TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15C

TEST REPORT

For

TONGFANG R.I.A COMPANY LIMITED

Room 2002, 20F, Building 4, Yard 1, Wangzhuang Road, Haidian District, Beijing, P.R. China

FCC ID: 2AU3PTF-DF6200

Report Type:	Product Type:
Original Report	Access Control Card Reader

Report Number:	RBJ191106050-00
Report Date:	2019-11-26
Reviewed By:	Gavin Xu RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

EUT Name:	Access Control Card Reader
EUT Model:	TF-DF6200
Operation Frequency:	13.56MHz
Modulation Type:	ASK
Rated Input Voltage:	DC 9-24V
Serial Number:	RBJ191106050-RF-S4
EUT Received Date:	2019/11/11
EUT Received Status:	Good

Objective

This type approval report is prepared on behalf of ***TONGFANG R.I.A COMPANY LIMITED*** in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communications Commission's rules

The objective is to determine the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209, 15.215 and 15.225.

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

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

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
radiated Emissions	9kHz~30MHz: 4.12dB 30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△ ". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode.

EUT Exercise Software

No software used in test.

Equipment Modifications

No modification was made to the EUT.

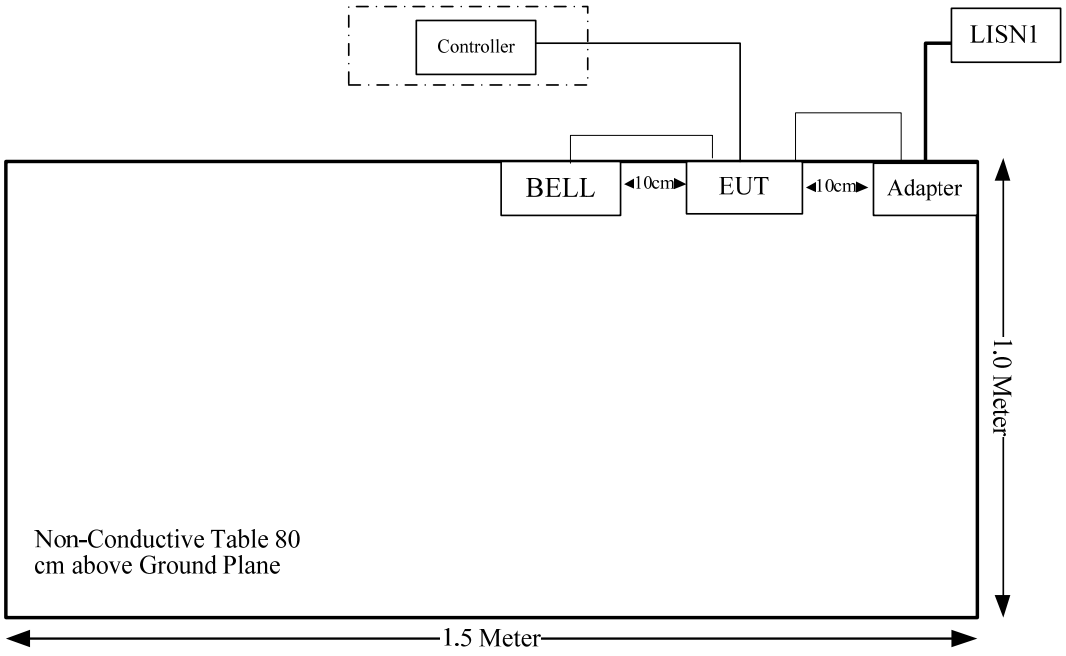
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
JUKE	Adapter	JK120100S37EUVD	/
HEYI	BELL	/	/
TONGFANG	Controller	/	/

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
Serial Cable	No	No	1.2	D0,D1 Port of EUT	Controller
Power Cable	No	No	1.2	Adapter	+12V,GND Port of EUT
Serial Cable	No	No	0.4	BELL Port of EUT	BELL

Block Diagram of Test Setup



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)	20 dB Bandwidth	Compliance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connected Construction

The EUT has one integral antenna arrangement, which was permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

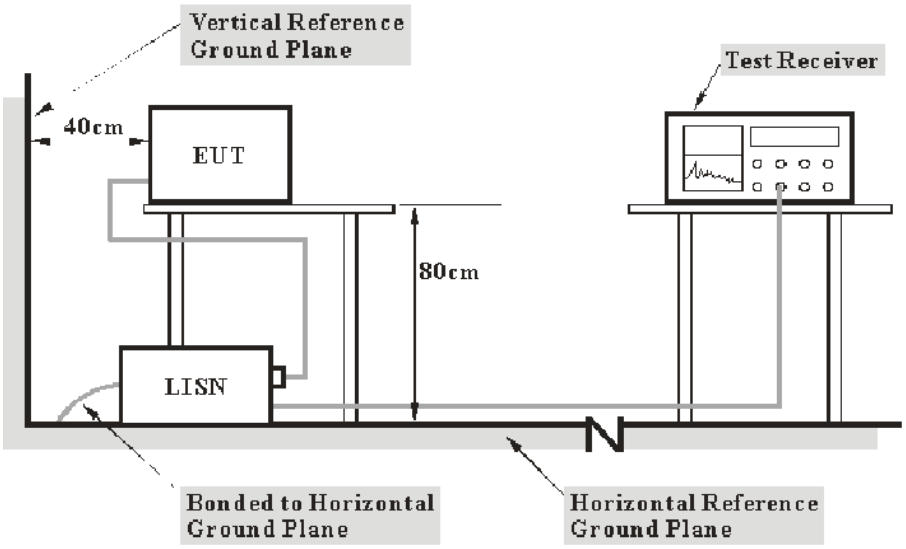
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

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 setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main LISN with an AC 120V/60Hz 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
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-09-12	2020-09-12
R&S	EMI Test Receiver	ESCI	101121	2019-05-09	2020-05-09

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

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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

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

According FCC publication number 174176,for a device with a permanent antenna operating at or below 30 MHz, the measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$

Herein,
V_C: corrected voltage amplitude
V_R: reading voltage amplitude

A_c: attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB 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.

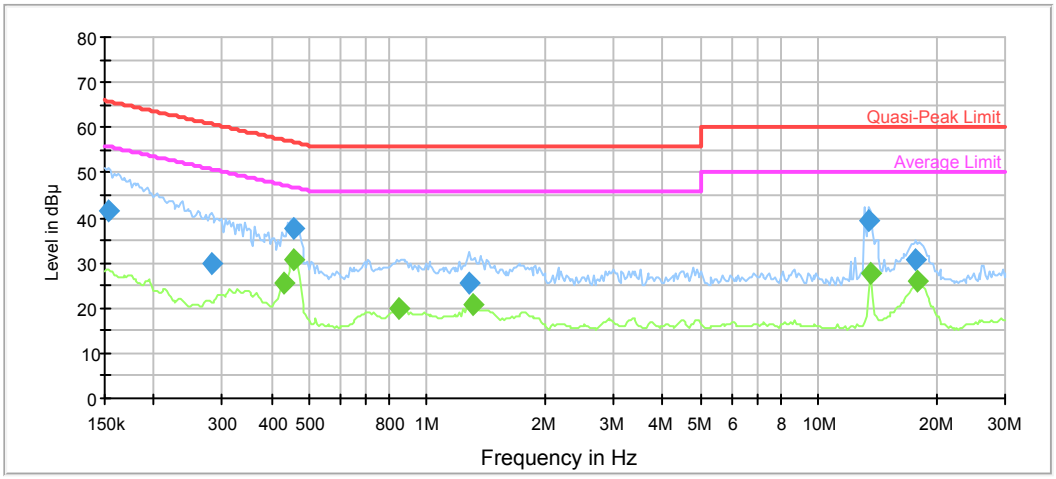
Test Data

Environmental Conditions

Temperature:	25.8 °C
Relative Humidity:	44 %
ATM Pressure:	100.5 kPa
Tester:	Sern Xiang
Test Date:	2019-11-19

Test Mode: Transmitting

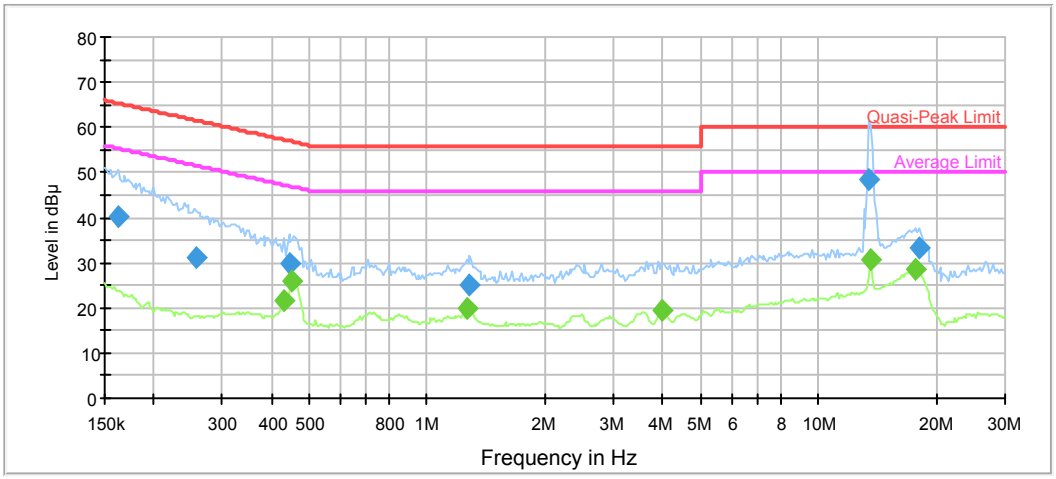
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.153015	41.5	9.000	L1	11.1	24.3	65.8
0.280762	29.9	9.000	L1	10.2	30.9	60.8
0.457178	37.6	9.000	L1	9.9	19.1	56.7
1.274051	25.6	9.000	L1	9.8	30.4	56.0
13.469532	39.5	9.000	L1	9.9	20.5	60.0
17.797171	30.7	9.000	L1	10.0	29.3	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	25.4	9.000	L1	9.9	21.8	47.2
0.457178	30.8	9.000	L1	9.9	15.9	46.7
0.847248	20.1	9.000	L1	9.8	25.9	46.0
1.312656	20.6	9.000	L1	9.8	25.4	46.0
13.604227	27.6	9.000	L1	9.9	22.4	50.0
17.975142	25.8	9.000	L1	10.0	24.2	50.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.162429	40.3	9.000	N	11.0	25.0	65.3
0.256712	31.1	9.000	N	10.3	30.4	61.5
0.443733	29.7	9.000	N	9.9	27.3	57.0
1.286792	25.1	9.000	N	9.8	30.9	56.0
13.469532	48.6	9.000	N	9.9	11.4	60.0
18.154894	33.3	9.000	N	10.0	26.7	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	21.4	9.000	N	9.9	25.8	47.2
0.452652	25.9	9.000	N	9.9	20.9	46.8
1.261437	19.8	9.000	N	9.8	26.2	46.0
4.000782	19.5	9.000	N	9.8	26.5	46.0
13.604227	30.5	9.000	N	9.9	19.5	50.0
17.797171	28.7	9.000	N	10.0	21.3	50.0

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

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.

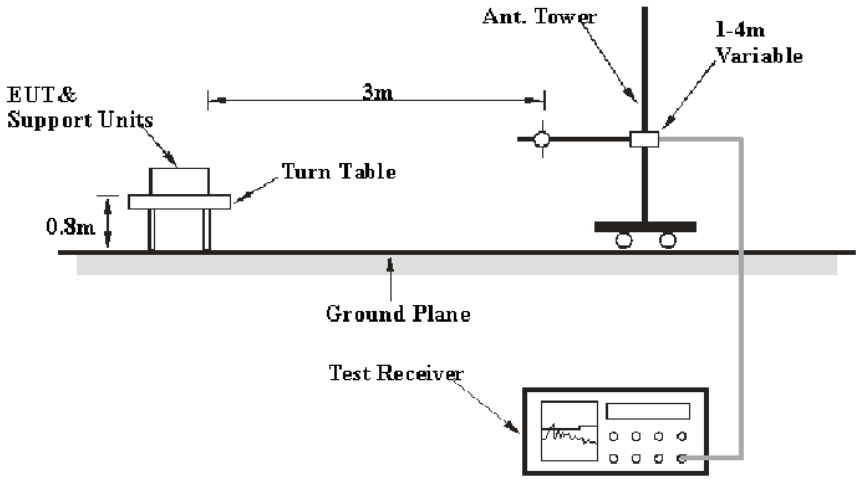
As per FCC Part 15.209

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

EUT Setup



The radiated emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 1 GHz.

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

Frequency Range	RBW	Video B/W	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	QP
150 kHz – 30 MHz	9 kHz	30 kHz	QP
30 MHz – 1000 MHz	120 kHz	300 kHz	QP

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP measurement

Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit - Corr. Ampl.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, 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&15.225.

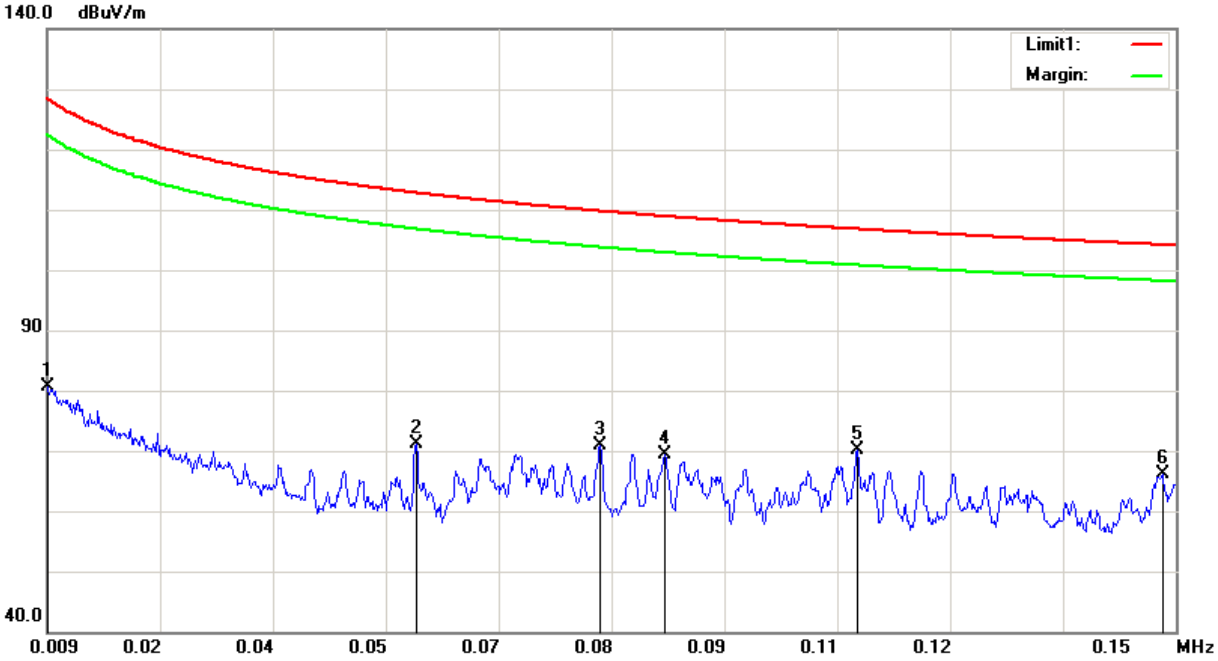
Test Data

Environmental Conditions

Test Items	Radiation emission
Temperature:	25.9 °C
Relative Humidity:	43%
ATM Pressure:	101.2 kPa
Tester:	Tyler Pan
Test Date:	2019-11-16

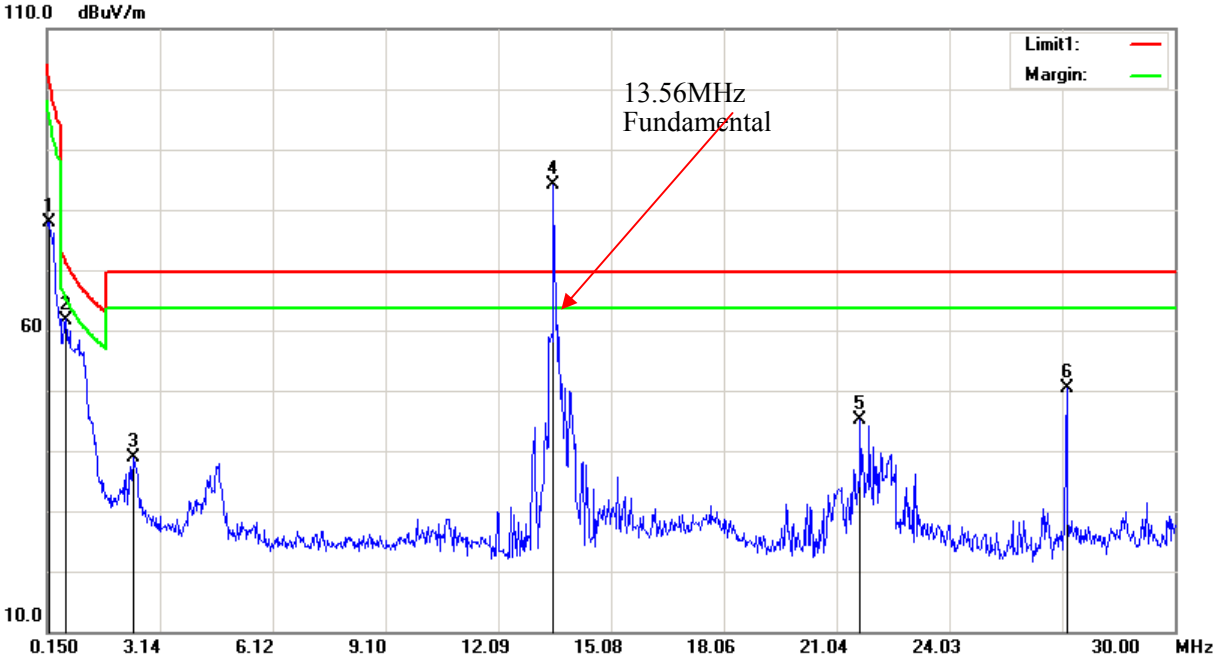
Test mode: Transmitting

1) 9 kHz~150kHz:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.0090	-8.07	peak	88.67	80.60	128.52	47.92
0.0551	-1.49	peak	72.67	71.18	112.78	41.60
0.0781	2.09	peak	68.90	70.99	109.75	38.76
0.0861	1.61	peak	67.85	69.46	108.90	39.44
0.1102	3.95	peak	66.23	70.18	106.76	36.58
0.1482	2.13	peak	64.06	66.19	104.18	37.99

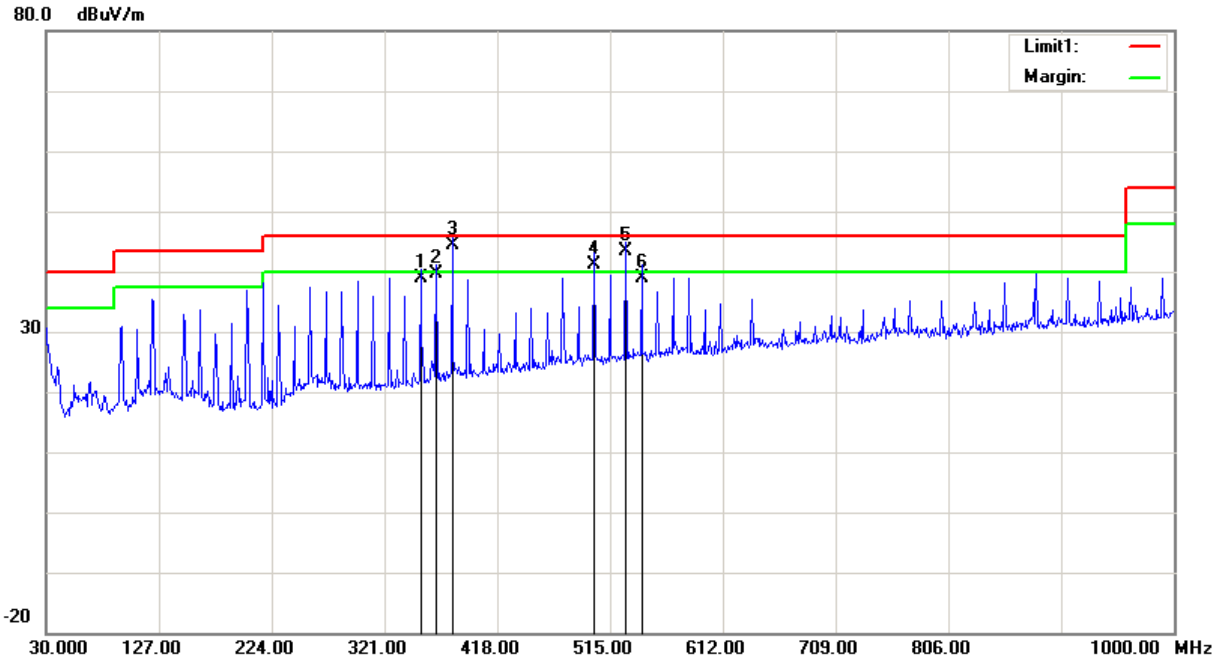
2) 150 kHz~30MHz:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.2097	43.25	peak	34.74	77.99	101.17	23.18
0.6575	36.24	peak	25.29	61.53	71.24	9.71
2.4186	23.69	peak	15.08	38.77	69.54	30.77
21.6720	36.04	peak	9.07	45.11	69.54	24.43
27.1344	41.41	peak	8.91	50.32	69.54	19.22

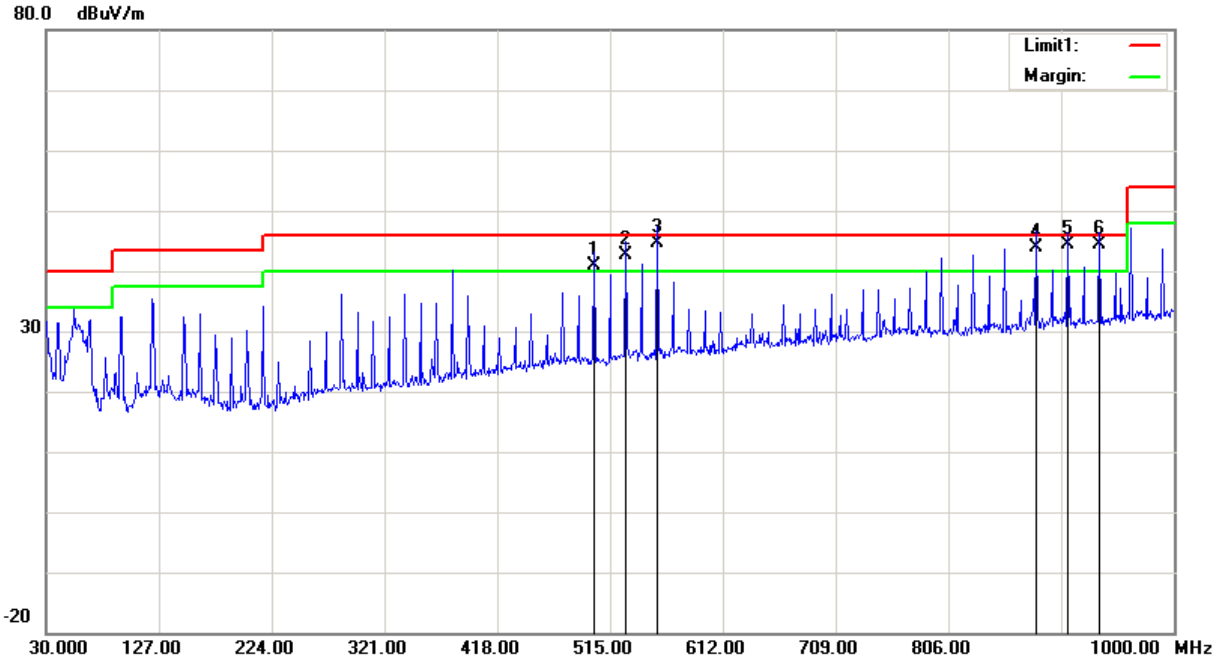
3)30MHz-1GHz

Horizontal



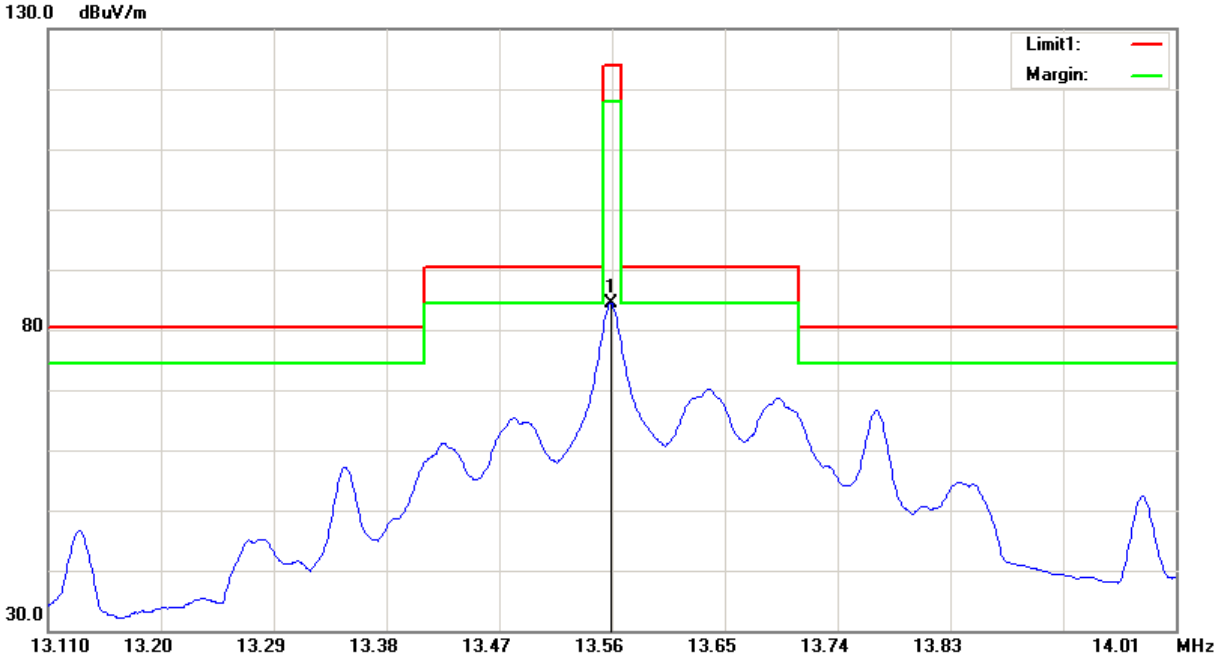
Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
352.0400	41.75	QP	-2.99	38.76	46.00	7.24
365.6200	42.33	QP	-2.81	39.52	46.00	6.48
379.2000	46.95	QP	-2.58	44.37	46.00	1.63
501.4200	41.54	QP	-0.32	41.22	46.00	4.78
528.5800	42.99	QP	0.34	43.33	46.00	2.67
542.1600	38.65	QP	0.31	38.96	46.00	7.04

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
501.4200	41.23	QP	-0.32	40.91	46.00	5.09
528.5800	42.24	QP	0.34	42.58	46.00	3.42
555.7400	44.33	QP	0.41	44.74	46.00	1.26
881.6600	44.32	QP	-0.37	43.95	46.00	2.05
908.8200	44.04	QP	0.24	44.28	46.00	1.72
935.9800	43.54	QP	0.76	44.30	46.00	1.70

3) Emission Mask



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13.56	75.04	peak	9.36	84.40	124.00	39.60

FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

As per FCC Part 15.225:

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 an external DC power.

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 DC power supply Source. The voltage was set to the end point of the battery. The output frequency was recorded for each voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019-03-26	2020-03-26
UNI-T	Multimeter	UT39A	M130199938	2019-07-24	2020-07-24
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

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

Test Data

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	57%
ATM Pressure:	101.2 kPa
Tester:	Tyler Pan
Test Date:	2019-11-16

Test Mode: Transmitting

Test Result: Pass

f_o = 13.56 MHz				
Temperature	**Voltage**	**Measured frequency**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**MHz**	**Hz**	**Hz**
-25	12	13.5591	-900	±1356
-20		13.5590	-1000	±1356
-10		13.5589	-1100	±1356
0		13.5596	-400	±1356
10		13.5589	-1100	±1356
20		13.5589	-1100	±1356
25		13.5590	-1000	±1356
30		13.5588	-1200	±1356
40		13.5591	-900	±1356
50		13.5590	-1000	±1356
60		13.5589	-1100	±1356
20	9	13.5592	-800	±1356
20	24	13.5594	-600	±1356

FCC §15.215(c)– 20 dB BANDWIDTH TESTING

Applicable Standard

Per FCC §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 Procedure

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05

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

Test Data

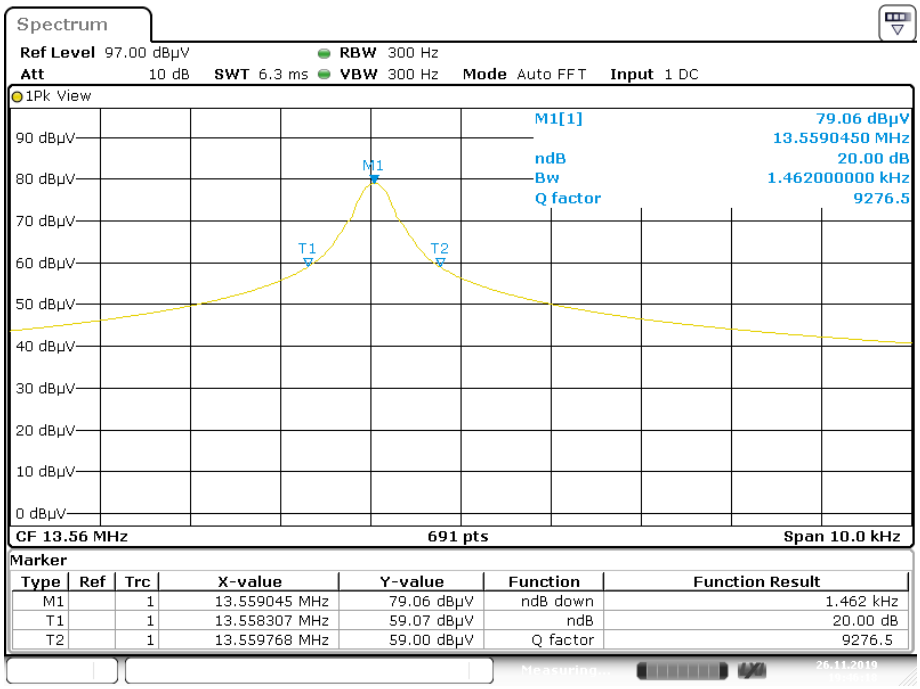
Environmental Conditions

Temperature:	26 °C
Relative Humidity:	57%
ATM Pressure:	101.2 kPa
Tester:	Tyler Pan
Test Date:	2019-11-26

Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	1.462

20 dB Bandwidth



Date: 26.NOV.2019 19:46:19

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