

FCC 47 CFR PART 15 SUBPART C: 2014 ANSI C63.10: 2013

TEST REPORT

For

Wireless Key Transmitter

Model : 8839-433-6

Data applies to: 8839-433-4

Brand : Safetymind Wireless

Issued to

Safetymind Wireless

16539 Elm Haven Dr Hacienda Hts, Ca 91745

Issued by

Compliance Certification Services Inc.

Tainan Lab.

No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

TEL: (06) 580-2201

FAX: (06) 580-2202

Issued Date: March 20, 2017



Note: This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.

REVISION HISTORY

| Rev. | Issue Date | Revisions | Effect Page | Revised By |
|-------------|-------------------|------------------|--------------------|-------------------|
| 00 | March 20, 2017 | Initial Issue | ALL | Daphne Liang |
| | | | | |
| | | | | |

TABLE OF CONTENTS

| | |
|---|-----------|
| 1. TEST RESULT CERTIFICATION | 4 |
| 2. EUT DESCRIPTION..... | 5 |
| 3. TEST METHODOLOGY..... | 6 |
| 3.1 EUT CONFIGURATION | 6 |
| 3.2 EUT EXERCISE | 6 |
| 3.3 GENERAL TEST PROCEDURES | 6 |
| 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS | 7 |
| 3.5 DESCRIPTION OF TEST MODES..... | 7 |
| 4. INSTRUMENT CALIBRATION | 8 |
| 4.1 MEASURING INSTRUMENT CALIBRATION..... | 8 |
| 4.2 MEASUREMENT EQUIPMENT USED..... | 8 |
| 4.3 MEASUREMENT UNCERTAINTY | 9 |
| 5. FACILITIES AND ACCREDITATIONS | 10 |
| 5.1 FACILITIES | 10 |
| 5.2 EQUIPMENT | 10 |
| 5.3 TABLE OF ACCREDITATIONS AND LISTINGS..... | 10 |
| 5.4 TABLE OF ACCREDITATIONS AND LISTINGS..... | 11 |
| 6. SETUP OF EQUIPMENT UNDER TEST | 12 |
| 6.1 SETUP CONFIGURATION OF EUT | 12 |
| 6.2 SUPPORT EQUIPMENT | 12 |
| 7. FCC PART 15.231 REQUIREMENTS | 13 |
| 7.1 20 DB BANDWIDTH..... | 13 |
| 7.2 LIMIT OF TRANSMISSION TIME..... | 16 |
| 7.3 DUTY CYCLE..... | 19 |
| 7.4 CENTRAL FREQUNCY..... | 23 |
| 7.5 RADIATED EMISSIONS..... | 25 |
| 7.6 POWERLINE CONDUCTED EMISSIONS | 34 |
| 8. APPENDIX 1 PHOTOGRAPHS OF TEST SETUP | 35 |

1. TEST RESULT CERTIFICATION

Product: Wirless Key Transmitter

Model: 8839-433-6

Data applies to: 8839-433-4

Brand Name: Safetymind Wireless

Applicant: **Safetymind Wireless**

16539 Elm Haven Dr Hacienda Hts, Ca 91745

Manufacturer: **OKURI TECHNOLOGY CO., LTD.**

No.50, Ln. 759, Yongping St. Yongkang Dist., Tainan City 71086
Taiwan (R.O.C.)

Tested: March 01, 2017 ~ March 02, 2017

APPLICABLE STANDARDS

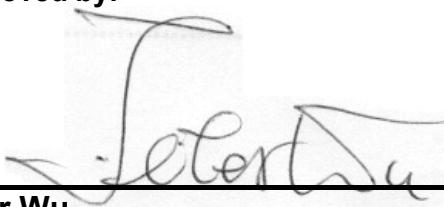
| STANDARD | TEST RESULT |
|---|-------------------------|
| FCC 47 CFR Part 15 Subpart C: 2014 ANSI C63.10: 2013 | No non-compliance noted |

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.207, 15.209 and Part 15.231.

The test results of this report relate only to the tested sample identified in this report.

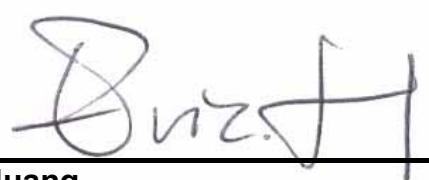
Approved by:



Jeter Wu

Assistant Manager

Reviewed by:



Eric Huang
Assistant Section Manager

2. EUT DESCRIPTION

| | |
|---------------------------|---|
| Product | Wireless Key Transmitter |
| Model Number | 8839-433-6 |
| Data applies to | 8839-433-4 |
| Brand Name | Safetymind Wireless |
| Received Date | February 20, 2017 |
| Frequency Range | 433.92 MHz ± 150 kHz |
| Number of Channels | 1 Channel |
| Type of Modulation | ASK |
| Power Supply | 3Vdc (Powered from battery) |
| Antenna Type | PCB antenna Model: 8839-433-6 Gain: -15 dBi |
| RF Module Model | PT4455 |
| Hardware Version | V01 |
| Software Version | V01 |
| Temperature Range | -20°C ~ +60°C |

Remark:

1. Client consigns only one model sample to test (Model Number: **8839-433-6**).
Therefore, the testing Lab. just guarantees the unit, which has been tested.
2. This submittal(s) (test report) is intended for FCC ID: **2AJ6J-8339-433** filing to comply with Section 15.207, 15.209 and 15.231 of the FCC Part 15, Subpart C Rules.
3. There are two external colors-blue and black for sale and are all the same, except for different colors & push bottom (6 key & 4 key) which just for marking purpose.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 (2013) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.231

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10.

3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---------------------|--------|---------------------|------------------|
| 0.090 | 0.110 | 16.42 - 16.423 | 4.5 - 5.15 |
| ¹ 0.495 | 0.505 | 16.69475 - 16.69525 | 5.35 - 5.46 |
| 2.1735 | 2.1905 | 16.80425 - 16.80475 | 7.25 - 7.75 |
| 4.125 - 4.128 | | 25.5 - 25.67 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | | 37.5 - 38.25 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | | 73 - 74.6 | 9.3 - 9.5 |
| 6.215 - 6.218 | | 74.8 - 75.2 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | | 108 - 121.94 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | | 123 - 138 | 14.47 - 14.5 |
| 8.291 - 8.294 | | 149.9 - 150.05 | 15.35 - 16.2 |
| 8.362 | 8.366 | 156.52475 - | 17.7 - 21.4 |
| 8.37625 - 8.38675 | | 156.52525 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | | 156.7 - 156.9 | 23.6 - 24.0 |
| 12.29 - 12.293 | | 162.0125 - 167.17 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | | 167.72 - 173.2 | 3345.8 - 3358 |
| 12.57675 - 12.57725 | | 240 - 285 | 3600 - 4400 |
| 13.36 | 13.41 | 322 - 335.4 | (²) |

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT (Model: **8839-433-6**) had been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

Note :

- 1) The field strength of spurious emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis). The worst emission was found in a lie-down position (Y axis) and the worst case was recorded.

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

| Open Area Test Site # 6 | | | | |
|-------------------------|---------------|-----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Bi-Log Antenna | Sunol | JB1 | A070506-2 | 07/22/2017 |
| EMI Test Receiver | R&S | ESCI | 100960 | 10/26/2017 |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 04/29/2017 |
| Horn Antenna | Com-Power | AH-118 | 071032 | 02/08/2018 |
| Power Meter | Anritsu | ML2487A | 6K00003888 | 03/23/2017 |
| Power Sensor | Anritsu | MA2491A | 33265 | 03/23/2017 |
| Pre-Amplifier | EMCI | EMC012645 | 980098 | 01/16/2018 |
| Pre-Amplifier | HP | 8447F | 2443A01683 | 01/17/2018 |
| Tem/Hum Chamber | K.SON | THS-M1 | 242 | 08/29/2017 |
| Type N coaxial cable | Suhner | CHA9513 | 6 | 01/17/2018 |
| Vector signal generator | ROHDE&SCHWARZ | SMU 200A | 103565 | 12/06/2017 |
| Software | Excel | | | |

Remark: Each piece of equipment is scheduled for calibration once a year.

4.3 MEASUREMENT UNCERTAINTY

| Parameter | Uncertainty |
|--|-------------|
| Radiated Emission, 150kHz to 30 MHz Test Site : Chamber 966 | ±5.2dB |
| Radiated Emission, 30 to 200 MHz Test Site : Chamber 966 | ±3.21dB |
| Radiated Emission, 200 to 1000 MHz Test Site : Chamber 966 | ±3.09dB |
| Radiated Emission, 1 to 8 GHz | ± 2.65dB |
| Radiated Emission, 8 to 18 GHz | ± 2.66dB |
| Radiated Emission, 18 to 26.5 GHz | ± 2.65dB |
| Radiated Emission, 26 to 40 GHz | ± 3.03dB |
| Power Line Conducted Emission | ±1.91dB |
| Band Width | 136.49kHz |
| Peak Output Power MU | ±1.34dB |
| Band Edge MU | ±0.30dBuV |
| Channel Separation MU | 361.69Hz |
| Duty Cycle MU | 0.064ms |
| Frequency Stability MU | 0.223kHz |

Uncertainty figures are valid to a confidence level of 95%, k=2

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.10: 2013 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 TABLE OF ACCREDITATIONS AND LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW-1037).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan

TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

| | |
|----------------|-----------------|
| Canada | Industry Canada |
| Germany | TUV NORD |
| Taiwan | BSMI |
| USA | FCC |

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

【RF】

| No. | Product | Manufacturer | Model No. | Certify No. | Signal cable |
|-----|---------|--------------|-----------|-------------|--------------|
| 1 | N/A | --- | --- | --- | --- |

| No. | Signal cable description |
|-----|--------------------------|
| A | N/A |

【EMC】

| No. | Product | Manufacturer | Model No. | Certify No. | Signal cable |
|-----|---------|--------------|-----------|-------------|--------------|
| 1 | N/A | --- | --- | --- | --- |

| No. | Signal cable description |
|-----|--------------------------|
| A | N/A |

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.3 EUT OPERATING CONDITION

RF Setup

1. Set up a whole system as the setup diagram.
2. Press five buttons and start test.



7. FCC PART 15.231 REQUIREMENTS

7.1 20 DB BANDWIDTH

LIMIT

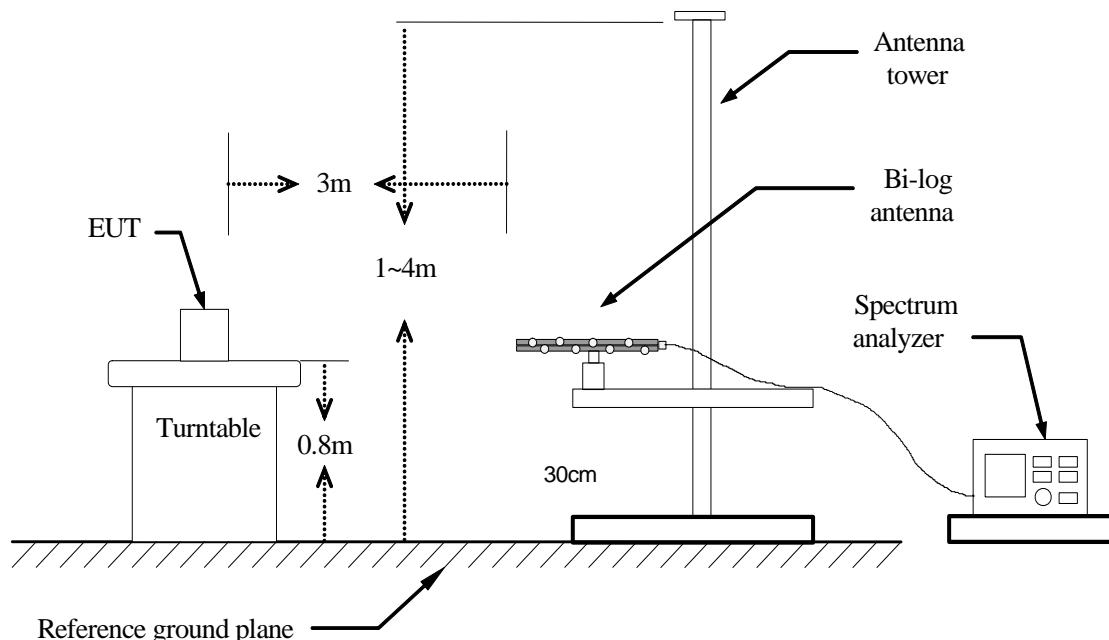
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

MEASUREMENT EQUIPMENT USED

| Open Area Test Site # 6 | | | | |
|-------------------------|---------------|-----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Bi-Log Antenna | Sunol | JB1 | A070506-2 | 07/22/2017 |
| EMI Test Receiver | R&S | ESCI | 100960 | 10/26/2017 |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 04/29/2017 |
| Horn Antenna | Com-Power | AH-118 | 071032 | 02/08/2018 |
| Power Meter | Anritsu | ML2487A | 6K00003888 | 03/23/2017 |
| Power Sensor | Anritsu | MA2491A | 33265 | 03/23/2017 |
| Pre-Amplifier | EMCI | EMC012645 | 980098 | 01/16/2018 |
| Pre-Amplifier | HP | 8447F | 2443A01683 | 01/17/2018 |
| Tem/Hum Chamber | K.SON | THS-M1 | 242 | 08/29/2017 |
| Type N coaxial cable | Suhner | CHA9513 | 6 | 01/17/2018 |
| Vector signal generator | ROHDE&SCHWARZ | SMU 200A | 103565 | 12/06/2017 |
| Software | Excel | | | |

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
RBW is set to 10 kHz and VBW is set 300kHz.

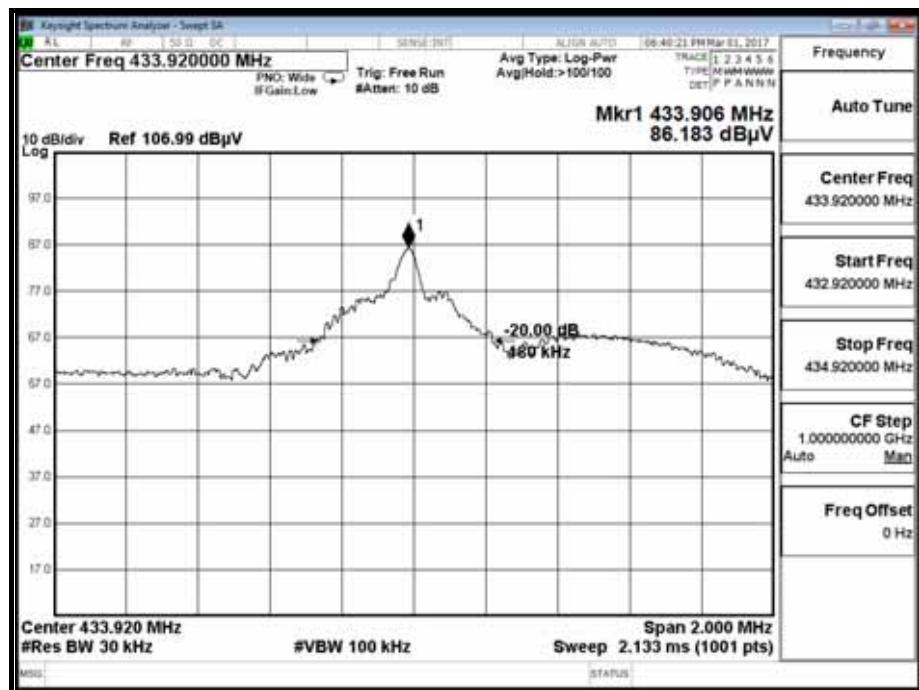
TEST RESULTS

No non-compliance noted.

TEST DATA

| Frequency (MHz) | 20dB Bandwidth (KHz) | Limit (KHz) | Result |
|--------------------|-------------------------|----------------|--------|
| 433.9 | 480 | 1084.75 | PASS |

Test Plot



7.2 LIMIT OF TRANSMISSION TIME

LIMIT

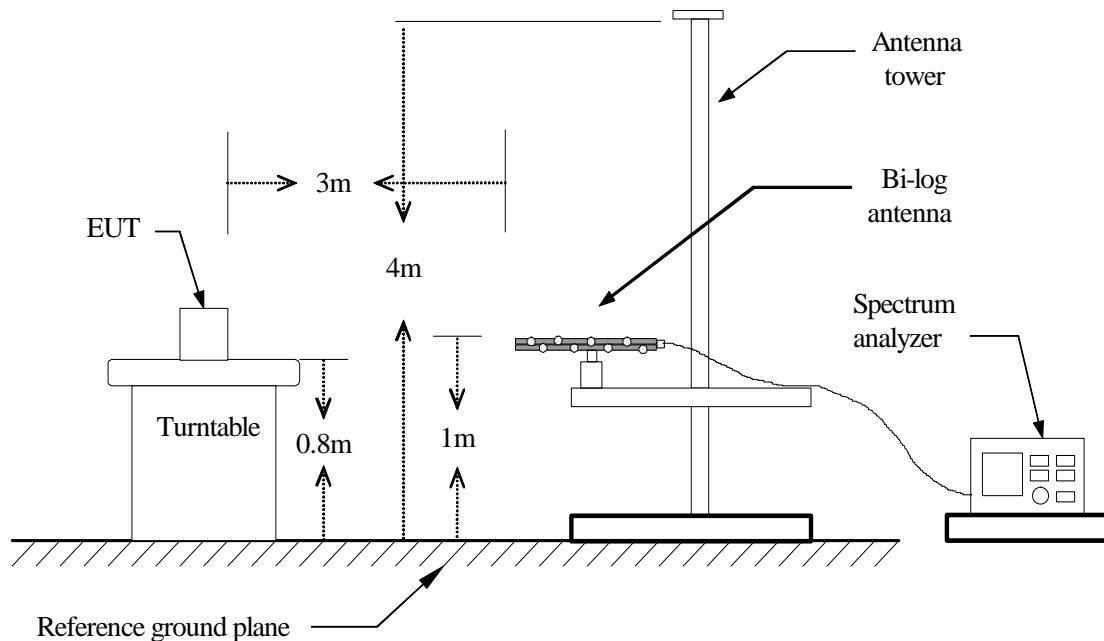
According to 15.231, a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

MEASUREMENT EQUIPMENT USED

| Open Area Test Site # 6 | | | | |
|-------------------------|---------------|-----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Bi-Log Antenna | Sunol | JB1 | A070506-2 | 07/22/2017 |
| EMI Test Receiver | R&S | ESCI | 100960 | 10/26/2017 |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 04/29/2017 |
| Horn Antenna | Com-Power | AH-118 | 071032 | 02/08/2018 |
| Power Meter | Anritsu | ML2487A | 6K00003888 | 03/23/2017 |
| Power Sensor | Anritsu | MA2491A | 33265 | 03/23/2017 |
| Pre-Amplifier | EMCI | EMC012645 | 980098 | 01/16/2018 |
| Pre-Amplifier | HP | 8447F | 2443A01683 | 01/17/2018 |
| Tem/Hum Chamber | K.SON | THS-M1 | 242 | 08/29/2017 |
| Type N coaxial cable | Suhner | CHA9513 | 6 | 01/17/2018 |
| Vector signal generator | ROHDE&SCHWARZ | SMU 200A | 103565 | 12/06/2017 |
| Software | Excel | | | |

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST CONFIGURATION



TEST PROCEDURE

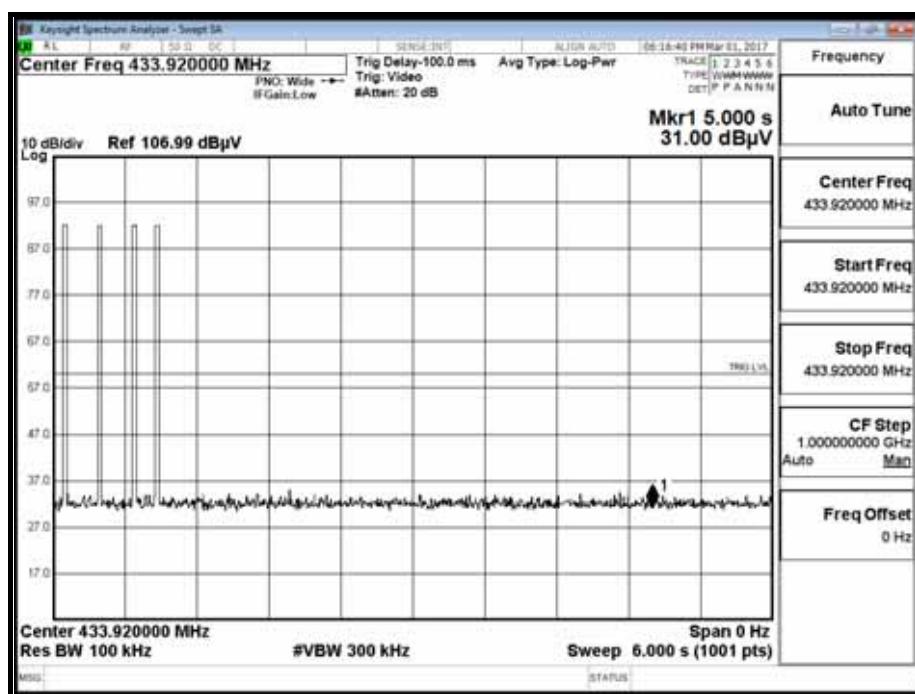
The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW = 100kHz and VBW = 300kHz.

TEST RESULTS

No non-compliance noted.

TEST DATA

| Frequency (MHz) | Transmission Time (s) | Limit (Second) | Result |
|--------------------|-----------------------------|-------------------|--------|
| 433.9 | 0.11568 | 5 | PASS |

Test Plot

7.3 DUTY CYCLE

LIMIT

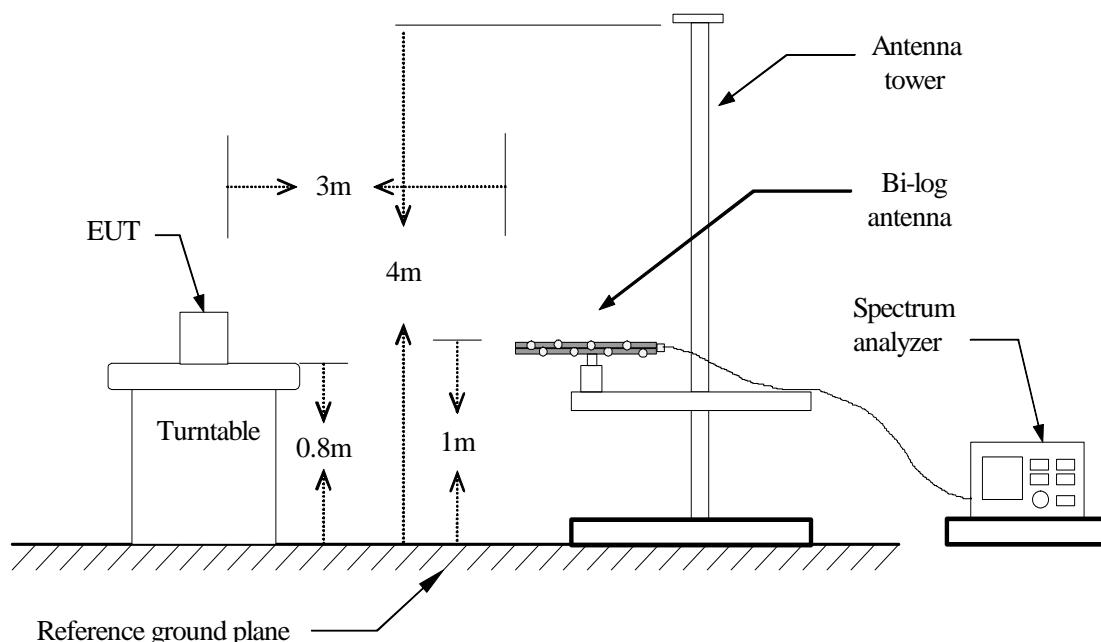
Nil (No dedicated limit specified in the Rules)

MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|-----------------------|--------------|--------|---------------|-----------------|
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 04/29/2017 |

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST CONFIGURATION



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 0Hz, a suitable Sweep Time.
4. Repeat above procedures until all frequency measured were complete.

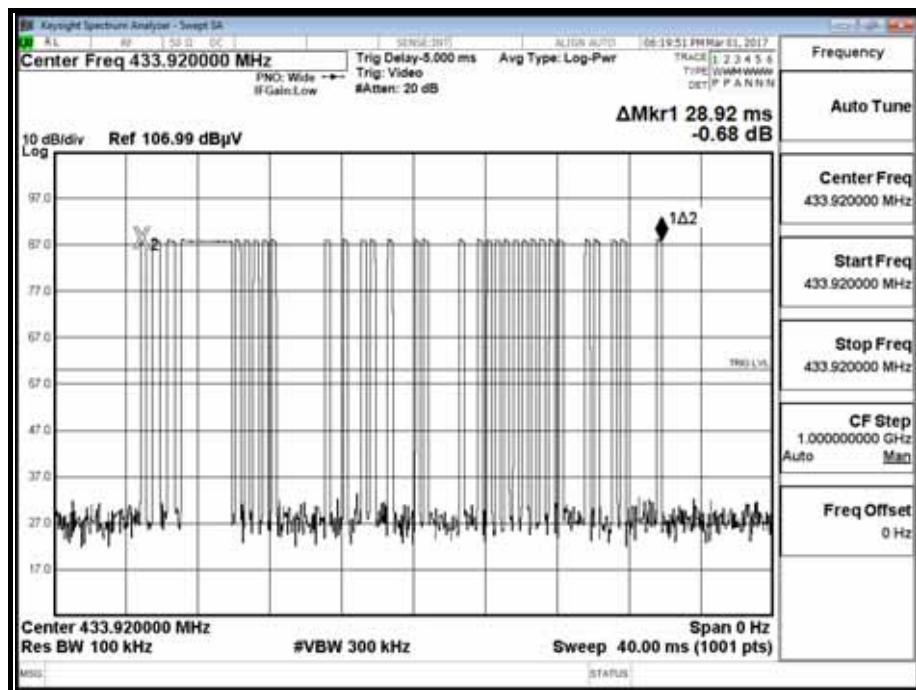
TEST RESULTS

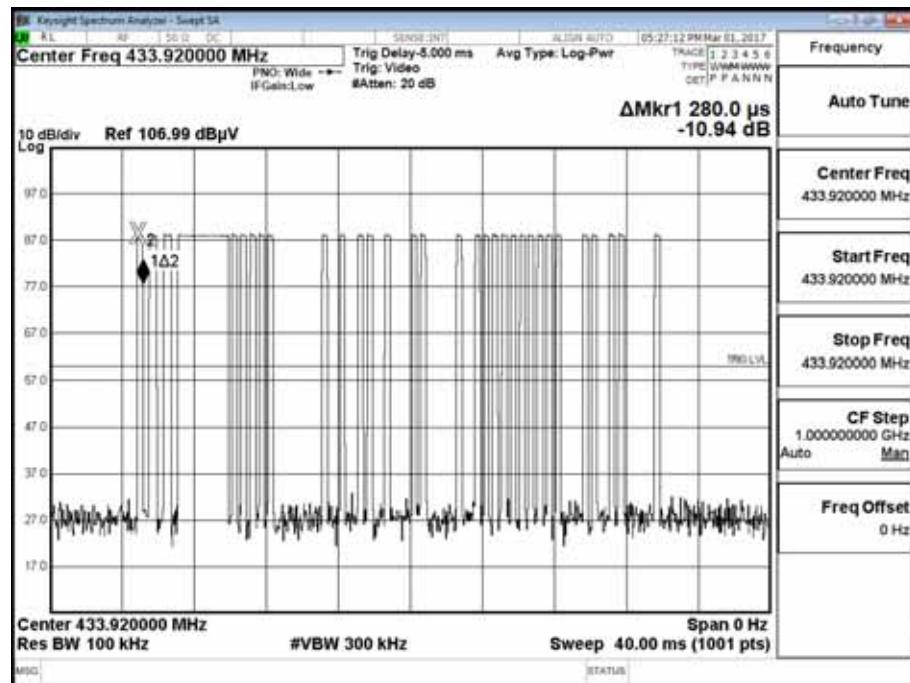
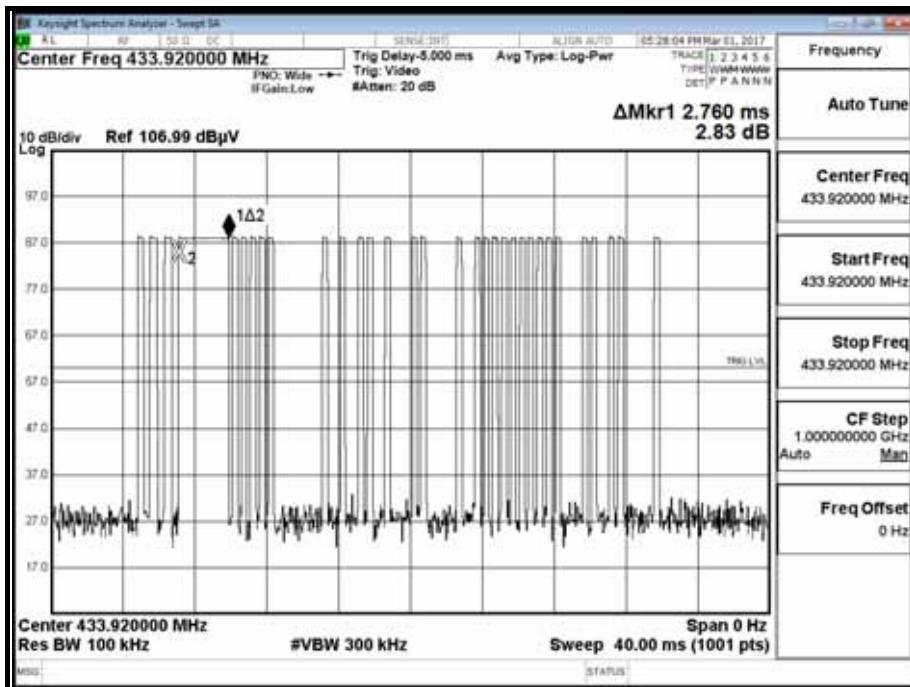
No non-compliance noted.

TEST DATA

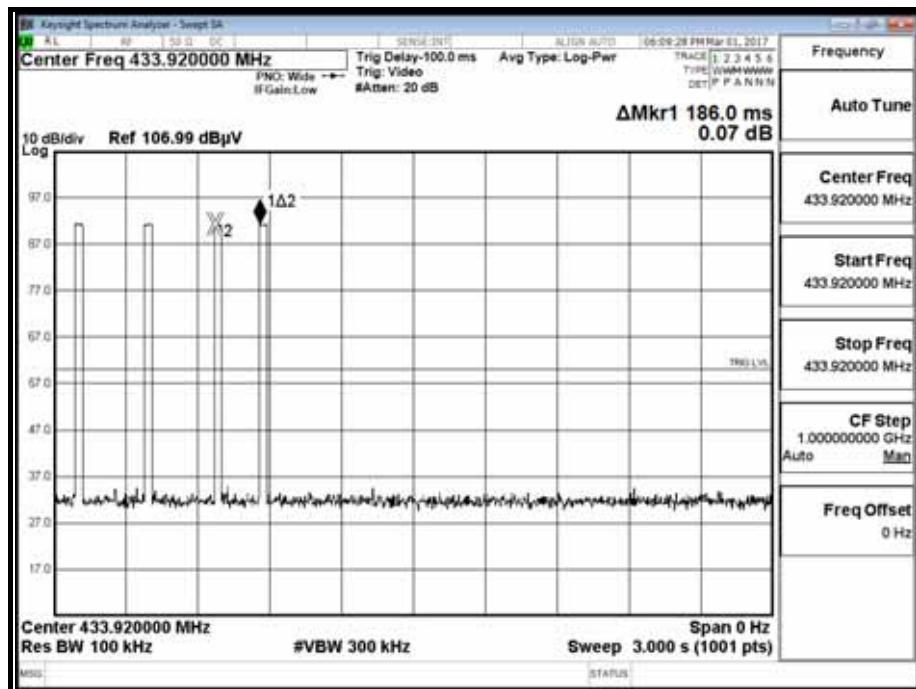
| | us | Times | Ton | Total Ton time(ms) |
|------|----------|-------|----------|--------------------|
| Ton1 | 280.000 | 31 | 8680.000 | 11.440 |
| Ton2 | 2760.000 | 1 | 2760.000 | |
| Ton3 | | 0 | 0.000 | |
| Tp | | | | 100.000 |

| | |
|--------------|---------|
| Ton | 11.440 |
| Tp(Ton+Toff) | 100.000 |
| Duty Cycle | 0.114 |
| Duty Factor | -18.831 |

Test Plot**Ton1**

Ton2Ton3

Tp



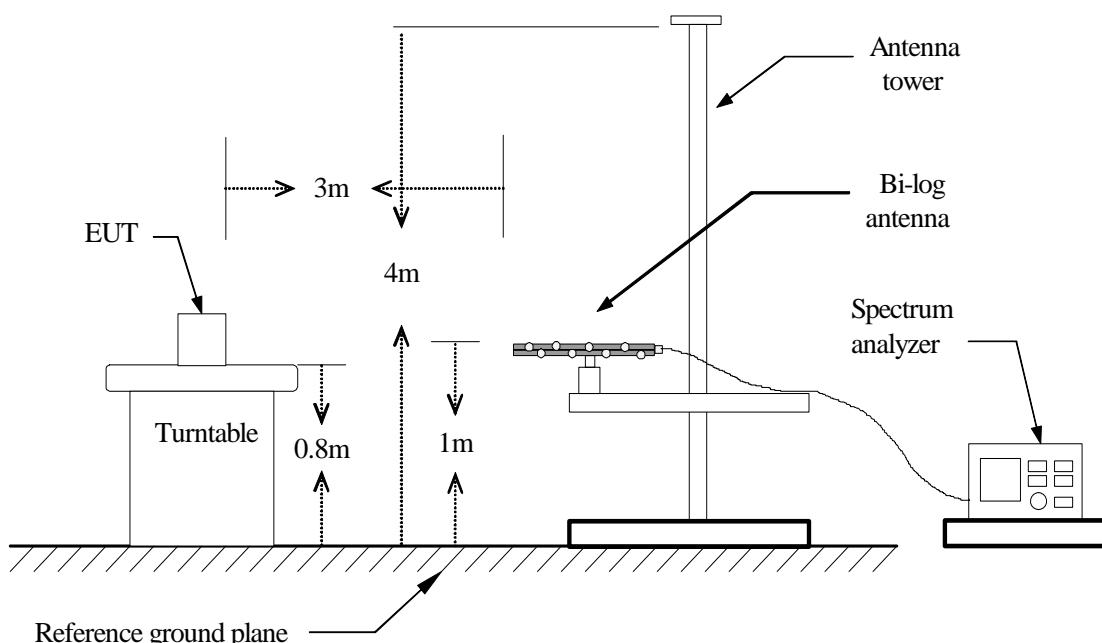
7.4 CENTRAL FREQUENCY

MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|-----------------------|--------------|--------|---------------|-----------------|
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 04/29/2017 |

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST CONFIGURATION



TEST PROCEDURE

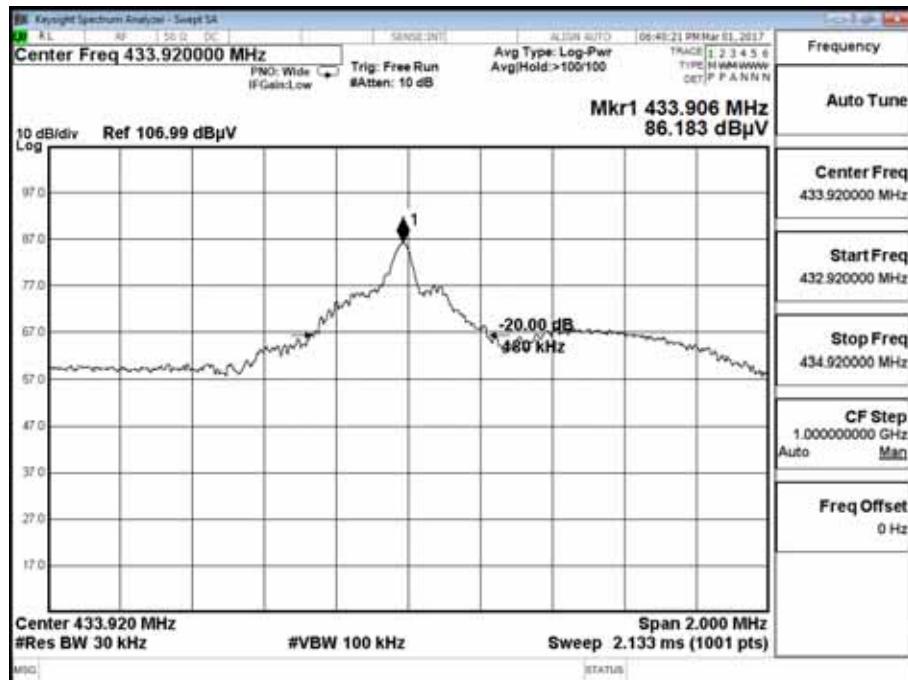
The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW = 1kHz and VBW = 3kHz.

TEST RESULTS

No non-compliance noted.

TEST DATA

| Frequency (MHz) | Central frequency (MHz) | Frequency Error (MHz) |
|--------------------|----------------------------|--------------------------|
| 433.9 | 433.906 | -0.006 |

Test Plot

7.5 RADIATED EMISSIONS

LIMIT

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (mV/m) | Field Strength (dB μ V/m at 3-meter) | Measurement Distance (m) |
|-----------------|-----------------------|--|--------------------------|
| 30-88 | 100* | 40 | 3 |
| 88-216 | 150* | 43.5 | 3 |
| 216-960 | 200* | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. For intentional device, according to § 15.231, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following table.

| Fundamental Frequency (MHz) | Field Strength of Fundamental (μ V/M) | Field Strength of Spurious Emission |
|-----------------------------|--|-------------------------------------|
| 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 |

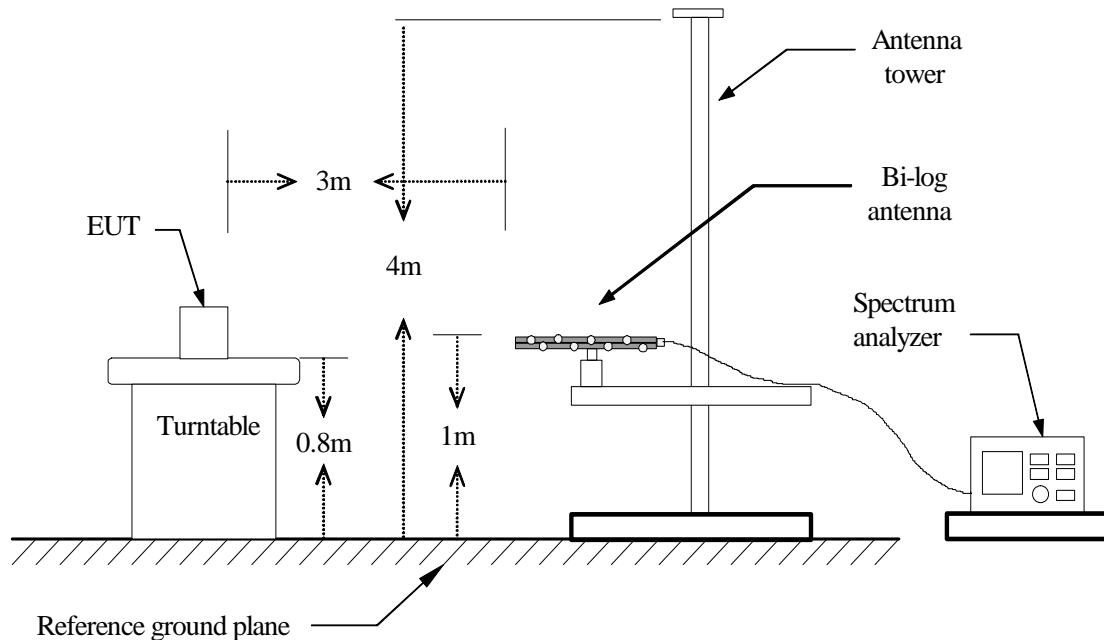
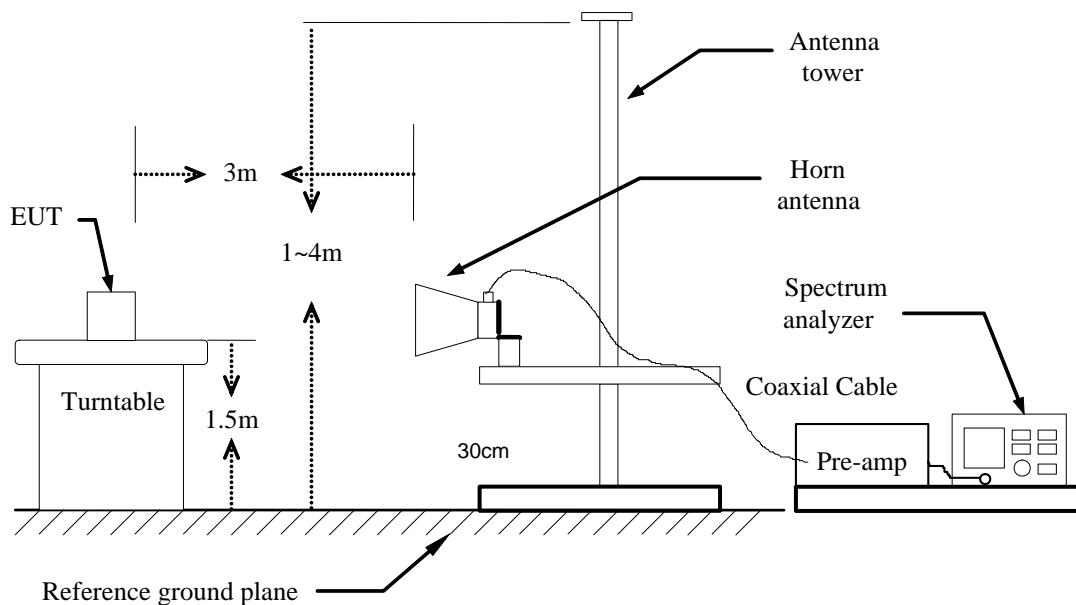
Note :

1. " " linear interpolations.
2. Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μ V/m at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, μ V/m at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

MEASUREMENT EQUIPMENT USED

| Open Area Test Site # 6 | | | | |
|--------------------------------|---------------------|--------------|----------------------|------------------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Bi-Log Antenna | Sunol | JB1 | A070506-2 | 07/22/2017 |
| EMI Test Receiver | R&S | ESCI | 100960 | 10/26/2017 |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 04/29/2017 |
| Horn Antenna | Com-Power | AH-118 | 071032 | 02/08/2018 |
| Power Meter | Anritsu | ML2487A | 6K00003888 | 03/23/2017 |
| Power Sensor | Anritsu | MA2491A | 33265 | 03/23/2017 |
| Pre-Amplifier | EMCI | EMC012645 | 980098 | 01/16/2018 |
| Pre-Amplifier | HP | 8447F | 2443A01683 | 01/17/2018 |
| Tem/Hum Chamber | K.SON | THS-M1 | 242 | 08/29/2017 |
| Type N coaxial cable | Suhner | CHA9513 | 6 | 01/17/2018 |
| Vector signal generator | ROHDE&SCHWARZ | SMU 200A | 103565 | 12/06/2017 |
| Software | Excel | | | |

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration**Below 1 GHz****Above 1 GHz**

TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:
 RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz:
 (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 (b) AVERAGE: Peak Level + Duty Factor
7. Repeat above procedures until the measurements for all frequencies are complete.
8. No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Operation

Test Date: 2017/03/02

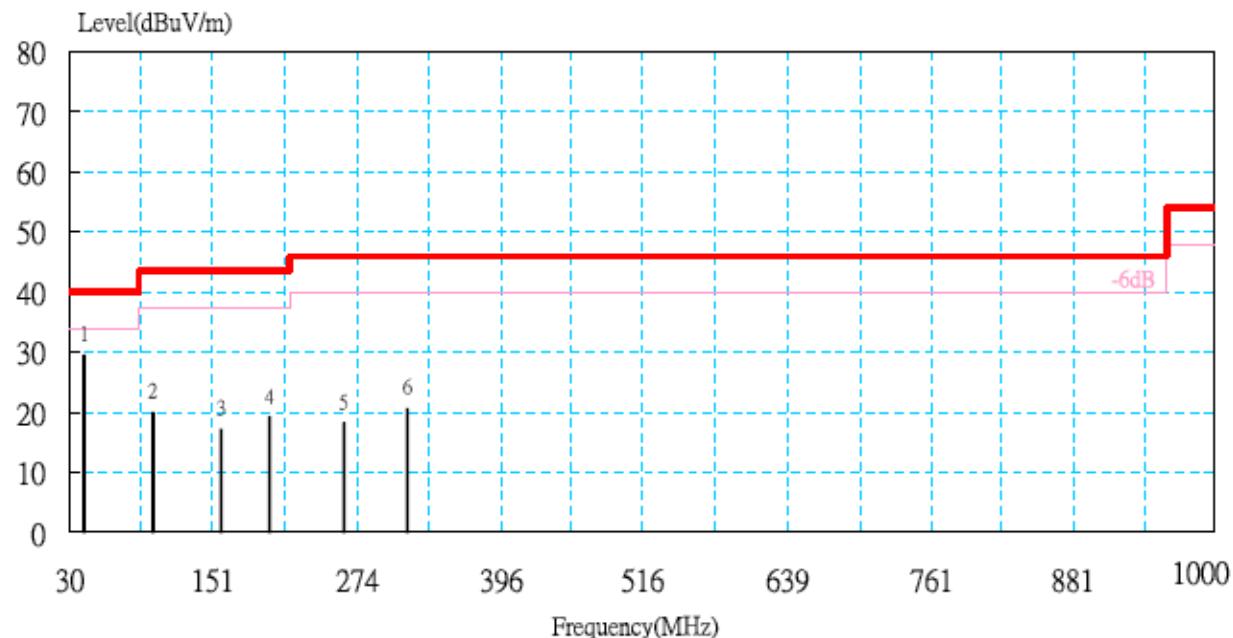
Temperature: 23.6°C

Tested by: Ted Huang

Humidity: 45% RH

Polarity: Ver. / Hor.

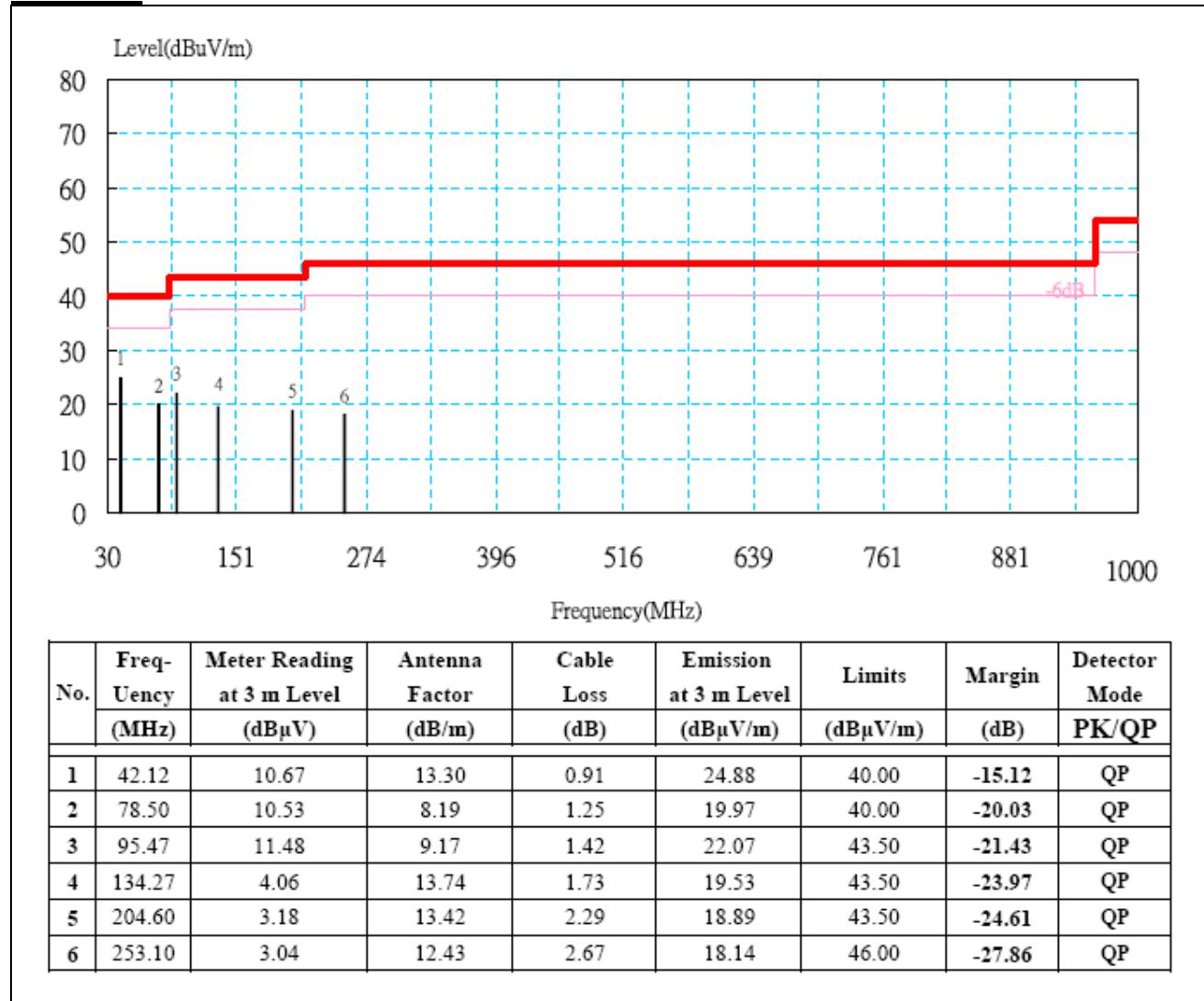
Vertical



| No. | Freq-Uency | Meter Reading at 3 m Level | Antenna Factor | Cable Loss | Emission at 3 m Level | Limits | Margin | Detector Mode |
|-----|------------|----------------------------|----------------|------------|-----------------------|----------------|--------|---------------|
| | (MHz) | (dB μ V) | (dB/m) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | PK/QP |
| 1 | 42.12 | 15.23 | 13.30 | 0.91 | 29.44 | 40.00 | -10.56 | QP |
| 2 | 100.32 | 8.10 | 10.37 | 1.45 | 19.92 | 43.50 | -23.58 | QP |
| 3 | 158.53 | 2.42 | 12.79 | 1.94 | 17.15 | 43.50 | -26.35 | QP |
| 4 | 199.75 | 3.42 | 13.51 | 2.25 | 19.17 | 43.50 | -24.33 | QP |
| 5 | 262.80 | 2.68 | 12.74 | 2.75 | 18.17 | 46.00 | -27.83 | QP |
| 6 | 316.15 | 3.04 | 14.29 | 3.18 | 20.52 | 46.00 | -25.48 | QP |

Remark:

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz-30MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dB μ V/m) – Quasi-peak limit (dB μ V/m).
6. That the limit for signals below 1GHz is a QP limit and peak readings are below the QP limit.
7. The fundamental signal is not shown in the test data because measurements at fundamental frequency are shown separately and were ignored during the 30 – 1000 MHz scan.

Operation Mode: Normal Operation**Test Date:** 2017/03/02**Temperature:** 23.6°C**Tested by:** Ted Huang**Humidity:** 45% RH**Polarity:** Ver. / Hor.**Horizontal****Remark:**

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).
6. That the limit for signals below 1GHz is a QP limit and peak readings are below the QP limit.
7. The fundamental signal is not shown in the test data because measurements at fundamental frequency are shown separately and were ignored during the 30 – 1000 MHz scan.

The fundamental signal

Operation Mode: TX / Y Mode **Test Date:** March 02, 2017
Temperature: 23.4 **Tested by:** Ted Huang
Humidity: 52 % RH **Polarity:** Ver. / Hor.

Horizontal

| Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
|--------|--------------|--------|------------|---------|--------|----------------|----------------|--------|---------|
| (MHz) | (dB μ V) | (dB/m) | (dB) | (dB) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | (P/Q/A) |
| 433.90 | 81.75 | 16.83 | 4.21 | 26.36 | 0.00 | 76.43 | 100.82 | -24.39 | P |
| 433.90 | 62.92 | 16.83 | 4.21 | 26.36 | 0.00 | 57.60 | 80.82 | -23.22 | A |

Vertical

| Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
|--------|--------------|--------|------------|---------|--------|----------------|----------------|--------|---------|
| (MHz) | (dB μ V) | (dB/m) | (dB) | (dB) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | (P/Q/A) |
| 433.90 | 89.91 | 16.83 | 4.21 | 26.36 | 0.00 | 84.59 | 100.82 | -16.24 | P |
| 433.90 | 71.07 | 16.83 | 4.21 | 26.36 | 0.00 | 65.76 | 80.82 | -15.07 | A |

Remark:

Margin (dB) = Remark result (dB μ V/m) – Quasi-peak limit (dB μ V/m).

Above 1 GHz

Operation Mode: TX / Y Mode **Test Date:** March 02, 2017
Temperature: 23.4 **Tested by:** Ted Huang
Humidity: 52 % RH **Polarity:** Ver. / Hor.

Horizontal

| Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark | |
|-------|--------------|--------|------------|---------|--------|----------------|----------------|--------|---------|--------|
| (MHz) | (dB μ V) | (dB/m) | (dB) | (dB) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | (P/Q/A) | |
| * | 1301.66 | 60.58 | 25.81 | 1.97 | 44.58 | 0.00 | 1.13 | 44.90 | 74.00 | -29.10 |
| * | 1301.66 | 41.75 | 25.81 | 1.97 | 44.58 | 0.00 | 1.13 | 26.06 | 54.00 | -27.94 |
| | 1735.78 | 59.60 | 28.39 | 2.30 | 44.72 | 0.00 | 0.63 | 46.21 | 80.82 | -34.62 |
| | 1735.78 | 40.77 | 28.39 | 2.30 | 44.72 | 0.00 | 0.63 | 27.37 | 60.82 | -33.45 |
| | 2169.65 | 58.40 | 30.26 | 2.59 | 44.51 | 0.00 | 0.41 | 47.15 | 80.82 | -33.67 |
| | 2169.65 | 39.57 | 30.26 | 2.59 | 44.51 | 0.00 | 0.41 | 28.32 | 60.82 | -32.51 |
| | 2603.45 | 63.75 | 30.06 | 2.86 | 44.26 | 0.00 | 0.38 | 52.79 | 80.82 | -28.04 |
| | 2603.45 | 44.91 | 30.06 | 2.86 | 44.26 | 0.00 | 0.38 | 33.95 | 60.82 | -26.87 |
| | 3037.40 | 57.17 | 30.31 | 3.15 | 44.07 | 0.00 | 0.28 | 46.82 | 80.82 | -34.00 |
| | 3037.40 | 38.33 | 30.31 | 3.15 | 44.07 | 0.00 | 0.28 | 27.99 | 60.82 | -32.83 |
| | 3470.86 | 55.58 | 30.39 | 3.39 | 44.70 | 0.00 | 0.23 | 44.90 | 80.82 | -35.92 |
| | 3470.86 | 36.75 | 30.39 | 3.39 | 44.70 | 0.00 | 0.23 | 26.07 | 60.82 | -34.75 |
| * | 3904.37 | 56.85 | 31.21 | 3.66 | 43.70 | 0.00 | 0.32 | 48.34 | 74.00 | -25.66 |
| * | 3904.37 | 38.01 | 31.21 | 3.66 | 43.70 | 0.00 | 0.32 | 29.51 | 54.00 | -24.49 |
| * | 4339.79 | 56.43 | 32.28 | 3.83 | 43.63 | 0.00 | 0.31 | 49.22 | 74.00 | -24.78 |
| * | 4339.79 | 37.59 | 32.28 | 3.83 | 43.63 | 0.00 | 0.31 | 30.39 | 54.00 | -23.61 |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dB μ V/m) – Average limit (dB μ V/m). Peak detector mode and average detector mode of the emission shown in Result column.

Operation Mode: TX / Y Mode **Test Date:** March 02, 2017
Temperature: 23.4 **Tested by:** Ted Huang
Humidity: 52 % RH **Polarity:** Ver. / Hor.

Vertical

| Freq. (MHz) | Reading (dB μ V) | AF (dB/m) | Cable Loss (dB) | Pre-amp (dB) | Filter (dB) | Level (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Mark (P/Q/A) | |
|----------------|-------------------------|--------------|-----------------------|-----------------|----------------|-------------------------|-------------------------|----------------|-----------------|--------|
| * | 1301.65 | 64.77 | 25.81 | 1.97 | 44.58 | 0.00 | 1.13 | 49.08 | 74.00 | -24.92 |
| * | 1301.65 | 45.94 | 25.81 | 1.97 | 44.58 | 0.00 | 1.13 | 30.25 | 54.00 | -23.75 |
| | 1735.57 | 58.45 | 28.39 | 2.30 | 44.72 | 0.00 | 0.63 | 45.05 | 80.82 | -35.77 |
| | 1735.57 | 39.62 | 28.39 | 2.30 | 44.72 | 0.00 | 0.63 | 26.22 | 60.82 | -34.60 |
| | 2169.86 | 60.88 | 30.26 | 2.59 | 44.51 | 0.00 | 0.41 | 49.63 | 80.82 | -31.20 |
| | 2169.86 | 42.05 | 30.26 | 2.59 | 44.51 | 0.00 | 0.41 | 30.79 | 60.82 | -30.03 |
| | 2603.30 | 60.05 | 30.06 | 2.86 | 44.26 | 0.00 | 0.38 | 49.08 | 80.82 | -31.74 |
| | 2603.30 | 41.21 | 30.06 | 2.86 | 44.26 | 0.00 | 0.38 | 30.25 | 60.82 | -30.57 |
| | 3037.17 | 60.03 | 30.31 | 3.15 | 44.07 | 0.00 | 0.28 | 49.68 | 80.82 | -31.14 |
| | 3037.17 | 41.19 | 30.31 | 3.15 | 44.07 | 0.00 | 0.28 | 30.85 | 60.82 | -29.97 |
| | 3470.91 | 56.07 | 30.39 | 3.39 | 44.70 | 0.00 | 0.23 | 45.39 | 80.82 | -35.43 |
| | 3470.91 | 37.24 | 30.39 | 3.39 | 44.70 | 0.00 | 0.23 | 26.56 | 60.82 | -34.26 |
| * | 3905.29 | 57.37 | 31.21 | 3.66 | 43.69 | 0.00 | 0.32 | 48.87 | 74.00 | -25.13 |
| * | 3905.29 | 38.54 | 31.21 | 3.66 | 43.69 | 0.00 | 0.32 | 30.04 | 54.00 | -23.96 |
| * | 4338.42 | 56.83 | 32.28 | 3.83 | 43.63 | 0.00 | 0.31 | 49.62 | 74.00 | -24.38 |
| * | 4338.42 | 38.00 | 32.28 | 3.83 | 43.63 | 0.00 | 0.31 | 30.79 | 54.00 | -23.21 |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dB μ V/m) – Average limit (dB μ V/m). Peak detector mode and average detector mode of the emission shown in Result column.

7.6 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dB μ V) | |
|-----------------------|---------------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

| Conducted Emission room #1 | | | | |
|----------------------------|--------------|------------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| BNC Coaxial Cable | CCS | BNC50 | 11 | 01/12/2018 |
| EMI Test Receiver | R&S | ESCS 30 | 100348 | 12/11/2017 |
| LISN | SCHWARZBECK | NNLK8130 | 8130124 | 11/07/2017 |
| LISN | FCC | FCC-LISN-50-32-2 | 08009 | 05/03/2017 |
| Pulse Limiter | R&S | ESH3-Z2 | 100116 | 01/12/2018 |
| Software | | e-3 (5.04211j) | | |

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST RESULTS

This EUT is not connected to AC Source directly. No applicability for this test.