

Product Name: Tapo Smart IoT HUB	Report No: FCC022022-05742RF0
Product Model: Tapo H100	Security Classification: Open
Version: V1.0	Total Page:50

TIRT Testing Report



Prepared By:	Checked By:	Approved By:	The logo for TIRT Shenzhen is a circular blue stamp. The outer ring contains the text "Beijing Jiairuite Inspection & Testing Technology Service Co., Ltd." and the inner circle contains "TIRT Shenzhen" with a small star at the bottom.
Stone Tang	Randy Lv	Daniel Chen	
<i>Stone Tang</i>	<i>Randy Lv</i>	<i>Daniel chen</i>	

FCC Radio Test Report

FCC ID: 2AXJ4H100

This report concerns: Class II Permissive Change

Equipment	: Tapo Smart IoT HUB
Brand Name	: Tp-link, Tapo
Test Model	: Tapo H100
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	: 2022.11.2
Date of Test	: 2022.11.2 ~ 2022.11.7 2022.11.24 ~ 2022.11.24
Issued Date	: 2022.11.24
Report Version	: V2.0
Test Sample	: Engineering Sample No.: 20221103019322
Standard(s)	: FCC CFR Title 47, Part 15, Subpart C FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10-2013

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

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen

Add: 101, 3 # Factory Building, Gongjin Electronics, Shatin Community, Kengzi
Street, Pingshan District, Shenzhen City, China

TEL: +86-0755-27087573

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	8
2 . GENERAL INFORMATION	9
2.1 GENERAL DESCRIPTION OF EUT	9
2.2 DESCRIPTION OF TEST MODES	10
2.3 PARAMETERS OF TEST SOFTWARE	10
2.4 DUTY CYCLE	11
2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	12
2.6 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

Table of Contents	Page
5.4 TEST SETUP	19
5.5 EUT OPERATION CONDITIONS	19
5.6 TEST RESULTS	19
6 . MAXIMUM AVERAGE 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	24
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	27
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	30
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	31
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ	34
APPENDIX E - BANDWIDTH	43
APPENDIX F - MAXIMUM OUTPUT POWER	45

Table of Contents**Page****APPENDIX G - CONDUCTED SPURIOUS EMISSION****47****APPENDIX H - POWER SPECTRAL DENSITY****49**

REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
FCC022022-05742RF0	V1.0	Compared with original report (BTL-FCCP-2-2104C175B), added the nominal operating frequency (920.9MHz, 921.7MHz). So all test items of new nominal operating frequency are tested and recorded. Other are kept the same.	2022.11.08	Invalid
FCC022022-05742RF0	V2.0	Modified the comments.	2022.11.24	Valid

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

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

Note:

- (1) "N/A" denotes test is not applicable to this device.
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

1.1 TEST FACILITY

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

1.2 MEASUREMENT UNCERTAINTY

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

The TIRT measurement uncertainty as below table:

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	±142.12kHz
RF power conducted	±0.74dB
RF power radiated	±3.25dB
Spurious emissions, conducted	±1.78dB
Spurious emissions, radiated (30MHz~1GHz)	±4.6dB
Spurious emissions, radiated (1GHz ~ 18GHz)	±4.9dB
Conduction Emissions(150kHz~30MHz)	±3.1dB
Humidity	±4.6%
Temperature	±0.7°C
Time	±1.25%

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

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	24.5°C	52%	AC 120V/60Hz	Stone Tang
Radiated Emissions-9 kHz to 30 MHz	24.2°C	53%	AC 120V/60Hz	Stone Tang
Radiated Emissions-30 MHz to 1000 MHz	24.2°C	53%	AC 120V/60Hz	Stone Tang
Radiated Emissions-Above 1000 MHz	24.2°C	53%	AC 120V/60Hz	Stone Tang
Bandwidth	24.3°C	56%	AC 120V/60Hz	Stone Tang
Maximum Output Power	24.3°C	56%	AC 120V/60Hz	Stone Tang
Conducted Spurious Emission	24.3°C	56%	AC 120V/60Hz	Stone Tang
Power Spectral Density	24.3°C	56%	AC 120V/60Hz	Stone Tang

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Tapo Smart IoT HUB
Brand Name	tp-link, tapo
Test Model	Tapo H100
Series Model	N/A
Model Difference(s)	N/A
Power Source	AC Mains.
Power Rating	100-240V ~50/60Hz
Operation Frequency Band	902 MHz ~ 928 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	50 kbps
Max. Output Power	15.39 dBm (0.0346 W)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

Channel	Frequency (MHz)
00	920.9
01	921.7
02	923.3

Note: Please refer to the original report (BTL-FCCP-2-2104C175B) for CH02 test data

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	tp-link	N/A	Internal	N/A	-4.85

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
Mode 2	TX Mode_Channel 00/01

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

AC Power Line Conducted Emissions test	
Final Test Mode	Description
Mode 1	TX Mode_Channel 00

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 2	TX Mode_Channel 00/01

Conducted test	
Final Test Mode	Description
Mode 2	TX Mode_Channel 00/01

Note:

- (1) For radiated emission above 1 GHz test, the spurious points of 1GHz~10GHz 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 emission below 1 GHz test, the Channel 00 is found to be the worst case and recorded.

2.3 PARAMETERS OF TEST SOFTWARE

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software Version	N/A	
Frequency (MHz)	920.9	921.7
-	Default	Default

2.4 DUTY CYCLE

If duty cycle is $\geq 98\%$, duty factor is not required.

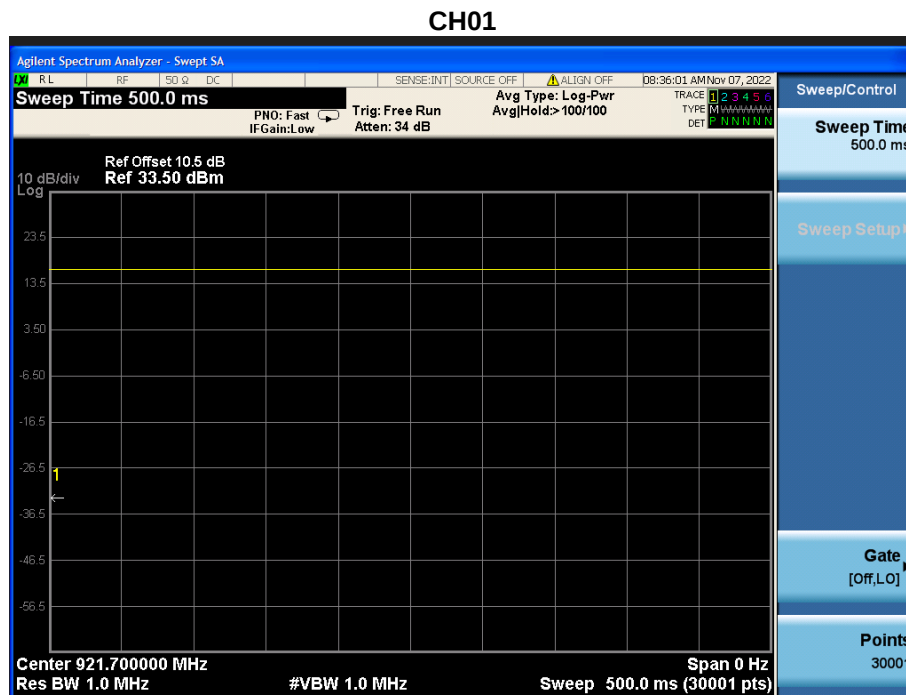
If duty cycle is $< 98\%$, duty factor shall be considered.

The output power = measured power + duty factor.



Duty cycle = 1.00 ms / 1.00 ms = 100.00%

Duty Factor = 0.00



Duty cycle = 1.00 ms / 1.00 ms = 100.00%

Duty Factor = 0.00

2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**2.6 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 (dBμV)	
	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.

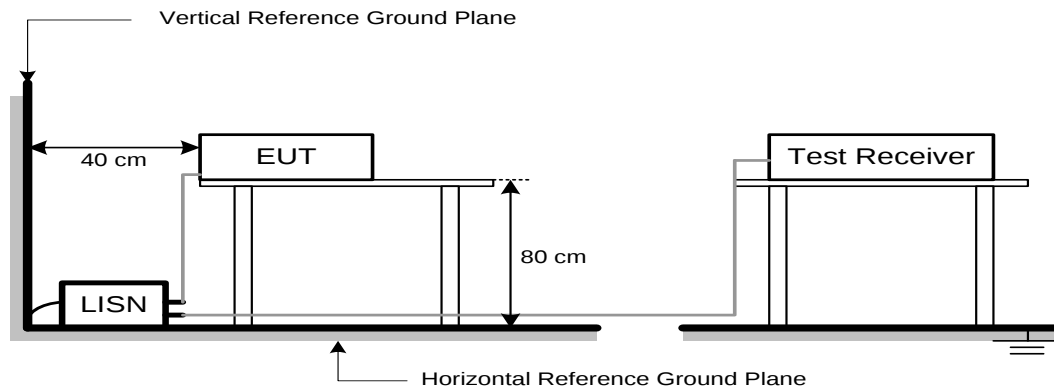
The following table is the setting of the receiver:

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

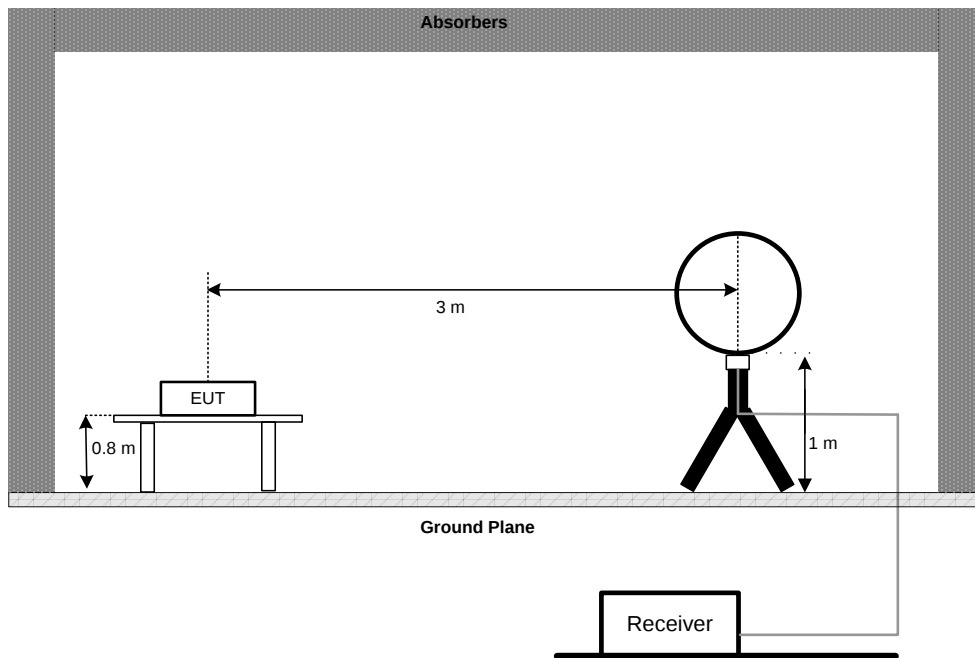
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector
Start ~ Stop Frequency	1 GHz~10 GHz for PK/AVG detector

4.3 DEVIATION FROM TEST STANDARD

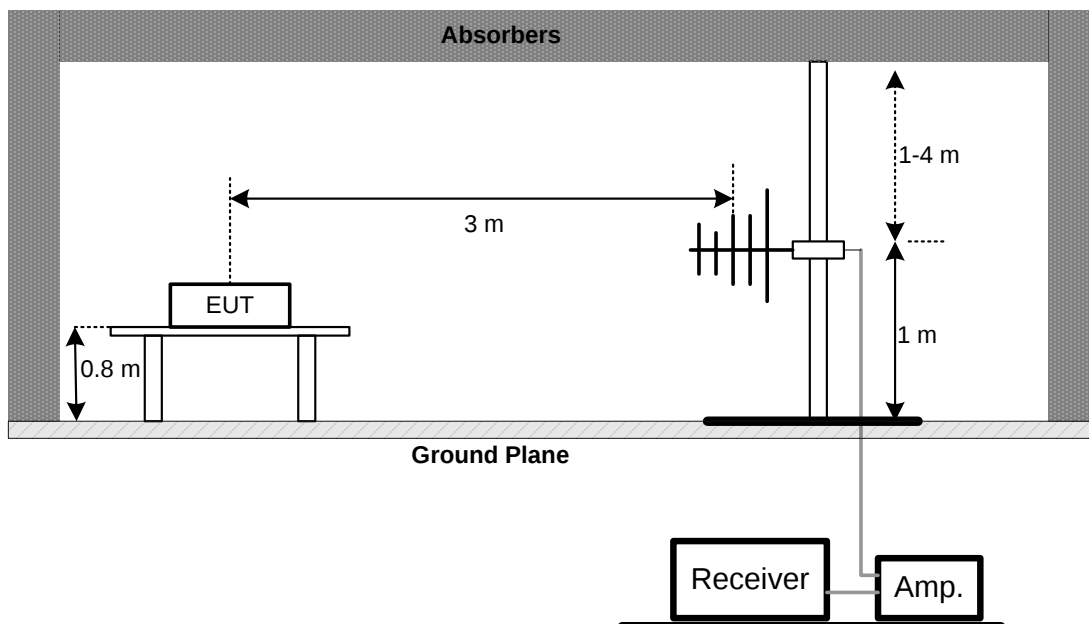
No deviation.

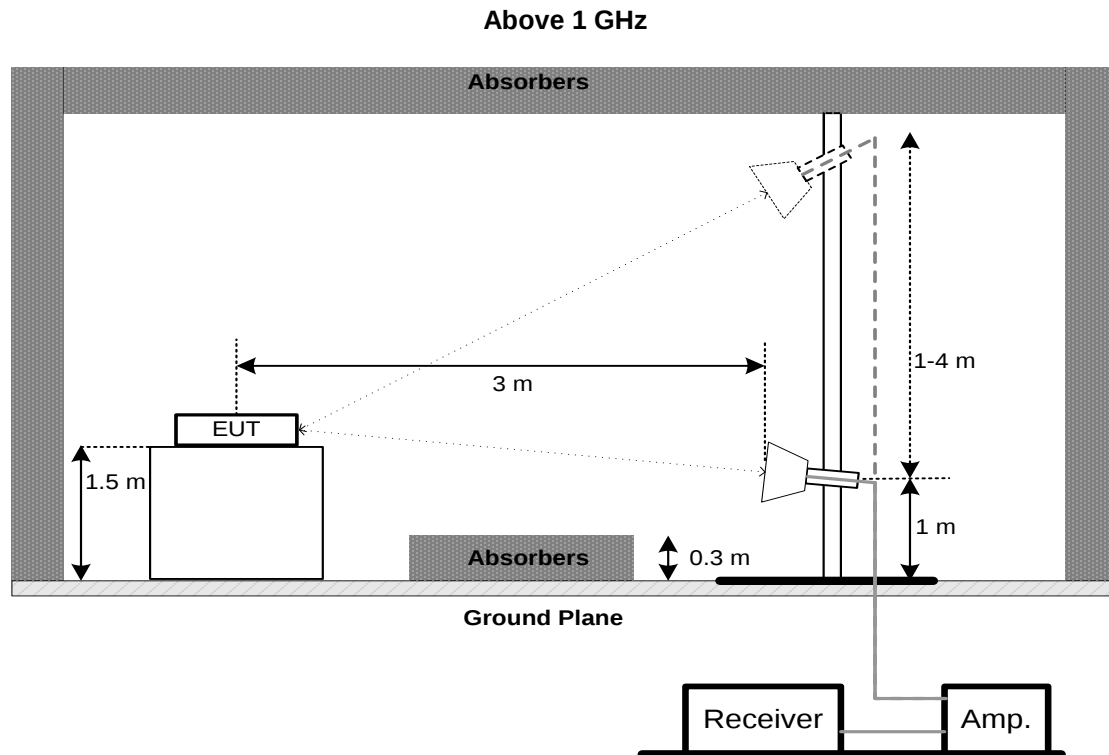
4.4 TEST SETUP

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 Average Output Power	1.0000 watt or 30.00 dBm

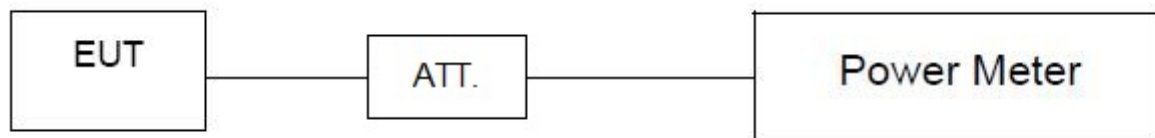
6.2 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- The maximum conducted output power was performed in accordance with method 11.9.2.3.1 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	10 GHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6 TEST RESULTS

Please refer to the APPENDIX G.

8. POWER SPECTRAL DENSITY

8.1 LIMIT

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

8.2 TEST PROCEDURE

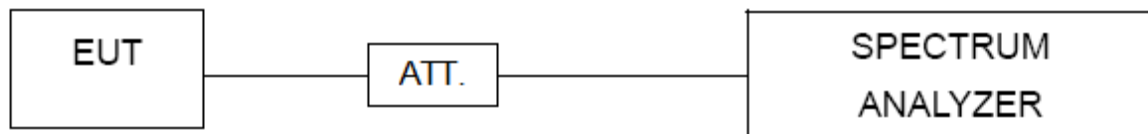
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	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

No.	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Receiver	Rohde&Schwarz	ESCI	1166.5950.03	2022/11/16
2	AMN	Rohde&Schwarz	ENV216	3560.6550.05	2022/11/09
3	AMN	Schwarzbeck	NSLK8127	#829	2022/11/09
4	ECSI RF IN RF Cable	Rohde&Schwarz	RP-X1	\	2022/11/18
5	ECSI RF IN RF Cable	Rohde&Schwarz	Sapre sm	\	2022/11/09
6	EMI Receiver	Rohde&Schwarz	ESR7	102013	2022/11/09
7	Spectrum analyzer	Rohde&Schwarz	FSV30	103741	2022/11/09
8	EMI receiver	Rohde&Schwarz	ESU	100184	2023/07/20
9	Spectrum analyzer	KEYSIGHT	N9010A-44	MY51440158	2022/11/09
10	Loop Antenna*	Schwarzbeck	FMZB1519B	00029	2025/07/03
11	Integral Antenna	Schwarzbeck	VULB 9163	VULB 9163-361	2022/11/09
12	Integral Antenna	Schwarzbeck	BBHA 9120D	BBHA 9120D 1201	2022/11/09
13	Integral Antenna	Schwarzbeck	BBHA 9170	9170#685	2022/11/09
14	Preamplifier	CD Systems Inc	PAP-03036-30	85060000	2022/11/09
15	Preamplifier	Schwarzbeck	BBV9721	9721-019	2022/11/09
16	Preamplifier	emci	EMC012645 SE	980417	2022/11/09
17	ECSI RF IN RF Cable	Rohde&Schwarz	AP-X1	\	2022/11/09
18	Spectrum Analyzer	Agilent	N9010A	MY52221119	2022/11/09
19	Power Collection Unit	Tonscend	JS0806-2	188060134	2022/11/09
20	Tonscend Test System	Tonscend	2.6.77.0518	NA	NA
21	10dB Attenuator	Tonscend	10dB	NA	NA
22	Temp&Humidity Recorder	Anymetre	JR900	NA	2023/11/03
23	Temp&Humidity Chamber	ETOMA	NTH1100-30 A	16080628	2023/11/03
24	Filter	STI	STI15-9845	N/A	N/A
25	Filter	STI	5.1G	N/A	N/A
26	Filter	STI	STI15-9845	N/A	N/A
27	Testing Software	EZ-EMC	TW-03A2	N/A	N/A
28	Power Collection Unit	Tonscend	JS0806-2	188060134	2023/10/15

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

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

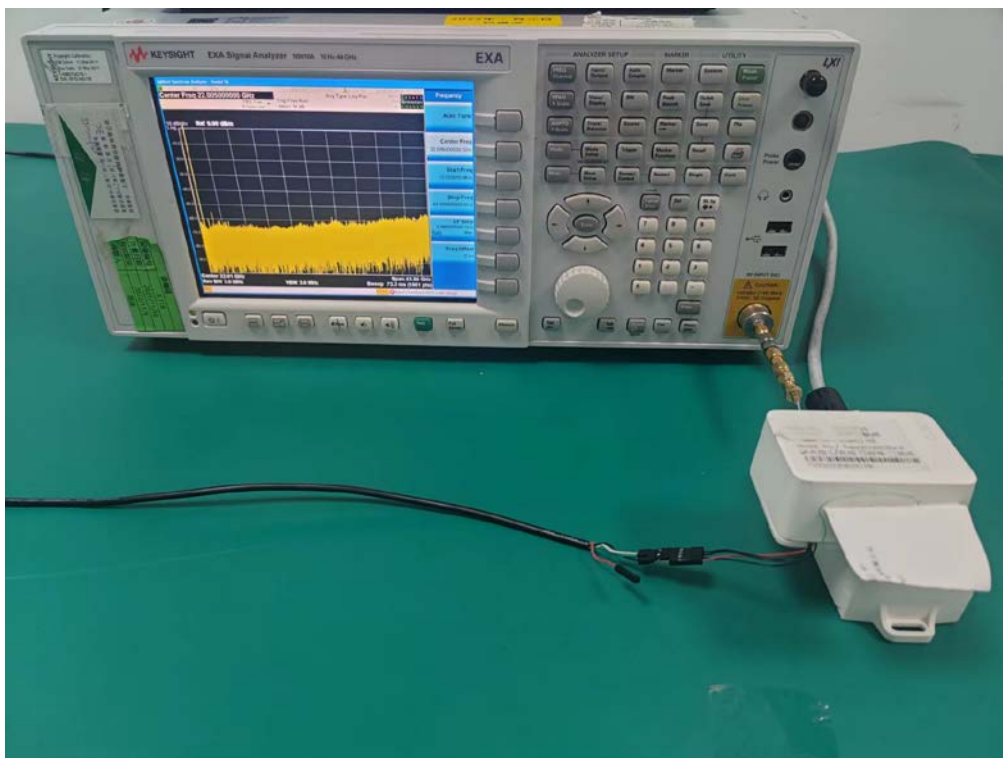
Except * item, all calibration period of equipment list is one year.

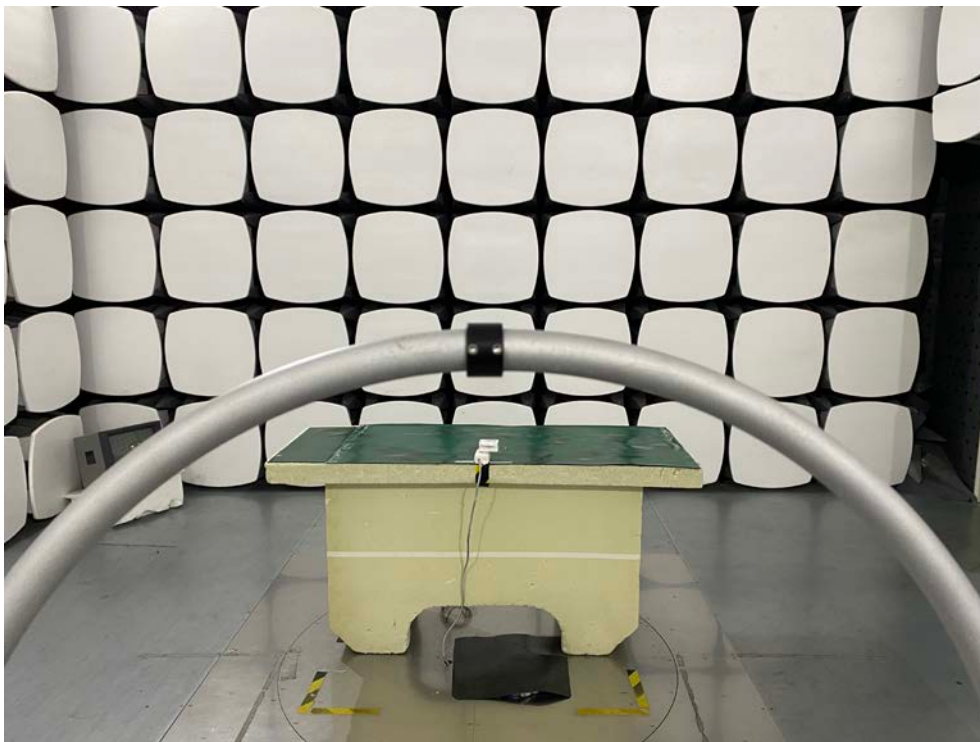
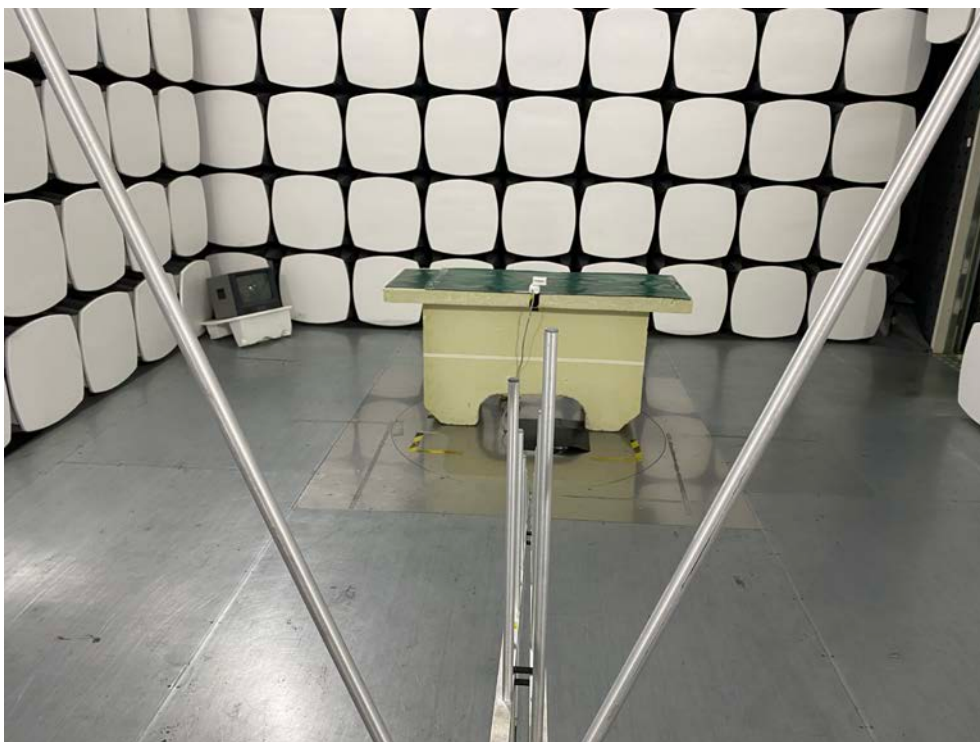
10. EUT TEST PHOTO

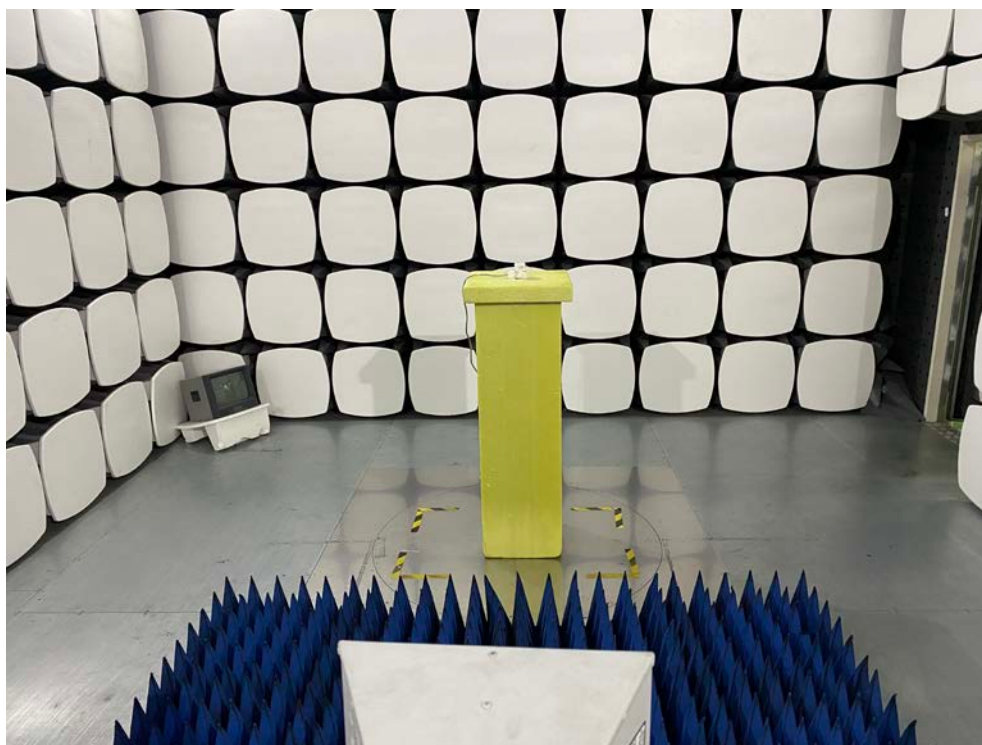
AC Power Line Conducted Emissions Test Photos



Conducted Test Photos

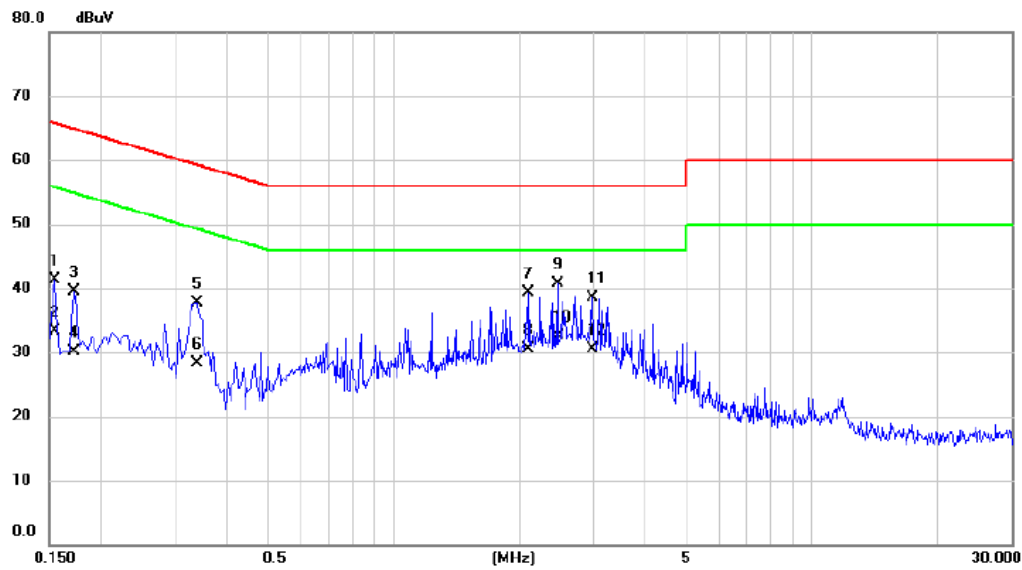


Radiated Emissions Test Photos**9 kHz to 30 MHz****30 MHz to 1 GHz**

Radiated Emissions Test Photos**Above 1 GHz**

APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

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



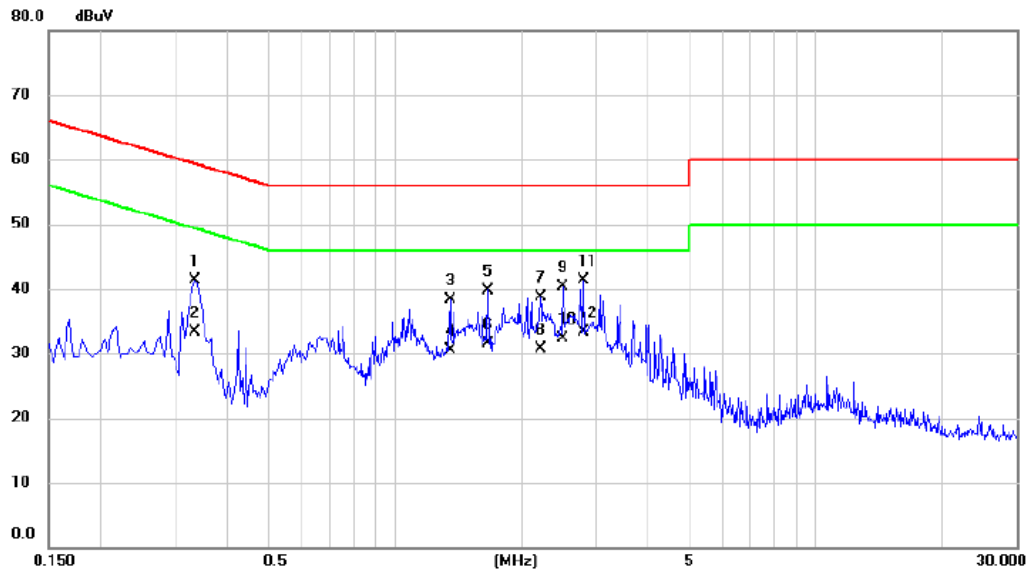
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.1545	31.72	9.66	41.38	65.75	-24.37	QP	
2	0.1545	23.70	9.66	33.36	55.75	-22.39	AVG	
3	0.1725	29.91	9.67	39.58	64.84	-25.26	QP	
4	0.1725	20.40	9.67	30.07	54.84	-24.77	AVG	
5	0.3390	27.93	9.73	37.66	59.23	-21.57	QP	
6	0.3390	18.60	9.73	28.33	49.23	-20.90	AVG	
7	2.1030	29.38	9.90	39.28	56.00	-16.72	QP	
8	2.1030	20.70	9.90	30.60	46.00	-15.40	AVG	
9	2.4630	30.82	9.93	40.75	56.00	-15.25	QP	
10 *	2.4630	22.60	9.93	32.53	46.00	-13.47	AVG	
11	2.9985	28.52	9.97	38.49	56.00	-17.51	QP	
12	2.9985	20.60	9.97	30.57	46.00	-15.43	AVG	

REMARKS:

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

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

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



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.3345	31.52	9.77	41.29	59.34	-18.05	QP	
2	0.3345	23.60	9.77	33.37	49.34	-15.97	AVG	
3	1.3515	28.51	9.88	38.39	56.00	-17.61	QP	
4	1.3515	20.70	9.88	30.58	46.00	-15.42	AVG	
5	1.6575	29.90	9.90	39.80	56.00	-16.20	QP	
6	1.6575	21.58	9.90	31.48	46.00	-14.52	AVG	
7	2.2155	28.82	9.93	38.75	56.00	-17.25	QP	
8	2.2155	20.80	9.93	30.73	46.00	-15.27	AVG	
9	2.5125	30.26	9.96	40.22	56.00	-15.78	QP	
10	2.5125	22.40	9.96	32.36	46.00	-13.64	AVG	
11	2.8050	31.28	9.99	41.27	56.00	-14.73	QP	
12 *	2.8050	23.40	9.99	33.39	46.00	-12.61	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

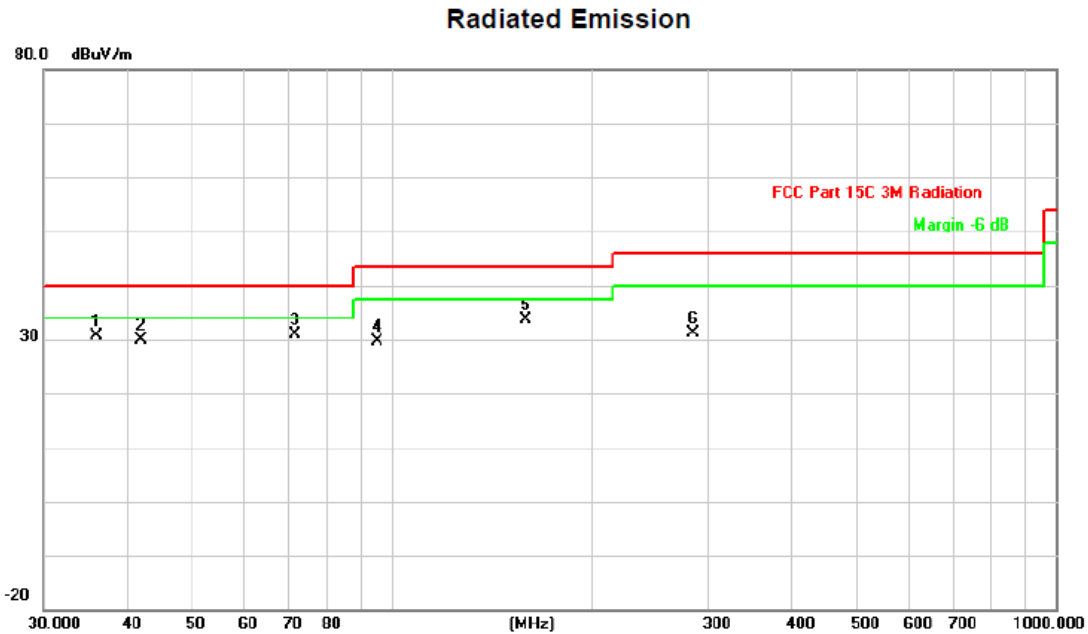
Radiated emission: 9KHz-30MHz

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

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

APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

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



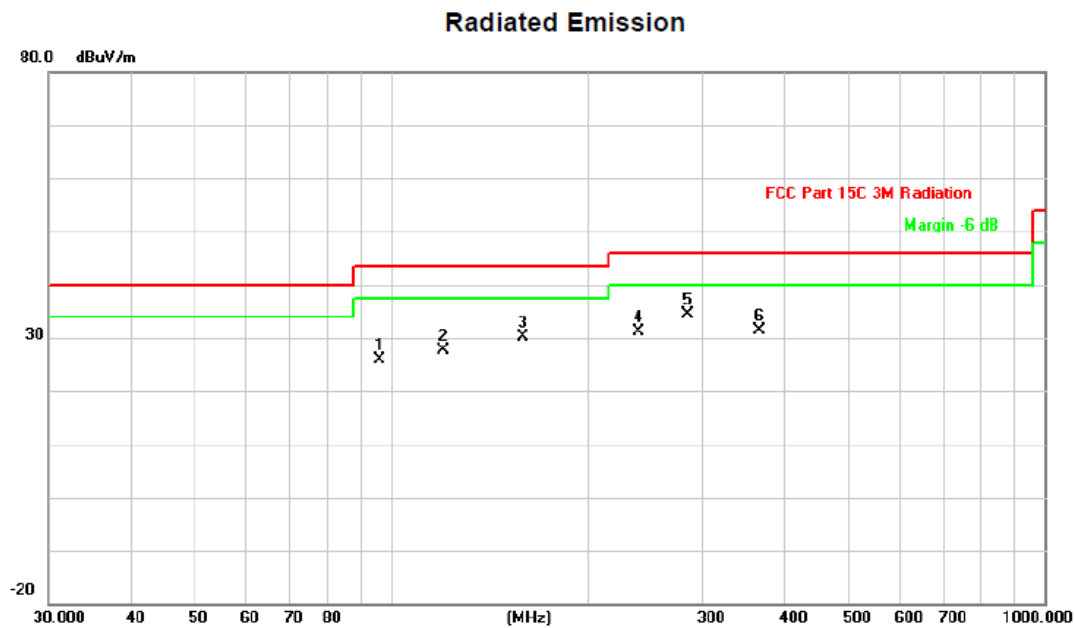
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		36.0007	41.18	-10.54	30.64	40.00	-9.36	peak			
2		41.8596	39.76	-9.95	29.81	40.00	-10.19	peak			
3	*	71.8320	43.58	-12.66	30.92	40.00	-9.08	peak			
4		95.0930	43.70	-14.13	29.57	43.50	-13.93	peak			
5		159.7844	43.32	-9.67	33.65	43.50	-9.85	peak			
6		284.9767	40.19	-9.15	31.04	46.00	-14.96	peak			

REMARKS:

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

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

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



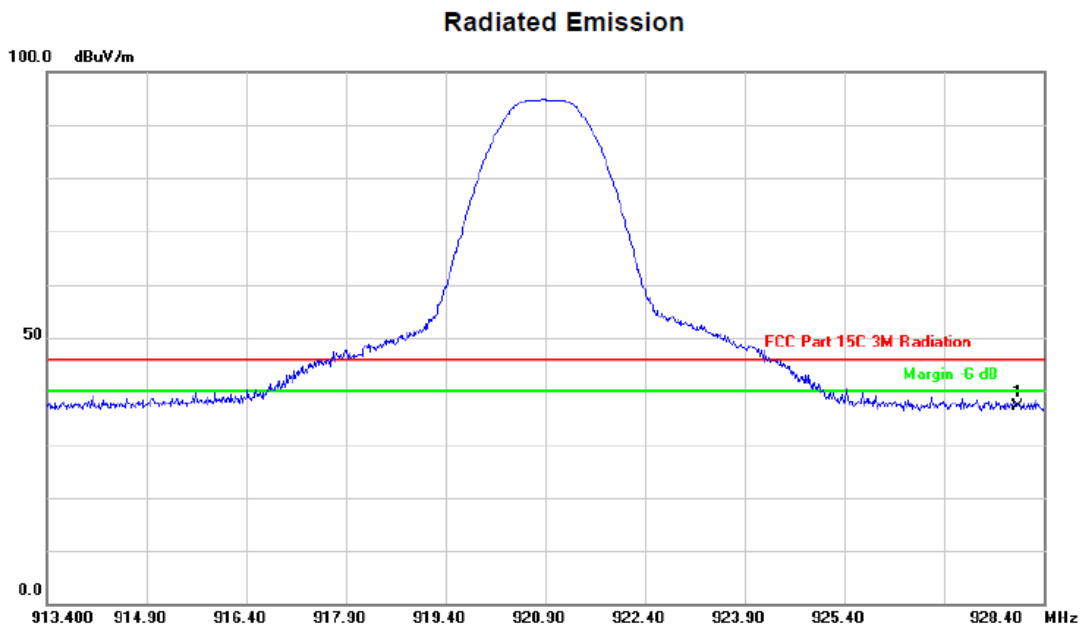
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		96.0986	40.03	-14.04	25.99	43.50	-17.51	peak		
2		120.2766	39.22	-11.68	27.54	43.50	-15.96	peak		
3		159.7844	39.88	-9.67	30.21	43.50	-13.29	peak		
4		239.9873	41.81	-10.64	31.17	46.00	-14.83	peak		
5	*	284.9767	43.63	-9.15	34.48	46.00	-11.52	peak		
6		365.5391	38.49	-7.07	31.42	46.00	-14.58	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 920.9 MHz _CH00	Polarization	Vertical
-----------	--------------------	--------------	----------



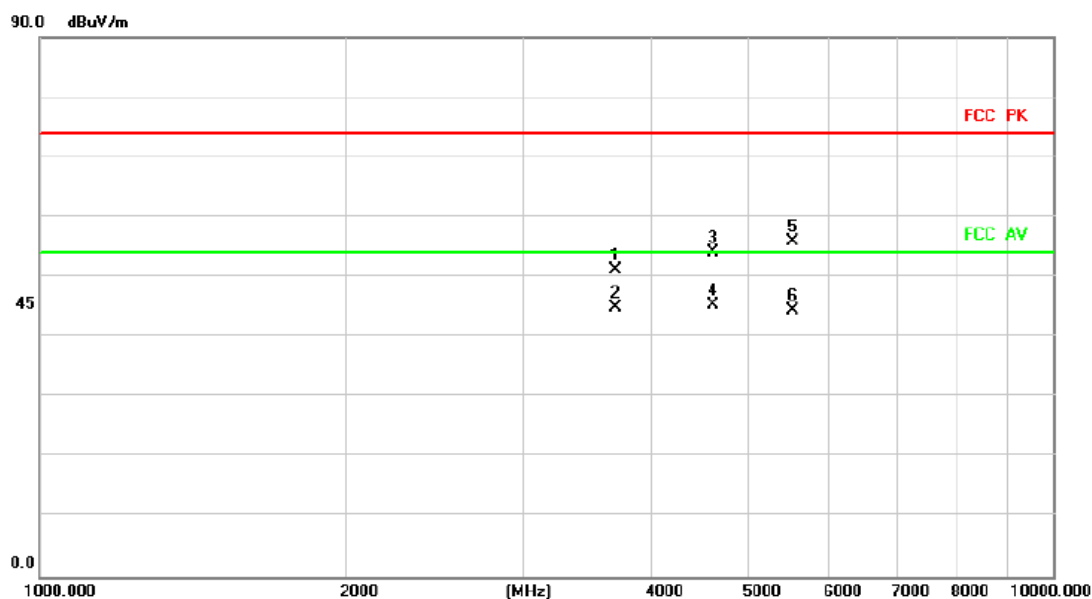
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	928.0000	39.07	-1.84	37.23	46.00	-8.77	peak		

REMARKS:

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

Test Mode	TX 920.9 MHz _CH00	Polarization	Vertical
-----------	--------------------	--------------	----------

Radiated Emission



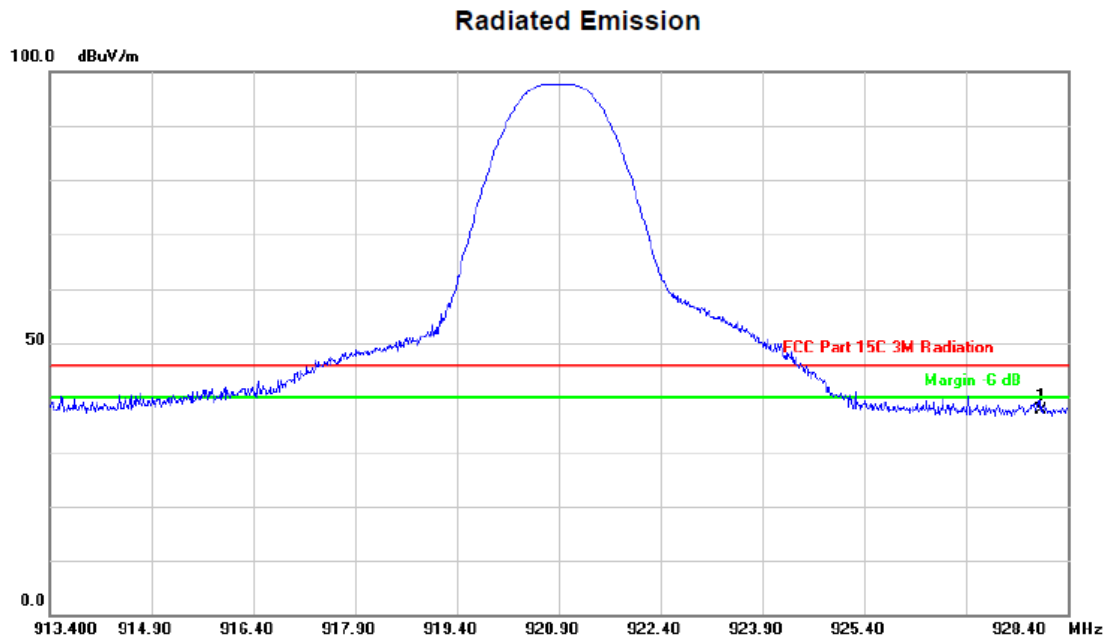
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		3689.776	57.47	-6.17	51.30	74.00	-22.70	peak		
2		3689.776	51.09	-6.17	44.92	54.00	-9.08	AVG		
3		4602.566	56.38	-2.25	54.13	74.00	-19.87	peak		
4	*	4602.566	47.49	-2.25	45.24	54.00	-8.76	AVG		
5		5533.501	58.22	-2.31	55.91	74.00	-18.09	peak		
6		5533.501	46.83	-2.31	44.52	54.00	-9.48	AVG		

REMARKS:

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

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

Test Mode	TX 920.9 MHz _CH00	Polarization	Horizontal
-----------	--------------------	--------------	------------



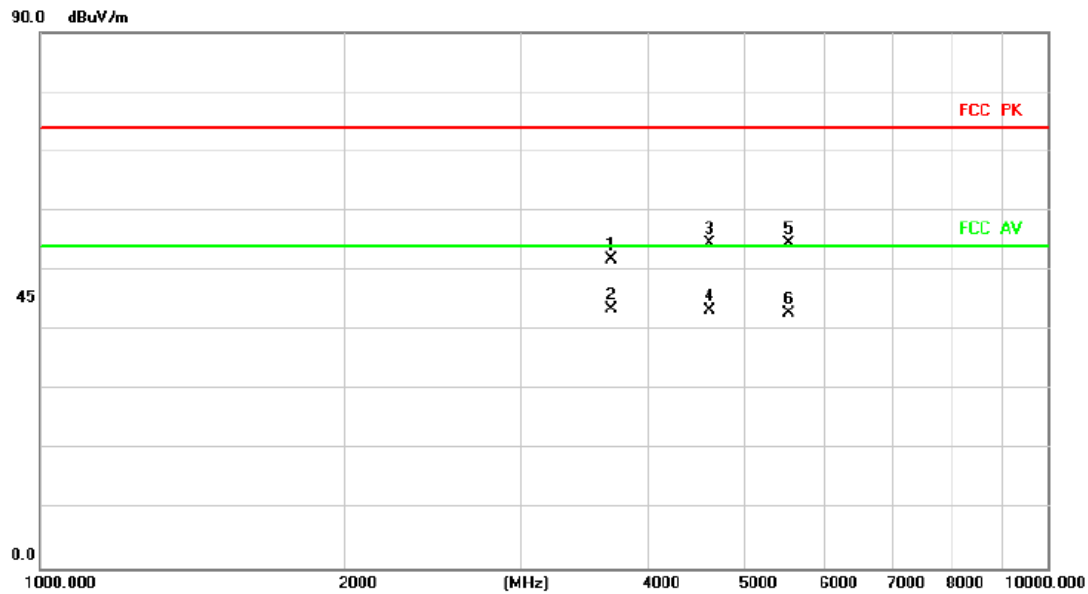
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	928.0000	39.38	-1.84	37.54	46.00	-8.46	peak		

REMARKS:

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

Test Mode	TX 920.9 MHz _CH00	Polarization	Horizontal
-----------	--------------------	--------------	------------

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		3689.290	57.93	-6.17	51.76	74.00	-22.24	peak		
2	*	3689.290	49.73	-6.17	43.56	54.00	-10.44	AVG		
3		4602.566	56.76	-2.25	54.51	74.00	-19.49	peak		
4		4602.566	45.50	-2.25	43.25	54.00	-10.75	AVG		
5		5533.501	56.78	-2.31	54.47	74.00	-19.53	peak		
6		5533.501	45.07	-2.31	42.76	54.00	-11.24	AVG		

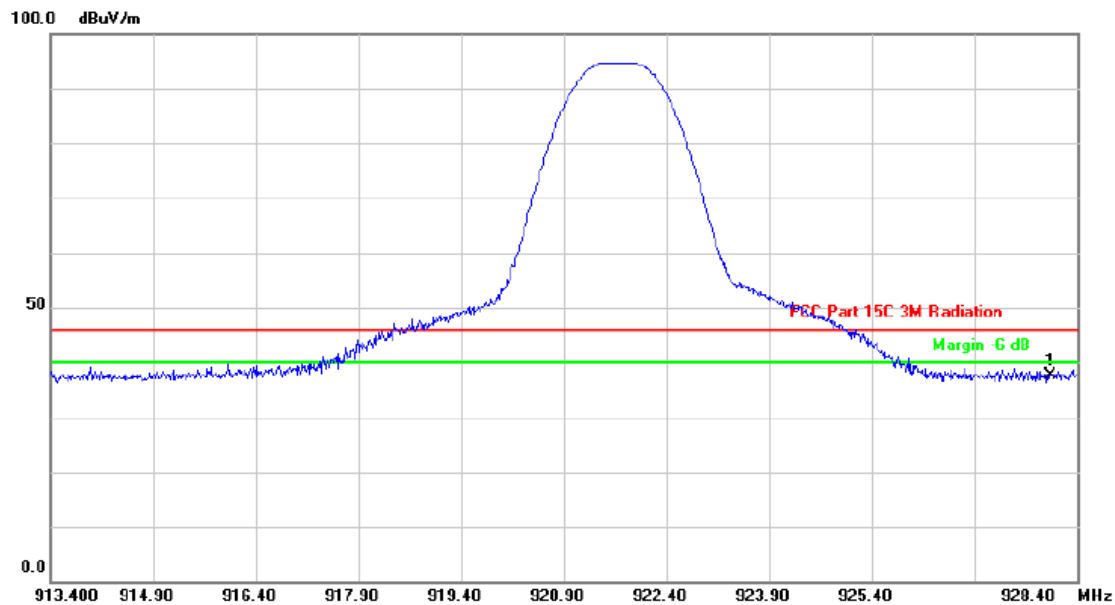
REMARKS:

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

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

Test Mode	TX 921.7 MHz _CH01	Polarization	Vertical
-----------	--------------------	--------------	----------

Radiated Emission



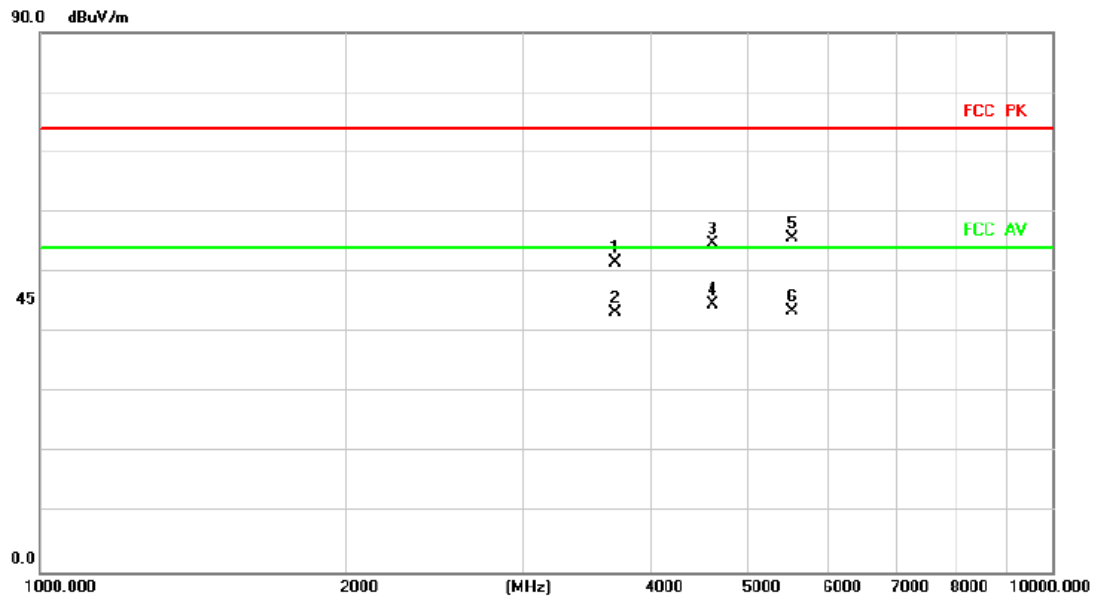
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	928.0000	39.58	-1.84	37.74	46.00	-8.26	peak		

REMARKS:

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

Test Mode	TX 921.7 MHz _CH01	Polarization	Vertical
-----------	--------------------	--------------	----------

Radiated Emission

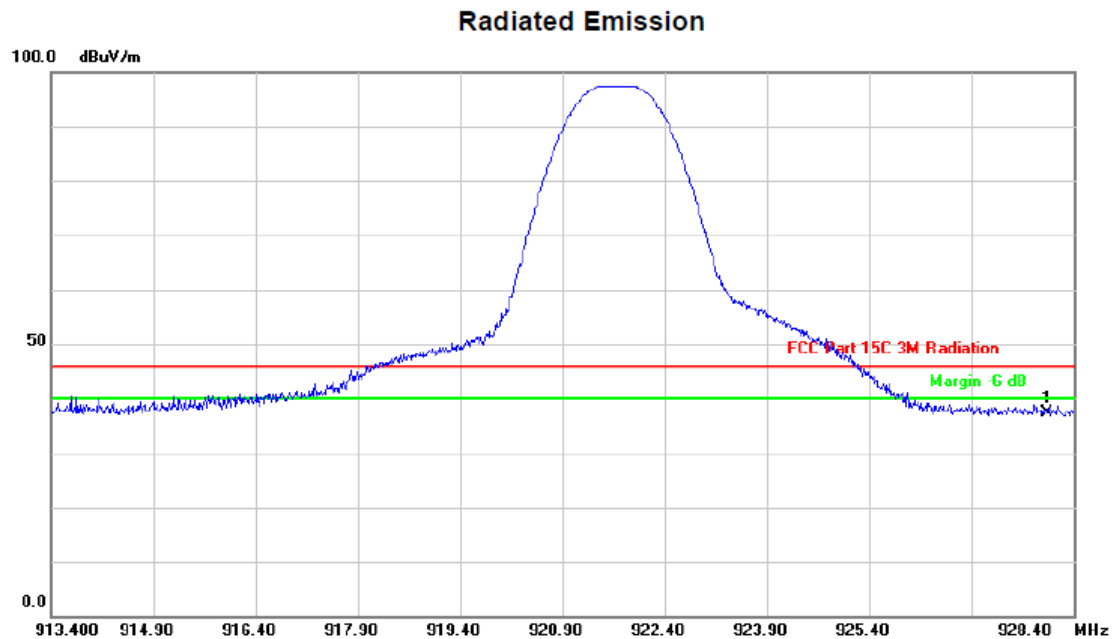


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		3689.776	57.78	-6.17	51.61	74.00	-22.39	peak		
2		3689.776	49.42	-6.17	43.25	54.00	-10.75	AVG		
3		4613.176	57.12	-2.24	54.88	74.00	-19.12	peak		
4	*	4613.176	46.80	-2.24	44.56	54.00	-9.44	AVG		
5		5533.501	58.06	-2.31	55.75	74.00	-18.25	peak		
6		5533.501	45.87	-2.31	43.56	54.00	-10.44	AVG		

REMARKS:

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

Test Mode	TX 921.7 MHz _CH01	Polarization	Horizontal
-----------	--------------------	--------------	------------



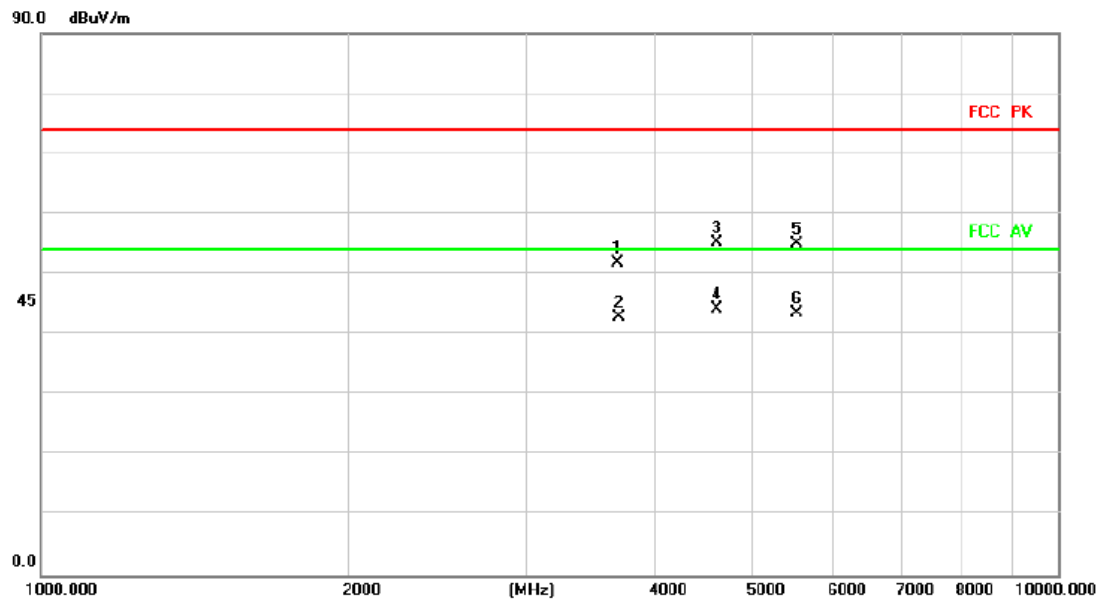
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	928.0000	39.16	-1.84	37.32	46.00	-8.68	peak		

REMARKS:

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

Test Mode	TX 921.7 MHz _CH01	Polarization	Horizontal
-----------	--------------------	--------------	------------

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		3689.000	58.01	-6.17	51.84	74.00	-22.16	peak		
2		3689.776	49.06	-6.17	42.89	54.00	-11.11	AVG		
3		4613.176	57.47	-2.24	55.23	74.00	-18.77	peak		
4 *		4613.176	46.50	-2.24	44.26	54.00	-9.74	AVG		
5		5533.000	57.36	-2.32	55.04	74.00	-18.96	peak		
6		5533.501	45.76	-2.31	43.45	54.00	-10.55	AVG		

REMARKS:

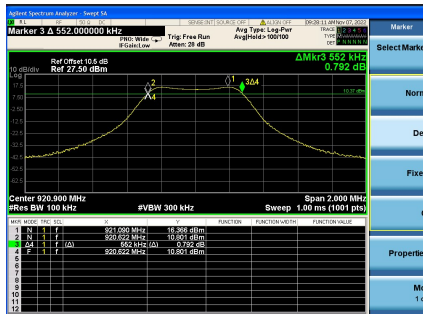
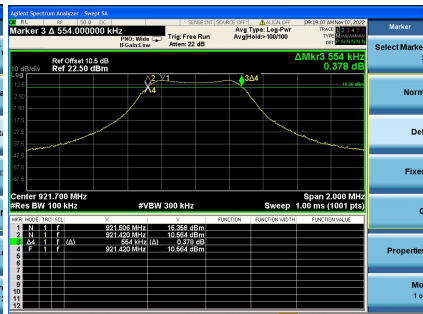
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX E - BANDWIDTH

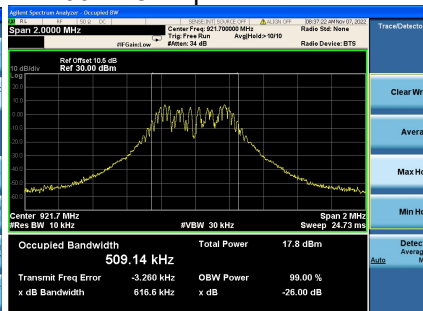
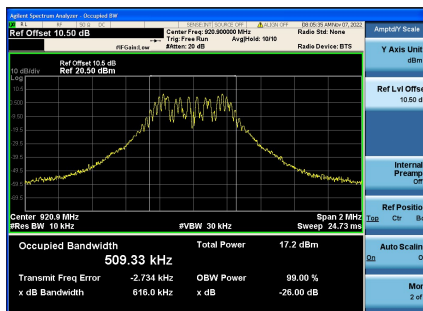
Test Mode	TX Mode
-----------	---------

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	920.9	0.552	0.509	0.50	Pass
01	921.7	0.554	0.509	0.50	Pass

CH00


CH01
6 dB Bandwidth


99 % Occupied Bandwidth



APPENDIX F - MAXIMUM OUTPUT POWER

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

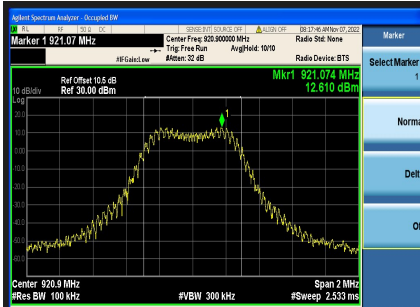
Channel	Frequency (MHz)	Output Peak Power (dBm)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	920.9	15.39	30.00	1.0000	Pass
01	921.7	15.39	30.00	1.0000	Pass

Channel	Frequency (MHz)	Output Average Power (dBm)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	920.9	15.25	30.00	1.0000	Pass
01	921.7	15.25	30.00	1.0000	Pass

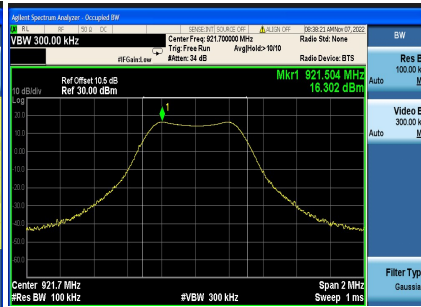
APPENDIX G - CONDUCTED SPURIOUS EMISSION

Test Mode TX Mode

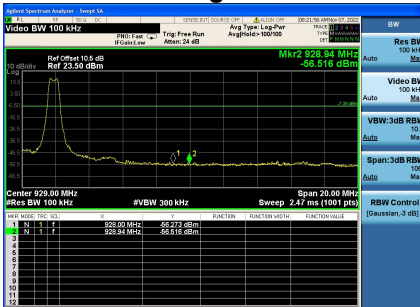
Reference Level-CH00



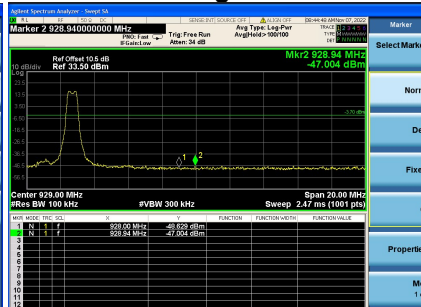
Reference Level-CH01



Bandedge-CH00

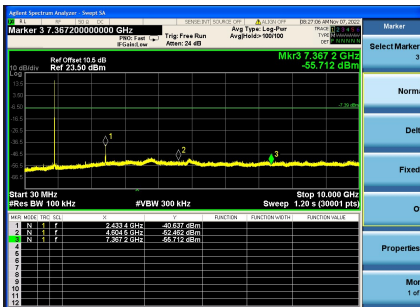


Bandedge-CH01

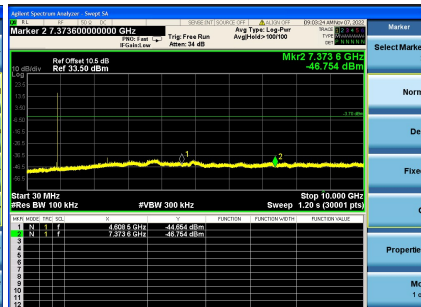


10th Harmonic of the fundamental frequency

CH00



CH01

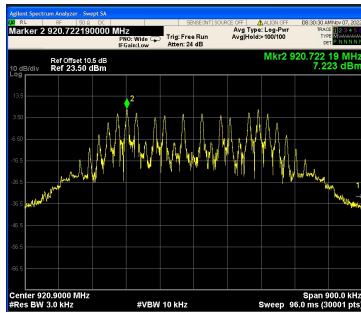


APPENDIX H - POWER SPECTRAL DENSITY

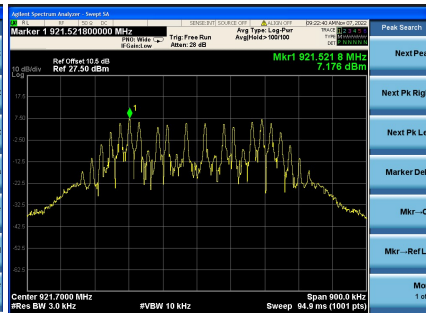
Test Mode	TX Mode
-----------	---------

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	920.9	7.22	8.00	Pass
01	921.7	7.18	8.00	Pass

CH00



CH01



End of Test Report