

FCC PART 15.231

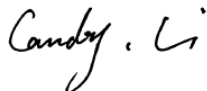
TEST REPORT

For

Shenzhen Joy Technology Co. Ltd

5/F,3rd Building, Shunchengji Park, Huayun Road of Dalang, Longhua, Shenzhen, China

FCC ID: 2AH83T10

Report Type: Original Report	Product Type: Medical Alert System
Test Engineer: <u>Xiangguang Kong</u> 	
Report Number: <u>RSZ160427004-00B</u>	
Report Date: <u>2016-05-26</u>	
Reviewed By: <u>RF Engineer</u> 	
Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 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.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Joy Technology Co. Ltd's* product, model number: *T10 (FCC ID: 2AH83T10)* (or the "EUT") in this report was an *Medical Alert System*, which was measured approximately: 20 cm (L) * 15cm (W) * 3 cm (H), rated with input voltage: DC 3.7V rechargeable Li-ion battery or DC 5.0V from adapter.

Adapter Information:

Model: JF005WR-0500100UH

Input AC: 100-240V, 50/60Hz, 0.18A

Output: DC 5.0V, 1.0 A

Note: For the product, series model T10 and T10-L, T10-W, T10-B, T10-M, T10-H, ESYS003, T10-G, T10-G are identical schematics, the differences between them are model number. T10 was selected for fully testing, which was explained in the attached product similarity declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 1602084 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-04-27.*

Objective

This test report is prepared on behalf of *Shenzhen Joy Technology Co. Ltd.* All the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.231 DSR submissions with FCC ID: 2AH83RC10P-FD.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10 - 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). 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. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10 - 2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. 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).

Special Accessories

No special accessories was used

Equipment Modifications

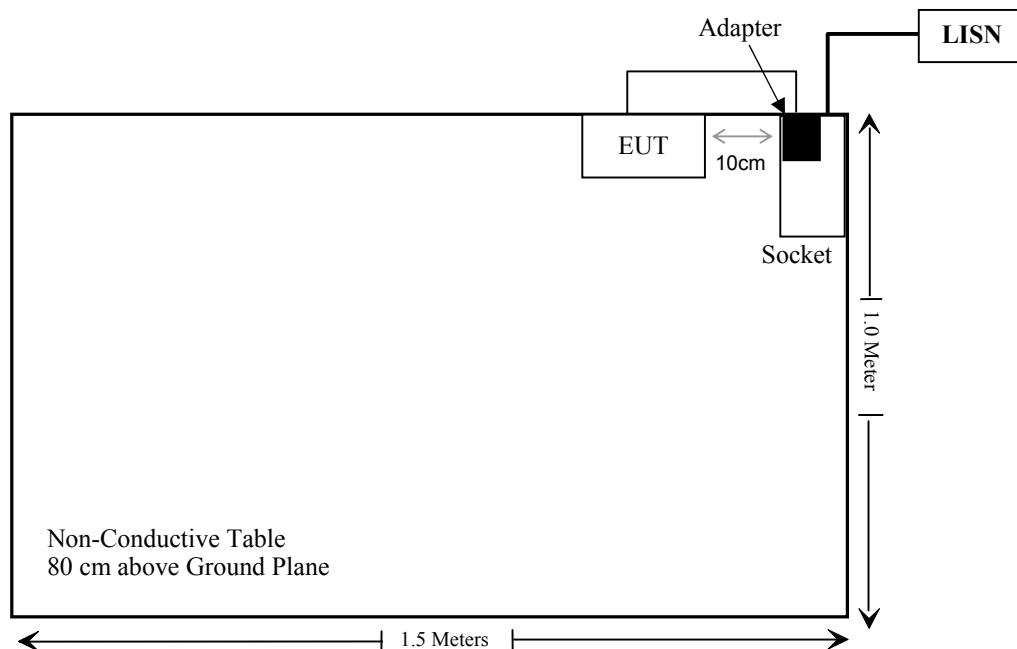
No modification was made to the EUT.

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding Un-detachable DC Power Cable	1.5	EUT	Adapter

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 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.231(b)	Radiated Emissions	Compliance
§15.231 (c)	20dB Emission Bandwidth	Compliance
§15.231 (a) (2)	Deactivation	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 Connector Construction

The EUT has one internal arrangement, which was permanently attached. The antenna is 2.0 dBi, fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

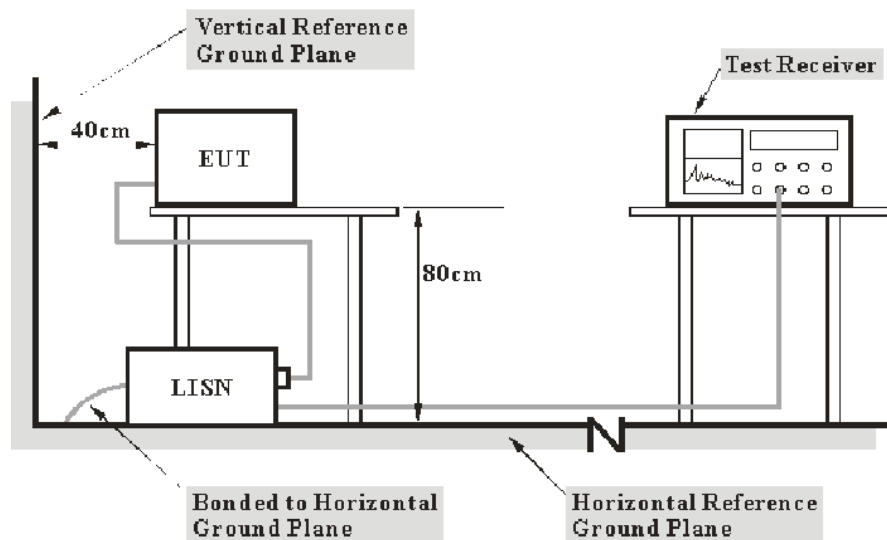
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements may be 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 expanded combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 limits.

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

Test Equipment List and Details

Manufacturer	1.1.1.1.1 Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2015-06-01	2016-05-31
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2015-12-15	2016-12-14
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2015-05-14	2016-05-14
Ducommun technologies	Conducted Emission Cable	RG-214	CB031	2015-06-15	2016-06-15
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

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

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:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

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:

10.0 dB at 0.230500 MHz in the Neutral conducted mode

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

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

In BACL, $U_{(L_m)}$ 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

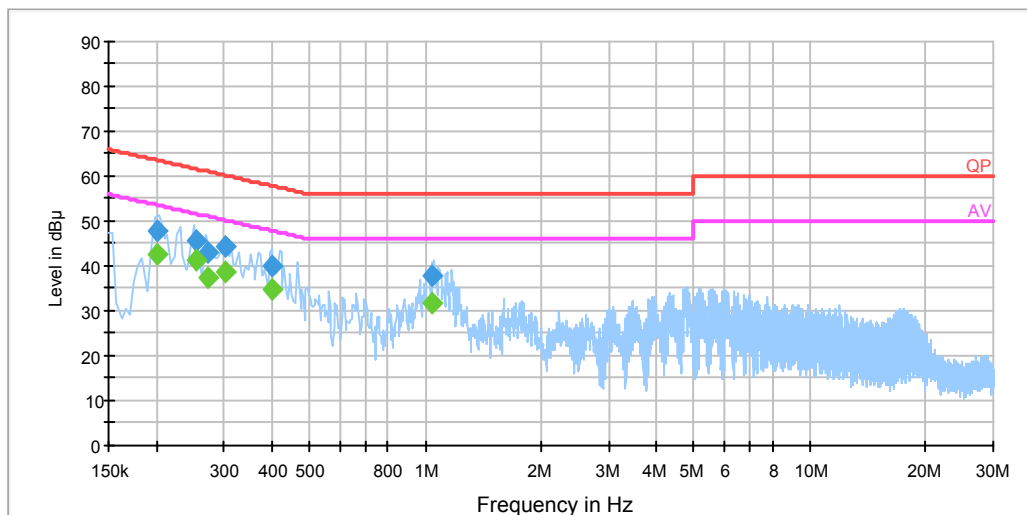
Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Xiangguang Kong on 2016-05-13.

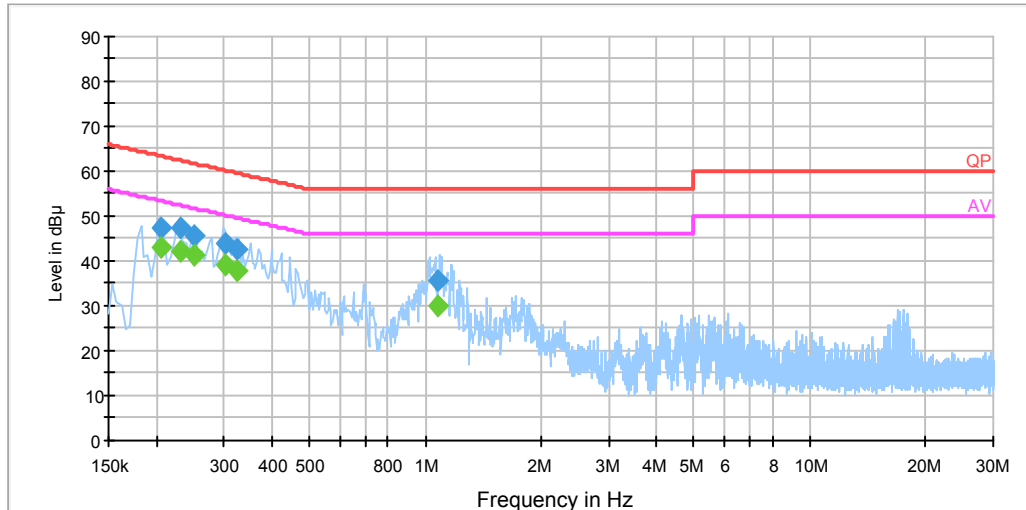
EUT operation mode: Transmitting

AC 120V/60 Hz, Line

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.201500	47.7	20.0	63.5	15.8	QP
0.254500	45.9	19.9	61.6	15.7	QP
0.273500	42.8	19.9	61.0	18.2	QP
0.301470	44.2	19.9	60.2	16.0	QP
0.400030	40.1	19.9	57.9	17.8	QP
1.046130	37.7	20.0	56.0	18.3	QP
0.201500	42.7	20.0	53.5	10.8	Ave.
0.254500	41.2	19.9	51.6	10.4	Ave.
0.273500	37.3	19.9	51.0	13.7	Ave.
0.301470	38.6	19.9	50.2	11.6	Ave.
0.400030	34.7	19.9	47.9	13.2	Ave.
1.046130	31.6	20.0	46.0	14.4	Ave.

AC 120V/60 Hz, Neutral**EMI Auto Test N**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.206500	47.3	20.0	63.3	16.0	QP
0.230500	47.2	20.0	62.4	15.2	QP
0.249500	45.6	20.0	61.8	16.2	QP
0.301500	44.1	19.9	60.2	16.1	QP
0.325110	42.6	19.9	59.6	17.0	QP
1.073650	35.7	20.0	56.0	20.3	QP
0.206500	43.0	20.0	53.3	10.3	Ave.
0.230500	42.4	20.0	52.4	10.0	Ave.
0.249500	41.3	20.0	51.8	10.5	Ave.
0.301500	39.0	19.9	50.2	11.2	Ave.
0.325110	37.8	19.9	49.6	11.8	Ave.
1.073650	29.8	20.0	46.0	16.2	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

FCC §15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS**Applicable Standard**

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 375**
174-260	3750	375
260-470	3750 to 12500**	375 to 1250**
Above 470	12500	1250

*Linear interpolations.

The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

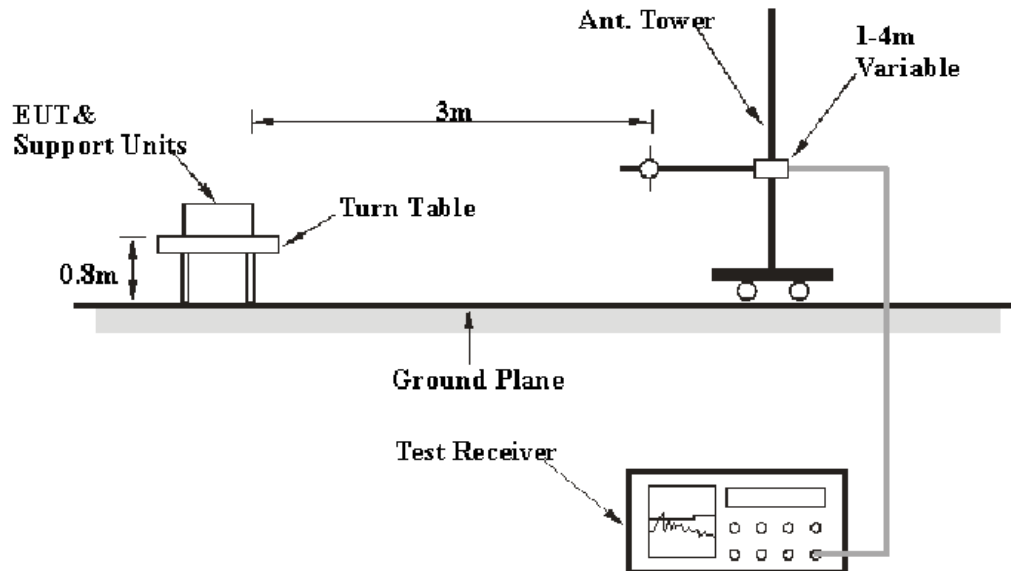
Measurement Uncertainty

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.

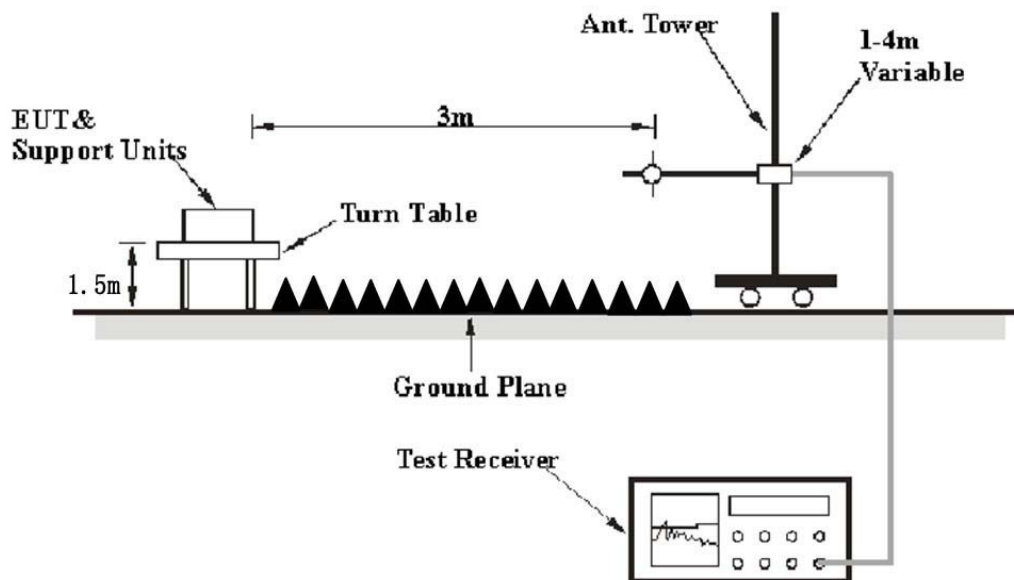
Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, and it will not be taken into consideration for the test data recorded in the report.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 - 2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 4 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2015-11-03	2016-11-03
HP	Amplifier	HP8447E	1937A01046	2016-05-06	2017-05-06
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2016-04-23	2017-04-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2014-12-29	2017-12-28
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	104PEA	218124002	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	1	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	2	2015-06-15	2016-06-15

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

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8 dB means the emission is 5.8 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (b), the worst margin reading as below:

0.39 dB at 434.21 MHz in the Horizontal polarization

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

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

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

Test Data**Environmental Conditions**

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Xiangguang Kong on 2016-05-22.

Test mode: Transmitting

30MHz - 4.4GHz (GFSK):

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.231(b)/205/209		
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)	Comment
434.21	93.49	PK	211	1.3	H	-9.93	83.56	100.8	17.24	Fundamental
434.21	90.34	Ave.	211	1.3	H	-9.93	80.41	80.8	0.39	Fundamental
434.21	84.01	PK	143	1.4	V	-9.93	74.08	100.8	26.72	Fundamental
434.21	81.03	Ave.	143	1.4	V	-9.93	71.10	80.8	9.70	Fundamental
868.42	47.75	PK	86	1.3	H	-3.45	44.30	80.8	36.50	Harmonic
868.42	39.55	Ave.	86	1.3	H	-3.45	36.10	60.8	24.70	Harmonic
868.42	48.65	PK	304	1.2	V	-3.45	45.20	80.8	35.60	Harmonic
868.42	40.35	Ave.	304	1.2	V	-3.45	36.90	60.8	23.90	Harmonic
1736.84	54.52	PK	219	2.1	H	-10.62	43.90	80.8	36.90	Harmonic
1736.84	52.75	Ave.	219	2.1	H	-10.62	42.13	60.8	18.67	Harmonic
1736.84	51.34	PK	42	2.4	V	-10.62	40.72	80.8	40.08	Harmonic
1736.84	48.56	Ave.	42	2.4	V	-10.62	37.94	60.8	22.86	Harmonic
3039.47	57.46	PK	274	2.4	H	-2.17	55.29	80.8	25.51	Harmonic
3039.47	54.91	Ave.	274	2.4	H	-2.17	52.74	60.8	8.06	Harmonic
3039.47	54.65	PK	251	1.0	V	-2.17	52.48	80.8	28.32	Harmonic
3039.47	52.29	Ave.	251	1.0	V	-2.17	50.12	60.8	10.68	Harmonic

Note :

This item was tested with 100% duty cycle.

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor = Antenna factor (Rx) + cable loss – amplifier factor

Margin = Limit - Corr. Amplitude

FCC §15.231(a) (2) - DEACTIVATION TESTING**Applicable Standard**

Per FCC §15.231(a) (2), a transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100k VBW=100k Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K0 3-101746-zn	2015-06-13	2016-06-13
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15

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

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

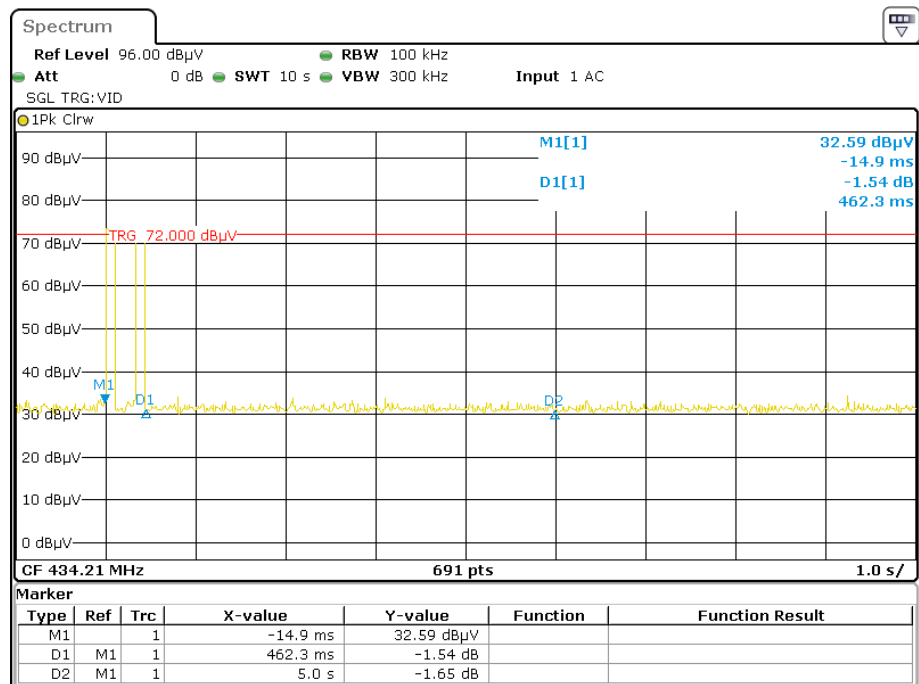
The testing was performed by Xiangguang Kong on 2016-05-22.

Test mode: Transmitting

Test Result: Compliant, please refer to following plot.

GFSK modulation:

Transmission period	Limit	Result
< 0.462 s	< 5 s	Pass



Date: 22.MAY.2016 18:11:31

FCC §15.231(c) – 20 dB EMISSION BANDWIDTH TESTING**Applicable Standard**

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15

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

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	54 %
ATM Pressure:	101.0 kPa

The testing was performed by Xiangguang Kong on 2016-05-19.

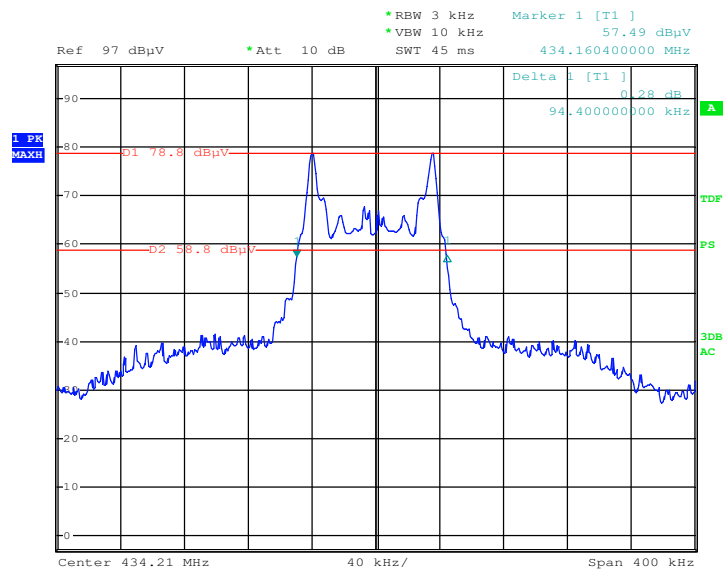
Test Mode: Transmitting

Please refer to following table and plot.

Test Mode: Transmitting

Channel Frequency (MHz)	20 dB Emission Bandwidth (kHz)	<Limit (kHz)	Result
434.21	94.4	1085.525	Pass

Note: Limit = 0.25% * center frequency = 0.25% * 434.21 MHz = 1085.525 kHz
 20dB bandwidth = 94.4 kHz <1085.525 kHz

20 dB Emission Bandwidth

EUT

Date: 19.MAY.2016 20:31:37

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