



MEASUREMENT REPORT

FCC Part 15.231

FCC ID: 2AEZB-FZJ202109-315

APPLICANT: Forcome(Shanghai) Co., Ltd.

Application Type: Certification

Product: Wireless remote control module

Model No.: FZJ-10801046(wm)-3000

Brand Name: X-POWER

FCC Classification: FCC Part 15 Security/remote control Transmitter (DSC)

FCC Rule Part(s): Part15 Subpart C (Section 15.231)

Test Procedure(s): ANSI C63.10-2013

Test Date: September 14 ~ 27, 2021

Reviewed By:

Sunny Sun

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2109RSU019-U1	Rev. 01	Initial Report	09-28-2021	Valid

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1. GENERAL INFORMATION

1.1. Applicant

Forcome(Shanghai) Co., Ltd.

Building 109, No. 255, South Sizhuan Road, Shanghai, 201612, China

1.2. Manufacturer

Forcome(Shanghai) Co., Ltd.

Building 109, No. 255, South Sizhuan Road, Shanghai, 201612, China

1.3. Testing Facility

☒	Test Site - MRT Suzhou Laboratory Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China Laboratory Accreditations A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: ☐ R-20025 ☐ G-20034 ☐ C-20020 ☐ T-20020 ☐ R-20141 ☐ G-20134 ☐ C-20103 ☐ T-20104
☐	Test Site - MRT Shenzhen Laboratory Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China Laboratory Accreditations A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
☐	Test Site - MRT Taiwan Laboratory Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) Laboratory Accreditations TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

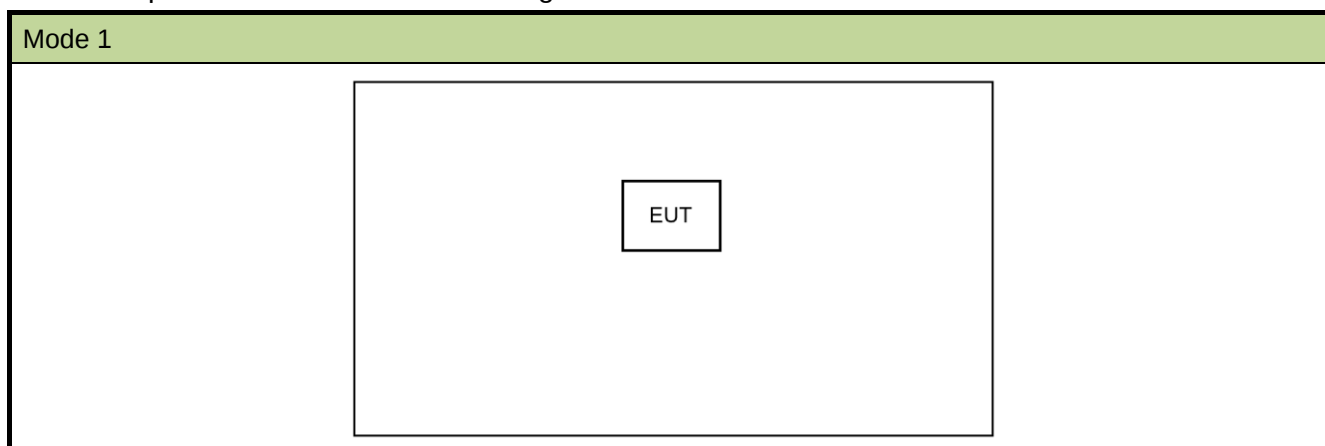
Product Name	Wireless remote control module
Model No.	FZJ-10801046(wm)-3000
Brand Name	X-POWER
Operating Frequency	315MHz
Type of Modulation	ASK
Antenna Type	Integrated Antenna
Antenna Gain	-1dBi
Power Type	Dry Battery
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Test Mode

Test Mode	Mode 1: Transmit at Channel 315MHz
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1.6. Test Configuration

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing.



1.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

1.8. Test Environment Condition

Ambient Temperature	15°C ~ 35°C
Relative Humidity	20%RH ~ 75%RH

2. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the unit is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

3. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/04
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/09/27
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2022/08/05
Thermohygrometer	Yuhuaze	HTC-2	MRTSUE06184	1 year	2022/08/10
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2022/04/29
Horn Antenna	ETS	3117	MRTSUE06257	1 year	2021/09/27
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2022/06/28
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/12/14
Preamplifier	EMCI	EMC051845SE	MRTSUE06601	1 year	2021/09/21
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022/01/06
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2022/01/14

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2022/05/24
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/8
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2022/06/24
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2021/12/8
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2021/10/25
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/14
Thermohygrometer	Yuhuaze	HTC-2	MRTSUE06178	1 year	2022/08/10
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2022/04/29
Horn Antenna	ETS	3117	MRTSUE06257	1 year	2021/09/27
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/12/14
Preamplifier	EMCI	EMC051845SE	MRTSUE06601	1 year	2021/09/21
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2022/01/14

Occupied Bandwidth (WZ-SR4)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Modulation Analyzer	HP	HP8901A	MRTSUE06098	1 year	2021/09/26
Thermohygrometer	testo	608-H1	MRTSUE06222	1 year	2021/10/25
DECT Tester	RTX	RTX2012	MRTSUE06408	1 year	2022/02/23
Signal Analyzer	Keysight	N9010B	MRTSUE06558	1 year	2022/06/24
Frequency extender for EXG or MXG	Keysight	N5182BX07	MRTSUE06984	1 year	2022/03/07

Software	Version	Function
EMI Software	V3	EMI Test Software

4. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Radiated Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.28%

5. TEST RESULT

5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Test Result	Reference
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	N/A	Section 5.2
15.231(b)	Duty Cycle	Radiated	N/A	Section 5.3
15.205, 15.231(b)	Radiated Spurious Emissions		Pass	Section 5.4
15.231(c)	20dB Bandwidth		Pass	Section 5.5
15.231(a)(1)	Release Time		Pass	Section 5.6

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst-case emissions.
- 2) For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
- 3) "N/A" means that the test item is not applicable, and the details refer to relevant section.

5.2. Conducted Emission

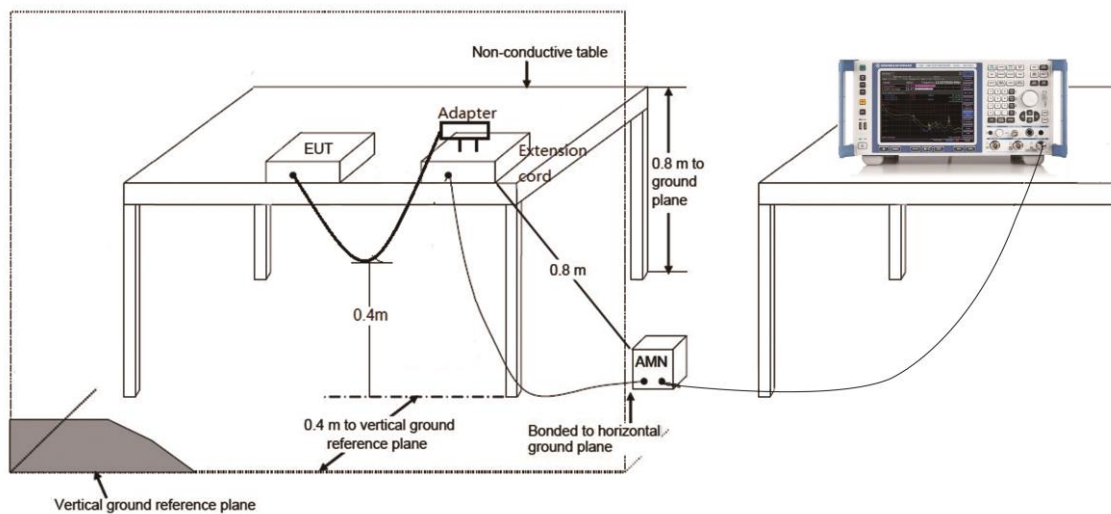
5.2.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	AV (dB μ V)
0.15 ~ 0.50	66 ~ 56	56 ~ 46
0.50 ~ 5.0	56	46
5.0 ~ 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

5.2.2. Test Setup



5.2.3. Test Result

The EUT is powered by dry battery, so this item is not applicable.

5.3. Duty Cycle

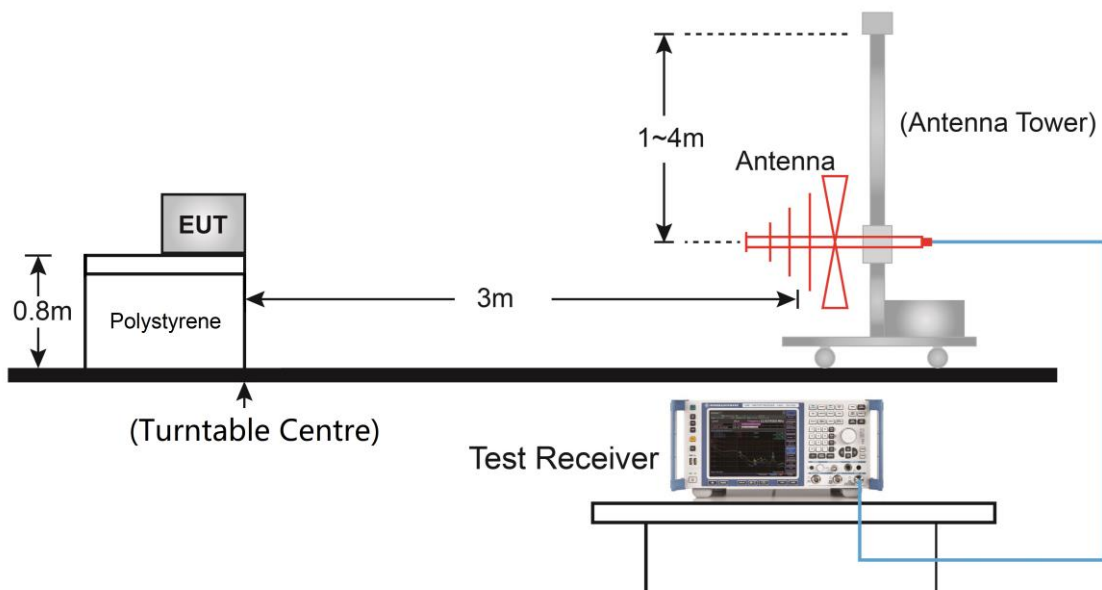
5.3.1. Test Limit

According to FCC Part 15.231(b) and 15.35(b), for pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

5.3.2. Test Procedure Used

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 315MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

5.3.3. Test Setup



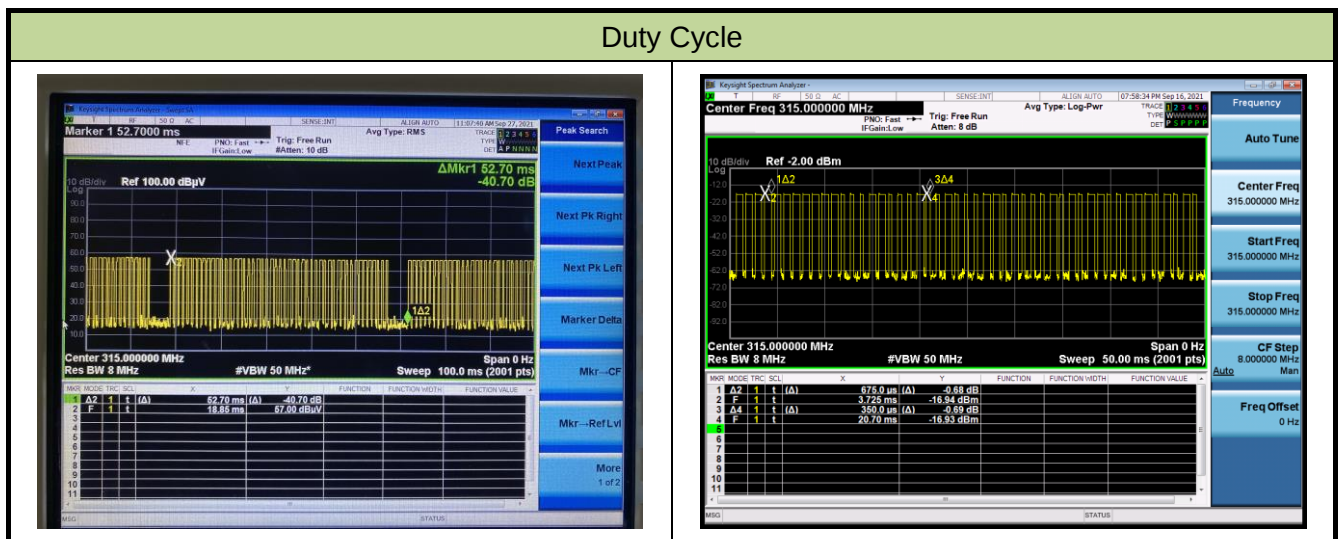
5.3.4. Test Result

Test Site	WZ-AC1	Test Engineer	Tommy Tang
Test Date	2021/09/16 & 2021/09/27		

Time On (ms)	One Period (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
25.925	52.70	49.19	-6.162

Note: Duty Cycle Factor = $20 \cdot \log(\text{Duty Cycle})$

Time On = $0.675\text{ms} \cdot 27 + 0.350\text{ms} \cdot 22 = 25.925\text{ms}$



5.4. Radiated Emissions

5.4.1. Test Limit

According to §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

FCC Part 15.231(b) Limits		
Fundamental Frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (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

The limits on the field 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 §15.209, whichever limit permits a higher field strength.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements start below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

For 315 MHz fundamental Limit:

Average Limit (dBμV/m) = $20 \cdot \log \{ (41.67 \times 315 - 7083) / 10^6 \} + 120 = 75.623$ (dBμV/m).

Peak Limit (dBμV/m) = Average Limit (dBμV/m) + 20 = 95.623 (dBμV/m).

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

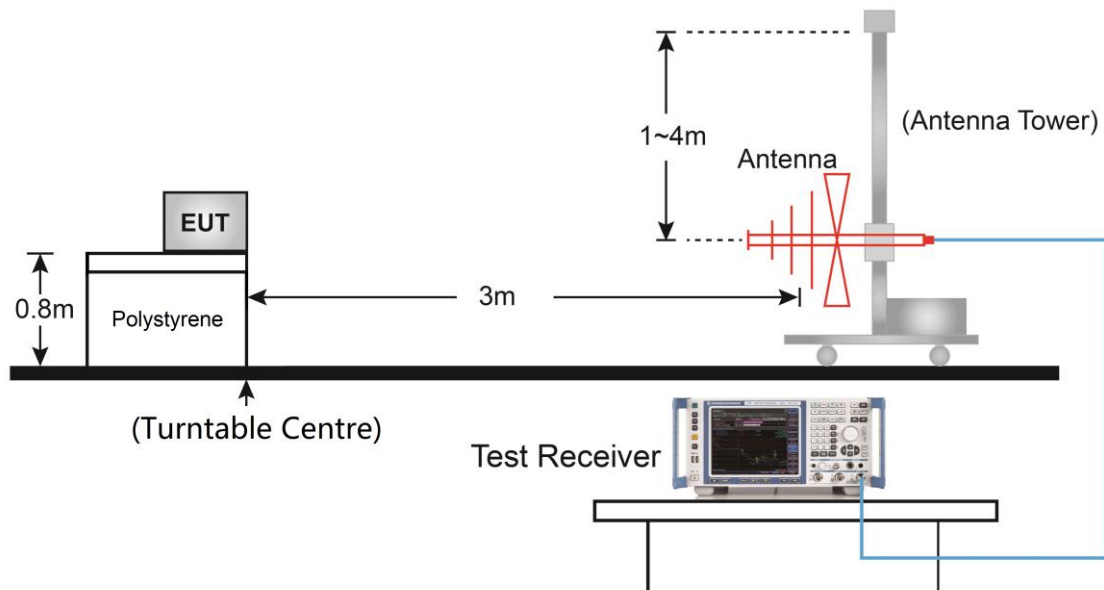
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	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	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	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	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

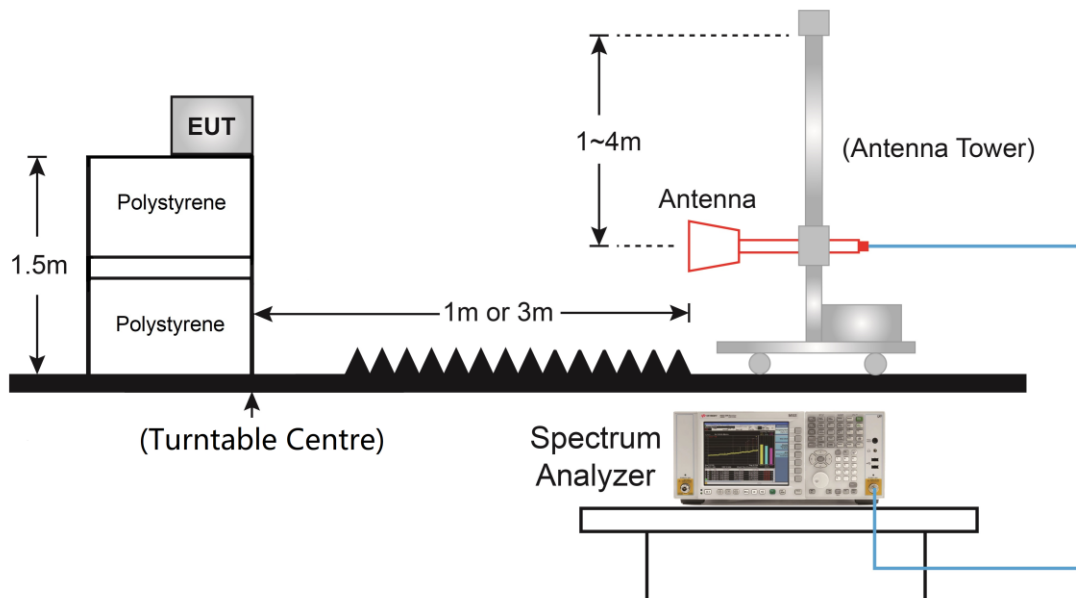
FCC Part 15.209 Limits		
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measured Distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

5.4.2. Test Setup

Below 1GHz Test Setup:

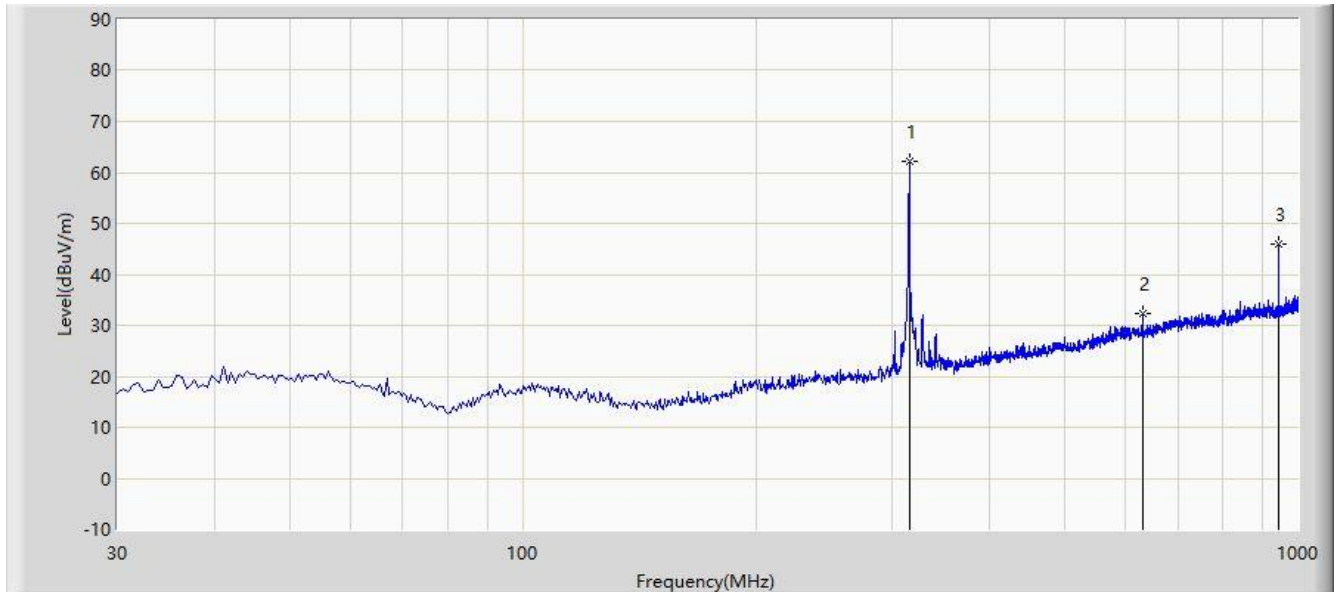


Above 1GHz Test Setup:



5.4.3. Test Result

Site: WZ-AC2	Time: 2021/09/14
Limit: FCC_Part15.231(b)_RE(3m)	Engineer: Messiah Li
Probe: WZ-AC2_VULB9162_0.03-7GHz	Polarity: Horizontal
EUT: Wireless remote control module	Power: By Dry Battery
Test Mode 1	



No.	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Type
1	315.180	40.861	21.174	N/A	62.035	95.623	-33.588	PK
	315.180	40.861	21.174	-6.162	55.873	75.623	-19.750	AV
2	629.945	5.019	27.298	N/A	32.317	75.623	-43.306	PK
	629.945	5.019	27.298	-6.162	26.155	55.623	-29.468	AV
3	945.195	14.692	31.393	N/A	46.085	75.623	-29.538	PK
	945.195	14.692	31.393	-6.162	39.923	55.623	-15.700	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

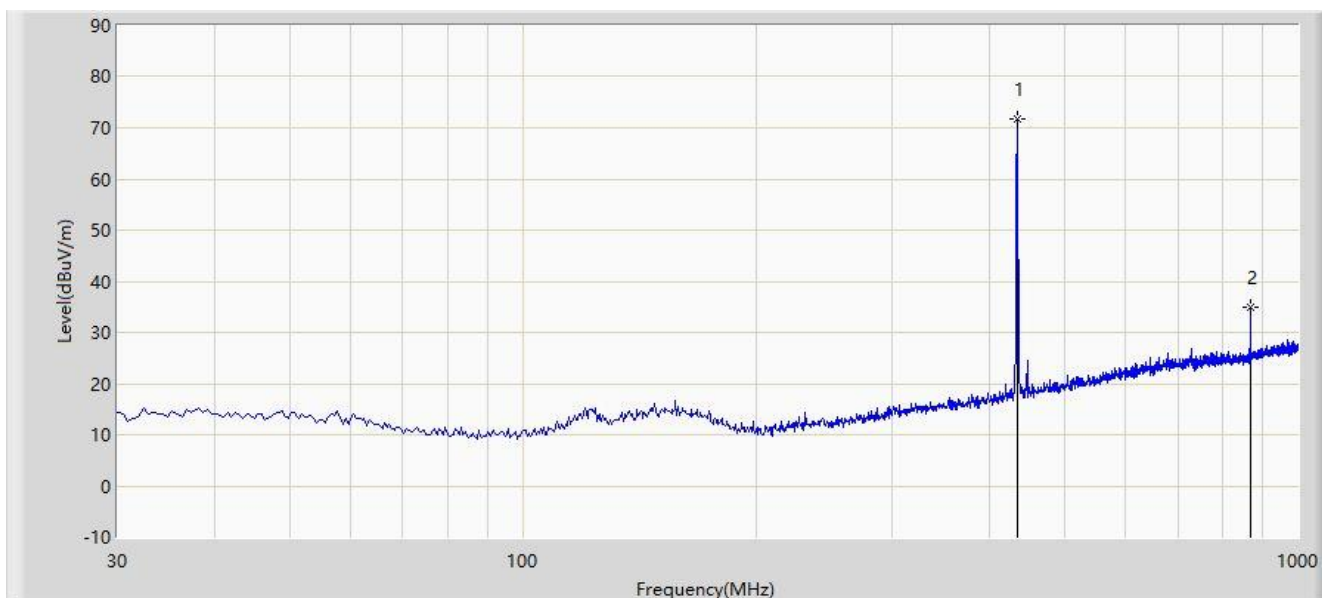
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

AV Measure Level = Peak Measure Level + Duty Cycle Factor.

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC2	Time: 2021/09/14
Limit: FCC_Part15.231(b)_RE(3m)	Engineer: Messiah Li
Probe: WZ-AC2_VULB9162_0.03-7GHz	Polarity: Vertical
EUT: Wireless remote control module	Power: By Dry Battery
Test Mode 1	



No.	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Type
1	315.180	37.526	21.174	N/A	58.700	95.623	-36.923	PK
	315.180	37.526	21.174	-6.162	52.538	75.623	-23.085	AV
2	629.945	2.324	27.298	N/A	29.622	75.623	-46.001	PK
	629.945	2.324	27.298	-6.162	23.460	55.623	-32.163	AV
3	945.195	5.065	31.393	N/A	36.458	75.623	-39.165	PK
	945.195	5.065	31.393	-6.162	30.296	55.623	-25.327	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

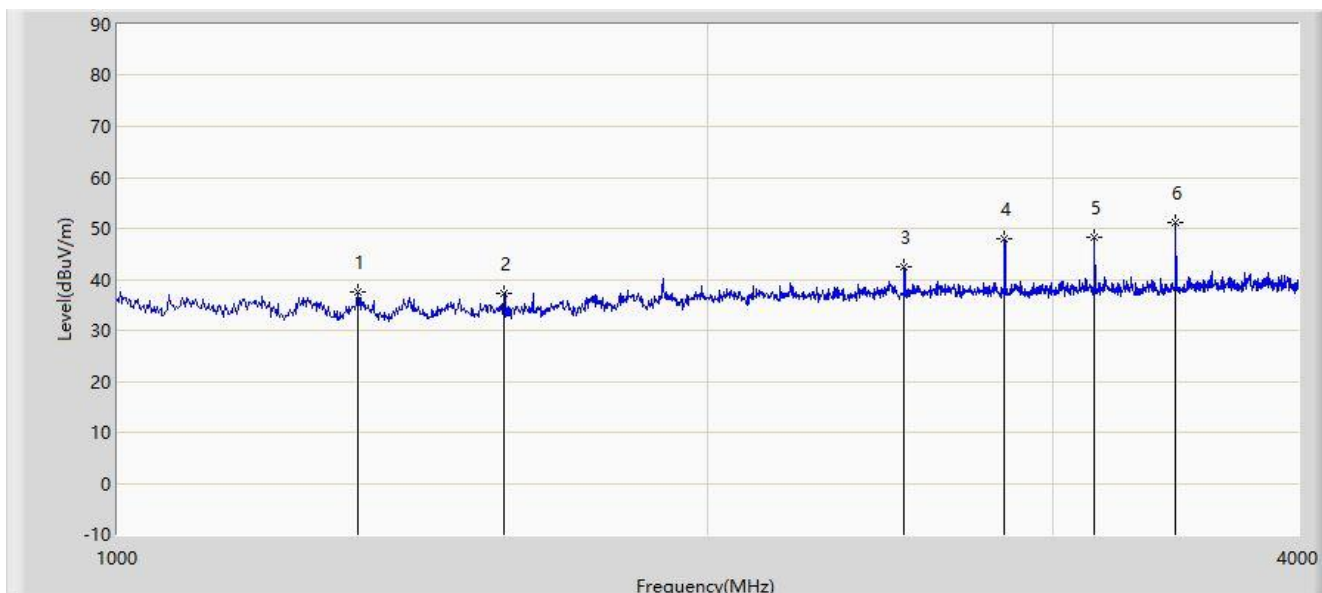
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

AV Measure Level = Peak Measure Level + Duty Cycle Factor.

Site: WZ-AC2	Time: 2021/09/13
Limit: FCC_Part15.231(b)_RE(3m)	Engineer: Messiah Li
Probe: WZ_Horn 3117_1-18GHz	Polarity: Horizontal
EUT: Wireless remote control module	Power: By Dry Battery
Test Mode 1	



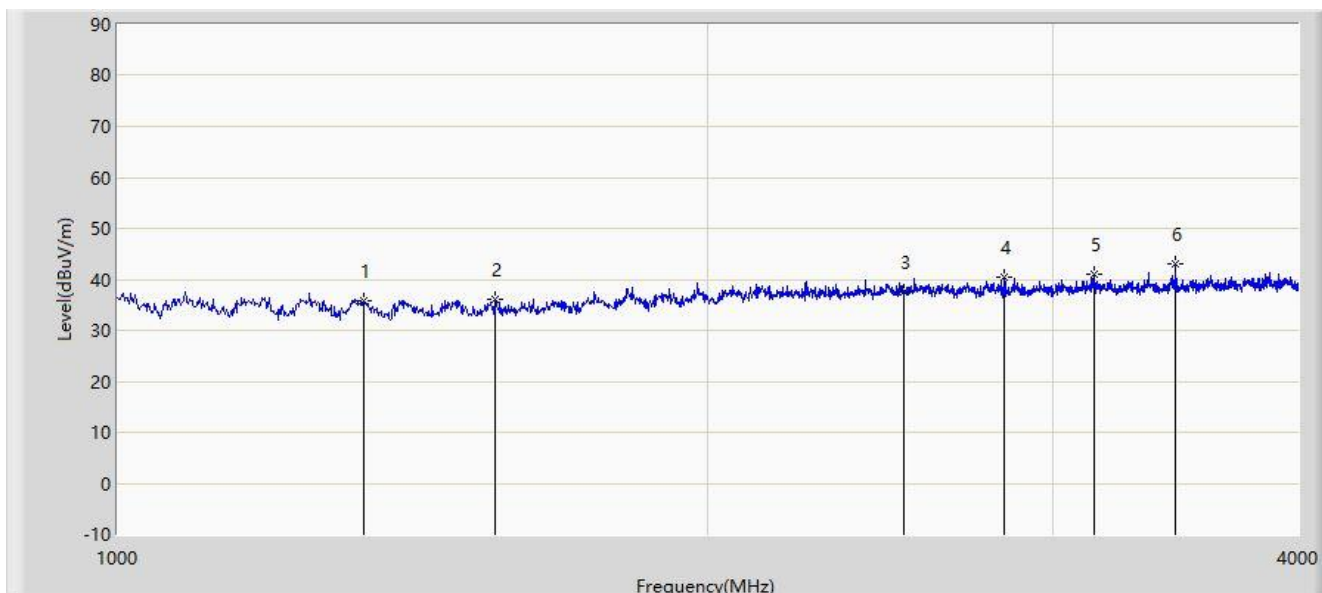
No.	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Type
1	1325.500	39.345	-1.850	37.495	74.000	-36.505	PK
2	1574.500	38.889	-1.703	37.186	74.000	-36.814	PK
3	2519.500	40.011	2.505	42.516	75.623	-33.107	PK
4	2834.500	45.587	2.364	47.951	74.000	-26.049	PK
5	3149.500	45.417	2.839	48.256	75.623	-27.367	PK
6	3464.500	47.214	3.872	51.086	75.623	-24.537	PK

Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 2: Average measurement was not performed when the peak level lower than average limit.

Site: WZ-AC2	Time: 2021/09/13
Limit: FCC_Part15.231(b)_RE(3m)	Engineer: Messiah Li
Probe: WZ_Horn 3117_1-18GHz	Polarity: Vertical
EUT: Wireless remote control module	Power: By Dry Battery
Test Mode 1	



No.	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Type
1	1334.500	37.700	-1.816	35.884	74.000	-38.116	PK
2	1559.500	37.648	-1.695	35.953	74.000	-38.047	PK
3	2519.500	34.995	2.505	37.500	75.623	-38.123	PK
4	2834.500	37.942	2.364	40.306	74.000	-33.694	PK
5	3149.500	38.089	2.839	40.928	75.623	-34.695	PK
6	3466.000	39.069	3.885	42.954	75.623	-32.669	PK

Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 2: Average measurement was not performed when the peak level lower than average limit.

5.5. 20dB Bandwidth

5.5.1. Test Limit

According to FCC Part 15.231(c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 6.9.2 (20dB Bandwidth)

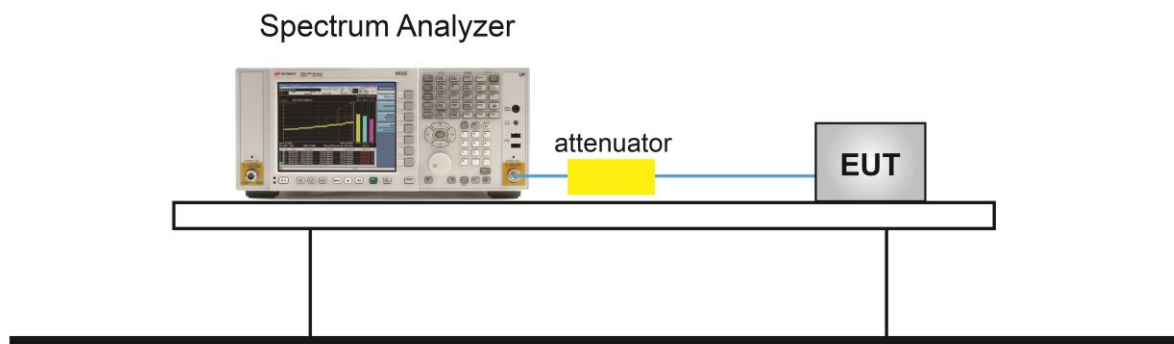
ANSI C63.10-2013 - Section 6.9.3 (99% Bandwidth)

5.5.3. Test Setting

20dB Bandwidth Measurements

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 1% to 5% of the OBW.
3. VBW = $3 * \text{RBW}$.
4. Span = 2 times to 5 times the OBW.
5. Detector = Peak.
6. Trace mode = Max hold.
7. Allow the trace to stabilize.

5.5.4. Test Setup

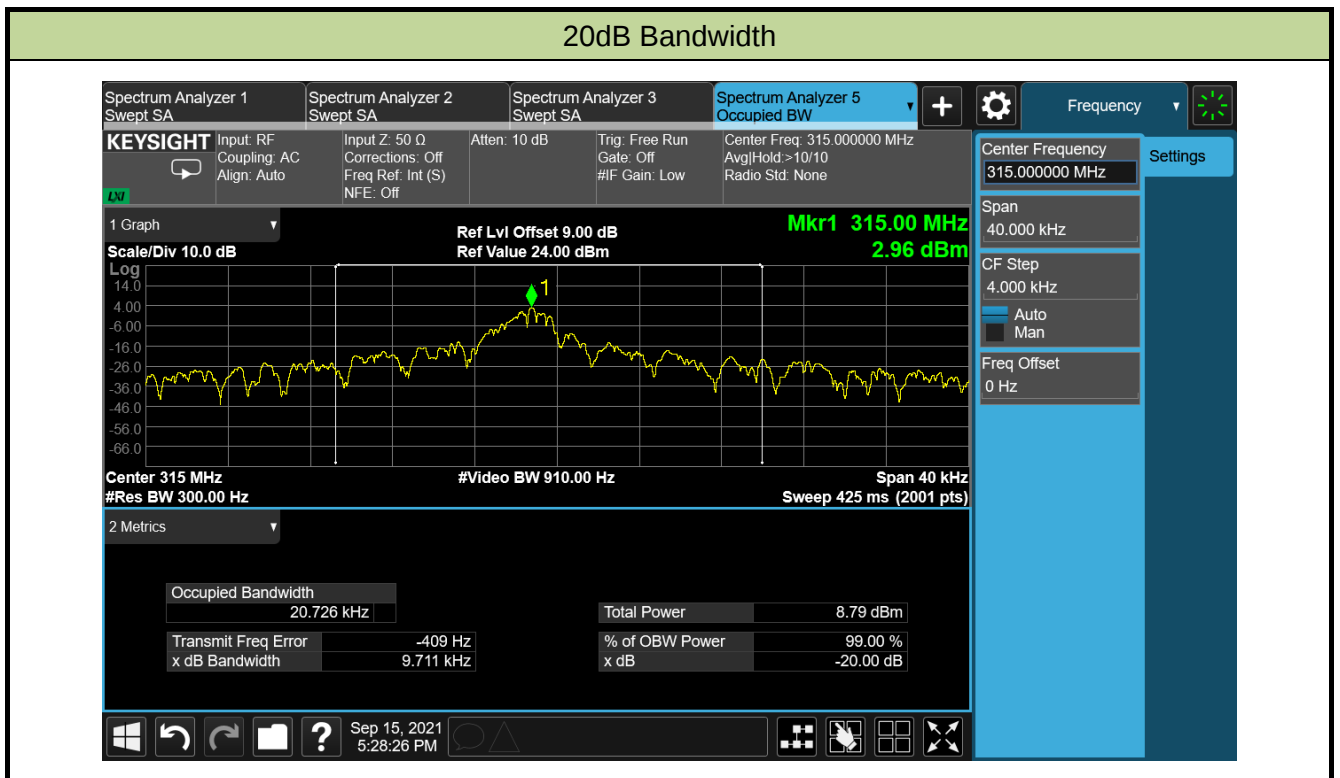


5.5.5. Test Result

Test Site	WZ-SR4	Test Engineer	Yuri Li
Test Date	2021/09/15		

20dB Bandwidth (kHz)	Limit (kHz)	Result
9.711	≤ 787.5	Pass

Note: For 315MHz: Limit = Fundamental Frequency * 0.25% = 315 MHz * 0.25% = 787.5 kHz



5.6. Release Time

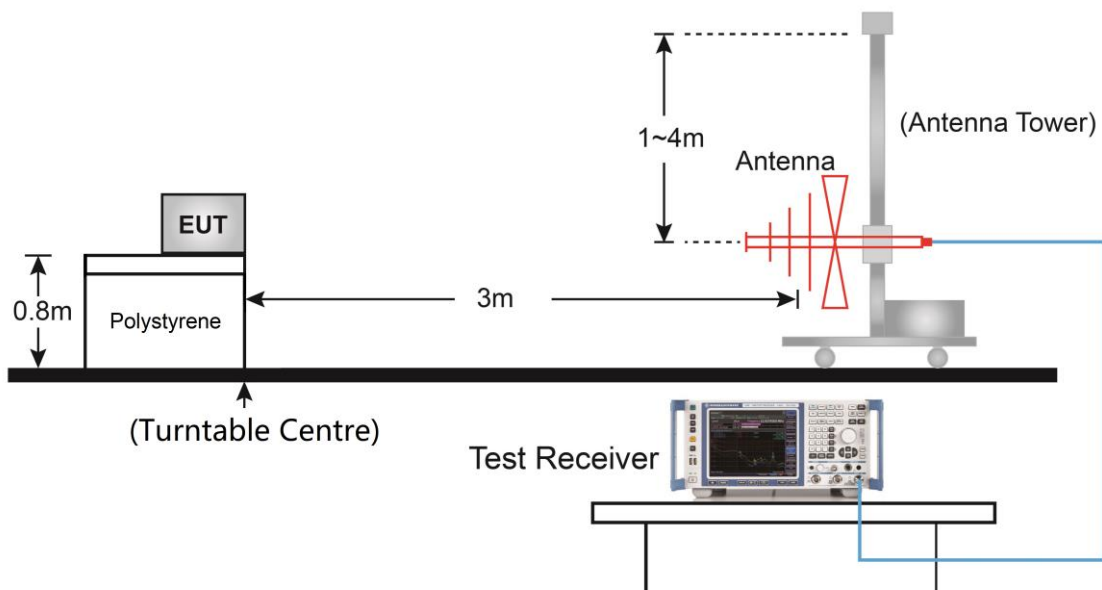
5.6.1. Test Limit

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

5.6.2. Test Procedure Used

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 315MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

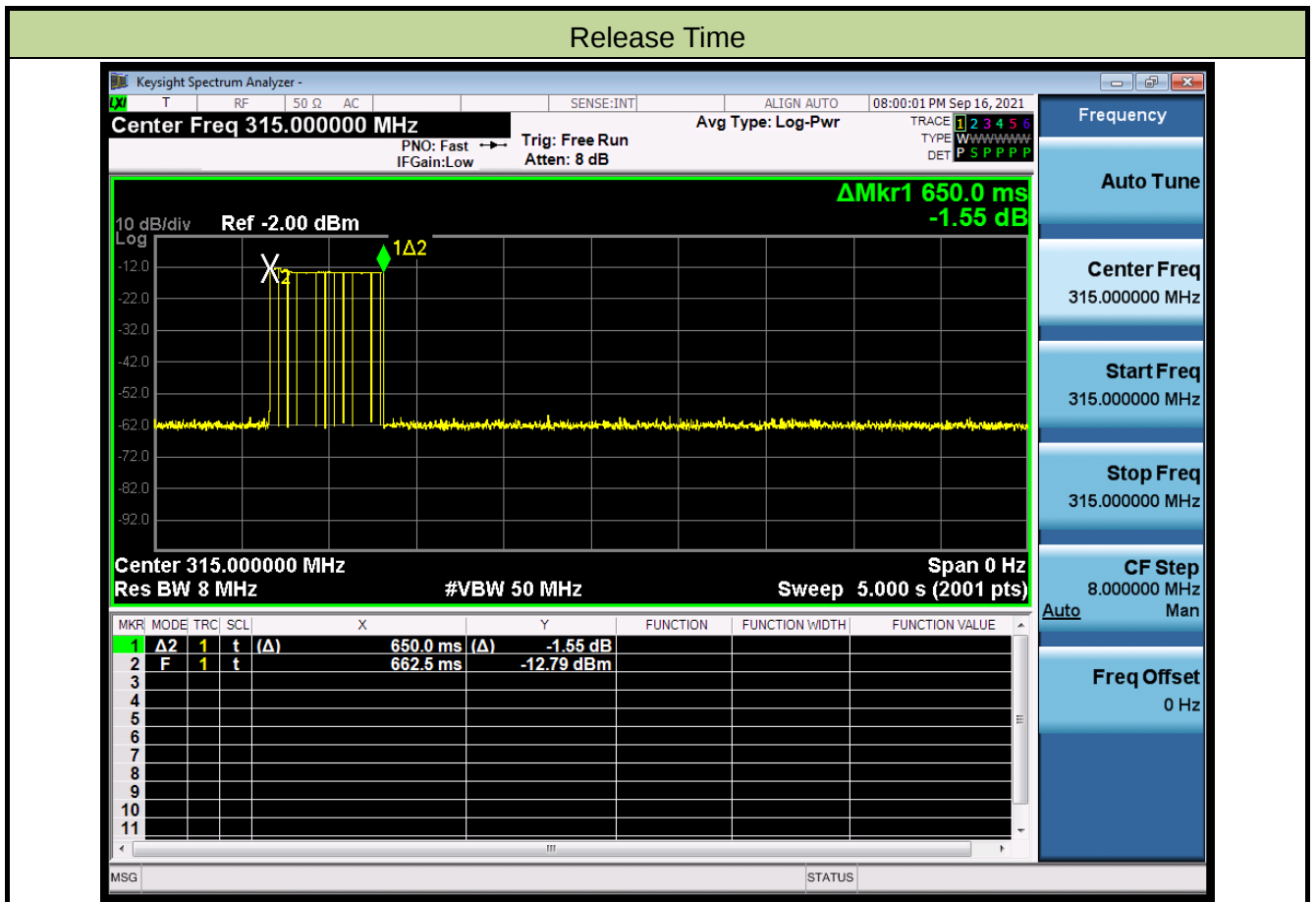
5.6.3. Test Setup



5.6.4. Test Result

Test Site	WZ-AC1	Test Engineer	Tommy Tang
Test Date	2021/09/16		

Item	Measured Value	Limit	Result
Release Time	650 ms	≤ 5 s	Pass



6. CONCLUSION

The data collected relate only the item(s) tested and show that the device is compliance with FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to “2109RSU019-UT” file.

Appendix B - EUT Photograph

Refer to “2109RSU019-UE” file.