



# FCC PART 15.245


## TEST REPORT

For

### Huizhou MOSITOEKO intelligence Lighting Technology Co., Ltd

East Hechang No.5 Road,Zhongkai Hi-tech industrial Development  
Park,Huizhou ,Guangdong,China

**FCC ID: 2AU7RS-RADAR**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Micro Wave Module
<b>Report Number:</b>	RBJ191202050-00
<b>Report Date:</b>	2020-09-10
<b>Reviewed By:</b>	Ivan Cao Assistant Manager 
<b>Test Laboratory:</b>	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

<b>EUT Name:</b>	Micro Wave Module
<b>EUT Model:</b>	S-RADAR
<b>Operation Frequency:</b>	10525 MHz
<b>Modulation Type:</b>	CW
<b>Rated Input Voltage:</b>	DC 5V from system
<b>Serial Number:</b>	RBJ191202050-RF-S1
<b>EUT Received Date:</b>	2020.7.20
<b>EUT Received Status:</b>	Good

### Objective

This type approval report is prepared on behalf of *Huizhou MOSITOEKO intelligence Lighting 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 15.245 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	±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	±1 °C
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

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### Justification

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

The device only operates in 10525 MHz

### 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.

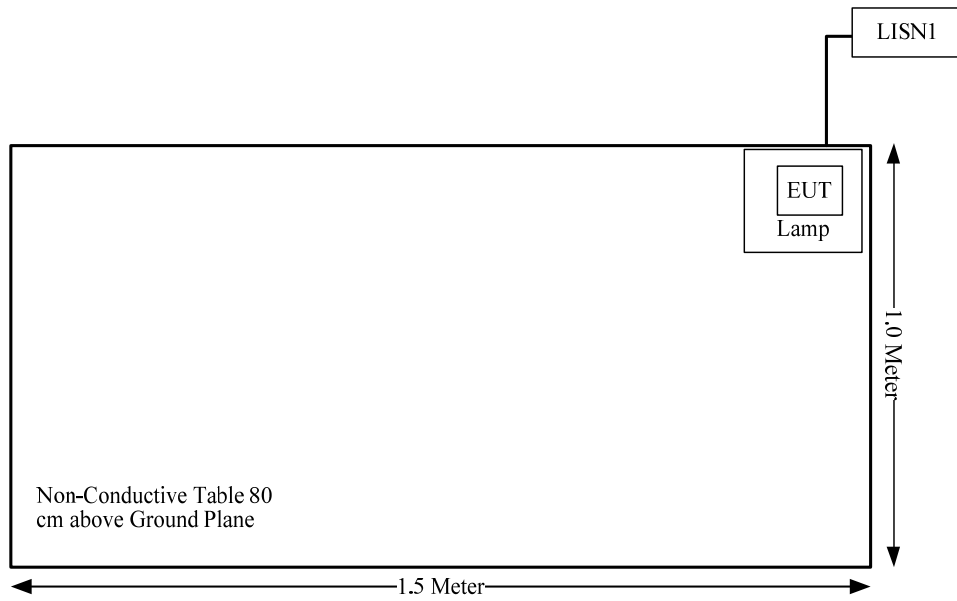
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Xidun	Host Lamp	CEA13501D/L	100810

### Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
AC Cable	No	No	1.0	LISN	Lamp

**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Compliance
15.205, §15.209, §15.245	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **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 two internal PCB Antennas permanently attached to the unit, the antenna gain is 3.2 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliant.

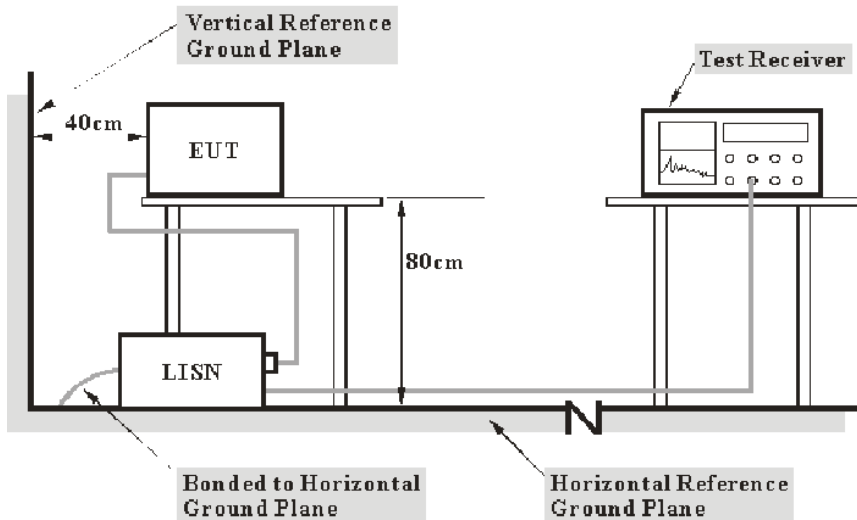


**FCC §15.207 (a)– AC LINE CONDUCTED EMISSIONS**

**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 Lamp 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 Lamp 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
R&S	LISN	ENV 216	101614	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**

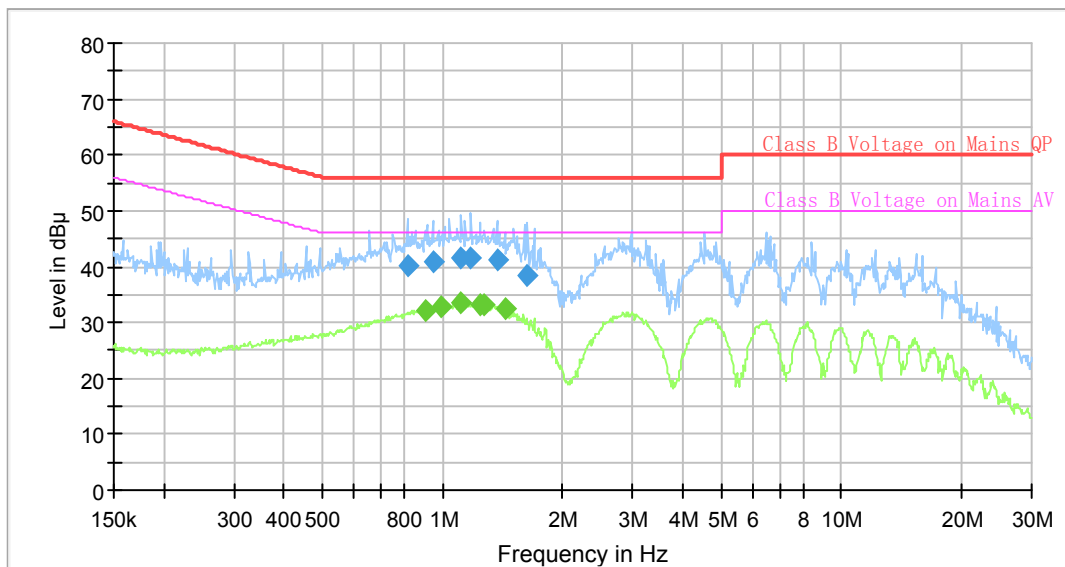
**Environmental Conditions**

<b>Temperature:</b>	27.5°C
<b>Relative Humidity:</b>	58%
<b>ATM Pressure:</b>	100.9kPa
<b>Tester:</b>	Barry Yang
<b>Test Date:</b>	2020-08-27

*Test Mode: Transmitting*

*Test Result: Compliance. Please refer to following table and plots:*

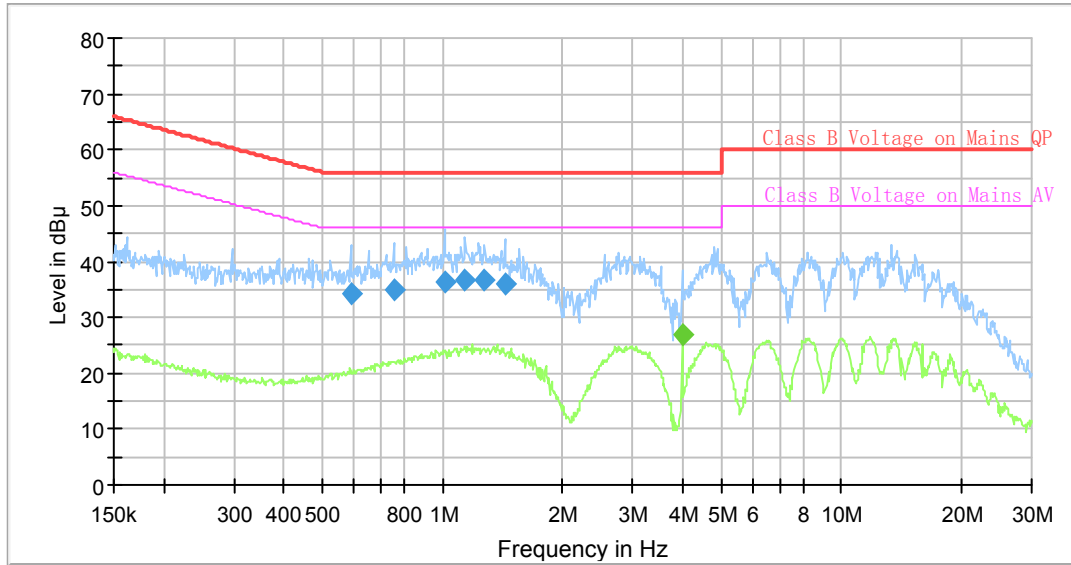
**AC120 V, 60 Hz, Line:**



**Final Result**

Frequency (MHz)	QuasiPeak (dB μV)	Average (dB μV)	Limit (dB μV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.817621	40.03	---	56.00	15.97	9.000	L1	9.7
0.903386	---	32.16	46.00	13.84	9.000	L1	9.7
0.944861	41.01	---	56.00	14.99	9.000	L1	9.7
0.988240	---	32.99	46.00	13.01	9.000	L1	9.7
1.113905	---	33.56	46.00	12.44	9.000	L1	9.7
1.113905	41.71	---	56.00	14.29	9.000	L1	9.7
1.176724	41.40	---	56.00	14.60	9.000	L1	9.7
1.236902	---	33.14	46.00	12.86	9.000	L1	9.7
1.268136	---	33.10	46.00	12.90	9.000	L1	9.7
1.373481	41.07	---	56.00	14.93	9.000	L1	9.7
1.436538	---	32.35	46.00	13.65	9.000	L1	9.7
1.635441	38.58	---	56.00	17.42	9.000	L1	9.7

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



**Final Result**

Frequency (MHz)	QuasiPeak (dB μV)	Average (dB μV)	Limit (dB μV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.591232	34.11	---	56.00	21.89	9.000	N	9.6
0.754910	34.92	---	56.00	21.08	9.000	N	9.6
1.013195	36.16	---	56.00	19.84	9.000	N	9.6
1.142032	36.82	---	56.00	19.18	9.000	N	9.6
1.274476	36.79	---	56.00	19.21	9.000	N	9.6
1.436538	35.93	---	56.00	20.07	9.000	N	9.6
3.993557	---	27.00	46.00	19.00	9.000	N	9.6

**FCC§15.205, §15.209&§15.245- RADIATED EMISSIONS**

**Applicable Standard**

As per FCC§15.245 (b):

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

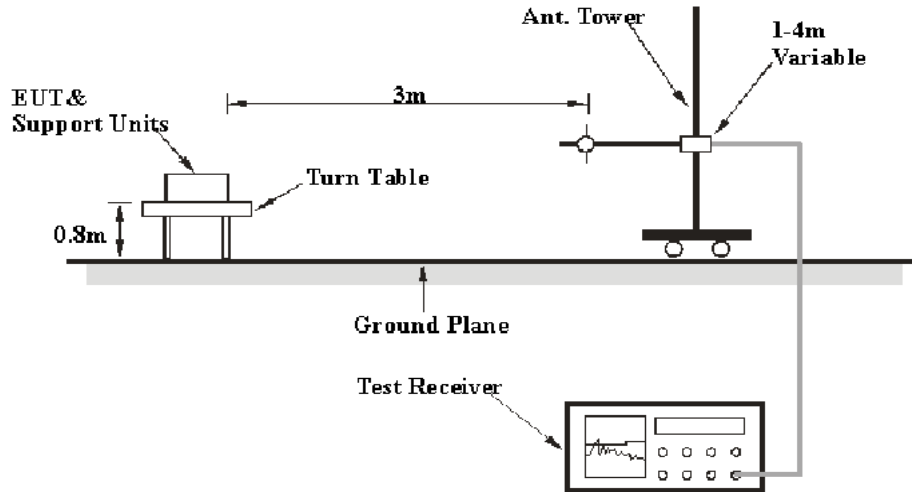
(2) Field strength limits are specified at a distance of 3 meters.

(3) 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.

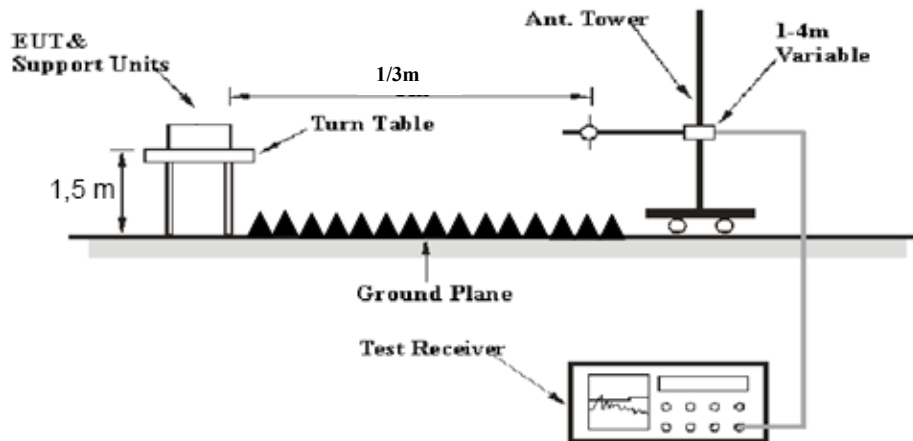
(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

### EUT Setup

Below 1 GHz:



1-60 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 15.245 limits.

## Test Equipment Setup

The system was investigated from 30 MHz to 60 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 1-40GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2017-12-06	2020-12-05
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2017-12-06	2020-12-05
R&S	Spectrum Analyzer	FSP 38	100478	2020-07-07	2021-07-07
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
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2020-06-27	2021-06-27
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
Radiation 40-60GHz					
R&S	Spectrum Analyzer	8564E	3943A01781	2020-03-02	2021-03-02
OML	Harmonic Mixer	WR19/M19HWD	U60313-1	2019-10-14	2022-10-14
OML	Horn Antenna	M19RH	11648-01	2019-10-14	2022-10-14
MICRO-COAX	Coaxial Cable	UFA147-1-2362- 100100	64639 231029- 001	2020-02-24	2021-02-24

\* **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**

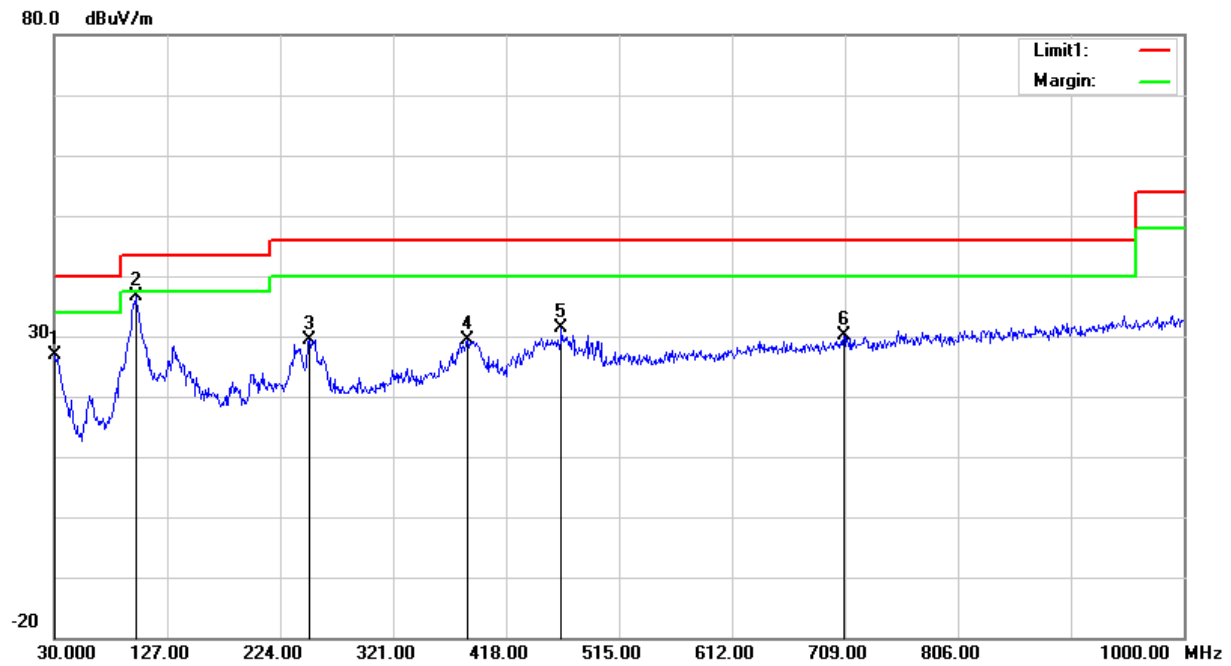
Test Items	Radiation Below 1GHz	Radiation 1-40GHz	Radiation 40-60GHz
<b>Temperature:</b>	28.2 °C	28.4 °C	28.4 °C
<b>Relative Humidity:</b>	48%	44%	44%
<b>ATM Pressure:</b>	100.5kPa	100.8kPa	100.8kPa
<b>Tester:</b>	Joker Chen	Sun Zhong	Sun Zhong
<b>Test Date:</b>	2020-08-31	2020-08-04	2020-08-04

*Test Mode: Transmitting*



1) 30MHz-1GHz

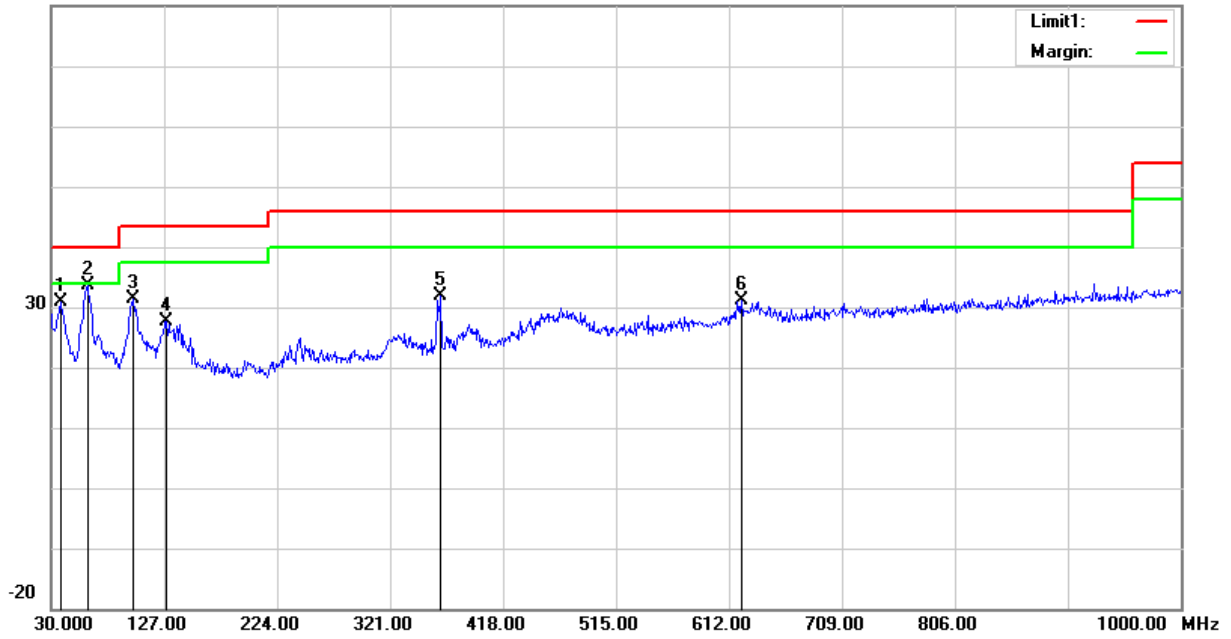
Horizontal



Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.0000	25.39	peak	1.46	26.85	40.00	13.15
99.8400	45.56	peak	-9.05	36.51	43.50	6.99
249.2200	35.25	peak	-5.93	29.32	46.00	16.68
385.0200	31.72	peak	-2.44	29.28	46.00	16.72
465.5300	32.02	peak	-0.60	31.42	46.00	14.58
708.0300	27.46	peak	2.77	30.23	46.00	15.77

**Vertical:**

80.0 dB $\mu$ V/m



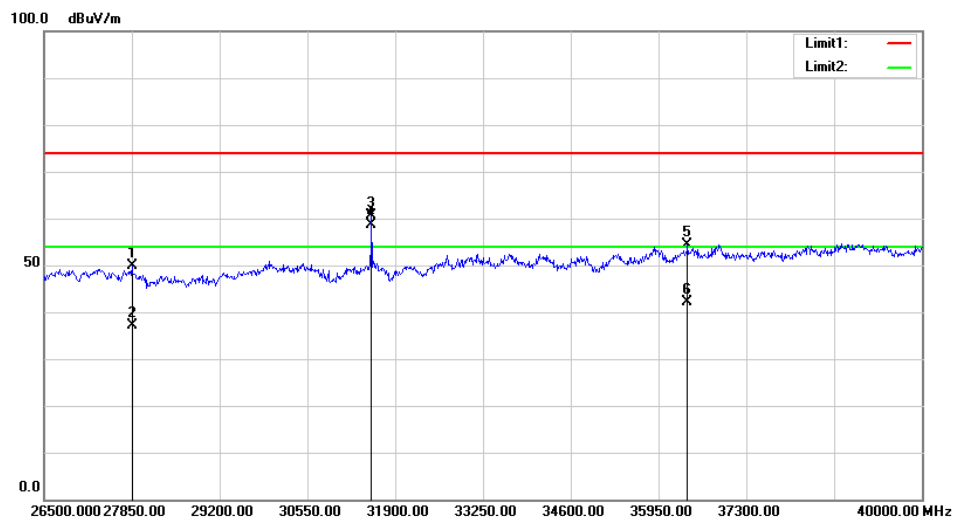
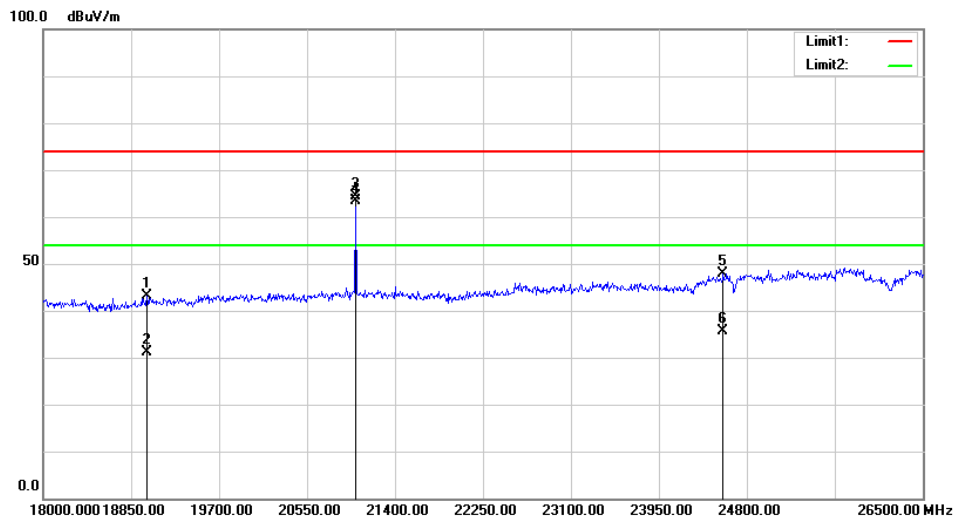
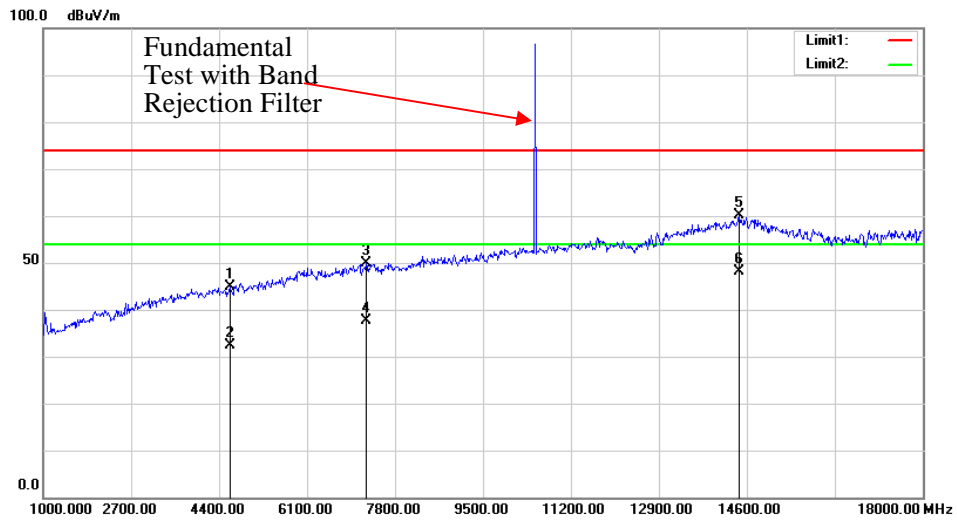
Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
37.7600	35.28	peak	-4.42	30.86	40.00	9.14
61.0400	45.97	peak	-12.28	33.69	40.00	6.31
100.8100	40.13	peak	-8.77	31.36	43.50	12.14
128.9400	32.53	peak	-4.97	27.56	43.50	15.94
364.6500	34.50	peak	-2.72	31.78	46.00	14.22
622.6700	29.81	peak	1.31	31.12	46.00	14.88

**2) 1GHz-40GHz:**

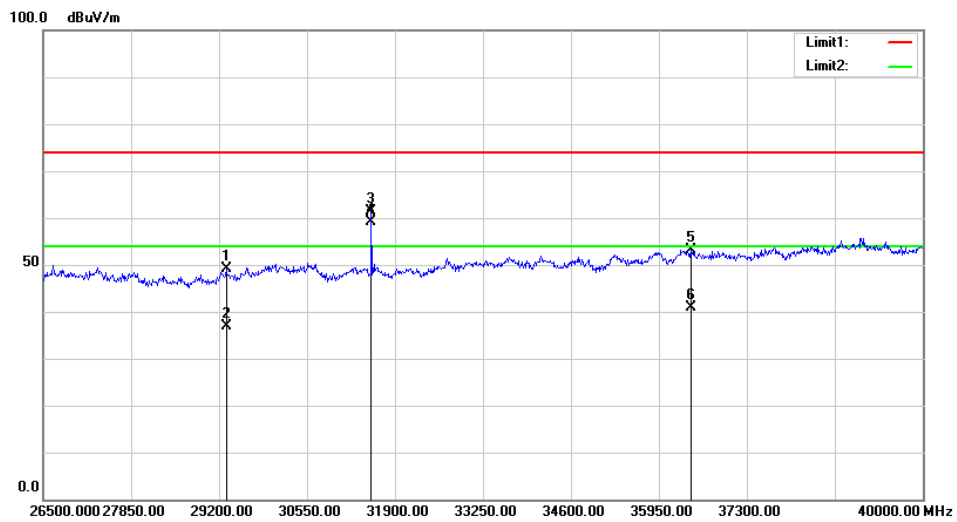
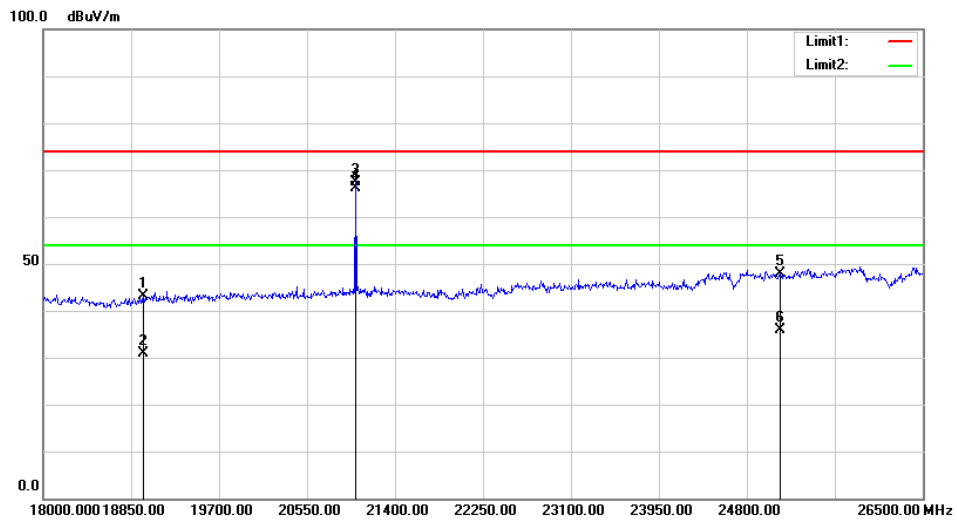
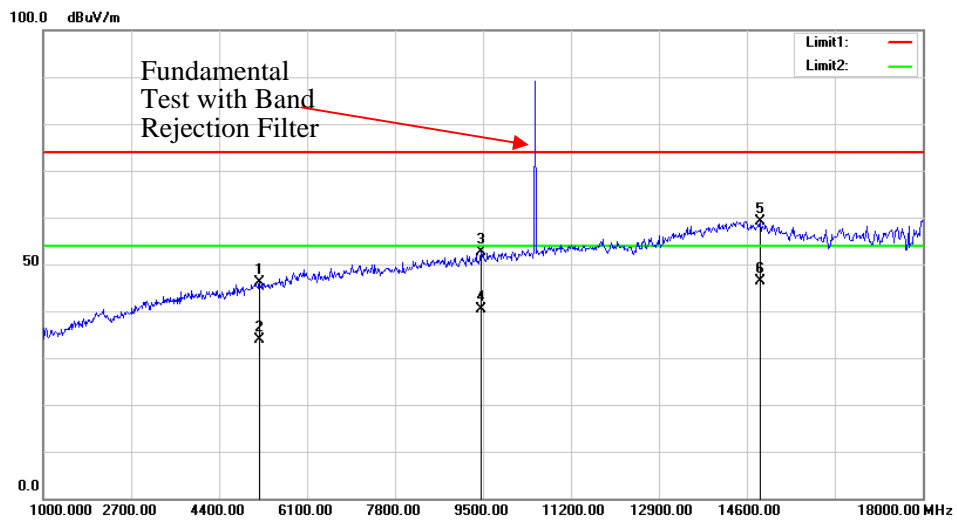
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
	Reading (dB $\mu$ V)	Remark	Polar (H/V)	Factor (dB/m)					
10525.00*	77.87	PK	H	38.21	6.38	25.47	96.99	147.96	50.97
10525.00*	76.56	AV	H	38.21	6.38	25.47	95.68	127.96	32.28
10525.00*	72.62	PK	V	38.21	6.38	25.47	91.74	147.96	56.22
10525.00*	70.18	AV	V	38.21	6.38	25.47	89.30	127.96	38.66
10500.00	34.20	PK	H	38.20	6.38	25.47	53.31	74.00	20.69
10500.00	22.64	AV	H	38.20	6.38	25.47	41.75	54.00	12.25
10550.00	33.76	PK	H	38.23	6.40	25.47	52.92	74.00	21.08
10550.00	22.08	AV	H	38.23	6.40	25.47	41.24	54.00	12.76
21050.00	58.58	PK	H	34.22	10.36	38.82	64.34	97.50	33.16
21050.00	57.79	AV	H	34.22	10.36	38.82	63.55	77.50	13.95
31575.00	48.25	PK	H	37.73	12.88	37.50	61.36	97.50	36.14
31575.00	46.17	AV	H	37.73	12.88	37.50	59.28	77.50	18.22

\*:Fundamental.

**Test plots:  
Horizontal**



Vertical:

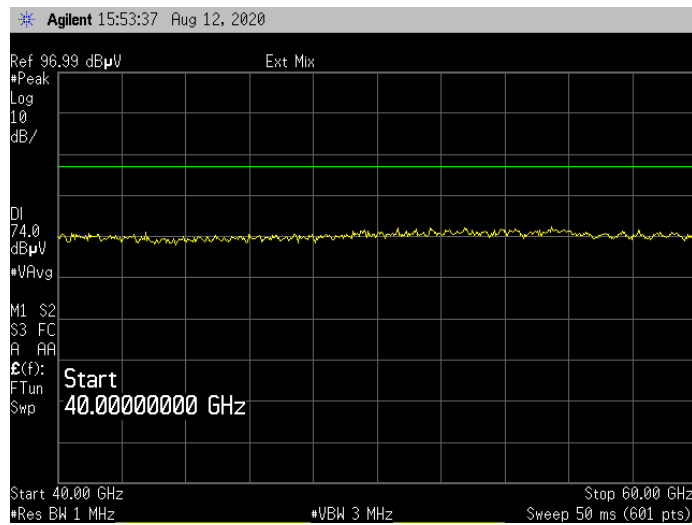


**40GHz-60GHz:**

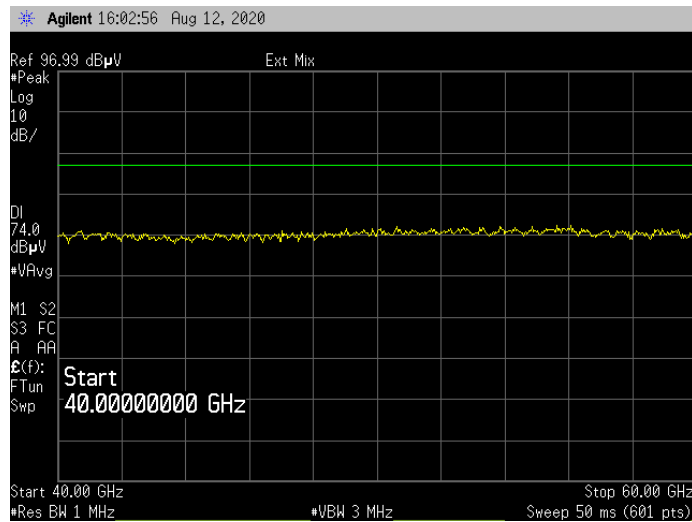
Frequency (GHz)	Receiver		Rx Antenna		Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB(1/m))				
42.04	57.68	PK	H	39.11	96.79	87.25	97.5	10.25
42.04	44.12	AV	H	39.11	83.23	73.69	77.5	3.81

Note:1. for the range 40-60GHz, the test performed at the distance 1m.

**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. 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
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
R&S	Spectrum Analyzer	FSP 38	100478	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

\* **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**

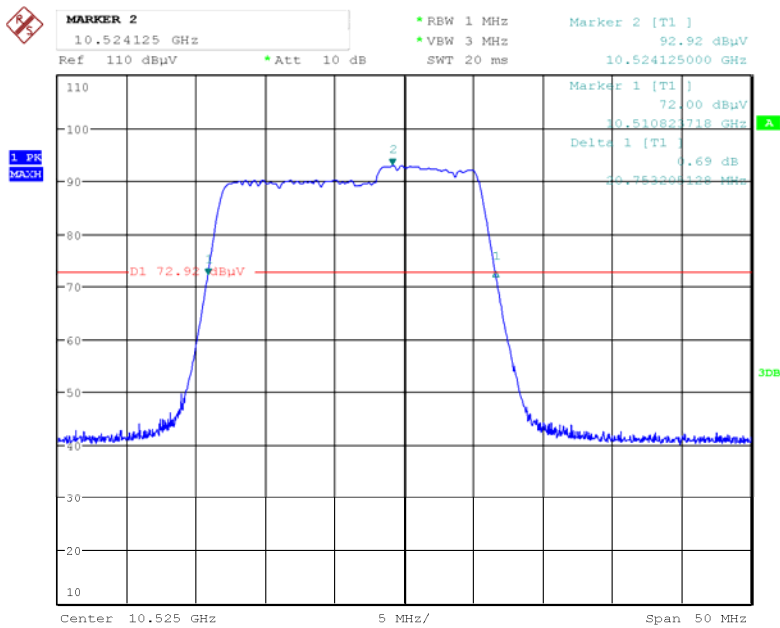
<b>Temperature:</b>	28.1 °C
<b>Relative Humidity:</b>	66%
<b>ATM Pressure:</b>	100.9kPa
<b>Tester:</b>	Carlos
<b>Test Date:</b>	2020-08-13

**Test Result:** Compliant. Please refer to following tables and plots

Test Mode: Transmitting

Frequency (GHz)	Result (MHz)
10.525	20.753

20 dB Bandwidth



Date: 13.AUG.2020 21:34:47

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