

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
SHENZHEN LANGZHUO TECHNOLOGY CO., LTD.

SMART CARD READER
Model No.: SCC-RF-MI-B370

FCC ID: 2AC6N-B370

Prepared for : SHENZHEN LANGZHUO TECHNOLOGY CO., LTD.
Address : ROOM 407, CHUNTIANGE, JIAHUXINDU, TIANBEI
4TH ROAD, LUOHU DISTRICT, SHENZHEN,
GUANGDONG, CHINA
Prepared by : ACCURATE TECHNOLOGY CO., LTD
Address : F1, Bldg. A, Chan Yuan New Material Port, Keyuan
Rd. Science & Industry Park, Nan Shan, Shenzhen,
Guangdong P.R. China

Tel: (0755) 26503290
Fax: (0755) 26503396

Report Number : ATE20141750
Date of Test : Sep 04-18, 2014
Date of Report : Sep 18, 2014

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Test Report Certification

Applicant& address : SHENZHEN LANGZHUO TECHNOLOGY CO., LTD.
ROOM 407, CHUNTIANGE, JIAHUXINDU, TIANBEI 4TH
ROAD, LUOHU DISTRICT, SHENZHEN, GUANGDONG,
CHINA

Manufacturer& address : SHENZHEN LANGZHUO TECHNOLOGY CO., LTD.
ROOM 407, CHUNTIANGE, JIAHUXINDU, TIANBEI 4TH
ROAD, LUOHU DISTRICT, SHENZHEN, GUANGDONG,
CHINA

Product : SMART CARD READER

Model No. : SCC-RF-MI-B370

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.225
ANSI C63.4: 2009

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.225 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Sep 04-18, 2014

Date of Report : Sep 18, 2014

Prepared by :



(Eric, Engineer)

Approved & Authorized Signer :



(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	SMART CARD READER
Model Number	:	SCC-RF-MI-B370
Power Supply	:	DC 5V
Operate Frequency	:	13.56MHz
Applicant	:	SHENZHEN LANGZHUO TECHNOLOGY CO., LTD.
Address	:	ROOM 407, CHUNTIANGE, JIAHUXINDU, TIANBEI 4TH ROAD, LUOHU DISTRICT, SHENZHEN, GUANGDONG, CHINA
Manufacturer	:	SHENZHEN LANGZHUO TECHNOLOGY CO., LTD.
Address	:	ROOM 407, CHUNTIANGE, JIAHUXINDU, TIANBEI 4TH ROAD, LUOHU DISTRICT, SHENZHEN, GUANGDONG, CHINA
Date of sample received	:	Sep 04, 2014
Date of Test	:	Sep 04-18, 2014

1.2. Special Accessory and Auxiliary Equipment

N/A

1.3. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC
The Registration Number is 752051

Listed by Industry Canada
The Registration Number is 5077A-2

Accredited by China National Accreditation Committee
for Laboratories
The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.4. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

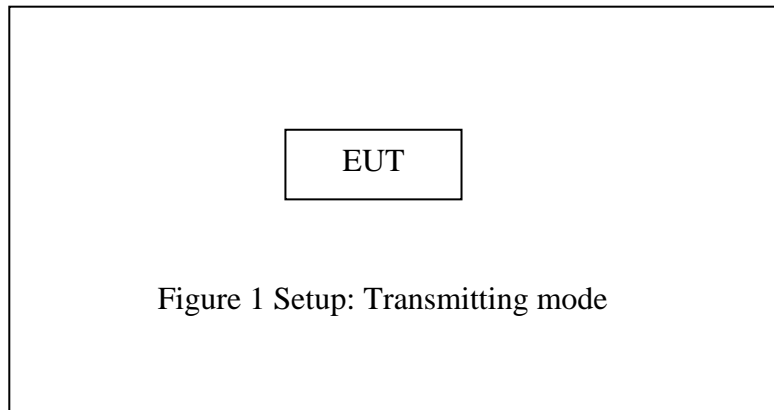
Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 11, 2014	Jan. 10, 2015
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 11, 2014	Jan. 10, 2015
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 11, 2014	Jan. 10, 2015
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 11, 2014	Jan. 10, 2015
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2014	Jan. 14, 2015
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 15, 2014	Jan. 14, 2015
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 11, 2014	Jan. 10, 2015
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 11, 2014	Jan. 10, 2015
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 11, 2014	Jan. 10, 2015
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 11, 2014	Jan. 10, 2015

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: **Transmitting mode**

3.2.Configuration and peripherals

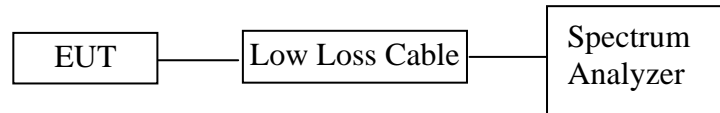


4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.215(c)	20dB Bandwidth	Compliant
Section 15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Compliant
Section 15.209(a) Section 15.225(d)	Radiated Spurious Emission	Compliant
Section 15.225(e)	Frequency Stability	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.215(c)

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long-term distribution appears evenly distributed.

5.3. Operating Condition of EUT

5.3.1. Setup the EUT and simulator as shown as Section 5.1.

5.3.2. Turn on the power of all equipment.

5.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 13.56 MHz.

5.4. Test Procedure

5.4.1. Place the EUT on the table and set it in transmitting mode.

5.4.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

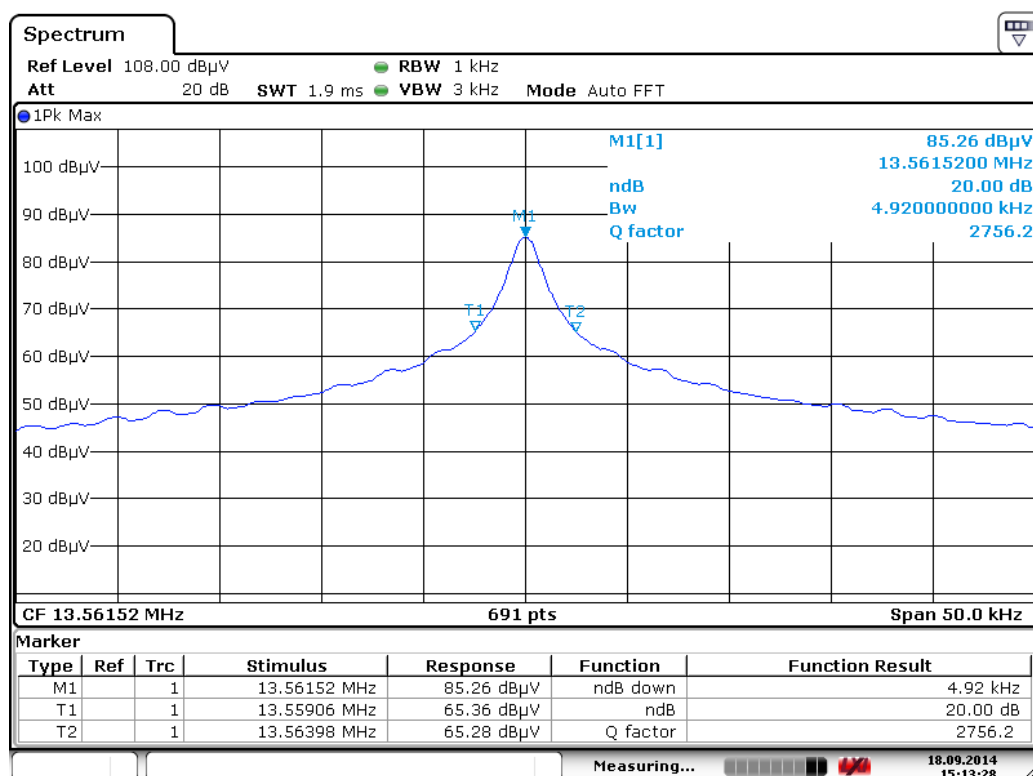
5.4.3. Set RBW of spectrum analyzer to 1 kHz and VBW to 3kHz, Detector function=peak, Trace=max hold, Sweep=auto.

5.4.4. Set the measured low, middle and high frequency and test 20dB bandwidth with spectrum analyzer.

5.5. Test Result

Frequency (MHz)	20 dB Bandwidth (kHz)	Result
13.56	4.92	Pass

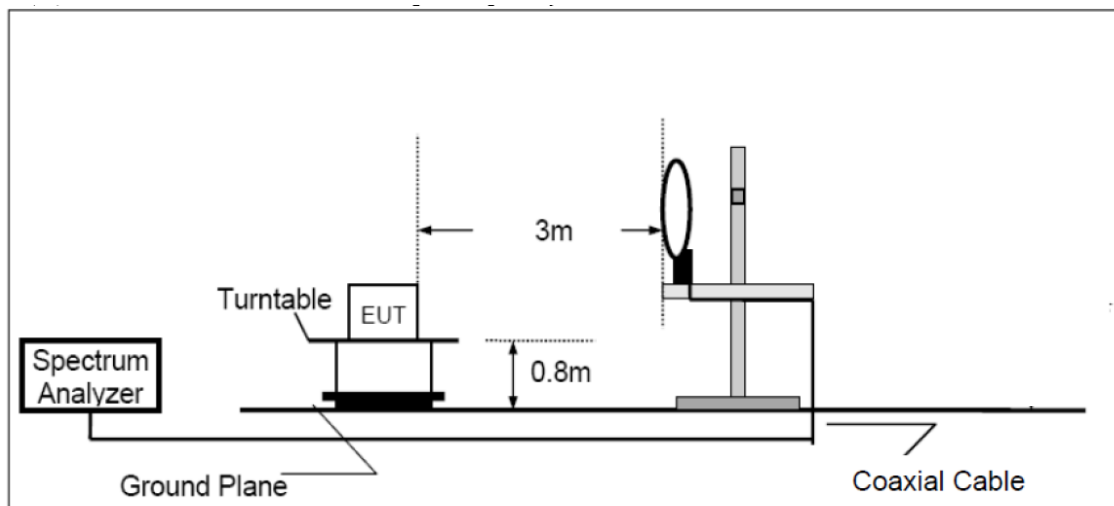
The spectrum analyzer plots are attached as below.



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6. FIELD STRENGTH OF FUNDAMENTAL EMISSION

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.225

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

Freq. of Emission (MHz)	Field Strength (uV/m) at 30m	Field Strength (dBuV/m) at 30m	Field Strength (dBuV/m) at 10m	Field Strength (dBuV/m) at 3m
1.705~13.110	30	29.5	48.58	69.5
13.110~13.410	106	40.5	59.58	80.5
13.410~13.553	334	50.5	69.58	90.5
13.553~13.567	15848	84.0	103.08	124.0
13.567~13.710	334	50.5	69.58	90.5
13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5

6.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4.Operating Condition of EUT

6.4.1.Setup the EUT and simulator as shown as Section 6.1.

6.4.2.Turn on the power of all equipment.

6.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 13.56 MHz.

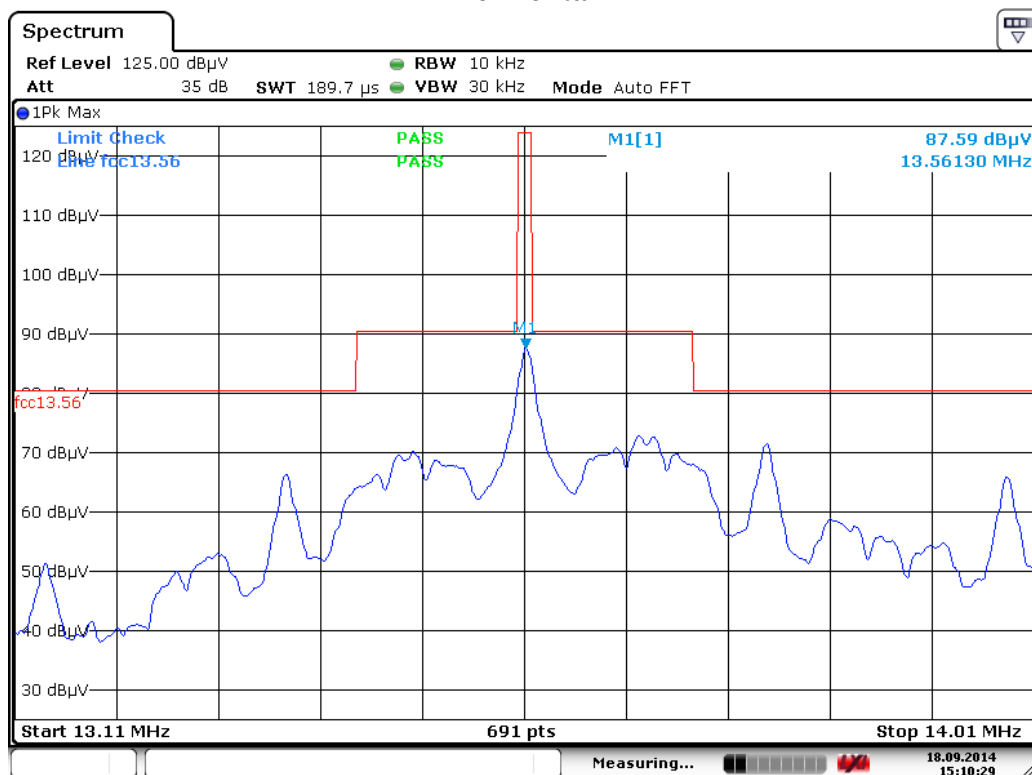
6.5.Test Procedure

- 1 Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested using a spectrum analyzer with RBW set to a 10kHz for the band 13.553~13.567MHz

6.6.Test Result

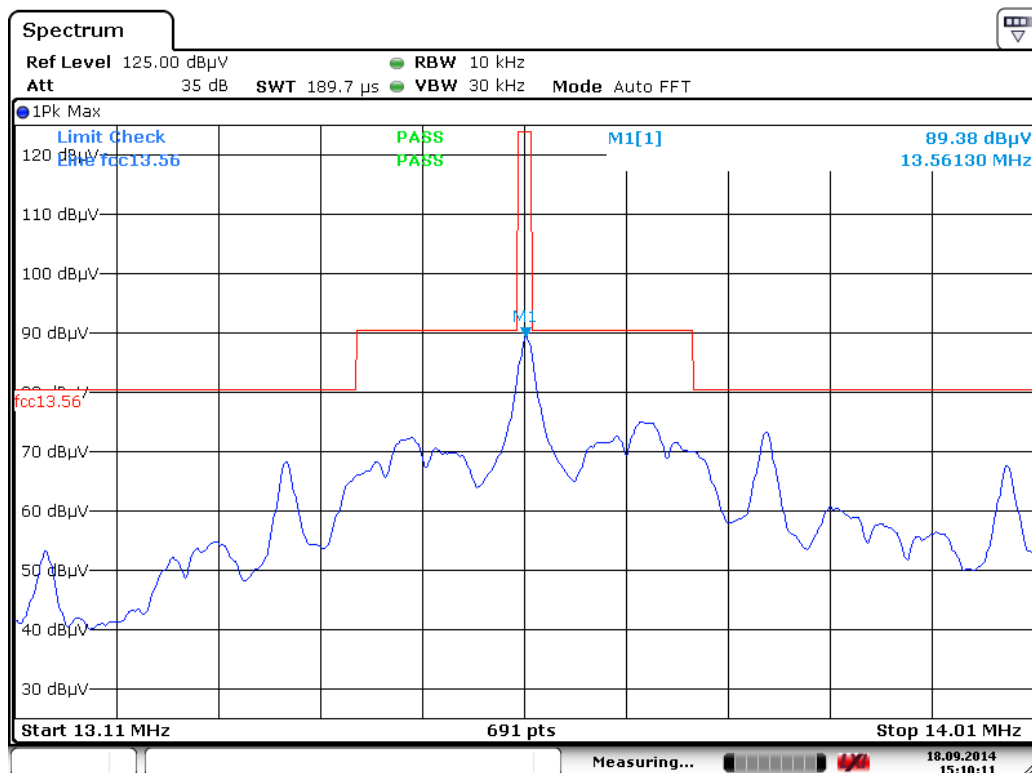
Frequency(MHz)	Reading (dB μ V/m)	Azimuth	Polarity (H/V)	Limit (dB μ V/m)	Margin (dB)
13.56	87.59	153	H	124	-36.41
13.56	89.38	185	V	124	-34.62

Horizontal



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Vertical

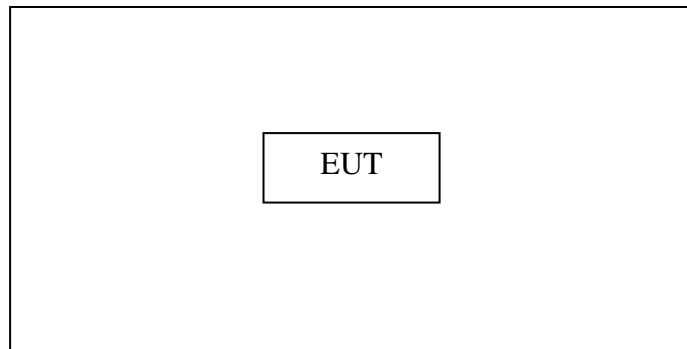


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7. RADIATED SPURIOUS EMISSION TEST

7.1. Block Diagram of Test Setup

7.1.1. Block diagram of connection between the EUT and peripherals

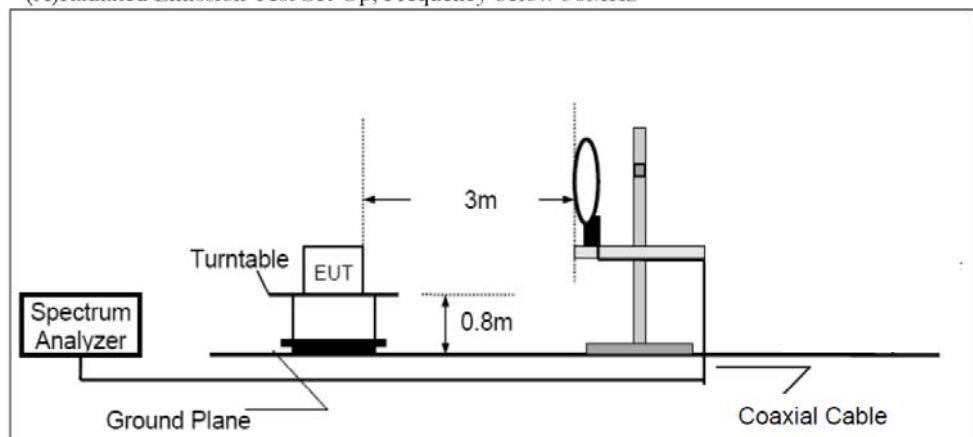


Setup: Transmitting mode

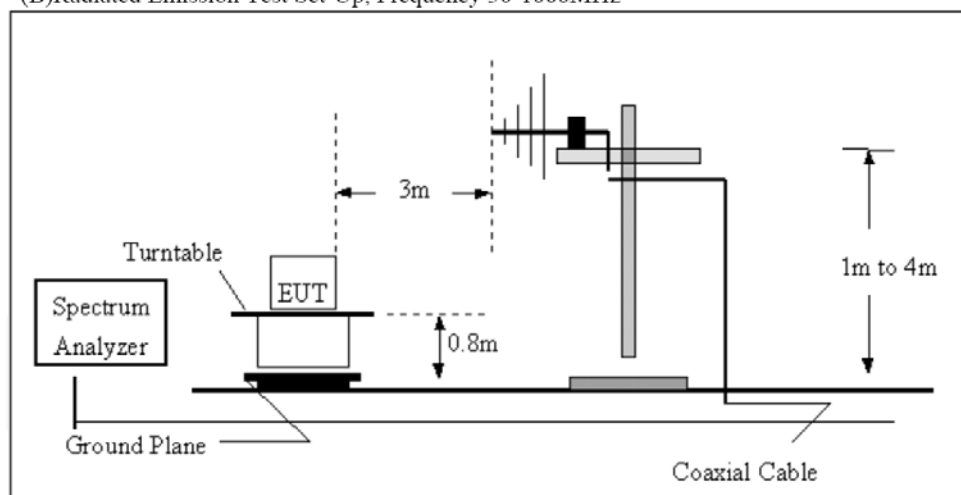
(EUT: SCC-RF-MI-B370)

7.1.2. Semi-Anechoic Chamber Test Setup Diagram

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



(B) Radiated Emission Test Set-Up, Frequency 30-1000MHz



7.2. The Limit For Section 15.209

Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	$2400 / F(\text{KHz})$	300m	$10000 * 2400 / F(\text{KHz})$	$20\log 2400 / F(\text{KHz}) + 80$
0.490 – 1.705	$24000 / F(\text{KHz})$	30m	$100 * 24000 / F(\text{KHz})$	$20\log 24000 / F(\text{KHz}) + 40$
1.705 – 30.00	30	30m	$100 * 30$	$20\log 30 + 40$
30.0 – 88.0	100	3m	100	$20\log 100$
88.0 – 216.0	150	3m	150	$20\log 150$
216.0 – 960.0	200	3m	200	$20\log 200$
Above 960.0	500	3m	500	$20\log 500$

7.3. Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2009 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9 kHz to 25GHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

7.5.The Field Strength of Radiation Emission Measurement Results

From 9kHz to 30MHz

Frequency(MHz)	Quasi Peak (dBμV/m)	Azimuth	Polarity (H/V)	Factors (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2.12	43.00	42	H	-54.15	69.5	-26.83
14.00	36.88	152	H	-52.01	69.5	-32.62
4.27	43.99	201	V	-53.27	69.5	-25.51
18.32	38.89	86	V	-51.25	69.5	-30.61

Part 15 Section 15.31(f)(2) (9kHz-30MHz)

Limit at 3m=Limit at 300m-40*log(300(m)/3(m))

Limit at 3m=Limit at 30m-40*log(30(m)/3(m))

Job No.: wcarry #50

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: SMART CARD READER

Mode: ON

Model: SCC-RF-MI-B370

Manufacturer: LANGZHUO

Polarization: Horizontal

Power Source: DC 5V

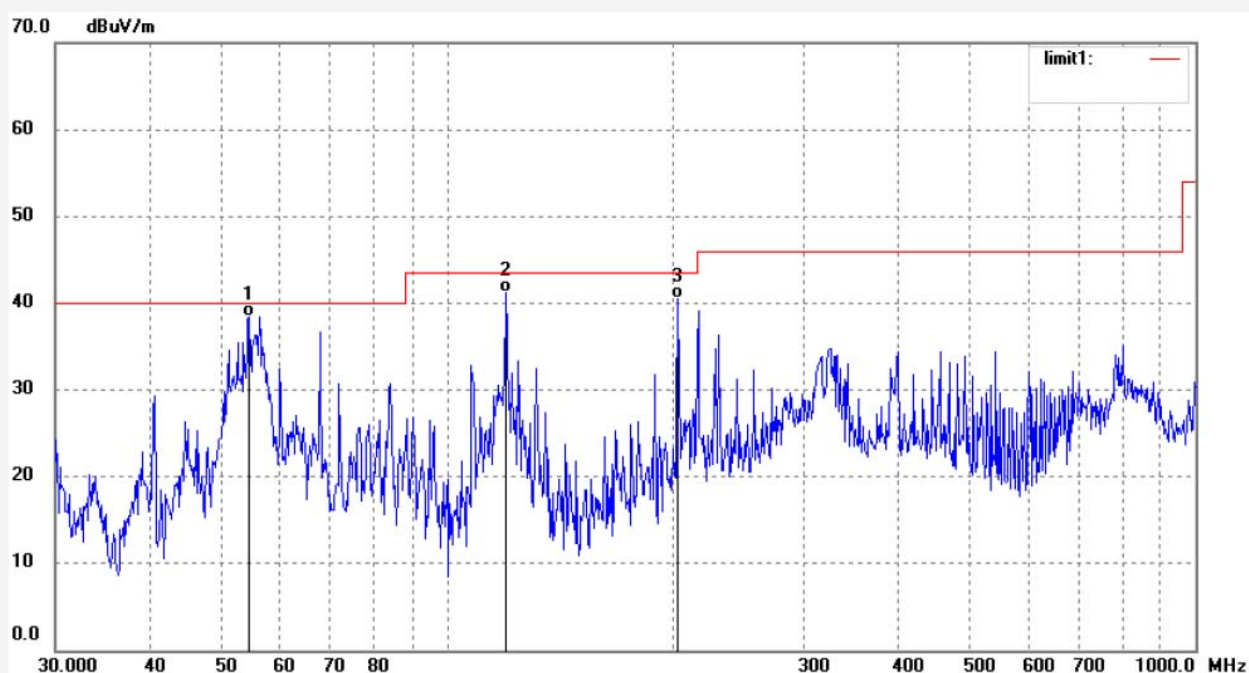
Date: 14/09/13/

Time: 18/17/59

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20141750



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	54.4515	59.38	-20.89	38.49	40.00	-1.51	QP			
2	119.8555	63.75	-22.52	41.23	43.50	-2.27	QP			
3	203.5226	60.58	-20.11	40.47	43.50	-3.03	QP			

**ACCURATE TECHNOLOGY CO., LTD.**F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: wcarry #49

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: SMART CARD READER

Mode: ON

Model: SCC-RF-MI-B370

Manufacturer: LANGZHUO

Polarization: Vertical

Power Source: DC 5V

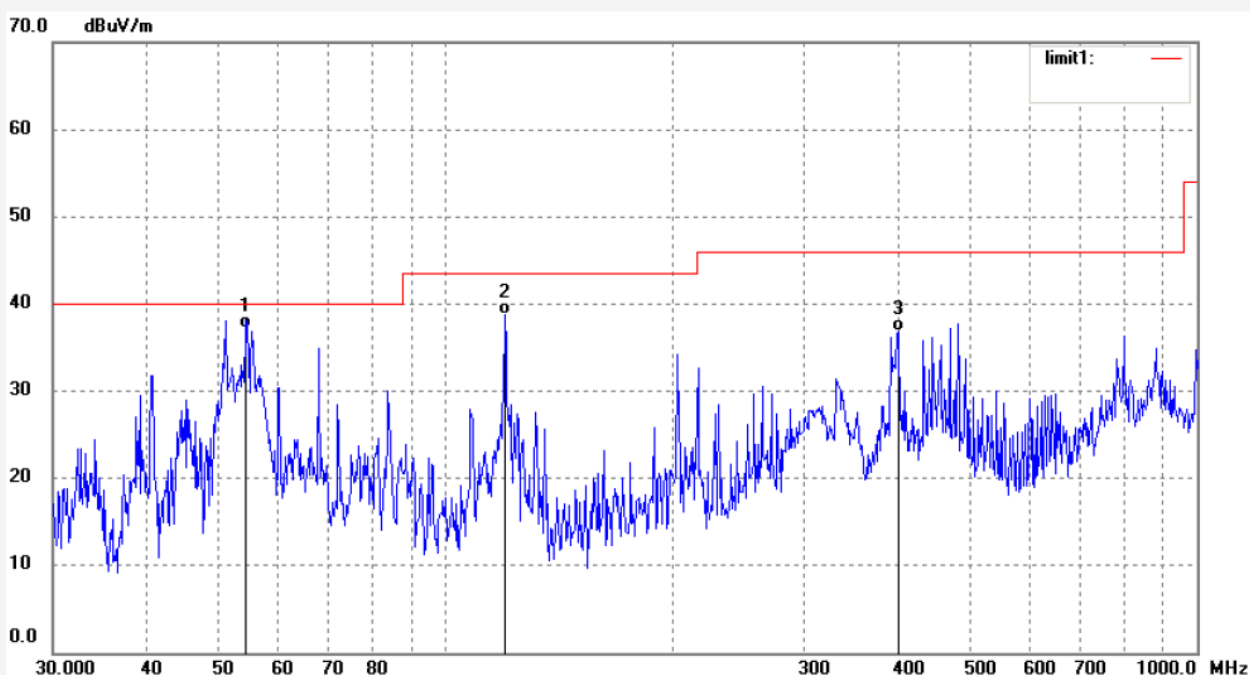
Date: 14/09/13/

Time: 18/16/21

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20141750



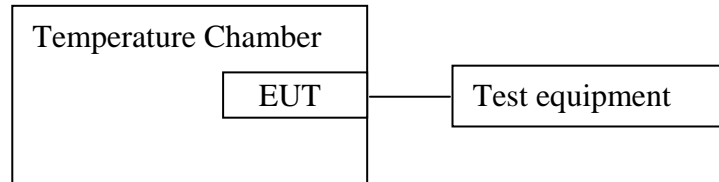
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	54.2610	58.10	-20.89	37.21	40.00	-2.79	QP			
2	119.8555	61.21	-22.52	38.69	43.50	-4.81	QP			
3	400.4318	52.40	-15.63	36.77	46.00	-9.23	QP			

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. *: Denotes restricted band of operation.
3. The EUT is tested radiation emission in three axes.

8. FREQUENCY STABILITY

8.1. Block Diagram of Test Setup



8.2. The Limit For Section 15.225(e)

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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.

8.3. Operating Condition of EUT

8.3.1. Setup the EUT and simulator as shown as Section 8.1.

8.3.2. Turn on the power of all equipment.

8.3.3. Let the EUT work in Test modes measure it. The test frequency are 13.56MHz.

8.4. Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

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

8.5. Test Result

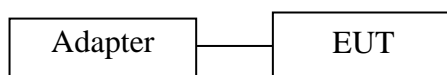
Pass.

Channel frequency = 13.56 MHz				
Temperature (OC)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-20	5.0	122	9.00	100
-10		134	9.88	100
0		84	6.19	100
10		32	2.36	100
20		12	0.88	100
30		27	1.99	100
40		38	2.80	100
50		124	9.14	100
20	4.25	20	1.47	100
	5.75	30	2.21	100

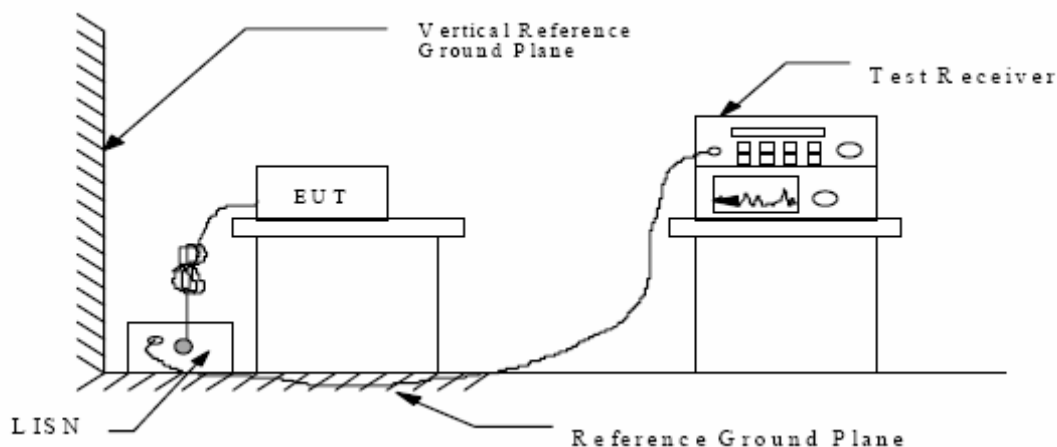
9. AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A)

9.1. Block Diagram of Test Setup

9.1.1. Block diagram of connection between the EUT and simulators



9.1.2. Shielding Room Test Setup Diagram



9.2. The Emission Limit

9.2.1. Conducted Emission Measurement Limits According to Section 15.207(a)

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

* Decreases with the logarithm of the frequency.

9.3.Configuration of EUT on Measurement

The equipment are installed on the Conducted Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4.Operating Condition of EUT

9.4.1.Setup the EUT and simulator as shown as Section 11.1.

9.4.2.Turn on the power of all equipment.

9.4.3. Let the EUT work in normal mode measure it.

9.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

9.6.Power Line Conducted Emission Measurement Results

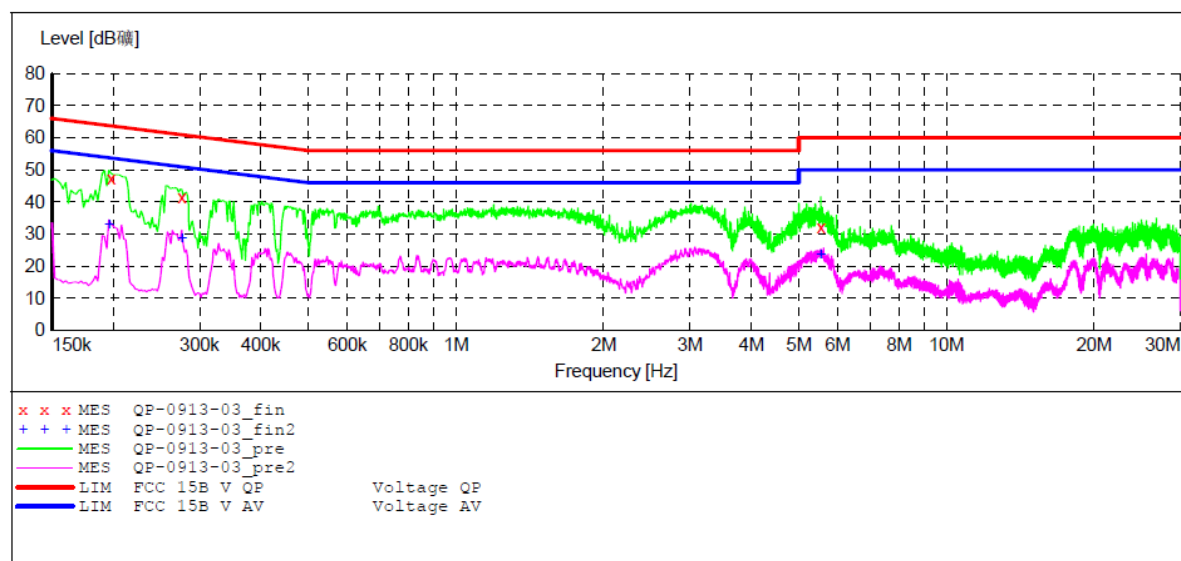
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: SMART CARD READER M/N:SCC-RF-MI-B370
 Manufacturer: LANGZHUO
 Operating Condition: ON
 Test Site: 2#Shielding Room
 Operator: Carry
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20141750
 Start of Test: 2014-9-13 / 20:10:57

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz LISN (ESH3-Z5)
 Average



MEASUREMENT RESULT: "QP-0913-03_fin"

2014-9-13 20:13

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.198000	47.20	10.6	64	16.5	QP	L1	GND
0.276000	41.50	10.9	61	19.4	QP	L1	GND
5.546000	32.00	11.8	60	28.0	QP	L1	GND

MEASUREMENT RESULT: "QP-0913-03_fin2"

2014-9-13 20:13

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.196000	32.70	10.6	54	21.1	AV	L1	GND
0.276000	28.60	10.9	51	22.3	AV	L1	GND
5.546000	23.60	11.8	50	26.4	AV	L1	GND

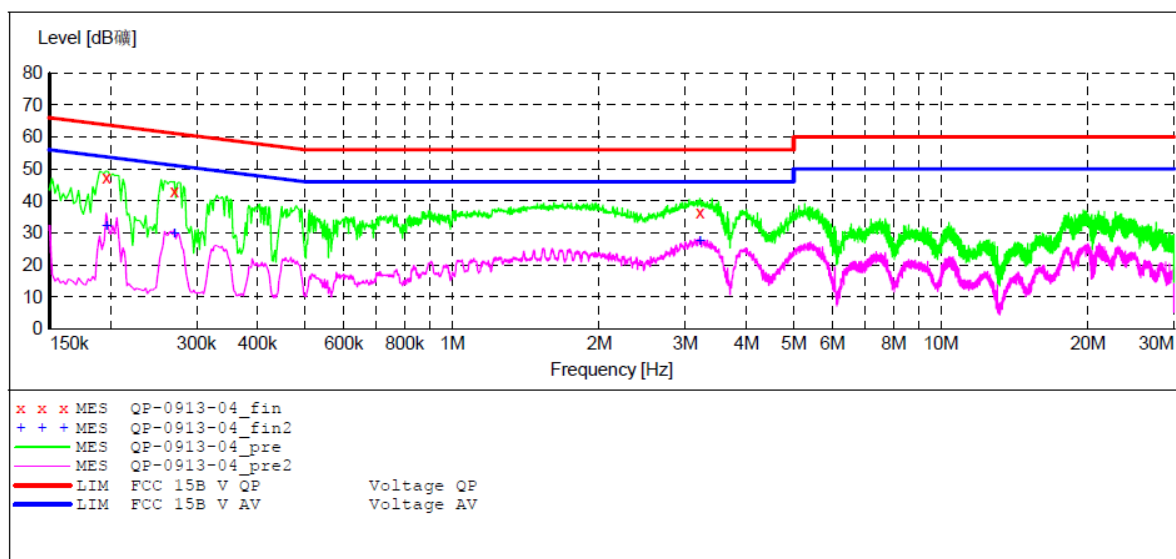
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: SMART CARD READER M/N:SCC-RF-MI-B370
 Manufacturer: LANGZHUO
 Operating Condition: ON
 Test Site: 2#Shielding Room
 Operator: Carry
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20141750
 Start of Test: 2014-9-13 / 20:13:49

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz LISN (ESH3-Z5)
 Average



MEASUREMENT RESULT: "QP-0913-04_fin"

2014-9-13 20:16

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.196000	47.40	10.6	64	16.4	QP	N	GND
0.270000	42.90	10.9	61	18.2	QP	N	GND
3.215000	36.30	11.7	56	19.7	QP	N	GND

MEASUREMENT RESULT: "QP-0913-04_fin2"

2014-9-13 20:16

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.196000	32.00	10.6	54	21.8	AV	N	GND
0.270000	29.70	10.9	51	21.4	AV	N	GND
3.215000	27.30	11.7	46	18.7	AV	N	GND

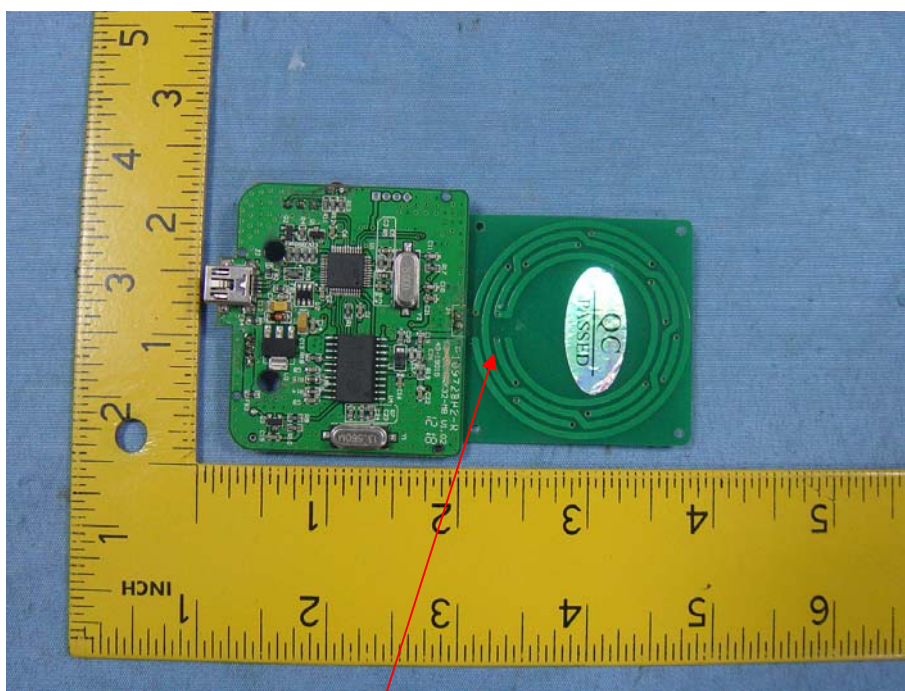
10.ANTENNA REQUIREMENT

10.1.The Requirement

According to 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.

10.2.Antenna Construction

Device is equipped with unique antenna, which isn't displaced by other antenna. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna