TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15C

TEST REPORT

For

Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, 518057 China

FCC ID: YAMVM780

Report Type:	Product Type:
Original Report	Body Worn Camera

Report Number:	RDG190606010-00C
Report Date:	2019-07-26
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:		Body Worn Camera
EUT Model:		VM780
Multiple Models:		DSJ-HYTH7A1
Operation Frequency:		13.56 MHz
Modulation Type:		ASK
Adapter Information	**Model:**	S010WU0500200
	Input:	AC 100-240V 50/60Hz 400mA
	Output:	DC 5V 2000mA
External Dimension:		115mm(L)*63mm(W)*26mm(H)
Rated Input Voltage:		DC 3.85V from battery or DC 5V charging from adapter
Serial Number:		190606010
EUT Received Date:		2019-06-12

Note: The series product, models DSJ-HYTH7A1 and VM780 are electrically identical, the difference between them please refer to the declaration letter for details. For marketing purpose, we selected VM780 for fully test.

Objective

This type approval report is prepared on behalf of ***Hytera Communications Corporation 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 and 15.225.

Related Submittal(s)/Grant(s)

FCC Part 22H, 24E,27, 90 PCB submissions with FCC ID: YAMVM780.
FCC Part 15C DTS submissions with FCC ID: YAMVM780.
FCC Part 15C DSS submissions with FCC ID: YAMVM780.

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.

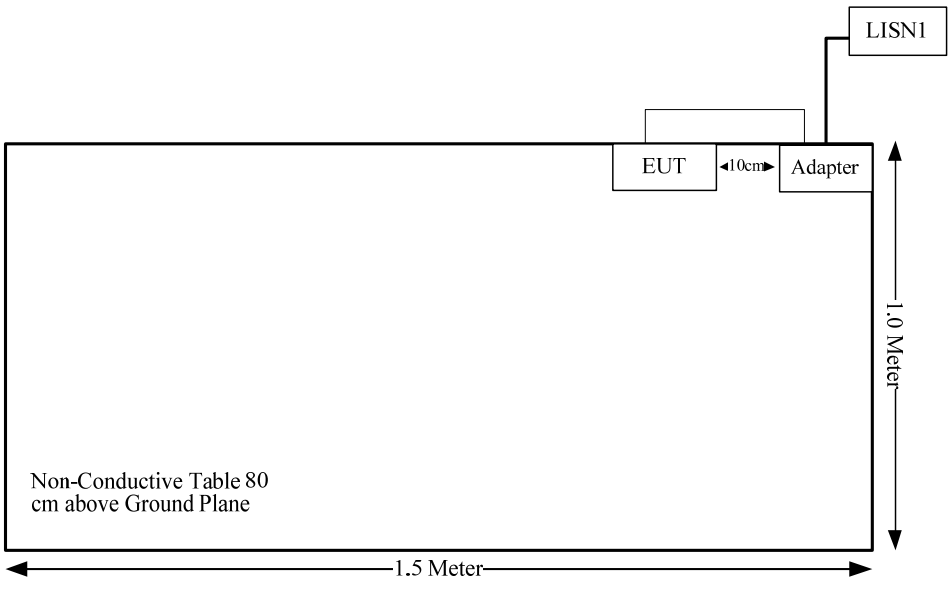
Equipment Modifications

No modification was made to the EUT.

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
USB Cable	No	No	1.1	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 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.

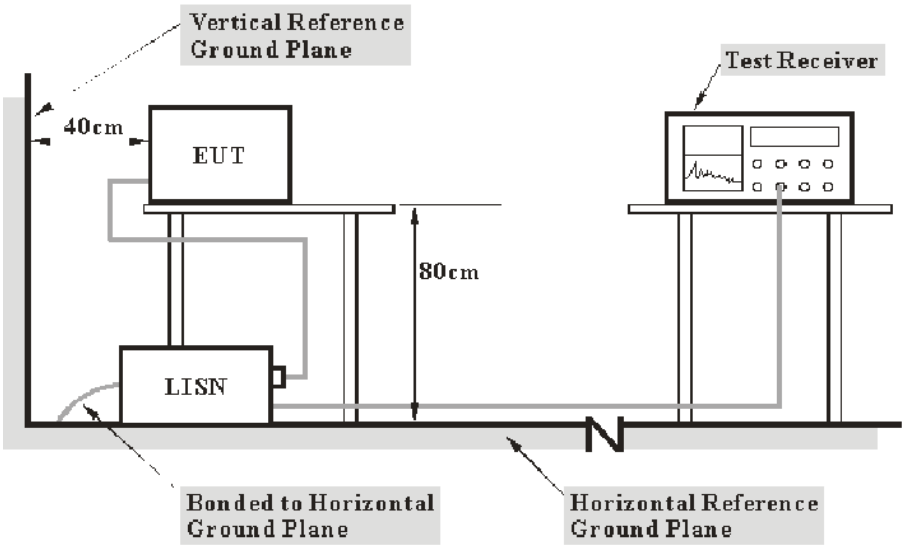
Result: Compliance.

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	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	2018-12-10	2019-12-10
R&S	EMI Test Receiver	ESPI	100120	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,RSS-Gen.

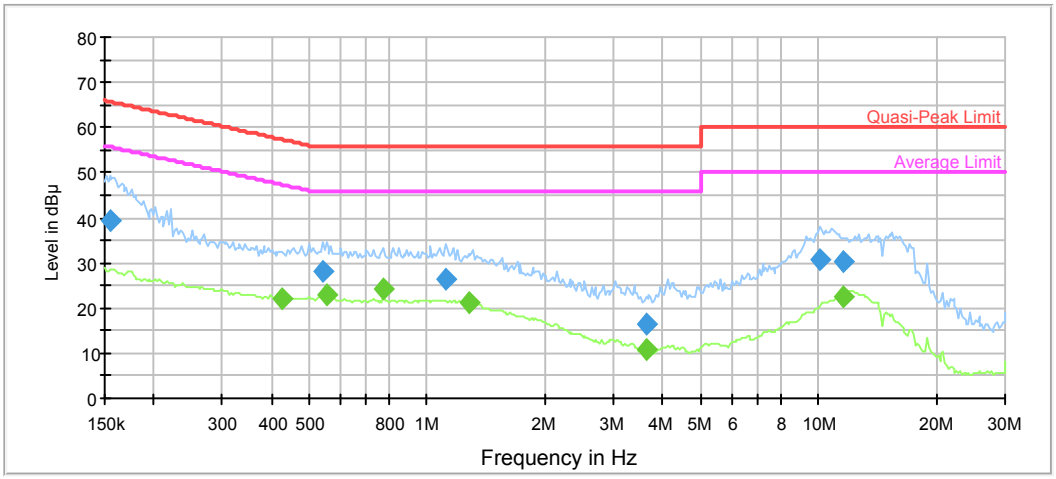
Test Data

Environmental Conditions

Temperature:	28.0 °C
Relative Humidity:	52 %
ATM Pressure:	100.6 kPa
Tester:	Lily Xie
Test Date:	2019-06-22

Test Mode: Transmitting

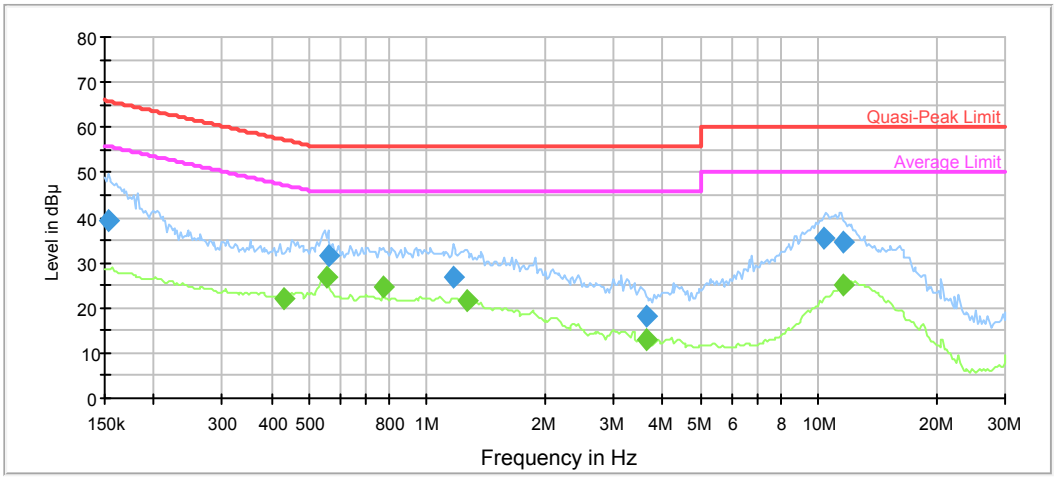
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154545	39.3	9.000	L1	11.1	26.5	65.8
0.541438	28.1	9.000	L1	9.9	27.9	56.0
1.119461	26.3	9.000	L1	9.8	29.7	56.0
3.621856	16.3	9.000	L1	9.8	39.7	56.0
10.093288	30.7	9.000	L1	9.8	29.3	60.0
11.601974	30.2	9.000	L1	9.8	29.8	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.426418	22.1	9.000	L1	9.9	25.2	47.3
0.552321	22.8	9.000	L1	9.8	23.2	46.0
0.774673	24.4	9.000	L1	9.8	21.6	46.0
1.274051	21.0	9.000	L1	9.8	25.0	46.0
3.621856	10.6	9.000	L1	9.8	35.4	46.0
11.601974	22.6	9.000	L1	9.8	27.4	50.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.153015	39.2	9.000	N	11.1	26.6	65.8
0.557844	31.4	9.000	N	9.8	24.6	56.0
1.164916	26.7	9.000	N	9.8	29.3	56.0
3.621856	18.3	9.000	N	9.8	37.7	56.0
10.296163	35.3	9.000	N	9.8	24.7	60.0
11.601974	34.6	9.000	N	9.8	25.4	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	22.1	9.000	N	9.9	25.1	47.2
0.552321	26.7	9.000	N	9.8	19.3	46.0
0.774673	24.6	9.000	N	9.8	21.4	46.0
1.261437	21.6	9.000	N	9.8	24.4	46.0
3.621856	13.0	9.000	N	9.8	33.0	46.0
11.601974	25.0	9.000	N	9.8	25.0	50.0

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

Applicable Standard

As per FCC Part 15.225

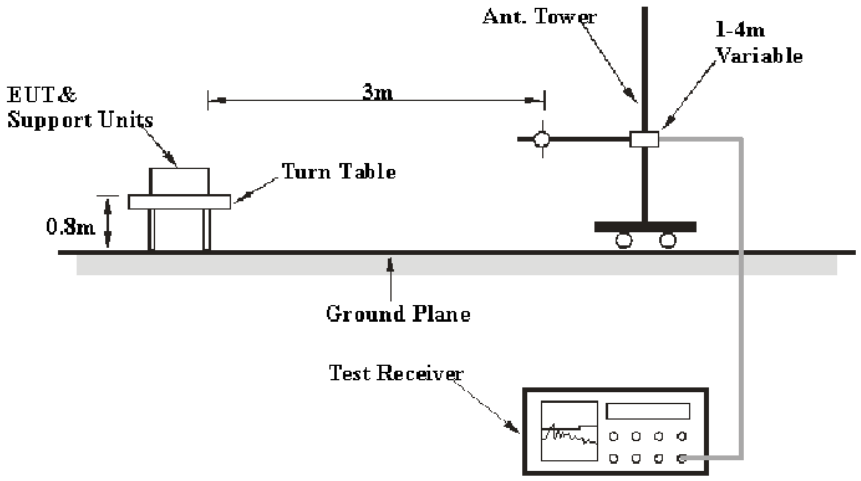
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(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.

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
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
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
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
HP	Amplifier	8447D	2727A05902	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 Results Summary

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

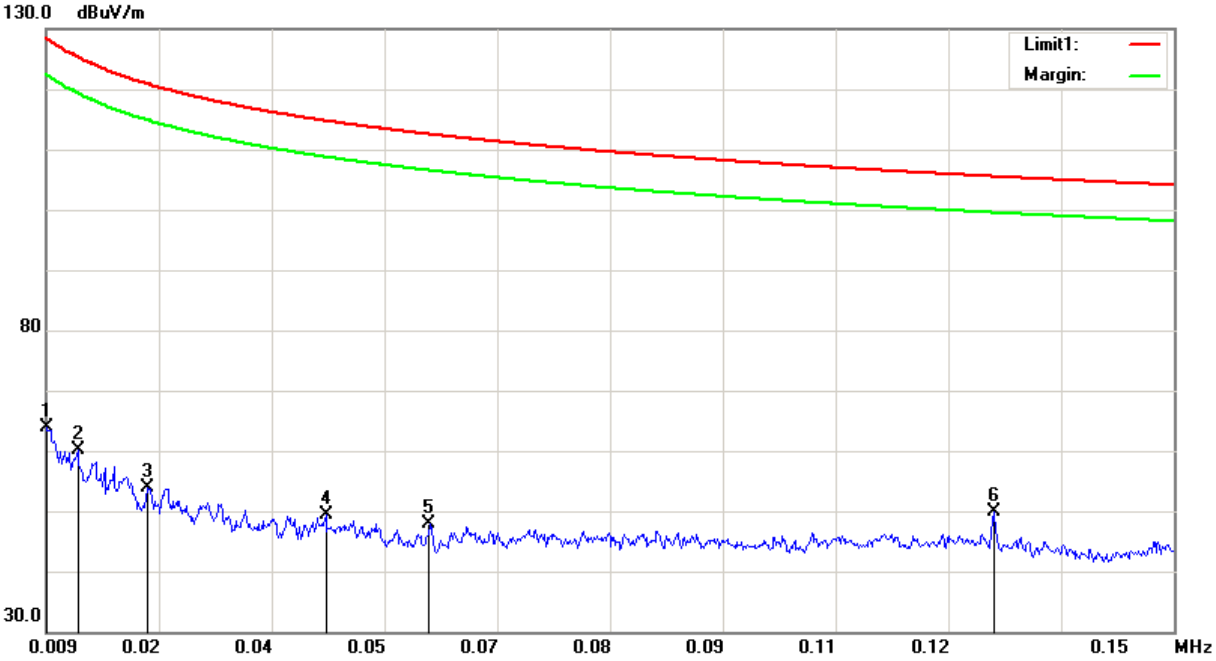
Test Data

Environmental Conditions

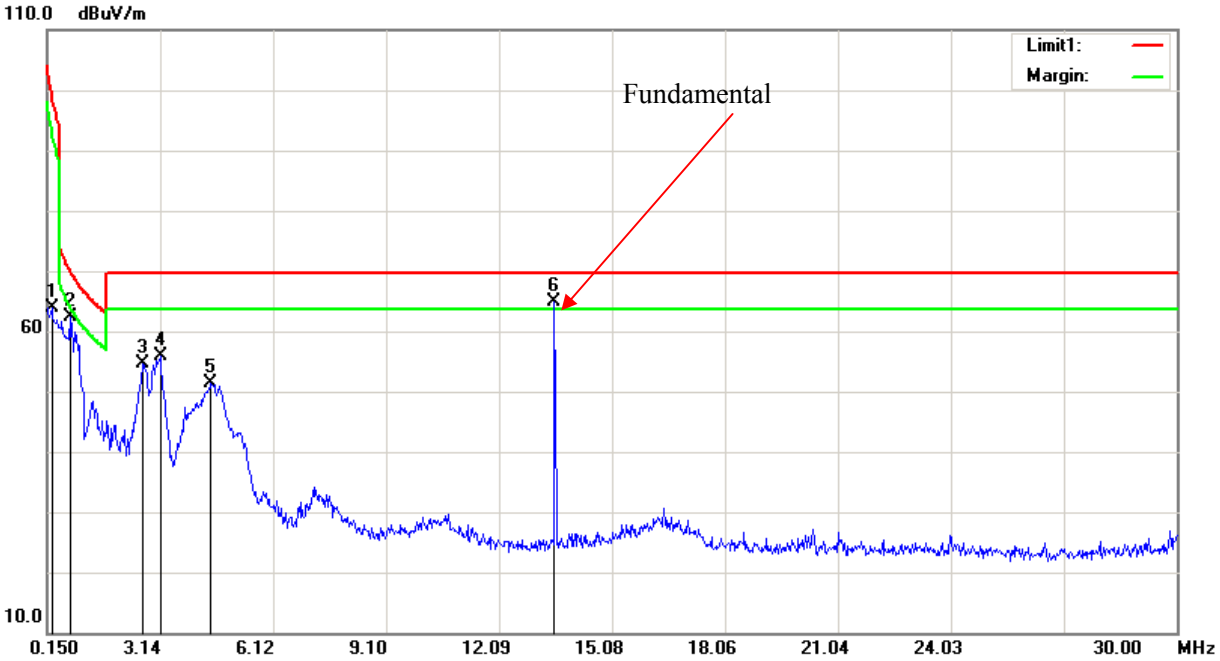
Test Items	Radiation Below 1GHz
Temperature:	25 °C
Relative Humidity:	44%
ATM Pressure:	100.2 kPa
Tester:	Tyler Pan
Test Date:	2019-06-18

Test mode: Transmitting

1) 9 kHz~30 MHz:

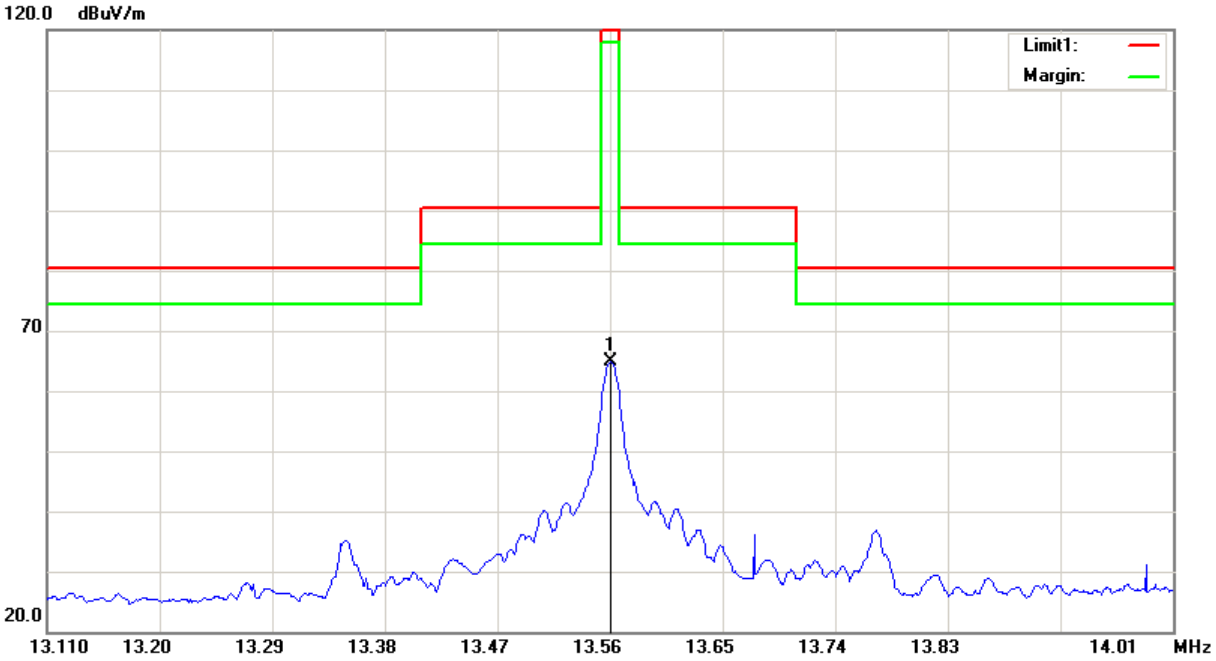


Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.0090	-24.75	peak	88.60	63.85	128.52	64.67
0.0130	-26.10	peak	86.11	60.01	125.33	65.32
0.0217	-25.79	peak	79.72	53.93	120.87	66.94
0.0440	-25.06	peak	74.48	49.42	114.73	65.31
0.0568	-24.28	peak	72.20	47.92	112.52	64.60
0.1274	-15.37	peak	65.14	49.77	105.50	55.73



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.2691	31.60	peak	32.40	64.00	99.00	35.00
0.7470	38.43	peak	23.95	62.38	70.13	7.75
2.6872	40.55	peak	14.03	54.58	69.54	14.96
3.1350	43.01	peak	12.92	55.93	69.54	13.61
4.4782	40.28	peak	10.99	51.27	69.54	18.27

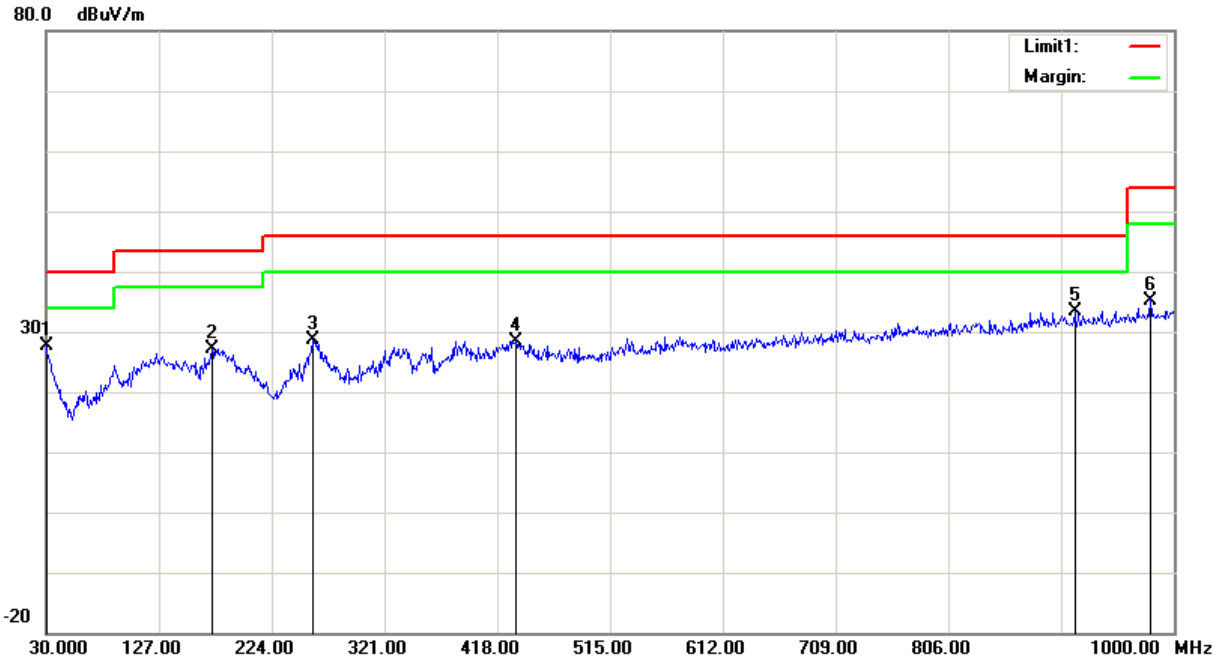
Fundamental:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13.5600	69.34	peak	8.90	78.24	124.00	45.76

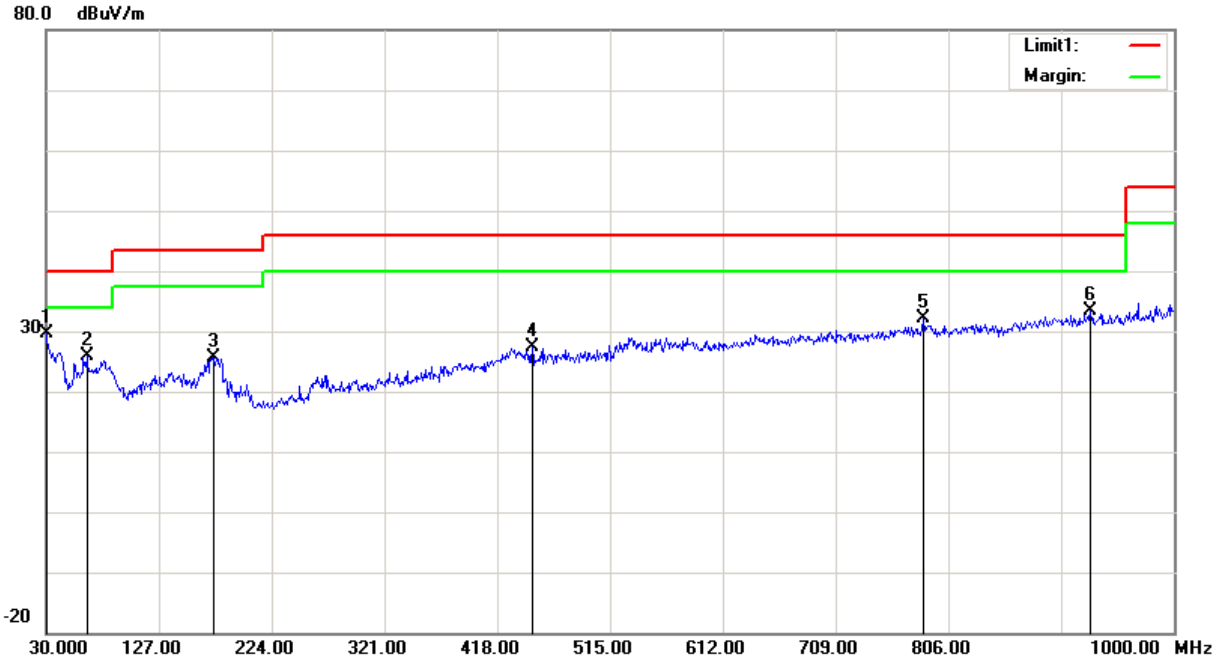
30MHz-1GHz

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	25.82	peak	1.72	27.54	40.00	12.46
172.5900	33.94	peak	-6.79	27.15	43.50	16.35
258.9200	34.03	peak	-5.43	28.60	46.00	17.40
434.4900	29.72	peak	-1.22	28.50	46.00	17.50
914.6400	33.22	peak	0.19	33.41	46.00	12.59
979.6300	33.93	peak	1.32	35.25	54.00	18.75

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	27.80	peak	1.72	29.52	40.00	10.48
64.9200	37.61	peak	-11.64	25.97	40.00	14.03
174.5300	32.43	peak	-6.88	25.55	43.50	17.95
448.0700	28.62	peak	-1.16	27.46	46.00	18.54
784.6600	27.79	peak	4.39	32.18	46.00	13.82
928.2200	32.83	peak	0.54	33.37	46.00	12.63

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	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019-03-26	2020-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
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:	25 °C
Relative Humidity:	44%
ATM Pressure:	100.2 kPa
Tester:	Tyler Pan
Test Date:	2019-06-18

Test Mode: Transmitting

Test Result: Pass

f_o = 13.56 MHz				
Temperature	**Voltage**	**Measured frequency**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**MHz**	**Hz**	**Hz**
-20	3.85	13.560479	479	±1356
-10		13.560471	471	±1356
0		13.560496	496	±1356
10		13.560487	487	±1356
20		13.560512	512	±1356
25		13.560492	492	±1356
30		13.560462	462	±1356
40		13.560500	500	±1356
50		13.560454	454	±1356
25	3.6	13.560456	456	±1356
25	4.4	13.560490	490	±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	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	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

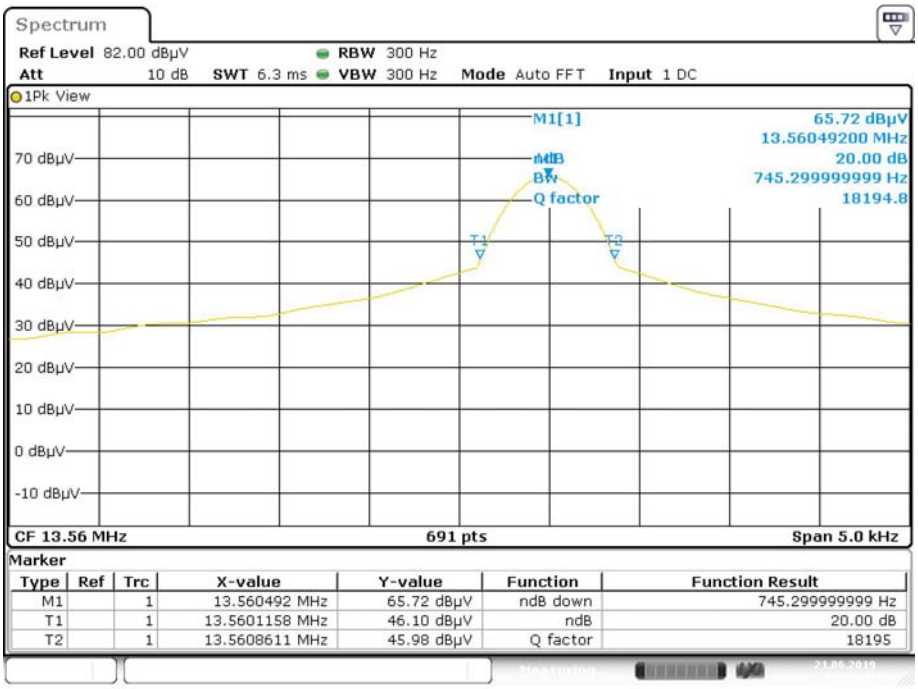
Environmental Conditions

Temperature:	26 °C~27 °C
Relative Humidity:	42%~44%
ATM Pressure:	100.1 kPa~100.1 kPa
Tester:	Tyler Pan
Test Date:	2019-06-21~2019-07-16

Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	0.745

20 dB Bandwidth



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