TEST REPORT

Applicant:	Giant Alarm System Co., Ltd
Address of Applicant:	No.37 Yangguang Road, Optoelectronic Information Park, Daxiamei Town, Nan'An, Fujian, China
Manufacturer:	Giant Alarm System Co., Ltd
Address of Manufacturer:	No.37 Yangguang Road, Optoelectronic Information Park, Daxiamei Town, Nan'An, Fujian, China

Equipment Under Test (EUT)

Product Name:	Remote Control
Model No.:	JJ-RC-SM24-24M(M2) JJ-RC-SM24-24C(M2), JJ-RC-SM24-21C, JJ-RC-SM24-21M, RGR540C, MGR540, RGR540C1, MGR540C1, RGR540C3, MGR540C3, RGR530C
Trade Mark:	N/A
FCC ID:	2ASU7JJ-RC
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231
Date of sample receipt:	Feb. 22, 2021
Date of Test:	Feb. 22, 2021 - Mar. 03, 2021
Date of report issued:	Mar. 03, 2021
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*Mar. 03, 2021*	*Original*

Prepared By:  ***Date:*** *Mar. 03, 2021*

Project Engineer

Check By:  ***Date:*** *Mar. 03, 2021*

Reviewer

3 Contents

Page

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	N/A
Fundamental &Radiated Spurious Emission Measurement	15.209,15.231b	Pass
Occupy Bandwidth	15.231c	Pass
Dwell time	15.231a	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark：Test according to ANSI C63.10:2013.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	N/A
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Remote Control
Model No.:	JJ-RC-SM24-24M(M2) JJ-RC-SM24-24C(M2), JJ-RC-SM24-21C, JJ-RC-SM24-21M, RGR540C, MGR540, RGR540C1, MGR540C1, RGR540C3, MGR540C3, RGR530C
Test Model:	JJ-RC-SM24-24M(M2)
Hardware Version:	HV01
Software Version:	SV01
Test sample(s) ID:	GTS202102000082-1
Sample(s) Status	Engineered sample
Operation Frequency:	310MHz, 315MHz, 390MHz
Channel numbers:	3
Modulation type:	ASK
Antenna Type:	PCB antenna
Antenna gain:	-0.5dBi(declare by applicant)
Power supply:	DC 12V from battery

Operation Frequency each of channel	
Channel	Frequency MHz
1	310
2	315
3	390

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency	Mode
The lowest channel	310MHz	ASK
The middle channel	315MHz	
The Highest channel	390MHz	

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: (1) New battery is used during the test.	

Pre-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	75.38	74.59	75.21

Final Test Mode:

According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”:

X axis (see the test setup photo)

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
/	/	/	/

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None

5.6 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0d by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203

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.

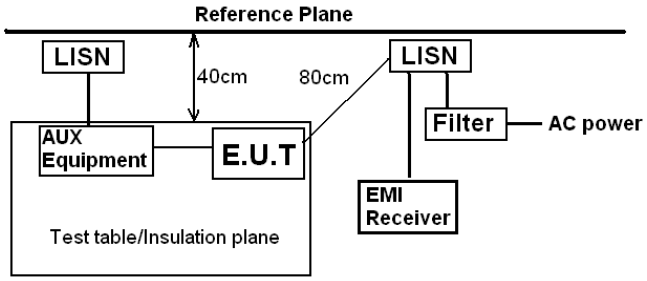
15.231 requirement:

For intentional device, according to 15.203: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.

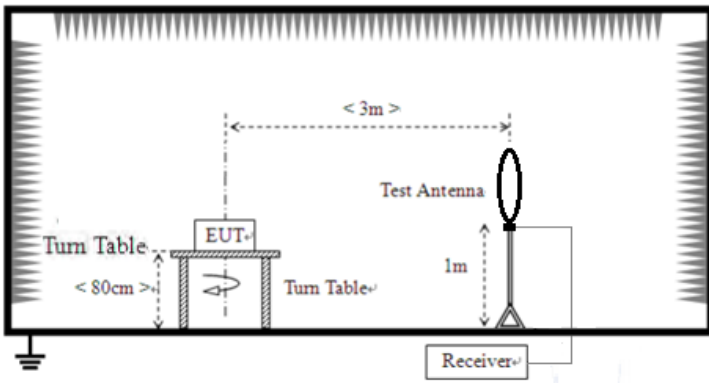
EUT Antenna:

The antenna is PCB antenna, the best case gain of the antenna is -0.5dBi, reference to the appendix II for details

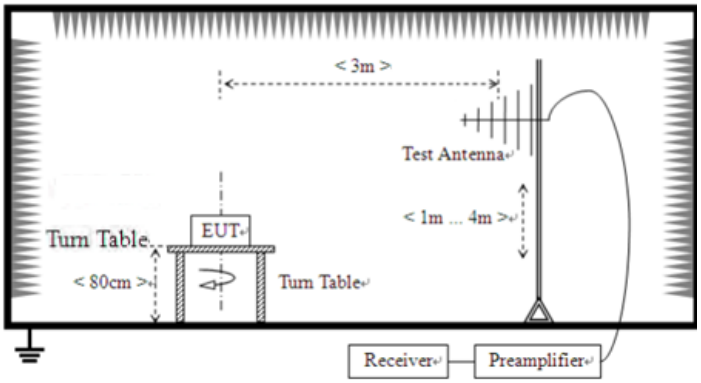
7.2 Conducted Emissions

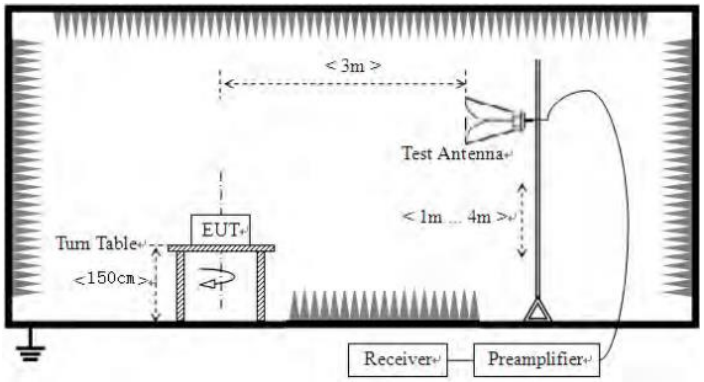
Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The EUT 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.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 25 °C / Humid.: 52% / Press.: 1012mbar
Test voltage:	/
Test results:	N/A

7.3 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 6GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td>9kHz-150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>300Hz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>10kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Field strength of the fundamental signal)</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td rowspan="2">310MHz</td><td>95.32</td><td>Peak Value</td></tr>
<tr><td>75.32</td><td>Average Value</td></tr>
<tr><td rowspan="2">315MHz</td><td>95.62</td><td>Peak Value</td></tr>
<tr><td>75.62</td><td>Average Value</td></tr>
<tr><td rowspan="2">390MHz</td><td>99.24</td><td>Peak Value</td></tr>
<tr><td>79.24</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Spurious Emissions)</td><td>
<table>
<tr><th>Fundamental Frequency (MHz)</th><th>Field Strength of fundamental (microvolts/meter)</th><th>Field Strength of Unwanted Emissions (microvolts/meter)</th></tr>
<tr><td>40.66-40.70</td><td>2250</td><td>225</td></tr>
<tr><td>70-130</td><td>1250</td><td>125</td></tr>
<tr><td>130-174</td><td>1250 to 3750</td><td>125 to 1,375**</td></tr>
<tr><td>174-260</td><td>3750</td><td>375</td></tr>
<tr><td>260-470</td><td>3750 to 12500 **</td><td>375 to 1250**</td></tr>
<tr><td>Above 470</td><td>12500</td><td>1250</td></tr>
</table>
<table>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Class B(dBuV/m @3m)</th></tr>
<tr><th>Peak</th><th>Average</th></tr>
<tr><td>Above 1000</td><td>74</td><td>54</td></tr>
</table>
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.
</td></tr>
<tr><td>Test setup:</td><td>For radiated emissions from 9kHz to 30MHz
 

For radiated emissions from 30MHz to1GHz</td></tr>
</table>

<table>
<tr><td></td><td colspan="6"> 

For radiated emissions above 1GHz

</td></tr>
<tr><td>Test Procedure:</td><td colspan="6">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.</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 6.0 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 5.2 for details</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>52%</td><td>Press.:</td><td>1012mbar</td></tr>
<tr><td>Test voltage:</td><td colspan="6">DC 12V</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

Measurement data:

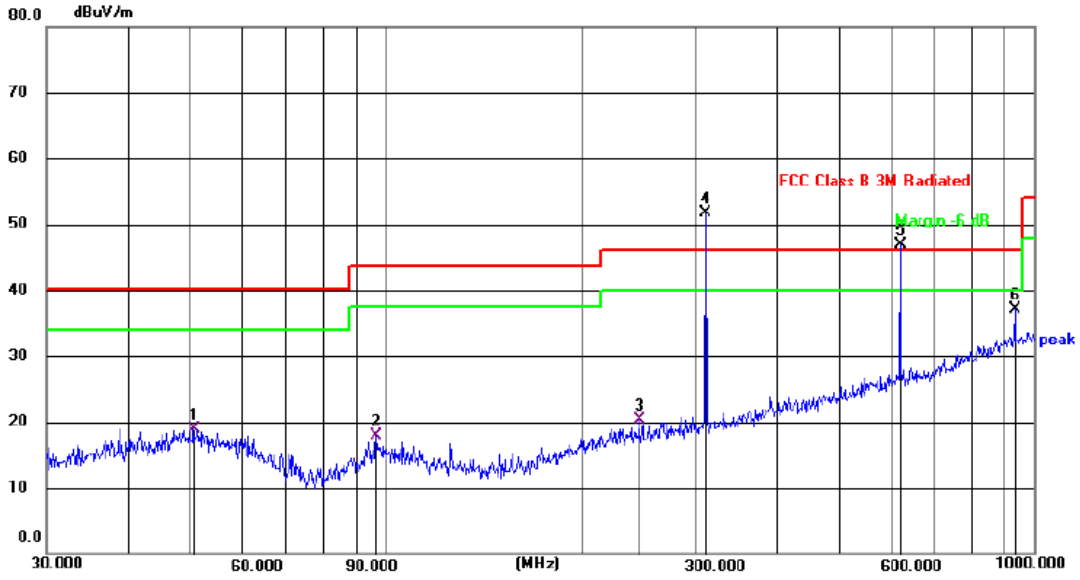
7.3.1 Spurious emissions

■ 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), the test result no need to reported.

■ Below 1GHz

Test channel:	Lowest channel



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	Comment
1		50.5860	32.59	-13.63	18.96	40.00	21.04	QP	
2		96.7749	34.27	-16.33	17.94	43.50	25.56	QP	
3		245.9509	34.44	-14.12	20.32	46.00	25.68	QP	
4	*	310.0000	64.37	-12.76	51.61	46.00	-5.61	peak	
5	X	620.0000	53.32	-6.36	46.96	46.00	-0.96	peak	
6		930.0000	38.59	-1.39	37.20	46.00	8.80	peak	

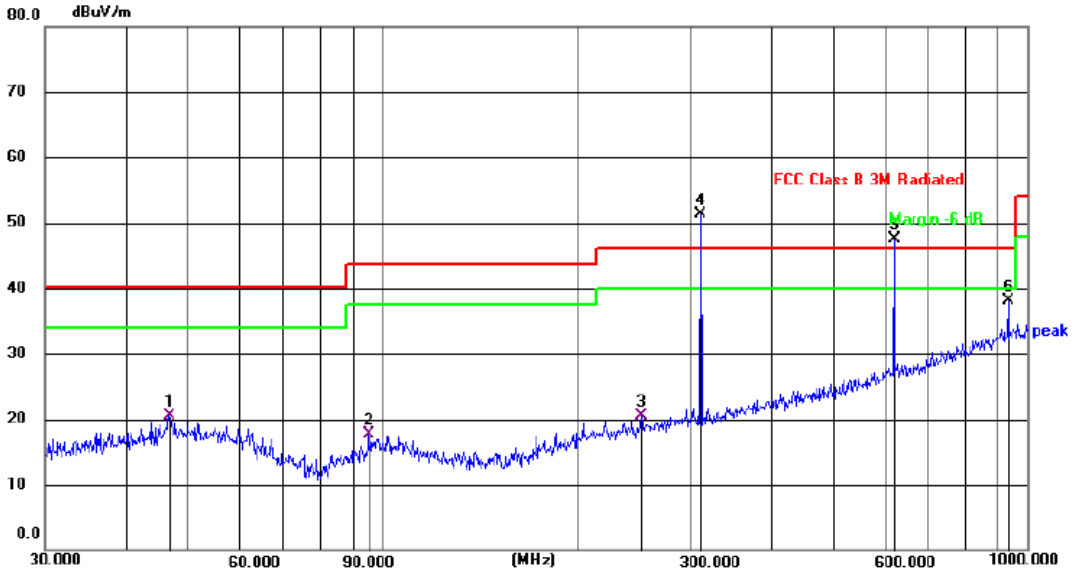
For average Emission

Frequency MHz	Peak Measurement Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit PK	Limit Average	Margin PK	Margin Average	Polarization
310.00	51.61	-11.06	40.55	95.32	75.32	-43.71	-34.77	Horizontal
620.00	46.96	-11.06	35.90	75.32	55.32	-28.36	-19.42	Horizontal
930.00	37.20	-11.06	26.14	75.32	55.32	-38.12	-29.18	Horizontal

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2.Duty cycle level please see clause 7.5.

Test channel:	Lowest channel



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	Comment
1		46.6664	34.41	-13.93	20.48	40.00	19.52	QP	
2		95.0930	34.28	-16.64	17.64	43.50	25.86	QP	
3		252.0627	34.38	-13.95	20.43	46.00	25.57	QP	
4	*	310.0000	64.10	-12.76	51.34	46.00	-5.34	peak	
5	X	620.0000	53.79	-6.36	47.43	46.00	-1.43	peak	
6		930.0000	39.46	-1.39	38.07	46.00	7.93	peak	

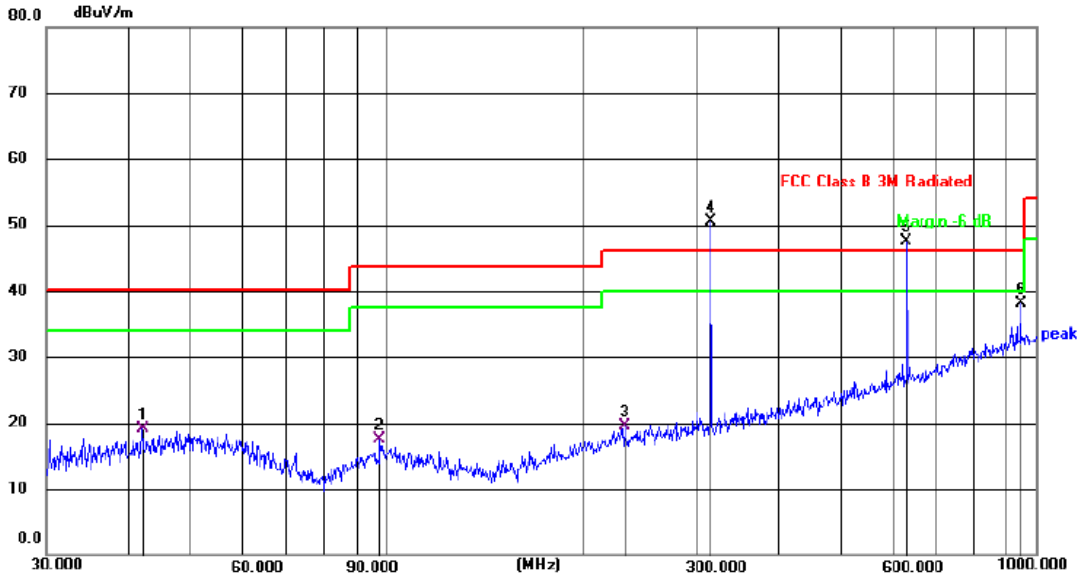
For average Emission

Frequency MHz	Peak Measurement Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit PK	Limit Average	Margin PK	Margin Average	Polarization
310.00	51.34	-11.06	40.28	95.32	75.32	-43.98	-35.04	Vertical
620.00	47.43	-11.06	36.37	75.32	55.32	-27.89	-18.95	Vertical
930.00	38.07	-11.06	27.01	75.32	55.32	-37.25	-28.31	Vertical

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2.Duty cycle level please see clause 7.5.

Test channel:	Middle channel



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	Comment
1		42.1542	33.47	-14.42	19.05	40.00	20.95	QP	
2		97.7983	33.60	-16.16	17.44	43.50	26.06	QP	
3		232.5318	33.98	-14.57	19.41	46.00	26.59	QP	
4	*	315.0000	63.14	-12.64	50.50	46.00	-4.50	peak	
5	X	630.0000	53.76	-6.17	47.59	46.00	-1.59	peak	
6		945.0000	39.23	-1.21	38.02	46.00	7.98	peak	

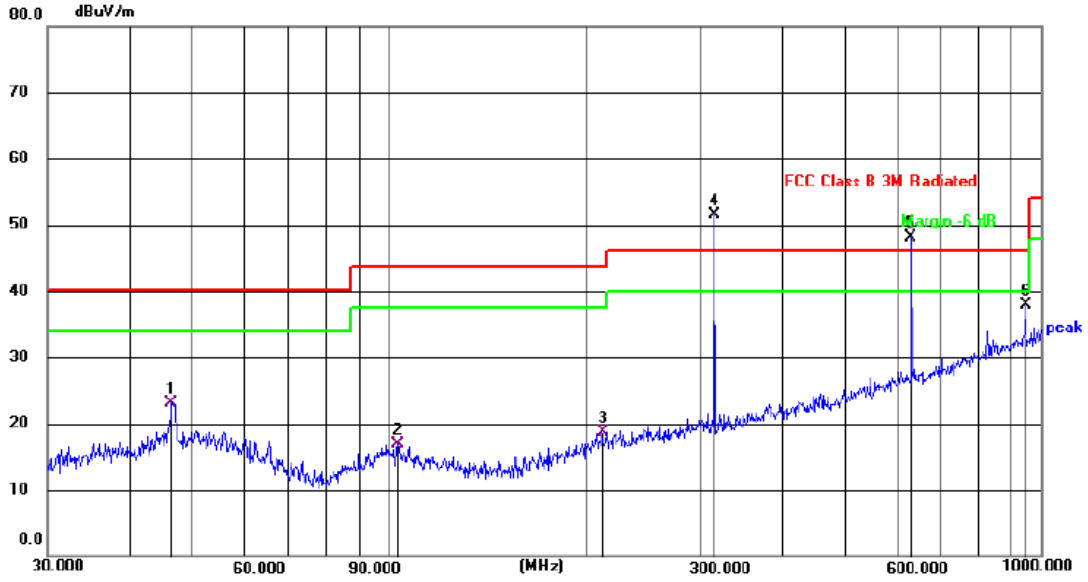
For average Emission

Frequency MHz	Peak Measurement Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit PK	Limit Average	Margin PK	Margin Average	Polarization
315.00	50.50	-11.06	39.44	95.62	75.62	-45.12	-36.18	Horizontal
630.00	47.59	-11.06	36.53	75.62	55.62	-28.03	-19.09	Horizontal
945.00	38.02	-11.06	26.96	75.62	55.62	-37.60	-28.66	Horizontal

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2.Duty cycle level please see clause 7.5.

Test channel:	Middle channel



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	Comment
1		46.5030	37.11	-13.93	23.18	40.00	16.82	QP	
2		103.0800	32.91	-16.06	16.85	43.50	26.65	QP	
3		212.2695	33.91	-15.26	18.65	43.50	24.85	QP	
4	*	315.0000	64.16	-12.64	51.52	46.00	-5.52	peak	
5	X	630.0000	54.37	-6.17	48.20	46.00	-2.20	peak	
6		945.0000	39.21	-1.21	38.00	46.00	8.00	peak	

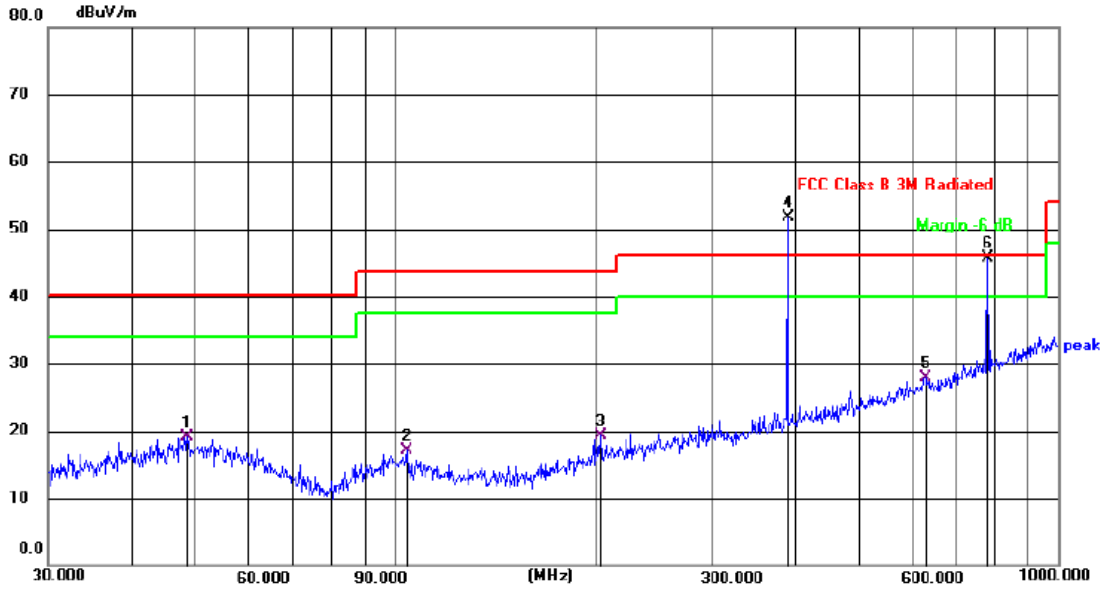
For average Emission

Frequency MHz	Peak Measurement Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit PK	Limit Average	Margin PK	Margin Average	Polarization
315.00	51.52	-11.06	40.46	95.62	75.62	-44.10	-35.16	Vertical
630.00	48.20	-11.06	37.14	75.62	55.62	-27.42	-18.48	Vertical
945.00	38.00	-11.06	26.94	75.62	55.62	-37.62	-28.68	Vertical

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2.Duty cycle level please see clause 7.5.

Test channel:	Highest channel



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	Comment
1		48.6719	32.73	-13.71	19.02	40.00	20.98	QP	
2		104.1701	33.27	-16.18	17.09	43.50	26.41	QP	
3		204.2377	34.77	-15.52	19.25	43.50	24.25	QP	
4	*	390.0000	62.57	-10.82	51.75	46.00	-5.75	peak	
5		629.4772	34.18	-6.18	28.00	46.00	18.00	QP	
6	!	780.0000	49.26	-3.61	45.65	46.00	0.35	peak	

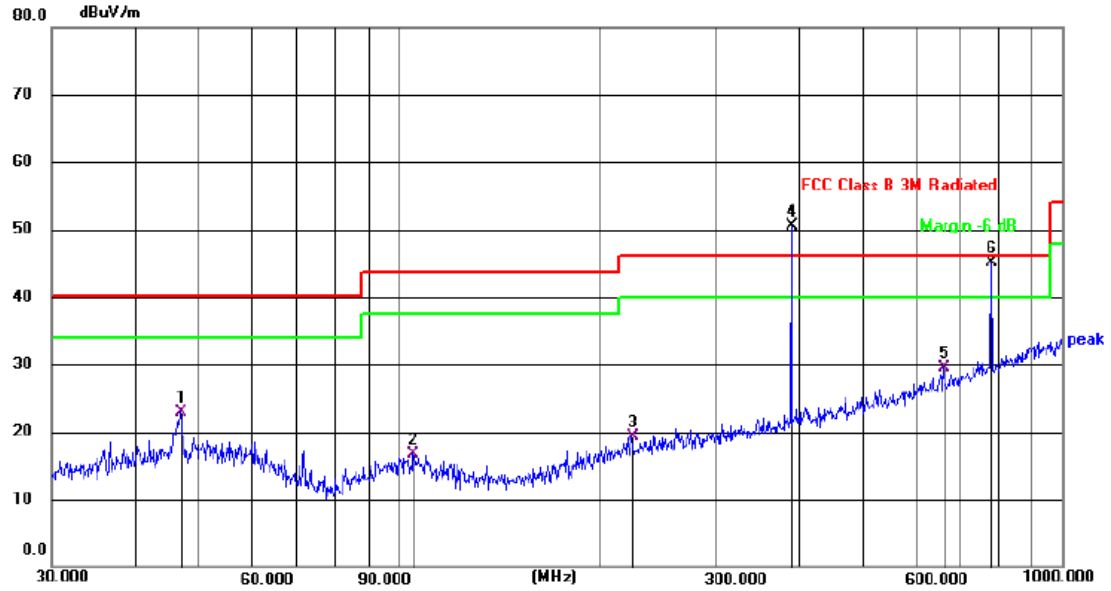
For average Emission

Frequency MHz	Peak Measurement Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit PK	Limit Average	Margin PK	Margin Average	Polarization
390.00	51.75	-11.06	40.69	99.24	79.24	-47.49	-38.55	Horizontal
780.00	45.65	-11.06	34.59	79.24	59.24	-33.59	-24.65	Horizontal

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2.Duty cycle level please see clause 7.5.

Test channel:	Highest channel



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	Comment
1		46.8303	36.82	-13.91	22.91	40.00	17.09	QP	
2		104.9033	32.86	-16.25	16.61	43.50	26.89	QP	
3		224.5193	34.06	-14.85	19.21	46.00	26.79	QP	
4	*	390.0000	61.37	-10.82	50.55	46.00	-4.55	peak	
5		661.1505	35.02	-5.59	29.43	46.00	16.57	QP	
6	!	780.0000	48.63	-3.61	45.02	46.00	0.98	peak	

For average Emission

Frequency MHz	Peak Measurement Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit PK	Limit Average	Margin PK	Margin Average	Polarization
390.00	50.55	-11.06	39.49	99.24	79.24	-48.69	-39.75	Vertical
780.00	45.02	-11.06	33.96	79.24	59.24	-34.22	-25.28	Vertical

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2.Duty cycle level please see clause 7.5.

■ Above 1GHz

Test Channel	Frequency MHz	Peak Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Limit		Margin dB		Polarization
					PK	AV	PK	AV	
Lowest channel	1240.00	48.38	-11.06	37.32	74.00	54.00	-25.62	-16.68	Vertical
	1550.00	45.28	-11.06	34.22	74.00	54.00	-28.72	-19.78	Vertical
	1860.00	47.05	-11.06	35.99	74.00	54.00	-26.95	-18.01	Vertical
	2170.00	49.69	-11.06	38.63	74.00	54.00	-24.31	-15.37	Vertical
	2480.00	48.75	-11.06	37.69	74.00	54.00	-25.25	-16.31	Vertical
	2790.00	46.86	-11.06	35.80	74.00	54.00	-27.14	-18.20	Vertical
	1240.00	49.32	-11.06	38.26	74.00	54.00	-24.68	-15.74	Horizontal
	1550.00	47.65	-11.06	36.59	74.00	54.00	-26.35	-17.41	Horizontal
	1860.00	49.15	-11.06	38.09	74.00	54.00	-24.85	-15.91	Horizontal
	2170.00	48.32	-11.06	37.26	74.00	54.00	-25.68	-16.74	Horizontal
	2480.00	46.18	-11.06	35.12	74.00	54.00	-27.82	-18.88	Horizontal
	2790.00	46.26	-11.06	35.20	74.00	54.00	-27.74	-18.80	Horizontal
Middle channel	1260.00	48.95	-11.06	37.89	74.00	54.00	-25.05	-16.11	Vertical
	1575.00	45.18	-11.06	34.12	74.00	54.00	-28.82	-19.88	Vertical
	1890.00	47.24	-11.06	36.18	74.00	54.00	-26.76	-17.82	Vertical
	2205.00	49.43	-11.06	38.37	74.00	54.00	-24.57	-15.63	Vertical
	2520.00	48.67	-11.06	37.61	74.00	54.00	-25.33	-16.39	Vertical
	2835.00	46.18	-11.06	35.12	74.00	54.00	-27.82	-18.88	Vertical
	1260.00	49.24	-11.06	38.18	74.00	54.00	-24.76	-15.82	Horizontal
	1575.00	47.37	-11.06	36.31	74.00	54.00	-26.63	-17.69	Horizontal
	1890.00	49.86	-11.06	38.80	74.00	54.00	-24.14	-15.20	Horizontal
	2205.00	48.31	-11.06	37.25	74.00	54.00	-25.69	-16.75	Horizontal
	2520.00	46.34	-11.06	35.28	74.00	54.00	-27.66	-18.72	Horizontal
	2835.00	46.08	-11.06	35.02	74.00	54.00	-27.92	-18.98	Horizontal
Highest channel	1170.00	48.19	-11.06	37.13	74.00	54.00	-25.81	-16.87	Vertical
	1560.00	45.41	-11.06	34.35	74.00	54.00	-28.59	-19.65	Vertical
	1950.00	47.28	-11.06	36.22	74.00	54.00	-26.72	-17.78	Vertical
	2340.00	49.47	-11.06	38.41	74.00	54.00	-24.53	-15.59	Vertical
	2730.00	48.56	-11.06	37.50	74.00	54.00	-25.44	-16.50	Vertical
	3120.00	46.37	-11.06	35.31	74.00	54.00	-27.63	-18.69	Vertical
	1170.00	49.27	-11.06	38.21	74.00	54.00	-24.73	-15.79	Horizontal
	1560.00	47.08	-11.06	36.02	74.00	54.00	-26.92	-17.98	Horizontal
	1950.00	49.87	-11.06	38.81	74.00	54.00	-24.13	-15.19	Horizontal
	2340.00	48.63	-11.06	37.57	74.00	54.00	-25.37	-16.43	Horizontal
	2730.00	46.29	-11.06	35.23	74.00	54.00	-27.71	-18.77	Horizontal
	3120.00	46.49	-11.06	35.43	74.00	54.00	-27.51	-18.57	Horizontal

Notes: 1.Average emission Level = Peak Level + Duty cycle factor

2. Duty cycle level please see clause 7.5.

3. Pulse Desensitization Correction Factor

Pulse Width (PW) = 10.7ms

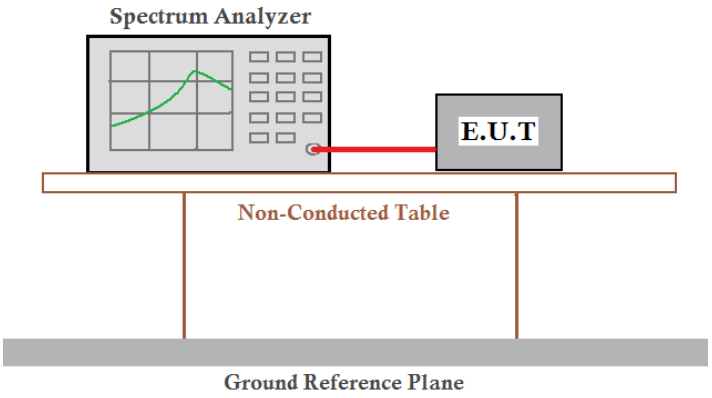
2/PW = 2/10.7ms = 0.19kHz

RBW (100 kHz) > 2/PW (0.028kHz)

Therefore PDCF is not needed

4. Other harmonics emissions are lower than 20dB below the allowable limit.

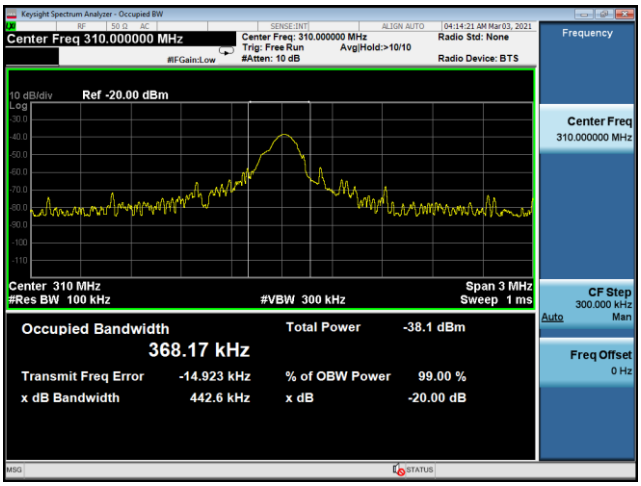
7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.231
Test Method:	ANSI C63.10:2013
Limit:	According to FCC 15.231(c) requirement: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. B.W (20dBc) Limit = 0.25% * f(MHz) = 0.25% * 310.0MHz = 0.775MHz 0.25% * 315.0MHz = 0.788MHz 0.25% * 390.0MHz = 0.975MHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

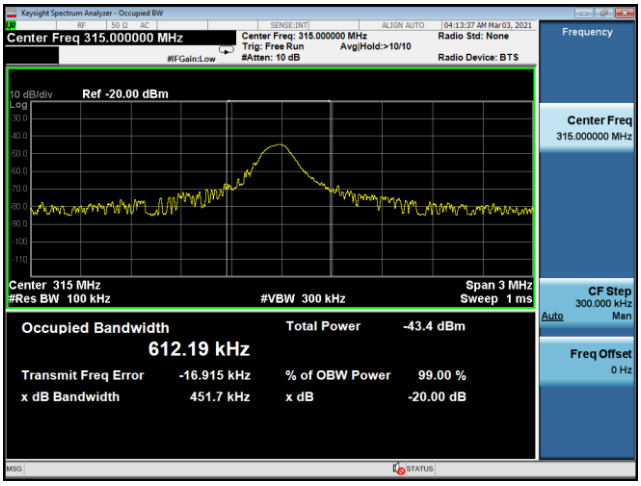
Measurement Data

Test channel	20dB bandwidth(kHz)	Limit(kHz)	Result
Lowest	442.6	775	Pass
Middle	451.7	788	Pass
Highest	520.9	975	Pass

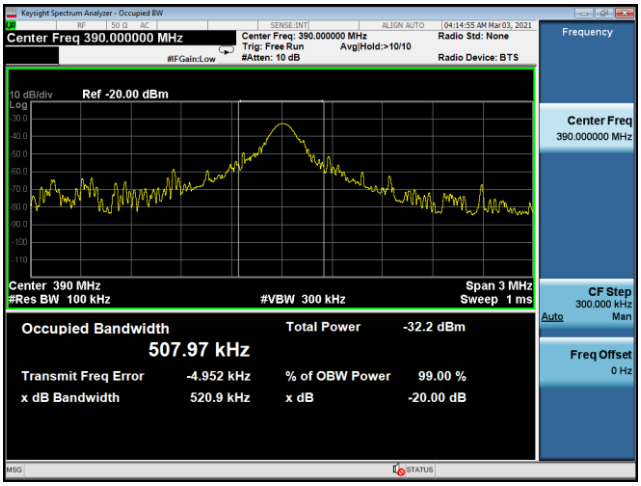
Test plot as follows:



Lowest channel



Middle channel



Highest channel

7.5 CALCULATION OF AVERAGE FACTOR

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB =20log (duty cycle)

The duration of one cycle = 63.40ms

The duty cycle is simply the on-time divided the duration of one cycle

Duty Cycle = (0.27ms*40+0.52ms*13)/63.40

=17.56ms / 63.40ms

=0.28

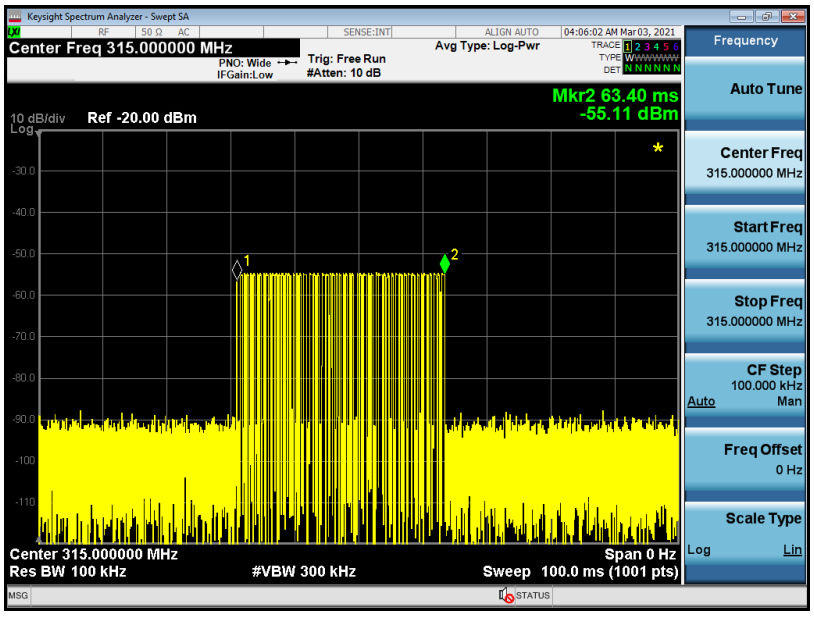
Therefore, the averaging factor is found by 20log0.28=-11.06dB

Test plot as follows:

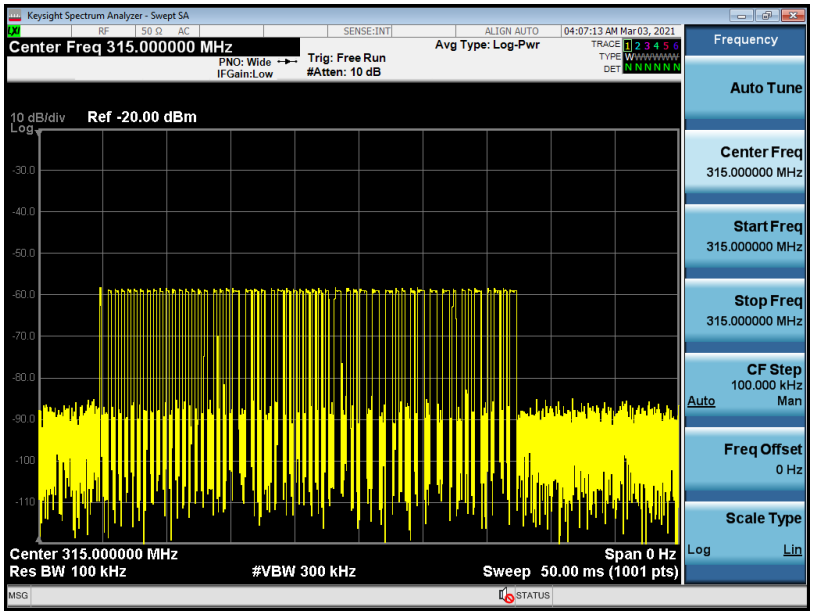
Note: During the 100ms, the amount of pulse and on-time of pulse are the same for every pulse train.

Measurement Data

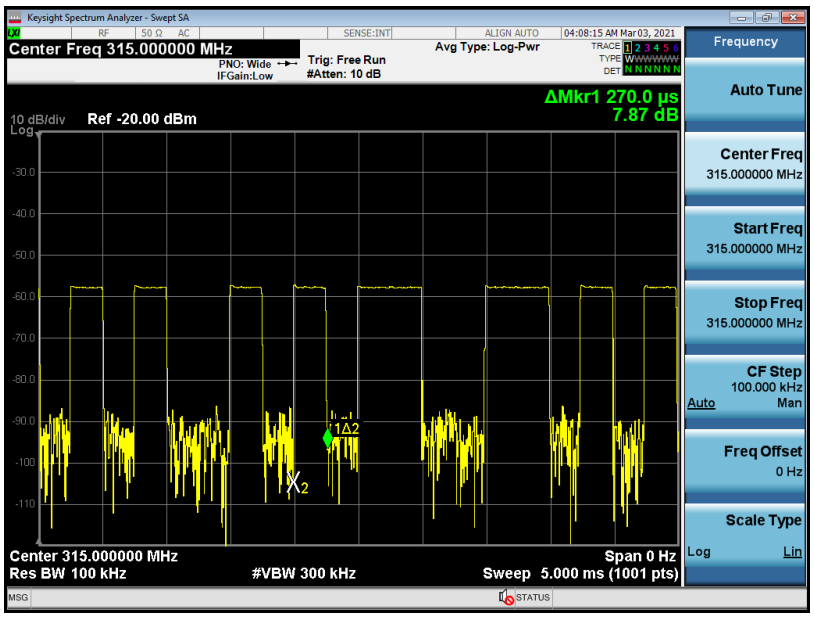
Cycle



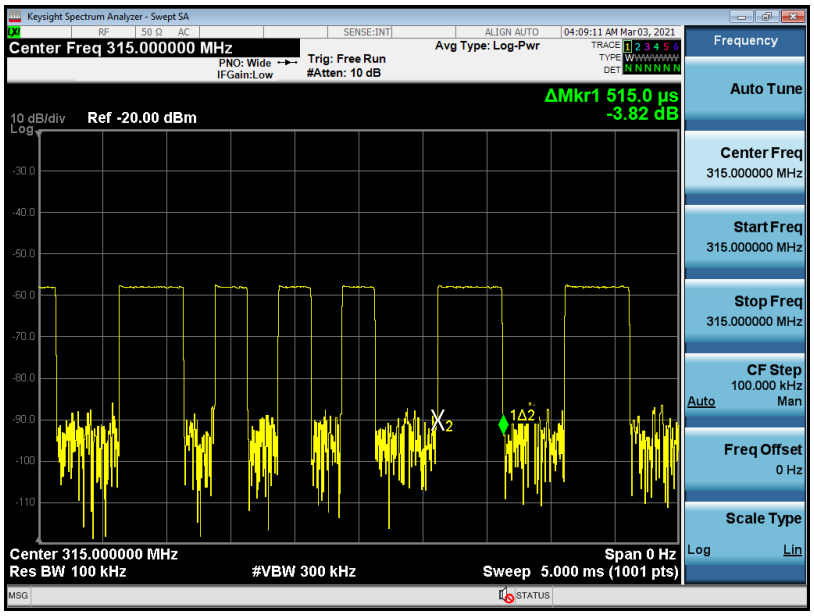
Pulse



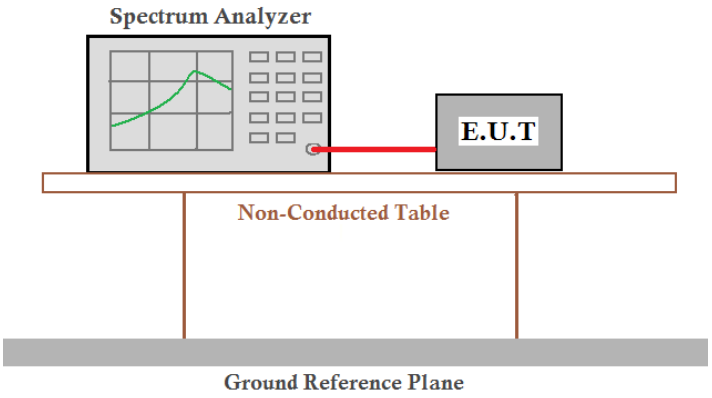
On-time



On-time


Keysight Spectrum Analyzer - Swept SA
Center Freq 315.000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: Log-Pwr
04:09:11 AM Mar 03, 2021
ΔMkr1 515.0 µs
-3.82 dB
10 dB/div
Log
Ref -20.00 dBm
Center 315.000000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 5.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
315.000000 MHz
Start Freq
315.000000 MHz
Stop Freq
315.000000 MHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

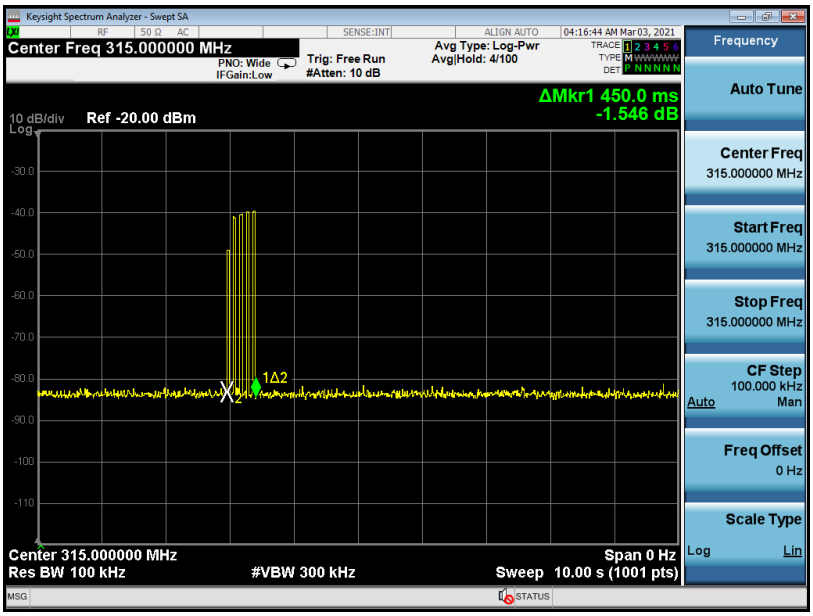
7.6 DWELL TIME

Test Requirement:	FCC Part15 C Section 15.231
Test Method:	ANSI C63.10:2013
Limit:	According to FCC 15.231(a) requirement: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Test Procedure a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range. c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge. d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. e) Repeat above procedures until all measured frequencies were complete.
Test results:	Pass

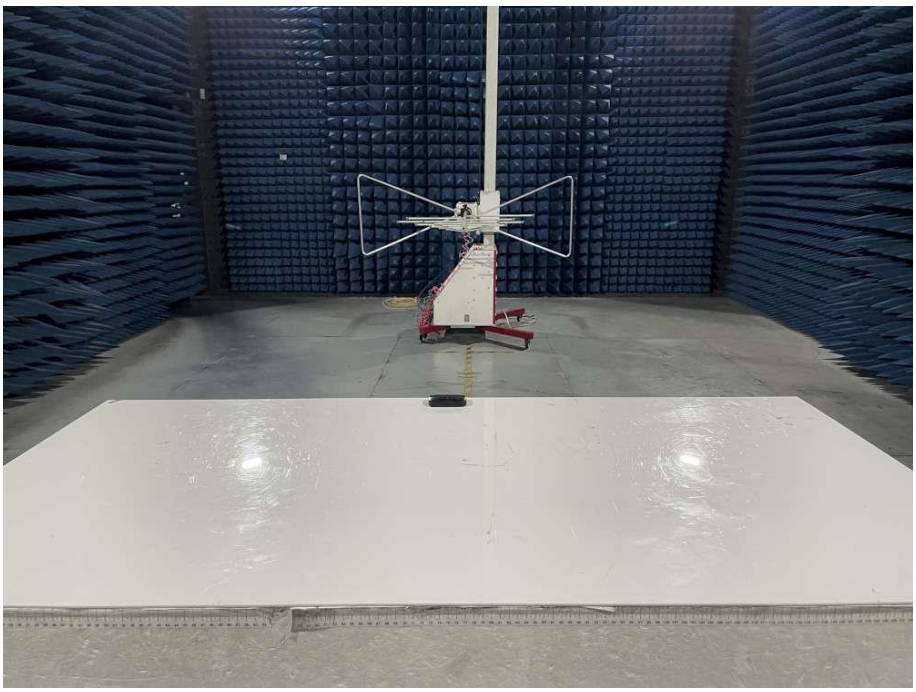
Measurement Data

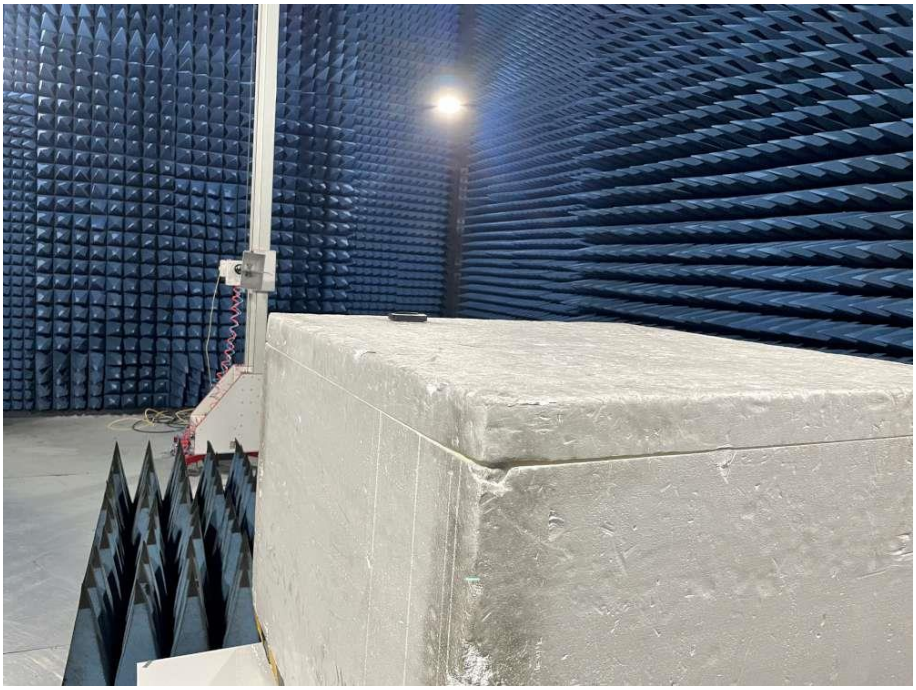
Dwell time (second)	Limit (second)	Result
0.45s	<5s	Pass

Test plot as follows:

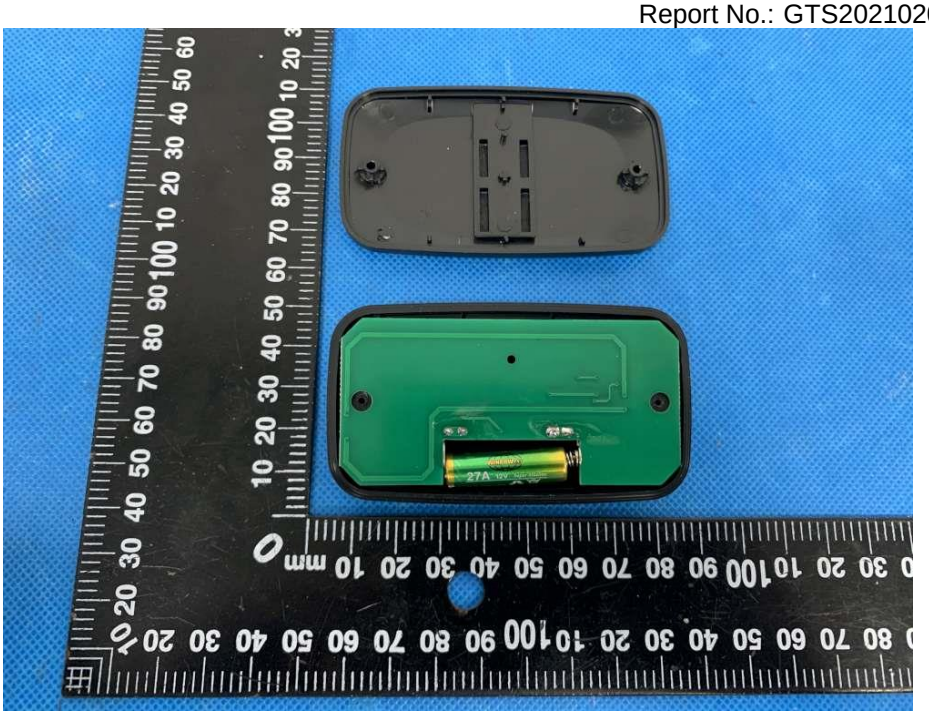


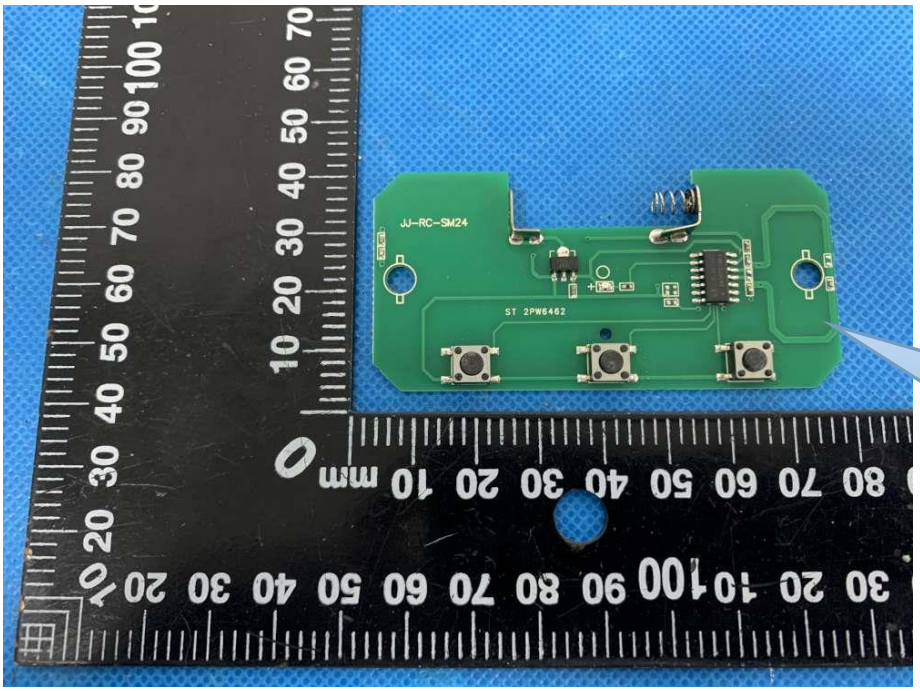
8 Test Setup Photo

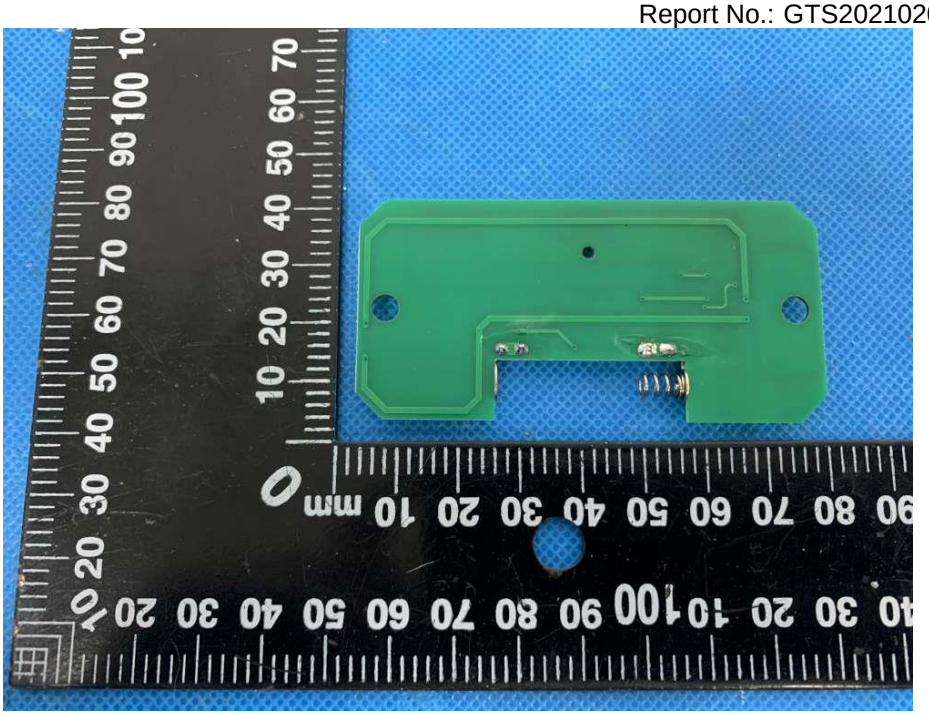


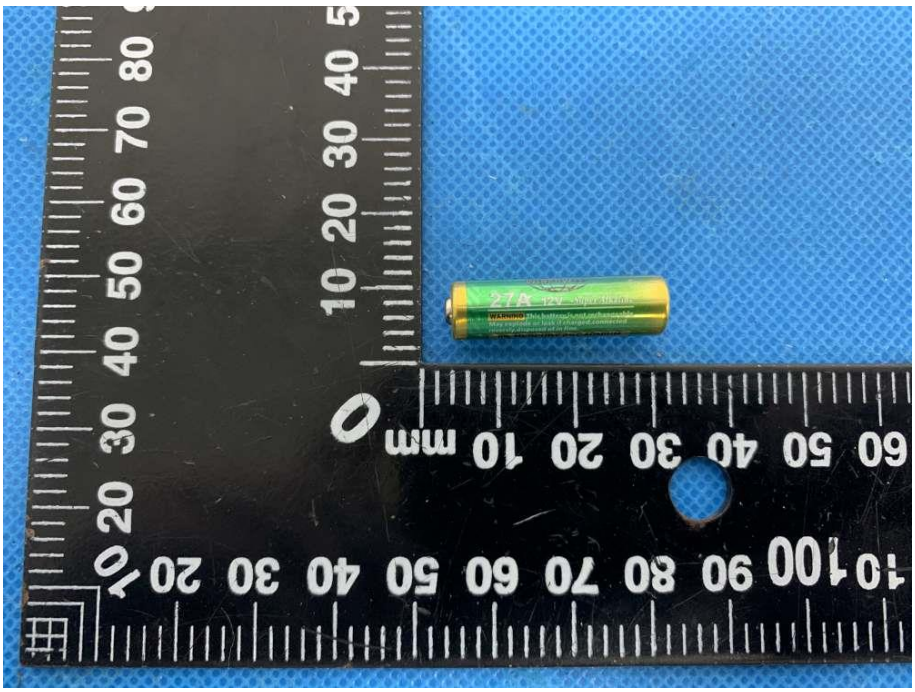


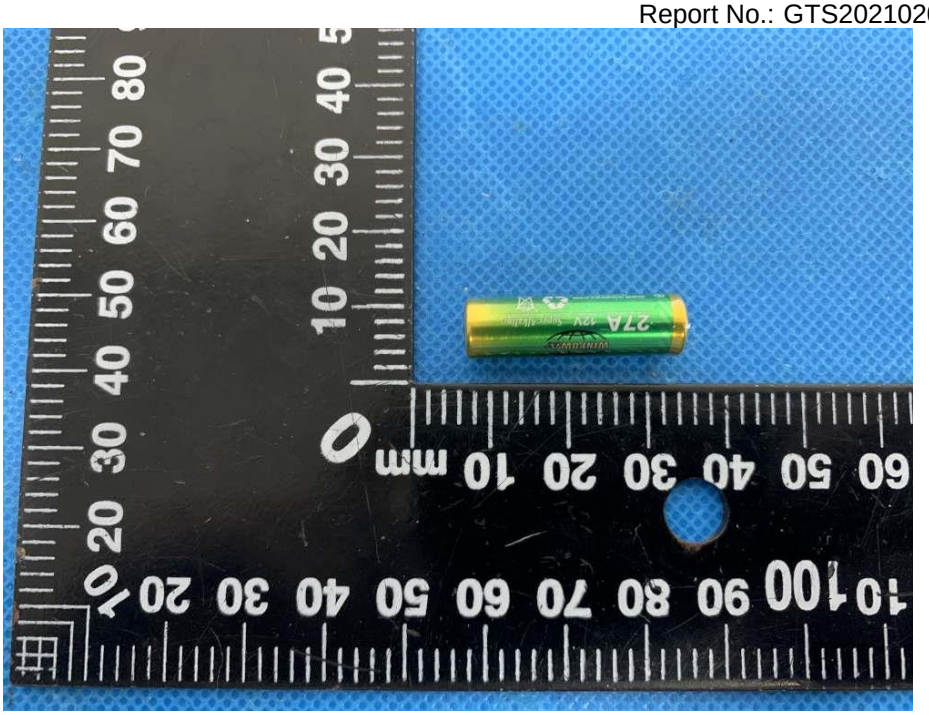
9 EUT Constructional Details




JJ-RC-SM24
Antenna location







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