MEASUREMENT REPORT

FCC PART 15.249

FCC ID:	2AQJT-J2RC
Application:	Actions Microelectronics Co., Ltd.
Application Type:	Certification
Product:	Remote control
Model No.:	EZC-RC-01
FCC Classification:	Part 15 low power transceiver, RX verified (DXT)
FCC Rule Part(s):	Part 15.249
Test Procedure(s):	ANSI C63.10 - 2013
Test Date:	January 23, 2019

Reviewed By: (Jame Yuan)

Approved By: (Robin Wu)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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
1901RSU036-U1	Rev. 01	Initial Report	01-28-2019	Valid

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§2.1033 General Information

Applicant:	Actions Microelectronics Co., Ltd.
Applicant Address:	201, No.9 Building, Software Park, KeJiZhong Er Road, GaoXinQu, NanShan, Shenzhen, China
Manufacturer:	ShenZhen A-unit Electronics Co., Ltd.
Manufacturer Address:	4th Floor, Building 8, Wisdom Land Business Park, Nanshan District, ShenZhen City, P.R. China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

Presented this 24th day of July 2018.

President and CEO
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

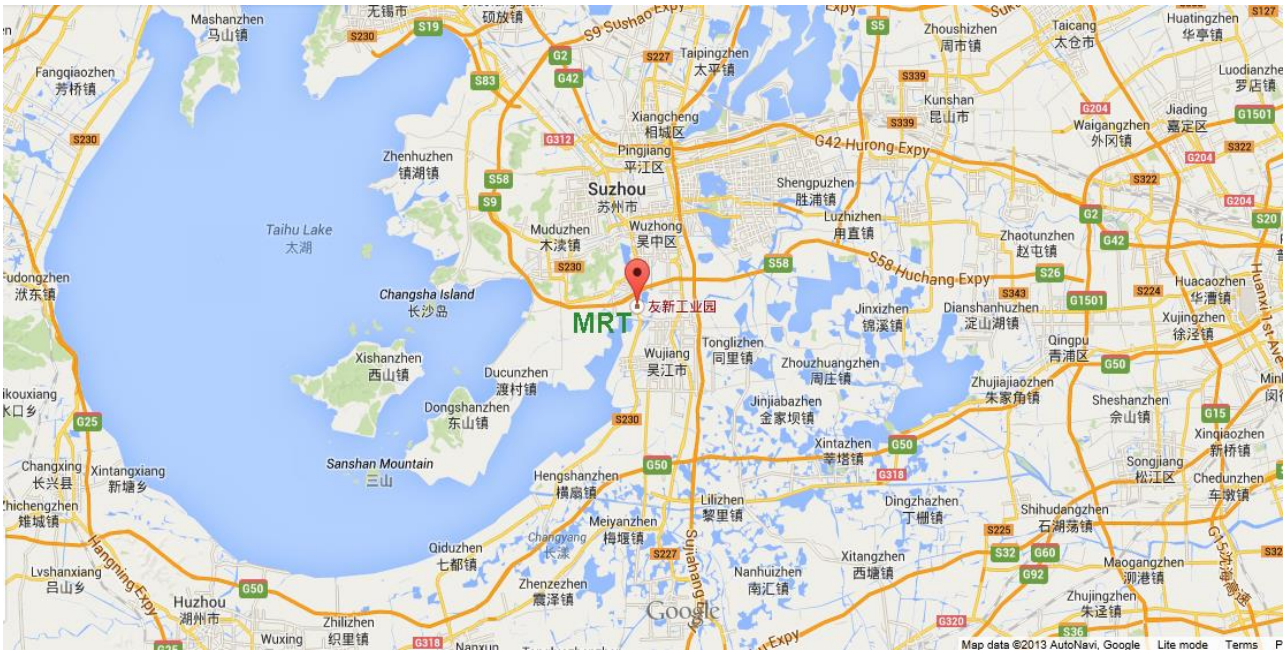
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Remote control
Model No.:	EZC-RC-01
Frequency Range:	2405 ~ 2479 MHz
Type of Modulation:	MSK
Antenna Gain:	1.5 dBi
Power Supply:	By Battery

2.2. Operation Frequency and Channel List

Channel	Frequency	Channel	Frequency
01	2405 MHz	02	2438 MHz
03	2458 MHz	04	2475 MHz
05	2479 MHz	---	---

2.3. Test Configuration

The EUT was tested as described in this report is in compliance with the requirements limits of FCC Rules Part 15.207, 15.209, 15.215 and 15.249. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.4. EMI Suppression Device(s)/Modifications

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

2.5. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the requirements provided in FCC 15.207, 15.209, 15.215 and 15.249 were performed in the report of the EUT.

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. 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 EUT is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

This unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2019/04/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2019/06/15
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2019/06/15
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2019/08/15
Shielding Room	Mikebang	Chamber-SR2	MRTSUE06215	N/A	N/A

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2019/09/05
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2019/08/14
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2019/11/09
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2019/04/12
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2019/10/20
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2019/11/16
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2019/08/15
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2019/05/02

Software	Version	Function
e3	V8.3.5	EMI Test Software

6. 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.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: ±3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: ±4.07dB 300MHz~1GHz: ±3.63dB 1GHz~18GHz: ±4.16dB Vertical: 30MHz~300MHz: ±4.18dB 300MHz~1GHz: ±3.60dB 1GHz~18GHz: ±4.76dB

7. TEST RESULT

7.1. Summary

Company Name: **Actions Microelectronics Co., Ltd.**

Product: **Remote control**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	N/A	Section 7.2
15.209 15.249	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.3 & 7.4
15.215(c)	20dB Spectrum Bandwidth	20 dB bandwidth of the emission in the specific band		Pass	Section 7.5

Notes:

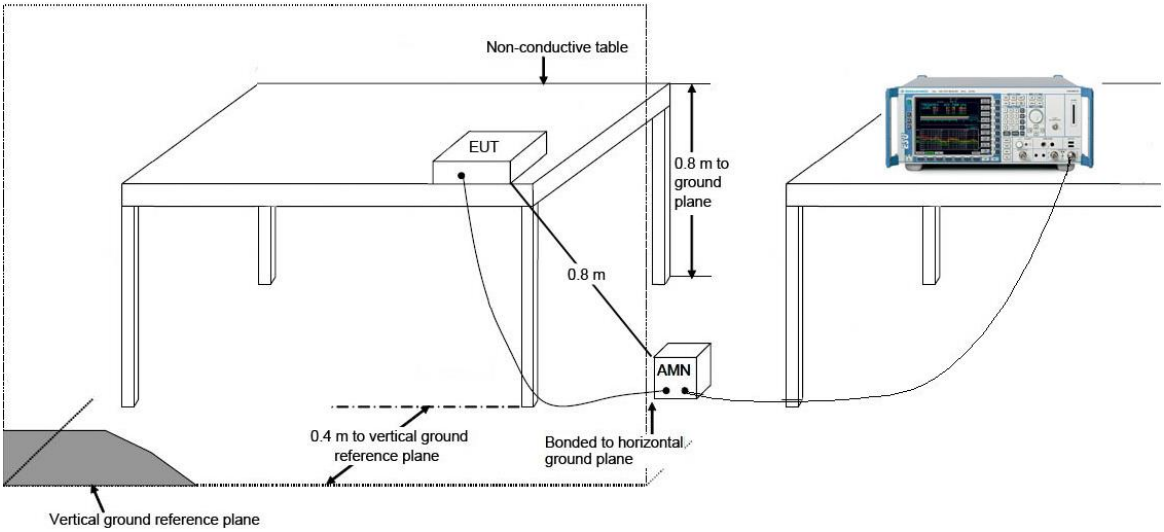
1. All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2. The analyzer plots shown in this section were all taken with an offset into the analyzer. The offset was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3. “N/A” means not applicable.

7.2. Conducted Emission

7.2.1.Test Limit

FCC 15.207 Limit		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
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.		

7.2.2.Test Setup



7.2.3.Test Result

The EUT is powered by battery, so this requirement does not apply.

7.3. Radiated Emission

7.3.1.Test Limit

FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (uV/m)
902 ~ 908	50	500
2400 ~ 2483.5	50	500
5725 ~ 5875	50	500
24000 ~ 24250	250	2500
Note: FCC Part 15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.		

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (uV/m)	Measurement 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
Note 1: The lower limit shall apply at the transition frequency. Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system. Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).		

7.3.2.Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

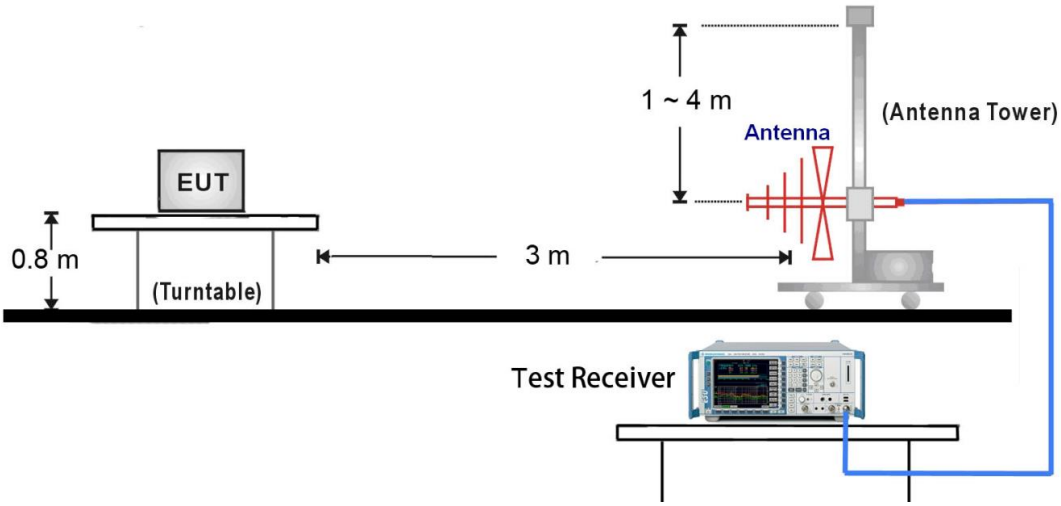
ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

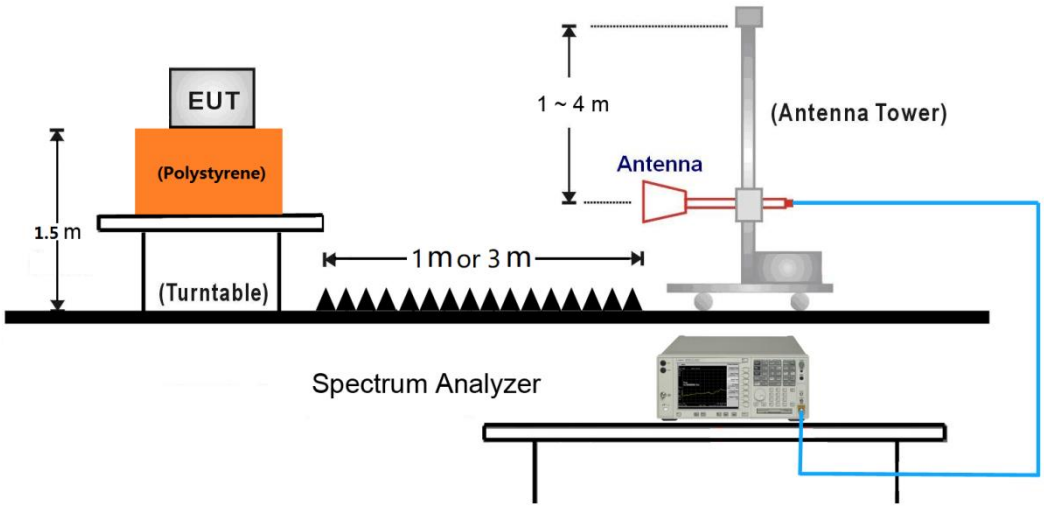
ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.3.3.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.3.4.Test Result

Product	Remote control	Temperature	25°C
Test Engineer	David Lv	Relative Humidity	58%
Test Site	AC1	Test Date	2019/01/23

Time On (ms)	One Period (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
19.8	100	19.8	-14.1

Note 1: Time On: 0.55 ms * 36 =19.8 ms.

Note 2: Duty Cycle Factor = 20*Log (Duty Cycle).

Channel 2438MHz	

Product	Remote control	Temperature	25°C
Test Engineer	David Lv	Relative Humidity	58%
Test Site	AC1	Test Date	2019/01/23
Remark	**Fundamental** Radiated Emission		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
2405	61.2	32.3	N/A	93.5	114	-20.5	PK	Horizontal
	61.2	32.3	-14.1	79.4	94	-14.6	AV	Horizontal
	48.4	32.3	N/A	80.7	114	-33.3	PK	Vertical
	48.4	32.3	-14.1	66.6	94	-27.4	AV	Vertical
2438	58.9	32.3	N/A	91.2	114	-22.8	PK	Horizontal
	58.9	32.3	-14.1	77.1	94	-16.9	AV	Horizontal
	46.2	32.3	N/A	78.5	114	-35.5	PK	Vertical
	46.2	32.3	-14.1	64.4	94	-29.6	AV	Vertical
2479	56.4	32.3	N/A	88.7	114	-25.3	PK	Horizontal
	56.4	32.3	-14.1	74.6	94	-19.4	AV	Horizontal
	42.0	32.3	N/A	74.4	114	-39.6	PK	Vertical
	42.0	32.3	-14.1	60.3	94	-33.7	AV	Vertical

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

Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)

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

Product	Remote control	Temperature	25°C
Test Engineer	David Lv	Relative Humidity	58%
Test Site	AC1	Test Date	2019/01/23
Remark	**Harmonics** Radiated Emission - 2405MHz		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
4810.0	51.7	5.9	N/A	57.5	74.0	-16.5	PK	Horizontal
4810.0	51.7	5.9	-14.1	43.4	54.0	-10.6	AV	Horizontal
7215.0	41.2	12.7	N/A	53.8	74.0 (Note 2)	-20.2	PK	Horizontal
9620.0	34.0	15.4	N/A	49.4	74.0 (Note 2)	-24.6	PK	Horizontal
12025.0	33.7	17.4	N/A	51.1	74.0 (Note 2)	-22.9	PK	Horizontal
4810.0	45.4	5.9	N/A	51.3	74.0 (Note 2)	-22.7	PK	Vertical
7215.0	44.3	12.7	N/A	57.0	74.0	-17.0	PK	Vertical
7215.0	44.3	12.7	-14.1	42.9	54.0	-11.1	AV	Vertical
9620.0	33.8	15.4	N/A	49.2	74.0 (Note 2)	-24.8	PK	Vertical
12025.0	33.5	17.4	N/A	50.9	74.0 (Note 2)	-23.1	PK	Vertical

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

Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)

Factor (dB) = 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.

Product	Remote control	Temperature	25°C
Test Engineer	David Lv	Relative Humidity	58%
Test Site	AC1	Test Date	2019/01/23
Remark	**Harmonics** Radiated Emission - 2438MHz		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
4876.0	56.3	6.0	N/A	62.2	74.0	-11.8	PK	Horizontal
4876.0	56.3	6.0	-14.1	48.1	54.0	-5.9	AV	Horizontal
7314.0	37.7	12.5	N/A	50.2	74.0 (Note 2)	-23.8	PK	Horizontal
9752.0	33.2	16.1	N/A	49.3	74.0 (Note 2)	-24.7	PK	Horizontal
12190.0	34.0	17.5	N/A	51.5	74.0 (Note 2)	-22.5	PK	Horizontal
4876.0	48.1	6.0	N/A	54.1	74.0	-19.9	PK	Vertical
4876.0	48.1	6.0	-14.1	40.0	54.0	-14.0	AV	Vertical
7314.0	41.3	12.5	N/A	53.8	74.0 (Note 2)	-20.2	PK	Vertical
9752.0	33.2	16.1	N/A	49.4	74.0 (Note 2)	-24.6	PK	Vertical
12190.0	33.8	17.5	N/A	51.2	74.0 (Note 2)	-22.8	PK	Vertical

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

Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)

Factor (dB) = 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.

Product	Remote control	Temperature	25°C
Test Engineer	David Lv	Relative Humidity	58%
Test Site	AC1	Test Date	2019/01/23
Remark	**Harmonics** Radiated Emission - 2479MHz		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
4958.0	57.3	6.1	N/A	63.4	74.0	-10.6	PK	Horizontal
4958.0	57.3	6.1	-14.1	49.3	54.0	-4.7	AV	Horizontal
7437.0	41.3	12.9	N/A	54.1	74.0	-19.9	PK	Horizontal
7437.0	41.3	12.9	-14.1	40.0	54.0	-14.0	AV	Horizontal
9916.0	33.3	16.6	N/A	49.9	74.0 (Note 2)	-24.1	PK	Horizontal
12395.0	34.0	17.2	N/A	51.2	74.0 (Note 2)	-22.8	PK	Horizontal
4958.0	49.8	6.1	N/A	55.9	74.0	-18.1	PK	Vertical
4958.0	49.8	6.1	-14.1	41.8	54.0	-12.2	AV	Vertical
7437.0	35.1	12.9	N/A	48.0	74.0 (Note 2)	-26.0	PK	Vertical
9916.0	33.8	16.6	N/A	50.4	74.0 (Note 2)	-23.6	PK	Vertical
12395.0	33.1	17.2	N/A	50.3	74.0 (Note 2)	-23.7	PK	Vertical

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

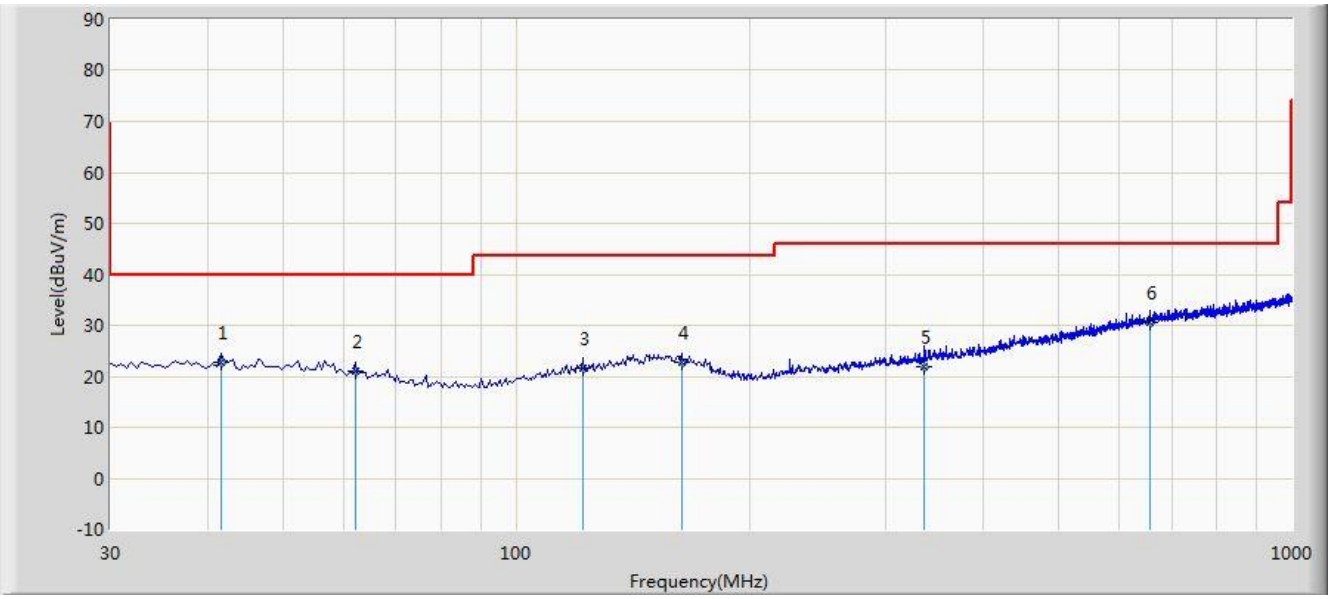
Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)

Factor (dB) = 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.

The Worst Case of Radiated Emission below 1GHz:

Site: AC1	Time: 2018/01/23 - 17:02
Limit: FCC_Part15.209_RE(3m)	Engineer: David Lv
Probe: VULB9168_20-2000MHz	Polarity: Horizontal
EUT: Remote control	Power: By Battery
Worst Case Mode: Transmit at channel 2405MHz	



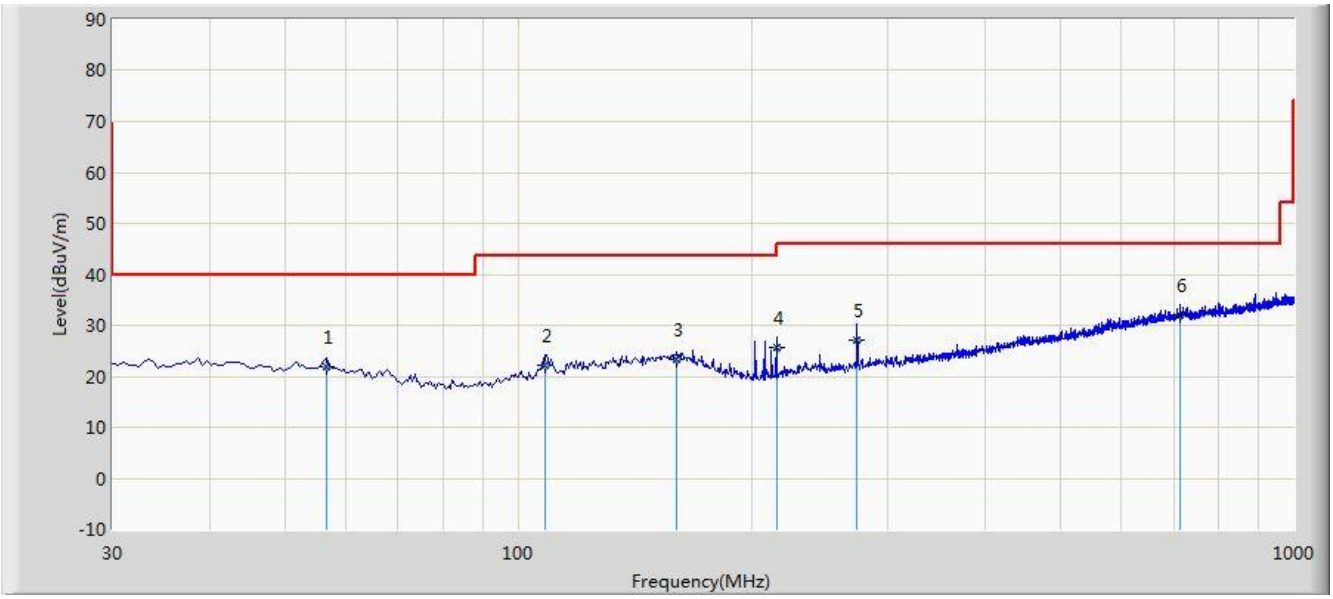
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			41.640	22.623	8.100	-17.377	40.000	14.524	QP
2			62.010	20.934	7.850	-19.066	40.000	13.084	QP
3			122.150	21.620	8.250	-21.880	43.500	13.369	QP
4			163.375	22.637	7.643	-20.863	43.500	14.994	QP
5			336.035	21.896	6.603	-24.104	46.000	15.293	QP
6		*	656.135	30.494	8.950	-15.506	46.000	21.544	QP

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

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

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC1	Time: 2018/01/23 - 17:07
Limit: FCC_Part15.209_RE(3m)	Engineer: David Lv
Probe: VULB9168_20-2000MHz	Polarity: Vertical
EUT: Remote control	Power: By Battery
Worst Case Mode: Transmit at channel 2405MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			56.675	21.884	8.180	-18.116	40.000	13.704	QP
2			108.570	22.303	10.360	-21.197	43.500	11.943	QP
3			159.980	23.269	8.000	-20.231	43.500	15.269	QP
4			215.270	25.671	13.952	-17.829	43.500	11.719	QP
5			273.470	27.227	13.520	-18.773	46.000	13.707	QP
6		*	714.820	31.908	9.600	-14.092	46.000	22.308	QP

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

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

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

7.4. Radiated Restricted Band Edge Measurement

7.4.1.Test Limit

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 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (uV/m)	Measurement 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

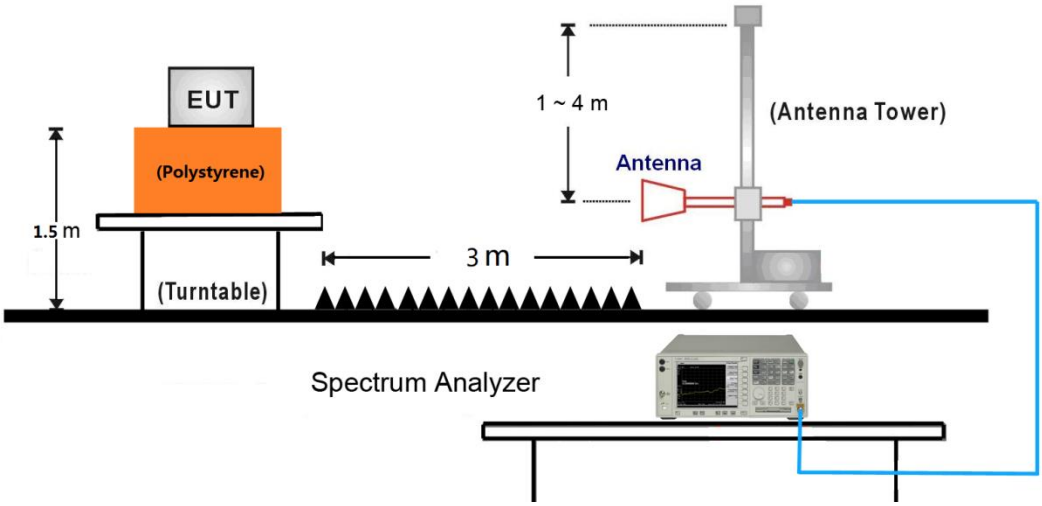
7.4.2.Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

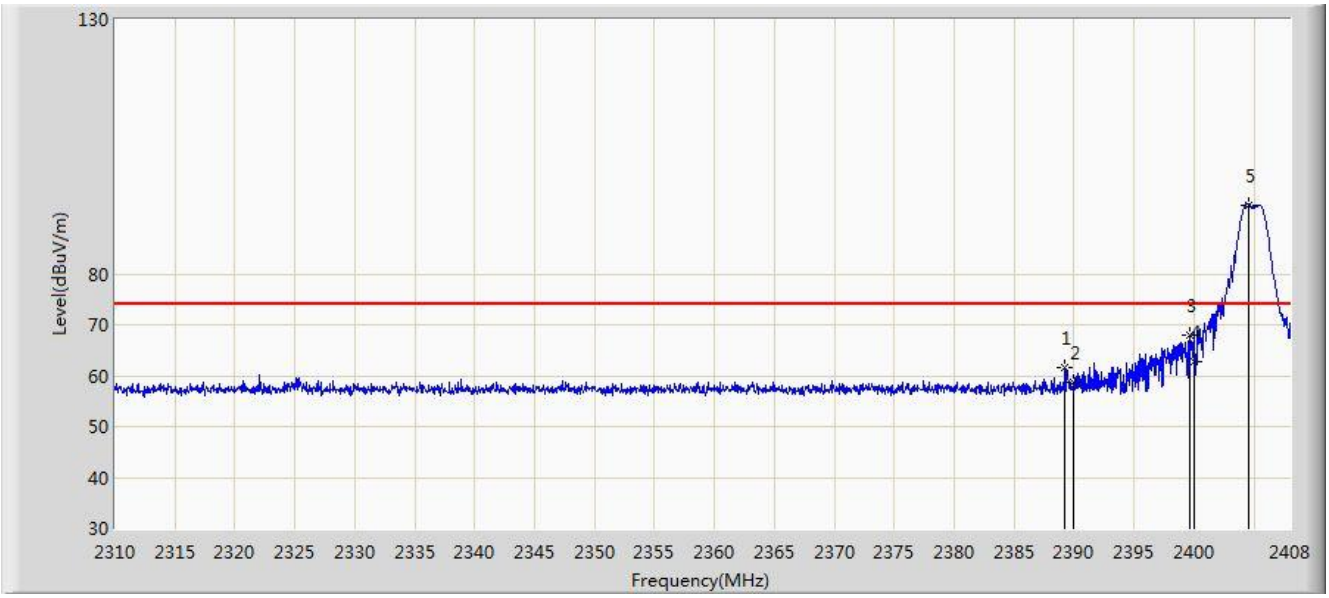
7.4.3.Test Setup

1GHz ~ 18GHz Test Setup:



7.4.4.Test Result

Site: AC1	Time: 2019/01/23 - 16:10
Limit: FCC_Part15.209_RE(3m)	Engineer: David Lv
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Remote control	Power: By Battery
Test Mode: Transmit at channel 2405MHz	

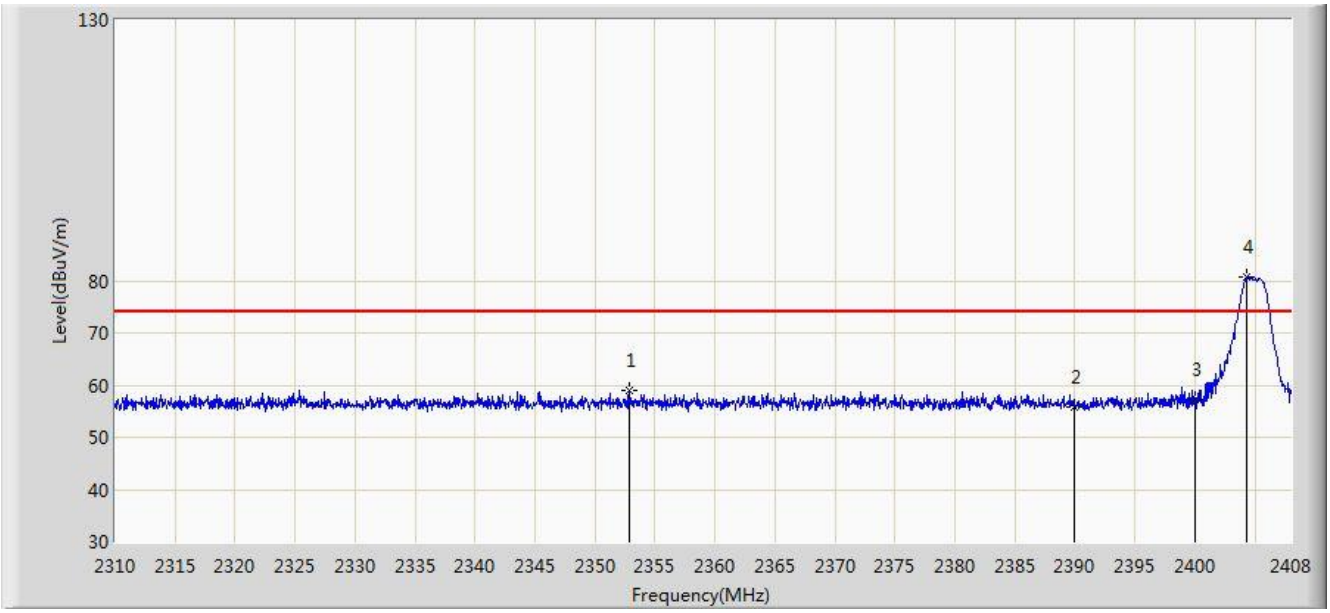


No	Flag	Mark	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1			2389.233	29.277	32.328	61.605	74.000	-12.395	PK
			2389.233	12.049	32.328	44.377	54.000	-9.623	AV
2			2390.000	26.342	32.327	58.669	74.000	-15.331	PK
			2390.000	10.363	32.327	42.690	54.000	-11.310	AV
3			2399.670	35.594	32.309	67.903	74.000	-6.097	PK
			2399.670	16.238	32.309	48.547	54.000	-5.453	AV
4			2400.000	30.589	32.309	62.898	74.000	-11.102	PK
			2400.000	16.819	32.309	49.128	54.000	-4.872	AV
5		*	2404.619	61.243	32.299	93.542	114.000	-20.458	PK

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

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

Site: AC1	Time: 2019/01/23 - 16:17
Limit: FCC_Part15.209_RE(3m)	Engineer: David Lv
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Remote control	Power: By Battery
Test Mode: Transmit at channel 2405MHz	

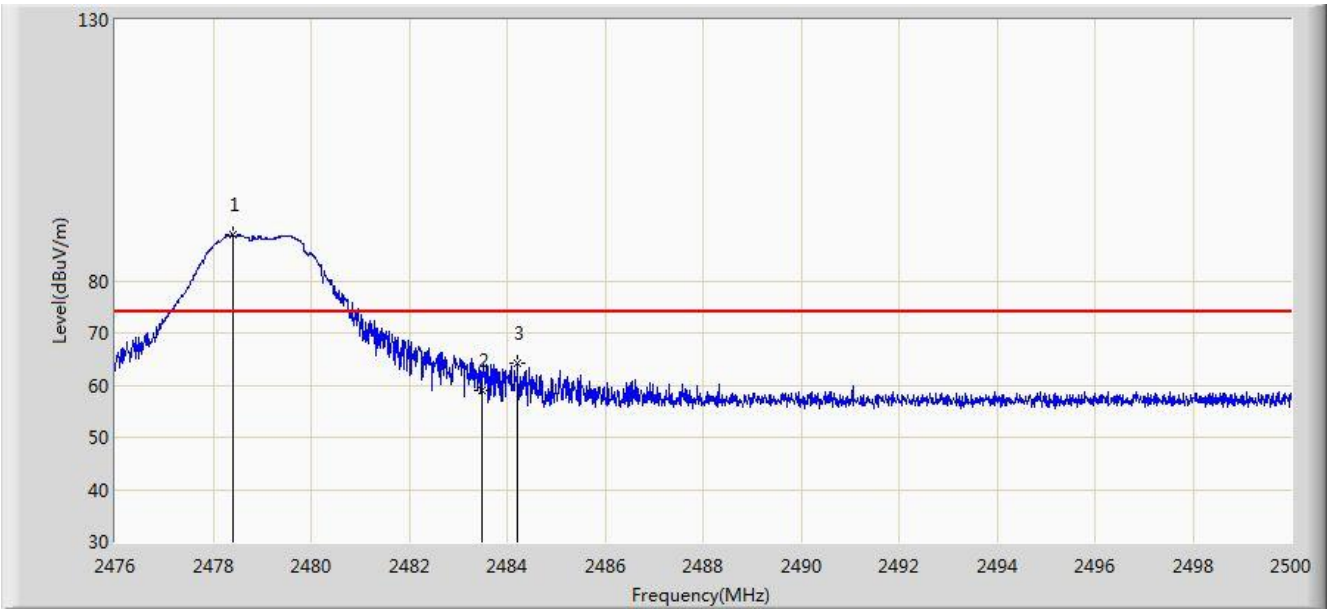


No	Flag	Mark	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1			2352.826	26.598	32.392	58.990	74.000	-15.010	PK
			2352.826	7.959	32.392	40.351	54.000	-13.649	AV
2			2390.000	10.782	32.327	43.091	74.000	-18.096	PK
			2390.000	8.332	32.327	40.659	54.000	-13.341	AV
3			2400.000	24.828	32.309	57.137	74.000	-16.863	PK
			2400.000	10.782	32.309	43.091	54.000	-10.909	AV
4		*	2404.374	48.403	32.3	80.703	114.000	-33.297	PK

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

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

Site: AC1	Time: 2019/01/23 - 16:23
Limit: FCC_Part15.209_RE(3m)	Engineer: David Lv
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Remote control	Power: By Battery
Test Mode: Transmit at channel 2479MHz	

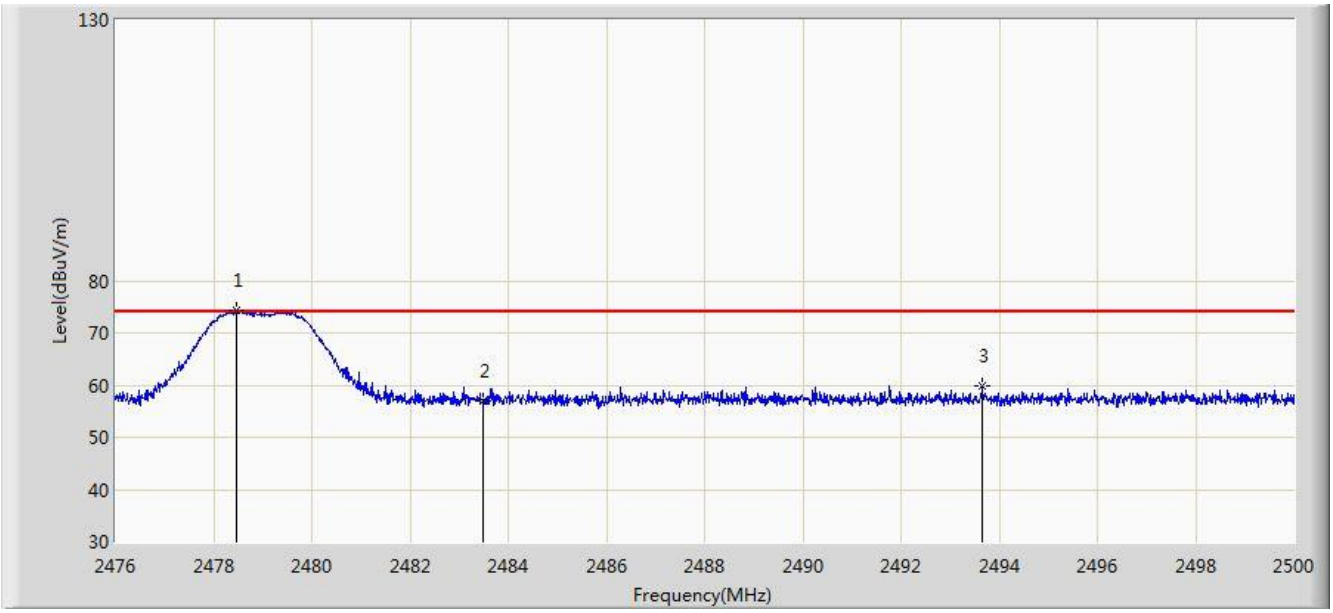


No	Flag	Mark	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1		*	2478.400	56.414	32.32	88.734	114.000	-25.266	PK
2			2483.500	26.565	32.340	58.905	74.000	-15.095	PK
			2483.500	13.855	32.340	46.195	54.000	-7.805	AV
3			2484.208	31.792	32.342	64.134	74.000	-9.866	PK
			2484.208	12.123	32.342	44.465	54.000	-9.535	AV

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

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

Site: AC1	Time: 2019/01/23 - 16:26
Limit: FCC_Part15.209_RE(3m)	Engineer: David Lv
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Remote control	Power: By Battery
Test Mode: Transmit at channel 2479MHz	



No	Flag	Mark	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1		*	2478.472	42.043	32.321	74.364	114.000	-39.636	PK
2			2483.500	24.596	32.340	56.936	74.000	-17.064	PK
			2483.500	8.820	32.340	41.160	54.000	-12.840	AV
3			2493.652	27.359	32.379	59.738	74.000	-14.262	PK
			2493.652	8.205	32.379	40.584	54.000	-13.416	AV

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

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

7.5. 20dB Spectrum Bandwidth Measurement

7.5.1.Test Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission in the specific band (2400 ~ 2483.5).

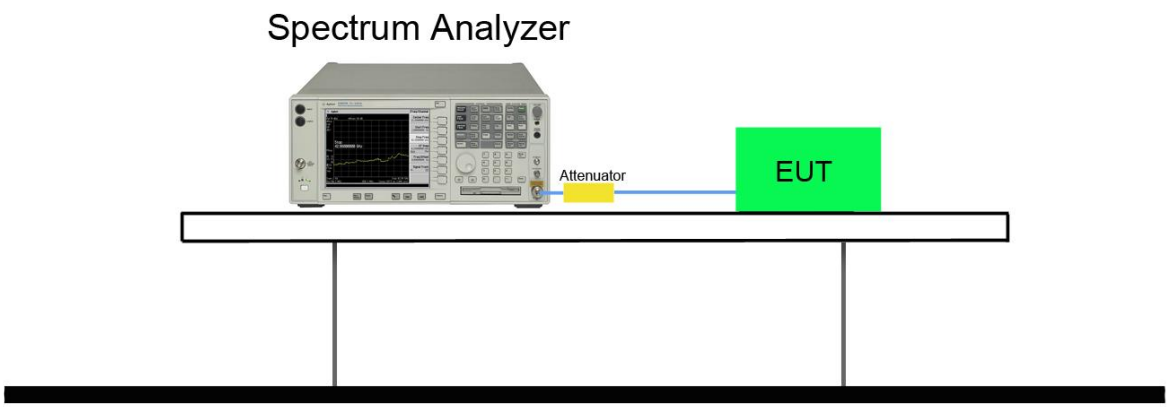
7.5.2.Test Procedure used

ANSI C63.10 Section 6.9.2

7.5.3.Test Setting

1. Set the spectrum span range to overlap the nominal center frequency
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize and marker the highest level.
8. Determine the display level (the highest level - 20dB) and place two markers, one at the lowest frequency and the other at the highest frequency.

7.5.4.Test Setup



7.5.5.Test Result

Product	Remote control	Temperature	25°C
Test Engineer	David Lv	Relative Humidity	58%
Test Site	AC1	Test Date	2019/01/23

Frequency (MHz)	Frequency Range (MHz)	Limit (MHz)	Result
2405	2403.68	> 2400	Pass
2479	2480.26	< 2483.5	Pass

20dB Spectrum Bandwidth Measurement	
2405 MHz	2479 MHz

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **Remote control** is in compliance with Part 15C of the FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to “1901RSU036-UT” file.

Appendix B - EUT Photograph

Refer to “1901RSU036-UE” file.