

# FCC TEST REPORT

**Product** : SLYPOD  
**Trade mark** : MOZA  
**Model/Type reference** : MS-280, MS-580, MS-280S  
**Serial Number** : N/A  
**Report Number** : EED32L00160903  
**FCC ID** : 2AMJR-SLYPOD  
**Date of Issue** : Jul. 31, 2019  
**Test Standards** : 47 CFR Part 15 Subpart C  
**Test result** : PASS

Prepared for:

**Shenzhen Gudsen Technology Co., Ltd**  
**6/F,10th Building,Jiuxiang Ling Industrial Park,**  
**Ave Xili ,Nanshan District, Shenzhen, China**

Prepared by:

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Jul. 31, 2019

Check No.:3096310050



## 2 Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | Jul. 31, 2019 | Original    |
|             |               |             |
|             |               |             |

### 3 Test Summary

| Test Item                                                                | Test Requirement                                   | Test method      | Result |
|--------------------------------------------------------------------------|----------------------------------------------------|------------------|--------|
| <b>Antenna Requirement</b>                                               | 47 CFR Part 15 Subpart C Section 15.203            | ANSI C63.10-2013 | PASS   |
| <b>AC Power Line Conducted Emission</b>                                  | 47 CFR Part 15 Subpart C Section 15.207            | ANSI C63.10-2013 | PASS   |
| <b>Field Strength of the Fundamental Signal</b>                          | 47 CFR Part 15 Subpart C Section 15.249 (a)        | ANSI C63.10-2013 | PASS   |
| <b>Spurious Emissions</b>                                                | 47 CFR Part 15 Subpart C Section 15.249 (a)/15.209 | ANSI C63.10-2013 | PASS   |
| <b>Restricted bands around fundamental frequency (Radiated Emission)</b> | 47 CFR Part 15 Subpart C Section 15.249(a)/15.205  | ANSI C63.10-2013 | PASS   |
| <b>20dB Occupied Bandwidth</b>                                           | 47 CFR Part 15 Subpart C Section 15.215 (c)        | ANSI C63.10-2013 | PASS   |

Remark:

The tested sample(s) and the sample information are provided by the client.

Model No.: MS-280, MS-580, MS-280S

Only the model MS-280 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, only the internal telescopic part of the telescopic length is different

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## 5 General Information

### 5.1 Client Information

|                          |                                                                                             |
|--------------------------|---------------------------------------------------------------------------------------------|
| Applicant:               | Shenzhen Gudsen Technology Co., Ltd                                                         |
| Address of Applicant:    | 6/F,10th Building,Jiuxiang Ling Industrial Park,Ave Xili ,Nanshan District, Shenzhen, China |
| Manufacturer:            | Shenzhen Gudsen Technology Co., Ltd                                                         |
| Address of Manufacturer: | 6/F,10th Building,Jiuxiang Ling Industrial Park,Ave Xili ,Nanshan District, Shenzhen, China |

### 5.2 General Description of EUT

|                                  |                         |
|----------------------------------|-------------------------|
| Product Name:                    | SLYPOD                  |
| Model No.(EUT):                  | MS-280, MS-580, MS-280S |
| Test Model No.                   | MS-280                  |
| Trade Mark:                      | MOZA                    |
| EUT Supports Radios application: | 2440MHz                 |
| Power Supply:                    | DC 11.1V                |

### 5.3 Product Specification subjective to this standard

|                       |                                            |
|-----------------------|--------------------------------------------|
| Frequency Range:      | 2440MHz                                    |
| Modulation Type:      | GFSK                                       |
| Number of Channels:   | 1                                          |
| Test Power Grade:     | N/A                                        |
| Test Software of EUT: | EMI_Test_Tool_v1.3 (manufacturer declare ) |
| Antenna Type:         | Internal Antenna                           |
| Antenna Gain:         | -2.29dBi                                   |
| Test voltage:         | 5V                                         |
| Sample Received Date: | Jun. 20, 2019                              |
| Sample tested Date:   | Jun. 20, 2019 to Jul. 31, 2019             |

## 5.4 Test Environment and Mode

| Operating Environment: |                                                    |
|------------------------|----------------------------------------------------|
| Temperature:           | 25.0 °C                                            |
| Humidity:              | 64 % RH                                            |
| Atmospheric Pressure:  | 1010 mbar                                          |
| Test mode:             |                                                    |
| Transmitting mode:     | Keep the EUT in transmitting mode with modulation. |

## 5.5 Description of Support Units

*The EUT has been tested independently*

## 5.6

## 5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

## 5.7 Deviation from Standards

None.

## 5.8 Abnormalities from Standard Conditions

None.

## 5.9 Other Information Requested by the Customer

None.

### 5.10 Measurement Uncertainty (95% confidence levels, k=2)

| No. | Item                            | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1   | Radio Frequency                 | $7.9 \times 10^{-8}$    |
| 2   | RF power, conducted             | 0.46dB (30MHz-1GHz)     |
|     |                                 | 0.55dB (1GHz-18GHz)     |
| 3   | Radiated Spurious emission test | 4.3dB (30MHz-1GHz)      |
|     |                                 | 4.5dB (1GHz-12.75GHz)   |
| 4   | Conduction emission             | 3.5dB (9kHz to 150kHz)  |
|     |                                 | 3.1dB (150kHz to 30MHz) |
| 5   | Temperature test                | 0.64°C                  |
| 6   | Humidity test                   | 3.8%                    |
| 7   | DC power voltages               | 0.026%                  |

## 6 Equipment List

| Conducted disturbance Test            |              |                             |                |                        |                            |
|---------------------------------------|--------------|-----------------------------|----------------|------------------------|----------------------------|
| Equipment                             | Manufacturer | Model No.                   | Serial Number  | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| Receiver                              | R&S          | ESCI                        | 100435         | 05-20-2019             | 05-18-2020                 |
| Temperature/<br>Humidity<br>Indicator | Defu         | TH128                       | /              | 06-14-2019             | 06-12-2020                 |
| Communication<br>test set             | Agilent      | E5515C                      | GB47050<br>534 | 03-01-2019             | 02-28-2020                 |
| Communication<br>test set             | R&S          | CMW500                      | 102898         | 01-18-2019             | 01-17-2020                 |
| LISN                                  | R&S          | ENV216                      | 100098         | 05-08-2019             | 05-06-2020                 |
| LISN                                  | schwarzbeck  | NNLK8121                    | 8121-529       | 05-08-2019             | 05-06-2020                 |
| Voltage Probe                         | R&S          | ESH2-Z3<br>0299.7810.5<br>6 | 100042         | 06-13-2017             | 06-11-2020                 |
| Current Probe                         | R&S          | EZ-17<br>816.2063.03        | 100106         | 05-20-2019             | 05-18-2020                 |
| ISN                                   | TESEQ        | ISN T800                    | 30297          | 01-06-2019             | 01-15-2020                 |
| Barometer                             | changchun    | DYM3                        | 1188           | 06-20-2019             | 06-18-2020                 |

| RF test system                   |               |                              |               |                        |                            |
|----------------------------------|---------------|------------------------------|---------------|------------------------|----------------------------|
| Equipment                        | Manufacturer  | Model No.                    | Serial Number | Cal. Date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| Signal Generator                 | Keysight      | E8257D                       | MY53401106    | 03-01-2019             | 02-28-2020                 |
| Spectrum Analyzer                | Keysight      | N9010A                       | MY54510339    | 03-01-2019             | 02-28-2020                 |
| Signal Generator                 | Keysight      | N5182B                       | MY53051549    | 03-01-2019             | 02-28-2020                 |
| High-pass filter                 | Sinoscite     | FL3CX03WG1<br>8NM12-0398-002 | ---           | 01-09-2019             | 01-08-2020                 |
| High-pass filter                 | MICRO-TRONICS | SPA-F-63029-4                | ---           | 01-09-2019             | 01-08-2020                 |
| DC Power                         | Keysight      | E3642A                       | MY54426035    | 03-01-2019             | 02-28-2020                 |
| PC-1                             | Lenovo        | R4960d                       | ---           | 03-01-2019             | 02-28-2020                 |
| BT&WI-FI Automatic control       | R&S           | OSP120                       | 101374        | 03-01-2019             | 02-28-2020                 |
| RF control unit                  | JS Tonscend   | JS0806-2                     | 15860006      | 03-01-2019             | 02-28-2020                 |
| RF control unit                  | JS Tonscend   | JS0806-1                     | 15860004      | 03-01-2019             | 02-28-2020                 |
| RF control unit                  | JS Tonscend   | JS0806-4                     | 158060007     | 03-01-2019             | 02-28-2020                 |
| BT&WI-FI Automatic test software | JS Tonscend   | JS1120-2                     | ---           | 03-01-2019             | 02-28-2020                 |
| Temperature/Humidity Indicator   | biaozhi       | HM10                         | 1804186       | 10-12-2018             | 10-11-2019                 |

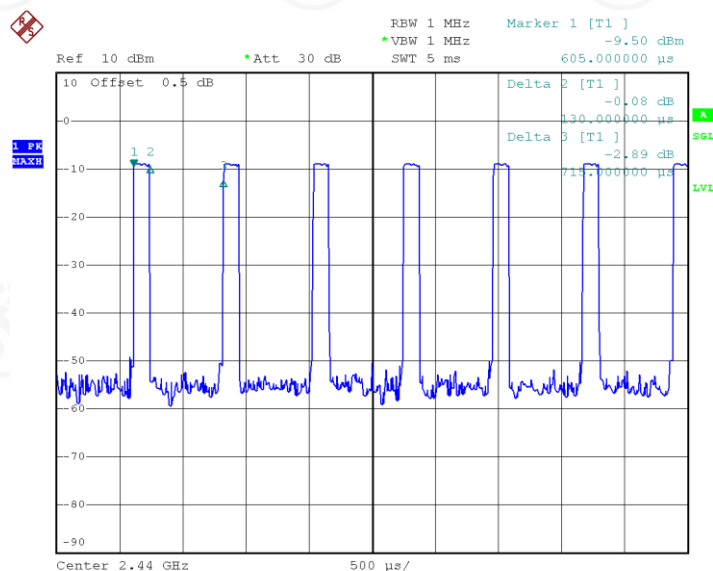
| 3M Semi/full-anechoic Chamber    |                  |                          |               |                        |                            |
|----------------------------------|------------------|--------------------------|---------------|------------------------|----------------------------|
| Equipment                        | Manufacturer     | Model No.                | Serial Number | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| 3M Chamber & Accessory Equipment | TDK              | SAC-3                    | ---           | 05-24-2019             | 05-24-2022                 |
| TRILOG Broadband Antenna         | Schwarzbeck      | VULB9163                 | 9163-401      | 12-21-2018             | 12-20-2019                 |
| TRILOG Broadband Antenna         | Schwarzbeck      | VULB9163                 | 9163-618      | 07-30-2018             | 07-29-2019                 |
| Microwave Preamplifier           | Agilent          | 8449B                    | 3008A02425    | 08-21-2018             | 08-20-2019                 |
| Microwave Preamplifier           | Tonscend         | EMC051845 SE             | 980380        | 01-16-2019             | 01-15-2020                 |
| Horn Antenna                     | Schwarzbeck      | BBHA 9120D               | 9120D-1869    | 04-25-2018             | 04-23-2021                 |
| Horn Antenna                     | ETS-LINDGREN     | 3117                     | 00057410      | 06-05-2018             | 06-03-2021                 |
| Double ridge horn antenna        | A.H.SYSTEMS      | SAS-574                  | 374           | 06-05-2018             | 06-04-2021                 |
| Pre-amplifier                    | A.H.SYSTEMS      | PAP-1840-60              | 6041.6041     | 08-08-2018             | 08-07-2019                 |
| Loop Antenna                     | Schwarzbeck      | FMZB 1519B               | 1519B-076     | 04-25-2018             | 04-25-2021                 |
| Spectrum Analyzer                | R&S              | FSP40                    | 100416        | 04-28-2019             | 04-26-2020                 |
| Receiver                         | R&S              | ESCI                     | 100435        | 05-20-2019             | 05-18-2020                 |
| Receiver                         | R&S              | ESCI7                    | 100938-003    | 11-23-2018             | 11-22-2019                 |
| Multi device Controller          | maturo           | NCD/070/10711112         | ---           | 01-09-2019             | 01-08-2020                 |
| Signal Generator                 | Agilent          | E4438C                   | MY45095744    | 03-01-2019             | 02-28-2020                 |
| Temperature/Humidity Indicator   | Shanghai qixiang | HM10                     | 1804298       | 10-12-2018             | 10-11-2019                 |
| Communication test set           | Agilent          | E5515C                   | GB47050534    | 03-01-2019             | 02-28-2020                 |
| Cable line                       | Fulai(7M)        | SF106                    | 5219/6A       | 01-09-2019             | 01-08-2020                 |
| Cable line                       | Fulai(6M)        | SF106                    | 5220/6A       | 01-09-2019             | 01-08-2020                 |
| Cable line                       | Fulai(3M)        | SF106                    | 5216/6A       | 01-09-2019             | 01-08-2020                 |
| Cable line                       | Fulai(3M)        | SF106                    | 5217/6A       | 01-09-2019             | 01-08-2020                 |
| High-pass filter                 | Sinoscite        | FL3CX03WG18NM12-0398-002 | ---           | 01-09-2019             | 01-08-2020                 |
| High-pass filter                 | MICRO-TRONICS    | SPA-F-63029-4            | ---           | 01-09-2019             | 01-08-2020                 |
| band rejection filter            | Sinoscite        | FL5CX01CA09CL12-0395-001 | ---           | 01-09-2019             | 01-08-2020                 |
| band rejection filter            | Sinoscite        | FL5CX01CA08CL12-0393-001 | ---           | 01-09-2019             | 01-08-2020                 |
| band rejection filter            | Sinoscite        | FL5CX02CA04CL12-0396-002 | ---           | 01-09-2019             | 01-08-2020                 |
| band rejection filter            | Sinoscite        | FL5CX02CA03CL12-0394-001 | ---           | 01-09-2019             | 01-08-2020                 |

| 3M full-anechoic Chamber        |              |                   |                |                        |                            |
|---------------------------------|--------------|-------------------|----------------|------------------------|----------------------------|
| Equipment                       | Manufacturer | Model No.         | Serial Number  | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| RSE Automatic test software     | JS Tonscend  | JS36-RSE          | 10166          | 06-18-2019             | 06-17-2020                 |
| Receiver                        | Keysight     | N9038A            | MY5729013<br>6 | 03-27-2019             | 03-25-2020                 |
| Spectrum Analyzer               | Keysight     | N9020B            | MY5711111<br>2 | 03-27-2019             | 03-25-2020                 |
| Spectrum Analyzer               | Keysight     | N9030B            | MY5714087<br>1 | 03-27-2019             | 03-25-2020                 |
| Loop Antenna                    | Schwarzbeck  | FMZB 1519B        | 1519B-075      | 04-25-2018             | 04-23-2021                 |
| Loop Antenna                    | Schwarzbeck  | FMZB 1519B        | 1519B-076      | 04-25-2018             | 04-23-2021                 |
| TRILOG Broadband Antenna        | Schwarzbeck  | VULB 9163         | 9163-1148      | 04-25-2018             | 04-23-2021                 |
| Horn Antenna                    | Schwarzbeck  | BBHA 9170         | 9170-832       | 04-25-2018             | 04-23-2021                 |
| Horn Antenna                    | Schwarzbeck  | BBHA 9170         | 9170-829       | 04-25-2018             | 04-23-2021                 |
| Communication Antenna           | Schwarzbeck  | CLSA 0110L        | 1014           | 02-14-2019             | 02-13-2020                 |
| Biconical antenna               | Schwarzbeck  | VUBA 9117         | 9117-381       | 04-25-2018             | 04-23-2021                 |
| Horn Antenna                    | ETS-LINDGREN | 3117              | 00057407       | 07-10-2018             | 07-08-2021                 |
| Preamplifier                    | EMCI         | EMC184055SE       | 980596         | 05-22-2019             | 05-22-2020                 |
| Communication test set          | R&S          | CMW500            | 102898         | 01-18-2019             | 01-17-2020                 |
| Preamplifier                    | EMCI         | EMC001330         | 980563         | 05-08-2019             | 05-08-2020                 |
| Preamplifier                    | Agilent      | 8449B             | 3008A0242<br>5 | 08-21-2018             | 08-20-2019                 |
| Temperature/ Humidity Indicator | biaozhi      | GM1360            | EE1186631      | 05-01-2019             | 04-30-2020                 |
| Signal Generator                | KEYSIGHT     | E8257D            | MY5340110<br>6 | 03-01-2019             | 02-28-2020                 |
| Fully Anechoic Chamber          | TDK          | FAC-3             | ---            | 01-17-2018             | 01-15-2021                 |
| Filter bank                     | JS Tonscend  | JS0806-F          | 188060094      | 04-10-2018             | 04-08-2021                 |
| Cable line                      | Times        | SFT205-NMSM-2.50M | 394812-0001    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | SFT205-NMSM-2.50M | 394812-0002    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | SFT205-NMSM-2.50M | 394812-0003    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | SFT205-NMSM-2.50M | 393495-0001    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | EMC104-NMNM-1000  | SN160710       | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | SFT205-NMSM-3.00M | 394813-0001    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | SFT205-NMNM-1.50M | 381964-0001    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | SFT205-NMSM-7.00M | 394815-0001    | 01-09-2019             | 01-08-2020                 |
| Cable line                      | Times        | HF160-KMKM-3.00M  | 393493-0001    | 01-09-2019             | 01-08-2020                 |

## 7 Test results and Measurement Data

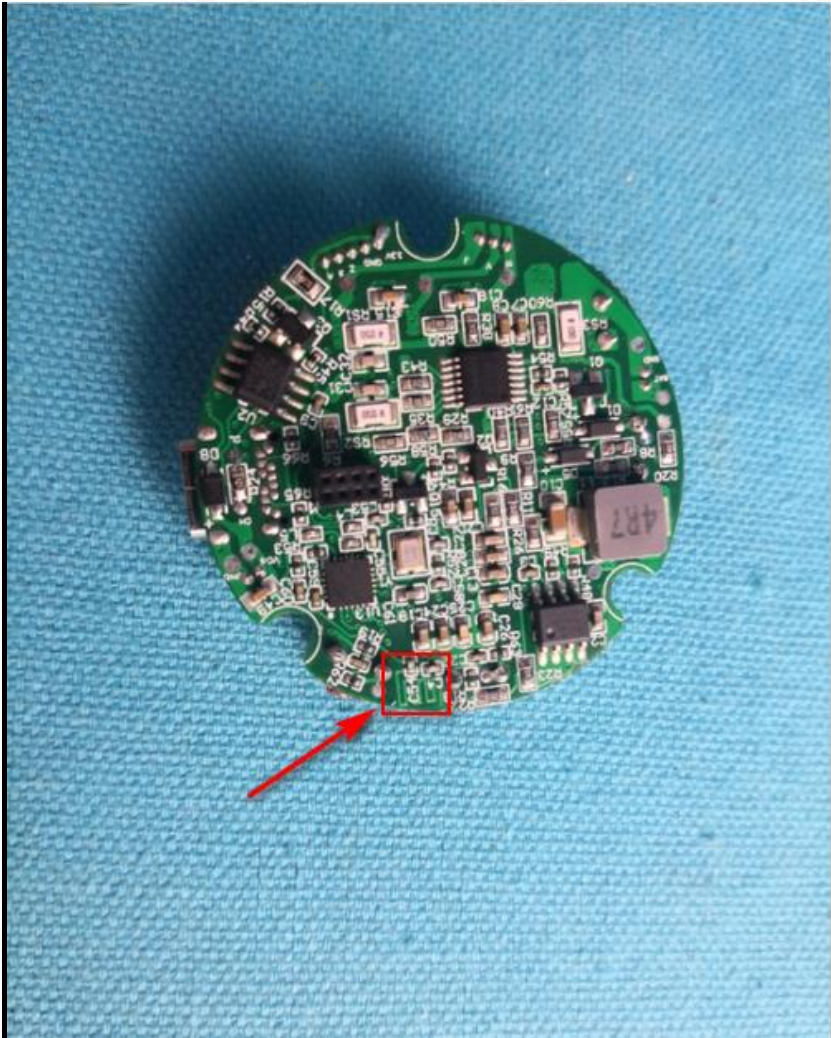
### 7.1 Duty cycle

| Duty Cycle    |           |            |               |
|---------------|-----------|------------|---------------|
| Configuration | TX ON(ms) | TX ALL(ms) | Duty Cycle(%) |
| customize     | 130       | 715        | 18.18         |



Date: 6.SEP.2019 15:15:17

## 7.2 Antenna Requirement

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 47 CFR Part 15C Section 15.203                                                      |
| <p>15.203 requirement:<br/>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> |                                                                                     |
| <b>EUT Antenna:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -2.29dBi.</p>                                                                                                                                                                                                                                                                                                                                              |                                                                                     |

### 7.3 Conducted Emissions

**Test Requirement:** 47 CFR Part 15C Section 15.207

Ambient: Temp.: 21 C  
1010mbar

Humid.: 54%

**Press.:**

**Test Method:** ANSI C63.10

**Test Frequency Range:** 150kHz to 30MHz

**Limit:**

| Frequency range (MHz) | Limit (dBµV) |           |
|-----------------------|--------------|-----------|
|                       | Quasi-peak   | Average   |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |
| 0.5-5                 | 56           | 46        |
| 5-30                  | 60           | 50        |

\* Decreases with the logarithm of the frequency.

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a  $50\Omega/50\mu\text{H} + 5\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

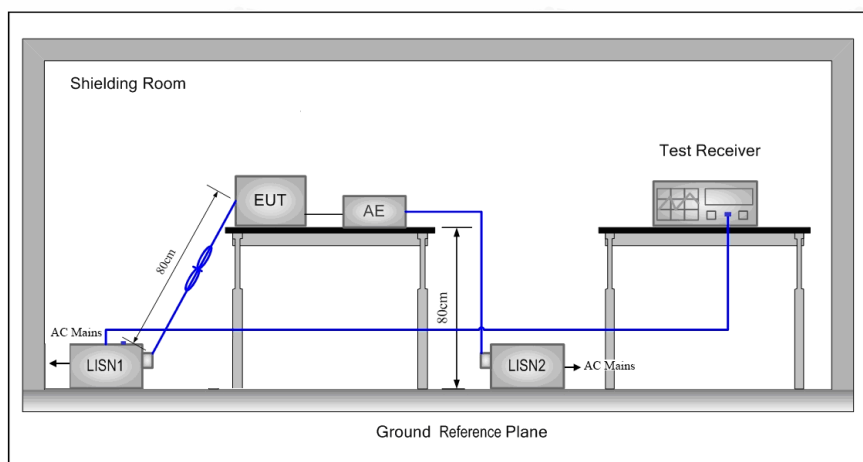
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

### Test Procedure:

### Test Setup:



**Test Mode:** BT mode

**Instruments Used:** Refer to section 6 for details

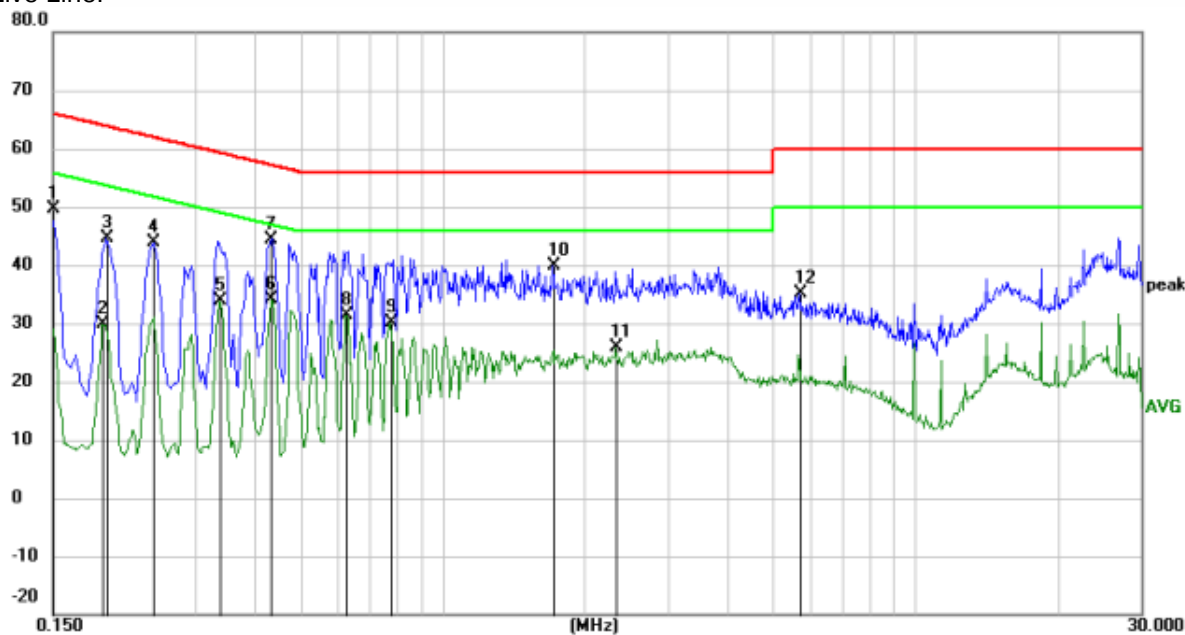
**Test Results:** Pass

**Measurement Data**

An initial pre-scan was performed on the live and neutral lines with peak detector.

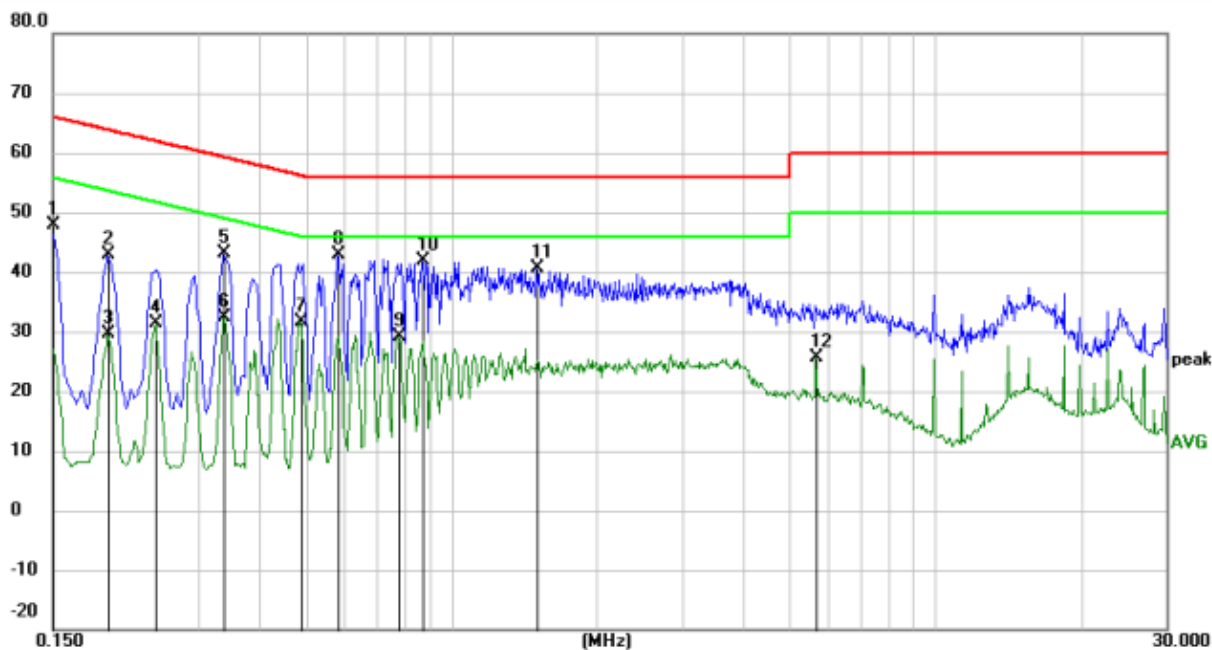
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1   |     | 0.1500       | 39.62                    | 9.91                    | 49.53                    | 66.00         | -16.47       | QP       |         |
| 2   |     | 0.1905       | 19.93                    | 9.91                    | 29.84                    | 54.01         | -24.17       | AVG      |         |
| 3   |     | 0.1949       | 34.67                    | 9.91                    | 44.58                    | 63.83         | -19.25       | QP       |         |
| 4   |     | 0.2445       | 33.92                    | 9.95                    | 43.87                    | 61.94         | -18.07       | QP       |         |
| 5   |     | 0.3390       | 23.94                    | 9.96                    | 33.90                    | 49.23         | -15.33       | AVG      |         |
| 6   |     | 0.4335       | 24.20                    | 9.89                    | 34.09                    | 47.19         | -13.10       | AVG      |         |
| 7   | *   | 0.4351       | 34.53                    | 9.89                    | 44.42                    | 57.15         | -12.73       | QP       |         |
| 8   |     | 0.6270       | 21.34                    | 9.99                    | 31.33                    | 46.00         | -14.67       | AVG      |         |
| 9   |     | 0.7755       | 20.23                    | 9.80                    | 30.03                    | 46.00         | -15.97       | AVG      |         |
| 10  |     | 1.7115       | 30.02                    | 9.75                    | 39.77                    | 56.00         | -16.23       | QP       |         |
| 11  |     | 2.3280       | 16.09                    | 9.72                    | 25.81                    | 46.00         | -20.19       | AVG      |         |
| 12  |     | 5.6850       | 25.32                    | 9.73                    | 35.05                    | 60.00         | -24.95       | QP       |         |

Neutral Line:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1   |     | 0.1500       | 38.01                    | 9.91                    | 47.92                    | 66.00         | -18.08       | QP       |         |
| 2   |     | 0.1949       | 32.91                    | 9.91                    | 42.82                    | 63.83         | -21.01       | QP       |         |
| 3   |     | 0.1949       | 19.82                    | 9.91                    | 29.73                    | 53.83         | -24.10       | AVG      |         |
| 4   |     | 0.2445       | 21.35                    | 9.95                    | 31.30                    | 51.94         | -20.64       | AVG      |         |
| 5   |     | 0.3390       | 33.06                    | 9.96                    | 43.02                    | 59.23         | -16.21       | QP       |         |
| 6   |     | 0.3390       | 22.52                    | 9.96                    | 32.48                    | 49.23         | -16.75       | AVG      |         |
| 7   |     | 0.4875       | 21.71                    | 9.89                    | 31.60                    | 46.21         | -14.61       | AVG      |         |
| 8   | *   | 0.5820       | 32.92                    | 10.02                   | 42.94                    | 56.00         | -13.06       | QP       |         |
| 9   |     | 0.7755       | 19.38                    | 9.80                    | 29.18                    | 46.00         | -16.82       | AVG      |         |
| 10  |     | 0.8700       | 31.97                    | 9.81                    | 41.78                    | 56.00         | -14.22       | QP       |         |
| 11  |     | 1.5000       | 30.82                    | 9.77                    | 40.59                    | 56.00         | -15.41       | QP       |         |
| 12  |     | 5.6805       | 15.85                    | 9.73                    | 25.58                    | 50.00         | -24.42       | AVG      |         |

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

## 7.4 Radiated Spurious Emission

**Test Requirement:** 47 CFR Part 15C Section 15.249 and 15.209

**Test Method:** ANSI C63.10

**Ambient:** Temp.: 21°C

**Humid.:** 54%

**Press.:** 1010mbar

**Test Site:** Measurement Distance: 3m (Semi-Anechoic Chamber)

**Receiver Setup:**

| Frequency         | Detector   | RBW    | VBW    | Remark     |
|-------------------|------------|--------|--------|------------|
| 0.009MHz-0.090MHz | Peak       | 10kHz  | 30KHz  | Peak       |
| 0.009MHz-0.090MHz | Average    | 10kHz  | 30KHz  | Average    |
| 0.090MHz-0.110MHz | Quasi-peak | 10kHz  | 30KHz  | Quasi-peak |
| 0.110MHz-0.490MHz | Peak       | 10kHz  | 30KHz  | Peak       |
| 0.110MHz-0.490MHz | Average    | 10kHz  | 30KHz  | Average    |
| 0.490MHz -30MHz   | Quasi-peak | 10kHz  | 30kHz  | Quasi-peak |
| 30MHz-1GHz        | Quasi-peak | 120kHz | 300KHz | Quasi-peak |
| Above 1GHz        | Peak       | 1MHz   | 3MHz   | Peak       |
|                   | Peak       | 1MHz   | 10Hz   | Average    |

**Test Setup:**

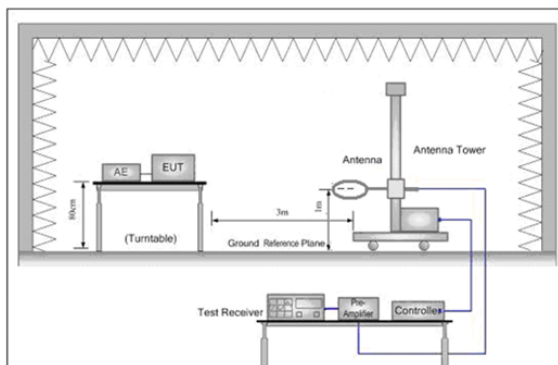


Figure 1. Below 30MHz

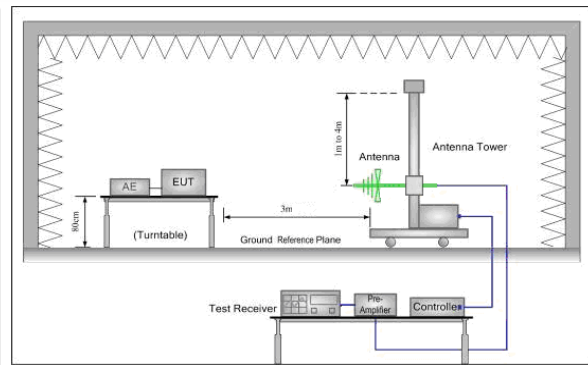


Figure 2. 30MHz to 1GHz

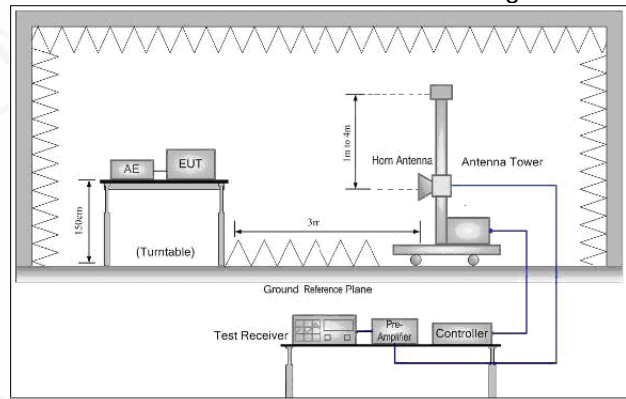


Figure 3. Above 1GHz

**Test Procedure:**

### Below 1GHz test procedure as below:

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading.

The test-receiver system was set to Peak Detect Function and Specified Bandwidth with

Maximum Hold Mode.

If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Above 1GHz test procedure as below:**

Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter r( Above 18GHz the distance is 1 meter and table is 1.5 meter).

Repeat above procedures until all frequencies measured was complete.

**Limit:**  
(Spurious Emissions)

| Frequency         | Field strength (microvolt/meter) | Limit (dBμV/m) | Remark     | Measurement distance (m) |
|-------------------|----------------------------------|----------------|------------|--------------------------|
| 0.009MHz-0.490MHz | 2400/F(kHz)                      | -              | -          | 300                      |
| 0.490MHz-1.705MHz | 24000/F(kHz)                     | -              | -          | 30                       |
| 1.705MHz-30MHz    | 30                               | -              | -          | 30                       |
| 30MHz-88MHz       | 100                              | 40.0           | Quasi-peak | 3                        |
| 88MHz-216MHz      | 150                              | 43.5           | Quasi-peak | 3                        |
| 216MHz-960MHz     | 200                              | 46.0           | Quasi-peak | 3                        |
| 960MHz-1GHz       | 500                              | 54.0           | Quasi-peak | 3                        |
| Above 1GHz        | 500                              | 54.0           | Average    | 3                        |

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

**Limit:**  
(Field strength of the fundamental signal)  
**Exploratory Test Mode:**

| Frequency         | Limit (dBμV/m @3m) | Remark        |
|-------------------|--------------------|---------------|
| 2400MHz-2483.5MHz | 94.0               | Average Value |
|                   | 114.0              | Peak Value    |

**Final Test Mode:**

BT mode,

Pretest the EUT at BT mode  
Only the worst case is recorded in the report.

**Test Results:**

Pass

**Spurious Emissions  
Below 1GHz**

| Channel: |                | 2440                  |                       |                       |                   |                   |                   |                |        |          |
|----------|----------------|-----------------------|-----------------------|-----------------------|-------------------|-------------------|-------------------|----------------|--------|----------|
| NO       | Freq.<br>[MHz] | Ant<br>Factor<br>[dB] | Cable<br>loss<br>[dB] | Pream<br>gain<br>[dB] | Reading<br>[dBμV] | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Margin<br>[dB] | Result | Polarity |
| 1        | 95.9666        | 10.35                 | 1.13                  | -32.07                | 38.38             | 17.79             | 43.50             | 25.71          | Pass   | H        |
| 2        | 168.9179       | 8.39                  | 1.52                  | -31.96                | 44.88             | 22.83             | 43.50             | 20.67          | Pass   | H        |
| 3        | 222.6613       | 11.49                 | 1.78                  | -31.94                | 48.77             | 30.10             | 46.00             | 15.90          | Pass   | H        |
| 4        | 625.0575       | 19.20                 | 2.97                  | -31.98                | 33.69             | 23.88             | 46.00             | 22.12          | Pass   | H        |
| 5        | 687.5318       | 19.70                 | 3.14                  | -32.06                | 35.46             | 26.24             | 46.00             | 19.76          | Pass   | H        |
| 6        | 906.3856       | 22.14                 | 3.60                  | -31.52                | 36.01             | 30.23             | 46.00             | 15.77          | Pass   | H        |
| 7        | 36.5967        | 11.21                 | 0.67                  | -32.11                | 38.49             | 18.26             | 40.00             | 21.74          | Pass   | V        |
| 8        | 55.2225        | 12.36                 | 0.84                  | -32.07                | 37.73             | 18.86             | 40.00             | 21.14          | Pass   | V        |
| 9        | 208.8859       | 11.13                 | 1.71                  | -31.94                | 47.40             | 28.30             | 43.50             | 15.20          | Pass   | V        |
| 10       | 285.0385       | 12.90                 | 2.01                  | -31.90                | 36.30             | 19.31             | 46.00             | 26.69          | Pass   | V        |
| 11       | 600.0290       | 19.00                 | 2.96                  | -31.99                | 33.59             | 23.56             | 46.00             | 22.44          | Pass   | V        |
| 12       | 974.9715       | 22.55                 | 3.75                  | -30.95                | 34.79             | 30.14             | 54.00             | 23.86          | Pass   | V        |

**Above 1GHz**

| Channel: |             | 2440            |                 |                 |                |                |                |             |        |          |        |
|----------|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|--------|
| NO       | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity | Remark |
| 1        | 1957.0957   | 31.42           | 3.43            | -42.64          | 51.01          | 43.22          | 74.00          | 30.78       | Pass   | H        | PK     |
| 2        | 3386.0257   | 33.35           | 4.55            | -41.89          | 49.17          | 45.18          | 74.00          | 28.82       | Pass   | H        | PK     |
| 3        | 5922.1948   | 35.68           | 5.18            | -41.03          | 46.34          | 46.17          | 74.00          | 27.83       | Pass   | H        | PK     |
| 4        | 8336.3558   | 36.53           | 6.15            | -40.70          | 46.57          | 48.55          | 74.00          | 25.45       | Pass   | H        | PK     |
| 5        | 9581.4388   | 37.63           | 6.68            | -40.79          | 46.08          | 49.60          | 74.00          | 24.40       | Pass   | H        | PK     |
| 6        | 11156.5438  | 38.69           | 7.22            | -41.19          | 45.64          | 50.36          | 74.00          | 23.64       | Pass   | H        | PK     |
| 7        | 2091.9092   | 31.83           | 3.58            | -42.57          | 50.53          | 43.37          | 74.00          | 30.63       | Pass   | V        | PK     |
| 8        | 2993.5994   | 33.19           | 4.53            | -42.12          | 50.32          | 45.92          | 74.00          | 28.08       | Pass   | V        | PK     |
| 9        | 3556.0371   | 33.44           | 4.43            | -41.70          | 49.88          | 46.05          | 74.00          | 27.95       | Pass   | V        | PK     |
| 10       | 5389.1593   | 34.89           | 4.84            | -40.61          | 46.71          | 45.83          | 74.00          | 28.17       | Pass   | V        | PK     |
| 11       | 7215.2810   | 36.32           | 5.81            | -41.02          | 46.70          | 47.81          | 74.00          | 26.19       | Pass   | V        | PK     |
| 12       | 9638.4426   | 37.66           | 6.69            | -40.73          | 44.50          | 48.12          | 74.00          | 25.88       | Pass   | V        | PK     |

**Above 18GHz**

| Channel: |             | 2440            |                 |                 |                |                |                |             |        |          |        |
|----------|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|--------|
| NO       | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity | Remark |
| 1        | 18886.6443  | 38.76           | 0.00            | -63.48          | 71.41          | 46.69          | 74.00          | 27.31       | Pass   | H        | PK     |
| 2        | 19937.1969  | 38.97           | 0.00            | -62.81          | 70.50          | 46.66          | 74.00          | 27.34       | Pass   | H        | PK     |
| 3        | 23720.2860  | 39.80           | 0.00            | -61.11          | 69.74          | 48.43          | 74.00          | 25.57       | Pass   | H        | PK     |
| 4        | 26588.1294  | 40.39           | 0.00            | -59.80          | 68.21          | 48.80          | 74.00          | 25.20       | Pass   | H        | PK     |
| 5        | 29554.9777  | 40.61           | 0.00            | -60.05          | 68.00          | 48.56          | 74.00          | 25.44       | Pass   | H        | PK     |
| 6        | 32452.5226  | 42.05           | 0.00            | -57.76          | 66.71          | 51.00          | 74.00          | 23.00       | Pass   | H        | PK     |
| 7        | 18774.4387  | 38.56           | 0.00            | -63.54          | 72.57          | 47.59          | 74.00          | 26.41       | Pass   | V        | PK     |
| 8        | 21260.5630  | 38.54           | 0.00            | -63.24          | 71.27          | 46.57          | 74.00          | 27.43       | Pass   | V        | PK     |
| 9        | 23655.3828  | 39.71           | 0.00            | -61.32          | 68.86          | 47.25          | 74.00          | 26.75       | Pass   | V        | PK     |
| 10       | 25159.1580  | 40.66           | 0.00            | -59.61          | 68.27          | 49.32          | 74.00          | 24.68       | Pass   | V        | PK     |
| 11       | 26877.4439  | 40.38           | 0.00            | -60.19          | 68.64          | 48.83          | 74.00          | 25.17       | Pass   | V        | PK     |
| 12       | 31018.0509  | 41.29           | 0.00            | -58.70          | 68.29          | 50.88          | 74.00          | 23.12       | Pass   | V        | PK     |

**Remark:**

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  

$$\text{Final Test Level} = \text{Receiver Reading} - \text{Correct Factor}$$

$$\text{Correct Factor} = \text{Preamplifier Factor} - \text{Antenna Factor} - \text{Cable Factor}$$
- 2) Scan from 30MHz to 25GHz, The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

## 7.5 Restricted bands around fundamental frequency

**Test Requirement:** 47 CFR Part 15C Section 15.209 and 15.205  
**Test Method:** ANSI C63.10  
**Test Site:** Measurement Distance: 3m (Semi-Anechoic Chamber)  
**Limit(Band Edge):** 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 Section 15.209, whichever is the lesser attenuation.

| Frequency     | Limit (dBμV/m @3m) | Remark           |
|---------------|--------------------|------------------|
| 30MHz-88MHz   | 40.0               | Quasi-peak Value |
| 88MHz-216MHz  | 43.5               | Quasi-peak Value |
| 216MHz-960MHz | 46.0               | Quasi-peak Value |
| 960MHz-1GHz   | 54.0               | Quasi-peak Value |
| Above 1GHz    | 54.0               | Average Value    |
|               | 74.0               | Peak Value       |

### Test Setup:

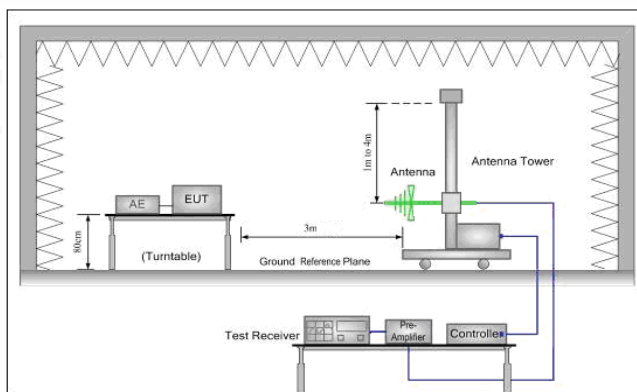


Figure 1. 30MHz to 1GHz

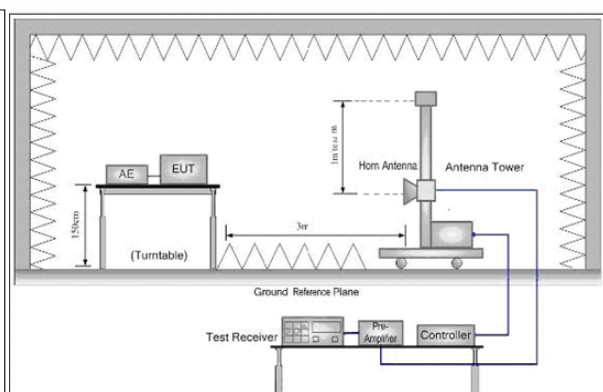


Figure 2. Above 1 GHz

### Test Procedure:

#### Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

#### Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre( Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel , the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

**Instruments Used:** Refer to section 6 for details

**Exploratory Test** BT mode

**Mode:**

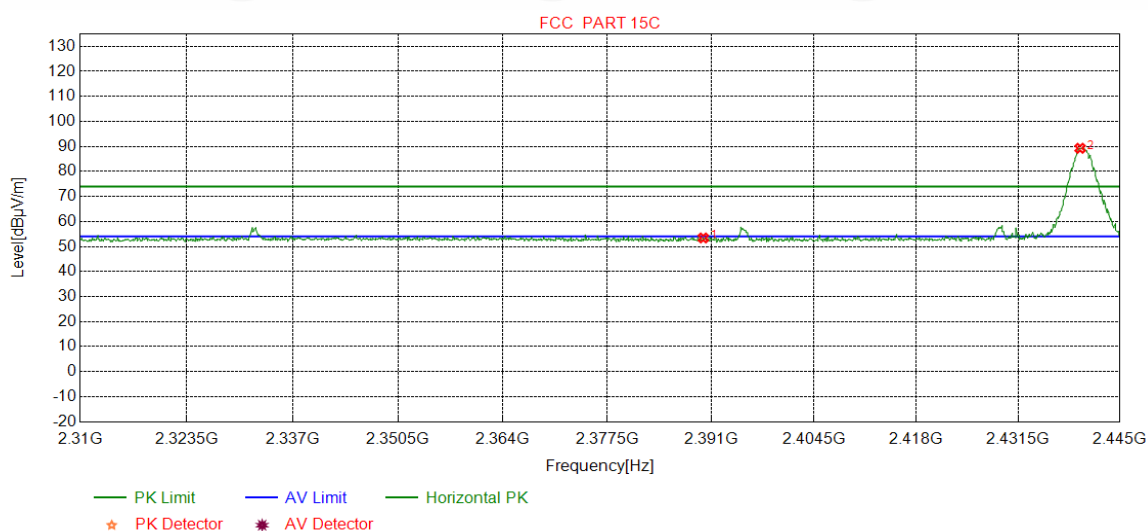
**Final Test Mode:** Pretest the EUT at BT mode

Only the worst case is recorded in the report.

**Test Results:** Pass

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | PK   |          |      |

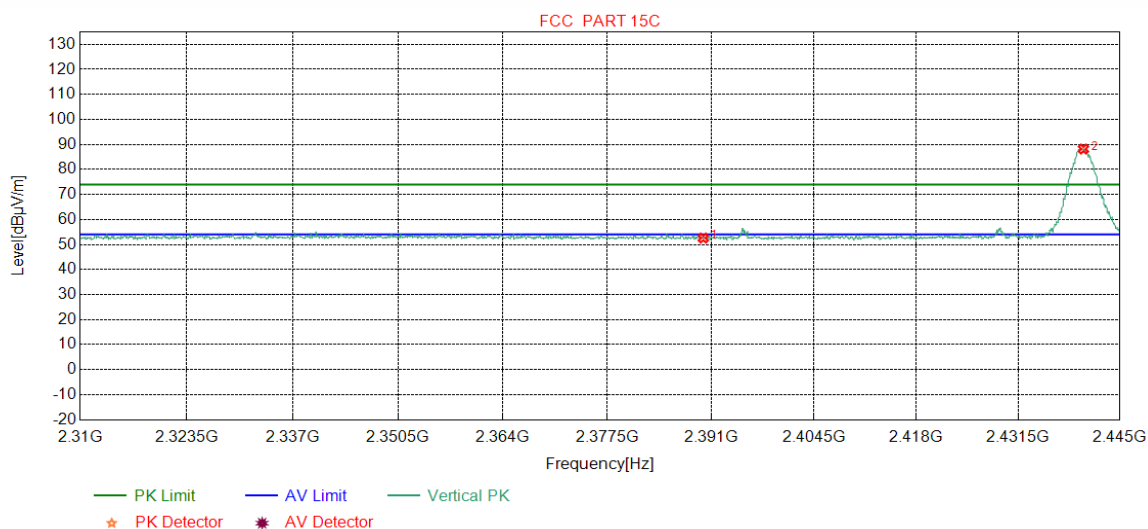
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity   |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|------------|
| 1  | 2390.0000   | 32.25           | 13.37           | -42.44          | 50.24          | 53.42          | 74.00          | 20.58       | Pass   | Horizontal |
| 2  | 2439.7081   | 32.32           | 13.48           | -42.42          | 85.88          | 89.26          | 74.00          | -15.26      | Pass   | Horizontal |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | PK   |          |      |

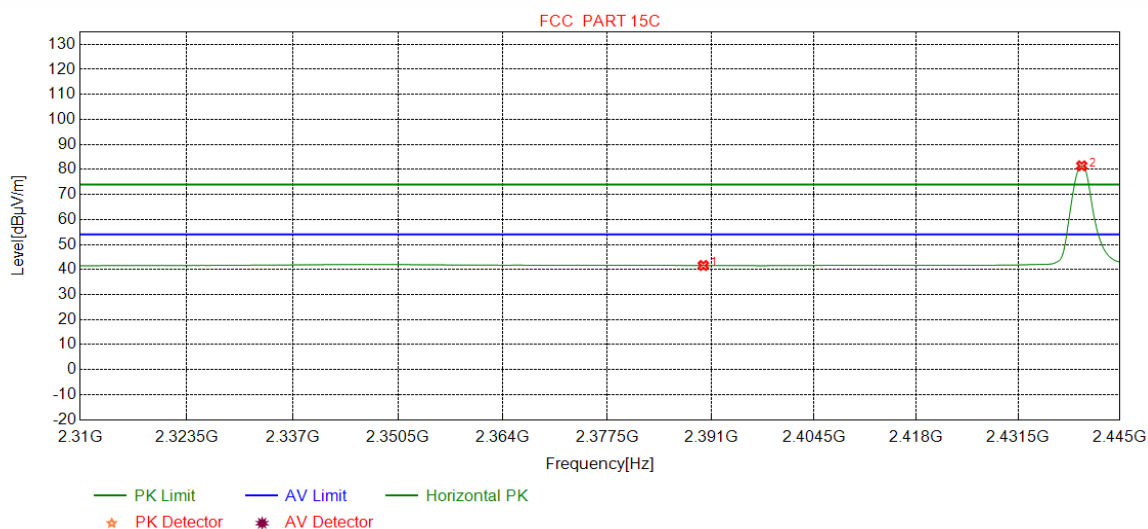
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|
| 1  | 2390.0000   | 32.25           | 13.37           | -42.44          | 49.41          | 52.59          | 74.00          | 21.41       | Pass   | Vertical |
| 2  | 2440.1585   | 32.32           | 13.48           | -42.42          | 84.78          | 88.16          | 74.00          | -14.16      | Pass   | Vertical |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | AV   |          |      |

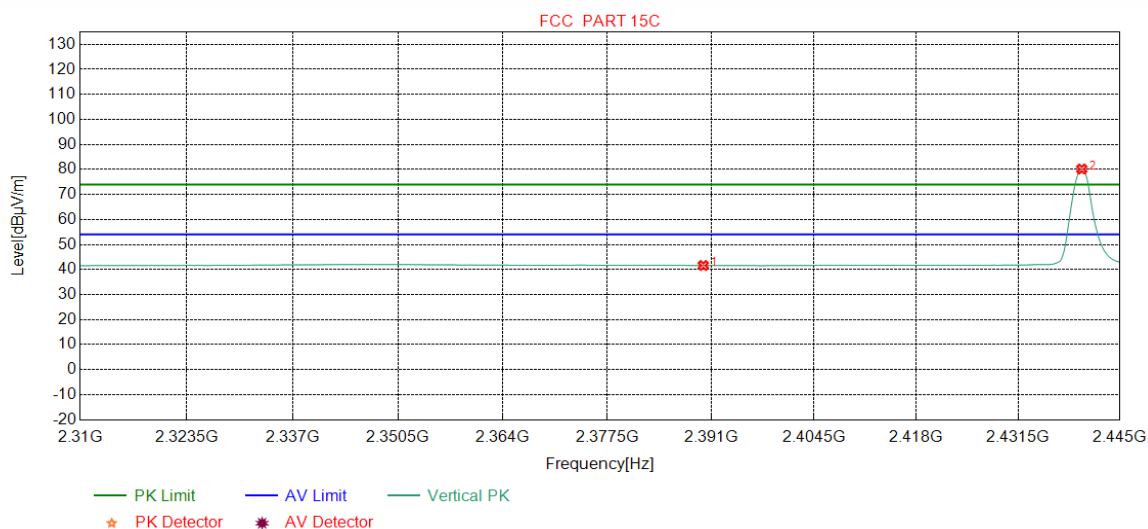
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity   |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|------------|
| 1  | 2390.0000   | 32.25           | 13.37           | -42.44          | 38.44          | 41.62          | 54.00          | 12.38       | Pass   | Horizontal |
| 2  | 2439.9312   | 32.32           | 13.48           | -42.42          | 78.08          | 81.46          | 54.00          | -27.46      | Pass   | Horizontal |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | AV   |          |      |

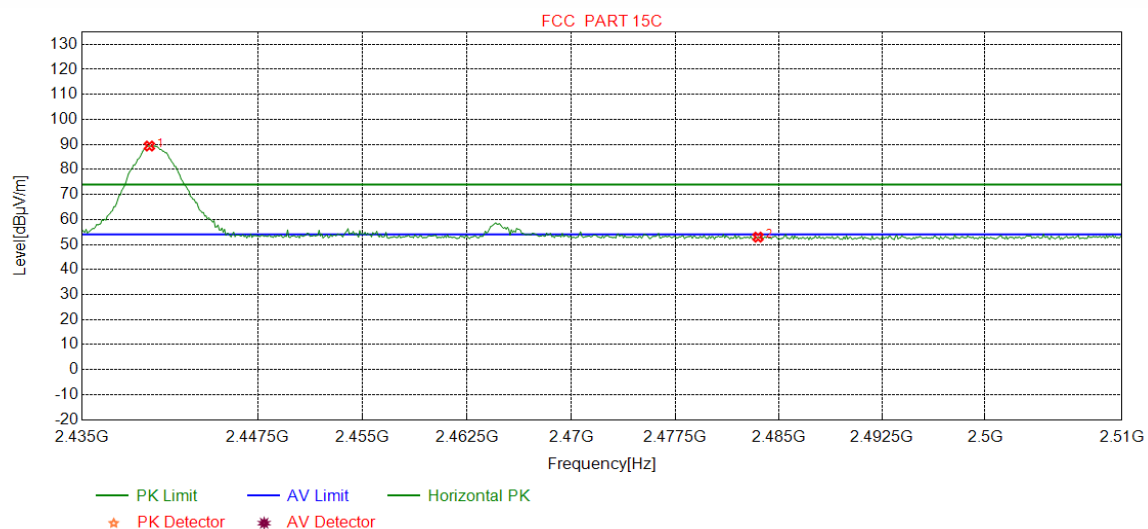
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|
| 1  | 2390.0000   | 32.25           | 13.37           | -42.44          | 38.43          | 41.61          | 54.00          | 12.39       | Pass   | Vertical |
| 2  | 2439.9312   | 32.32           | 13.48           | -42.42          | 76.79          | 80.17          | 54.00          | -26.17      | Pass   | Vertical |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | PK   |          |      |

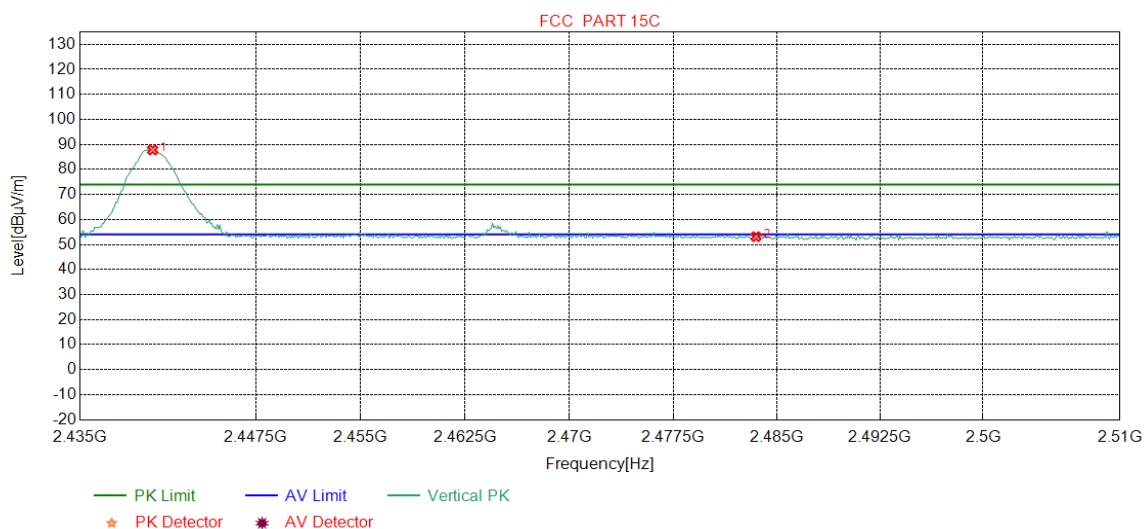
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity   |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|------------|
| 1  | 2439.7872   | 32.32           | 13.48           | -42.42          | 85.97          | 89.35          | 74.00          | -15.35      | Pass   | Horizontal |
| 2  | 2483.5000   | 32.38           | 13.38           | -42.40          | 49.58          | 52.94          | 74.00          | 21.06       | Pass   | Horizontal |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | PK   |          |      |

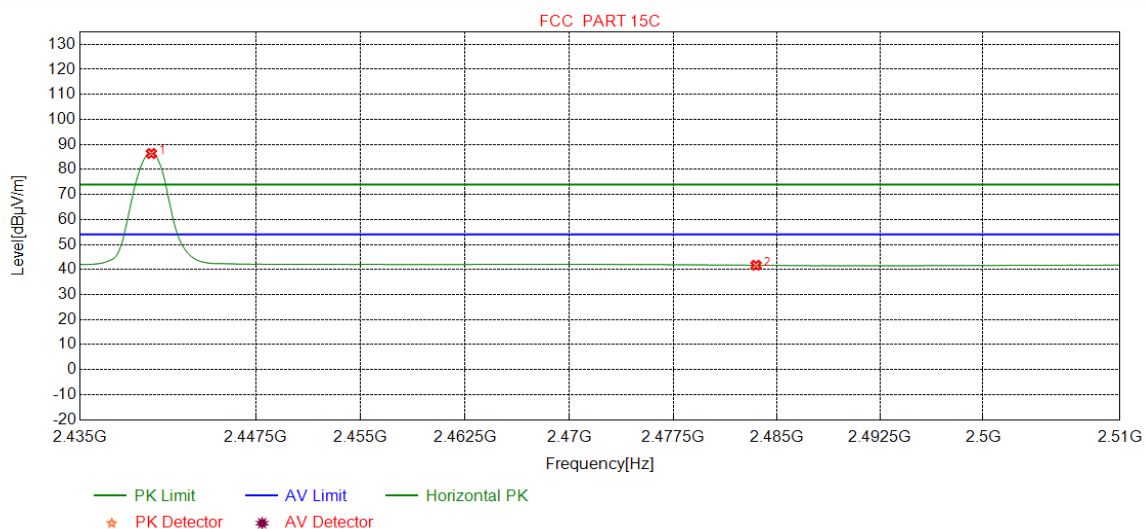
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|
| 1  | 2440.1627   | 32.32           | 13.48           | -42.42          | 84.42          | 87.80          | 74.00          | -13.80      | Pass   | Vertical |
| 2  | 2483.5000   | 32.38           | 13.38           | -42.40          | 49.76          | 53.12          | 74.00          | 20.88       | Pass   | Vertical |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | AV   |          |      |

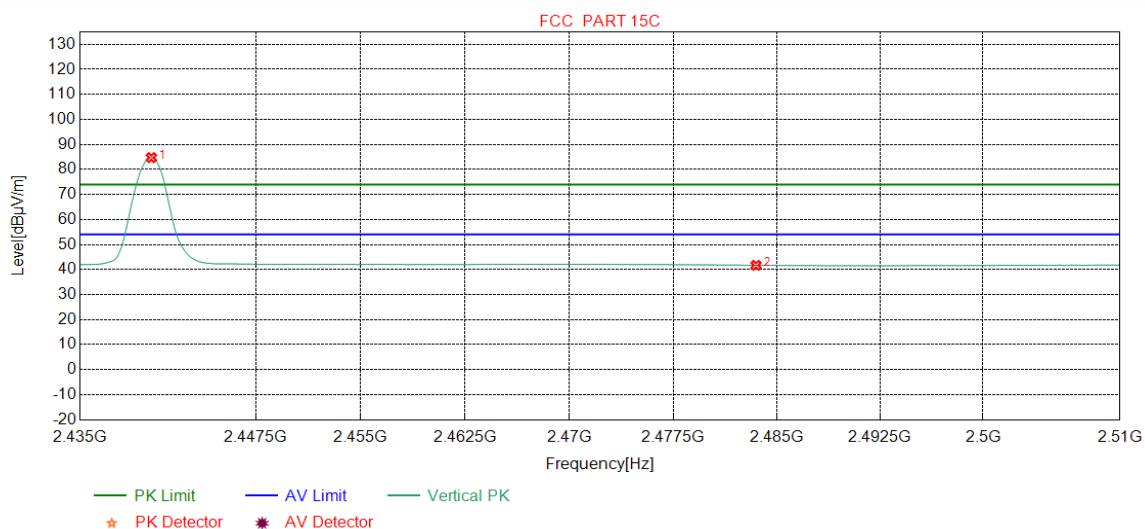
### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity   |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|------------|
| 1  | 2440.0688   | 32.32           | 13.48           | -42.42          | 82.98          | 86.36          | 54.00          | -32.36      | Pass   | Horizontal |
| 2  | 2483.5000   | 32.38           | 13.38           | -42.40          | 38.34          | 41.70          | 54.00          | 12.30       | Pass   | Horizontal |

|         |      |          |      |
|---------|------|----------|------|
| Mode:   | GFSK | Channel: | 2440 |
| Remark: | AV   |          |      |

### Test Graph



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|
| 1  | 2440.0688   | 32.32           | 13.48           | -42.42          | 81.34          | 84.72          | 54.00          | -30.72      | Pass   | Vertical |
| 2  | 2483.5000   | 32.38           | 13.38           | -42.40          | 38.32          | 41.68          | 54.00          | 12.32       | Pass   | Vertical |

### Note:

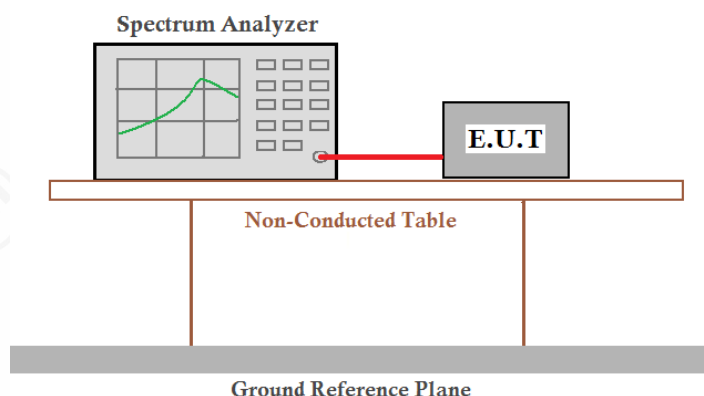
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

*Final Test Level = Receiver Reading - Correct Factor*

*Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor*

## 7.6 20dB Bandwidth

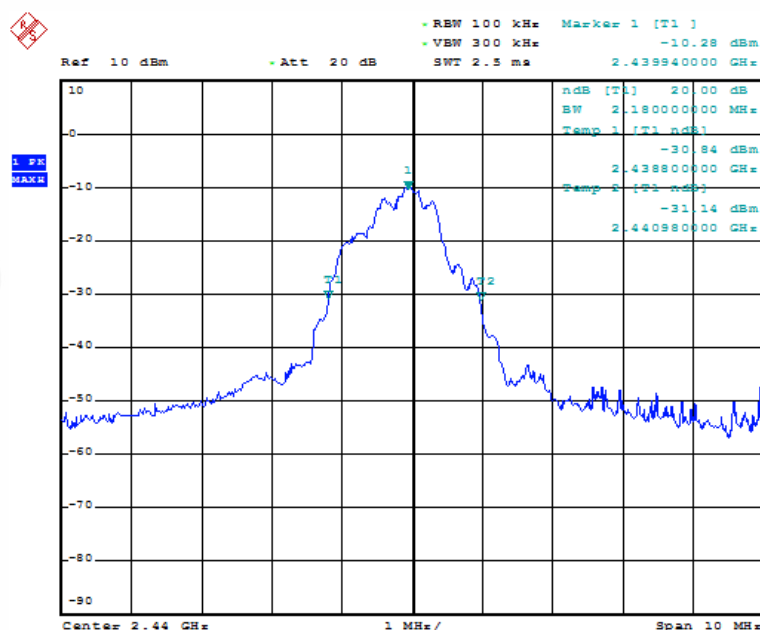
**Test Requirement:** 47 CFR Part 15C Section 15.215  
**Test Method:** ANSI C63.10  
**Test Setup:**



**Test Mode:** Transmitter mode  
**Limit:** N/A  
**Instruments Used:** Refer to section 6 for details  
**Test Results:** Pass

### Measurement Data

| Test Channel/Frequency | 20dB bandwidth (kHz) |
|------------------------|----------------------|
| 2440MHz                | 2180                 |



Date: 24.JUL.2019 17:14:27

## APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test Model No.: MS-280



**Radiated spurious emission Test Setup-1(Below 30MHz)**



**Radiated spurious emission Test Setup-2(Below 1GHz)**



**Radiated spurious emission Test Setup-3(Above 1GHz)**

## APPENDIX 2 PHOTOGRAPHS OF EUT

Refer to Report No. EED32L00160901 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.