# FCC RADIO TEST REPORT

| | | |
|---|---|---|
| **FCC ID** | : | **B94HNC09CMCL** |
| **Equipment** | : | **Convertible PC** |
| **Brand Name** | : | **HP** |
| **Model Name** | : | **HSN-C09C** |
| **Applicant** | : | **HP Inc.**<br>**1501 Page Mill Road, Palo Alto CA 94304 USA** |
| **Standard** | : | **FCC 47 CFR Part 2, Part 27(D)** |

**The product was received on Aug. 21, 2020 and testing was started from Sep. 11, 2020 and completed on Sep. 14, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.**

**The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**

Louis Wu

**Approved by: Louis Wu**

***SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory***
*No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)*

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# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FG082123C | 01 | Initial issue of report | Oct. 29, 2020 |
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# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| - | §2.1046 | Conducted Output Power and Effective Isotropic Radiated Power | - | See Note |
| - | - | Peak-to-Average Ratio | - | See Note |
| - | §27.50 (a)(3) | EIRP Power Density | - | See Note |
| - | §2.1049 | Occupied Bandwidth | - | See Note |
| - | §2.1051 §27.53 (a)(4) | Conducted Band Edge Measurement | - | See Note |
| - | §2.1051 §27.53 (a)(4) | Conducted Spurious Emission | - | See Note |
| - | §2.1055 §27.54 | Frequency Stability Temperature & Voltage | - | See Note |
| 3.2 | §2.1053 §27.53 (a)(4) | Radiated Spurious Emission | Pass | Under limit 17.63 dB at 9240.000 MHz |

**Note:** The module (Model: T77W968) makes no difference after verifying output power, this report reuses test data from the module report.

| **Declaration of Conformity:** |
|---|
| The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. |
| **Comments and Explanations:** |
| The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |

**Reviewed by: Wii Chang**

**Report Producer: Yimin Ho**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, and GNSS.

| Product Specification subjective to this standard | |
|---|---|
| **WWAN Module** | Brand Name: FOXCONN<br>Model Name: T77W968 |
| **Antenna Type** | WWAN<br><Ant. 1>: PIFA Antenna<br><Ant. 2>: PIFA Antenna (Rx only)<br><Ant. 3>: Couple Antenna<br><Ant. 4>: Couple Antenna (Rx only)<br>WLAN<br><Ant. 1>: Couple Antenna<br><Ant. 2>: Couple Antenna<br>Bluetooth: Couple Antenna<br>GPS / Glonass / Galileo : PIFA Antenna |

| WWAN Antenna Information_NB Mode | | | |
|---|---|---|---|
| **Antenna Part Number** | **Manufacture** | **Antenna Type** | **Peak Gain (dBi)** |
| Tx1 Main Antenna<br>260-24315 DC33002FX20) | HONG-BO | PIFA | 824-849MHz -5.33 dBi (peak) |
| | | | 880-915MHz -5.19 dBi (peak) |
| | | | 1710-1785MHz -3.50 dBi (peak) |
| | | | 1850-1910MHz -1.81 dBi (peak) |
| | | | 1920-1980MHz -0.23 dBi (peak) |
| | | | 704-716MHz -5.56 dBi (peak) |
| | | | 746-756MHz -3.93 dBi (peak) |
| | | | 777-787MHz -5.35 dBi (peak) |
| | | | 832-862MHz -4.85 dBi (peak) |
| | | | 1710-1755MHz -4.61 dBi (peak) |
| | | | 2500-2570MHz -1.34 dBi (peak) |
| | | | 2570-2620MHz -3.21 dBi (peak) |
| | | | 2300-2400MHz 0.40 dBi (peak) |

| WWAN Antenna Information_TB Mode | | | |
|---|---|---|---|
| **Antenna Part Number** | **Manufacture** | **Antenna Type** | **Peak Gain loss (dBi)** |
| Tx1 Main Antenna<br>260-24315 (DC33002FX20) | HONG-BO | PIFA | 824-849MHz -4.92 dBi (peak) |
| | | | 880-915MHz -5.52 dBi (peak) |
| | | | 1710-1785MHz -0.09 dBi (peak) |
| | | | 1850-1910MHz -0.45 dBi (peak) |
| | | | 1920-1980MHz -0.17 dBi (peak) |
| | | | 704-716MHz -8.11 dBi (peak) |
| | | | 746-756MHz -7.17 dBi (peak) |
| | | | 777-787MHz -6.54 dBi (peak) |
| | | | 832-862MHz -4.92 dBi (peak) |
| | | | 1710-1755MHz -0.31 dBi (peak) |
| | | | 2500-2570MHz -3.24dBi (peak) |
| | | | 2570-2620MHz -3.24 dBi (peak) |
| | | | 2300-2400MHz -0.58 dBi (peak) |

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.3 Testing Site

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory |
| **Test Site Location** | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH11-HY |
| **Test Engineer** | Fu Chen and Troye Hsieh |
| **Temperature** | 20.1~25.7℃ |
| **Relative Humidity** | 55.2~67.5% |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW0007

## 1.4 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26-2015
- FCC 47 CFR Part 2, Part 27(D)
- ANSI / TIA-603-E
- FCC KDB 971168 Power Meas License Digital Systems D01 v03r01
- FCC KDB 414788 D01 Radiated Test Site v01r01

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

# 2 Test Configuration of Equipment Under Test

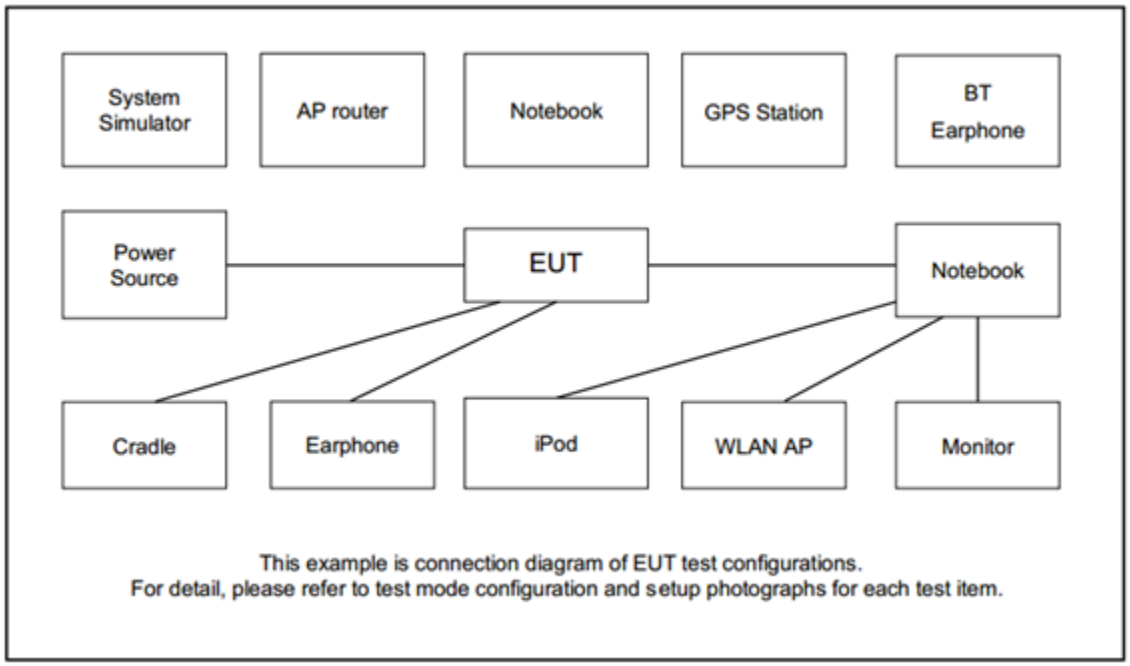
## 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in Tablet type (three orthogonal panels, X, Y, Z) and Notebook type. The worst cases (Y plane) were recorded in this report.

| Test Items | Band | Bandwidth (MHz) | | | | | | Modulation | | | RB # | | | Test Channel | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | QPSK | 16QAM | 64QAM | 1 | Half | Full | L | M | H |
| Radiated Spurious Emission | 30 | - | - | v | | - | - | v | | | v | | | v | v | v |
| Remark | 1. The mark "**v** " means that this configuration is chosen for testing<br>2. The mark "-" means that this bandwidth is not supported.<br>3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.<br>4. All the radiated test cases were performed with Adapter 3. | | | | | | | | | | | | | | | |

## 2.2 Connection Diagram of Test System




This example is connection diagram of EUT test configurations.
For detail, please refer to test mode configuration and setup photographs for each test item.

## 2.3 Support Unit used in test configuration and system

| Item | Equipment | Brand Name | Model No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | iPod Earphone | Apple | N/A | Verification | Unshielded, 1.0 m | N/A |
| 2. | System Simulator | Anritsu | MT8821C | N/A | N/A | Unshielded, 1.8 m |

## 2.4 Frequency List of Low/Middle/High Channels

| LTE Band 30 Channel and Frequency List | | | | |
|---|---|---|---|---|
| **BW [MHz]** | **Channel/Frequency(MHz)** | **Lowest** | **Middle** | **Highest** |
| 5 | Channel | 27685 | 27710 | 27735 |
| | Frequency | 2307.5 | 2310 | 2312.5 |

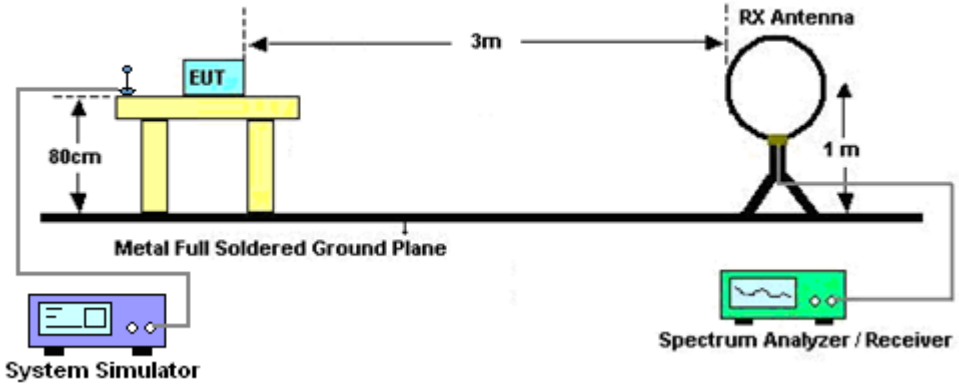
# 3 Radiated Test Items

## 3.1 Measuring Instruments

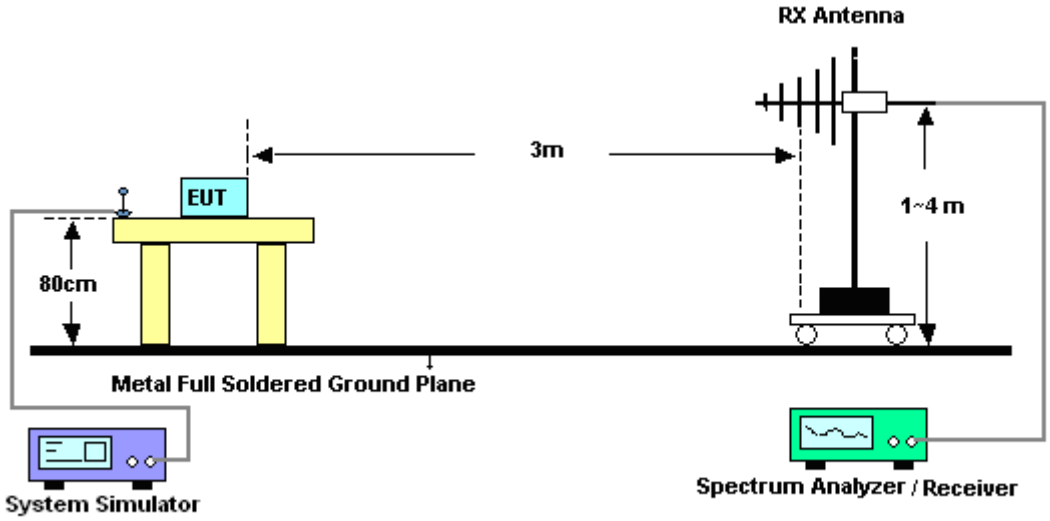
See list of measuring instruments of this test report.

### 3.1.1 Test Setup

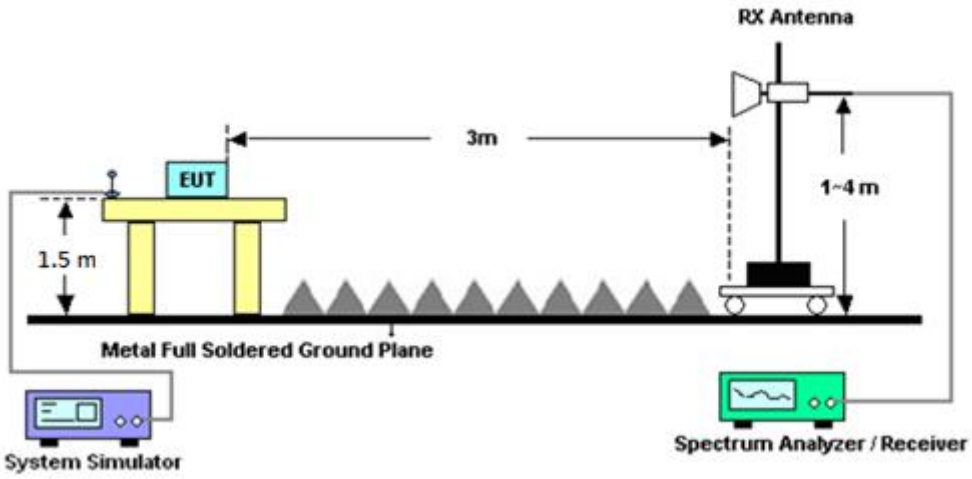
**For radiated emissions below 30MHz**




**For radiated test from 30MHz to 1GHz**



**For radiated test above 1GHz**




## 3.1.2 Test Result of Radiated Test

Please refer to Appendix A.

**Note:**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Sitev01r01, and the result came out very similar.

# 3.2 Radiated Spurious Emission Measurement

## 3.2.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

## 3.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
   EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
   ERP (dBm) = EIRP - 2.15
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
   The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [70 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [70 + 10log(P)] (dB)
   = -40dBm.

# 4 List of Measuring Equipment

| Instrument | Brand Name | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Amplifier | SONOMA | 310N | 187312 | 9kHz~1GHz | Dec. 03, 2019 | Sep. 11, 2020~ Sep. 14, 2020 | Dec. 02, 2020 | Radiation (03CH11-HY) |
| Bilog Antenna | TESEQ | CBL 6111D & N-6-06 | 35414 & AT-N0602 | 30MHz~1GHz | Oct. 12, 2019 | Sep. 11, 2020~ Sep. 14, 2020 | Oct. 11, 2020 | Radiation (03CH11-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1326 | 1GHz ~ 18GHz | Nov. 04, 2019 | Sep. 11, 2020~ Sep. 14, 2020 | Nov. 03, 2020 | Radiation (03CH11-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Jan. 09, 2020 | Sep. 11, 2020~ Sep. 14, 2020 | Jan. 08, 2021 | Radiation (03CH11-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200486 | 10Hz ~ 44GHz | Oct. 28, 2019 | Sep. 11, 2020~ Sep. 14, 2020 | Oct. 27, 2020 | Radiation (03CH11-HY) |
| Filter | Wainwright | WLK4-1000-1530-8000-40SS | SN11 | 1.53G Low Pass | Sep. 15, 2019 | Sep. 11, 2020~ Sep. 13, 2020 | Sep. 14, 2020 | Radiation (03CH11-HY) |
| Filter | Wainwright | WLK4-1000-1530-8000-40SS | SN11 | 1.53G Low Pass | Sep. 14, 2020 | Sep. 14, 2020 | Sep. 13, 2021 | Radiation (03CH11-HY) |
| Filter | Wainwright | WHKX12-2700-3000-18000-60SS | SN3 | 3GHz High Pass | Sep. 15, 2019 | Sep. 11, 2020~ Sep. 13, 2020 | Sep. 14, 2020 | Radiation (03CH11-HY) |
| Filter | Wainwright | WHKX12-2700-3000-18000-60SS | SN3 | 3GHz High Pass | Sep. 14, 2020 | Sep. 14, 2020 | Sep. 13, 2021 | Radiation (03CH11-HY) |
| Controller | EMEC | EM 1000 | N/A | Control Turn table & Ant Mast | N/A | Sep. 11, 2020~ Sep. 14, 2020 | N/A | Radiation (03CH11-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1~4m | N/A | Sep. 11, 2020~ Sep. 14, 2020 | N/A | Radiation (03CH11-HY) |
| Turn Table | EMEC | TT 2000 | N/A | 0~360 Degree | N/A | Sep. 11, 2020~ Sep. 14, 2020 | N/A | Radiation (03CH11-HY) |
| EMI Test Receiver | Keysight | N9038A (MXE) | MY53290045 | 20MHz~8.4GHz | Jan. 18, 2020 | Sep. 11, 2020~ Sep. 14, 2020 | Jan. 17, 2021 | Radiation (03CH11-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-001042 | N/A | N/A | Sep. 11, 2020~ Sep. 14, 2020 | N/A | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 | MY9837/4PE | 9kHz-30MHz | Mar. 12, 2020 | Sep. 11, 2020~ Sep. 14, 2020 | Mar. 11, 2021 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | MY2859/2 | 30MHz-40GHz | Mar. 12, 2020 | Sep. 11, 2020~ Sep. 14, 2020 | Mar. 11, 2021 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 | MY9837/4PE | 30M-18G | Mar. 12, 2020 | Sep. 11, 2020~ Sep. 14, 2020 | Mar. 11, 2021 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | MY4274/2 | 30MHz-40GHz | Mar. 12, 2020 | Sep. 11, 2020~ Sep. 14, 2020 | Mar. 11, 2021 | Radiation (03CH11-HY) |
| SMB100A Signal Generator | Anritsu | MG3694C | 163401 | 0.1Hz~40GHz | Feb. 15,2020 | Sep. 11, 2020~ Sep. 14, 2020 | Feb.14, 2021 | Radiation (03CH11-HY) |

# 5 Uncertainty of Evaluation

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.29** |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.32** |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **4.08** |

# Appendix A. Test Results of Radiated Test

## LTE Band 30

| LTE Band 30 / 5MHz / QPSK | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | EIRP ( dBm ) | Limit ( dBm ) | Over Limit ( dB ) | SPA Reading (dBm) | S.G. Power ( dBm ) | TX Cable loss ( dB ) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Lowest | 4615 | -63.73 | -40 | -23.73 | -55.08 | -75.11 | 0.82 | 12.20 | H |
| | 6922 | -64.43 | -40 | -24.43 | -62.66 | -74.91 | 0.99 | 11.47 | H |
| | 9230 | -59.58 | -40 | -19.58 | -63.31 | -70.16 | 1.38 | 11.96 | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | 4615 | -62.40 | -40 | -22.40 | -54.74 | -73.78 | 0.82 | 12.20 | V |
| | 6922 | -63.78 | -40 | -23.78 | -62.38 | -74.26 | 0.99 | 11.47 | V |
| | 9230 | -57.64 | -40 | -17.64 | -63.12 | -68.22 | 1.38 | 11.96 | V |
| | | | | | | | | | V |
| | | | | | | | | | V |
| | | | | | | | | | V |
| Middle | 4620 | -60.68 | -40 | -20.68 | -52.04 | -72.09 | 0.79 | 12.20 | H |
| | 6930 | -64.12 | -40 | -24.12 | -62.36 | -74.57 | 1.01 | 11.45 | H |
| | 9240 | -59.28 | -40 | -19.28 | -62.98 | -69.83 | 1.38 | 11.93 | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | 4620 | -59.80 | -40 | -19.80 | -52.19 | -71.21 | 0.79 | 12.20 | V |
| | 6930 | -64.13 | -40 | -24.13 | -62.75 | -74.58 | 1.01 | 11.45 | V |
| | 9240 | -57.63 | -40 | -17.63 | -63.09 | -68.18 | 1.38 | 11.93 | V |
| | | | | | | | | | V |
| | | | | | | | | | V |
| | | | | | | | | | V |
| | | | | | | | | | V |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Highest | 4715 | -64.50 | -40 | -24.50 | -57.54 | -76.35 | 0.35 | 12.20 | H |
| | 7072 | -63.41 | -40 | -23.41 | -62.3 | -73.41 | 1.17 | 11.17 | H |
| | 9430 | -60.11 | -40 | -20.11 | -63.23 | -70.01 | 1.50 | 11.40 | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | 4715 | -64.32 | -40 | -24.32 | -57.68 | -76.17 | 0.35 | 12.20 | V |
| | 7072 | -62.78 | -40 | -22.78 | -61.97 | -72.78 | 1.17 | 11.17 | V |
| | 9430 | -59.01 | -40 | -19.01 | -63.82 | -68.91 | 1.50 | 11.40 | V |
| | | | | | | | | | V |
| | | | | | | | | | V |
| | | | | | | | | | V |
| | | | | | | | | | V |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

———THE END———