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MEASUREMENT REPORT

FCC PART 15.231(a)

FCC ID: 2AIX5-806CKEYLN

APPLICANT: Shenzhen D.F.S Technology Co., Ltd

Application Type: Certification

Product: Remote Controller

Model No.: 806C_key_LN

FCC Classification: FCC Part 15 Security / Remote Control Transmitter
(DSC)

FCC Rule Part(s): Part 15.231(a)

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

Test Date: June 27 ~ 30, 2016

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)



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
1605RSU01201	Rev. 01	Initial report	07-06-2016

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§2.1033 General Information

Applicant:	Shenzhen D.F.S Technology Co., Ltd
Applicant Address:	Building 3, Block2, Third Industrial Zone of Yan Chuan, Songgang Town, Bao'an District, Shenzhen, China
Manufacturer:	Shenzhen D.F.S Technology Co., Ltd
Manufacturer Address:	Building 3, Block2, Third Industrial Zone of Yan Chuan, Songgang Town, Bao'an District, Shenzhen, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.231(a)
Model No.	806C_key_LN
FCC ID:	2AIX5-806CKEYLN
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	FCC Part 15 Security/Remote Control Transmitter(DSC)

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. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- 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-4179, G-814, C-4664, T-2206) 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 and Radio testing for FCC, Industry Canada, EU and TELEC Rules.



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 detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Remote Controller
Model No.	806C_key_LN
Frequency Range	315 MHz
Type of modulation	ASK
Antenna Type	Dipole Antenna
Antenna Gain	0dBi
Device Category	Alarm Systems

2.2. Test Standards

The following report is prepared on behalf of the **Shenzhen D.F.S Technology Co., Ltd** in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

2.3. Test Methodology

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013).

Deviation from measurement procedure.....None

2.4. EUT Setup and Test Mode

The EUT was operated at continuous transmitting with a duration less than 5s mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode	Description	Remark
Mode 1	Transmitting	With modulation

3. 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 **Remote Controller** is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The Remote Controller **FCC ID: 2AIX5-806CKEYLN** unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATA

Radiated Disturbance - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2016/12/14
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2016/11/07
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2017/03/29
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2016/12/20

20dB Bandwidth - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9038A	MRTSUE06125	1 year	2016/08/02
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2016/12/20

Release Time - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9038A	MRTSUE06125	1 year	2016/08/02
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2016/12/20

Duty Cycle - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9038A	MRTSUE06125	1 year	2016/08/02
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2016/12/20

Software	Version	Function
e3	V8.3.5	EMI Test Software

5. 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 - AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 18GHz: 4.76dB

6. TEST RESULT

6.1. Summary

Company Name: Shenzhen D.F.S Technology Co., Ltd

FCC ID: 2AIX5-806CKEYLN

FCC Part Section(s)	Test Description	Test Condition	Test Result
15.205 15.231(b)	Radiated Spurious Emissions	Radiated	Pass
15.231(c)	20dB Bandwidth		Pass
15.231(a)(1)	Release Time		Pass
15.231(b)	Duty Cycle		Pass

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) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table 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) The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

6.2. Radiated Emissions

6.2.1. Standard Applicable

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

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

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.

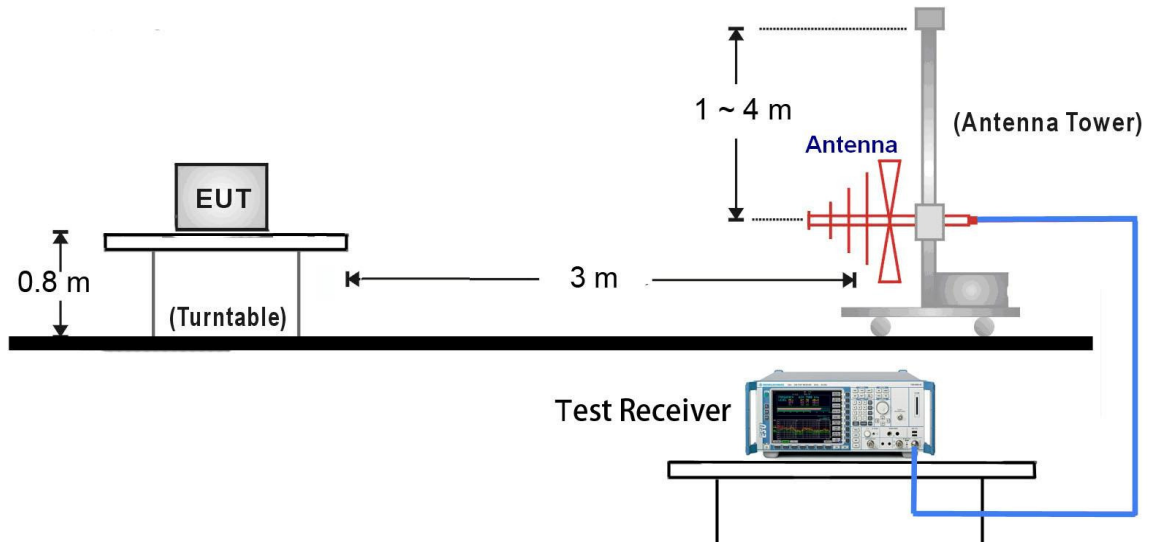
6.2.2. Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit.

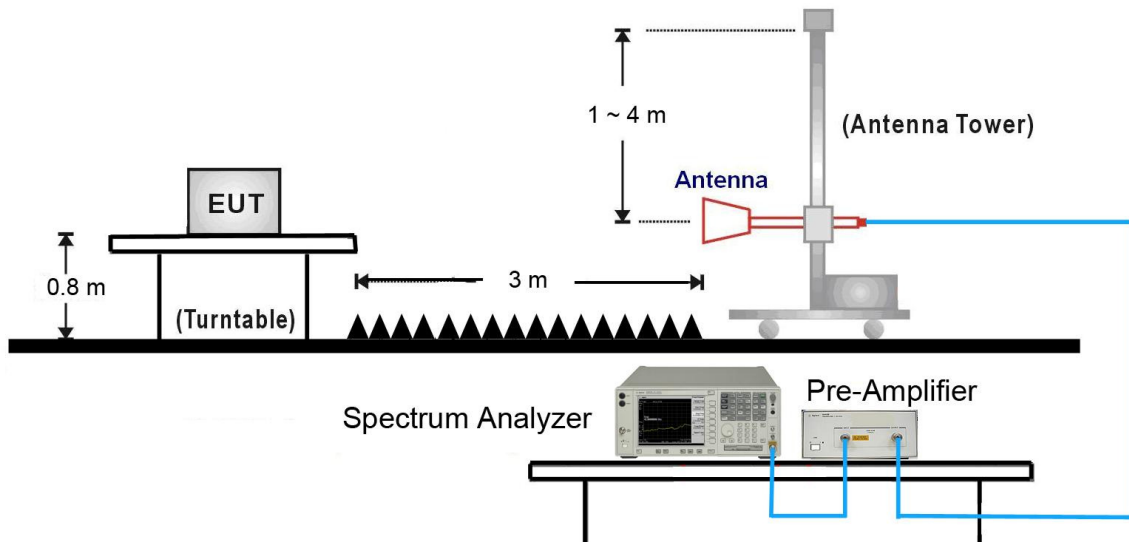
6.2.3. Test Setup

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit.

30MHz ~ 1GHz Test Setup:

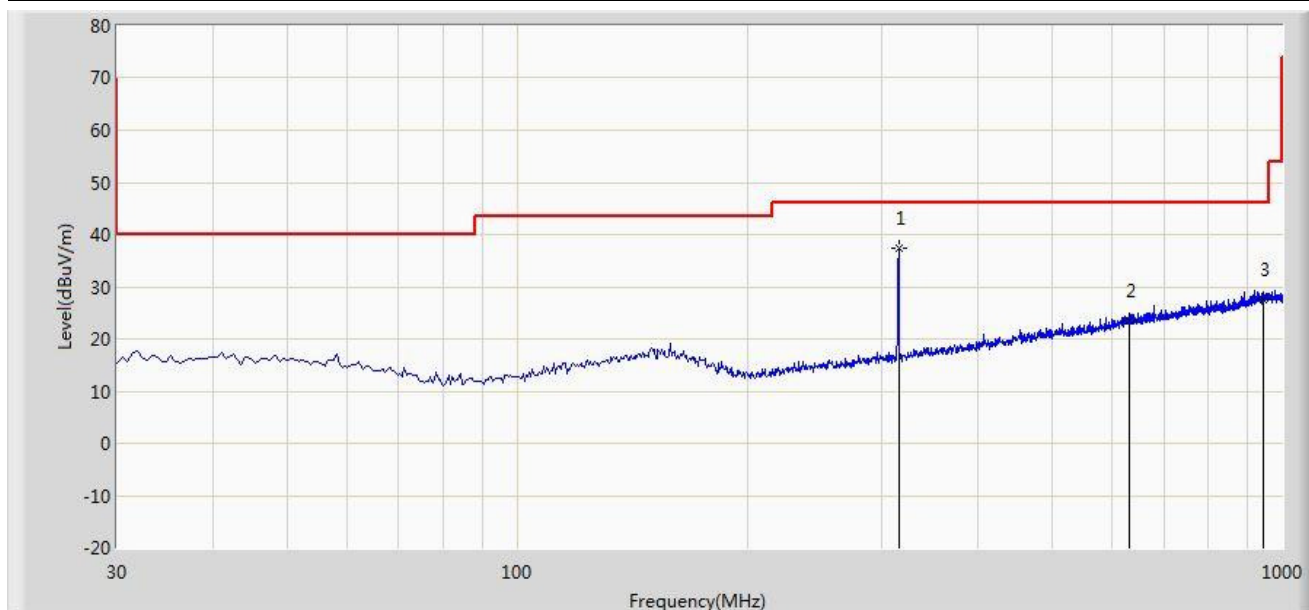


1GHz ~ 18GHz Test Setup:



6.2.4. Test Results

Site: AC1	Time: 2016/06/29 - 17:17
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: Remote Controller	Power: DC 3V
Note: Transmit	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	315.180	22.741	14.718	N/A	37.459	95.62	-58.161	100	123	PK
	315.180	22.741	14.718	-7.351	30.108	75.62	-45.512	100	123	AV
2	630.000	2.397	21.096	N/A	23.493	75.62	-52.127	100	36	PK
	630.000	2.397	21.096	-7.351	16.142	55.62	-39.478	100	36	AV
3	945.000	2.567	24.875	N/A	27.442	75.62	-48.178	100	74	PK
	945.000	2.567	24.875	-7.351	20.091	55.62	-35.529	100	74	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.

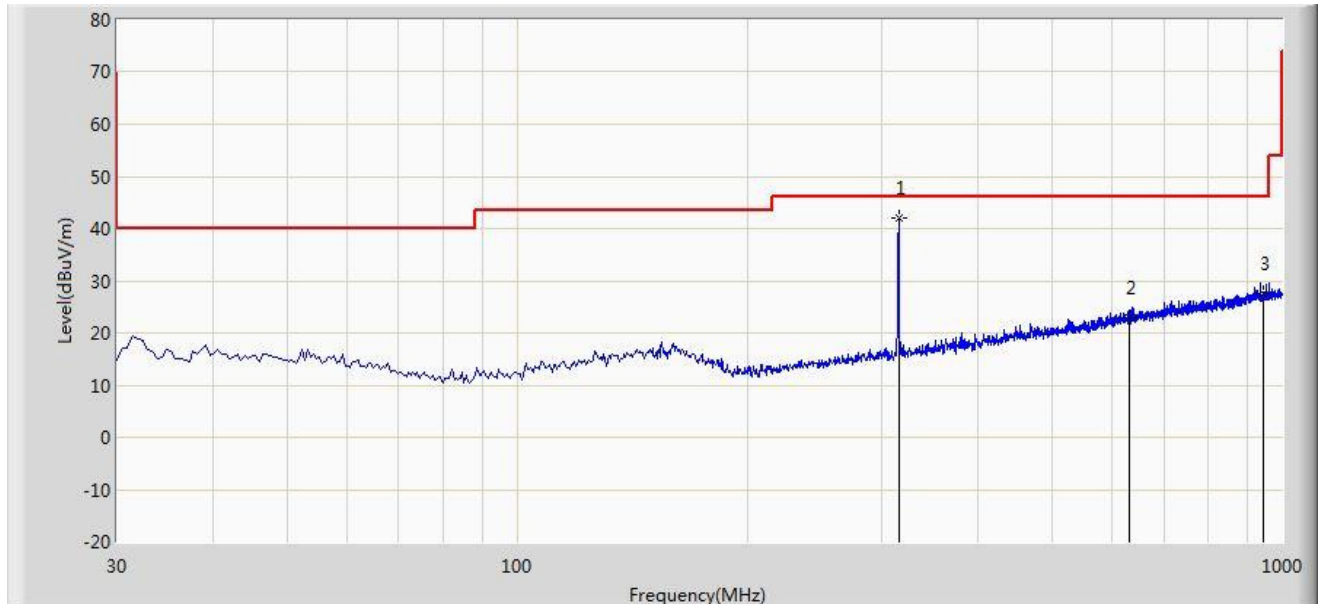
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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

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

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

Site: AC1	Time: 2016/06/29 - 17:28
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: Remote Controller	Power: DC 3V
Note: Transmit	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	315.180	27.191	14.718	N/A	41.909	95.62	-53.711	100	192	PK
	315.180	27.191	14.718	-7.351	34.558	75.62	-41.062	100	192	AV
2	630.000	1.721	21.096	N/A	22.817	75.62	-52.803	100	34	PK
	630.000	1.721	21.096	-7.351	15.466	55.62	-40.154	100	34	AV
3	945.000	2.694	24.875	N/A	27.569	75.62	-48.051	100	107	PK
	945.000	2.694	24.875	-7.351	20.218	55.62	-35.402	100	107	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.

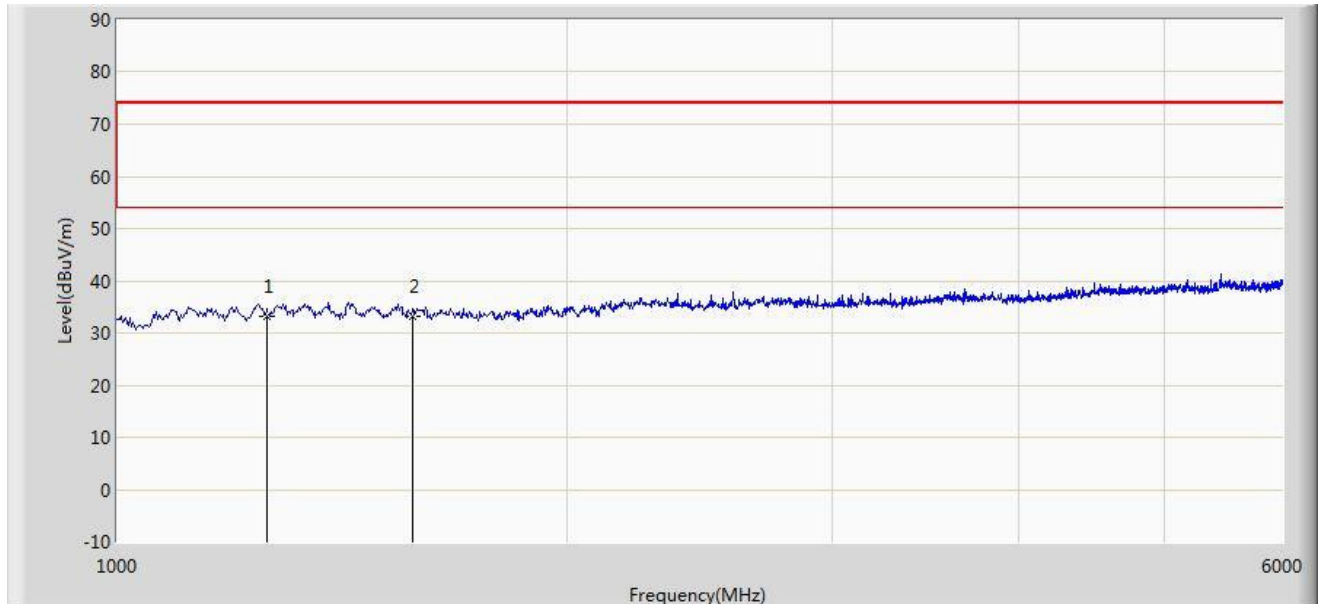
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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

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

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

Site: AC1	Time: 2016/06/28 - 16:33
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Remote Controller	Power: DC 3V
Note: Transmit	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	1260.000	41.767	-8.460	N/A	33.307	75.62	-42.313	100	231	PK
	1260.000	41.767	-8.460	-7.351	25.956	55.62	-29.664	100	231	AV
2	1575.000	40.934	-7.683	N/A	33.250	74.00	-40.750	100	26	PK
	1575.000	40.934	-7.683	-7.351	25.899	54.00	-28.101	100	26	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.

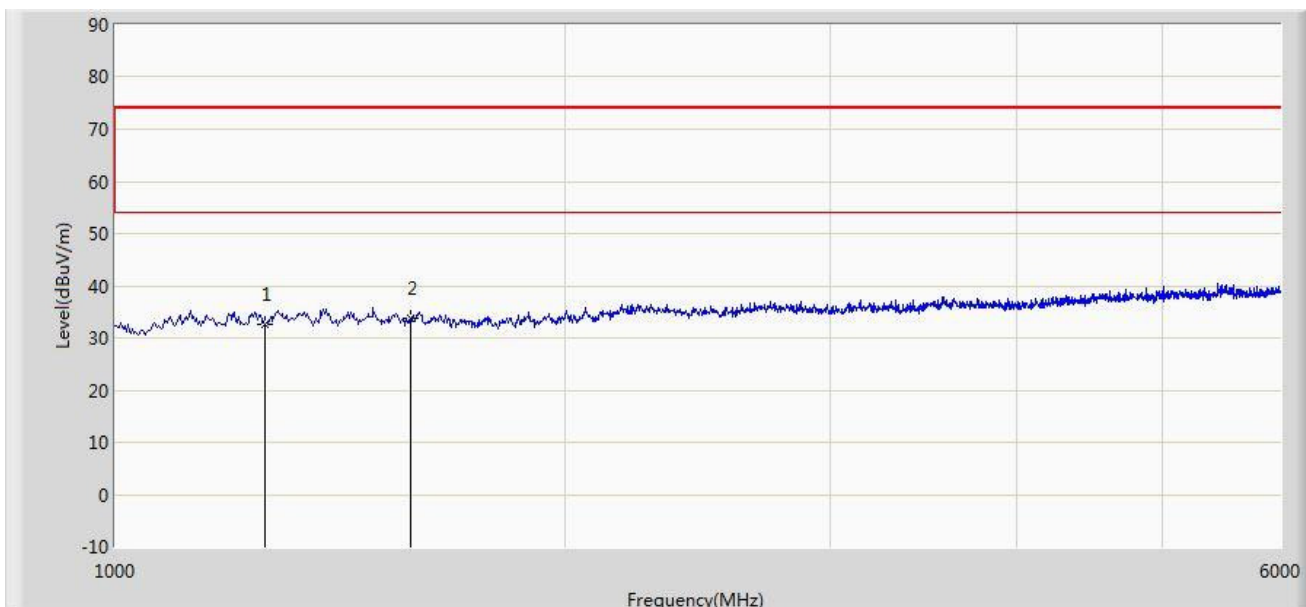
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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

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

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

Site: AC1	Time: 2016/06/28 - 16:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Remote Controller	Power: DC 3V
Note: Transmit	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	1260.000	41.061	-8.460	N/A	32.601	75.62	-43.019	100	341	PK
	1260.000	41.061	-8.460	-7.351	25.250	55.62	-30.370	100	341	AV
2	1575.000	41.384	-7.683	N/A	33.700	74.00	-40.300	100	217	PK
	1575.000	41.384	-7.683	-7.351	26.349	54.00	-27.651	100	217	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 (dBuV/m) = Reading Level (dBuV) + Factor (dB).

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

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

6.3. 20dB Bandwidth

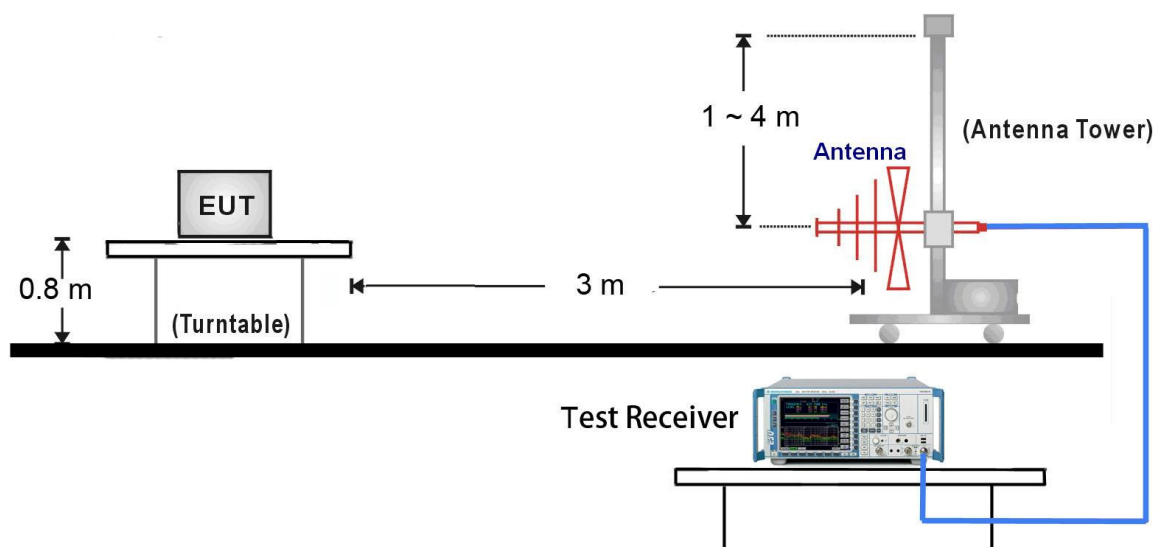
6.3.1. Standard Applicable

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.

6.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

6.3.3. Test Setup

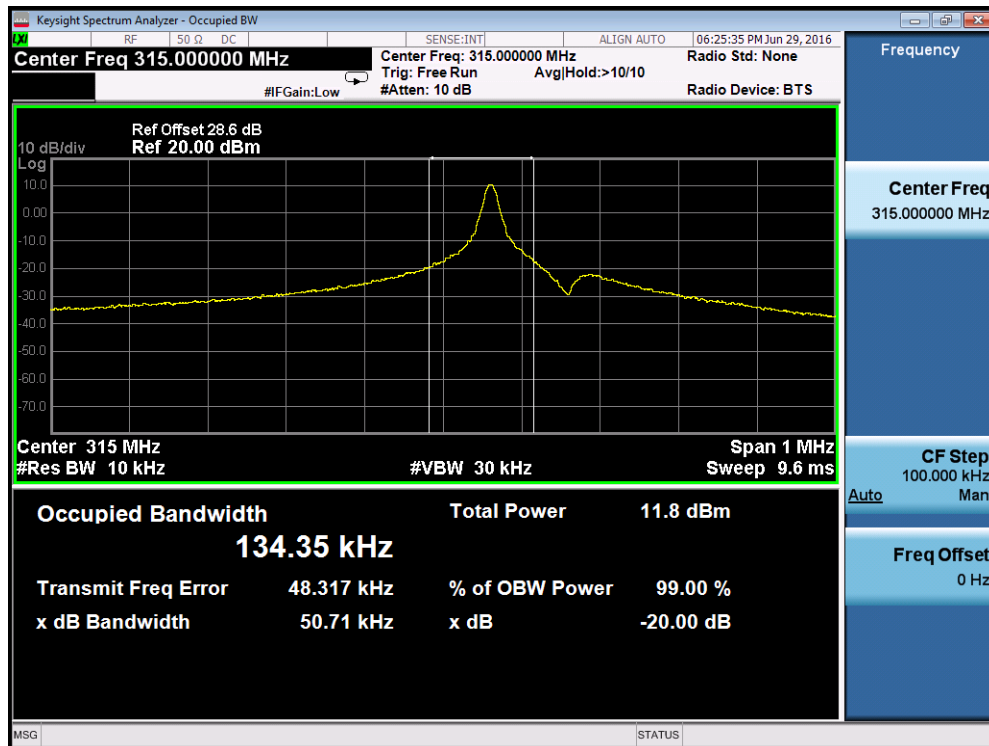


6.3.4. Test Result

Test Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Result
315	50.71	≤ 787.50	Pass

Limit = Fundamental Frequency * 0.25% = 315 MHz * 0.25% = 787.50 kHz

20dB Bandwidth Test Plot



6.4. Release Time

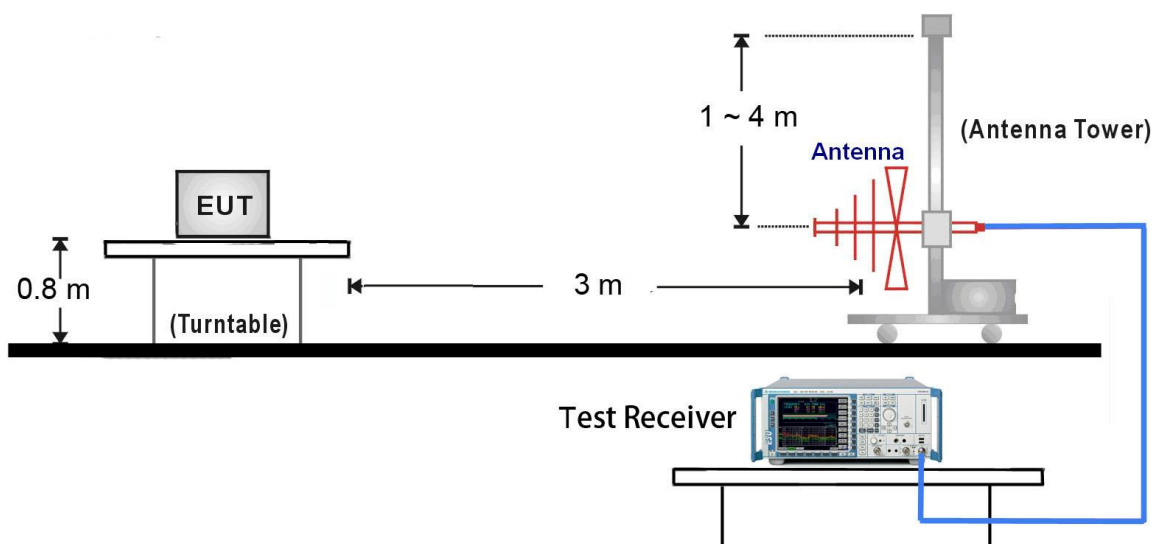
6.4.1. Standard Applicable

According to FCC 15.231(a), (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6.4.2. Test Procedure

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.

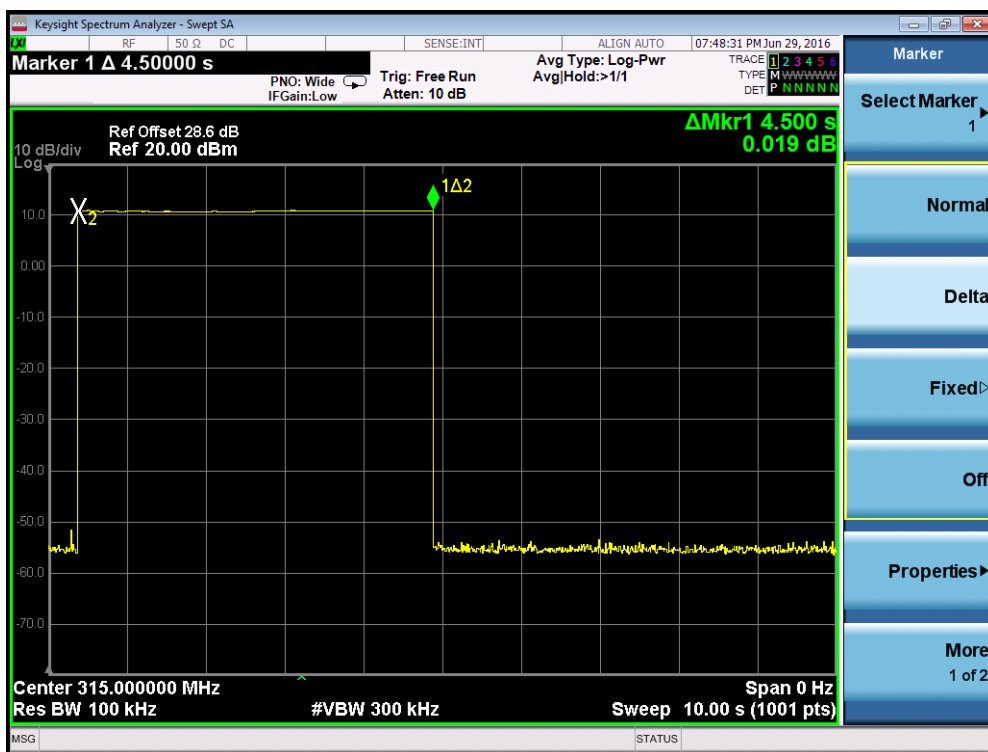
6.4.3. Test Setup



6.4.4. Test Result

Item	Measured Value	Limit	Result
Release Time	4.500 s	≤ 5 s	Pass

Release Time



6.5. Duty Cycle

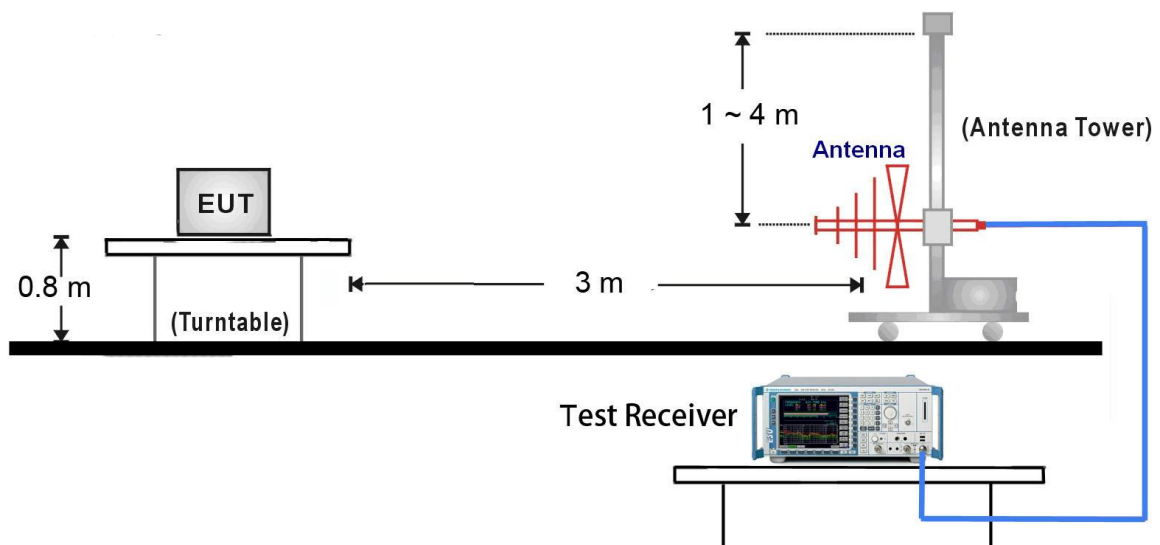
6.5.1. Standard Applicable

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

6.5.2. Test Procedure

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.

6.5.3. Test Setup



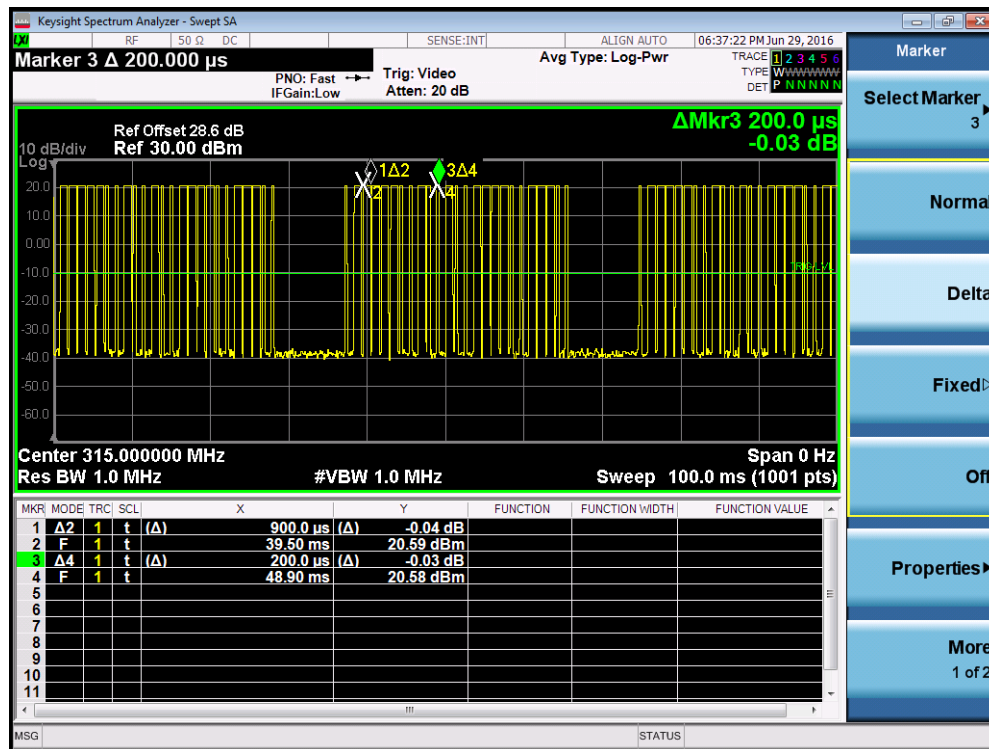
6.5.4. Test Result

Total Time (Ton) (ms)	The duration of one cycle (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
42.900	100	42.900	-7.351

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

Total Time (T_{on})(ms)= $0.900 \cdot 41 + 0.200 \cdot 30 = 42.900$ (ms)

Width of Pulse



7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Remote Controller FCC ID: 2AIX5-806CKEYLN** is in compliance with FCC Part 15.231(a) of the FCC Rules.

The End