

# TEST REPORT

|                                                                                                                                                                                                                    |                                                                                                                         |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------|
| Report Number. .... :                                                                                                                                                                                              | 90899-22-72-22-PP001                                                                                                    |                  |
| Date of issue..... :                                                                                                                                                                                               | 2022.11.09                                                                                                              |                  |
| Tested by (+signature)..... :                                                                                                                                                                                      | Duke Chen                                                                                                               | <i>Duke Chen</i> |
| Approved by (+signature) ..... :                                                                                                                                                                                   | Jason Gao                                                                                                               | <i>Jason gao</i> |
| Testing Laboratory name ..... :                                                                                                                                                                                    | SLG-CPC Testlaboratory Co., Ltd.                                                                                        |                  |
| Address..... :                                                                                                                                                                                                     | No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117                                    |                  |
| Applicant's name ..... :                                                                                                                                                                                           | Shenzhen Tongchuang Mechantronics Co., Ltd.                                                                             |                  |
| Address..... :                                                                                                                                                                                                     | 5th Floor, Building 8, Nangang Second Industrial Zone, 1026# SongBai Road, Xili Town, Nanshan District, Shenzhen, China |                  |
| Manufacturer's name ..... :                                                                                                                                                                                        | Shenzhen Tongchuang Mechantronics Co., Ltd.                                                                             |                  |
| Address..... :                                                                                                                                                                                                     | 5th Floor, Building 8, Nangang Second Industrial Zone, 1026# SongBai Road, Xili Town, Nanshan District, Shenzhen, China |                  |
| Factory's name ..... :                                                                                                                                                                                             | Shenzhen Tongchuang Mechantronics Co., Ltd.                                                                             |                  |
| Address..... :                                                                                                                                                                                                     | 5th Floor, Building 8, Nangang Second Industrial Zone, 1026# SongBai Road, Xili Town, Nanshan District, Shenzhen, China |                  |
| Standard(s) ..... :                                                                                                                                                                                                | FCC Rules and Regulations Part 15 Subpart C, Section 209                                                                |                  |
| Test item description ..... :                                                                                                                                                                                      | TRL1 Safety interlock                                                                                                   |                  |
| Trade Mark ..... :                                                                                                                                                                                                 | <br>施莱格                              |                  |
| Test Model/Type reference ..... :                                                                                                                                                                                  | TRL1M0A1NE                                                                                                              |                  |
| FCC ID ..... :                                                                                                                                                                                                     | 2A82Y-TRL1M0A1NE                                                                                                        |                  |
| Date of receipt of test item..... :                                                                                                                                                                                | 2022.10.20                                                                                                              |                  |
| Date (s) of performance of test:                                                                                                                                                                                   | 2022.10.20-2022.10.27                                                                                                   |                  |
| Summary of Test Results ..... :                                                                                                                                                                                    | Pass                                                                                                                    |                  |
| The Summary of Test Results based on a technical opinion belongs to the standard(s).                                                                                                                               |                                                                                                                         |                  |
| <b>General disclaimer:</b><br>This report shall not be reproduced except in full, without the written approval of SLG-CPC Testlaboratory Co., Ltd. The test results in the report only apply to the tested sample. |                                                                                                                         |                  |

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## 1. SUMMARY OF TEST RESULTS

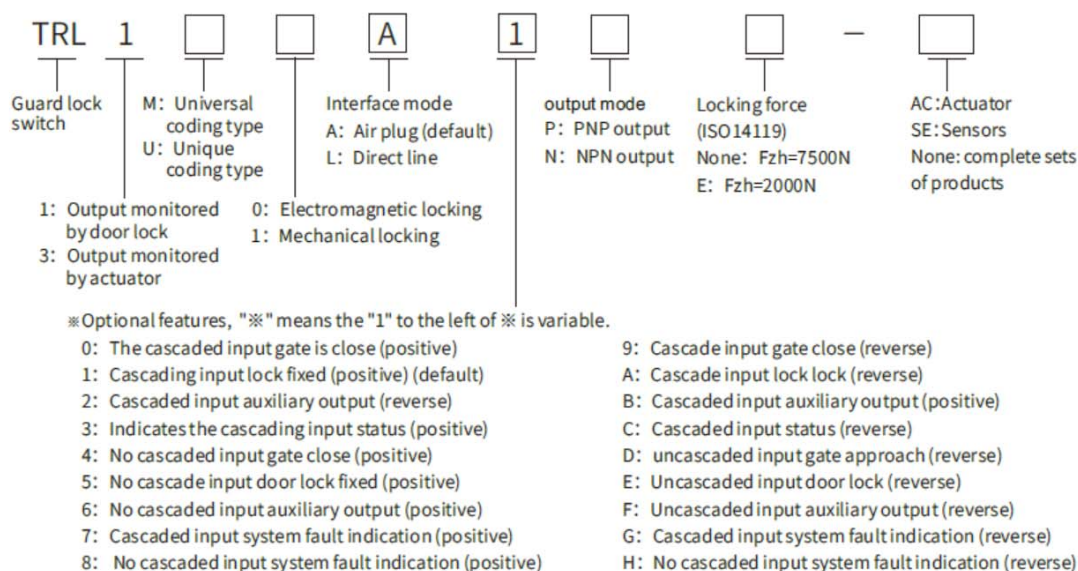
| EMISSION                                         |                                                            |         |
|--------------------------------------------------|------------------------------------------------------------|---------|
| Description of Test Item                         | Standard & Limits                                          | Results |
| Conducted Emission                               | FCC Part 15, Subpart C- Section 15.207<br>ANSI C63.10-2013 | N/A     |
| Radiated Emission                                | FCC Part 15, Subpart C- Section 15.209<br>ANSI C63.10-2013 | Pass    |
| 20dB Bandwidth                                   | FCC Part 15, Subpart C- Section 15.215<br>ANSI C63.10-2013 | Pass    |
| Note: N/A is an abbreviation for Not Applicable. |                                                            |         |

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

|                        |                                                                                                                                                                                                                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name           | TRL1 Safety interlock                                                                                                                                                                                                                                                                                      |
| Trade Name             | N/A                                                                                                                                                                                                                                                                                                        |
| Test Model             | TRL1M0N-AC, TRL1M0A1NE-SE, TRL1M0A1NE                                                                                                                                                                                                                                                                      |
| Series Model           | TRL1M0A1※P, TRL1M0A1※N, TRL1M1A1※P, TRL1M1A1※N, TRL1U0A1※P, TRL1U0A1※N, TRL1U1A1※P, TRL1U1A1※N, TRL1M0A1※PE, TRL1M0A1※NE, TRL1M1A1※PE, TRL1M1A1※NE, TRL1U0A1※PE, TRL1U0A1※NE, TRL1U1A1※PE, TRL1U1A1※NE<br>("※" means the "1" to the left of ※ is variable, see <b>Model description</b> for more details.) |
| Operation frequency    | 125KHz                                                                                                                                                                                                                                                                                                     |
| Modulation Type        | RFID                                                                                                                                                                                                                                                                                                       |
| Connecting I/O Port(s) | Please refer to the User's Manual                                                                                                                                                                                                                                                                          |

#### Model description



| Lockholding force      | Type                  | lock type               | PNP/NPN | Actuator   | Sensors       | Actuator + Sensor | Order No.<br>(Actuator + Sensor) |
|------------------------|-----------------------|-------------------------|---------|------------|---------------|-------------------|----------------------------------|
| F <sub>zh</sub> :7500N | Universal coding type | Electromagnetic locking | PNP     | TRL1M0P-AC | TRL1M0A1P-SE  | TRL1M0A1*P        | LOT136352299SCPE                 |
|                        |                       |                         | NPN     | TRL1M0N-AC | TRL1M0A1N-SE  | TRL1M0A1*N        | LOT136352299SCNE                 |
|                        |                       | Mechanical locking      | PNP     | TRL1M1P-AC | TRL1M1A1P-SE  | TRL1M1A1*P        | LOT136352299SCPO                 |
|                        |                       |                         | NPN     | TRL1M1N-AC | TRL1M1A1N-SE  | TRL1M1A1*N        | LOT136352299SCNO                 |
|                        | Unique coding type    | Electromagnetic locking | PNP     | TRL1U0P-AC | TRL1U0A1P-SE  | TRL1U0A1*P        | LOT136352299UCPE                 |
|                        |                       |                         | NPN     | TRL1U0N-AC | TRL1U0A1N-SE  | TRL1U0A1*N        | LOT136352299UCNE                 |
|                        |                       | Mechanical locking      | PNP     | TRL1U1P-AC | TRL1U1A1P-SE  | TRL1U1A1*P        | LOT136352299UCPO                 |
|                        |                       |                         | NPN     | TRL1U1N-AC | TRL1U1A1N-SE  | TRL1U1A1*N        | LOT136352299UCNO                 |
| F <sub>zh</sub> :2000N | Universal coding type | Electromagnetic locking | PNP     | TRL1M0P-AC | TRL1M0A1PE-SE | TRL1M0A1*PE       | LOT1E36352299SCPE                |
|                        |                       |                         | NPN     | TRL1M0N-AC | TRL1M0A1NE-SE | TRL1M0A1*NE       | LOT1E36352299SCNE                |
|                        |                       | Mechanical locking      | PNP     | TRL1M1P-AC | TRL1M1A1PE-SE | TRL1M1A1*PE       | LOT1E36352299SCPO                |
|                        |                       |                         | NPN     | TRL1M1N-AC | TRL1M1A1NE-SE | TRL1M1A1*NE       | LOT1E36352299SCNO                |
|                        | Unique coding type    | Electromagnetic locking | PNP     | TRL1U0P-AC | TRL1U0A1PE-SE | TRL1U0A1*PE       | LOT1E36352299UCPE                |
|                        |                       |                         | NPN     | TRL1U0N-AC | TRL1U0A1NE-SE | TRL1U0A1*NE       | LOT1E36352299UCNE                |
|                        |                       | Mechanical locking      | PNP     | TRL1U1P-AC | TRL1U1A1PE-SE | TRL1U1A1*PE       | LOT1E36352299UCPO                |
|                        |                       |                         | NPN     | TRL1U1N-AC | TRL1U1A1NE-SE | TRL1U1A1*NE       | LOT1E36352299UCNO                |

※Optional: Optional items, "※" means the "1" to the left of ※ is variable.  
 Lock holding force F<sub>zh</sub> complies with ISO14119 test standards

## 2.2. Independent Operation Modes

| Mode  | TEST MODE DESCRIPTION |
|-------|-----------------------|
| 1.    | Normal mode           |
| Note: |                       |

## 2.3. Description of Test Facility

### Site Description

EMC Lab. :  
Accredited by ISED, October 04 2021  
CAB identifier: CN0126  
Company Number: 27767  
Accredited by A2LA, October 04 2021  
The Certificate Registration Number is 6325.01

Name of Firm : SLG-CPC Testlaboratory Co., Ltd.  
Site Location : No. 11, Wu Song Road, Dongcheng District, Dongguan,  
Guangdong Province, China 523117

## 2.4. Description of Support Device

| No. | Equipment | Trade name | Model | S/N | Power Cord |
|-----|-----------|------------|-------|-----|------------|
| 1.  | /         | /          | /     | /   | /          |
| 2.  |           |            |       |     |            |
| 3.  |           |            |       |     |            |
| 4.  |           |            |       |     |            |

## 2.5. Measurement Uncertainty

| Test Item                                     | Uncertainty                            |
|-----------------------------------------------|----------------------------------------|
| Occupied Channel Bandwidth                    | : $\pm 2.3\%$                          |
| Conducted Emission Uncertainty                | : 3.08dB                               |
| Radiated Emission Uncertainty<br>(3m Chamber) | : 3.60dB (30M~1GHz)<br>4.48dB (1~6GHz) |

### 3. MEASURING DEVICE AND TEST EQUIPMENT

#### 3.1. MEASUREMENT EQUIPMENT USED

| Equipment                           | Model           | Manufacturer | S/N               | Last Cal.  | DUE Cal. |
|-------------------------------------|-----------------|--------------|-------------------|------------|----------|
| <b>RF Connected Test</b>            |                 |              |                   |            |          |
| Vector Signal Generator             | Rohde & Schwarz | SMBV100B(6G) | 101166            | 2022/06/29 | 1 year   |
| Analog Signal Generator             | Rohde & Schwarz | SMB100A(40G) | 181333            | 2022/06/29 | 1 year   |
| Signal Analyzer                     | Rohde & Schwarz | FSV40        | 101527            | 2022/04/19 | 1 year   |
| Power Analyzer                      | Rohde & Schwarz | OSP-B157W8   | N/A               | 2022/06/29 | 1 year   |
| Wideband Radio Communication Tester | R&S             | CMW270       | 101985            | 2022/07/05 | 1 year   |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500       | 166898            | 2022/07/14 | 1 year   |
| Temperature&Humidity test chamber   | ESPEC           | VC 4018      | /                 | 2022/03/23 | 1 year   |
| <b>Radiated Emission Test</b>       |                 |              |                   |            |          |
| EMI Test Receiver                   | KEYSIGHT        | N9010A       | MY56070465        | 2021/12/10 | 1 year   |
| EMI Test Receiver                   | Rohde & Schwarz | FSV40        | 101511            | 2022/04/19 | 1 year   |
| Bilog Antenna                       | Schwarzbeck     | VULB 9163    | 01335             | 2020/04/28 | 3 year   |
| Power Amplifier                     | EMEC            | EM330        | 060676            | 2021/12/10 | 3 year   |
| Cable                               | Tuyue           | F4309        | L-400-NmNm-1 2000 | 2021/12/10 | 1 year   |
| Horn Antenna                        | Schwarzbeck     | BBHA9120D    | 1779              | 2022/04/21 | 3 year   |
| Horn Antenna                        | Schwarzbeck     | BBHA9170     | 00954             | 2022/09/13 | 3 year   |
| Power Amplifier                     | Rohde & Schwarz | SCU-18F      | 180118            | 2022/04/21 | 3 year   |
| Active Loop Antenna                 | ETS LINDGREN    | 6512         | 41623             | 2022/04/23 | 3 year   |
| Test Software                       | Farad           | EZ-EMC       | Ver.CPC-3A1       | /          | /        |
| <b>Conducted Emission Test</b>      |                 |              |                   |            |          |
| LISN                                | Schwarzbeck     | NSLK 8127    | 8127-892          | 2022/03/19 | 1 year   |
| LISN                                | Schwarzbeck     | NSLK 8127    | 8127-437          | 2022/08/26 | 1 year   |
| EMI Test Receiver                   | R&S             | ESR3         | 102124            | 2021/12/10 | 1 year   |
| Pulse Limiter                       | R&S             | ESH3-Z2      | 357.8810.52       | 2021/12/10 | 1 year   |
| Test Software                       | Farad           | EZ-EMC       | Ver.CPC-3A1       | /          | /        |

## 4. 20DB BANDWIDTH

### 4.1. Test Procedure

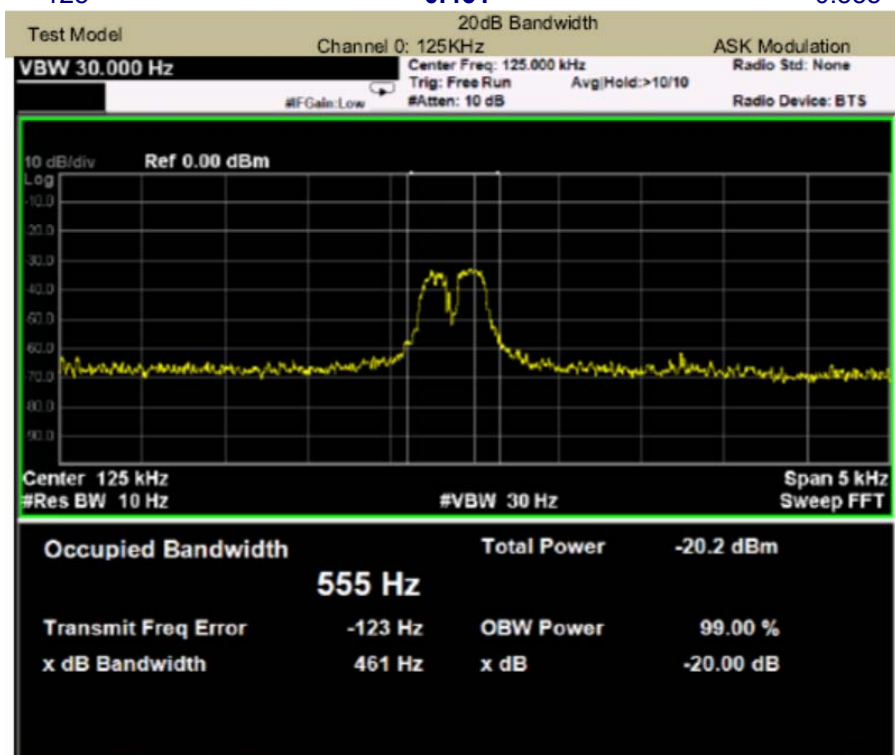
Set to the maximum power setting and enable the EUT transmit continuously

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
  - The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW.
  - Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation.
  - The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement
  - Set detection mode to peak and trace mode to max hold.
  - Determine the “-xx dB down amplitude” using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
- Measure and record the results in the test report.

### 4.2. Test Results

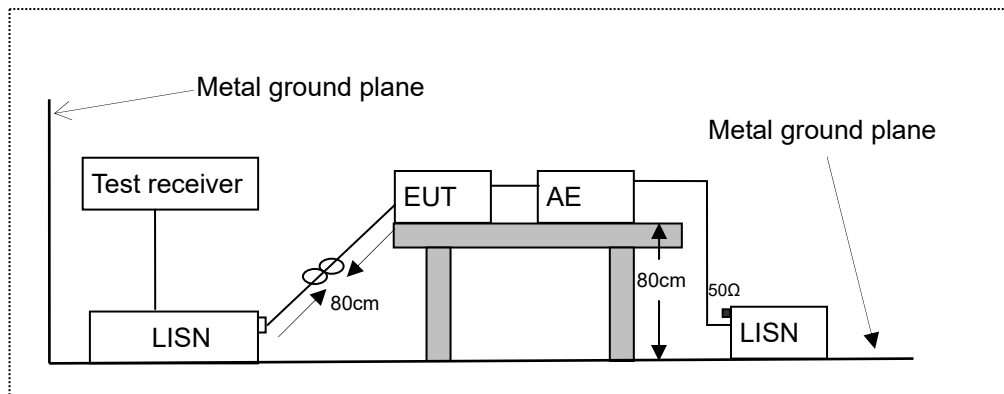
Note: Because the measured signal is CW-like, adjusting the RBW per C63.10 would not be practical since measurement bandwidth will always follow the RBW. The RBW is set to 300 Hz to perform the occupied bandwidth test.

|              |         |                          |            |
|--------------|---------|--------------------------|------------|
| Temperature: | 24℃     | Test Date:               | 2022.10.25 |
| Humidity:    | 53 %    | Test By:                 | Ken        |
| Frequency    | 125 kHz | 20 dB occupied bandwidth | 0.461 KHz  |
|              |         | 99% occupied bandwidth   | 0.555 KHz  |



## 5. POWER LINE CONDUCTED EMISSION MEASUREMENT

### 5.1. Block Diagram of Test Setup



LISN: Line Impedance Stabilization Network

AE: Associated equipment

EUT: Equipment under test

### 5.2. Limits

FCC Part 15.207

| Frequency<br>(MHz) | Limit (dB $\mu$ V) |               |
|--------------------|--------------------|---------------|
|                    | Quasi-peak Level   | Average Level |
| 0.15 ~ 0.50        | 66.0 ~ 56.0 *      | 56.0 ~ 46.0 * |
| 0.50 ~ 5.00        | 56.0               | 46.0          |
| 5.00 ~ 30.00       | 60.0               | 50.0          |

NOTE1-The lower limit shall apply at the transition frequencies.  
 NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

### 5.3. Test Procedure

The EUT was placed on a desk 0.8 m height from the metal ground plane and 0.4 m from the conducting wall of the shielding room and it was kept at least 0.8 m from any other grounded conducting surface. The size of the table will nominally be 1.5 m x1.0 m.

The rear of the arrangement shall be flush with the back of the supporting tabletop unless that would not be possible or typical of normal use.

All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units.

Connect EUT to the power mains through a line impedance stabilization network (LISN). Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, so that its length is shortened to 1 m.

All the support units are connecting to the other LISN.

The LISN provides 50 ohm coupling impedance for the measuring instrument.

Both sides of AC line were checked for maximum conducted interference.

The frequency range from 150 kHz to 30 MHz was sweep.

Set the test-receiver system to quasi peak detect function and average detect function, and to measure the conducted emissions values.

Test results were obtained from the following equation:

Emission Level (dB $\mu$ V) = LISN Factor (dB) + Cable Loss (dB) + Reading (dB $\mu$ V)

Margin (dB) = Emission Level (dB $\mu$ V) - Limit (dB $\mu$ V)

#### 5.4. Measuring Results

**PASS.**

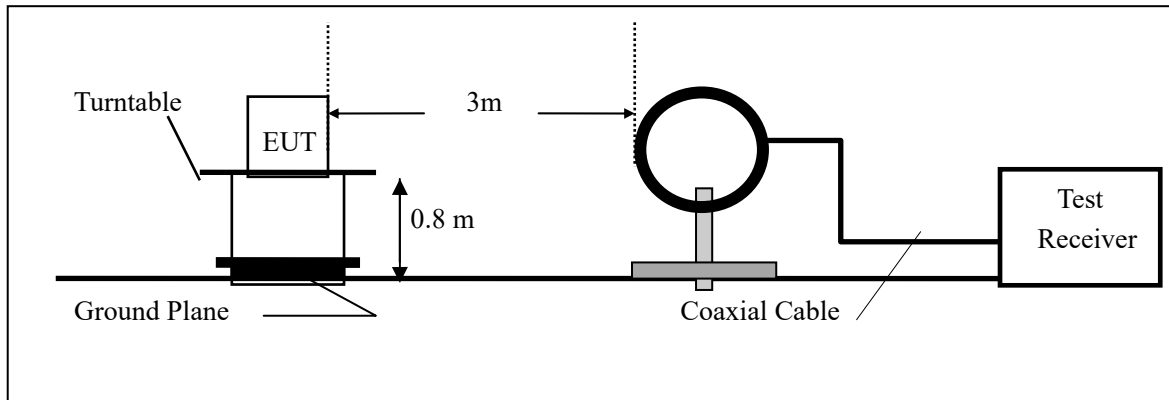
## 6. RADIATED EMISSION TEST

### 6.1. Measurement Procedure

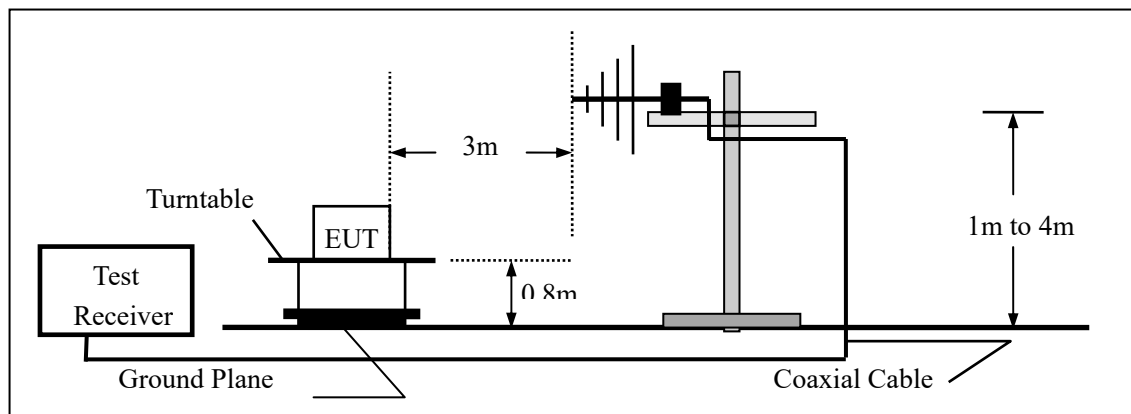
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.
5. Use the following receiver/spectrum analyzer settings:  
 Span = wide enough to fully capture the emission being measured  
 RBW=200Hz for 9KHz to 150KHz,  
 RBW=9kHz for 150KHz to 30MHz,  
 RBW=120KHz for 30MHz to 1GHz  
 VBW  $\geq 3 \times$  RBW  
 Sweep = auto  
 Detector function = QP  
 Trace = max hold

### 6.2. Test SET-UP (Block Diagram of Configuration)

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



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



### 6.3. Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

| FCC Part 15.209 |                           |      |                                                                 |                         |
|-----------------|---------------------------|------|-----------------------------------------------------------------|-------------------------|
| Frequency (MHz) | Field Strength Limitation |      | Field Strength Limitation Frequency tion at 3m Measurement Dist |                         |
|                 | (uV/m)                    | Dist | (uV/m)                                                          | (dBuV/m)                |
| 0.009 – 0.490   | 2400 / F(KHz)             | 300m | 10000 * 2400/F(KHz)                                             | 20log 2400/F(KHz) + 80  |
| 0.490 – 1.705   | 24000 / F(KHz)            | 30m  | 100 * 24000/F(KHz)                                              | 20log 24000/F(KHz) + 40 |
| 1.705 – 30.00   | 30                        | 30m  | 100* 30                                                         | 20log 30 + 40           |
| 30.0 – 88.0     | 100                       | 3m   | 100                                                             | 20log 100               |
| 88.0 – 216.0    | 150                       | 3m   | 150                                                             | 20log 150               |
| 216.0 – 960.0   | 200                       | 3m   | 200                                                             | 20log 200               |
| Above 960.0     | 500                       | 3m   | 500                                                             | 20log 500               |

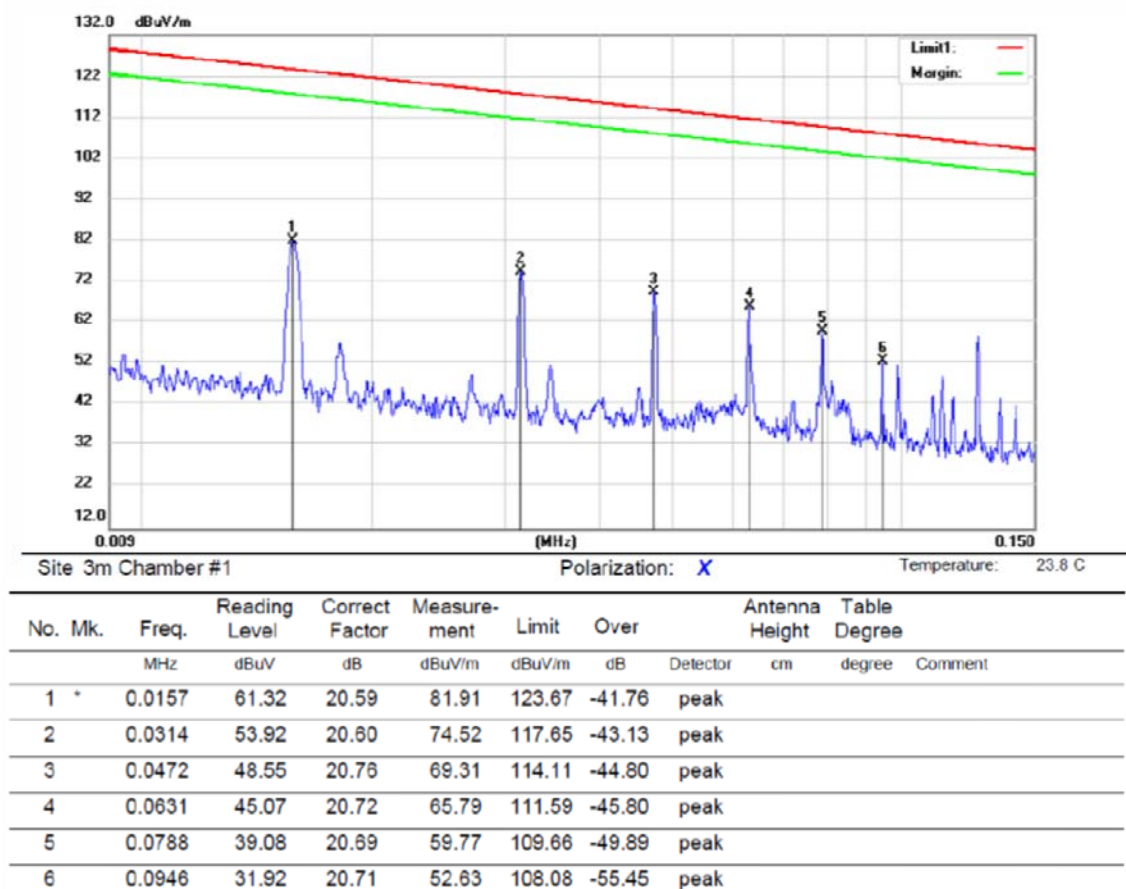
### 15.205 Restricted bands of operation

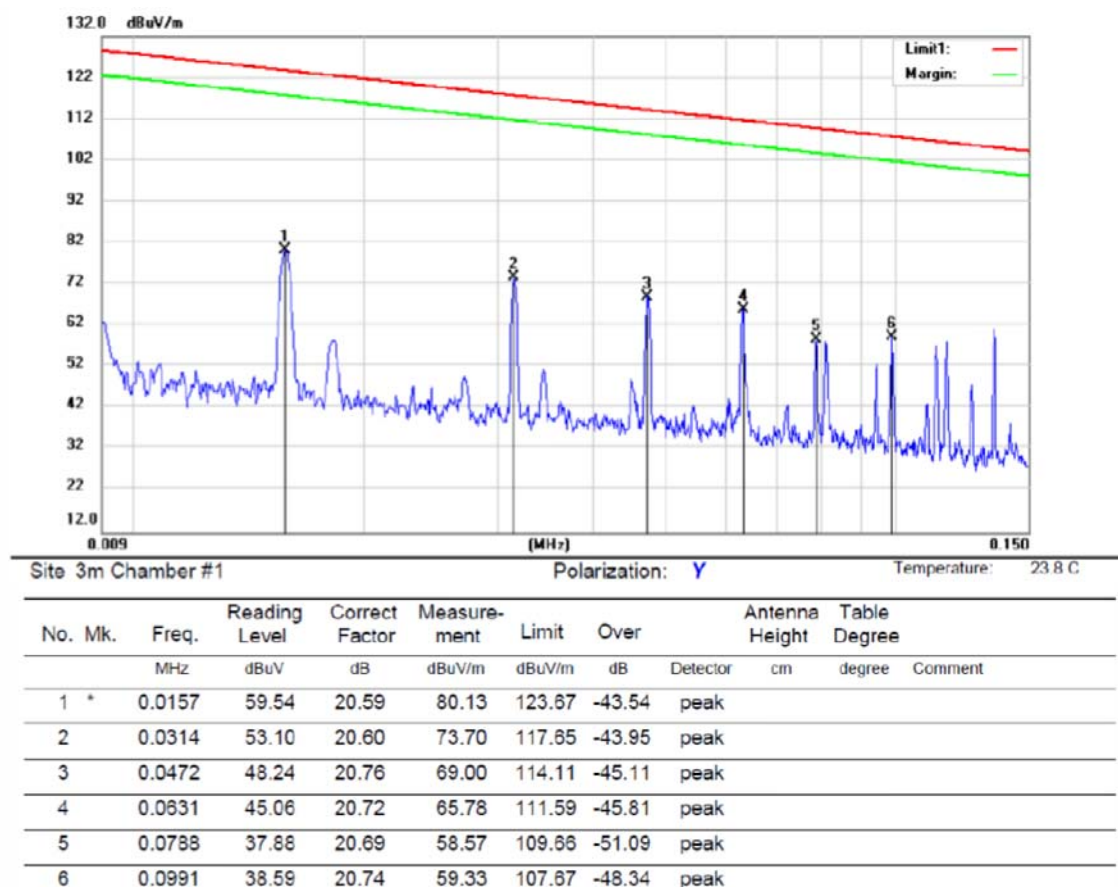
| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 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     | ( <sup>2</sup> ) |

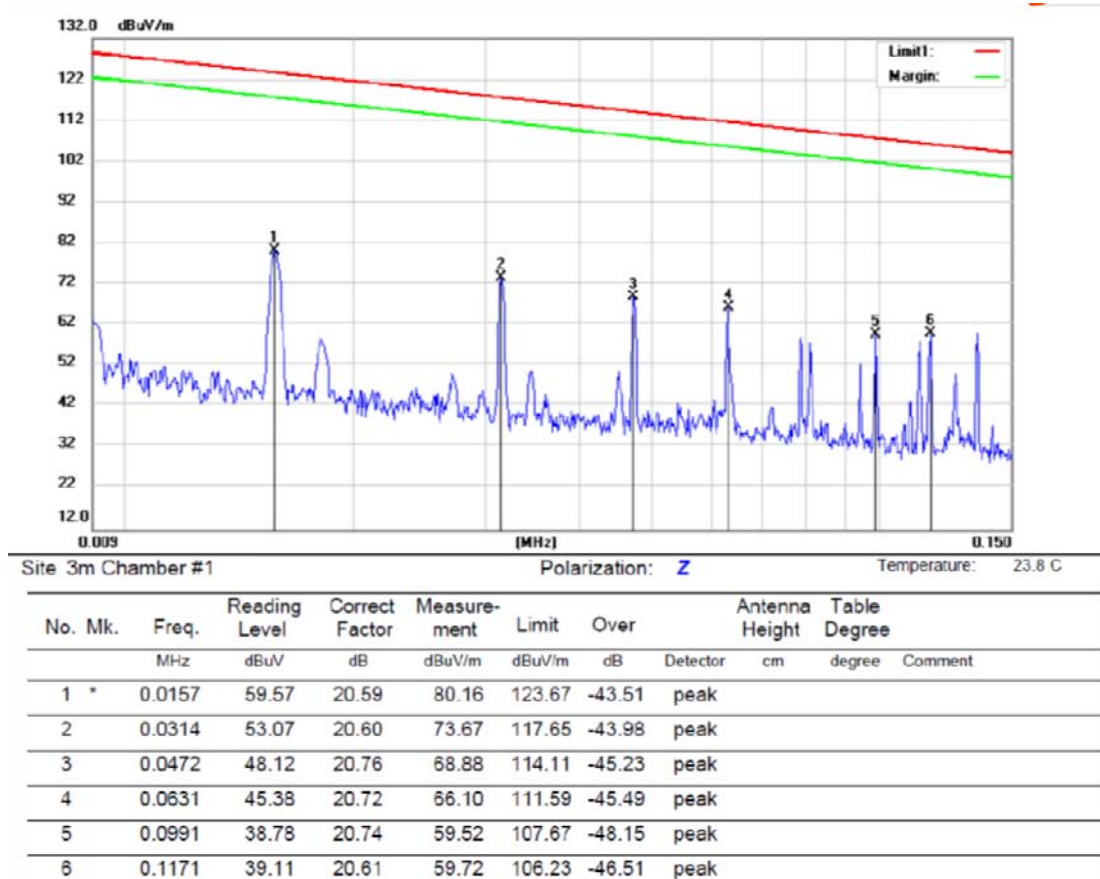
- Remark:
1. Emission level in dBuV/m=20 log (uV/m)
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

## 6.4.Measurement Result

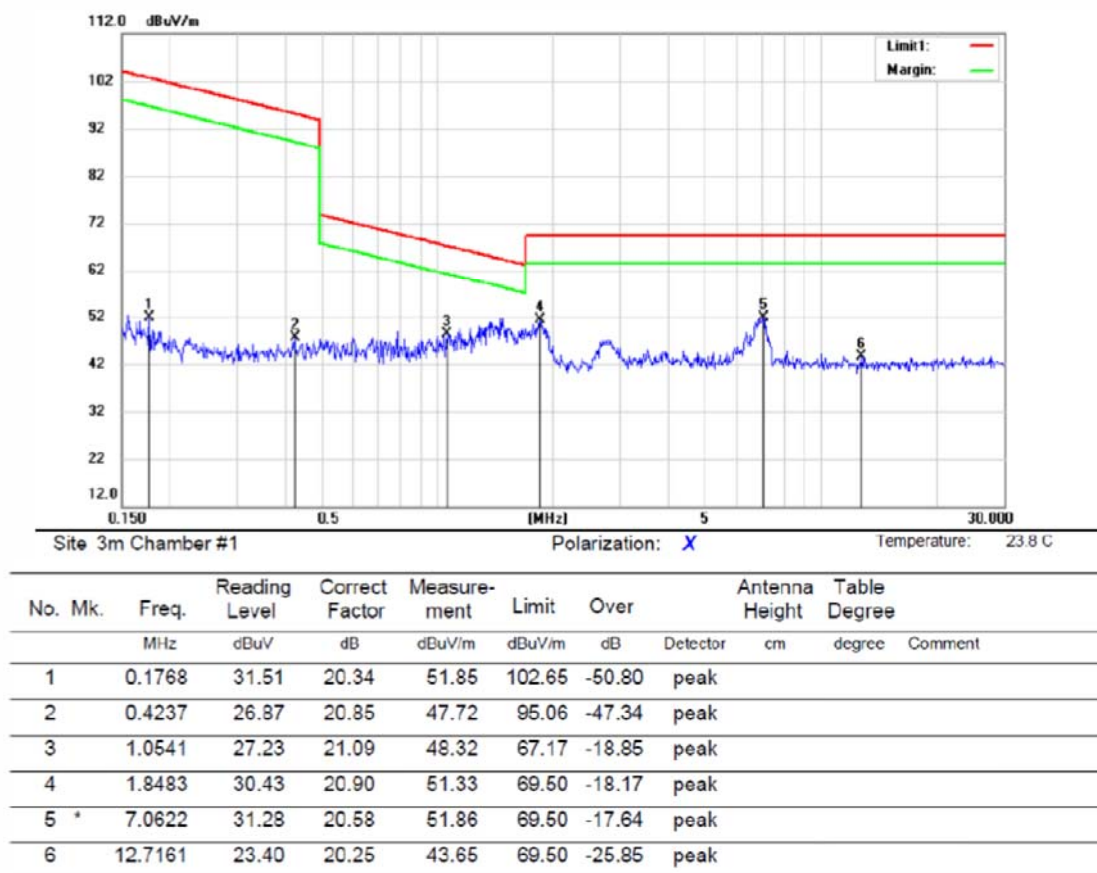
9kHz-150kHz:

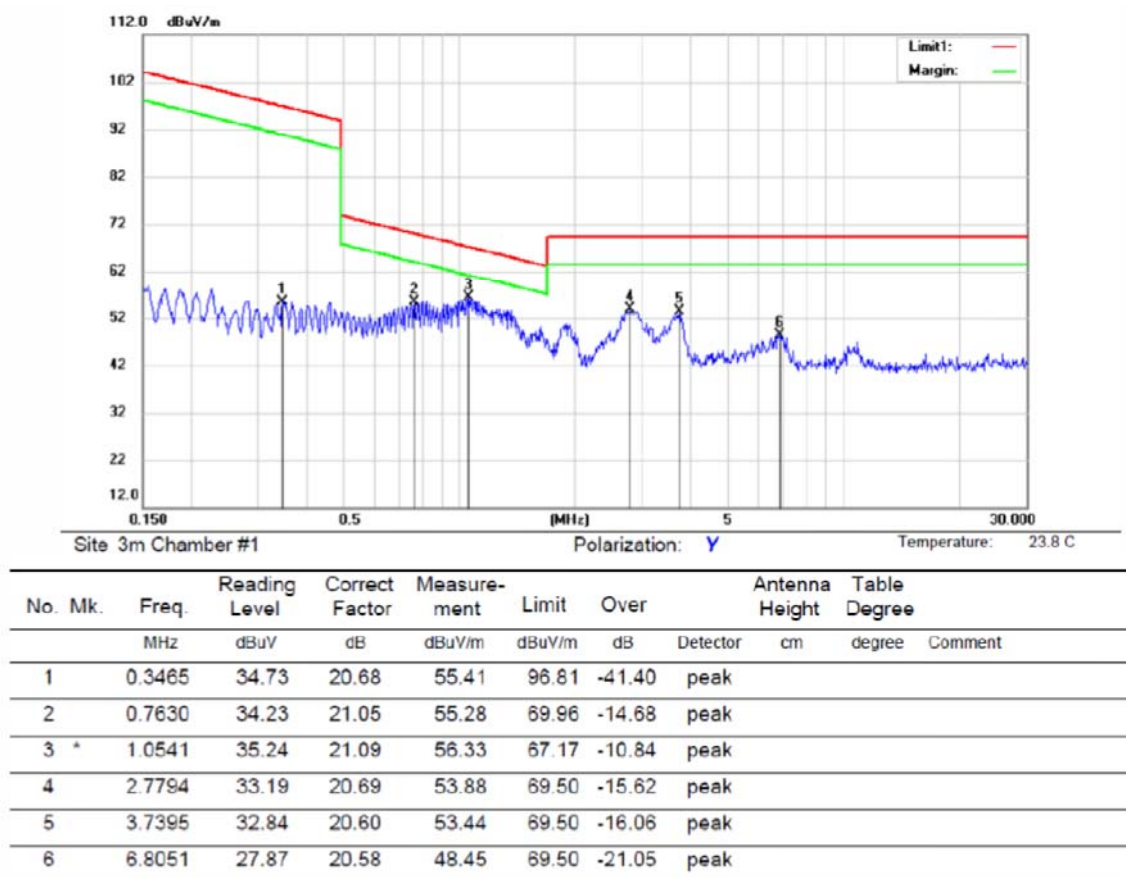


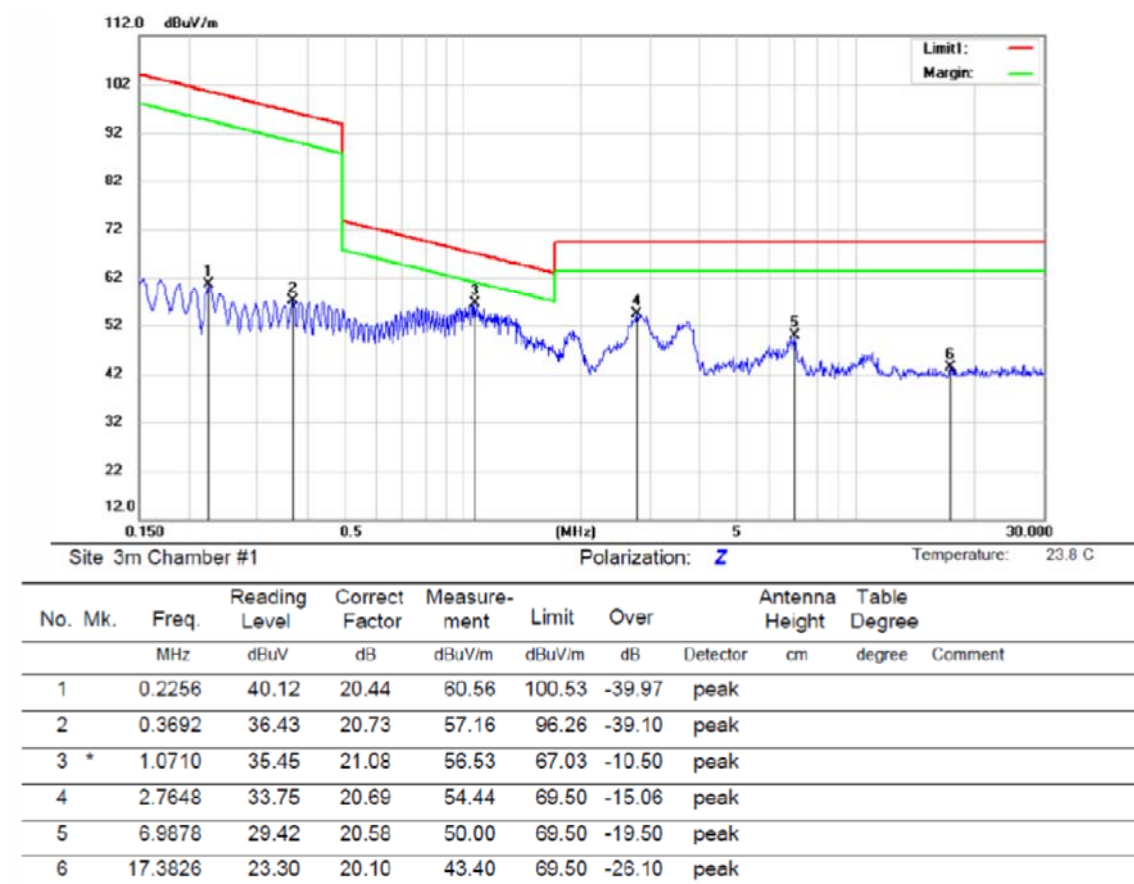




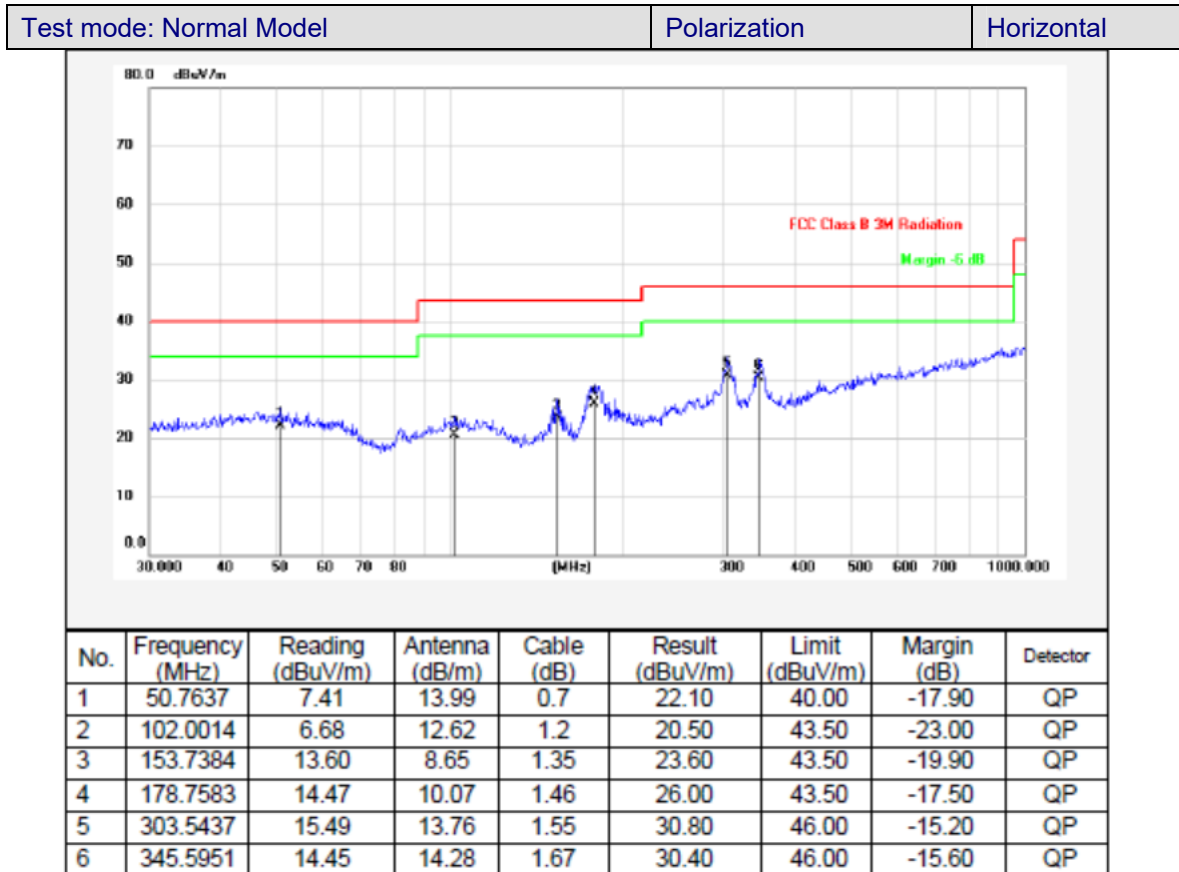
150kHz-30MHz:

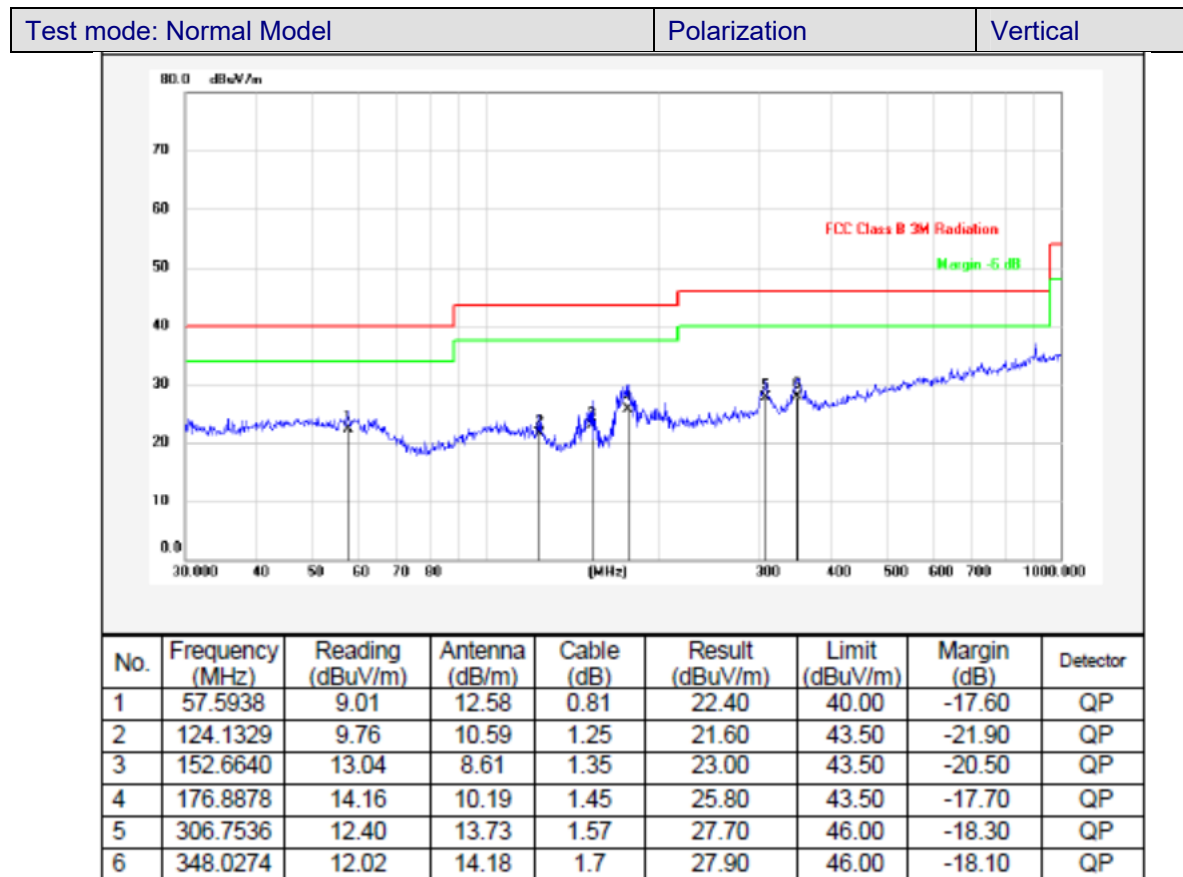






30MHz-1GHz:





-----The end-----