

# FCC Radio Test Report

## FCC ID: 2APPZ-V65

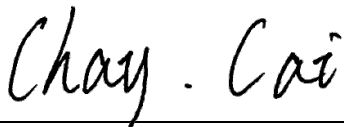
This report concerns: Original Grant

**Project No.** : 2204C250  
**Equipment** : IP Phone  
**Brand Name** : Fanvil  
**Test Model** : V65  
**Series Model** : N/A  
**Applicant** : Fanvil Technology Co., Ltd  
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North 2nd Road, Bao'an District, Shenzhen, China  
**Date of Receipt** : Apr. 28, 2022  
**Date of Test** : May 05, 2022 ~ Aug. 10, 2022  
**Issued Date** : Aug. 16, 2022  
**Report Version** : R00  
**Test Sample** : Engineering Sample No.: DG202204296 for AC Power Line Conducted  
Emissions, DG202204297 for others.  
**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.



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TESTING CERT #5123.02

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**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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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-2-2204C250	R00	Original Report.	Aug. 16, 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	N/A	-----
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. 3 Jinshagang 1st Rd. Shixia, Dalang Town Dongguan City, Guangdong 523792 People's Republic of China.

BTL's Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

## 1.2 MEASUREMENT UNCERTAINTY

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

The BTL measurement uncertainty as below table:

### A. AC power line conducted emissions Measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.60

### B. Radiated emissions Measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB01	CISPR	9kHz ~ 30MHz	2.36

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03 (3m)	CISPR	30MHz ~ 200MHz	V	4.36
		30MHz ~ 200MHz	H	3.32
		200MHz ~ 1,000MHz	V	4.08
		200MHz ~ 1,000MHz	H	3.96

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (3m)	CISPR	1GHz ~ 6GHz	3.80
		6GHz ~ 18GHz	4.82

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (1m)	CISPR	18 ~ 26.5 GHz	3.62
		26.5 ~ 40 GHz	4.00



## C. 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
Humidity	±1.5%

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

**1.3 TEST ENVIRONMENT CONDITIONS**

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	22°C	51%	AC 120V/60Hz	Jeter Wang
Radiated Emissions-9 kHz to 30 MHz	25°C	55%	DC 5V	Farun Liang
Radiated Emissions-30 MHz to 1000 MHz	26°C	56%	DC 5V	Meers Zhang
Radiated Emissions-Above 1000 MHz	23°C	58%	DC 5V	Meers Zhang
Bandwidth	28°C	56%	DC 5V	Ansel Yang
Maximum Output Power	28°C	56%	DC 5V	Ansel Yang
Conducted Spurious Emission	28°C	56%	DC 5V	Ansel Yang
Power Spectral Density	28°C	56%	DC 5V	Ansel Yang

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	IP Phone
Brand Name	Fanvil
Test Model	V65
Series Model	N/A
Model Difference(s)	N/A
Power Source	1# DC voltage supplied from AC adapter. (Supports Unit) 2# Supplied from PoE.
Power Rating	1# I/P: 100-240V~50/60Hz 0.3A O/P: 5.0V $\overline{=}$ 2.0A 2# PoE 48V
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Max. Output Power	2Mbps: 5.05 dBm (0.0032 W)

Note:

- 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.	Manufacturer	P/N	Antenna Type	Connector	Gain (dBi)
1	Dongguan YiJia Electronics Communication Technology Co.,Ltd.	YJL01.106.031. 303A	FPC	N/A	5.2

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
Mode 2	TX Mode_2Mbps Channel 00/19/39
Mode 3	TX Mode_2Mbps Channel 19

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 3	TX Mode_2Mbps Channel 19

<b>Radiated emissions test - Below 1GHz</b>	
Final Test Mode	Description
Mode 3	TX Mode_2Mbps Channel 19

<b>Radiated emissions test - Above 1GHz</b>	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/19/39
Mode 2	TX Mode_2Mbps Channel 00/19/39

<b>Conducted test</b>	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/19/39
Mode 2	TX Mode_2Mbps Channel 00/19/39

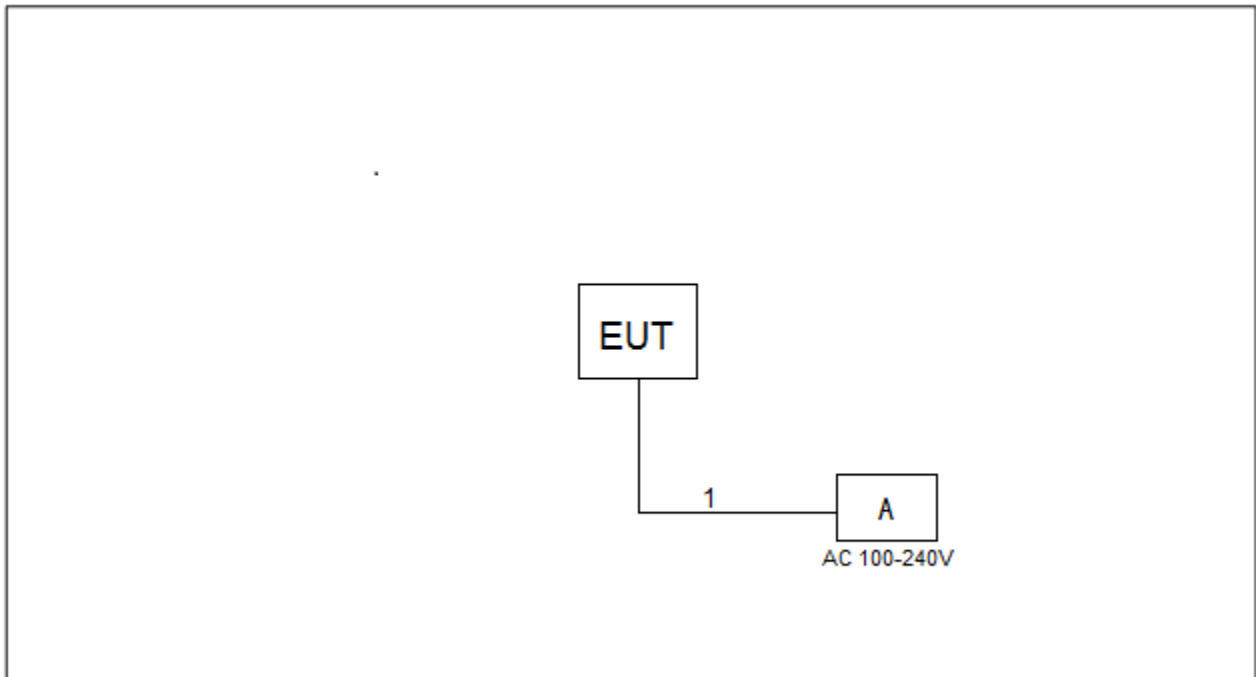
Note:

- (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 2Mbps Channel 19 is found to be the worst case and recorded.
- (3) For AC power line conducted emissions and radiated emissions below 1 GHz test, adapter supply and PoE supply are pretested, the worst case is adapter supply and recorded.
- (4) For radiated emission above 1 GHz test, the polarization of Vertical and Horizontal are evaluated, the worst case is Horizontal for Band edge, Vertical for Harmonic. In this report only recorded the worst case.
- (5) For radiated emission test, every axis (X, Y, Z) are verified. The test results shown in the following sections represent the worst case emissions.

### 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	IPOP_V4.0		
Frequency (MHz)	2402	2440	2480
1Mbps	default	default	default
2Mbps	default	default	default

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

Item	Equipment	Mfr/Brand	Model No.	Series No.
A	Adapter	FRECOM	N/A	N/A

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

### 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.

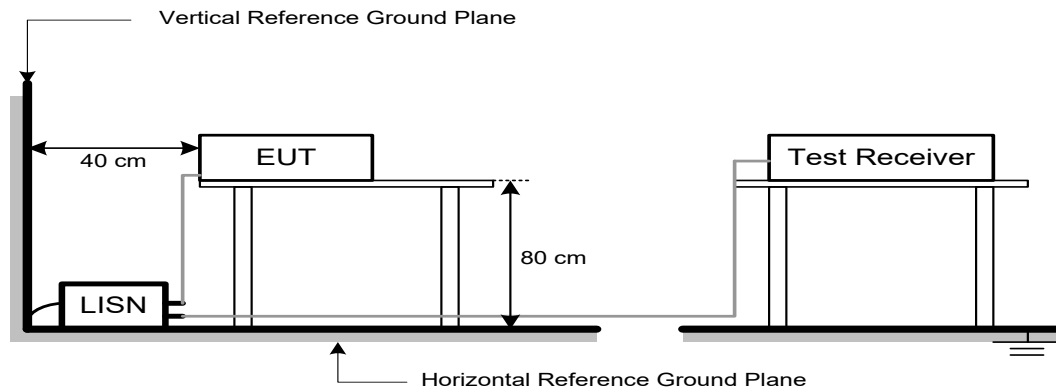
The following table is the setting of the receiver:

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

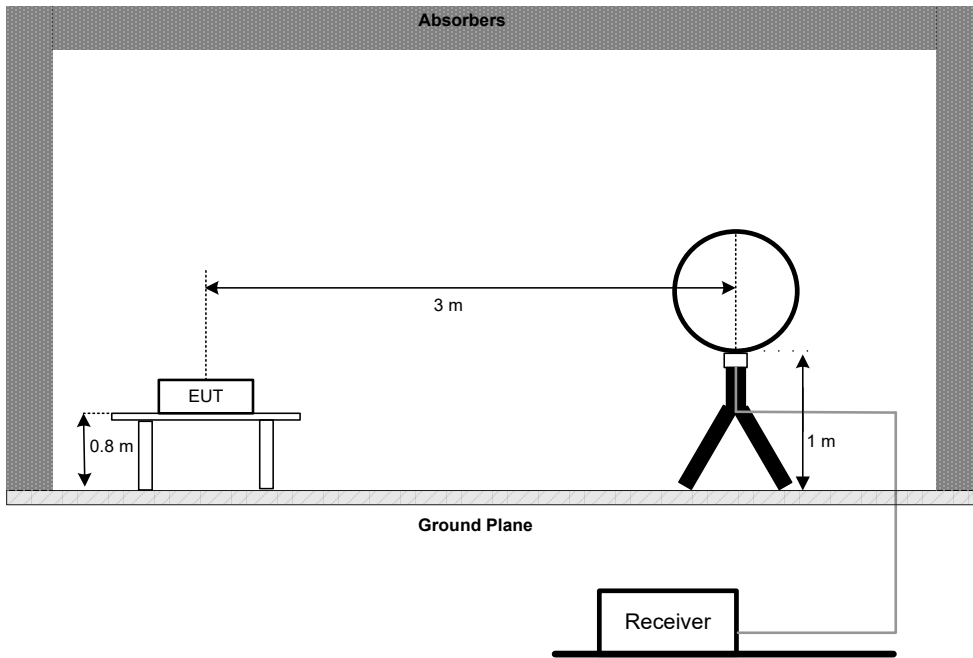
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector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

#### 4.3 DEVIATION FROM TEST STANDARD

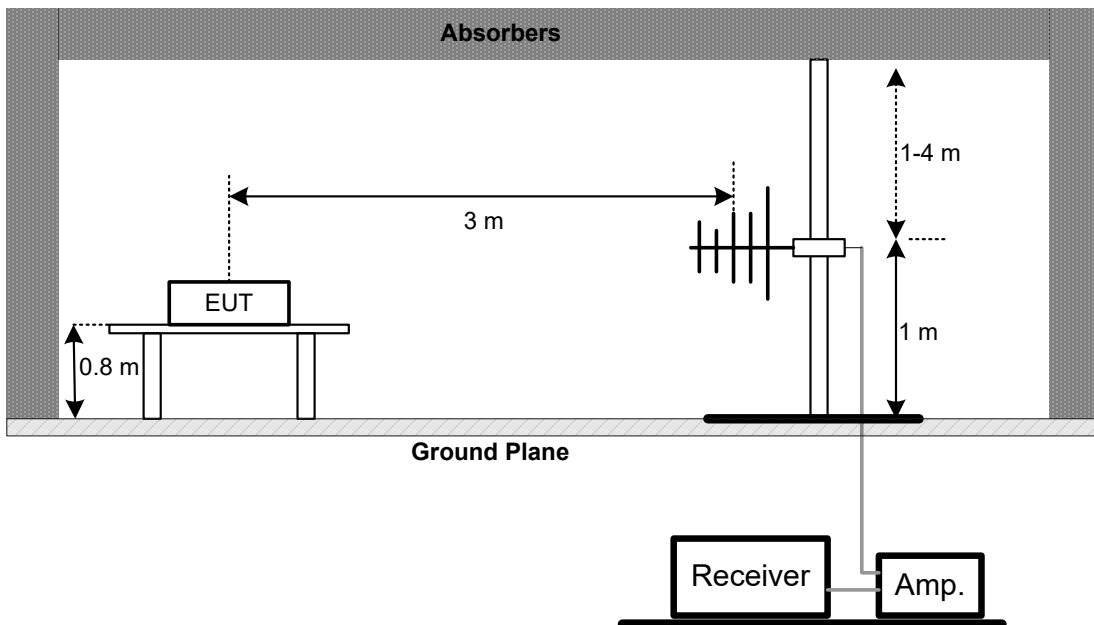
No deviation.

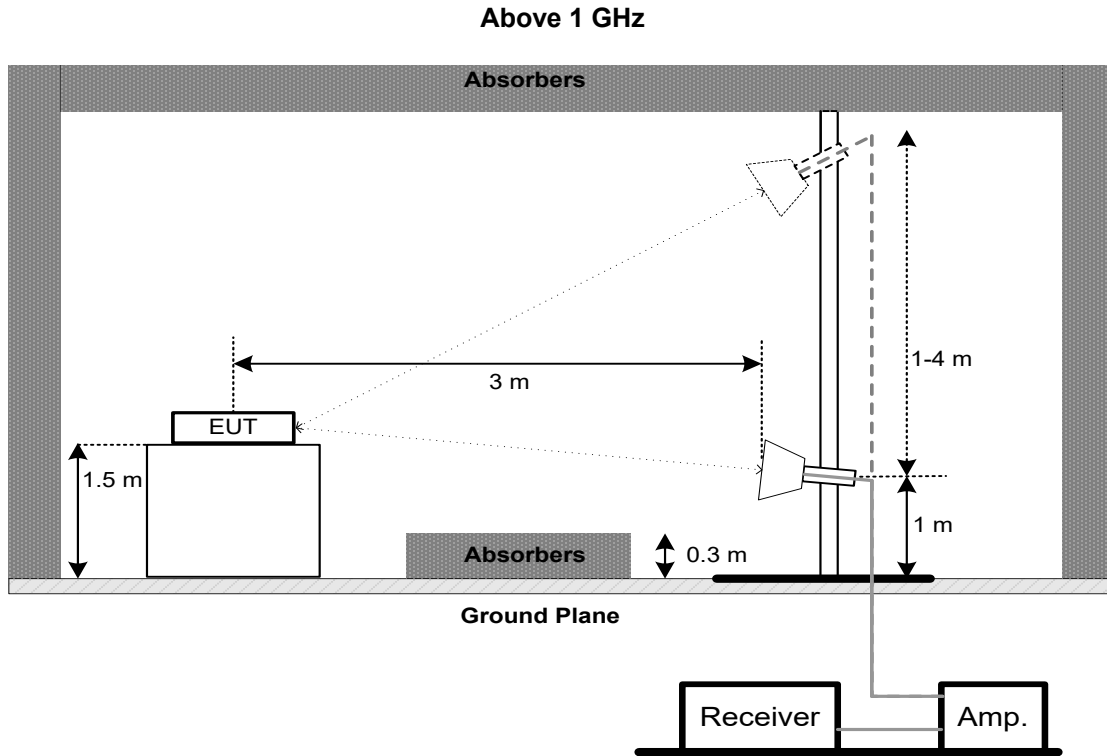
#### 4.4 TEST SETUP

##### 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

- 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	At least 1.5 times the OBW
RBW	1% to 5% of the OBW, not to exceed 1 MHz
VBW	$\geq 3 \times \text{RBW}$
Detector	RMS
Trace	Max Hold
Sweep Time	$\leq (\text{number of points in sweep}) \times T$ (Note)

Note: Where T is defined in 11.6 of ANSI C63.10-2013.

### 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

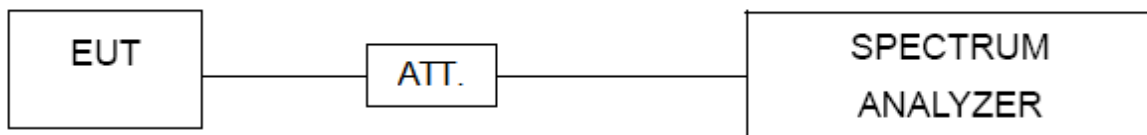
- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

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

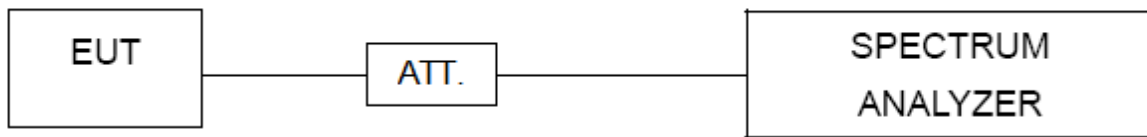
- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	2 MHz (1 Mbps) / 4 MHz (2 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	EMI Test Receiver	R&S	ESCI	100382	Jan. 22, 2023
2	LISN	EMCO	3816/2	52765	Jan. 23, 2023
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Jan. 23, 2023
4	50Ω Terminator	SHX	TF5-3	15041304	Jan. 22, 2023
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	Cable	N/A	RG223	12m	Mar. 08, 2023
7	643 Shield Room	ETS	6*4*3	N/A	N/A

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	MXE EMI Receiver	Keysight	N9038A	MY56400091	Jan. 22, 2023
2*	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 23, 2024
3	Cable	N/A	RG 213/U(9kHz~1GHz)	N/A	Jun. 17, 2022 Jun. 17, 2023
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
5	966 Chamber Room	ETS	9*6*6	N/A	Jul. 14, 2022 Jul. 14, 2023

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. 03, 2023
2	Amplifier	HP	8447D	2944A08742	Jan. 22, 2023
3	Cable	emci	LMR-400	N/A	Nov. 30, 2022
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Jan. 22, 2023
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	966 Chamber Room	RM	9*6*6	N/A	Jul. 15, 2022 Jul. 15, 2023



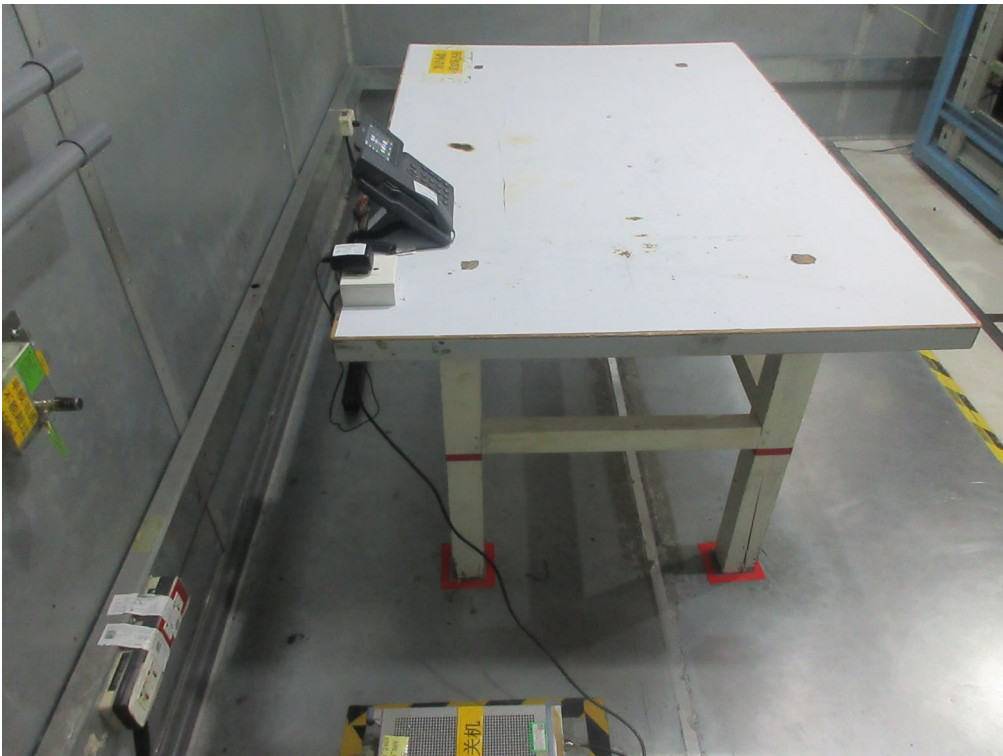
Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Horn Antenna	ARA	DRG-118A	16554	Apr. 18, 2023
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	May 27, 2022 May 27, 2023
3	Amplifier	Agilent	8449B	3008A02584	Jul. 03, 2022 Jul. 03, 2023
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Jan. 22, 2023
7	EXA Spectrum Analyzer	Keysight	N9010A	MY56480488	Jan. 22, 2023
8*	Low Noise Amplifier	CONNPHY	CLN-18G40G-4330-K	619413	Jul. 05, 2022 Jul. 05, 2025
9	Cable	Talent microwave	A81-SMAMSMAM-12.5M	N/A	Oct. 15, 2022
10	Cable	Talent microwave	A40-2.92M2.92M-2.5M	N/A	Nov. 30, 2022
11	Filter	STI	STI15-9912	N/A	Jul. 03, 2022 Jul. 03, 2023
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
13	966 Chamber Room	RM	9*6*6	N/A	Jul. 15, 2022 Jul. 15, 2023

Bandwidth & Maximum Output Power & Power Spectral Density & Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 03, 2022 Jul. 03, 2023
2	Attenuator	WOKEN	6SM3502	VAS1214NL	N/A
3	RF Cable	Tongkaichuan	N/A	N/A	N/A
4	DC Block	Mini	N/A	N/A	N/A

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

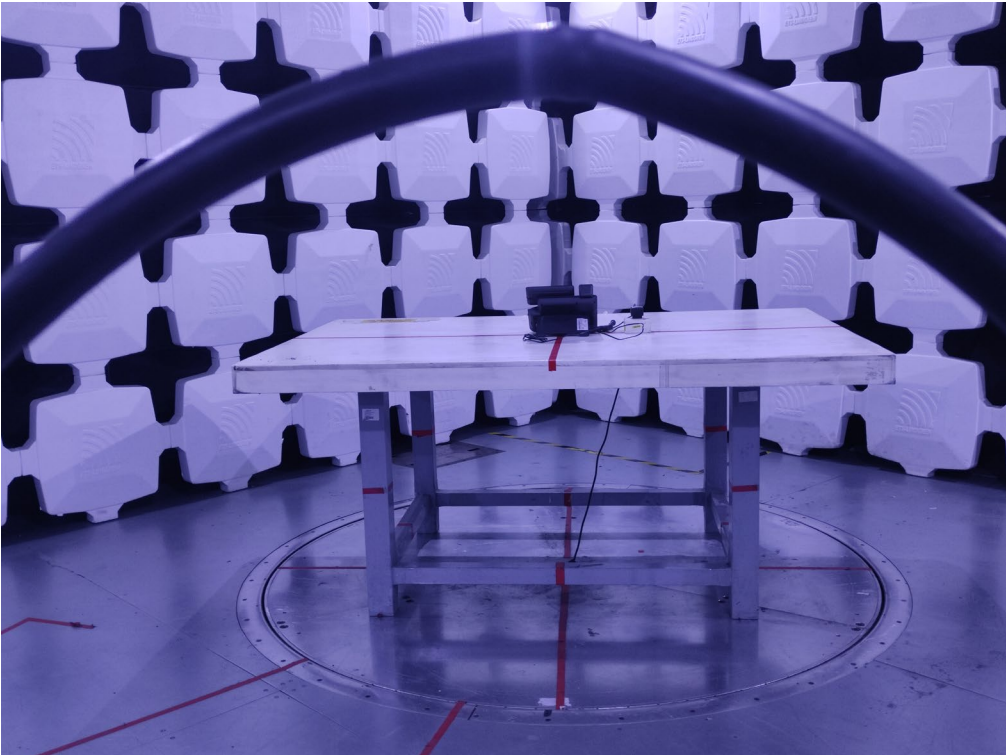
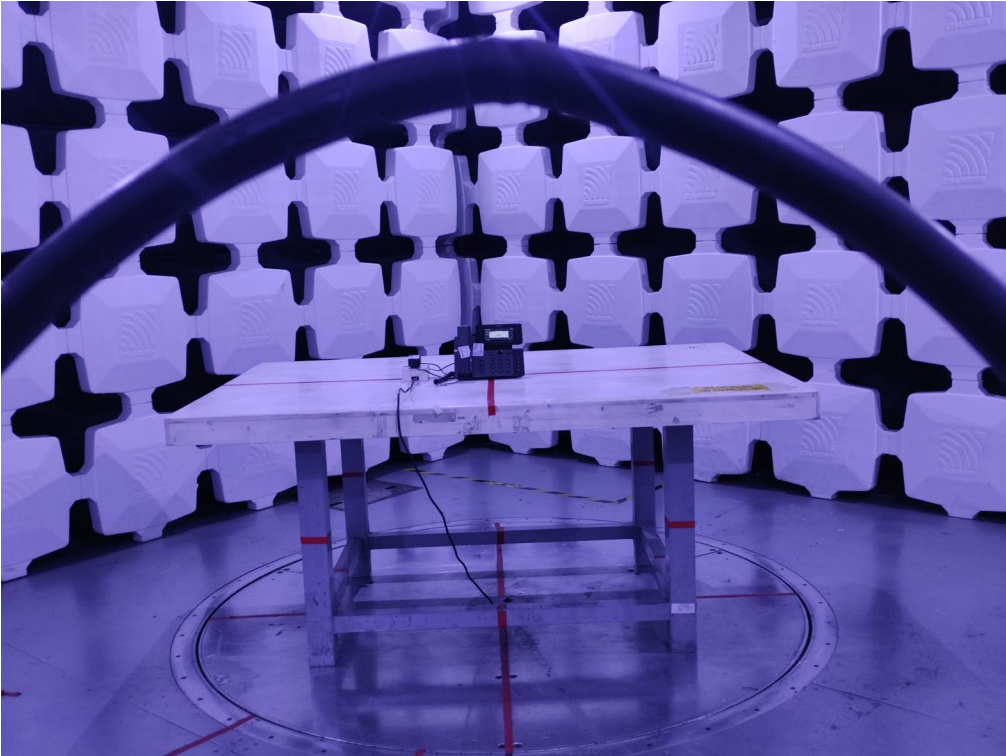
"\*" calibration period of equipment list is three year.

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

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

**Radiated Emissions Test Photos**

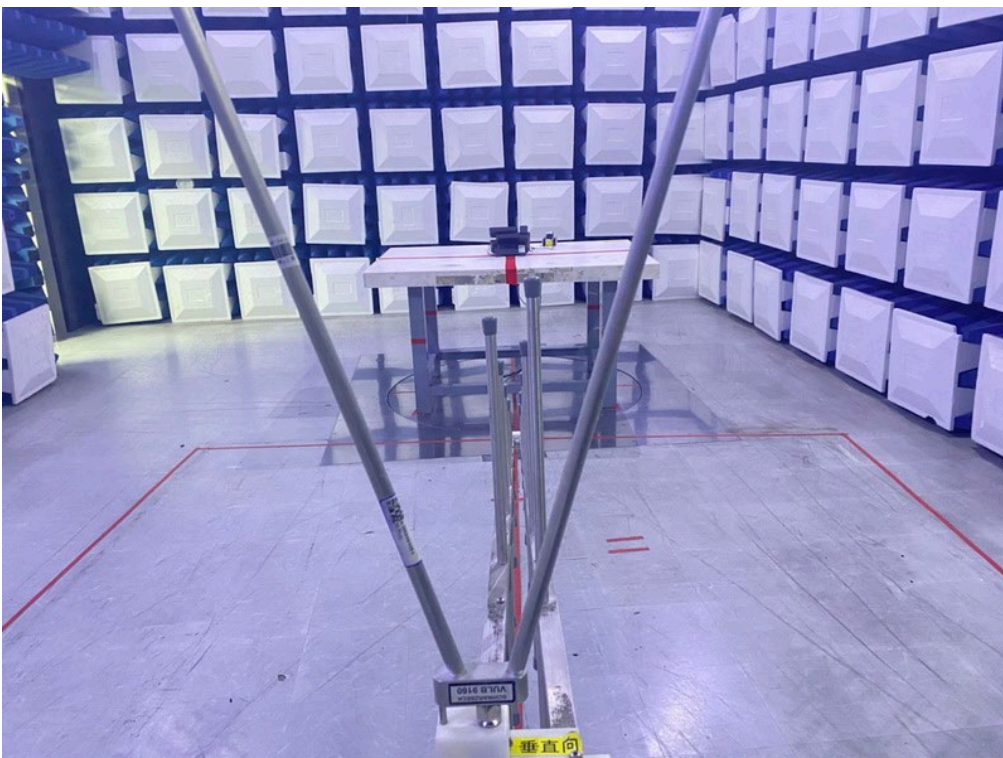
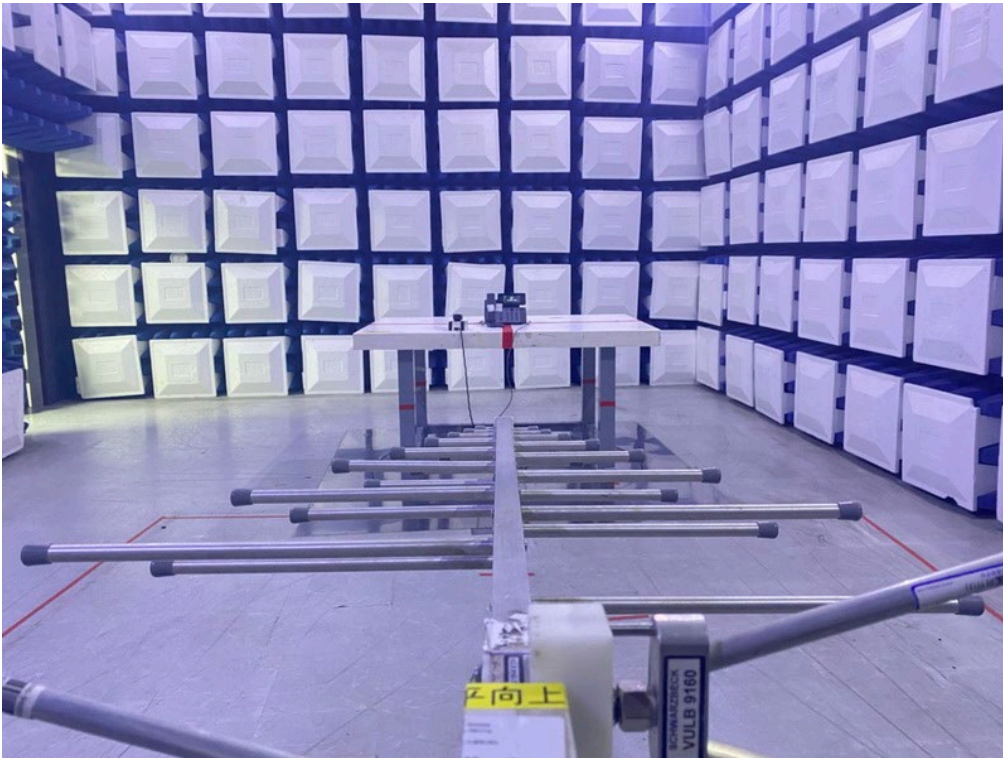
**9 kHz to 30 MHz**





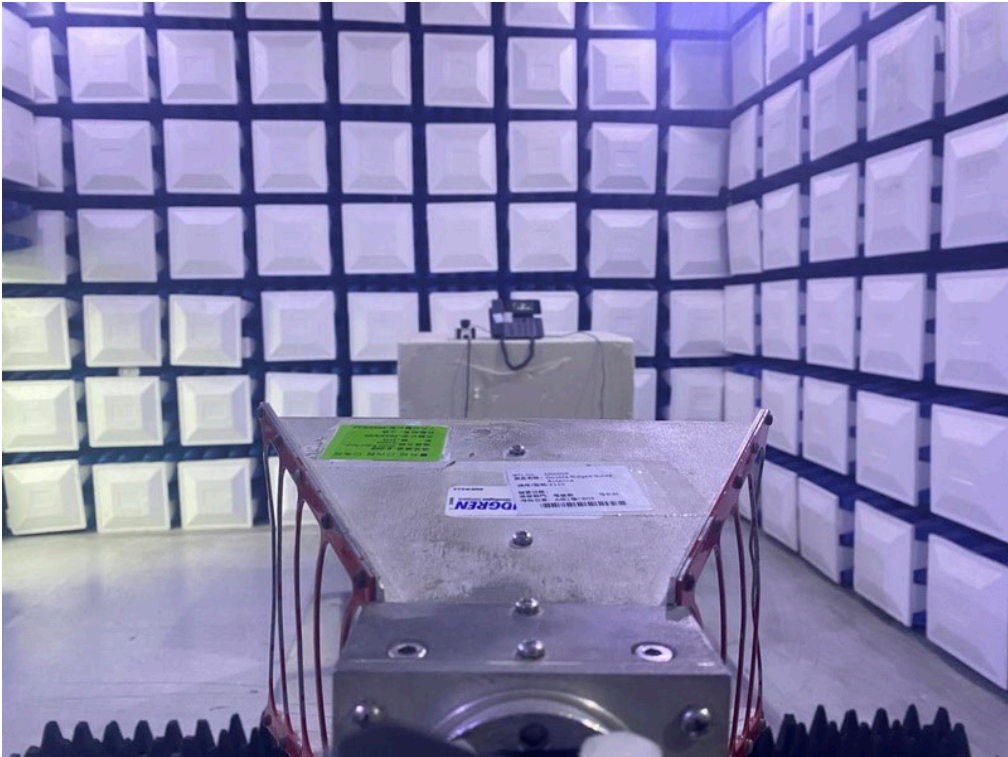
**Radiated Emissions Test Photos**

**30 MHz to 1000 MHz**



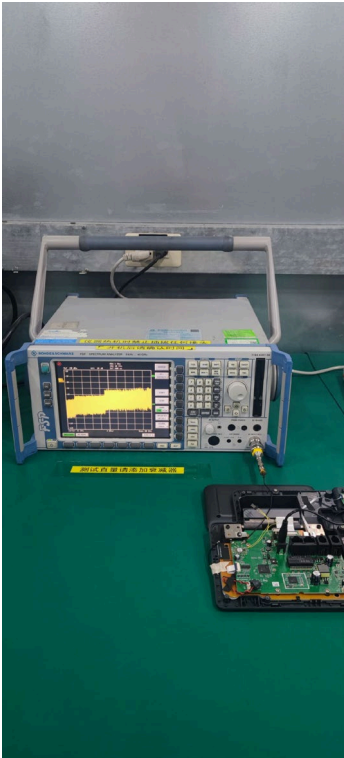
**Radiated Emissions Test Photos**

**Above 1 GHz**



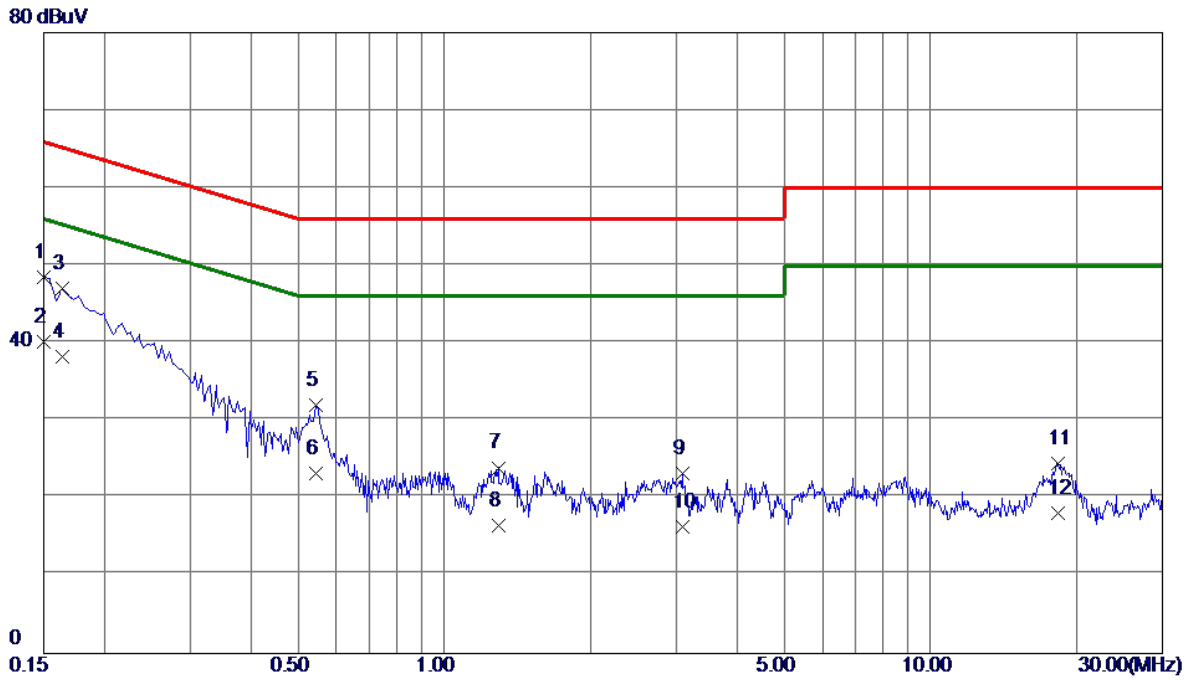


**Conducted Test Photos**



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

Test Mode	TX Mode Channel 19 _2Mbps	Phase	Line
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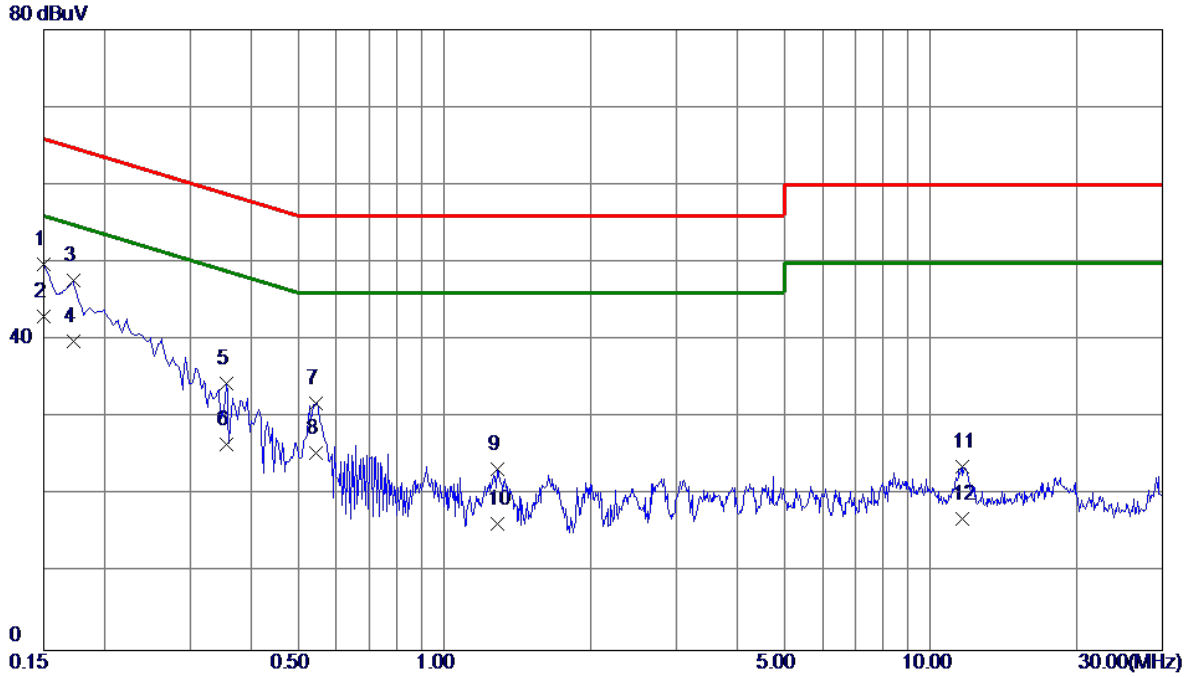
No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.1500	38.83	9.65	48.48	66.00	-17.52	QP	
2 *	0.1500	30.51	9.65	40.16	56.00	-15.84	AVG	
3	0.1635	37.44	9.67	47.11	65.28	-18.17	QP	
4	0.1635	28.60	9.67	38.27	55.28	-17.01	AVG	
5	0.5460	22.17	9.77	31.94	56.00	-24.06	QP	
6	0.5460	13.40	9.77	23.17	46.00	-22.83	AVG	
7	1.2930	14.08	9.84	23.92	56.00	-32.08	QP	
8	1.2930	6.71	9.84	16.55	46.00	-29.45	AVG	
9	3.0885	13.19	9.98	23.17	56.00	-32.83	QP	
10	3.0885	6.29	9.98	16.27	46.00	-29.73	AVG	
11	18.2985	13.82	10.71	24.53	60.00	-35.47	QP	
12	18.2985	7.40	10.71	18.11	50.00	-31.89	AVG	

**REMARKS:**

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



Test Mode	TX Mode Channel 19 _2Mbps	Phase	Neutral
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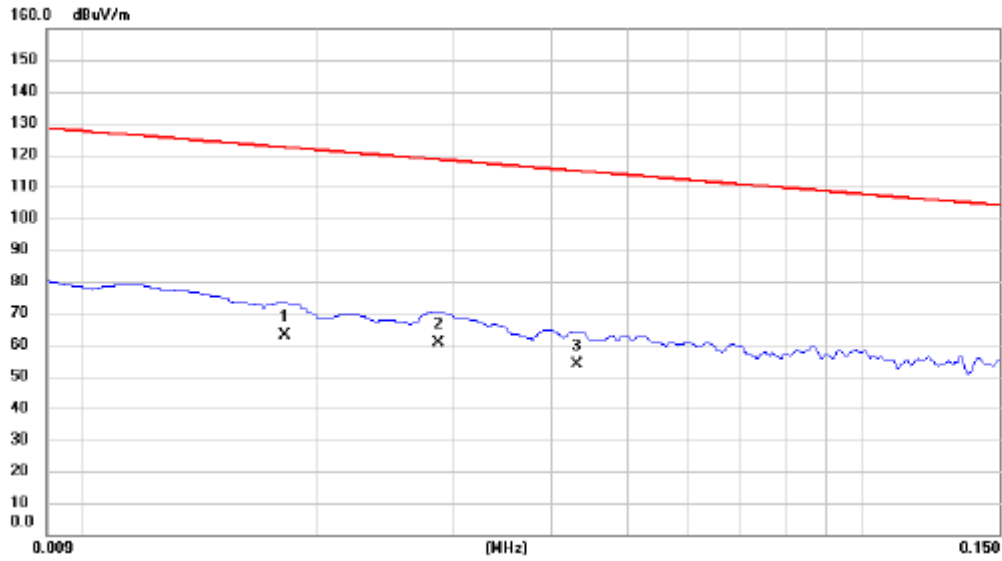
No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.1500	40.10	9.70	49.80	66.00	-16.20	QP	
2 *	0.1500	33.41	9.70	43.11	56.00	-12.89	AVG	
3	0.1725	37.93	9.71	47.64	64.84	-17.20	QP	
4	0.1725	30.10	9.71	39.81	54.84	-15.03	AVG	
5	0.3570	24.61	9.78	34.39	58.80	-24.41	QP	
6	0.3570	16.80	9.78	26.58	48.80	-22.22	AVG	
7	0.5460	22.02	9.80	31.82	56.00	-24.18	QP	
8	0.5460	15.70	9.80	25.50	46.00	-20.50	AVG	
9	1.2839	13.52	9.88	23.40	56.00	-32.60	QP	
10	1.2839	6.40	9.88	16.28	46.00	-29.72	AVG	
11	11.6115	13.17	10.52	23.69	60.00	-36.31	QP	
12	11.6115	6.51	10.52	17.03	50.00	-32.97	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**

Test Mode	TX Mode Channel 19 _2Mbps	Polarization	0°
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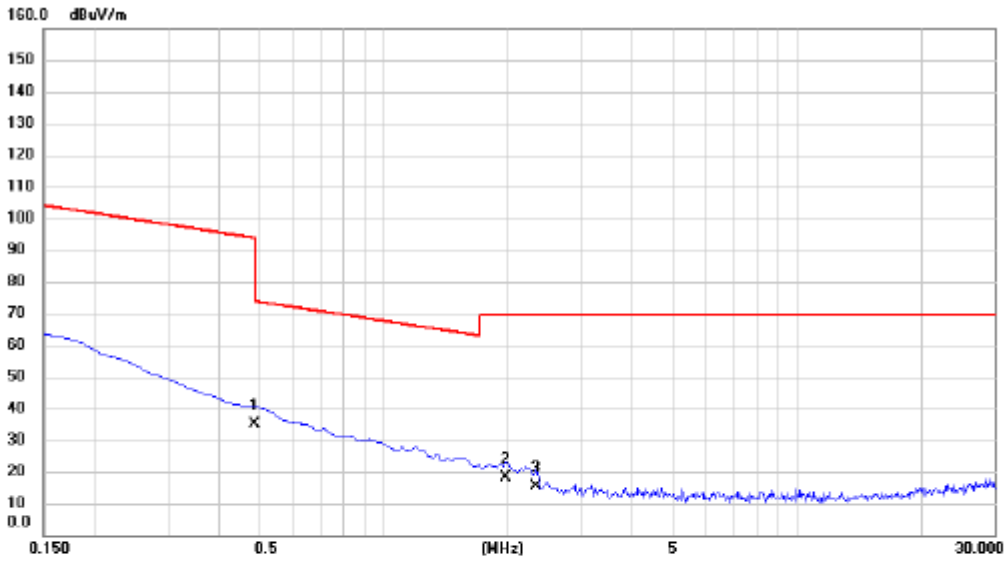


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	0.0182	48.25	14.84	63.09	122.40	-59.31	AVG	
2 *	0.0286	46.63	14.06	60.69	118.48	-57.79	AVG	
3	0.0431	40.25	13.64	53.89	114.92	-61.03	AVG	

**REMARKS:**

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

Test Mode	TX Mode Channel 19 _2Mbps	Polarization	0°
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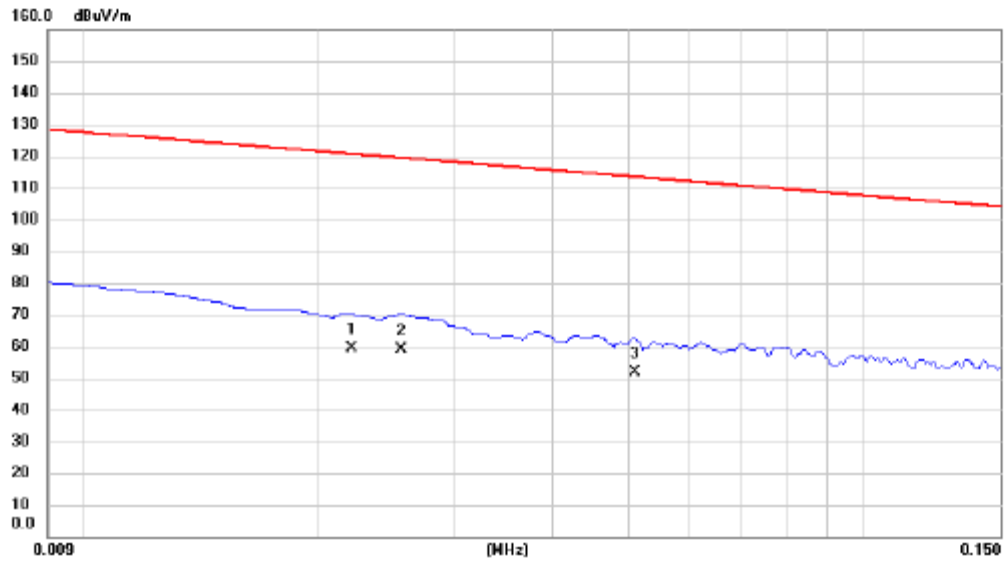


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	0.4863	22.14	12.98	35.12	93.87	-58.75	AVG	
2 *	1.9708	6.63	11.46	18.09	69.54	-51.45	QP	
3	2.3290	4.36	11.05	15.41	69.54	-54.13	QP	

**REMARKS:**

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

Test Mode	TX Mode Channel 19 _2Mbps	Polarization	90°
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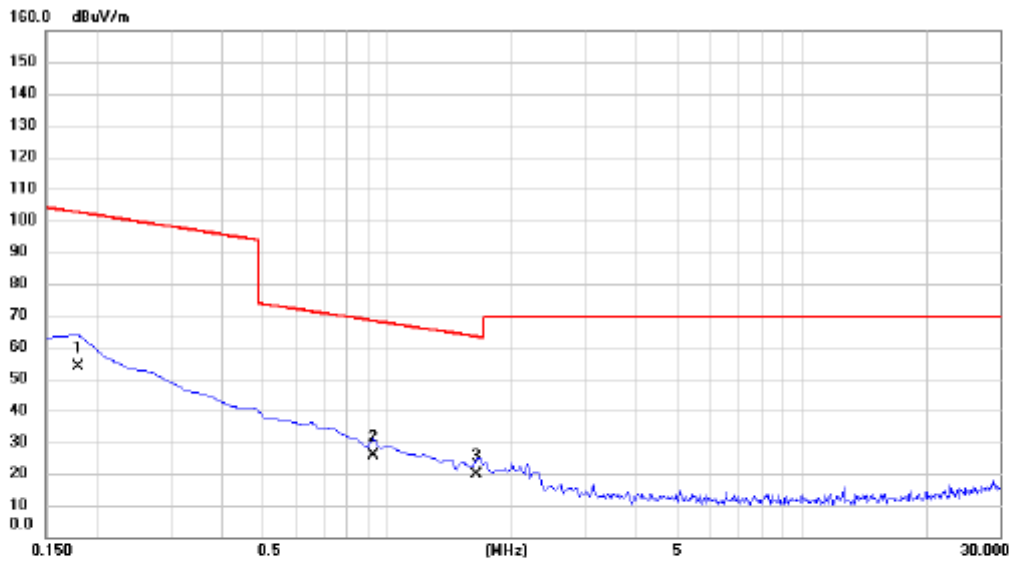


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.0221	45.26	14.25	59.51	120.72	-61.21	AVG	
2	*	0.0256	45.02	14.15	59.17	119.44	-60.27	AVG	
3		0.0510	38.29	13.44	51.73	113.45	-61.72	AVG	

**REMARKS:**

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

Test Mode	TX Mode Channel 19 _2Mbps	Polarization	90°
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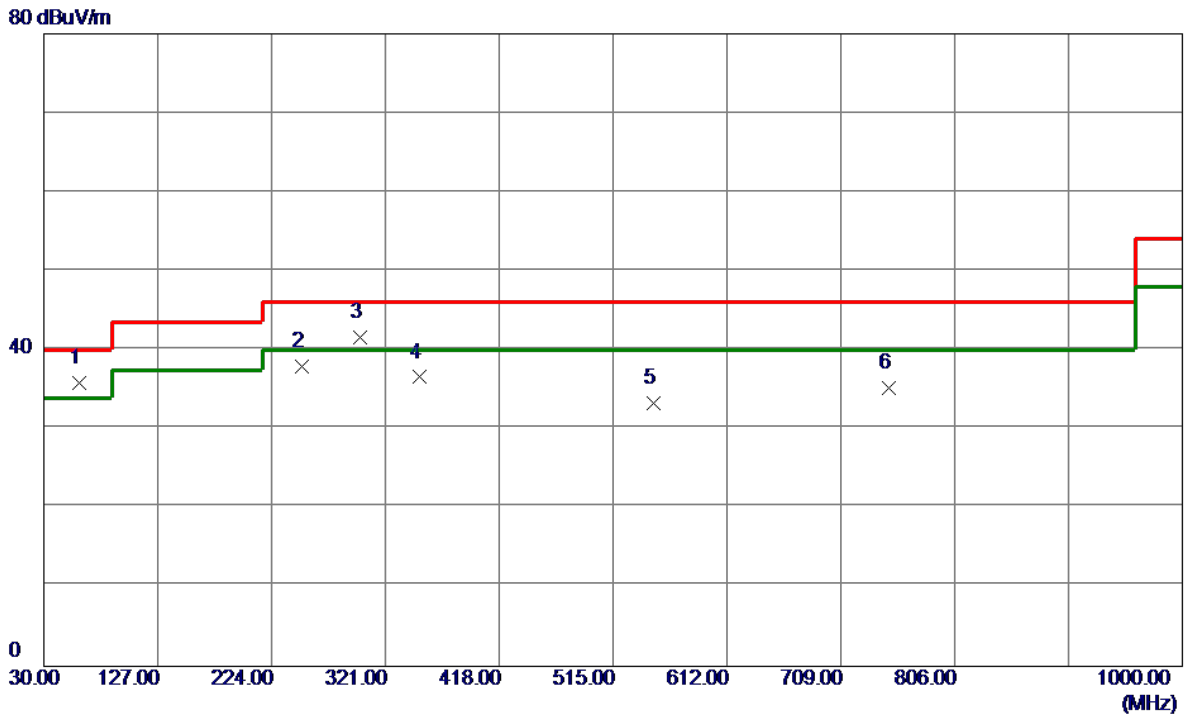
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		0.1800	40.23	13.40	53.63	102.50	-48.87	AVG	
2	*	0.9261	13.25	12.37	25.62	68.27	-42.65	QP	
3		1.6425	8.26	11.73	19.99	63.29	-43.30	QP	

**REMARKS:**

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

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

Test Mode	TX Mode Channel 19 _2Mbps	Polarization	Vertical
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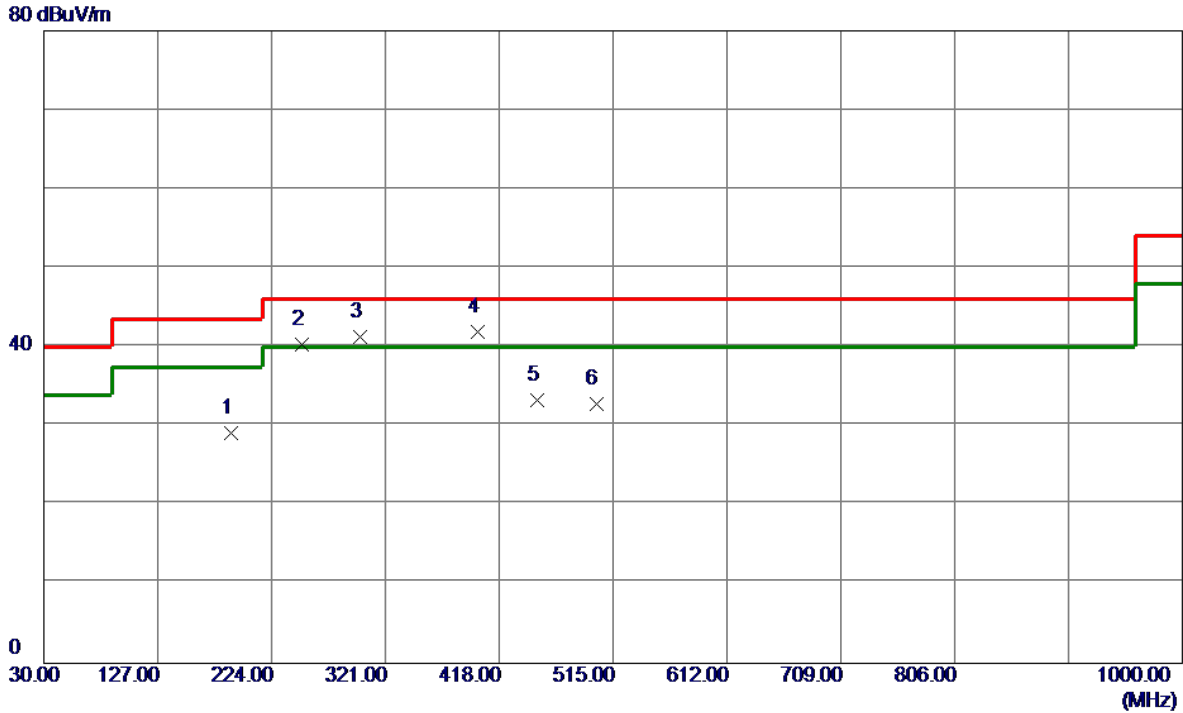
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	60.0700	50.71	-14.81	35.90	40.00	-4.10	Peak	
2	250.1900	51.14	-13.17	37.97	46.00	-8.03	Peak	
3	299.6600	52.84	-11.27	41.57	46.00	-4.43	Peak	
4	350.1000	46.78	-10.22	36.56	46.00	-9.44	Peak	
5	549.9200	38.85	-5.58	33.27	46.00	-12.73	Peak	
6	749.7400	36.91	-1.78	35.13	46.00	-10.87	Peak	

**REMARKS:**

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



Test Mode	TX Mode Channel 19 _2Mbps	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	189.0800	44.11	-14.97	29.14	43.50	-14.36	Peak	
2	250.1900	53.53	-13.17	40.36	46.00	-5.64	Peak	
3	299.6600	52.57	-11.27	41.30	46.00	-4.70	Peak	
4 *	399.5700	50.85	-8.97	41.88	46.00	-4.12	Peak	
5	450.0100	40.80	-7.50	33.30	46.00	-12.70	Peak	
6	500.4500	39.63	-6.86	32.77	46.00	-13.23	Peak	

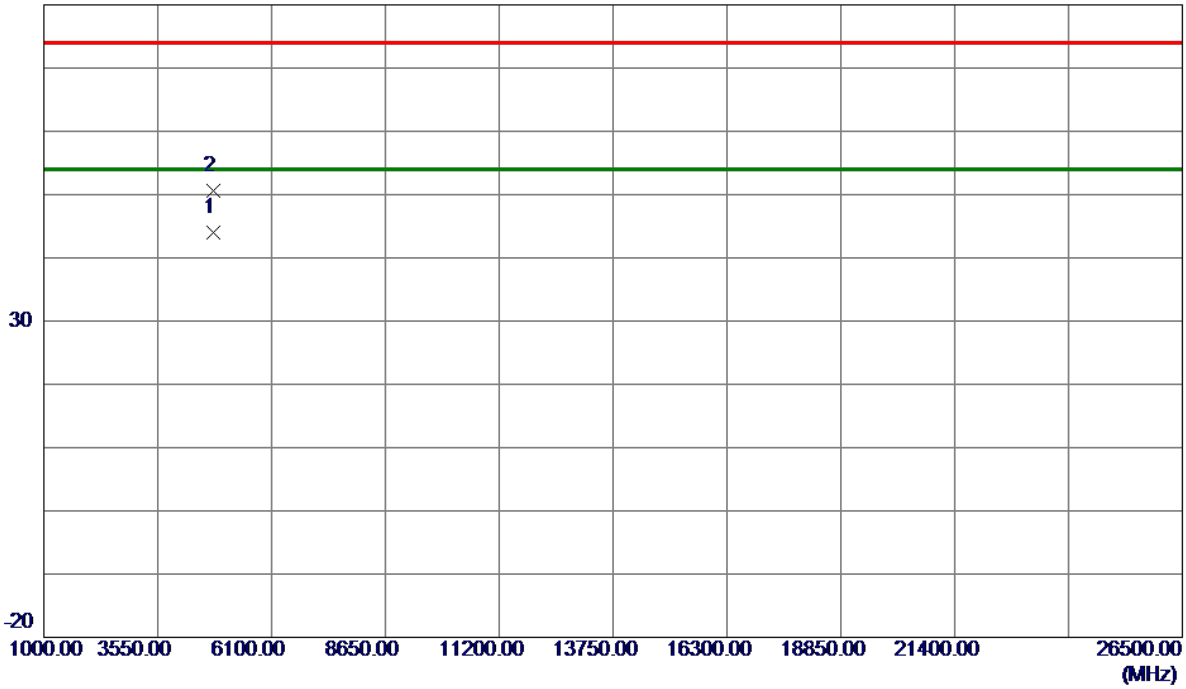
**REMARKS:**

- (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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80 dBuV/m

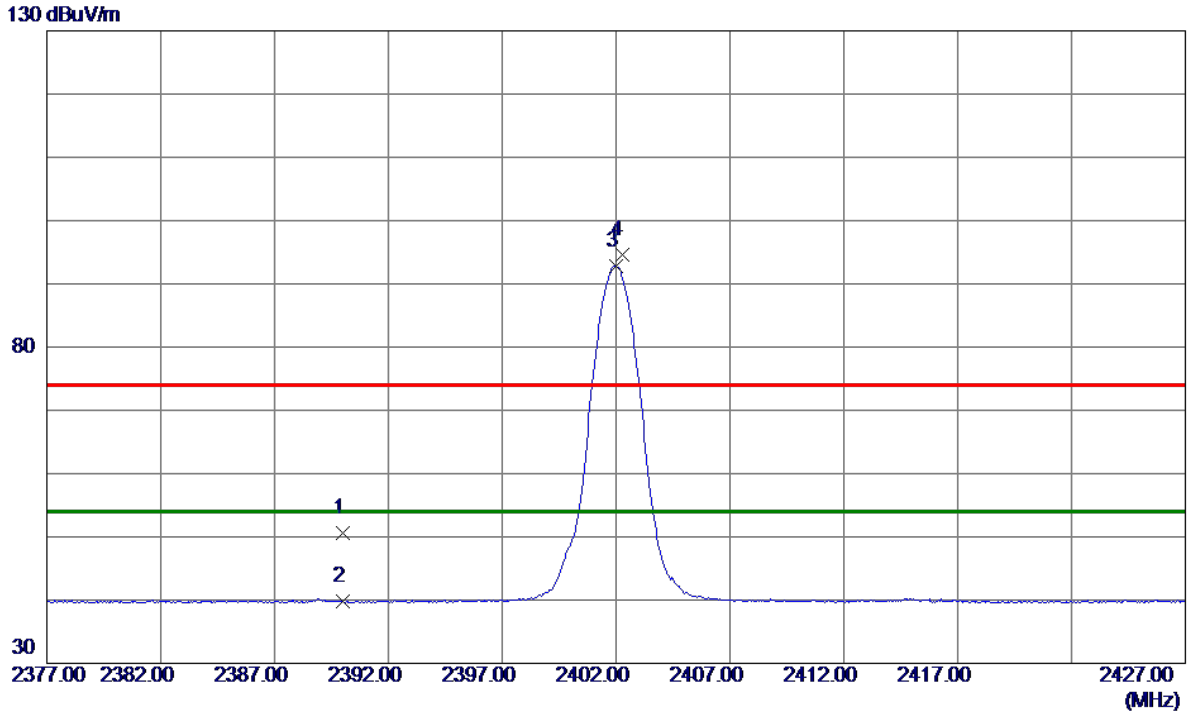


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4803.8400	39.52	4.48	44.00	54.00	-10.00	AVG	
2	4804.5200	46.19	4.48	50.67	74.00	-23.33	Peak	

**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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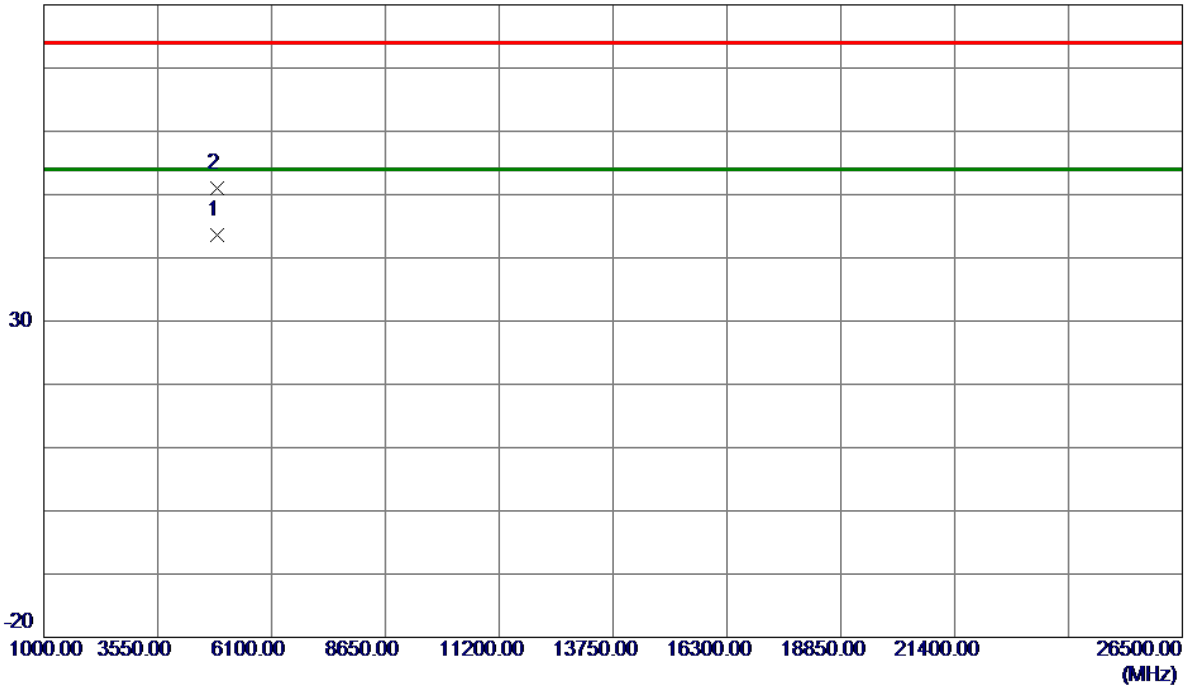
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	42.60	7.98	50.58	74.00	-23.42	Peak	
2	2390.0000	31.79	7.98	39.77	54.00	-14.23	AVG	
3 *	2402.0000	84.76	8.00	92.76	54.00	38.76	AVG	No Limit
4	2402.2500	86.64	8.00	94.64	74.00	20.64	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	Polarization	Vertical
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80 dBuV/m

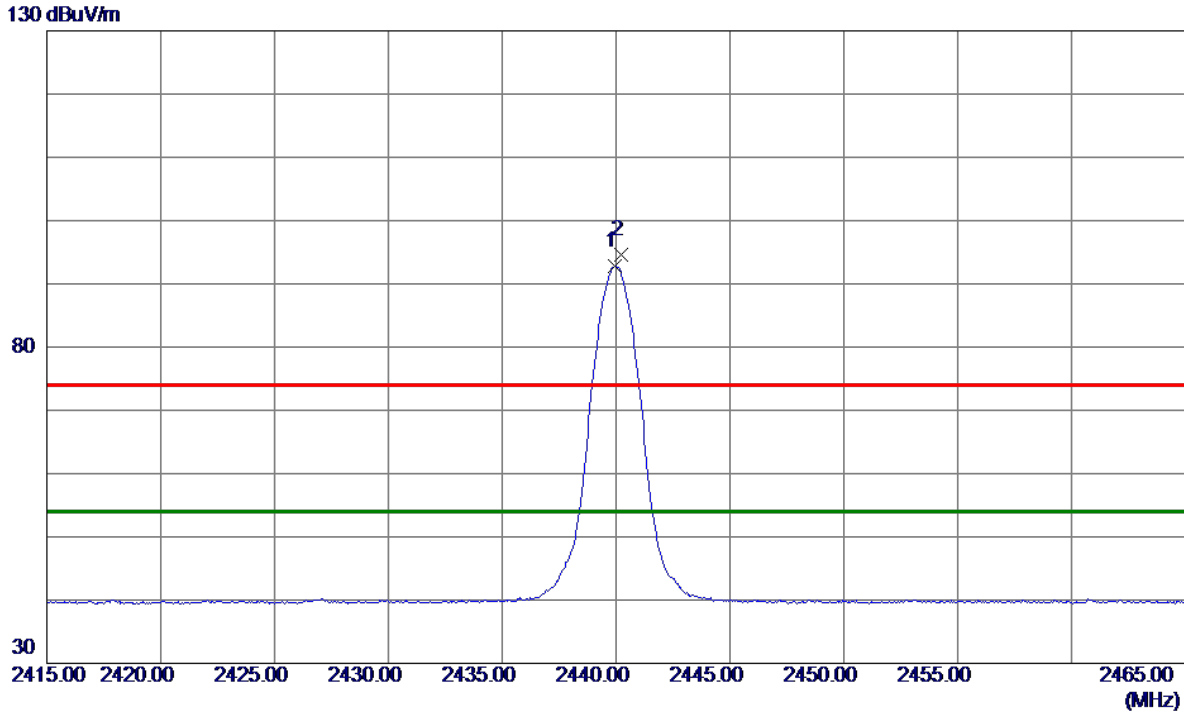


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4879.8750	38.81	4.79	43.60	54.00	-10.40	AVG	
2	4880.5050	46.15	4.80	50.95	74.00	-23.05	Peak	

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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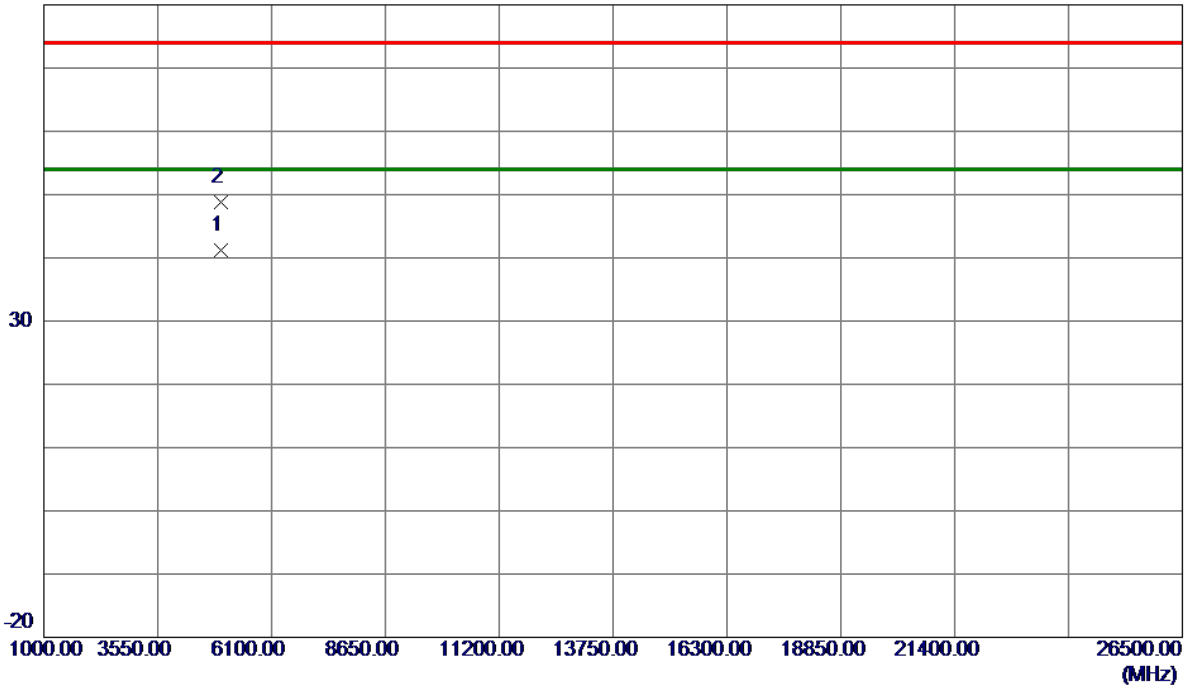
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2439.9500	84.71	8.06	92.77	54.00	38.77	AVG	No Limit
2	2440.2000	86.61	8.06	94.67	74.00	20.67	Peak	No Limit

**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

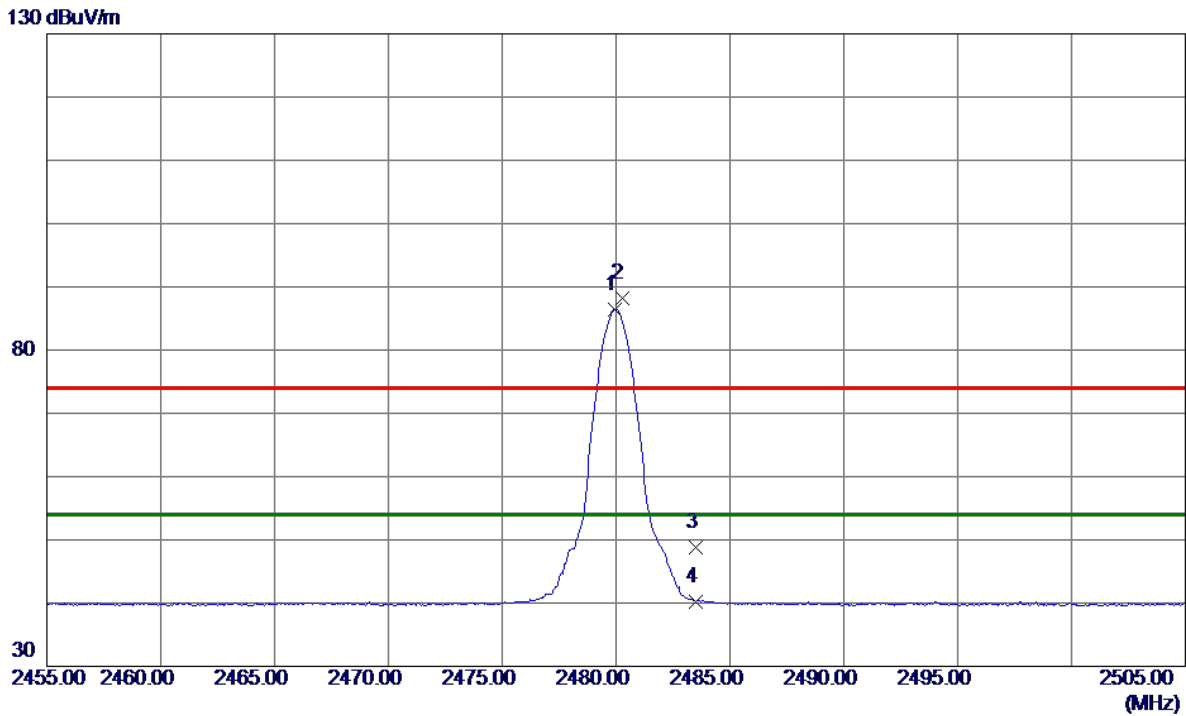


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4959.8600	35.99	5.12	41.11	54.00	-12.89	AVG	
2	4960.6050	43.76	5.13	48.89	74.00	-25.11	Peak	

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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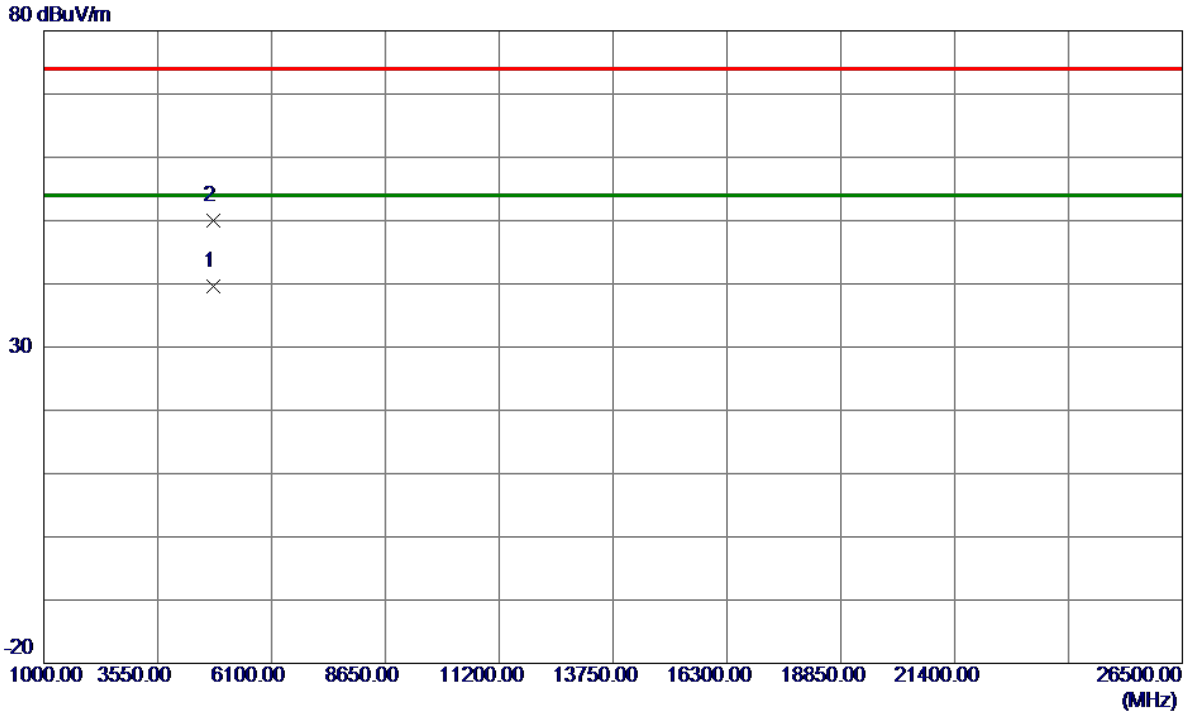
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2479.9500	78.28	8.13	86.41	54.00	32.41	AVG	No Limit
2	2480.2500	80.15	8.13	88.28	74.00	14.28	Peak	No Limit
3	2483.5000	40.70	8.14	48.84	74.00	-25.16	Peak	
4	2483.5000	32.15	8.14	40.29	54.00	-13.71	AVG	

**REMARKS:**

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



Test Mode	TX 2402 MHz _CH00_2Mbps	Polarization	Vertical
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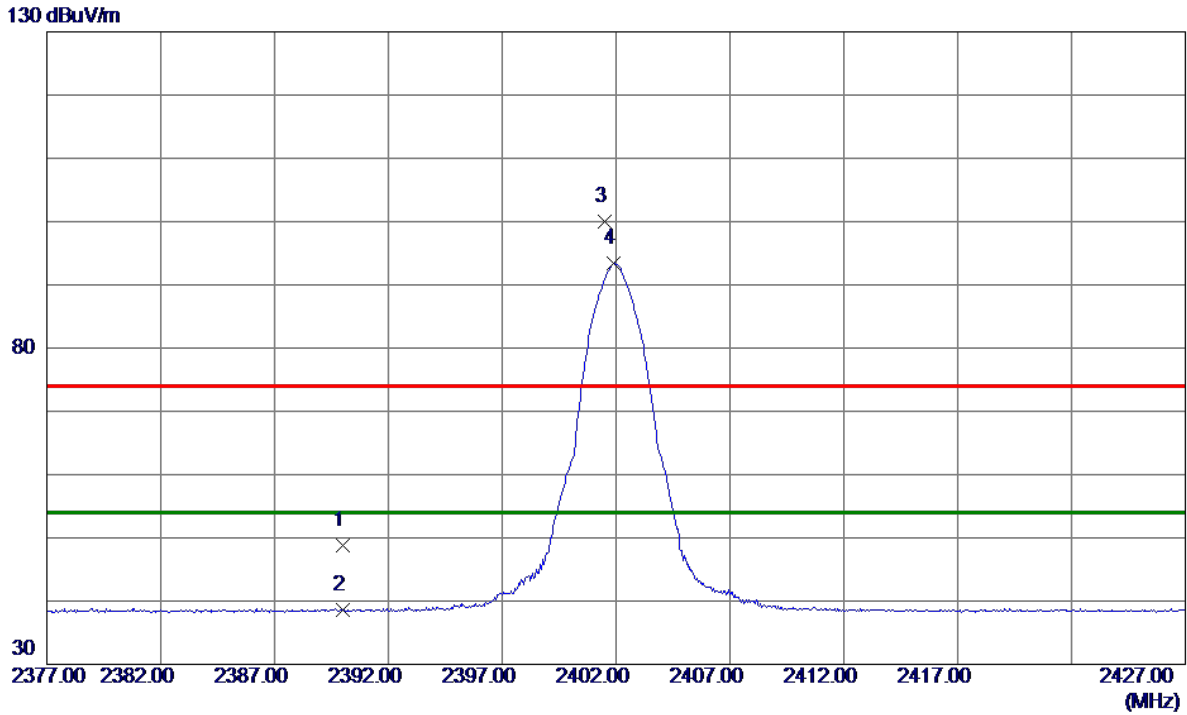


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4803.0650	35.44	4.17	39.61	54.00	-14.39	AVG	
2	4805.0250	45.88	4.17	50.05	74.00	-23.95	Peak	

**REMARKS:**

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

Test Mode	TX 2402 MHz _CH00_2Mbps	Polarization	Horizontal
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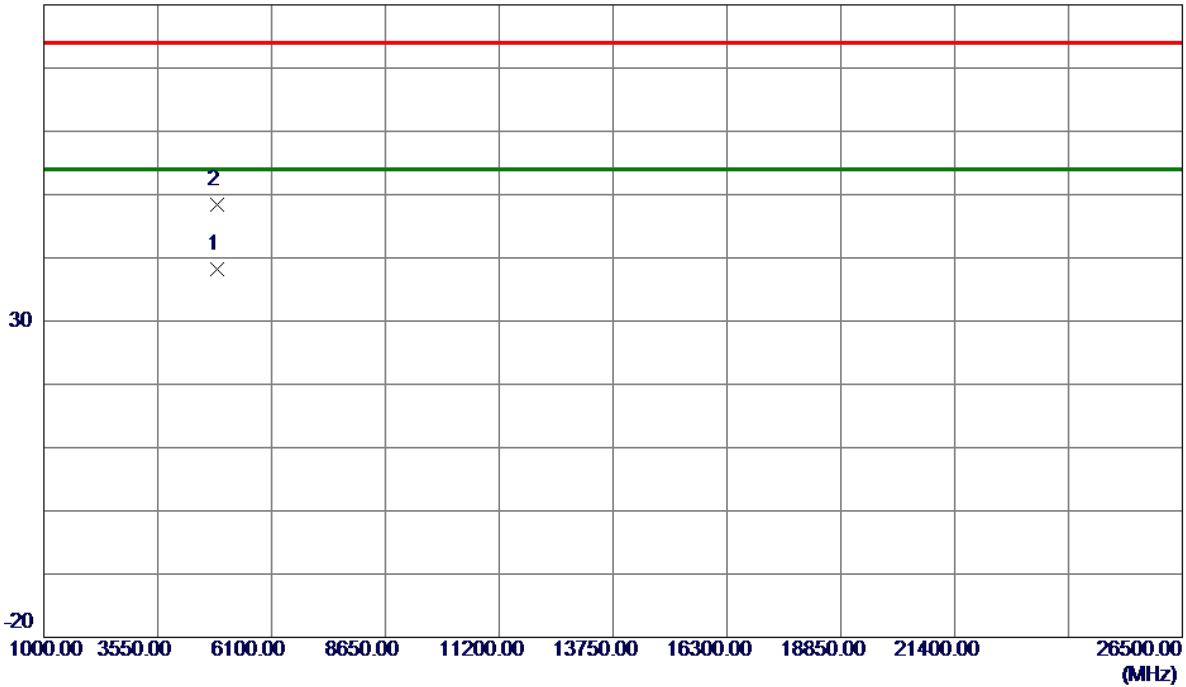
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2390.0000	40.88	7.98	48.86	74.00	-25.14	Peak	
2	2390.0000	30.60	7.98	38.58	54.00	-15.42	AVG	
3	2401.5000	91.97	8.00	99.97	74.00	25.97	Peak	No Limit
4 *	2401.9000	85.32	8.00	93.32	54.00	39.32	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	Polarization	Vertical
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80 dBuV/m

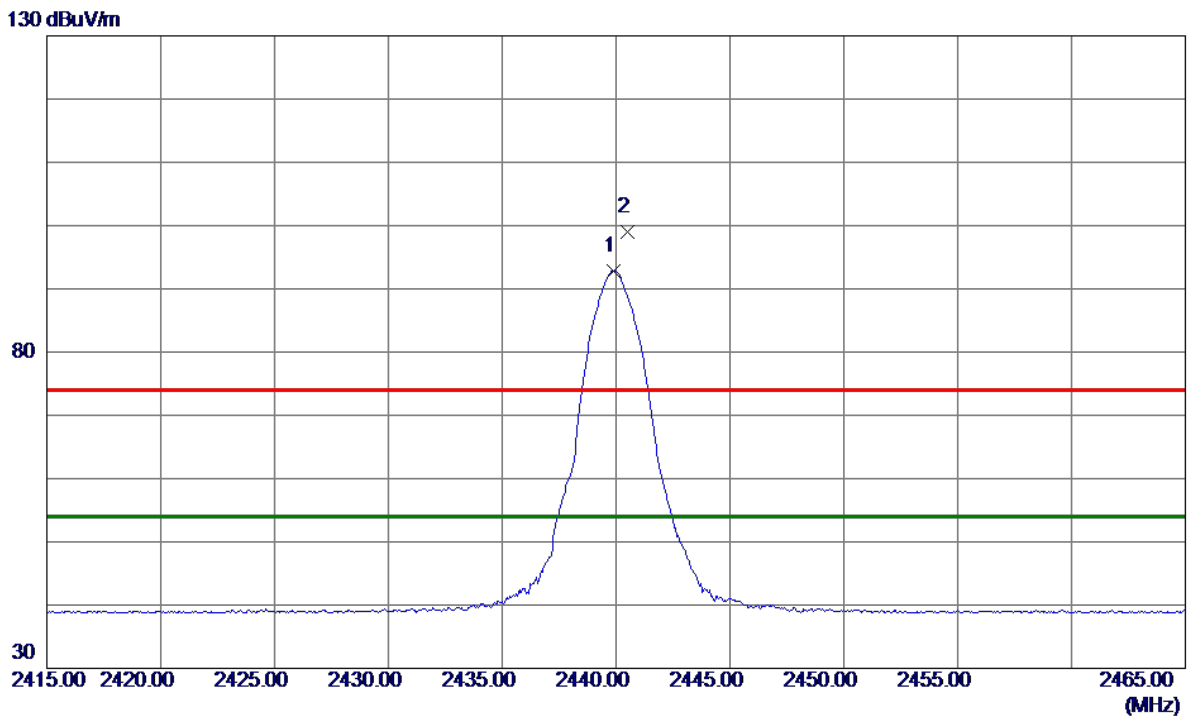


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4878.9900	33.84	4.39	38.23	54.00	-15.77	AVG	
2	4879.0000	44.02	4.39	48.41	74.00	-25.59	Peak	

**REMARKS:**

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

Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Horizontal
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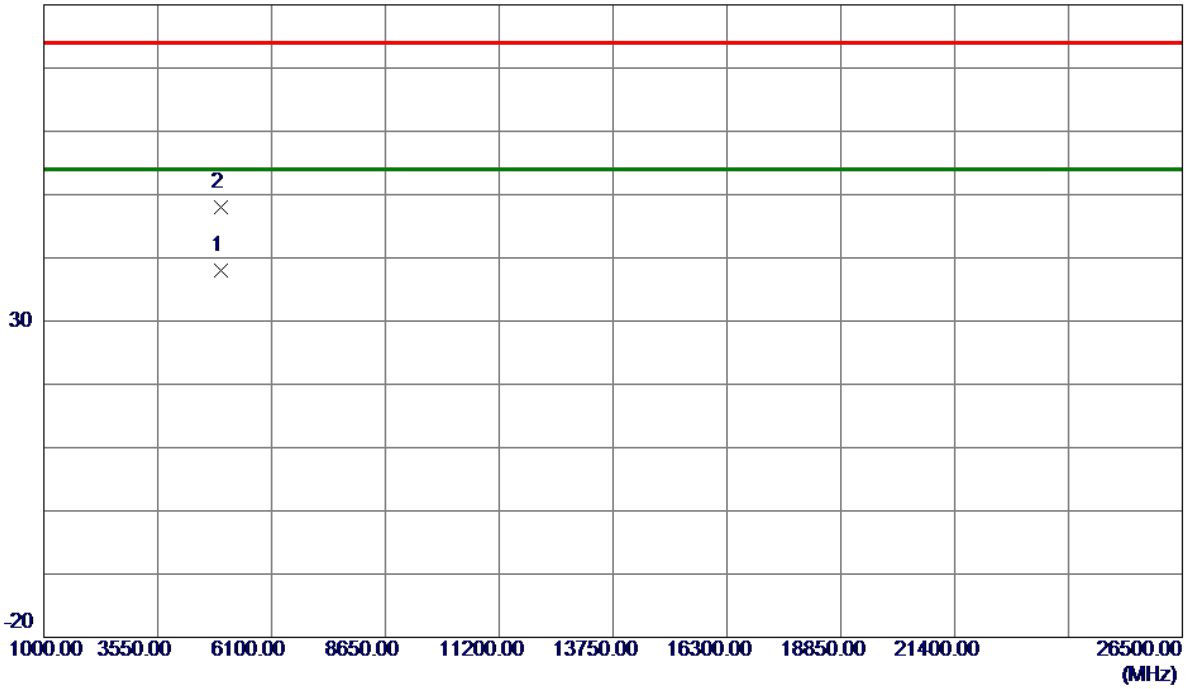


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	2439.9000	84.83	8.06	92.89	54.00	38.89	AVG	No Limit
2	2440.5000	91.03	8.06	99.09	74.00	25.09	Peak	No Limit

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

Test Mode	TX 2480 MHz _CH39_2Mbps	Polarization	Vertical
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80 dBuV/m

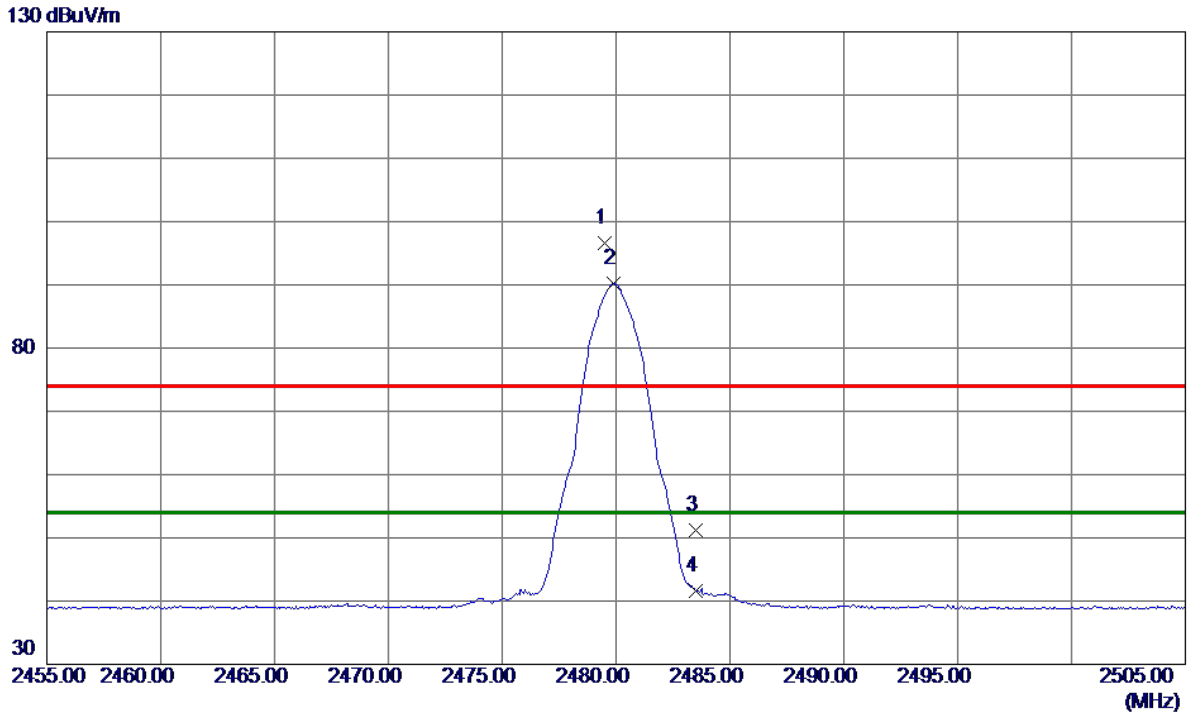


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1 *	4958.9850	33.35	4.63	37.98	54.00	-16.02	AVG	
2	4959.1000	43.29	4.63	47.92	74.00	-26.08	Peak	

REMARKS:

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

Test Mode	TX 2480 MHz _CH39_2Mbps	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	2479.5000	88.46	8.13	96.59	74.00	22.59	Peak	No Limit
2 *	2479.9000	82.03	8.13	90.16	54.00	36.16	AVG	No Limit
3	2483.5000	43.14	8.14	51.28	74.00	-22.72	Peak	
4	2483.5000	33.51	8.14	41.65	54.00	-12.35	AVG	

**REMARKS:**

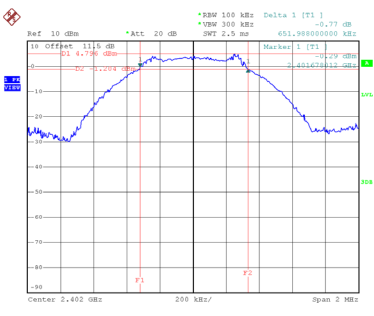
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

## 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	0.652	1.036	0.5	Pass
19	2440	0.660	1.040	0.5	Pass
39	2480	0.660	1.040	0.5	Pass

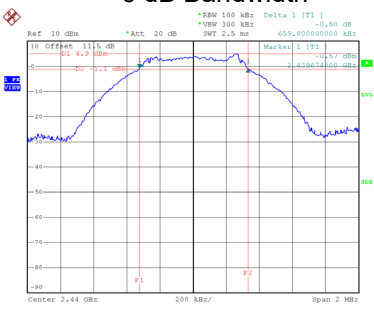
CH00



Date: 18.JUL.2022 09:37:55

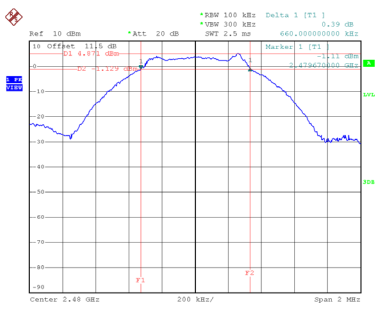
CH19

6 dB Bandwidth



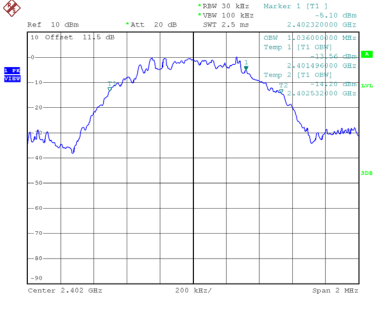
Date: 18.JUL.2022 09:40:02

CH39

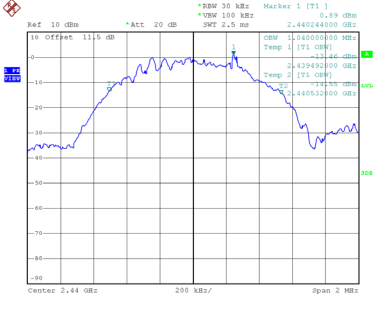


Date: 18.JUL.2022 09:42:35

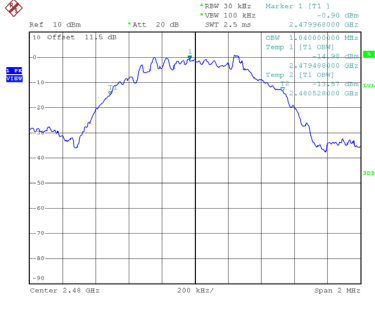
99 % Occupied Bandwidth



Date: 18.JUL.2022 09:37:04



Date: 18.JUL.2022 09:40:09



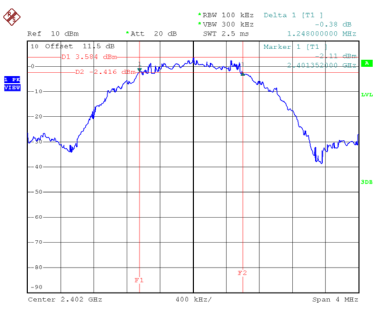
Date: 18.JUL.2022 09:42:42



Test Mode TX Mode \_2Mbps

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	1.248	2.096	0.5	Pass
19	2440	1.248	2.112	0.5	Pass
39	2480	1.178	2.064	0.5	Pass

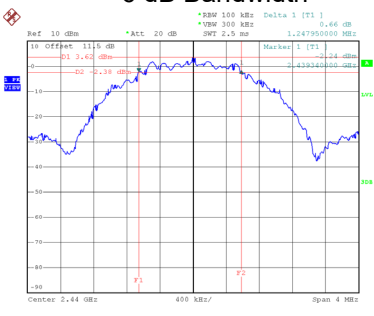
CH00



Date: 18.JUL.2022 10:01:47

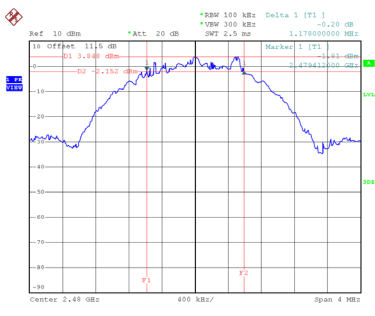
CH19

6 dB Bandwidth



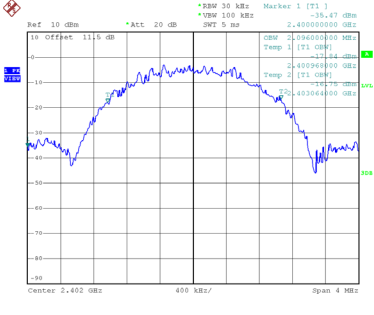
Date: 18.JUL.2022 10:03:41

CH39

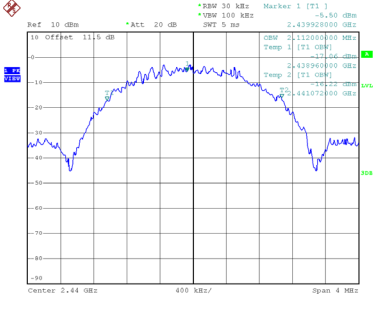


Date: 18.JUL.2022 10:05:33

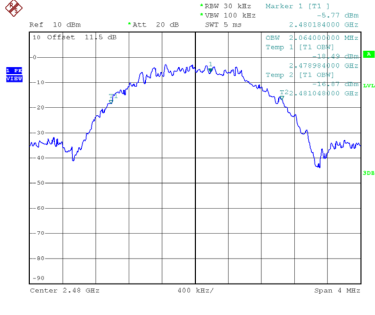
99 % Occupied Bandwidth



Date: 18.JUL.2022 10:00:43



Date: 18.JUL.2022 10:03:49

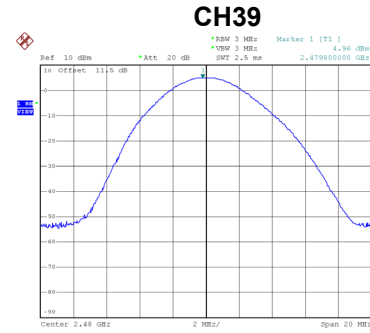
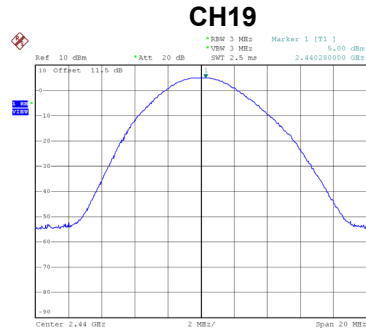
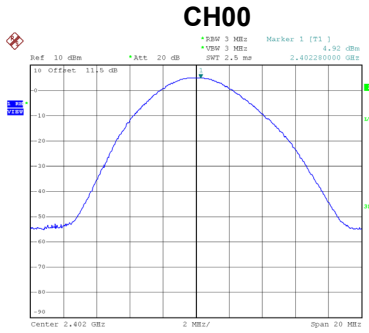


Date: 18.JUL.2022 10:05:41

## APPENDIX F - MAXIMUM OUTPUT POWER

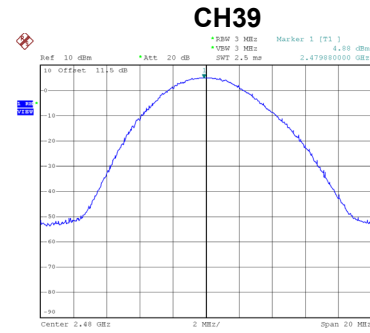
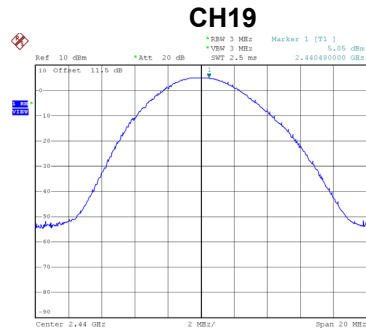
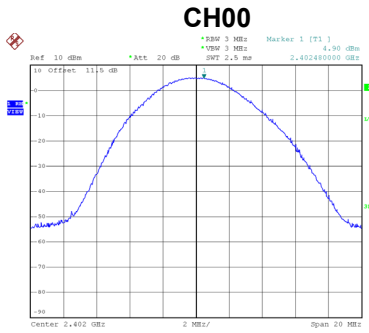
Test Mode	TX Mode _1Mbps
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Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	4.92	0.0031	30.00	1.0000	Pass
2440	5.00	0.0032	30.00	1.0000	Pass
2480	4.96	0.0031	30.00	1.0000	Pass



Test Mode	TX Mode _2Mbps
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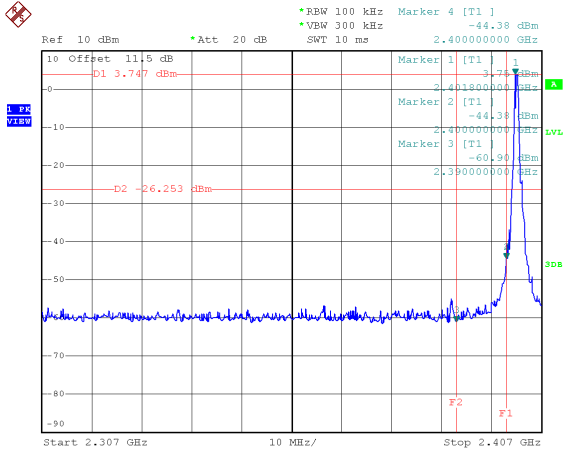
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	4.90	0.0031	30.00	1.0000	Pass
2440	5.05	0.0032	30.00	1.0000	Pass
2480	4.88	0.0031	30.00	1.0000	Pass



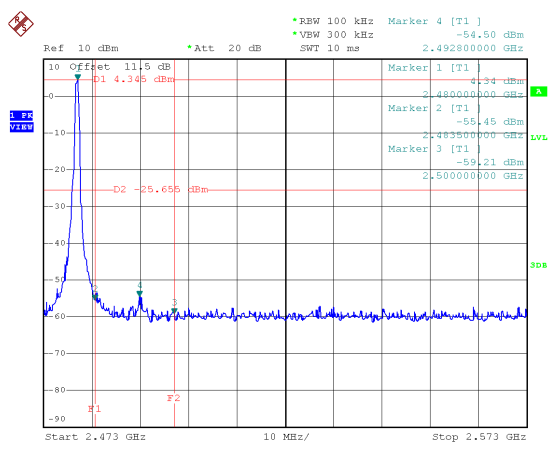
## **APPENDIX G - CONDUCTED SPURIOUS EMISSION**

Test Mode TX Mode\_1Mbps

### Bandedge CH00 (Lower)



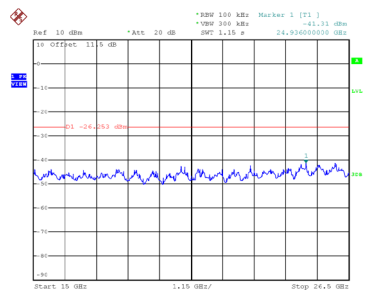
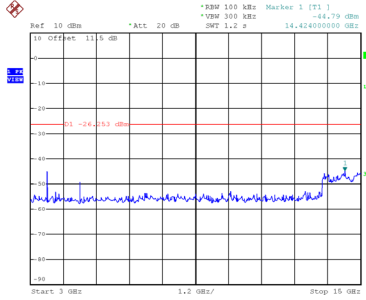
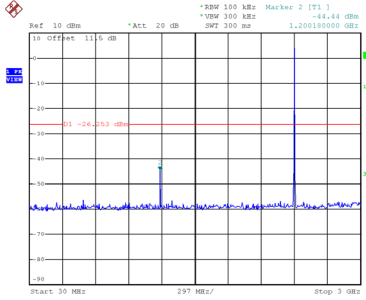
### Bandedge CH39 (Upper)



Date: 18.JUL.2022 10:10:41

Date: 18.JUL.2022 10:33:44

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

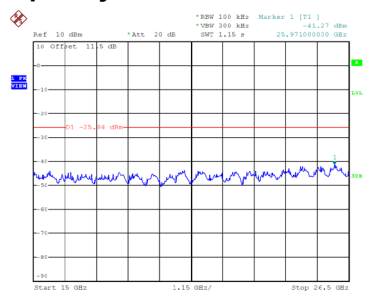
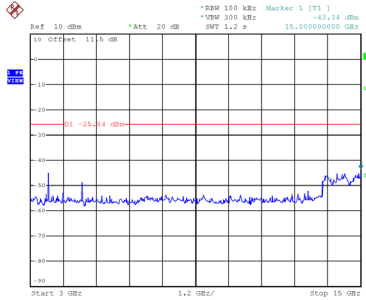
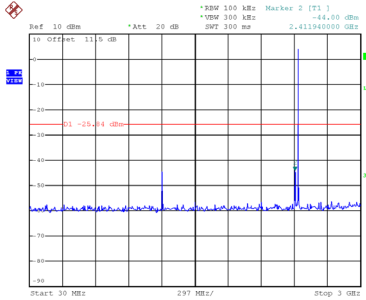


Date: 19.JUL.2022 19:25:01

Date: 19.JUL.2022 19:25:09

Date: 19.JUL.2022 19:25:17

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

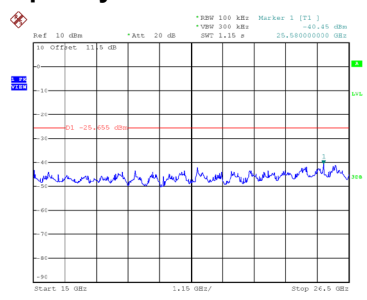
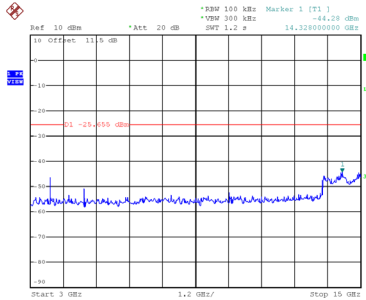
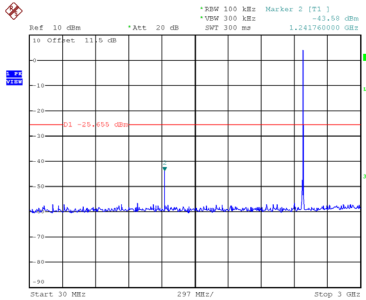


Date: 19.JUL.2022 19:36:55

Date: 19.JUL.2022 19:37:03

Date: 19.JUL.2022 19:37:11

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



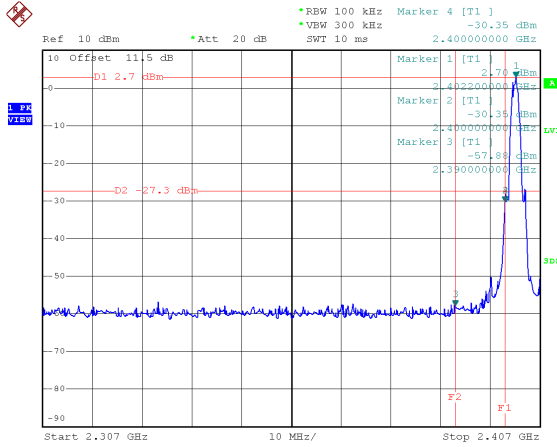
Date: 19.JUL.2022 19:37:41

Date: 19.JUL.2022 19:37:50

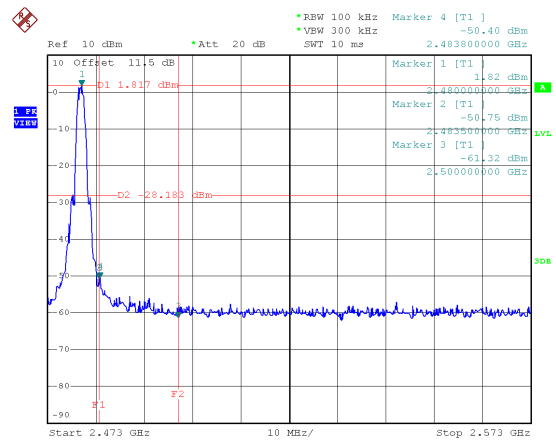
Date: 19.JUL.2022 19:37:58

Test Mode TX Mode\_2Mbps

### Bandedge CH00 (Lower)



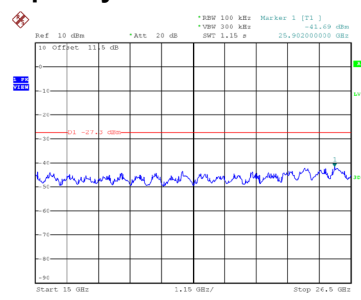
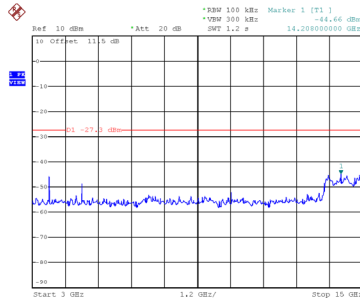
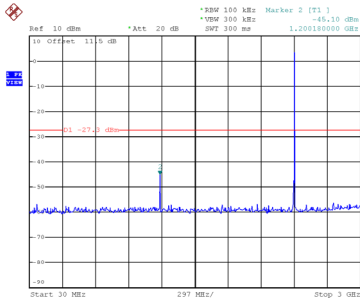
### Bandedge CH39 (Upper)



Date: 18.JUL.2022 10:25:24

Date: 18.JUL.2022 10:31:11

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

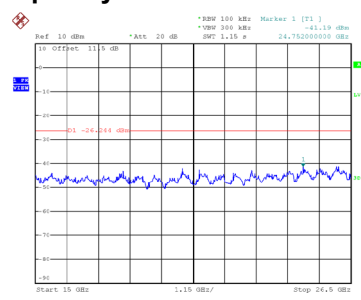
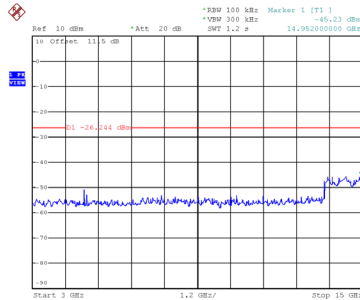
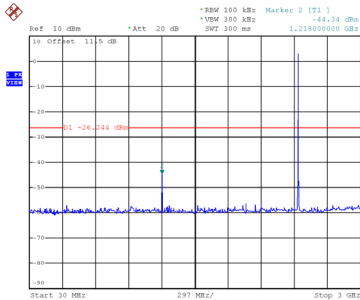


Date: 19.JUL.2022 19:38:18

Date: 19.JUL.2022 19:38:26

Date: 19.JUL.2022 19:38:34

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

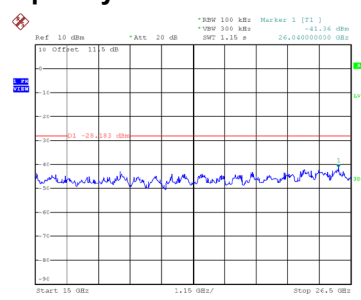
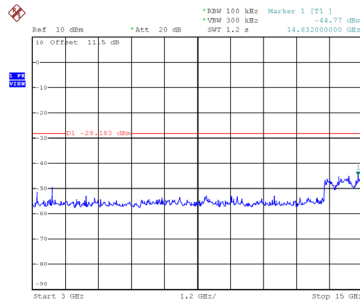
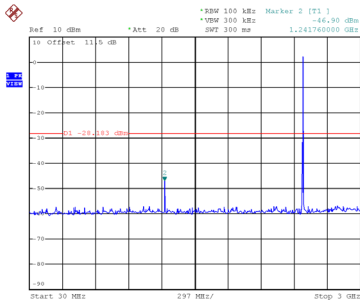


Date: 19.JUL.2022 19:39:31

Date: 19.JUL.2022 19:39:39

Date: 19.JUL.2022 19:39:47

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



Date: 19.JUL.2022 19:40:29

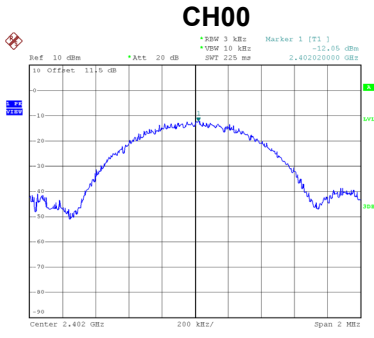
Date: 19.JUL.2022 19:40:37

Date: 19.JUL.2022 19:40:45

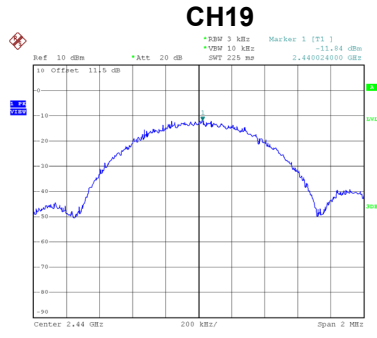
## APPENDIX H - POWER SPECTRAL DENSITY

Test Mode	TX Mode _1Mbps
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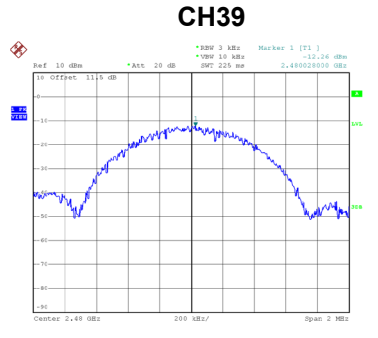
Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-12.05	8.00	Pass
19	2440	-11.84	8.00	Pass
39	2480	-12.26	8.00	Pass



Date: 18.JUL.2022 09:38:02



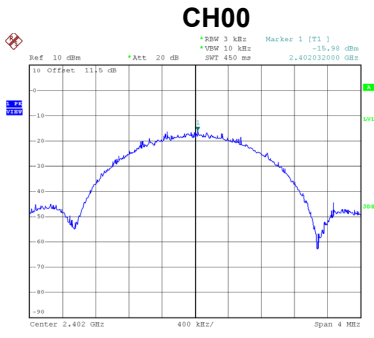
Date: 18.JUL.2022 09:40:16



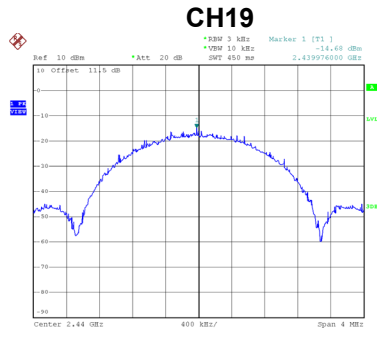
Date: 19.JUL.2022 09:42:49

Test Mode	TX Mode _2Mbps
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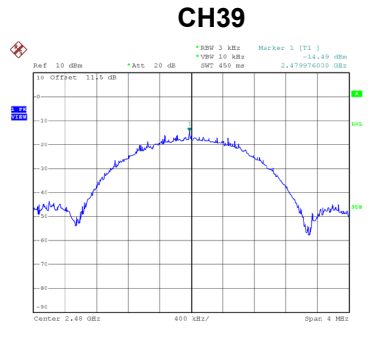
Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-15.98	8.00	Pass
19	2440	-14.68	8.00	Pass
39	2480	-14.49	8.00	Pass



Date: 18.JUL.2022 10:01:54



Date: 18.JUL.2022 10:03:56



Date: 19.JUL.2022 10:05:49

End of Test Report