

FCC Radio Test Report

FCC ID: 2AXJ4T110

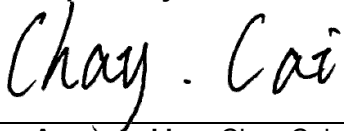
This report concerns: Original Grant

Project No. : 2103C168B
Equipment : Tapo Smart Contact Sensor
Brand Name : tp-link
Test Model : Tapo T110
Series Model : N/A
Applicant : TP-Link Corporation Limited
Address : Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road,
Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer : TP-Link Corporation Limited
Address : Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road,
Tsim Sha Tsui, Kowloon, Hong Kong
Date of Receipt : Dec. 31, 2021
Date of Test : Jan. 06, 2022 ~ Jan. 22, 2022
Issued Date : Feb. 10, 2022
Report Version : R00
Test Sample : Engineering Sample No.: DG2021123036 for conducted,
DG20220114251 for radiated.
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.



Prepared by : Sheldon Ou



Approved by : Chay Cai



TESTING CERT #5123.02

Add: No. 3 Jinshagang 1st Rd. Shixia, Dalang Town Dongguan City, Guangdong 523792

People's Republic of China

Tel: +86-769-8318-3000

Web: www.newbtl.com

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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

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

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

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

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

Limitation

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

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

Table of Contents	Page
REPORT ISSUED HISTORY	6
1 . SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	9
2 . GENERAL INFORMATION	10
2.1 GENERAL DESCRIPTION OF EUT	10
2.2 DESCRIPTION OF TEST MODES	11
2.3 PARAMETERS OF TEST SOFTWARE	11
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	12
2.5 SUPPORT UNITS	12
3 . AC POWER LINE CONDUCTED EMISSIONS	13
3.1 LIMIT	13
3.2 TEST PROCEDURE	13
3.3 DEVIATION FROM TEST STANDARD	13
3.4 TEST SETUP	14
3.5 EUT OPERATING CONDITIONS	14
3.6 TEST RESULTS	14
4 . RADIATED EMISSIONS	15
4.1 LIMIT	15
4.2 TEST PROCEDURE	16
4.3 DEVIATION FROM TEST STANDARD	17
4.4 TEST SETUP	17
4.5 EUT OPERATING CONDITIONS	18
4.6 TEST RESULT - 9 KHZ TO 30 MHZ	18
4.7 TEST RESULT - 30 MHZ TO 1000 MHZ	18
4.8 TEST RESULT - ABOVE 1000 MHZ	18
5 . BANDWIDTH	19
5.1 LIMIT	19
5.2 TEST PROCEDURE	19
5.3 DEVIATION FROM STANDARD	19
5.4 TEST SETUP	19

Table of Contents	Page
5.5 EUT OPERATION CONDITIONS	19
5.6 TEST RESULTS	19
6 . MAXIMUM OUTPUT POWER	20
6.1 LIMIT	20
6.2 TEST PROCEDURE	20
6.3 DEVIATION FROM STANDARD	20
6.4 TEST SETUP	20
6.5 EUT OPERATION CONDITIONS	20
6.6 TEST RESULTS	20
7 . CONDUCTED SPURIOUS EMISSION	21
7.1 LIMIT	21
7.2 TEST PROCEDURE	21
7.3 DEVIATION FROM STANDARD	21
7.4 TEST SETUP	21
7.5 EUT OPERATION CONDITIONS	21
7.6 TEST RESULTS	21
8 . POWER SPECTRAL DENSITY	22
8.1 LIMIT	22
8.2 TEST PROCEDURE	22
8.3 DEVIATION FROM STANDARD	22
8.4 TEST SETUP	22
8.5 EUT OPERATION CONDITIONS	22
8.6 TEST RESULTS	22
9 . MEASUREMENT INSTRUMENTS LIST	23
10 . EUT TEST PHOTO	25
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	30
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	31
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	36
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ	39
APPENDIX E - BANDWIDTH	44
APPENDIX F - MAXIMUM OUTPUT POWER	46

Table of Contents**Page****APPENDIX G - CONDUCTED SPURIOUS EMISSION****48****APPENDIX H - POWER SPECTRAL DENSITY****52**

REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Feb. 10, 2022

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. 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

B. Other Measurement:

Test Item	Uncertainty
Bandwidth	±3.8 %
Maximum Output Power	±0.95 dB
Conducted Spurious Emission	±2.71 dB
Power Spectral Density	±0.86 dB
Temperature	±0.08 °C
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
Radiated Emissions-9 kHz to 30 MHz	20°C	55%	DC 3V	Torocat Yuan
Radiated Emissions-30 MHz to 1000 MHz	22°C	55%	DC 3V	Jakyri Wen
Radiated Emissions-Above 1000 MHz	22°C	55%	DC 3V	Jakyri Wen
Bandwidth	21°C	41%	DC 3V	Jesse Wang
Maximum Output Power	21°C	41%	DC 3V	Jesse Wang
Conducted Spurious Emission	21°C	41%	DC 3V	Jesse Wang
Power Spectral Density	21°C	41%	DC 3V	Jesse Wang

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Tapo Smart Contact Sensor
Brand Name	tp-link
Test Model	Tapo T110
Series Model	N/A
Model Difference(s)	N/A
Power Source	Battery supplied.
Power Rating	2.5-3V 
Operation Frequency	902 MHz ~ 928 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	50 kbps
Max. Output Power	10.94 dBm (0.0124 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)
00	922.3

3. Table for Filed Antenna:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	tp-link	Antenna_Tapo T110(US)1.0	Internal	N/A	-2.61

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_Channel 00

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

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 1	TX Mode_Channel 00

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	TX Mode_Channel 00

Conducted test	
Final Test Mode	Description
Mode 1	TX Mode_Channel 00

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.

2.3 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	N/A
-----------------------	-----

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

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

Item	Cable Type	Shielded Type	Ferrite Core	Length
-	-	-	-	-

3. AC POWER LINE CONDUCTED EMISSIONS

3.1 LIMIT

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

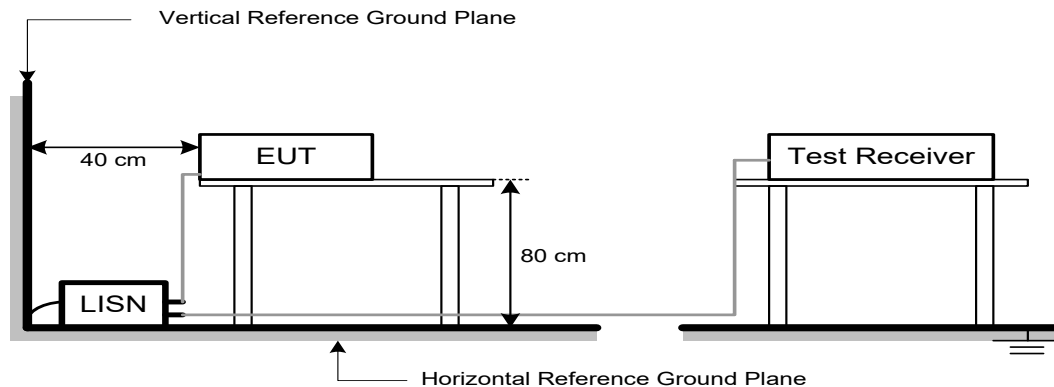
The following table is the setting of the receiver:

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:

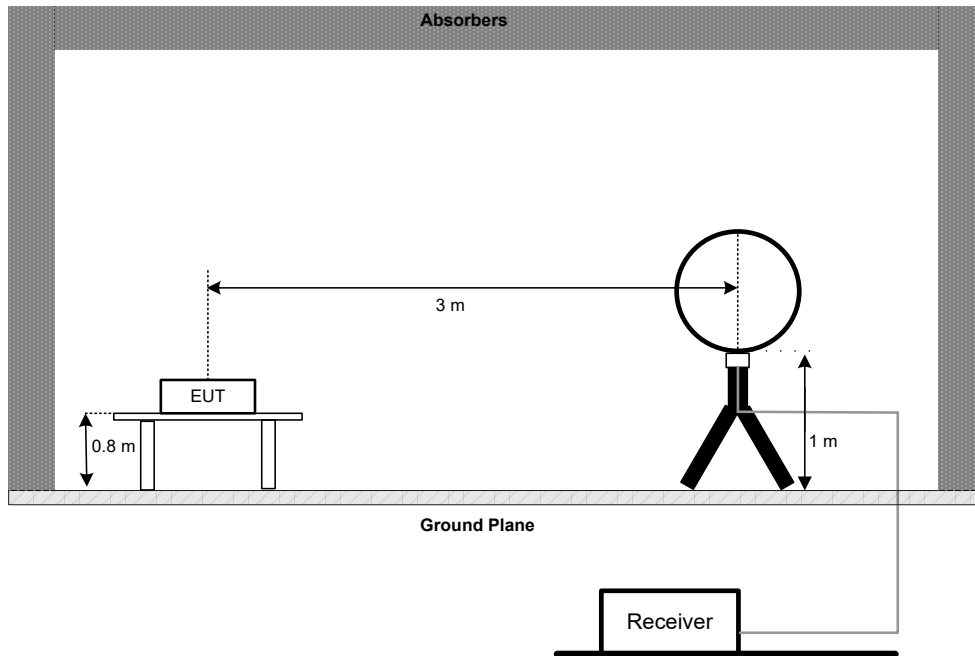
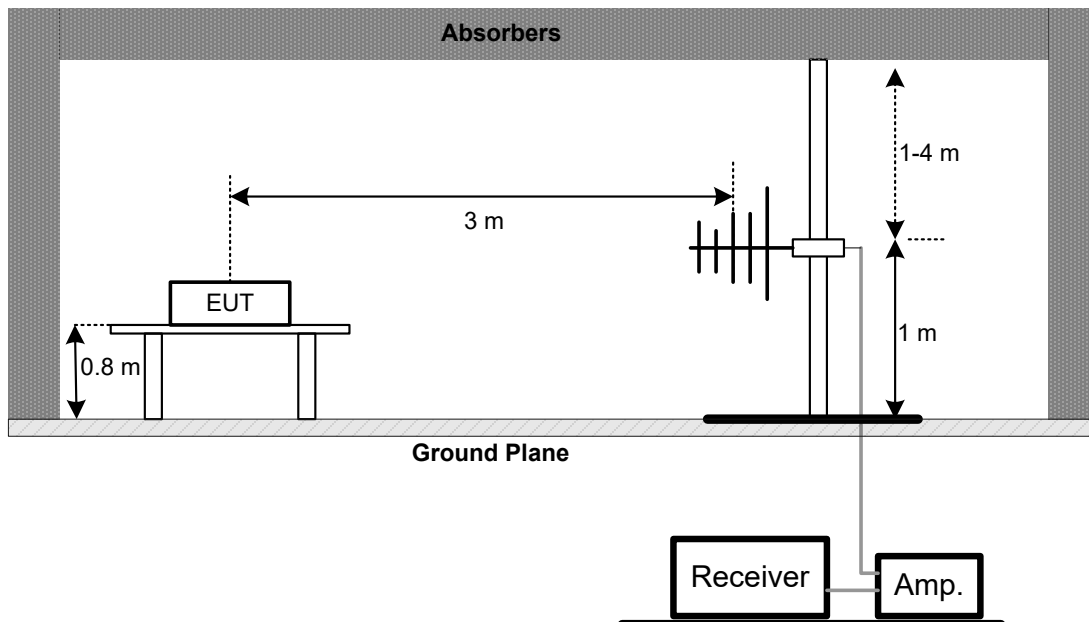
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

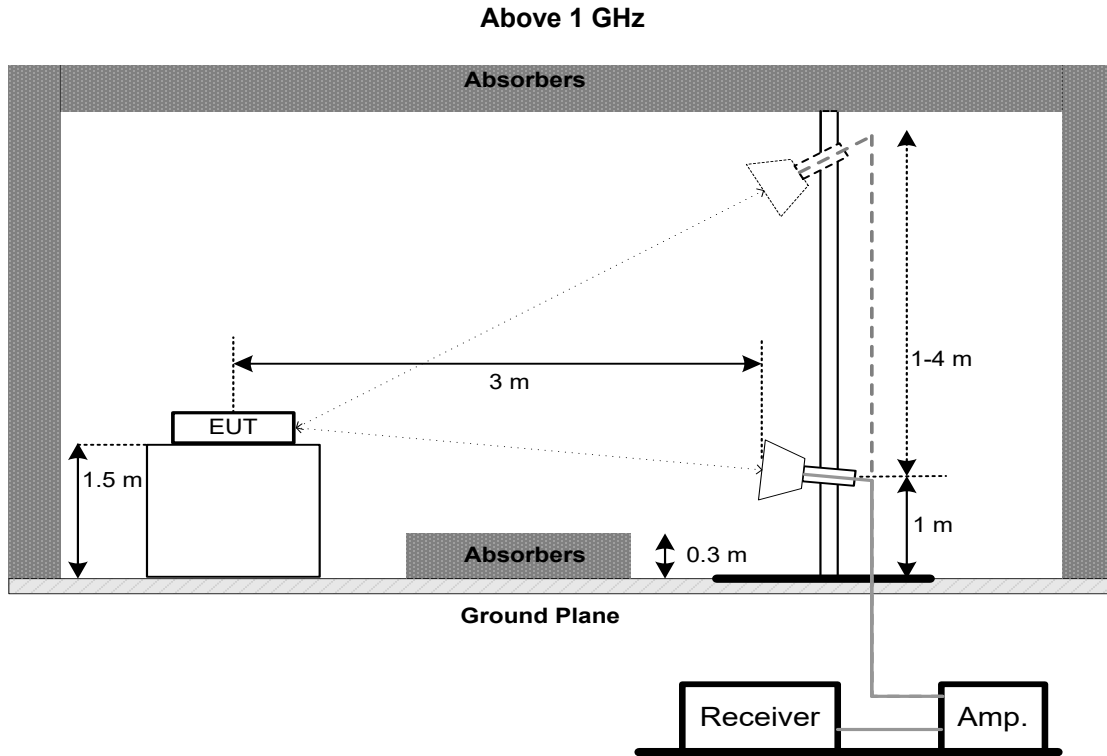
Spectrum Parameters	Setting
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3 MHz for PK value 1 MHz / 1/T Hz for AVG value

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	≥ 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	2 MHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

For 99% Emission Bandwidth:

Spectrum Parameters	Setting
Span Frequency	2 MHz
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

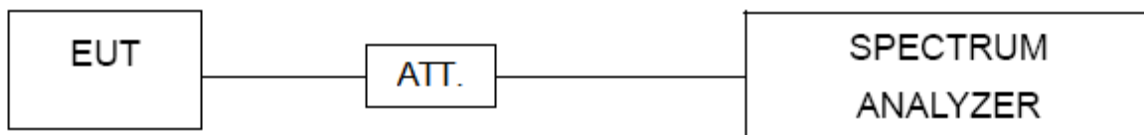
Spectrum Parameters	Setting
Span Frequency	At least 1.5 times the OBW
RBW	1% to 5% of the OBW, not to exceed 1 MHz
VBW	$\geq 3 \times \text{RBW}$
Detector	RMS
Trace	Max Hold
Sweep Time	$\leq (\text{number of points in sweep}) \times T$ (Note)

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

- 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 Reference Level:

Spectrum Parameters	Setting
Span Frequency	≥ 1.5 times the bandwidth.
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

For Emission Level:

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	900 kHz
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

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	Feb. 27, 2022
2*	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 23, 2024
3	Cable	N/A	RG 213/U(9kHz~1GHz)	N/A	May 27, 2022
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. 17, 2022

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. 15, 2022
2	Amplifier	HP	8447D	2944A08742	Feb. 28, 2022
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	Mar. 19, 2022
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. 24, 2022

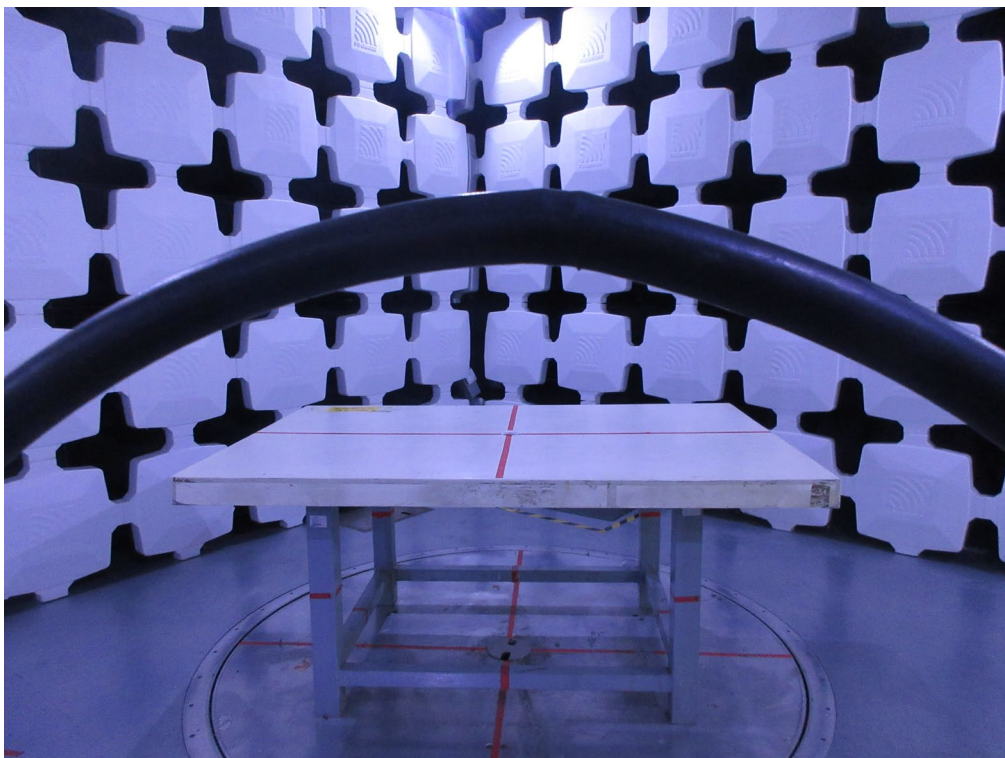
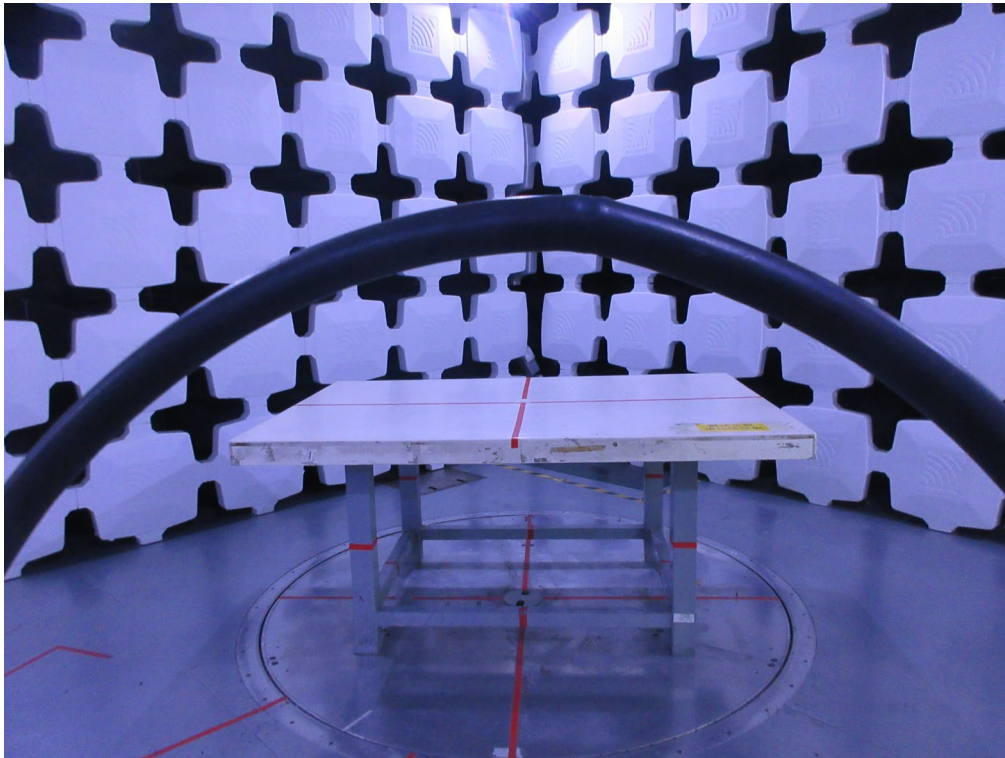
Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Horn Antenna	ARA	DRG-118A	16554	Apr. 21, 2022
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2022
3	Amplifier	Agilent	8449B	3008A02584	Jul. 10, 2022
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022
7	EXA Spectrum Analyzer	Keysight	N9010A	MY56480488	Feb. 28, 2022
8	Low Noise Amplifier	CONNPHY	CLN-18G40G-4330 -K	619413	Jul. 16, 2022
9	Cable	N/A	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. 10, 2022
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. 24, 2022

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. 10, 2022
2	Attenuator	WOKEN	6SM3502	VAS1214NL	Feb. 07, 2022
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.

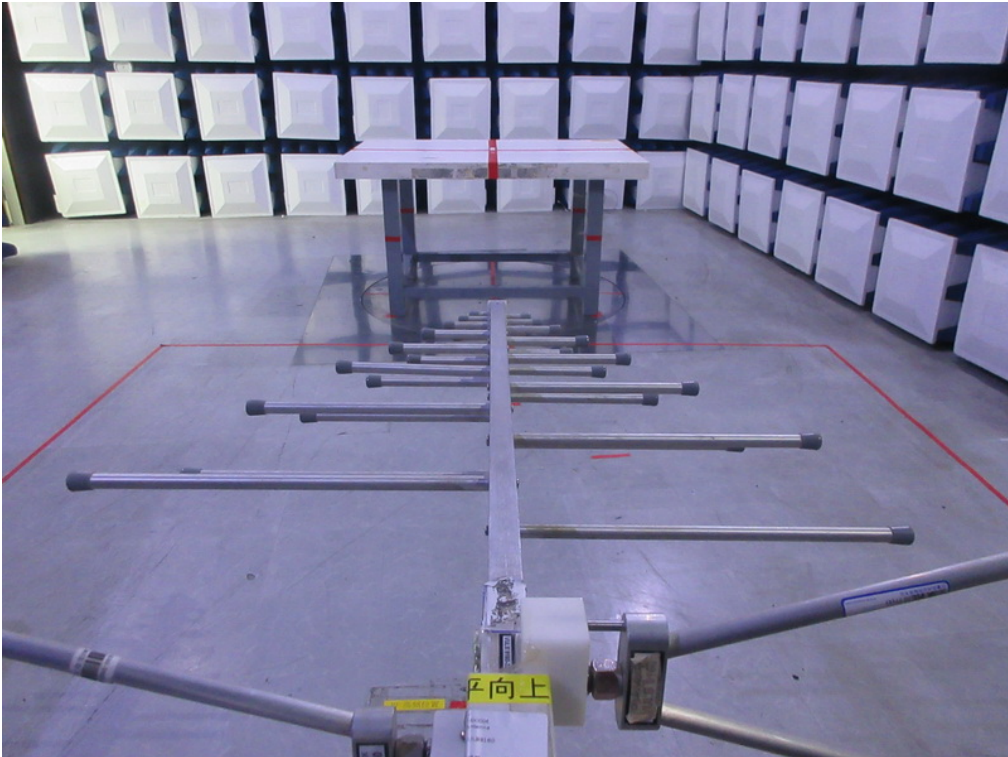
"*" calibration period of equipment list is three year.

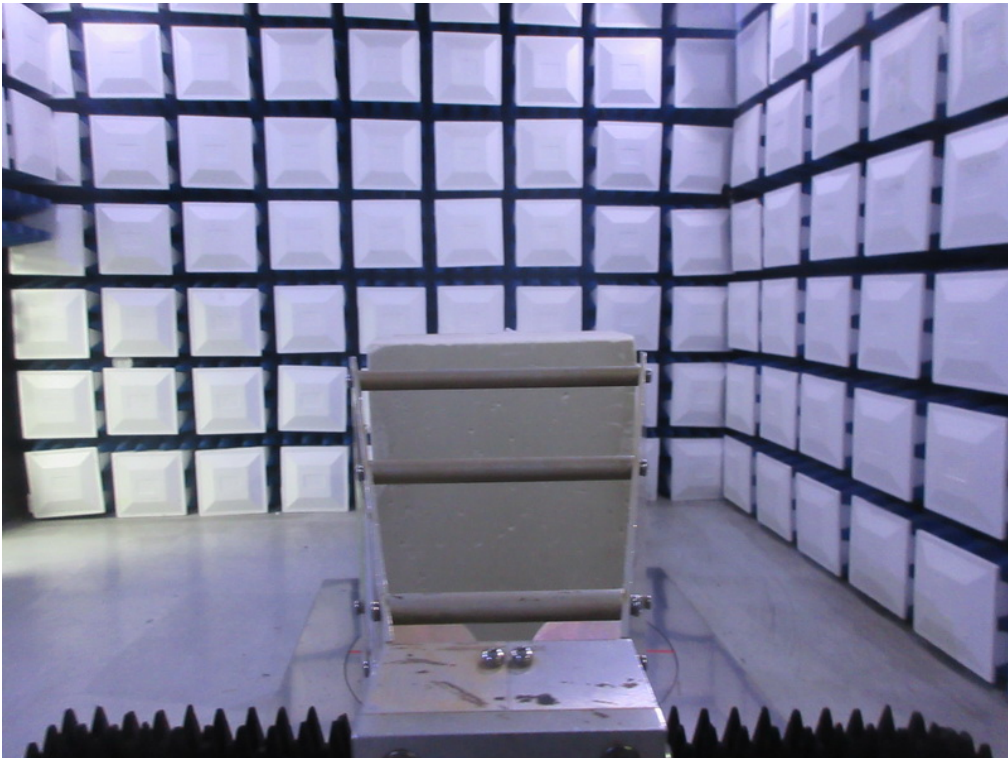
Except * item, all calibration period of equipment list is one year.

10. EUT TEST PHOTO**Radiated Emissions Test Photos****9 kHz to 30 MHz**

Radiated Emissions Test Photos

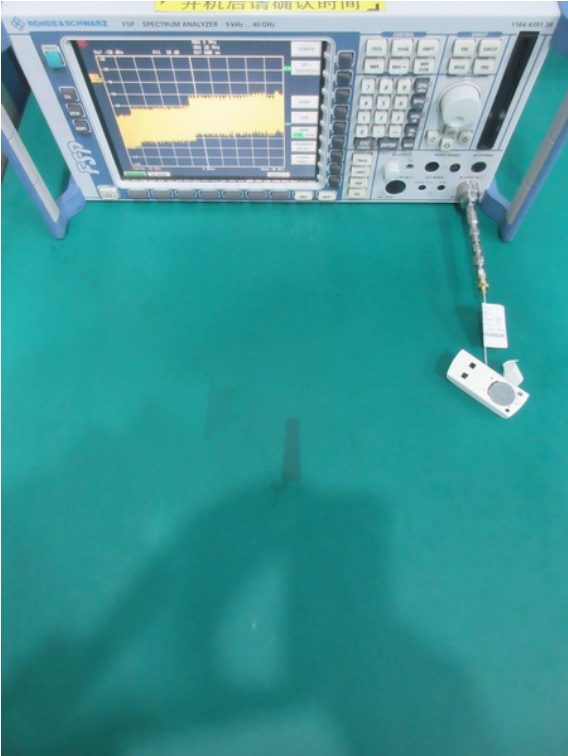
30 MHz to 1 GHz



Radiated Emissions Test Photos**Above 1 GHz**



Conducted Test Photos



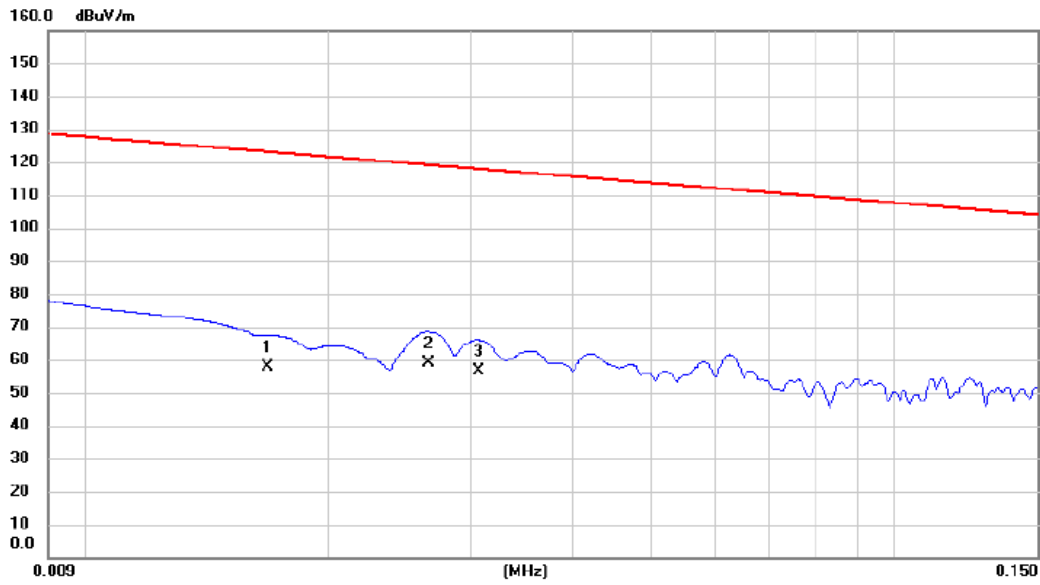
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

Test Mode: N/A

Note: "N/A" denotes test is not applicable to this device.

APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ

Test Mode	TX Mode Channel 00	Polarization	Ant 0°
-----------	--------------------	--------------	--------

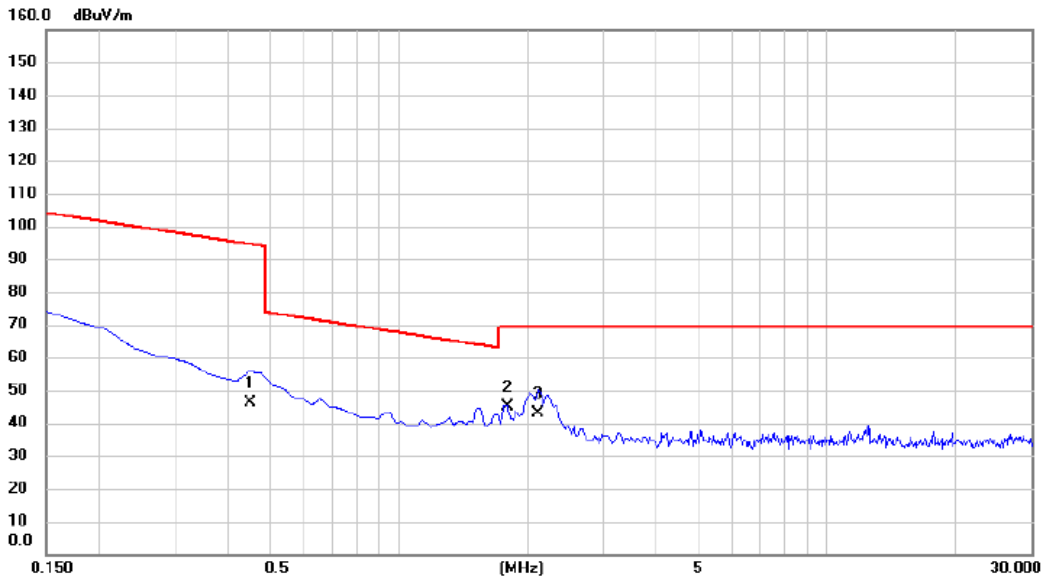


No. Mk.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	0.0168	42.55	15.30	57.85	123.10	-65.25	AVG	
2 *	0.0266	44.96	14.14	59.10	119.11	-60.01	AVG	
3	0.0306	42.63	14.05	56.68	117.89	-61.21	AVG	

REMARKS:

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

Test Mode	TX Mode Channel 00	Polarization	Ant 0°
-----------	--------------------	--------------	--------

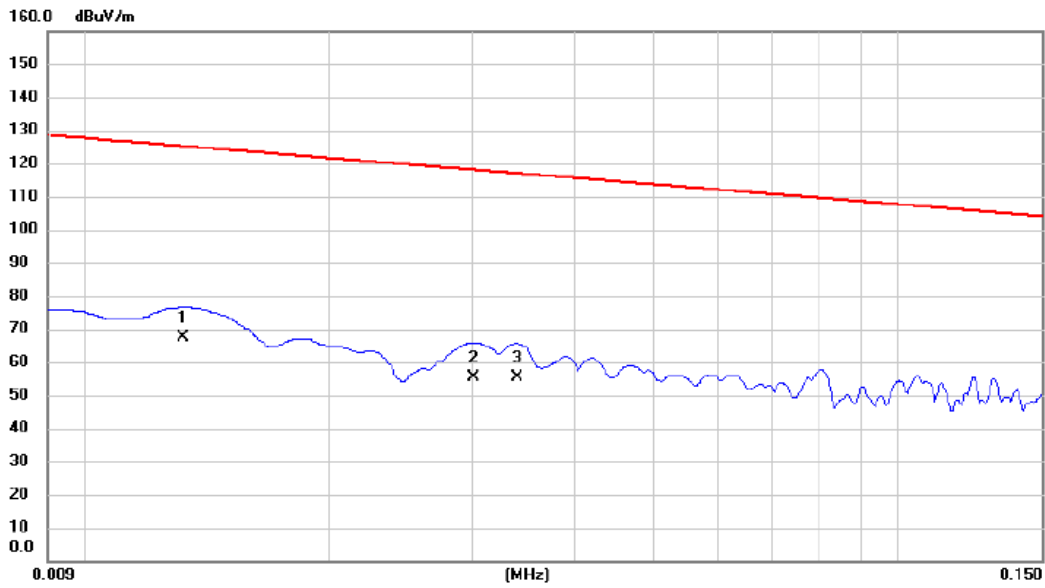


No. Mk.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	0.4485	32.85	13.40	46.25	94.57	-48.32	AVG	
2 *	1.7917	32.96	12.24	45.20	69.54	-24.34	QP	
3	2.1201	30.96	12.04	43.00	69.54	-26.54	QP	

REMARKS:

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

Test Mode	TX Mode Channel 00	Polarization	Ant 90°
-----------	--------------------	--------------	---------

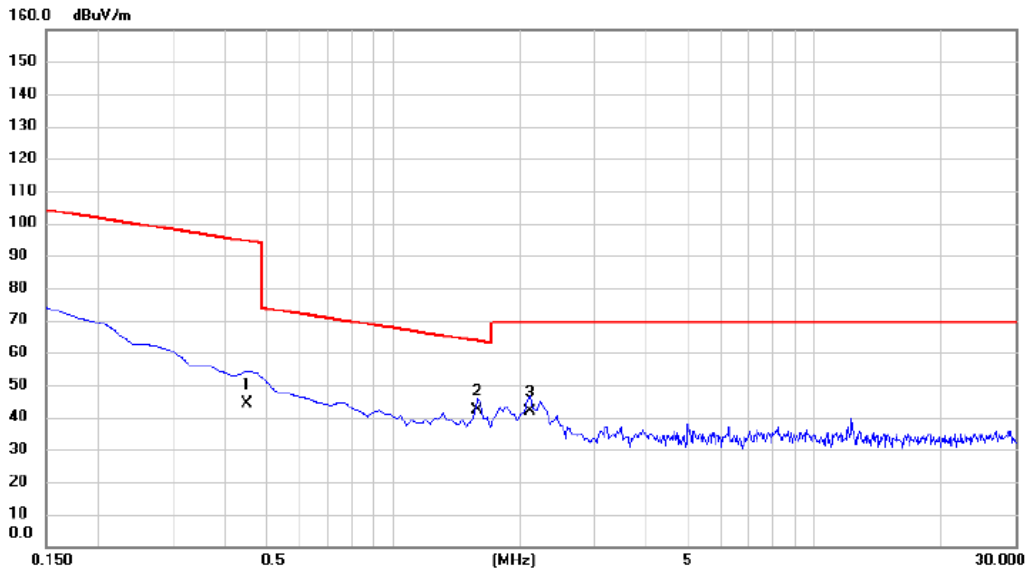


No.	Mk.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	0.0132	50.96	16.43	67.39	125.19	-57.80	AVG	
2		0.0301	41.21	14.06	55.27	118.03	-62.76	AVG	
3		0.0340	41.35	13.97	55.32	116.98	-61.66	AVG	

REMARKS:

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

Test Mode	TX Mode Channel 00	Polarization	Ant 90°
-----------	--------------------	--------------	---------



No. Mk.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	0.4485	30.96	13.40	44.36	94.57	-50.21	AVG	
2 *	1.5828	29.65	12.40	42.05	63.62	-21.57	QP	
3	2.1201	29.63	12.04	41.67	69.54	-27.87	QP	

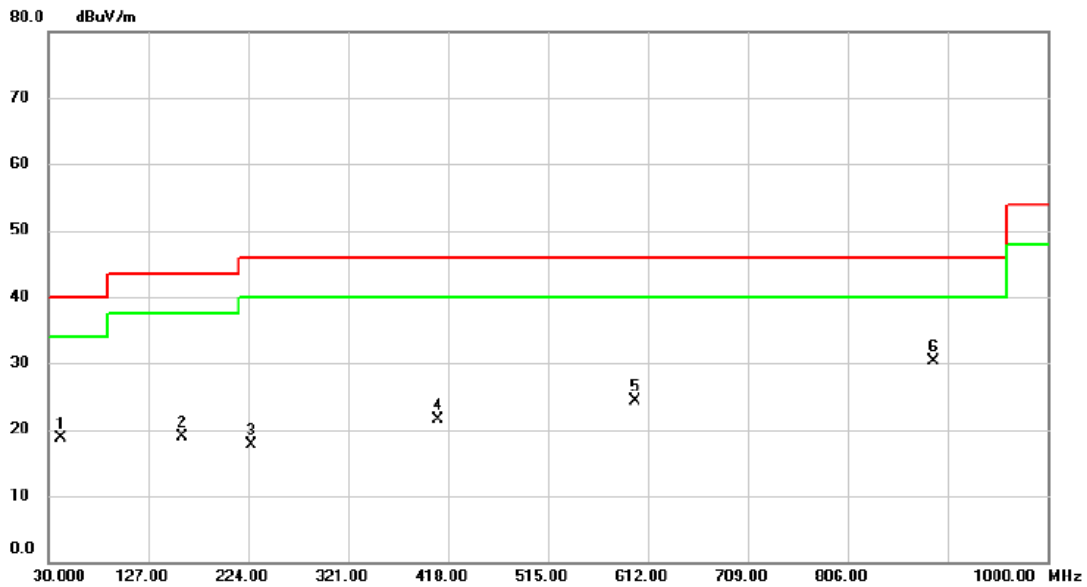
REMARKS:

(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 00	Polarization	Vertical
-----------	--------------------	--------------	----------

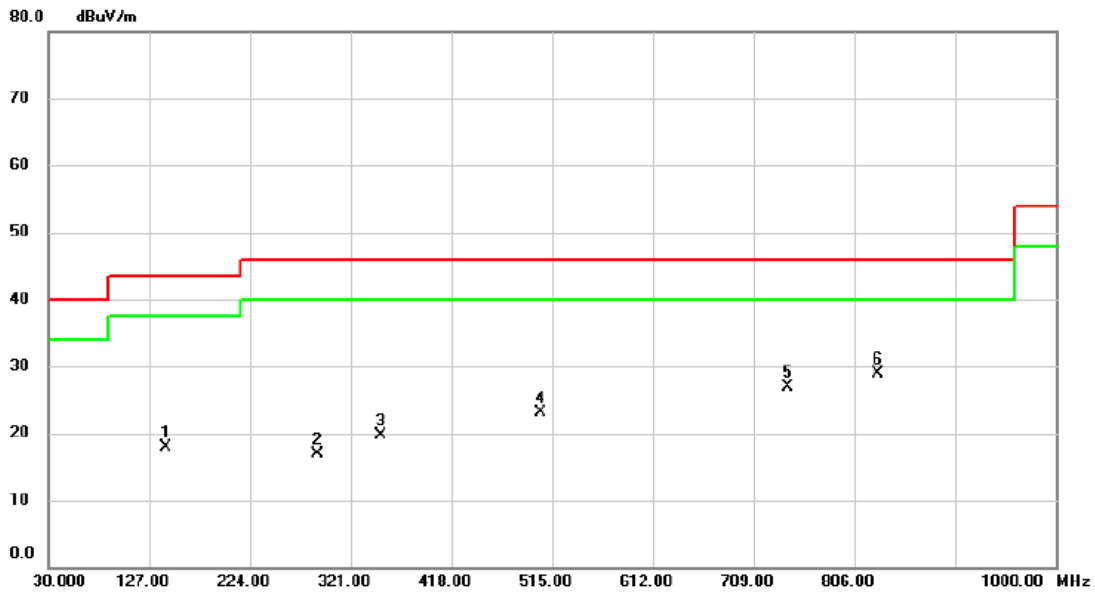


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	42.610	32.92	-14.18	18.74	40.00	-21.26	peak	
2	159.980	29.52	-10.67	18.85	43.50	-24.65	peak	
3	227.395	31.67	-13.96	17.71	46.00	-28.29	peak	
4	408.785	30.18	-8.76	21.42	46.00	-24.58	peak	
5	599.390	29.63	-5.37	24.26	46.00	-21.74	peak	
6 *	889.420	31.53	-1.27	30.26	46.00	-15.74	peak	

REMARKS:

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

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



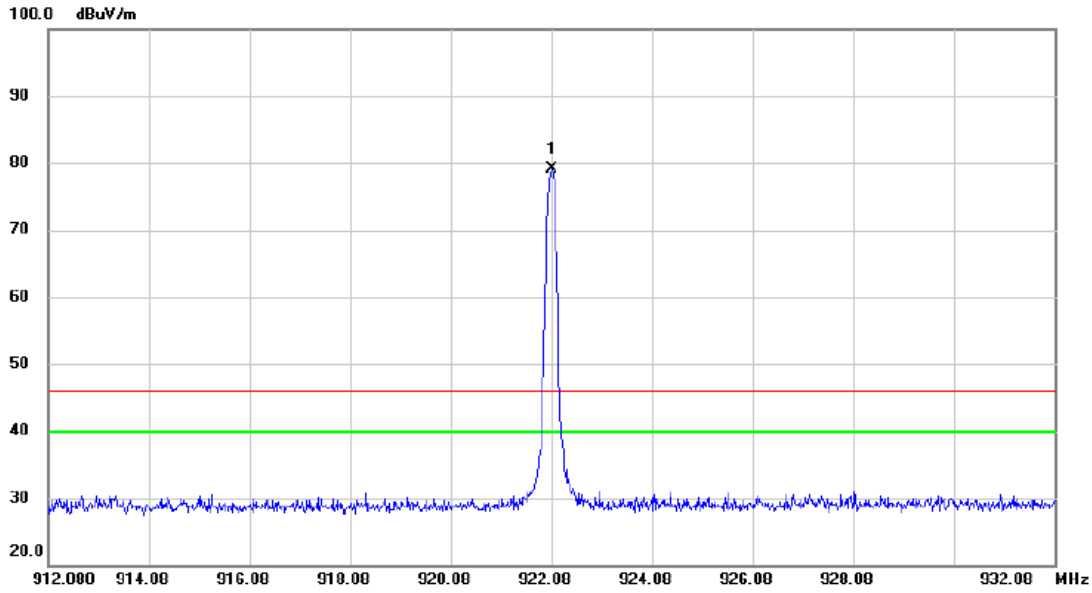
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		143.005	30.25	-12.38	17.87	43.50	-25.63	peak	
2		288.990	28.39	-11.55	16.84	46.00	-29.16	peak	
3		349.615	29.86	-10.22	19.64	46.00	-26.36	peak	
4		504.330	30.34	-7.22	23.12	46.00	-22.88	peak	
5		742.465	30.18	-3.27	26.91	46.00	-19.09	peak	
6	*	828.795	30.98	-2.07	28.91	46.00	-17.09	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 922.3 MHz _CH00	Polarization	Vertical
-----------	--------------------	--------------	----------

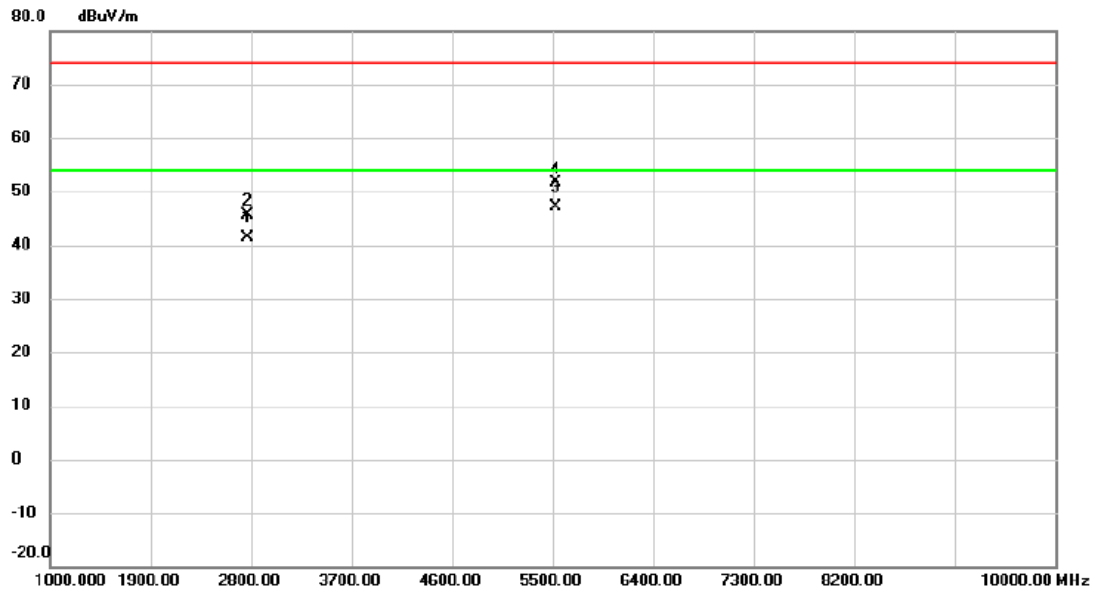


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	922.080	68.12	10.95	79.07	46.00	33.07	QP	No Limit

REMARKS:

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

Test Mode	TX 922.3 MHz _CH00	Polarization	Vertical
-----------	--------------------	--------------	----------

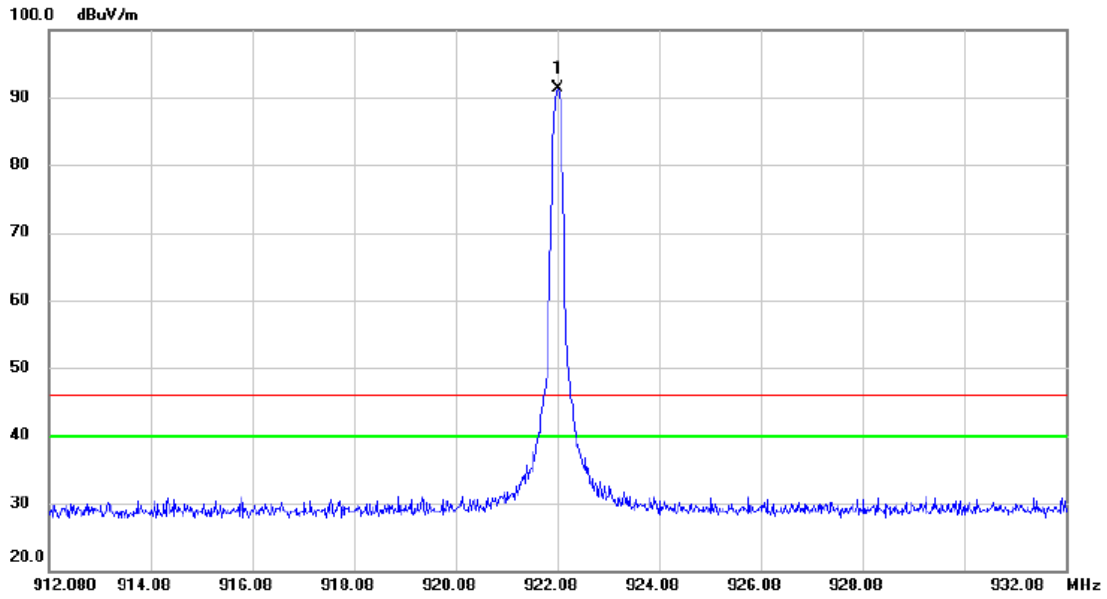


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2766.229	42.14	-0.64	41.50	54.00	-12.50	AVG	
2		2766.258	46.22	-0.64	45.58	74.00	-28.42	peak	
3	*	5532.529	40.40	6.68	47.08	54.00	-6.92	AVG	
4		5532.706	45.01	6.68	51.69	74.00	-22.31	peak	

REMARKS:

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

Test Mode	TX 922.3 MHz _CH00	Polarization	Horizontal
-----------	--------------------	--------------	------------

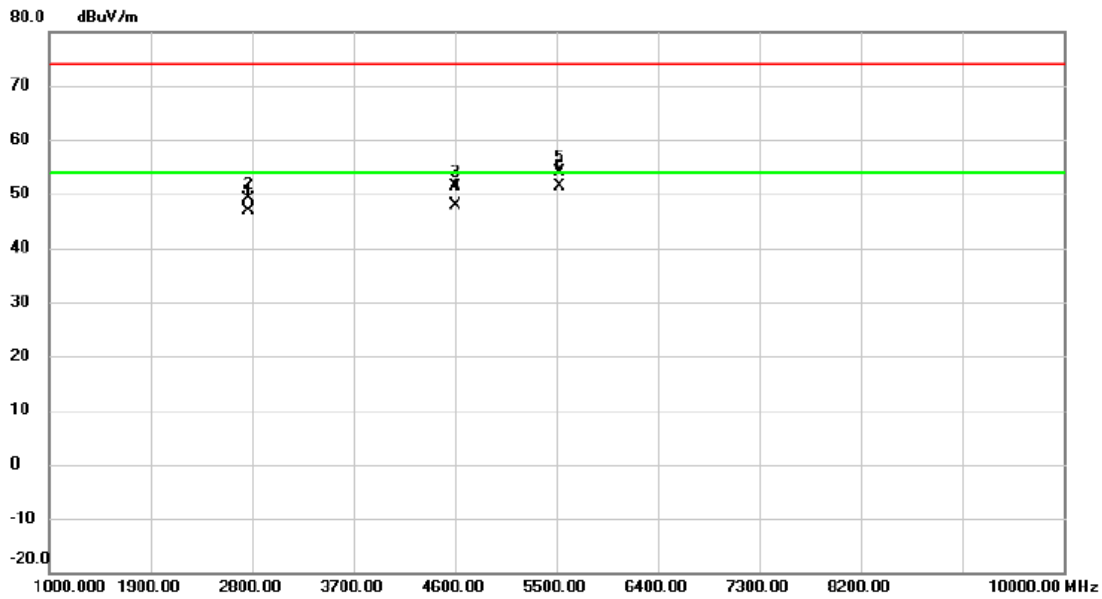


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	922.080	80.40	10.95	91.35	46.00	45.35	QP	No Limit

REMARKS:

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

Test Mode	TX 922.3 MHz _CH00	Polarization	Horizontal
-----------	--------------------	--------------	------------



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	2766.255	47.50	-0.64	46.86	54.00	-7.14	AVG	
2	2766.315	49.89	-0.64	49.25	74.00	-24.75	peak	
3	4610.370	47.17	4.15	51.32	74.00	-22.68	peak	
4	4610.447	43.81	4.15	47.96	54.00	-6.04	AVG	
5	5532.510	47.55	6.68	54.23	74.00	-19.77	peak	
6 *	5532.532	44.62	6.68	51.30	54.00	-2.70	AVG	

REMARKS:

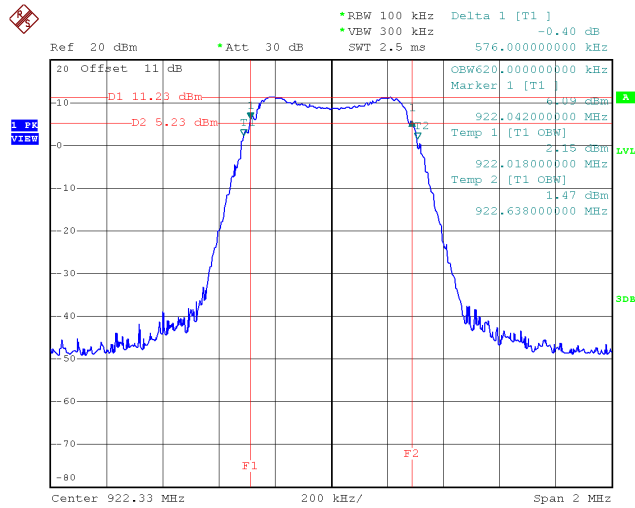
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX E - BANDWIDTH

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

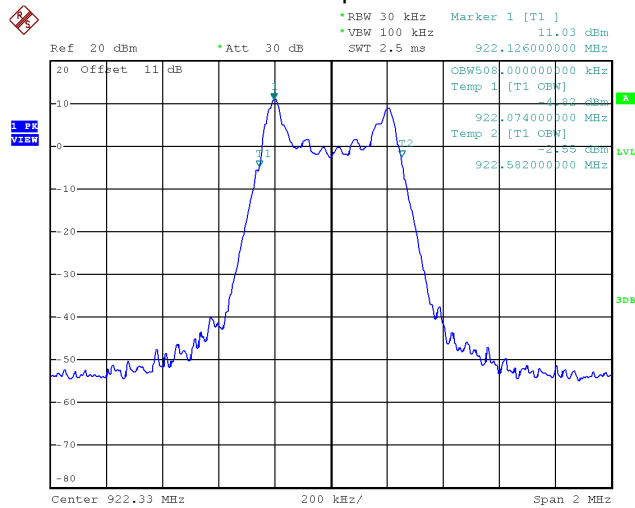
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	922.3	0.576	0.508	0.50	Pass

CH00 6 dB Bandwidth



Date: 19.JAN.2022 20:04:57

99 % Occupied Bandwidth

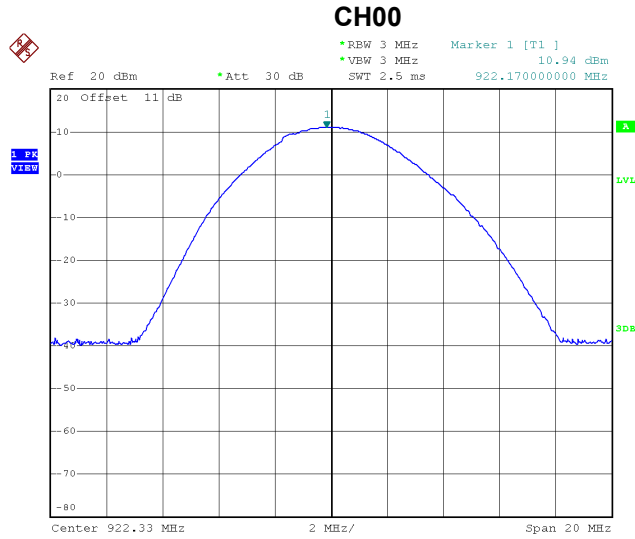


Date: 10.JAN.2022 10:00:13

APPENDIX F - MAXIMUM OUTPUT POWER

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

Frequency (MHz)	Output Power (dBm)	Max. Limit (dBm)	Max. Limit (W)	Test Result
922.3	10.94	30.00	1.0000	Pass

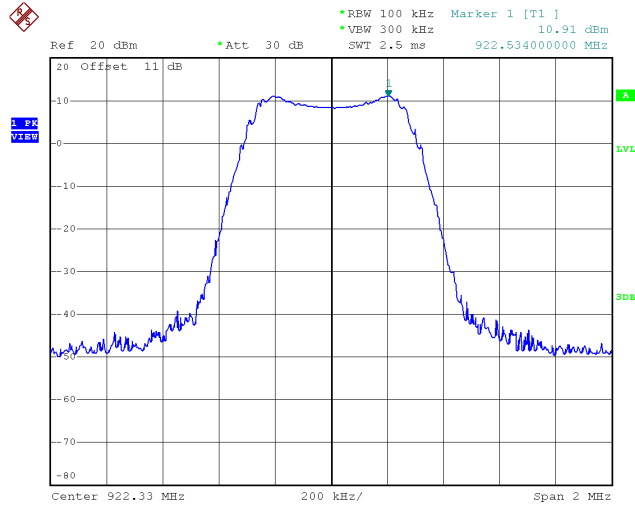


Date: 19.JAN.2022 20:17:04

APPENDIX G - CONDUCTED SPURIOUS EMISSION

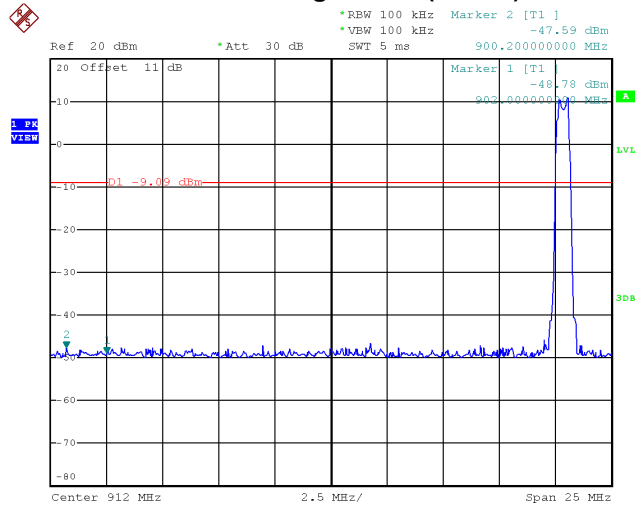
Test Mode TX Mode

Reference Level



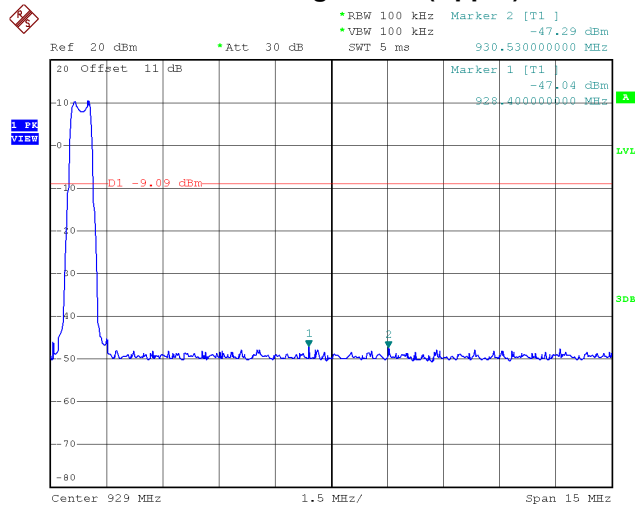
Date: 19.JAN.2022 20:12:36

Bandedge CH00 (Lower)



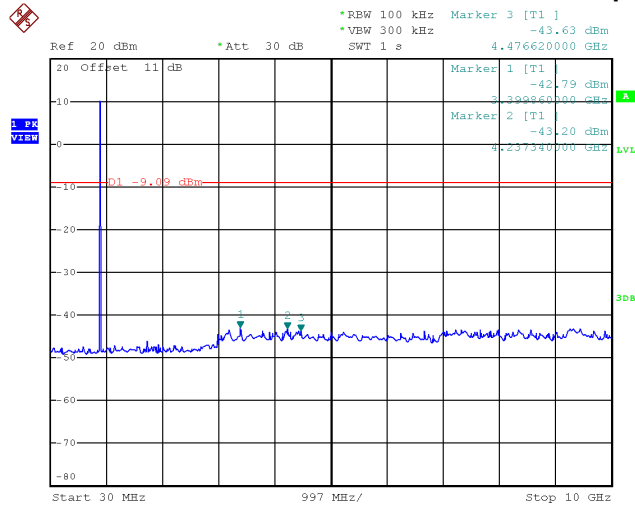
Date: 10.JAN.2022 09:57:45

Bandedge CH00 (Upper)



Date: 19.JAN.2022 20:28:40

CH00 - 10th Harmonic of the fundamental frequency

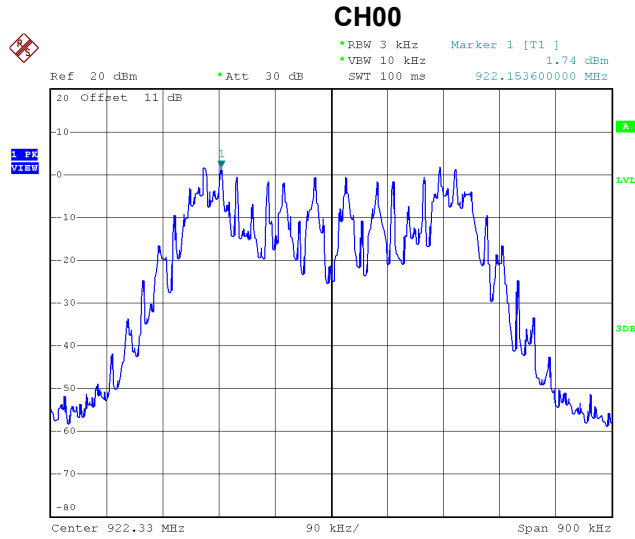


Date: 10.JAN.2022 09:51:39

APPENDIX H - POWER SPECTRAL DENSITY

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

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	922.3	1.74	8.00	Pass



Date: 19.JAN.2022 20:16:04

End of Test Report