

## FCC PART 15B

## TEST REPORT

For

### Xstar Smart Power Co., Limited

9B, Cheong Tai Commercil Building, 66 Wing Lok Street, Sheung Wan, Hong Kong

**FCC ID: 2ARIR-1824B**

|                                        |                                                                                                                                                                                                                                                       |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>Mobile Phone                                                                                                                                                                                                                  |
| <b>Report Number:</b>                  | RDG190625007-00B                                                                                                                                                                                                                                      |
| <b>Report Date:</b>                    | 2019-07-16                                                                                                                                                                                                                                            |
| <b>Reviewed By:</b>                    | Jerry Zhang<br>EMC Manager                                                                                                                                                                                                                            |
| <b>Test Laboratory:</b>                | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industry Area,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br><a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a> |

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

|                                     |                |                                            |
|-------------------------------------|----------------|--------------------------------------------|
| <b>EUT Name:</b>                    |                | Mobile Phone                               |
| <b>EUT Model:</b>                   |                | X100                                       |
| <b>Highest Operation Frequency:</b> |                | 2480 MHz                                   |
| <b>Rated Input Voltage:</b>         |                | DC 3.7V from battery or DC 5V from adapter |
| <b>Adapter Information</b>          | <b>Model:</b>  | N/A                                        |
|                                     | <b>Input:</b>  | AC 100V-240V 50/60Hz 150mA                 |
|                                     | <b>Output:</b> | DC 5.0V, 500mA                             |
| <b>External Dimension:</b>          |                | 118.6mm(L)*50mm(W)*14.7mm(H)               |
| <b>Serial Number:</b>               |                | 190625007                                  |
| <b>EUT Received Date:</b>           |                | 2019-07-03                                 |

### Objective

This report is prepared on behalf of *Xstar Smart Power Co., Limited* in accordance with FCC Part 15B Part 2, subpart J, and Part 15, Subpart A and B of the Federal Communications Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15 B Class B.

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

FCC Part 22H, 24E PCE submissions with FCC ID: 2ARIR-1824B

FCC Part 15C DSS submissions with FCC ID: 2ARIR-1824B

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan).

## Measurement Uncertainty

| Parameter                         | Measurement Uncertainty                                                                                              |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Unwanted Emissions, radiated      | 30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB, 1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB |
| Temperature                       | $\pm 1^{\circ}\text{C}$                                                                                              |
| Humidity                          | $\pm 5\%$                                                                                                            |
| AC Power Lines Conducted Emission | 3.12 dB (150 kHz to 30 MHz)                                                                                          |

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in downloading mode.

### Equipment Modifications

No modification was made to the EUT.

### EUT Exercise Software

The software "Winthrax.exe" was used during test.

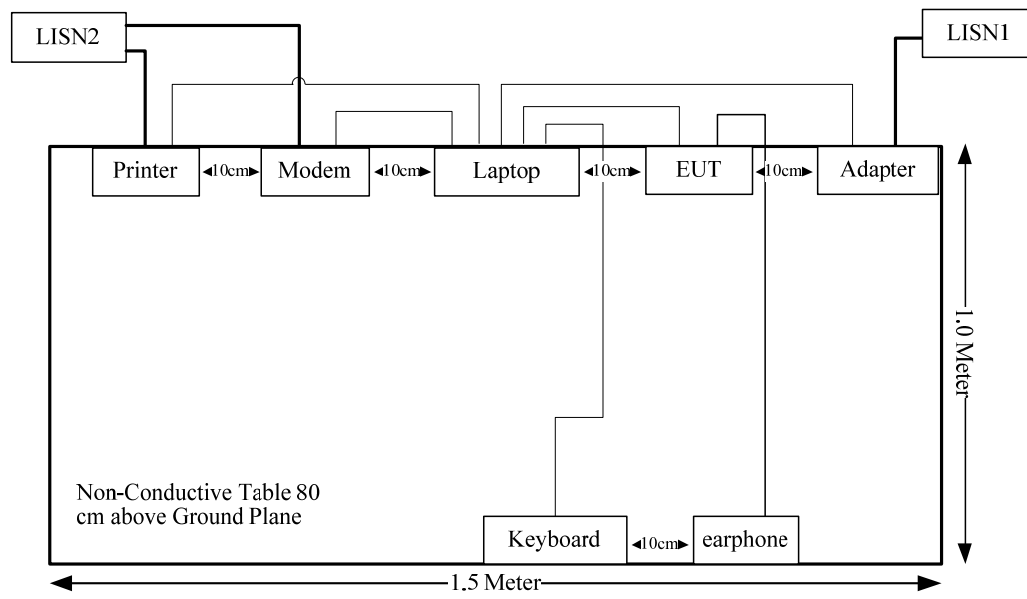
### Local Support Equipment List and Details

| Manufacturer | Description | Model    | Serial Number        |
|--------------|-------------|----------|----------------------|
| DELL         | Laptop      | PP11L    | QDS-BRCM1017         |
| HP           | Printer     | C3941A   | JPTVOB2337           |
| DELL         | Keyboard    | L100     | CNORH656658907BL05DC |
| SAST         | Modem       | AEM-2100 | 293                  |

### Support Cable List and Details

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port               | To       |
|-------------------|----------------|--------------|------------|-------------------------|----------|
| Serial Cable      | yes            | No           | 1.2        | Serial Port of Laptop   | Modem    |
| Parallel Cable    | yes            | No           | 1.2        | Parallel Port of Laptop | Printer  |
| Keyboard Cable    | yes            | No           | 1.8        | USB Port of Laptop      | Keyboard |
| USB Cable         | yes            | No           | 0.8        | USB Port of Laptop      | EUT      |
| Earphone          | No             | No           | 1.0        | Port of EUT             | Earphone |

## Block Diagram of Test Setup



**Test Equipment List**

| Manufacturer                         | Description        | Model                  | Serial Number | Calibration Date | Calibration Due Date |
|--------------------------------------|--------------------|------------------------|---------------|------------------|----------------------|
| <b>Conducted emissions</b>           |                    |                        |               |                  |                      |
| R&S                                  | EMI Test Receiver  | ESPI                   | 100120        | 2019-05-09       | 2020-05-09           |
| Unknown                              | Coaxial Cable      | C-NJNJ-50              | C-0200-01     | 2018-09-05       | 2019-09-05           |
| R&S                                  | Test Software      | EMC32                  | Version8.53.0 | N/A              | N/A                  |
| R&S                                  | Two-line V-network | ENV 216                | 101614        | 2018-12-10       | 2019-12-10           |
| R&S                                  | L.I.S.N            | ESH2-Z5                | 892107/021    | 2018-09-19       | 2019-09-19           |
| <b>Radiated emissions Below 1GHz</b> |                    |                        |               |                  |                      |
| R&S                                  | EMI Test Receiver  | ESCI                   | 100035        | 2018-08-03       | 2019-08-03           |
| Farad                                | Test Software      | EZ-EMC                 | V1.1.4.2      | N/A              | N/A                  |
| Sunol Sciences                       | Antenna            | JB3                    | A060611-1     | 2017-11-10       | 2020-11-10           |
| Unknown                              | Coaxial Cable      | C-NJNJ-50              | C-0400-01     | 2018-09-05       | 2019-09-05           |
| Unknown                              | Coaxial Cable      | C-NJNJ-50              | C-0075-01     | 2018-09-05       | 2019-09-05           |
| Unknown                              | Coaxial Cable      | C-NJNJ-50              | C-1400-01     | 2019-05-06       | 2020-05-06           |
| HP                                   | Amplifier          | 8447D                  | 2727A05902    | 2018-09-05       | 2019-09-05           |
| <b>Radiated emissions Above 1GHz</b> |                    |                        |               |                  |                      |
| Agilent                              | Spectrum Analyzer  | E4440A                 | SG43360054    | 2019-05-09       | 2020-05-09           |
| Farad                                | Test Software      | EZ-EMC                 | V1.1.4.2      | N/A              | N/A                  |
| ETS-Lindgren                         | Horn Antenna       | 3115                   | 000 527 35    | 2018-10-12       | 2021-10-12           |
| Unknown                              | Coaxial Cable      | C-SJSJ-50              | C-0800-01     | 2018-09-05       | 2019-09-05           |
| MITEQ                                | Amplifier          | AFS42-00101800-25-S-42 | 2001271       | 2018-09-05       | 2019-09-05           |

\* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Environmental Conditions**

| Test Item:                | Conducted emissions | Radiated emissions Below 1GHz | Radiated emissions Above 1GHz |
|---------------------------|---------------------|-------------------------------|-------------------------------|
| <b>Test Date:</b>         | 2019-07-09          | 2019-07-05                    | 2019-07-08                    |
| <b>Tester:</b>            | Lily Xie            | Tyler Pan                     | Neil Liao                     |
| <b>Temperature:</b>       | 28.2°C              | 28.6°C                        | 28.7°C                        |
| <b>Relative Humidity:</b> | 58%                 | 57%                           | 63%                           |
| <b>ATM Pressure:</b>      | 100.4kPa            | 100.6kPa                      | 100.4kPa                      |

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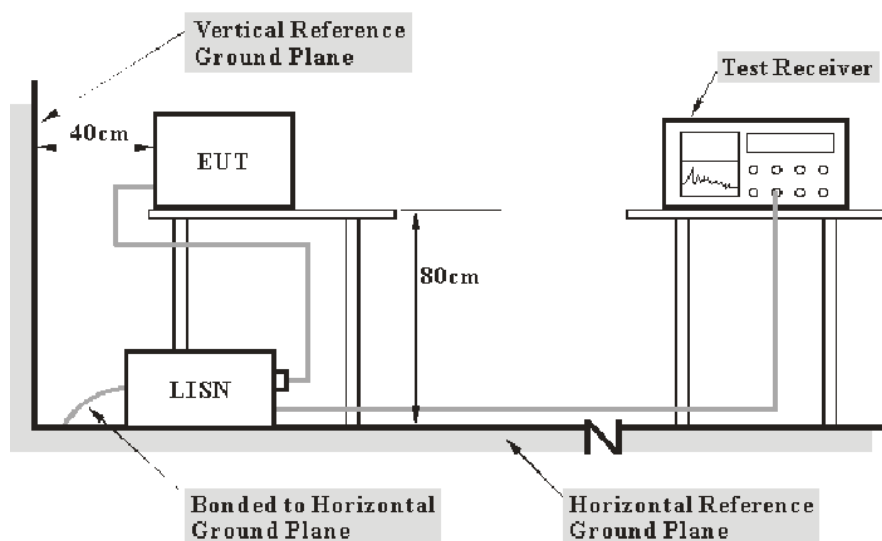
**SUMMARY OF TEST RESULTS**

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| Rule and Clause | Description of Test | Test Result |
|-----------------|---------------------|-------------|
| FCC §15.107     | Conducted emissions | Compliance  |
| FCC §15.109     | Radiated emissions  | Compliance  |

## CONDUCTED EMISSIONS

### EUT Setup



- Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15 B Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The adapter was connected to the Main LISN with 120V/60Hz AC power source.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range  | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz  |

### Test Procedure

During the conducted emission test, the Adapter of Laptop was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

$V_C$ : corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

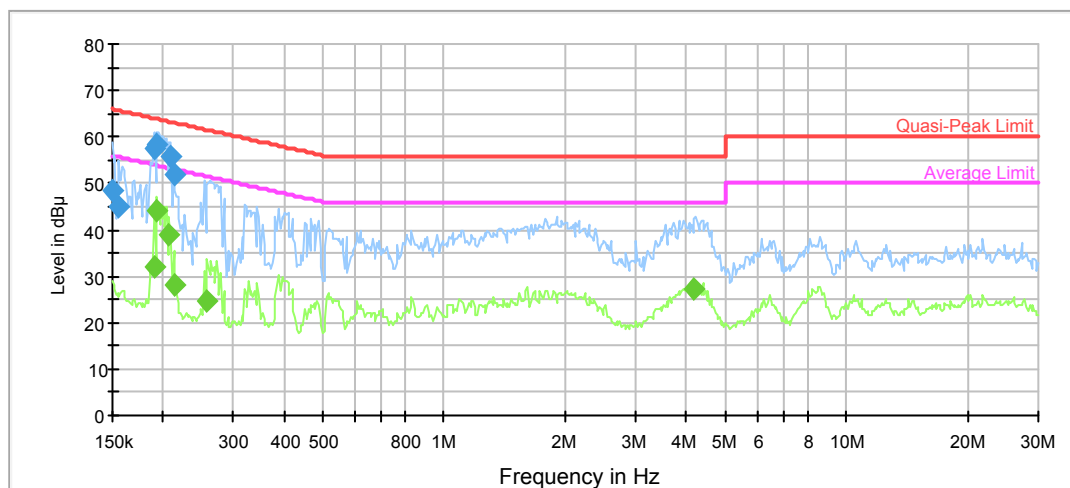
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Data

Please refer to following table and plots:

Port: L  
 Test Mode: Downloading  
 Power Source: AC120V/60Hz



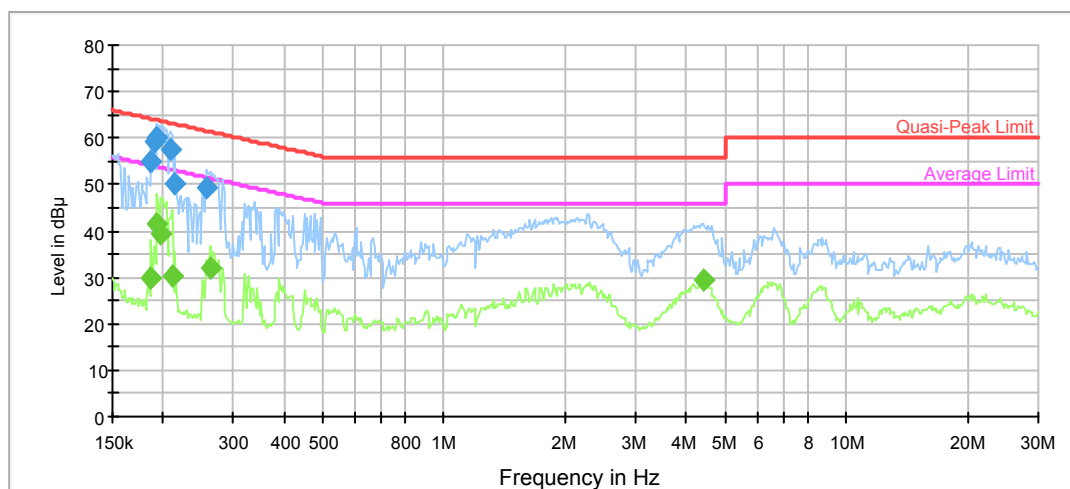
## Final Result 1

| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|
| 0.150000        | 48.6             | 9.000           | L1   | 11.2       | 17.4        | 66.0         |
| 0.156097        | 45.1             | 9.000           | L1   | 11.1       | 20.6        | 65.7         |
| 0.190505        | 57.4             | 9.000           | L1   | 10.7       | 6.6         | 64.0         |
| 0.193566        | 58.2             | 9.000           | L1   | 10.7       | 5.7         | 63.9         |
| 0.209621        | 55.7             | 9.000           | L1   | 10.6       | 7.5         | 63.2         |
| 0.212988        | 52.0             | 9.000           | L1   | 10.5       | 11.1        | 63.1         |

## Final Result 2

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|
| 0.190505        | 32.1           | 9.000           | L1   | 10.7       | 21.9        | 54.0         |
| 0.193566        | 44.2           | 9.000           | L1   | 10.7       | 9.7         | 53.9         |
| 0.207957        | 39.1           | 9.000           | L1   | 10.6       | 14.2        | 53.3         |
| 0.212988        | 28.0           | 9.000           | L1   | 10.5       | 25.1        | 53.1         |
| 0.257874        | 24.7           | 9.000           | L1   | 10.3       | 26.8        | 51.5         |
| 4.193667        | 27.2           | 9.000           | L1   | 9.8        | 18.8        | 46.0         |

Port: N  
 Test Mode: Downloading  
 Power Source: AC120V/60Hz



### Final Result 1

| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|
| 0.187494        | 55.1             | 9.000           | N    | 10.7       | 9.0         | 64.1         |
| 0.190505        | 59.3             | 9.000           | N    | 10.7       | 4.7         | 64.0         |
| 0.193566        | 60.3             | 9.000           | N    | 10.7       | 3.6         | 63.9         |
| 0.209621        | 57.6             | 9.000           | N    | 10.5       | 5.6         | 63.2         |
| 0.214692        | 50.4             | 9.000           | N    | 10.5       | 12.6        | 63.0         |
| 0.255827        | 49.1             | 9.000           | N    | 10.3       | 12.5        | 61.6         |

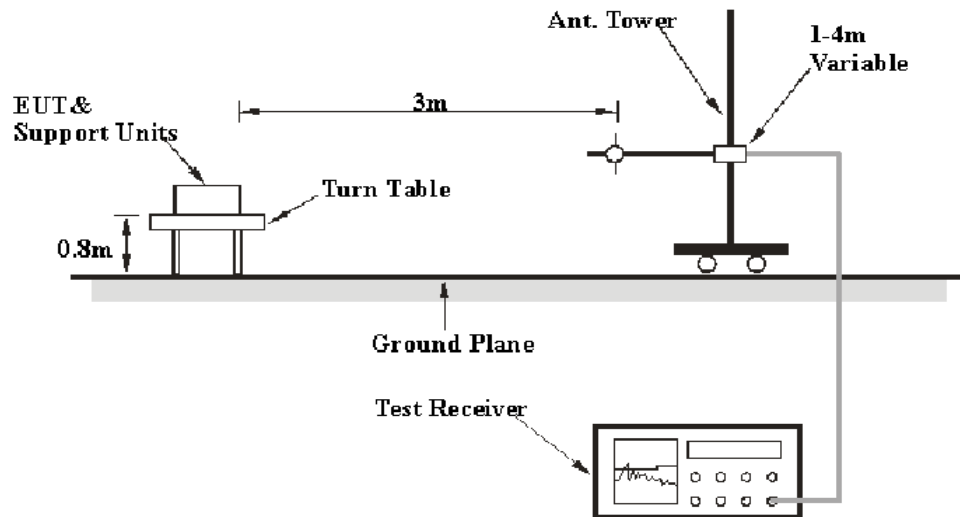
### Final Result 2

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|
| 0.187494        | 29.9           | 9.000           | N    | 10.7       | 24.2        | 54.1         |
| 0.193566        | 41.4           | 9.000           | N    | 10.7       | 12.5        | 53.9         |
| 0.198249        | 39.2           | 9.000           | N    | 10.6       | 14.5        | 53.7         |
| 0.211298        | 30.4           | 9.000           | N    | 10.5       | 22.8        | 53.2         |
| 0.262017        | 32.2           | 9.000           | N    | 10.3       | 19.2        | 51.4         |
| 4.399032        | 29.6           | 9.000           | N    | 9.8        | 16.4        | 46.0         |

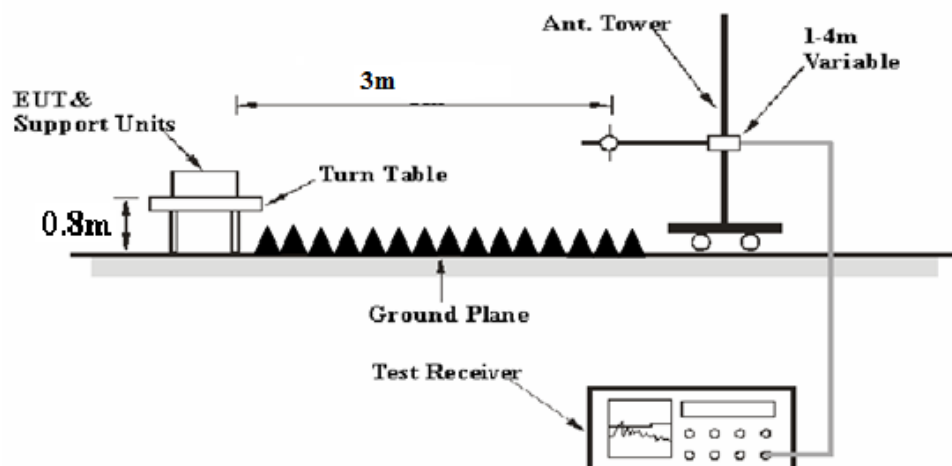
## RADIATED EMISSIONS

### EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.4-2014. The specification used was with the FCC Part 15 B Class B limits.

## EMI Test Receiver Setup

The system was investigated from 30 MHz to 13 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

| Frequency Range   | RBW     | Video B/W               | IF B/W  | Measurement |
|-------------------|---------|-------------------------|---------|-------------|
| 30 MHz – 1000 MHz | 120 kHz | 300 kHz                 | 120 kHz | QP          |
| Above 1 GHz       | 1 MHz   | 3 MHz                   | /       | Peak        |
|                   | 1 MHz   | Reduced video bandwidth | /       | AVG         |

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

## Test Procedure

During the radiated emissions, the adapter of laptop was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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

The data was recorded in the Quasi-peak detection mode for below 1 GHz, peak and average detection mode above 1 GHz.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Meter Reading+ Corrected

Note:

Corrected = Antenna Factor + Cable Loss - Amplifier Gain

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

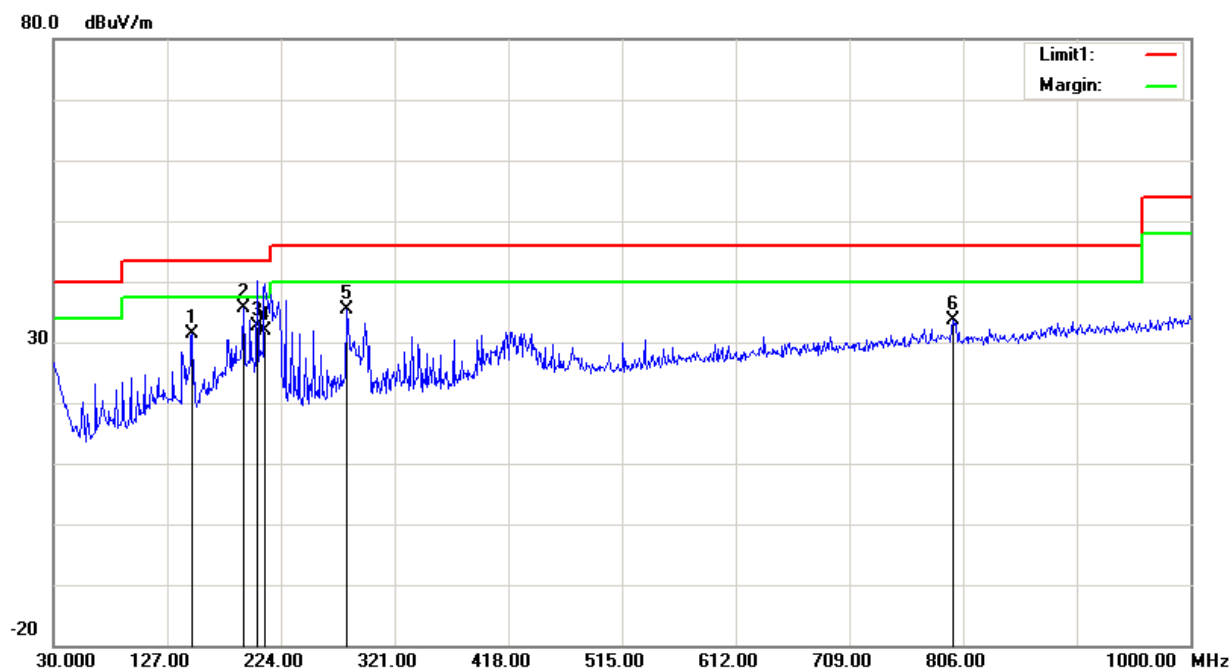
$$\text{Margin} = \text{Limit} - \text{Result}$$

## Test Data

Please refer to following table and plots:

**Condition:** FCC Part 15B Class B  
**EUT:** Xstar  
**Test Mode:** Downloading

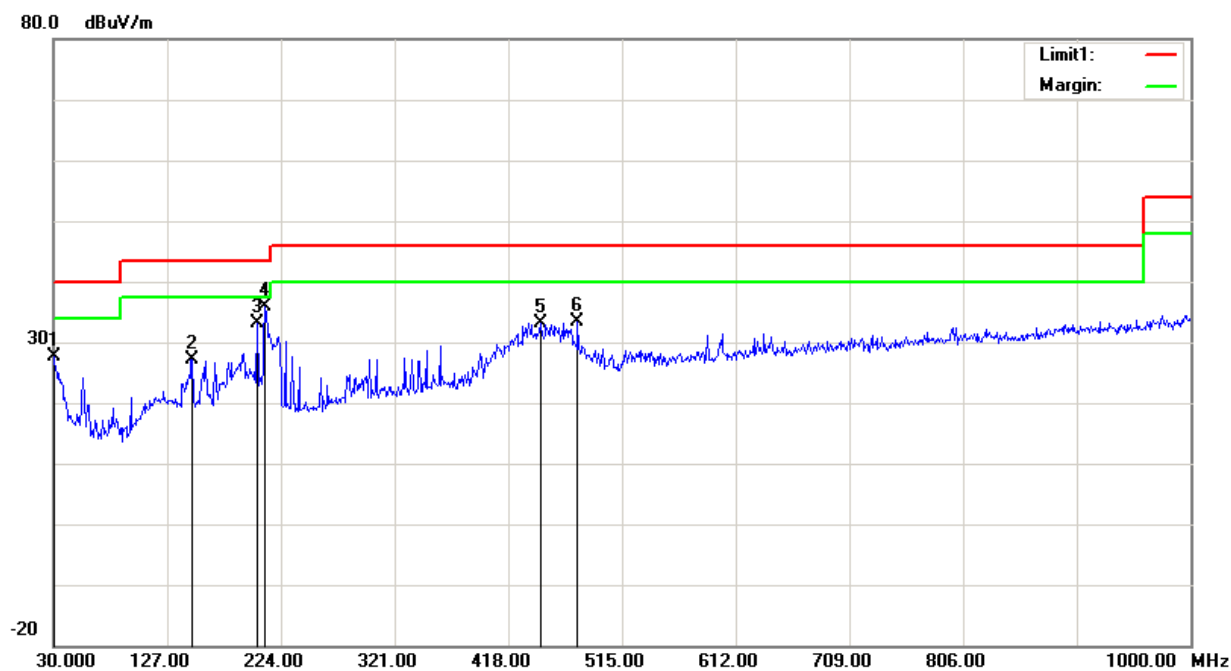
**Polarization:** Horizontal  
**Power:** AC 120V/60Hz  
**Distance:** 3m



| Frequency<br>(MHz) | Reading<br>(dBuV) | Detector | Corrected<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------|-------------------|----------|---------------------|--------------------|-------------------|----------------|
| 148.3400           | 37.49             | peak     | -6.05               | 31.44              | 43.50             | 12.06          |
| 191.9900           | 42.63             | peak     | -7.01               | 35.62              | 43.50             | 7.88           |
| 203.6300           | 38.87             | QP       | -6.29               | 32.58              | 43.50             | 10.92          |
| 210.4200           | 39.22             | QP       | -7.37               | 31.85              | 43.50             | 11.65          |
| 280.2600           | 39.48             | peak     | -4.15               | 35.33              | 46.00             | 10.67          |
| 797.2700           | 29.23             | peak     | 4.34                | 33.57              | 46.00             | 12.43          |

**Condition:** FCC Part 15B Class B  
**EUT:** Xstar  
**Test Mode:** Downloading

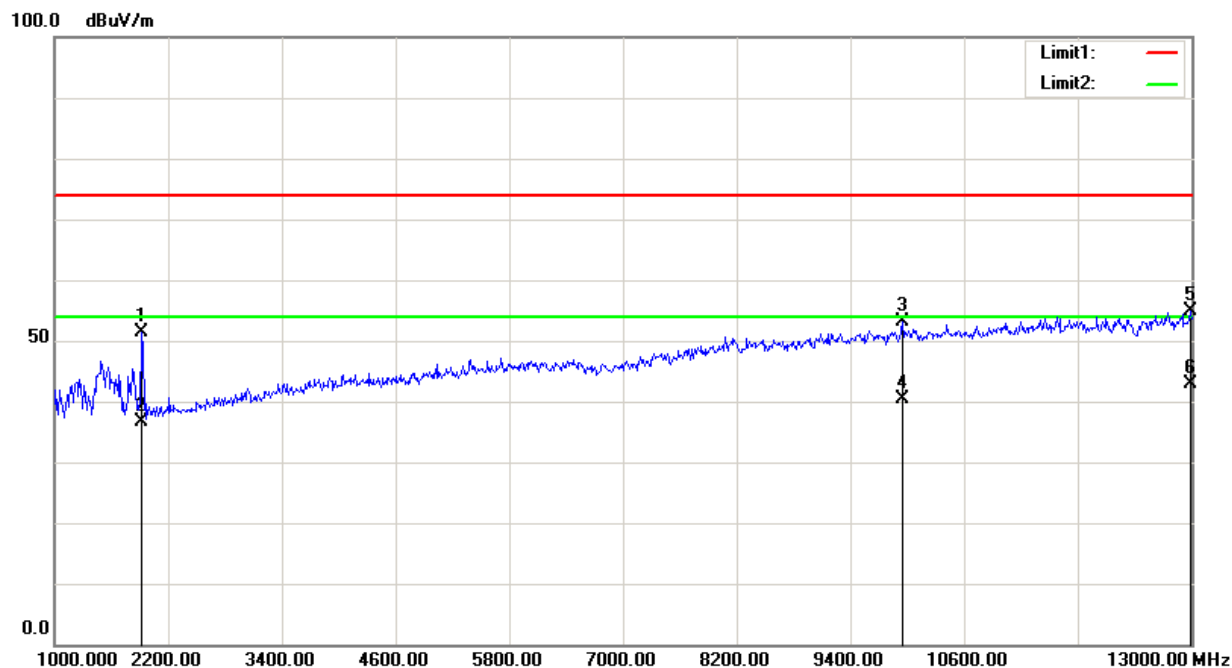
**Polarization:** Vertical  
**Power:** AC 120V/60Hz  
**Distance:** 3m



| Frequency | Reading | Detector | Corrected | Result   | Limit    | Margin |
|-----------|---------|----------|-----------|----------|----------|--------|
| (MHz)     | (dBuV)  |          | (dB/m)    | (dBuV/m) | (dBuV/m) | (dB)   |
| 30.0000   | 25.88   | peak     | 1.72      | 27.60    | 40.00    | 12.40  |
| 148.3400  | 33.24   | peak     | -6.05     | 27.19    | 43.50    | 16.31  |
| 203.6300  | 39.38   | peak     | -6.29     | 33.09    | 43.50    | 10.41  |
| 210.4200  | 43.31   | peak     | -7.37     | 35.94    | 43.50    | 7.56   |
| 445.1600  | 34.35   | peak     | -1.14     | 33.21    | 46.00    | 12.79  |
| 477.1700  | 33.59   | peak     | -0.33     | 33.26    | 46.00    | 12.74  |

**Condition:** FCC Part 15B Class B  
**EUT:** Xstar  
**Test Mode:** Downloading

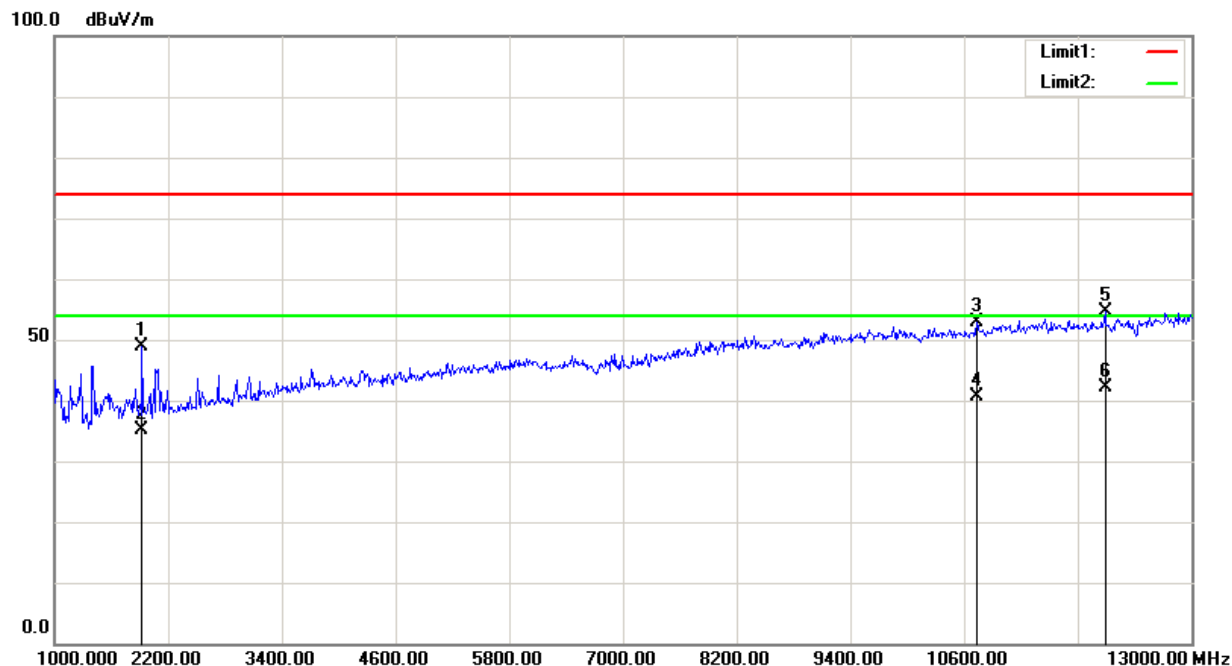
**Polarization:** Horizontal  
**Power:** AC 120V/60Hz  
**Distance:** 3m



| Frequency<br>(MHz) | Reading<br>(dB $\mu$ V) | Detector | Corrected<br>(dB/m) | Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
|--------------------|-------------------------|----------|---------------------|--------------------------|-------------------------|----------------|
| 1924.000           | 58.92                   | peak     | -7.45               | 51.47                    | 74.00                   | 22.53          |
| 1924.000           | 44.03                   | AVG      | -7.45               | 36.58                    | 54.00                   | 17.42          |
| 9958.000           | 45.65                   | peak     | 7.36                | 53.01                    | 74.00                   | 20.99          |
| 9958.000           | 33.14                   | AVG      | 7.36                | 40.50                    | 54.00                   | 13.50          |
| 12988.000          | 46.63                   | peak     | 8.35                | 54.98                    | 74.00                   | 19.02          |
| 12988.000          | 34.54                   | AVG      | 8.35                | 42.89                    | 54.00                   | 11.11          |

**Condition:** FCC Part 15B Class B  
**EUT:** Xstar  
**Test Mode:** Downloading

**Polarization:** Vertical  
**Power:** AC 120V/60Hz  
**Distance:** 3m



| Frequency (MHz) | Reading (dBμV) | Detector | Corrected (dB/m) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------|----------|------------------|-----------------|----------------|-------------|
| 1924.000        | 56.43          | peak     | -7.45            | 48.98           | 74.00          | 25.02       |
| 1924.000        | 42.55          | AVG      | -7.45            | 35.10           | 54.00          | 18.90       |
| 10732.000       | 44.94          | peak     | 7.85             | 52.79           | 74.00          | 21.21       |
| 10732.000       | 32.74          | AVG      | 7.85             | 40.59           | 54.00          | 13.41       |
| 12094.000       | 46.81          | peak     | 7.72             | 54.53           | 74.00          | 19.47       |
| 12094.000       | 34.51          | AVG      | 7.72             | 42.23           | 54.00          | 11.77       |

\*\*\*\*\*END OF REPORT\*\*\*\*\*