Report No.: ET-22040205E

TEST REPORT

Applicant:	Zhongshan Shuofeng Electric Technology Co., Ltd.
Address of Applicant:	Block 1,Building 4,No. 25, Tongxing East Road, Dongsheng District,Xiaolan Town, Zhongshan City, China
Manufacturer/Factory:	Zhongshan Shuofeng Electric Technology Co., Ltd.
Address of Manufacturer/Factory:	Block 1,Building 4,No. 25, Tongxing East Road, Dongsheng District,Xiaolan Town, Zhongshan City, China
Product Name:	Six-button RGB remote controlled by wire
Model No.:	DF-C3
Trade Mark:	N/A
FCC ID:	2A6RT-DFC3
Applicable standards:	FCC Part 15.231
Test procedure	ANSI C63.10-2013
Date of Test:	May.05, 2022- May.07, 2022
Date of report issued:	May.20, 2022
Test Result :	PASS*

Remark:

* In the configuration tested, the EUT complied with the standards specified above.

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver

Prepared By

Shenzhen ETR Standard Technology Co., Ltd.

Address: No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Compiled by:	Reviewed by:	Approved by:
Project Engineer	Project Manager	Authorized Signature

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Report Revision History		
Report No.	Description	Issue Date
ET-22040205E	Original	May.20, 2022

Contents

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1 Test Summary

Test Item	Section in CFR 47	Result	Test by
Antenna requirement	15.203 RSS-Gen Section 6.8	Pass	/
Conducted emission	15.207 RSS-Gen Section 8.8	N/A	/
Transmitter field strength	15.231(b) RSS210 Annex D	Pass	Yvan
Radiated emission and Restricted band	15.205 and 15.209 RSS-210 D& RSS-Gen Clause 8.9&8.10	Pass	Yvan
Occupied Bandwidth	15.215 RSS-Gen 6.7	Pass	Yvan
Release time	15.231(a)(2) RSS-210 D	Pass	Yvan

Remarks:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *Test according to ANSI C63.10:2013*

Measurement Uncertainty

Test Item	Uncertainty Criterion	Measurement Uncertainty	Notes
Occupied Channel Bandwidth	±5%	±0.55%	(1)
RF output power, conducted	±1.5dB	±0.99dB	(1)
Power Spectral Density, conducted	±3dB	±0.61dB	(1)
Unwanted Emissions, conducted	±3dB	±0.64dB	(1)
AC Power Line Conducted Emission	±6dB	± 3.02 dB	(1)
Radiated emissions Below 1GHz	±6dB	±4.30 dB	(1)
Radiated emissions Above 1GHz	±6dB	±4.35 dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

2 General Information

2.1 General Description of EUT

Product Name:	Six-button RGB remote controlled by wire
Model No.:	DF-C3
Model of difference:	N/A
Sample(s) Status:	Engineer sample
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	433.92MHz
Channel numbers:	1
Channel separation:	N/A
Modulation type:	ASK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi Max (Declare by applicant)
Power supply:	DC 3V
Connecting I/O port(s)	Please refer to User's Manual

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual

2.2 Test mode

Test mode	Description
Mode 1	TX Mode: During test, Keep EUT is in continuous transmission mode, New battery is used during all test

2.3 Description of Support Units

None.

2.4 Deviation from Standards

None.

2.5 Abnormalities from Standard Conditions

None.

2.6 Test Facility

Test laboratory:	Shenzhen ETR Standard Technology Co., Ltd.
CNAS Registration Number:	L11864
A2LA Certificate Number:	6640.01
FCC Designation Number:	CN1326
FCC Test Firm Registration:	183064

2.7 Test Location

All tests were performed at:

Laboratory location:	No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	+86 755 85259392
Fax:	+86 755 27219460

2.8 Additional Instructions

None.

3 Test Instruments list

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESPI7	100605	2022.3.09	2023.3.08
2	EMI Test Receiver	Rohde&schwarz	ESCI3	102696	2022.3.09	2023.3.08
3	Broadband antenna	schwarabeck	VULB9168	1064	2022.3.11	2024.3.10
4	Horn antenna	schwarabeck	BBHA9120D	9120D-1145	2022.3.09	2023.3.08
5	amplifier	EMtrace	RP01A	50117	2022.3.09	2023.3.08
6	Artificial power network	schwarabeck	NSLK8127	8127483	2022.3.09	2023.3.08
	Artificial power network	ETS	3186/2NM	1132	2022.3.09	2023.3.08
7	10dB attenuator	HUBER+SUHNER	10dB	/	2022.3.09	2023.3.08
8	amplifier	Space-Dtronics	EWLAN0118G-P40	19113001	2022.3.09	2023.3.08
9	Spectrum analyzer	KEYSIGHT	N9020A	MY55370280	2022.3.09	2023.3.08
10	Power detector box	MWRFtest	MW100-PSB	MW201020JYT	2021.11.19	2022.11.18

Note: the calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).

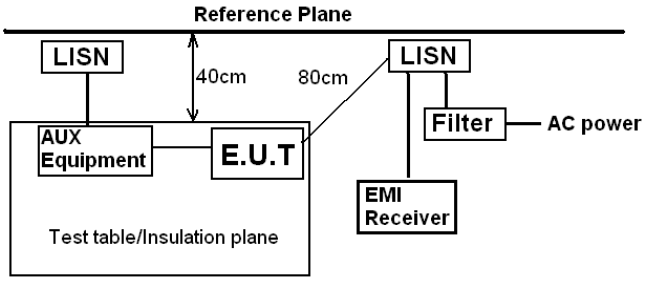
Software Name	Manufacturer	Model	Version
Conducted	Farad	EZ-EMC	Ver.EMC-CON 3A1.1
Radiated	Farad	EZ-EMC	Ver.FA-03A2 RE

4 Test results and Measurement Data

4.1 Antenna requirement

Standard requirement:
FCC part 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.
RSS-Gen 6.8: The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list. For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).
EUT Antenna:
The antenna is PCB antenna, the best case gain of the antenna is 0dBi, reference to the appendix II for details

4.2 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td colspan="6">FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td colspan="6">ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="6">150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td colspan="6">Class B</td></tr>
<tr><td>Receiver setup:</td><td colspan="6">RBW=9KHz, VBW=30KHz, Sweep time=auto</td></tr>
<tr><td>Limit:</td><td colspan="6">
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test setup:</td><td colspan="6"> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test procedure:</td><td colspan="6">1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 3.0 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 2.2 for details</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>/</td><td>Humid.:</td><td>/</td><td>Press.:</td><td>/</td></tr>
<tr><td>Test voltage:</td><td colspan="6">N/A; Because the EUT is powered by the battery, so the item is not applicable.</td></tr>
</table>

4.3 Radiated Emission Measurement

Test Requirement:	FCC Part15 C Section 15.209 & 15.231 (b) and 15.205(a). RSS-210 D & RSS-Gen Clause 8.9&8.10
Test Method:	ANSI C63.10: 2013 & RSS-Gen
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

Limit:
(Field strength of the fundamental signal)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2.250	225
70-130	1.250	125
130-174	11250 to 3750	1125 to 375
174-260	3.750	375
260-470	13750 to 12500	1375 to 1250
Above 470	12500	1250

Limit:
(Spurious Emissions)

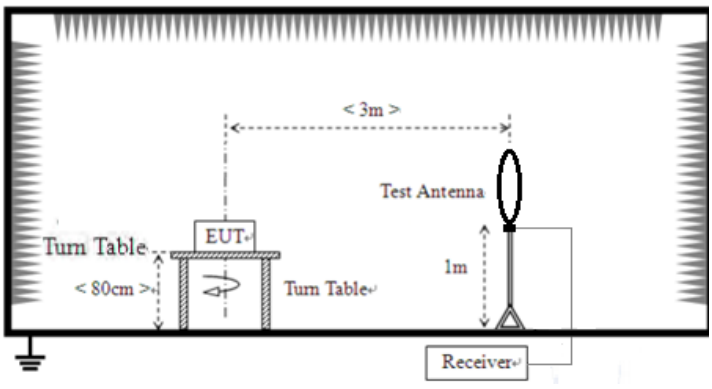
Frequency	Limit (uV/m)	Remark
0.009MHz-0.490MHz	2400/F(kHz) @300m	Quasi-peak Value
0.490MHz-1.705MHz	24000/F(kHz) @30m	Quasi-peak Value
1.705MHz-30.0MHz	30 @30m	Quasi-peak Value
30MHz-88MHz	100 @3m	Quasi-peak Value
88MHz-216MHz	150 @3m	Quasi-peak Value
216MHz-960MHz	200 @3m	Quasi-peak Value
960MHz-1GHz	500 @3m	Quasi-peak Value
Above 1GHz	500 @3m	Average Value
	5000 @3m	Peak Value

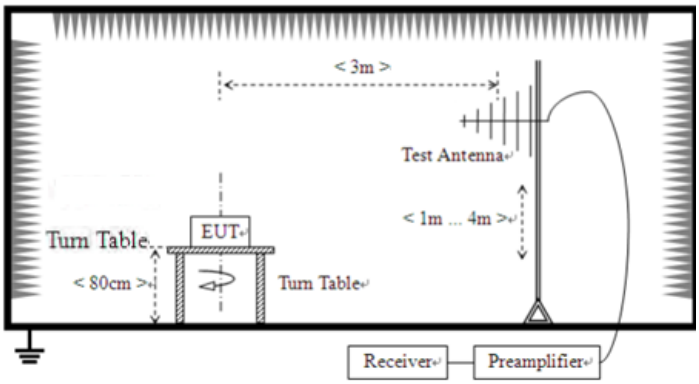
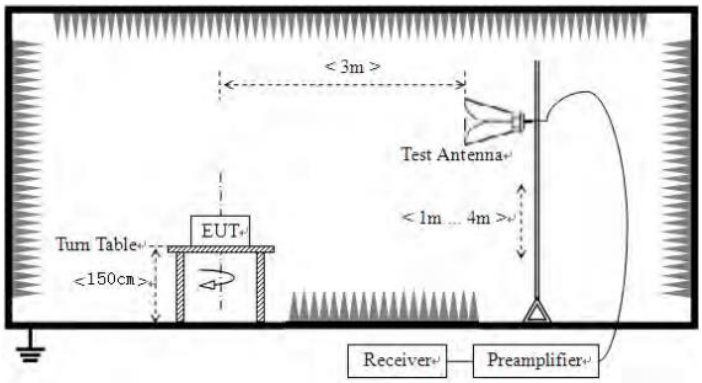
Limit:
(band edge)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test setup:

For radiated emissions from 9kHz to 30MHz



	For radiated emissions from 30MHz to1GHz  For radiated emissions above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test environment:	Temp.: 25.6 °C Humid.: 55% Press.: 1012mbar
Test voltage:	DC 3V
Test results:	Pass

Measurement Data

4.3.1 Field Strength of Fundamental

Peak value:

Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
433.92	85.99	-15.27	70.82	100.83	-30.01	Vertical
433.92	86.38	-15.27	71.11	100.83	-29.72	Horizontal

Average value:

Frequency (MHz)	Peak Level (dBuV/m)	DC Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
433.92	70.82	-7.47	63.35	80.83	-17.48	Vertical
433.92	71.11	-7.47	63.64	80.83	-17.19	Horizontal

Remark: Average=Peak+ Duty Cycle factor (see 4.5 clause)

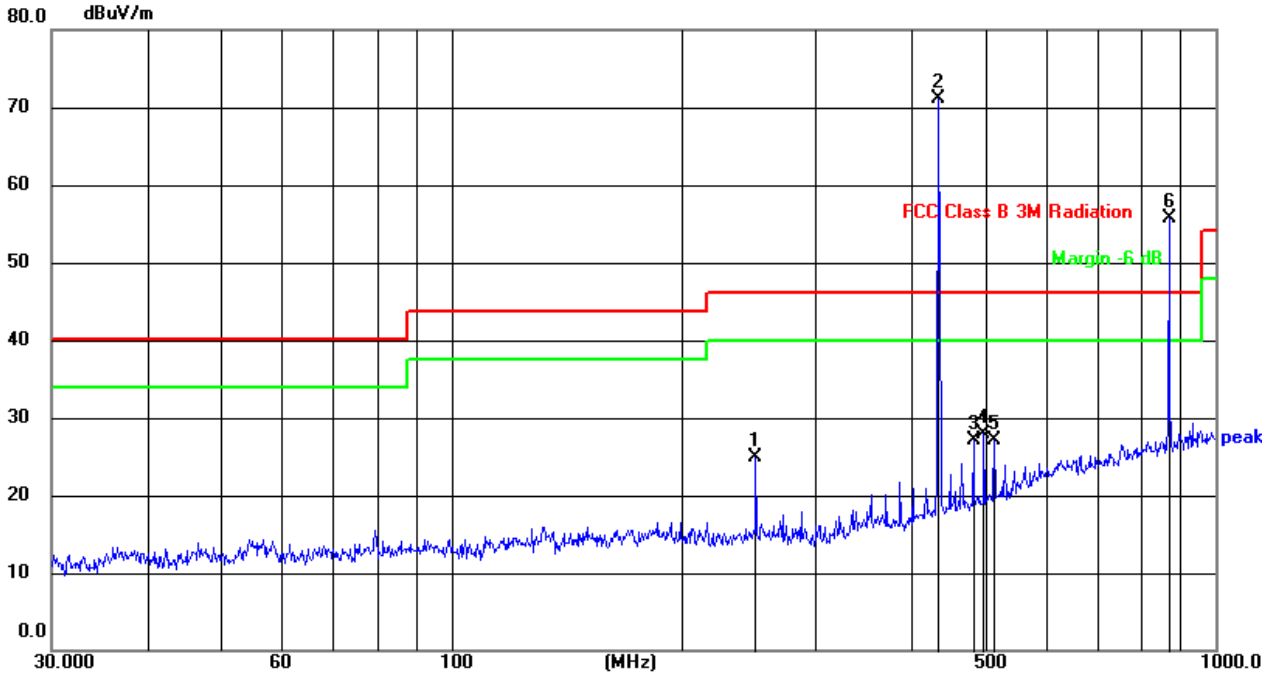
4.3.2 Spurious emissions and Bandedge

■ **Below 30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

■ **Below 1GHz**

Horizontal:



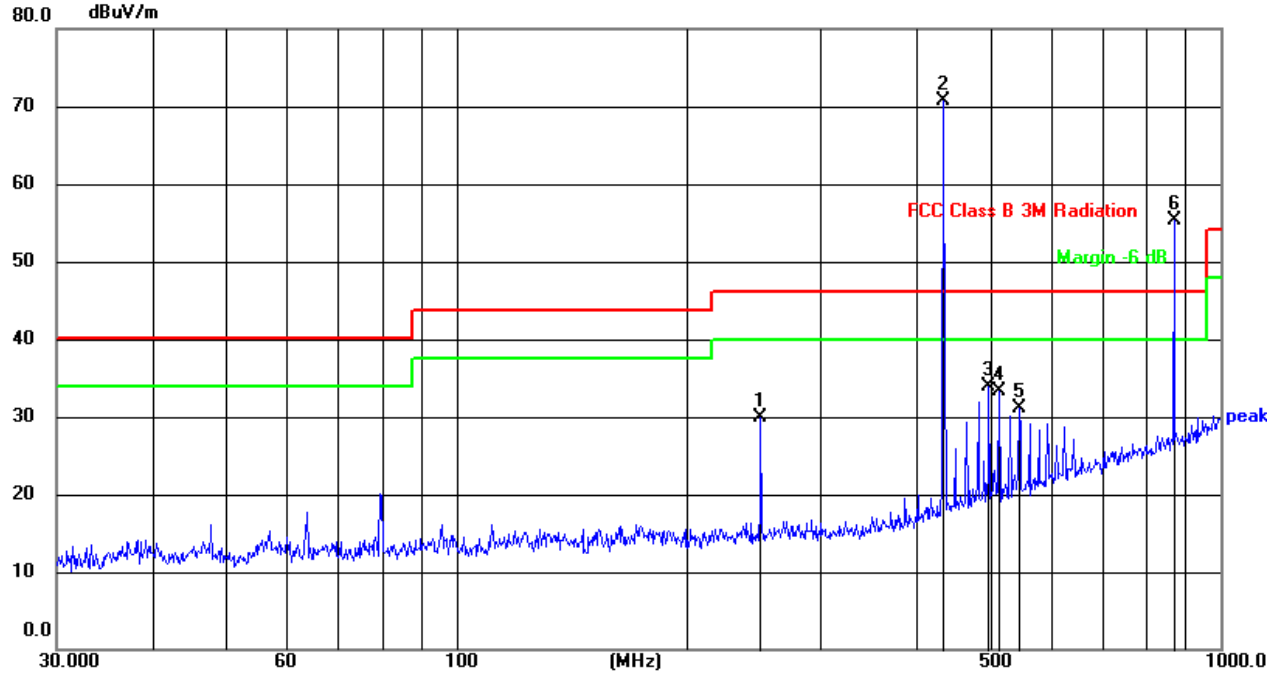
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	250.3009	43.10	-18.20	24.90	46.00	-21.10	QP
2	434.0649	86.38	-15.27	71.11	46.00	25.11	peak
3	482.2155	41.28	-14.14	27.14	46.00	-18.86	QP
4	497.6764	41.63	-13.80	27.83	46.00	-18.17	QP
5	513.6331	40.44	-13.41	27.03	46.00	-18.97	QP
6	869.1300	62.53	-6.84	55.69	46.00	9.69	peak

Average value:

Frequency (MHz)	Peak Level (dBuV/m)	DC Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
869.1300	55.69	-7.47	48.22	60.83	-12.61	Horizontal

Remark: Average=Peak+ Duty Cycle factor

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	250.3010	48.15	-18.20	29.95	46.00	-16.05	QP
2	434.0649	86.09	-15.27	70.82	46.00	24.82	peak
3	497.6764	47.64	-13.80	33.84	46.00	-12.16	QP
4	513.6331	46.77	-13.41	33.36	46.00	-12.64	QP
5	545.1825	43.73	-12.61	31.12	46.00	-14.88	QP
6	869.1302	61.78	-6.39	55.39	46.00	9.39	peak

Average value:

Frequency (MHz)	Peak Level (dBuV/m)	DC Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
869.1302	55.39	-7.47	47.92	12.91	-14.01	vertical

Average=Peak+ Duty Cycle factor

■ **Above 1GHz**

Peak value:

No.	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Polar (H/V)
1	1301.332	73.66	-15.66	58.00	74	-16.00	Horizontal
2	1736.483	69.70	-15.90	53.80	74	-20.20	Horizontal
3	2168.510	62.80	-15.38	47.42	74	-26.58	Horizontal
4	2603.351	62.74	-13.64	49.10	74	-24.90	Horizontal
1	1301.332	72.10	-15.66	56.44	74	-15.66	Vertical
2	1736.483	71.92	-15.66	56.02	74	-15.90	Vertical
3	2168.510	70.30	-15.90	54.92	74	-15.38	Vertical
4	2603.351	60.98	-15.38	47.34	74	-13.64	Vertical

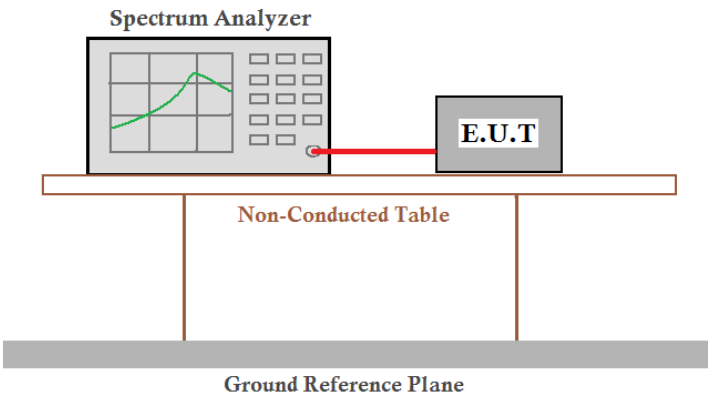
Average value:

No.	Frequency (MHz)	Peak (dBuV)	DC Factor (dB)	Result (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Polar (H/V)
1	1301.332	58.00	-7.47	50.53	54	-3.47	Horizontal
2	1736.483	53.80	-7.47	46.33	54	-7.67	Horizontal
3	2168.510	47.42	-7.47	39.95	54	-14.05	Horizontal
4	2603.351	49.10	-7.47	41.63	54	-12.37	Horizontal
1	1301.332	56.44	-7.47	48.97	54	-5.03	Vertical
2	1736.483	56.02	-7.47	48.55	54	-5.45	Vertical
3	2168.510	54.92	-7.47	47.45	54	-6.55	Vertical
4	2603.351	47.34	-7.47	39.87	54	-14.13	Vertical

Remark:

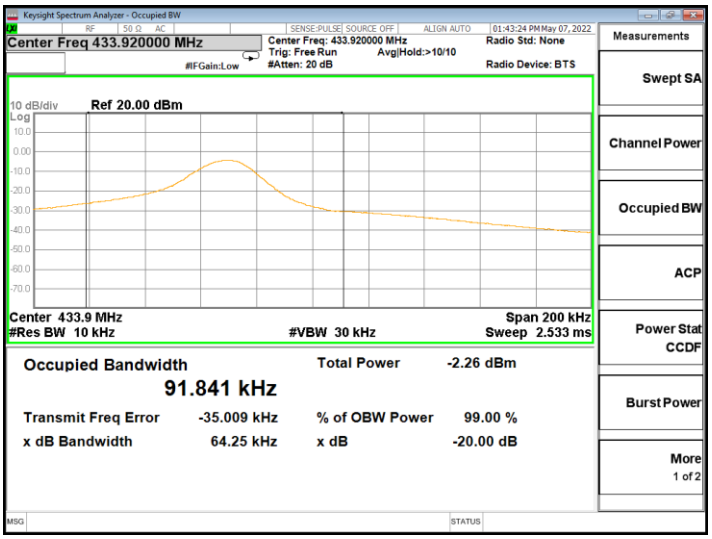
1. *Final Level =Receiver Read level +Correction Factor(Antenna Factor + Cable Loss – Preamplifier Factor)*
2. *The emission levels of other frequencies are more than 20 dB below the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*
4. *Average=Peak+ Duty Cycle factor*

4.4 20dB Occupy Bandwidth

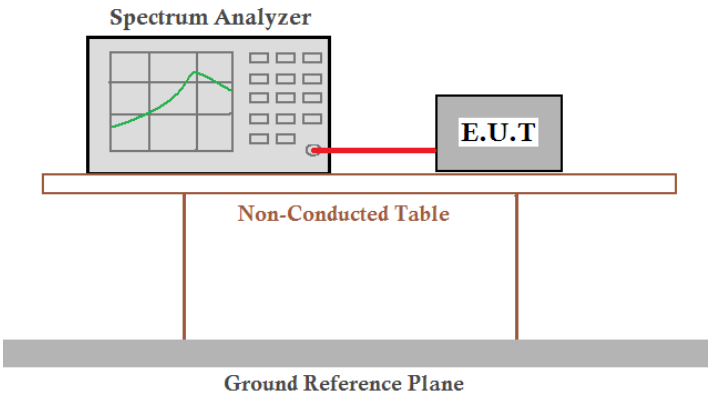
Test Requirement:	FCC Part15 C Section 15.231
Test Method:	ANSI C63.10:2013
Limit:	20dB bandwidth of the emissions shall not exceed 0.25% of the center frequency
Test setup:	
Test Procedure:	With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

Measurement Data

Center Frequency	20dB bandwidth(kHz)	Limit(kHz)	Result
433.92MHz	64.25	1084.8	Pass

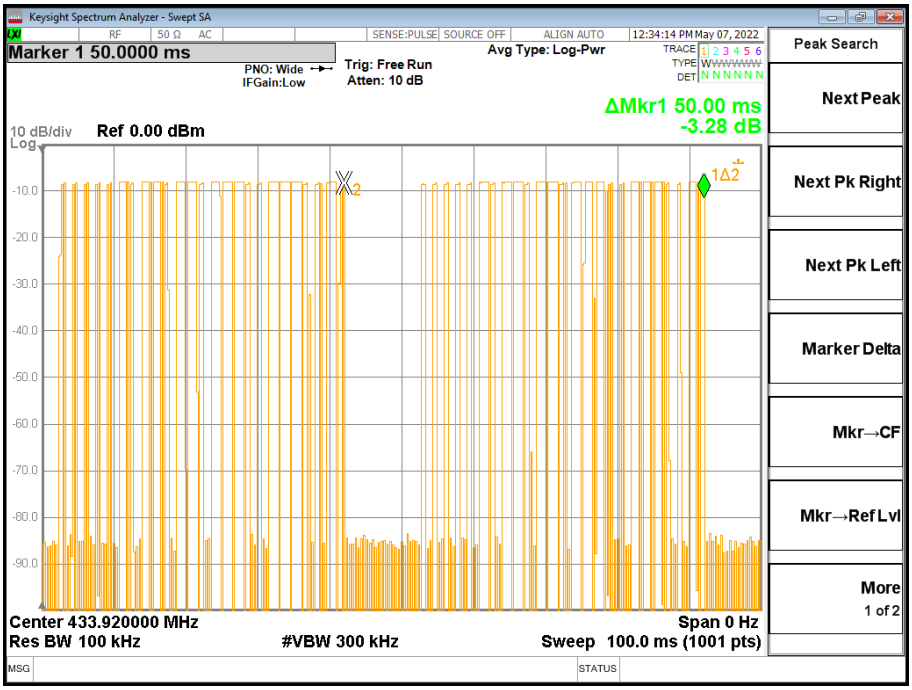


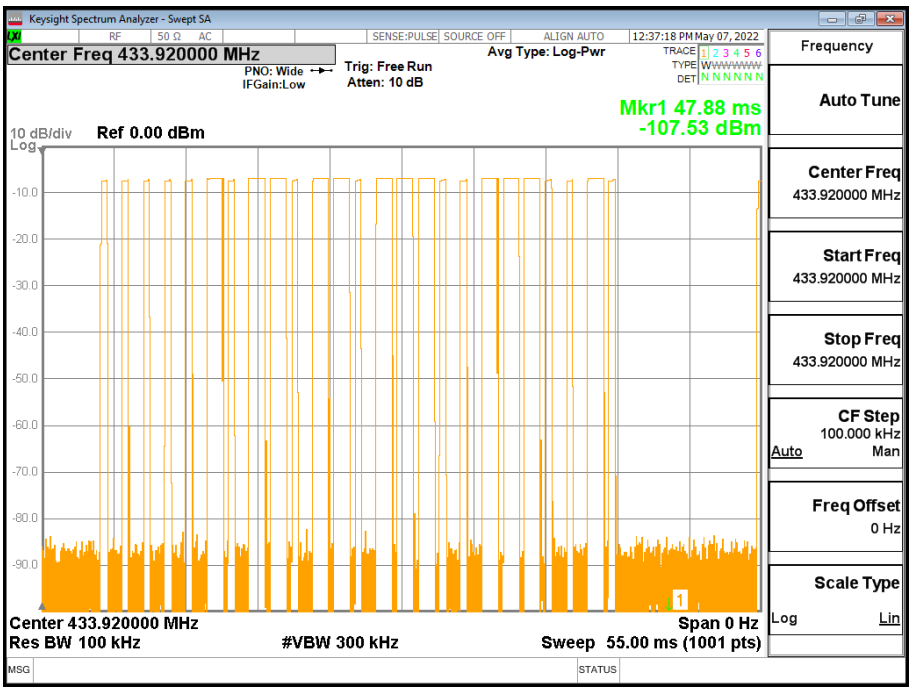
4.5 DUTY CYCLE

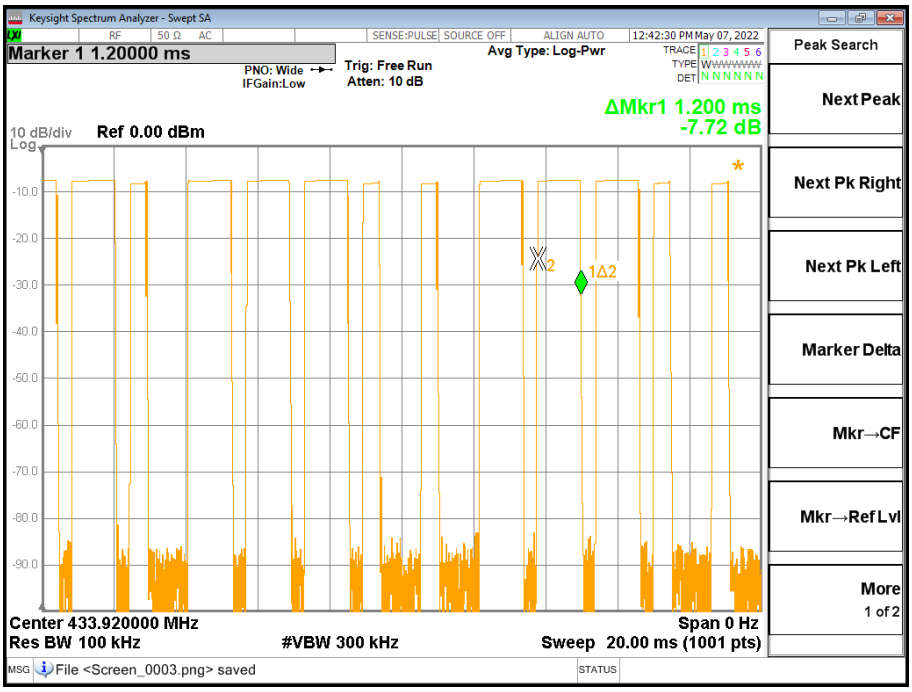
Test Requirement:	FCC Part15 C Section 15.231
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Procedure:	1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below. 2. The Duty Cycle Was Determined By The Following Equation: To Calculate The Actual Field Intensity,The Duty Cycle Correction Factor In Decibel Is Needed For Later Use And Can Be Obtained From Following Conversion Duty Cycle(%)=Total On Interval In A Complete Pulse Train/ Length Of A Complete Pulse Train * % Duty Cycle Correction Factor(Db)=20 * Log10(Duty Cycle(%)
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

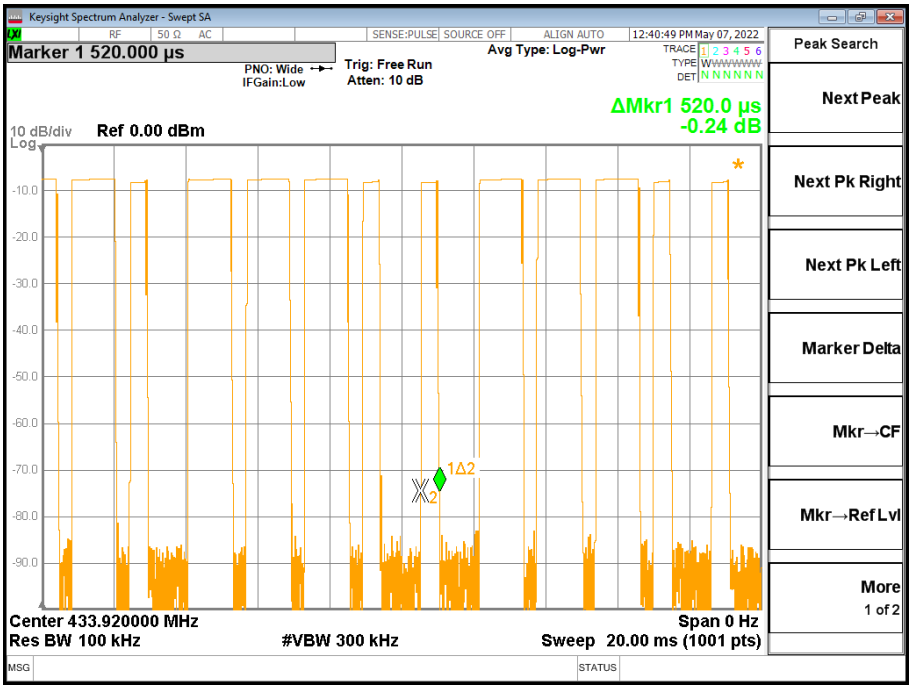
Test data:

Ton = (0.52*13+1.2*12)ms= 21.16(ms)
Tp = 50(ms)
Duty cycle= Ton/ Tp*100%=21.16/50*100%=42.32%
DC Correction Factor= 20log (Ton/Tp) =20log (21.16/42.32) = -7.47dB

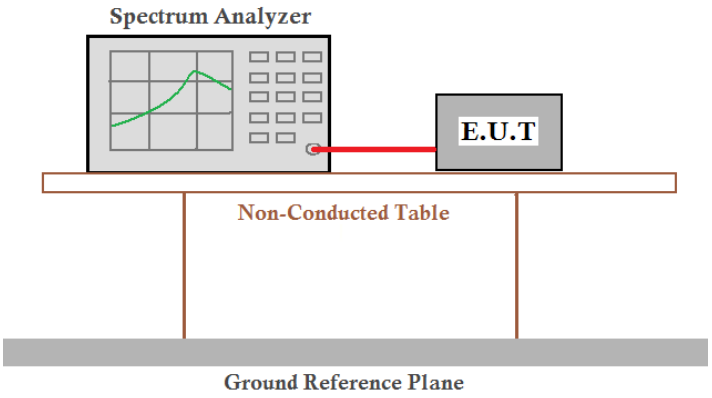

Keysight Spectrum Analyzer - Swept SA
Marker 1 50.0000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
12:34:14 PM May 07, 2022
ΔMkr1 50.00 ms
-3.28 dB
10 dB/div
Log
Ref 0.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 100.0 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Keysight Spectrum Analyzer - Swept SA
Center Freq 433.920000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
12:37:18 PM May 07, 2022
Mkr1 47.88 ms
-107.53 dBm
10 dB/div
Log
Ref 0.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 55.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
433.920000 MHz
Start Freq
433.920000 MHz
Stop Freq
433.920000 MHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Keysight Spectrum Analyzer - Swept SA
Marker 1 1.20000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
12:42:30 PM May 07, 2022
ΔMkr1 1.200 ms
-7.72 dB
10 dB/div
Log
Ref 0.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
File <Screen_0003.png> saved
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

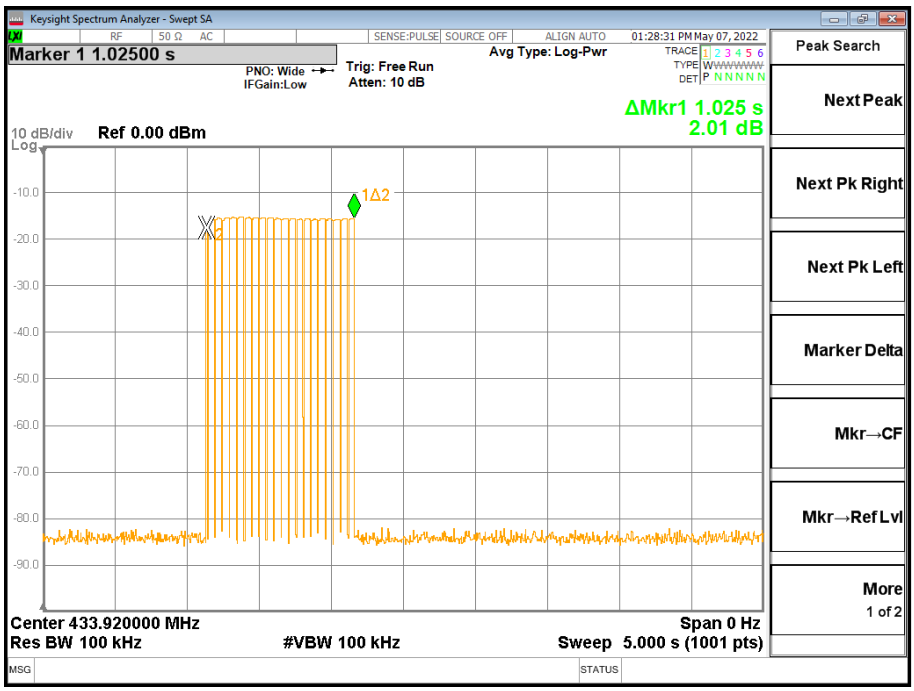

Keysight Spectrum Analyzer - Swept SA
Marker 1 520.000 µs
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
12:40:49 PM May 07, 2022
ΔMkr1 520.0 µs
-0.24 dB
10 dB/div
Log
Ref 0.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

4.6 Release time

Test Requirement:	FCC Part15 C Section 15.231
Test Method:	ANSI C63.10:2013
Limit:	A manumotive operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
Test setup:	
Test Procedure:	The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below. Spectrum Setting: RBW= 1MHz, VBW=3MHz, Sweep time = 10s. Note: (1)Refer to the plot (As Below), We find a manumotive operated transmitter shall employ a switch that will automatically deactivate the transmitteri immediately, within not more than 5 seconds of being released. (2)The EUT is comply with FCC PART 15 clause 15.231(a)(1). Manumotive working mode are pre-tested. and only the worst result is reported
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

Test Result:

Cease time(s)	Limit(s)	Result
1.025	5	Pass



5 Test Setup Photo

Reference to the **appendix I** for details.

6 EUT Constructional Details

Reference to the **appendix II** for details.

------End------