

# FCC Radio Test Report

## FCC ID: XMR2022SC262RWF

This report concerns: Original Grant

**Project No.** : 2204H021  
**Equipment** : Smart Module  
**Brand Name** : Quectel  
**Test Model** : SC262R-WF  
**Series Model** : N/A  
**Applicant** : Quectel Wireless Solutions Co., Ltd  
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**Manufacturer** : Quectel Wireless Solutions Co., Ltd  
**Address** : Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233  
**Date of Receipt** : May 20, 2022  
**Date of Test** : May 24, 2022~Jun. 08, 2022  
**Issued Date** : Jun. 29, 2022  
**Report Version** : R00  
**Test Sample** : Engineering Sample No.: SH2022052370 for radiated, SH2022052371 for conducted.  
**Standard(s)** : FCC CFR Title 47, Part 15, Subpart C  
FCC KDB 558074 D01 15.247 Meas Guidance v05r02  
ANSI C63.10-2013

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

Maker Qi

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TESTING CERT #5123.03

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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 No.	Version	Description	Issued Date	Note
BTL-FCCP-5-2204H021	R00	Original Report	Jun. 29, 2022	Valid

**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	APPENDIX A	PASS	-----
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS	-----
15.247(a)(2)	Bandwidth	APPENDIX E	PASS	-----
15.247(b)(3)	Maximum Output Power	APPENDIX F	PASS	-----
15.247(d)	Conducted Spurious Emission	APPENDIX G	PASS	-----
15.247(e)	Power Spectral Density	APPENDIX H	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. 29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210, China  
 BTL's Registration Number for FCC: 476765  
 BTL's Designation Number for FCC: CN1241  
 BTL's CAB Identifier for ISED: CN0043

### 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)
SH-C01	CISPR	150 kHz ~ 30 MHz	2.64

B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
SH-CB02	CISPR	9 KHz~30 MHz	-	2.16
		30 MHz~200 MHz	V	4.04
		30 MHz~200 MHz	H	2.90
		200 MHz~1,000 MHz	V	3.76
		200 MHz~1,000 MHz	H	3.82
		1GHz ~ 6GHz	-	4.56
		6GHz ~ 18GHz	-	4.14
		18 ~ 26.5 GHz	-	3.48

C. Conducted test:

Parameter	U
Output Power	±0.95 dB
Occupied Channel Bandwidth	±3.8 %
Power Spectral Density	±0.86 dB
Conducted Spurious Emission	±2.71 dB
Temperature	±0.08 °C
Humidity	±1.5 %
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
AC Power Line Conducted Emissions	22°C	54%	AC 120V/60Hz	Joven Xiong
Radiated Emissions-9 kHz to 30 MHz	24°C	58%	AC 120V/60Hz	Jane Wang
Radiated Emissions-30 MHz to 1000 MHz	24°C	58%	AC 120V/60Hz	Jane Wang
Radiated Emissions-Above 1000 MHz	24°C	58%	AC 120V/60Hz	Jane Wang
Bandwidth	28°C	34%	AC 120V/60Hz	Forest Li
Maximum Output Power	28°C	34%	AC 120V/60Hz	Forest Li
Conducted Spurious Emission	28°C	34%	AC 120V/60Hz	Forest Li
Power Spectral Density	28°C	34%	AC 120V/60Hz	Forest Li



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Module
Brand Name	Quectel
Test Model	SC262R-WF
Series Model	N/A
Model Difference(s)	N/A
Software Version	N/A
Hardware Version	R1.0
Power Source	DC Voltage supplied from AC/DC adapter. Model: P12F050200
Power Rating	I/P: 100-240V ~ 50/60Hz 0.3A O/P: 5.0V --- 2.0A
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps
Max. Output Power	1Mbps: 0.38 dBm (0.0011 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	P/N	Antenna Type	Connector	Gain (dBi)
1	 圣丹纳 SAIN TENNA	SAA31578A	Dipole	SMA-J	0.47

## Note:

The antenna gain is provided by the manufacturer.

## 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_1Mbps Channel 00/19/39

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

<b>AC power line conducted emissions test</b>	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 39

<b>Radiated emissions test - Below 1GHz</b>	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 39

<b>Radiated emissions test - Above 1GHz</b>	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/19/39

<b>Conducted test</b>	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/19/39

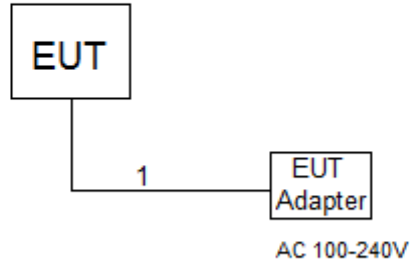
Note:

- (1) For radiated emission above 1 GHz test, the spurious points of 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) For AC power line conducted emissions and radiated emissions below 1 GHz test, the 1Mbps Channel 00 is 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.

Test Software Version	QRCT		
Frequency (MHz)	2402	2440	2480
1Mbps	Default	Default	Default

**2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED****2.5 SUPPORT UNITS**

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC	N/A	N/A	1m

### 3. AC POWER LINE CONDUCTED EMISSIONS

#### 3.1 LIMIT

Frequency of Emission (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 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.

#### 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.

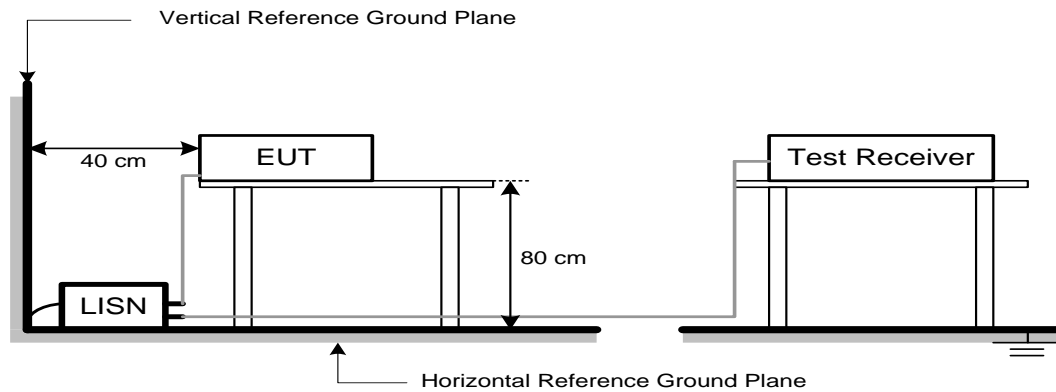
The following table is the setting of the receiver:

Receiver Parameters	Setting
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

#### 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 fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

### 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 EMISSIONS

##### 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 CFR Title 47, Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).



**4.2 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.

The following table is the setting of the receiver:

Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

Spectrum Parameters	Setting
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3 MHz for PK value 1 MHz / 1/T Hz for AVG value

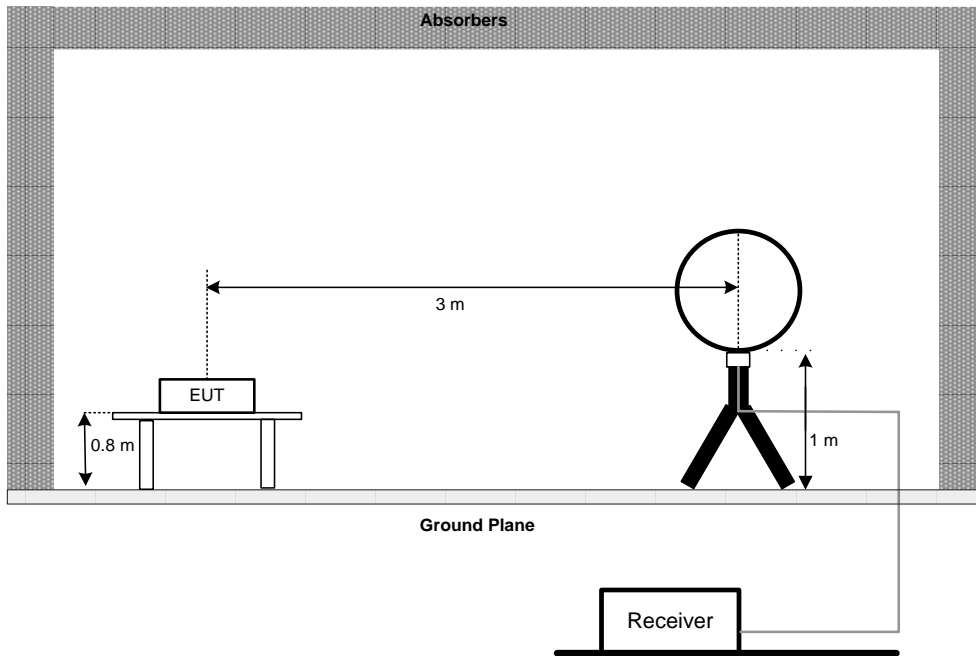
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector
Start ~ Stop Frequency	1 GHz~26.5 GHz for PK/AVG detector

#### 4.3 DEVIATION FROM TEST STANDARD

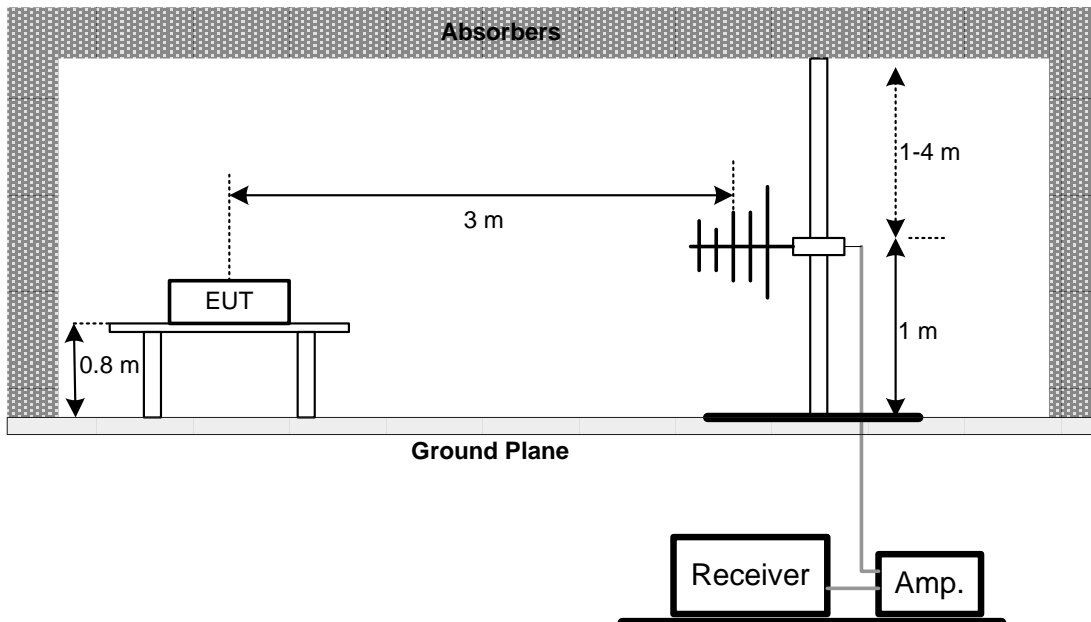
No deviation.

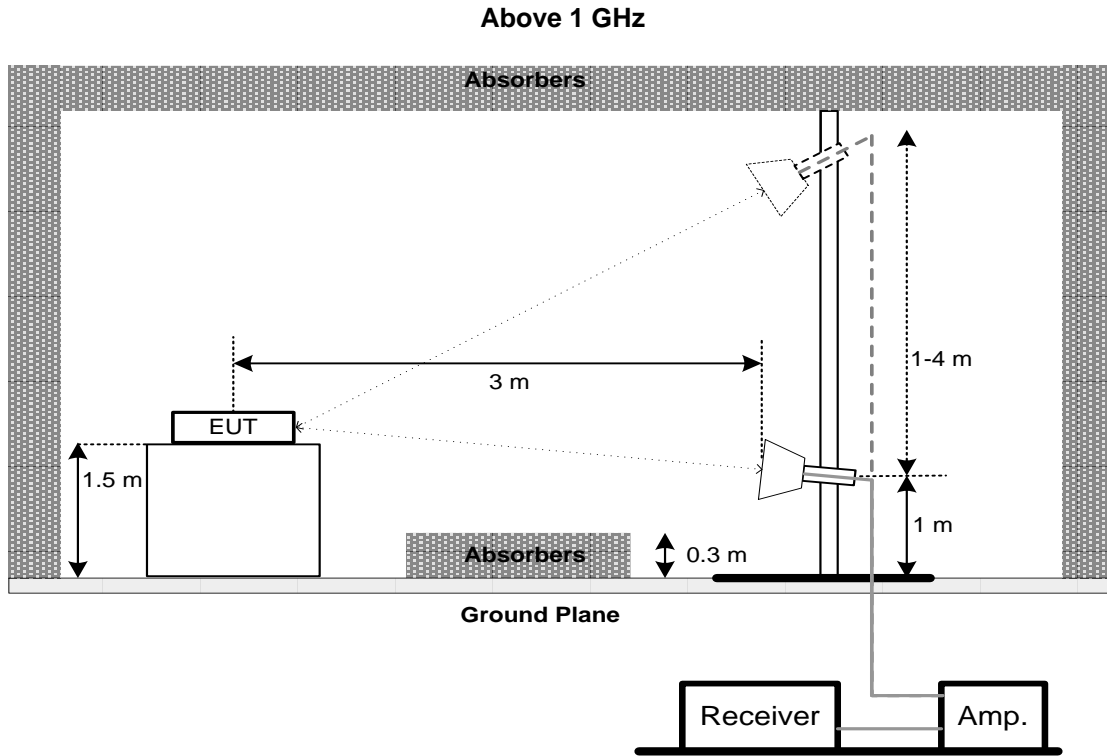
#### 4.4 TEST SETUP

##### 9 kHz to 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 RESULT - 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 RESULT - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

#### 4.8 TEST RESULT - 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. BANDWIDTH

### 5.1 LIMIT

Section	Test Item	Limit
FCC 15.247(a)(2)	6 dB Bandwidth	$\geq 500$ kHz
	99% Emission Bandwidth	-

### 5.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

For 6 dB Bandwidth:

Spectrum Parameters	Setting
Span Frequency	$>$ Measurement Bandwidth
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

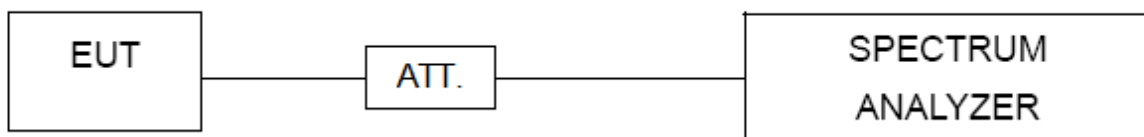
For 99% Emission Bandwidth:

Spectrum Parameters	Setting
Span Frequency	Between 1.5 times and 5.0 times the OBW
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 5.3 DEVIATION FROM STANDARD

No deviation.

### 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 5.6 TEST RESULTS

Please refer to the APPENDIX E.

**6. MAXIMUM OUTPUT POWER**

**6.1 LIMIT**

Section	Test Item	Limit
FCC 15.247(b)(3)	Maximum Output Power	1.0000 watt or 30.00 dBm

**6.2 TEST PROCEDURE**

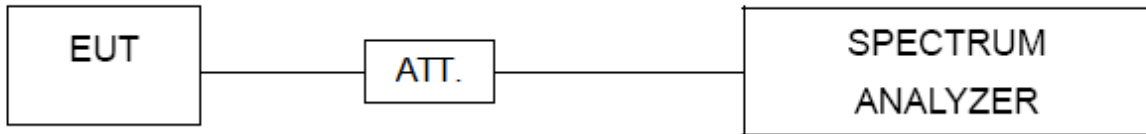
- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	$\geq 3 \times \text{RBW}$
RBW	3 MHz
VBW	3 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

**6.3 DEVIATION FROM STANDARD**

No deviation.

**6.4 TEST SETUP**



**6.5 EUT OPERATION CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

**6.6 TEST RESULTS**

Please refer to the APPENDIX F.

**7. CONDUCTED SPURIOUS EMISSION**

**7.1 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.

**7.2 TEST PROCEDURE**

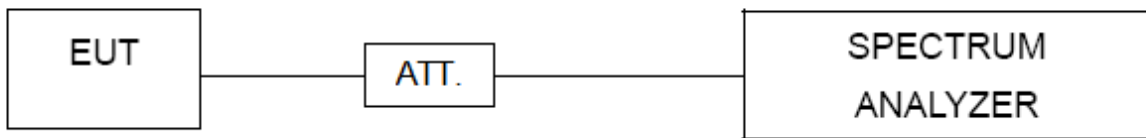
- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Start Frequency	30 MHz
Stop Frequency	26.5 GHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

**7.3 DEVIATION FROM STANDARD**

No deviation.

**7.4 TEST SETUP**



**7.5 EUT OPERATION CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

**7.6 TEST RESULTS**

Please refer to the APPENDIX G.

## 8. POWER SPECTRAL DENSITY

### 8.1 LIMIT

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

### 8.2 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 following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	2 MHz (1 Mbps)
RBW	3 kHz
VBW	10 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 8.3 DEVIATION FROM STANDARD

No deviation.

### 8.4 TEST SETUP



### 8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 8.6 TEST RESULTS

Please refer to the APPENDIX H.

**9. MEASUREMENT INSTRUMENTS LIST**

AC Power Line Conducted Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Line Impedance Stabilisation Network	Schwarzbeck	NNLK 8121	8121-822	Mar. 20, 2023
2	TWO-LINE V-NETWORK	R&S	ENV216	101340	Aug. 23, 2022
3	Test Cable	emci	EMCRG400-BM-N M-10000	170628	Apr. 05, 2023
4	EMI Test Receiver	R&S	ESCI	100082	Mar. 20, 2023
5	50Ω Terminator	SHX	TF2-1G-A	17051602	Mar. 20, 2023
6	50Ω coaxial switch	Anritsu	MP59B	6201750902	Mar. 20, 2023
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EMCI	EMCI LPA600	275	Mar. 20, 2023
2	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 20, 2023
3	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	VULB 9160	9160-3233	Mar. 23, 2023
2	Pre-Amplifier	emci	EMC9135	980401	Mar. 20, 2023
3	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 20, 2023
4	Test Cable	emci	EMC104-SM-SM-7 000	181020	Apr. 05, 2023
5	Test Cable	emci	EMC104-SM-SM-2 500	170618	Apr. 05, 2023
6	Test Cable	emci	EMC104-SM-SM-8 00	170647	Apr. 05, 2023
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 Waveguide Horn Antenna	ETS-Lindgren	BBHA 9120D	9120D-1817	Mar. 23, 2023
2	Pre-Amplifier	emci	EMC051845SE	980725	Aug. 23, 2022
3	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 20, 2023
4	Test Cable	emci	EMC104-SM-SM-7000	181020	Apr. 05, 2023
5	Test Cable	emci	EMC104-SM-SM-2500	170618	Apr. 05, 2023
6	Test Cable	emci	EMC104-SM-SM-8000	170647	Apr. 05, 2023
7	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	3116C	00203919	Mar. 20, 2023
8	Pre-Amplifier	emci	EMC184045B	980265	Apr. 05, 2023
9	Test Cable	emci	EMC102-SM-SM-8000	170335	Apr. 05, 2023
10	Test Cable	emci	EMC102-KM-KM-2500	170627	Apr. 05, 2023
11	MXE EMI Receiver	Keysight	N9038A	MY5640088	Mar. 20, 2023
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 20, 2023
2	Attenuator	JUK	ATT-2W6G-S-10	N/A	N/A

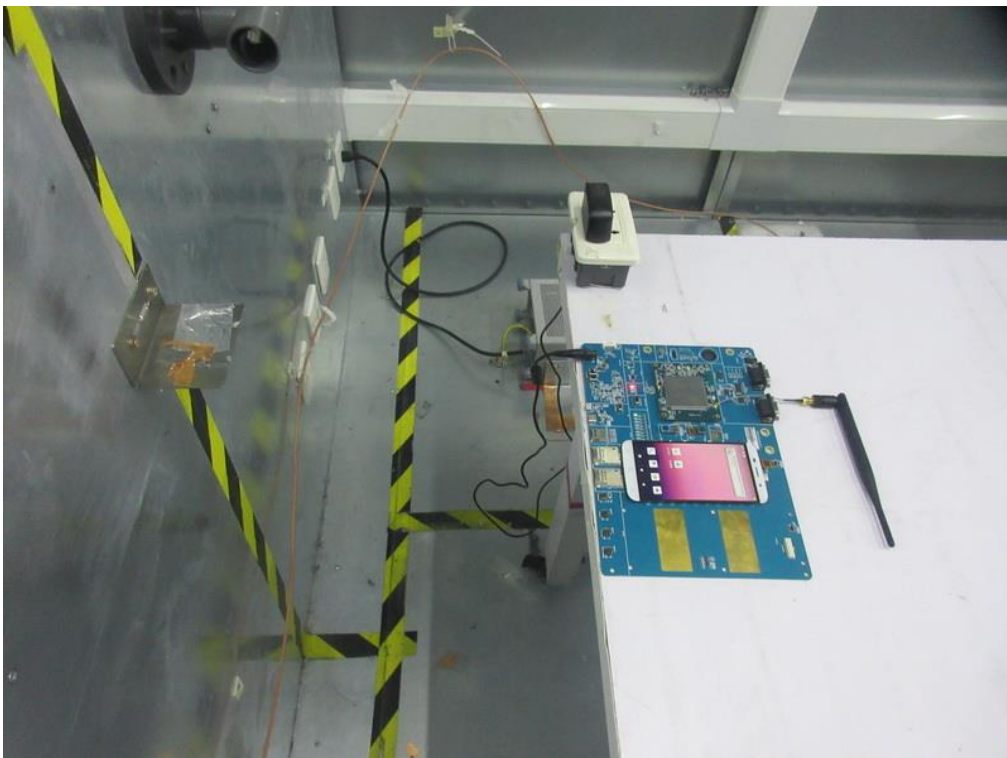
Maximum Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Peak Power Analyze	Keysight	8990B	MY51000507	Mar. 20, 2023
2	Wideband Power Sensor	Keysight	N1923A	MY58310003	Mar. 20, 2023
3	Attenuator	JUK	ATT-2W6G-S-10	N/A	N/A

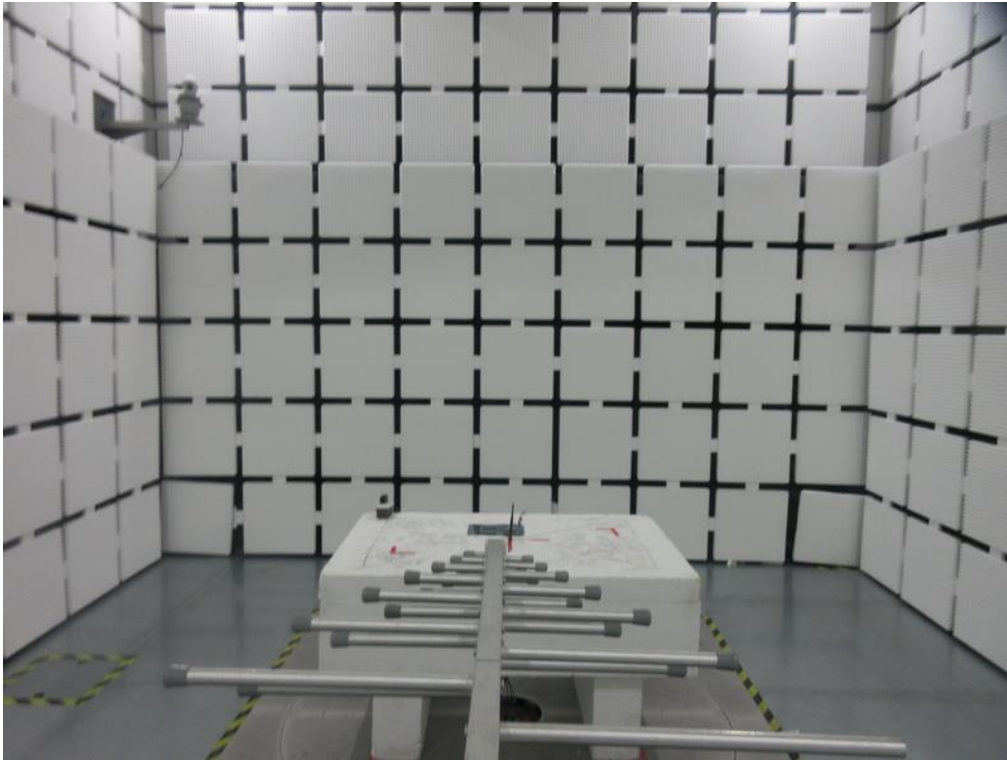
Antenna Conducted Spurious Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 20, 2023
2	Attenuator	JUK	ATT-2W6G-S-10	N/A	N/A

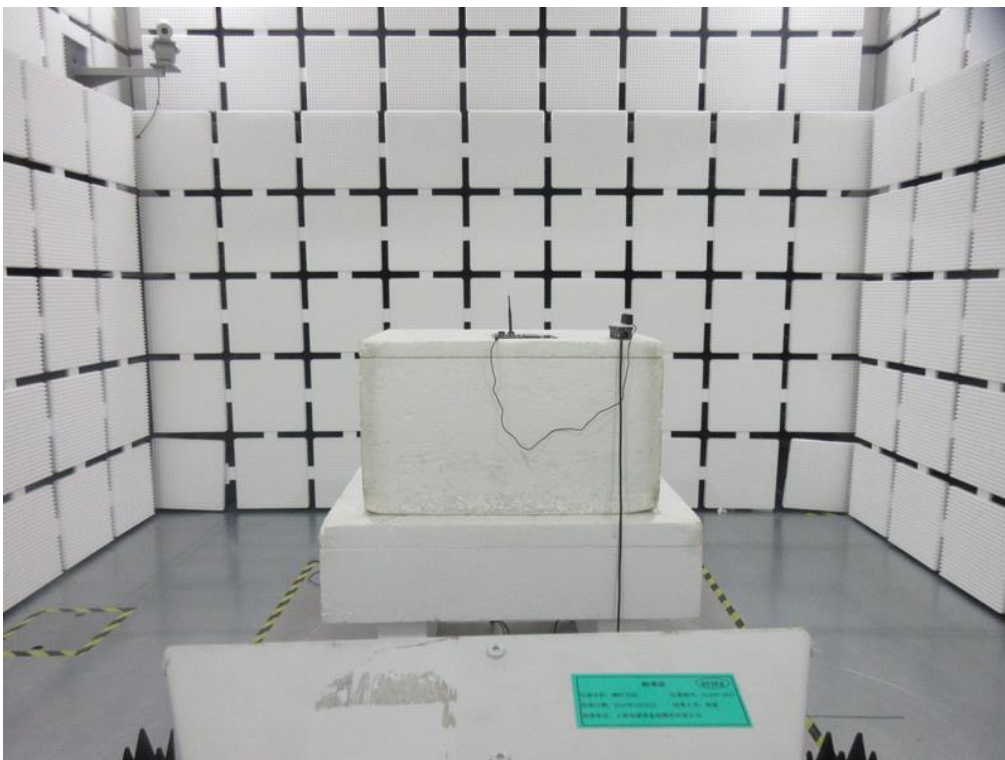
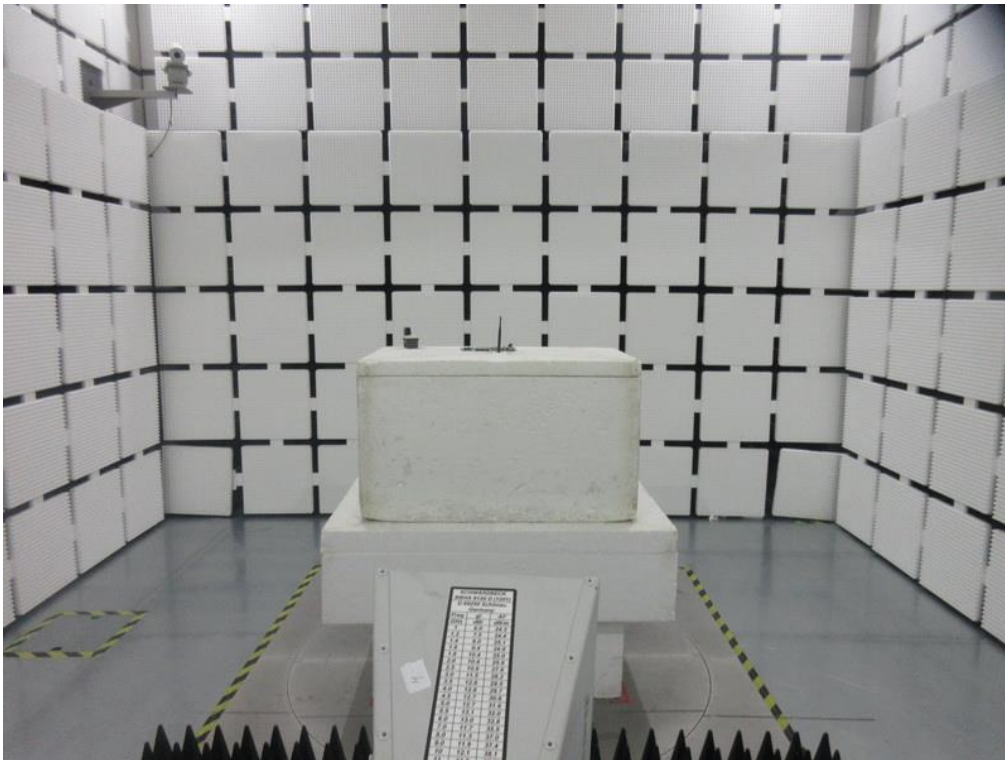
Power Spectral Density					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 20, 2023
2	Attenuator	JUK	ATT-2W6G-S-10	N/A	N/A

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

All calibration period of equipment list is one year.

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

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

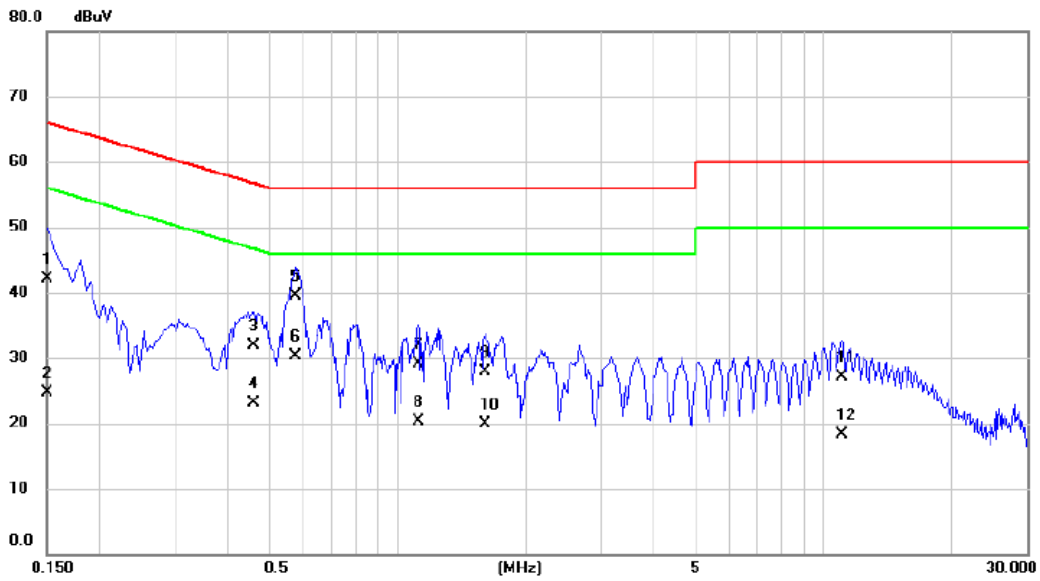
**Radiated Emissions Test Photos****Above 1 GHz**



**Close-up Test Photos**

## **APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**

Test Mode	TX Mode_1Mbps Channel 39	Phase	Line
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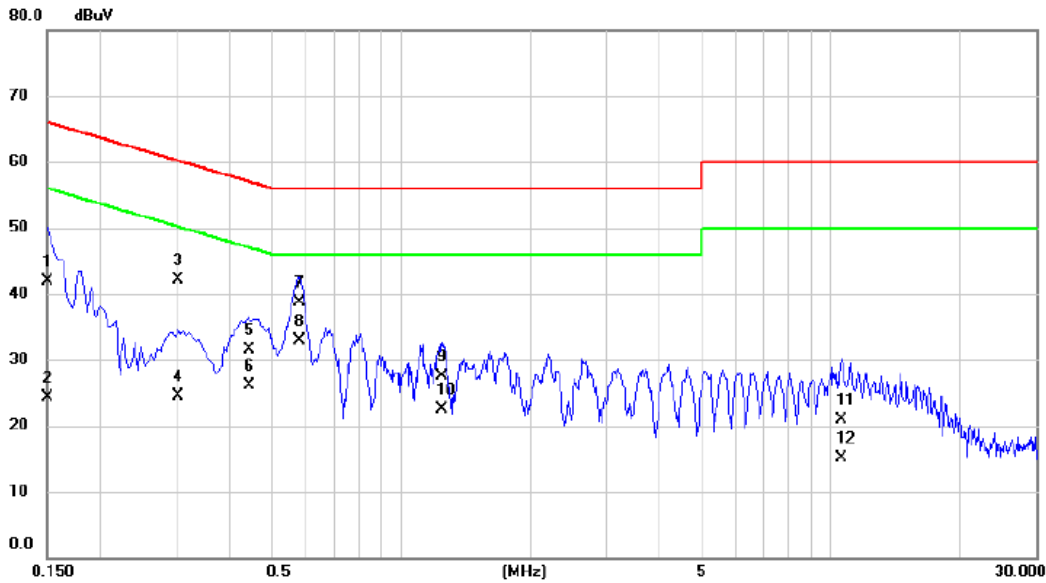
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.1500	32.50	9.65	42.15	66.00	-23.85	QP	
2	0.1500	15.00	9.65	24.65	56.00	-31.35	AVG	
3	0.4605	22.20	9.80	32.00	56.68	-24.68	QP	
4	0.4605	13.40	9.80	23.20	46.68	-23.48	AVG	
5	0.5775	29.70	9.73	39.43	56.00	-16.57	QP	
6 *	0.5775	20.60	9.73	30.33	46.00	-15.67	AVG	
7	1.1220	19.20	9.87	29.07	56.00	-26.93	QP	
8	1.1220	10.40	9.87	20.27	46.00	-25.73	AVG	
9	1.6035	18.00	9.92	27.92	56.00	-28.08	QP	
10	1.6035	9.90	9.92	19.82	46.00	-26.18	AVG	
11	11.0715	16.90	10.25	27.15	60.00	-32.85	QP	
12	11.0715	8.10	10.25	18.35	50.00	-31.65	AVG	

**REMARKS:**

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

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

Test Mode	TX Mode_1Mbps Channel 39	Phase	Neutral
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1500	32.40	9.60	42.00	66.00	-24.00	QP	
2		0.1500	14.80	9.60	24.40	56.00	-31.60	AVG	
3		0.3030	32.50	9.62	42.12	60.16	-18.04	QP	
4		0.3030	14.90	9.62	24.52	50.16	-25.64	AVG	
5		0.4425	21.70	9.78	31.48	57.01	-25.53	QP	
6		0.4425	16.40	9.78	26.18	47.01	-20.83	AVG	
7		0.5820	28.90	9.79	38.69	56.00	-17.31	QP	
8	*	0.5820	23.20	9.79	32.99	46.00	-13.01	AVG	
9		1.2435	17.70	9.79	27.49	56.00	-28.51	QP	
10		1.2435	12.70	9.79	22.49	46.00	-23.51	AVG	
11		10.5900	10.50	10.39	20.89	60.00	-39.11	QP	
12		10.5900	4.80	10.39	15.19	50.00	-34.81	AVG	

**REMARKS:**

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



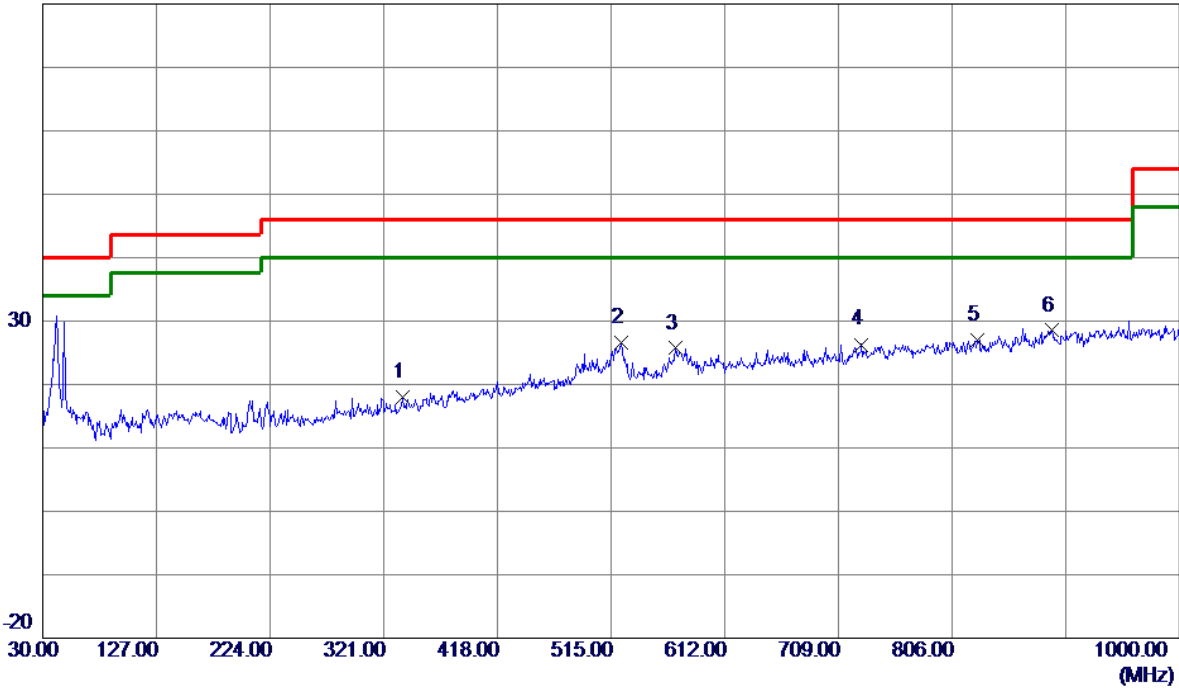
## **APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ**

Note: The measured value have enough margin over 20dB than the limit, therefore they are not reported.

## **APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ**

Test Mode	TX Mode_1Mbps Channel 39	Polarization	Vertical
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80 dBuV/m



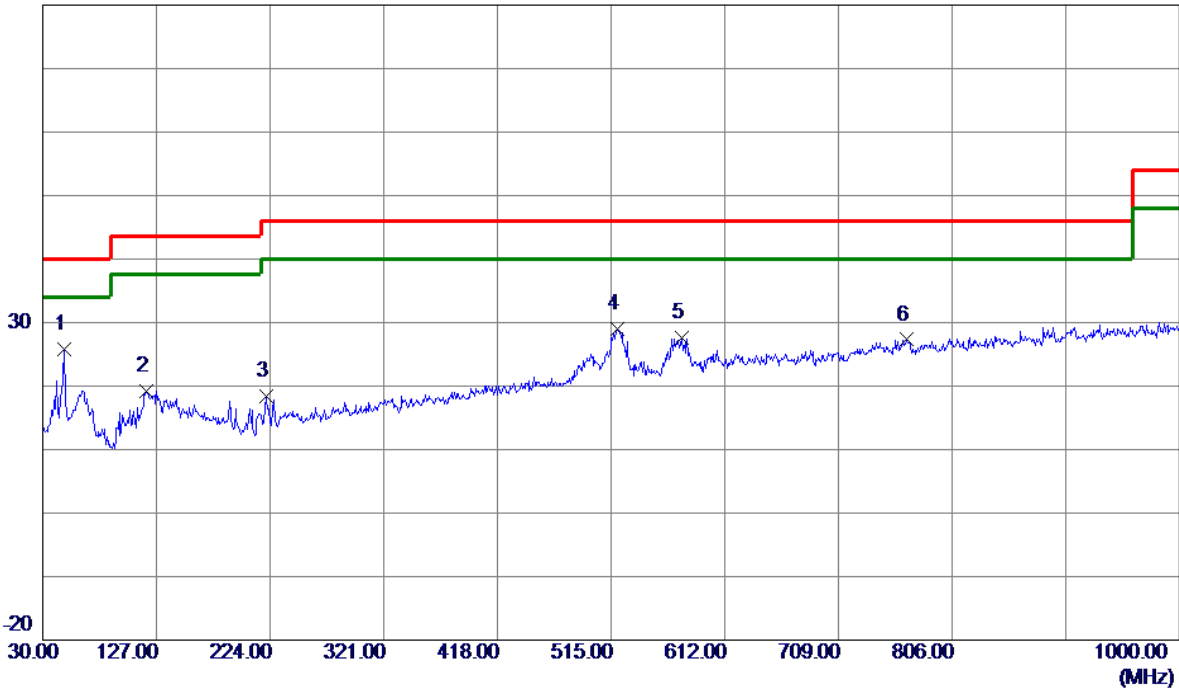
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	337.0050	32.12	-14.14	17.98	46.00	-28.02	Peak	
2	523.2450	36.75	-10.22	26.53	46.00	-19.47	Peak	
3	570.2900	34.96	-9.26	25.70	46.00	-20.30	Peak	
4	728.4000	32.99	-6.69	26.30	46.00	-19.70	Peak	
5	827.8250	32.48	-5.57	26.91	46.00	-19.09	Peak	
6 *	891.3600	33.19	-4.69	28.50	46.00	-17.50	Peak	

**REMARKS:**

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

Test Mode	TX Mode_1Mbps Channel 39	Polarization	Horizontal
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80 dBuV/m



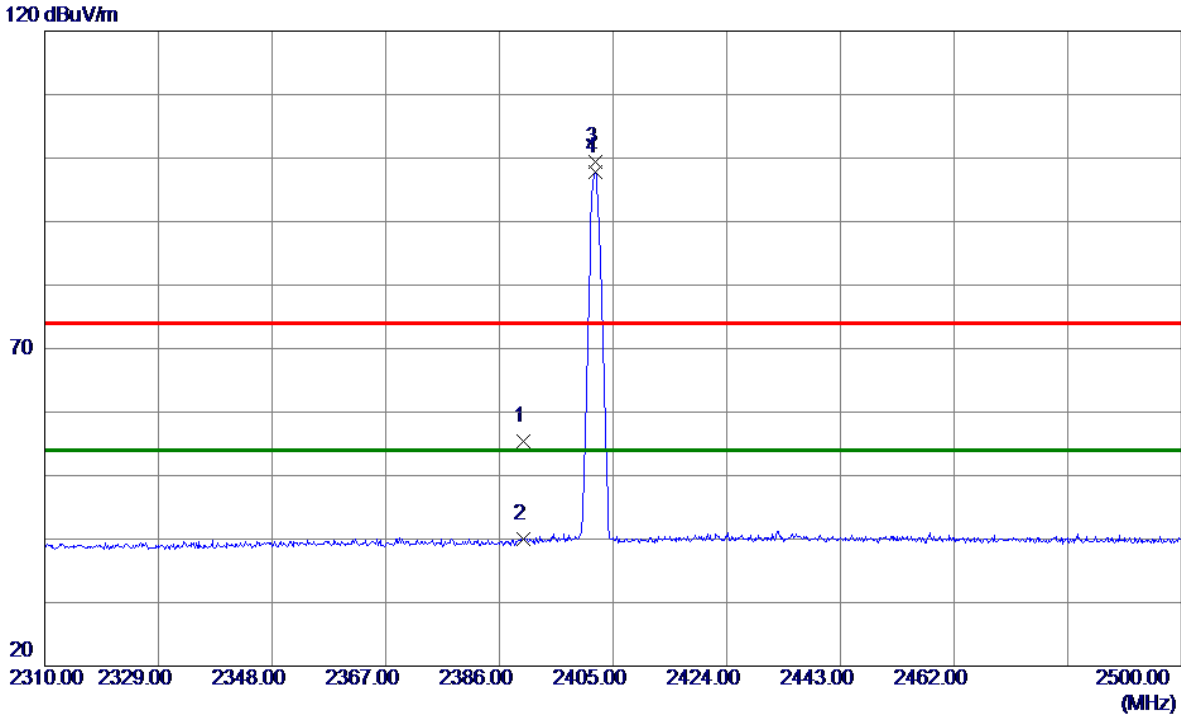
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	48.4300	43.19	-17.30	25.89	40.00	-14.11	Peak	
2	118.7550	37.27	-18.07	19.20	43.50	-24.30	Peak	
3	220.6050	36.65	-18.27	18.38	46.00	-27.62	Peak	
4	520.3350	39.23	-10.26	28.97	46.00	-17.03	Peak	
5	575.1400	36.66	-9.13	27.53	46.00	-18.47	Peak	
6	767.6850	33.35	-6.05	27.30	46.00	-18.70	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	Polarization	Vertical
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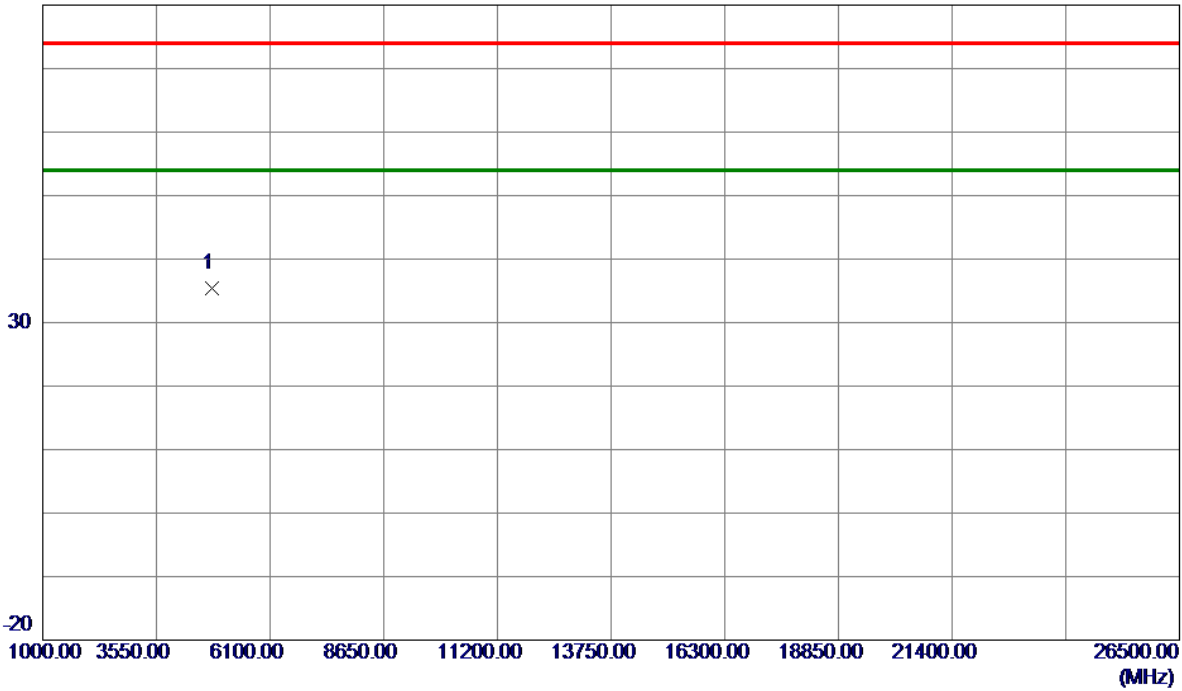
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	24.88	30.55	55.43	74.00	-18.57	Peak	
2	2390.0000	9.45	30.55	40.00	54.00	-14.00	AVG	
3	2401.9600	68.80	30.60	99.40	74.00	25.40	Peak	No limit
4 *	2401.9600	67.20	30.60	97.80	54.00	43.80	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	Polarization	Vertical
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80 dBuV/m

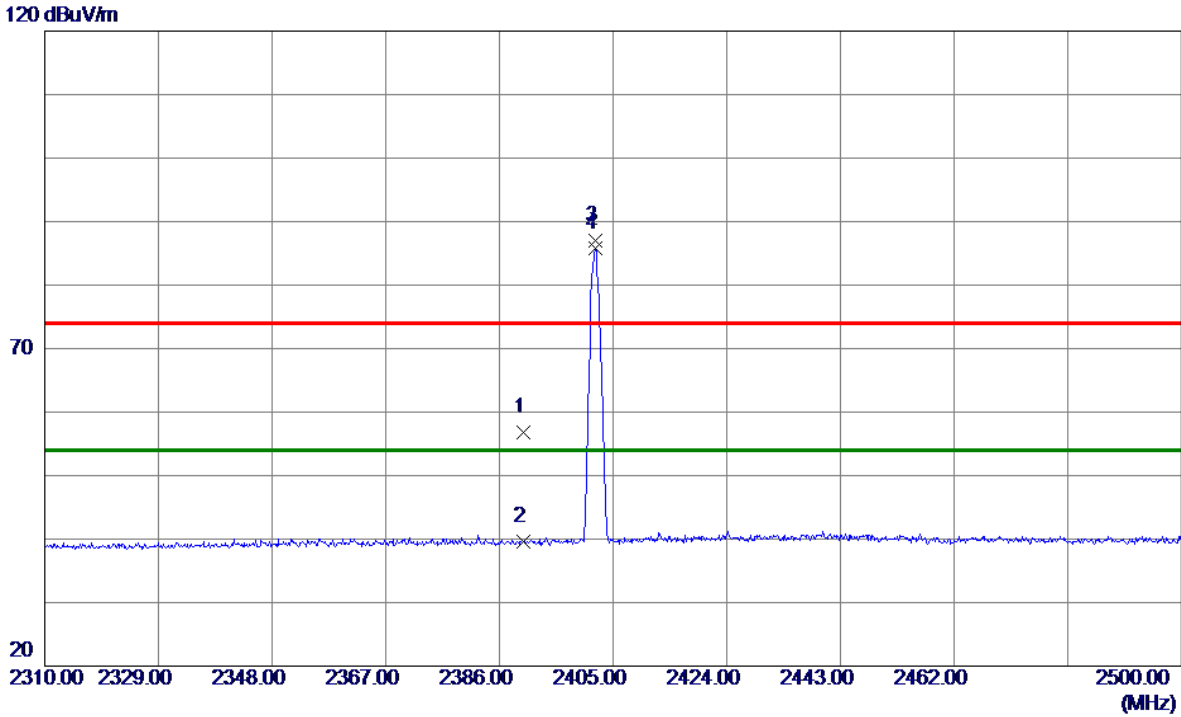


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4804.0000	52.62	-17.27	35.35	74.00	-38.65	Peak	

REMARKS:

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

Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Horizontal
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No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	26.29	30.55	56.84	74.00	-17.16	Peak	
2	2390.0000	9.00	30.55	39.55	54.00	-14.45	AVG	
3	2402.0550	56.40	30.60	87.00	74.00	13.00	Peak	No limit
4 *	2402.0550	55.13	30.60	85.73	54.00	31.73	AVG	No limit

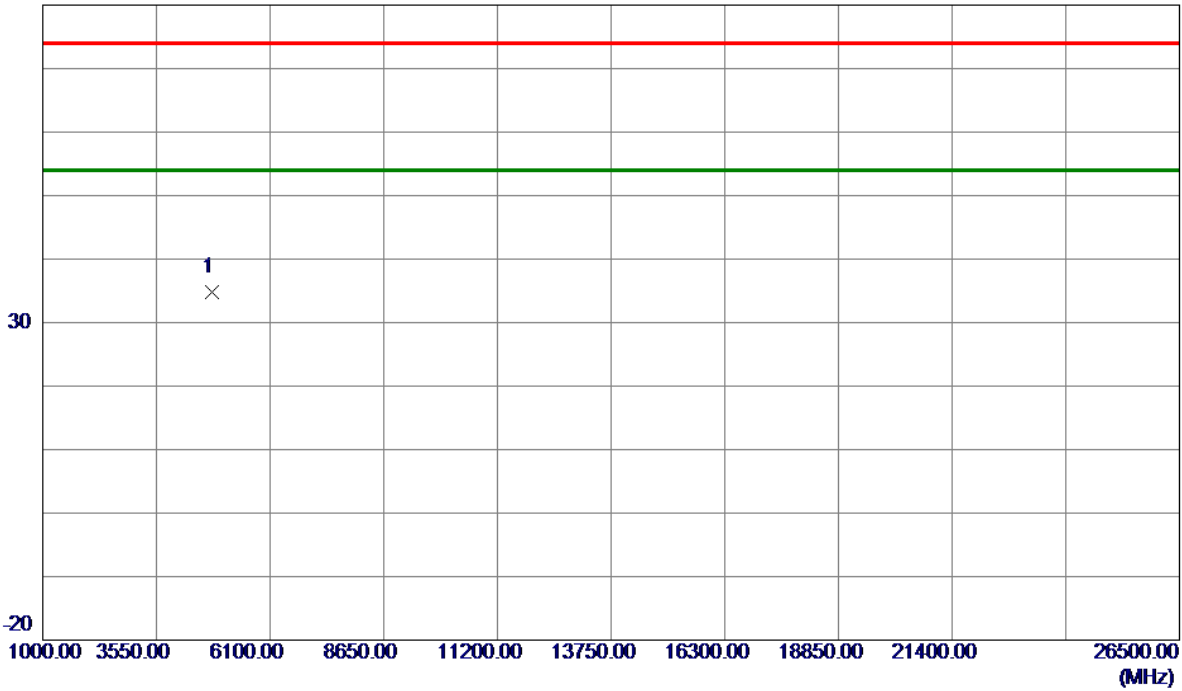
**REMARKS:**

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



Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Horizontal
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80 dBuV/m



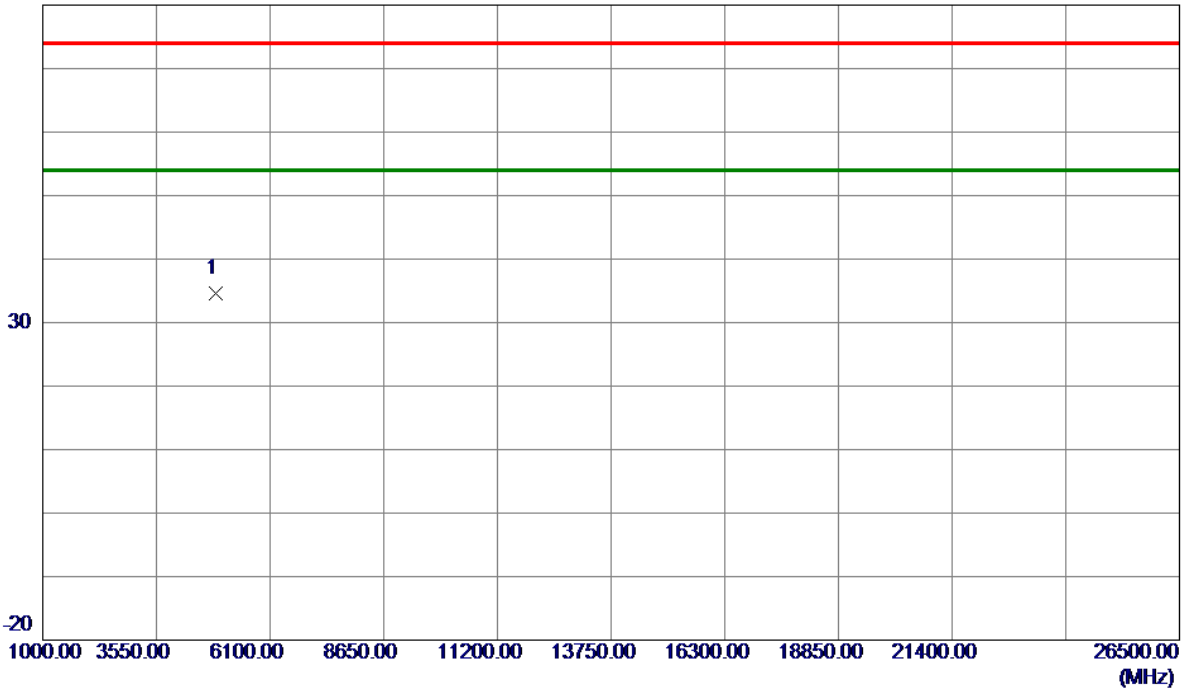
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4804.0000	52.09	-17.27	34.82	74.00	-39.18	Peak	

REMARKS:

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

Test Mode	TX 2440 MHz _CH19_1Mbps	Polarization	Vertical
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80 dBuV/m



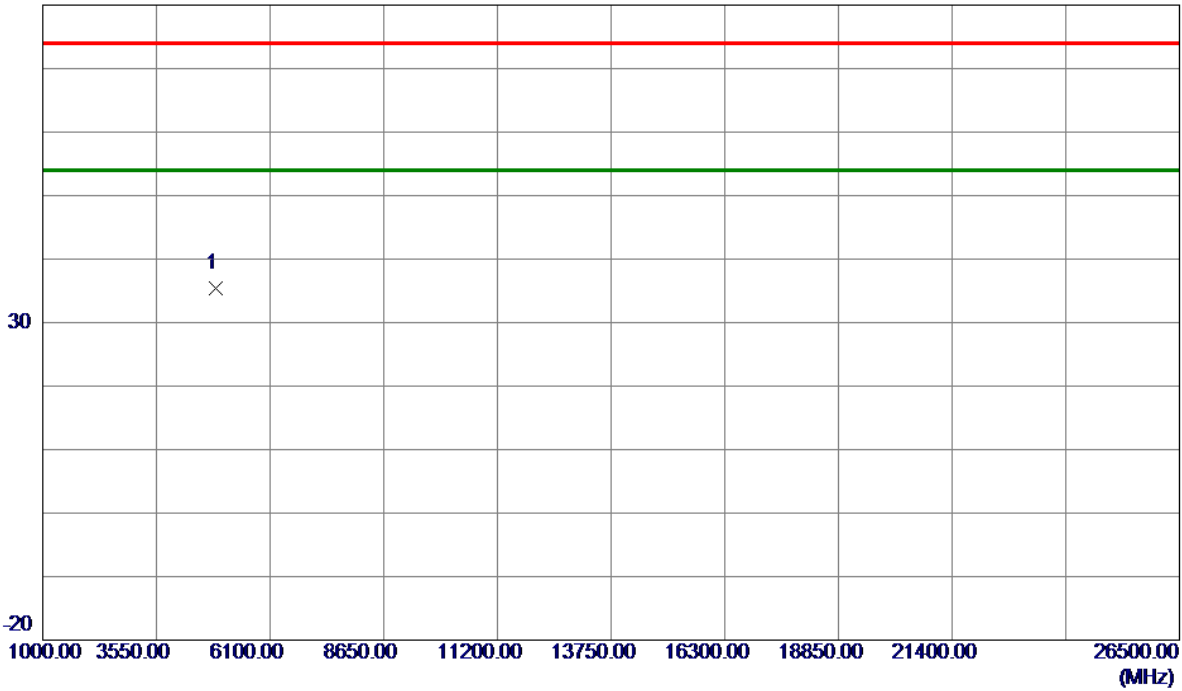
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4880.0000	51.65	-16.98	34.67	74.00	-39.33	Peak	

REMARKS:

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

Test Mode	TX 2440 MHz _CH19_1Mbps	Polarization	Horizontal
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80 dBuV/m

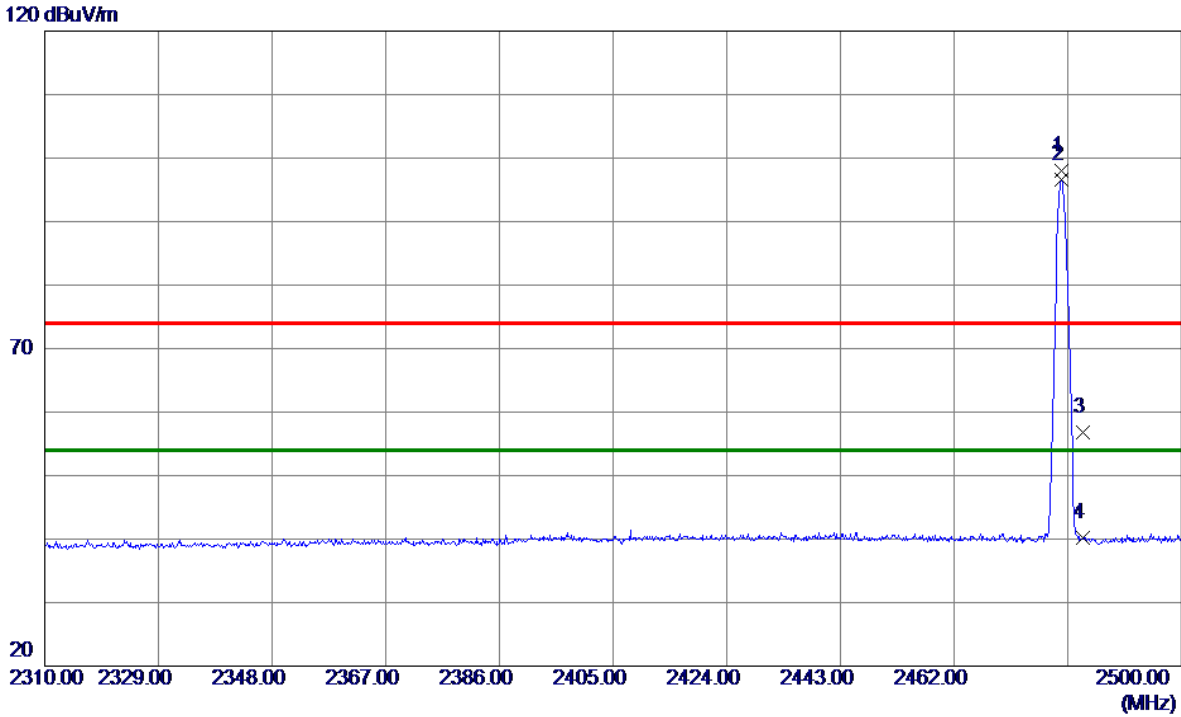


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4880.0000	52.32	-16.98	35.34	74.00	-38.66	Peak	

REMARKS:

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

Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical
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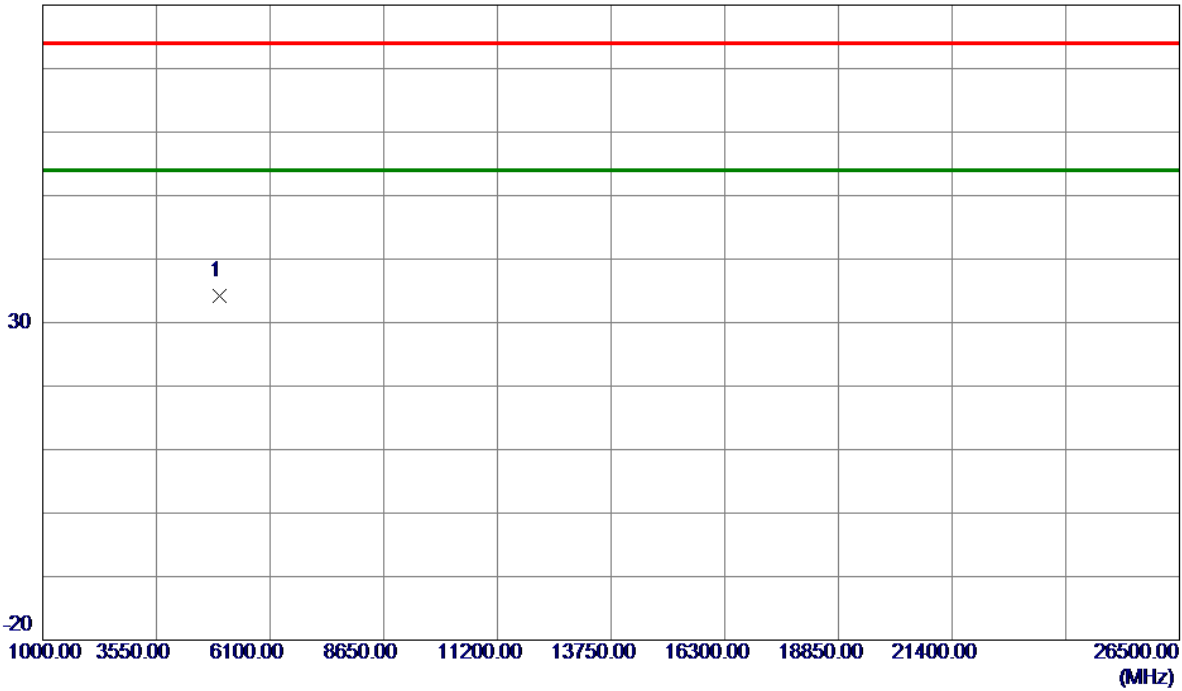
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2479.9550	67.01	30.93	97.94	74.00	23.94	Peak	No limit
2 *	2479.9550	65.71	30.93	96.64	54.00	42.64	AVG	No limit
3	2483.5000	25.84	30.94	56.78	74.00	-17.22	Peak	
4	2483.5000	9.26	30.94	40.20	54.00	-13.80	AVG	

REMARKS:

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

Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical
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80 dBuV/m

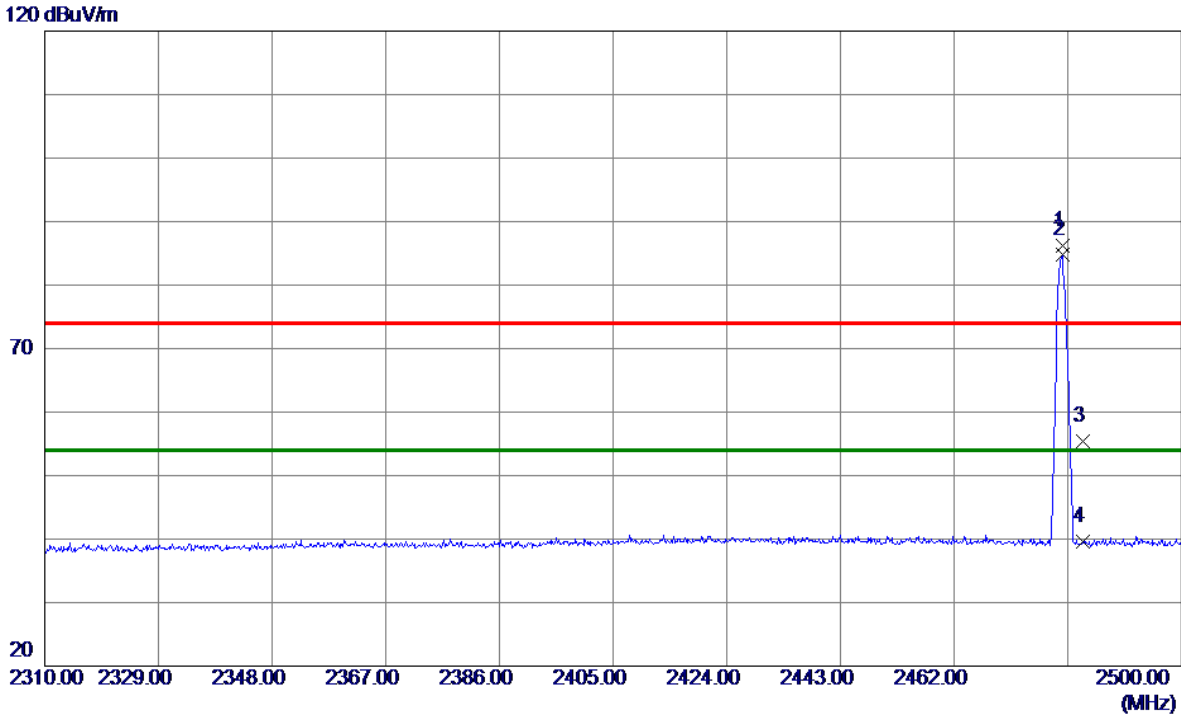


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4960.0000	50.92	-16.68	34.24	74.00	-39.76	Peak	

REMARKS:

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

Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Horizontal
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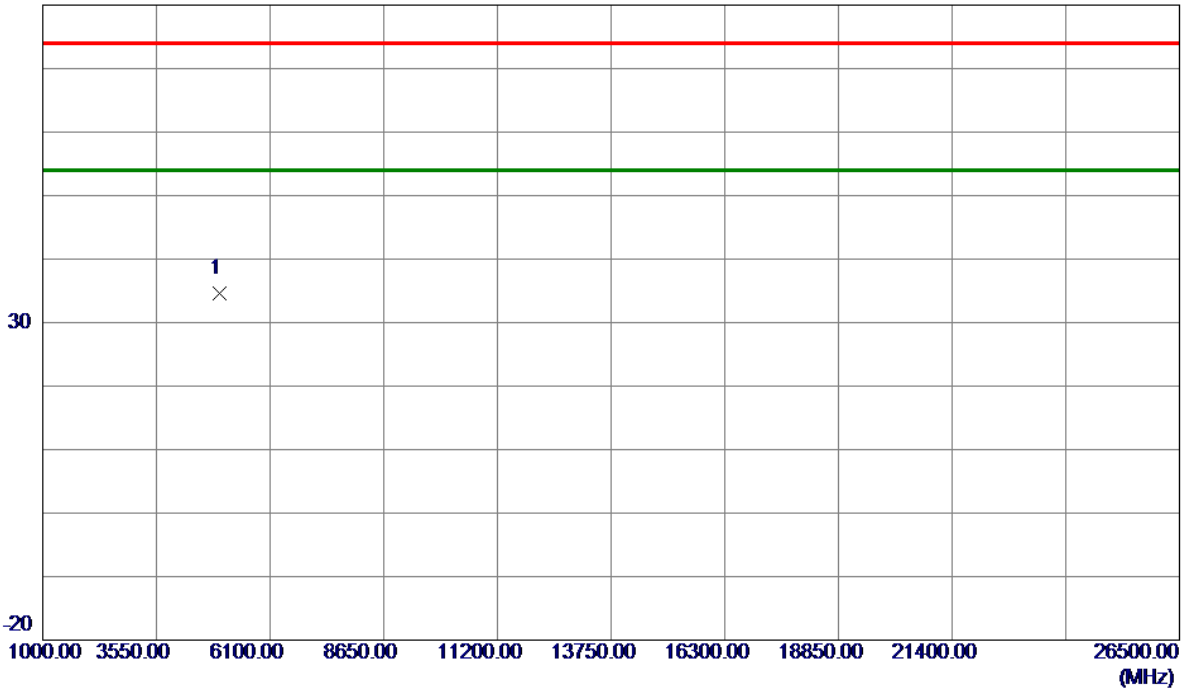
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2480.1450	55.28	30.93	86.21	74.00	12.21	Peak	No limit
2 *	2480.1450	53.79	30.93	84.72	54.00	30.72	AVG	No limit
3	2483.5000	24.48	30.94	55.42	74.00	-18.58	Peak	
4	2483.5000	8.61	30.94	39.55	54.00	-14.45	AVG	

**REMARKS:**

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

Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Horizontal
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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 *	4960.0000	51.28	-16.68	34.60	74.00	-39.40	Peak	

REMARKS:

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

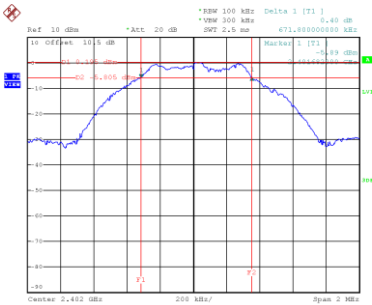
## APPENDIX E - BANDWIDTH



Test Mode	TX Mode_1Mbps
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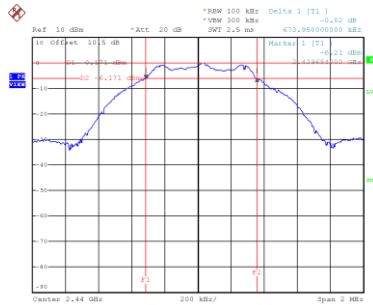
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	0.672	1.064	0.5	Pass
19	2440	0.674	1.056	0.5	Pass
39	2480	0.680	1.064	0.5	Pass

**CH00**



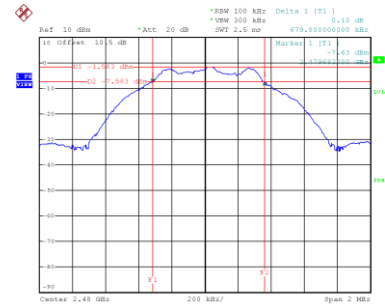
Date: 26\_MAY.2022 18:00:38

**CH19**  
6 dB Bandwidth



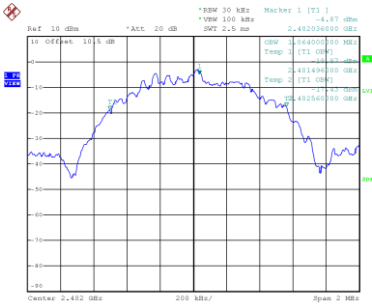
Date: 26\_MAY.2022 18:05:16

**CH39**

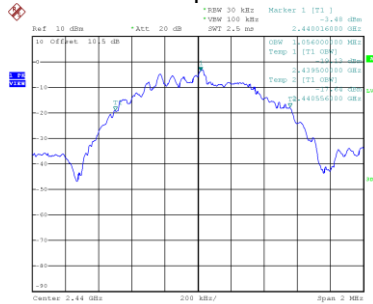


Date: 26\_MAY.2022 18:25:03

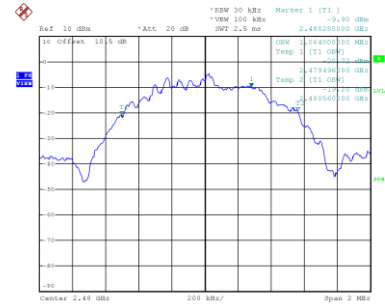
**99 % Occupied Bandwidth**



Date: 26\_MAY.2022 18:00:04



Date: 26\_MAY.2022 18:05:22

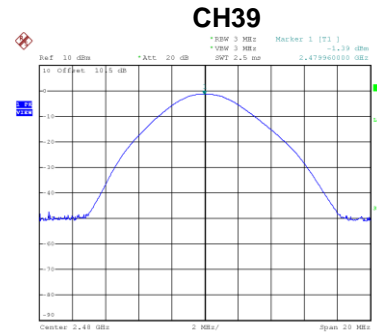
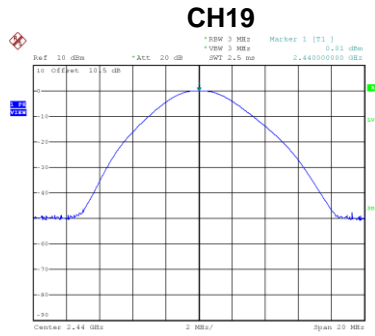
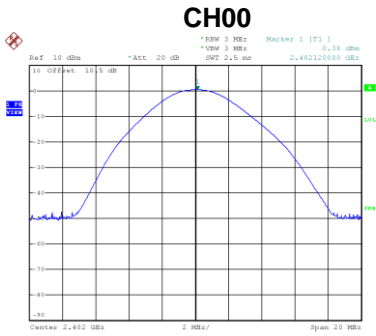


Date: 26\_MAY.2022 18:25:09

## APPENDIX F - MAXIMUM OUTPUT POWER

Test Mode	TX Mode_1Mbps
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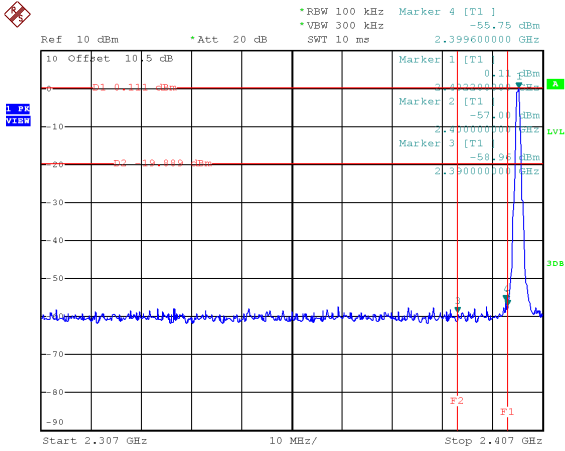
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	0.38	0.0011	30.00	1.0000	Pass
2440	0.01	0.0010	30.00	1.0000	Pass
2480	-1.39	0.0007	30.00	1.0000	Pass



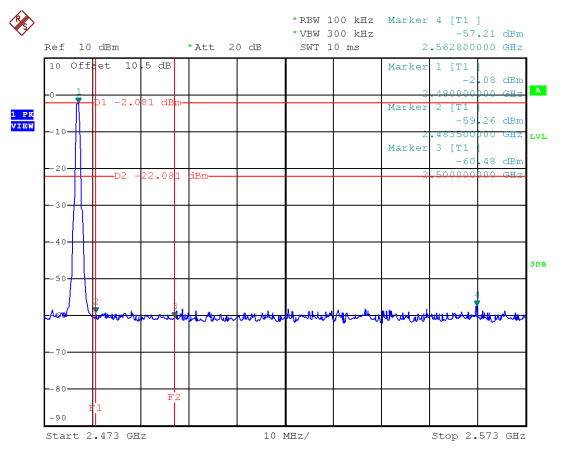
## **APPENDIX G - CONDUCTED SPURIOUS EMISSION**

Test Mode TX Mode\_1Mbps

### Bandedge CH00 (Lower)



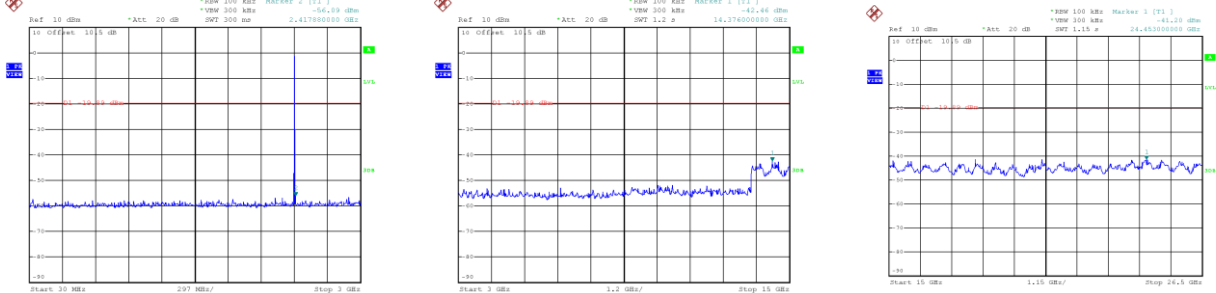
### Bandedge CH39 (Upper)



Date: 26.MAY.2022 18:00:46

Date: 26.MAY.2022 18:25:17

### CH00 – 10th Harmonic of the fundamental frequency

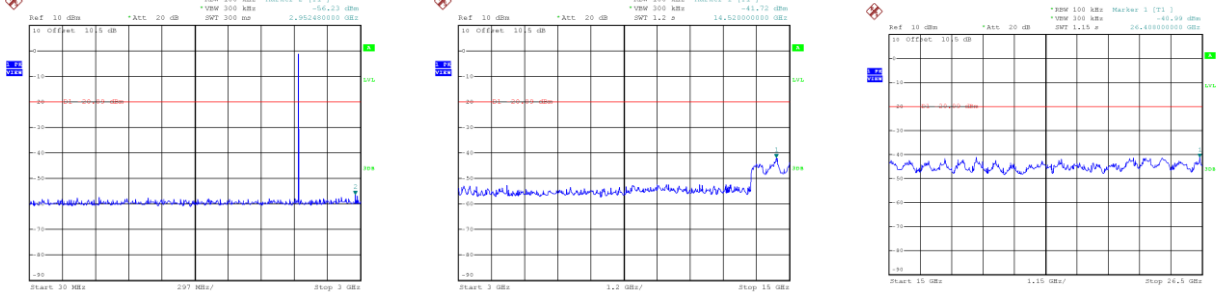


Date: 26.MAY.2022 18:00:59

Date: 26.MAY.2022 18:01:06

Date: 26.MAY.2022 18:01:13

### CH19 – 10th Harmonic of the fundamental frequency

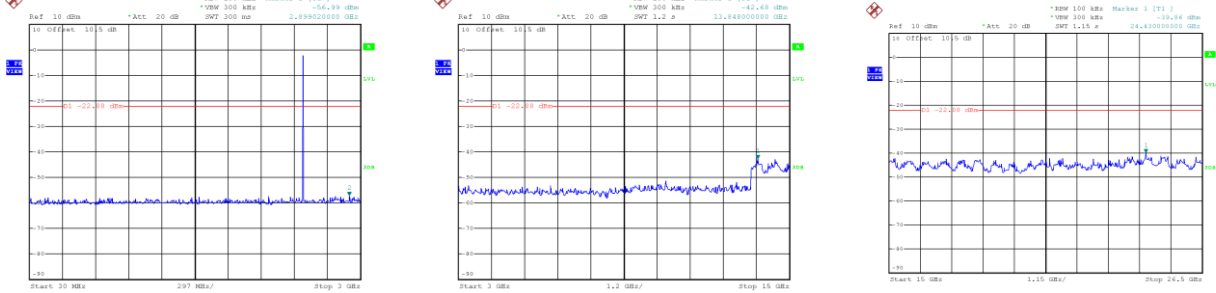


Date: 26.MAY.2022 18:00:42

Date: 26.MAY.2022 18:00:50

Date: 26.MAY.2022 18:00:57

### CH39 – 10th Harmonic of the fundamental frequency



Date: 26.MAY.2022 18:25:10

Date: 26.MAY.2022 18:25:17

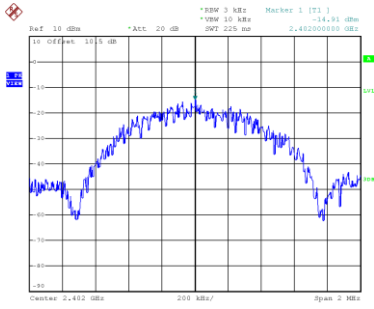
Date: 26.MAY.2022 18:25:44

## APPENDIX H - POWER SPECTRAL DENSITY

Test Mode	TX Mode_1Mbps
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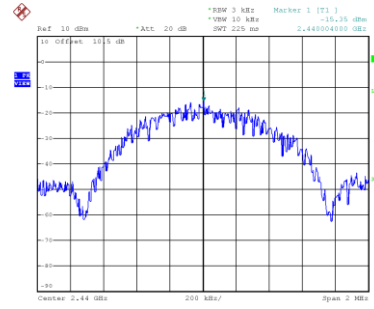
Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-14.91	8.00	Pass
19	2440	-15.35	8.00	Pass
39	2480	-17.00	8.00	Pass

**CH00**



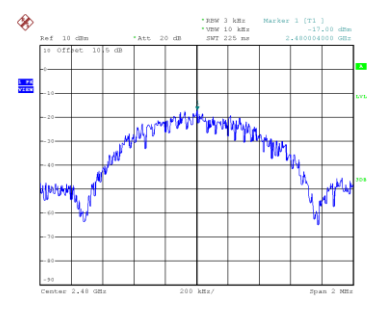
Date: 26.MAY.2022 18:01:19

**CH19**



Date: 26.MAY.2022 18:06:02

**CH39**



Date: 26.MAY.2022 18:25:50

**End of Test Report**