

**Produkte**  
*Products*

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                  |                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------|
| <b>Prüfbericht - Nr.:</b> 19660295 001                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                   | <b>Seite 1 von 19</b>                            |                                                                                |
| <i>Test Report No.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                   | <i>Page 1 of 19</i>                              |                                                                                |
| <b>Auftraggeber:</b><br><i>Client:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | The Heil Co.<br>2030 Hamilton Place Blvd.<br>Suite 200<br>Chattanooga, TN 37421<br>United States                                                                                                  |                                                  |                                                                                |
| <b>Gegenstand der Prüfung:</b><br><i>Test item:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3 <sup>rd</sup> Eye Cam                                                                                                                                                                           |                                                  |                                                                                |
| <b>Bezeichnung:</b><br><i>Identification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | V4                                                                                                                                                                                                | <b>Serien-Nr.:</b><br><i>Serial No.</i>          | 14                                                                             |
| <b>Wareneingangs-Nr.:</b><br><i>Receipt No.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1803223211                                                                                                                                                                                        | <b>Eingangsdatum:</b><br><i>Date of receipt:</i> | 04.04.2017                                                                     |
| <b>Prüfört:</b><br><i>Testing location:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Refer Page 4 of 19 for test facilities                                                                                                                                                            |                                                  |                                                                                |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                            | FCC Part 2, Part 22H, Part 24E & Part 27<br>ANSI C63.10-2013 & TIA-603-D-2010                                                                                                                     |                                                  |                                                                                |
| <b>Prüfergebnis:</b><br><i>Test Result:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).<br><i>The test items passed the test specification(s).</i>                                                                         |                                                  |                                                                                |
| <b>Prüflaboratorium:</b><br><i>Testing Laboratory:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                         | TÜV Rheinland (India) Pvt. Ltd.<br>82/A, 3rd Main, West Wing, Electronic City Phase 1<br>Hosur Road, Bangalore – 560 100. India<br><br>FCC Registration No.: 176555 & IC OATS Reg. Number.: 3466E |                                                  |                                                                                |
| <b>geprüft / tested by:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                   | <b>kontrolliert / reviewed by:</b>               |                                                                                |
| 06.04.2017                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Shrikanth S Naik<br>Sr.Engineer                                                                                                                                                                   | 12.04.2017                                       | Saibaba Siddapur<br>Assistant Manager                                          |
| <b>Datum</b><br><i>Date</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Name/Stellung</b><br><i>Name/Position</i>                                                                                                                                                      | <b>Unterschrift</b><br><i>Signature</i>          | <b>Datum</b><br><i>Date</i>                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                  |                                                                                |
| <b>Sonstiges / Other Aspects:</b> FCC ID : 2AL99-TECV4 & IC : 22779-TECV4                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                   |                                                  |                                                                                |
| <b>Abkürzungen:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | P(ass) = entspricht Prüfgrundlage<br>F(ail) = entspricht nicht Prüfgrundlage<br>N/A = nicht anwendbar<br>N/T = nicht getestet                                                                     | <b>Abbreviations:</b>                            | P(ass) = passed<br>F(ail) = failed<br>N/A = not applicable<br>N/T = not tested |
| <p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b></p> <p><i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i></p> |                                                                                                                                                                                                   |                                                  |                                                                                |

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**Test Result Summary**

| Test Item                                        | Clause                                                                                  |                                                                                                                                                                                | Result |
|--------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
|                                                  | FCC                                                                                     | IC                                                                                                                                                                             |        |
| RF Output Power<br>(ERP/EIRP) – Radiated<br>Mode | FCC Part 2.1046,<br>22.913(a)(2) 24.232(c)<br>27.50(d)<br>(4),27.50(b)(10),27.50(c)(10) | RSS 132 Issue 3 section 5.4, SRSP-<br>503 section 5.1.3 & RSS 133 Issue 6<br>section 4.1/6.4, SRSP-510.5.1.2 &<br>RSS 139 Issue 3 section 6.5, RSS-<br>130 Issue 1 section 4.4 | Pass   |
| Field Strength of Spurious<br>Radiation          | FCC Part 2.1053(a),<br>22.917(a)(b), 24.238(a)(b)<br>27.53(h)                           | RSS 132 Issue 3 section 5.5 (i)(ii) &<br>RSS 133 Issue 6 section 6.5.1 (i)(ii)<br>& RSS 139 Issue 3 section 6.6(i)(ii),<br>RSS-130 Issue 1 section 4.6                         | Pass   |
| Radiated Spurious<br>Emission                    | FCC Part 15.109                                                                         | ICES 003 Issue 6 Section 6.2.1                                                                                                                                                 | Pass   |

**Note:** Product contains certified RF module with FCC ID: QIPPLS8-X and IC: 830A-PLS8X, hence antenna port related test cases are not reported.

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Appendix 1: Test Setup Photo

Appendix 2: EUT External Photo

Appendix 3: EUT Internal Photo

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Appendix 5: Block Diagram

Appendix 6: Specification of EUT

Appendix 7: Schematic Diagrams

Appendix 8: Bill of Material

Appendix 9: User Manual

Appendix 10: Maximum Permissible Exposure Information

**List of Test and Measurement Instruments**

| Equipment                            | Manufacturer    | Model Name | Serial Number | Calibration Due Date | Periodicity | Used for Test Items                  |
|--------------------------------------|-----------------|------------|---------------|----------------------|-------------|--------------------------------------|
| EMI Test Receiver                    | Rohde & Schwarz | ESU 40     | 100288        | 29.10.2017           | Yearly      | Field Strength of Spurious Radiation |
| Broadband Antenna                    | Frankonia       | ALX-4000   | 814           | 09.01.2018           | Yearly      |                                      |
| Active Loop Antenna                  | Frankonia       | LAX-10     | LAX-10-800    | 22.12.2017           | Yearly      |                                      |
| Broadband Horn Antenna               | Frankonia       | HAX-18     | HAX18-802     | 16.03.2018           | Yearly      |                                      |
| Double-Ridged Waveguide Horn Antenna | ETS Lindgren    | 116706     | 00107323      | 02.11.2017           | Yearly      |                                      |
| Wideband Radio Communication Tester  | Rohde & Schwarz | CMW500     | 158345        | 05.11.2017           | Yearly      |                                      |
| Anechoic Chamber                     | Frankonia       | -          | -             |                      | -           |                                      |

**Testing Facilities:**

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108 , Beside ISBR Business School,  
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## General Product Information

### Product Function and Intended Use

This product is intended for vehicle surveillance and records the activities like accidents for investigation. This product can be used to capture driver's behaviour and allowing management to coach driver for safe behaviour. Through video analytics this product provides awareness of what is happening with vehicle and driver all the time with recording of various data such as traffic/stop sign board detection, vehicle proximity detection, Distractions, Driving lane recognition.

### Ratings and System Details

|                               |                                                                                           |
|-------------------------------|-------------------------------------------------------------------------------------------|
| Operating Bands               | GSM/GPRS/EDGE 850MHz & 1900 MHz<br>UMTS/HSPA+: B2,B4 & B5<br>LTE: B2,B4,B5,B13 & B17      |
| Number of Antenna -Two        | Primary Antenna – One<br>Diversity Antenna - One                                          |
| Antenna Gain and Antenna type | Refer Page No.10                                                                          |
| Supply Voltage to Product     | 12VDC from Vehicle battery                                                                |
| Dimension Size (WxHxD)        | UDU: 192mm x 65mm x 122mm<br>WU: 125mm x 38mm x 75mm<br>Battery Pack: 64mm x 60mm x 121mm |
| Environmental                 | •Operating temperature: 0°C to 60°C<br>•Storage temperature: -40°C to 85°C                |

**Note:** Device exclusively used in vehicle only, it will operates on vehicle battery & Backup battery is also used to power the device for short duration when vehicle battery power is not available

### Test Conditions:

Supply Voltage: 12 VDC

### Environmental conditions:

Temperature: +25 °C      RH: 62%

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## Test Set-up and Operation Mode

### Principle of Configuration Selection

Transmission was enabled with help of CMW500 on low, mid and high channel

### Test Operation and Test Software

No Special Test software used for enabling the Transmission, Test SIM inserted in EUT to communicate with CMW500 simulator

### Special Accessories and Auxiliary Equipment

- None

### Countermeasures to achieve EMC Compliance

- None

### Test Modes – Data Rates and Modulations

For Radiated spurious emissions, the tests were performed for all data rates and only worst case results are reported in this report.

Ethernet cable is not used in vehicle (i.e. in field) but was used during testing for remote debugging from control room. The cable ferrite clamp used over Ethernet cable was 28A2025-0A2 (MFG: Laird-Signal Integrity Products)

Equipment used for testing as identified in below Table.

| Equipment Used for    | S/N Number | IMEI No.        | Hardware Version | Software version |
|-----------------------|------------|-----------------|------------------|------------------|
| Radiated Mode Testing | 14         | 359677060038116 | 3.0              | 1.2.2            |

### GSM/PCS Frequency band details

| Frequency Band | Uplink Frequency (MHz) | Downlink Frequency (MHz) |
|----------------|------------------------|--------------------------|
| GSM850         | 824.2 – 849.2          | 869.2 – 893.8            |
| PCS1900        | 1850.2 – 1909.8        | 1930.2 – 1989.8          |

| GSM/PCS - Frequency List of Low/Mid/High channel |                         |        |       |        |
|--------------------------------------------------|-------------------------|--------|-------|--------|
| Frequency Band                                   | Channel/Frequency (MHz) | Low    | Mid   | High   |
| GSM850                                           | Channel No.             | 128    | 190   | 251    |
|                                                  | Frequency               | 824.2  | 836.6 | 848.8  |
| PCS1900                                          | Channel No.             | 512    | 661   | 810    |
|                                                  | Frequency               | 1850.2 | 1880  | 1909.8 |

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#### W-CDMA Frequency band details

| FDD Band | Uplink Frequency (MHz) | Downlink Frequency (MHz) |
|----------|------------------------|--------------------------|
| 2        | 1852.4 – 1907.6        | 1930 – 1990              |
| 4        | 1712.4 – 1752.6        | 2110 - 2155              |
| 5        | 826.4 – 846.6          | 869 -894                 |

#### W-CDMA - Frequency List of Low/Mid/High channel

| FDD Band | Channel/Frequency (MHz) | Low    | Mid    | High   |
|----------|-------------------------|--------|--------|--------|
| 2        | Channel No.             | 9262   | 9400   | 9538   |
|          | Frequency               | 1852.4 | 1880   | 1907.6 |
| 4        | Channel No.             | 1312   | 1412   | 1513   |
|          | Frequency               | 1712.4 | 1732.4 | 1752.6 |
| 5        | Channel No.             | 4132   | 4183   | 4233   |
|          | Frequency               | 826.4  | 836.6  | 846.6  |

#### LTE bands Frequency Details

| FDD Band | Transmitter Frequency (Uplink) (MHz) | Receiver Frequency (Downlink) (MHz) |
|----------|--------------------------------------|-------------------------------------|
| 2        | 1850 – 1910                          | 1930 – 1990                         |
| 4        | 1710 – 1755                          | 2110 – 2155                         |
| 5        | 824 – 849                            | 869 – 894                           |
| 17       | 704 - 716                            | 734 - 746                           |
| 13       | 777 – 787                            | 746 – 756                           |

#### Maximum Measurement Uncertainty (UE) details

| Parameter                                           | Uncertainty |
|-----------------------------------------------------|-------------|
| Effective radiated RF power between 30MHz to 180MHz | ±6 dB       |
| Effective radiated RF power between 180MHz to 20GHz | ±3 dB       |

#### Antenna gain information:

External antenna with separate antenna connector having a RF cable length of 15feet was used with product for testing.

| Frequency  | Below 1GHz | 1700MHz | 1900MHz |
|------------|------------|---------|---------|
| Gain (dBi) | -0.25      | -1.59   | -2.03   |

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## Operational description

The product is divided into two main units: UDU (Under Dash Unit) and WU (Window Unit)

WU contains two Internal video camera inside vehicle cabin and various sensors like accelerometers, gyroscope, Ambient Light sensor UDU contains two circuit boards:

1. Power supply board to generate various DC voltages from vehicle battery. Backup battery is also used to power the device for short duration when vehicle battery power is not available.
2. Mother board with SoC and other peripherals like
  - i. uSD card for storage
  - ii.Video decoder chips to convert analog audio/video data from two internal and six external camera into digital data for storage and analysis.
  - iii.PLS8-X 2G/3G/4G-LTE wireless module
  - iv. HDMI output.

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## Test Methodology

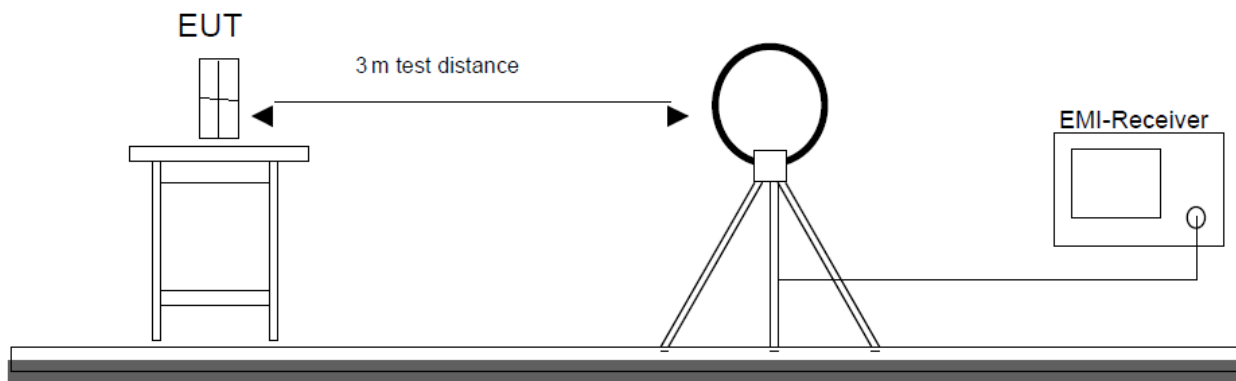
### Frequency Range 9 kHz -30 MHz

#### Test performed as per ANSI C63.10-2013 section 6.4

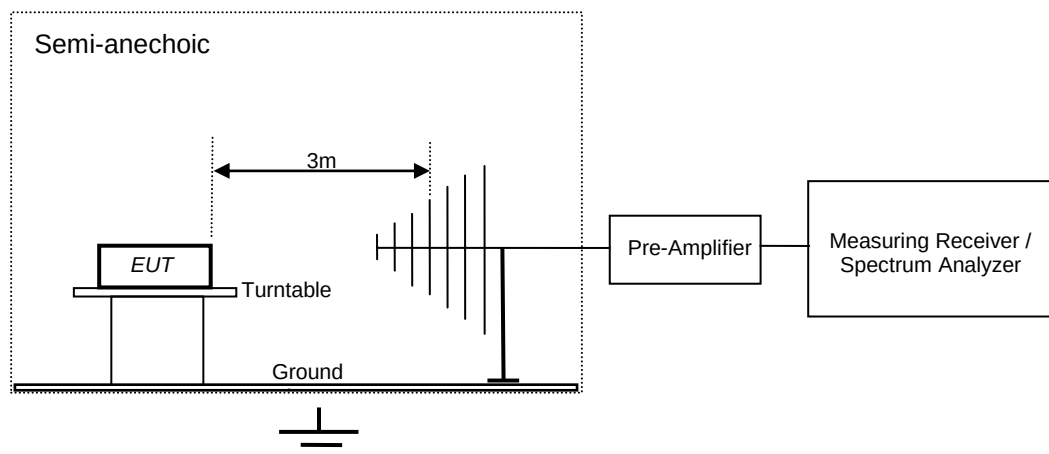
The loop Antenna was placed at 1m above the ground plane & EUT is 3 meters far from the measuring antenna. With 3m measurement distance, correction data were applied to the measured results. The test arrangement, measuring antenna guidelines and operational configurations in 6.3.1 and 6.3.2, shall be followed. The measurement antenna shall be positioned with its plane perpendicular to the ground at the Specified distance, when perpendicular to the ground plane, the lowest height of the magnetic antenna shall be 1 m above the ground and shall be positioned at the specified distance from the EUT. EUT & its associates are placed on non-conducting table of 0.8m height which is placed on the turn table, For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable. The report shall list worst case emission results, for each of the parallel & perpendicular orientations.

#### Test Setup Configuration

Frequency Range 9 kHz -30 MHz



Frequency Range 30MHz -1GHz



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## **Frequency Range 30MHz to 10<sup>th</sup> harmonics of the highest fundamental frequency**

**Test performed as per ANSI/TIA-603-D-2010 Clause 2.2.12/17**

ERP/EIRP Radiated Power & Radiated spurious emission test are performed as below.

The equipment under test is placed on non-conductive table at 3m away from the receive antenna in accordance with above mentioned standard. Turn table is rotated through 360 degree, and receiver antenna height is varied in order to determine the level of maximum emission. The maximum emission level and position of the maximized emission is recorded with use of spectrum analyzer.

The EUT is substituted by a substitution antenna. The substitute antenna is connected to a signal generator. Adjust the output level of the signal generator to get the same power recorded in with EUT and record the power level of Signal Generator. The cable loss at the test frequency should be compensated

The Power is calculated by the following formula

$$P_d \text{ (dBm)} = P_g \text{ (dBm)} - \text{Cable Loss (dB)} + \text{Antenna Gain (dB)}$$

Where

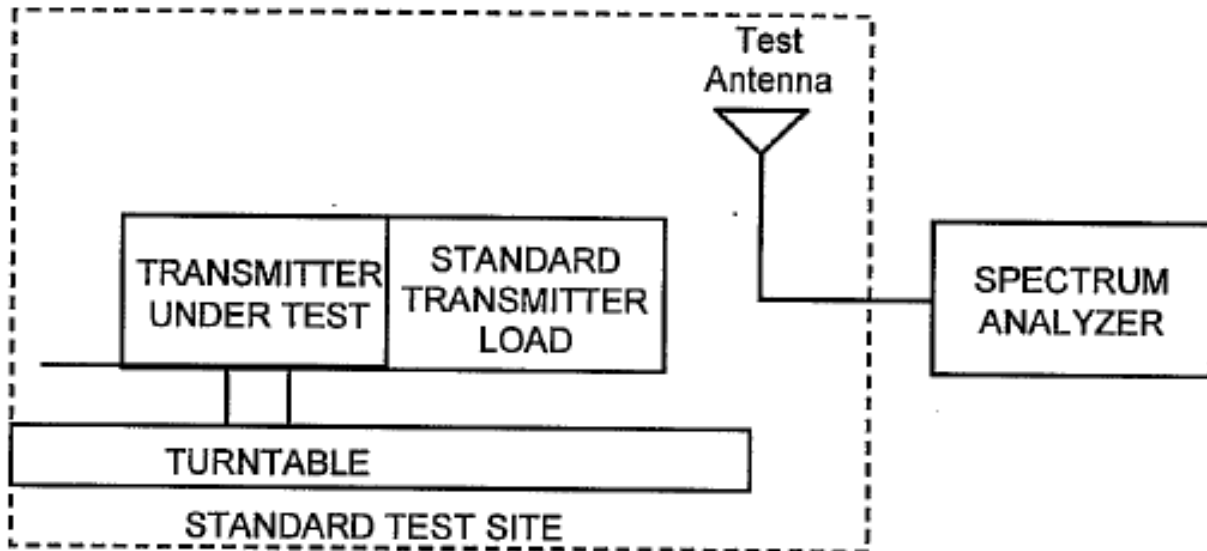
$P_d$  is the dipole equivalent power.

$P_g$  is the generator output power into the substitution antenna

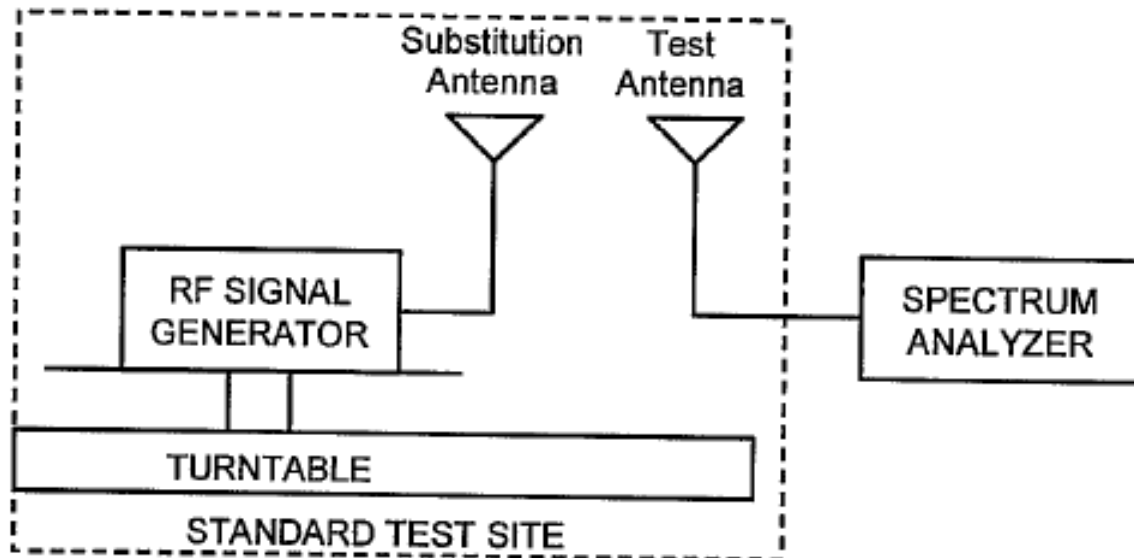
These steps are repeated with the receiving antenna in the both vertical & horizontal polarization

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## Measurement Method



## Substitute measurement method



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## Test Results

**RF Power (ERP/EIRP) – Radiated Mode  
Result**

**Pass**

Specification Refer Below Table 1  
 Measurement Bandwidth 100KHz/1MHz  
 (RBW)  
 Detector Function Peak  
 Requirement Refer Below Table 1

**Test Limits, Test Clause – Table 1**

| Cellular Bands | FCC Rule Part                                                                               | IC Rule Part                                                                                                                                                                    | Limits                    |                                |
|----------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------|
|                |                                                                                             |                                                                                                                                                                                 | Watt                      | dBm                            |
| GSM850         | FCC Part 2.1046,<br>22.913(a)(2) 24.232(c)                                                  | RSS 132 Issue 3 section 5.4,<br>SRSP-503 section 5.1.3 &<br>RSS 133 Issue 6 section<br>4.1/6.4, SRSP-510.5.1.2                                                                  | 7 for FCC,<br>11.5 for IC | 38.4 for FCC,<br>40.60 for IC  |
| PCS1900        |                                                                                             |                                                                                                                                                                                 | 2                         | 33                             |
| WCDMA Band 2   | FCC Part 2.1046,<br>22.913(a)(2)<br>24.232(c),27.50(d)(4)                                   | RSS 132 Issue 3 section 5.4,<br>SRSP-503 section 5.1.3 &<br>RSS 133 Issue 6 section<br>4.1/6.4, SRSP-510.5.1.2<br>&RSS 139 Issue 3 section 6.5                                  | 2                         | 33                             |
| WCDMA Band 4   |                                                                                             |                                                                                                                                                                                 | 1                         | 30                             |
| WCDMA Band 5   |                                                                                             |                                                                                                                                                                                 | 7 for FCC,<br>11.5 for IC | 38.4 for FCC,<br>40.60 for IC  |
| LTE Band 2     | FCC Part 2.1046,<br>22.913(a)(2) 24.232(c)<br>27.50(d)<br>(4),27.50(b)(10),<br>27.50(c)(10) | RSS 132 Issue 3 section 5.4,<br>SRSP-503 section 5.1.3 &<br>RSS 133 Issue 6 section<br>4.1/6.4, SRSP-510.5.1.2 &<br>RSS 139 Issue 3 section 6.5,<br>RSS-130 Issue 1 section 4.4 | 2                         | 33                             |
| LTE Band 4     |                                                                                             |                                                                                                                                                                                 | 1                         | 30                             |
| LTE Band 5     |                                                                                             |                                                                                                                                                                                 | 7 for FCC,<br>11.5 for IC | 38.4 for FCC,<br>40.60 for IC  |
| LTE Band 13    |                                                                                             |                                                                                                                                                                                 | 3 for FCC,<br>5 for IC    | 34.77 for FCC,<br>36.98 for IC |
| LTE Band 17    |                                                                                             |                                                                                                                                                                                 | 3 for FCC,<br>5 for IC    | 34.77 for FCC,<br>36.98 for IC |

**Note:** For measurement of RF Output Power, Test performed as per ANSI/TIA-603-D-2010 Clause 2.2.17.

### Test Results

Note: The output power is measured with configuration of maximum conducted output power.

### GSM bands

| Mode           | Channel No. | Frequency (MHz) | Polarization | RF Power (dBm) | Limit (dBm) | Limit (Watts) |
|----------------|-------------|-----------------|--------------|----------------|-------------|---------------|
| GSM_GPRS_850   | 128         | 824.2           | Vertical     | 20.01          | 38.4        | 7             |
|                |             |                 | Horizontal   | 28.1           | 38.4        | 7             |
|                | 251         | 848.8           | Vertical     | 19.51          | 38.4        | 7             |
|                |             |                 | Horizontal   | 27.91          | 38.4        | 7             |
| GSM_EGPRS_850  | 128         | 824.2           | Vertical     | 17.32          | 38.4        | 7             |
|                |             |                 | Horizontal   | 25.35          | 38.4        | 7             |
|                | 251         | 848.8           | Vertical     | 15.44          | 38.4        | 7             |
|                |             |                 | Horizontal   | 24.23          | 38.4        | 7             |
| GSM_GPRS_1900  | 512         | 1850.2          | Vertical     | 22.07          | 33          | 2             |
|                |             |                 | Horizontal   | 25.9           | 33          | 2             |
|                | 810         | 1909.8          | Vertical     | 21.89          | 33          | 2             |
|                |             |                 | Horizontal   | 27.17          | 33          | 2             |
| GSM_EGPRS_1900 | 512         | 1850.2          | Vertical     | 16.06          | 33          | 2             |
|                |             |                 | Horizontal   | 20.58          | 33          | 2             |
|                | 810         | 1909.8          | Vertical     | 17.51          | 33          | 2             |
|                |             |                 | Horizontal   | 22.05          | 33          | 2             |

### WCDMA Bands

| Test Case : Release 99 12.2kbps RMC |                    |                                |              |                |             |               |
|-------------------------------------|--------------------|--------------------------------|--------------|----------------|-------------|---------------|
| Band                                | UARFCN Channel No. | UARFCN Channel Frequency (MHz) | Polarization | RF Power (dBm) | Limit (dBm) | Limit (Watts) |
| 2                                   | 9262               | 1852.4                         | Vertical     | 20.18          | 33          | 2             |
|                                     |                    |                                | Horizontal   | 19.79          | 33          | 2             |
|                                     | 9538               | 1907.6                         | Vertical     | 21.15          | 33          | 2             |
|                                     |                    |                                | Horizontal   | 20.54          | 33          | 2             |
| 4                                   | 1312               | 1712.4                         | Vertical     | 20.25          | 30          | 1             |
|                                     |                    |                                | Horizontal   | 23.02          | 30          | 1             |
|                                     | 1513               | 1752.6                         | Vertical     | 19.83          | 30          | 1             |
|                                     |                    |                                | Horizontal   | 23.16          | 30          | 1             |
| 5                                   | 4132               | 826.4                          | Vertical     | 8.48           | 38.5        | 7             |
|                                     |                    |                                | Horizontal   | 15.27          | 38.5        | 7             |

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|  |      |       |            |       |      |   |
|--|------|-------|------------|-------|------|---|
|  | 4233 | 846.6 | Vertical   | 7.1   | 38.5 | 7 |
|  |      |       | Horizontal | 17.87 | 38.5 | 7 |

#### LTE Bands

| Band        | Bandwidth (MHz) | Frequency (MHz) | Polarization | RF Power (dBm) | Limit (dBm) | Limit (Watts) |
|-------------|-----------------|-----------------|--------------|----------------|-------------|---------------|
| LTE Band 2  | 1.4             | 1880            | Vertical     | 15.7           | 33          | 2             |
|             |                 |                 | Horizontal   | 21.3           | 33          | 2             |
|             | 3               |                 | Vertical     | 17.15          | 33          | 2             |
|             |                 |                 | Horizontal   | 20.73          | 33          | 2             |
|             | 5               |                 | Vertical     | 15.6           | 33          | 2             |
|             |                 |                 | Horizontal   | 20.54          | 33          | 2             |
|             | 10              |                 | Vertical     | 14.55          | 33          | 2             |
|             |                 |                 | Horizontal   | 19.59          | 33          | 2             |
|             | 15              |                 | Vertical     | 13.77          | 33          | 2             |
|             |                 |                 | Horizontal   | 18.89          | 33          | 2             |
| 20          | Vertical        | 13.09           | 33           | 2              |             |               |
|             | Horizontal      | 16.88           | 33           | 2              |             |               |
| LTE Band 4  | 1.4             | 1732.5          | Vertical     | 17.1           | 30          | 1             |
|             |                 |                 | Horizontal   | 21.04          | 30          | 1             |
|             | 3               |                 | Vertical     | 14.77          | 30          | 1             |
|             |                 |                 | Horizontal   | 19.35          | 30          | 1             |
|             | 5               |                 | Vertical     | 13.24          | 30          | 1             |
|             |                 |                 | Horizontal   | 18.47          | 30          | 1             |
|             | 10              |                 | Vertical     | 12.64          | 30          | 1             |
|             |                 |                 | Horizontal   | 16.61          | 30          | 1             |
|             | 15              |                 | Vertical     | 11.9           | 30          | 1             |
|             |                 |                 | Horizontal   | 16.55          | 30          | 1             |
| 20          | Vertical        | 12.08           | 30           | 1              |             |               |
|             | Horizontal      | 15.85           | 30           | 1              |             |               |
| LTE Band 5  | 1.4             | 836.6           | Vertical     | 7.84           | 38.5        | 7             |
|             |                 |                 | Horizontal   | 17.09          | 38.5        | 7             |
|             | 3               |                 | Vertical     | 6.24           | 38.5        | 7             |
|             |                 |                 | Horizontal   | 13.94          | 38.5        | 7             |
|             | 5               |                 | Vertical     | 4.52           | 38.5        | 7             |
|             |                 |                 | Horizontal   | 12.05          | 38.5        | 7             |
|             | 10              |                 | Vertical     | 1.46           | 38.5        | 7             |
| Horizontal  |                 | 9.57            | 38.5         | 7              |             |               |
| LTE Band 13 | 10              | 782             | Vertical     | 0.57           | 36.98       | 3             |
|             |                 |                 | Horizontal   | 8.47           | 36.98       | 3             |
| LTE Band 17 | 5               | 710             | Vertical     | -2.76          | 36.98       | 3             |
|             |                 |                 | Horizontal   | 8.69           | 36.98       | 3             |
|             | 10              |                 | Vertical     | -3.43          | 36.98       | 3             |
|             |                 |                 | Horizontal   | 7.37           | 36.98       | 3             |

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**Field Strength of Spurious Radiation  
Result**

**Pass**

|                                |                                                                                                              |
|--------------------------------|--------------------------------------------------------------------------------------------------------------|
| Specification                  | FCC Part 2.1053(a), 22.917(a)(b), 24.238(a)(b) &<br>RSS 132 Issue 3 section 5.5, RSS 133 Issue 6 section 6.5 |
| Measurement Bandwidth<br>(RBW) | 100KHz/1MHz                                                                                                  |
| Detector Function              | Peak                                                                                                         |
| Requirement                    | Shall be attenuated below the transmitter power (P in watt) by at least $43+10 \log(P)$ dBm,                 |

**Note:** For measurement of RF Output Power, Test performed as per ANSI/TIA-603-D-2010 Clause 2.2.12.

**Test Results**

Test Results below 1GHz

Worst case test results are reported.

| Polarization | Frequency<br>(MHz) | Spurious<br>Emission<br>(dBm) | Limit<br>(dBm) | Margin(dB) |
|--------------|--------------------|-------------------------------|----------------|------------|
| Vertical     | 37.76              | -62.00                        | -13            | -49.00     |
|              | 43.96              | -64.56                        | -13            | -51.56     |
|              | 148.43             | -71.34                        | -13            | -58.34     |
|              | 324                | -72.55                        | -13            | -59.55     |
|              | 374.93             | -71.05                        | -13            | -58.05     |
|              | 624.9              | -60.42                        | -13            | -47.42     |
|              | 869.24             | -53.59                        | -13            | -40.59     |
| Horizontal   | 31.35              | -61.98                        | -13            | -48.98     |
|              | 38.53              | -65.11                        | -13            | -52.11     |
|              | 43.96              | -65.58                        | -13            | -52.58     |
|              | 324                | -67.85                        | -13            | -54.85     |
|              | 374.92             | -61.43                        | -13            | -48.43     |
|              | 624.99             | -64.82                        | -13            | -51.82     |
|              | 869.24             | -54.86                        | -13            | -41.86     |

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**Test Result above 1GHz**

| Band              | Channel No. | Channel Frequency (MHz) | Emission Frequency (MHz) | Polarization | Spurious Emission (dBm) | Limit (dBm) | Margin (dB) |
|-------------------|-------------|-------------------------|--------------------------|--------------|-------------------------|-------------|-------------|
| GPRS 850          | 128         | 824.2                   | 1648.4                   | Vertical     | -58.05                  | -13         | -45.05      |
|                   |             |                         |                          | Horizontal   | -53.32                  | -13         | -40.32      |
|                   |             |                         | 2472.6                   | Vertical     | -55.32                  | -13         | -42.32      |
|                   |             |                         |                          | Horizontal   | -52.41                  | -13         | -39.41      |
|                   | 251         | 848.8                   | 1697.6                   | Vertical     | -57.74                  | -13         | -44.74      |
|                   |             |                         |                          | Horizontal   | -55.19                  | -13         | -42.19      |
|                   |             |                         | 2546.4                   | Vertical     | -59.22                  | -13         | -46.22      |
|                   |             |                         |                          | Horizontal   | -57.10                  | -13         | -44.10      |
| EGPRS 850         | 128         | 824.2                   | 1648.4                   | Vertical     | -57.46                  | -13         | -44.46      |
|                   |             |                         |                          | Horizontal   | -57.39                  | -13         | -44.39      |
|                   |             |                         | 2472.6                   | Vertical     | -55.27                  | -13         | -42.27      |
|                   |             |                         |                          | Horizontal   | -54.44                  | -13         | -41.44      |
| GPRS1900          | 661         | 1880                    | 3760                     | Vertical     | -52.97                  | -13         | -39.97      |
|                   |             |                         |                          | Horizontal   | -53.31                  | -13         | -40.31      |
| EGPRS1900         | 661         | 1880                    | 3760                     | Vertical     | -53.11                  | -13         | -40.11      |
|                   |             |                         |                          | Horizontal   | -53.20                  | -13         | -40.20      |
| W-CDMA_Band 2     | 9262        | 1852.4                  | 3704.8                   | Vertical     | -58.32                  | -13         | -45.32      |
|                   |             |                         |                          | Horizontal   | -57.27                  | -13         | -44.27      |
|                   | 9538        | 1907.5                  | 3704.8                   | Vertical     | -60.36                  | -13         | -47.36      |
|                   |             |                         |                          | Horizontal   | -59.29                  | -13         | -46.29      |
| W-CDMA_Band 4     | 1312        | 1712.4                  | 3424.8                   | Vertical     | -53.32                  | -13         | -40.32      |
|                   |             |                         |                          | Horizontal   | -52.84                  | -13         | -39.84      |
|                   | 1513        | 1752.6                  | 3505.2                   | Vertical     | -52.74                  | -13         | -39.74      |
|                   |             |                         |                          | Horizontal   | -53.06                  | -13         | -40.06      |
| W-CDMA_Band 5     | 4132        | 826.4                   | 1652.8                   | Vertical     | -42.05                  | -13         | -29.05      |
|                   |             |                         |                          | Horizontal   | -40.30                  | -13         | -27.30      |
|                   |             |                         | 2479.2                   | Vertical     | -55.48                  | -13         | -42.48      |
|                   |             |                         |                          | Horizontal   | -55.73                  | -13         | -42.73      |
|                   |             |                         | 3305.6                   | Vertical     | -53.06                  | -13         | -40.06      |
|                   |             |                         |                          | Horizontal   | -53.36                  | -13         | -40.36      |
|                   | 4233        | 846.6                   | 1693.2                   | Vertical     | -42.88                  | -13         | -29.88      |
|                   |             |                         |                          | Horizontal   | -37.70                  | -13         | -24.70      |
|                   |             |                         | 2539.8                   | Vertical     | -54.86                  | -13         | -41.86      |
|                   |             |                         |                          | Horizontal   | -54.72                  | -13         | -41.72      |
| LTE Band 2_1.4MHz | 18607       | 1850.7                  | 370134                   | Vertical     | -57.78                  | -13         | -44.78      |
|                   |             |                         |                          | Horizontal   | -56.64                  | -13         | -43.64      |
|                   | 19193       | 1909.3                  | 3818.6                   | Vertical     | -58.12                  | -13         | -45.12      |
|                   |             |                         |                          | Horizontal   | -57.33                  | -13         | -44.33      |

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|                      |       |        |        |            |        |     |        |
|----------------------|-------|--------|--------|------------|--------|-----|--------|
| LTE Band<br>4_1.4MHz | 19957 | 1710.7 | 3421.4 | Vertical   | -59.73 | -13 | -46.73 |
|                      |       |        |        | Horizontal | -59.14 | -13 | -46.14 |
|                      | 20393 | 1754.3 | 3508.6 | Vertical   | -59.27 | -13 | -46.27 |
|                      |       |        |        | Horizontal | -58.91 | -13 | -45.91 |
| LTE Band<br>5_1.4MHz | 20526 | 836.5  | 1673.2 | Vertical   | -51.40 | -13 | -38.40 |
|                      |       |        |        | Horizontal | -50.38 | -13 | -37.38 |
|                      |       |        | 2509.8 | Vertical   | -51.25 | -13 | -38.25 |
|                      |       |        |        | Horizontal | -51.62 | -13 | -38.62 |
| LTE Band<br>17_5MHz  | 23790 | 710    | 1420   | Vertical   | -53.56 | -13 | -40.56 |
|                      |       |        |        | Horizontal | -56.33 | -13 | -43.33 |
|                      |       |        | 2130   | Vertical   | -51.39 | -13 | -38.39 |
|                      |       |        |        | Horizontal | -50.60 | -13 | -37.60 |
| LTE Band<br>13_5MHz  | 23230 | 782    | 1564   | Vertical   | -52.30 | -13 | -39.30 |
|                      |       |        |        | Horizontal | -55.06 | -13 | -42.06 |
|                      |       |        | 2346   | Vertical   | -49.84 | -13 | -36.84 |
|                      |       |        |        | Horizontal | -50.97 | -13 | -37.97 |

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**Radiated Spurious Emissions  
Result**

**Pass**

|                      |                                                               |
|----------------------|---------------------------------------------------------------|
| Test Specification   | FCC Part 15.109 & ICES 003 Issue 6 ,Section 6.2.1             |
| Test Method          | ANSI C63.10-2013                                              |
| Measurement Location | Semi Anechoic Chamber                                         |
| Measuring Distance   | 3m                                                            |
| Detection            | QP for frequency below 1GHz, Average for frequency above 1GHz |
| Requirement          | As per the limits mentioned in the bellow table               |

**Radiated Spurious Emission Limits:**

| Frequency (MHz) | Field strength (μV/m) | Field strength (dBμV/m) | Distance of Measurement (m) |
|-----------------|-----------------------|-------------------------|-----------------------------|
| 0.009 – 0.490   | 2400/F(kHz)           | 48.50 – 13.80           | 300*                        |
| 0.490 – 1.705   | 24000/F(kHz)          | 33.80 – 23.00           | 30*                         |
| 1.705 -30       | 30                    | 29.54                   | 30*                         |
| 30-88           | 100                   | 40.0                    | 3                           |
| 88-216          | 150                   | 43.5                    | 3                           |
| 216-960         | 200                   | 46.0                    | 3                           |
| Above 960       | 500                   | 54.0                    | 3                           |

Remark: \* The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88.50 – 53.80, 53.80 – 43.00 and 49.5dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

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## Test results:

**For Frequency Range 9kHz – 30MHz**

No emissions found in this frequency range.

**For Frequency Range 30MHz – 1GHz**

| Polarization | Frequency (MHz) | Radiated Spurious Emission (dBm) | Limit (dBµV/m) | Margin (dB) |
|--------------|-----------------|----------------------------------|----------------|-------------|
| Vertical     | 30              | 39.42                            | 40             | -0.58       |
|              | 31.12           | 38.27                            | 40             | 37.87       |
|              | 31.37           | 35.84                            | 40             | -4.16       |
|              | 37.41           | 30.85                            | 40             | -9.15       |
| Horizontal   | 30              | 39.53                            | 40             | -0.47       |
|              | 30.06           | 38.59                            | 40             | -1.41       |
|              | 31.02           | 34.67                            | 40             | -5.33       |

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