

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

OF

Card Reader

MODEL No.: KR612E, KR612E-RS

FCC ID: 2AJ9T-KR612E

Trademark: N/A

REPORT NO: ES160919023E

ISSUE DATE: October 18, 2016

Prepared for
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CNAS L2291

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Access to the World

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:	Card Reader
Model Number:	KR612E, KR612E-RS (Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only differences are appearance and model. for trading purpose. We prepare KR612E-RS for test, and the worst result recorded in the report.)
Serial Number:	N/A
File Number:	ES160919023E

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 C63.4 (2014) 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 : September 20, 2016 to October 18, 2016

Prepared by : Yaping Shen
Yaping Shen/Editor

Reviewer : Joe Xia
Joe Xia /Supervisor

Approve & Authorized Signer : Lisa Wang
Lisa Wang/Manager

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1. GENERAL INFORMATION

1.1 Product Description

A major technical descriptions of EUT is described as following:

Supply power: DC 12V

RFID Frequency: 125KHz

Modulation: ASK

Operating temperature: -10°C ~ 70°C

Antenna type: Coil Antenna

Antenna gain: 0 dBi

Support adapter:

M/N: FJ-SW1203000N

Input: AC 100-240V 50/60Hz

Output: DC 12V 3A

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AJ9T-KR612E 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 C63.4 (2014) 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, 2013.10.29
The certificate is valid until 2016.10.28
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, July 06, 2016
The Certificate Registration Number is 406365.
- : 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 C63.4-2014.

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

3. Summary of Test Results

FCC Rule	Description Of Test	Result
15.207	AC Power Conducted Emission	Pass
15.209	Radiated Emission	Pass

4. CONDUCTED EMISSION TEST

4.1 Applicable Standard

According to FCC Part 15.207(a)

4.2 Conformance Limit

Frequency(MHz)	Conducted Emission Limit	
	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.

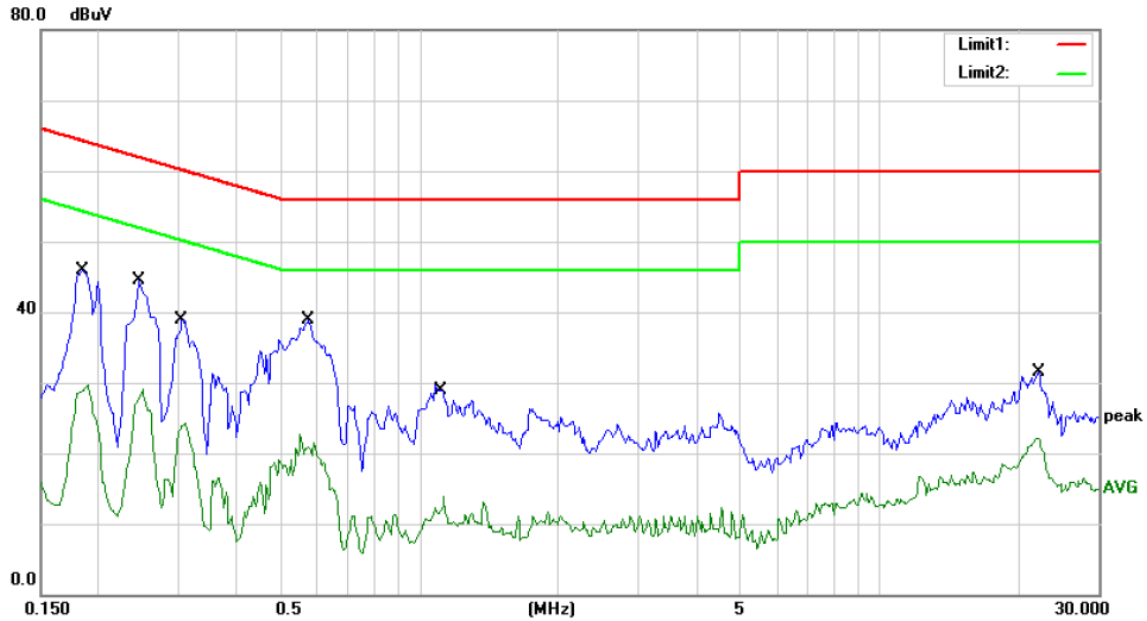
Maximum procedure was performed on the highest emissions to ensure EUT compliance.

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	05/28/2016	05/28/2017
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/28/2016	05/28/2017
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A

4.6 Test Result



Site Conduction #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 C

Power: AC 120V/60Hz

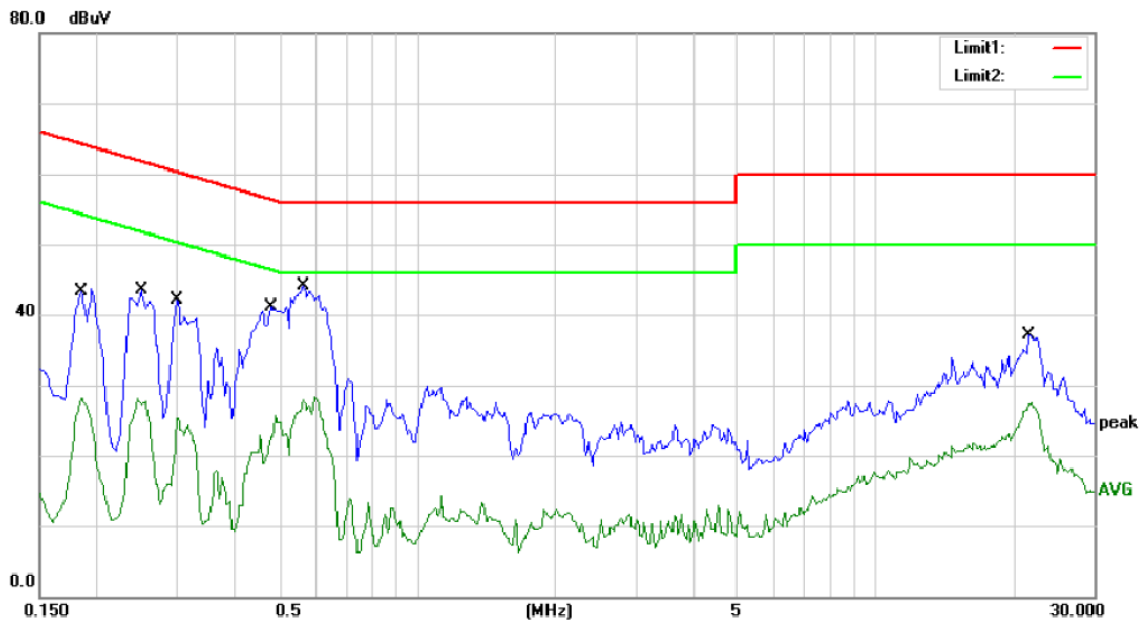
Humidity: 55 %

Mode: ON

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1850	45.95	0.00	45.95	64.26	-18.31	QP	
2		0.1850	29.75	0.00	29.75	54.26	-24.51	AVG	
3		0.2455	44.26	0.00	44.26	61.91	-17.65	QP	
4		0.2455	29.01	0.00	29.01	51.91	-22.90	AVG	
5		0.3050	38.92	0.00	38.92	60.11	-21.19	QP	
6		0.3050	24.33	0.00	24.33	50.11	-25.78	AVG	
7	*	0.5750	38.81	0.00	38.81	56.00	-17.19	QP	
8		0.5750	22.16	0.00	22.16	46.00	-23.84	AVG	
9		1.1150	28.91	0.00	28.91	56.00	-27.09	QP	
10		1.1150	13.91	0.00	13.91	46.00	-32.09	AVG	
11		22.2500	31.42	0.00	31.42	60.00	-28.58	QP	
12		22.2500	22.15	0.00	22.15	50.00	-27.85	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: WAP



Site Conduction #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 C

Power: AC 120V/60Hz

Humidity: 55 %

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1850	43.25	0.00	43.25	64.26	-21.01	QP	
2		0.1850	28.12	0.00	28.12	54.26	-26.14	AVG	
3		0.2500	43.46	0.00	43.46	61.76	-18.30	QP	
4		0.2500	28.03	0.00	28.03	51.76	-23.73	AVG	
5		0.3000	42.06	0.00	42.06	60.24	-18.18	QP	
6		0.3000	25.37	0.00	25.37	50.24	-24.87	AVG	
7		0.4800	41.14	0.00	41.14	56.34	-15.20	QP	
8		0.4800	25.65	0.00	25.65	46.34	-20.69	AVG	
9	*	0.5650	44.04	0.00	44.04	56.00	-11.96	QP	
10		0.5650	27.87	0.00	27.87	46.00	-18.13	AVG	
11		21.6500	37.15	0.00	37.15	60.00	-22.85	QP	
12		21.6500	27.57	0.00	27.57	50.00	-22.43	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: WAP

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.

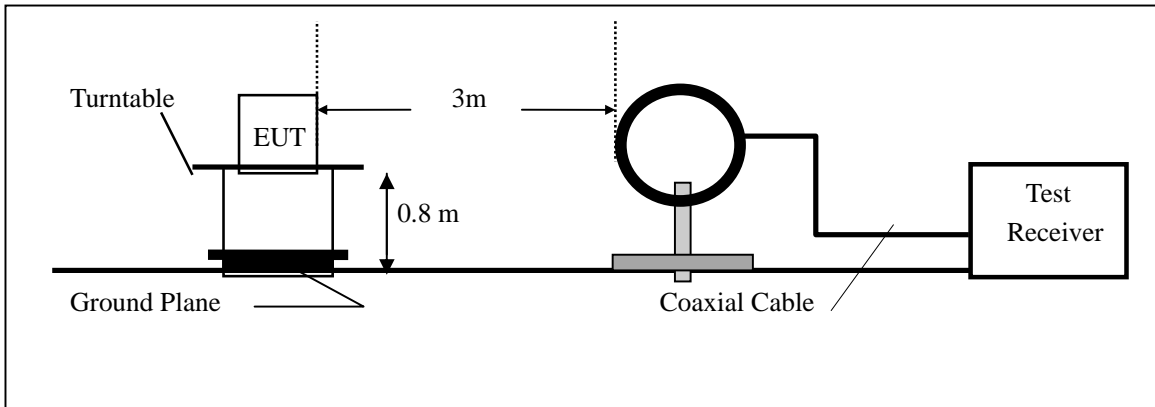
EMI Test Receiver	Setting
Attenuation	Auto
RB	9kHz
VB	30kHz
Detector	QP
Trace	Max hold

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

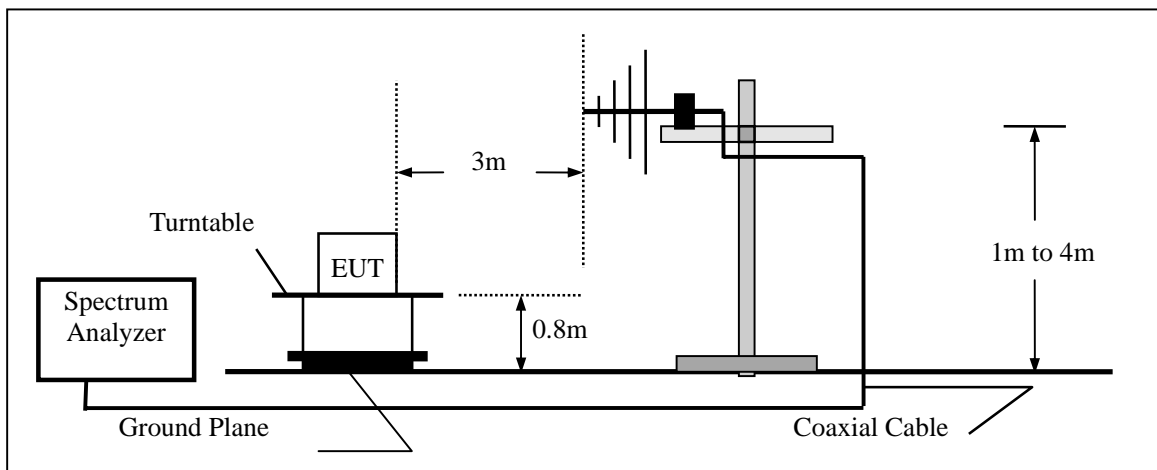
EMI Test Receiver	Setting
Attenuation	Auto
RB	120kHz
VB	300kHz
Detector	QP
Trace	Max hold

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



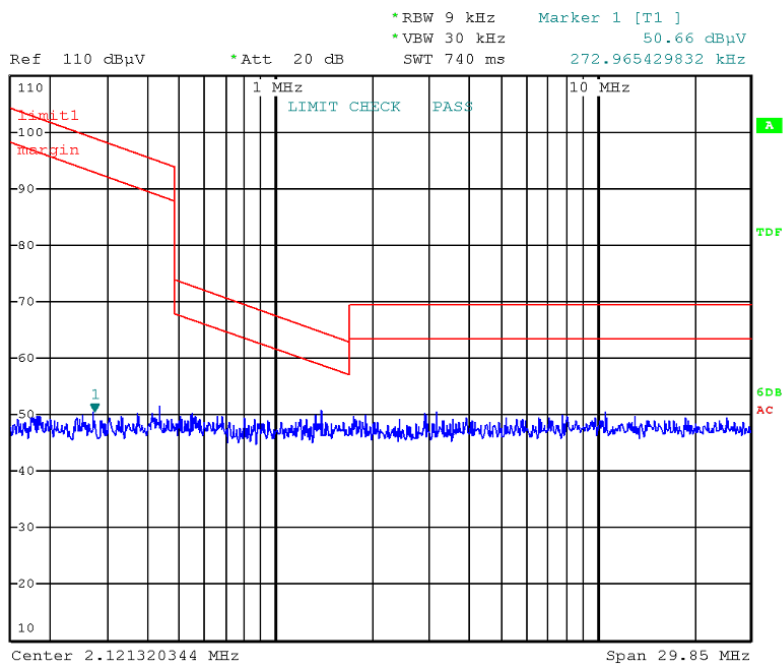
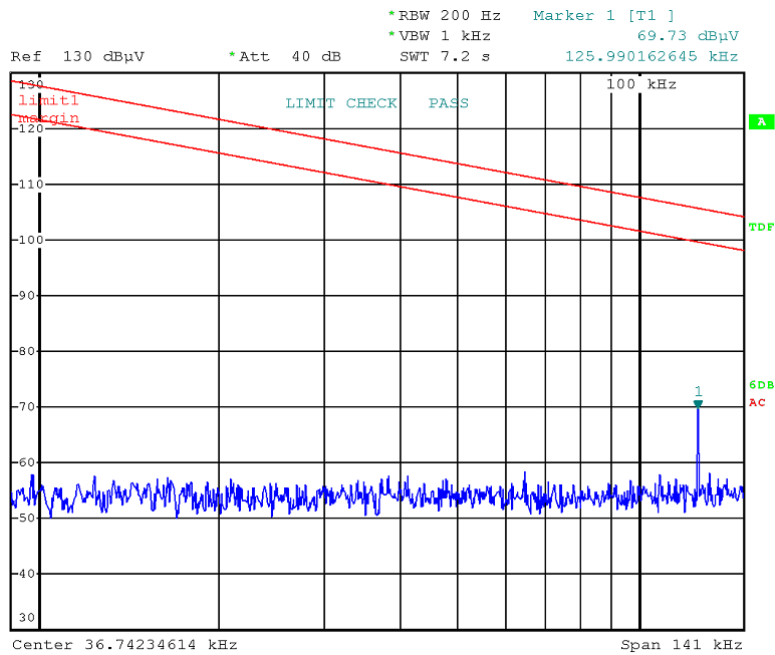
5.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	05/28/2016	05/28/2017
Spectrum Analyzer	HP	E4407B	839840481	05/28/2016	05/28/2017
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/28/2016	05/28/2017
Pre-Amplifier	HP	8447D	2944A07999	05/28/2016	05/28/2017
Bilog Antenna	Schwarzbeck	VULB9163	142	05/28/2016	05/28/2017
Loop Antenna	ARA	PLA-1030/B	1029	05/28/2016	05/28/2017

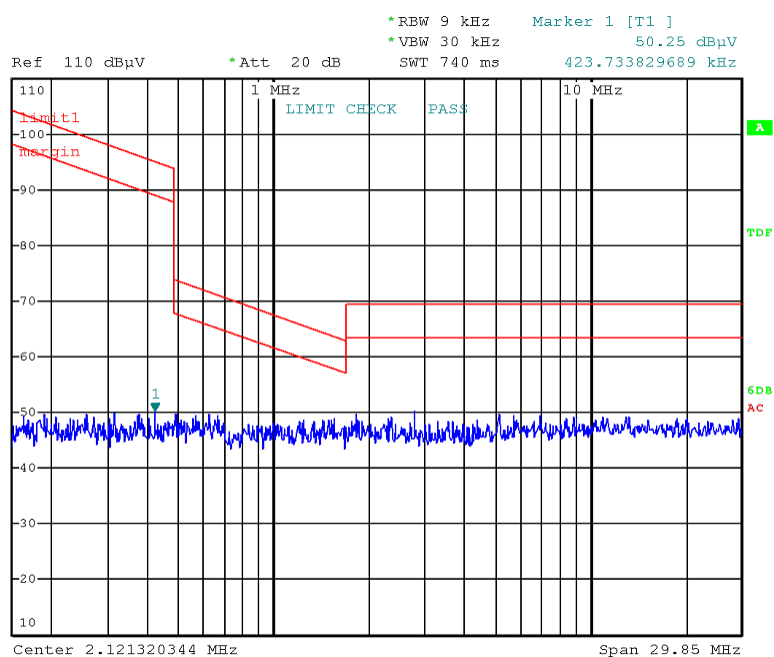
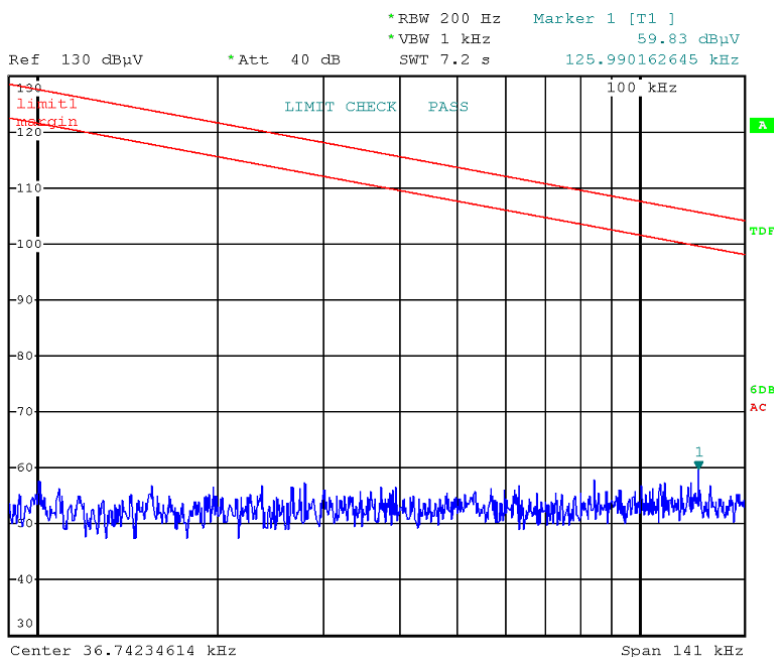
5.4 Measurement Result

Operation Mode:	TX	Test Date :	September 23, 2016
Frequency Range:	9KHz~30MHz	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK

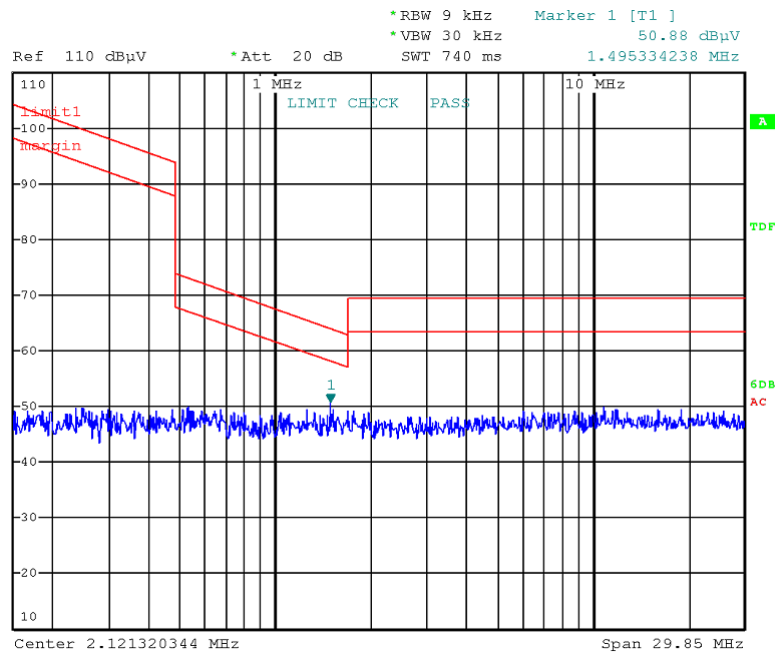
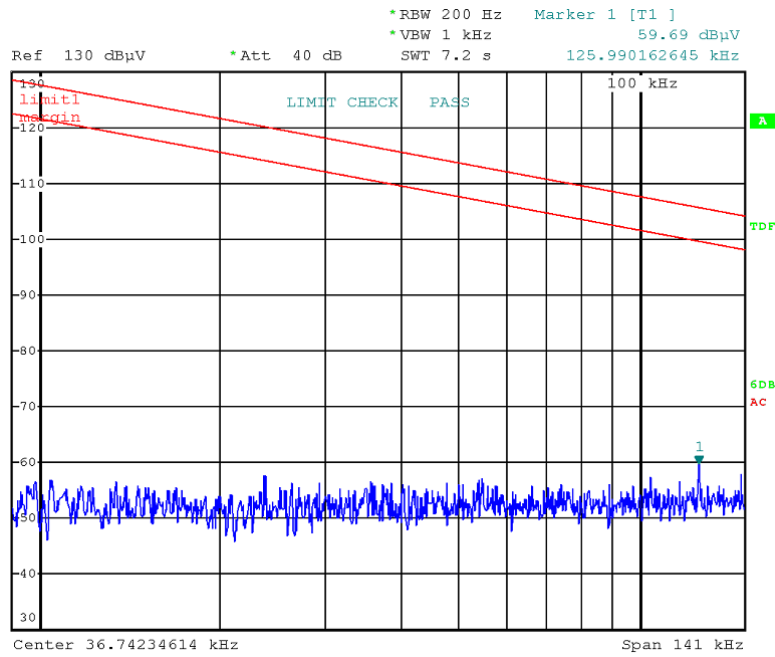
X:



Y:

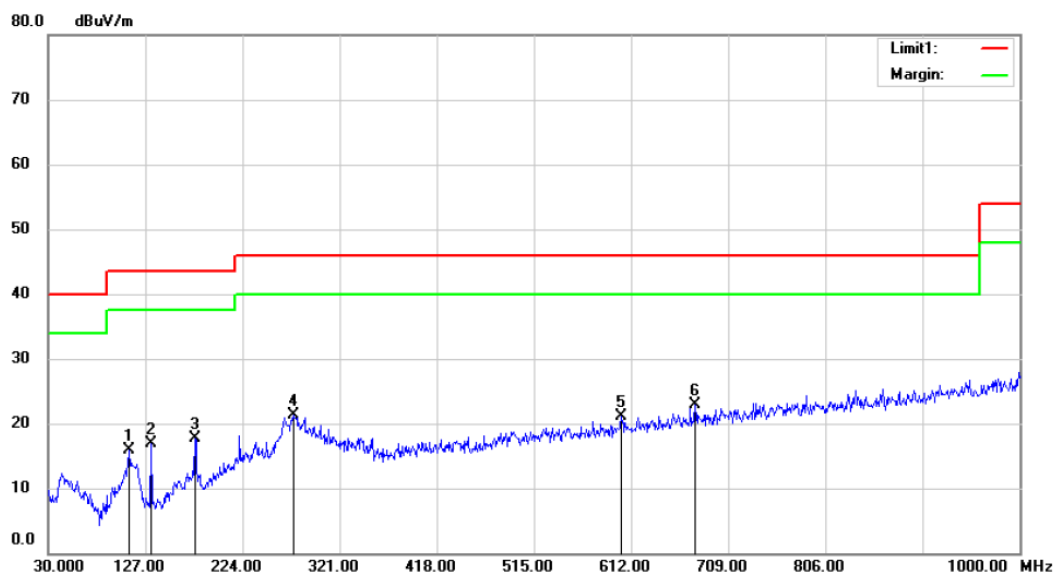


Z:



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

Test Date : September 23, 2016
 Temperature : 24°C
 Humidity : 53 %
 Test By: KK

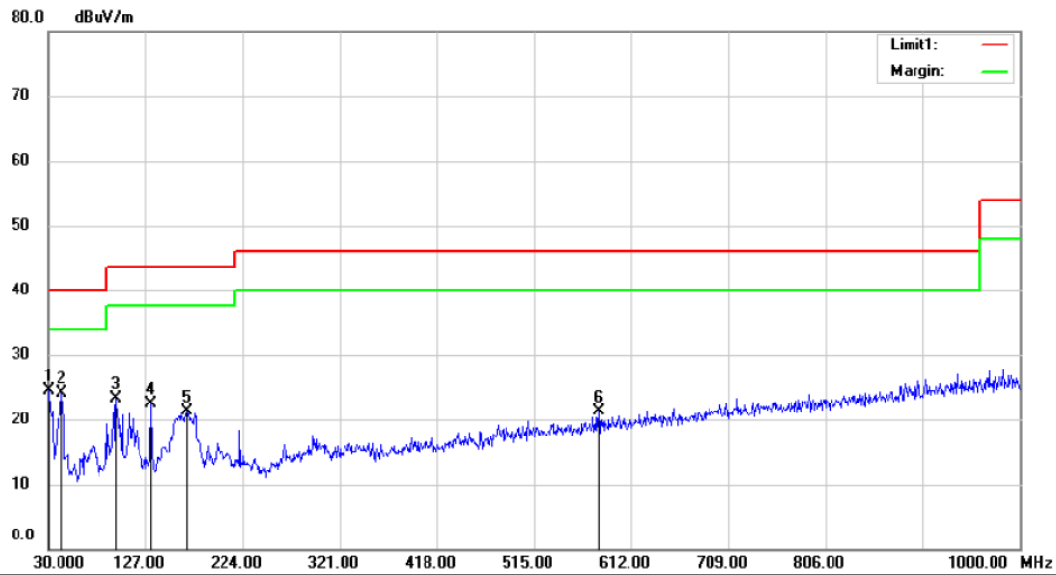


Site 3m Chamber #3 Polarization: *Horizontal* Temperature: 24 C
 Limit: (RE)FCC PART 15 C Power: AC 120V/60Hz Humidity: 53 %
 Mode:ON
 Note:

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		110.5100	31.47	-15.47	16.00	43.50	-27.50	QP		
2		132.8200	35.52	-18.63	16.89	43.50	-26.61	QP		
3		176.4700	34.85	-17.15	17.70	43.50	-25.80	QP		
4		274.4400	33.83	-12.51	21.32	46.00	-24.68	QP		
5		602.3000	26.87	-5.81	21.06	46.00	-24.94	QP		
6	*	676.0200	27.54	-4.59	22.95	46.00	-23.05	QP		

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

Operator: SKJ



Site 3m Chamber #3 Polarization: *Vertical* Temperature: 24 C
 Limit: (RE)FCC PART 15 C Power: AC 120V/60Hz Humidity: 53 %
 Mode:ON
 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	*	30.0000	42.27	-17.68	24.59	40.00	-15.41	QP		
2		43.5800	38.62	-14.47	24.15	40.00	-15.85	QP		
3		97.9000	38.90	-15.65	23.25	43.50	-20.25	QP		
4		132.8200	41.10	-18.63	22.47	43.50	-21.03	QP		
5		168.7100	38.60	-17.34	21.26	43.50	-22.24	QP		
6		579.9900	27.45	-6.16	21.29	46.00	-24.71	QP		

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

Operator: SKJ

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.

7. APPENDIX(Photos of EUT)





