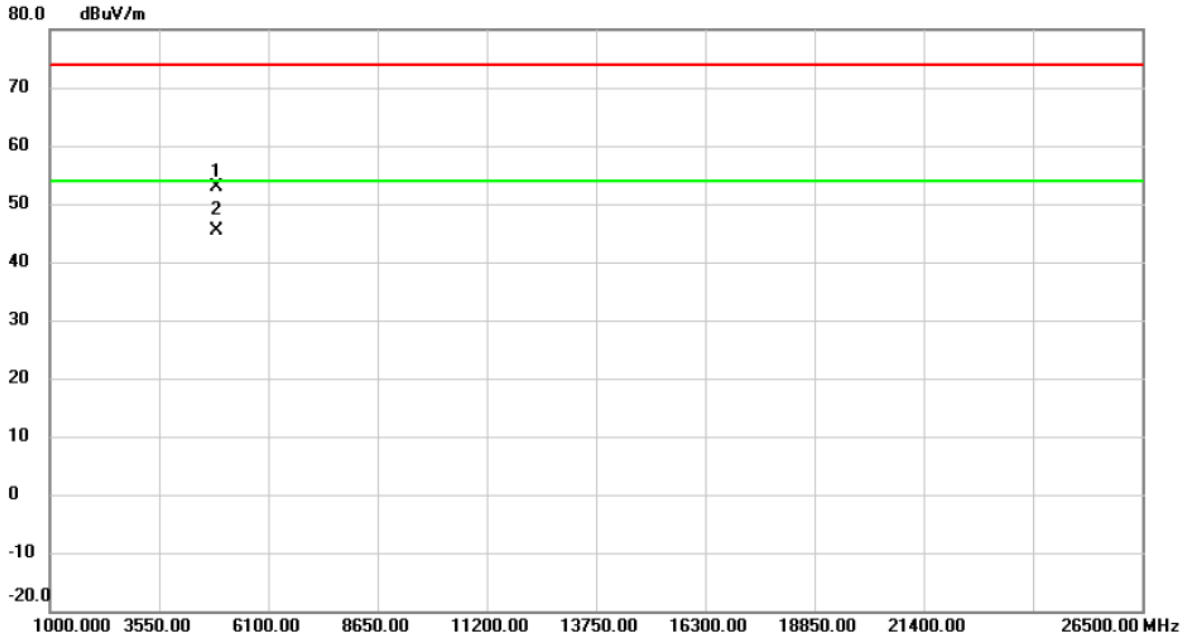


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2439.575	84.90	10.77	95.67	74.00	21.67	peak	No Limit
2	*	2440.000	83.50	10.77	94.27	54.00	40.27	AVG	No Limit

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

Test Mode :	TX 2440 MHz _CH19_2Mbps

Vertical

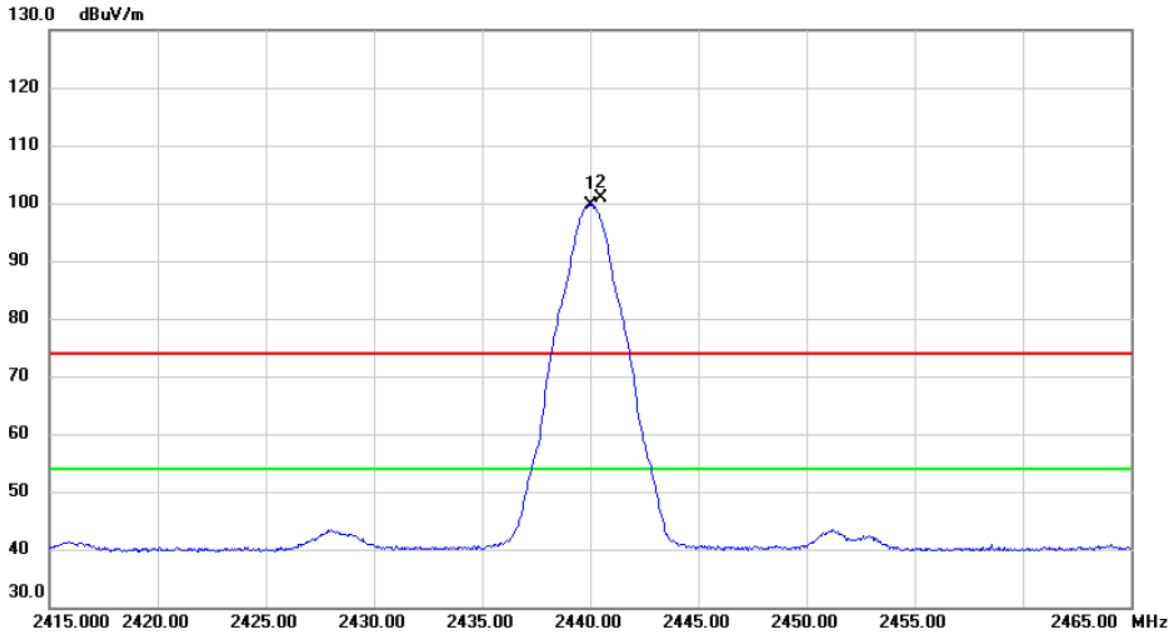


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.135	44.84	8.08	52.92	74.00	-21.08	peak	
2	*	4880.380	37.42	8.08	45.50	54.00	-8.50	AVG	

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

Test Mode :	TX 2440 MHz _CH19_2Mbps

Horizontal

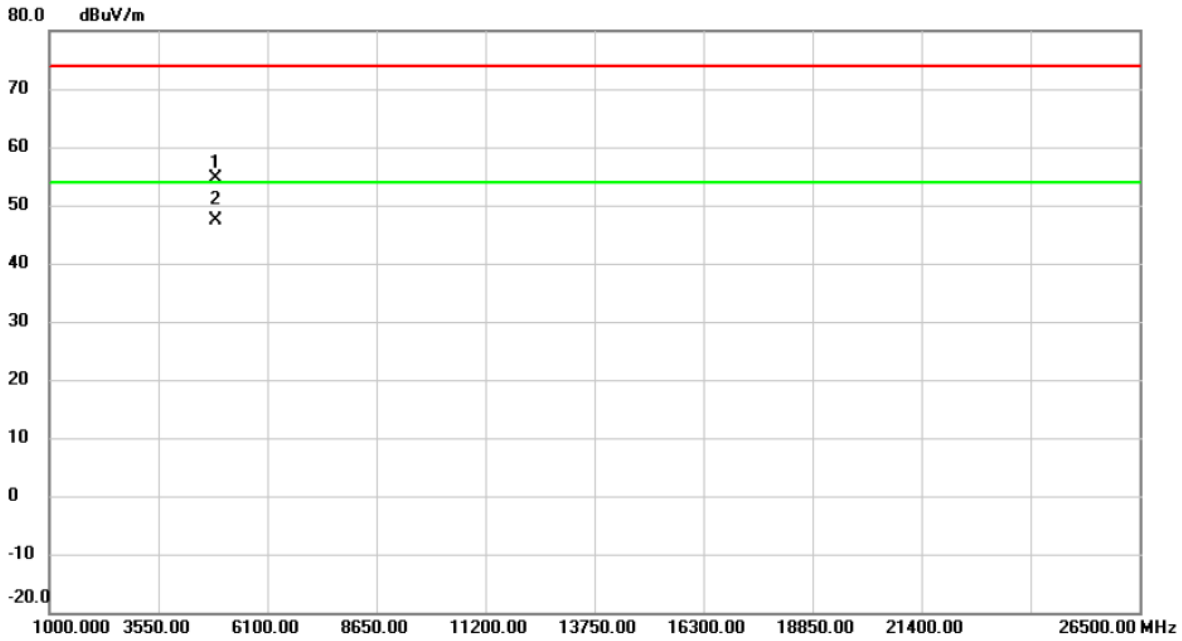


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2440.025	88.89	10.77	99.66	54.00	45.66	AVG	No Limit
2	X	2440.500	90.23	10.77	101.00	74.00	27.00	peak	No Limit

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

Test Mode :	TX 2440 MHz _CH19_2Mbps

Horizontal

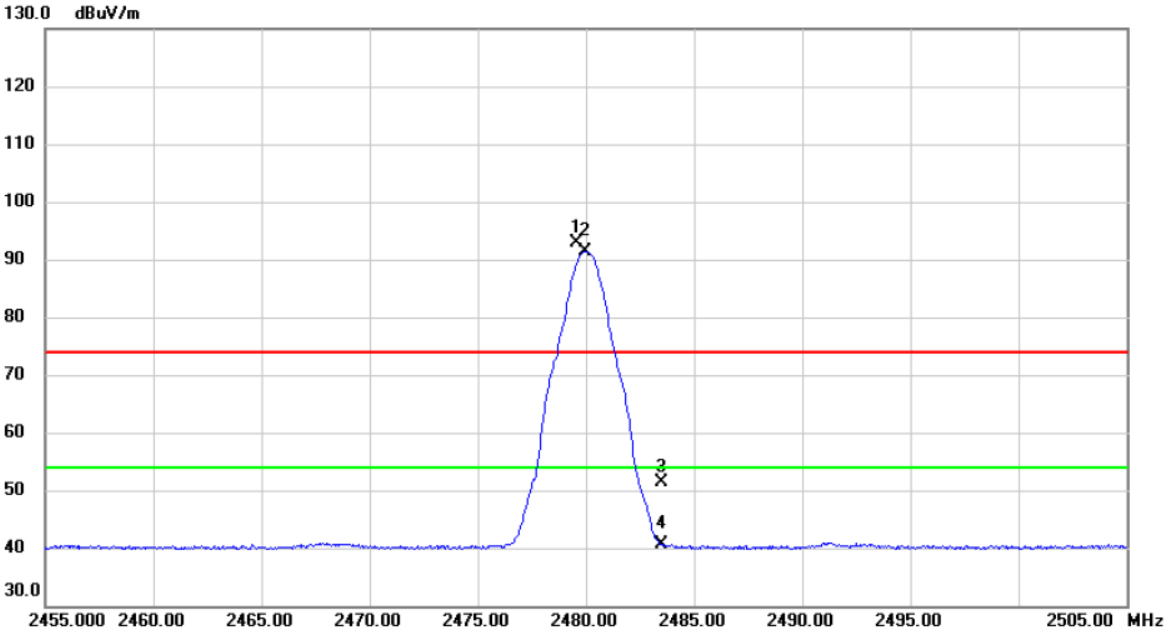


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.300	46.66	8.08	54.74	74.00	-19.26	peak	
2	*	4880.470	39.42	8.08	47.50	54.00	-6.50	AVG	

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

Test Mode :	TX 2480 MHz _CH39_2Mbps

Vertical

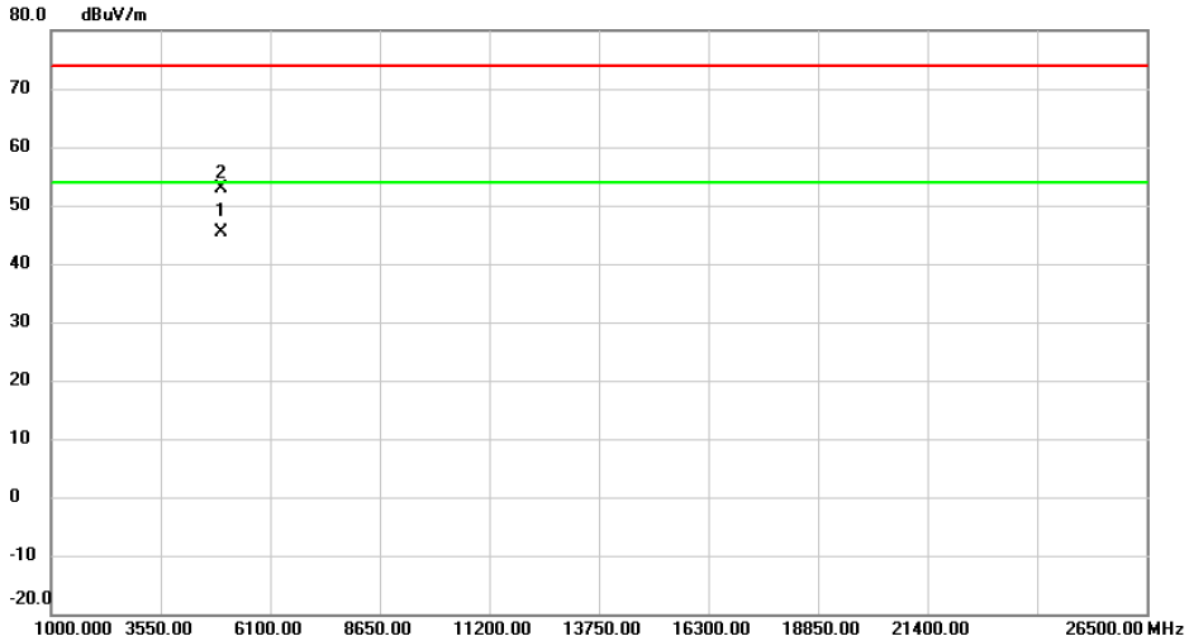


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2479.575	81.97	10.89	92.86	74.00	18.86	peak	No Limit
2	*	2479.975	80.48	10.89	91.37	54.00	37.37	AVG	No Limit
3		2483.500	40.36	10.90	51.26	74.00	-22.74	peak	
4		2483.500	29.68	10.90	40.58	54.00	-13.42	AVG	

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

Test Mode :	TX 2480 MHz _CH39_2Mbps

Vertical

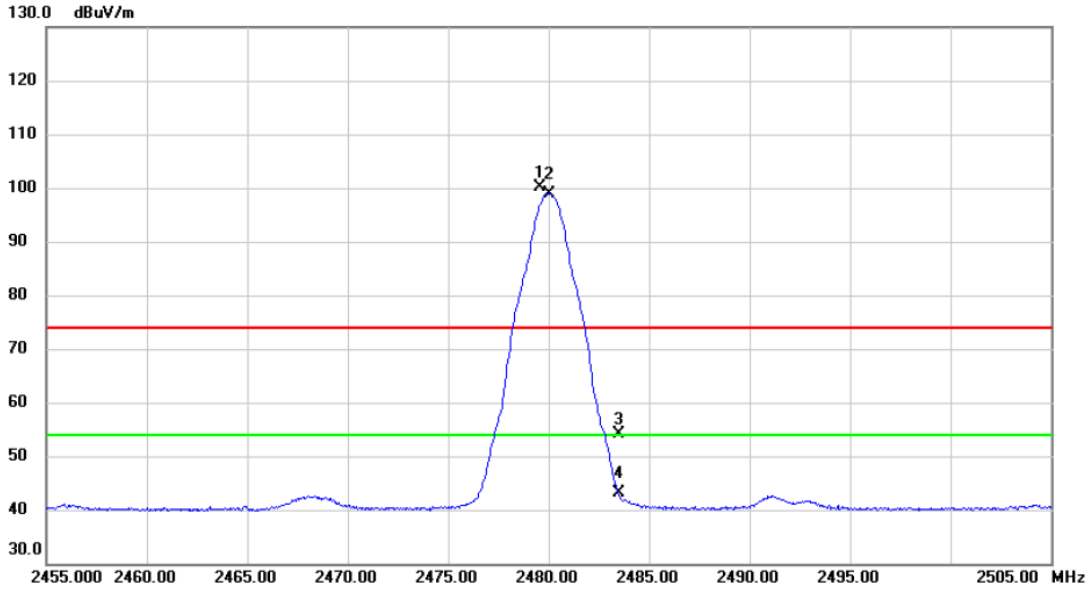


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4959.288	37.08	8.39	45.47	54.00	-8.53	AVG	
2		4961.090	44.36	8.41	52.77	74.00	-21.23	peak	

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

Test Mode :	TX 2480 MHz _CH39_2Mbps

Horizontal

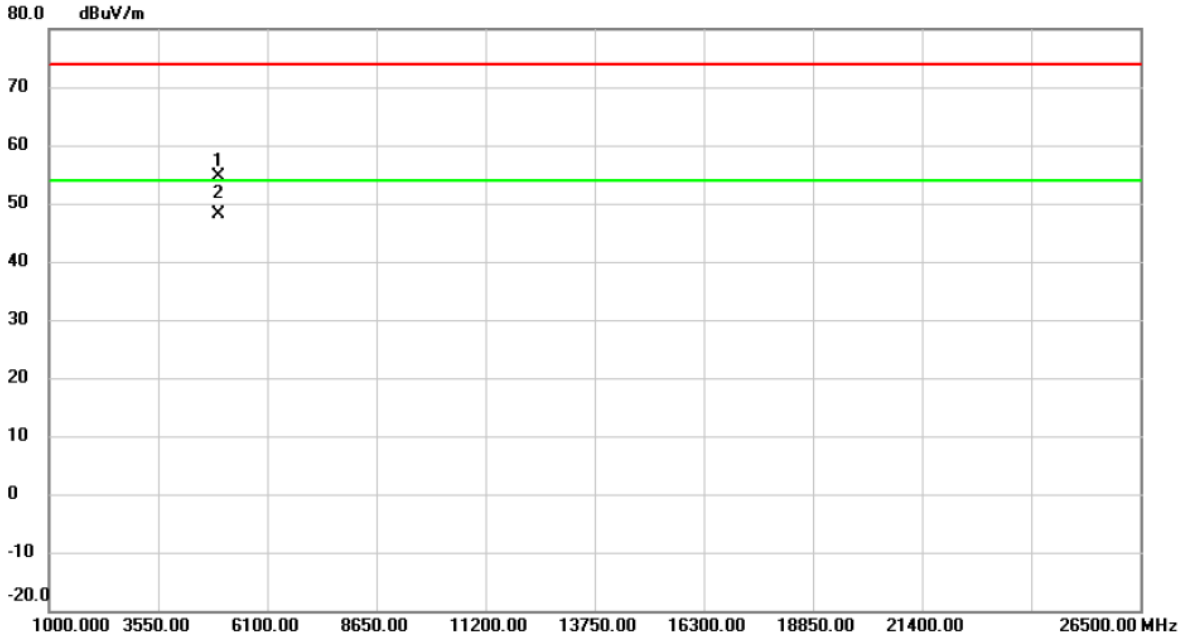


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2479.550	89.32	10.89	100.21	74.00	26.21	peak	No Limit
2	*	2480.050	88.01	10.89	98.90	54.00	44.90	AVG	No Limit
3		2483.500	43.27	10.90	54.17	74.00	-19.83	peak	
4		2483.500	32.19	10.90	43.09	54.00	-10.91	AVG	

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

Test Mode :	TX 2480 MHz _CH39_2Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.285	46.23	8.39	54.62	74.00	-19.38	peak	
2	*	4959.320	39.73	8.39	48.12	54.00	-5.88	AVG	

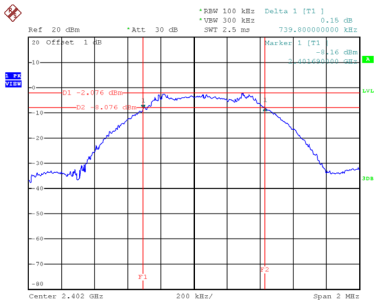
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D - BANDWIDTH

Test Mode:	CH00, CH19 , CH39 - 1Mbps

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Test Result
00	2402	0.740	1.064	500	Pass
19	2440	0.752	1.064	500	Pass
39	2480	0.756	1.072	500	Pass

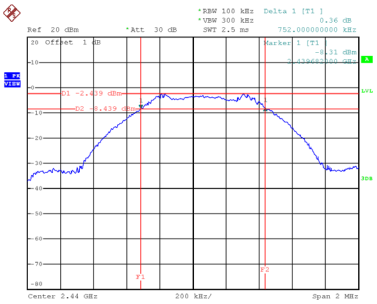
CH00



Date: 20.AUG.2020 10:23:26

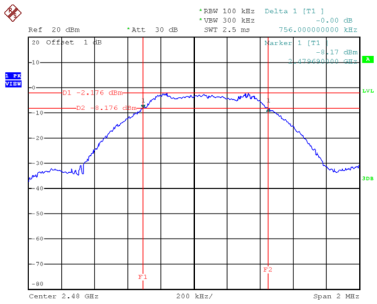
CH19

6 dB Bandwidth

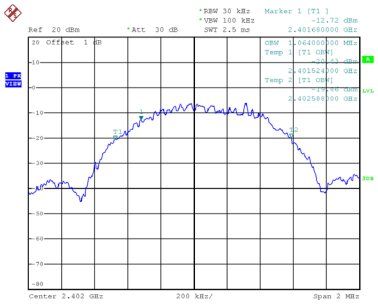


Date: 20.AUG.2020 10:24:57

CH39

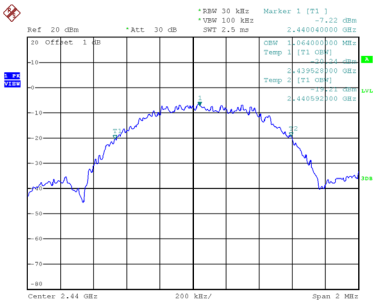


Date: 20.AUG.2020 10:26:34

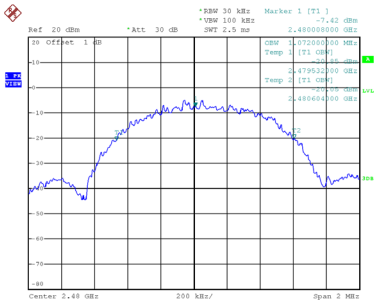


Date: 20.AUG.2020 10:23:03

99 % Emission Bandwidth



Date: 20.AUG.2020 10:25:03

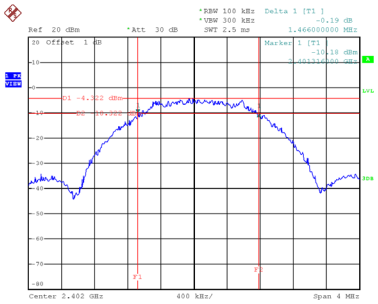


Date: 20.AUG.2020 10:26:40

Test Mode:	CH00, CH19 , CH39 - 2Mbps

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Test Result
00	2402	1.466	2.088	500	Pass
19	2440	1.406	2.120	500	Pass
39	2480	1.512	2.072	500	Pass

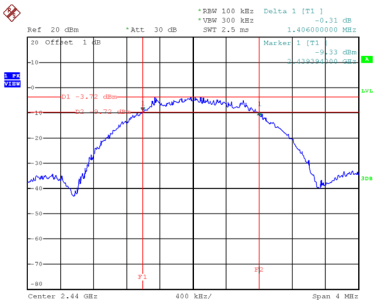
CH00



Date: 20.AUG.2020 10:28:18

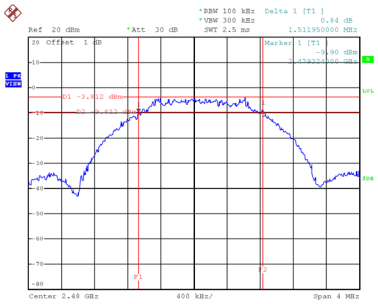
CH19

6 dB Bandwidth

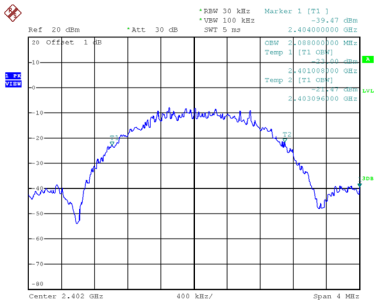


Date: 20.AUG.2020 10:29:58

CH39

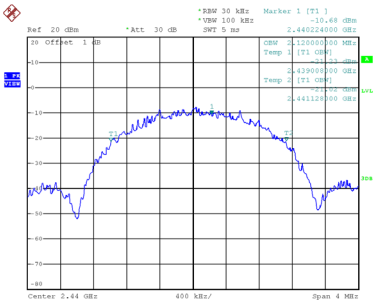


Date: 20.AUG.2020 10:31:34

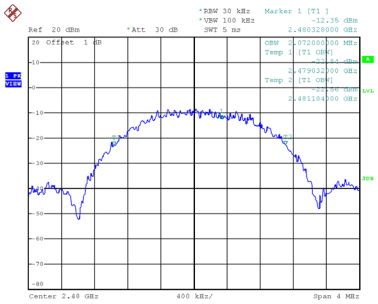


Date: 20.AUG.2020 10:27:55

99 % Emission Bandwidth



Date: 20.AUG.2020 10:30:04



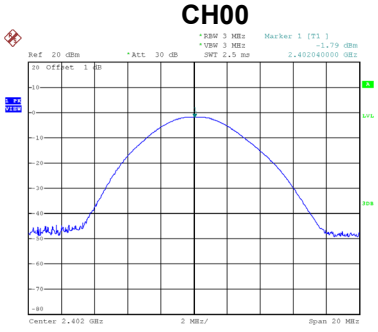
Date: 20.AUG.2020 10:31:39

APPENDIX E - MAXIMUM OUTPUT POWER

Test Mode :	CH00, CH19 , CH39 - 1Mbps

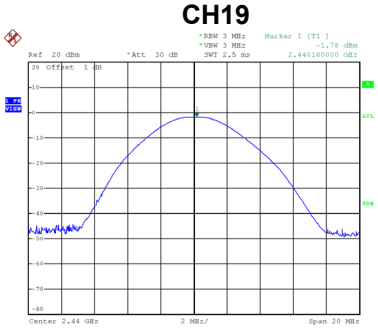
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	-1.79	0.0007	30.00	1.00	Pass
2440	-1.78	0.0007	30.00	1.00	Pass
2480	-1.57	0.0007	30.00	1.00	Pass

CH00



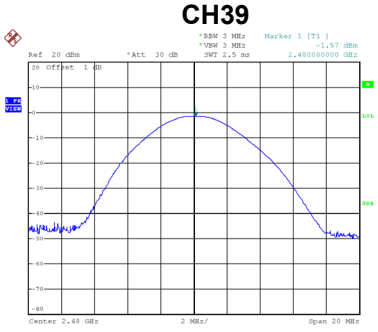
Date: 20.AUG.2020 10:24:10

CH19



Date: 20.AUG.2020 10:25:46

CH39

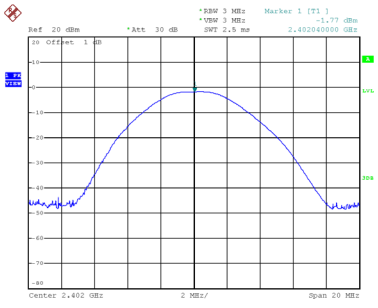


Date: 20.AUG.2020 10:27:23

Test Mode :	CH00, CH19 , CH39 - 2Mbps

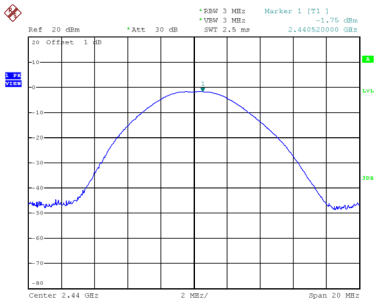
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	-1.77	0.0007	30.00	1.00	Pass
2440	-1.75	0.0007	30.00	1.00	Pass
2480	-1.55	0.0007	30.00	1.00	Pass

CH00



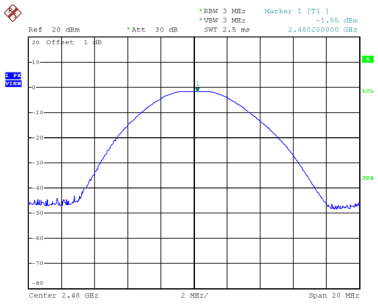
Date: 20.AUG.2020 10:29:02

CH19



Date: 20.AUG.2020 10:30:48

CH39

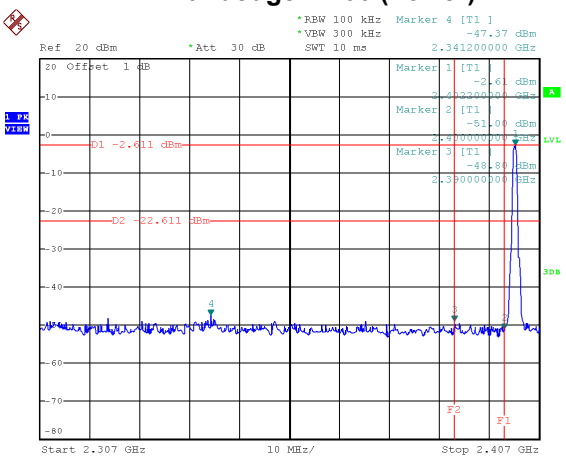


Date: 20.AUG.2020 10:32:23

APPENDIX F - CONDUCTED SPURIOUS EMISSION

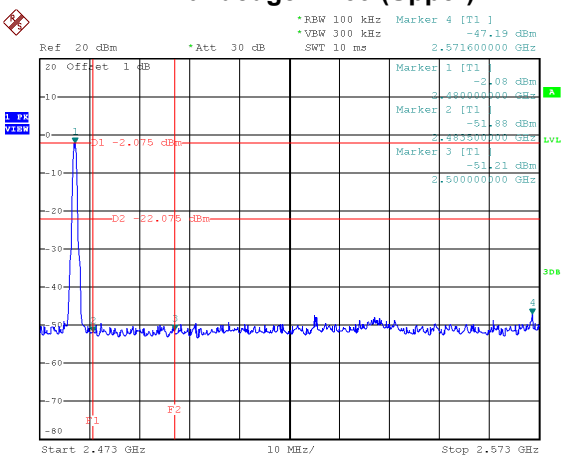
Test Mode :	CH00, CH19 , CH39 - 1Mbps

Bandedge CH00 (Lower)



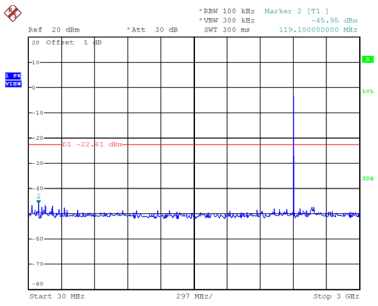
Date: 20.AUG.2020 10:23:33

Bandedge CH39 (Upper)

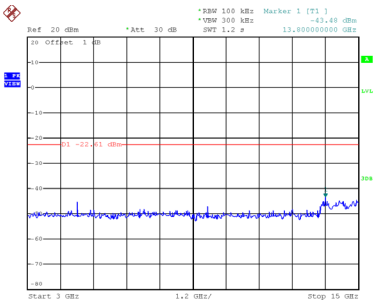


Date: 20.AUG.2020 10:26:46

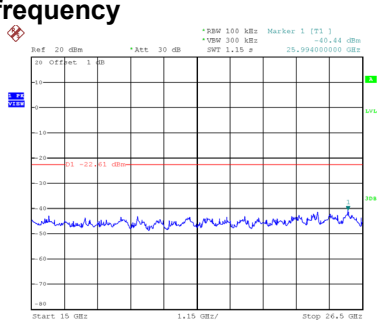
CH00 – 10th Harmonic of the fundamental frequency



Date: 20.AUG.2020 10:23:46

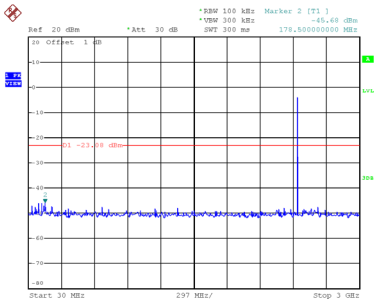


Date: 20.AUG.2020 10:23:52

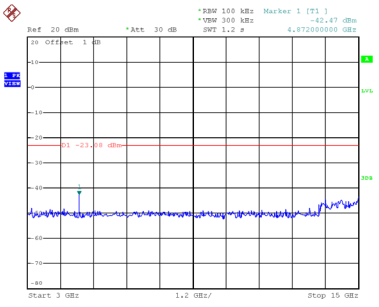


Date: 20.AUG.2020 10:23:59

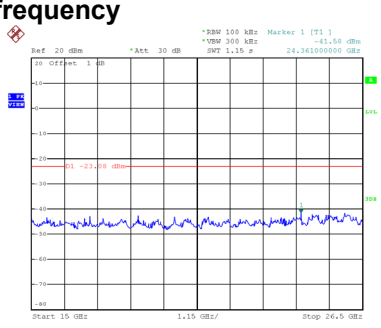
CH19 – 10th Harmonic of the fundamental frequency



Date: 20.AUG.2020 10:25:22

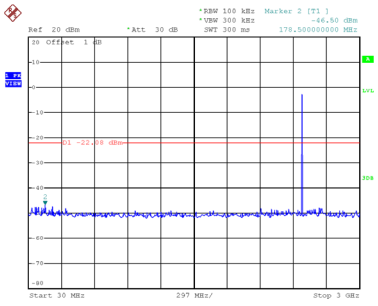


Date: 20.AUG.2020 10:25:29

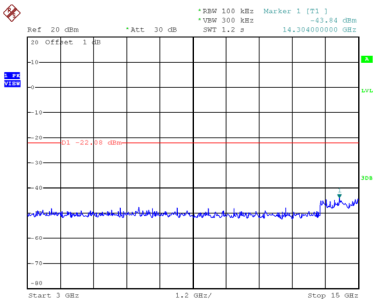


Date: 20.AUG.2020 10:25:36

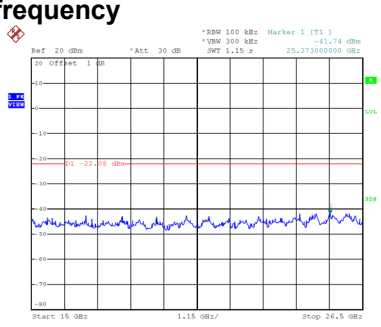
CH39 – 10th Harmonic of the fundamental frequency



Date: 20.AUG.2020 10:26:59



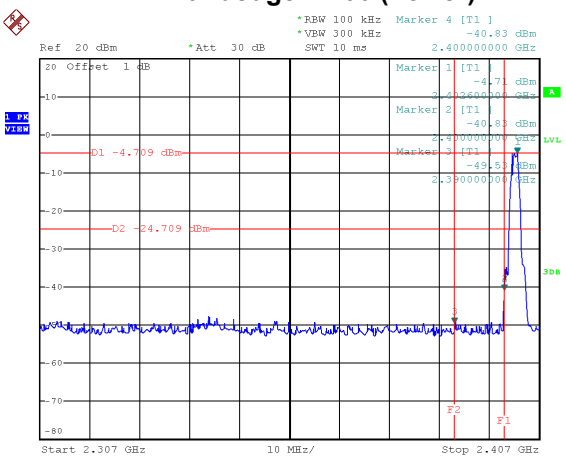
Date: 20.AUG.2020 10:27:06



Date: 20.AUG.2020 10:27:12

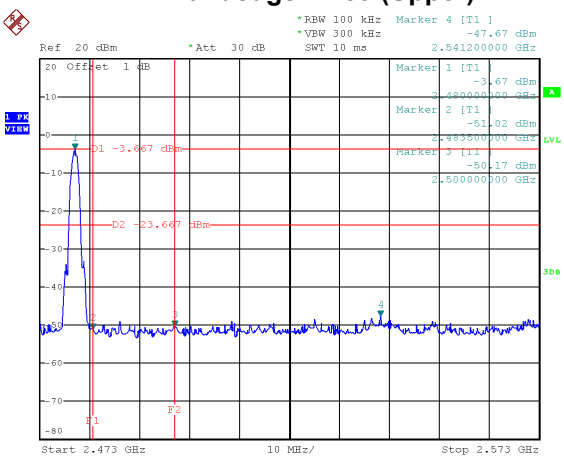
Test Mode :	CH00, CH19 , CH39 - 2Mbps

Bandedge CH00 (Lower)



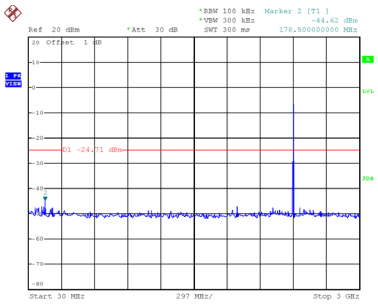
Date: 20.AUG.2020 10:28:25

Bandedge CH39 (Upper)

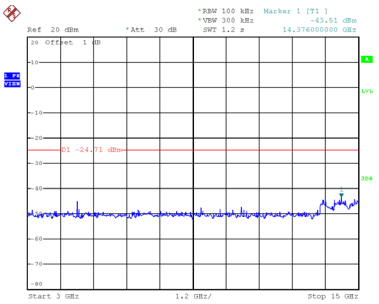


Date: 20.AUG.2020 10:31:46

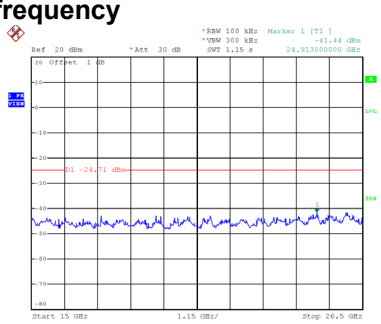
CH00 – 10th Harmonic of the fundamental frequency



Date: 20.AUG.2020 10:28:38

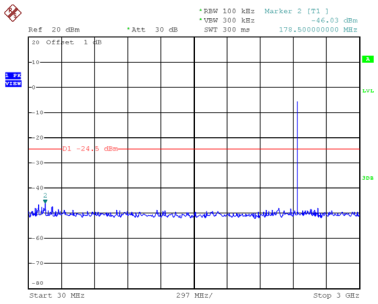


Date: 20.AUG.2020 10:28:45

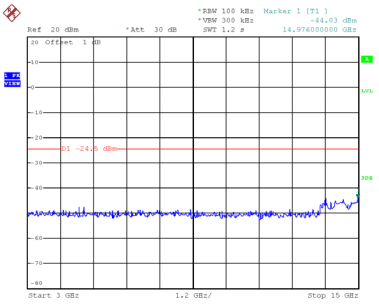


Date: 20.AUG.2020 10:28:51

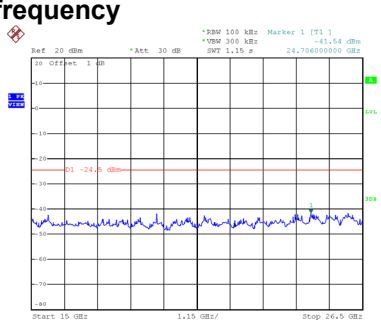
CH19 – 10th Harmonic of the fundamental frequency



Date: 20.AUG.2020 10:30:23

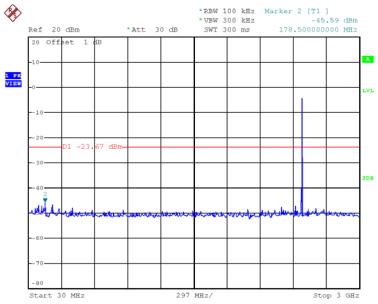


Date: 20.AUG.2020 10:30:30

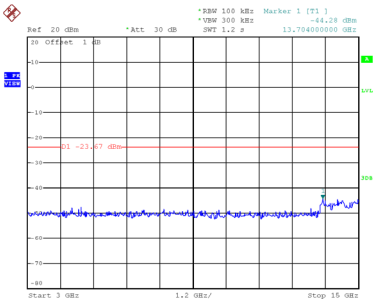


Date: 20.AUG.2020 10:30:37

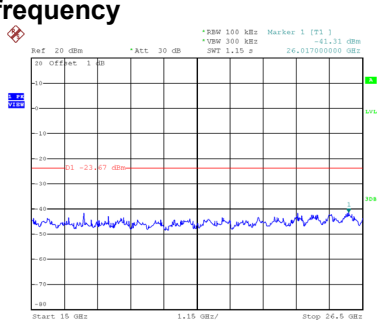
CH39 – 10th Harmonic of the fundamental frequency



Date: 20.AUG.2020 10:31:59



Date: 20.AUG.2020 10:32:06



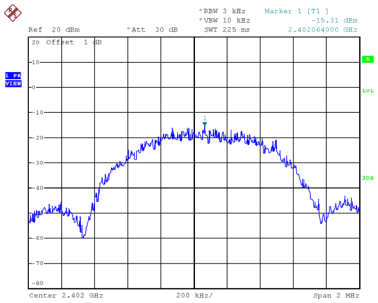
Date: 20.AUG.2020 10:32:12

APPENDIX G - POWER SPECTRAL DENSITY

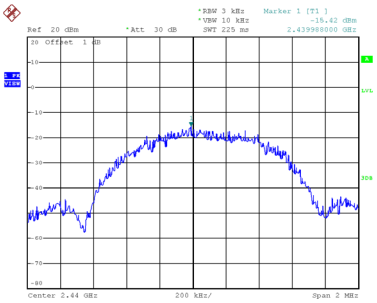
Test Mode:	CH00, CH19 , CH39 - 1Mbps

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-15.31	8.00	Pass
19	2440	-15.42	8.00	Pass
39	2480	-15.21	8.00	Pass

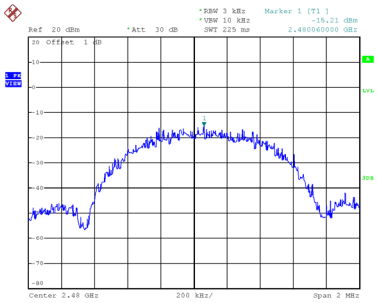
CH00



CH19



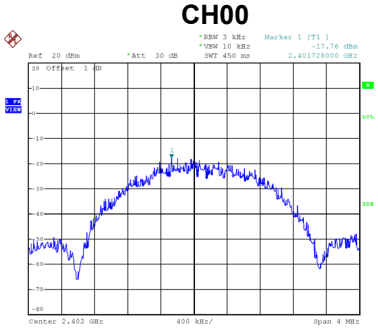
CH39



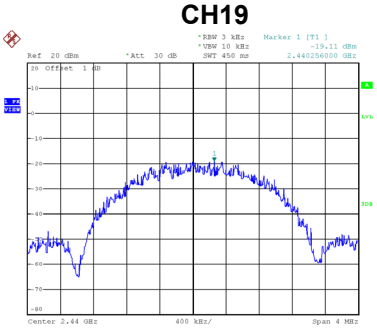
Test Mode:	CH00, CH19 , CH39 - 2Mbps

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-17.76	8.00	Pass
19	2440	-19.11	8.00	Pass
39	2480	-17.49	8.00	Pass

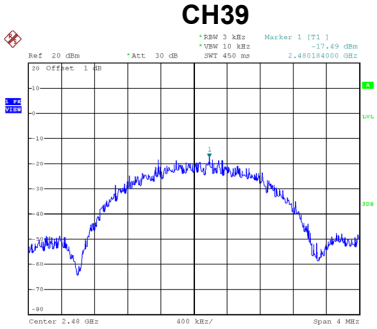
CH00



CH19



CH39



End of Test Report