



Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.231

Report Reference No......: **GTS20210925003-1-1**

FCC ID.....: **2A3FM-GE-G2**

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Date of issue.....: Oct. 14, 2021

Representative Laboratory Name.: **Shenzhen Global Test Service Co., Ltd.**

Address.....: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

Applicant's name.....: **Maoming city Dasi Electronic Commerce Co.,Ltd**

Address: Room 01,Wei Min Road No. 41 Maoming Guangdong, China

Test specification

Standard: **FCC Part 15.231**

TRF Originator.....: Shenzhen Global Test Service Co.,Ltd.

Master TRF.....: Dated 2014-12

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Test item description: REMOTE DOG TRAINING COLLAR

Trade Mark: N/A

Manufacturer.....: Shen Zhen Lead Microelectronics Co., Ltd

Model/Type reference.....: GE-G2

Listed Models: GE-G21, GE-G22, GE-G23, GE-G24, GE-G25

Ratings: 5V $\Rightarrow$ 0.2A

Modulation: ASK

Hardware version: V1.0

Software version: V1.0

Frequency.....: 433.92MHz

Result.....: **PASS**

TEST REPORT

Test Report No. : GTS20210925003-1-1	Oct.13, 2021 Date of issue
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Equipment under Test : REMOTE DOG TRAINING COLLAR

Model /Type : GE-G2

Listed Models : GE-G21, GE-G22, GE-G23, GE-G24, GE-G25

Applicant : **Maoming city Dasi Electronic Commerce Co.,Ltd**

Address : Room 01,Wei Min Road No. 41 Maoming Guangdong, China

Manufacturer : **Shen Zhen Lead Microelectronics Co., Ltd**

Address : 3 / F, building B2, guantian Huafeng Science Park, Hengkeng Avenue, Shiyan street, Bao'an District, Shenzhen, China

Test Result:	PASS
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

<u>1</u>	<u>TEST STANDARDS.....</u>	<u>4</u>
<u>2</u>	<u>SUMMARY</u>	<u>5</u>
2.1	General Remarks	5
2.2	Product Description	5
2.3	Block Diagram of Test Setup	5
2.4	Special Accessories	5
2.5	Related Submittal(s) / Grant (s)	5
2.6	Modifications	5
<u>3</u>	<u>TEST ENVIRONMENT.....</u>	<u>6</u>
3.1	Address of the test laboratory	6
3.2	Test Facility	6
3.3	Environmental conditions	6
3.4	Summary of measurement results	7
3.5	Statement of the measurement uncertainty	7
3.6	Equipments Used during the Test	7
<u>4</u>	<u>TEST CONDITIONS AND RESULTS.....</u>	<u>9</u>
4.1	AC Power Conducted Emission	9
4.2	Radiated Emission	12
4.3	20dB Bandwidth	16
4.4	Deactivation Time	17
4.5	Antenna Requirement	18
<u>5</u>	<u>TEST SETUP PHOTOS OF THE EUT</u>	<u>19</u>
<u>6</u>	<u>PHOTOS OF THE EUT.....</u>	<u>20</u>

1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.231](#): Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.
[ANSI C63.10:2013](#) : American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

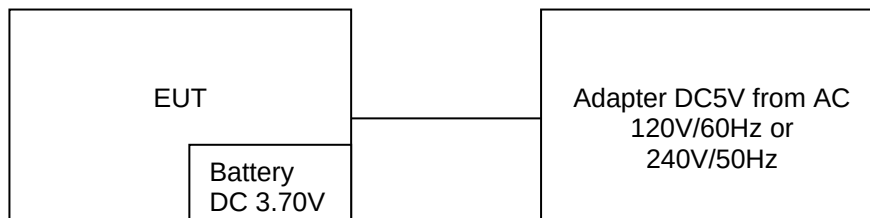
2.1 General Remarks

Date of receipt of test sample	:	Sep. 26, 2021
Testing commenced on	:	Sep. 27, 2021
Testing concluded on	:	Oct. 13, 2021

2.2 Product Description

Product Name:	REMOTE DOG TRAINING COLLAR
Model/Type reference:	GE-G2
Power supply:	DC 3.7V from battery
Modulation:	ASK
Operation frequency:	433.92MHz
Channel number:	1
Antenna type:	Integral antenna
Antenna gain:	0 dBi
Test Sample ID:	GTS20210925003-1-1#

2.3 Block Diagram of Test Setup



2.4 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
Adapter	MOSO	EP-TA10CBC	Input:AC100-240V-50/60Hz, 0.5A Output:DC 5V,1A	FCC	Laboratory
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

2.5 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules.

2.6 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 165725 Designation Number: CN1234

Shenzhen Global Test Service Co.,Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

A2LA-Lab Cert. No.: 4758.01

Shenzhen Global Test Service Co.,Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

CNAS-Lab Code: L8169

Shenzhen Global Test Service Co.,Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2024.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4 Summary of measurement results

FCC Requirements		
FCC Part 15.207	Conducted Emission	PASS
FCC Part 15.231(a)(2)	Automatically Deactivate	PASS
FCC Part 15.231(b)	Electric Field Strength of Fundamental Emission	PASS
FCC Part 15.205 & 15.209 & 15.231(b)	Electric Field Strength of Spurious Emission	PASS
FCC Part 15.231(c)	-20dB bandwidth	PASS
FCC Part 15.203	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	CYBERTEK	EM5040A	E1850400105	2021/07/23	2022/07/22
LISN	R&S	ESH2-Z5	893606/008	2021/07/23	2022/07/22
EMI Test Receiver	R&S	ESPI3	101841-cd	2021/07/23	2022/07/22
EMI Test Receiver	R&S	ESCI7	101102	2021/09/19	2022/09/18
Spectrum Analyzer	Agilent	N9020A	MY48010425	2021/09/19	2022/09/18
Spectrum Analyzer	R&S	FSV40	100019	2021/07/23	2022/07/22
Vector Signal generator	Agilent	N5181A	MY49060502	2021/07/23	2022/07/22
Spectrum Analyzer	Agilent	E4421B	3610AO1069	2021/09/19	2022/09/18
Climate Chamber	ESPEC	EL-10KA	A20120523	2021/09/19	2022/09/18
Controller	EM Electronics	Controller EM 1000	N/A	N/A	N/A
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2020/11/08	2021/11/07
Active Loop Antenna	Beijing Da Ze Technology Co.,Ltd.	ZN30900C	15006	2021/10/10	2022/10/09

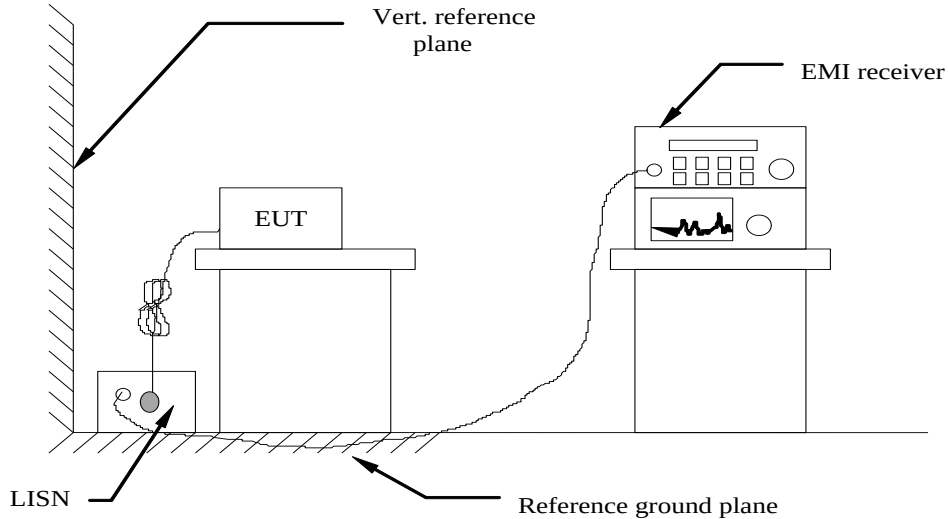
Bilog Antenna	Schwarzbeck	VULB9163	000976	2021/07/23	2022/07/22
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2020/11/08	2021/11/07
Amplifier	Schwarzbeck	BBV 9743	#202	2021/07/23	2022/07/22
Amplifier	Schwarzbeck	BBV9179	9719-025	2021/07/23	2022/07/22
Amplifier	EMCI	EMC051845B	980355	2021/07/23	2022/07/22
Temperature/Humidity Meter	Gangxing	CTH-608	02	2021/07/23	2022/07/22
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	KL142031	2021/07/23	2022/07/22
High-Pass Filter	K&L	41H10-1375/U12750-O/O	KL142032	2021/07/23	2022/07/22
RF Cable(below 1GHz)	HUBER+SUHNER	RG214	RE01	2021/07/23	2022/07/22
RF Cable(above 1GHz)	HUBER+SUHNER	RG214	RE02	2021/07/23	2022/07/22
Data acquisition card	Agilent	U2531A	TW53323507	2021/07/23	2022/07/22
Power Sensor	Agilent	U2021XA	MY5365004	2021/07/23	2022/07/22
Test Control Unit	Tonscend	JS0806-1	178060067	2021/07/23	2022/07/22
Automated filter bank	Tonscend	JS0806-F	19F8060177	2021/07/23	2022/07/22
EMI Test Software	Tonscend	JS1120-1	Ver 2.6.8.0518	/	/
EMI Test Software	Tonscend	JS1120-3	Ver 2.5.77.0418	/	/
EMI Test Software	Tonscend	JS32-CE	Ver 2.5	/	/
EMI Test Software	Tonscend	JS32-RE	Ver 2.5.1.8	/	/

Note: The Cal.Interval was one year.

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

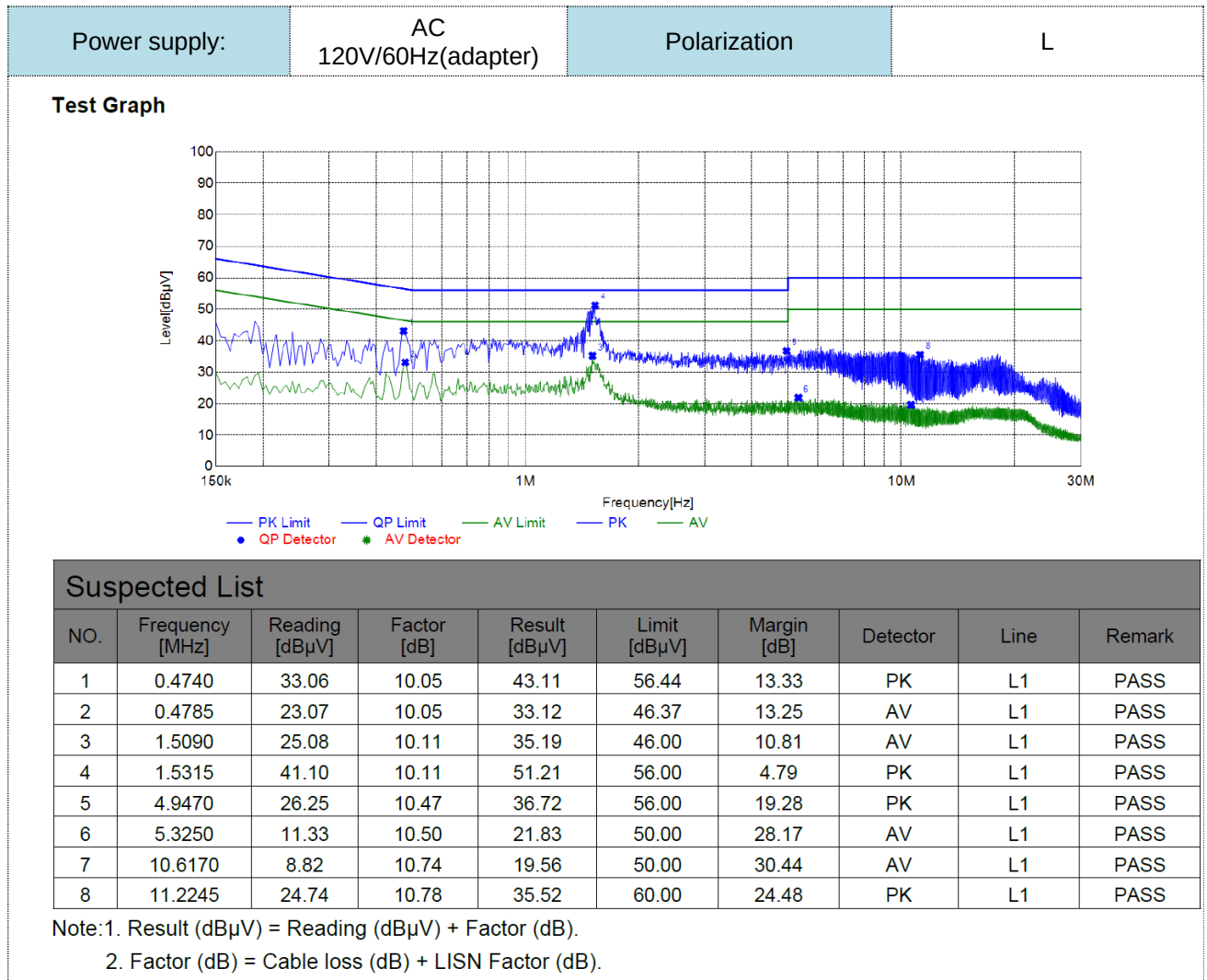
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST RESULTS

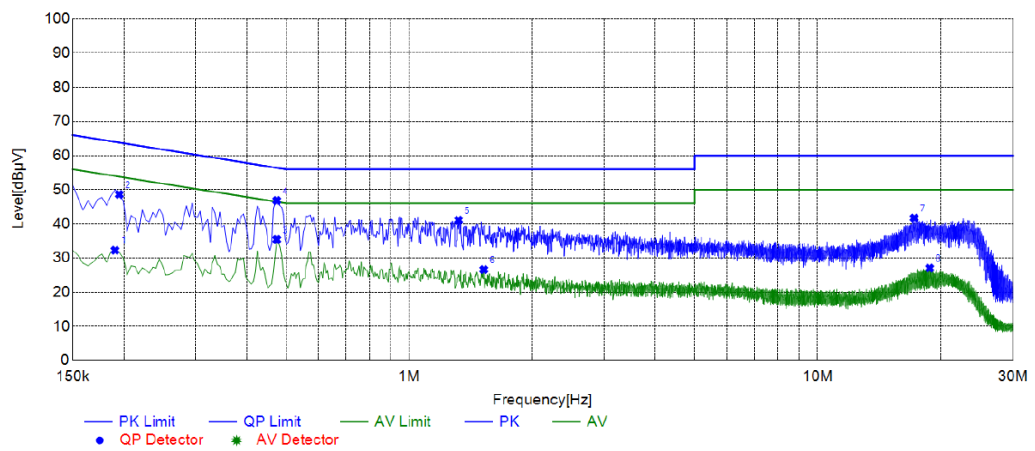
Temperature	22.8°C	Humidity	56%
Test Engineer	Moon Tan	Configurations	433.92MHz TX

Remark: Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:



Power supply:	AC 120V/60Hz(adapter)	Polarization	N
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Test Graph



Suspected List

NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	Result [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Line	Remark
1	0.1905	22.17	10.06	32.23	54.01	21.78	AV	N	PASS
2	0.1950	38.54	10.06	48.60	63.82	15.22	PK	N	PASS
3	0.4740	25.33	10.05	35.38	46.44	11.06	AV	N	PASS
4	0.4740	36.77	10.05	46.82	56.44	9.62	PK	N	PASS
5	1.3200	30.98	10.09	41.07	56.00	14.93	PK	N	PASS
6	1.5225	16.48	10.11	26.59	46.00	19.41	AV	N	PASS
7	17.2365	30.47	11.20	41.67	60.00	18.33	PK	N	PASS
8	18.7935	15.70	11.33	27.03	50.00	22.97	AV	N	PASS

Note:1. Result (dBμV) = Reading (dBμV) + Factor (dB).

2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

4.2 Radiated Emission

Limit

For intentional device, according to 15.209(a) the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz})) + 40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz})) + 40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30) + 40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

In addition to the provisions of 15.231(b) and RSS 210-A1.1.2, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

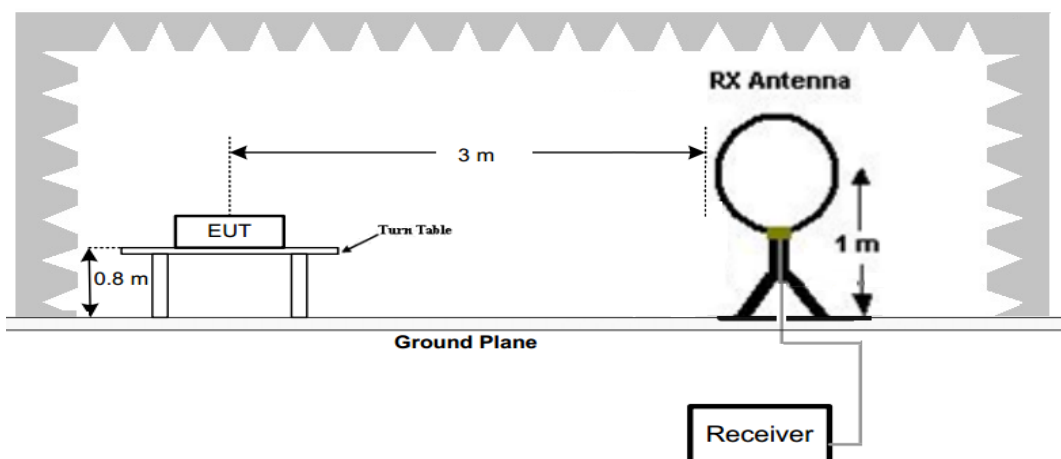
Funda- mental fre- quency (MHz)	Field strength of funda- mental (microvolts/ meter)	Field strength of spurious emissions (microvolts/meter)
40.66– 40.70.	2,250	225
70–130	1,250	125
130–174	¹ 1,250 to 3,750	¹ 125 to 375
174–260	3,750	375
260–470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

¹ Linear interpolations.

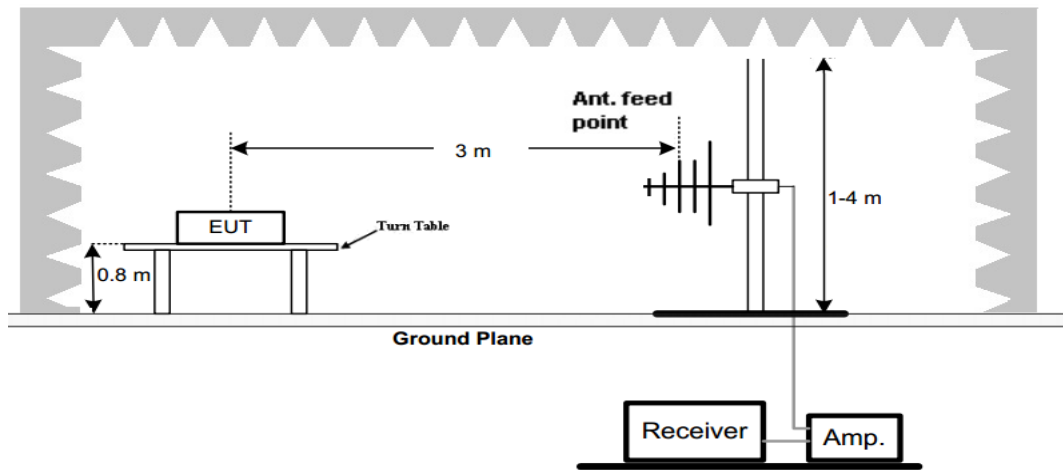
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters $= 41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

TEST CONFIGURATION

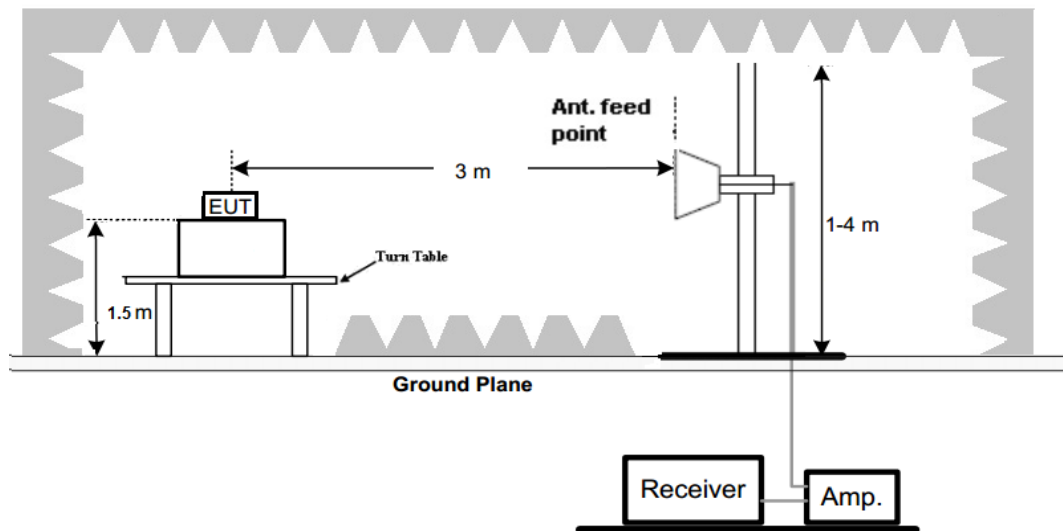
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Temperature	22.8°C	Humidity	56%
Test Engineer	Moon Tan	Configurations	433.92MHz TX

The emissions from 30MHz to 5GHz are measured peak and average level, below 1 GHz measured QP level, detailed test data please see below. Besides, we tested 3 directions and recorded the worst data.

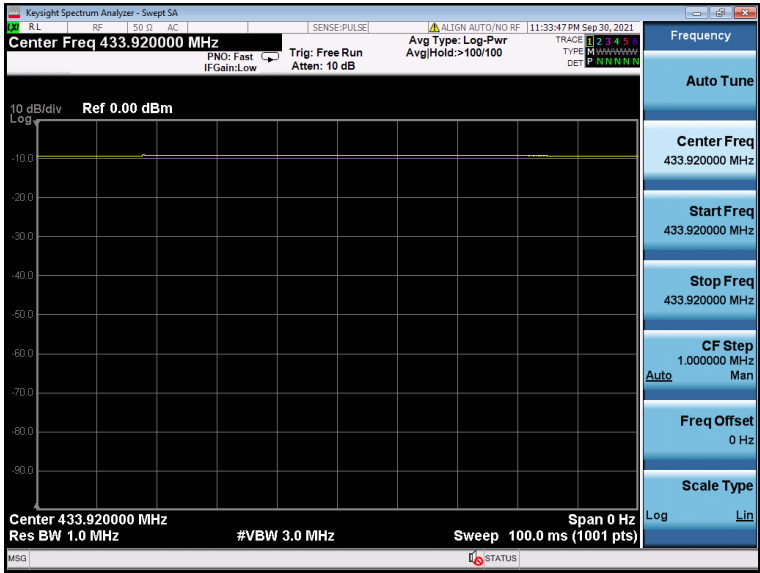
Emission Styles	Frequency (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Direction (H/V)
Fundamental	433.92	74.55	100.80	26.25	PK	H
Spurious	435.35	32.15	46.00	13.85	QP	H
Harmonics	867.84	55.38	80.80	25.42	PK	H
Harmonics	1301.76	43.54	74.00	30.46	PK	H
--	--	--	--	--	--	--
Fundamental	433.92	74.58	100.80	26.22	PK	V
Spurious	435.35	32.35	46.00	13.65	QP	V
Harmonics	867.84	56.38	80.80	24.42	PK	V
Harmonics	1301.76	44.09	74.00	29.91	PK	V
--	--	--	--	--	--	--

Emission Styles	Frequency (MHz)	PK Level (dBuV/m)	AV Factor (dB/m)	AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Direction (H/V)
Fundamental	433.92	74.55	0	74.55	80.80	6.25	H
Harmonics	867.84	55.38	0	55.38	60.80	5.42	H
Harmonics	1301.76	43.54	0	43.54	54.00	10.46	H
--	--	--	--	--	--	--	--
Fundamental	433.92	74.58	0	74.58	80.80	6.22	V
Harmonics	867.84	56.38	0	56.38	60.80	4.42	V
Harmonics	1301.76	44.09	0	44.09	54.00	9.91	V
--	--	--	--	--	--	--	--

Note:

1. AV Level (dBuV/m)= PK Level (dBuV/m)+ AV Factor(dB)
2. Duty Cycle= 100%

AV Factor=20*log(Duty Cycle)=20*log(100%)=0
(The plot of Duty Cycle See the follow page)



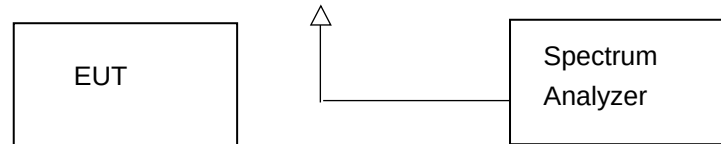
(Duty cycle)

4.3 20dB Bandwidth

Limit

According to 47 CFR 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

Test Configuration



Test Procedure

The 20dB bandwidth and 99% bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

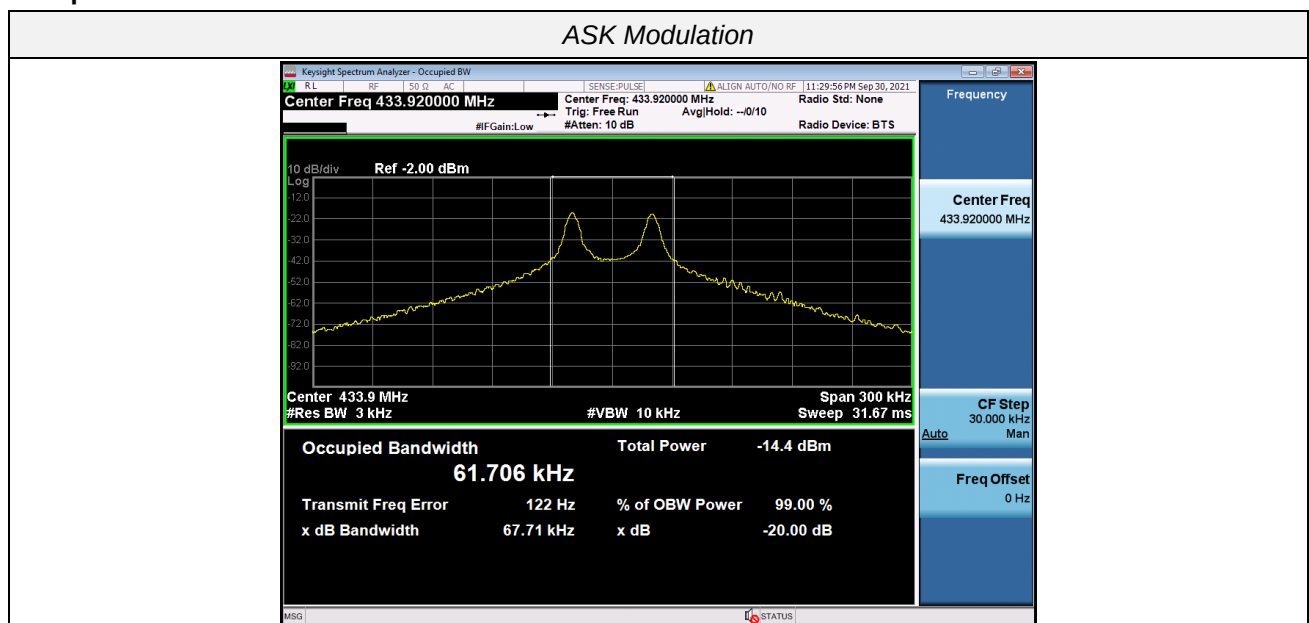
The occupied bandwidth (OBW), that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Test Results

Temperature	22.8°C	Humidity	56%
Test Engineer	Moon Tan	Configurations	433.92MHz TX

Modulation	Channel Frequency (MHz)	99% OBW (KHz)	20dB bandwidth (KHz)	Limit (KHz)	Result
ASK	433.92	61.706	67.71	$0.25\% \times 433920 = 1084.8$	Pass

Test plot as follows:

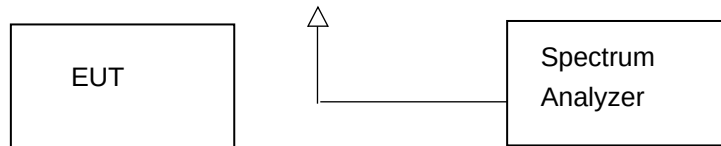


4.4 Deactivation Time

Limit

According to FCC §15.231(a)(2), A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Configuration



Test Procedure

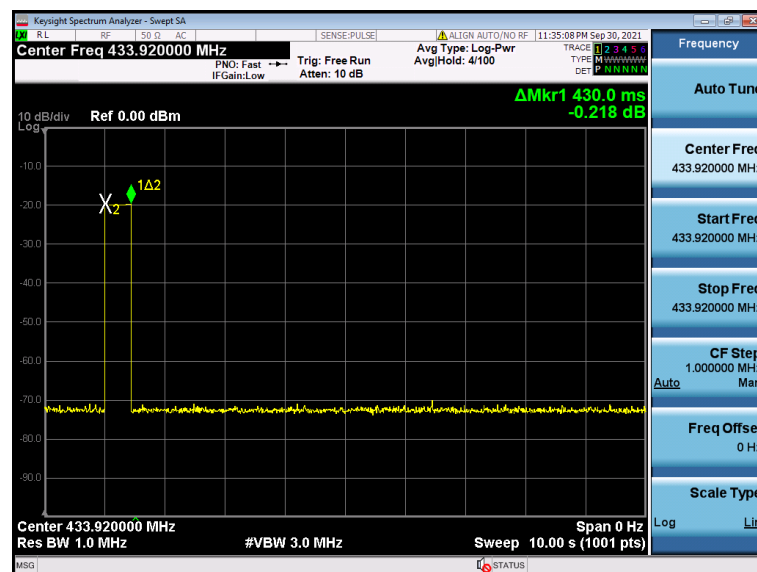
1. The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.
2. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was set to 3 MHz to encompass all significant spectral components during the test. The spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

TEST RESULTS

Temperature	22.8°C	Humidity	56%
Test Engineer	Moon Tan	Configurations	433.92MHz TX

Note: The transmitter was automatically activated, and the carrier frequency 433.92MHz:

Frequency (MHz)	One transmission time (S)	Limit(S)	Result
433.92	0.430	5	Pass



4.5 Antenna Requirement

Standard Applicable

According to FCC Part 15C 15.203

- a) An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
- b) The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

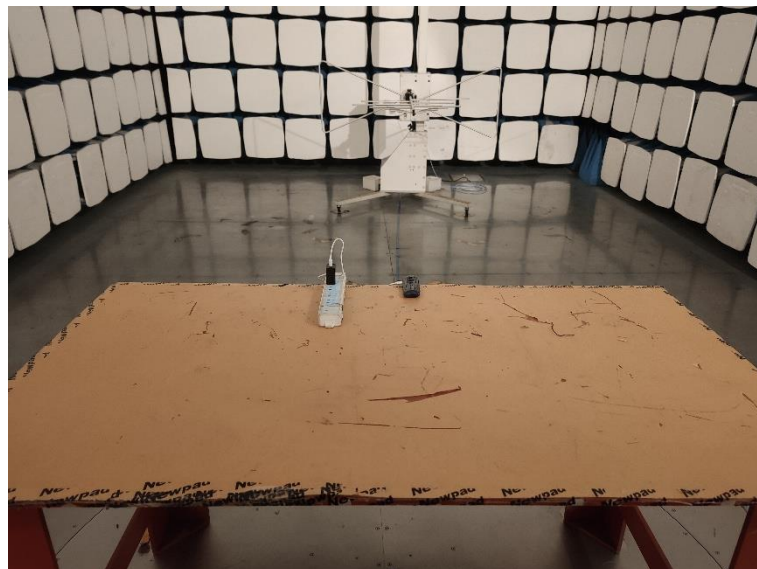
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is an integral Antenna, The directional gains of antenna used for transmitting is 0 dBi.

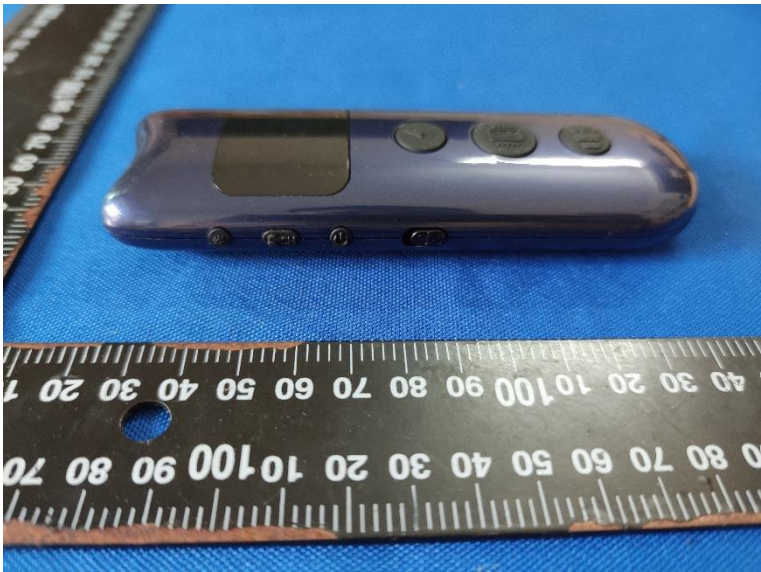
5 Test Setup Photos of the EUT



6 Photos of the EUT

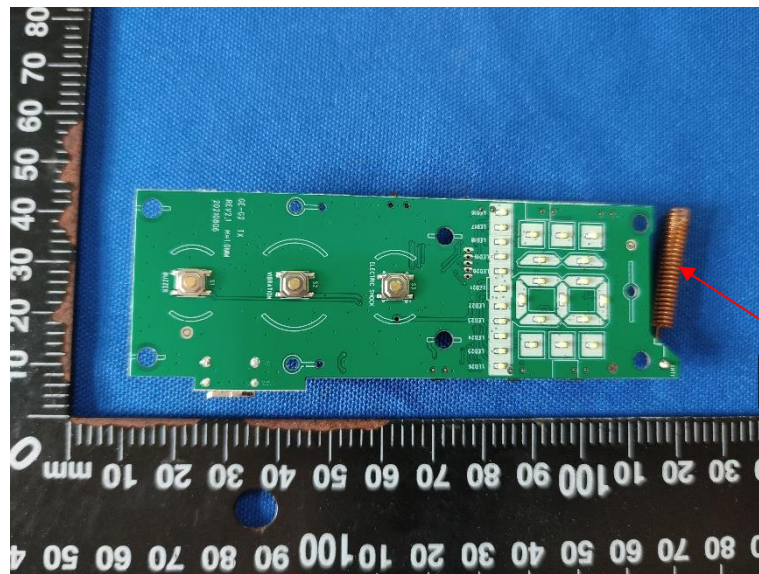
External photos



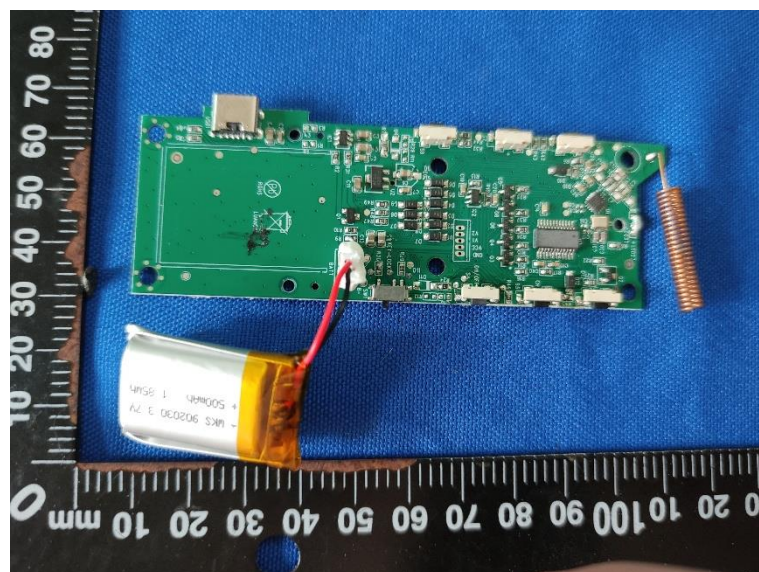




Internal photos



Antenna



***** End of Report *****