TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15C

TEST REPORT

For

Ingenico Inc.

101 Federal Street, Suite 700, Boston, MA, 02110 United States

FCC ID: 2ABY6-MOB55A

Report Type:	Product Name:
Original Report	Mobile Payment Terminal

Report Number:	RXM190322051-00D
Report Date:	2019-04-23
Reviewed By:	Jerry Zhang EMC Manager
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:	Mobile Payment Terminal
EUT Model:	Moby/5500
FCC ID:	2ABY6-MOB55A
Operating frequency:	13.56MHz
Modulation Type:	ASK
Rated Input Voltage:	DC 3.7V from battery or DC5V from USB port
External Dimension:	77mm(L)*54mm(W)*16mm(H)
Serial Number:	190322051
EUT Received Date:	2019.3.25

Objective

This Type approval report is prepared on behalf of *Ingenico Inc.* 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.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS & DTS submissions with FCC ID: 2ABY6-MOB55A.

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)

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.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode

EUT Exercise Software

No software used in test.

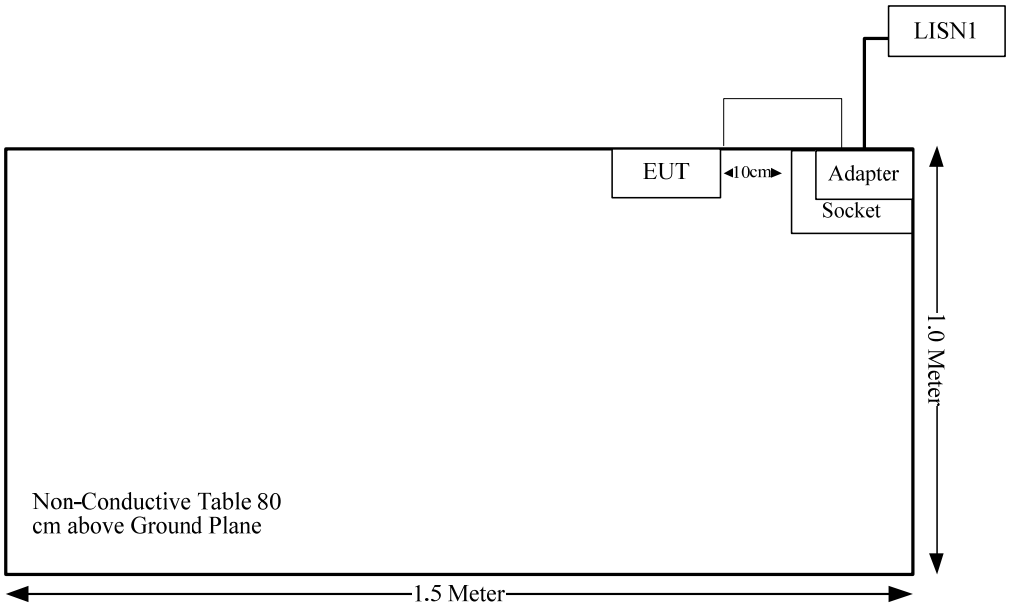
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
HUAWEI	Adapter	KA25-0501000US	N/A

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
USB Cable	Yes	No	1	Adapter	EUT

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

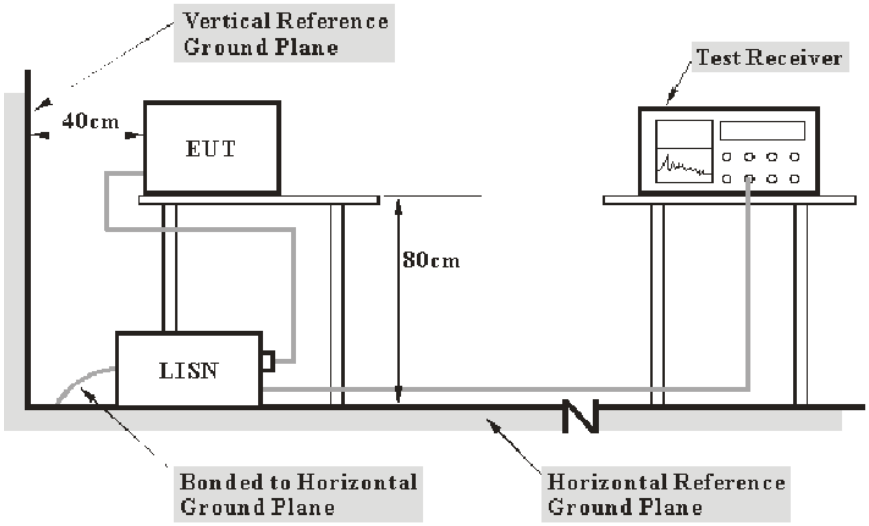
Result: Compliance.

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.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC 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 Procedure

During the conducted emission test, the adapter was connected to the first 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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2018-12-11	2019-12-11
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2018-12-08	2019-12-08

*** 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

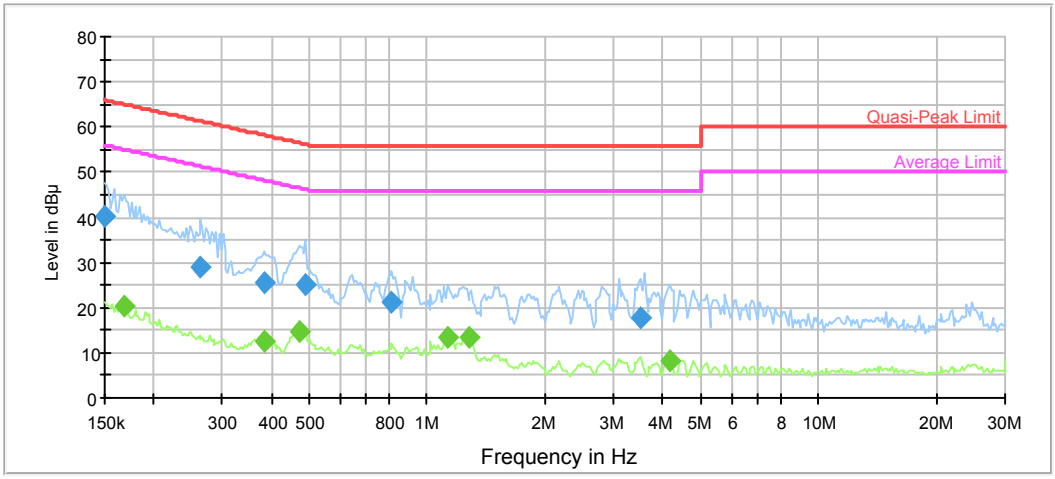
Environmental Conditions

Temperature:	26.7 °C
Relative Humidity:	67 %
ATM Pressure:	101.4 kPa

The testing was performed by Lily Xie on 2019-03-29.

Test Mode: RFID transmitting

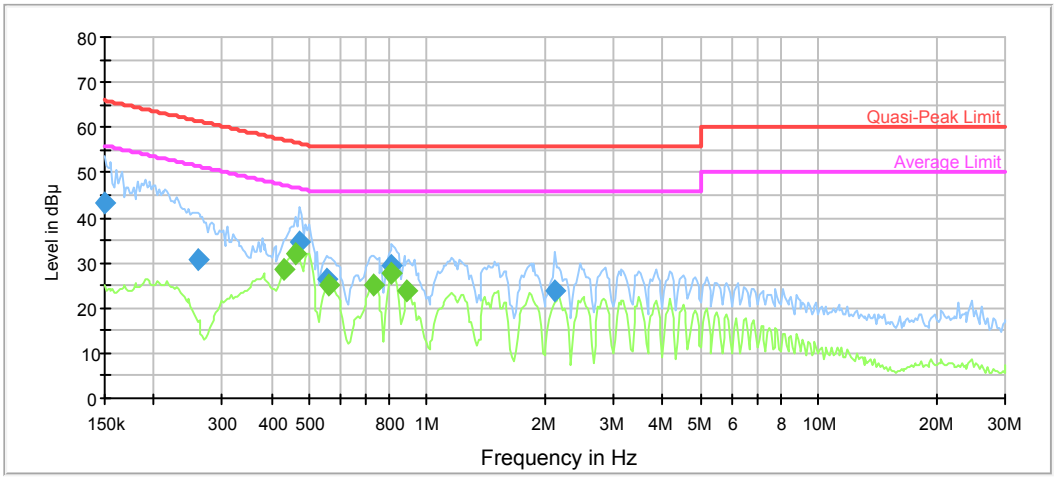
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	40.4	9.000	L1	11.2	25.6	66.0	Compliance
0.264490	28.8	9.000	L1	10.3	32.5	61.3	Compliance
0.382209	25.7	9.000	L1	10.0	32.5	58.2	Compliance
0.490157	25.3	9.000	L1	9.9	30.9	56.2	Compliance
0.814189	21.1	9.000	L1	9.8	34.9	56.0	Compliance
3.515338	17.5	9.000	L1	9.8	38.5	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.167350	20.1	9.000	L1	10.9	34.9	55..	Compliance
0.382209	12.5	9.000	L1	10.0	35.7	48.2	Compliance
0.471031	14.9	9.000	L1	9.9	31.6	46.5	Compliance
1.130656	13.2	9.000	L1	9.8	32.8	46.0	Compliance
1.286792	13.5	9.000	L1	9.8	32.5	46.0	Compliance
4.163230	8.1	9.000	L1	9.8	37.9	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	43.2	9.000	N	11.2	22.8	66.0	Compliance
0.259279	30.8	9.000	N	10.3	30.7	61.5	Compliance
0.471031	34.6	9.000	N	9.9	21.9	56.5	Compliance
0.552321	26.3	9.000	N	9.8	29.7	56.0	Compliance
0.814189	29.4	9.000	N	9.8	26.6	56.0	Compliance
2.116299	23.7	9.000	N	9.8	32.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.430682	28.4	9.000	N	9.9	18.8	47.2	Compliance
0.461750	32.0	9.000	N	9.9	14.7	46.7	Compliance
0.557844	25.0	9.000	N	9.8	21.0	46.0	Compliance
0.729777	25.1	9.000	N	9.8	20.9	46.0	Compliance
0.814189	27.6	9.000	N	9.8	18.4	46.0	Compliance
0.890466	23.6	9.000	N	9.8	22.4	46.0	Compliance

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

Applicable Standard

FCC Part 15.205, 15.209, 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.

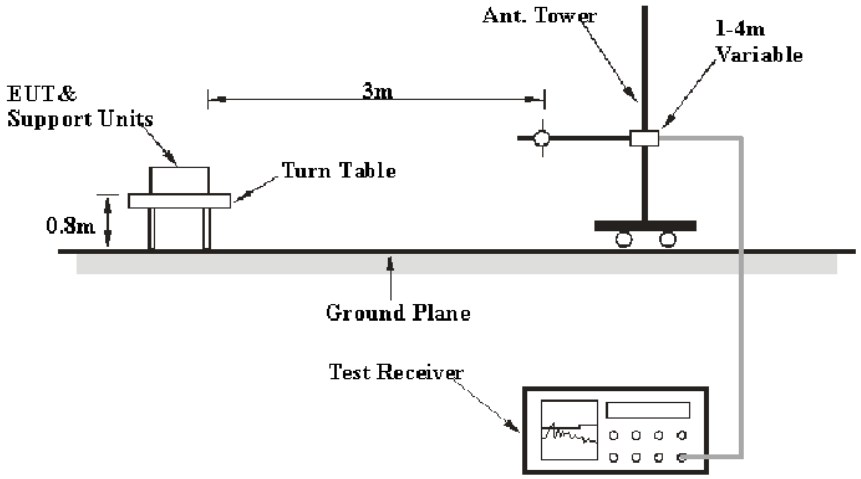
As per FCC Part 15.209

(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 Part Subpart C 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	Measurement
9 kHz – 150 kHz	200 Hz	1 kHz	QP/AV
150 kHz – 30 MHz	9 kHz	30 kHz	QP/AV
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/Average 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
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	EMI Test Receiver	ESCI	100224	2018-12-11	2019-12-11
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Farad	Test Software	EZ-EMC	V1.1.4.2	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 Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209&15.225.

Test Data

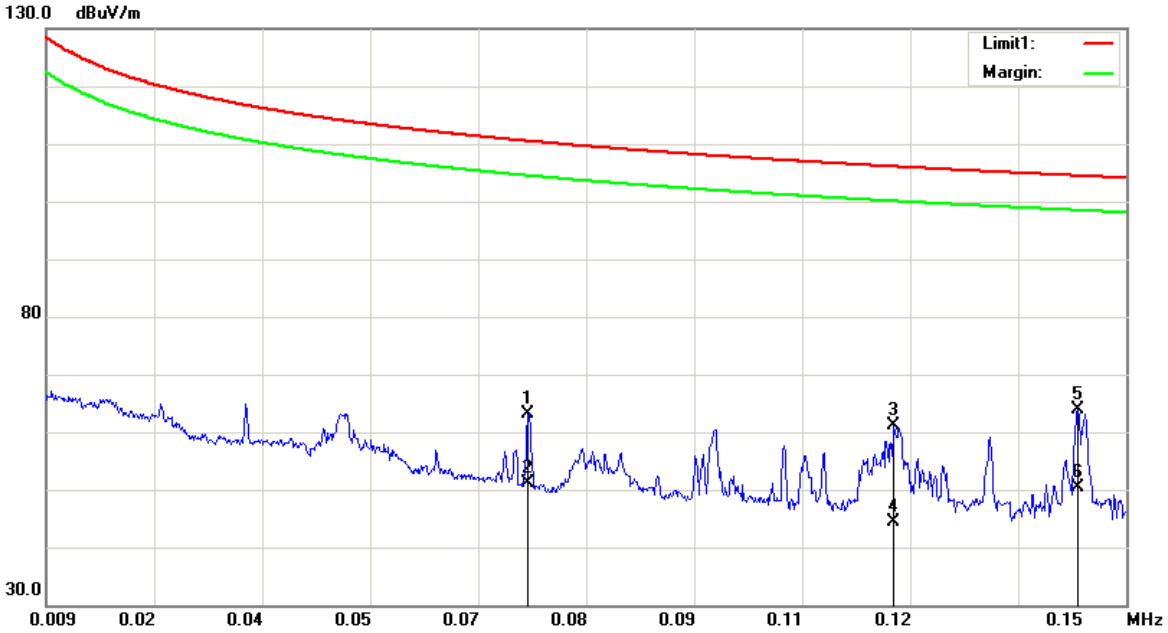
Environmental Conditions

Temperature:	26.8~27.2 °C
Relative Humidity:	40~41 %
ATM Pressure:	99.5~99.9 kPa

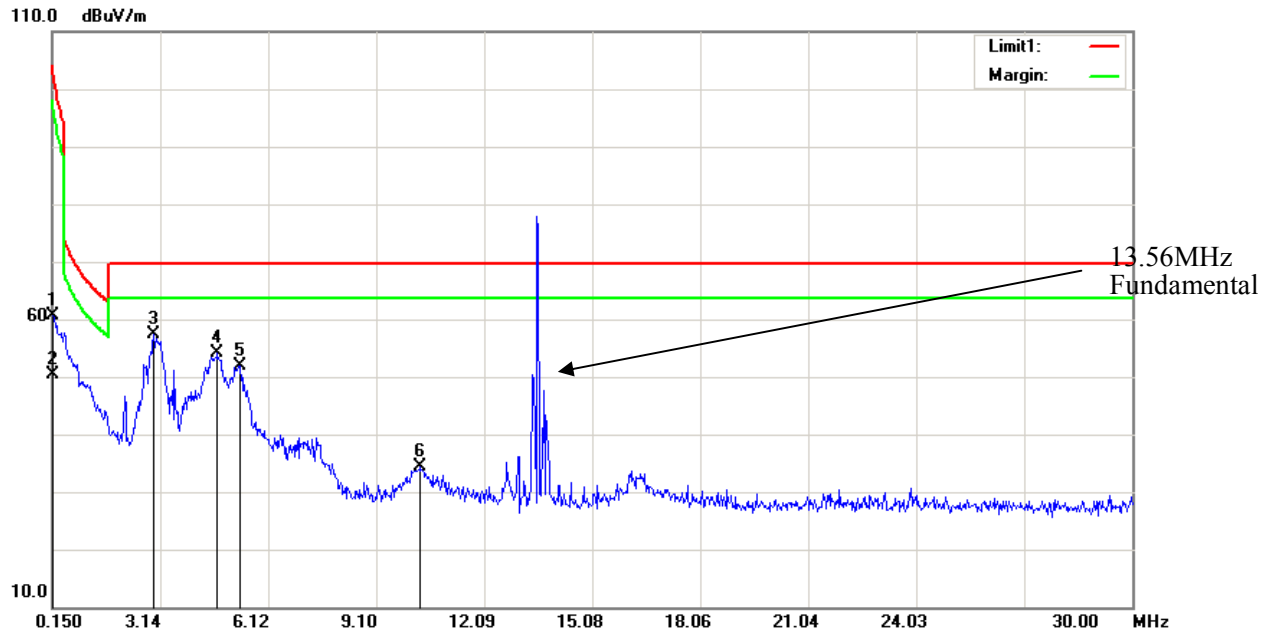
** The testing was performed by Vern Shen from 2019-03-28 to 2019-03-29.*

Test mode: Transmitting

1) 9 kHz~30MHz:

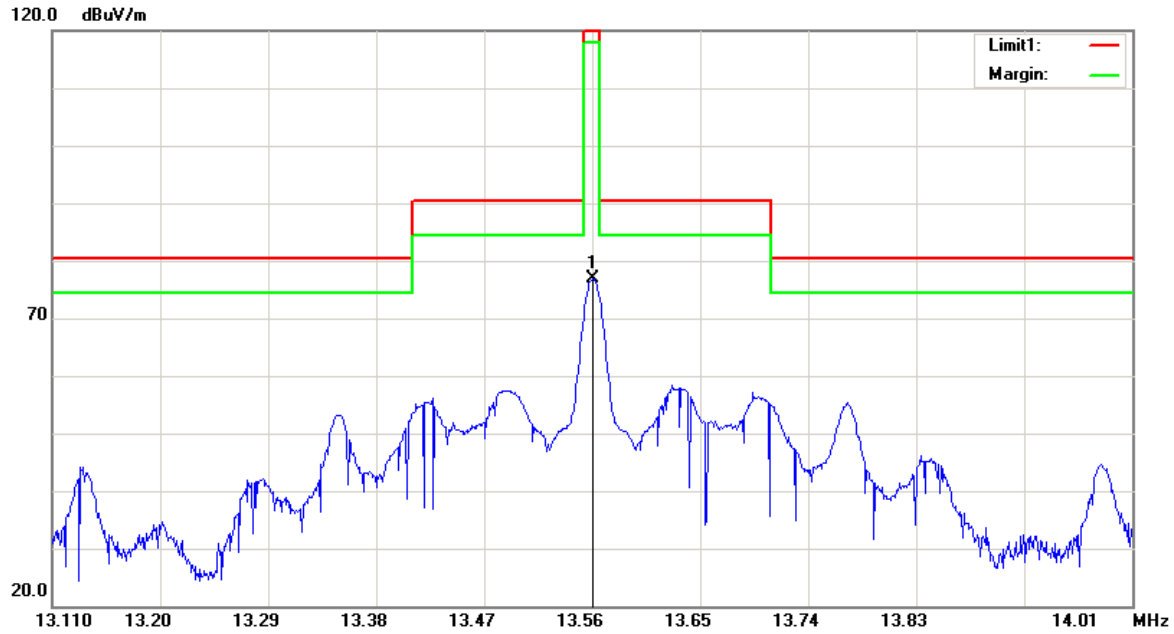


Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.0720	-6.49	peak	69.57	63.08	110.46	47.38
0.0720	-18.47	AVG	69.57	51.10	110.46	59.36
0.1197	20.43	peak	40.76	61.19	106.04	44.85
0.1197	3.64	AVG	40.76	44.40	106.04	61.64
0.1436	24.72	peak	39.07	63.79	104.46	40.67
0.1436	11.33	AVG	39.07	50.40	104.46	54.06



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.1797	24.14	peak	36.53	60.67	102.51	41.84
0.1797	13.87	AVG	36.53	50.40	102.51	52.11
2.9558	43.90	peak	13.55	57.45	69.54	12.09
4.7171	43.01	peak	11.01	54.02	69.54	15.52
5.3440	41.33	peak	10.57	51.90	69.54	17.64
10.3290	24.93	peak	9.52	34.45	69.54	35.09

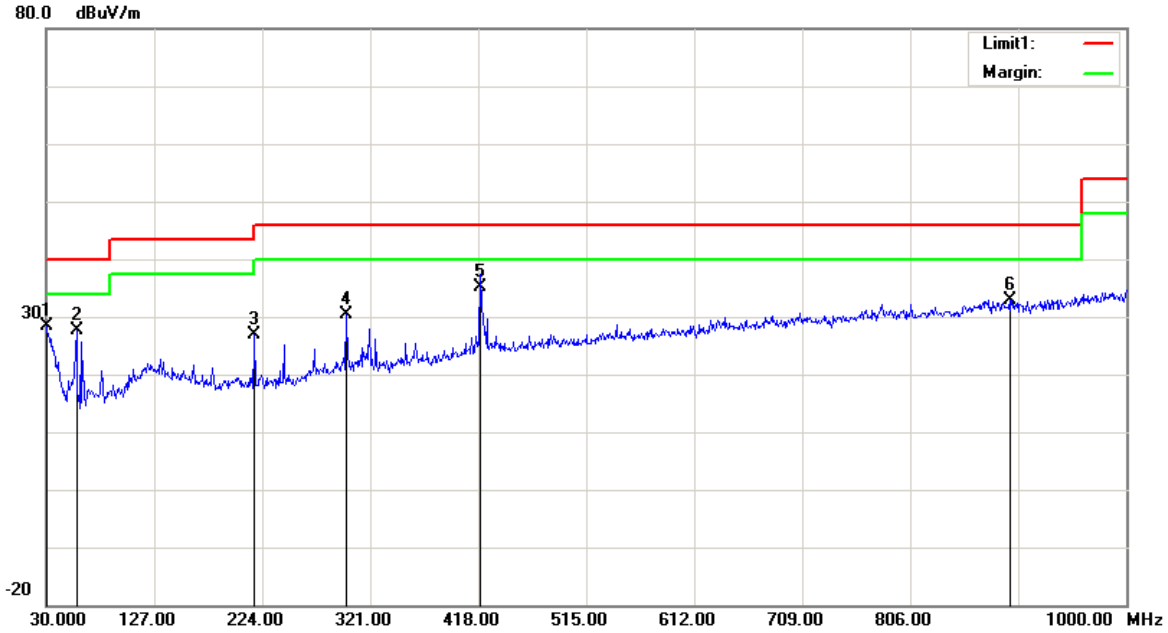
Fundamental:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13.5610	67.50	peak	9.36	76.86	124.00	47.14

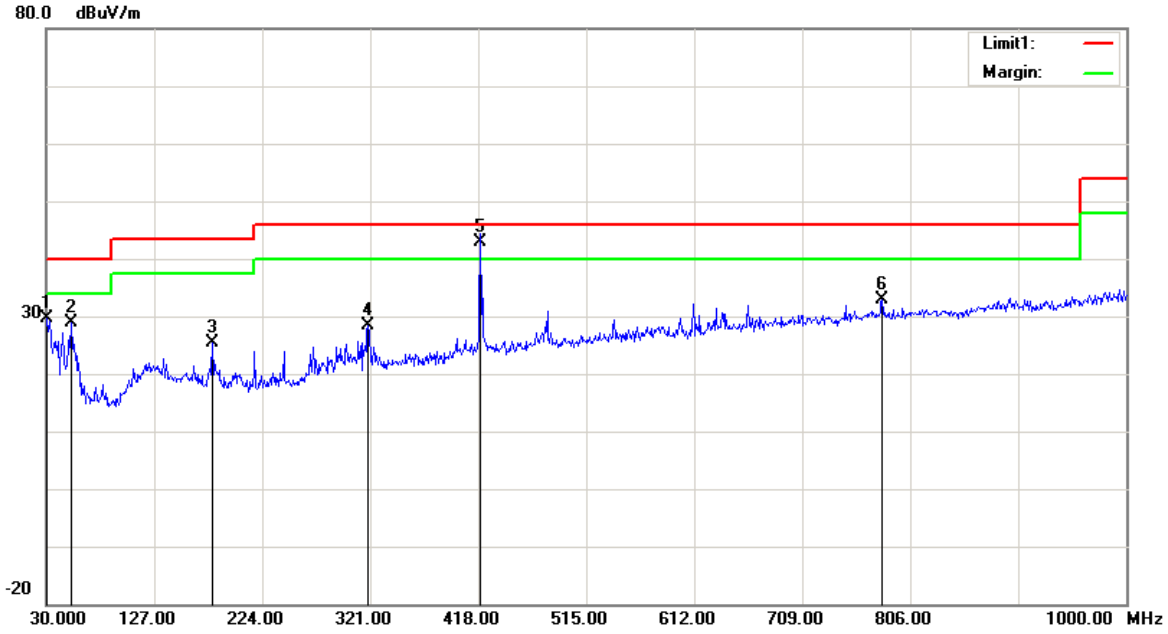
2) Above 30 MHz

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	26.67	peak	1.72	28.39	40.00	11.61
57.1600	39.87	peak	-12.21	27.66	40.00	12.34
217.2100	34.12	peak	-7.14	26.98	46.00	19.02
299.6600	34.13	peak	-3.83	30.30	46.00	15.70
419.9400	36.66	QP	-1.56	35.10	46.00	10.90
895.2400	36.92	peak	-3.93	32.99	46.00	13.01

Vertical



No.	Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	30.9700	28.66	peak	0.91	29.57	40.00	10.43
2	52.3100	40.65	peak	-11.84	28.81	40.00	11.19
3	179.3800	32.44	peak	-7.12	25.32	43.50	18.18
4	319.0600	31.75	peak	-3.45	28.30	46.00	17.70
5	419.9400	44.56	QP	-1.56	43.00	46.00	3.00
6	780.7800	28.55	peak	4.38	32.93	46.00	13.07

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 adapter under test was connected to an external AC 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 AC or DC power supply Source connected to the EUT or EUT adapter. Test the frequency output in the extremity voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-11	2019-12-11
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
UNI-T	Multimeter	UT39A	M130199938	2018-05-09	2019-05-09
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019/3/26	2020/3/26
Pro instrument	DC Power Supply	pps3300	N/A	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:	26.8 °C
Relative Humidity:	41 %
ATM Pressure:	99.5 kPa

** The testing was performed by Vern Shen on 2019-03-28.*

Test Mode: Transmitting

Test Result: Pass

f_o = 13.56 MHz				
Temperature	**Voltage**	**Measured frequency**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**MHz**	**Hz**	**Hz**
-20	3.7	13.5604	440	±1356
-10		13.5604	400	±1356
0		13.5605	500	±1356
10		13.5604	378	±1356
20		13.5601	100	±1356
30		13.5602	220	±1356
40		13.5607	700	±1356
50		13.5606	600	±1356
20	3.5	13.5605	500	±1356
20	4.2	13.5607	700	±1356

Note: Operation voltage range declared by manufacturer.

FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

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
R&S	EMI Test Receiver	ESCI	100224	2018-12-11	2019-12-11
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05

*** 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:	26.8 °C
Relative Humidity:	41 %
ATM Pressure:	99.9 kPa

** The testing was performed by Vern Shen on 2019-03-28.*

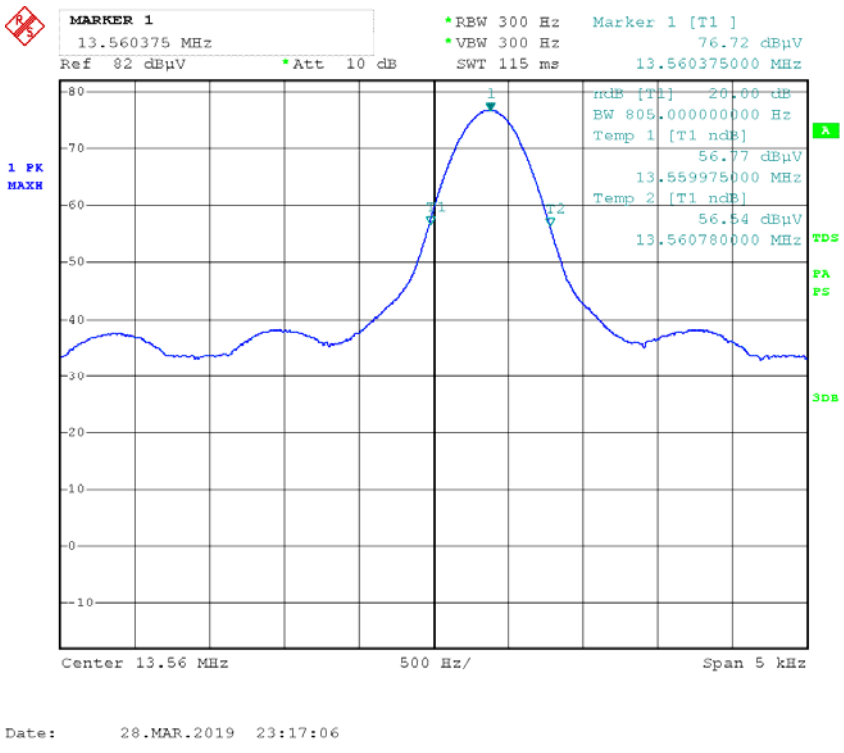
Test Result: Compliance.

Please refer to following tables and plots

Test Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	0.805

Test Mode: Transmitting

20 dB Emission Bandwidth



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