

FCC Test Report

Report No.: RWAQ202400221A Applicant: Polygroup Evergreen Limited Address: Unit 606, 6th Floor, Fairmont House, No.8 Cotton Tree Drive, Central, Hong Kong Product Name: Remote Controller Product Model: PDT-015-15 Multiple Models: PDT-015-01, PDT-015-02, PDT-015-03, PDT-015-04, PDT-015-05, PDT-015-06, PDT-015-07, PDT-015-08, PDT-015-09, PDT-015-10, PDT-015-11, PDT-015-12, PDT-015-13, PDT-015-14 Trade Mark: N/A FCC ID: 2A62O-PDT015CXD Standards: FCC CFR Title 47 Part 15C (§15.231) Test Date: 2024-03-07 to 2024-03-12 Test Result: Complied **Report Date: 2024-03-18**

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Report Template: TR-4-E-015/V1.0



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Revision History

Version No.	Issued Date	Description
00	2024-03-18	Original



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1 General Information

1.1 Client Information

Applicant:	Polygroup Evergreen Limited
Address:	Unit 606, 6th Floor, Fairmont House, No.8 Cotton Tree Drive, Central, Hong Kong
Manufacturer:	Polygroup Evergreen Limited
Address:	Unit 606, 6th Floor, Fairmont House, No.8 Cotton Tree Drive, Central, Hong Kong

1.2 Product Description of EUT

The EUT is Remote Controller that contains 433.92MHz transmitter, this report covers the full testing of the 433.92MHz transmitter.

Sample Serial Number	PDT-015-01: 6J-1; PDT-015-02: 6J-2; PDT-015-03: 6J-3; PDT-015-04: 6J-4; PDT-015-05: 6J-5; PDT-015-06: 6J-6; PDT-015-07: 6J-7; PDT-015-08: 6J-8; PDT-015-09: 6J-9; PDT-015-10: 6J-10; PDT-015-11: 6J-11; PDT-015-12: 6J-12; PDT-015-13: 6J-13; PDT-015-14: 6J-14; PDT-015-15: 6J-15 (assigned by WATC)
Sample Received Date	2024-03-04
Sample Status	Good Condition
Frequency Range	433.92MHz
Maximum E-field Strength:	71.22dBuV/m@3m
Modulation Technology	ASK
Antenna Gain [#]	-9.65dBi
Spatial Streams [#]	1TX
Power Supply	DC 3V from battery
Operating temperature [#]	-20 deg.C to +40 deg.C
Adapter Information	N/A
Modification	Sample No Modification by the test lab

1.3 Antenna information

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.

Device Antenna information:

The antenna is an internal antenna which cannot replace by end-user. Please see product internal photos for details.



1.4 Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s)

1.5 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))	
AC Power Lines Conducted Emissions		±3.14dB	
	Below 30MHz	±2.78dB	
Emissions, Radiated	Below 1GHz	±4.84dB	
	Above 1GHz	±5.44dB	
Bandwidth		0.34%	

Note 1: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Note 2: The Decision Rule is based on simple acceptance with ISO Guide 98-4:2012 Clause 8.2 (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

1.6 Laboratory Location

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: <u>qa@watc.com.cn</u>

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

1.7 Test Methodology

FCC CFR 47 Part 2 FCC CFR 47 Part 15 ANSI C63.10-2013



2 Description of Measurement

2.1 Test Configuration

Operating ch	Operating channels:					
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	
1	433.92	/	/	/	/	
	According to ANSI C63.10-2013 chapter 5.6.1 Table 11 requirement, select middle channel, in the frequency range in which device operates for testing. The detailed frequency points are as follows:					
Lowe	est channel	Midd	le channel	Highest o	channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	
/	/	1	433.92	/	/	

Worst-Case Configuration:

For radiated emissions, EUT was investigated in three orthogonal orientation, the worst-case orientation was recorded in report

According to applicant, for multiple models, same position key with same function, and all the keys with same power setting, the EUT was configured to an engineering mode that with continue transmitting when power on for the testing.

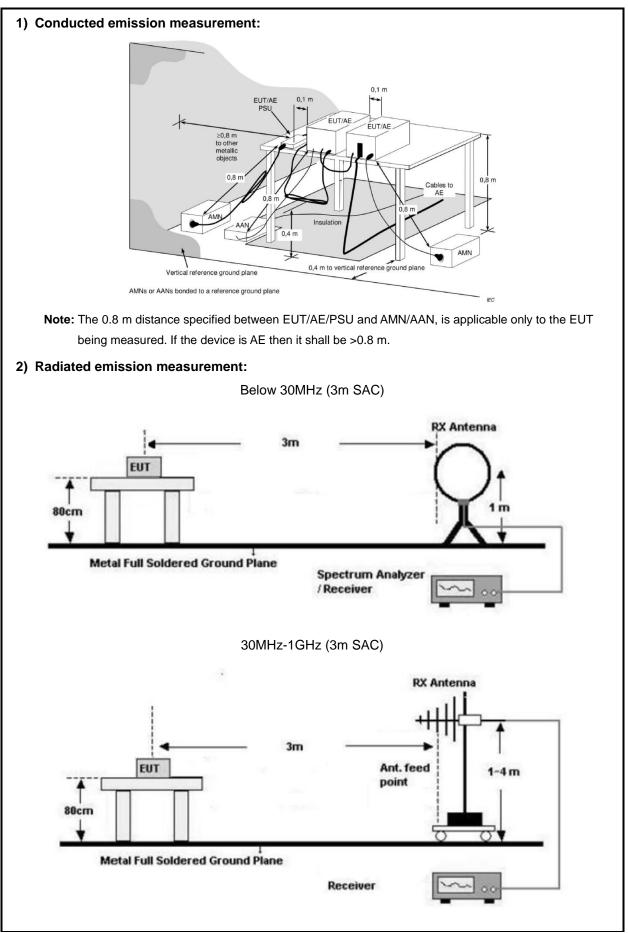
All keys were evaluated the duty cycle, only the worst case duty cycle was recorded in report.

2.2 Test Auxiliary Equipment

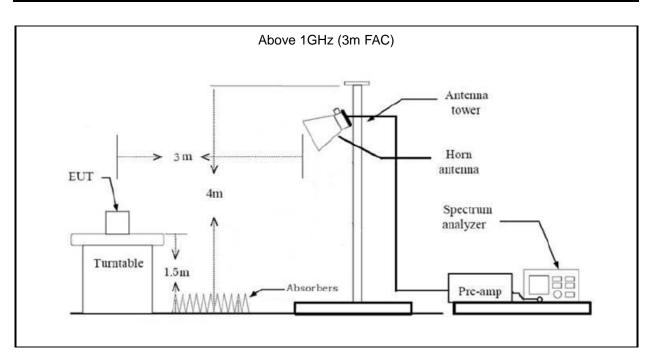
Manufacturer	Description Model		Serial Number
/	/	/	/



2.3 Test Setup







2.4 Test Procedure

Conducted emission:

- 1. The E.U.T is placed on a non-conducting table 40cm from the vertical ground plane and 80cm above the horizontal ground plane (Please refer to the block diagram of the test setup and photographs).
- 2. 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 on conducted measurement.
- 3. Line conducted data is recorded for both Line and Neutral

Radiated Emission Procedure:

a) For below 30MHz

- All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz- 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).
- 2. Loop antenna use, investigation was done on the three antenna orientations (parallel, perpendicular, gound-parallel)

b) For 30MHz-1GHz:

- 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.
- 2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.



c) For above 1GHz:

- 1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m.
- 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
- 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

Bandwidth Test:

- 1. Use the same setup for radiated above 1GHz, found the maximum fundamental level.
- 2. Change the spectrum analyzer setting for bandwidth testing
- 3. Test the bandwidth and record the result

Deactivation Test:

- 1. Use the same setup for radiated below 1GHz, found the maximum fundamental level.
- 2. Change the spectrum analyzer setting to time domain, the sweep time greater than the specified time for periodic operation
- 3. Manually activate and deactivate the EUT and confirm that it ceases transmission within the specified time of deactivation, record the result

2.5 Measurement Method

Description of Test	Measurement Method	
AC Line Conducted Emissions	ANSI C63.10-2013 Section 6.2	
20dB Emission Bandwidth	ANSI C63.10-2013 Section 6.9.2	
Deactivation Test	ANSI C63.10-2013 Section 7.4	
Field strength of fundamental and	ANSI C63.10-2013 Section 6.3&6.4&6.5&6.6	
Radiated emission		

2.6 Measurement Equipment

Manufacturer	Description	Model	Management No.	Calibration Date	Calibration Due Date	
		Radiated Emissio	n Test			
R&S	EMI test receiver	ESR3	102758	2023/7/3	2024/7/2	
ROHDE&	SPECTRUM		404000	2022/7/2	2024/7/2	
SCHWARZ	ANALYZER	FSV40-N	101608	2023/7/3	2024/7/2	
SONOMA	Low frequency	24.0	400044	2022/7/42	2024/7/44	
INSTRUMENT	amplifier	310	186014	2023/7/12	2024/7/11	
COM-POWER	preamplifier	PAM-118A	18040152	2023/8/21	2024/8/20	
BACL	Loop Antenna	1313-1A	4010611	2024/2/7	2027/2/6	
	Log - periodic			0400.070	2022/7/7	2024/7/0
SCHWARZBECK	wideband antenna	VULB 9163	9163-872	2023/7/7	2024/7/6	
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2024/7/5	
N/A	Coaxial Cable	N/A	NO.9	2023/8/8	2024/8/7	
N/A	Coaxial Cable	N/A	NO.10	2023/8/8	2024/8/7	
N/A	Coaxial Cable	N/A	NO.11	2023/8/8	2024/8/7	
Audix	Test Software	E3	191218 V9	/	/	

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.



3 Test Results

3.1 Test Summary

FCC Rules	Description of Test	Result
FCC §15.203	Antenna Requirement	Compliance
FCC §15.207(a)	AC Line Conducted Emissions	Not Applicable
FCC §15.231(c)	20dB Emission Bandwidth	Compliance
FCC §15.231(a)	Deactivation Testing	Compliance
FCC §15.205, §15.209, §15.231(b)	Field strength of fundamental and Radiated emission	Compliance



3.2 Limit

Test items	Limit				
AC Line Conducted Emissions	See details §15.207 (a)				
20dB Emission Bandwidth	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz.				
Deactivation Testing	A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.				
			eld strength of emissions from n shall not exceed the following:		
	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	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.				
	The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.				
Field strength of fundamental and Radiated emission	Intentional radiators operating under the provisions of this section shall				
	demonstrate compliance with the limits on the field strength of emissions, as				
	shown in the above table, based on the average value of the measured				
	emissions. As an alternative, compliance with the limits in the above table may				
	be based on the use of measurement instrumentation with a CISPR quasi-peak				
	detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements				
	are employed, the provisions in § 15.35 for averaging pulsed emissions and for				
	limiting peak emissions apply. Further, compliance with the provisions of §				
	15.205 shall be demonstrated using the measurement instrumentation specified				
	in that section.				
	The limits on the fie	eld strength of the spurious	emissions in the above table are		
		based on the fundamental frequency of the intentional radiator. Spurious			
	emissions shall be attenuated to the average (or, alternatively, CISPR				
	quasi-peak) limits shown in this table or to the general limits shown in § 15.2				
	whichever limit permits a higher field strength.				



3.3 AC Line Conducted Emissions Test Data

Not Applicable, the device only powered by battery



3.4 Radiated emission Test Data

9 kHz-30MHz:

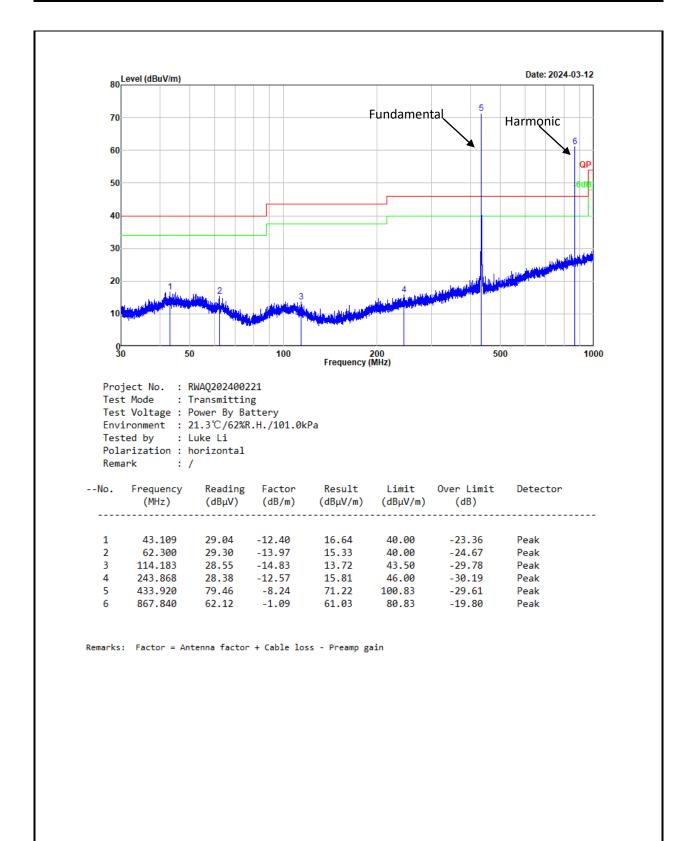
Test Date:	2024-03-07	Test By:	Bard Huang
Environment condition:	Temperature: 23.2°C; Relative Humidity:60%; ATM Pressure:		essure: 101.0kPa

For radiated emissions below 30MHz, there were no emissions found within 20dB of limit.

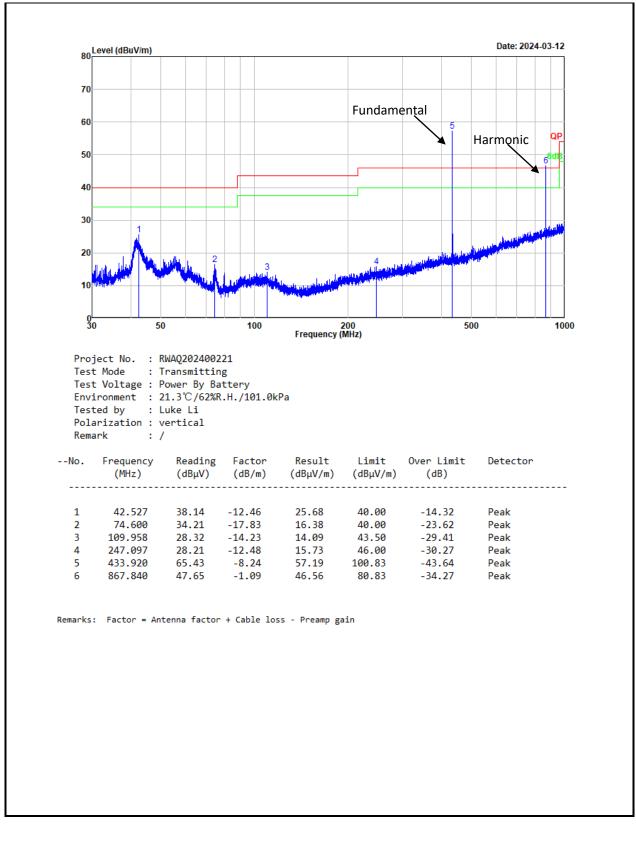


30MHz-1GHz:

Test Date:	2024-03-12	Test By:	Luke Li
Environment condition:	Temperature: 21.3°C; Relative Humidity:62%; ATM Pressure: 101.0kPa		







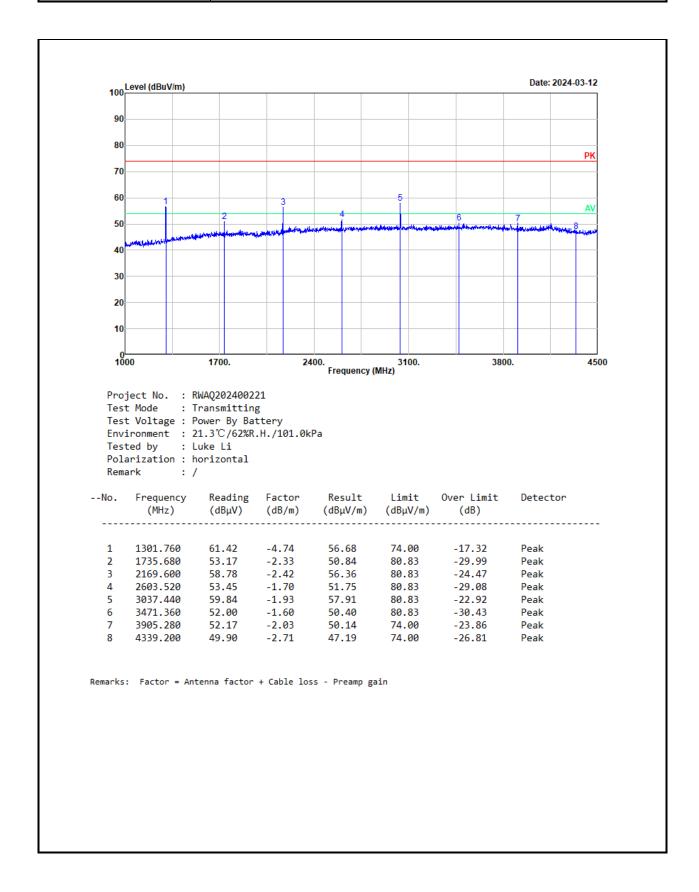
Remark:

Result = Reading + Factor Factor = Antenna factor + Cable loss – Amplifier gain Over Limit = Result – Limit

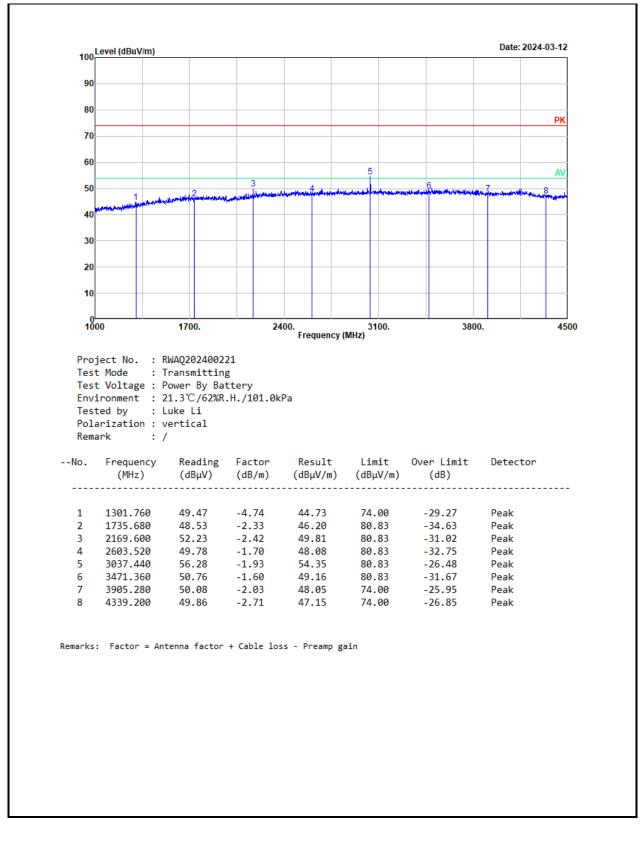


Above 1GHz:

Test Date:	2024-03-12	Test By:	Luke Li
Environment condition:	Temperature: 21.3°C; Relative	Humidity:62%; ATM Pres	ssure: 101.0kPa







Remark:

Result = Reading + Factor

Factor = Antenna factor + Cable loss - Amplifier gain

Over Limit = Result – Limit

The emission levels of other frequencies that were lower than the limit 20dB not show in test report.



Field strength of average:

Frequency (MHz)	Peak level (dBµV/m)	Polar	Duty cycle Factor (dB)	Average Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
433.920	71.22	horizontal	-6.97	64.25	80.83	-16.58	Fundamental
433.920	57.19	vertical	-6.97	50.22	80.83	-30.61	Fundamental
867.840	61.03	horizontal	-6.97	54.06	60.83	-6.77	Harmonic
1301.760	56.68	horizontal	-6.97	49.71	54.00	-4.29	Harmonic
1735.680	50.84	horizontal	-6.97	43.87	60.83	-16.96	Harmonic
2169.600	56.36	horizontal	-6.97	49.39	60.83	-11.44	Harmonic
2603.520	51.75	horizontal	-6.97	44.78	60.83	-16.05	Harmonic
3037.440	57.91	horizontal	-6.97	50.94	60.83	-9.89	Harmonic
3471.360	50.40	horizontal	-6.97	43.43	60.83	-17.40	Harmonic
3905.280	50.14	horizontal	-6.97	43.17	54.00	-10.83	Harmonic
4339.200	47.19	horizontal	-6.97	40.22	54.00	-13.78	Harmonic
867.840	46.56	vertical	-6.97	39.59	60.83	-21.24	Harmonic
1301.760	44.73	vertical	-6.97	37.76	54.00	-16.24	Harmonic
1735.680	46.20	vertical	-6.97	39.23	60.83	-21.60	Harmonic
2169.600	49.81	vertical	-6.97	42.84	60.83	-17.99	Harmonic
2603.520	48.08	vertical	-6.97	41.11	60.83	-19.72	Harmonic
3037.440	54.35	vertical	-6.97	47.38	60.83	-13.45	Harmonic
3471.360	49.16	vertical	-6.97	42.19	60.83	-18.64	Harmonic
3905.280	48.05	vertical	-6.97	41.08	54.00	-12.92	Harmonic
4339.200	47.15	vertical	-6.97	40.18	54.00	-13.82	Harmonic

Remark:

Average Amplitude= Peak level + Duty Cycle Factor Margin= Average Amplitude - Limit



3.5 Duty Cycle

Test Date:	2024-03-12	Test By:	Luke Li
Environment condition:	Temperature: 21.3°C; Relative Humidity:62%; ATM Pressure: 101.0kPa		

Subpulse	Ton Duration [ms]	Number of pulse	Total On time [ms]	Period of the pulse train [ms]	Duty Cycle [%]
1	1.0995	33	40.3846	90.045	44.8%
2	4.1011	1	40.3640	90.045	44.0%
Duty cyc	le Factor[dB]:		-6.97		

Remark:

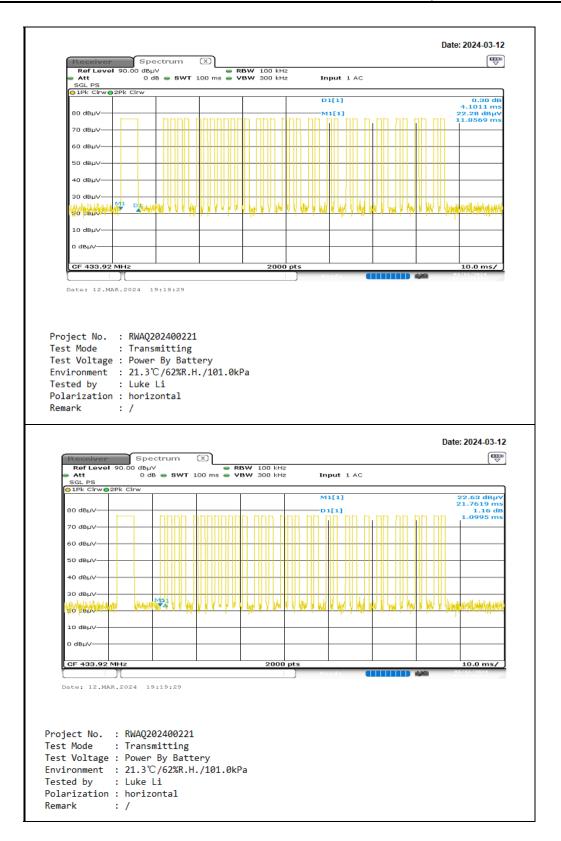
Total On time= Ton1*N1+Ton2*N2 Duty Cycle=(Total On time)/Tp Duty Cycle Factor=20*log(Duty Cycle)













3.6 Deactivation Testing

Test Date:	2024-03-07	Test By:	Bard Huang	
Environment condition:	Temperature: 23.2°C; Relative Humidity:60%; ATM Pressure: 101.0kPa			

Channel Frequency [MHz]	Deactivation time[s]	Limit[s]	Verdict
433.92	0.435	≤5	Pass

Test Plots:

		Deactivation t			
				Date	e: 2024-03-
Receiver	pectrum 🗵				
RefLevel 80.00 d Att	lBµ∀ 0 dB ● SWT 10 s ●	RBW 100 kHz VBW 300 kHz In	put 1 AC		
SGL PS					
			D2[1]		0.50 d
70 dBµ∨			-M1[1]		434.8 m 26.45 dBµ 2.4783
60 dBµ∨			_		
50 dBµ∨					
40 dBµ∨					
30 dBuV	M1				
20 dBuV	human	antere Anterese and survey and	generalise and all all and all	ويحاول وساليه ومارور والمريد المحاولية	mumple
10 dBµV					
о авил					
-10 dBµV					
CF 433.92 MHz		691 pts			1.0 5/
GP 433.92 MPI2		091 pts	Ready		3/07/2024
Date: 7.MAR.2024	21:05:44				
ject No. : RWA	P202400221				
t Mode : Tra					
t Voltage : DC					
	2℃/60%R.H./101	.0kPa			
ted by : Bar					

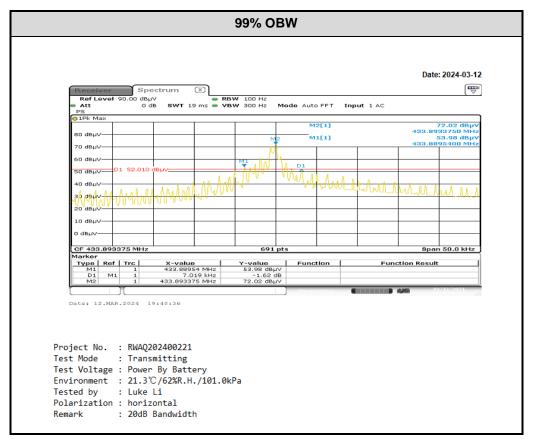
3.7 Bandwidth Test Data

Test Date:	2024-03-12	Test By:	Luke Li
Environment condition:	Temperature: 21.3°C; Relative Humidity:62%; ATM Pressure: 101.0kPa		

Channel Frequency [MHz]	20dB BW[kHz]	Limit[MHz]	Verdict
433.92	7.019	1.0848	Pass

Note: Limit << Center frequency*0.25%=433.92MHz*0.25%=1.0848MHz

Test Plots:





4 Test Setup Photo

Please refer to the attachment RWAQ202400221Test Setup photo.



5 E.U.T Photo

Please refer to the attachment RWAQ202400221 External photo and RWAQ202400221 Internal photo.

---End of Report---