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Report No.: 1411RSU01701
Report Version: V02
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MEASUREMENT REPORT

FCC PART 15.231(a)

FCC ID: 2ADMDCTK200

APPLICANT: ZISA Corporation Limited

Application Type: Certification

Product: Keypad Transmitter

Model No.: CTK200

Brand Name: ZISA

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

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

Test Procedure(s): ANSI C63.10-2009

Test Date: Nov. 15 ~ 23, 2014

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 C63.10-2009. 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
1411RSU01701	Rev. 01	Initial report	11-24-2014
1411RSU01701	Rev. 02	Modify the spurious emission limit	11-26-2014

CONTENTS

Description	Page
1. INTRODUCTION	6
1.1. Scope	6
1.2. MRT Test Location	6
2. PRODUCT INFORMATION	7
2.1. Equipment Description.....	7
2.2. Description of Support Units	7
2.3. Test Standards	8
2.4. Test Methodology	8
2.5. EUT Setup and Test Mode	8
3. ANTENNA REQUIREMENTS.....	9
4. TEST EQUIPMENT CALIBRATION DATA	10
5. MEASUREMENT UNCERTAINTY	11
6. TEST RESULT	12
6.1. Summary	12
6.2. AC Conducted Emissions Measurement.....	13
6.2.1. Test Limit	13
6.2.2. Test Setup.....	13
6.2.3. Test Result.....	14
6.3. Radiated Emissions	16
6.3.1. Standard Applicable	16
6.3.2. Test Procedure.....	16
6.3.3. Test Setup.....	17
6.3.4. Test Results	18
6.4. 20dB Bandwidth	20
6.4.1. Standard Applicable	20
6.4.2. Test Procedure.....	20
6.4.3. Test Setup.....	20
6.4.4. Test Result.....	21
6.5. Transmission Time.....	22
6.5.1. Standard Applicable	22
6.5.2. Test Procedure.....	22
6.5.3. Test Setup.....	22
6.5.4. Test Result.....	23
6.6. Duty Cycle	24

6.6.1.	Standard Applicable	24
6.6.2.	Test Procedure.....	24
6.6.3.	Test Setup.....	24
6.6.4.	Test Result.....	25
7.	CONCLUSION.....	27

§2.1033 General Information

Applicant:	ZISA Corporation Limited
Applicant Address:	606, Building F, Kaixuancheng, No.170, Beiyuan Rd., Chaoyang District, Beijing, China
Manufacturer:	ZISA Corporation Limited
Manufacturer Address:	605, Building F, Kaixuancheng, No.170, Beiyuan Rd., Chaoyang District, Beijing, 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.	CTK200
FCC ID:	2ADMDCTK200
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	FCC Part 15 Security/Remote Control Transmitter(DSC)
Date(s) of Test:	Nov. 15 ~ 23, 2014
Test Report S/N:	1411RSU01701

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	Keypad Transmitter
Model No.	CTK200
Brand Name	ZISA
Frequency Range	315.0 MHz
Type of modulation	ASK
Antenna Type	Dipole Antenna
Device Category	Fixed Device

2.2. Description of Support Units

The EUT has been tested with associated equipment below:

Description	Manufacturer	Model No.
Adapter	Supply by MRT	PV-1201200

2.3. Test Standards

The following report is prepared on behalf of the ZISA Corporation Limited in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions 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 Commissions 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.

2.4. Test Methodology

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009).

Deviation from measurement procedure.....None

2.5. EUT Setup and Test Mode

The EUT was operated at continuous transmitting 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 List		
Test Mode	Description	Remark
Mode 1	Transmitting	With modulation

Special Cable List and Details			
Cable Description	Length (m)	Shielded / Unshielded	With / Without Ferrite
N/A	N/A	N/A	N/A

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
N/A	N/A	N/A	N/A

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

Conclusion:

The **Keypad Transmitter FCC ID: 2ADMDCTK200** unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATA

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	101683	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	101684	1 year	2015/11/07
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2015/11/14

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Preamplifier	MRT	AP01G18	1310002	1 year	2015/10/06
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2015/11/08
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

20dB Bandwidth

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

Transmission Time

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

Duty Cycle

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

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
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 9kHz ~ 1GHz: $\pm 4.18\text{dB}$ 1GHz ~ 18GHz: $\pm 4.76\text{dB}$

6. TEST RESULT

6.1. Summary

Company Name: ZISA Corporation Limited

FCC ID: 2ADMDCTK200

FCC Part Section(s)	Test Description	Test Condition	Test Result
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass
15.205 15.209 15.231(b)	Radiated Spurious Emissions	Radiated	Pass
15.231(c)	20dB Bandwidth		Pass
15.231(a)	Transmission Time		Pass
15.231(a)	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) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

6.2. AC Conducted Emissions Measurement

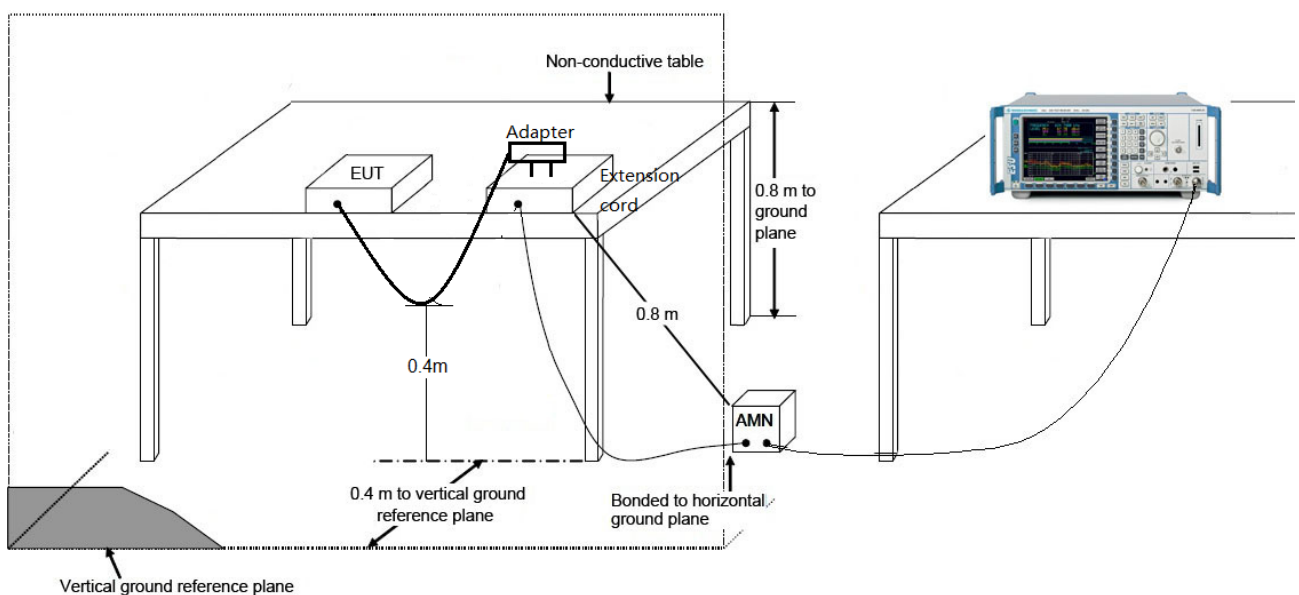
6.2.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
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.

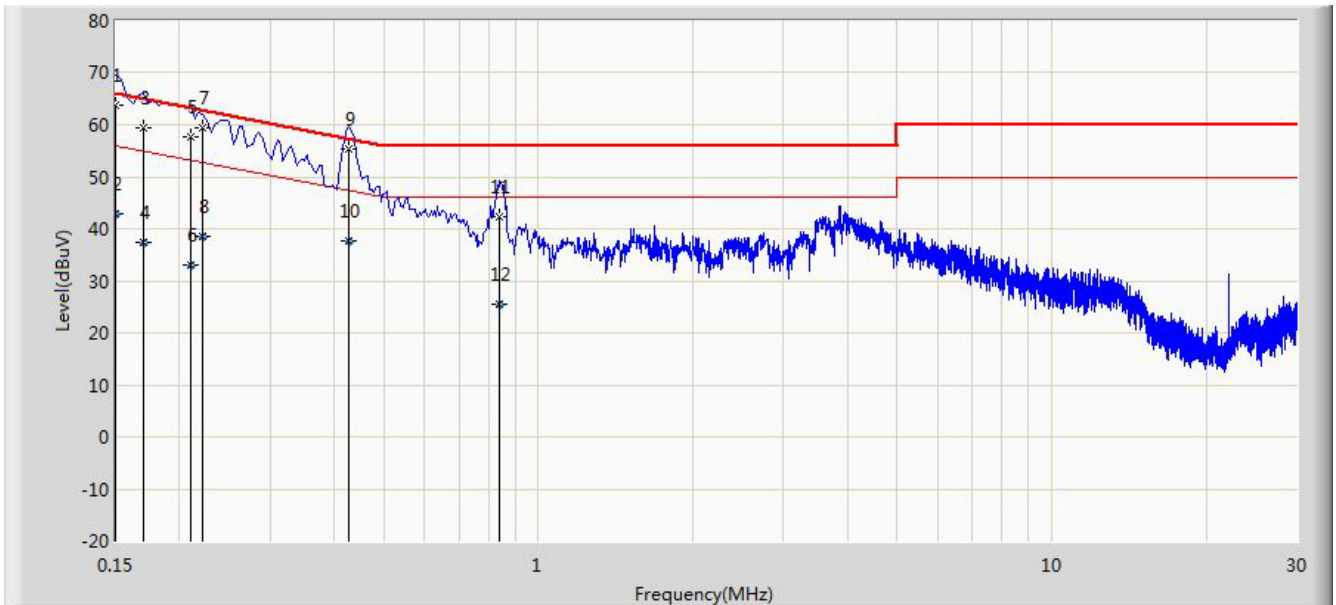
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result

Site: SR2	Time: 2014/11/24 - 10:05
Limit: FCC_Part15.207_CE_AC Power	Engineer: Milo Li
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Keypad Transmitter	Power: AC 120V/60Hz
Note: Mode 1: Transmit	

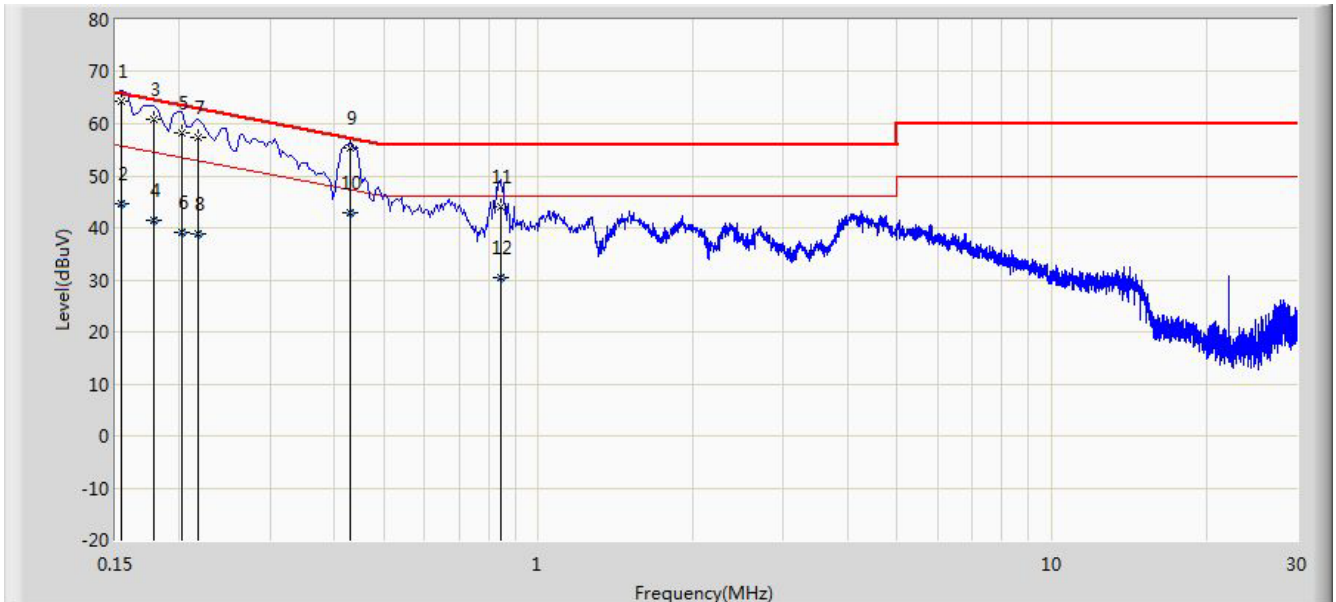


No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.150	63.698	52.529	-2.302	66.000	11.168	QP
2		0.150	42.783	31.615	-13.217	56.000	11.168	AV
3		0.170	59.386	49.309	-5.574	64.960	10.078	QP
4		0.170	37.420	27.343	-17.540	54.960	10.078	AV
5		0.210	57.703	47.735	-5.502	63.205	9.969	QP
6		0.210	33.018	23.049	-20.187	53.205	9.969	AV
7		0.222	59.315	49.374	-3.429	62.744	9.941	QP
8		0.222	38.520	28.579	-14.224	52.744	9.941	AV
9	*	0.426	55.317	45.210	-2.013	57.330	10.107	QP
10		0.426	37.603	27.497	-9.727	47.330	10.107	AV
11		0.838	42.300	32.308	-13.700	56.000	9.992	QP
12		0.838	25.563	15.571	-20.437	46.000	9.992	AV

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

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Site: SR2	Time: 2014/11/24 - 10:10
Limit: FCC_Part15.207_CE_AC Power	Engineer: Milo Li
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Keypad Transmitter	Power: AC 120V/60Hz
Note: Mode 1: Transmit	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1	*	0.154	64.418	53.702	-1.364	65.781	10.716	QP
2		0.154	44.633	33.917	-11.148	55.781	10.716	AV
3		0.178	60.859	50.810	-3.719	64.578	10.049	QP
4		0.178	41.509	31.460	-13.069	54.578	10.049	AV
5		0.202	58.396	48.388	-5.132	63.528	10.008	QP
6		0.202	39.253	29.245	-14.275	53.528	10.008	AV
7		0.218	57.531	47.550	-5.364	62.895	9.981	QP
8		0.218	38.939	28.958	-13.956	52.895	9.981	AV
9		0.430	55.441	45.306	-1.811	57.253	10.135	QP
10		0.430	42.965	32.830	-4.288	47.253	10.135	AV
11		0.846	44.113	34.119	-11.887	56.000	9.994	QP
12		0.846	30.346	20.352	-15.654	46.000	9.994	AV

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

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

6.3. Radiated Emissions

6.3.1. 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.

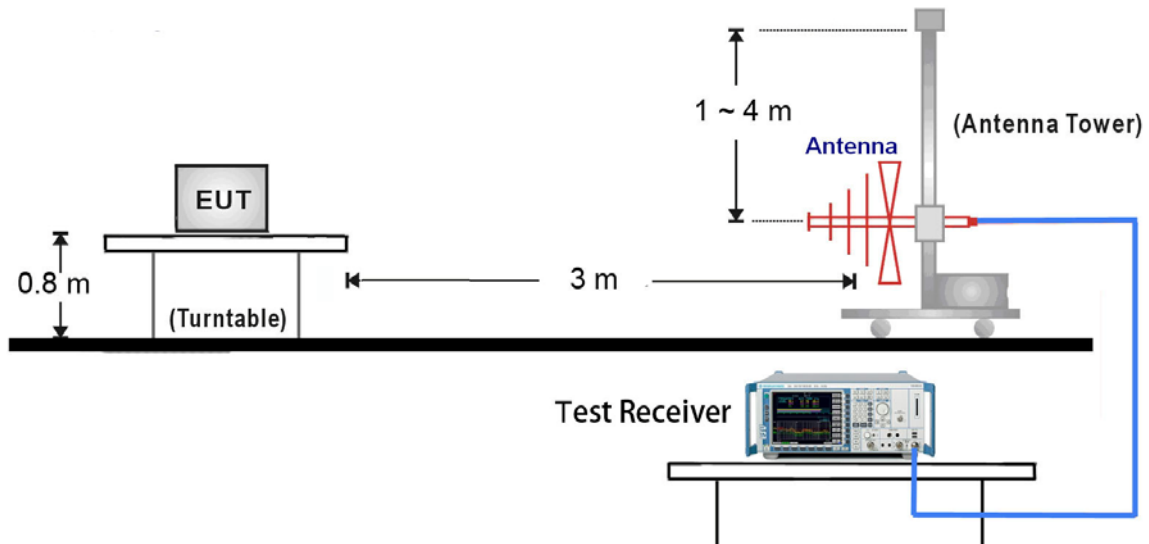
6.3.2. Test Procedure

The setup of EUT is according with per ANSI C63.10-2009 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit.

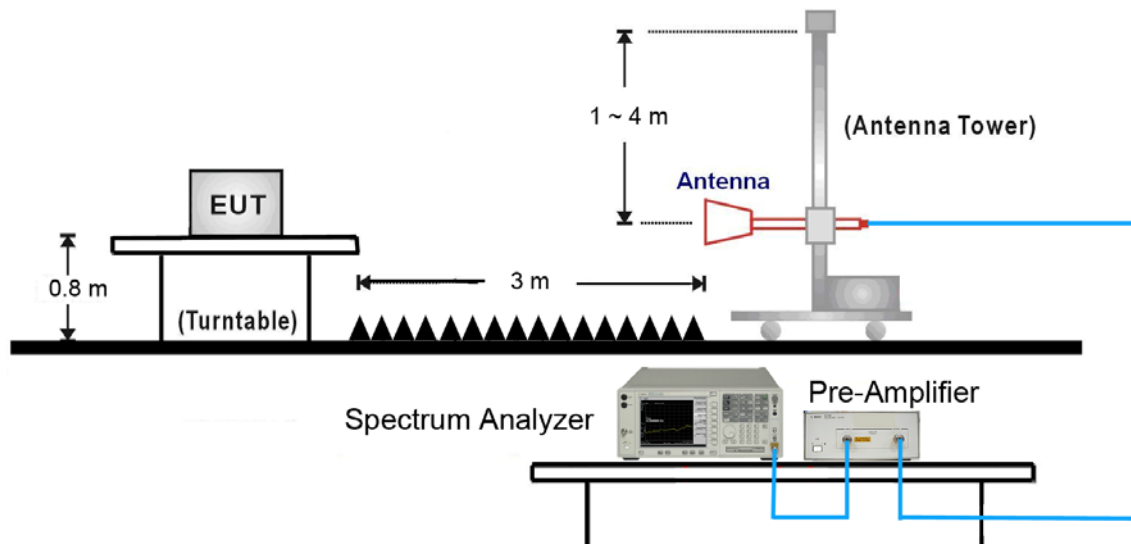
6.3.3. Test Setup

The setup of EUT is according with per ANSI C63.10-2009 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit.

30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



6.3.4. Test Results

Product:	Keypad Transmitter	Test Site:	AC1
Test Channel:	315MHz	Test Engineer:	Milo Li

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Fundamental Radiated Emission							
315.2	59.8	14.5	74.3	95.6	-21.3	PK	Horizontal
315.2	59.8	14.5	64.0	75.6	-11.6	AV	Horizontal
315.1	59.6	14.5	74.1	95.6	-21.5	PK	Vertical
315.1	59.6	14.5	63.8	75.6	-11.8	AV	Vertical
Harmonic Radiated Emission							
629.9	33.2	19.8	53.0	75.6	-22.6	PK	Horizontal
629.9	33.2	19.8	42.7	55.6	-12.9	AV	Horizontal
945.1	29.2	23.6	52.8	75.6	-22.8	PK	Horizontal
945.1	29.2	23.6	42.5	55.6	-13.1	AV	Horizontal
1249.0	47.6	-1.9	45.7	75.6	-29.9	PK	Horizontal
1249.0	47.6	-1.9	35.4	55.6	-20.2	AV	Horizontal
1575.3	38.9	-1.1	37.8	74.0	-36.2	PK	Horizontal
1575.3	38.9	-1.1	27.5	54.0	-26.5	AV	Horizontal
1890.0	38.3	0.6	38.9	75.6	-36.7	PK	Horizontal
1890.0	38.3	0.6	28.6	55.6	-27.0	AV	Horizontal
630.0	34.2	19.8	54.0	75.6	-21.6	PK	Vertical
630.0	34.2	19.8	43.7	55.6	-11.9	AV	Vertical
945.1	28.4	23.6	52.0	75.6	-23.6	PK	Vertical
945.1	28.4	23.6	41.7	55.6	-13.9	AV	Vertical
1260.1	46.0	-1.8	44.2	75.6	-31.4	PK	Vertical
1260.1	46.0	-1.8	33.9	55.6	-21.7	AV	Vertical
1575.2	36.7	-1.1	35.6	74.0	-38.4	PK	Vertical
1575.2	36.7	-1.1	25.3	54.0	-28.7	AV	Vertical
1890.0	37.7	0.6	38.3	75.6	-37.3	PK	Vertical
1890.0	37.7	0.6	28.0	55.6	-27.6	AV	Vertical

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 (dB μ V/m) = Reading Level (dB μ V) + Factor (dB).

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

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

Duty Cycle factor = $20 \cdot \log(\text{Duty Cycle}) = 20 \cdot \log(0.3058) = -10.29\text{dB}$

6.4. 20dB Bandwidth

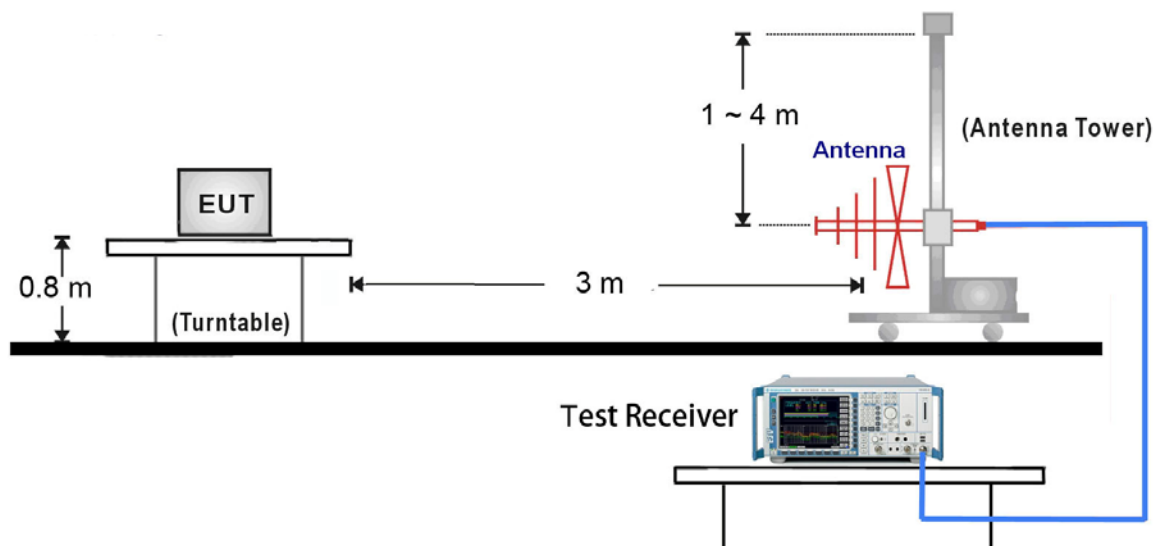
6.4.1. Standard Applicable

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.

6.4.2. 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.

6.4.3. Test Setup

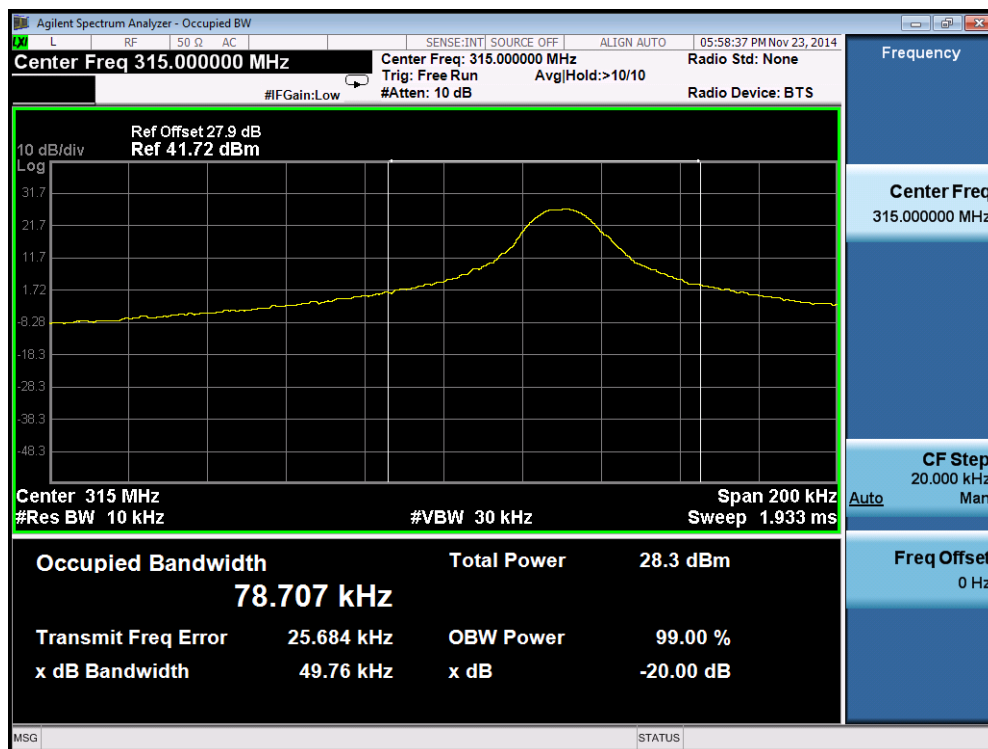


6.4.4. Test Result

Test Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Result
315.0	49.76	≤ 78.75	Pass

Limit = Fundamental Frequency X 0.25% = 315.0MHz X 0.25% = 78.75 kHz

20dB Bandwidth Test Plot



6.5. Transmission Time

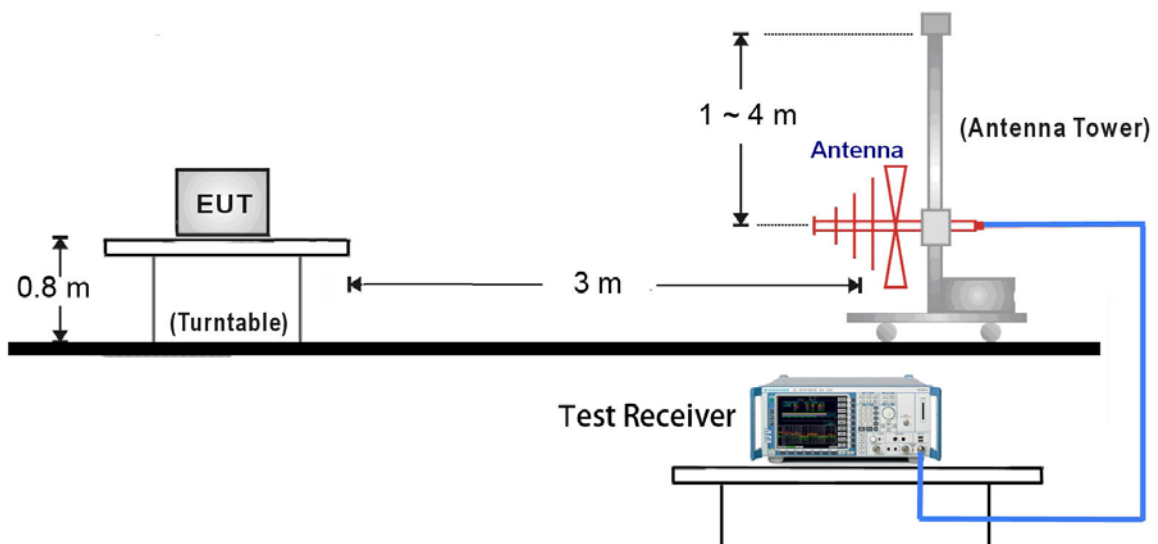
6.5.1. Standard Applicable

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.

6.5.2. 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.

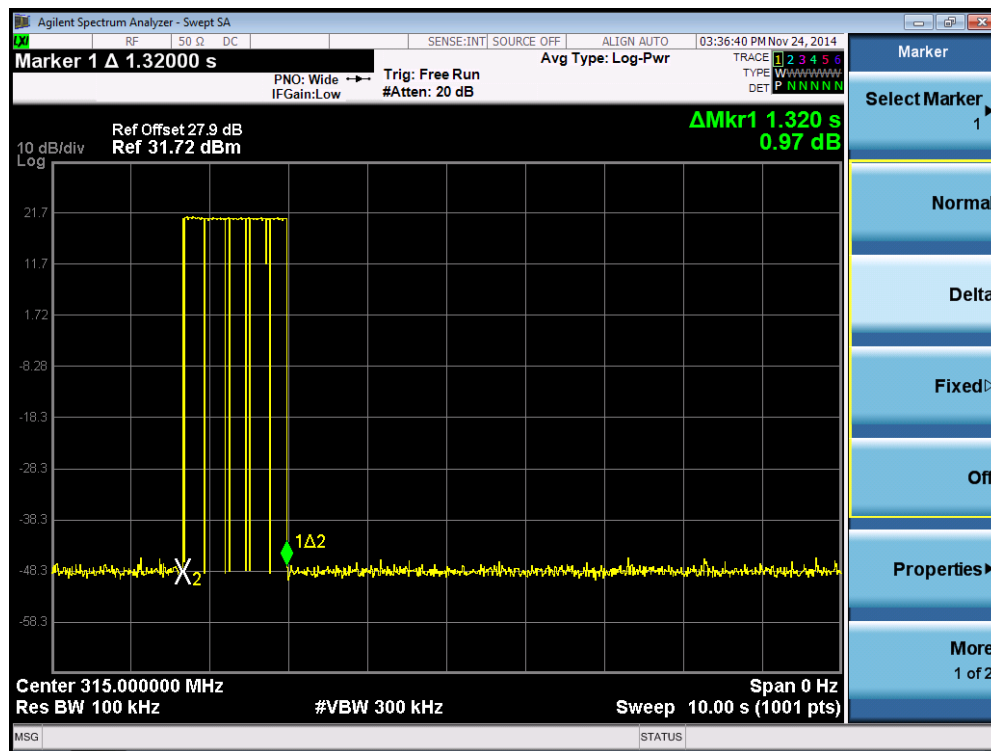
6.5.3. Test Setup



6.5.4. Test Result

Item	Measured Value	Limit	Result
Transmission Time	1.32 s	≤ 5 s	Pass

Transmission Time



Note: The EUT belongs to the manually operated transmitter.

6.6. Duty Cycle

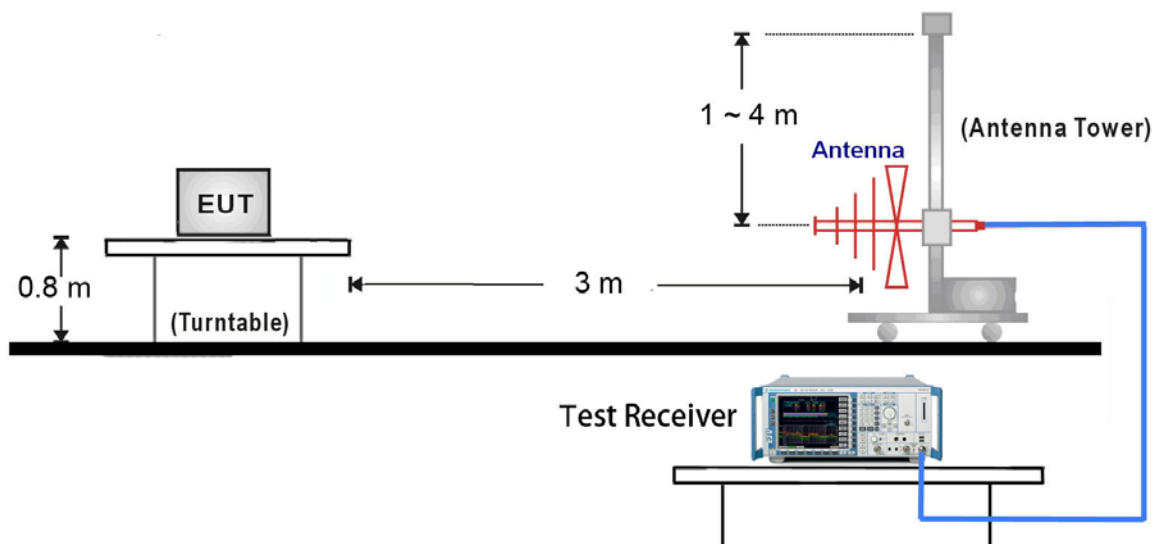
6.6.1. Standard Applicable

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.

6.6.2. Test Procedure

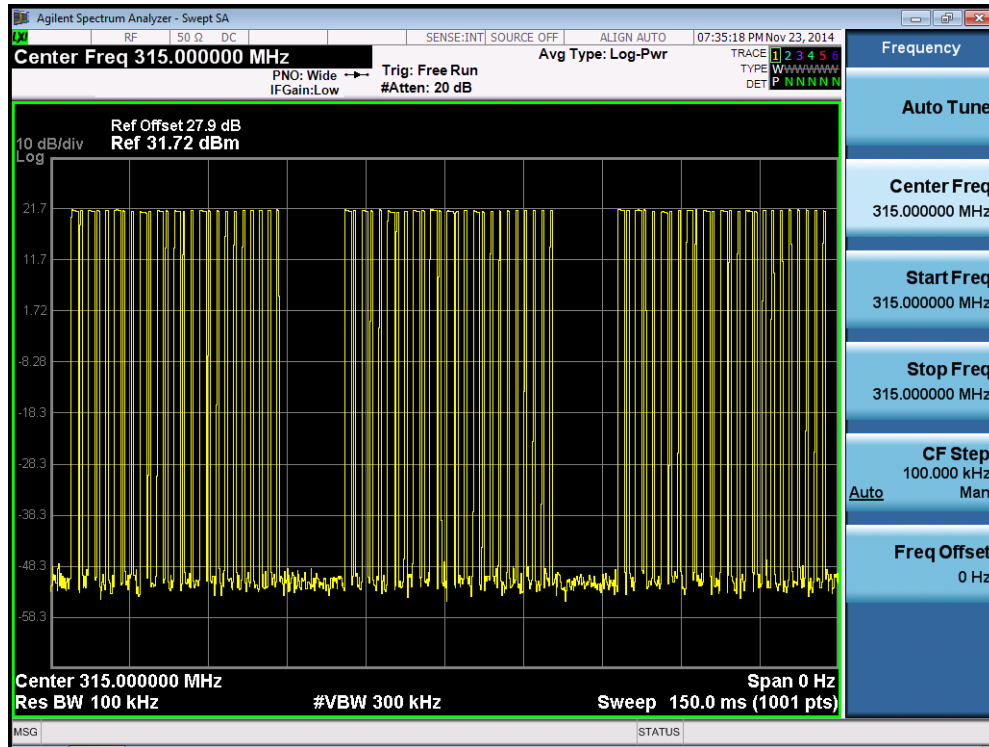
With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 315MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

6.6.3. Test Setup

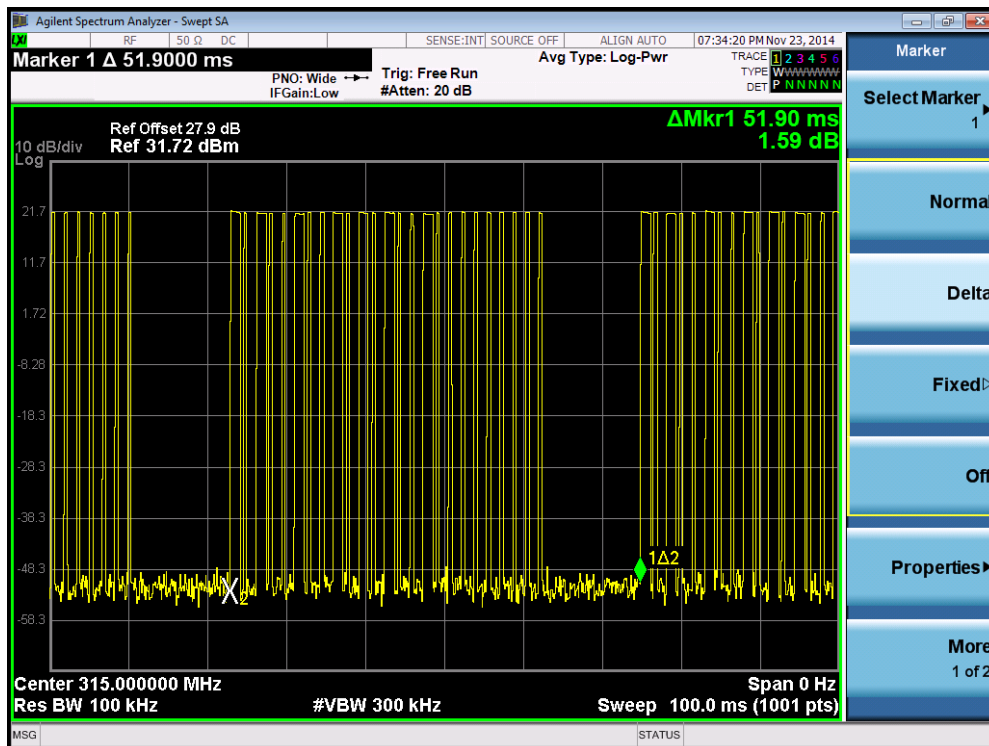


6.6.4. Test Result

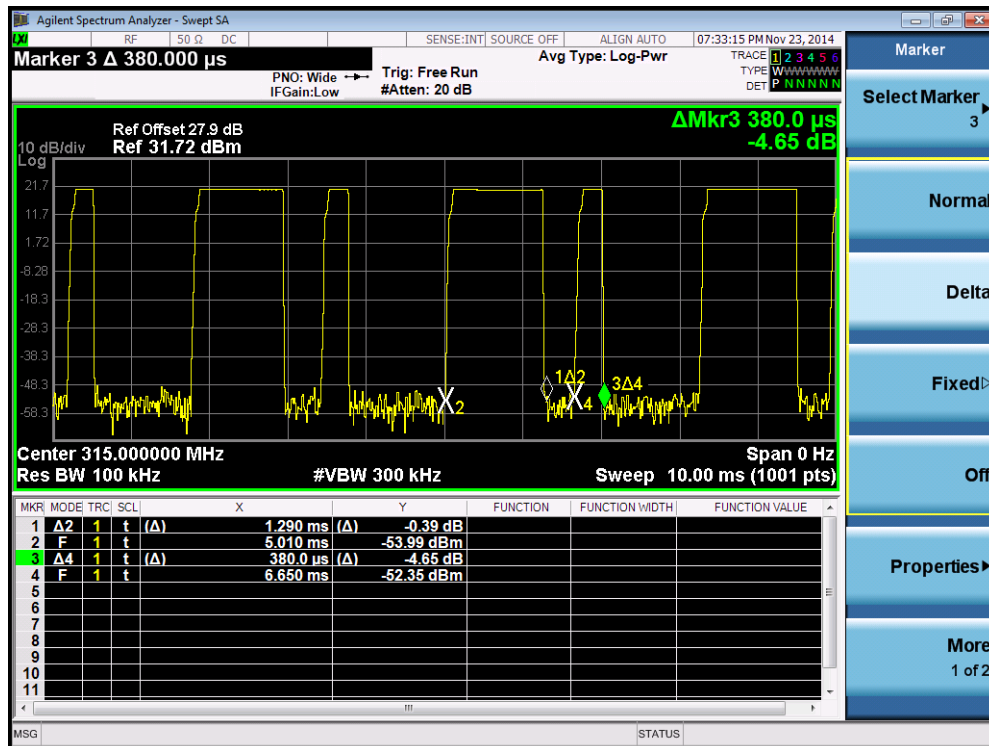
Duty Cycle



The Duration of one Cycle



Each Width of Pulse



Declaration

The Duration Of One Cycle = 51.90ms

Effective Period Of The Cycle= $7 \times 1.29 + 18 \times 0.38 = 15.87\text{ms}$

Duty Cycle = $15.87/51.90 = 30.58\%$

7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Keypad Transmitter FCC ID: 2ADMDCTK200** is in compliance with FCC Part 15.231(a) of the FCC Rules.

The End