

# TEST REPORT

Applicant Name : Polygroup Evergreen Limited  
Address : Unit 606, 6th Floor, Fairmont House, No.8 Cotton Tree Drive, Central,  
Hong Kong  
Report Number : SZNS220713-31763E-RF-00  
FCC ID: 2A62O-CBL1712

## Test Standard (s)

FCC PART 15.249

## Sample Description

Product Type: Remote Controller  
Model No.: CBR-001  
Multiple Model(s) No.: N/A  
Trade Mark: N/A  
Date Received: 2022/07/13  
Report Date: 2022/08/12

Test Result:	Pass*
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\* In the configuration tested, the EUT complied with the standards above.

## Prepared and Checked By:

*Roger Ling*

\_\_\_\_\_  
Roger Ling  
EMC Engineer

## Approved By:

*Candy Li*

\_\_\_\_\_  
Candy Li  
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "\*" .

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## Shenzhen Accurate Technology Co., Ltd.

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Frequency Range	2407-2477MHz
Maximum E-field strength	81.06dBuV/m@3m
Modulation Technique	GFSK
Antenna Specification*	0dBi (provided by the applicant)
Voltage Range	DC 3 V from battery
Sample serial number	SZNS220713-31763E-RF-S1 (Assigned by ATC, Shenzhen)
Sample/EUT Status	Good condition

### Objective

This test report is in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Measurement Uncertainty

Parameter		Uncertainty
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz- 18GHz	4.98dB
	18GHz- 26.5GHz	5.06dB
	26.5GHz- 40GHz	4.72dB
Occupied Channel Bandwidth		5%
Temperature		1°C
Humidity		6%
Supply voltages		0.4%

*Note: 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.*

## **Test Facility**

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing by manufacturer.

4 channels are provided to testing:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2407	2	2445
3	2470	4	2477

EUT was tested with Channel 1, 2 and 4.

### EUT Exercise Software

No exercise software was used.

### Equipment Modifications

No modifications were made to the unit tested.

### Support Equipment List and Details

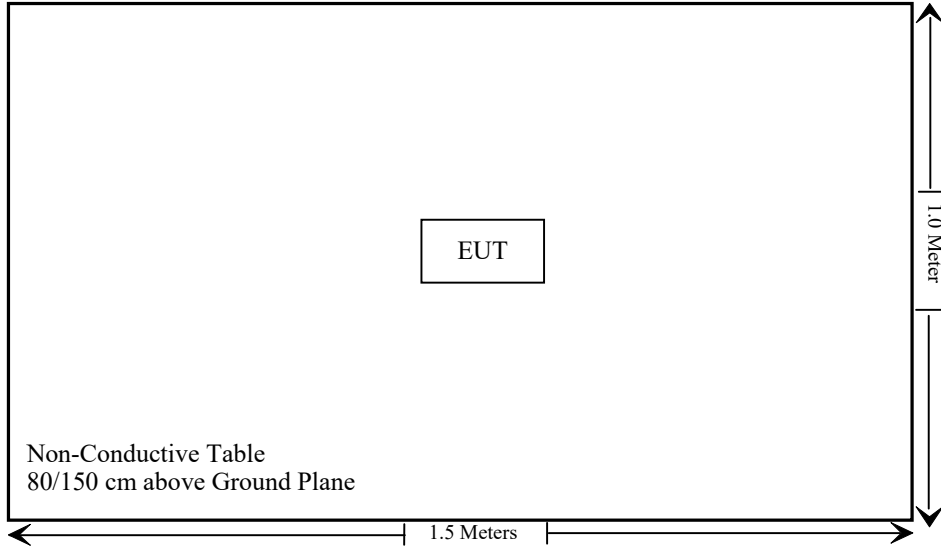
Manufacturer	Description	Model	Serial Number
/	/	/	/

### Support Cable Descriptions

Cable Description	Length (m)	From/Port	To
/	/	/	/

### Block Diagram of Test Setup

For Radiated Emissions:



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Not Applicable
15.205, §15.209, §15.249(d)	Radiated Emissions& Outside of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant

Not Applicable: EUT only powered by battery.

Note: the EUT have multiple keys, pre-scan all keys, only the worst case key was recorded in report.

## Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emissions Test</b>					
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2021/12/14	2022/12/13

\* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).



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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

According to FCC § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

### **Antenna Connector Construction**

The EUT has one integral Antenna which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

## **FCC§15.205, §15.209 & §15.249(d) - RADIATED EMISSIONS**

### **Applicable Standard**

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

<b>Fundamental frequency</b>	<b>Field strength of fundamental (millivolts/meter)</b>	<b>Field strength of harmonics (microvolts/meter)</b>
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

As per FCC§15.249 (d), 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 §15.209, whichever is the lesser attenuation.

### **Test Equipment Setup**

The spectrum analyzer or receiver is set as:

Below 1000MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000MHz:

$$\text{Peak: RBW} = 1\text{MHz} / \text{VBW} = 1\text{MHz} / \text{Sweep} = \text{Auto}$$

For average measurement:

use the duty cycle factor correction factor method per 15.35(c).

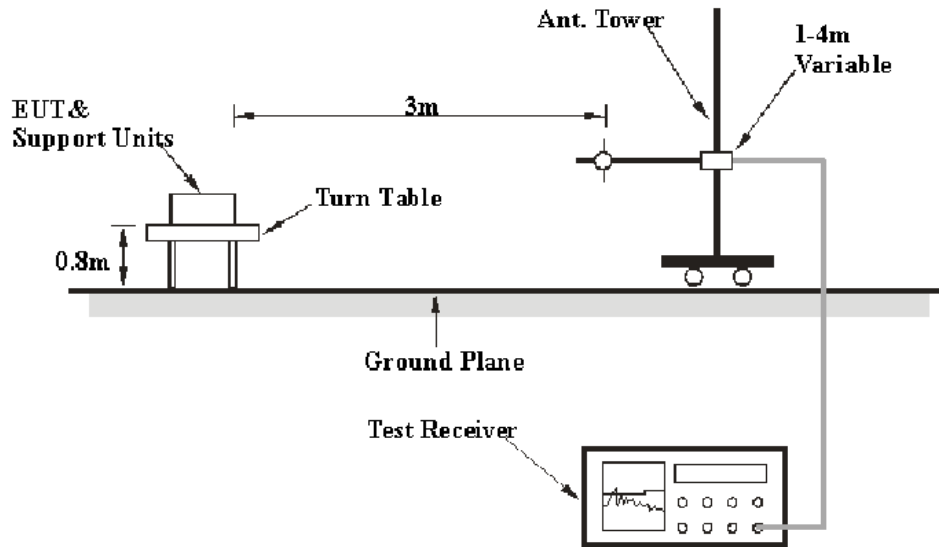
Duty cycle=On time/100milliseconds, On time= $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$ ,

where  $N_1$  is number of type 1 pulses,  $L_1$  is length of type 1 pulse, etc.

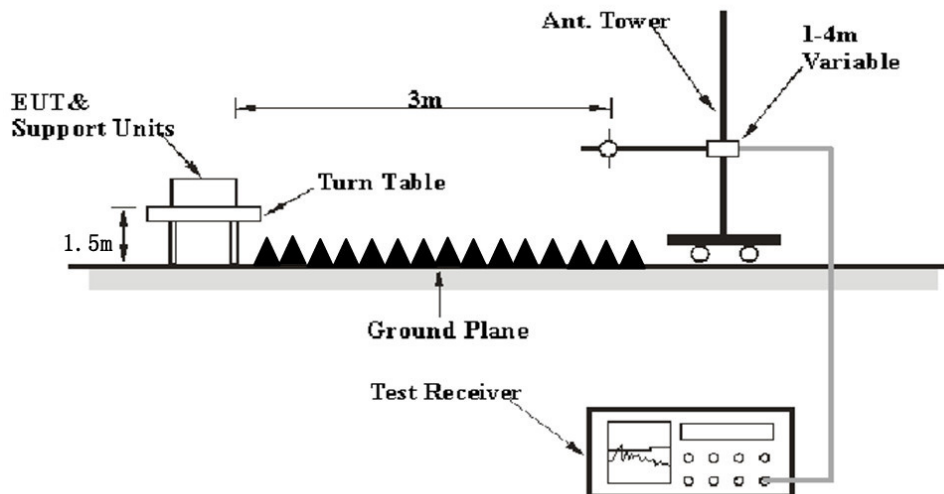
Average Emission Level=Peak Emission Level+20\*log(Duty cycle)

## EUT Setup

### Below 1GHz:



### Above 1GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane for below 1GHz or 1.5 meter for above 1GHz, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Over Limit/Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Over Limit/Margin} = \text{Level} / \text{Corrected Amplitude} - \text{Limit}$$

## Test Results Summary

According to the EUT complied with the FCC Part 15.205, 15.209 & §15.249

## Test Data

### Environmental Conditions

<b>Temperature:</b>	25~26.1 °C
<b>Relative Humidity:</b>	62 %
<b>ATM Pressure:</b>	101.0 kPa

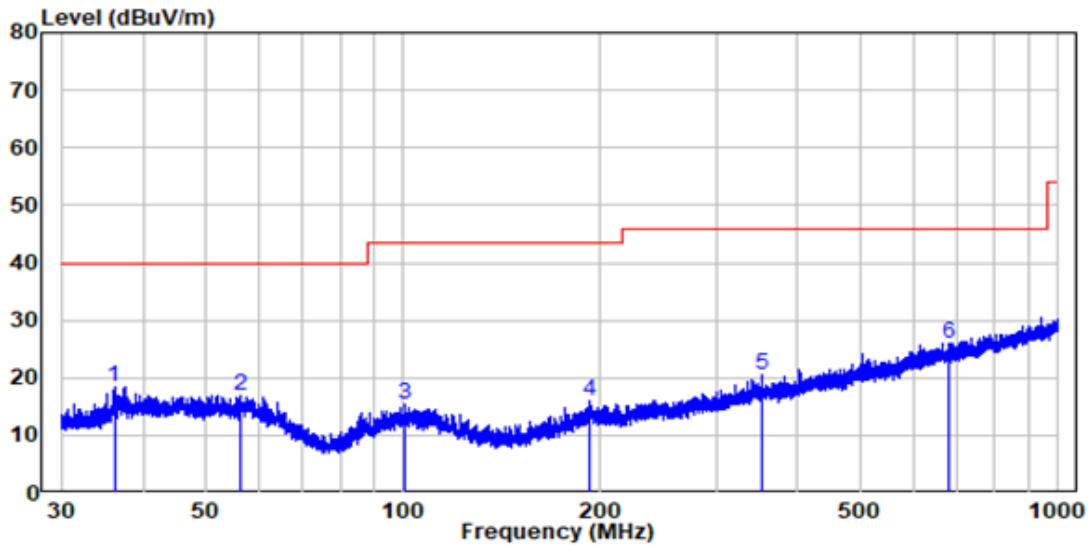
*The testing was performed by Level on 2022-08-03 for below 1GHz, Zeki Ma from 2022-08-03 to 2022-08-12 for above 1GHz*

*EUT operation mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axes of orientation was recorded)*

**30MHz-1GHz: (worst case is low channel)**

*Note: when the test result of peak was below the limit of QP more than 6dB, just the peak level was recorded.*

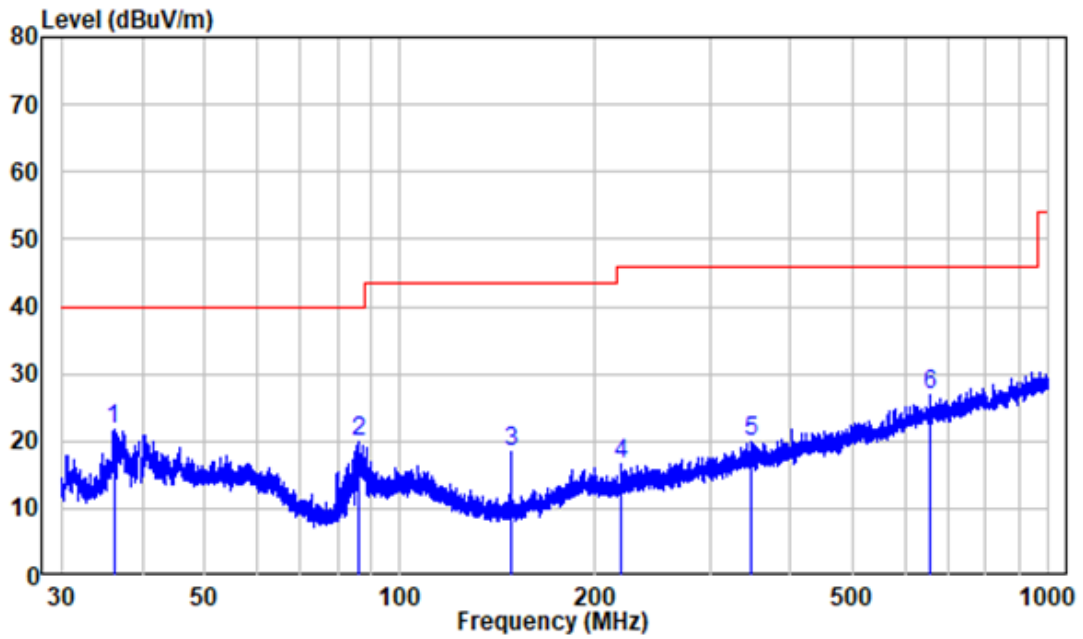
**Horizontal**



Site : chamber  
 Condition: 3m HORIZONTAL  
 Job No. : SZNS220713-31763E-RF  
 Test Mode: Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36.143	-11.17	29.73	18.56	40.00	-21.44	Peak
2	56.247	-10.16	27.01	16.85	40.00	-23.15	Peak
3	100.141	-11.79	27.15	15.36	43.50	-28.14	Peak
4	192.925	-11.28	27.16	15.88	43.50	-27.62	Peak
5	351.862	-7.37	27.93	20.56	46.00	-25.44	Peak
6	679.960	-1.50	27.58	26.08	46.00	-19.92	Peak

Vertical



Site : chamber  
 Condition: 3m VERTICAL  
 Job No. : SZNS220713-31763E-RF  
 Test Mode: Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36.143	-11.17	32.85	21.68	40.00	-18.32	Peak
2	86.049	-15.19	35.16	19.97	40.00	-20.03	Peak
3	148.376	-15.36	33.76	18.40	43.50	-25.10	Peak
4	218.596	-11.49	28.06	16.57	46.00	-29.43	Peak
5	348.944	-7.29	27.10	19.81	46.00	-26.19	Peak
6	654.806	-1.58	28.54	26.96	46.00	-19.04	Peak

## 1-25 GHz:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
	Reading (dB $\mu$ V)	PK/Ave		Height (m)	Polar (H/V)				
Low Channel(2407MHz)									
2407	88.14	PK	121	1.5	H	-7.23	80.91	94	-13.09
2407	88.29	PK	51	1.9	V	-7.23	81.06	94	-12.94
2310	67.22	PK	109	1.7	H	-7.24	59.98	74	-14.02
2310	68.55	PK	339	2.3	V	-7.24	61.31	74	-12.69
2390	68.65	PK	319	1.2	H	-7.22	61.43	74	-12.57
2390	67.88	PK	49	1.1	V	-7.22	60.66	74	-13.34
2400	69.87	PK	132	1.5	H	-7.22	62.65	74	-11.35
2400	68.81	PK	84	1.4	V	-7.22	61.59	74	-12.41
4814	54.02	PK	144	2.1	H	-3.51	50.51	74	-23.49
4814	53.93	PK	237	2.1	V	-3.51	50.42	74	-23.58
Middle Channel(2445MHz)									
2445	87.19	PK	185	2.3	H	-7.24	79.95	94	-14.05
2445	87.30	PK	152	1.9	V	-7.24	80.06	94	-13.94
4890	55.87	PK	161	1	H	-3.33	52.54	74	-21.46
4890	54.98	PK	229	1	V	-3.33	51.65	74	-22.35
High Channel(2477MHz)									
2477	86.48	PK	109	2.3	H	-7.21	79.27	94	-14.73
2477	86.86	PK	64	2.2	V	-7.21	79.65	94	-14.35
2483.5	68.72	PK	101	2.4	H	-7.20	61.52	74	-12.48
2483.5	68.23	PK	85	2.3	V	-7.20	61.03	74	-12.97
2500	68.66	PK	341	2.1	H	-7.18	61.48	74	-12.52
2500	68.20	PK	156	1.2	V	-7.18	61.02	74	-12.98
4954	53.70	PK	247	1.8	H	-3.03	50.67	74	-23.33
4954	53.47	PK	339	1.8	V	-3.03	50.44	74	-23.56

Field Strength of Average							
Frequency (MHz)	Peak Measurement @3m (dB $\mu$ V/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dB $\mu$ V/m)	FCC Part 15.249		
					Limit (dB $\mu$ V/m)	Margin (dB)	Comment
Low Channel(2407MHz)							
2310	59.98	H	-25.26	34.72	54	-19.28	Bandedge
2310	61.31	V	-25.26	36.05	54	-17.95	Bandedge
2390	61.43	H	-25.26	36.17	54	-17.83	Bandedge
2390	60.66	V	-25.26	35.40	54	-18.60	Bandedge
2400	62.65	H	-25.26	37.39	54	-16.61	Bandedge
2400	61.59	V	-25.26	36.33	54	-17.67	Bandedge
4814	50.51	H	-25.26	25.25	54	-28.75	Harmonic
4814	50.42	V	-25.26	25.16	54	-28.84	Harmonic
Middle Channel(2445MHz)							
4890	52.54	H	-25.26	27.28	54	-26.72	Harmonic
4890	51.65	V	-25.26	26.39	54	-27.61	Harmonic
High Channel(2477MHz)							
2483.5	61.52	H	-25.26	36.26	54	-17.74	Bandedge
2483.5	61.03	V	-25.26	35.77	54	-18.23	Bandedge
2500	61.48	H	-25.26	36.22	54	-17.78	Bandedge
2500	61.02	V	-25.26	35.76	54	-18.24	Bandedge
4954	50.67	H	-25.26	25.41	54	-28.59	Harmonic
4954	50.44	V	-25.26	25.18	54	-28.82	Harmonic

## Note:

Absolute Level = Corrected Factor + Reading

Margin = Corrected. Amplitude - Limit

Average level= Peak level+ Duty Cycle Corrected Factor

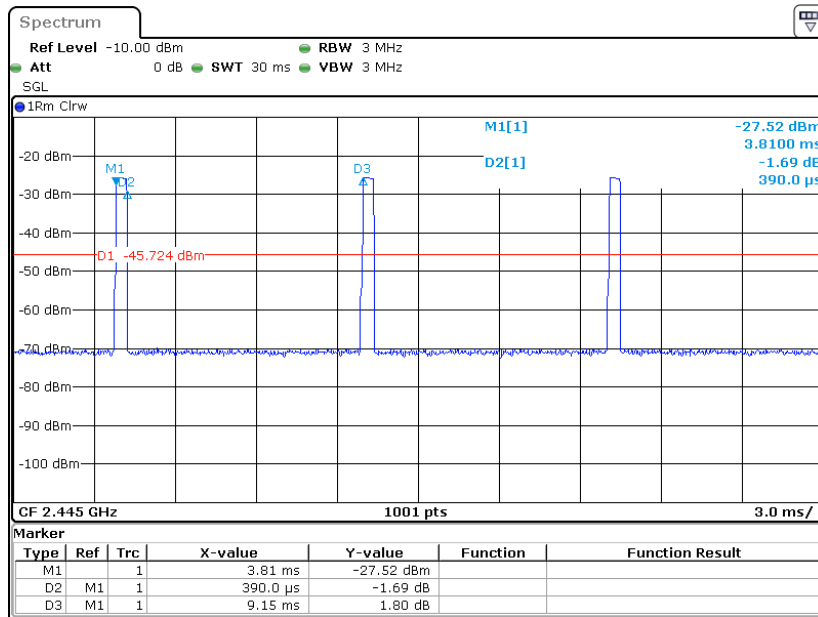
For fundamental, the peak value compliance with the limit of Average.

Duty cycle = Ton/100ms = 0.39\*14/100=0.0546

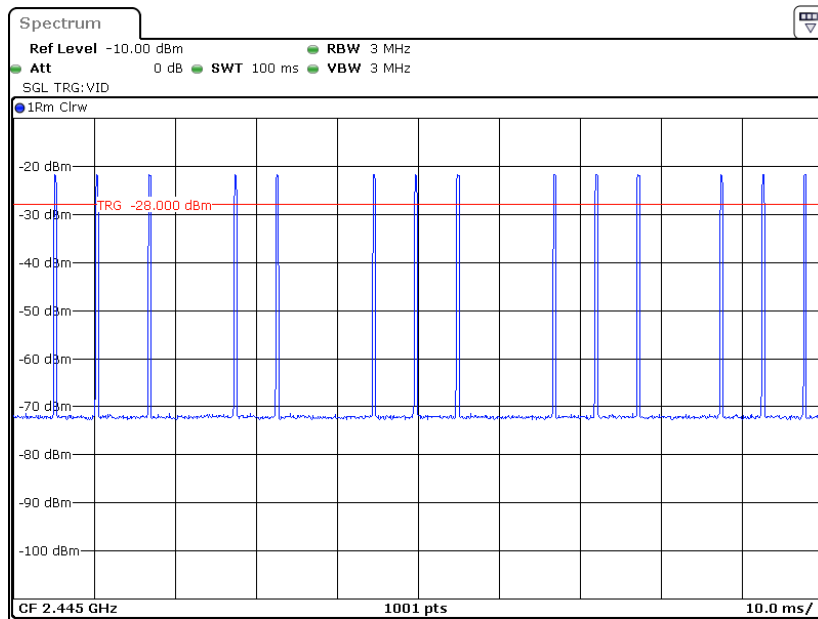
Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg0.0546 = -25.26



### Duty Cycle



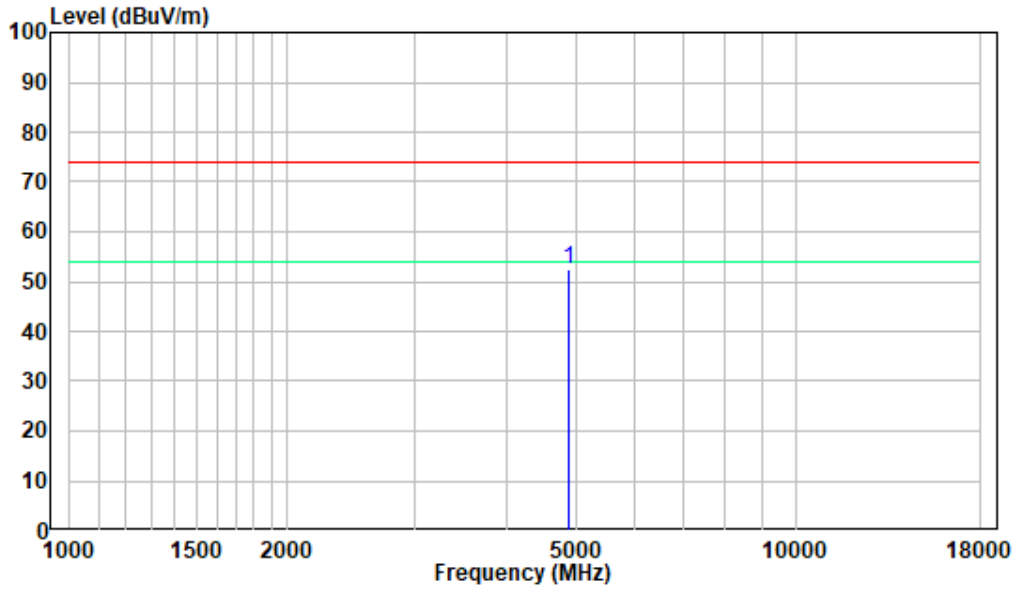
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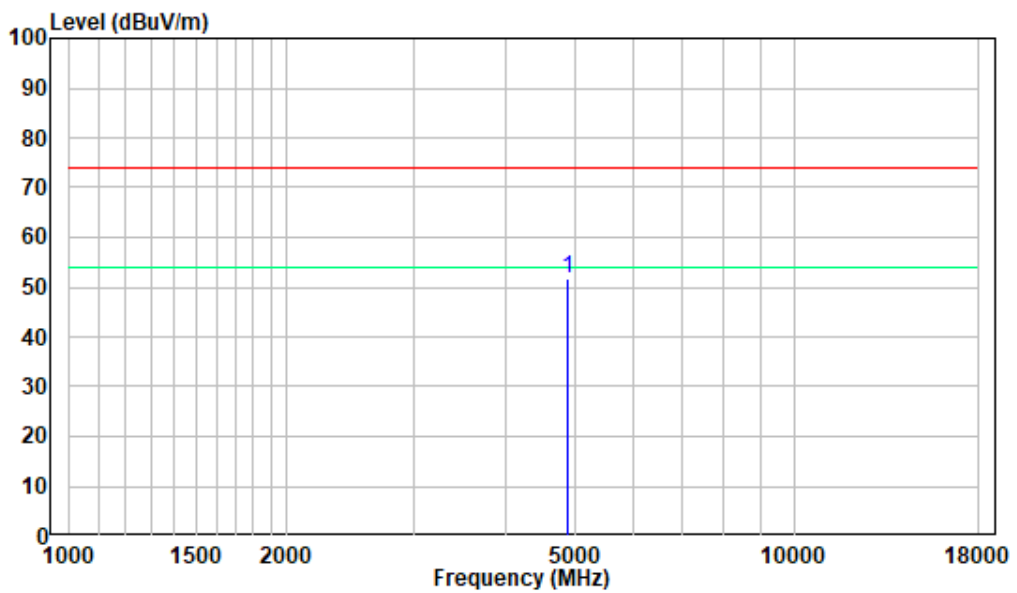
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**Pre-scan with Middle channel Peak  
1-18GHz**

**Horizontal**

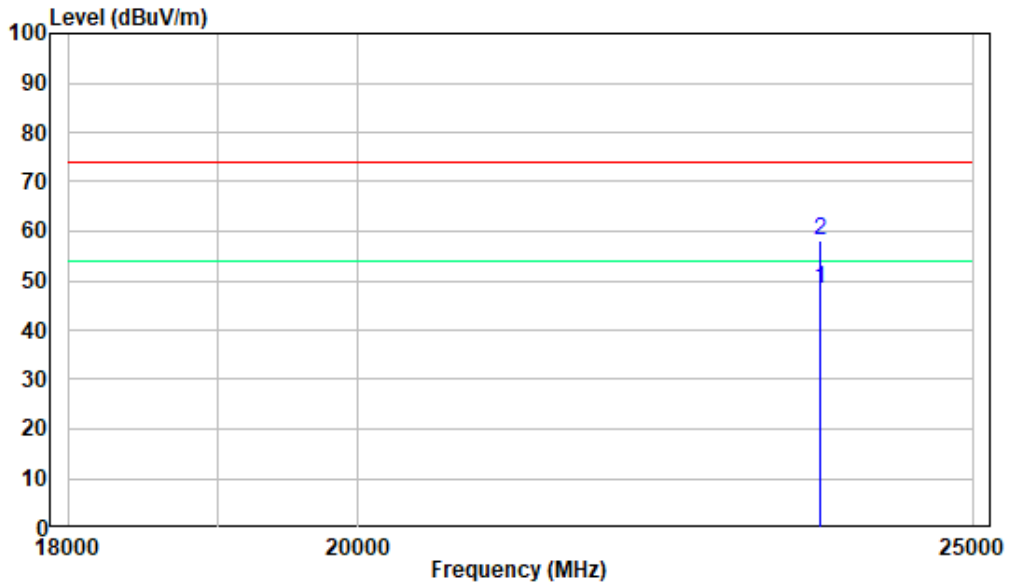


**Vertical**

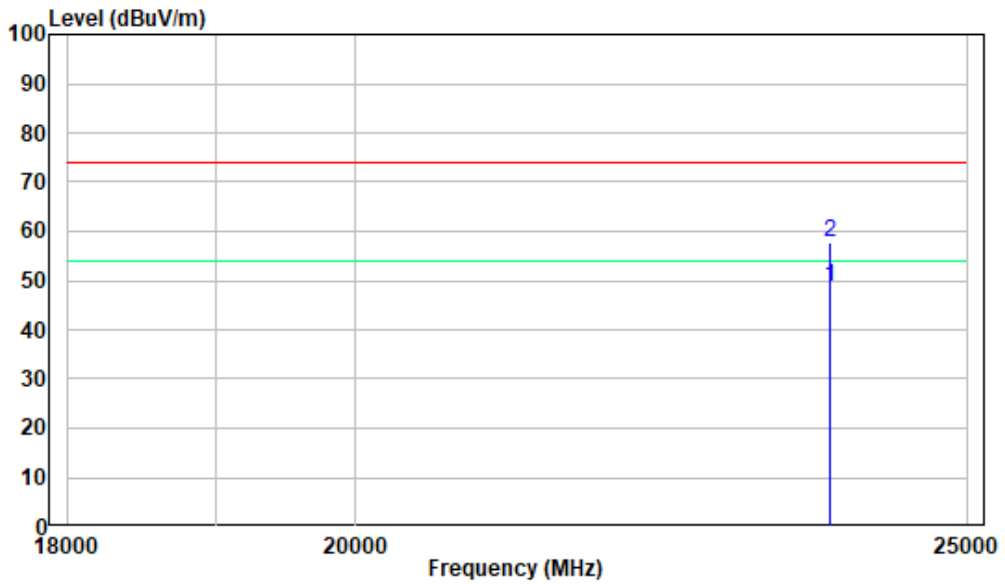


18-25GHz

Horizontal



Vertical



## FCC§15.215(c) - 20dB EMISSION BANDWIDTH

### Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	26.1 °C
<b>Relative Humidity:</b>	62 %
<b>ATM Pressure:</b>	101.0 kPa

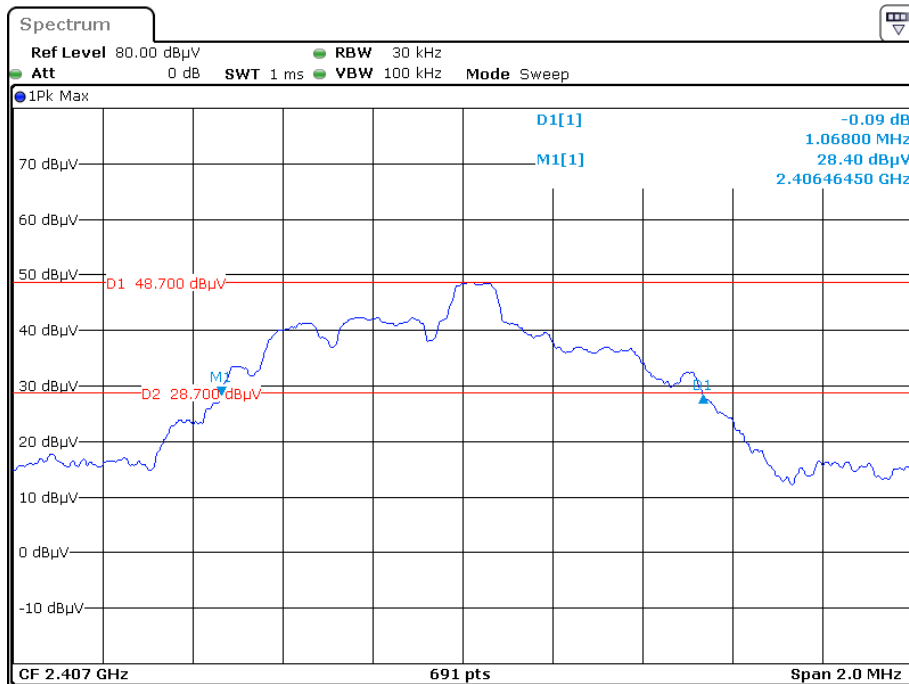
*The testing was performed by Zeki Ma on 2022-08-03.*

*EUT operation mode: Transmitting*

*Please refer to the following table and plots.*

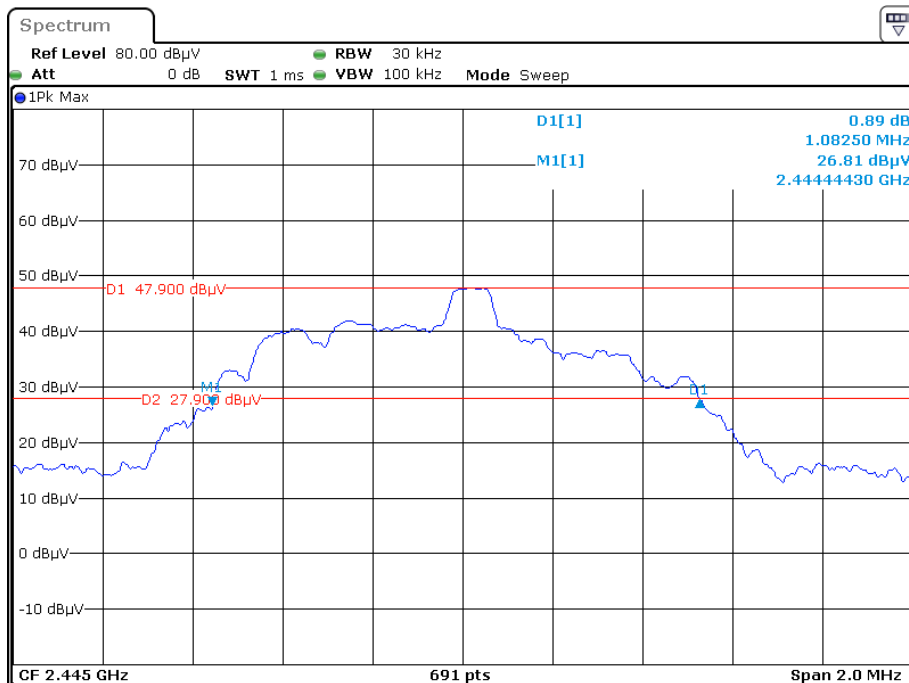
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>20dB Bandwidth (MHz)</b>
Low	2407	1.068
Middle	2445	1.083
High	2477	1.083

### Low Channel



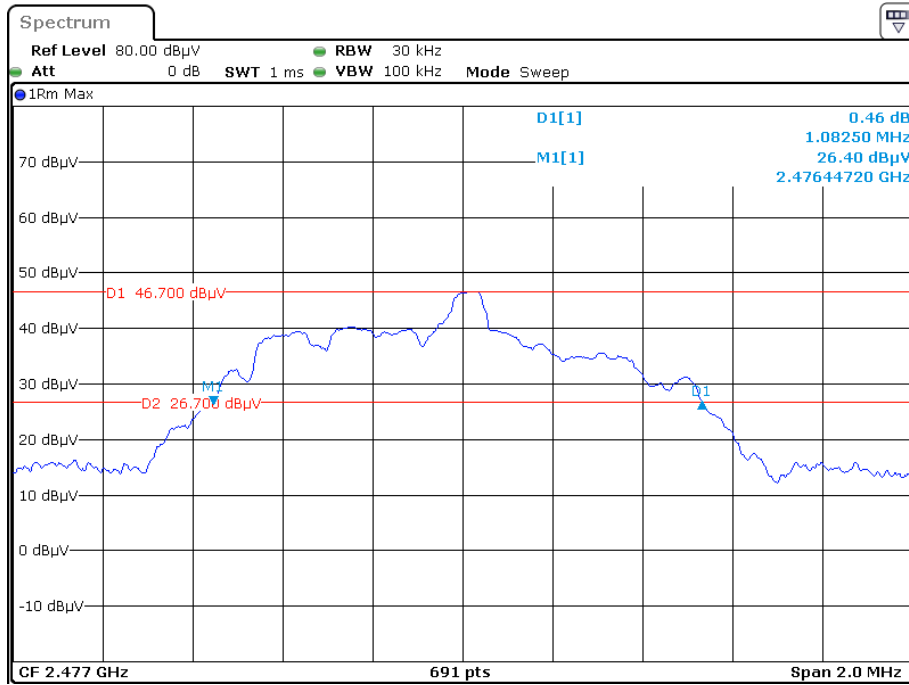
Date: 3.AUG.2022 14:57:35

### Middle Channel



Date: 3.AUG.2022 14:38:28

### High Channel



Date: 3.AUG.2022 15:12:41

\*\*\*\*\* END OF REPORT \*\*\*\*\*