

FCC Test Report

On Model Name: Wrist belt intelligent Tag

Model Numbers: TS-NC380M

Trade Marks:  TimeSpace 天经

FCCID Number: WUJTSNC380M

Prepared for GuangZhou TimeSpace Technology Co., Ltd

Test Specification : Part 15(2007), Subpart C

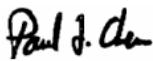
Test Report #: GUA-0807-10025-FCC ID

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Reviewed by: Ivan Wen

QC Manager: Paul Chen

Test Report Released by:



Paul Chen

2008, October 28

Date

List of Attached Files

| <i>Exhibit Type</i> | <i>File Description</i> | <i>File Name</i> |
|------------------------------|-----------------------------------|--|
| <i>Test Report</i> | <i>Test Report</i> | <i>WUJTSNC380M_Test report.pdf</i> |
| <i>Operation Description</i> | <i>Technical Description</i> | <i>WUJTSNC380M_operation description.pdf</i> |
| <i>External Photos</i> | <i>External Photos</i> | <i>WUJTSNC380M_External Photos.pdf</i> |
| <i>Internal Photos</i> | <i>Internal Photos</i> | <i>WUJTSNC380M_Internal Photos.pdf</i> |
| <i>Block Diagram</i> | <i>Block Diagram</i> | <i>WUJTSNC380M_Block_Rev1 Diagram.pdf</i> |
| <i>Schematics</i> | <i>Circuit Diagram</i> | <i>WUJTSNC380M_Schematics.pdf</i> |
| <i>ID Label/Location</i> | <i>Label Artwork and Location</i> | <i>WUJTSNC380M_Label & Location.pdf</i> |
| <i>User Manual</i> | <i>User Manual</i> | <i>WUJTSNC380M_User Manual.pdf</i> |
| <i>Test setup photos</i> | <i>Test setup photos</i> | <i>WUJTSNC380M_Test Setup Photos.pdf</i> |

Test Location

Tests performed in a Certified ANSI Semi-Anechoic Chamber and Shielded Room.

Test Site Location: **Shenzhen Academy of Metrology and quality Inspection.**

*Bldg. of Metrology & Quality Inspection,
Longzhu Road, Nanshan District,
Shenzhen, Guangdong, China.*

Tel: 86-755-26941599

Fax: 86-755-26941615

CNAS Number: L0579

FCC Registration Number: 274801

List of Test and Measurement Instruments

| <i>Equipment</i> | <i>Manufacture</i> | <i>Model No.</i> | <i>Serial No.</i> | <i>Calibrated Until</i> |
|---------------------------------|---------------------------|-------------------------|--------------------------|--------------------------------|
| <i>EMI Test Receiver</i> | <i>R&S</i> | <i>ESI6</i> | <i>SB3436</i> | <i>11/29/2008</i> |
| <i>EMI Test Receiver</i> | <i>R&S</i> | <i>ESCS30</i> | <i>SB3319</i> | <i>11/19/2008</i> |
| <i>Bilog Antenna</i> | <i>Chase</i> | <i>CBL6112B</i> | <i>SB3435</i> | <i>11/29/2008</i> |
| <i>Horn Antenna</i> | <i>R&S</i> | <i>HF906</i> | <i>SB3434</i> | <i>11/29/2008</i> |
| <i>3m Semi-anechoic chamber</i> | <i>Albatross Projects</i> | <i>9*6*6</i> | <i>SB3450/01</i> | <i>11/29/2010</i> |

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Administrative Data

| | |
|----------------------|--|
| <i>Test Sample</i> | : <i>Wrist belt intelligent Tag</i> |
| <i>Model Name</i> | : <i>TS-NC380M</i> |
| <i>Model Tested</i> | : <i>TS-NC380M</i> |
| <i>Serial Number</i> | : <i>Engineering Sample</i> |
| <i>Date Tested</i> | : <i>2008 , september 06 to 11</i> |
| <i>Applicant</i> | : <i>GuangZhou TimeSpace Technology Co., LTD</i> |
| | <i>810 Middle Times Plaza, No28, Tianhe North Road, Guangzhou, China</i> |
| <i>Telephone</i> | : <i>86-20-28269500</i> |
| <i>Fax</i> | : <i>86-20-28269503</i> |
| <i>Manufacturer</i> | : <i>GuangZhou TimeSpace Technology Co., LTD</i> |
| | <i>810 Middle Times Plaza, No28, Tianhe North Road, Guangzhou, China</i> |

EUT Description

GuangZhou TimeSpace Technology Co., LTD, model tested TS-NC380M (referred to as the EUT in this report) is a Wrist belt intelligent Tag.

TS-NC380M tag is active active tags, tag will take the initiative to send card number and status information to reader,detailed technical specification is as below:

Technical specification :

| | |
|------------------------------|---|
| <i>Product Name</i> | <i>Wrist belt intelligent Tag</i> |
| <i>Frequency</i> | <i>2.417GHz</i> |
| <i>Weight</i> | <i>20g</i> |
| <i>Modulation Method</i> | <i>GFSK</i> |
| <i>Power Consumption</i> | <i>1mW</i> |
| <i>Operating Temperature</i> | <i>-40 °C~+85 °C</i> |
| <i>Battery Voltage</i> | <i>DC 3.0V (built-in lithium battery)</i> |

For more informations refer to the user's manual.

Test Summary

The Electromagnetic Compatibility requirements on tested model TS-NC380M for this test is stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

TS-NC380M has been found to conform to the following parts of the Part 15(2007), Subpart C. as detailed below:

| FCC Rules | Requirement | Result | Remark |
|------------------------------------|--|-----------|--------------|
| §15.203 | Antenna requirement | Compliant | Attachment 1 |
| §15.207(a) | Test is not applicable, because EUT only employ battery power for operation. | | |
| §15.205(a), §15.209(a), §15.249(a) | Radiated Emissions | Compliant | Attachment 2 |
| §15.249(d) | Out of Band Emissions | Compliant | Attachment 3 |
| §15.215(c) | 20dB Bandwidth | Compliant | Attachment 4 |

Test Mode Justification

This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

EUT Exercise Software

No Software was used in during the test.

Equipment Modification

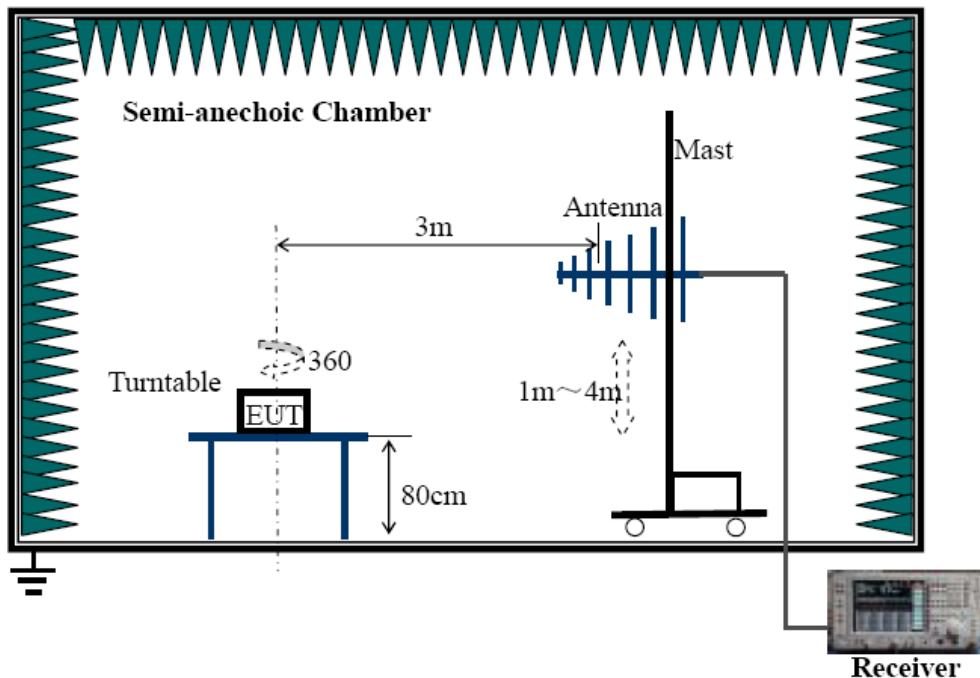
Any modifications installed previous to testing by GuangZhou TimeSpace Technology Co., LTD will be incorporated in each production model sold or leased in United States.

There were no modifications for this EUT intended for grant.

Test System Details

| EUT | | | | |
|--------------------------------|---|------------------------|-----------------------|--------------------------------|
| Model Name: | TS-NC380M | | | |
| Tested Model: | TS-NC380M | | | |
| Serial Number: | Engineering Sample | | | |
| Input Voltage: | DC 3.0V | | | |
| Description: | Wrist belt intelligent Tag | | | |
| Manufacturer: | GuangZhou TimeSpace Technology Co., LTD | | | |
| Support Equipment | | | | |
| Description | Model Number | Serial Number | Manufacturer | Power Cable Description |
| None | | | | |
| Power Cable Description | | | | |
| From | To | Length (Meters) | Shielded (Y/N) | Ferrite Loaded (Y/N) |
| None | | | | |

Test Set-up Diagram



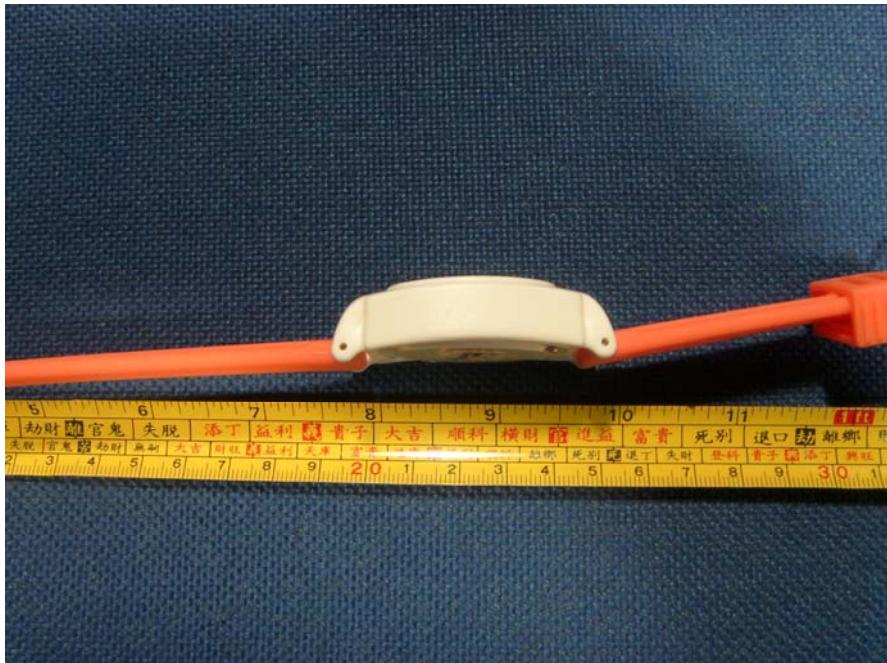
EUT Sample Photos



Front View



Rear View



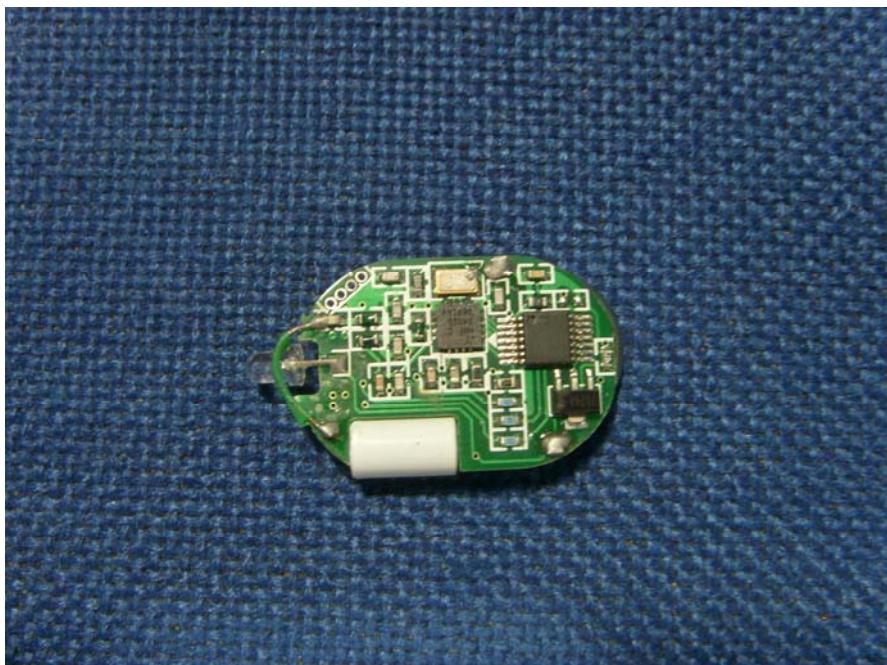
Side View



Uncovered View



PCBA View#1



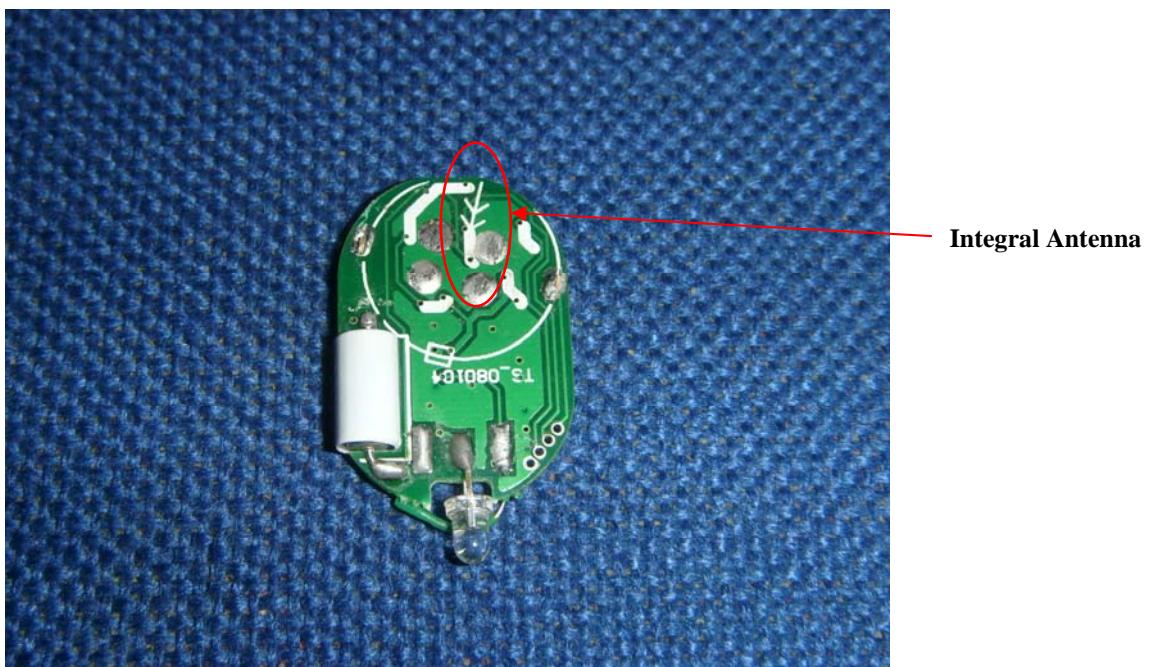
PCBA View#2

Attachment 1 - Antenna Requirement

Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

| FCC Section | FCC Rules | Conclusion |
|-------------|--|---|
| § 15.203 | <p>Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.</p> <p>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</p> <ol style="list-style-type: none"> 1. The application (or intended use) of the EUT 2. The installation requirements of the EUT 3. The method by which the EUT will be marketed | <p>The RF Device uses an integral antenna without connector</p> |



Integral Antenna without Connector View

Attachment 2- Field Strength of Fundamental and Spurious Emission

Requirement:

§ 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 |
| ¹ 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 | (²) |
| 13.36 - 13.41 | | | |

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

² Above 38.6

The fundamental is not in a restricted band, and the fundamental & spurious emission in the restricted bands comply with the general emission limits of 15.209.

Field strength limits of § 15.209(a):

The emissions from an intentional radiator shall strength levels specified in the following table:

| Other Frequency (MHz) | Field strength (uV/meter) dB uV/meter | |
|-----------------------|---------------------------------------|------|
| 30-88 | 100 | 40.0 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

Note:

- 1) *Field Strength (dBmV/m)=20log Field Strength (mV/m).*
- 2) *In the emission tables above, the tighter limit applies at the band edge*

Requirements of § 15.249(a):

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental Frequency | Field Strength of Fundamental (millivolts/meter) | Field Strength of Harmonics (microvolts/meter) |
|------------------------------|---|---|
| 902-928MHz | 50 | 500 |
| 2400-2483.5MHz | 50 | 500 |
| 5725-5875MHz | 50 | 500 |
| 24.0-24.25GHz | 250 | 2500 |

Note:
Field strength limits are specified at a distance of 3 meters.

Test Equipment setup:

The spectrum analyzer or receiver is set as:

Below 1GHz: RBW=100KHz/VBM=300KHz/Sweep=auto

Above 1GHz:

- 1) *Peak: RBW=1MHz/VBW=1MHz/Sweep=auto;*
- 2) *Average: RBW=1MHz/VBW=10Hz/Sweep=auto.*

Test Procedure:

According to ANSI C63.4(2003) Section 13.1.4, The test procedure for filed strength of emission as follow:

- 1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.*
- 2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a anechoic chamber. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 3 meter measuring distance before final test.*
- 3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.*
- 4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 degree to 360 degree With a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.*
- 5. Repeat step 4 until all frequencies need to be measured were complete.*
- 6. Repeat step 5 with search antenna in vertical polarized orientations. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.*

Figure 1 : Frequencies measured below 1 GHz configuration

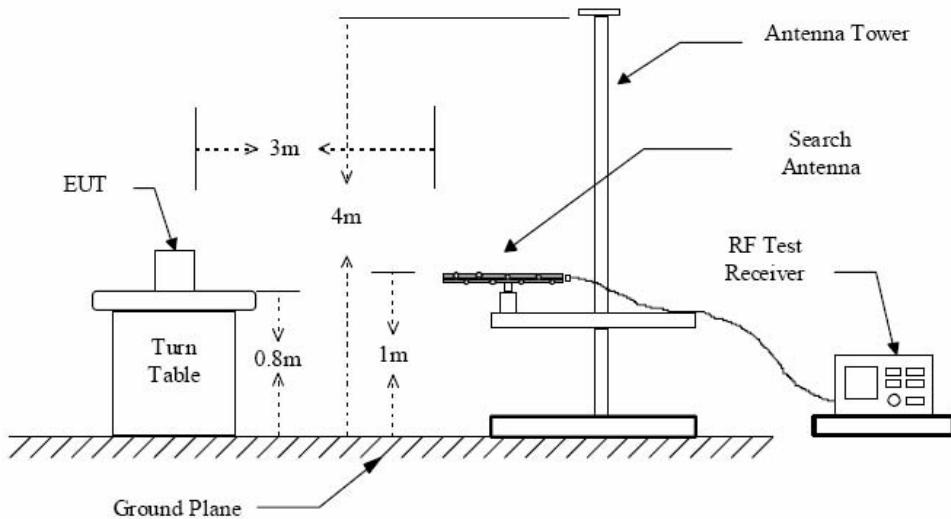
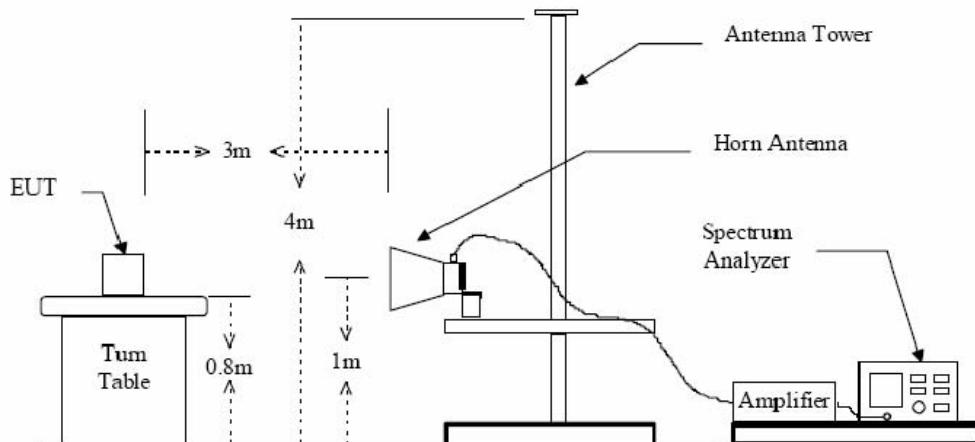


Figure 2 : Frequencies measured above 1 GHz configuration



Test Results Summary:

According to the data in the following, the EUT complied with the FCC Part 15.209 & 15.249, with the worst margin reading of:

30- 1000MHz:

13.01 dB at 425MHz of Z-axes in the vertical Polarization.

Above 1GHz:

10.79 dB at 9669.310MHz of Y-axes in the vertical Polarization.

Environmental Conditions:

| | |
|-------------------|----------|
| Temperature | 22°C |
| Relative Humidity | 56% |
| ATM Pressure | 100.2KPa |

30MHz - 1000MHz:

X-axes:

| Horizontal | | | | | | | | |
|------------|-----------------|-------------------------|-----------------------|-----------------------------|--------------------------|-------------|--------------------------|----------------------|
| Signal | Frequency (MHz) | Reading Level dB (uV/m) | Corrected Factor (dB) | Corrected QP Level dB(uV/m) | 3 Meter Limits dB (uV/m) | Margin (dB) | Angle of Turner (degree) | Height of Tower (cm) |
| 1 | 30.58 | 17.68 | 8.72 | 26.40 | 40.0 | -13.60 | 120 | 100 |
| 2 | 95.28 | 14.86 | 9.24 | 24.10 | 43.5 | -19.40 | 330 | 100 |
| 3 | 300.00 | 10.84 | 15.50 | 25.34 | 46.0 | -20.66 | 135 | 288 |
| Vertical | | | | | | | | |
| Signal | Frequency (MHz) | Reading Level dB (uV/m) | Corrected Factor (dB) | Corrected QP Level dB(uV/m) | 3 Meter Limits dB (uV/m) | Margin (dB) | Angle of Turner (degree) | Height of Tower (cm) |
| 1 | 59.32 | 15.68 | 8.81 | 24.49 | 40.00 | -15.51 | 309 | 120 |
| 2 | 93.04 | 19.04 | 8.89 | 27.93 | 43.50 | -15.57 | 28 | 200 |
| 3 | 300.00 | 12.11 | 15.50 | 27.61 | 46.00 | -18.39 | 208 | 199 |

Note:

- 1) All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.
- 2) Corrected Level =reading level + corected factor, Margin = limits – corrected level.
- 3) The other emission levels that are 20dB below the official limit are not reported.

Y-axes:

| Horizontal | | | | | | | | |
|--|-----------------|-------------------------|-----------------------|-----------------------------|--------------------------|-------------|--------------------------|----------------------|
| Signal | Frequency (MHz) | Reading Level dB (uV/m) | Corrected Factor (dB) | Corrected QP Level dB(uV/m) | 3 Meter Limits dB (uV/m) | Margin (dB) | Angle of Turner (degree) | Height of Tower (cm) |
| 1 | 40.20 | 16.29 | 8.83 | 25.12 | 40.0 | -14.88 | 130 | 115 |
| 2 | 83.39 | 14.20 | 9.10 | 23.30 | 40.0 | -16.70 | 200 | 250 |
| 3 | 305.00 | 10.80 | 15.50 | 26.30 | 46.0 | -19.70 | 150 | 300 |
| Vertical | | | | | | | | |
| Signal | Frequency (MHz) | Reading Level dB (uV/m) | Corrected Factor (dB) | Corrected QP Level dB(uV/m) | 3 Meter Limits dB (uV/m) | Margin (dB) | Angle of Turner (degree) | Height of Tower (cm) |
| 1 | 58.19 | 15.60 | 7.99 | 23.59 | 40.00 | -16.41 | 280 | 105 |
| 2 | 92.59 | 19.00 | 8.80 | 27.80 | 43.50 | -15.70 | 35 | 100 |
| 3 | 300.00 | 12.11 | 15.50 | 27.61 | 46.00 | -18.39 | 149 | 230 |
| Note: 4) All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 30 ms sweep time, A video filter was not used. 5) Corrected Level =reading level + corected factor, Margin = limits – corrected level. 6) The other emission levels that are 20dB below the official limit are not reported. | | | | | | | | |

Z-axes:

| Horizontal | | | | | | | | |
|------------|-----------------|-------------------------|-----------------------|-----------------------------|-------------------------|-------------|--------------------------|----------------------|
| Signal | Frequency (MHz) | Reading Level dB (uV/m) | Corrected Factor (dB) | Corrected QP Level dB(uV/m) | 3 Meter Limits dB(uV/m) | Margin (dB) | Angle of Turner (degree) | Height of Tower (cm) |
| 1 | 31.58 | 17.60 | 8.79 | 26.39 | 40.0 | -13.61 | 120 | 210 |
| 2 | 95.28 | 14.86 | 9.24 | 24.10 | 43.5 | -19.40 | 280 | 350 |
| 3 | 300.00 | 10.84 | 15.50 | 25.34 | 46.0 | -20.66 | 190 | 100 |
| Vertical | | | | | | | | |
| Signal | Frequency (MHz) | Reading Level dB (uV/m) | Corrected Factor (dB) | Corrected QP Level dB(uV/m) | 3 Meter Limits dB(uV/m) | Margin (dB) | Angle of Turner (degree) | Height of Tower (cm) |
| 1 | 59.32 | 15.68 | 8.81 | 24.49 | 40.00 | -15.51 | 80 | 150 |
| 2 | 93.04 | 19.04 | 8.89 | 27.93 | 43.50 | -15.57 | 350 | 120 |
| 3 | 425.00 | 16.30 | 16.69 | 32.99 | 46.00 | -13.01 | 105 | 330 |

Note:

7) All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.

8) Corrected Level =reading level + corected factor, Margin = limits – corrected level.

9) The other emission levels that are 20dB below the official limit are not reported.

Above 1GHz:

X-axes:

| Horizontal | | | | | | | | | |
|----------------|----------------------------------|--------------------------|-----------------------------------|------------------------|----------------------|-------------------------------------|-----------------------------------|-------------------------|----------------------|
| Freq. (MHz) | Reading AV Level dB (uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB (uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 1200 | 13.28 | 20.26 | 33.54 | 54.0 | -20.46 | 23.17 | 43.43 | 74.0 | -30.57 |
| 1810 | 7.74 | 24.10 | 31.84 | 54.0 | -22.16 | 21.54 | 45.64 | 74.0 | -28.36 |
| 2710 | 6.18 | 26.11 | 32.29 | 54.0 | -21.71 | 16.05 | 42.16 | 74.0 | -31.84 |
| Vertical | | | | | | | | | |
| Freq. (MHz) | Reading AV Level dB (uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB (uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 1200 | 11.09 | 20.26 | 34.12 | 54.0 | -19.88 | 25.17 | 45.43 | 74.0 | -28.57 |
| 1810 | 8.70 | 24.10 | 32.80 | 54.0 | -22.16 | 22.50 | 46.60 | 74.0 | -27.40 |
| 4510 | 4.22 | 28.61 | 32.83 | 54.0 | -21.17 | 15.21 | 43.81 | 74.0 | -30.19 |

Note:

- 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time, A video filter was not used.
- 2) Corrected Level =reading level + corrected factor, Margin = limits – corrected level.
- 3) The other emission levels that are 20dB below the official limit are not reported.

Y-axes:

| Horizontal | | | | | | | | | |
|-------------|---------------------------|-----------------------|-----------------------------|------------------|----------------|----------------------------|------------------------------|-------------------|----------------|
| Freq. (MHz) | Reading AV Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 1210 | 13.39 | 20.28 | 33.67 | 54.0 | -20.33 | 23.16 | 43.34 | 74.0 | -30.66 |
| 1819 | 8.10 | 24.15 | 32.25 | 54.0 | -21.75 | 22.47 | 46.12 | 74.0 | -27.88 |
| 2700 | 6.81 | 26.09 | 32.90 | 54.0 | -21.10 | 17.01 | 43.10 | 74.0 | -30.09 |
| Vertical | | | | | | | | | |
| Freq. (MHz) | Reading AV Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 1218 | 12.31 | 20.29 | 32.60 | 54.0 | -21.40 | 26.02 | 46.31 | 74.0 | -27.69 |
| 1810 | 8.70 | 24.10 | 32.80 | 54.0 | -22.16 | 22.50 | 46.60 | 74.0 | -27.40 |
| 4500 | 4.48 | 28.60 | 33.08 | 54.0 | -20.92 | 16.27 | 44.87 | 74.0 | -29.13 |

Note:

4) All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time, A video filter was not used.
 5) Corrected Level =reading level + corrected factor, Margin = limits – corrected level.
 6) The other emission levels that are 20dB below the official limit are not reported.

Z-axes:

| Horizontal | | | | | | | | | |
|-------------|---------------------------|-----------------------|-----------------------------|------------------|----------------|----------------------------|------------------------------|-------------------|----------------|
| Freq. (MHz) | Reading AV Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 1300 | 13.20 | 21.20 | 34.40 | 54.0 | -19.60 | 23.10 | 44.30 | 74.0 | -29.70 |
| 1810 | 7.78 | 24.10 | 31.88 | 54.0 | -22.12 | 21.59 | 45.69 | 74.0 | -28.31 |
| 2710 | 7.19 | 26.11 | 33.30 | 54.0 | -20.70 | 17.28 | 43.39 | 74.0 | -30.61 |
| Vertical | | | | | | | | | |
| Freq. (MHz) | Reading AV Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 1300 | 14.10 | 21.20 | 35.30 | 54.0 | -18.70 | 25.12 | 46.32 | 74.0 | -27.68 |
| 1810 | 8.70 | 24.10 | 32.80 | 54.0 | -22.16 | 22.50 | 46.60 | 74.0 | -27.40 |
| 4510 | 5.38 | 28.61 | 33.99 | 54.0 | -20.01 | 17.25 | 45.86 | 74.0 | -28.14 |

Note:

7) All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time, A video filter was not used.

8) Corrected Level =reading level + corrected factor, Margin = limits – corrected level.

9) The other emission levels that are 20dB below the official limit are not reported.

| Fundamental | | | | | | | | | | |
|------------------|-------------|----------------------------|-----------------------|-----------------------------|------------------|----------------|----------------------------|------------------------------|-------------------|----------------|
| X-axes | | | | | | | | | | |
| Ant. Polar (H/V) | Freq. (MHz) | Reading AV Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| H | 2417.725 | 16.54 | 26.26 | 42.80 | 94.0 | -51.20 | 32.94 | 59.20 | 114.0 | -54.80 |
| V | 2417.802 | 17.14 | 26.26 | 43.40 | 94.0 | -50.60 | 35.00 | 61.25 | 114.0 | -52.75 |
| Y-axes | | | | | | | | | | |
| Ant. Polar (H/V) | Freq. (MHz) | Reading AV Level dB (uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| H | 2417.315 | 15.23 | 26.26 | 41.49 | 94.0 | -52.51 | 31.82 | 58.08 | 114.0 | -55.92 |
| V | 2417.537 | 16.18 | 26.26 | 42.44 | 94.0 | -51.56 | 34.49 | 60.75 | 114.0 | -53.25 |
| Z-axes | | | | | | | | | | |
| Ant. Polar (H/V) | Freq. (MHz) | Reading AV Level dB (uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| H | 2417.366 | 17.18 | 26.26 | 43.44 | 94.0 | -50.56 | 33.74 | 60.00 | 114.0 | -54.00 |
| V | 2417.769 | 19.15 | 26.26 | 45.41 | 94.0 | -48.59 | 36.17 | 62.43 | 114.0 | -51.57 |

Note:

- 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time. A video filter was not used.
- 2) Corrected Level =reading level + corrected factor, Margin = limits –corrected level.
- 3) The other emission levels that are 20dB below the official limit are not reported.

| Harmonics | | | | | | | | | | |
|------------------|-------------|------------------------|-----------------------|-----------------------------|------------------|----------------|---------------------------|-----------------------------|-------------------|----------------|
| X-axes | | | | | | | | | | |
| Ant. Polar (H/V) | Freq. (MHz) | Reading Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| H | 4815.631 | 7.15 | 31.10 | 38.25 | 54.0 | -15.75 | 8.64 | 39.74 | 74.0 | -34.26 |
| H | 7251.197 | 3.94 | 35.34 | 39.28 | 54.0 | -16.70 | 6.03 | 41.37 | 74.0 | -32.63 |
| H | 9669.310 | 2.67 | 38.56 | 41.23 | 54.0 | -12.77 | 5.02 | 43.58 | 74.0 | -30.42 |
| V | 4815.631 | 6.15 | 31.10 | 37.25 | 54.0 | -16.75 | 8.64 | 39.74 | 74.0 | -34.26 |
| V | 7251.197 | 4.94 | 35.34 | 40.28 | 54.0 | -16.70 | 8.03 | 43.37 | 74.0 | -30.63 |
| V | 9669.310 | 3.67 | 38.56 | 42.23 | 54.0 | -13.80 | 5.02 | 43.58 | 74.0 | -30.42 |
| Y-axes | | | | | | | | | | |
| Ant. Polar (H/V) | Freq. (MHz) | Reading Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| H | 4815.210 | 8.13 | 31.10 | 39.23 | 54.0 | -14.77 | 9.23 | 40.33 | 74.0 | -33.67 |
| H | 7251.879 | 4.31 | 35.34 | 39.65 | 54.0 | -14.35 | 7.81 | 43.15 | 74.0 | -30.85 |
| H | 9669.824 | 1.67 | 38.56 | 40.23 | 54.0 | -13.77 | 6.28 | 44.84 | 74.0 | -29.16 |
| V | 4815.360 | 8.18 | 31.10 | 39.28 | 54.0 | -14.72 | 9.78 | 40.88 | 74.0 | -33.12 |
| V | 7251.197 | 4.94 | 35.34 | 40.28 | 54.0 | -16.70 | 8.03 | 43.37 | 74.0 | -30.63 |
| V | 9669.310 | 2.33 | 38.56 | 40.89 | 54.0 | -13.11 | 5.02 | 43.58 | 74.0 | -30.42 |
| Z-axes | | | | | | | | | | |
| Ant. Polar (H/V) | Freq. (MHz) | Reading Level dB(uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| H | 4815.230 | 7.18 | 31.10 | 38.28 | 54.0 | -15.72 | 8.69 | 39.79 | 74.0 | -34.21 |
| H | 7251.835 | 4.31 | 35.34 | 39.65 | 54.0 | -14.35 | 6.84 | 42.18 | 74.0 | -31.82 |
| H | 9669.350 | 2.60 | 38.56 | 41.16 | 54.0 | -12.84 | 5.01 | 43.57 | 74.0 | -30.43 |
| V | 4815.832 | 6.17 | 31.10 | 37.27 | 54.0 | -16.73 | 8.60 | 39.74 | 74.0 | -34.30 |
| V | 7251.329 | 5.21 | 35.34 | 40.55 | 54.0 | -13.45 | 9.03 | 44.37 | 74.0 | -29.63 |

| | | | | | | | | | | |
|---|----------|------|-------|-------|------|--------|------|-------|------|--------|
| V | 9669.480 | 3.60 | 38.56 | 42.16 | 54.0 | -11.84 | 5.09 | 43.65 | 74.0 | -30.35 |
|---|----------|------|-------|-------|------|--------|------|-------|------|--------|

Note:

- 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time. A video filter was not used.
- 2) Corrected Level =reading level + corrected factor, Margin = limits –corrected level.
- 3) The other emission levels that are 20dB below the official limit are not reported.

Attachment 3- Out of Band Emissions

Applicable standard:

15.249(d) *Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.*

Test procedure:

1. *Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.*
2. *Position the EUT without connection to measurement instrument.turn on the EUT and set it to any one measured frequency within its opreratiing range, and make sure the intrument is opreated in its linear range.*
3. *Set RBW to 100KHz and VBW of spectrum analyzer to 300KHz with a convenient frequency span including the specified frequencies of band edges.*
4. *Measure the hightest amplitude appearing on spectral display and set it as a reference level.plot the graph with marking the highest ponit and edge frequency.*
5. *Repeat above procedures until all measured frequencies were completed.*

Test Data:

| Horizontal | | | | | | | | | |
|-------------|----------------------------|-----------------------|-----------------------------|------------------|----------------|---------------------------|------------------------------|-------------------|----------------|
| Freq. (MHz) | Reading AV Level dB (uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 2385.7 | 8.13 | 25.10 | 33.23 | 54 | -23.77 | 12.00 | 37.10 | 74 | -36.90 |
| 2345.3 | 6.80 | 24.32 | 31.12 | 54 | -24.88 | 10.43 | 34.75 | 74 | -39.25 |
| 2485.2 | 5.92 | 26.56 | 32.48 | 54 | -21.52 | 11.74 | 38.30 | 74 | -35.70 |
| 2489.5 | 6.18 | 27.10 | 33.28 | 54 | -20.72 | 12.15 | 39.25 | 74 | -34.75 |
| Vertical | | | | | | | | | |
| Freq. (MHz) | Reading AV Level dB (uV/m) | Corrected Factor (dB) | Corrected AV Level dB(uV/m) | Limits dB (uV/m) | Margin (dB) AV | Reading PK Level dB(uV/m) | Corrected PK Level dB(uV/m) | Limits dB (uV /m) | Margin (dB) PK |
| 2385.7 | 7.43 | 25.10 | 32.53 | 54 | -22.47 | 12.02 | 37.12 | 74 | -36.88 |
| 2345.3 | 6.06 | 24.32 | 30.38 | 54 | -23.72 | 10.96 | 35.28 | 74 | -38.72 |
| 2485.2 | 7.73 | 26.56 | 33.29 | 54 | -20.71 | 13.31 | 39.87 | 74 | -34.13 |
| 2489.5 | 8.57 | 27.10 | 33.67 | 54 | -20.33 | 13.13 | 40.23 | 74 | -33.77 |

Note:

- 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time. A video filter was not used.
- 2) Corrected Level =reading level + corrected factor, Margin = limits – corrected level.
- 3) The other emission levels that are 20dB below the official limit are not reported.

Attachment 4 - 20 dB Bandwidth

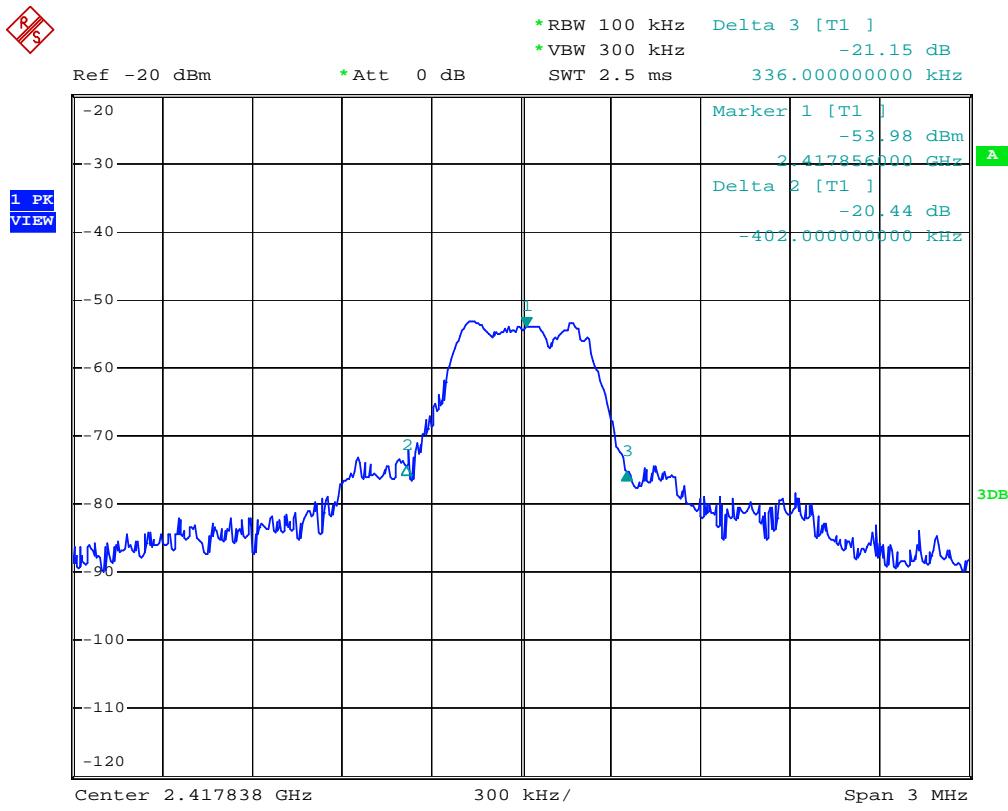
Applicable Standard

§ 15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test procedure

According to ANSI C63.4(2003) Section 13.1.7, The test procedure for bandwidth measurement as follow:

- a. The center frequency of the receiver was set to the channel under investigation.
- b. The antenna port of the EUT was connected to the input of a receiver.
- c. Set receiver : RBW=9KHz, VBW=30KHz.
- d. Max hold, peak detection.

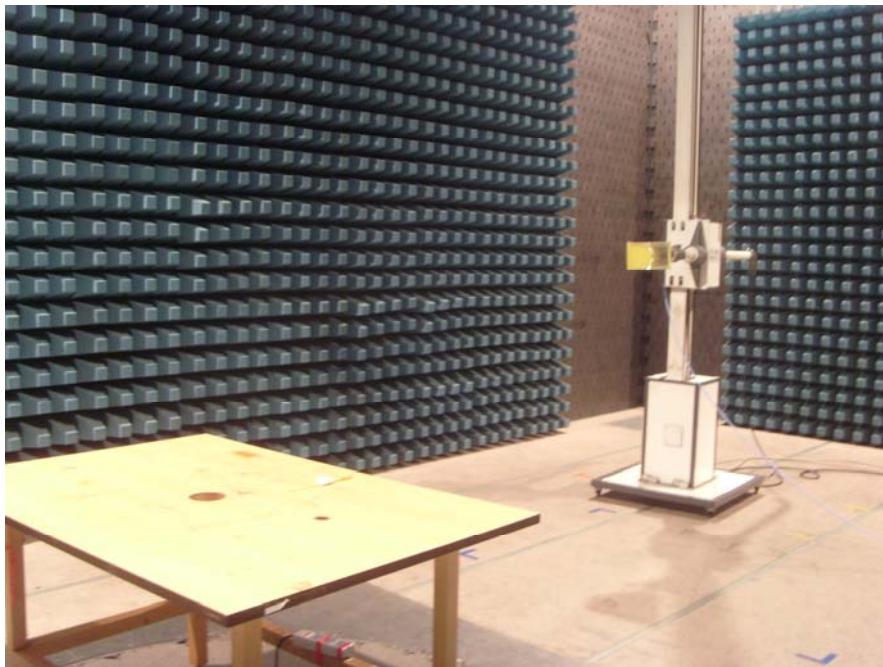


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Attachment 5- Test Set-up Photo



Radiated Emission Test Set-up -below 1GHz



Radiated Emission Test Set-up - Above 1GHz