



# Radio Test Report

Report No.: STS2505146W02

Issued for

ShenZhen ZhongKeRui Electronics CO., LTD.

501, Building A, Nankeng 2nd Industrial Park, Bantian,  
Longgang, Shenzhen 518129, China

Product Name: Bike Safety Light

Brand Name: RAVEMEN

Model Name: FR300 ANT+

Series Model(s): N/A

FCC ID: 2AYUF-25516

Test Standards: FCC Part15.247

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

**TEST REPORT****Applicant's Name**..... : ShenZhen ZhongKeRui Electronics CO., LTD.Address ..... : 501, Building A, Nankeng 2nd Industrial Park, Bantian, Longgang,  
Shenzhen 518129, China**Manufacturer's Name** ..... : ShenZhen ZhongKeRui Electronics CO., LTD.Address ..... : 501, Building A, Nankeng 2nd Industrial Park, Bantian, Longgang,  
Shenzhen 518129, China**Product Description**

Product Name ..... : Bike Safety Light

Brand Name ..... : RAVEMEN

Model Name ..... : FR300 ANT+

Series Model(s) ..... : N/A

**Test Standards**..... : FCC Part15.247

Test Procedure ..... : ANSI C63.10-2020

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the IC requirements. And it is applicable only to the tested sample identified in the report.

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

**Date of Test**..... :

Date of receipt of test item ..... : 21 May 2025

Date (s) of performance of tests..... : 21 May 2025~28 May 2025

Date of Issue..... : 28 May 2025

Test Result..... : **Pass**

Testing Engineer : \_\_\_\_\_

*Aaron Bu*

(Aaron Bu)

Technical Manager : \_\_\_\_\_

*Skylar Li*

(Skylar Li)

Authorized Signatory : \_\_\_\_\_

*Bovey Yang*

(Bovey Yang)





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**Revision History**

| Rev. | Issue Date  | Report No.    | Effect Page | Contents      |
|------|-------------|---------------|-------------|---------------|
| 00   | 28 May 2025 | STS2505146W02 | ALL         | Initial Issue |
|      |             |               |             |               |



## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:  
KDB 558074 D01 15.247 Meas Guidance v05r02.

| FCC Part 15.247, Subpart C        |                                         |          |        |
|-----------------------------------|-----------------------------------------|----------|--------|
| Standard Section                  | Test Item                               | Judgment | Remark |
| 15.207                            | Conducted Emission                      | PASS     | --     |
| 15.247 (a)(2)                     | 6dB Bandwidth                           | PASS     | --     |
| 15.247 (b)(3)                     | Output Power                            | PASS     | --     |
| 15.209                            | Radiated Spurious Emission              | PASS     | --     |
| 15.247 (d)                        | Conducted Spurious & Band Edge Emission | PASS     | --     |
| 15.247 (e)                        | Power Spectral Density                  | PASS     | --     |
| 15.205                            | Restricted bands of operation           | PASS     | --     |
| Part 15.247(d)/<br>Part 15.209(a) | Band Edge Emission                      | PASS     | --     |
| 15.203                            | Antenna Requirement                     | PASS     | --     |

Note:

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to ANSI C63.10-2020.



### 1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

### 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95 %**.

| No. | Item                              | Uncertainty          |
|-----|-----------------------------------|----------------------|
| 1   | RF output power, conducted        | $\pm 0.755\text{dB}$ |
| 2   | Unwanted Emissions, conducted     | $\pm 2.874\text{dB}$ |
| 3   | All emissions, radiated 9K-30MHz  | $\pm 3.80\text{dB}$  |
| 4   | All emissions, radiated 30M-1GHz  | $\pm 4.18\text{dB}$  |
| 5   | All emissions, radiated 1G-6GHz   | $\pm 4.90\text{dB}$  |
| 6   | All emissions, radiated >6G       | $\pm 5.24\text{dB}$  |
| 7   | Conducted Emission (9KHz-150KHz)  | $\pm 2.19\text{dB}$  |
| 8   | Conducted Emission (150KHz-30MHz) | $\pm 2.53\text{dB}$  |
| 9   | Occupied Channel Bandwidth        | $\pm 3.5\%$          |
| 10  | Power Spectral Density, conducted | $\pm 1.245\text{dB}$ |
| 11  | Duty Cycle                        | $\pm 3.2\%$          |



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF THE EUT

|                         |                                                                      |                           |
|-------------------------|----------------------------------------------------------------------|---------------------------|
| Product Name            | Bike Safety Light                                                    |                           |
| Brand Name              | RAVEMEN                                                              |                           |
| Model Name              | FR300 ANT+                                                           |                           |
| Series Model(s)         | N/A                                                                  |                           |
| Model Difference        | N/A                                                                  |                           |
| Product Description     | The EUT is a Bike Safety Light                                       |                           |
|                         | Operation Frequency:                                                 | 2402~2480 MHz             |
|                         | Modulation Type:                                                     | GFSK                      |
|                         | Radio Technology:                                                    | BLE                       |
|                         | Bluetooth Configuration:                                             | LE(Support 1M PHY,2M PHY) |
|                         | Number Of Channel:                                                   | 40                        |
|                         | Antenna Type:                                                        | PCB                       |
|                         | Antenna Gain (dBi)                                                   | 0dBi                      |
| Channel List            | Please refer to the Note 3.                                          |                           |
| Power Rating            | Input: DC 5V 1A                                                      |                           |
| Adapter                 | N/A                                                                  |                           |
| Battery                 | Rated Voltage:3.7V<br>Charge Limit Voltage:4.2V<br>Capacity: 1200mAh |                           |
| Hardware version number | V1                                                                   |                           |
| Software version number | 1.1                                                                  |                           |
| Connecting I/O Port(s)  | Please refer to the Note 1.                                          |                           |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2. The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report. Due to the incorrect antenna information, a series of problems such as the accuracy of the test results will be borne by the customer.



3.

| Channel List |                 |         |                 |         |                 |         |                 |
|--------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel      | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00           | 2402            | 10      | 2422            | 20      | 2442            | 30      | 2462            |
| 01           | 2404            | 11      | 2424            | 21      | 2444            | 31      | 2464            |
| 02           | 2406            | 12      | 2426            | 22      | 2446            | 32      | 2466            |
| 03           | 2408            | 13      | 2428            | 23      | 2448            | 33      | 2468            |
| 04           | 2410            | 14      | 2430            | 24      | 2450            | 34      | 2470            |
| 05           | 2412            | 15      | 2432            | 25      | 2452            | 35      | 2472            |
| 06           | 2414            | 16      | 2434            | 26      | 2454            | 36      | 2474            |
| 07           | 2416            | 17      | 2436            | 27      | 2456            | 37      | 2476            |
| 08           | 2418            | 18      | 2438            | 28      | 2458            | 38      | 2478            |
| 09           | 2420            | 19      | 2440            | 29      | 2460            | 39      | 2480            |

## 2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions

Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

| Worst Mode | Description      | Data/Modulation |
|------------|------------------|-----------------|
| Mode 1     | TX CH00(2402MHz) | 1M PHY /GFSK    |
| Mode 2     | TX CH19(2440MHz) | 1M PHY /GFSK    |
| Mode 3     | TX CH39(2480MHz) | 1M PHY /GFSK    |

| Worst Mode | Description      | Data/Modulation |
|------------|------------------|-----------------|
| Mode 4     | TX CH00(2402MHz) | 2M PHY /GFSK    |
| Mode 5     | TX CH19(2440MHz) | 2M PHY /GFSK    |
| Mode 6     | TX CH39(2480MHz) | 2M PHY /GFSK    |

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

(2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report.

For AC Conducted Emission

| Test Case             |                        |
|-----------------------|------------------------|
| AC Conducted Emission | Mode 7 : Keeping BT TX |



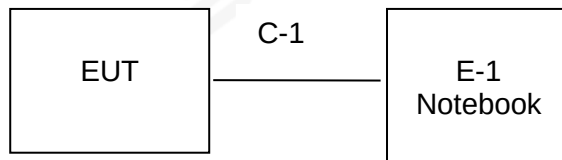
### 2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

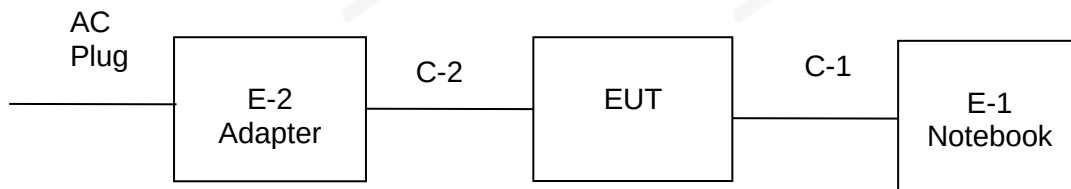
| RF Function      | Type       | Mode Or Modulation type | ANT Gain(dBi) | Power Class | Software For Testing    |
|------------------|------------|-------------------------|---------------|-------------|-------------------------|
| BLE(With 2M PHY) | BLE_1M PHY | GFSK                    | 0             | -8          | nRF Connect for Desktop |
|                  | BLE_2M PHY | GFSK                    | 0             | -8          |                         |

### 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

#### Radiated Spurious Emission Test



#### Conducted Emission Test





## 2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment         | Mfr/Brand | Model/Type No. | Note |
|------|-------------------|-----------|----------------|------|
| E-1  | Notebook          | DELL      | Inspiron 3501  | N/A  |
| E-2  | Adapter           | ZTC       | NB-A515A       | N/A  |
| C-1  | Serial port board | XES       | WTYZK          | N/A  |
| C-2  | USB Cable         | ZTC       | NB-A515A       | N/A  |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| C-2  | Shielded      | NO           | 150cm  | N/A  |
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (2) “YES” is means “with core”; “NO” is means “without core”.



## 2.6 EQUIPMENTS LIST

| RF Radiation Test Equipment |                  |                    |              |                  |                  |
|-----------------------------|------------------|--------------------|--------------|------------------|------------------|
| Kind of Equipment           | Manufacturer     | Type No.           | Serial No.   | Last Calibration | Calibrated Until |
| Temperature & Humidity      | SW-108           | SuWei              | N/A          | 2025.02.24       | 2026.02.23       |
| Pre-Amplifier(0.1M-3GHz)    | EM               | EM330              | 060665       | 2025.02.22       | 2026.02.21       |
| Pre-Amplifier(1G-18GHz)     | SKET             | LNPA-01018G-45     | SK2018080901 | 2024.09.23       | 2025.09.22       |
| Pre-Amplifier(18G-40GHz)    | SKET             | LNPA_1840-50       | SK2018101801 | 2025.02.22       | 2026.02.21       |
| Active loop Antenna         | ZHINAN           | ZN30900C           | 16035        | 2025.02.25       | 2026.02.24       |
| Bilog Antenna               | TESEQ            | CBL6111D           | 34678        | 2024.09.30       | 2025.09.29       |
| Horn Antenna                | SCHWARZBECK      | BBHA 9120D         | 02014        | 2023.09.24       | 2025.09.23       |
| Horn Antenna                | A-INFOMW         | LB-180400-KF       | J211020657   | 2023.10.10       | 2025.10.09       |
| Positioning Controller      | MF               | MF-7802            | MF-780208587 | N/A              | N/A              |
| Signal Analyzer             | R&S              | FSV 40-N           | 101823       | 2024.09.23       | 2025.09.22       |
| Switch Control Box          | N/A              | N/A                | N/A          | N/A              | N/A              |
| Filter Box                  | BALUN Technology | SU319E             | BL-SZ1530051 | N/A              | N/A              |
| Antenna Mast                | MF               | MFA-440H           | N/A          | N/A              | N/A              |
| Turn Table                  | MF               | SC100 1            | 60531        | N/A              | N/A              |
| AC Power Source             | APC              | KDF-11010G         | F214050035   | N/A              | N/A              |
| DC power supply             | HONGSHENGFE NG   | DPS-305AF          | 17064939     | 2024.09.23       | 2025.09.22       |
| Test SW                     | EZ-EMC           | Ver.STSLAB-03A1 RE |              |                  |                  |
| Conduction Test Equipment   |                  |                    |              |                  |                  |
| Kind of Equipment           | Manufacturer     | Type No.           | Serial No.   | Last calibration | Calibrated until |
| Test Receiver               | R&S              | ESCI               | 101427       | 2024.09.24       | 2025.09.23       |
| Limtter                     | CYBERTEK         | EM5010             | N/A          | 2024.09.24       | 2025.09.23       |
| LISN                        | R&S              | ENV216             | 101242       | 2024.09.24       | 2025.09.23       |
| LISN                        | EMCO             | 3810/2NM           | 23625        | 2024.09.24       | 2025.09.23       |
| Temperature & Humidity      | SW-108           | SuWei              | N/A          | 2025.02.24       | 2026.02.23       |
| Test SW                     | EZ-EMC           | Ver.STSLAB-03A1 CE |              |                  |                  |
| RF Connected Test           |                  |                    |              |                  |                  |
| Kind of Equipment           | Manufacturer     | Type No.           | Serial No.   | Last calibration | Calibrated until |
| Signal Analyzer             | Agilent          | N9020A             | MY51510623   | 2025.02.22       | 2026.02.21       |
| Power detector group        | Keysight         | NW2021031          | N/A          | 2024.09.23       | 2025.09.22       |
| Switch control box          | MW               | MW100-RFCB         | N/A          | N/A              | N/A              |
| Temperature & Humidity      | SW-108           | SuWei              | N/A          | 2025.02.24       | 2026.02.23       |
| Test SW                     | MW               | MTS 8310 2.0.0.0   |              |                  |                  |



### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

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 the limits in the following table.

| FREQUENCY (MHz) | Conducted Emission limit (dBuV) |           |
|-----------------|---------------------------------|-----------|
|                 | Quasi-peak                      | Average   |
| 0.15 -0.5       | 66 - 56 *                       | 56 - 46 * |
| 0.50 -5.0       | 56.00                           | 46.00     |
| 5.0 -30.0       | 60.00                           | 50.00     |

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “\*” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

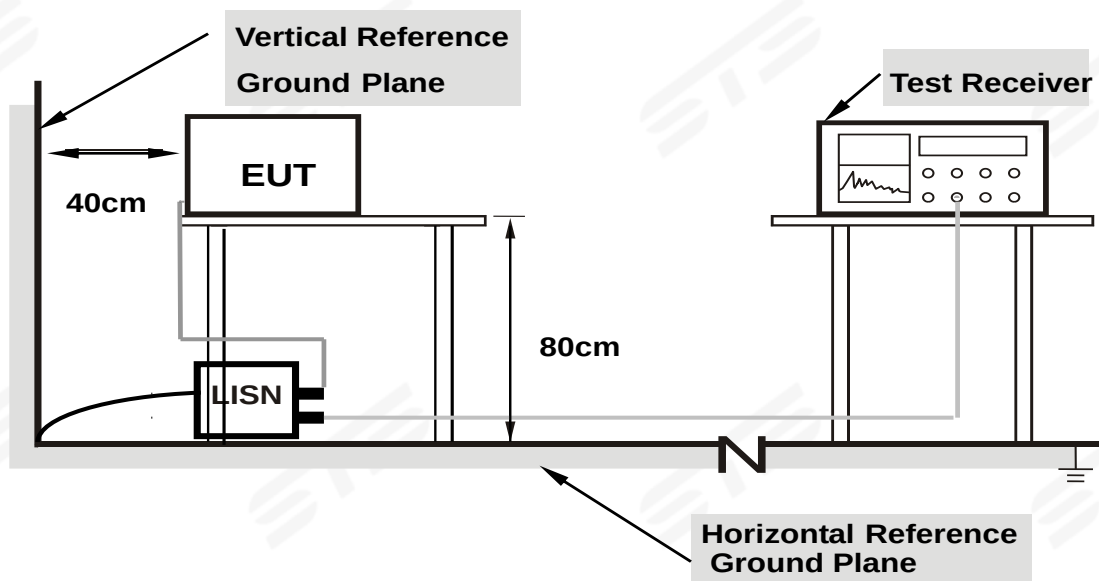
The following table is the setting of the receiver

| Receiver Parameters | Setting  |
|---------------------|----------|
| Attenuation         | 10 dB    |
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 kHz    |

### 3.2 TEST PROCEDURE

- The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN is at least 80 cm from the nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.3 TEST SETUP



**Note: 1. Support units were connected to second LISN.**

**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.**

### 3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



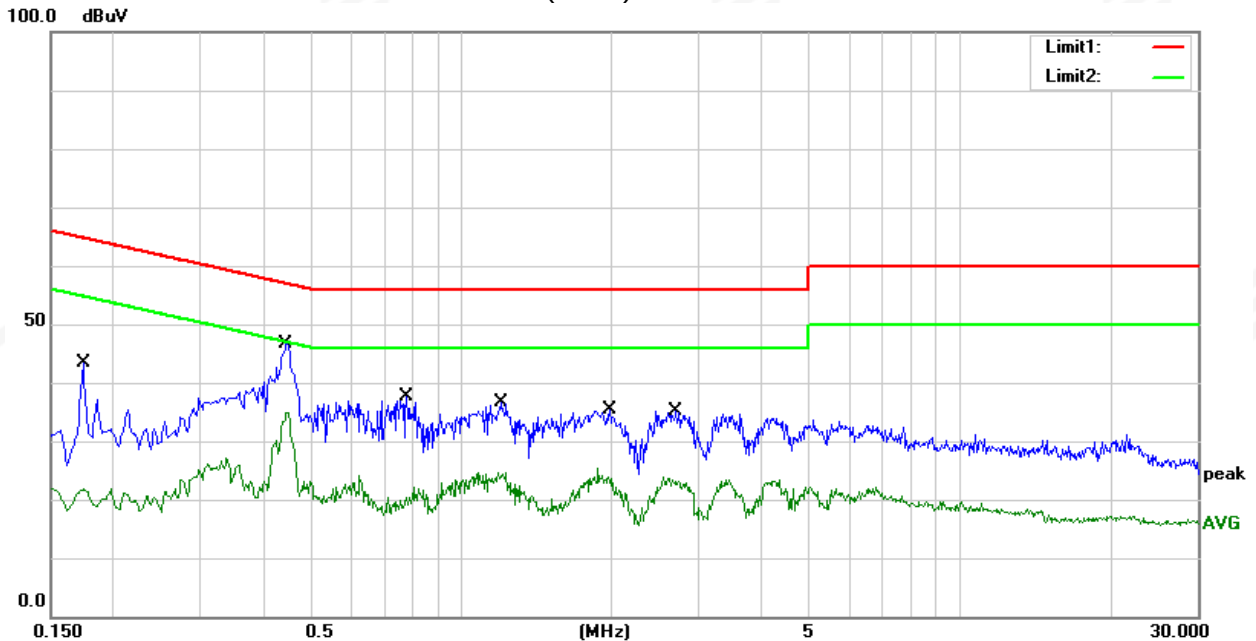
## 3.5 TEST RESULTS

|               |              |                    |     |
|---------------|--------------|--------------------|-----|
| Temperature:  | 25.1°C       | Relative Humidity: | 59% |
| Test Voltage: | AC 120V/60Hz | Phase:             | L   |
| Test Mode:    | Mode 7       |                    |     |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 0.1740             | 23.59             | 19.78                 | 43.37            | 64.77           | -21.40         | QP     |
| 2   | 0.1740             | 7.42              | 19.78                 | 27.20            | 54.77           | -27.57         | AVG    |
| 3   | 0.4460             | 26.67             | 20.01                 | 46.68            | 56.95           | -10.27         | QP     |
| 4   | 0.4460             | 14.90             | 20.01                 | 34.91            | 46.95           | -12.04         | AVG    |
| 5   | 0.7780             | 17.92             | 19.81                 | 37.73            | 56.00           | -18.27         | QP     |
| 6   | 0.7780             | 3.03              | 19.81                 | 22.84            | 46.00           | -23.16         | AVG    |
| 7   | 1.2020             | 16.88             | 19.78                 | 36.66            | 56.00           | -19.34         | QP     |
| 8   | 1.2020             | 4.87              | 19.78                 | 24.65            | 46.00           | -21.35         | AVG    |
| 9   | 1.9820             | 15.67             | 19.79                 | 35.46            | 56.00           | -20.54         | QP     |
| 10  | 1.9820             | 5.51              | 19.79                 | 25.30            | 46.00           | -20.70         | AVG    |
| 11  | 2.7060             | 15.22             | 19.81                 | 35.03            | 56.00           | -20.97         | QP     |
| 12  | 2.7060             | 3.96              | 19.81                 | 23.77            | 46.00           | -22.23         | AVG    |

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)



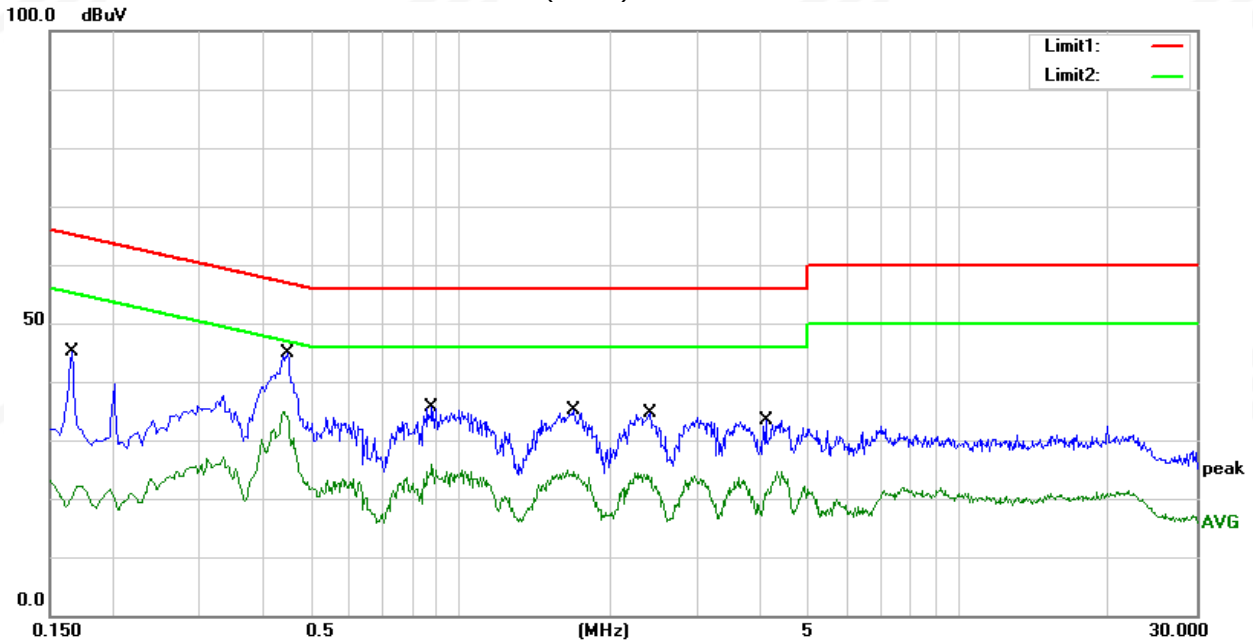


|               |              |                    |     |
|---------------|--------------|--------------------|-----|
| Temperature:  | 25.1°C       | Relative Humidity: | 59% |
| Test Voltage: | AC 120V/60Hz | Phase:             | N   |
| Test Mode:    | Mode 7       |                    |     |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 0.1660             | 25.30             | 19.78                 | 45.08            | 65.16           | -20.08         | QP     |
| 2   | 0.1660             | 5.47              | 19.78                 | 25.25            | 55.16           | -29.91         | AVG    |
| 3   | 0.4500             | 24.80             | 20.00                 | 44.80            | 56.88           | -12.08         | QP     |
| 4   | 0.4500             | 14.91             | 20.00                 | 34.91            | 46.88           | -11.97         | AVG    |
| 5   | 0.8780             | 15.92             | 19.80                 | 35.72            | 56.00           | -20.28         | QP     |
| 6   | 0.8780             | 6.07              | 19.80                 | 25.87            | 46.00           | -20.13         | AVG    |
| 7   | 1.6900             | 15.25             | 19.85                 | 35.10            | 56.00           | -20.90         | QP     |
| 8   | 1.6900             | 5.06              | 19.85                 | 24.91            | 46.00           | -21.09         | AVG    |
| 9   | 2.3980             | 14.66             | 19.90                 | 34.56            | 56.00           | -21.44         | QP     |
| 10  | 2.3980             | 4.49              | 19.90                 | 24.39            | 46.00           | -21.61         | AVG    |
| 11  | 4.0980             | 13.42             | 19.95                 | 33.37            | 56.00           | -22.63         | QP     |
| 12  | 4.0980             | 4.79              | 19.95                 | 24.74            | 46.00           | -21.26         | AVG    |

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)





#### 4. RADIATED EMISSION MEASUREMENT

##### 4.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2020 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009~0.490          | 2400/F(KHz)                          | 300                              |
| 0.490~1.705          | 24000/F(KHz)                         | 30                               |
| 1.705~30.0           | 30                                   | 30                               |
| 30~88                | 100                                  | 3                                |
| 88~216               | 150                                  | 3                                |
| 216~960              | 200                                  | 3                                |
| Above 960            | 500                                  | 3                                |

LIMITS OF RADIATED EMISSION MEASUREMENT (1000MHz-25GHz)

| FREQUENCY (MHz) | (dBuV/m) (at 3M) |         |
|-----------------|------------------|---------|
|                 | PEAK             | AVERAGE |
| Above 1000      | 74               | 54      |

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

##### LIMITS OF RESTRICTED FREQUENCY BANDS

| FREQUENCY (MHz)   | FREQUENCY (MHz)     | FREQUENCY (MHz) | FREQUENCY (GHz) |
|-------------------|---------------------|-----------------|-----------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410       | 4.5-5.15        |
| 0.495-0.505       | 16.69475-16.69525   | 608-614         | 5.35-5.46       |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240        | 7.25-7.75       |
| 4.125-4.128       | 25.5-25.67          | 1300-1427       | 8.025-8.5       |
| 4.17725-4.17775   | 37.5-38.25          | 1435-1626.5     | 9.0-9.2         |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5   | 9.3-9.5         |
| 6.215-6.218       | 74.8-75.2           | 1660-1710       | 10.6-12.7       |
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2   | 13.25-13.4      |
| 6.31175-6.31225   | 123-138             | 2200-2300       | 14.47-14.5      |
| 8.291-8.294       | 149.9-150.05        | 2310-2390       | 15.35-16.2      |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500     | 17.7-21.4       |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900       | 22.01-23.12     |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267       | 23.6-24.0       |
| 12.29-12.293      | 167.72-173.2        | 3332-3339       | 31.2-31.8       |
| 12.51975-12.52025 | 240-285             | 3345.8-3358     | 36.43-36.5      |
| 12.57675-12.57725 | 322-335.4           | 3600-4400       | Above 38.6      |
| 13.36-13.41       |                     |                 |                 |



## For Radiated Emission

| Spectrum Parameter                    | Setting                                                                                                                         |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Attenuation                           | Auto                                                                                                                            |
| Detector                              | Peak/QP/AV                                                                                                                      |
| Start Frequency                       | 9 KHz/150KHz(Peak/QP/AV)                                                                                                        |
| Stop Frequency                        | 150KHz/30MHz(Peak/QP/AV)                                                                                                        |
| RB / VB (emission in restricted band) | 200Hz (From 9kHz to 0.15MHz)/<br>9KHz (From 0.15MHz to 30MHz);<br>200Hz (From 9kHz to 0.15MHz)/<br>9KHz (From 0.15MHz to 30MHz) |

| Spectrum Parameter                    | Setting            |
|---------------------------------------|--------------------|
| Attenuation                           | Auto               |
| Detector                              | Peak/QP            |
| Start Frequency                       | 30 MHz(Peak/QP)    |
| Stop Frequency                        | 1000 MHz (Peak/QP) |
| RB / VB (emission in restricted band) | 120 KHz / 300 KHz  |

| Spectrum Parameter                    | Setting                                   |
|---------------------------------------|-------------------------------------------|
| Attenuation                           | Auto                                      |
| Detector                              | Peak/AV                                   |
| Start Frequency                       | 1000 MHz(Peak/AV)                         |
| Stop Frequency                        | 10th carrier hamonic(Peak/AV)             |
| RB / VB (emission in restricted band) | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG) |

## For Restricted band

| Spectrum Parameter   | Setting                                                                |
|----------------------|------------------------------------------------------------------------|
| Detector             | Peak/AV                                                                |
| Start/Stop Frequency | Lower Band Edge: 2310 to 2410 MHz<br>Upper Band Edge: 2475 to 2500 MHz |
| RB / VB              | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG)                              |



| Receiver Parameter     | Setting                              |
|------------------------|--------------------------------------|
| Start ~ Stop Frequency | 9kHz~90kHz / RB 200Hz for PK & AV    |
| Start ~ Stop Frequency | 90kHz~110kHz / RB 200Hz for QP       |
| Start ~ Stop Frequency | 110kHz~490kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 490kHz~30MHz / RB 9kHz for QP        |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP     |

#### 4.2 TEST PROCEDURE

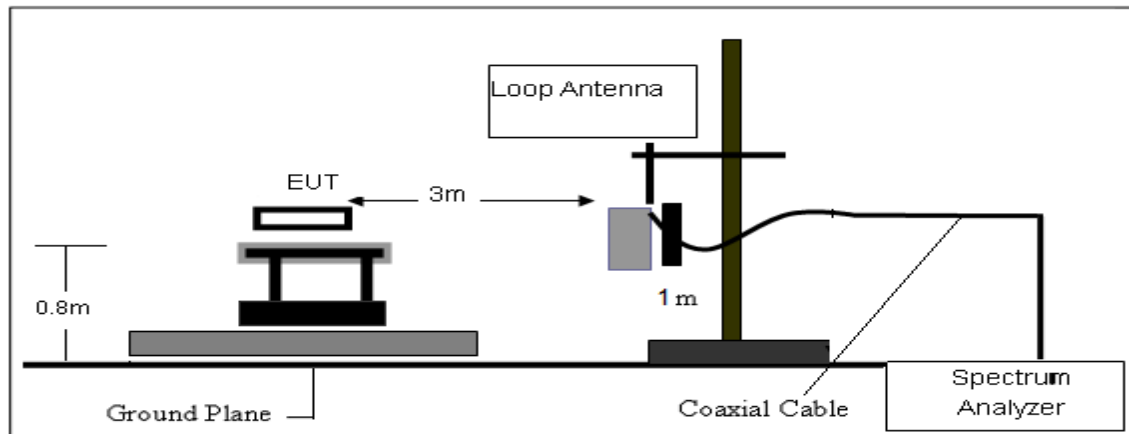
- The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and QuasiPeak detector mode will be re-measured.
- If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

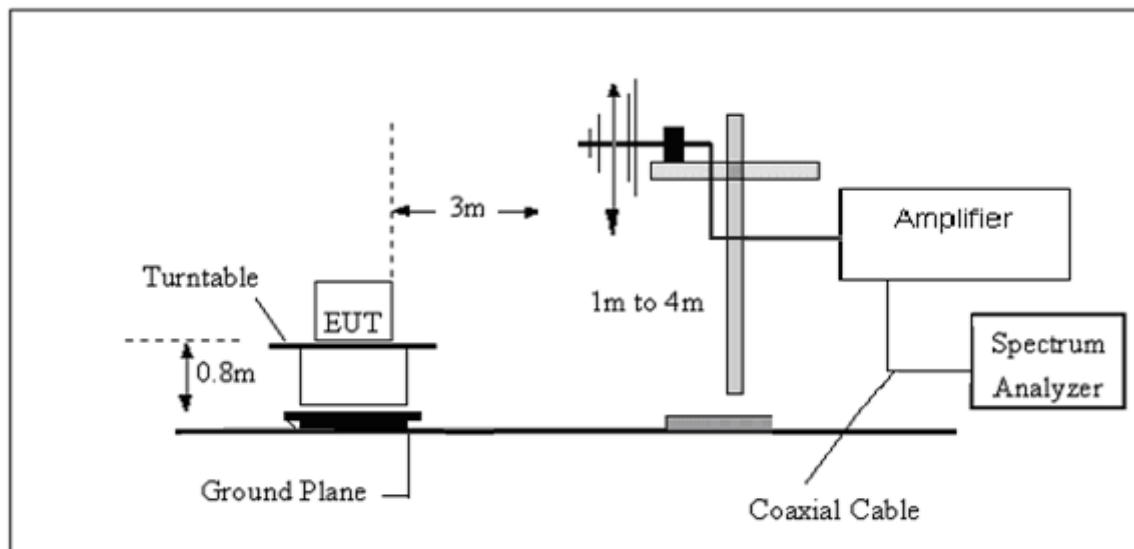
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

### 4.3 TEST SETUP

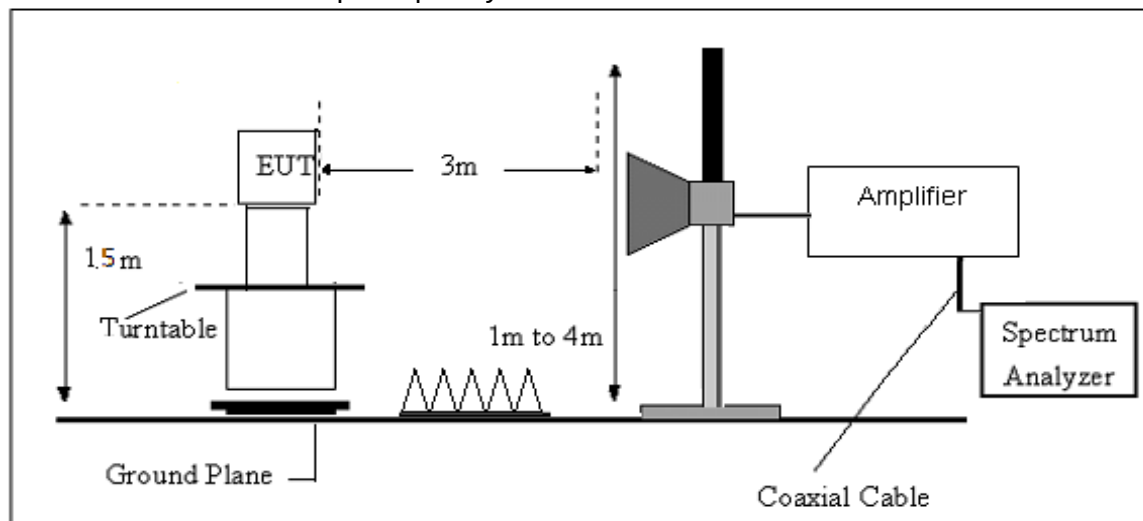
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



#### (C) Radiated Emission Test-Up Frequency Above 1GHz





#### 4.4 EUT OPERATING CONDITIONS

Please refer to section 3.4 of this report.

#### 4.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

| Frequency | FS       | RA       | AF   | CL   | AG   | Factor |
|-----------|----------|----------|------|------|------|--------|
| (MHz)     | (dBμV/m) | (dBμV/m) | (dB) | (dB) | (dB) | (dB)   |
| 300       | 40       | 58.1     | 12.2 | 1.6  | 31.9 | -18.1  |

$$\text{Factor} = AF + CL - AG$$



## 4.6 TEST RESULTS

(Between 9KHz – 30 MHz)

|               |         |                    |     |
|---------------|---------|--------------------|-----|
| Temperature:  | 23.4 °C | Relative Humidity: | 60% |
| Test Voltage: | DC 3.7V | Polarization:      | --  |
| Test Mode:    | TX Mode |                    |     |

| Freq. | Reading  | Limit    | Margin | State |
|-------|----------|----------|--------|-------|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB)   | P/F   |
| --    | --       | --       | --     | PASS  |
| --    | --       | --       | --     | PASS  |

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



(30MHz -1000MHz)

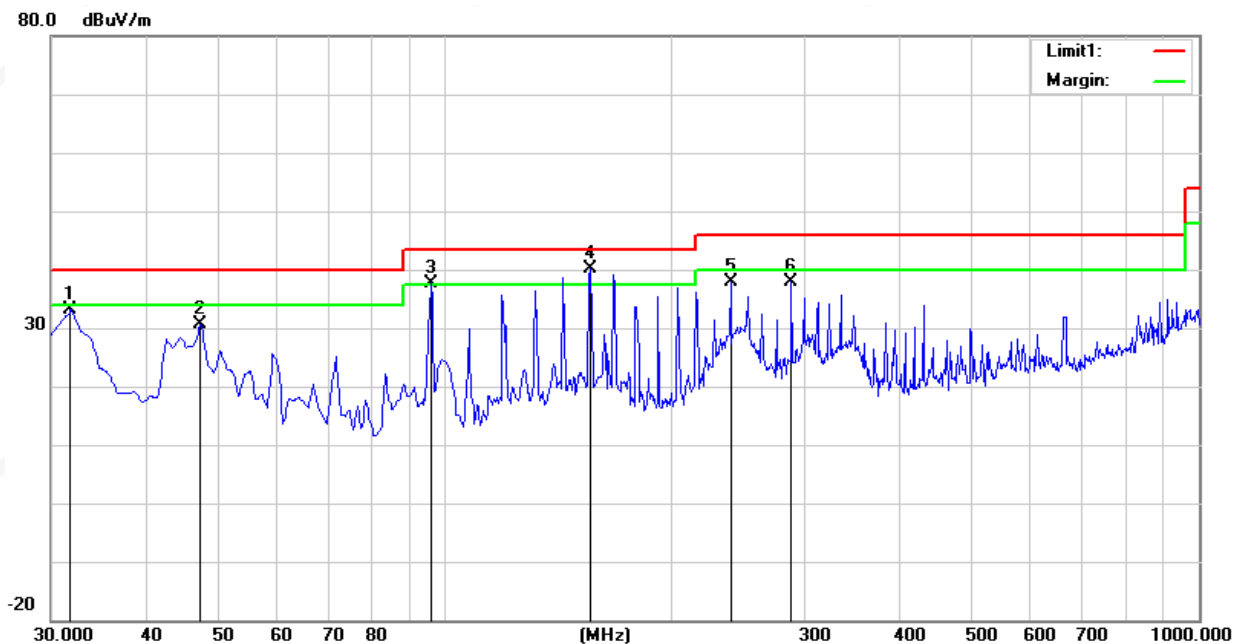
1M PHY

|               |                                |                    |            |
|---------------|--------------------------------|--------------------|------------|
| Temperature:  | 23.4℃                          | Relative Humidity: | 60%        |
| Test Voltage: | DC 3.7V                        | Phase:             | Horizontal |
| Test Mode:    | Mode 1/2/3 (Mode 2 worst mode) |                    |            |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/<br>m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------------|--------------------|-------------------|----------------|--------|
| 1   | 31.9400            | 46.93             | -13.86                      | 33.07              | 40.00             | -6.93          | peak   |
| 2   | 47.4600            | 52.56             | -21.92                      | 30.64              | 40.00             | -9.36          | peak   |
| 3   | 95.9600            | 58.39             | -20.67                      | 37.72              | 43.50             | -5.78          | peak   |
| 4   | 156.1000           | 58.75             | -18.66                      | 40.09              | 43.50             | -3.41          | peak   |
| 5   | 239.5200           | 55.87             | -18.10                      | 37.77              | 46.00             | -8.23          | peak   |
| 6   | 288.0200           | 53.19             | -15.26                      | 37.93              | 46.00             | -8.07          | peak   |

Remark:

1. Margin = Result (Result =Reading + Factor )-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All modes have been tested,only show the worst case.



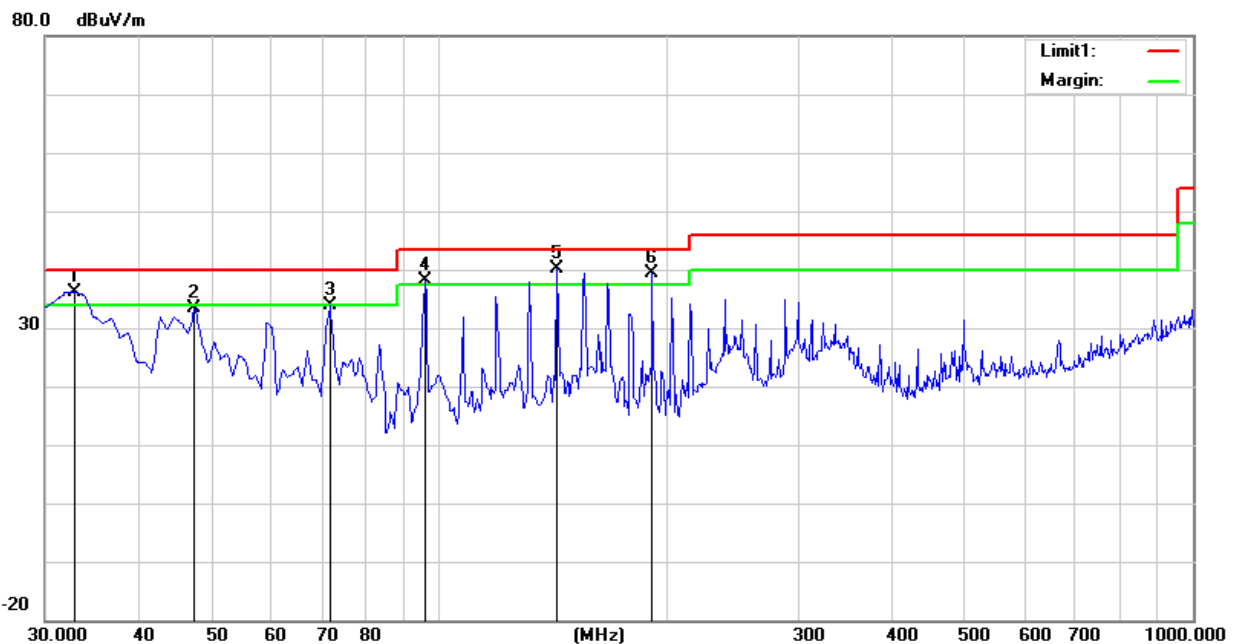


|               |                                |                    |          |
|---------------|--------------------------------|--------------------|----------|
| Temperature:  | 23.4℃                          | Relative Humidity: | 60%      |
| Test Voltage: | DC 3.7V                        | Phase:             | Vertical |
| Test Mode:    | Mode 1/2/3 (Mode 2 worst mode) |                    |          |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/<br>m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------------|--------------------|-------------------|----------------|--------|
| 1   | 32.9100            | 50.57             | -14.33                      | 36.24              | 40.00             | -3.76          | peak   |
| 2   | 47.4600            | 55.28             | -21.92                      | 33.36              | 40.00             | -6.64          | peak   |
| 3   | 71.7100            | 58.43             | -24.56                      | 33.87              | 40.00             | -6.13          | peak   |
| 4   | 95.9600            | 58.69             | -20.67                      | 38.02              | 43.50             | -5.48          | peak   |
| 5   | 143.4900           | 58.36             | -18.23                      | 40.13              | 43.50             | -3.37          | peak   |
| 6   | 191.9900           | 60.35             | -21.04                      | 39.31              | 43.50             | -4.19          | peak   |

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All modes have been tested,only show the worst case.





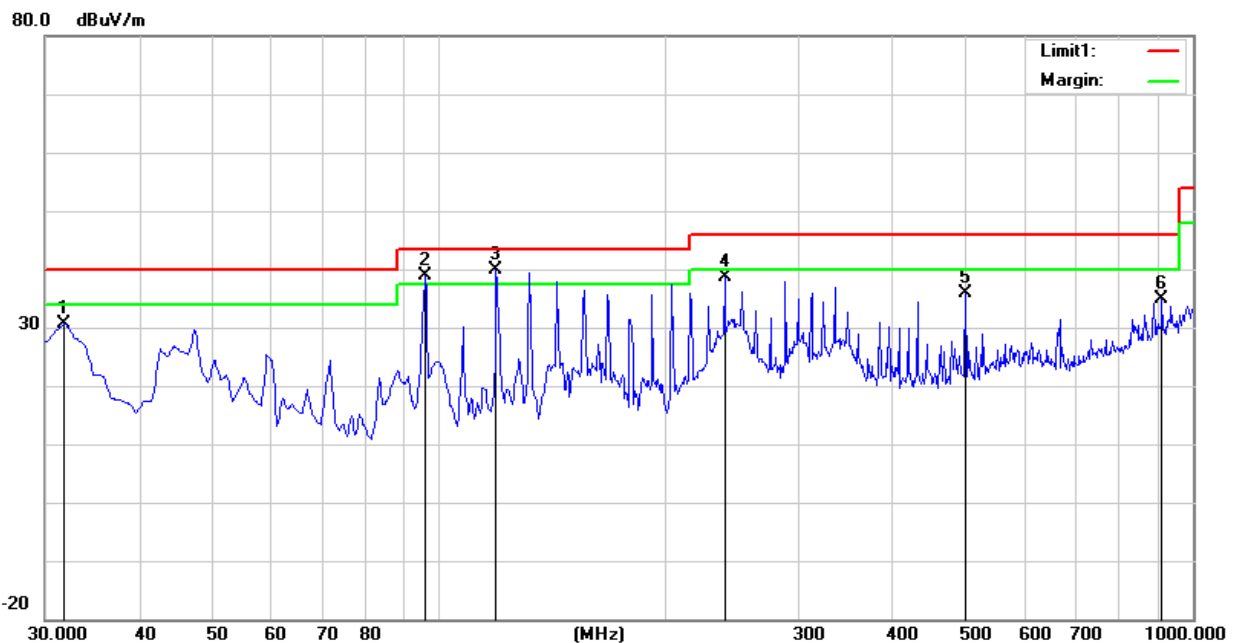
## 2M PHY

|               |                                |                    |            |
|---------------|--------------------------------|--------------------|------------|
| Temperature:  | 23.4℃                          | Relative Humidity: | 60%        |
| Test Voltage: | DC 3.7V                        | Phase:             | Horizontal |
| Test Mode:    | Mode 4/5/6 (Mode 5 worst mode) |                    |            |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/<br>m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------------|--------------------|-------------------|----------------|--------|
| 1   | 31.9400            | 44.54             | -13.86                      | 30.68              | 40.00             | -9.32          | peak   |
| 2   | 95.9600            | 59.47             | -20.67                      | 38.80              | 43.50             | -4.70          | peak   |
| 3   | 119.2400           | 58.26             | -18.38                      | 39.88              | 43.50             | -3.62          | peak   |
| 4   | 239.5200           | 56.63             | -18.10                      | 38.53              | 46.00             | -7.47          | peak   |
| 5   | 499.4800           | 43.93             | -8.02                       | 35.91              | 46.00             | -10.09         | peak   |
| 6   | 912.7000           | 35.07             | -0.14                       | 34.93              | 46.00             | -11.07         | peak   |

Remark:

1. Margin = Result (Result =Reading + Factor )-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All modes have been tested,only show the worst case.





|               |                                |                    |          |
|---------------|--------------------------------|--------------------|----------|
| Temperature:  | 23.4℃                          | Relative Humidity: | 60%      |
| Test Voltage: | DC 3.7V                        | Phase:             | Vertical |
| Test Mode:    | Mode 4/5/6 (Mode 5 worst mode) |                    |          |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/<br>m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------------|--------------------|-------------------|----------------|--------|
| 1   | 31.9400            | 48.46             | -13.86                      | 34.60              | 40.00             | -5.40          | peak   |
| 2   | 47.4600            | 55.41             | -21.92                      | 33.49              | 40.00             | -6.51          | peak   |
| 3   | 71.7100            | 58.00             | -24.56                      | 33.44              | 40.00             | -6.56          | peak   |
| 4   | 95.9600            | 58.09             | -20.67                      | 37.42              | 43.50             | -6.08          | peak   |
| 5   | 143.4900           | 57.09             | -18.23                      | 38.86              | 43.50             | -4.64          | peak   |
| 6   | 497.5400           | 45.39             | -8.06                       | 37.33              | 46.00             | -8.67          | peak   |

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All modes have been tested,only show the worst case.

