

TEST REPORT

Applicant:	SHENZHEN GEILI TECHNOLOGY CO.,LTD		
Address:	503, Building C1, Zhonghao yuandong industrial area, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, China		
Manufacturer:	SHENZHEN GEILI TECHNOLOGY CO.,LTD		
Address:	503, Building C1, Zhonghao yuandong industrial area, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, China		
Factory:	SHENZHEN GEILI TECHNOLOGY CO.,LTD		
Address:	503, Building C1, Zhonghao yuandong industrial area, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, China		
E.U.T.:	Remote Control		
Model Number:	MZWX-F1-1, MZWX-F1-2, MZWX-F1-3, MZWX-F1-4, MZWX-F1-5, MZWX-F1-6, MZWX-F1-7, MZWX-F1-8, MZWX-F1-9, MZWX-F1-11, MZWX-F1-12, MZWX-F1-13, MZWX-F1-14, MZWX-F1-15, MZWX-F1-16		
Trade Name:	N/A		
FCC ID:	2A4KFGLKJ-3		
Date of Receipt:	April 17, 2024	Date of Test:	April 17 - August 5, 2024
Test Specification:	FCC 47 CFR Part 15, Subpart C		
Equipment Rule:	The equipment under test was found to be compliance with the requirements of the standards applied.		
Prepared by:	Approved & Authorized Signer		
 Jerry Hu/ Engineer	 Frank Shen/ Manager Issue Date: August 5, 2024		
Other Aspects: None			
Abbreviations: N/A=not applicable E.U.T.=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Dongguan Lepont Service Co., Ltd.			

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Revision History of This Test Report

1. GENERAL PRODUCT INFORMATION

1.1 PRODUCT FUNCTION

Refer to Technical Construction Form and User Manual.

1.2 TEST DESCRIPTION OF DEVICE (EUT)

Product Name:	Remote Control
Model No.:	MZWX-F1-1, MZWX-F1-2, MZWX-F1-3, MZWX-F1-4, MZWX-F1-5, MZWX-F1-6, MZWX-F1-7, MZWX-F1-8, MZWX-F1-9, MZWX-F1-11, MZWX-F1-12, MZWX-F1-13, MZWX-F1-14, MZWX-F1-15, MZWX-F1-16
Test Model No:	MZWX-F1-6, MZWX-F1-9, MZWX-F1-11
Difference:	All models have the same RF circuit, PCB LAOUT, schematics, just different appearance and number of buttons
Serial No.:	N/A
Test sample(s) ID:	LP24030132C01-S001/005/006
Sample(s) Status	Engineer sample
Hardware:	N/A
Software:	N/A
Modulation :	OOK
Operating Frequency:	433.92MHz
Antenna Type :	PCB Antenna
Antenna Gain :	-1.51dBi
Power Supply:	<input checked="" type="checkbox"/> DC 6V form Battery <input type="checkbox"/> AC IP: N/A
Note: for more details, please refer to the User's manual of the EUT.	

1.3 DESCRIPTION OF TEST MODES AND SOFTWARE

For All Emission	
Final Test Mode	Description
A	Keep the EUT in continuously transmitting mode
B	Keep the EUT Normal transmitting mode
<p>Note: The EUT has been tested under its typical operating condition. The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.</p> <p>The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.</p>	

Software	Description
/	/

2. TEST STANDARDS AND SITES

2.1 DESCRIPTION OF STANDARDS AND RESULTS

The EUT have been tested according to the applicable standards as referenced below.

FCC Part Clause	Test Parameter	Verdict	Remark
15.231(c)	20dB Emission Bandwidth	PASS	
15.209 & 15.231(b)	Radiated Emissions	PASS	
15.203	Antenna Requirement	PASS	
15.207	Conducted Emission	N/A	
15.231(a)	Transmission Time	PASS	
NOTE1: N/A (Not Applicable)			

2.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS

For RF test							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Jan. 24, 2024	1 Year	LEP-E076	<input checked="" type="checkbox"/>
Spectrum analyzer	Agilent	N9020A	MY49100060	Jan. 24, 2024	1 Year	LEP-E020	<input checked="" type="checkbox"/>
Vector source	Agilent	N5182A	MY47420382	Jan. 24, 2024	1 Year	LEP-E021	<input checked="" type="checkbox"/>
Analog signal source	Agilent	N5171B	MY51350292	Jan. 24, 2024	1 Year	LEP-E022	<input checked="" type="checkbox"/>
All instrument	Rohde & Schwarz	CMW 500	1201.002K50	Jan. 24, 2024	1 Year	LEP-E019	<input checked="" type="checkbox"/>
High and low temperature chamber	Math-mart	MT-1202-40	LEP-E041	Jan. 24, 2024	1 Year	LEP-E041	<input checked="" type="checkbox"/>
control unit	Tonscend	JS0806-2	10165	Jan. 24, 2024	1 Year	LEP-E034	<input checked="" type="checkbox"/>
Testing software	Tonscend	JSTS1120-3	Ver 2.6.77.0518	N/A	N/A	N/A	<input checked="" type="checkbox"/>

For radiated(9K-30M) emission test(966 Chamber 1)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESR 3	101849	Jan. 31, 2024	1 Year	LEP-E006	<input checked="" type="checkbox"/>
Active Loop Antenna	Schwarzbeck	FMZB 1519C	00008	Feb. 02, 2024	3 Year	LEP-E068	<input checked="" type="checkbox"/>
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	<input checked="" type="checkbox"/>
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>

For radiated(30M-1G) emission test(966 Chamber 1)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESR 3	101849	Jan. 31, 2024	1 Year	LEP-E006	<input checked="" type="checkbox"/>
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	743	Nov. 20, 2022	3 Year	LEP-E005	<input checked="" type="checkbox"/>
Signal Amplifier	HP	8447D	1726A01222	Jan. 24, 2024	1 Year	LEP-E007	<input type="checkbox"/>
6dB Attenuator	RswTech	5W 6dB	LEP-E084	Jan. 24, 2024	1 Year	LEP-E084	<input type="checkbox"/>
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	<input checked="" type="checkbox"/>
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>

For radiated(1-18G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Jan. 24, 2024	1 Year	LEP-E076	<input type="checkbox"/>
Spectrum analyzer	Agilent	N9020A	MY49100060	Jan. 24, 2024	1 Year	LEP-E020	<input checked="" type="checkbox"/>
Horn antenna	Schwarzbeck	BBHA 9120D	01875	Nov. 20, 2022	3 Year	LEP-E024	<input checked="" type="checkbox"/>
Preamplifier	Schwarzbeck	BBN 9718B	00010	Jan. 24, 2024	1 Year	LEP-E025	<input checked="" type="checkbox"/>
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	<input checked="" type="checkbox"/>
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>

2.3 MEASUREMENT UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\%$
Conducted Emissions Test	$\pm 3.08\text{dB}$
Radiated Emission Test	$\pm 4.60\text{dB}$
Power Density	$\pm 0.9\%$
Occupied Bandwidth Test	$\pm 2.3\%$
Band Edge Test	$\pm 1.2\%$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 3.2\%$
Humidity	$\pm 2.5\%$
Measurement Uncertainty for a level of Confidence of 95%	

2.4 TEST FACILITY

EMC Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS/CL01

The Certificate Registration Number is L10100.

The Laboratory has been assessed and proved to be in compliance with A2LA

The Certificate Registration Number is 6901.01

FCC Designation No.: CN1351

Test Firm Registration No.: 397428

ISED CAB identifier: CN0151

Test Firm Registration No.: 20133

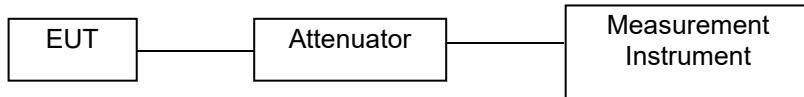
Test Location (Others) : Dongguan Lepont Testing Service Co., Ltd.

Address : Room 102, Building 11, No.7, Houjie Science And Technology Avenue, Houjie, Dongguan, Guangdong, China

3. SETUP OF EQUIPMENT UNDER TEST

3.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



3.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 32.

Below 30MHz:

The EUT is placed on a turntable 0.8meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

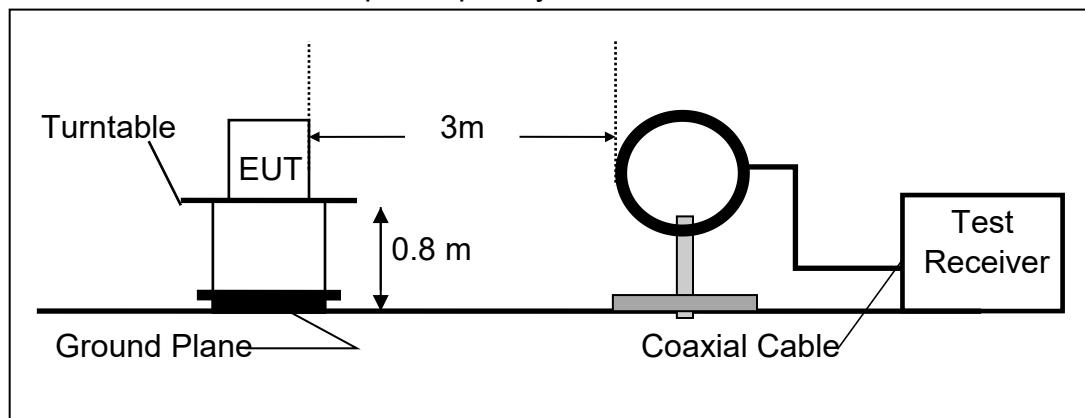
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

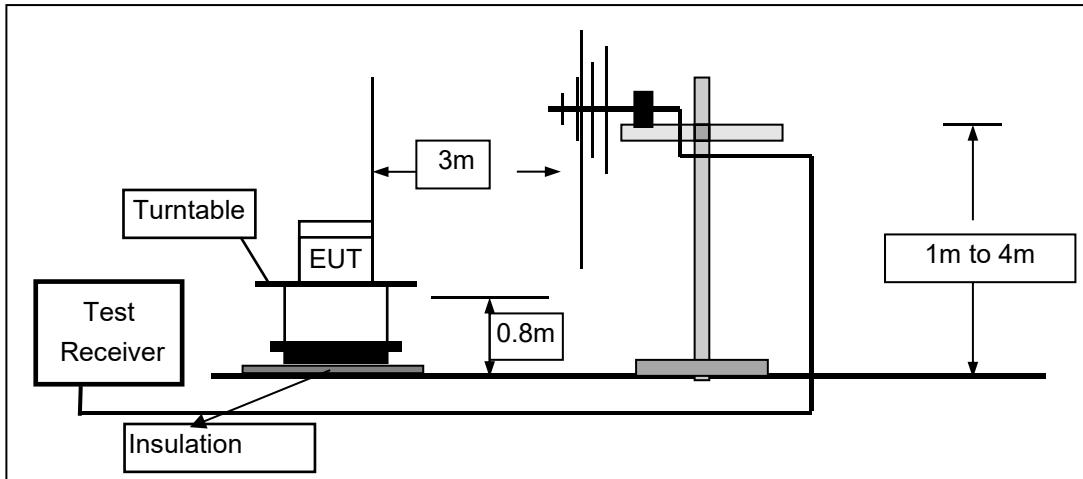
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

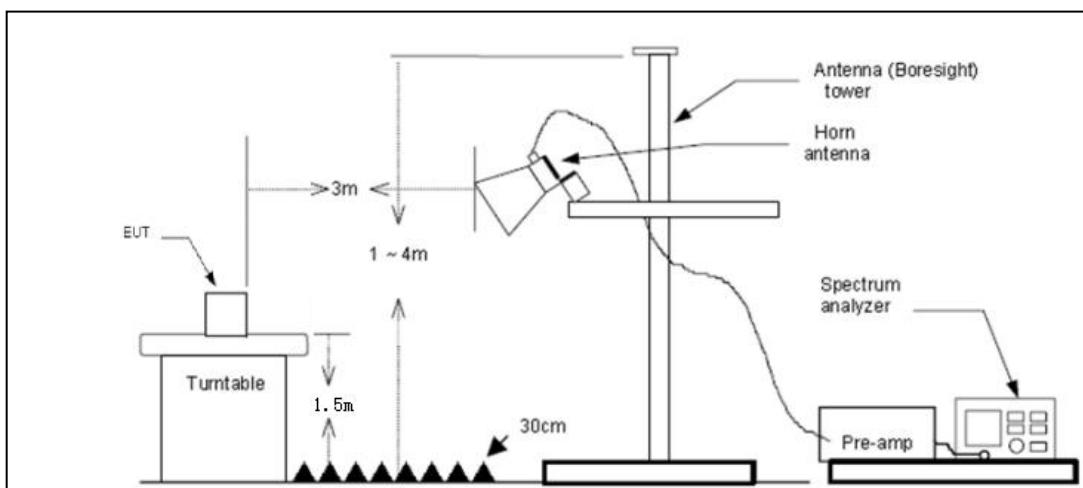
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



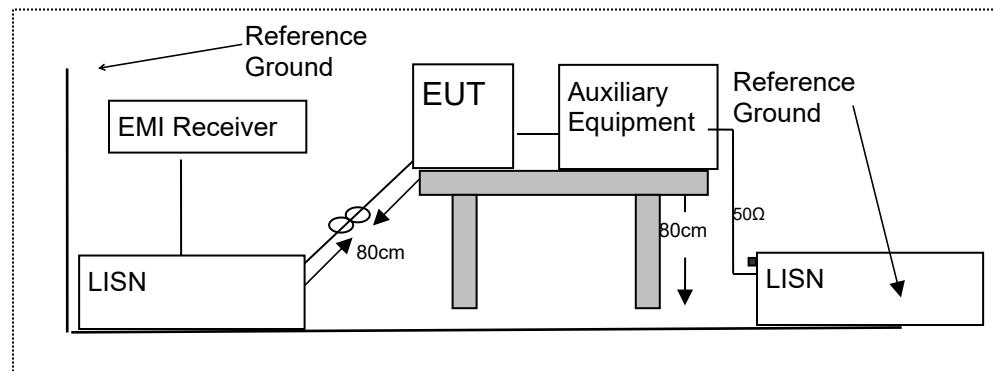
(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



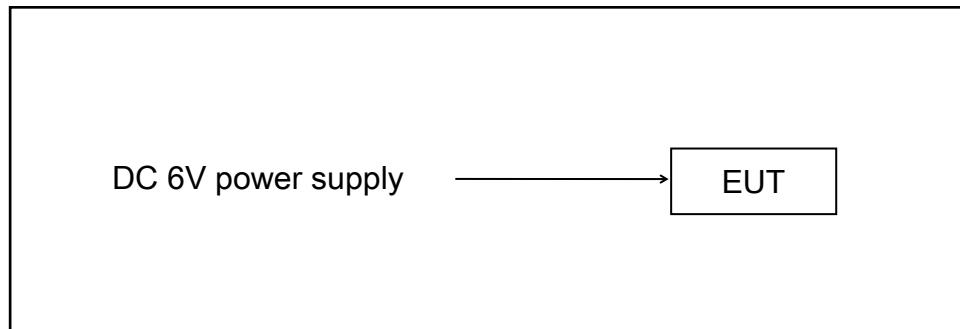
3.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8 m. According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



3.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



3.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Laptop computer	Lenovo	Xiaoxin Pro IA5HR	PF490VB0
AC Load	/	3000W	/

Notes:

- 1.All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2.Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4. TEST REQUIREMENTS

4.1 20DB EMISSION BANDWIDTH

4.1.1 Applicable Standard

According to FCC part 15.231(c)

4.1.2 Conformance Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

4.1.3 Test Configuration

Test according to clause 3.1 radio frequency test setup 1

4.1.4 Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1-5%OBW.

Set the video bandwidth (VBW) = \geq RBW.

Set Span= > Measurement Bandwidth or Channel Separation(approximately 2 to 3 times the 20 dB bandwidth)

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

Test Results

Modulation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (kHz)	Limit (kHz)	Verdict
OOK	1	433.92	236.8	≤1084.8	PASS

Note: Limit=0.5% of the center frequency=433.92MHz * 0.25% = 1084.8KHz



4.2 TRANSMISSION CEASE TIME

4.1.1 Applicable Standard

According to FCC part 15.231(a)

4.1.2 Conformance Limit

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

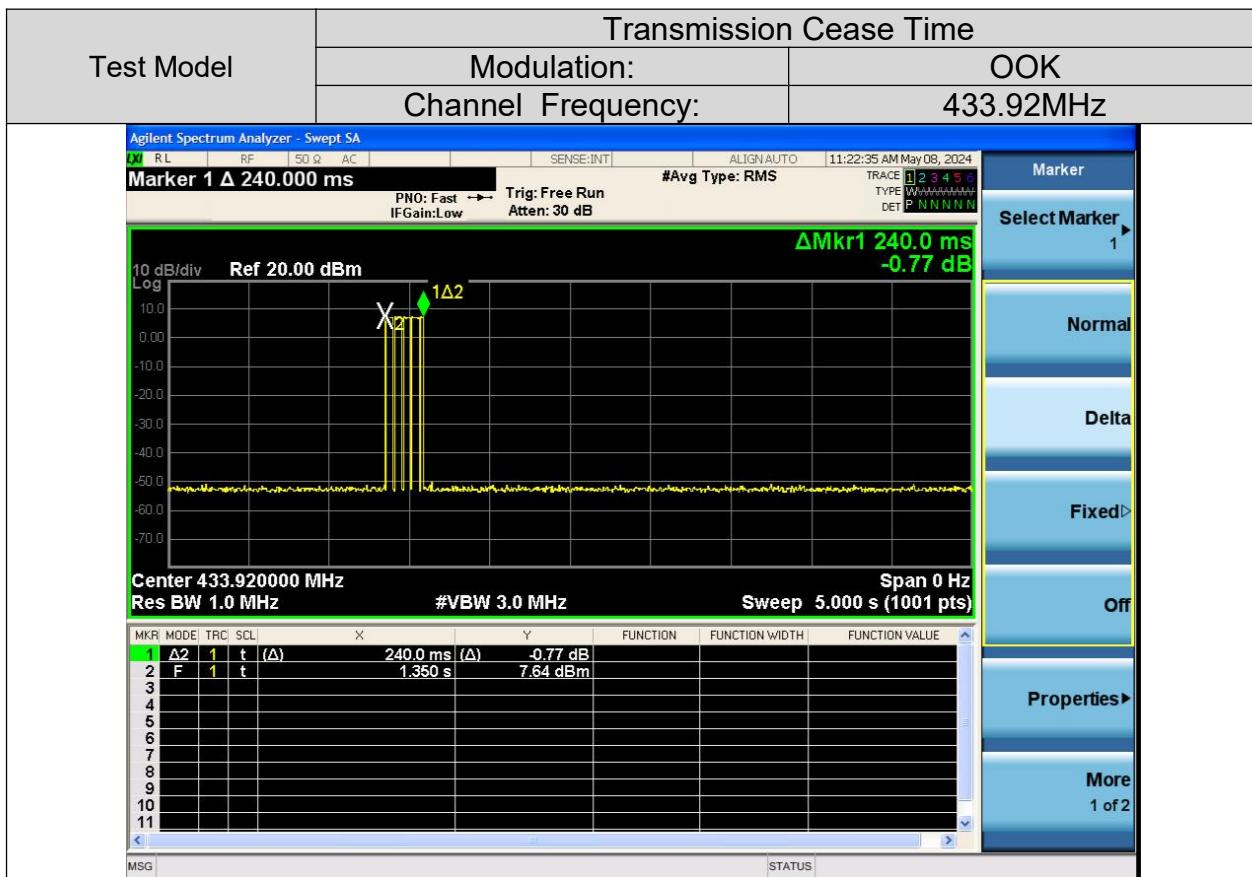
4.1.3 Test Configuration

Test according to clause 3.1 radio frequency test setup

4.1.4 Test Procedures

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the transmission duration was measured and recorded.

Frequency MHz	Transmission Cease Time	Limit	Result
433.92	0.24s	5s	Pass



4.3 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 1000kHz resolution bandwidth.

Averaging factor in dB = $20\log(\text{duty cycle})$

The duration of one cycle =53.6ms

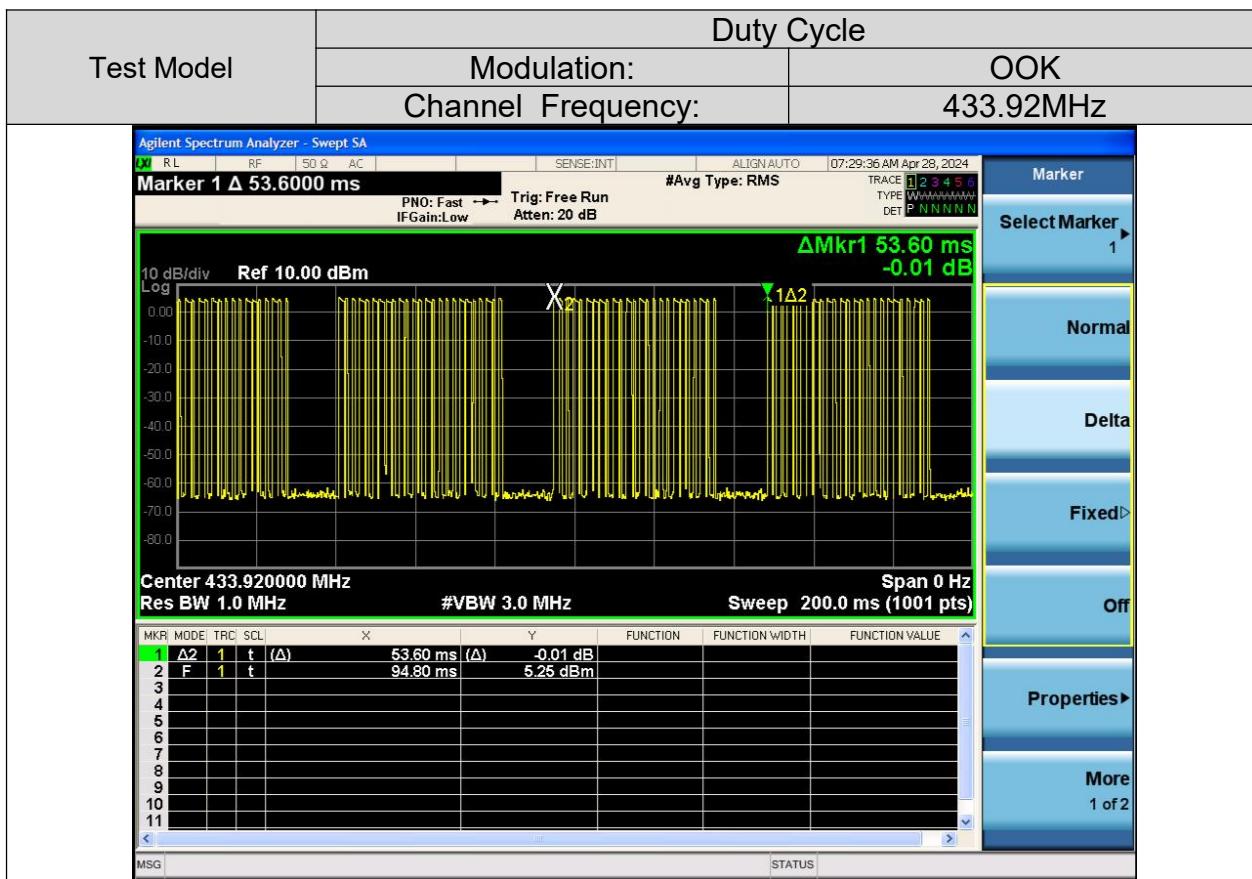
The duty cycle is simply the on-time divided the duration of one cycle

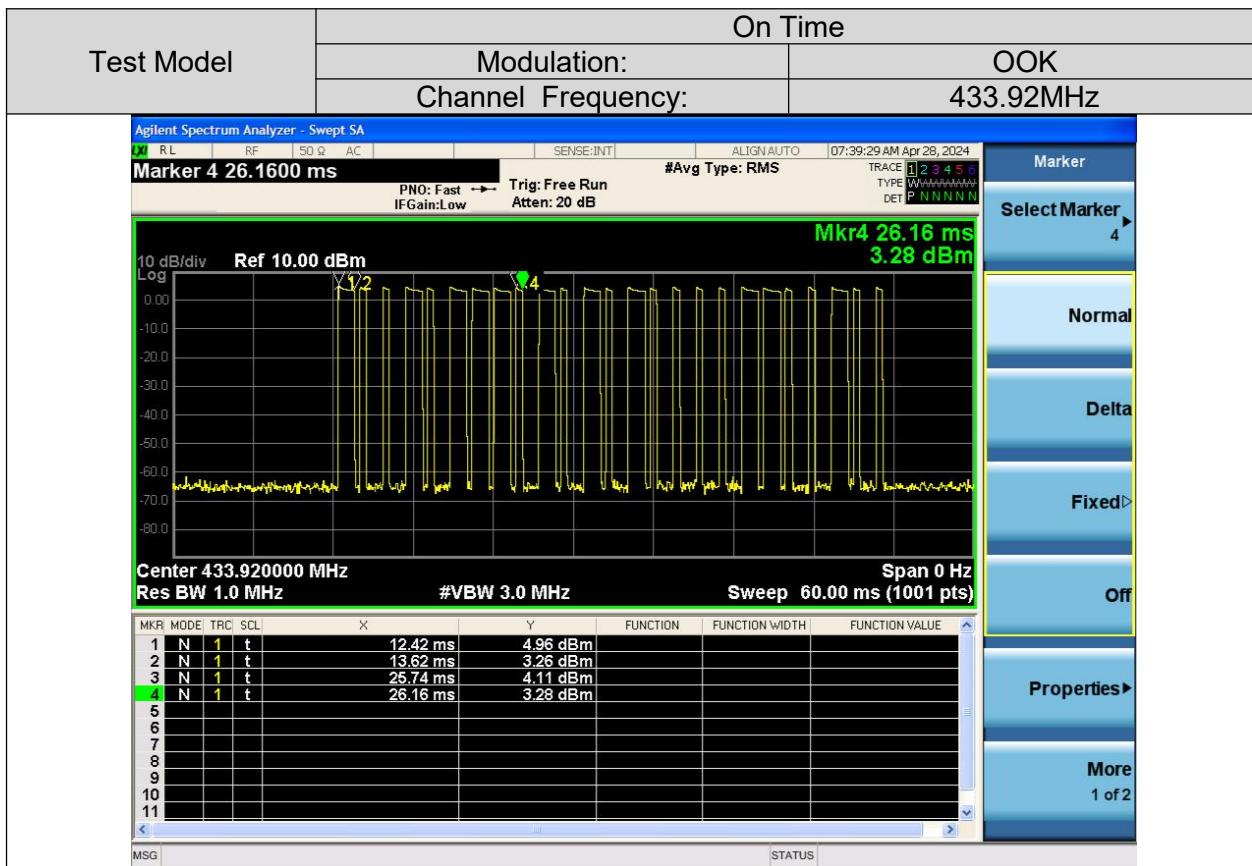
Duty Cycle = $(1.2*11+0.42*14)\text{ms} / 53.60 = 19.08\text{ms} / 53.60\text{ms} = 0.3559$

Therefore, the averaging factor is found by $20\log 0.364 = -8.78\text{dB}$

Test Result

Duty Cycle:	$(1.2*11+0.42*14)\text{ms} / 53.60 = 19.08\text{ms} / 53.60\text{ms} = 0.3559$
Duty Cycle Correction Factor:	$20\lg(0.3559) = -8.973$





4.4 RADIATED SPURIOUS EMISSION

4.1.1 Applicable Standard

According to FCC Part 15.231(b) and 15.209

4.1.2 Conformance Limit

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

According to FCC Part 15.231 the field strength Limited

Frequencies (MHz)	Field strength of fundamental @3m	
	(Microvolts /meter)	(Microvolts /meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 375**
174-260	3750	375
260-470	3750 to 12500*	375 to 1250*
Above 470	12500	1250

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

FCC Part15 (15.231) , Subpart C		
Fundamental Frequency	Field Strength Of Fundamental	Field Strength of Spurious Emissions
433.92MHz	AV:80.82 dBuV/m at 3m distance	AV:54 dBuV/m at 3m distance
	PK:100.82dBuV/m at 3m distance	PK:74 dBuV/m at 3m distance

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μ V/m)	Field Strength (dB μ V/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	300	See the remark
0.490~1.705	24000/F(KHz)	30	
1.705~30.0	30	30	
30-88	100	40	
88-216	150	43.5	
216-960	200	46	
Above 960	500	54	

 Remark :1. Emission level in dB μ V/m=20 log (μ V/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

 3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
 Limit line=Specific limits(dB μ V) + distance extrapolation factor.

for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] = $10 \times \lg(100 \text{ [kHz]}/\text{narrower RBW [kHz]})$. , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

4.1.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

4.1.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for $f < 1$ GHz(30MHz to 1GHz), 200Hz for $f < 150$ KHz(9KHz to 150KHz), 9KHz for $f < 30$ MHz(150KHz to 30MHz), 1MHz for $f < 5$ GHz

VBW \geq RBW Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

■ Spurious Emission below 30MHz (9KHz to 30MHz)

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type	Ant. Pol. H/V
--	--	--	--	--	--		--

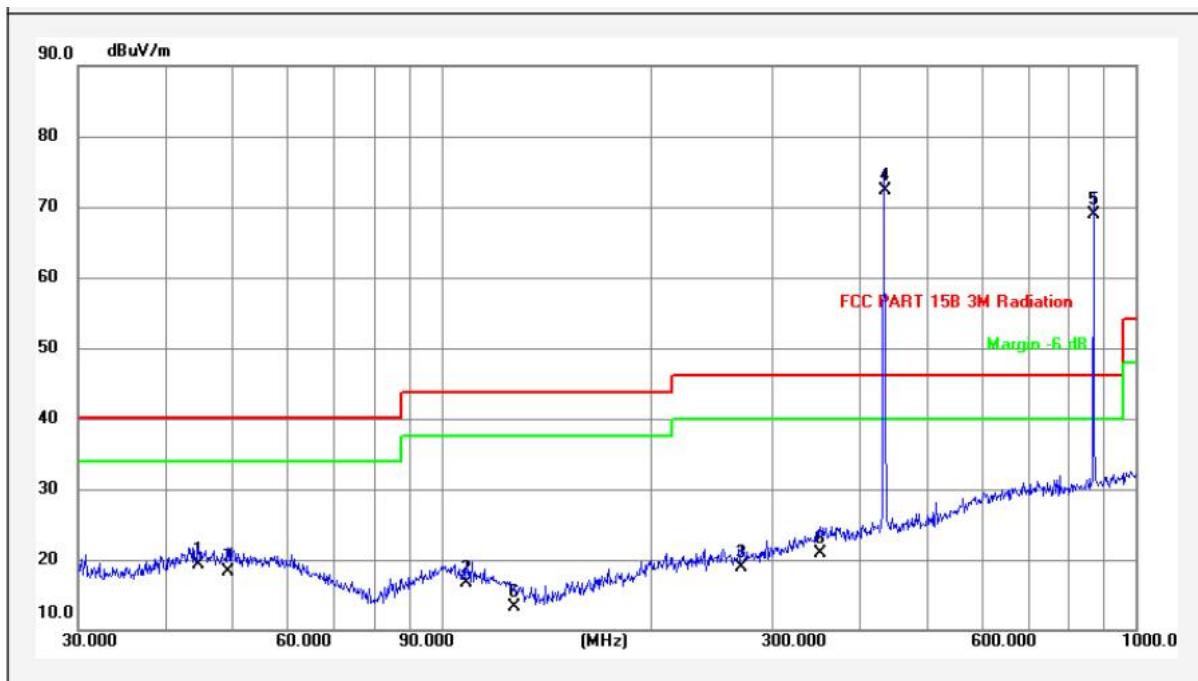
Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance/ test distance})(\text{ dB})$;

Limit line=Specific limits(dBuV) + distance extrapolation factor

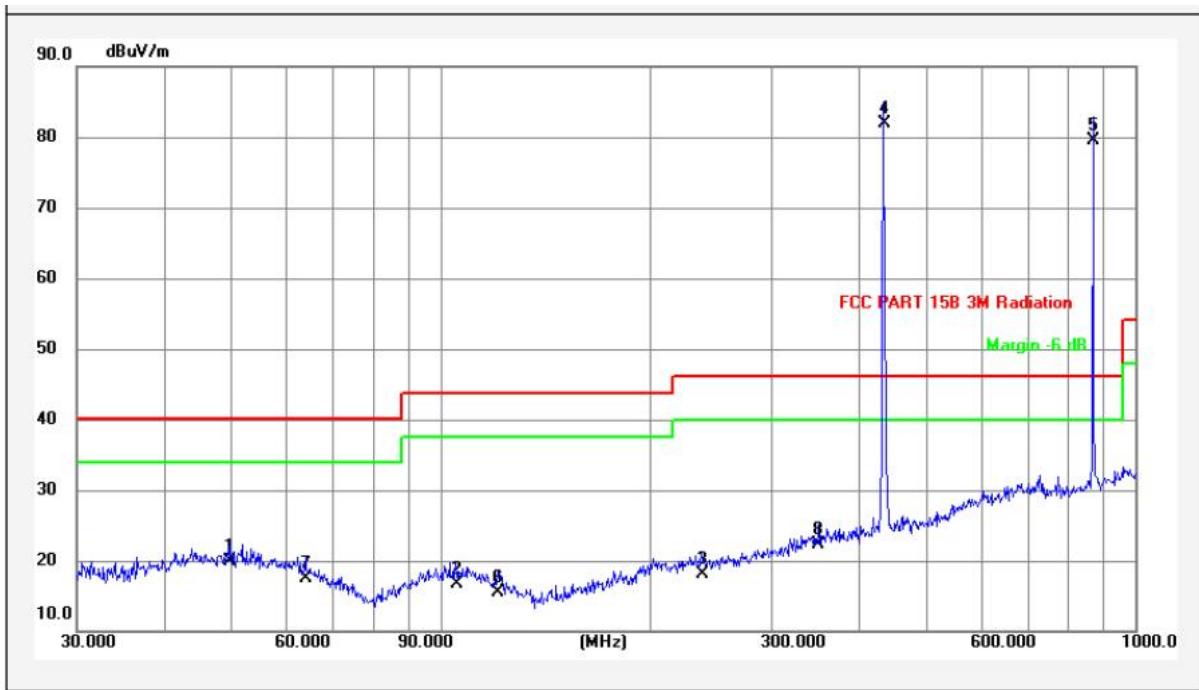
■ Spurious Emission below 1GHz (30MHz to 1GHz)

Test Model:	MZWX-F1-6	TX	Test Voltage:	DC 6V
Temperature:	23.7 °C		Phase:	Vertical
Relative Humidity:	56%		Pressure:	101.5KPa



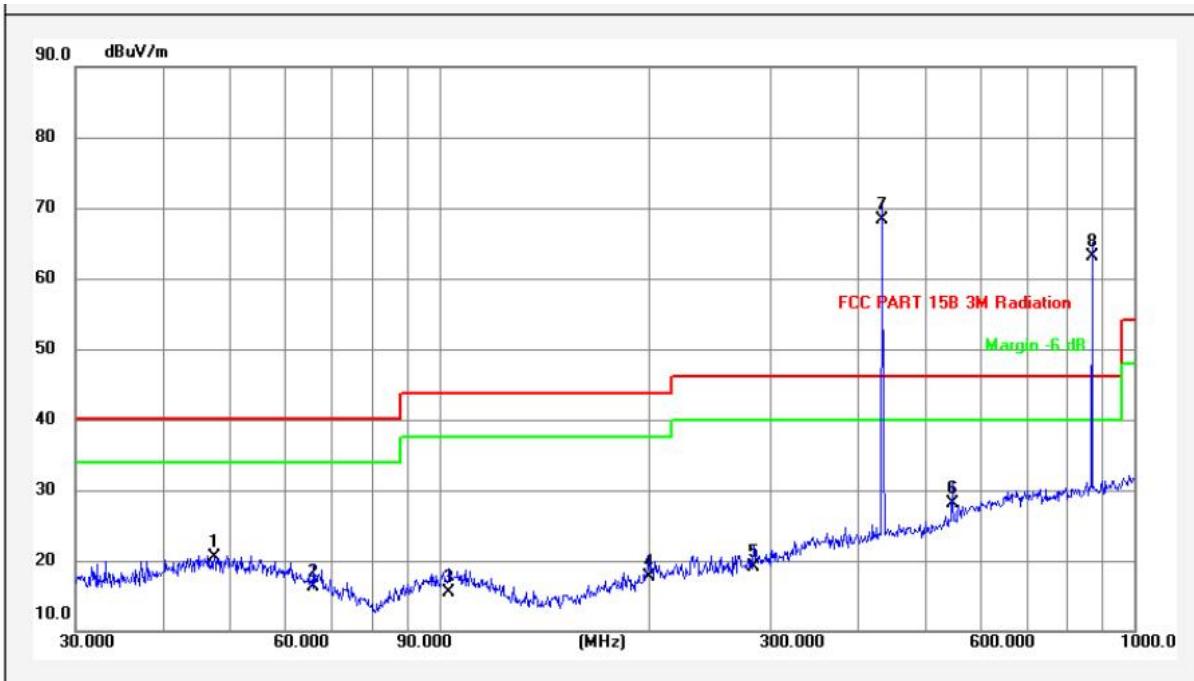
No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	M.K.	Remark
1	44.7433	12.70	6.59	19.29	40.00	-20.71	QP		
2	108.6470	10.04	6.70	16.74	43.50	-26.76	QP		
3	270.3748	11.71	7.19	18.90	46.00	-27.10	QP		
4	433.9200	15.36	56.98	72.34	46.00	26.34	QP	*	
5	867.8400	21.41	47.42	68.83	46.00	22.83	QP	X	
6	127.6645	8.00	5.40	13.40	43.50	-30.10	QP		
7	49.3594	12.45	5.85	18.30	40.00	-21.70	QP		
8	351.7078	14.55	6.35	20.90	46.00	-25.10	QP		

Test Model:	MZWX-F1-6	TX	Test Voltage:	DC 6V
Temperature:	23.7°C		Phase:	Horizontal
Relative Humidity:	56%		Pressure:	101.5KPa



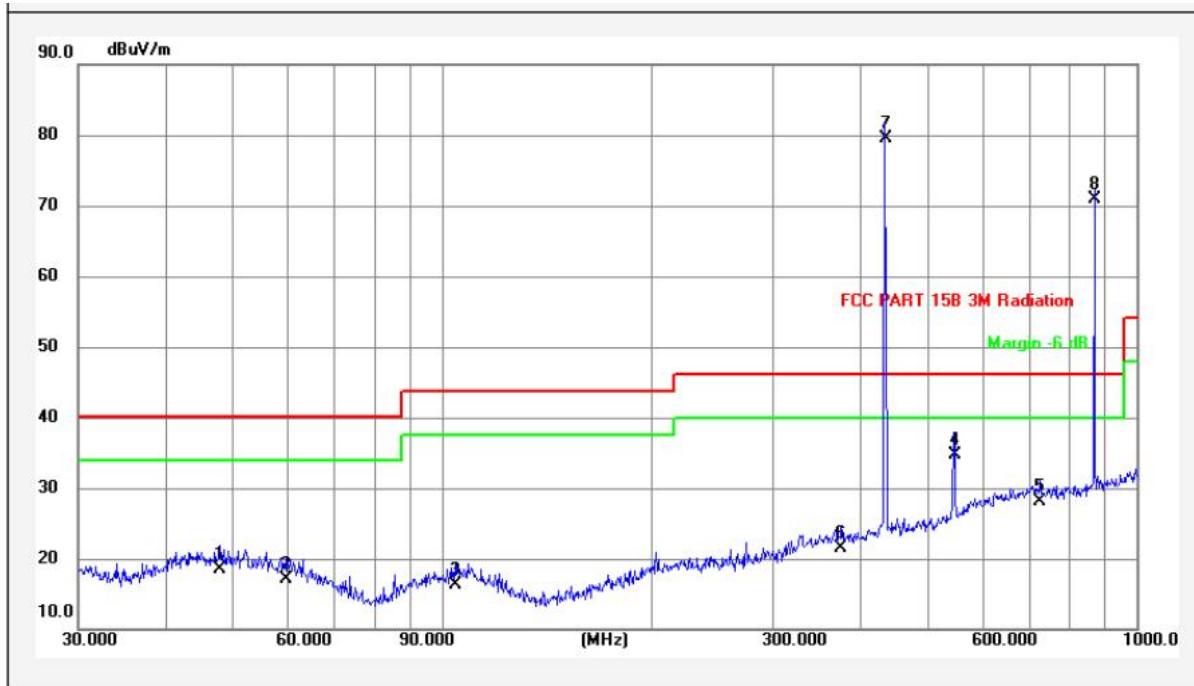
No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	49.7068	12.42	7.40	19.82	40.00	-20.18	QP		
2	105.2718	10.26	6.38	16.64	43.50	-26.86	QP		
3	237.4760	11.11	6.94	18.05	46.00	-27.95	QP		
4	433.9200	15.36	66.58	81.94	46.00	35.94	QP	*	
5	867.8400	21.41	58.15	79.56	46.00	33.56	QP	X	
6	121.1230	9.11	6.33	15.44	43.50	-28.06	QP		
7	63.9827	10.41	7.09	17.50	40.00	-22.50	QP		
8	350.4766	14.55	7.75	22.30	46.00	-23.70	QP		

Test Model:	MZWX-F1-9	TX	Test Voltage:	DC 6V
Temperature:	24.4 °C		Phase:	Vertical
Relative Humidity:	53%		Pressure:	101.3KPa



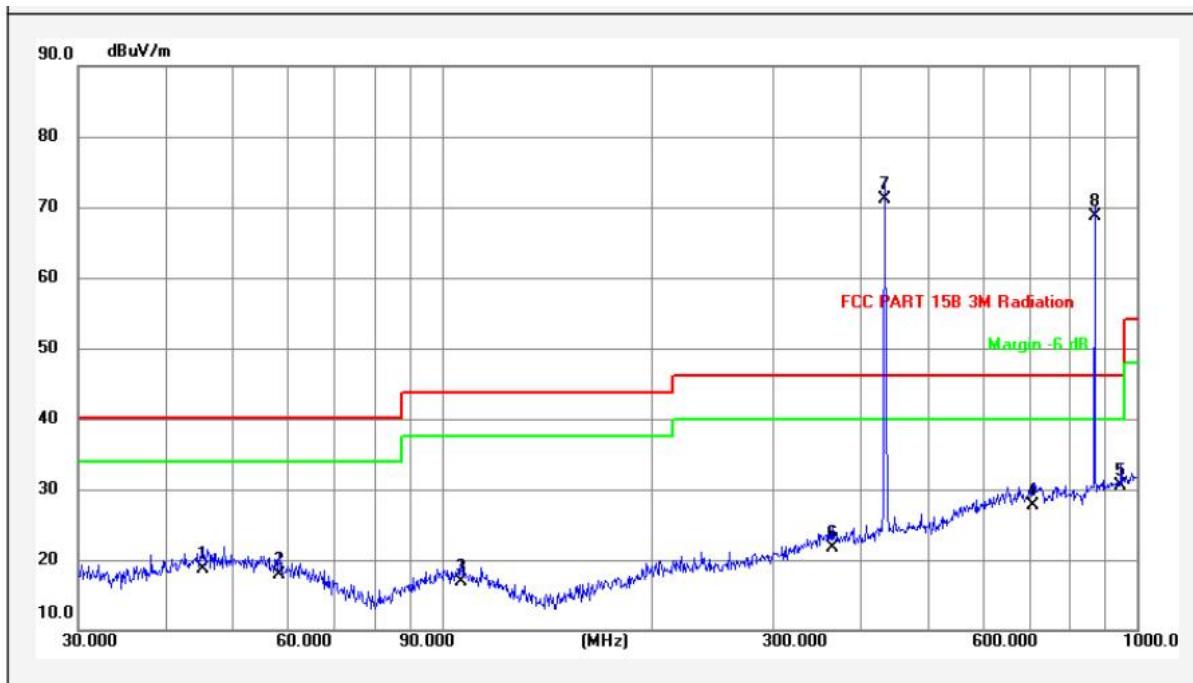
No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	47.4917	12.59	7.91	20.50	40.00	-19.50	QP		
2	66.0341	9.92	6.48	16.40	40.00	-23.60	QP		
3	103.4419	10.38	5.12	15.50	43.50	-28.00	QP		
4	200.6879	10.81	6.79	17.60	43.50	-25.90	QP		
5	282.9849	12.02	7.08	19.10	46.00	-26.90	QP		
6	547.0976	17.31	10.89	28.20	46.00	-17.80	QP		
7	433.9200	15.36	52.94	68.30	46.00	22.30	QP	*	
8	867.8400	21.41	41.69	63.10	46.00	17.10	QP	X	

Test Model:	MZWX-F1-9	TX	Test Voltage:	DC 6V
Temperature:	24.4 °C		Phase:	Horizontal
Relative Humidity:	53%		Pressure:	101.3KPa



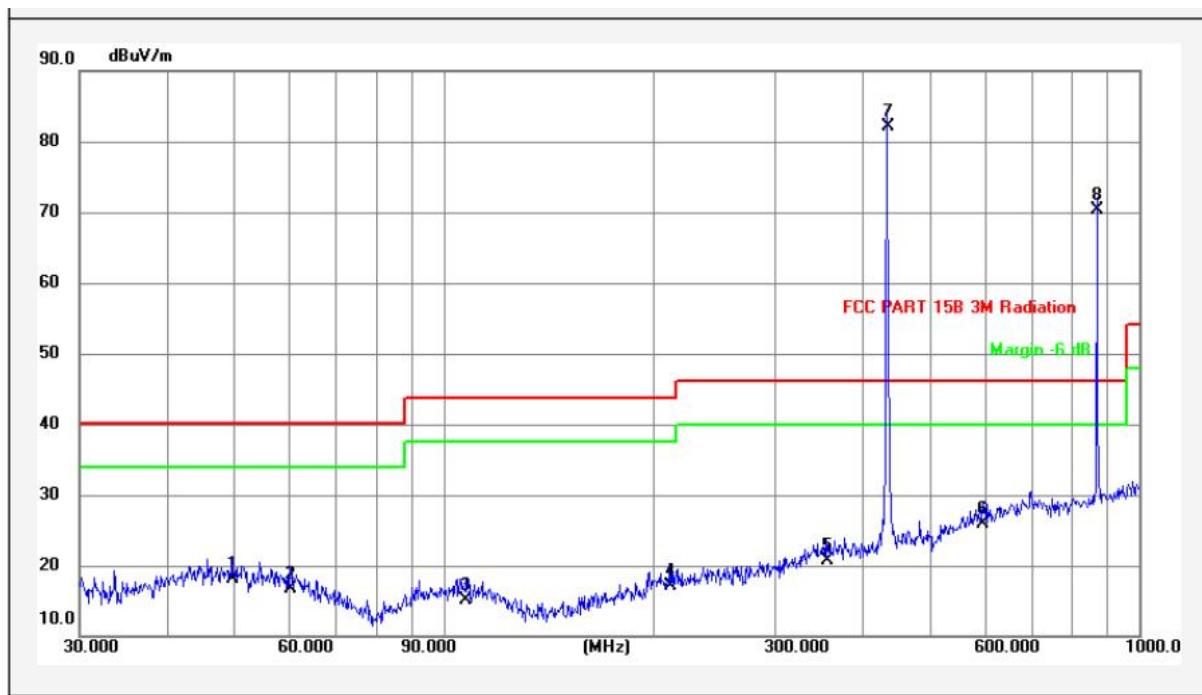
No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	47.9940	12.55	5.95	18.50	40.00	-21.50	QP		
2	59.8588	11.40	5.70	17.10	40.00	-22.90	QP		
3	104.5361	10.30	6.00	16.30	43.50	-27.20	QP		
4	545.1826	17.25	17.45	34.70	46.00	-11.30	QP		
5	726.8052	20.19	7.91	28.10	46.00	-17.90	QP		
6	375.9385	14.61	6.89	21.50	46.00	-24.50	QP		
7	433.9200	15.36	64.24	79.60	46.00	33.60	QP	*	
8	867.8400	21.41	49.59	71.00	46.00	25.00	QP	X	

Test Model:	MZWX-F1-11	TX	Test Voltage:	DC 6V
Temperature:	24.4 °C		Phase:	Vertical
Relative Humidity:	53%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	45.3753	12.75	5.85	18.60	40.00	-21.40	QP		
2	58.4074	11.55	6.35	17.90	40.00	-22.10	QP		
3	106.7587	10.16	6.74	16.90	43.50	-26.60	QP		
4	709.1821	20.06	7.74	27.80	46.00	-18.20	QP		
5	948.7608	22.23	8.37	30.60	46.00	-15.40	QP		
6	364.2595	14.58	7.12	21.70	46.00	-24.30	QP		
7	433.9200	15.36	55.84	71.20	46.00	25.20	QP	*	
8	867.8400	21.41	47.39	68.80	46.00	22.80	QP	X	

Test Model:	MZWX-F1-11	TX	Test Voltage:	DC 6V
Temperature:	24.4°C		Phase:	Horizontal
Relative Humidity:	53%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	49.7068	12.42	5.78	18.20	40.00	-21.80	QP		
2	60.2801	11.31	5.49	16.80	40.00	-23.20	QP		
3	107.8877	10.09	5.01	15.10	43.50	-28.40	QP		
4	211.5265	10.89	6.31	17.20	43.50	-26.30	QP		
5	355.4273	14.56	6.14	20.70	46.00	-25.30	QP		
6	595.1329	18.75	7.25	26.00	46.00	-20.00	QP		
7	433.9200	15.36	66.74	82.10	46.00	36.10	QP	*	
8	867.8400	21.41	48.89	70.30	46.00	24.30	QP	X	

■ For Fundamental radiation, Harmonic radiation:

Test model:		MZWX-F1-6				TX	
Frequency	Peak Emission Level	Duty cycle factor	AV Emission Level	Limits	Margin	Detector Type	Ant. Pol.
(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)		H/V
433.92	81.94	-8.973	72.967	100.82	27.853	peak	H
867.84	79.52	-8.973	70.547	100.82	30.273	peak	H
433.92	72.34	-8.973	63.367	80.82	17.453	peak	V
867.84	68.83	-8.973	59.857	80.82	20.963	peak	V

Test model:		MZWX-F1-9				TX	
Frequency	Peak Emission Level	Duty cycle factor	AV Emission Level	Limits	Margin	Detector Type	Ant. Pol.
(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)		H/V
433.92	79.6	-8.973	70.627	100.82	30.193	peak	H
867.84	71.0	-8.973	62.027	100.82	38.793	peak	H
433.92	68.3	-8.973	59.327	80.82	21.493	peak	V
867.84	63.1	-8.973	54.127	80.82	26.693	peak	V

Test model:		MZWX-F1-11				TX	
Frequency	Peak Emission Level	Duty cycle factor	AV Emission Level	Limits	Margin	Detector Type	Ant. Pol.
(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)		H/V
433.92	82.10	-8.973	73.127	100.82	27.693	peak	H
867.84	70.30	-8.973	61.327	100.82	39.493	peak	H
433.92	71.20	-8.973	62.227	80.82	18.593	peak	V
867.84	68.80	-8.973	59.827	80.82	20.993	peak	V

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

2. Duty cycle level please see clause 6.

■ Spurious Emission Above 1GHz

Test mode:		TX					
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Ant. Pol.
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)		H/V
1306	74.99	-5.82	69.17	74	-4.83	peak	V
2173	71.21	-3.66	67.55	74	-6.45	peak	V
3465	64.97	0.3	65.27	74	-8.73	peak	V
3907	63.65	1.01	64.66	74	-9.34	peak	V
1323	55.47	-5.81	49.66	54	-4.34	AVG	V
2190	52.18	-3.61	48.57	54	-5.43	AVG	V
3924	48.7	1.04	49.74	54	-4.26	AVG	V
3482	45.88	0.34	46.22	54	-7.78	AVG	V

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Ant. Pol.
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)		H/V
2598	64.01	-2.06	61.95	74	-12.05	peak	H
3040	66.63	-0.46	66.17	74	-7.83	peak	H
3465	58.83	0.3	59.13	74	-14.87	peak	H
1306	75.85	-5.82	70.03	74	-3.97	peak	H
1323	53.29	-5.81	47.48	54	-6.52	AVG	H
2190	49.85	-3.61	46.24	54	-7.76	AVG	H
3057	49.98	-0.43	49.55	54	-4.45	AVG	H
3482	46.42	0.34	46.76	54	-7.24	AVG	H

Note: (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).

(2) Emission Level= Reading Level+Probe Factor +Cable Loss.

(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4.5 CONDUCTED EMISSION TEST

4.1.1 Applicable Standard

According to FCC Part 15.207(a)

4.1.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.1.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

4.1.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

Test Results

Note: EUT power supply by battery, so the test not applicable.

5. ANTENNA APPLICATION

5.1 ANTENNA REQUIREMENT

Standard	Requirement
FCC CRF Part 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.2 RESULT

PASS.

The EUT has 1 antenna: a Helical Antenna for OOK model, the gain is -1.51 dBi;

- Antenna use a permanently attached antenna which is not replaceable.
- Not using a standard antenna jack or electrical connector for antenna replacement
- The antenna has to be professionally installed (please provide method of installation)

Note: which in accordance to section 15.203, please refer to the internal photos.

----- END OF REPORT -----