

<b>Product Name:</b> Wi-Fi&Bluetooth Module	<b>Report No:</b> FCC022022-5799RF5
<b>Product Model:</b> FC905A	<b>Security Classification:</b> Open
<b>Version:</b> V1.0	<b>Total Page:</b> 54

## TIRT Testing Report



<b>Prepared By:</b>	<b>Checked By:</b>	<b>Approved By:</b>	A circular blue ink stamp for TIRT Technology Service Co., Ltd. Shenzhen. The stamp contains the text "TIRT Technology Service Co., Ltd." around the perimeter, "TIRT Shenzhen" in the center, and a small asterisk at the bottom.
Stone Tang	Randy Lv	Daniel Chen	
Stone Tang	Randy Lv	Daniel chen	

# FCC Radio Test Report

## FCC ID: XMR202208FC905A

This report concerns: Original Grant

**Project No.** : 022022-5799  
**Equipment** : Wi-Fi&Bluetooth Module  
**Brand Name** : Quectel  
**Test Model** : FC905A  
**Series Model** : NA  
**Applicant** : Quectel Wireless Solutions Co., Ltd  
**Address** : Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233  
**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  
**Factory** : NA  
**Address** : NA  
**Date of Receipt** : Sep. 14, 2022  
**Date of Test** : Sep. 14, 2022~Nov. 01, 2022  
**Issued Date** : Nov. 12, 2022  
**Report Version** : V1.0  
**Test Sample** : Engineering Sample No.: 20221108019601  
**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 TIRT Inc.

- The test result referred exclusively to the presented test model /sample.
- Without written approval of TIRT Inc. the test report shall not reproduced except in full.

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen  
Add: 101, 3 # Factory Building, Gongjin Electronics, Shatin Community, Kengzi  
Street, Pingshan District, Shenzhen City, China

TEL: +86-0755-27087573

**Page****Table of Contents**

<b>REPORT ISSUED HISTORY</b>	<b>6</b>
<b>1 . SUMMARY OF TEST RESULTS</b>	<b>7</b>
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	9
<b>2 . GENERAL INFORMATION</b>	<b>10</b>
2.1 GENERAL DESCRIPTION OF EUT	10
2.2 DESCRIPTION OF TEST MODES	12
2.3 PARAMETERS OF TEST SOFTWARE	13
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	14
2.5 SUPPORT UNITS	14
<b>3 . AC POWER LINE CONDUCTED EMISSIONS</b>	<b>15</b>
3.1 LIMIT	15
3.2 TEST PROCEDURE	15
3.3 DEVIATION FROM TEST STANDARD	15
3.4 TEST SETUP	16
3.5 EUT OPERATING CONDITIONS	16
3.6 TEST RESULTS	16
<b>4 . RADIATED EMISSIONS</b>	<b>17</b>
4.1 LIMIT	17
4.2 TEST PROCEDURE	19
4.3 DEVIATION FROM TEST STANDARD	20
4.4 TEST SETUP	20
4.5 EUT OPERATING CONDITIONS	22
4.6 TEST RESULT - 9 KHZ TO 30 MHZ	22
4.7 TEST RESULT - 30 MHZ TO 1000 MHZ	22
4.8 TEST RESULT - ABOVE 1000 MHZ	22
<b>5 . BANDWIDTH</b>	<b>23</b>
5.1 LIMIT	23
5.2 TEST PROCEDURE	23
5.3 DEVIATION FROM STANDARD	23

**Page****Table of Contents**

5.4 TEST SETUP	23
5.5 EUT OPERATION CONDITIONS	23
5.6 TEST RESULTS	23
<b>6 . MAXIMUM OUTPUT POWER</b>	<b>24</b>
6.1 LIMIT	24
6.2 TEST PROCEDURE	24
6.3 DEVIATION FROM STANDARD	24
6.4 TEST SETUP	24
6.5 EUT OPERATION CONDITIONS	24
6.6 TEST RESULTS	24
<b>7 . CONDUCTED SPURIOUS EMISSION</b>	<b>25</b>
7.1 LIMIT	25
7.2 TEST PROCEDURE	25
7.3 DEVIATION FROM STANDARD	25
7.4 TEST SETUP	25
7.5 EUT OPERATION CONDITIONS	25
7.6 TEST RESULTS	25
<b>8 . POWER SPECTRAL DENSITY</b>	<b>26</b>
8.1 LIMIT	26
8.2 TEST PROCEDURE	26
8.3 DEVIATION FROM STANDARD	26
8.4 TEST SETUP	26
8.5 EUT OPERATION CONDITIONS	26
8.6 TEST RESULTS	26
<b>9 . MEASUREMENT INSTRUMENTS LIST</b>	<b>27</b>
<b>10 . EUT TEST PHOTO</b>	<b>28</b>
<b>APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS</b>	<b>29</b>
<b>APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ</b>	<b>32</b>
<b>APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ</b>	<b>33</b>
<b>APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ</b>	<b>36</b>

**Page****Table of Contents**

<b>APPENDIX E - BANDWIDTH</b>	<b>47</b>
<b>APPENDIX F - MAXIMUM OUTPUT POWER</b>	<b>49</b>
<b>APPENDIX G - CONDUCTED SPURIOUS EMISSION</b>	<b>51</b>
<b>APPENDIX H - POWER SPECTRAL DENSITY</b>	<b>53</b>

**REPORT ISSUED HISTORY**

Report No.	Version	Description	Issued Date	Note
FCC022022-5799RF5	V1.0	Original Report.	2022.11.12	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

Company:	Beijing TIRT Technology Service Co.,Ltd Shenzhen
Address:	101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China
CNAS Registration Number:	CNAS L14158
A2LA Registration Number:	6049.01
FCC Accredited Lab. Designation Number:	CN1309
FCC Test Firm Registration Number:	825524
Telephone:	+86-0755-27087573

## 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 TIRT measurement uncertainty as below table:

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 142.12$ KHz
RF power conducted	$\pm 0.74$ dB
RF power radiated	$\pm 3.25$ dB
Spurious emissions, conducted	$\pm 1.78$ dB
Spurious emissions, radiated (30MHz~1GHz)	$\pm 4.6$ dB
Spurious emissions, radiated (1GHz ~ 18GHz)	$\pm 4.9$ dB
Conduction Emissions(150kHz~30MHz)	$\pm 3.1$ dB
Humidity	$\pm 4.6\%$
Temperature	$\pm 0.7^{\circ}\text{C}$
Time	$\pm 1.25\%$

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	24°C	58%	AC 120V/60Hz	Stone Tang
Radiated Emissions-9kHz to 30 MHz	24°C	58%	AC 120V/60Hz	Stone Tang
Radiated Emissions-30MHz to 1000MHz	24°C	58%	AC 120V/60Hz	Stone Tang
Radiated Emissions-Above 1000MHz	24°C	58%	AC 120V/60Hz	Stone Tang
Bandwidth	24.3°C	54%	DC3.6V	Stone Tang
Maximum Output Power	24.3°C	54%	DC3.6V	Stone Tang
Conducted Spurious Emissions	24.3°C	54%	DC3.6V	Stone Tang
Power Spectral Density	24.3°C	54%	DC3.6V	Stone Tang

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wi-Fi&Bluetooth Module
Brand Name	Quectel
Test Model	FC905A
Series Model	NA
Model Difference(s)	NA
Software Version	NA
Hardware Version	R1.0
Power Source	DC voltage supplied from AC/DC adapter.
Power Rating	3.6V
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps
Max. Output Power	1Mbps: 5.81 dBm (0.0038 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	Dipole	N/A	0.52

## Note:

- 1) The antenna gain is provided by the manufacturer.
- 2) The antenna is for testing only and will not be sold with equipments.

## 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
Mode 2	TX Mode_1Mbps Channel 00

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

AC power line conducted emissions test	
Final Test Mode	Description
Mode 2	TX Mode_1Mbps Channel 00

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	TX Mode_1Mbps Channel 00

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

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

Note:

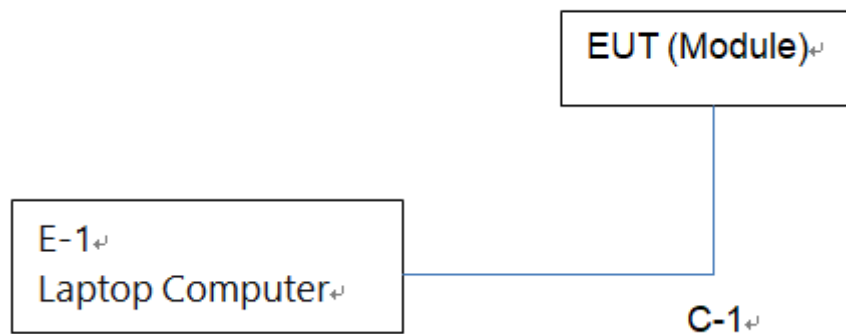
- (1) For radiated emission above 1 GHz test, the spurious points of 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.
- (2) For AC power line conducted emissions and radiated emissions below 1 GHz test, 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	Cybluetool		
Frequency (MHz)	2402	2440	2480
1Mbps	default	default	default

## 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



## 2.5 SUPPORT UNITS

Item	Equipment	Brand	Model/Type No.	Series No.
E-1	Laptop Computer	LENOVO	ThinkPad L450	--

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	USB	YES	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	6
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.

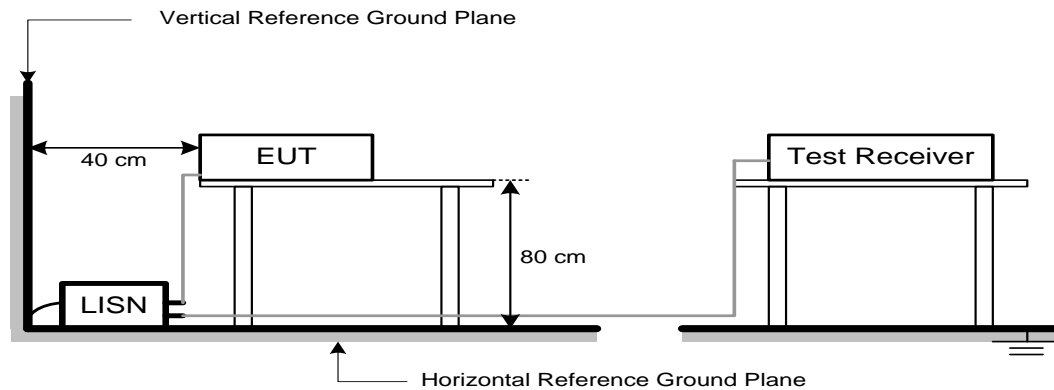
The following table is the setting of the receiver:

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

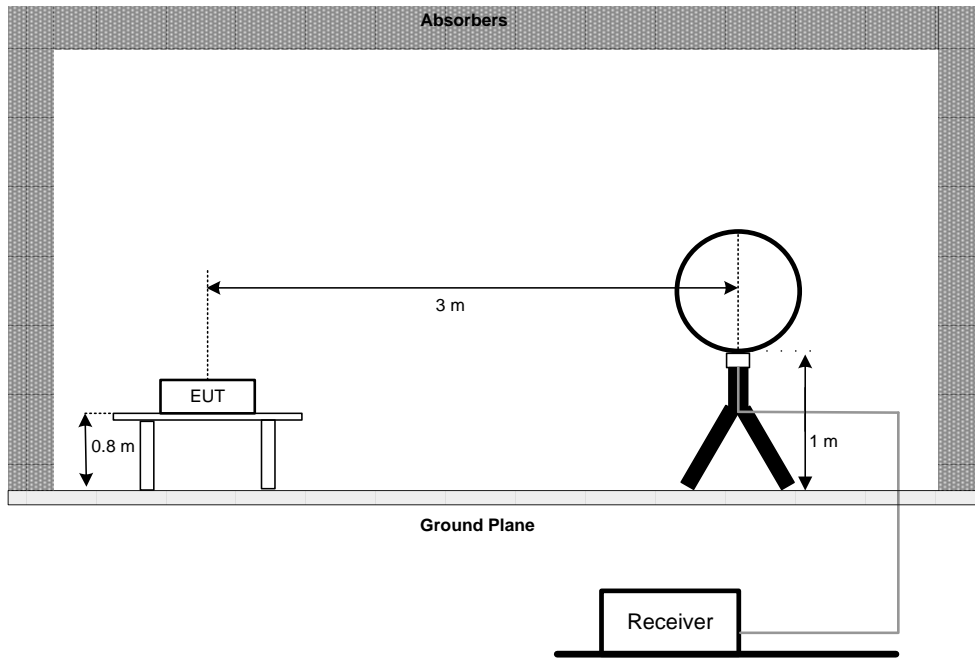
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector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

#### 4.3 DEVIATION FROM TEST STANDARD

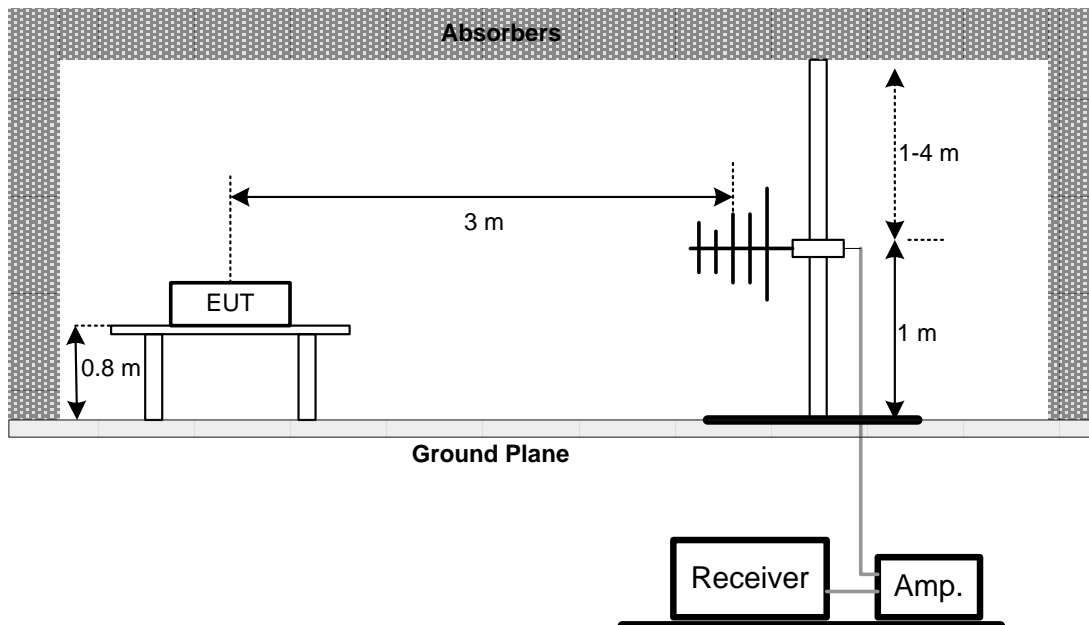
No deviation.

#### 4.4 TEST SETUP

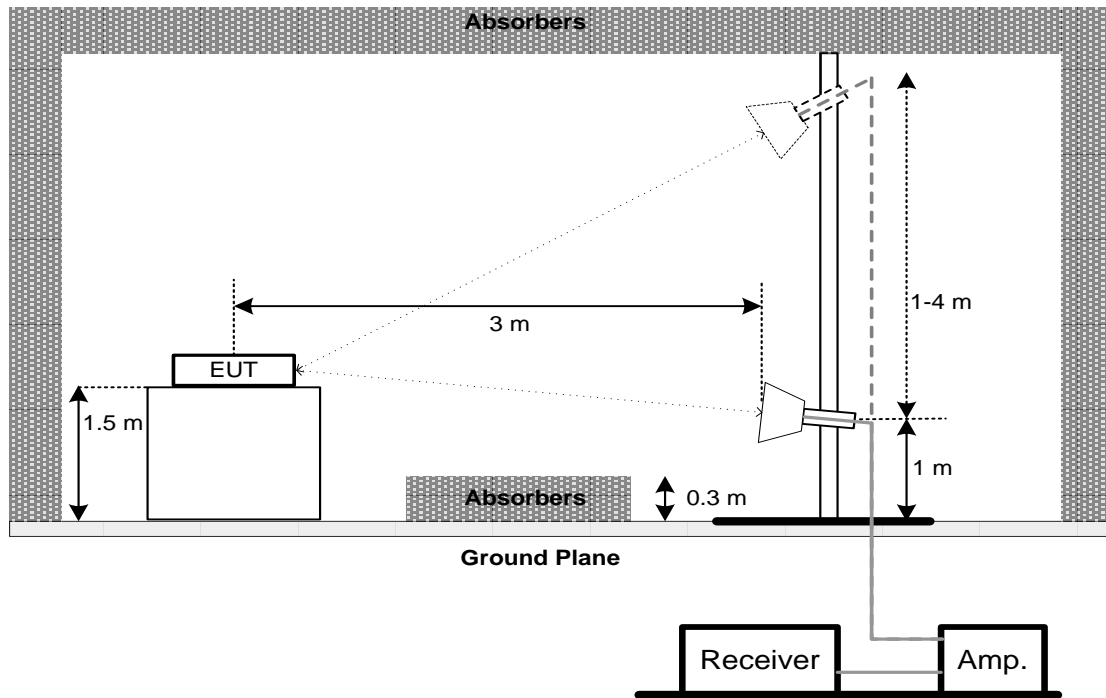
##### 9 kHz to 30 MHz



##### 30 MHz to 1 GHz



**Above 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

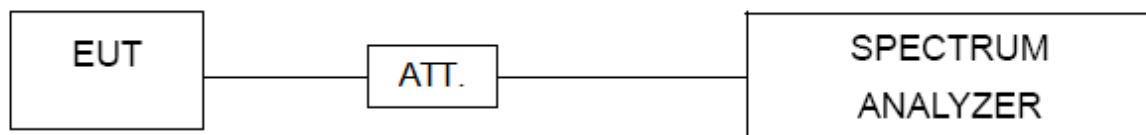
For 99% Emission Bandwidth:

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

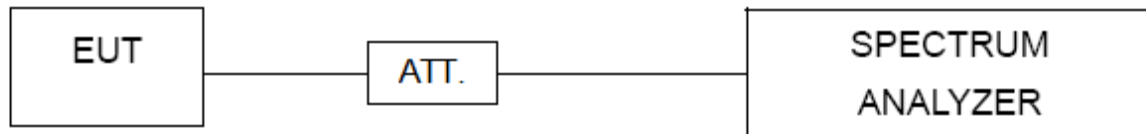
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

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

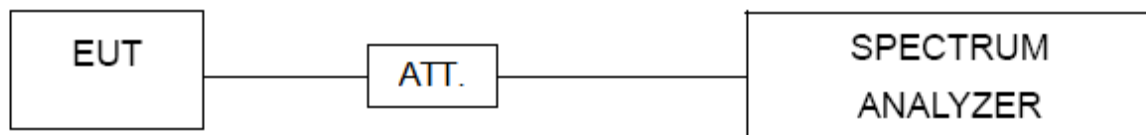
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

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

- 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:

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

No.	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Receiver	Rohde&Schwarz	ESCI	1166.5950.03	2022/11/09
2	AMN	Rohde&Schwarz	ENV216	3560.6550.05	2022/11/09
3	AMN	Schwarzbeck	NSLK8127	#829	2022/11/09
4	ECSI RF IN RF Cable	Rohde&Schwarz	RP-X1	N/A	2022/11/09
5	ECSI RF IN RF Cable	Rohde&Schwarz	Sapre sm	N/A	2022/11/09
6	EMI Receiver	Rohde&Schwarz	ESR7	102013	2022/11/09
7	Spectrum analyzer	Rohde&Schwarz	FSV30	103741	2022/11/09
8	Spectrum analyzer	KEYSIGHT	N9010A-44	MY51440158	2022/11/09
9	Log periodic antenna	Schwarzbeck	VULB 9163	VULB 9163-361	2022/11/20
10	Loop Antenna	Schwarzbeck	FMZB1519 B	00029	2023/07/03
11	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1201	2022/11/20
12	Horn Antenna	Schwarzbeck	BBHA 9170	9170#685	2022/11/20
13	Preamplifier	Schwarzbeck	BBV9745	#78	2022/11/09
14	Preamplifier	Schwarzbeck	BBV9721	9721-019	2022/11/09
15	Preamplifier	/	LNA 0920N	2014	2023/05/03
16	Preamplifier	Schwarzbeck	BBV 9718	284	2023/05/03
17	Preamplifier	RF System/UK	TRLA-0101 80G50B	22062101	2023/07/20
18	ECSI RF IN RF Cable	Rohde&Schwarz	AP-X1	N/A	2022/11/09
19	ECSI RF IN RF Cable	HAOXUN	Z-108	N/A	2022/11/09
20	RF Cable	ZDECL	ZT40-2.92J -2.92J-6M	18124358	2023/07/20
21	Spectrum Analyzer	Agilent	N9010A	MY51440158	2022/11/09
22	Spectrum Analyzer	Agilent	N9010A	MY52221119	2022/11/09
23	EMI Receiver	Rohde&Schwarz	ESU	100184	2023/07/20
24	Temp&Humidity Recorder	Anymetre	JR900	N/A	2022/11/03
25	Power Collection Unit	Tonscend	JS0806-2	188060134	2023/08/21
26	Temp&Humidity Chamber	ETOMA	NTH1100-3 0A	16080628	2022/11/03
27	Filter	STI	STI15-9845	N/A	N/A
28	Filter	STI	5.1G	N/A	N/A
29	Filter	STI	STI15-9845	N/A	N/A
30	Testing Software	EZ-EMC	TW-03A2	N/A	N/A

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

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

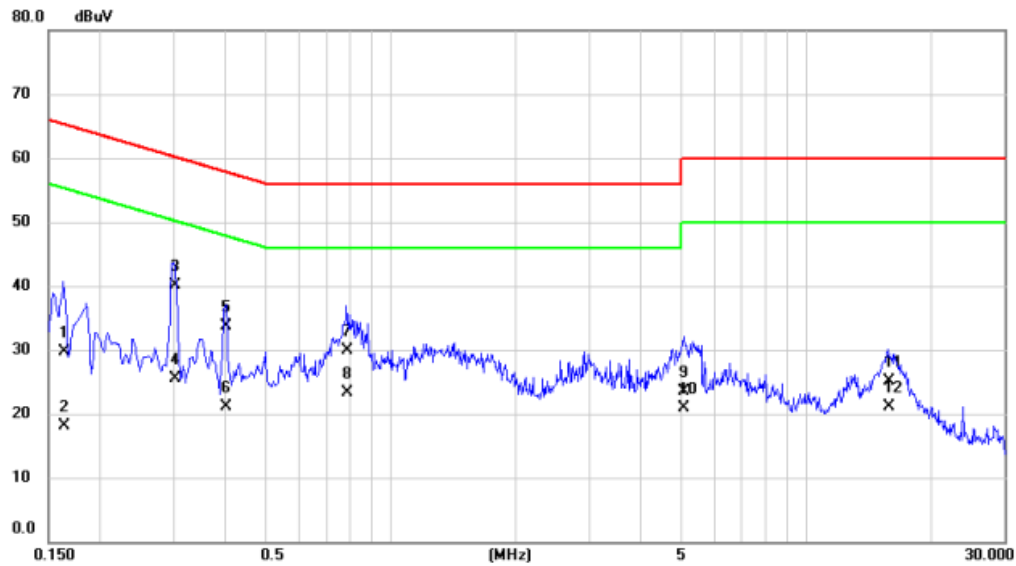
Except \* item, all calibration period of equipment list is one year.

**10. EUT TEST PHOTO**

Please refer to the Appendix TEST PHOTOS .

## APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

Test Mode	TX Mode_1Mbps Channel 00	Phase	Line
-----------	--------------------------	-------	------

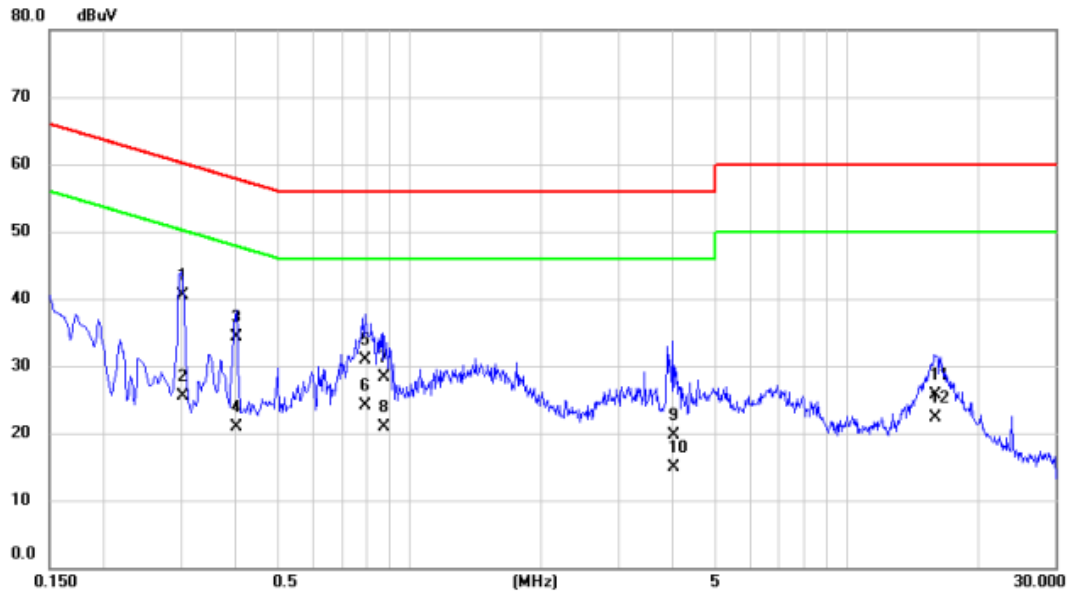


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1635	10.48	19.30	29.78	65.28	-35.50	QP	
2	0.1635	-1.22	19.30	18.08	55.28	-37.20	AVG	
3 *	0.3030	20.77	19.32	40.09	60.16	-20.07	QP	
4	0.3030	6.17	19.32	25.49	50.16	-24.67	AVG	
5	0.4020	14.35	19.33	33.68	57.81	-24.13	QP	
6	0.4020	1.85	19.33	21.18	47.81	-26.63	AVG	
7	0.7845	10.35	19.46	29.81	56.00	-26.19	QP	
8	0.7845	3.85	19.46	23.31	46.00	-22.69	AVG	
9	5.0820	2.87	20.62	23.49	60.00	-36.51	QP	
10	5.0820	0.37	20.62	20.99	50.00	-29.01	AVG	
11	15.7920	4.01	21.13	25.14	60.00	-34.86	QP	
12	15.7920	0.01	21.13	21.14	50.00	-28.86	AVG	

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.
- (3) The test result has included the cable loss.

Test Mode	TX Mode_1Mbps Channel 00	Phase	Neutral
-----------	--------------------------	-------	---------



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1 *	0.3030	20.98	19.50	40.48	60.16	-19.68	QP	
2	0.3030	5.98	19.50	25.48	50.16	-24.68	AVG	
3	0.4020	14.86	19.52	34.38	57.81	-23.43	QP	
4	0.4020	1.46	19.52	20.98	47.81	-26.83	AVG	
5	0.7935	11.23	19.68	30.91	56.00	-25.09	QP	
6	0.7935	4.33	19.68	24.01	46.00	-21.99	AVG	
7	0.8745	8.60	19.72	28.32	56.00	-27.68	QP	
8	0.8745	1.10	19.72	20.82	46.00	-25.18	AVG	
9	4.0200	-0.82	20.50	19.68	56.00	-36.32	QP	
10	4.0200	-5.52	20.50	14.98	46.00	-31.02	AVG	
11	15.8955	4.76	21.02	25.78	60.00	-34.22	QP	
12	15.8955	1.26	21.02	22.28	50.00	-27.72	AVG	

# REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.
- (3) The test result has included the cable loss.

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

Radiated emission: 9KHz-30MHz

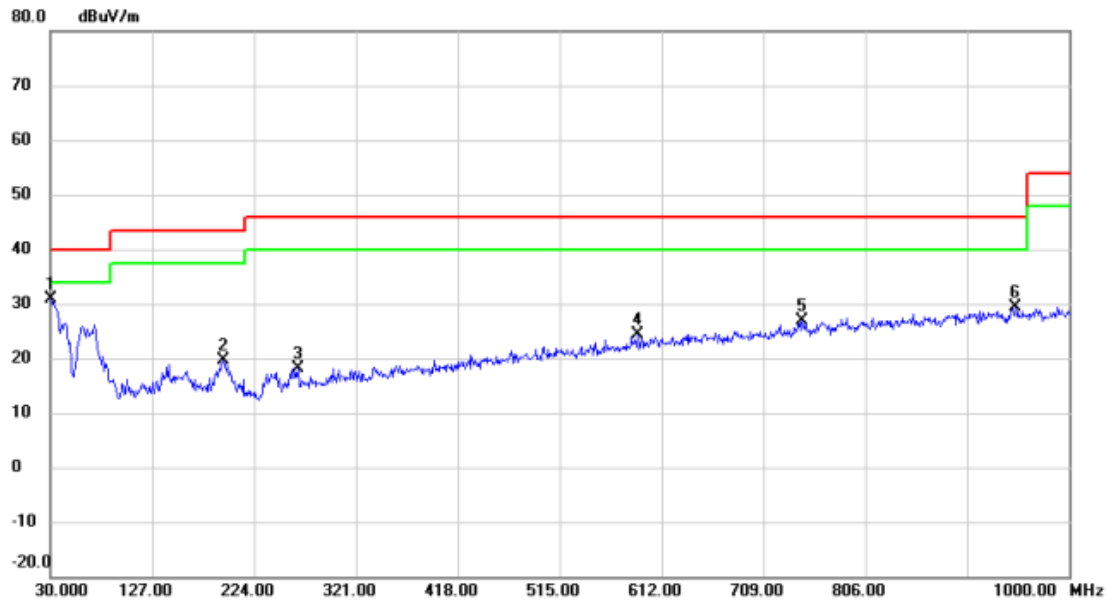
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.



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

Test Mode	TX Mode_1Mbps Channel 00	Polarization	Vertical
-----------	--------------------------	--------------	----------

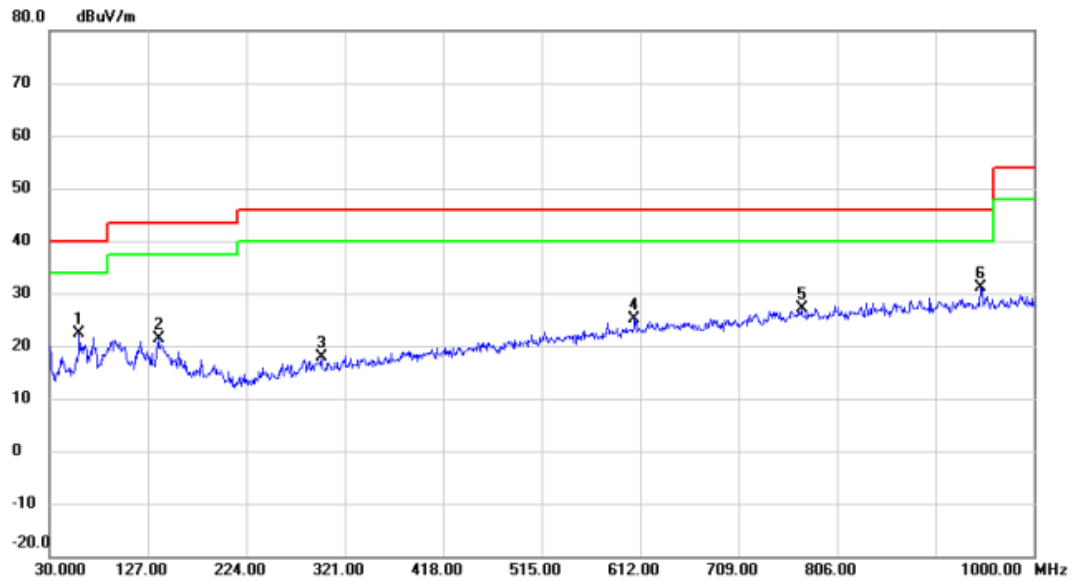


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	30.0000	50.49	-19.55	30.94	40.00	-9.06	peak	
2		195.3850	38.02	-18.45	19.57	43.50	-23.93	peak	
3		265.7100	34.24	-16.08	18.16	46.00	-27.84	peak	
4		588.7200	33.12	-8.75	24.37	46.00	-21.63	peak	
5		746.3450	33.03	-6.25	26.78	46.00	-19.22	peak	
6		948.5900	33.68	-4.38	29.30	46.00	-16.70	peak	

# REMARKS:

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

Test Mode	TX Mode_1Mbps Channel 00	Polarization	Horizontal
-----------	--------------------------	--------------	------------



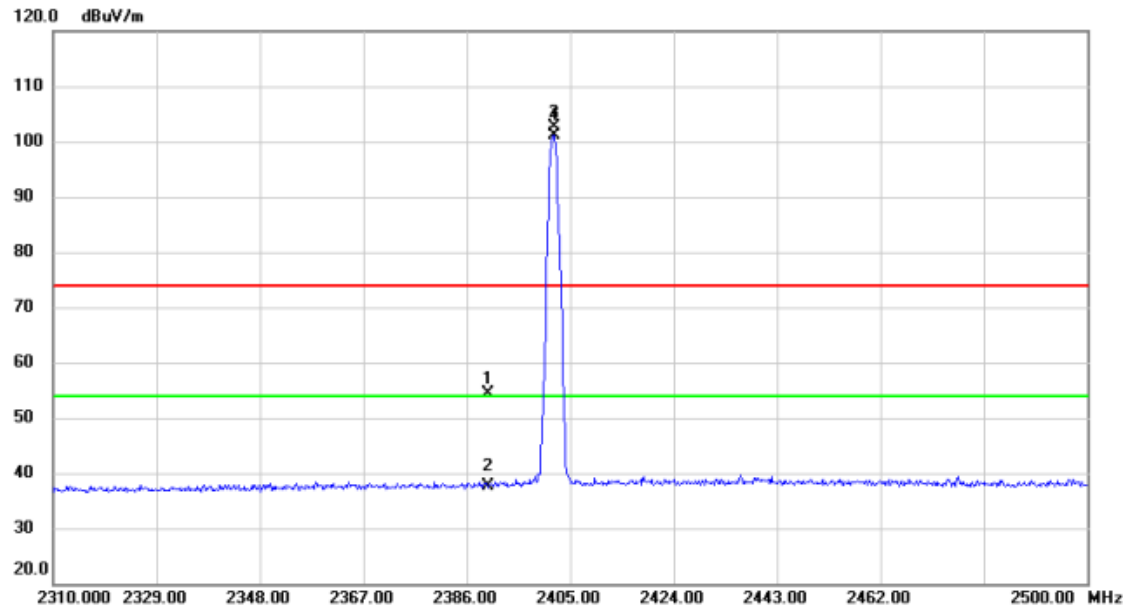
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	59.5850	40.21	-17.76	22.45	40.00	-17.55	peak	
2	137.6700	37.90	-16.62	21.28	43.50	-22.22	peak	
3	297.7200	32.78	-14.98	17.80	46.00	-28.20	peak	
4	606.1800	33.58	-8.33	25.25	46.00	-20.75	peak	
5	771.5650	33.05	-6.04	27.01	46.00	-18.99	peak	
6 *	948.1050	35.44	-4.37	31.07	46.00	-14.93	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
-----------	-------------------------	--------------	----------



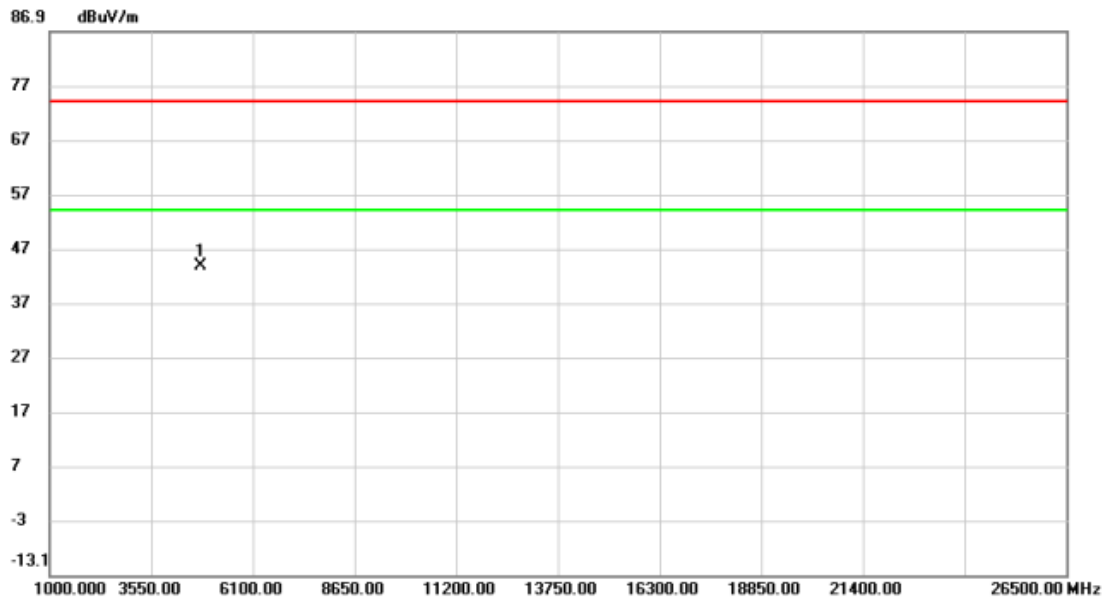
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	21.74	32.63	54.37	74.00	-19.63	peak	
2		2390.000	5.06	32.63	37.69	54.00	-16.31	AVG	
3	X	2401.960	69.97	32.67	102.64	74.00	28.64	peak	No limit
4	*	2401.960	68.53	32.67	101.20	54.00	47.20	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
-----------	-------------------------	--------------	----------

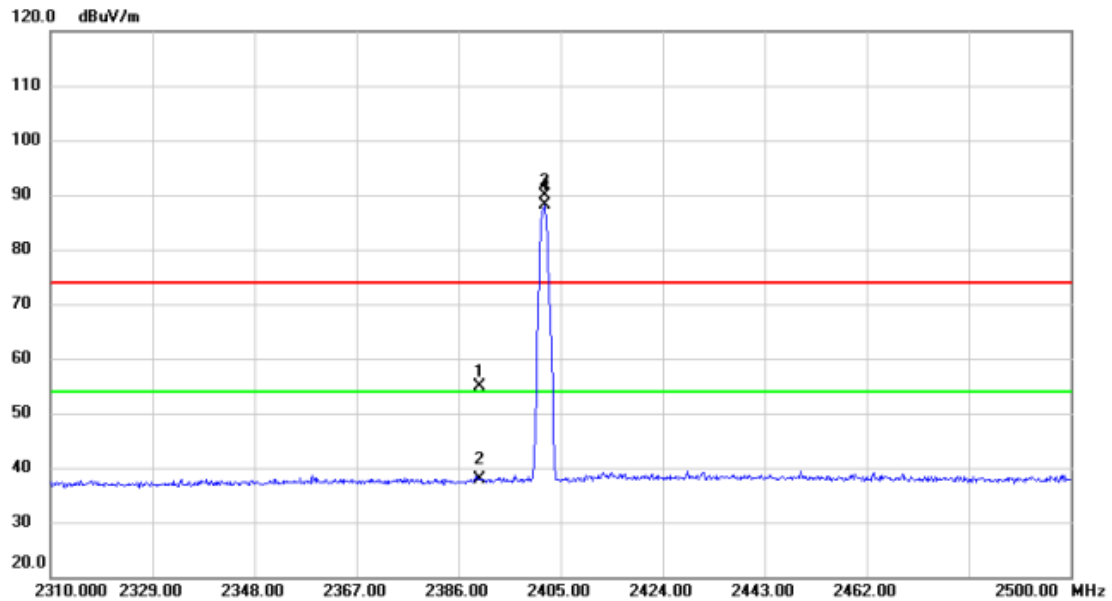


No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4804.000	58.25	-14.49	43.76	74.00	-30.24	peak	

# REMARKS:

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

Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Horizontal
-----------	-------------------------	--------------	------------

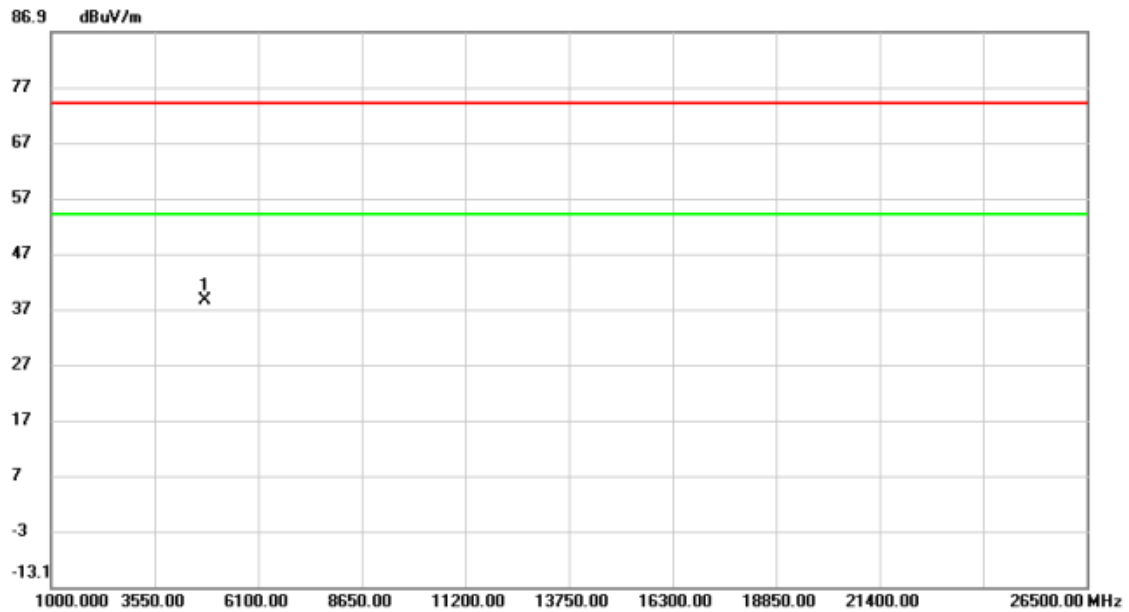


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.000	22.22	32.63	54.85	74.00	-19.15	peak	
2	2390.000	5.14	32.63	37.77	54.00	-16.23	AVG	
3 X	2402.055	57.11	32.67	89.78	74.00	15.78	peak	No limit
4 *	2402.055	55.53	32.67	88.20	54.00	34.20	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
-----------	-------------------------	--------------	------------



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4803.325	52.93	-14.49	38.44	74.00	-35.56	peak	

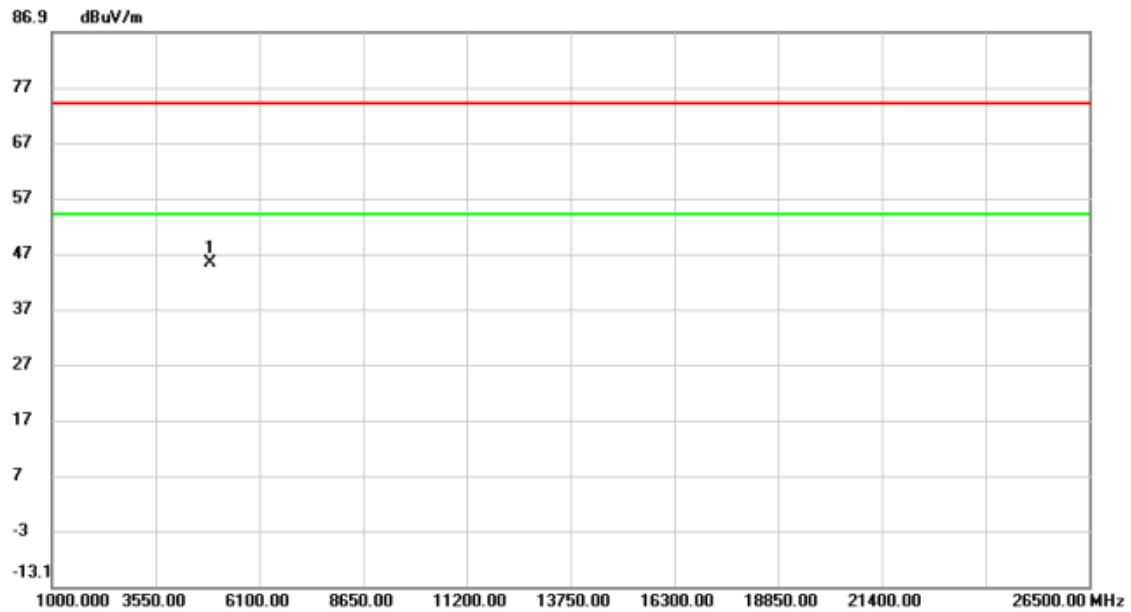
# REMARKS:

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

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



Test Mode	TX 2440 MHz _CH19_1Mbps	Polarization	Vertical
-----------	-------------------------	--------------	----------

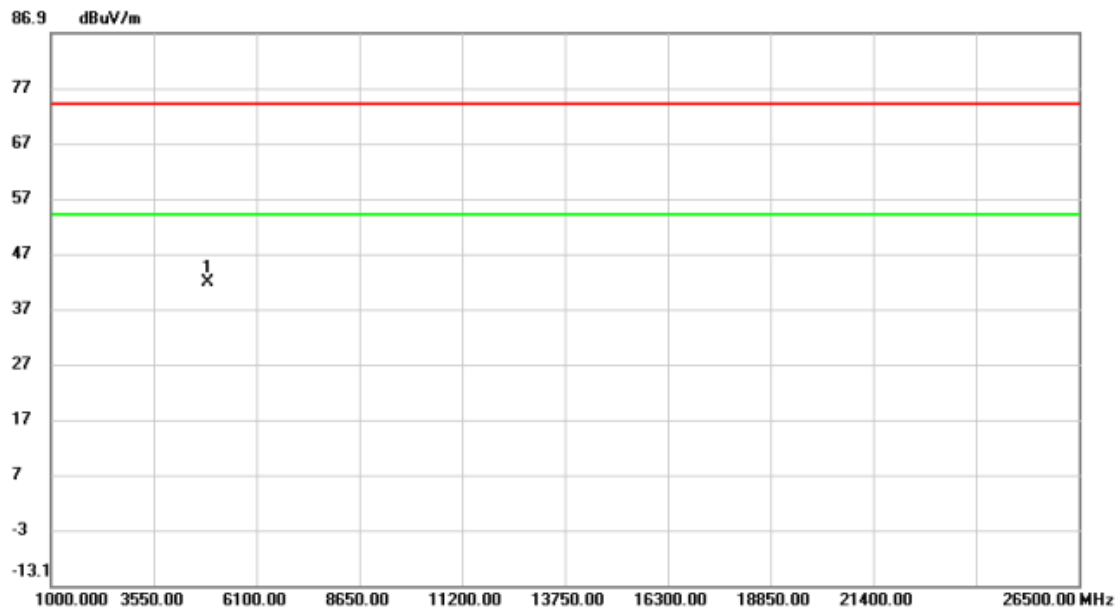


No. Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	4879.825	59.56	-14.23	45.33	74.00	-28.67	peak	

# REMARKS:

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

Test Mode	TX 2440 MHz _CH19_1Mbps	Polarization	Horizontal
-----------	-------------------------	--------------	------------

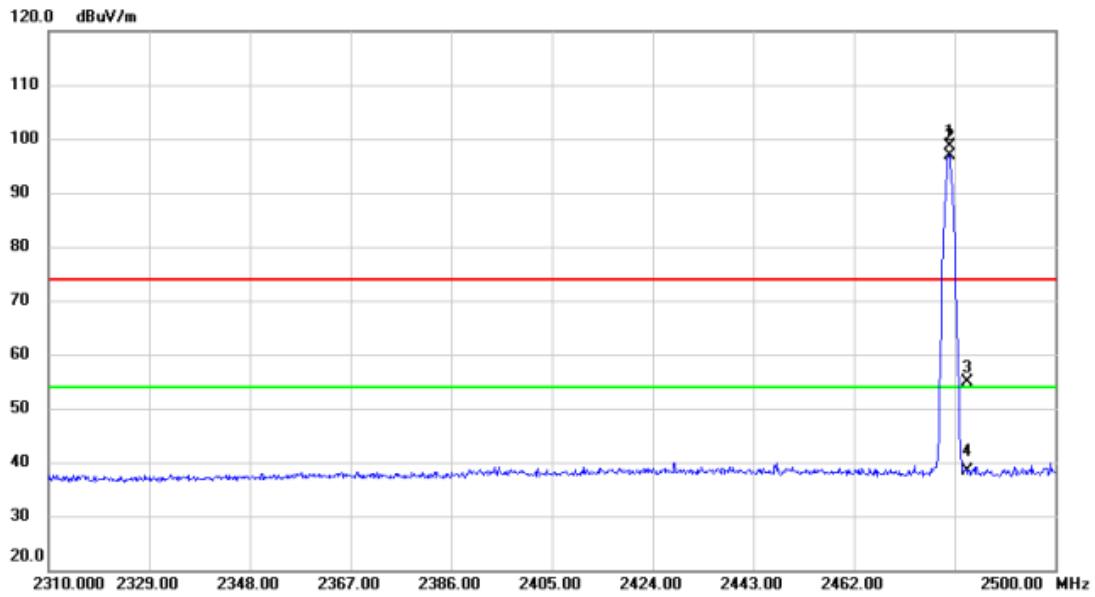


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4879.825	55.89	-14.23	41.66	74.00	-32.34	peak	

# REMARKS:

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

Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical
-----------	-------------------------	--------------	----------

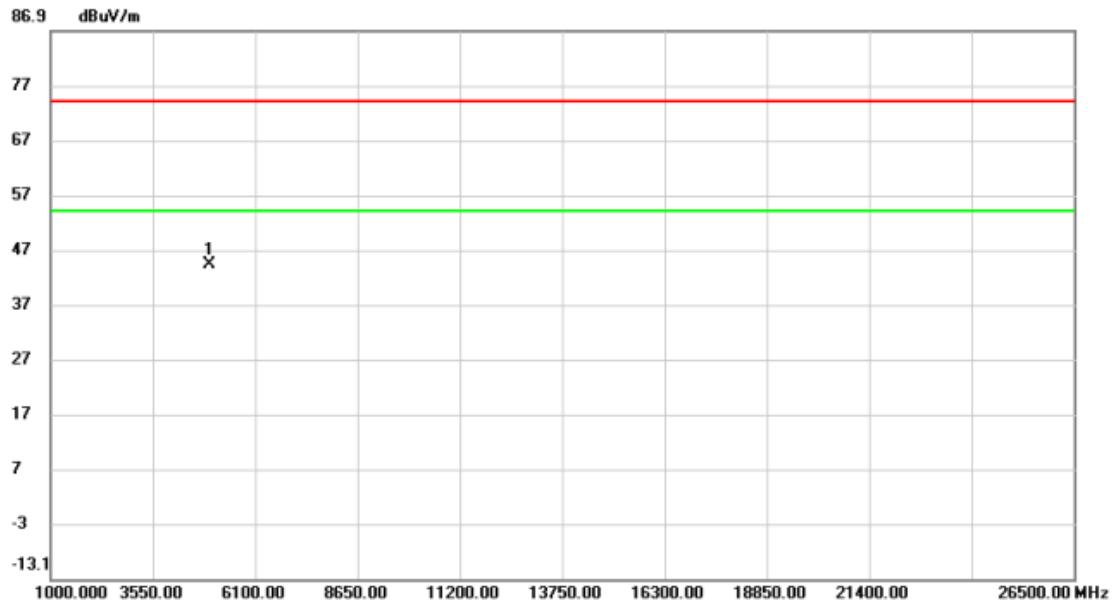


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.050	65.60	32.96	98.56	74.00	24.56	peak	No limit
2	*	2480.050	63.94	32.96	96.90	54.00	42.90	AVG	No limit
3		2483.500	21.97	32.97	54.94	74.00	-19.06	peak	
4		2483.500	5.29	32.97	38.26	54.00	-15.74	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
-----------	-------------------------	--------------	----------

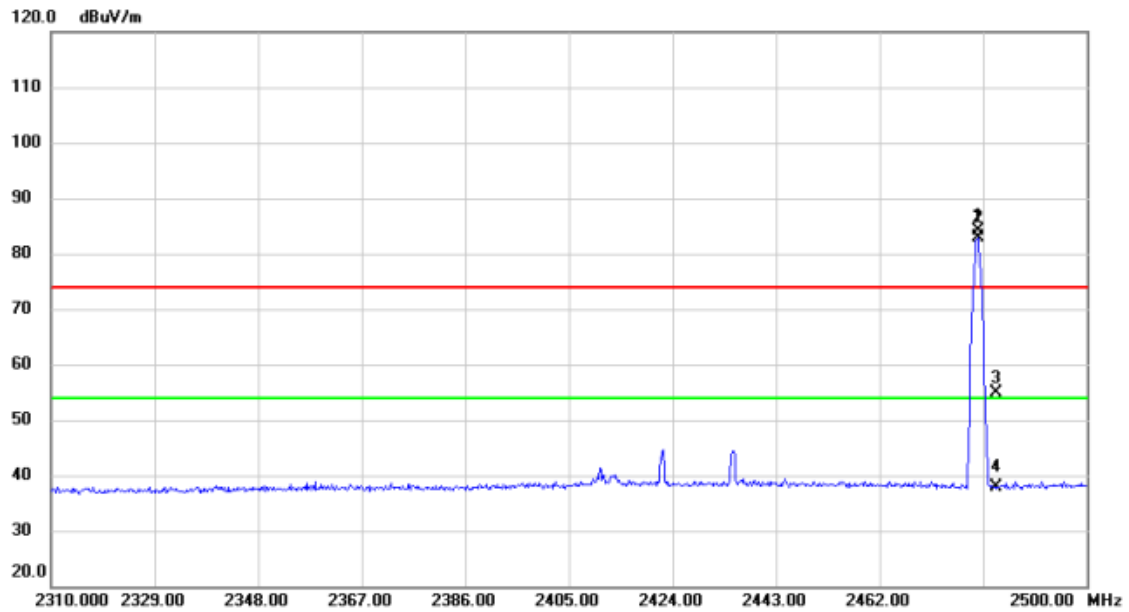


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4961.425	58.24	-13.95	44.29	74.00	-29.71	peak	

# REMARKS:

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

Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Horizontal
-----------	-------------------------	--------------	------------

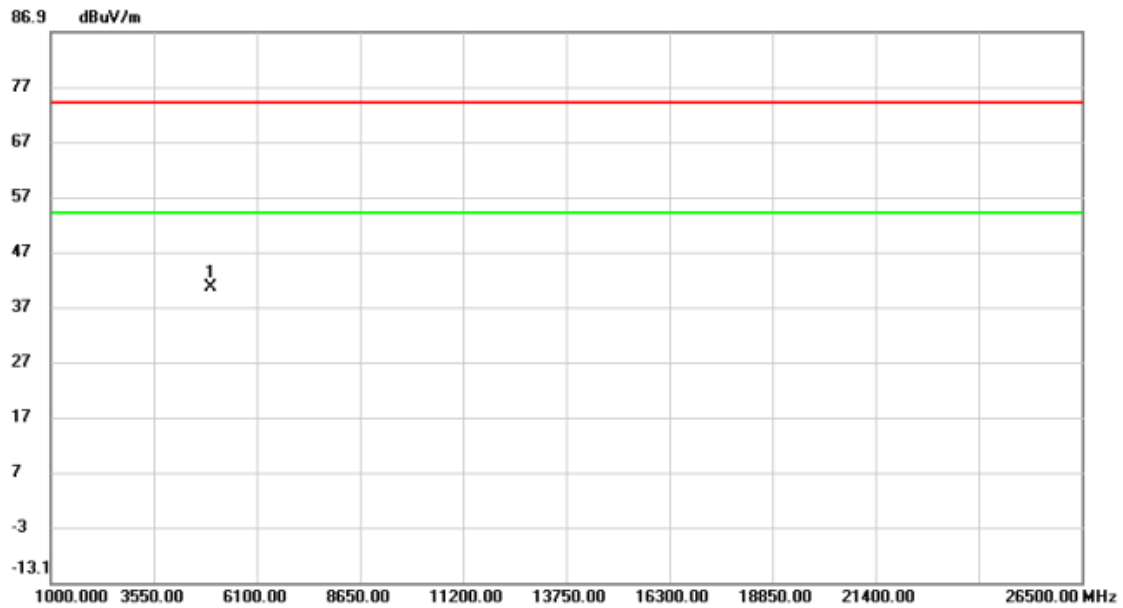


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2480.050	51.29	32.96	84.25	74.00	10.25	peak	No limit
2	*	2480.050	49.88	32.96	82.84	54.00	28.84	AVG	No limit
3		2483.500	21.95	32.97	54.92	74.00	-19.08	peak	
4		2483.500	4.90	32.97	37.87	54.00	-16.13	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
-----------	-------------------------	--------------	------------



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4960.000	54.59	-13.95	40.64	74.00	-33.36	peak	

# REMARKS:

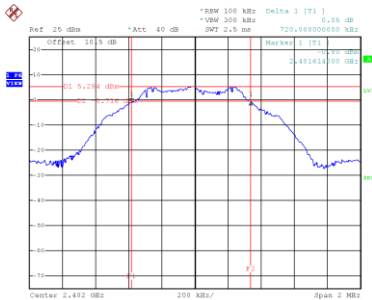
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

## APPENDIX E - BANDWIDTH

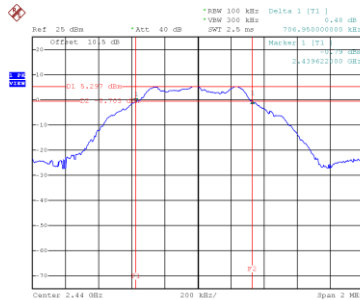
Test Mode	TX Mode _1Mbps
-----------	----------------

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	0.720	1.056	0.5	Pass
19	2440	0.707	1.060	0.5	Pass
39	2480	0.700	1.064	0.5	Pass

CH00

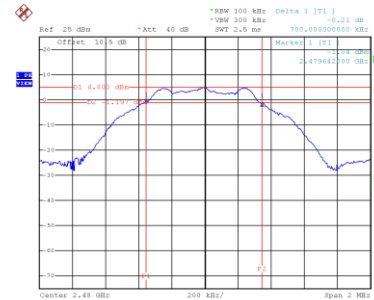


Date: 22.08P.2022 15:12:40

CH19  
6 dB Bandwidth


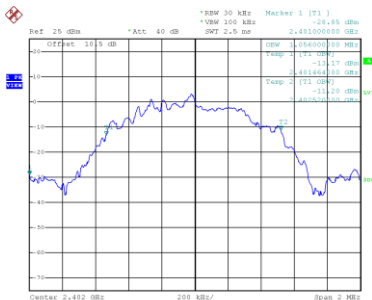
Date: 22.08P.2022 15:16:10

CH39

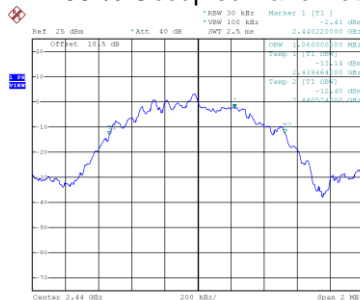


Date: 22.08P.2022 15:18:03

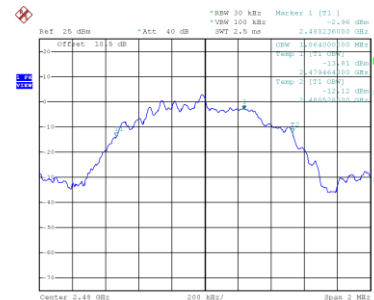
99 % Occupied Bandwidth



Date: 22.08P.2022 15:12:06



Date: 22.08P.2022 15:16:16



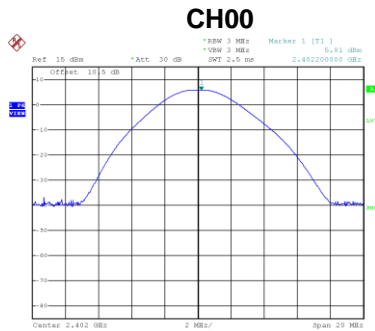
Date: 22.08P.2022 15:18:10



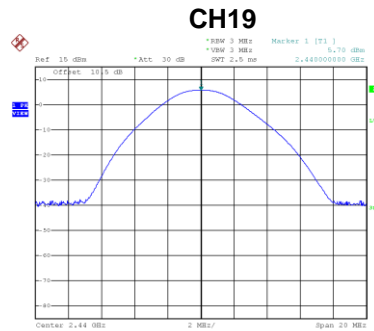
## APPENDIX F - MAXIMUM OUTPUT POWER

Test Mode	TX Mode _1Mbps
-----------	----------------

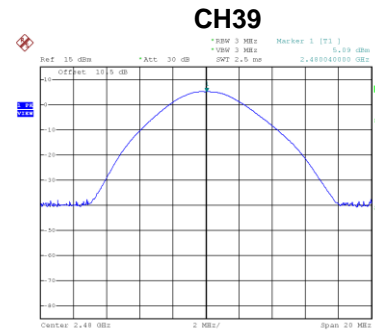
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.81	0.0038	30.00	1.0000	Pass
2440	5.70	0.0037	30.00	1.0000	Pass
2480	5.09	0.0032	30.00	1.0000	Pass



Date: 19.SEP.2022 16:20:16



Date: 19.SEP.2022 16:22:02



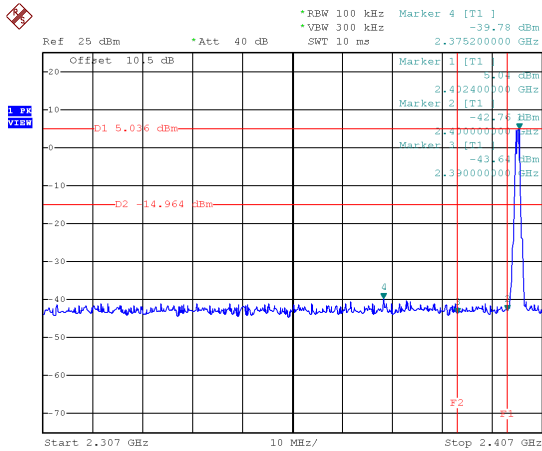
Date: 19.SEP.2022 16:22:43

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

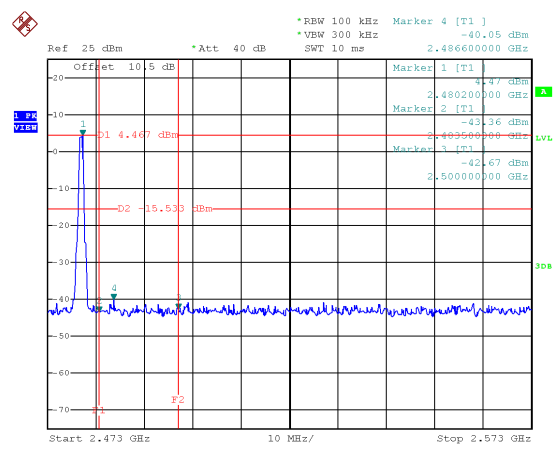
Test Mode

TX Mode \_1Mbps

### Bandedge CH00 (Lower)



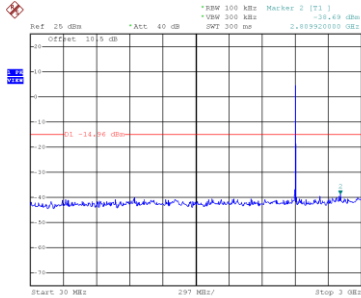
### Bandedge CH39 (Upper)



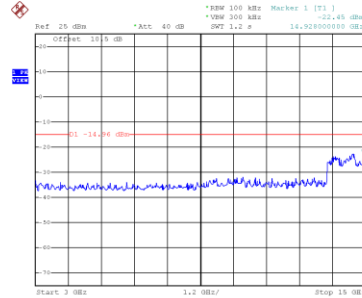
Date: 22.SEP.2022 15:12:48

Date: 22.SEP.2022 15:18:18

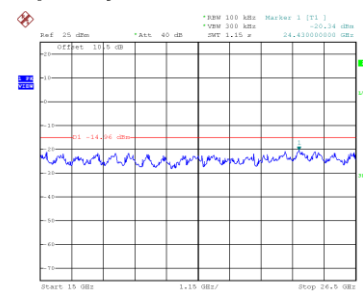
### CH00 – 10th Harmonic of the fundamental frequency



Date: 22.SEP.2022 15:13:01

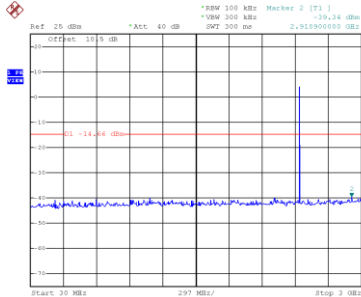


Date: 22.SEP.2022 15:13:09

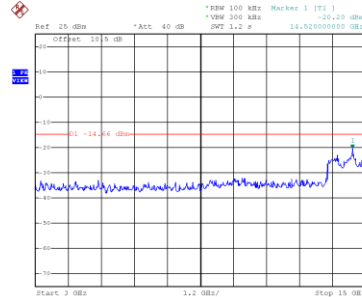


Date: 22.SEP.2022 15:13:17

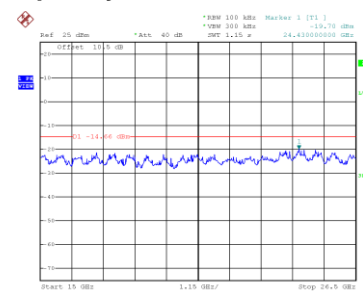
### CH19 – 10th Harmonic of the fundamental frequency



Date: 22.SEP.2022 15:16:38

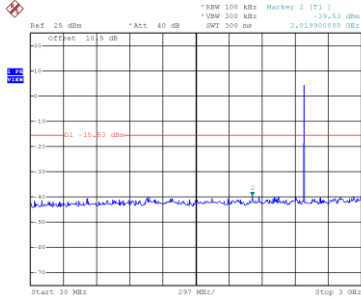


Date: 22.SEP.2022 15:16:45

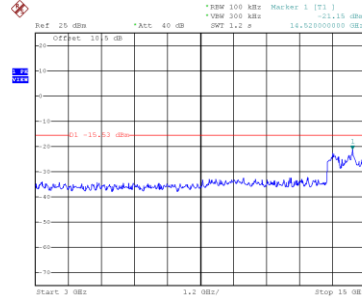


Date: 22.SEP.2022 15:16:53

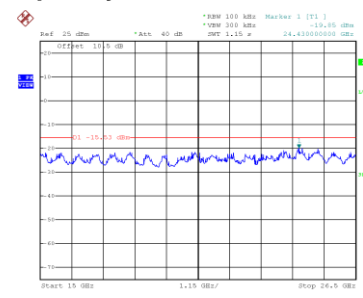
### CH39 – 10th Harmonic of the fundamental frequency



Date: 22.SEP.2022 15:18:31



Date: 22.SEP.2022 15:18:39



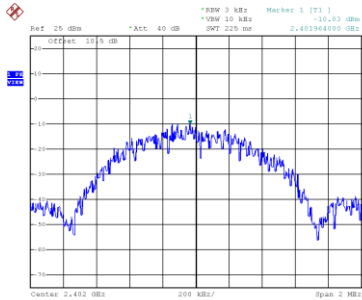
Date: 22.SEP.2022 15:18:47

## APPENDIX H - POWER SPECTRAL DENSITY

Test Mode	TX Mode _1Mbps
-----------	----------------

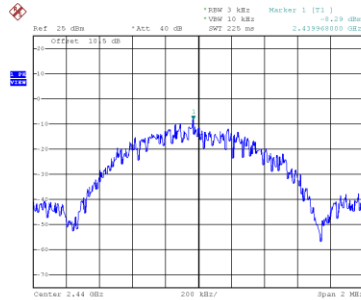
Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-10.03	8.00	Pass
19	2440	-8.29	8.00	Pass
39	2480	-9.01	8.00	Pass

CH00



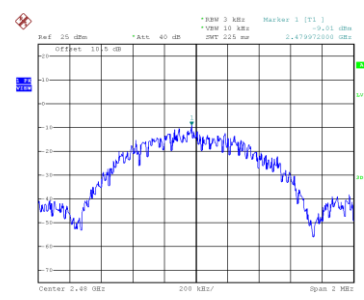
Date: 22.8BP.2022 15:13:23

CH19



Date: 22.8BP.2022 15:16:59

CH39



Date: 22.8BP.2022 15:18:53

End of Test Report