TESTING LABORATORY
CERTIFICATE #4820.01

# FCC PART 15.249

# TEST REPORT

For

## Techwall Electronics Co., Ltd.

24/F, Tower 1, Tern Centre, 237 Queen's Road, Central, Hong Kong

## FCC ID: OD9BSM1

| Report Type: | Product Name: |
|---|---|
| Original Report | Digital Baby Monitor |

| | |
|---|---|
| **Report Number:** | RDG180611008-00B |
| **Report Date:** | 2018-07-05 |
| **Reviewed By:** | Jerry Zhang<br>EMC Manager |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industry Area,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br>www.baclcorp.com.cn |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| **EUT Name:** | Digital Baby Monitor |
| **EUT Model:** | BC-70 |
| **FCC ID:** | OD9BSM1 |
| **Rated Input Voltage:** | DC 4.5V |
| **Serial Number:** | 180611008 |
| **EUT Received Date:** | 2018.06.11 |

## Objective

This type approval report is prepared on behalf of ***Techwall Electronics 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, 15.215, 15.209 and 15.249 rules.

## Related Submittal(s)/Grant(s)

Part of system submissions with FCC ID: OD9BC70PU, FCC ID: OD9BC70BU.

## 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<br>200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical<br>1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 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 test site has been approved by the FCC 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 test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

# SYSTEM TEST CONFIGURATION

## Justification

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

The device employs 4 channels as below list:

| Channel | Frequency (MHz) |
|---|---|
| 1 | 915.80 |
| 2 | 916.00 |
| 3 | 926.80 |
| 4 | 927.00 |

3channels were tested: 915.80 MHz, 916.00MHz and 927.00MHz

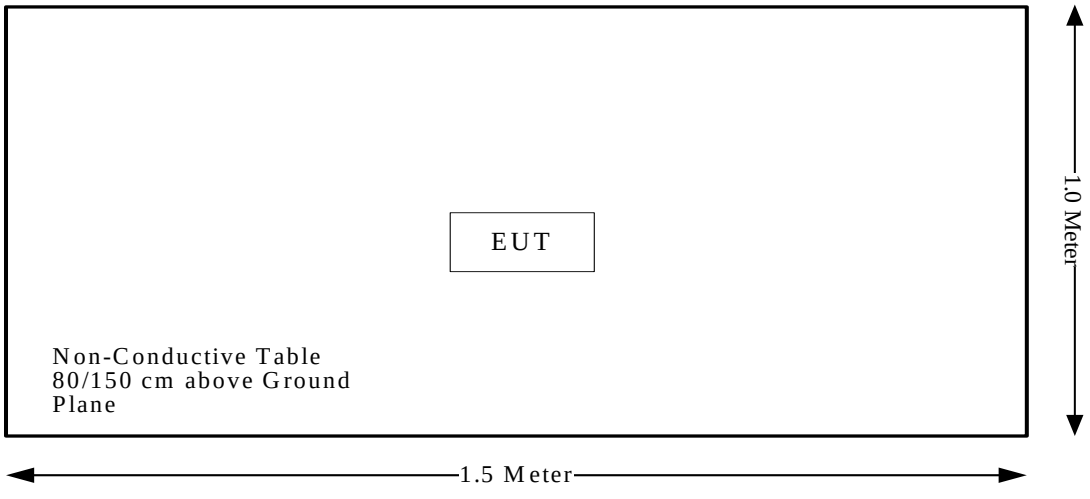
## EUT Exercise Software

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

## Equipment Modifications

No modifications were made to the 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 | Not Applicable* |
| 15.205, §15.209, §15.249 | Radiated Emissions | Compliance |
| §15.215 (c) | 20 dB Bandwidth | Compliance |

Note:
Not Applicable*: the EUT is battery operated equipment.

# FCC§15.203 - ANTENNA REQUIREMENT

## Applicable Standard

For intentional device, 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.

## Antenna Connector Construction

The EUT has one internal antenna arrangement, and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

# 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:

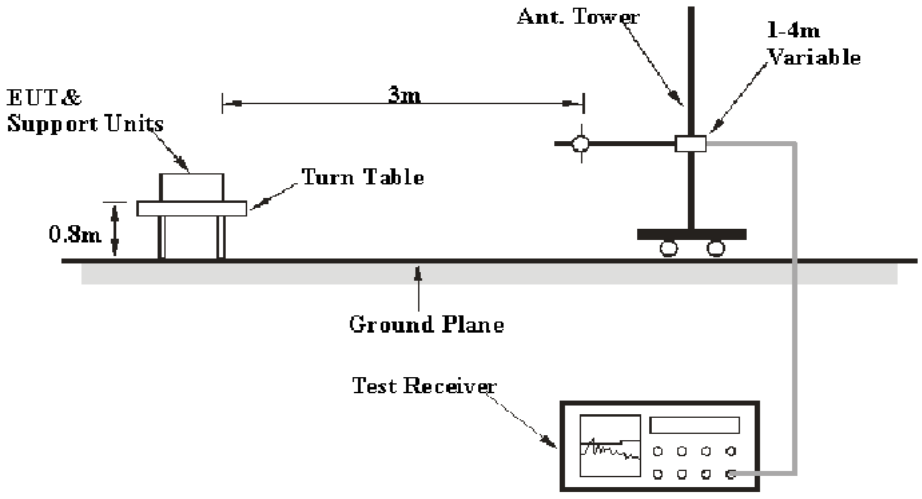
| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|---|---|---|
| 902–928 MHz | 50 | 500 |
| 2400–2483.5 MHz | 50 | 500 |
| 5725–5875 MHz | 50 | 500 |
| 24.0–24.25 GHz | 250 | 2500 |

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

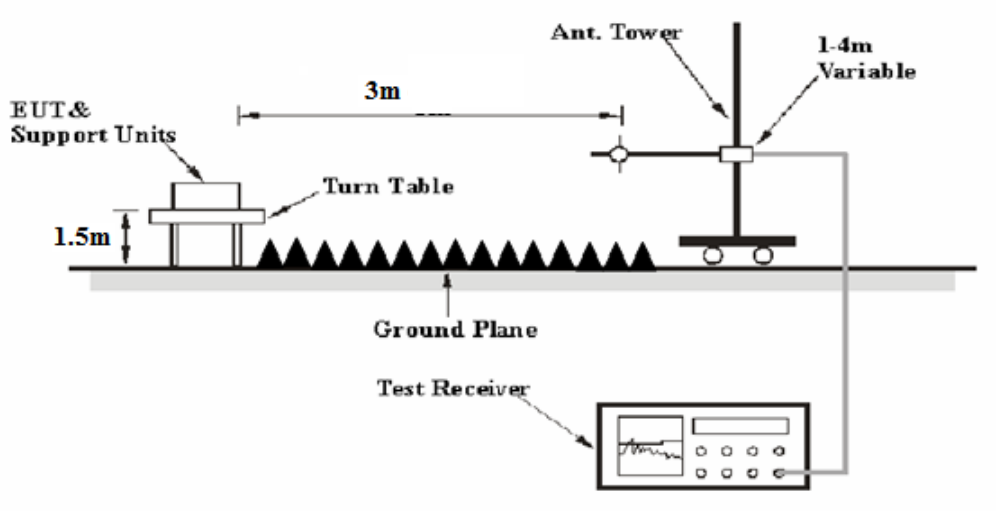
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

## EUT Setup

Below 1 GHz:



Above 1 GHz:




The radiated emission tests were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 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 |

## Test Procedure

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

All data was recorded in the Quasi-peak detection mode from 30 MHz to 1GHz, peak detection mode 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:

Corrected Amplitude = 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 –Corrected Amplitude

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | EMI Test Receiver | ESCI | 100224 | 2017-12-11 | 2018-12-11 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2017-11-10 | 2020-11-10 |
| Agilent | Spectrum Analyzer | E4440A | SG43360054 | 2018-01-04 | 2019-01-04 |
| ETS-Lindgren | Horn Antenna | 3115 | 000 527 35 | 2016-01-05 | 2019-01-04 |
| MITEQ | Amplifier | AFS42-00101800-25-S-42 | 2001271 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0400-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0075-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-SJSJ-50 | C-0800-01 | 2017-09-05 | 2018-09-05 |
| 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

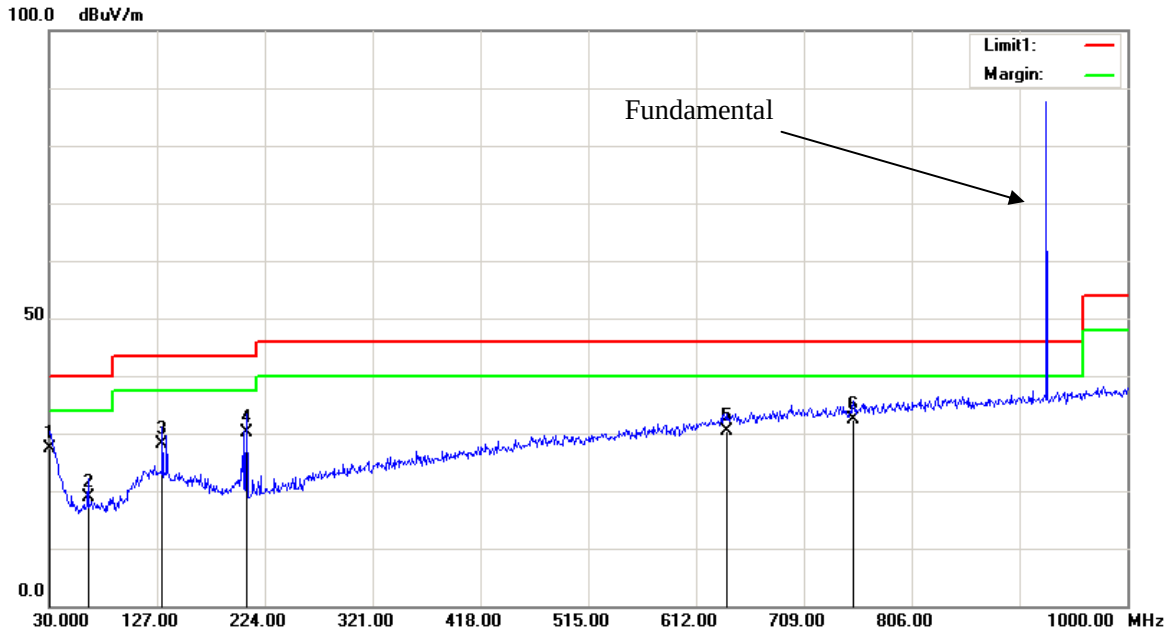
| | |
|---|---|
| **Temperature:** | 27.0~28.6°C |
| **Relative Humidity:** | 35~43 % |
| **ATM Pressure:** | 99.6~101.6kPa |

*The testing was performed by Vern Shen and Blake Yang on 2018-06-27 to 2018-07-04 .*

*Test Mode: Transmitting*

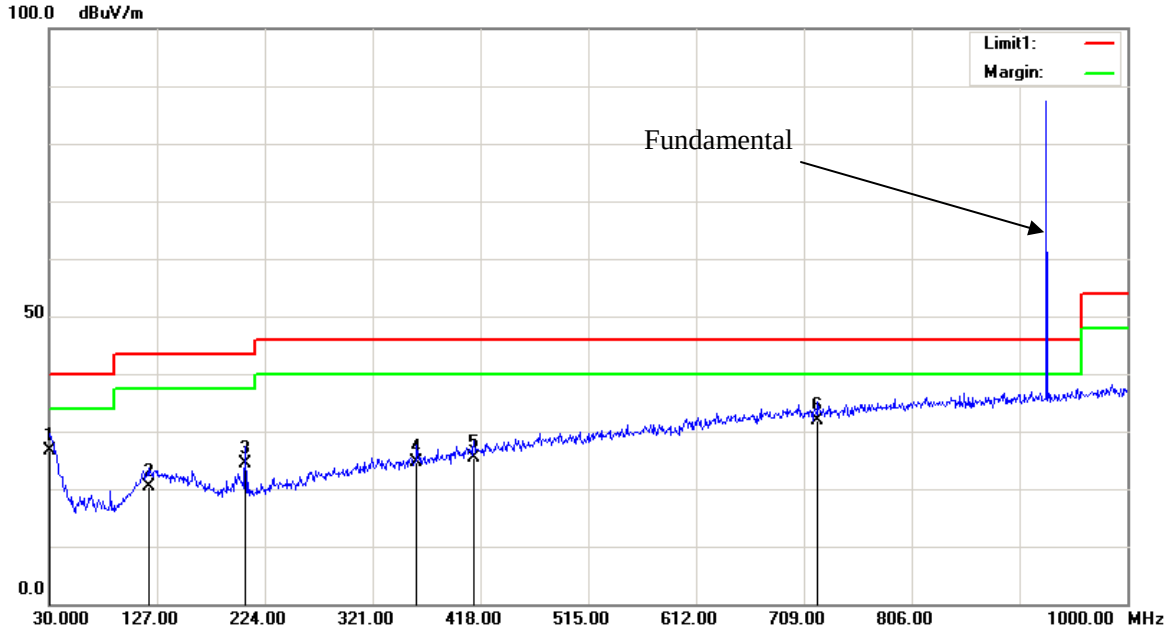
**1) 30MHz-1GHz(Worst at Middle Channel)**

**Horizontal:**




| Frequency (MHz) | Receiver Reading (dBuV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 30.0000 | -0.57 | QP | 27.87 | 27.30 | 40.00 | 12.70 |
| 64.9200 | 4.55 | QP | 14.45 | 19.00 | 40.00 | 21.00 |
| 131.8500 | 7.17 | QP | 20.93 | 28.10 | 43.50 | 15.40 |
| 207.5100 | 11.90 | QP | 18.30 | 30.20 | 43.50 | 13.30 |
| 640.1300 | 1.09 | QP | 29.31 | 30.40 | 46.00 | 15.60 |
| 753.6200 | 1.92 | QP | 30.58 | 32.50 | 46.00 | 13.50 |

**Vertical:**



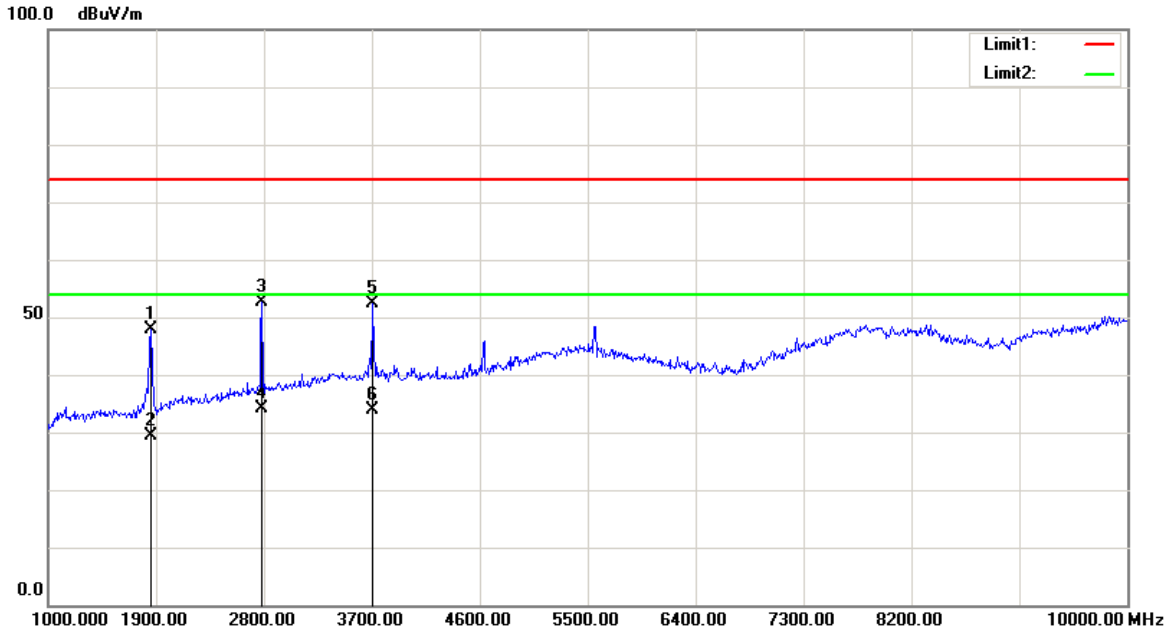

| Frequency (MHz) | Receiver Reading (dBuV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 30.0000 | -1.17 | QP | 27.87 | 26.70 | 40.00 | 13.30 |
| 119.2400 | -0.49 | QP | 20.99 | 20.50 | 43.50 | 23.00 |
| 206.5400 | 5.83 | QP | 18.47 | 24.30 | 43.50 | 19.20 |
| 360.7700 | 1.67 | QP | 23.03 | 24.70 | 46.00 | 21.30 |
| 412.1800 | 0.72 | QP | 24.58 | 25.30 | 46.00 | 20.70 |
| 721.6100 | 1.71 | QP | 30.29 | 32.00 | 46.00 | 14.00 |

**2) Above 1G, Bandedge, and Fundamental field strength:**

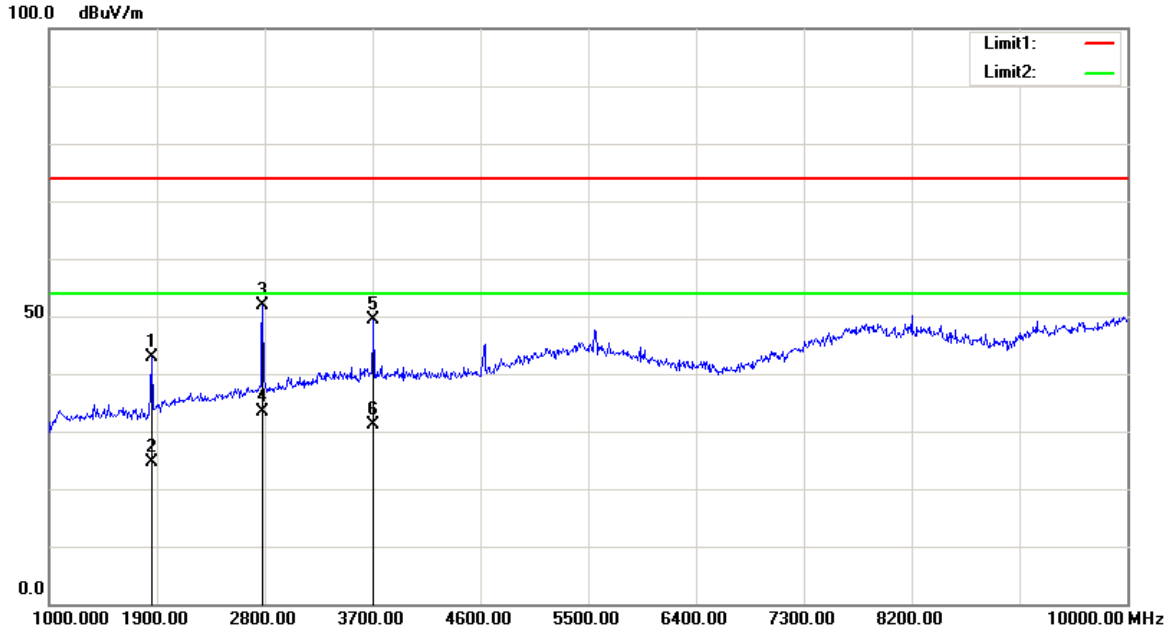
| Frequency (MHz) | Receiver | | Rx Antenna | | Cable loss (dB) | Amplifier Gain (dB) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | Reading (dBμV) | Detector | Polar (H/V) | Factor (dB/m) | | | | | |
| Low Channel: 915.8 MHz | | | | | | | | | |
| 915.80 | 54.60 | QP | H | 22.40 | 4.22 | 0.00 | 81.22 | 93.98 | 12.76 |
| 915.80 | 53.90 | QP | V | 22.40 | 4.22 | 0.00 | 80.52 | 93.98 | 13.46 |
| 902.00 | 5.50 | QP | H | 22.34 | 4.29 | 0.00 | 32.13 | 46.00 | 13.87 |
| 1831.60 | 51.93 | PK | H | 26.59 | 1.66 | 35.95 | 44.23 | 74.00 | 29.77 |
| 1831.60 | 33.63 | AV | H | 26.59 | 1.66 | 35.95 | 25.93 | 54.00 | 28.07 |
| 2747.40 | 53.16 | PK | H | 29.19 | 1.91 | 36.51 | 47.75 | 74.00 | 26.25 |
| 2747.40 | 34.78 | AV | H | 29.19 | 1.91 | 36.51 | 29.37 | 54.00 | 24.63 |
| 3663.20 | 57.02 | PK | H | 31.66 | 2.51 | 37.06 | 54.13 | 74.00 | 19.87 |
| 3663.20 | 38.57 | AV | H | 31.66 | 2.51 | 37.06 | 35.68 | 54.00 | 18.32 |
| Middle Channel: 916 MHz | | | | | | | | | |
| 916.00 | 54.50 | QP | H | 22.40 | 4.22 | 0.00 | 81.12 | 93.98 | 12.86 |
| 916.00 | 54.00 | QP | V | 22.40 | 4.22 | 0.00 | 80.62 | 93.98 | 13.36 |
| 1832.00 | 52.19 | PK | H | 26.59 | 1.66 | 35.95 | 44.49 | 74.00 | 29.51 |
| 1832.00 | 33.76 | AV | H | 26.59 | 1.66 | 35.95 | 26.06 | 54.00 | 27.94 |
| 2748.00 | 51.92 | PK | H | 29.19 | 1.91 | 36.51 | 46.51 | 74.00 | 27.49 |
| 2748.00 | 33.54 | AV | H | 29.19 | 1.91 | 36.51 | 28.13 | 54.00 | 25.87 |
| 3664.00 | 55.28 | PK | H | 31.66 | 2.51 | 37.06 | 52.39 | 74.00 | 21.61 |
| 3664.00 | 36.79 | AV | H | 31.66 | 2.51 | 37.06 | 33.90 | 54.00 | 20.10 |
| High Channel: 927 MHz | | | | | | | | | |
| 927.00 | 56.10 | QP | H | 22.54 | 4.35 | 0.00 | 82.99 | 93.98 | 10.99 |
| 927.00 | 54.00 | QP | V | 22.54 | 4.35 | 0.00 | 80.89 | 93.98 | 13.09 |
| 928.00 | 5.20 | QP | H | 22.56 | 4.34 | 0.00 | 32.10 | 46.00 | 13.90 |
| 1854.00 | 55.34 | PK | H | 26.69 | 1.66 | 35.99 | 47.70 | 74.00 | 26.30 |
| 1854.00 | 36.97 | AV | H | 26.69 | 1.66 | 35.99 | 29.33 | 54.00 | 24.67 |
| 2781.00 | 57.97 | PK | H | 29.31 | 1.93 | 36.55 | 52.66 | 74.00 | 21.34 |
| 2781.00 | 39.68 | AV | H | 29.31 | 1.93 | 36.55 | 34.37 | 54.00 | 19.63 |
| 3708.00 | 54.22 | PK | H | 31.76 | 2.57 | 37.02 | 51.53 | 74.00 | 22.47 |
| 3708.00 | 35.64 | AV | H | 31.76 | 2.57 | 37.02 | 32.95 | 54.00 | 21.05 |

**Worst Plots(Middle Channel)**

**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 |
|---|---|---|---|---|---|
| R&S | EMI Test Receiver | ESCI | 100224 | 2017-12-11 | 2018-12-11 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2017-11-10 | 2020-11-10 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0400-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0075-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2017-09-05 | 2018-09-05 |

*** 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:** | 27.3 °C |
| **Relative Humidity:** | 55 % |
| **ATM Pressure:** | 101.7 kPa |

*The testing was performed by Vern Shen on 2018-06-27.*

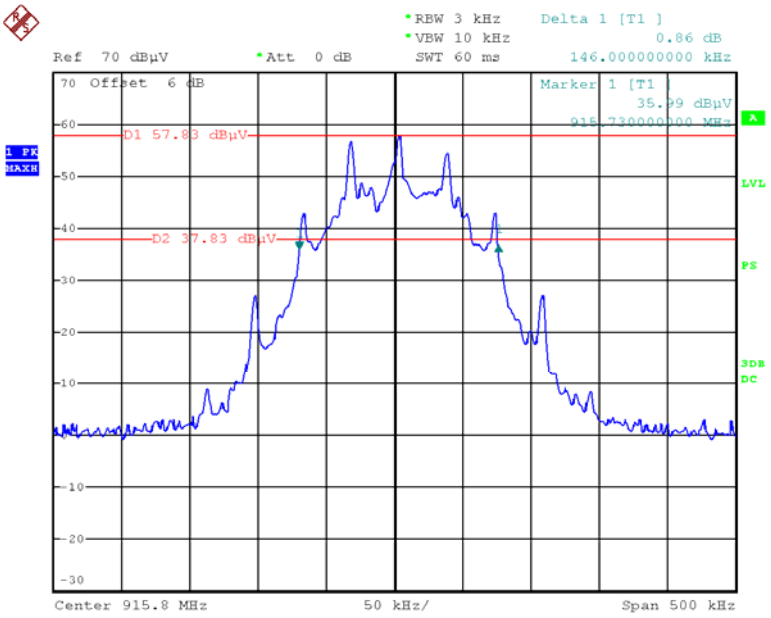
**Test Result:** Compliance.

Please refer to following tables and plots

*Test Mode: Transmitting*

| Channel | Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---|---|---|
| Low | 915.8 | 0.146 |
| Middle | 916 | 0.147 |
| High | 927 | 0.146 |

**Low Channel**

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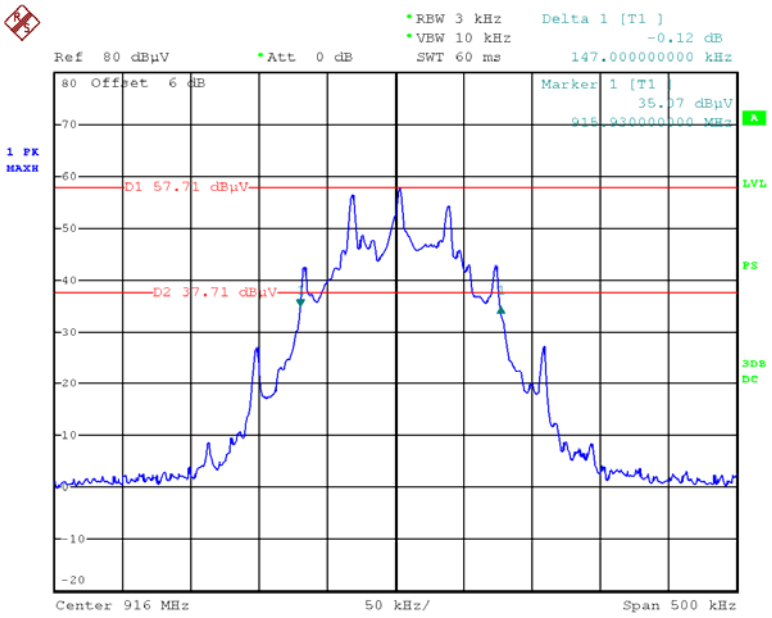
**Middle Channel**

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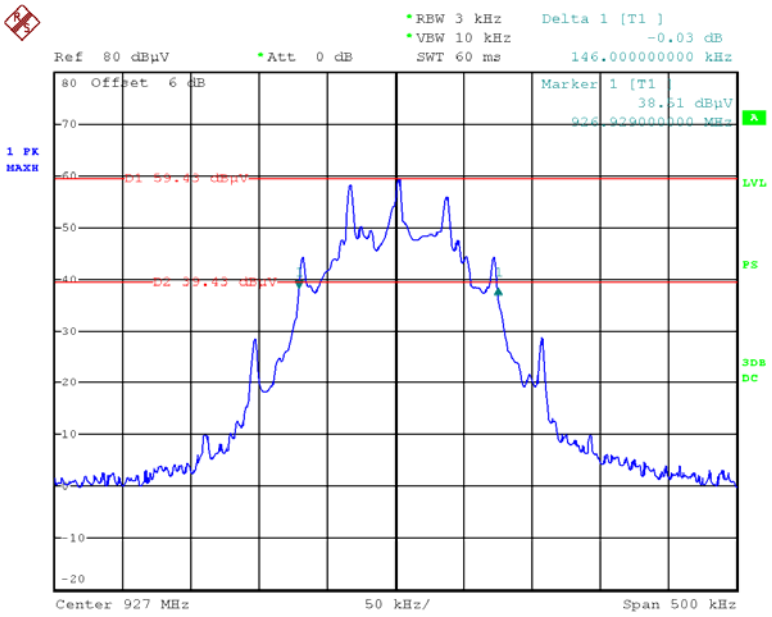
**High Channel**

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