

FCC PART 15.249

TEST REPORT

For

Dongguan WILL POWER Technology Co.,Ltd.

Room 404, Building 1, No.2, XinyuanSouthRoad, Shahu, TangxiaTown, Dongguan City,
Guangdong Province, China.

FCC ID: 2AWKXWP-02SF

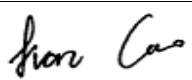
Report Type: Original Report	Product Type: Touch Panel Smart Valve
Report Number: RDG200601018-00A	
Report Date: 2020-08-12	
Reviewed By:	Ivan Cao Assistant Manager 
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Touch Panel Smart Valve
EUT Model:		WP-02SF
Operation Frequency:		908.4 MHz
Modulation Type:		GFSK
Rated Input Voltage:		DC 12V from Adapter
Adapter Information	Model:	BSG18W-1201500A
	Input:	AC 100V-240V~50/60Hz 0.5A Max
	Output:	12V-1.5A
Serial Number:		RDG200601018-RF-S1
EUT Received Date:		2020.06.11
EUT Received Status:		Good

Objective

This type approval report is prepared on behalf of ***Dongguan WILL POWER Technology Co.,Ltd.*** in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

N/A

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 emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	$\pm 5\%$
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB
Temperature	$\pm 1^\circ\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
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 “ Δ ”. 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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SYSTEM TEST CONFIGURATION

Justification

The EUT was configured in operating mode for testing which was provided by the manufacturer.

The device only operates in 908.4MHz.

EUT Exercise Software

No software was used in test, the device was configured to engineer mode by manufacturer.

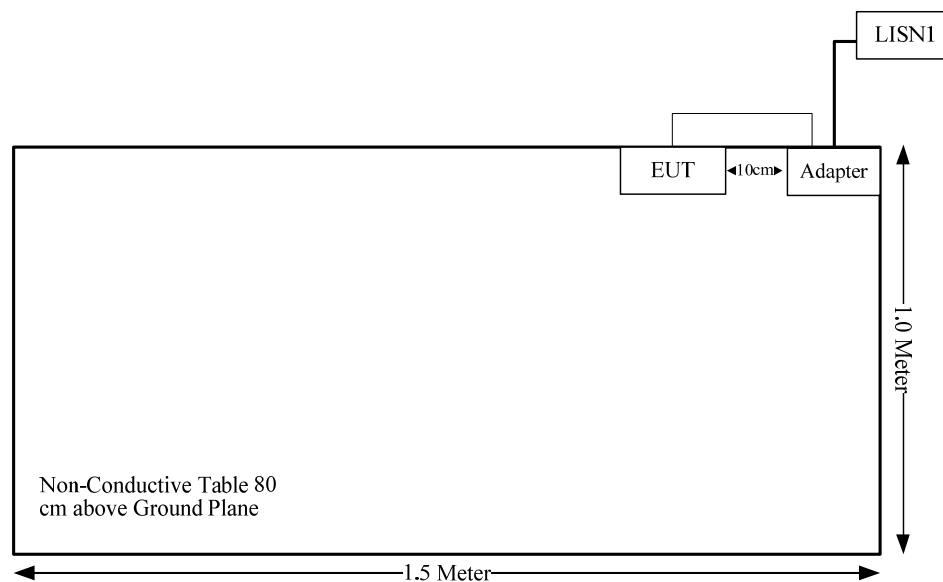
Equipment Modifications

No modifications were made to the EUT.

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
DC Cable	No	No	1.0	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Compliance
15.205, §15.209, §15.249	Radiated Emissions	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 Connector Construction

The EUT has internal Antenna permanently attached to the unit, the antenna gain is 6 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

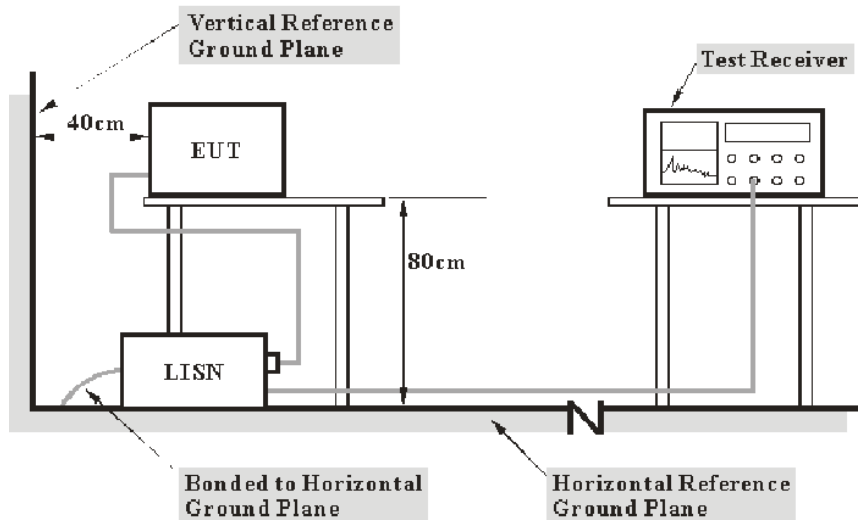
Result: Compliant.

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 outlet of the first LISN.

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase (“hot”) line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

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:

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

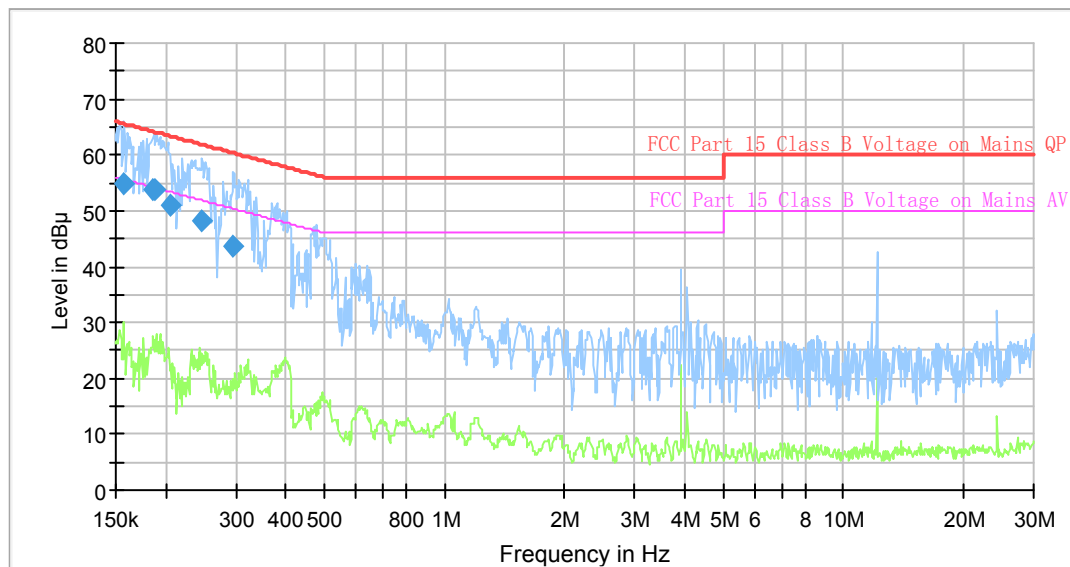
Test Equipment List and Details

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
COM-POWER	LISN	LI-3P-132	20200003	2019-09-12	2020-09-12
R&S	EMI Test Receiver	ESCI	101121	2020-05-09	2021-05-09

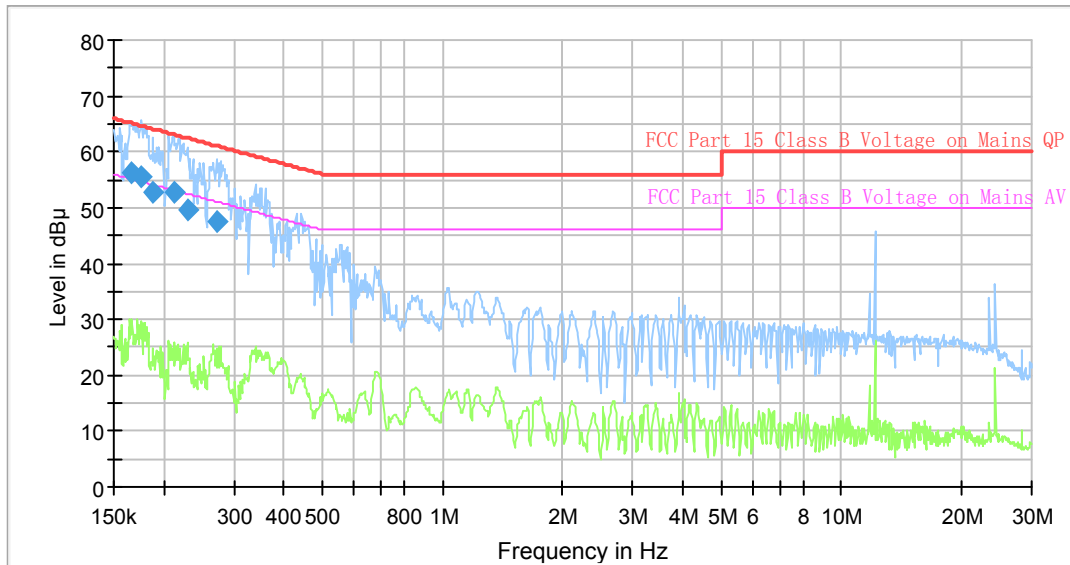
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	27.2°C
Relative Humidity:	63%
ATM Pressure:	100.8kPa
Tester:	Barry Yang
Test Date:	2020-06-11

*Test Mode: Transmitting**Test Result: Compliance. Please refer to following table and plots:***AC120 V, 60 Hz, Line:****Final Result**

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.157671	54.82	---	65.59	10.77	9.000	L1	9.7
0.184955	53.68	---	64.26	10.58	9.000	L1	9.7
0.186809	53.67	---	64.18	10.51	9.000	L1	9.7
0.206405	50.96	---	63.35	12.39	9.000	L1	9.7
0.247000	48.30	---	61.86	13.56	9.000	L1	9.7
0.295580	43.64	---	60.37	16.73	9.000	L1	9.7

AC120 V, 60 Hz, Neutral:**Final_Result**

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.166563	56.26	---	65.13	8.87	9.000	N	9.7
0.175956	55.68	---	64.67	8.99	9.000	N	9.7
0.187743	52.64	---	64.14	11.50	9.000	N	9.7
0.211616	52.84	---	63.14	10.30	9.000	N	9.7
0.229196	49.72	---	62.48	12.76	9.000	N	9.7
0.271552	47.58	---	61.07	13.49	9.000	N	9.7

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS**Applicable Standard**

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

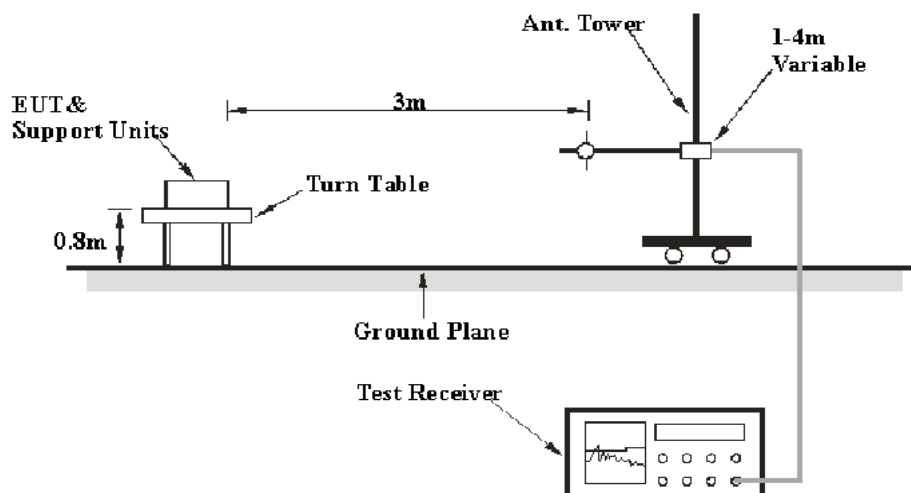
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

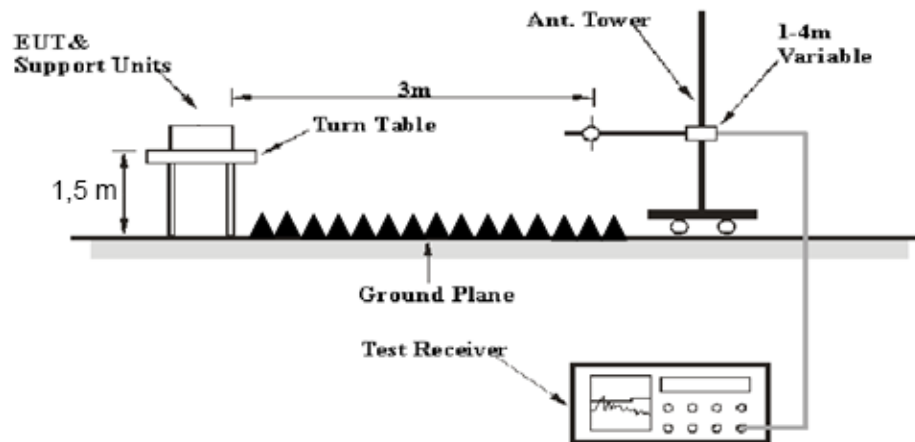
As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



1-10 GHz:

The radiated emission below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.249 limits.

Test Equipment Setup

The system was investigated from 30 MHz to 10 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation Below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2020-05-06	2021-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Radiation Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-07-07	2021-07-07
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2020-06-27	2021-06-27
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2019-09-05	2020-09-05
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 Data

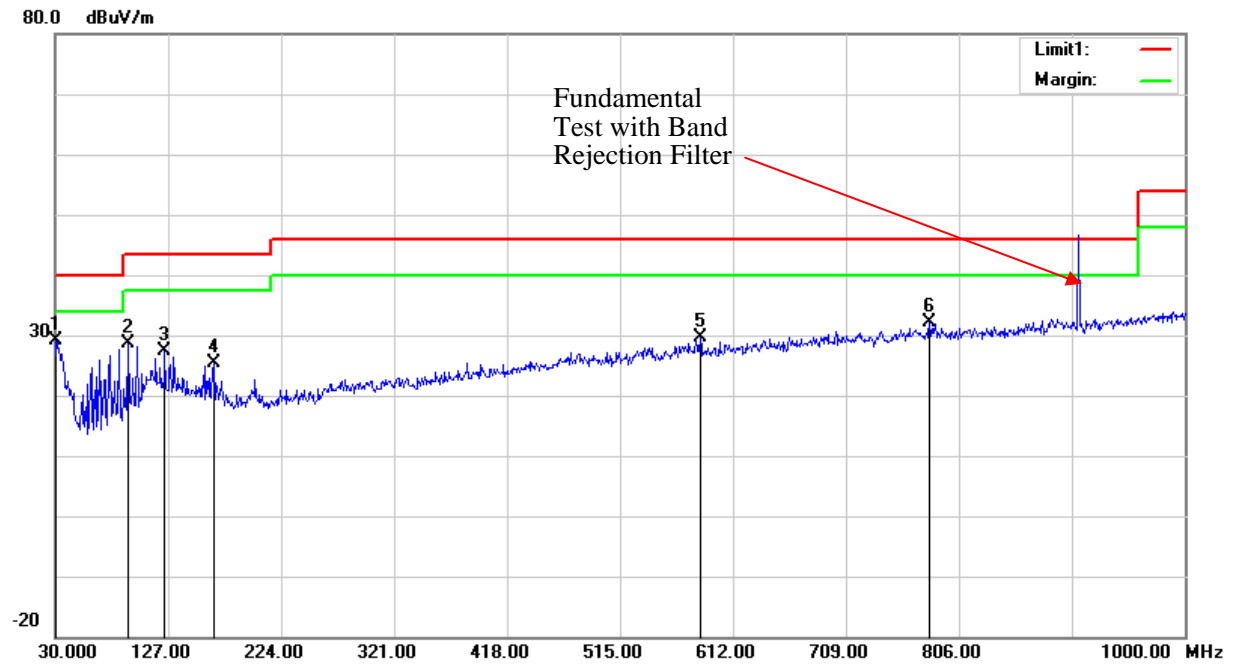
Environmental Conditions

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	27.2 °C	28.1 °C
Relative Humidity:	60%	42%
ATM Pressure:	100.6kPa	100.2kPa
Tester:	Joker Chen	Daniel Liang
Test Date:	2020-06-13	2020-08-07

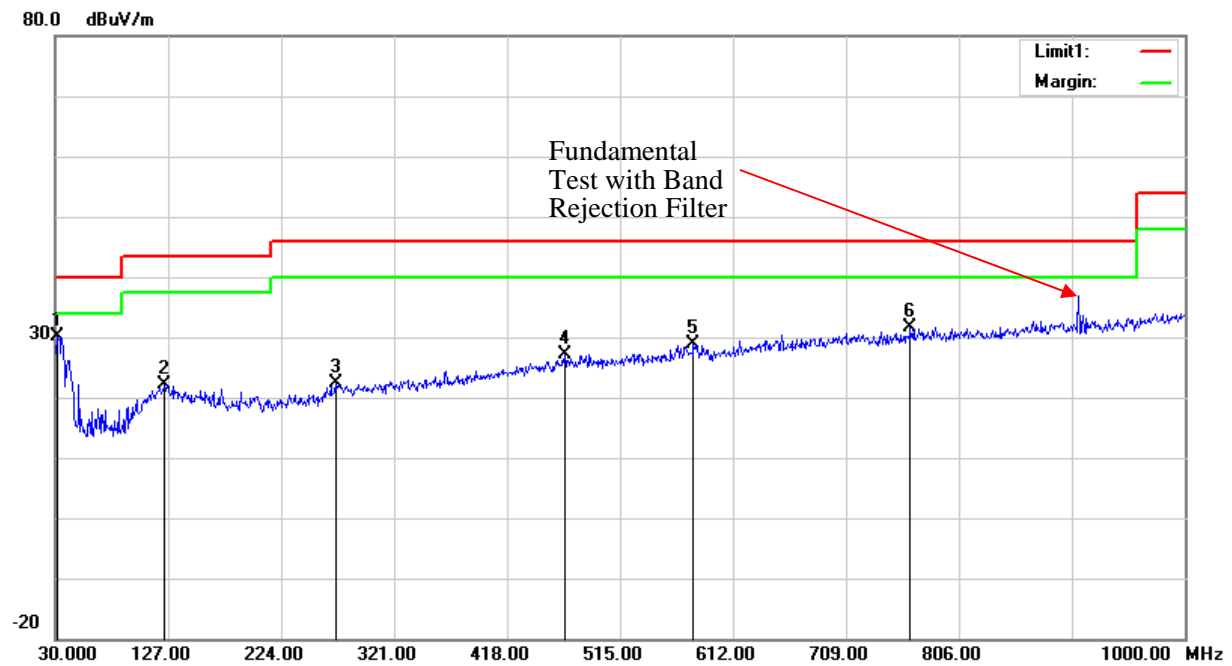
Test Mode: Transmitting

1) 30MHz-1GHz

Horizontal



Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.0000	27.41	peak	1.72	29.13	40.00	10.87
93.0500	39.37	peak	-10.73	28.64	43.50	14.86
124.0900	31.92	peak	-4.56	27.36	43.50	16.14
166.7700	31.68	peak	-6.30	25.38	43.50	18.12
583.8700	28.57	peak	0.96	29.53	46.00	16.47
780.7800	27.65	peak	4.38	32.03	46.00	13.97

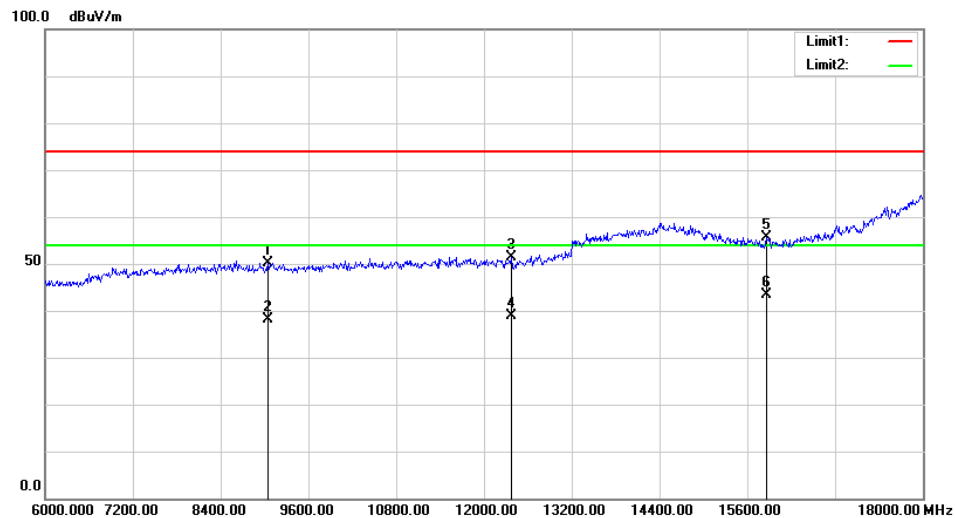
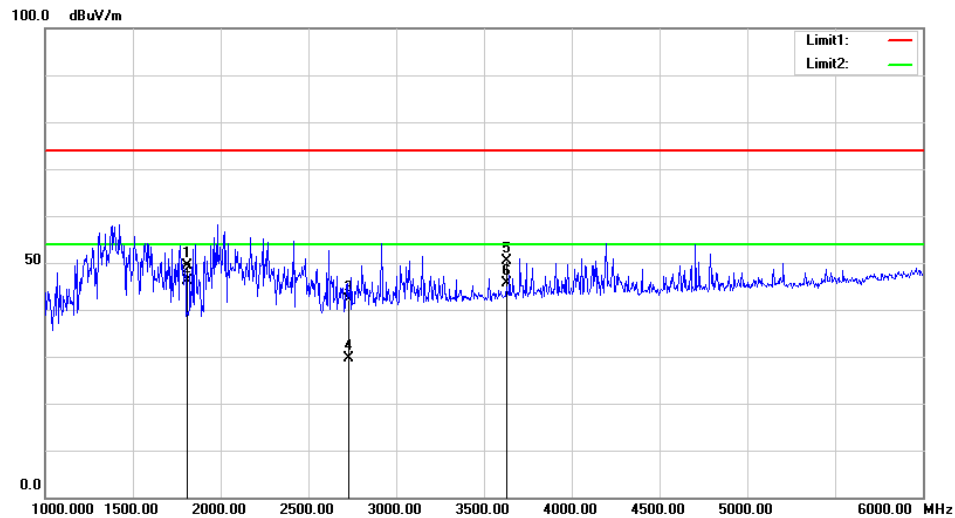
Vertical:

Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
31.9400	30.00	peak	0.19	30.19	40.00	9.81
124.0900	26.73	peak	-4.56	22.17	43.50	21.33
270.5600	26.75	peak	-4.28	22.47	46.00	23.53
467.4700	27.62	peak	-0.47	27.15	46.00	18.85
578.0500	27.83	peak	1.10	28.93	46.00	17.07
764.2900	27.43	peak	4.15	31.58	46.00	14.42

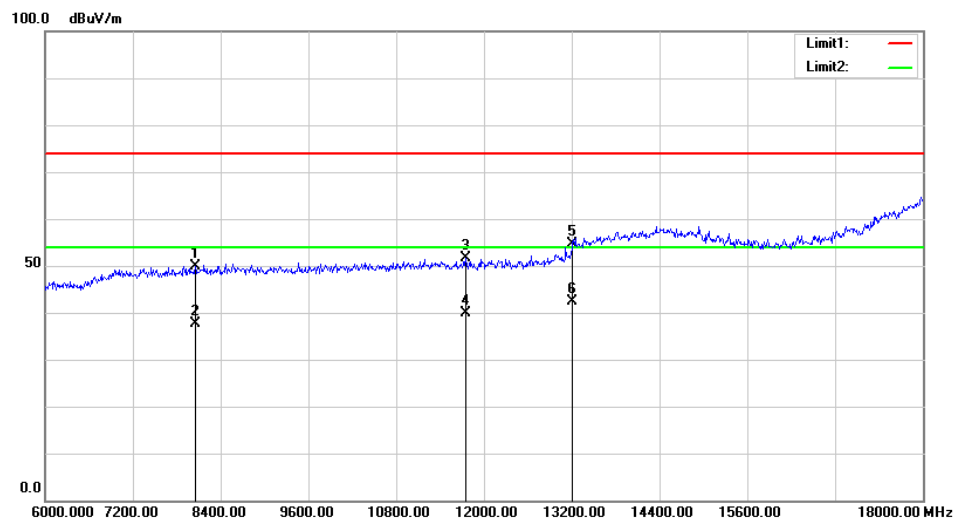
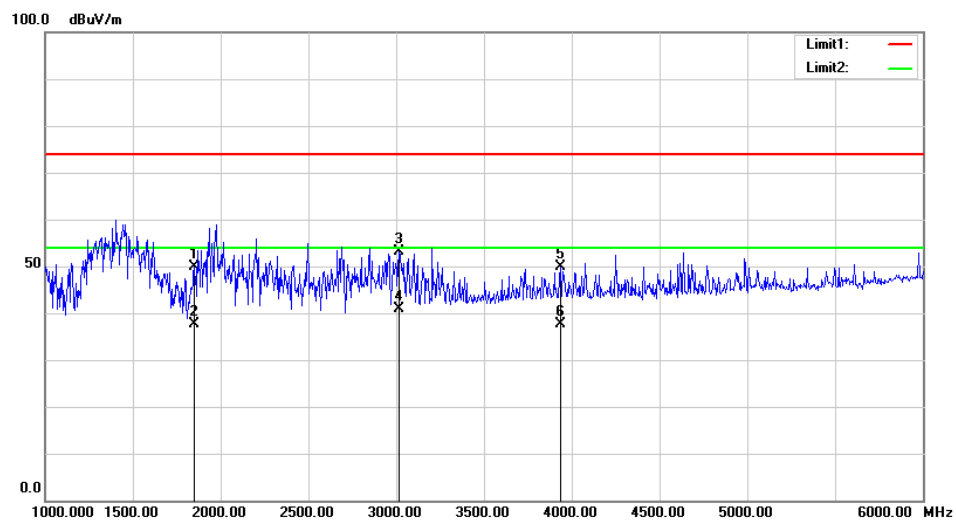
2) 1GHz-10GHz and Fundamental, Bandedge:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Remark	Polar (H/V)	Factor (dB/m)					
908.4 MHz									
908.40	59.70	QP	H	22.40	4.23	0.00	86.33	93.98	7.65
908.40	51.50	QP	V	22.40	4.23	0.00	78.13	93.98	15.85
902.00	8.30	QP	H	22.34	4.29	0.00	34.93	46.00	11.07
928.00	8.50	QP	H	22.56	4.34	0.00	35.40	46.00	10.60
1816.80	47.09	PK	H	26.53	1.66	25.85	49.43	74.00	24.57
1816.80	43.88	AV	H	26.53	1.66	25.85	46.22	54.00	7.78
2725.20	37.26	PK	H	29.11	1.89	26.10	42.16	74.00	31.84
2725.20	24.73	AV	H	29.11	1.89	26.10	29.63	54.00	24.37
3633.60	42.26	PK	H	31.59	2.45	25.94	50.36	74.00	23.64
3633.60	37.47	AV	H	31.59	2.45	25.94	45.57	54.00	8.43

Test plots:
Horizontal



Vertical:



FCC §15.215(c) – 20 dB BANDWIDTH TESTING**Applicable Standard**

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.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. Repeat above procedures until all frequencies measured were complete.

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	ESR3	102453	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	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:	25.0 °C
Relative Humidity:	50%
ATM Pressure:	100.5kPa
Tester:	Joker Chen
Test Date:	2020-06-14

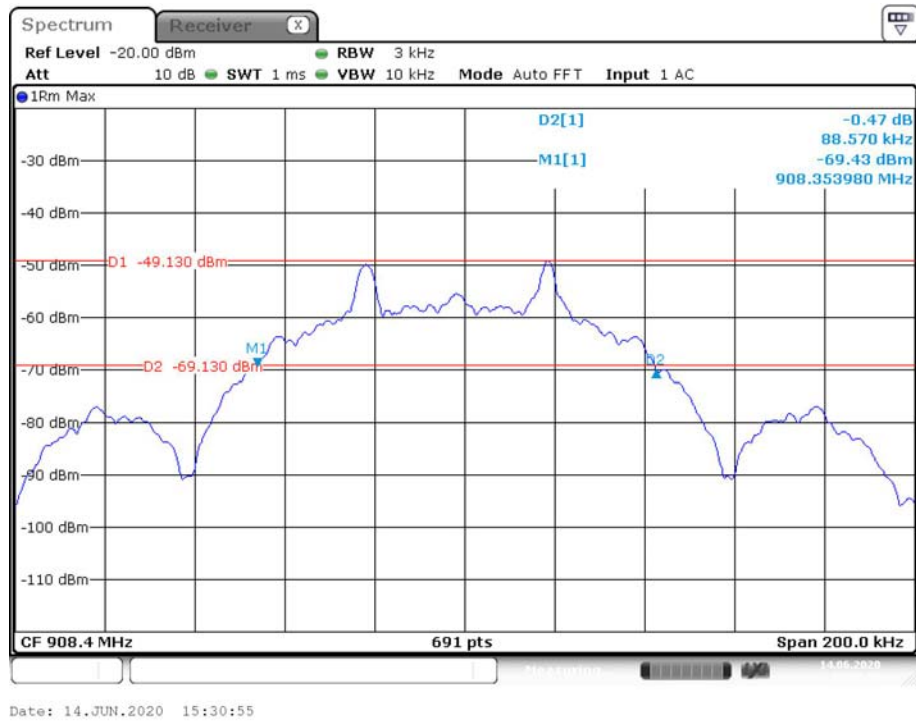
Test Result: Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (MHz)
908.4	0.089

5795 MHz



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