

**CFR 47 FCC PART 90**

**TEST REPORT**

**For**

**GNSS Receiver**

**MODEL NUMBER: TS30**

**REPORT NUMBER: E04A26041481F00204**

**ISSUE DATE: September 29, 2026**

**FCC ID: 2AMDJ-TS30**

*Prepared for*

**Tersus GNSS Inc.**

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*Prepared by*

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**This report is based on a single evaluation of the submitted sample(s) of the above mentioned product, it does not imply an assessment of the production of the products.**

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## Revision History

| Rev. | Issue Date            | Revisions     | Revised By |
|------|-----------------------|---------------|------------|
| V0   | September 29,<br>2026 | Initial Issue |            |

**Summary of Test Results**

| Test Item                               | Limit/Requirement                                             | Test Result      |
|-----------------------------------------|---------------------------------------------------------------|------------------|
| RF Power Output                         | CFR 47 FCC Part 90.205<br>Part 2.1046(a)<br>RSS-119 (4.1,5.4) | Pass             |
| Modulation Characteristics              | Part 2.1047<br>RSS-119 (5.5)                                  | N/A <sup>1</sup> |
| Occupied Bandwidth                      | CFR 47 FCC Part 90.209<br>Part 2.1049<br>RSS-119 (5.5)        | Pass             |
| Emission Mask                           | CFR 47 FCC Part 90.210<br>RSS-119 (5.5)                       | Pass             |
| Frequency Stability                     | CFR 47 FCC Part 90.213<br>Part 2.1055<br>RSS-119(5.3)         | Pass             |
| Transient Frequency Behavior            | CFR 47 FCC Part 90.214<br>RSS-119(5.9)                        | Pass             |
| Transmitter Radiated Spurious Emission  | CFR 47 FCC Part 90.210<br>Part 2.1053<br>RSS-119 (4.2, 5.8)   | Pass             |
| Spurious Emissions at Antenna Terminals | Part 2.1051<br>RSS-119 (4.2, 5.8)                             | Pass             |

**Note:**

1. The EUT is used in digital modulation.
2. N/A: In this whole report not applicable.

\*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.

\*The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 90, ISSED RSS-119 Issue 12> when <Accuracy Method> decision rule is applied.

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## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

Company Name: Tersus GNSS Inc.  
Address: Rm 601, Bldg E2, No. 88, Jinjihu Ave, Suzhou, China

### Manufacturer Information

Company Name: Tersus GNSS Inc.  
Address: Rm 601, Bldg E2, No. 88, Jinjihu Ave, Suzhou, China.

### EUT Information

Product Description: GNSS Receiver  
Model: TS30  
Series Model: /  
Brand:   
Sample Received Date: June 4, 2026  
Sample Status: Normal  
Sample ID: A26041481 002  
Date of Tested: June 4, 2026 to September 22, 2026

| APPLICABLE STANDARDS |              |
|----------------------|--------------|
| STANDARD             | TEST RESULTS |
| CFR 47 FCC PART 90   | Pass         |

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## 2. TEST METHODOLOGY

All tests were performed in accordance with the standard ANSI C63.26-2015, ANSI/TIA-603-E-2016, CFR 47 FCC Part 2, CFR 47 FCC Part 90, ISED RSS-119 Issue 12 and ISED RSS-GEN Issue 5.

## 3. FACILITIES AND ACCREDITATION

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accreditation Certificate | <p><b>A2LA (Certificate No.: 6947.01)</b><br/>Guangdong Global Testing Technology Co., Ltd.<br/>has been assessed and proved to be in compliance with A2LA.</p> <p><b>FCC (FCC Designation No.: CN1343)</b><br/>Guangdong Global Testing Technology Co., Ltd.<br/>has been recognized to perform compliance testing on equipment<br/>subject to Supplier's Declaration of Conformity (SDoC) and<br/>Certification rules</p> <p><b>ISED (Company No.: 30714)</b><br/>Guangdong Global Testing Technology Co., Ltd.<br/>has been registered and fully described in a report filed with ISED.<br/>The Company Number is 30714 and the test lab Conformity<br/>Assessment Body Identifier (CABID) is CN0148.</p> |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Items                                                                                                                                       | k    | Uncertainty                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------|
| Occupied Bandwidth                                                                                                                               | 1.96 | ±9.2 PPM                                                                                                    |
| Conducted Output Power                                                                                                                           | 1.96 | ±1.5 dB                                                                                                     |
| Conducted Spurious Emission                                                                                                                      | 1.96 | 9 kHz-30 MHz: ± 0.95 dB<br>30 MHz-1 GHz: ± 1.5 dB<br>1GHz-12.75GHz: ± 1.8 dB<br>12.75 GHz-26.5 GHz: ± 2.1dB |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96. |      |                                                                                                             |

| Test Item                                                                                                                                     | Measurement Frequency Range | K | U(dB) |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---|-------|
| Conducted emissions from the AC mains power ports (AMN)                                                                                       | 150 kHz ~ 30 MHz            | 2 | 3.37  |
| Radiated emissions                                                                                                                            | 9 kHz ~ 30 MHz              | 2 | 4.16  |
| Radiated emissions                                                                                                                            | 30 MHz ~ 1 GHz              | 2 | 3.79  |
| Radiated emissions                                                                                                                            | 1 GHz ~ 18 GHz              | 2 | 5.62  |
| Radiated emissions                                                                                                                            | 18 GHz ~ 40 GHz             | 2 | 5.54  |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |                             |   |       |

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

|                  |         |                                                                                |
|------------------|---------|--------------------------------------------------------------------------------|
| EUT Name         |         | GNSS Receiver                                                                  |
| Model            |         | TS30                                                                           |
| Series Model     |         | /                                                                              |
| Model Difference |         | /                                                                              |
| Hardware Version |         | V1.0                                                                           |
| Software Version |         | 2.0.38-alpha                                                                   |
| Ratings          |         | DC 5V/Battery 7.2V                                                             |
| Adapter Ratings  |         | MODEL: QL015-0503000U1<br>INPUT: 100-240V~ 50/60Hz 0.5A<br>OUTPUT: 5.0V===3.0A |
| Power Supply     | AC      | 120V 60Hz                                                                      |
|                  | DC      | 5V                                                                             |
|                  | Battery | 7.2V                                                                           |

|                      |                                                                                                                                                    |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Frequency  | 410 MHz to 470 MHz                                                                                                                                 |
| Type of Modulation   | GMSK                                                                                                                                               |
| Channel Separation   | 6.25kHz                                                                                                                                            |
| Channel Bandwidth    | 6.25kHz                                                                                                                                            |
| Rated Power          | High power: 2.0W<br>Low power: 1.0W                                                                                                                |
| Normal Test Voltage: | 7.2 V                                                                                                                                              |
| Note:                | The Antenna Gain was provided by applicant, and this information may affect the validity of the results, applicant should be responsible for this. |

### 5.2. TEST CHANNEL CONFIGURATION

| Test Channel | Frequency (MHz) | Channel Spacing (kHz) | Modulation Type |
|--------------|-----------------|-----------------------|-----------------|
| 1            | 410.00625       | 6.25                  | GMSK            |
| 2            | 440             | 6.25                  | GMSK            |
| 3            | 469.99375       | 6.25                  | GMSK            |

### 5.3. THE WORSE CASE POWER SETTING PARAMETER

| The Worse Case Power Setting Parameter |                         |                             |         |         |
|----------------------------------------|-------------------------|-----------------------------|---------|---------|
| Test Software Version                  |                         | sscom5.13.1                 |         |         |
| Modulation Type                        | Transmit Antenna Number | Test Software setting value |         |         |
|                                        |                         | CH 1                        | CH 2    | CH 3    |
| GMSK                                   | 1                       | Default                     | Default | Default |

#### 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

| Antenna | Frequency (MHz) | Antenna Type | MAX Antenna Gain (dBi) |
|---------|-----------------|--------------|------------------------|
| 1       | 410-470         | External     | 4.29                   |

| Test Mode | Transmit and Receive Mode                    | Description                                              |
|-----------|----------------------------------------------|----------------------------------------------------------|
| GMSK      | <input checked="" type="checkbox"/> 1TX, 1RX | Antenna 1 can be used as transmitting/receiving antenna. |

#### 5.5. EUT ACCESSORY

| Adapter    |                                      |
|------------|--------------------------------------|
| Model No.: | QL015-0503000U1                      |
| Input:     | 100-240V~ 50/60Hz 0.5A               |
| Output:    | 5V = 3.0A                            |
| AC Cable:  | /                                    |
| DC Cable:  | 1.54 Meter, Shielded without ferrite |

#### 5.6. SUPPORT UNITS FOR SYSTEM TEST

The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. | Note        |
|------|-----------|-----------|----------------|------------|-------------|
| E-1  | Laptop    | Lenovo    | T14            | /          | GTG Support |

#### 5.7. SETUP DIAGRAM

Radiated emissions:



AC Power Line Conducted Emission:



## 6. MEASURING EQUIPMENT AND SOFTWARE USED

| Test Equipment of Conducted RF      |                 |                      |             |            |            |
|-------------------------------------|-----------------|----------------------|-------------|------------|------------|
| Equipment                           | Manufacturer    | Model No.            | Serial No.  | Last Cal.  | Due Date   |
| Spectrum Analyzer                   | Rohde & Schwarz | FSV40-N              | 102257      | 2026/08/04 | 2027/08/03 |
| Spectrum Analyzer                   | KEYSIGHT        | N9020A               | MY51285127  | 2026/08/04 | 2027/08/03 |
| EXG Analog Signal Generator         | KEYSIGHT        | N5173B               | MY61253075  | 2026/08/04 | 2027/08/03 |
| Vector Signal Generator             | Rohde & Schwarz | SMM100A              | 101899      | 2026/08/04 | 2027/08/03 |
| RF Control box                      | MWRF-test       | MW100-RFCB           | MW220926GTG | 2026/08/04 | 2027/08/03 |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW270               | 102792      | 2026/08/04 | 2027/08/03 |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500               | 103235      | 2026/08/04 | 2027/08/03 |
| temperature humidity chamber        | Espec           | SH-241               | SH-241-2014 | 2026/08/11 | 2027/08/10 |
| RF Test Software                    | MWRF-test       | MTS8310E (Ver. V2/0) | N/A         | N/A        | N/A        |

| Test Equipment of Radiated emissions below 1GHz |                 |                         |            |            |            |
|-------------------------------------------------|-----------------|-------------------------|------------|------------|------------|
| Equipment                                       | Manufacturer    | Model No.               | Serial No. | Last Cal.  | Due Date   |
| 3m Semi-anechoic Chamber                        | ETS             | 9*6*6m                  | Q2146      | 2025/08/23 | 2028/08/22 |
| EMI Test Receiver                               | Rohde & Schwarz | ESCI3                   | 101409     | 2026/08/03 | 2027/08/02 |
| Pre-Amplifier                                   | HzEMC           | HPA-9K0130              | HYPA21002  | 2026/08/03 | 2027/08/02 |
| Biconilog Antenna                               | Schwarzbeck     | VULB 9168               | 01315      | 2025/09/20 | 2028/09/19 |
| Biconilog Antenna                               | ETS             | 3142E                   | 00243651   | 2025/02/22 | 2028/02/21 |
| Loop Antenna                                    | ETS             | 6502                    | 00243668   | 2025/02/22 | 2028/02/21 |
| RF Cable                                        | TIMES Microwave | LMR240UF-NMMN-14M       | N/A        | 2026/08/03 | 2027/08/02 |
| RF Cable                                        | TIMES Microwave | HF205-NMMN-11.00M       | N/A        | 2026/08/03 | 2027/08/02 |
| RF Cable                                        | JCT             | JCT-06S-NJ-NJ-2.5M      | N/A        | 2026/08/03 | 2027/08/02 |
| Test Software                                   | Farad           | EZ-EMC (Ver.FA-03A2 RE) | N/A        | N/A        | N/A        |
| Test Software                                   | Tonscend        | TS+ (Ver. 5.0.0)        | N/A        | N/A        | N/A        |

| Test Equipment of Radiated emissions above 1GHz |              |           |            |            |            |
|-------------------------------------------------|--------------|-----------|------------|------------|------------|
| Equipment                                       | Manufacturer | Model No. | Serial No. | Last Cal.  | Due Date   |
| 3m Semi-anechoic Chamber                        | ETS          | 9*6*6m    | Q2149      | 2025/08/23 | 2028/08/22 |

|                   |                 |                  |             |            |            |
|-------------------|-----------------|------------------|-------------|------------|------------|
| Spectrum Analyzer | Rohde & Schwarz | FSV40            | 101413      | 2026/08/03 | 2027/08/02 |
| Pre-Amplifier     | HzEMC           | HPA-1G1850       | HYP A21003  | 2026/08/04 | 2027/08/03 |
| Horn antenna      | ETS             | 3117             | 00246069    | 2025/02/22 | 2028/02/21 |
| Pre-Amplifier     | HzEMC           | HPA-184057       | HYP A21004  | 2026/08/04 | 2027/08/03 |
| Horn antenna      | ETS             | 3116C            | 00246265    | 2025/02/22 | 2028/02/21 |
| RF Filter Bank    | HzEMC           | HSW-F18          | HSWF2218E01 | 2026/08/03 | 2027/08/02 |
| RF Filter Bank    | HzEMC           | HPF18            | HPF2218E02  | 2026/08/03 | 2027/08/02 |
| RF Cable          | TIMES Microwave | HF205-NMNM-7.00M | N/A         | 2026/08/03 | 2027/08/02 |
| RF Cable          | TIMES Microwave | HF205-NMNM-2.50M | N/A         | 2026/08/03 | 2027/08/02 |
| Test Software     | Tonscend        | TS+ (Ver. 5.0.0) | N/A         | N/A        | N/A        |

## 7. ANTENNA PORT TEST RESULTS

### 7.1. RF POWER OUTPUT

#### LIMITS

Per FCC §2.1046 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

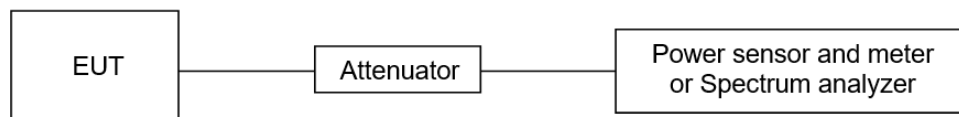
RSS-119 §5.4: The output power shall be within  $\pm 1.0$  dB of the manufacturer's rated power.

#### TEST PROCEDURE

Connect the EUT to a low loss RF cable from the antenna port to the power sensor and meter or Spectrum analyzer (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

#### TEST SETUP



#### TEST ENVIRONMENT

|                     |        |                   |     |
|---------------------|--------|-------------------|-----|
| Temperature         | 24.9°C | Relative Humidity | 48% |
| Atmosphere Pressure | 101kPa |                   |     |

#### TEST RESULTS

Please refer to section "Test Data" - Appendix D

## 7.2. OCCUPIED BANDWIDTH & EMISSION MASK

### LIMITS

Emission Mask E—6.25 kHz or less channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1. On any frequency from the center of the authorized bandwidth  $f_0$  to 3.0 kHz removed from  $f_0$ : Zero dB.

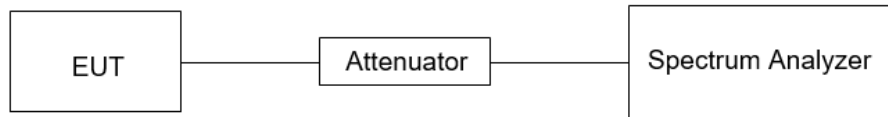
2. On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(f_d - 3 \text{ kHz})$  or  $55 + 10 \log (P)$  or 65 dB, whichever is the lesser attenuation.

3. On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least  $55 + 10 \log (P)$  or 65 dB, whichever is the lesser attenuation.

4. The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

### TEST PROCEDURE

- 1) The DUT transmitter output port was connected to RF Communications Test Set.
- 2) Path loss for the measurement included.
- 3) Spectrum set as follow:  
Centre frequency = fundamental frequency, span=62.50 kHz, RBW=300 Hz, VBW=910 Hz, Sweep = auto, Detector function = peak, Trace = max hold
- 4) Key the transmitter and set the level of the unmodulated carrier to a full scale reference line. This is the 0dB reference for the measurement.
- 5) Set RF Communications Test Set audio bandwidth filter to 15 kHz low pass filter and 50 Hz high pass filter.
- 6) Transmit the radio and set the RF Communications Test Set to 2.5 kHz tone at an input level 16 dB greater than that necessary to produce 50 % deviation
- 7) Measure and record the results in the test report.
- 8) Use the 99 % occupied bandwidth and ndB bandwidth function to test the bandwidth.

**TEST SETUP****TEST ENVIRONMENT**

|                     |        |                   |     |
|---------------------|--------|-------------------|-----|
| Temperature         | 24.9°C | Relative Humidity | 48% |
| Atmosphere Pressure | 101kPa |                   |     |

**TEST RESULTS**

Please refer to section "Test Data" - Appendix D

### 7.3. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

#### LIMITS

For 6.25 kHz Channel Separation mode:  $55 + 10 \log (\text{Pwatts})$

Calculation: Limit (dBm) =  $\text{EL} - 55 - 10 \log_{10} (\text{TP})$

Notes: EL is the emission level of the Output Power expressed in dBm, In this application, the EL is P (dBm).

Limit (dBm) =  $\text{P}(\text{dBm}) - 55 - 10 \log (\text{Pwatts}) = -25 \text{ dBm}$

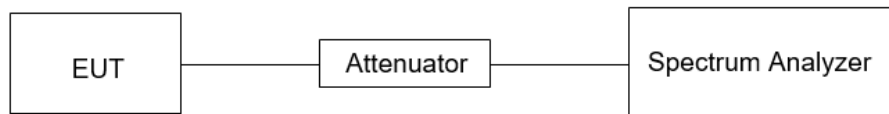
#### TEST PROCEDURE

Connect the EUT to the spectrum analyzer and use the following settings for reference level measurement:

| Spectrum Analyzer | Setting                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Detector          | Peak                                                                                                                                                      |
| RBW               | 100 kHz: $30 \text{ MHz} \leq f < 1000 \text{ MHz}$<br>1 MHz: $1000 \text{ MHz} \leq f < 10\text{th Harmonics}$                                           |
| VBW               | $\geq 3 \times \text{RBW}$ : $30 \text{ MHz} \leq f < 1000 \text{ MHz}$<br>$\geq 3 \times \text{RBW}$ : $1000 \text{ MHz} \leq f < 10\text{th Harmonics}$ |
| Trace             | Max hold                                                                                                                                                  |
| Sweep time        | Auto couple.                                                                                                                                              |

Sufficient scans were taken to show any out of band emissions up to 10th Harmonics

#### TEST SETUP



#### TEST ENVIRONMENT

|                     |        |                   |     |
|---------------------|--------|-------------------|-----|
| Temperature         | 24.9°C | Relative Humidity | 48% |
| Atmosphere Pressure | 101kPa |                   |     |

#### TEST RESULTS

Please refer to section "Test Data" - Appendix D

Note: For all conducted spurious emissions measurements, the offset from cable loss and test system for whole test band was applied to the measurement result.

## 7.4. TRANSMITTER RADIATED SPURIOUS EMISSION

### LIMITS

$EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m. when  $m = 3$ ,  $EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} - 95.2$

For 6.25 kHz Channel Separation mode:  $55 + 10 \log (\text{Pwatts})$

Calculation: Limit (dBm) =  $EL - 55 - 10\log_{10} (\text{TP})$

Notes: EL is the emission level of the Output Power expressed in dBm, In this application, the EL is P (dBm).

Limit (dBm) =  $P(\text{dBm}) - 55 - 10 \log (\text{Pwatts}) = -25 \text{ dBm}$

Limit (dBuV/m) =  $-25 + 95.2 = 70.2 \text{ dBuV/m}$

### TEST PROCEDURE

Below 1GHz test procedure as below:

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. Calculate power in dBm by the following formula:  
 $ERP(\text{dBm}) = Pg(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$

Where:

$P_d$  is the dipole equivalent power,  $P_g$  is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to  $P_g [\text{dBm}] - \text{cable loss [dB]}$ . The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -25 dBm which is equivalent to the required minimum attenuation of  $55 + 10\log_{10}(\text{Power [Watts]})$ .

Above 1GHz test procedure as below:

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.

10. Calculate power in dBm by the following formula:

$$\text{EIRP(dBm)} = \text{Pg(dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$\text{EIRP} = \text{ERP} + 2.15\text{dB}$$

Where: Pg is the generator output power into the substitution antenna.

11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

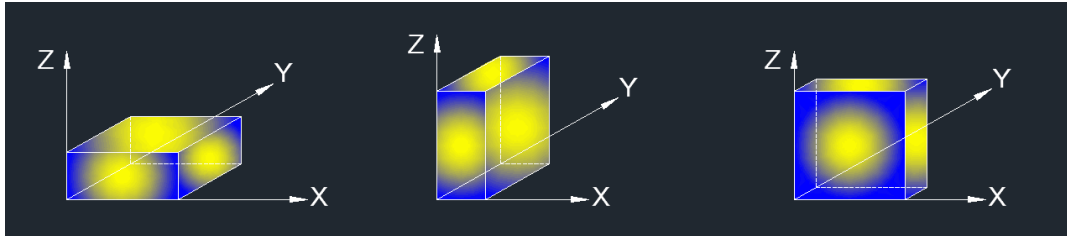
The limit line is derived from  $55 + 10\log(P)\text{dB}$  below the transmitter power P(Watts)

$$= P(\text{W}) - [55 + 10\log(P)] (\text{dB})$$

$$= [30 + 10\log(P)] (\text{dBm}) - [55 + 10\log(P)] (\text{dB})$$

$$= -25\text{dBm}.$$

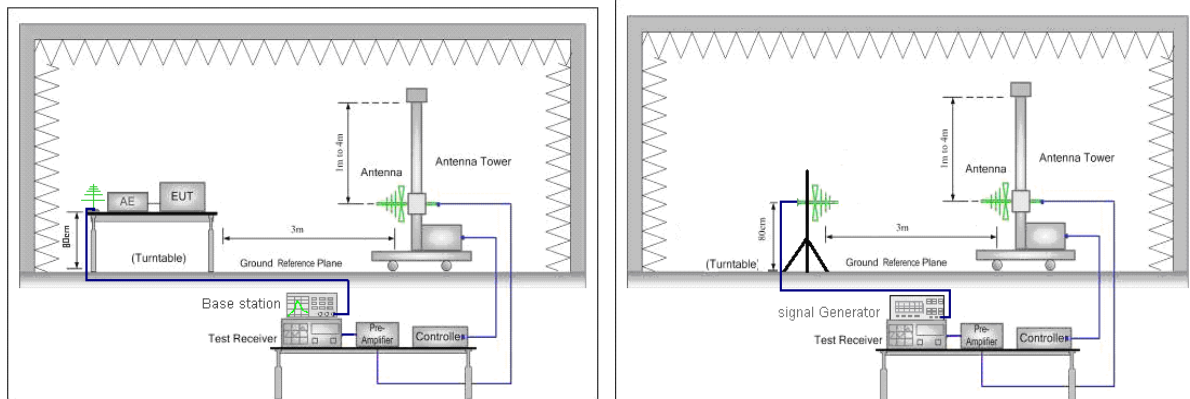
X axis, Y axis, Z axis positions:



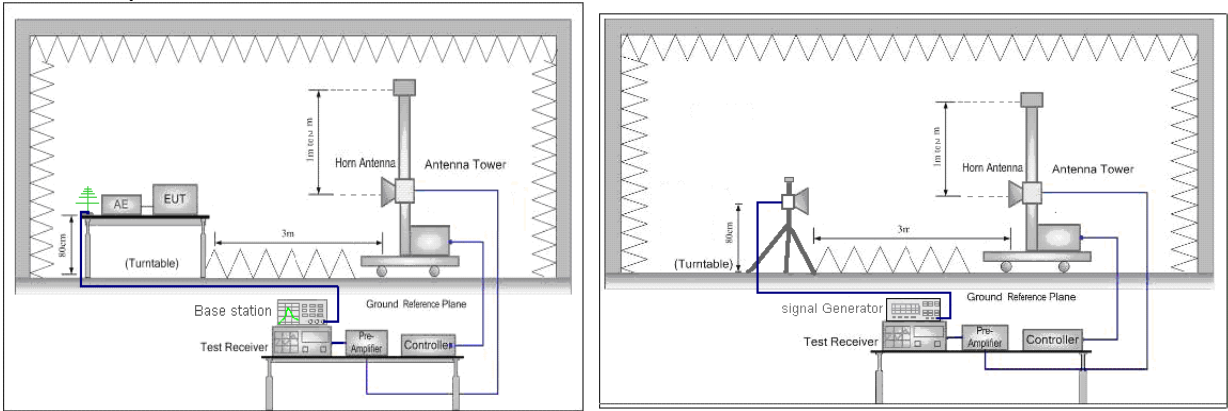
Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

## TEST SETUP

Test Setup for Below 1 GHz



Test Setup for Above 1 GHz



TEST ENVIRONMENT

|                     |        |                   |     |
|---------------------|--------|-------------------|-----|
| Temperature         | 23.6°C | Relative Humidity | 52% |
| Atmosphere Pressure | 101kPa |                   |     |

TEST RESULTS

Please refer to section "Test Data" - Appendix D

## 7.5. FREQUENCY STABILITY

### LIMITS

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Minimum Frequency Stability  
[Parts per million (ppm)]

| Frequency range<br>(MHz) | Fixed and base<br>stations | Mobile stations              |                                 |
|--------------------------|----------------------------|------------------------------|---------------------------------|
|                          |                            | Over 2 watts output<br>power | 2 watts or less output<br>power |
| Below 25                 | <sup>1 2 3</sup> 100       | 100                          | 200                             |
| 25-50                    | 20                         | 20                           | 50                              |
| 72-76                    | 5                          |                              | 50                              |
| 150-174                  | <sup>5 11</sup> 5          | <sup>6</sup> 5               | <sup>4 6</sup> 50               |
| 216-220                  | 1.0                        |                              | 1.0                             |
| 220-222 <sup>12</sup>    | 0.1                        | 1.5                          | 1.5                             |
| 421-512                  | <sup>7 11 14</sup> 2.5     | <sup>8</sup> 5               | <sup>8</sup> 5                  |
| 806-809                  | <sup>14</sup> 1.0          | 1.5                          | 1.5                             |
| 809-824                  | <sup>14</sup> 1.5          | 2.5                          | 2.5                             |
| 851-854                  | 1.0                        | 1.5                          | 1.5                             |
| 854-869                  | 1.5                        | 2.5                          | 2.5                             |
| 896-901                  | <sup>14</sup> 0.1          | 1.5                          | 1.5                             |
| 902-928                  | 2.5                        | 2.5                          | 2.5                             |
| 902-928 <sup>13</sup>    | 2.5                        | 2.5                          | 2.5                             |
| 929-930                  | 1.5                        |                              |                                 |
| 935-940                  | 0.1                        | 1.5                          | 1.5                             |
| 1427-1435                | <sup>9</sup> 300           | 300                          | 300                             |
| Above 2450 <sup>10</sup> |                            |                              |                                 |

<sup>1</sup>Fixed and base stations with over 200 watts transmitter power must have a frequency stability of 50 ppm except for equipment used in the Public Safety Pool where the frequency stability is 100 ppm.

<sup>2</sup>For single sideband operations below 25 MHz, the carrier frequency must be maintained within 50 Hz of the authorized carrier frequency.

<sup>3</sup>Travelers information station transmitters operating from 530-1700 kHz and transmitters exceeding 200 watts peak envelope power used for disaster communications and long distance circuit operations pursuant to §§90.242 and 90.264 must maintain the carrier frequency to within 20 Hz of the authorized frequency.

<sup>4</sup>Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.

<sup>5</sup>In the 150-174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

<sup>6</sup>In the 150-174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.

<sup>7</sup>In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

<sup>8</sup>In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

<sup>9</sup>Fixed stations with output powers above 120 watts and necessary bandwidth less than 3 kHz must operate with a frequency stability of 100 ppm. Fixed stations with output powers less than 120 watts and using time-division multiplex, must operate with a frequency stability of 500 ppm.

<sup>10</sup>Except for DSRCS equipment in the 5850-5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850-5925 MHz band is specified in subpart M of this part.

<sup>11</sup>Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

<sup>12</sup>Mobile units may utilize synchronizing signals from associated base stations to achieve the specified carrier stability.

<sup>13</sup>Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency tolerance restrictions.

<sup>14</sup>Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

(b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

## **TEST PROCEDURE**

Frequency stability over variations in temperature:

- 1) The EUT transmitter output port was connected to analyzer.
- 2) The EUT was placed inside the temperature chamber.
- 3) Supply the EUT with a DC 7.2 V voltage by DC power supply.

- 4) Turn EUT off and set the chamber temperature to -30 °C. After the temperature stabilized for approximately 30 minutes recorded the frequency as  $MCF_{MHz}$ .
- 5) Calculate the ppm frequency error by the following:  

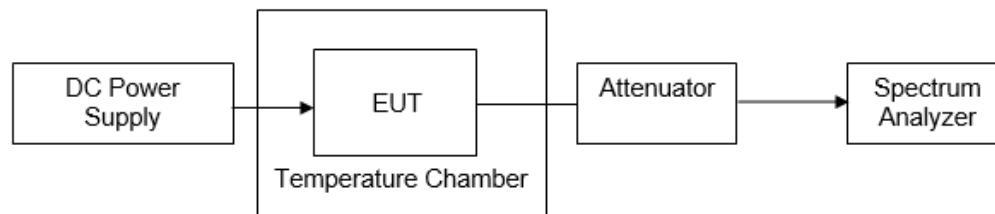
$$\text{ppm error} = (MCF_{MHz}/ACF_{MHz} - 1) * 10^6$$
 where  
 $MCF_{MHz}$  is the Measured Carrier Frequency in MHz  $ACF_{MHz}$  is the Assigned Carrier Frequency in MHz
- 6) Repeat step 4 measure with 10 °C increased per stage until the highest temperature of +50 °C reached.

Frequency stability when varying supply voltage:

- 7) The EUT transmitter output port was connected to analyzer.
- 8) The EUT was placed inside the temperature chamber at -40 °C to +70 °C.
- 9) Supply the EUT with a DC 7.2 V voltage by power supply.
- 10) Recorded the frequency as  $MCF_{MHz}$ .
- 11) Calculate the ppm frequency error by the following:  

$$\text{ppm error} = (MCF_{MHz}/ACF_{MHz} - 1) * 10^6$$
 where  
 $MCF_{MHz}$  is the Measured Carrier Frequency in MHz  $ACF_{MHz}$  is the Assigned Carrier Frequency in MHz
- 12) Repeat step 4 measure with vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.

### **TEST SETUP**



### **TEST ENVIRONMENT**

|                     |        |                   |     |
|---------------------|--------|-------------------|-----|
| Temperature         | 24.9°C | Relative Humidity | 48% |
| Atmosphere Pressure | 101kPa |                   |     |

### **TEST RESULTS**

Please refer to section "Test Data" - Appendix D

## 7.6. TRANSIENT FREQUENCY BEHAVIOR

### LIMITS

| Time intervals <sup>1 2</sup>                                                       | Maximum frequency difference <sup>3</sup> | All equipment  |                |
|-------------------------------------------------------------------------------------|-------------------------------------------|----------------|----------------|
|                                                                                     |                                           | 150 to 174 MHz | 421 to 512 MHz |
| Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels   |                                           |                |                |
| t <sub>1</sub> <sup>4</sup>                                                         | ±25.0 kHz                                 | 5.0 ms         | 10.0 ms        |
| t <sub>2</sub>                                                                      | ±12.5 kHz                                 | 20.0 ms        | 25.0 ms        |
| t <sub>3</sub> <sup>4</sup>                                                         | ±25.0 kHz                                 | 5.0 ms         | 10.0 ms        |
| Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels |                                           |                |                |
| t <sub>1</sub> <sup>4</sup>                                                         | ±12.5 kHz                                 | 5.0 ms         | 10.0 ms        |
| t <sub>2</sub>                                                                      | ±6.25 kHz                                 | 20.0 ms        | 25.0 ms        |
| t <sub>3</sub> <sup>4</sup>                                                         | ±12.5 kHz                                 | 5.0 ms         | 10.0 ms        |
| Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels |                                           |                |                |
| t <sub>1</sub> <sup>4</sup>                                                         | ±6.25 kHz                                 | 5.0 ms         | 10.0 ms        |
| t <sub>2</sub>                                                                      | ±3.125 kHz                                | 20.0 ms        | 25.0 ms        |
| t <sub>3</sub> <sup>4</sup>                                                         | ±6.25 kHz                                 | 5.0 ms         | 10.0 ms        |

<sup>1</sup> *t<sub>on</sub> is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.*

*t<sub>1</sub> is the time period immediately following t<sub>off</sub>.*

*t<sub>2</sub> is the time period immediately following t<sub>1</sub>.*

*t<sub>3</sub> is the time period from the instant when the transmitter is turned off until t<sub>off</sub>.*

*t<sub>off</sub> is the instant when the 1 kHz test signal starts to rise.*

<sup>2</sup> *During the time from the end of t<sub>2</sub> to the beginning of t<sub>3</sub>, the frequency difference must not exceed the limits specified in § 90.213.*

<sup>3</sup> *Difference between the actual transmitter frequency and the assigned transmitter frequency.*

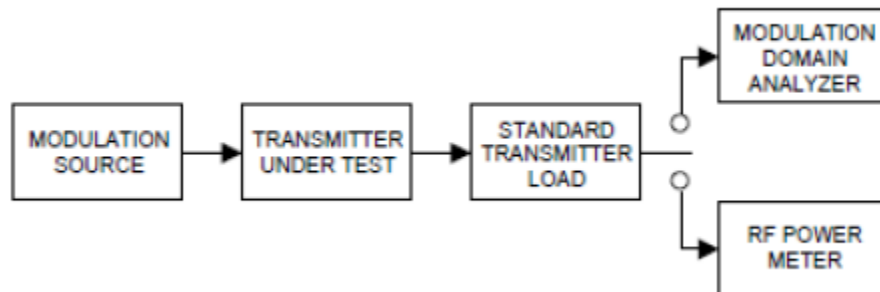
<sup>4</sup> *If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.*

### TEST PROCEDURE

1. Connect the equipment as illustrated.
2. Modulate the transmitter with the standard transmitter symbol rate pattern.
3. Connect the output of the standard transmitter load to the RF power meter. Supply sufficient attenuation via the RF attenuator to provide a level that is approximately 40 dB below the maximum allowable input to the modulation domain analyzer.
4. Turn the transmitter off.
5. Disconnect the RF power meter and connect the modulation domain analyzer in its place. Set the envelope trigger of the modulation domain analyzer to the minimum level that will trigger when the transmitter is keyed.
6. Reduce the attenuation of the RF attenuator so that the input to the modulation domain analyzer is increased by 30 dB when the transmitter is turned on.
7. Set the modulation domain analyzer to trigger on the rising edge of the waveform in order to capture a single-shot turn-on of the transmitter signal.
8. Adjust the display of the modulation domain analyzer for proper viewing of the transmitter transient behavior. Set the timebase reference to the left for observing the transmitter turn-on transient.
9. Turn the transmitter on.
10. Observe the stored display of the modulation domain analyzer. The average of the positive and negative peak of the signal trace shall be maintained within the allowable limits during the periods  $t_1$  and  $t_2$ , and shall also remain within limits following  $t_2$ .

11. Adjust the modulation domain analyzer to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transient of the transmitter signal.
12. Adjust the display of the modulation domain analyzer for proper viewing of the transmitter transient behavior. Set the timebase reference to the right for observing the transmitter turn-off transient.
13. Turn off the transmitter.
14. Observe the stored display of the modulation domain analyzer. The average of the positive and negative peak of the signal trace shall be maintained within the allowable limits during the period  $t_3$ .

### **TEST SETUP**



### **TEST ENVIRONMENT**

|                     |        |                   |     |
|---------------------|--------|-------------------|-----|
| Temperature         | 24.9°C | Relative Humidity | 48% |
| Atmosphere Pressure | 101kPa |                   |     |

### **TEST RESULTS**

Please refer to section "Test Data" - Appendix D

## **8. TEST DATA - APPENDIX D**

Please refer to section "Test Data" - Appendix D

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**END OF REPORT**