

# RF TEST REPORT



Report No.: FCC\_IC\_RF\_SL18030602-DIG-004\_3H9080\_Rev1.0  
Supersede Report No.: NONE

|                                                                                                                                      |                                                                       |                                                                                       |  |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|
| Applicant                                                                                                                            | Digital Security Controls, A Div. of TYCO Safety Products Canada Ltd. |                                                                                       |  |
| Product Name                                                                                                                         | LTE Cellular Alarm Communicator                                       |                                                                                       |  |
| Model No.                                                                                                                            | 3H9080                                                                |                                                                                       |  |
| Test Standard                                                                                                                        | 47CFR Part22, 47CFR Part24<br>RSS-132, Issue 3<br>RSS133, Issue 6     |                                                                                       |  |
| Test Method                                                                                                                          | TIA-603-D: 2010<br>RSS Gen Issue 4, Nov 2014                          |                                                                                       |  |
| FCC ID                                                                                                                               | F53183H9080                                                           |                                                                                       |  |
| IC ID                                                                                                                                | 160A-3H9080                                                           |                                                                                       |  |
| Date of test                                                                                                                         | 04/30/2018 - 05/01/2018                                               |                                                                                       |  |
| Issue Date                                                                                                                           | 05/07/2018                                                            |                                                                                       |  |
| Test Result                                                                                                                          | <u>Pass</u> Fail                                                      |                                                                                       |  |
| Equipment complied with the specification [ x ]                                                                                      |                                                                       |                                                                                       |  |
| Equipment did not comply with the specification [ ]                                                                                  |                                                                       |                                                                                       |  |
|                                                                                                                                      |                                                                       |                                                                                       |  |
|                                                                                                                                      |                                                                       |                                                                                       |  |
|                                                   |                                                                       |  |  |
| Rachana Khanduri                                                                                                                     |                                                                       | Chen Ge                                                                               |  |
| RF Test Engineer                                                                                                                     |                                                                       | Engineering Reviewer                                                                  |  |
| This test report may be reproduced in full only<br>Test result presented in this test report is applicable to the tested sample only |                                                                       |                                                                                       |  |

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## Laboratory Introduction

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### Accreditations for Conformity Assessment

| Country/Region | Accreditation Body     | Scope                             |
|----------------|------------------------|-----------------------------------|
| USA            | FCC, A2LA              | EMC, RF/Wireless, Telecom         |
| Canada         | IC, A2LA, NIST         | EMC, RF/Wireless, Telecom         |
| Taiwan         | BSMI, NCC, NIST        | EMC, RF, Telecom, Safety          |
| Hong Kong      | OFTA, NIST             | RF/Wireless, Telecom              |
| Australia      | NATA, NIST             | EMC, RF, Telecom, Safety          |
| Korea          | KCC/RRA, NIST          | EMI, EMS, RF, Telecom, Safety     |
| Japan          | VCCI, JATE, TELEC, RFT | EMI, RF/Wireless, Telecom         |
| Mexico         | NOM, COFETEL, Caniety  | Safety, EMC, RF/Wireless, Telecom |
| Europe         | A2LA, NIST             | EMC, RF, Telecom, Safety          |
| Israel         | MOC, NIST              | EMC, RF, Telecom, Safety          |

### Accreditations for Product Certifications

| Country   | Accreditation Body | Scope                                 |
|-----------|--------------------|---------------------------------------|
| USA       | FCC TCB, NIST      | EMC, RF, Telecom                      |
| Canada    | IC FCB, NIST       | EMC, RF, Telecom                      |
| Singapore | iDA, NIST          | EMC, RF, Telecom                      |
| EU        | NB                 | EMC & Radio Equipment Directive (RED) |
| Japan     | MIC (RCB 208)      | RF, Telecom                           |
| HongKong  | OFTA (US002)       | RF, Telecom                           |

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## 1 Report Revision History

| Report No.                                 | Report Version | Description                                            | Issue Date |
|--------------------------------------------|----------------|--------------------------------------------------------|------------|
| FCC_IC_RF_SL18030602-DIG-004_3H9080        | None           | Original                                               | 05/02/2018 |
| FCC_IC_RF_SL18030602-DIG-004_3H9080_Rev1.0 | Rev1.0         | Updated test standard and addred reference test report | 05/072018  |
|                                            |                |                                                        |            |
|                                            |                |                                                        |            |
|                                            |                |                                                        |            |

## 2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Digital Security Controls, A Div. of TYCO Safety Products Canada Ltd.  
Product: LTE Cellular Alarm Communicator  
Model: 3H9080

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1<sup>st</sup> page.

## 3 Customer information

|                      |                                                                       |
|----------------------|-----------------------------------------------------------------------|
| Applicant Name       | Digital Security Controls, A Div. of TYCO Safety Products Canada Ltd. |
| Applicant Address    | 3301 Langstaff Rd., Concord, ON L4k4L2 Canada                         |
| Manufacturer Name    | Digital Security Controls, A Div. of TYCO Safety Products Canada Ltd. |
| Manufacturer Address | 3301 Langstaff Rd., Concord, ON L4k4L2 Canada                         |

## 4 Test site information

|                      |                                             |
|----------------------|---------------------------------------------|
| Lab performing tests | SIEMIC Laboratories                         |
| Lab Address          | 775 Montague Expressway, Milpitas, CA 95035 |
| FCC Test Site No.    | 881796                                      |
| IC Test Site No.     | 4842D-2                                     |
| VCCI Test Site No.   | A0133                                       |

## 5 Modification

| Index | Item | Description | Note |
|-------|------|-------------|------|
| -     | -    | -           | -    |
|       |      |             |      |
|       |      |             |      |
|       |      |             |      |
|       |      |             |      |
|       |      |             |      |

## 6 EUT Information

### 6.1 EUT Description

|                           |                                                                                                              |
|---------------------------|--------------------------------------------------------------------------------------------------------------|
| Product Name              | LTE Cellular Alarm Communicator                                                                              |
| Model No.                 | 3H9080                                                                                                       |
| Trade Name                | Tyco - Digital Security Controls                                                                             |
| Serial No.                | 001                                                                                                          |
| Host Input Power          | 100-240VAC,50/60Hz                                                                                           |
| EUT Input Power           | 3.9VDC                                                                                                       |
| Power Adapter Manu/Model  | SOY-1800360NA                                                                                                |
| Date of EUT received      | 04/13/2018                                                                                                   |
| Hardware Version          | UA716 Rev.03                                                                                                 |
| Software Version          | ver. 1.0                                                                                                     |
| Equipment Class/ Category | PCB, TNB                                                                                                     |
| Operating Frequencies     | UMTS<br>TX: 1850 MHz to 1910 MHz, RX: 1930 MHz to 1990 MHz<br>TX: 824 MHz to 849 MHz, RX: 869 MHz to 894 MHz |
| Port/Connectors           | N/A                                                                                                          |
| Remark                    | NONE                                                                                                         |

## 6.2 Radio Description

| Item                       | UMTS                                                 | UMTS                                             |
|----------------------------|------------------------------------------------------|--------------------------------------------------|
| Operating Band /Radio Type | UMTS Band 2                                          | UMTS Band 5                                      |
| Bandwidth                  | 3.84MHz                                              | 3.84MHz                                          |
| Modulation                 | QPSK                                                 | QPSK                                             |
| Antenna Type               | PCB Dipole Antenna                                   | PCB Dipole Antenna                               |
| Antenna Gain               | 6.8 dBi                                              | 1.3 dBi                                          |
| Frequency TX(MHz)          | TX: 1850 MHz to 1910 MHz<br>RX: 1930 MHz to 1990 MHz | TX: 824 MHz to 849 MHz<br>RX: 869 MHz to 894 MHz |

### 6.3 EUT test modes/configuration Description

#### Test mode

| Final Test Mode                       |                                         | Note |
|---------------------------------------|-----------------------------------------|------|
| Final_test_mode_1                     | Continuous transmission, single channel | UMTS |
|                                       |                                         |      |
|                                       |                                         |      |
|                                       |                                         |      |
| Remark: UMTS band 2, 5 are evaluated. |                                         |      |



## 7 Supporting Equipment/Software and cabling Description

### 7.1 Supporting Equipment

| Item | Supporting Equipment Description | Model | Serial Number | Manufacturer | Note |
|------|----------------------------------|-------|---------------|--------------|------|
| -    | -                                | -     | -             | -            | -    |
|      |                                  |       |               |              |      |

### 7.1 Cabling Description

| Name | Connection Start |          | Connection Stop |          | Length / shielding Info |           | Note |
|------|------------------|----------|-----------------|----------|-------------------------|-----------|------|
|      | From             | I/O Port | To              | I/O Port | Length (m)              | Shielding |      |
| -    | -                | -        | -               | -        | -                       | -         | -    |

### 7.2 Test Software Description

| Test Item  | Software | Description                                                   |
|------------|----------|---------------------------------------------------------------|
| RF Testing | N/A      | Enable EUT continuous TX mode and change to different channel |

## 8 Test Summary

| Test Item                                      | Test standard                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      | Test Method/Procedure |                       | Pass / Fail                                |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------|-----------------------|--------------------------------------------|
| E.R.P/ E.I.R.P.                                | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR24.232, 47CFR27.50              | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass * |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Occupied Bandwidth                             | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR24.238(a), 47CFR27.53           | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass * |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Peak-Average Ratio                             | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR24.232, 47CFR27.50              | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass * |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Spurious and harmonic Emission at antenna port | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR2.1051, 47CFR24.238, 47CFR27.53 | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass   |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Band Edge                                      | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR2.1053, 47CFR24.238, 47CFR27.53 | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass * |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Radiated spurious and harmonic emission        | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR2.1053, 47CFR24.238, 47CFR27.53 | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass   |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Frequency stability                            | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                         | 47CFR2.1055, 47CFR24.135, 47CFR27.54 | FCC                   | TIA-603-D: 2010       | <input checked="" type="checkbox"/> Pass * |
|                                                | IC                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSS-130, RSS-132, RSS-133            | IC                    | RSS Gen Issue 4: 2014 | <input type="checkbox"/> N/A               |
| Remark                                         | <ol style="list-style-type: none"> <li>1. All measurement uncertainties do not take into consideration for all presented test results.</li> <li>2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.</li> <li>3. Pass* Please refer to UE910 Module FCC test report for test items.</li> </ol> |                                      |                       |                       |                                            |

## 9 Measurement Uncertainty

### 9.1 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

| Source of Uncertainty             | Value (dB) | Probability Distribution | Division | Sensitivity Coefficient | Expanded Uncertainty |
|-----------------------------------|------------|--------------------------|----------|-------------------------|----------------------|
| Receiver Reading                  | 0.12       | Rectangular              | 1.732    | 1                       | 0.069284             |
| Cable Insertion Loss              | 0.21       | Normal                   | 2        | 1                       | 0.105                |
| Filter Insertion Loss             | 0.25       | Normal                   | 2        | 1                       | 0.125                |
| Antenna Factor                    | 0.65       | Normal                   | 2        | 1                       | 0.325                |
| Receiver CW accuracy              | 0.5        | Rectangular              | 1.732    | 1                       | 0.2886836            |
| Pulse Amplitude Response          | 1.5        | Rectangular              | 1.732    | 1                       | 0.86605081           |
| PRF Response                      | 1.5        | Rectangular              | 1.732    | 1                       | 0.86605081           |
| Mismatch Filter - Receiver        | 0.25       | U-Shape                  | 1.414    | 1                       | 0.1768033            |
| NSA Calibration                   | 4.0        | U-Shape                  | 1.414    | 1                       | 2.8288543            |
| Combined Standard Uncertainty     |            |                          |          |                         | 3.0059131            |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>6.0118262</b>     |

The total derived measurement uncertainty is +/- 6.00 dB.

### 9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

| Source of Uncertainty             | Value (dB) | Probability Distribution | Division | Sensitivity Coefficient | Expanded Uncertainty |
|-----------------------------------|------------|--------------------------|----------|-------------------------|----------------------|
| Receiver Reading                  | 0.12       | Rectangular              | 1.732    | 1                       | 0.0692840            |
| Cable Insertion Loss              | 0.21       | Normal                   | 2        | 1                       | 0.1050000            |
| Filter Insertion Loss             | 0.25       | Normal                   | 2        | 1                       | 0.1250000            |
| Antenna Factor                    | 0.65       | Normal                   | 2        | 1                       | 0.3250000            |
| Receiver CW accuracy              | 0.5        | Rectangular              | 1.732    | 1                       | 0.2886836            |
| Pulse Amplitude Response          | 1.5        | Rectangular              | 1.732    | 1                       | 0.8660508            |
| PRF Response                      | 1.5        | Rectangular              | 1.732    | 1                       | 0.8660508            |
| Mismatch Filter - Receiver        | 0.25       | U-Shape                  | 1.414    | 1                       | 0.1768033            |
| VSWR Calibration                  | 2.0        | U-Shape                  | 1.414    | 1                       | 1.4144272            |
| Combined Standard Uncertainty     |            |                          |          |                         | 4.2363               |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>8.4726</b>        |

The total derived measurement uncertainty is +/- 8.47 dB.

### 9.3 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

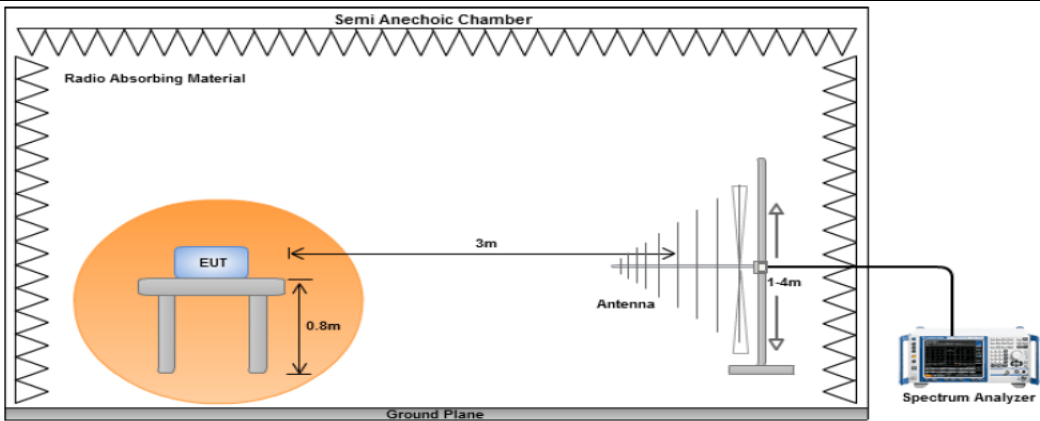
| Source of Uncertainty             | Value (dB) | Probability Distribution | Division | Sensitivity Coefficient | Expanded Uncertainty |
|-----------------------------------|------------|--------------------------|----------|-------------------------|----------------------|
| Reference Level                   | 0.12       | Rectangular              | 1.732    | 1                       | 0.069284             |
| Cable Insertion Loss              | 0.21       | Normal                   | 2        | 1                       | 0.105                |
| Attenuator                        | 0.25       | Normal                   | 2        | 1                       | 0.125                |
| Mismatch                          | 0.25       | U-Shape                  | 1.414    | 1                       | 0.1768033            |
| Combined Standard Uncertainty     |            |                          |          |                         | 0.476087             |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>0.952174</b>      |

The total derived measurement uncertainty is +/- 0.95 dB.

## 10 Measurements, Examination and Derived Results

### 10.1 Radiated Spurious Emission below 1GHz

#### Requirement(s):

| Spec                                           | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Requirement                                                                                                                                                                                             | Applicable                                                                 |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 47CFR27.53<br>RSS-130,<br>RSS-132,<br>RSS-133  | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. | <input checked="" type="checkbox"/>                                        |
| 47CFR24.238<br>RSS-130,<br>RSS-132,<br>RSS-133 | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. | <input checked="" type="checkbox"/>                                        |
| Test Setup                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                         |                                                                            |
| Test Procedure                                 | <p><u>Substitution method:</u></p> <ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> <li>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>The EUT was then rotated to the direction that gave the maximum emission.</li> <li>Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.</li> <li>Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained.</li> <li>Steps 4 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol> |                                                                                                                                                                                                         |                                                                            |
| Test Date                                      | 04/30/2018-05/01/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Environmental condition                                                                                                                                                                                 | Temperature 24°C<br>Relative Humidity 42%<br>Atmospheric Pressure 1012mbar |
| Remark                                         | <p>Limit calculation:<br/> <math>\text{Emission limit} = \text{Pd}Bm - [43 + 10 \log(PW)] = 10 \log(1000 \times PW) - 43 - 10 \log(PW) = 30 \text{ dBm} - 43 = -13 \text{ dBm}</math><br/>           All different modulation and bandwidth configuration has been verified and only the test data of worst case with QPSK modulation and greatest bandwidth was presented in this report.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                         |                                                                            |
| Result                                         | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                         |                                                                            |

Test Data    ☒ Yes (See below)      ☐ N/A

Test Plot    ☒ Yes (See below)      ☐ N/A

Test was done by **Rachana Khanduri** at **10m chamber**.

## Radiated Emission Test Results for UMTS

|                           |                       |      |        |      |
|---------------------------|-----------------------|------|--------|------|
| Test specification        | Below 1GHz            |      | Result | Pass |
| Environmental Conditions: | Temp (°C):            | 24   |        |      |
|                           | Humidity (%)          | 42   |        |      |
|                           | Atmospheric (mbar):   | 1012 |        |      |
| Mains Power:              | 120VAC, 60Hz          |      |        |      |
| Tested by:                | Rachana Khanduri      |      |        |      |
| Test Date:                | 04/30/2018-05/01/2018 |      |        |      |
| Remarks:                  | UMTS Band 2 and 5     |      |        |      |

### UMTS band 2 Middle Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 120.75          | -43.17    | 123    | 132          | V        | 120.75          | -33.17      | 0              | 0.31            | -33.48               | -13         | -20.48      |
| 112.35          | -41.94    | 314    | 154          | H        | 112.35          | -34.94      | 0              | 0.31            | -35.25               | -13         | -22.25      |
| 255.19          | -45.78    | 180    | 189          | V        | 255.19          | -34.00      | 0              | 0.44            | -34.44               | -13         | -21.44      |
| 255.19          | -42.63    | 285    | 200          | H        | 255.19          | -33.63      | 0              | 0.44            | -34.07               | -13         | -21.07      |

### UMTS band 5 Middle Channel, QPSK

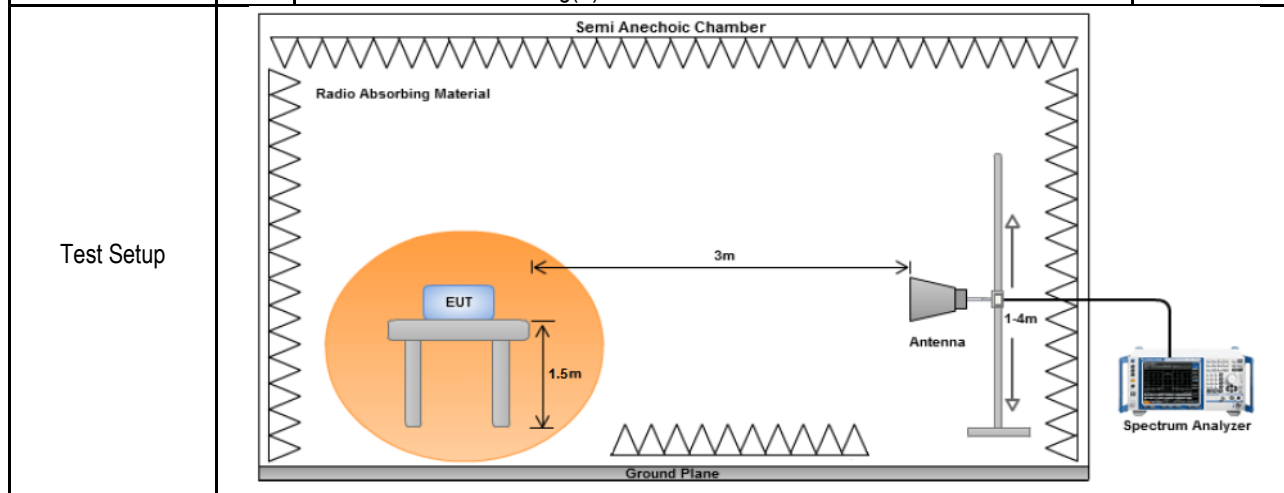
| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 82.61           | -42.22    | 288    | 176          | V        | 82.61           | -31.29      | 0              | 0.26            | -31.55               | -13         | -18.55      |
| 82.61           | -46.07    | 318    | 155          | H        | 82.61           | -34.54      | 0              | 0.26            | -34.8                | -13         | -21.80      |
| 222.91          | -43.88    | 275    | 161          | V        | 222.91          | -34.17      | 0              | 0.37            | -34.54               | -13         | -21.54      |
| 222.91          | -45.38    | 194    | 112          | H        | 222.91          | -34.08      | 0              | 0.37            | -34.45               | -13         | -21.45      |

Note: Dipole antenna was used for substitution method.

## 10.2 Radiated Spurious Emissions above 1GHz

### Requirement(s):

| Spec                                        | Item | Requirement                                                                                                                                                                                             | Applicable                          |
|---------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 47CFR27.53<br>RSS-130, RSS-132,<br>RSS-133  | -    | Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. | <input checked="" type="checkbox"/> |
| 47CFR24.238<br>RSS-130, RSS-132,<br>RSS-133 | -    | Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. | <input checked="" type="checkbox"/> |



|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                |                                                                            |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------|
| <b>Test Procedure</b> | <p><b>Substitution method:</b></p> <ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> <li>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>The EUT was then rotated to the direction that gave the maximum emission.</li> <li>Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The centre of the substitution antenna should be approximately at the same location as the centre of the transmitter.</li> <li>Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained.</li> <li>Steps 4 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol> |                                |                                                                            |
| <b>Test Date</b>      | 04/30/2018-05/01/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Environmental condition</b> | Temperature 23°C<br>Relative Humidity 48%<br>Atmospheric Pressure 1008mbar |
| <b>Remark</b>         | The EUT was scanned up to 25GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.<br>Limit calculation:<br>Emission limit = $P \text{ dBm} - [43 + 10 \log(PW)] = 10 \log(1000 \times PW) - 43 - 10 \log(PW) = 30 \text{ dBm} - 43 = -13 \text{ dBm}$<br>All different modulation and bandwidth configuration has been verified and only the test data of worst case with QPSK modulation and greatest bandwidth was presented in this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                            |
| <b>Result</b>         | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                            |

**Test Data**    ☒ Yes (See below)      ☐ N/A

**Test Plot**    ☐ Yes (See below)      ☒ N/A

**Test was done by** *Rachana Khanduri* **at** *10m chamber*.

## Radiated Emission Test Results (Above 1GHz)

### UMTS Band 2 Low Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 3723.62         | -36.99    | 211    | 200          | V        | 3723.62         | -38.99      | 10.96          | 1.94            | -29.97               | -13         | -16.97      |
| 3723.62         | -33.25    | 341    | 82           | H        | 3723.62         | -34.25      | 10.96          | 1.94            | -25.23               | -13         | -12.23      |
| 5581.02         | -43.89    | 220    | 155          | V        | 5581.02         | -46.41      | 11.87          | 2.20            | -36.74               | -13         | -23.74      |
| 5581.02         | -38.12    | 280    | 163          | H        | 5581.02         | -38.7       | 11.87          | 2.20            | -29.03               | -13         | -16.03      |

### UMTS Band 2 Middle Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 3760.11         | -38.01    | 133    | 149          | V        | 3760.11         | -40.01      | 10.47          | 2.01            | -31.55               | -13         | -18.55      |
| 3760.11         | -35.11    | 208    | 150          | H        | 3760.11         | -36.11      | 10.47          | 2.01            | -27.65               | -13         | -14.65      |
| 5641.39         | -43.23    | 96     | 194          | V        | 5641.39         | -45.75      | 11.96          | 2.24            | -36.03               | -13         | -23.03      |
| 5641.39         | -36.22    | 100    | 165          | H        | 5641.39         | -36.8       | 11.96          | 2.24            | -27.08               | -13         | -14.08      |

### UMTS Band 2 High Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 3800.72         | -35.19    | 245    | 172          | V        | 3800.72         | -37.19      | 11.04          | 2.08            | -28.23               | -13         | -15.23      |
| 3800.72         | -41.03    | 233    | 155          | H        | 3800.72         | -42.03      | 11.04          | 2.08            | -33.07               | -13         | -20.07      |
| 5705.21         | -42.44    | 141    | 158          | V        | 5705.21         | -44.96      | 10.77          | 2.28            | -36.47               | -13         | -23.47      |
| 5705.21         | -41.31    | 39     | 165          | H        | 5705.21         | -41.89      | 10.77          | 2.28            | -33.40               | -13         | -20.40      |



### UMTS Band 5 Low Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 1658.29         | -30.17    | 120    | 167          | V        | 1658.29         | -32.17      | 9.94           | 0.73            | -22.96               | -13         | -9.96       |
| 1658.29         | -41.88    | 304    | 158          | H        | 1658.29         | -42.88      | 9.94           | 0.73            | -33.67               | -13         | -20.67      |
| 2487.63         | -42.39    | 222    | 211          | V        | 2487.63         | -44.91      | 9.39           | 1.31            | -36.83               | -13         | -23.83      |
| 2487.63         | -41.25    | 130    | 198          | H        | 2487.63         | -41.83      | 9.39           | 1.31            | -33.75               | -13         | -20.75      |

### UMTS Band 5 Middle Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 1673.09         | -29.77    | 118    | 122          | V        | 1673.09         | -31.77      | 9.94           | 0.74            | -22.57               | -13         | -9.57       |
| 1673.09         | -40.93    | 200    | 137          | H        | 1673.09         | -41.93      | 9.94           | 0.74            | -32.73               | -13         | -19.73      |
| 2509.30         | -43.26    | 319    | 140          | V        | 2509.30         | -45.78      | 8.96           | 1.31            | -38.13               | -13         | -25.13      |
| 2509.30         | -41.76    | 276    | 167          | H        | 2509.30         | -42.34      | 8.96           | 1.31            | -34.69               | -13         | -21.69      |

### UMTS Band 5 High Channel, QPSK

| Indicated       |           |        | Test Antenna |          | Substituted     |             |                |                 |                      |             |             |
|-----------------|-----------|--------|--------------|----------|-----------------|-------------|----------------|-----------------|----------------------|-------------|-------------|
| Frequency (MHz) | Raw (dBm) | Degree | Height (cm)  | Polarity | Frequency (MHz) | Level (dBm) | Ant Gain (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
| 1688.58         | -27.65    | 98     | 182          | V        | 1688.58         | -29.65      | 9.94           | 0.74            | -20.45               | -13         | -7.45       |
| 1688.58         | -40.16    | 311    | 152          | H        | 1688.58         | -41.16      | 9.94           | 0.74            | -31.96               | -13         | -18.96      |
| 2531.73         | -42.54    | 189    | 161          | V        | 2531.73         | -45.06      | 8.96           | 1.31            | -37.41               | -13         | -24.41      |
| 2531.73         | -42.77    | 196    | 170          | H        | 2531.73         | -43.35      | 8.96           | 1.31            | -35.70               | -13         | -22.70      |

## Annex A. TEST INSTRUMENT

| Instrument                                    | Model    | Serial #   | Cal Date   | Cal Cycle | Cal Due    | In use                              |
|-----------------------------------------------|----------|------------|------------|-----------|------------|-------------------------------------|
| <b>Radiated Emissions</b>                     |          |            |            |           |            |                                     |
| Keysight EXA 44GHz Spectrum Analyzer          | N9010A   | MY51440112 | 11/08/2017 | 1 Year    | 11/08/2018 | <input checked="" type="checkbox"/> |
| R & S Wideband Communication Tester           | CMW500   | 108852     | 08/03/2017 | 1 Year    | 08/03/2018 | <input checked="" type="checkbox"/> |
| Pre-Amplifier (1-26.5GHz)                     | 8449B    | 3008A00715 | 08/16/2017 | 1 Year    | 08/16/2018 | <input checked="" type="checkbox"/> |
| Preamplifier (100KHz-7GHz)                    | LPA-6-30 | 11170601   | 07/21/2017 | 1 Year    | 07/21/2018 | <input checked="" type="checkbox"/> |
| Bi-Log antenna (30MHz~2GHz)                   | JB1      | A030702    | 03/09/2018 | 2 Year    | 03/09/2020 | <input checked="" type="checkbox"/> |
| Horn Antenna (1-18GHz)                        | 3115     | 10SL0059   | 11/09/2017 | 1 Year    | 11/09/2018 | <input checked="" type="checkbox"/> |
| Horn Antenna (700MHz-18GHz)                   | SAS-571  | 411        | 05/13/2017 | 1 Year    | 05/13/2018 | <input checked="" type="checkbox"/> |
| Tuned Dipole Antenna 30 - 1000 MHz (4pcs set) | AD-100   | 40133      | 01/23/2018 | 1 Year    | 01/23/2020 | <input checked="" type="checkbox"/> |

## Annex B. SIEMIC Accreditation

| Accreditations                           | Document                                                                                                                                                                | Scope / Remark                                                                                                                                                            |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISO 17025 (A2LA)                         |                                                                                        | Please see the documents for the detailed scope                                                                                                                           |
| ISO Guide 65 (A2LA)                      |                                                                                        | Please see the documents for the detailed scope                                                                                                                           |
| TCB Designation                          |                                                                                                                                                                         | <a href="#">A1</a> , <a href="#">A2</a> , <a href="#">A3</a> , <a href="#">A4</a> , <a href="#">B1</a> , <a href="#">B2</a> , <a href="#">B3</a> , <a href="#">B4</a> , C |
| FCC DoC Accreditation                    |                                                                                        | FCC Declaration of Conformity Accreditation                                                                                                                               |
| FCC Site Registration                    |                                                                                        | 3-meter site                                                                                                                                                              |
| FCC Site Registration                    |                                                                                        | 10-meter site                                                                                                                                                             |
| IC Site Registration                     |                                                                                        | 3-meter site                                                                                                                                                              |
| IC Site Registration                     |                                                                                        | 10-meter site                                                                                                                                                             |
| EU NB                                    |                                                                                        | <b>Radio Equipment: EN45011:</b><br>EN ISO/IEC 17065                                                                                                                      |
|                                          |                                                                                      | <b>Electromagnetic Compatibility:</b><br>EN45011 – EN ISO/IEC 17065                                                                                                       |
| Singapore iDA<br>CB (Certification Body) |   | <a href="#">Phase I</a> , <a href="#">Phase II</a>                                                                                                                        |
| Vietnam MIC<br>CAB Accreditation         |                                                                                      | Please see the document for the detailed scope                                                                                                                            |
| Hong Kong OFCA                           |                                                                                      | <b>(Phase II)</b> OFCA Foreign Certification Body for Radio and Telecom                                                                                                   |
|                                          |                                                                                      | <b>(Phase I)</b> Conformity Assessment Body for Radio and Telecom                                                                                                         |
| Industry Canada CAB                      |                                                                                      | <b>Radio:</b> Scope A – All Radio Standard Specification in Category I                                                                                                    |
|                                          |                                                                                      | <b>Telecom:</b> CS-03 Part I, II, V, VI, VII, VIII                                                                                                                        |

|                                                    |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Japan Recognized Certification<br>Body Designation |    | <p><b>Radio:</b> A1. Terminal equipment for purpose of calling</p> <p><b>Telecom:</b> B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Korea CAB Accreditation                            |    | <p><b>EMI:</b> KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI<br/>KN22: Test Method for EMI</p> <p><b>EMS:</b> KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS<br/>KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS</p> <p><b>Radio:</b> RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10,<br/>RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68</p> <p><b>Telecom:</b> President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4</p> |
| Taiwan NCC CAB Recognition                         |    | LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Taiwan BSMI CAB Recognition                        |  | CNS 13438                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Japan VCCI                                         |  | <p>R-3083: Radiation 3-meter site</p> <p>C-3421: Main Ports Conducted Interference Measurement</p> <p>T-1597: Telecommunication Ports Conducted Interference Measurement</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Australia CAB Recognition                          |  | <p><b>EMC:</b> AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4</p> <p><b>Radiocommunications:</b> AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771</p> <p><b>Telecommunications:</b> AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1</p>                                                                                                                   |
| Australia NATA Recognition                         |  | AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |