FCC PART 15.225

TEST REPORT

For

Shanghai Smarfid Security Equipment Co.,Ltd

Room 301,4th Bldg., No.4 TongLi Road, SongJiang District,Shanghai ,China

FCC ID: X3A-FSLE8

Report Type:	Product Type:
Original Report	Fingerprint Series Reader

Test Engineer:	Matt Yao
Report Number:	RKS150313001-00D
Report Date:	2015-03-13
Reviewed By:	Jesse Huang EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) Chenghu Road,Kunshan Development Zone No.248,Kunshan, Jiangsu, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Shanghai Smarfid Security Equipment Co., Ltd.'s product, model number: LE8A2-8K (or the "EUT") in this report was a Fingerprint Series Reader, which was measured approximately: 186 mm (L) x 85 mm (W) 22(RFID Reader)/31.5(Fingerprint Scanner) mm (H), rated input voltage: DC 12V to power Supply .

**Series model and difference：LE8A2-8K, LE8XY-8Z, LH8XY-8Z, MW8XY-8Z,Note（Variable）：X=A,B,C；Y=2,3,4,5,6,7；Z=K,N.These models have the same Circuits, PCB layout components ,Bom list,and The shell , The difference of product are the model name. but other differences is following:*
(X=A,B,C)
A:the color of shell is black(like : LE8AY-8Z, LH8AY-8Z, MW8AY-8Z)
B:the color of shell is silver (like : LE8BY-8Z, LH8BY-8Z, MW8BY-8Z)
C:the color of shell is white (like : LE8CY-8Z, LH8CY-8Z, MW8CY-8Z)
(Y=2,3,4,5,6,7)
The difference are reading function which design by software (like : CSN/UID/ID Reading and Sector Reading)
(Z=K,N)
K:the reader has buttons
N:the reader does not have buttons

** All measurement and test data in this report was gathered from production sample serial number: 20150302 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2015-3-10.*

Objective

This Type approval report is prepared on behalf of *Shanghai Smarfid Security Equipment Co.,Ltd* in accordance with Part 2- Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Road,Kunshan Development Zone No.248,Kunshan, Jiangsu, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No exercise software.

Equipment Modifications

No modification on the EUT.

Local Support Equipment

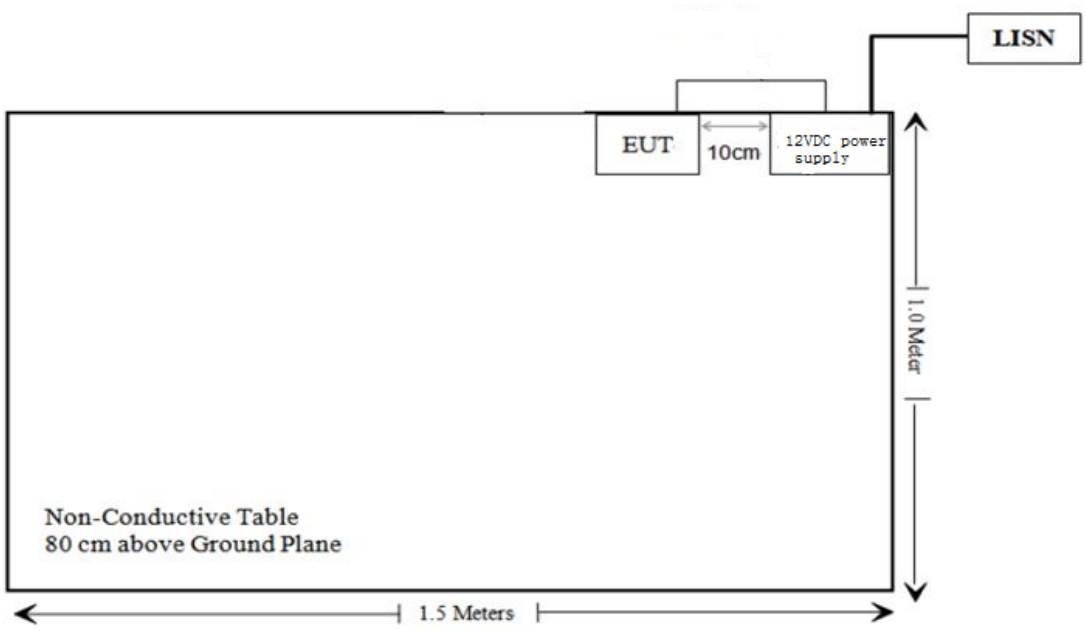
Manufacturer	Description	Model	Serial Number
Meichuang	DC Power Supply	MCH-303D	/
/	RF ID card	/	/

External I/O Cable

NO.	Cable Description	Length (m)	From/Port	To
1	N/A			

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207	AC Line Conducted Emission	Compliance
§15.225 §15.209, §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20dB Emission Bandwidth Testing	Compliance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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.

Antenna Connected Construction

The EUT has an integral loop antenna which was permanently attached, fulfill the requirement of this section. Please see EUT photo for details.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207

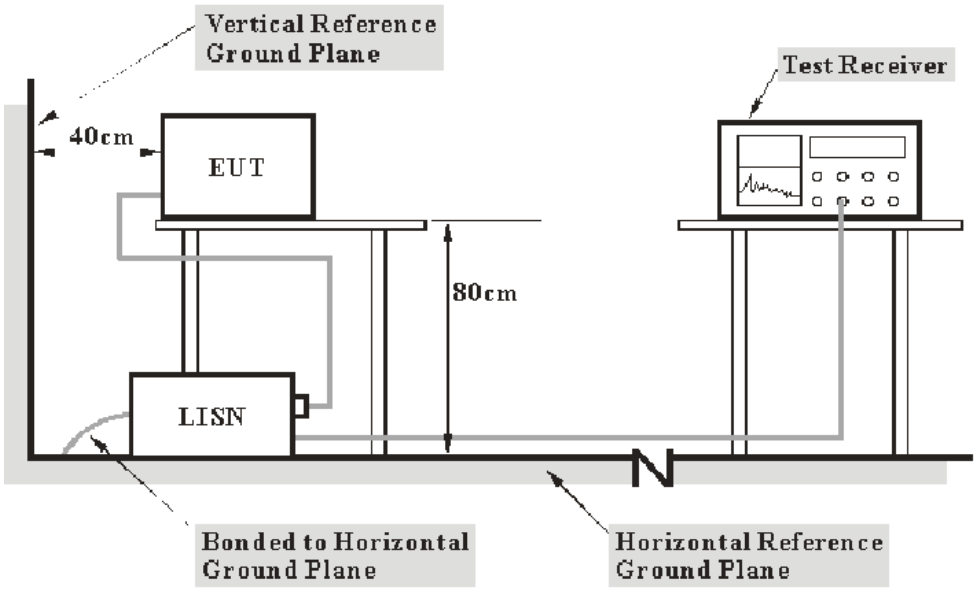
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with per ANSI C63.4-2009. The related limit was specified in FCC Part 15.207 limit.

The EUT was connected to a 12VDC power supply.
The 12VDC power supply was connected to a 120 VAC/60 Hz power source .

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	831294/005	2014-09-16	2015-09-16
Rohde & Schwarz	LISN	ESH3-Z5	12005	2014-09-16	2015-09-16
Rohde & Schwarz	LISN	ESH3-Z5	12008	2014-09-16	2015-09-16
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	--	--

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, the worst margin reading as below:

12.05 dB at **24.106 MHz** in the **line** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

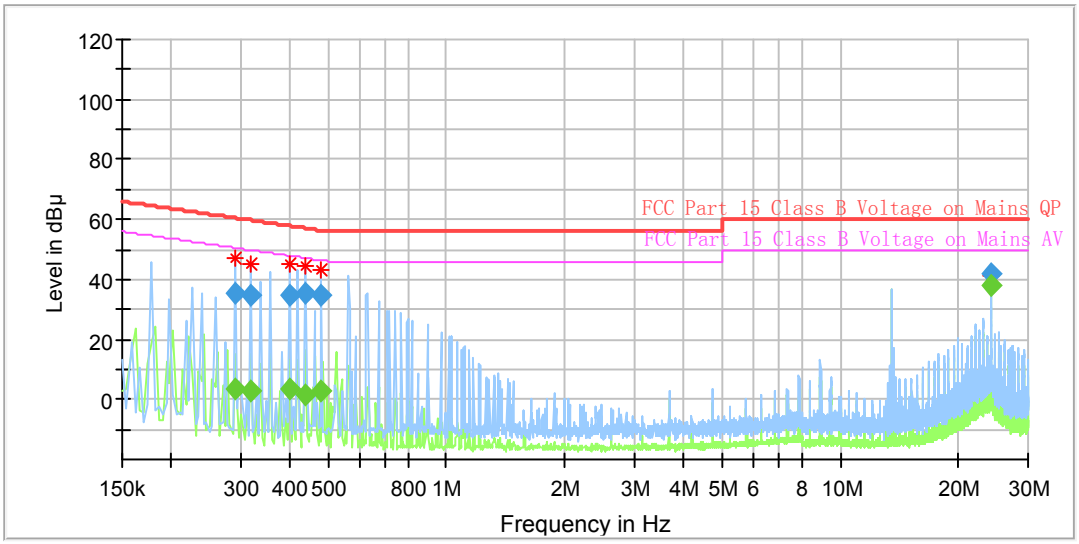
Environmental Conditions

Temperature:	27 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2015-03-12

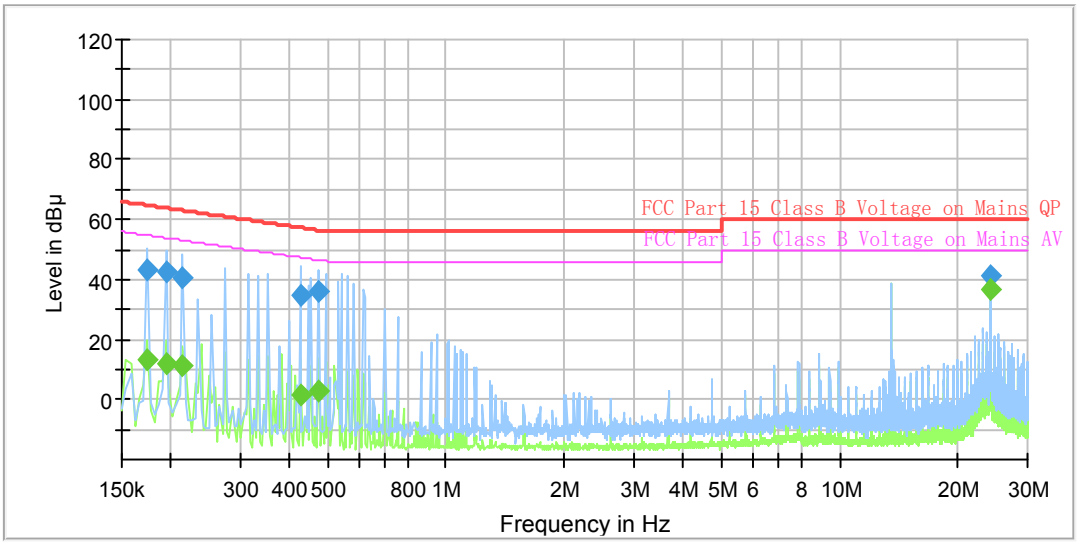
EUT operation mode: Normal operation

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)	Comment
0.290000	---	3.53	50.52	46.99	9.000	L1	1.0	Compliance
0.290000	35.43	---	60.52	25.09	9.000	L1	1.0	Compliance
0.318000	---	2.66	49.76	47.10	9.000	L1	1.0	Compliance
0.318000	34.76	---	59.76	25.00	9.000	L1	1.0	Compliance
0.398000	---	3.27	47.90	44.63	9.000	L1	1.0	Compliance
0.398000	34.62	---	57.90	23.28	9.000	L1	1.0	Compliance
0.438000	---	1.76	47.10	45.34	9.000	L1	1.0	Compliance
0.438000	35.53	---	57.10	21.57	9.000	L1	1.0	Compliance
0.482000	---	2.59	46.30	43.71	9.000	L1	1.0	Compliance
0.482000	34.70	---	56.30	21.60	9.000	L1	1.0	Compliance
24.106000	---	37.95	50.00	12.05	9.000	L1	1.4	Compliance
24.106000	42.00	---	60.00	18.00	9.000	L1	1.4	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)	Comment
0.174000	---	13.53	54.77	41.24	9.000	N	1.0	Compliance
0.174000	43.30	---	64.77	21.47	9.000	N	1.0	Compliance
0.194000	---	12.15	53.86	41.71	9.000	N	1.0	Compliance
0.194000	42.62	---	63.86	21.24	9.000	N	1.0	Compliance
0.214000	---	11.20	53.05	41.85	9.000	N	1.0	Compliance
0.214000	40.39	---	63.05	22.66	9.000	N	1.0	Compliance
0.426000	---	1.47	47.33	45.86	9.000	N	1.0	Compliance
0.426000	34.57	---	57.33	22.76	9.000	N	1.0	Compliance
0.474000	---	2.92	46.44	43.52	9.000	N	1.0	Compliance
0.474000	35.98	---	56.44	20.46	9.000	N	1.0	Compliance
24.110000	---	36.33	50.00	13.67	9.000	N	1.4	Compliance
24.110000	40.93	---	60.00	19.07	9.000	N	1.4	Compliance

FCC §15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

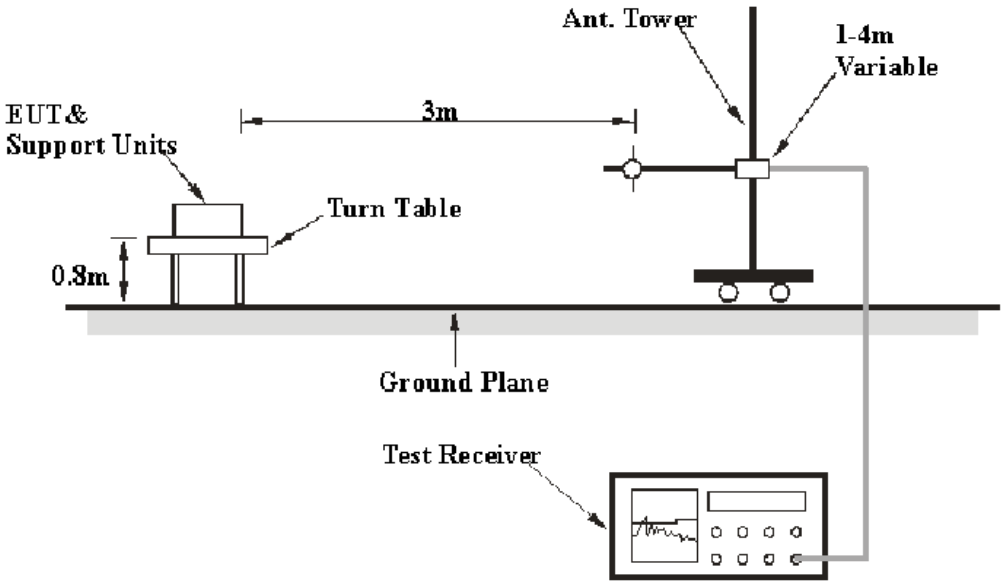
(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz. And it will not be taken into consideration for the test data recorded in the report

EUT Setup



The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

The EUT was connected to a 12VDC power supply.
The 12VDC power supply was connected to a 120 VAC/60 Hz power source .

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	300 Hz	1 kHz	/	QP
150 kHz –30 MHz	10 kHz	30 kHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	/	QP

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Factor = Antenna Factor + Cable Loss- Amplifier Gain
Corrected Amplitude = Meter Reading + Corrected Factor

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
ETS	Passive Loop Antenna	6512	001769	2014-11-29	2015-11-29
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2014-09-16	2015-09-16
Sonoma Instrunent	Amplifier	330	171377	2014-09-16	2015-09-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209, the worst margin reading as below:

2.82dB at **610.18 MHz**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2015-03-12
Test mode: Transmitting

1) Radiated Emissions (9 kHz~30 MHz):

Indicated		Detector PK/QP/Ave.	Correction Factor			Corrected Amplitude (dBμV/m) @3m	FCC Part 15.225\15.209	
Frequency (MHz)	Maximum Reading (dBuV)		Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)		Limit (dBμV/m) @3m	Margin (dB)
13.21	18.57	QP	35.70	0.5	25.23	29.54	80.50	50.96
13.34	17.81	QP	35.70	0.5	25.23	28.78	80.50	51.72
13.52	25.05	QP	35.70	0.5	25.23	36.02	90.50	54.48
13.56	36.81	QP	35.70	0.5	25.23	47.48	124.00	76.52
13.58	23.66	QP	35.70	0.5	25.23	34.63	90.50	55.87
13.73	16.79	QP	35.70	0.5	25.23	27.76	80.50	52.74

2) Radiated Spurious Emissions (30 MHz ~1 GHz):

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Detector PK/QP/Ave.	Antenna Height (m)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
212.117500	38.02	QP	100	V	133.0	-12.3	43.50	5.48
284.746250	40.43	QP	201.0	V	52.0	-10.6	46.00	5.57
406.723750	26.73	QP	100	H	24.0	-8.2	46.00	19.27
610.181250	43.18	QP	100	V	164.0	-4.5	46.00	2.82
664.501250	35.76	QP	100	V	196.0	-3.3	46.00	10.24
691.661250	29.05	QP	100	V	188.0	-2.6	46.00	16.95

FCC §15.225(e) - FREQUENCY STABILITY

Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to PC, then to an external AC power supply and inductive antenna was connected to a Spectrum Analyzer. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable AC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2014-09-16	2015-09-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

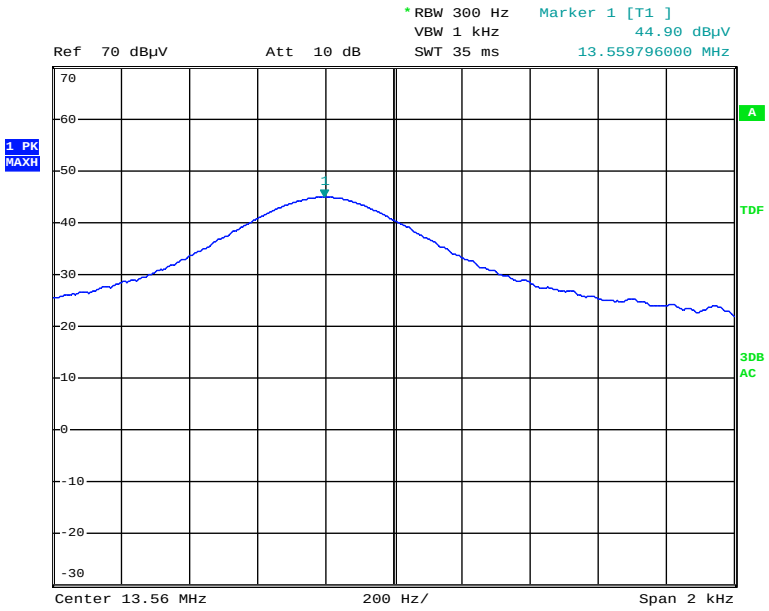
The testing was performed by Matt Yao on 2015-03-13

Test Mode: Transmitting

Test Result: Pass

F_0=13.56MHz				
Power Supply	**Temperature (℃)**	**Measured Frequency (MHz)**	**Frequency Error**	**Part 15.225 Limit**
12VDC	-20	13.559834	-0.001	±0.01%
	-10	13.559715	-0.002	±0.01%
	0	13.559604	-0.002	±0.01%
	10	13.558988	-0.007	±0.01%
	20	13.559796	-0.002	±0.01%
	30	13.559189	-0.006	±0.01%
	40	13.558967	-0.008	±0.01%
	50	13.558896	-0.008	±0.01%

Frequency Stability(20℃,12V)



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FCC §15.215(c) - 20 dB EMISSION BANDWIDTH TESTING

Requirement

Per 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
ETS	Passive Loop Antenna	6512	001769	2014-11-29	2015-11-29
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2014-09-16	2015-09-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Test Data

Environmental Conditions

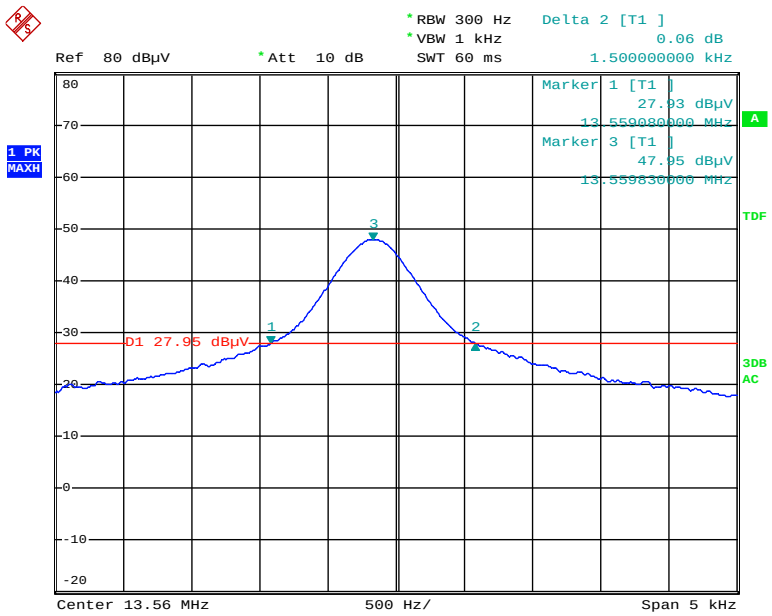
Temperature:	23 ℃
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2015-03-12

Test Mode: Transmitting

Test Result: Pass

20 dB Emission Bandwidth



Date: 12.MAR.2015 13:33:52

PRODUCT SIMILARITY DECLARATION LETTER

SMARFID
Shanghai Smarfid Security Equipment Co., Ltd.
Room 301, 4th Bldg., No.4 TongLi Road, SongJiang District, Shanghai, China
Tel: +86-021-54260132 Fax: +86-021-54260132

To:

Declaration letter

Dear :

For our business issue and marketing requirement, we would like to list different models numbers on the FCC certificates、CE certificates and reports, as following:
FCC ID:X3A-FSLE8
Model No: LE8A2-8K
LE8XY-8Z, LH8XY-8Z, MW8XY-8Z
Note （Variable）: X=A,B,C
Y=2,3,4,5,6,7
Z=K,N
These models have the same Circuits, PCB layout components ,Bom list,and The shell

The difference of product are the model name. but other differences is following:
(X=A,B,C)
A:the color of shell is black(like : LE8AY-8Z, LH8AY-8Z, MW8AY-8Z)
B:the color of shell is silver (like : LE8BY-8Z, LH8BY-8Z, MW8BY-8Z)
C:the color of shell is white (like : LE8CY-8Z, LH8CY-8Z, MW8CY-8Z)
(Y=2,3,4,5,6,7)
The difference are reading function which design by software (like : CSN/UID/ID Reading and Sector Reading)
(Z=K,N)
K:the reader has buttons
N:the reader does not have buttons

Thank you!

Signature: Songling Dai
Printed name/title: Songling Dai

*******END OF REPORT*******