

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

Fingerprint Lock

MODEL No.: TL400B

FCC ID: 2AJ9T-TL400B

Trademark: N/A

REPORT NO: ES171027979W02

ISSUE DATE: November 27, 2017

Prepared for
ZKTECO CO., LTD.
No.26, Pingshan 188 Industry zone, Tangxia Town, Dongguan City,
Guangdong Province, China

Prepared by
EMTEK(SHENZHEN) CO., LTD.

Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, China
TEL: 86-755-26954280
FAX: 86-755-26954282

VERIFICATION OF COMPLIANCE

Applicant:	ZKTECO CO., LTD. No.26, Pingshan 188 Industry zone, Tangxia Town, Dongguan City, Guangdong Province, China
Manufacturer:	ZKTECO CO., LTD. No.26, Pingshan 188 Industry zone, Tangxia Town, Dongguan City, Guangdong Province, China
Product Name:	Fingerprint Lock
Model Number:	TL400B
Serial Number:	N/A
File Number:	ES171027979W02

We hereby certify that:

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD.. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.207&15.209.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : October 27, 2017 to November 27, 2017

Prepared by : 
Sevin Li/Editor

Reviewer : 
Joe Xia/Supervisor



Approved & Authorized Signer : 
Lisa Wang/Manager

Table of Contents

1.	GENERAL INFORMATION	4
1.1	PRODUCT DESCRIPTION	4
1.2	RELATED SUBMITTAL(S) / GRANT (S)	4
1.3	TEST METHODOLOGY	4
1.4	SPECIAL ACCESSORIES	4
1.5	EQUIPMENT MODIFICATIONS	4
1.6	TEST FACILITY	5
2.	SYSTEM TEST CONFIGURATION	6
2.1	EUT CONFIGURATION	6
2.2	EUT EXERCISE	6
2.3	TEST PROCEDURE	6
2.4	LIMITATION	6
3.	SUMMARY OF TEST RESULTS	7
4.	CONDUCTED EMISSION TEST	8
4.1	APPLICABLE STANDARD	8
4.2	CONFORMANCE LIMIT	8
4.3	TEST CONFIGURATION	8
4.4	TEST PROCEDURE	8
4.5	MEASUREMENT EQUIPMENT USED:	8
4.6	TEST RESULT	9
5.	RADIATED EMISSION TEST	10
5.1	MEASUREMENT PROCEDURE	10
5.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	11
5.3	MEASUREMENT EQUIPMENT USED:	11
5.4	MEASUREMENT RESULT	12
6.	ANTENNA APPLICATION	17
	ANTENNA REQUIREMENT	17
	RESULT	17

1. GENERAL INFORMATION

1.1 Product Description

Characteristics	Description
EUT Description	Fingerprint Lock
Model Number	TL400B
Device style	RFID
Modulation	ASK
Operating Frequency Range	125kHz
Number of Channels	1
Antenna Type	Coil Antenna
Antenna Gain	0dBi
Power supply	<input checked="" type="checkbox"/> DC 6V via 4*AA Batteries

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AJ9T-TL400B filing to comply with Section 15.207&15.209 of the FCC Part 15 Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013) and Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description
EMC Lab.

- : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291
- : Accredited by TUV Rheinland Shenzhen, 2010.5.25
The Laboratory has been assessed according to the requirements ISO/IEC 17025.
- : Accredited by FCC, August 03, 2017
Designation Number: CN1204
Test Firm Registration Number: 882943
- : Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number is 4480A-2

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

2.4 Limitation

(1) Radiated Emission

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance(m)	Field strength at 3m dB $\mu\text{V/m}$
0.009~0.490	2400/F(KHz)	300	See the remark
0.490~1.705	2400/F(KHz)	30	
1.705~30.0	30	30	
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in dB $\mu\text{V/m}$ = $20 \log(\mu\text{V/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Distance extrapolation factor = $40 \log(\text{Specific distance} / \text{test distance})$ (dB);
 Limit line = Specific limits(dB μV) + distance extrapolation factor.

3. Summary of Test Results

FCC Rule	Description Of Test	Result
15.207	AC Power Conducted Emission	N/A _{Note}
15.209	Radiated Emission	Pass

Note: The EUT power supply is DC 6V via 4*AA batteries

4. CONDUCTED EMISSION TEST

4.1 Applicable Standard

According to FCC Part 15.207(a)

4.2 Conformance Limit

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

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

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

4.4 Test Procedure

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

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

Repeat above procedures until all frequency measured were complete.

4.5 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	Due. CAL
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 20, 2017	May 19, 2018
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	May 20, 2017	May 19, 2018
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A

4.6 Test Result

N/A

The EUT power supply is DC 6V via 4*AA batteries, So this test item is not applicable.

5. Radiated Emission Test

5.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

When spectrum scanned from 9KHz to 150KHz setting resolution bandwidth 200Hz and video bandwidth 1kHz.

EMI Test Receiver	Setting
Attenuation	Auto
RB	200Hz
VB	1kHz
Detector	QP
Trace	Max hold

When spectrum scanned from 150KHz to 30MHz setting resolution bandwidth 9 kHz and video bandwidth 30kHz.

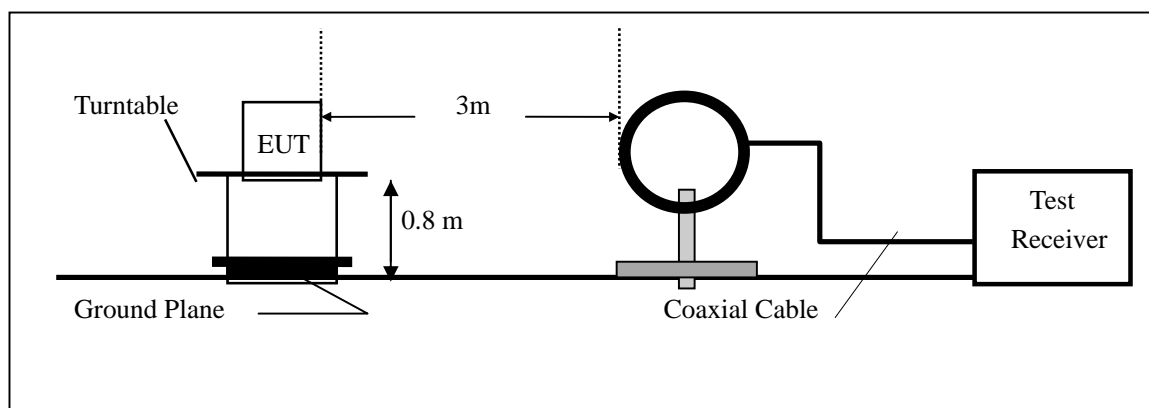
EMI Test Receiver	Setting
Attenuation	Auto
RB	9kHz
VB	30kHz
Detector	QP
Trace	Max hold

When spectrum scanned from 30 MHz to 1GHz setting resolution bandwidth 120 kHz and video bandwidth 300kHz.

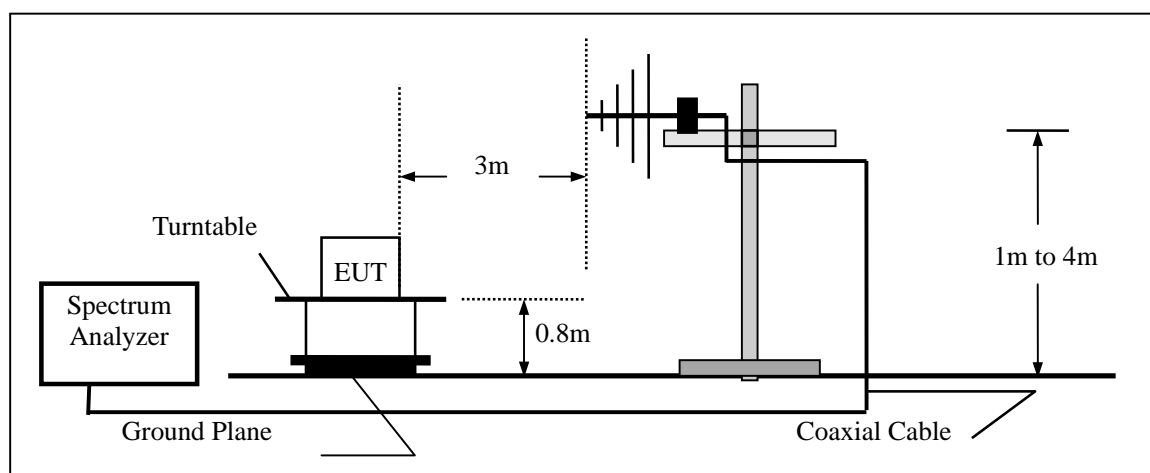
EMI Test Receiver	Setting
Attenuation	Auto
RB	120kHz
VB	300kHz
Detector	QP
Trace	Max hold

5.2 Test SET-UP (Block Diagram of Configuration)

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



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



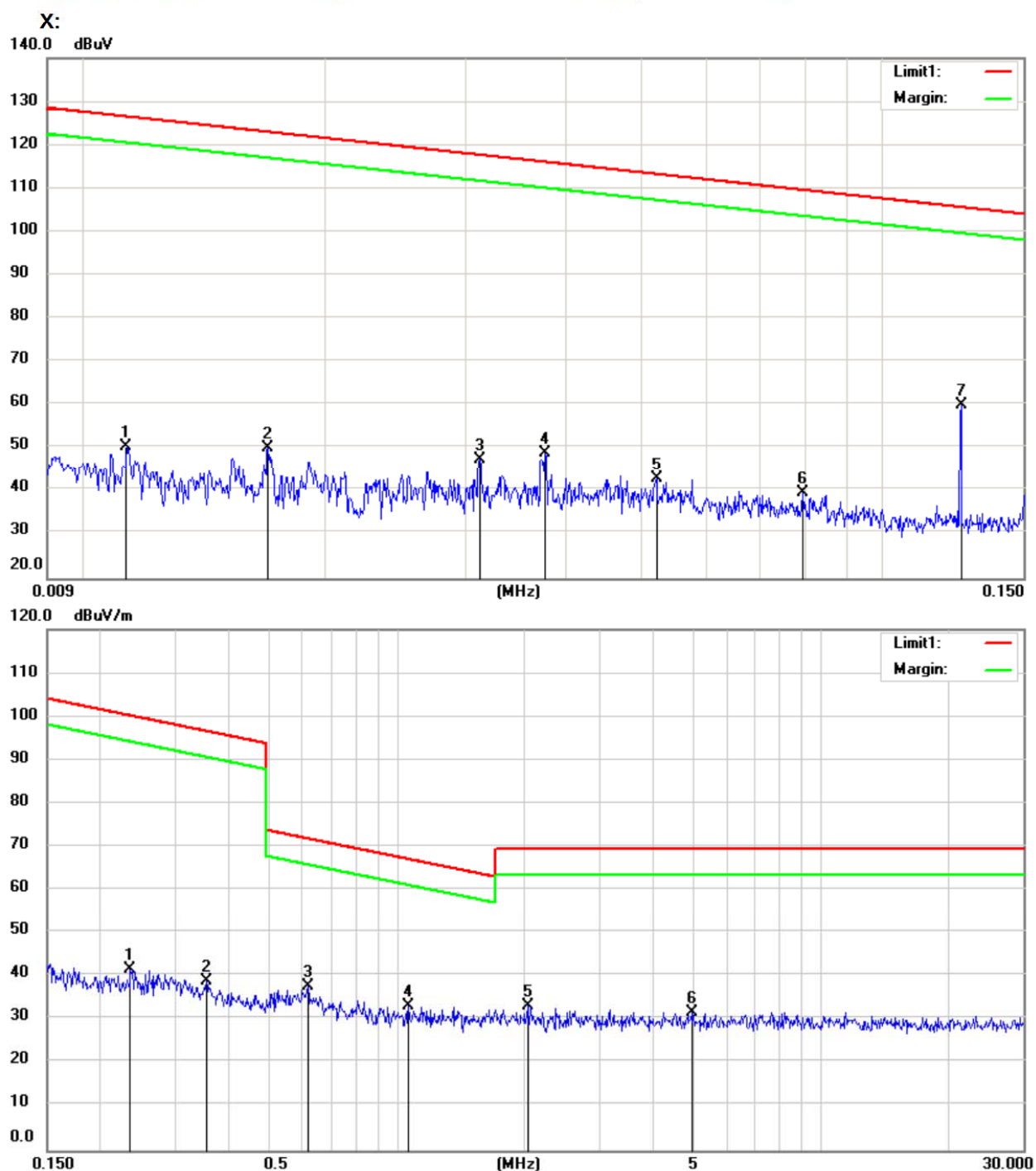
5.3 Measurement Equipment Used:

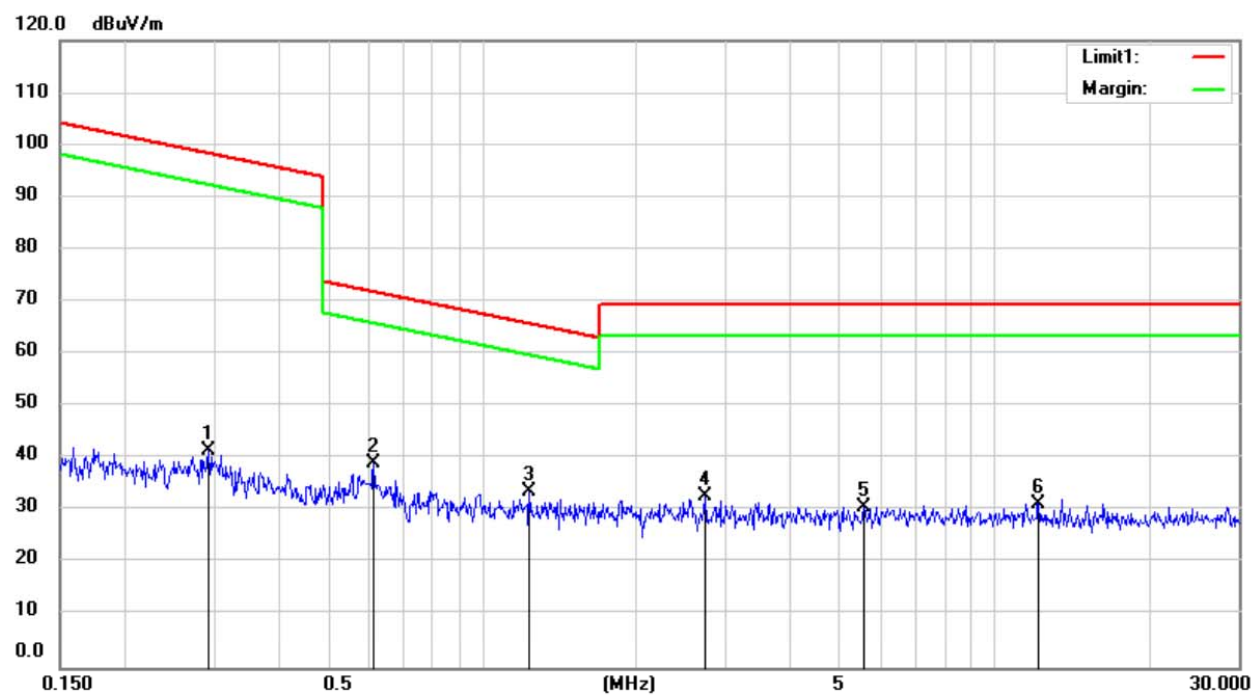
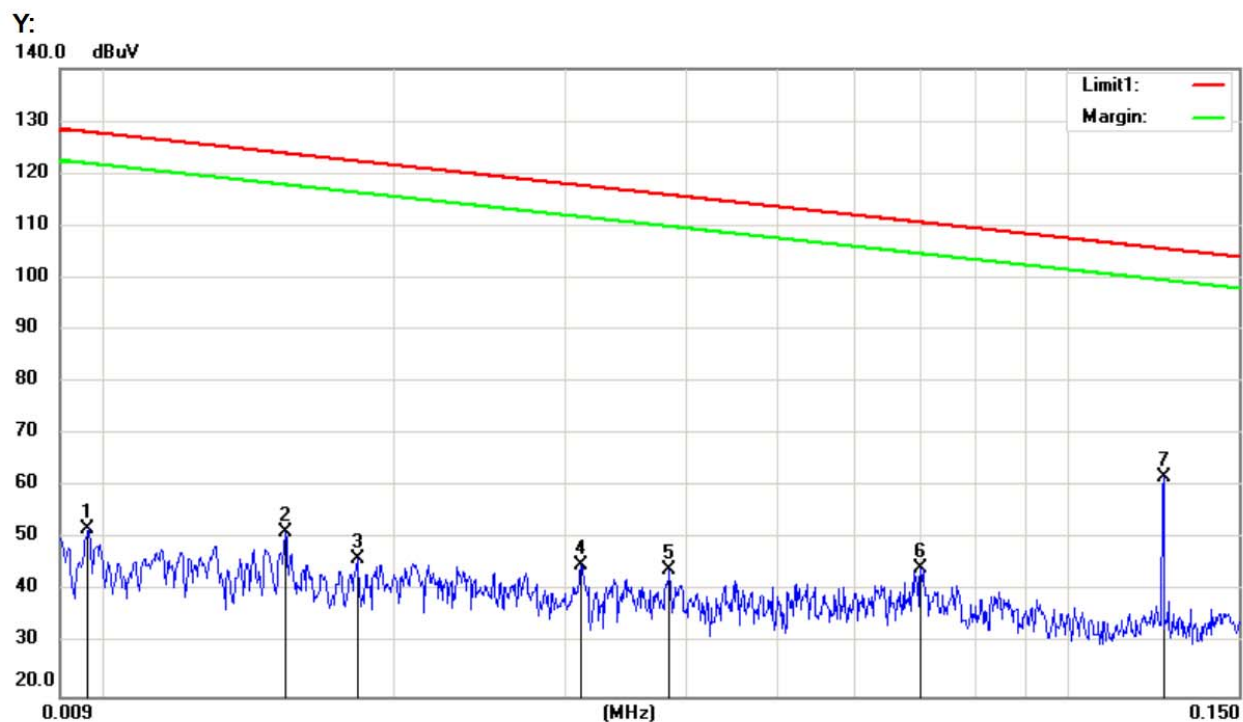
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 21, 2017	May 20, 2018
Pre-Amplifier	HP	8447F	2944A07999	May 20, 2017	May 19, 2018
Bilog Antenna	Schwarzbeck	VULB9163	142	May 20, 2017	May 19, 2018
Loop Antenna	ARA	PLA-1030/B	1029	May 20, 2017	May 19, 2018
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 21, 2017	May 20, 2018
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 20, 2017	May 19, 2018
Cable	Schwarzbeck	AK9513	ACRX1	May 21, 2017	May 20, 2018
Cable	Rosenberger	N/A	FP2RX2	May 21, 2017	May 20, 2018
Cable	Schwarzbeck	AK9513	CRPX1	May 21, 2017	May 20, 2018
Cable	Schwarzbeck	AK9513	CRRX2	May 21, 2017	May 20, 2018

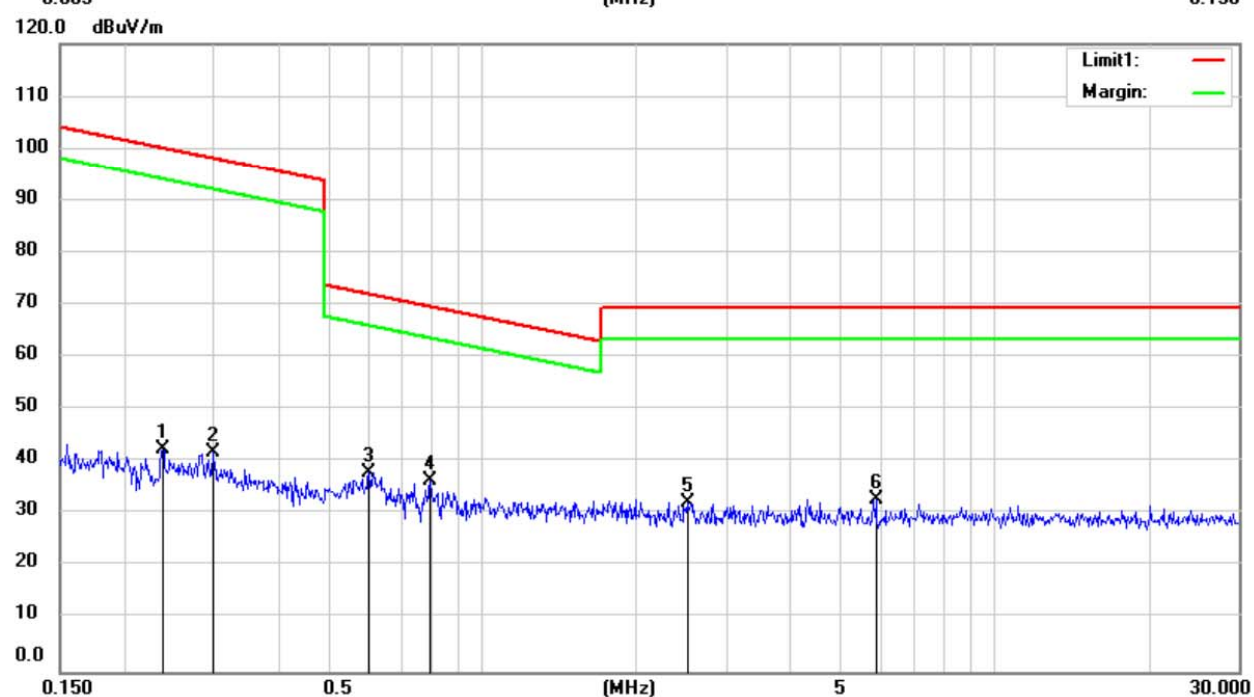
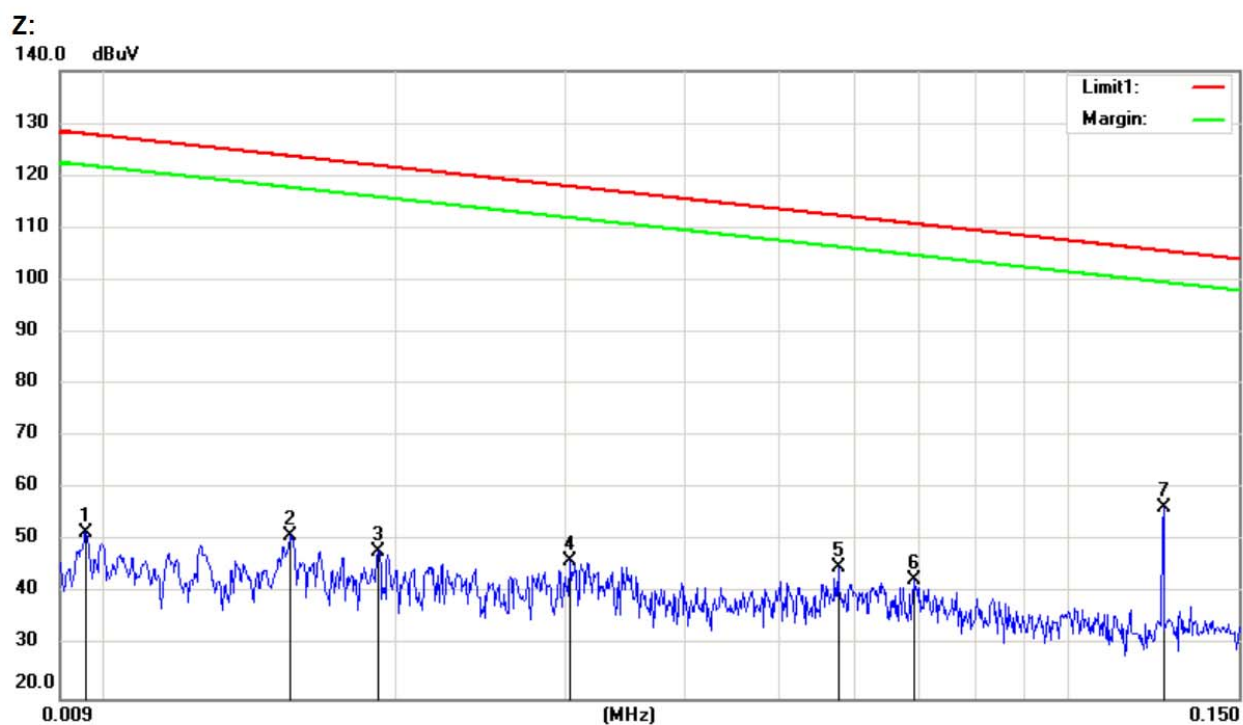
5.4 Measurement Result

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible Limit.

Operation Mode:	ON	Test Date :	November 12, 2017
Frequency Range:	9KHz~30MHz	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK



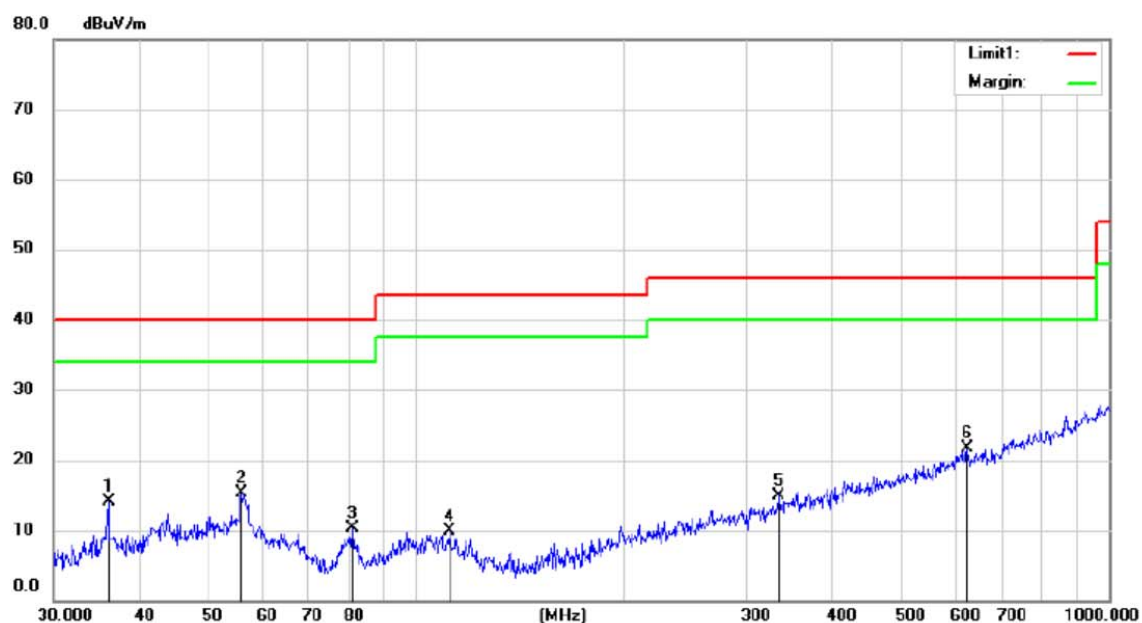




Note: the Fundamental Emission is less than the spurious emission Limit, the bandage test is not need.

Operation Mode: ON
 Frequency Range: 30~1000MHz
 Test Result: PASS
 Measured Distance: 3m

Test Date : November 12, 2017
 Temperature : 24°C
 Humidity : 53 %
 Test By: KK



Site 3m Chamber #3

Polarization: **Horizontal**

Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B

Power: DC 6V

Humidity: 53 %

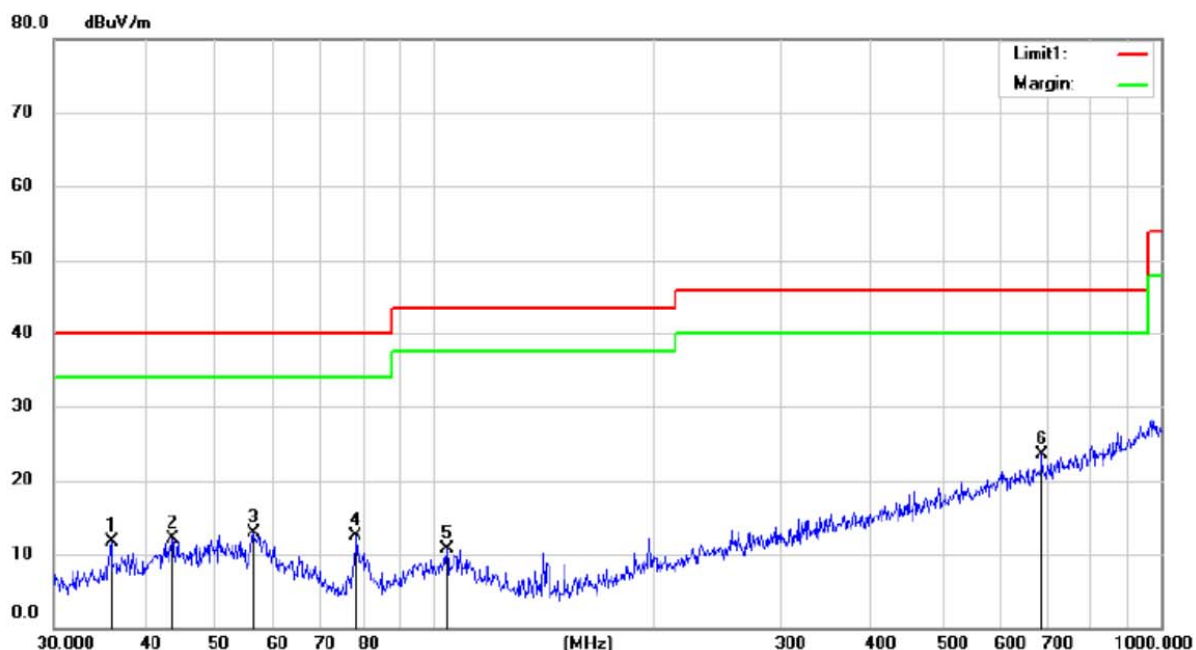
Mode: 125KHz TX

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		36.0007	30.67	-16.54	14.13	40.00	-25.87	QP		
2		56.0007	29.95	-14.69	15.26	40.00	-24.74	QP		
3		80.9274	26.82	-16.50	10.32	40.00	-29.68	QP		
4		111.7380	25.98	-16.00	9.98	43.50	-33.52	QP		
5		333.6865	26.01	-11.18	14.83	46.00	-31.17	QP		
6	*	625.0780	26.49	-4.80	21.69	46.00	-24.31	QP		

*:Maximum data x:Over limit !:over margin

Operator: LQZ



Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B

Power: DC 6V

Humidity: 53 %

Mode: 125KHz TX

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		36.0007	28.21	-16.54	11.67	40.00	-28.33	QP		
2		43.6584	26.30	-14.24	12.06	40.00	-27.94	QP		
3		56.3947	27.82	-14.83	12.99	40.00	-27.01	QP		
4		78.1388	32.43	-19.83	12.60	40.00	-27.40	QP		
5		104.1701	26.24	-15.61	10.63	43.50	-32.87	QP		
6	*	687.1506	27.35	-3.92	23.43	46.00	-22.57	QP		

*:Maximum data x:Over limit !:over margin

Operator: LQZ

6. Antenna Application

Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Result

The EUT'S antenna is coil antenna, The antenna's gain is 0dBi and meets the requirement. and the antenna can't be replaced by the user, which in accordance to section 15.203.

The antenna dimension: $0.02 \times 2 + 0.04 \times 2 = 0.12\text{m} < 0.625 \times \lambda (0.625 \times c/f = 1500\text{m})$, the detail see the internal Photo.