

FCC ISED Test Report

Report No.: FCC_ISED_RF_SL19120201-STL-002_Co-location Rev 1.0

FCC ID: 2AWMB-SX

FCC ID: QIPPLS62-W

FCC ID: N7NBX31A

IC: 26190-SX

IC: 7830A-PLS62W

IC: 2417C-BX31A

Host Model: Spider X

Series Model: N/A

Test Date: 05/18/2020

Issued Date: 05/20/2020

Applicant: Spider Tracks Limited

Address: Unit 205/150 Karangahape Road Auckland CBD, 1010, Auckland, New Zealand

Manufacturer: Spider Tracks Limited

Address: Unit 205/150 Karangahape Road Auckland CBD, 1010, Auckland, New Zealand

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035, USA

**FCC Registration /
Designation Number:** 540430

ISED# / CAB identifier: 4842D



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Release Control Record

| Issue No. | Description | Date Issued |
|---|-----------------|-------------|
| FCC_IC_RF_SL19120201-STL-002_Co-location | Initial release | 05/20/2020 |
| FCC_ISED_RF_SL19120201-STL-002_Co-location Rev 1.0 | Update FCC ID | 09/01/2020 |

1 Certificate of Conformity

Product: Spidertracks

Brand: Spider

Test Model: Spider X

Series Model: N/A

Sample Status: Engineering Sample

Applicant: Spider Tracks Limited

Test Date: 05/18/2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
47 CFR FCC Part 2/22/24/27/25
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc. Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Deon Dai, **Date:** 05/20/2020
Deon Dai / Test Engineer

Approved by : Chen Ge, **Date:** 05/20/2020
Chen Ge / Engineer Reviewer

2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (Section 15.247)/RSS247 Issue 2, February 2017 47 CFR FCC Part 2/22/24/27/25 / RSS130 /RSS139 / RSS 132 / RSS 170 | | | |
|--|--------------------------------|--------|--------------------------------|
| Item | Test Item | Result | Remarks |
| 1 | Radiated Emissions Measurement | PASS | Meet the requirement of limit. |

Note: For all other test details please see original FCC ID No.: XMR201707BG96 and GKM-XT2500 test report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Expanded Uncertainty (k=2) (±) |
|------------------------------------|----------------|-----------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 3.51dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GHz | 3.73dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 6GHz | 4.64dB |
| | 6GHz ~ 18GHz | 4.82dB |
| | 18GHz ~ 40GHz | 4.91dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

| | |
|---------------------|--|
| Product | Spidertracks |
| Brand | Spider |
| Test Model | Spider X |
| Series Model | N/A |
| Serial Number | CXD42ZCJW2-6141 |
| Status of EUT | Engineering Sample |
| Power Supply rating | 14 / 28 VDC, 3A |
| Operating Frequency | BLE: 2402-2480 MHz WLAN: 2412-2462MHz Satellite: 1616-1626.5MHz GSM850: 824-849 MHz GSM1900: 1850-1910 MHz UMTS Band 2: 1850-1910 MHz UMTS Band 4: 1710-1755 MHz UMTS Band 5: 824-849 MHz LTE Band 2: 1850-1910 MHz LTE Band 4: 1710-1755 MHz LTE Band 5: 824-849 MHz LTE Band 7: 2500-2570 MHz LTE Band 12: 699-716 MHz LTE Band 18: 815-830 MHz LTE Band 19: 830-845 MHz |
| Antenna Gain | BLE: -1.65 dBi WLAN: -1.65dBi Satellite: 3dBi GSM850: 5.15dBi GSM1900: 2.15dBi UMTS Band 2: 2.15dBi UMTS Band 4: 2.15dBi UMTS Band 5: 5.15dBi LTE Band 2: 2.15dBi LTE Band 4: 2.15dBi LTE Band 5: 5.15dBi LTE Band 7: 4.2dBi LTE Band 12: 2dBi LTE Band 18: 5.15dBi LTE Band 19: 5.15dBi |

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.1.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|--------------------------|---------------|-------|-----|------|-------------|
| | RE \geq 1G | RE<1G | PLC | APCM | |
| - | √ | √ | - | - | - |

Where RE \geq 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission
 APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.
NOTE: "-" means no effect.

Test Condition:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---------------|--------------------------|-------------|-----------|
| RE \geq 1G | 25deg. C, 65%RH | DC 14V | Deon Dai |
| RE<1G | 25deg. C, 65%RH | DC 14V | Deon Dai |
| PLC | - | - | - |
| APCM | - | - | - |

3.2 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|-----------------------------|-----------------|---------------|------------|--------|------------------------------------|
| A. | Wideband Radio Communicator | Rohde & Schwarz | CMW500 | 108852 | N/A | Provided by Lab For LTE Connection |
| B. | Wide-band Antenna | Speag | SE UMS 176 CA | 1116 | N/A | Provided by Lab |
| C. | Dipole Antenna | N/A | N/A | N/A | N/A | Provided by Lab |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |

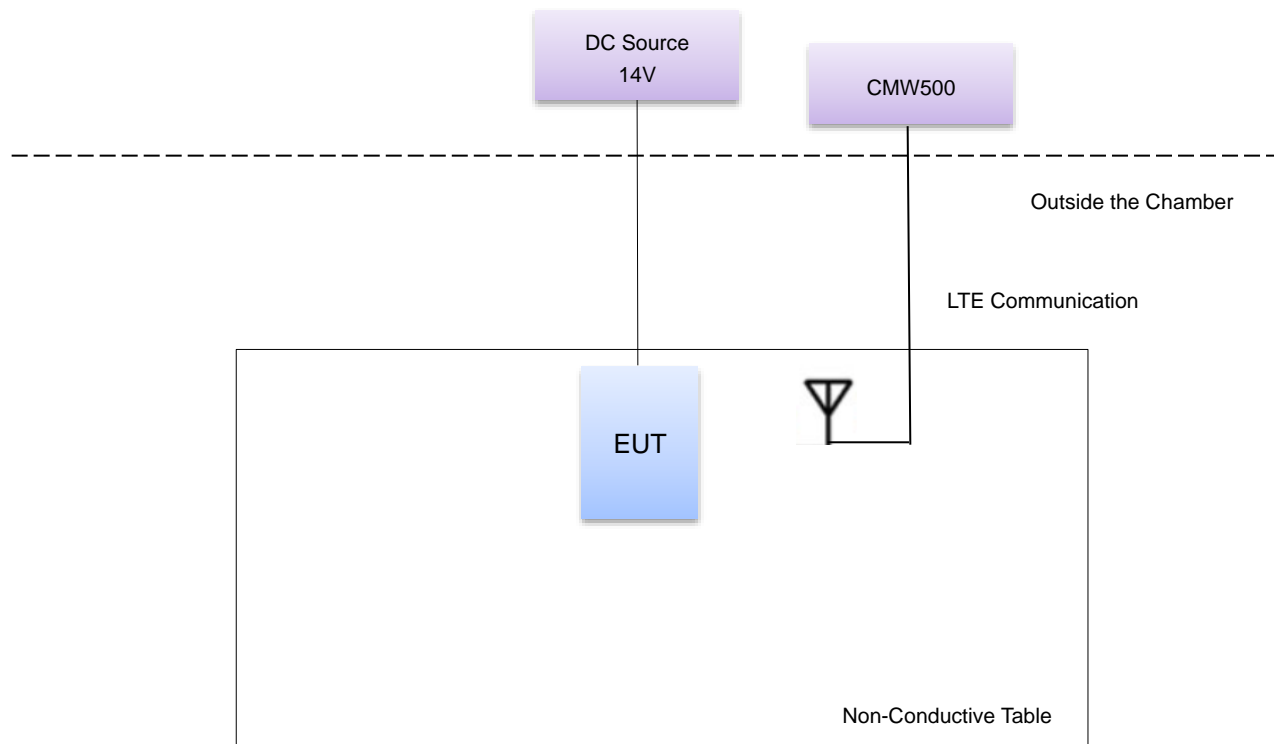
Note:

1. All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|---------|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |

Note: The core(s) is(are) originally attached to the cable(s).

3.2.1 Configuration of System under Test



3.3 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

47 CFR FCC Part 15, Subpart C (Section 15.247)

47 CFR FCC Part 22/24/27

RSS247

RSS130 /RSS139 / RSS 132

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB (power peak measurement) or 30dB (power Ave.measurement) below the highest level of the desired power:

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---------------------------------|-------------|--------------------------|------------------------|----------------------------|
| EMI Receiver Rohde & Schwarz | ESW 44 | 1328.4100K- 101662-MH | 08/30/2019 | 08/30/2020 |
| Biconilog Antenna Sunol | JB1 | A030702 | 03/09/2020 | 03/09/2021 |
| Horn Antenna ETS-Lindgren | 3117 | 218554 | 12/20/2019 | 12/20/2020 |
| Pre-Amplifier RF-Lambda | RAMP00M50GA | 17032300048 | 06/18/2019 | 06/18/2020 |

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

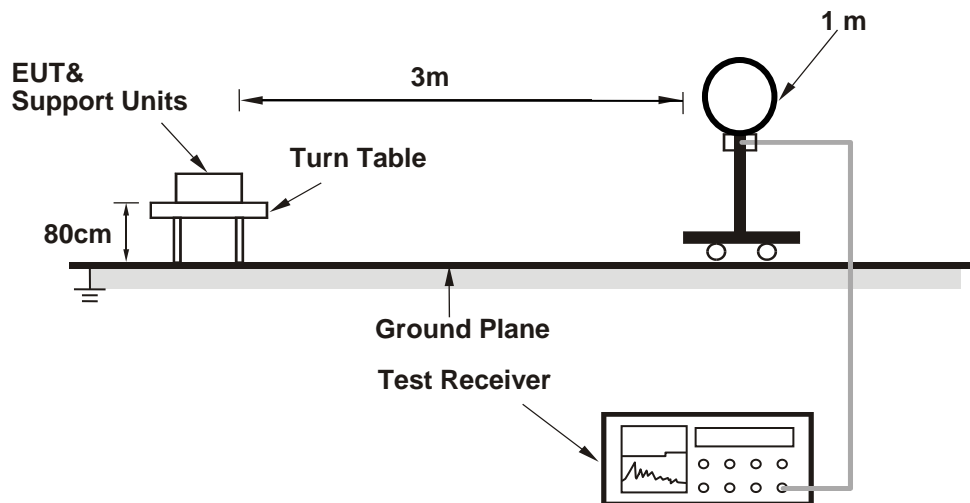
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

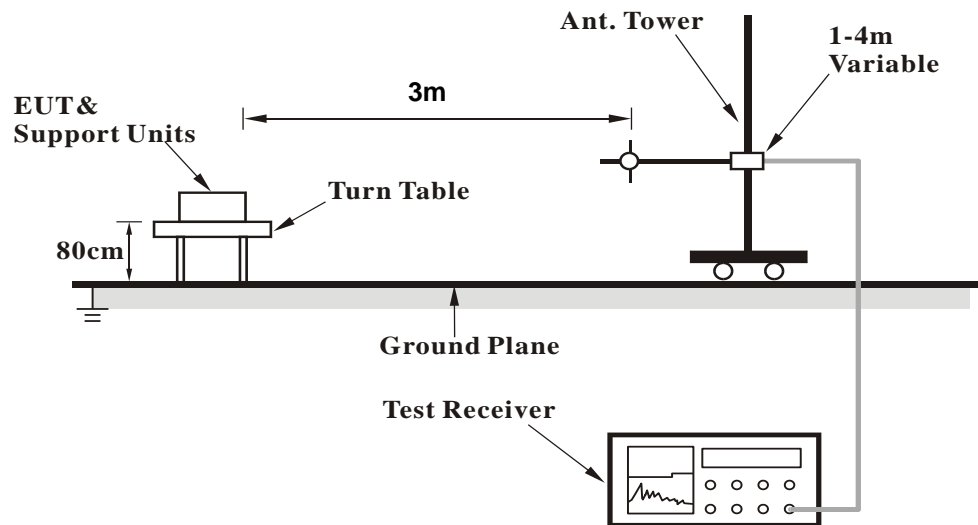
No deviation.

4.1.5 Test Setup

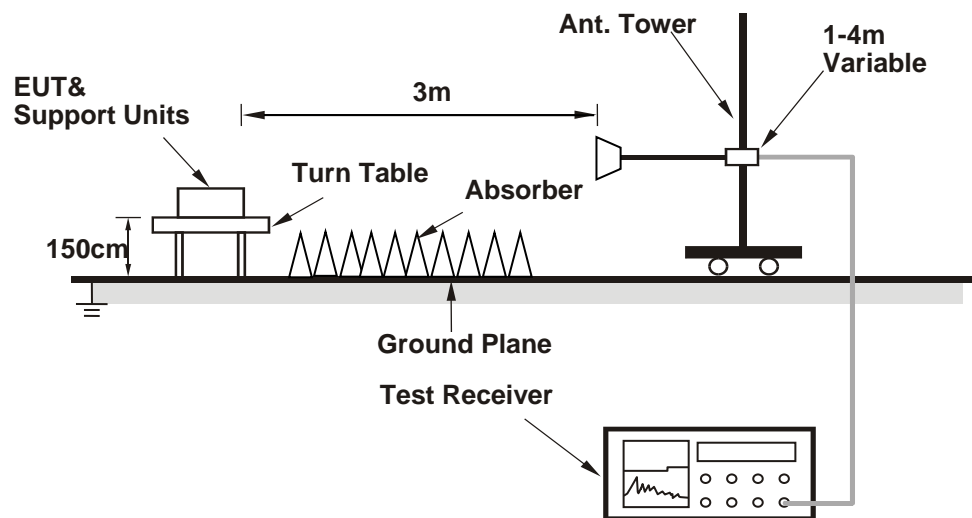
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Prepared notebooks to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the system in full functions.

4.1.6 Test Results

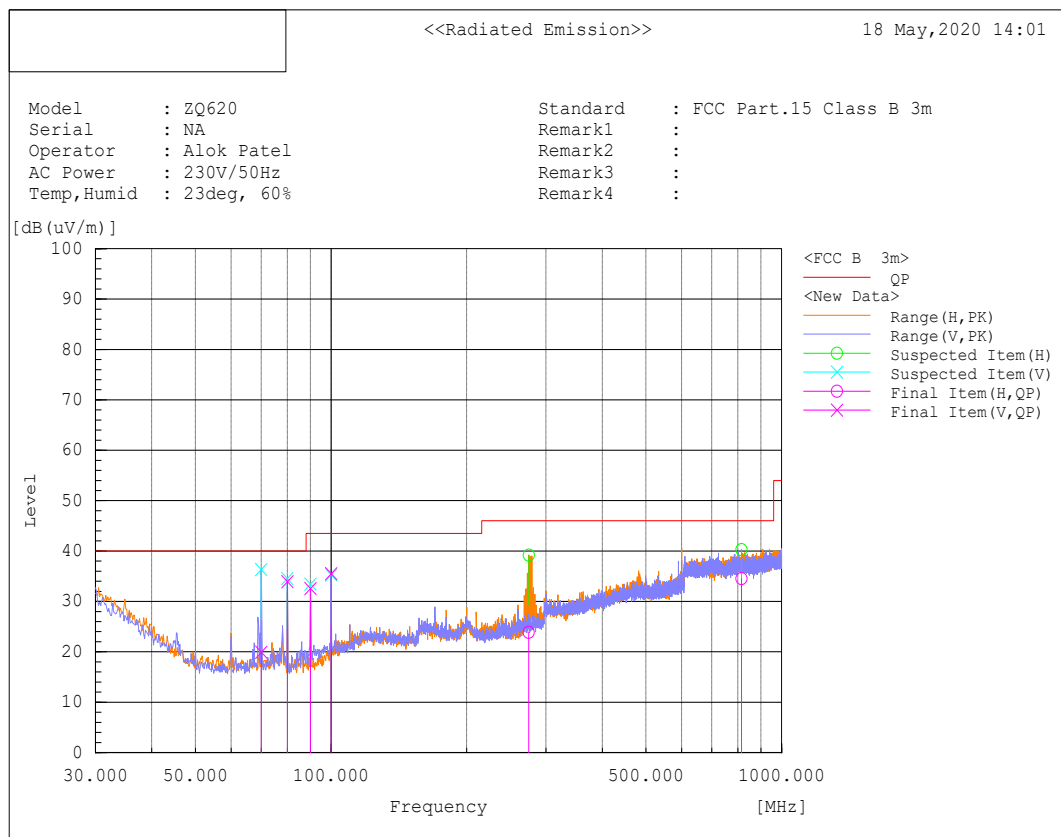
BELOW 1GHz WORST-CASE DATA:

| | | | |
|------------------------|--|--------------------------|------------|
| CHANNEL | WLAN/LTE B5 transmit simultaneous mode | DETECTOR FUNCTION | Quasi Peak |
| FREQUENCY RANGE | 30MHz – 1GHz | | |

| Antenna Polarity & Test Distance: Vertical and Horizontal at 3m | | | | | | | | | | |
|---|-----------------|--------------------|---------------------|------------------|---------------------|------------------|----------------|-------------|-------------|-----------|
| No. | Frequency (MHz) | Polarization (H/V) | Reading QP [dB(uV)] | Factor [dB(1/m)] | Level QP [dB(uV/m)] | LimitQP dB(uV/m) | Margin QP [dB] | Height (cm) | Angle (Deg) | Pass/Fail |
| 1 | 69.99 | V | 7 | 13 | 20 | 40 | -20 | 214 | 328 | Pass |
| 2 | 79.99 | V | 20.8 | 13.1 | 33.9 | 40 | -6.1 | 100 | 104 | Pass |
| 3 | 90.00 | V | 18.4 | 14.2 | 32.6 | 43.5 | -10.9 | 112 | 49.9 | Pass |
| 4 | 100.00 | V | 18.9 | 16.6 | 35.5 | 43.5 | -8 | 112 | 171 | Pass |
| 5 | 274.53 | H | 3.4 | 20.5 | 23.9 | 46 | -22.1 | 391 | 356 | Pass |
| 6 | 815.03 | H | 4.1 | 30.4 | 34.5 | 46 | -11.5 | 362 | 32.1 | Pass |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.



Above 1GHz Test Data:

Above 1GHz-40GHz – Co-location

| Antenna Polarity & Test Distance: Vertical and Horizontal at 3m | | | | | | | | | | | | | | |
|---|-----------------|--------------------|---------------------|---------------------|------------------|---------------------|---------------------|--------------------|--------------------|----------------|----------------|-------------|-------------|-----------|
| No. | Frequency (MHz) | Polarization (H/V) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | LimitAV [dB(uV/m)] | LimitPK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] | Height (cm) | Angle (Deg) | Pass/Fail |
| 1 | 1682.04 | H | 44.1 | 63.7 | -13 | 31.1 | 50.7 | 54 | 74 | -22.9 | -23.3 | 374 | 352.3 | Pass |
| 2 | 2522.71 | H | 43.4 | 55.4 | -9.3 | 34.1 | 46.1 | 54 | 74 | -19.9 | -27.9 | 399 | 16.1 | Pass |
| 3 | 3362.36 | H | 42.3 | 53.6 | -7.9 | 34.4 | 45.7 | 54 | 74 | -19.6 | -28.3 | 162 | 295.6 | Pass |
| 4 | 4204.69 | H | 43.2 | 54.2 | -7.8 | 35.4 | 46.4 | 54 | 74 | -18.6 | -27.6 | 283 | 99 | Pass |
| 5 | 5043.94 | V | 40.1 | 52.6 | -5.9 | 34.2 | 46.7 | 54 | 74 | -19.8 | -27.3 | 374 | 43.4 | Pass |
| 6 | 5885.99 | H | 39.6 | 50.4 | -3.4 | 36.2 | 47 | 54 | 74 | -17.8 | -27 | 147 | 277.6 | Pass |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.

5 Pictures of Test Arrangements

Please see setup photo file.

Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

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The address and road map of all our labs can be found in our web site also.

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