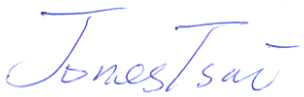
# Spot Check Evaluation

**Reviewed by: Joseph Lin / Supervisor**



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# REVISION HISTORY

| VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|
| Rev. 01 | Initial issue of report | Mar. 23, 2017 |
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# 1. Introduction Section

**For BT/WLAN:**

The original model (FCC ID: ZNFX240H) and the variant model (FCC ID: ZNFX240DS) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GPS. Based on their similarity, the FCC Part 15C (equipment class: DTS, DSS) test data issued for original model also apply for the variant model.

**For WWAN:**

The original model (FCC ID: ZNFX240YK) and the variant model (FCC ID: ZNFX240DS) has identical PCB layout, antenna, SW implementation for GSM/WCDMA/LTE. Based on their similarity, the FCC Part 22, 24, 27 (equipment class: PCS) test data issued for original model also apply for the variant model.

The applicant takes full responsibility that the test data as referenced in section 4 below represent compliance for this FCC ID (FCC ID: ZNFX240DS).

# 2. Difference Section

**For BT/WLAN:**

The original model (FCC ID: ZNFX240H) and the variant model (FCC ID: ZNFX240DS) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GPS. The details of similarity and difference can be found in the Produce Equality Description.

**For WWAN:**

The original model (FCC ID: ZNFX240YK) and the variant model (FCC ID: ZNFX240DS) has identical PCB layout, antenna, SW implementation for GSM/WCDMA/LTE. The details of similarity and difference can be found in the Produce Equality Description.

The product specification is outlined in the following table:

| FCC ID | | ZNFX240H | ZNFX240DS |
|---|---|---|---|
| **Wireless Tech** | **Mode** | **Frequency (MHz)** | |
| **Wi-Fi** | 11b/11g/11n(HT20)/11n(HT40) | 2412-2462 MHz | |
| **Bluetooth** | BR/EDR/LE | 2402-2480 MHz | |

| FCC ID | | | ZNFX240YK | ZNFX240DS |
|---|---|---|---|---|
| **Wireless Tech** | **Mode** | | **Frequency (MHz)** | |
| **GSM** | GSM Voice<br>GPRS (GMSK)<br>EDGE (8PSK) | Multi-Slot<br>Class 12<br>DTM: No | 850/1900 | 850/1900 |
| **UMTS** | AMR/RCM12.2Kbps<br>HSDPA/HSUPA/DC-HSDPA | | B5 | B5 |
| **LTE (FDD)** | QPSK<br>16QAM | | B5/B7 | B7 |

# 3. Spot Check Verification Data Section

Summary of the spot check:

| Test Item | Mode | ZNFX240H Worst Result | ZNFX240DS Worst Result | Difference (dB) |
|---|---|---|---|---|
| **Average Conducted Power (dBm)** | 802.11b | 16.97 | 16.89 | 0.08 |
| | 802.11g | 14.63 | 14.48 | 0.15 |
| | 11n HT20 | 11.43 | 11.29 | 0.14 |
| | 11n HT40 | 10.99 | 10.68 | 0.31 |
| | BT (1Mbps) | 7.06 | 6.74 | 0.32 |
| | BT (2Mbps) | 4.71 | 4.30 | 0.41 |
| | BT (3Mbps) | 4.67 | 4.31 | 0.36 |
| | BT-LE | -0.93 | -1.08 | 0.15 |
| | Test date | Nov. 03, 2016~ Feb. 24, 2017 | Feb. 09, 2017~ Feb. 27, 2017 | |
| | | | | |
| **Peak Conducted Power (dBm)** | 802.11b | 19.85 | 19.84 | 0.01 |
| | 802.11g | 22.58 | 22.38 | 0.2 |
| | 11n HT20 | 20.97 | 20.95 | 0.02 |
| | 11n HT40 | 21.52 | 21.21 | 0.31 |
| | BT (1Mbps) | 7.25 | 6.89 | 0.36 |
| | BT (2Mbps) | 6.49 | 6.15 | 0.34 |
| | BT (3Mbps) | 6.73 | 6.39 | 0.34 |
| | BT-LE | -0.37 | -0.38 | 0.01 |
| | Test date | Nov. 03, 2016~ Feb. 24, 2017 | Feb. 09, 2017~ Feb. 27, 2017 | |
| | | | | |
| **Peak Radiated Spurious Emission (Band Edge) (dBuV/m)** | 11n HT40 | 59.53 | 57.50 | -1.99 |
| | BT (1Mbps) | 44.26 | 45.02 | -0.02 |
| | BT-LE | 54.28 | 53.45 | -0.26 |
| | Test date | Nov. 12, 2016~ Feb. 24, 2017 | | |
| | | | | |
| **Average Radiated Spurious Emission (Band Edge) (dBuV/m)** | 11n HT40 | 46.76 | 46.32 | -0.54 |
| | BT (1Mbps) | 19.44 | 20.20 | -0.02 |
| | BT-LE | 44.71 | 45.05 | 0.04 |
| | Test date | Nov. 12, 2016~ Feb. 24, 2017 | Feb. 20, 2017~ Feb. 27, 2017 | |
| | | | | |
| **Peak Radiated Spurious Emission (Harmonic) (dBuV/m)** | 11n HT40 | 37.88 | 40.06 | 0.36 |
| | BT (1Mbps) | 38.86 | 40.91 | 1.41 |
| | BT-LE | 37.65 | 39.70 | 0.48 |
| | Test date | Nov. 12, 2016~ Feb. 24, 2017 | Feb. 20, 2017~ Feb. 27, 2017 | |

| Test Item | Mode | ZNFX240YK Worst Result | ZNFX240DS Worst Result | Difference (dB) |
|---|---|---|---|---|
| Average Conducted Power (dBm) | GSM 850 (GPRS) | 33.87 | 33.93 | -0.06 |
| | GSM 850 (EDGE) | 26.92 | 26.79 | 0.13 |
| | GSM 1900 (GPRS) | 29.92 | 29.84 | 0.08 |
| | GSM 1900 (EDGE) | 25.90 | 25.90 | 0.00 |
| | UMTS B5 (RMC 12.2Kbps) | 24.98 | 25.00 | -0.02 |
| | LTE B7 (FDD - QPSK) | 23.24 | 23.18 | 0.06 |
| | Test date | Feb. 06, 2017~ Feb. 07, 2017 | Feb. 10, 2017 | |
| | | | | |
| Radiated Spurious Emission (dBm) | GSM 850 (GPRS) | -45.91 | -45.76 | -0.15 |
| | GSM 1900 (GPRS) | -35.86 | -36.35 | 0.49 |
| | LTE B7 (FDD - QPSK) / 5MHz | -40.90 | -40.77 | -0.13 |
| | Test date | Feb. 04, 2017~ Feb. 17, 2017 | Feb. 17, 2017~ Feb. 22, 2017 | |

| | System | Type of Modulation | FCC ID ZNFX240YK | FCC ID ZNFX240DS |
|---|---|---|---|---|
| Maximum ERP/EIRP (W) | GSM850 GPRS class 8 | GMSK | 0.5420 | 0.4753 |
| | GSM850 EDGE class 8 | 8PSK | 0.1866 | 0.1652 |
| | WCDMA Band V RMC 12.2Kbps | BPSK | 0.0977 | 0.1005 |
| | GSM1900 GPRS class 8 | GMSK | 0.8954 | 0.9099 |
| | GSM1900 EDGE class 8 | 8PSK | 0.2891 | 0.2891 |

Remark: Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02.

| | LTE Band 7 | | QPSK | | 16QAM | |
|---|---|---|---|---|---|---|
| | BW (MHz) | Frequency Range (MHz) | FCC ID ZNFX240YK | FCC ID ZNFX240DS | FCC ID ZNFX240YK | FCC ID ZNFX240DS |
| Maximum ERP/EIRP (W) | 5 | 2502.5 ~ 2567.5 | 0.1355 | - | 0.1102 | - |
| | 10 | 2505.0 ~ 2565.0 | 0.1343 | - | 0.1132 | - |
| | 15 | 2507.5 ~ 2562.5 | 0.1416 | - | 0.1164 | - |
| | 20 | 2510.0 ~ 2560.0 | **0.1459** | 0.1297 | **0.1183** | 0.1012 |

Remark: Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02.

**Conclusion:**

Radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.

Based on the spot check test result (power levels measured are within 0.5dB, and the worst case of RSE spot check verification based on the worst condition from the original model is within 3dB, and are compliance with the limits), the test data from the original model is representative for the variant model.

The unwanted, harmonics, radiated spurious emission is reported peak measurement only due to spurious lower than 20dB than the limit.

The detail test results can be found in this document, Appendix A, hereafter.

# 4. Reference detail Section

| Equipment Class | Reference FCC ID | Type Grant/Permissive Change | Reference Application | Folder Test/RF Exposure | Report Title |
|---|---|---|---|---|---|
| DTS | ZNFX240H | Original Grant | FR6O1802B<br>FR6O1802C | Part 15C | All sections applicable |
| | | | FA6O1802 | RF Exposure | All sections applicable |
| DSS | ZNFX240H | Original Grant | FR6O1802A | Part 15C | All sections applicable |
| | | | FA6O1802 | RF Exposure | All sections applicable |
| PCS | ZNFX240YK | Original Grant | FG6D1013A<br>FG6D1013B | Part 22(H)<br>Part 24(E)<br>Part 27(M) | All sections Applicable |
| | | | FA6D1013 | RF Exposure | All sections applicable |

# Appendix A. Spot Check Test Result

## A.1 Conducted power

### A.1.1 Test Procedures

**DSS**

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

**DTS**

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

**PCS**

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

## A.1.2 Test results

**<Bluetooth>**

| Mode | Channel | Frequency (MHz) | FCC ID ZNFX240H Peak power (dBm) | FCC ID ZNFX240DS Peak power (dBm) |
|---|---|---|---|---|
| Bluetooth (1Mbps) | CH 00 | 2402 | 6.25 | 5.79 |
| | CH 39 | 2441 | 7.25 | 6.89 |
| | CH 78 | 2480 | 6.08 | 5.65 |
| Bluetooth (2Mbps) | CH 00 | 2402 | 5.55 | 5.11 |
| | CH 39 | 2441 | 6.49 | 6.15 |
| | CH 78 | 2480 | 5.29 | 4.88 |
| Bluetooth (3Mbps) | CH 00 | 2402 | 5.70 | 5.27 |
| | CH 39 | 2441 | 6.73 | 6.39 |
| | CH 78 | 2480 | 5.47 | 5.00 |
| BLE (GFSK) | CH 00 | 2402 | -1.07 | -1.10 |
| | CH 19 | 2440 | -0.37 | -0.38 |
| | CH 39 | 2480 | -1.53 | -1.55 |

**<Bluetooth>**

| Mode | Channel | Frequency (MHz) | Tune-Up Limit | FCC ID ZNFX240H Average power (dBm) | FCC ID ZNFX240DS Average power (dBm) |
|---|---|---|---|---|---|
| Bluetooth (1Mbps) | CH 00 | 2402 | 8.0 | 6.00 | 5.55 |
| | CH 39 | 2441 | | 7.06 | 6.74 |
| | CH 78 | 2480 | | 5.87 | 5.39 |
| Bluetooth (2Mbps) | CH 00 | 2402 | 5.0 | 3.63 | 3.29 |
| | CH 39 | 2441 | | 4.71 | 4.30 |
| | CH 78 | 2480 | | 3.44 | 3.19 |
| Bluetooth (3Mbps) | CH 00 | 2402 | 5.0 | 3.62 | 3.19 |
| | CH 39 | 2441 | | 4.67 | 4.31 |
| | CH 78 | 2480 | | 3.45 | 3.19 |
| BLE (GFSK) | CH 00 | 2402 | 0.0 | -1.70 | -2.11 |
| | CH 19 | 2440 | | -0.93 | -1.08 |
| | CH 39 | 2480 | | -2.17 | -2.57 |

**<2.4GHz WLAN>**

| | Mode | Channel | Frequency (MHz) | Data Rate | FCC ID ZNFX240H Peak power (dBm) | FCC ID ZNFX240DS Peak power (dBm) |
|---|---|---|---|---|---|---|
| 2.4GHz WLAN | 802.11b | CH 1 | 2412 | 1Mbps | 18.77 | 18.70 |
| | | CH 6 | 2437 | | 19.85 | 19.84 |
| | | CH 11 | 2462 | | 18.99 | 18.66 |
| | 802.11g | CH 1 | 2412 | 6Mbps | 21.17 | 20.95 |
| | | CH 6 | 2437 | | 22.58 | 22.38 |
| | | CH 11 | 2462 | | 22.02 | 21.65 |
| | 802.11n-HT20 | CH 1 | 2412 | MCS0 | 20.45 | 20.44 |
| | | CH 6 | 2437 | | 20.95 | 20.67 |
| | | CH 11 | 2462 | | 20.97 | 20.95 |
| | 802.11n-HT40 | CH 3 | 2422 | MCS0 | 20.45 | 20.40 |
| | | CH 6 | 2437 | | 21.36 | 21.19 |
| | | CH 9 | 2452 | | 21.52 | 21.21 |

**<2.4GHz WLAN>**

| | Mode | Channel | Frequency (MHz) | Data Rate | Tune-Up Limit | FCC ID ZNFX240H Average power (dBm) | FCC ID ZNFX240DS Average power (dBm) |
|---|---|---|---|---|---|---|---|
| 2.4GHz WLAN | 802.11b | CH 1 | 2412 | 1Mbps | 16.0 | 15.93 | 15.89 |
| | | CH 6 | 2437 | | 17.0 | 16.97 | 16.89 |
| | | CH 11 | 2462 | | 16.0 | 15.99 | 15.70 |
| | 802.11g | CH 1 | 2412 | 6Mbps | 12.0 | 11.94 | 11.87 |
| | | CH 6 | 2437 | | 15.0 | 14.63 | 14.48 |
| | | CH 11 | 2462 | | 13.5 | 13.26 | 13.07 |
| | 802.11n-HT20 | CH 1 | 2412 | MCS0 | 11.5 | 11.13 | 10.79 |
| | | CH 6 | 2437 | | | 11.35 | 10.90 |
| | | CH 11 | 2462 | | | 11.43 | 11.29 |
| | 802.11n-HT40 | CH 3 | 2422 | MCS0 | 9.5 | 9.14 | 9.13 |
| | | CH 6 | 2437 | | 11.0 | 10.94 | 10.55 |
| | | CH 9 | 2452 | | | 10.99 | 10.68 |

**<WWAN>**

| GSM850 | | FCC ID ZNFX240YK Average power (dBm) | | | FCC ID ZNFX240DS Average power (dBm) | | |
|---|---|---|---|---|---|---|---|
| TX Channel | Tune-up Limit (dBm) | 128 | 189 | 251 | 128 | 189 | 251 |
| Frequency (MHz) | | 824.2 | 836.4 | 848.8 | 824.2 | 836.4 | 848.8 |
| GSM 1 Tx slot | 34.00 | 33.73 | 33.80 | 33.81 | 33.91 | 33.92 | 33.85 |
| GPRS 1 Tx slot | 34.00 | **33.87** | 33.83 | 33.86 | **33.93** | **33.93** | 33.88 |
| GPRS 2 Tx slots | 30.50 | 30.32 | 30.13 | 30.10 | 30.06 | 30.09 | 30.12 |
| GPRS 3 Tx slots | 29.00 | 28.48 | 28.47 | 28.48 | 28.55 | 28.59 | 28.62 |
| GPRS 4 Tx slots | 28.00 | 27.91 | 27.92 | 27.93 | 27.90 | 27.95 | 28.00 |
| EDGE 1 Tx slot | 27.00 | **26.92** | 26.83 | 26.80 | 26.64 | **26.79** | 26.75 |
| EDGE 2 Tx slots | 25.00 | 24.79 | 24.81 | 24.77 | 24.56 | 24.70 | 24.63 |
| EDGE 3 Tx slots | 23.50 | 23.17 | 23.11 | 23.04 | 23.00 | 23.12 | 23.05 |
| EDGE 4 Tx slots | 22.50 | 21.99 | 21.93 | 21.84 | 21.87 | 21.98 | 21.94 |

| GSM1900 | | FCC ID ZNFX240YK Average power (dBm) | | | FCC ID ZNFX240DS Average power (dBm) | | |
|---|---|---|---|---|---|---|---|
| TX Channel | Tune-up Limit (dBm) | 512 | 661 | 810 | 512 | 661 | 810 |
| Frequency (MHz) | | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 |
| GSM 1 Tx slot | 30.00 | 29.90 | 29.84 | 29.80 | 29.63 | 29.70 | 29.82 |
| GPRS 1 Tx slot | 30.00 | 29.83 | 29.87 | **29.92** | 29.65 | 29.72 | **29.84** |
| GPRS 2 Tx slots | 27.50 | 27.17 | 27.23 | 27.26 | 27.05 | 27.21 | 27.38 |
| GPRS 3 Tx slots | 26.00 | 25.37 | 25.47 | 25.56 | 25.40 | 25.67 | 25.85 |
| GPRS 4 Tx slots | 25.00 | 24.71 | 24.81 | 24.92 | 24.52 | 24.83 | 25.00 |
| EDGE 1 Tx slot | 26.00 | 25.78 | 25.84 | **25.90** | 25.57 | 25.84 | **25.90** |
| EDGE 2 Tx slots | 24.00 | 23.57 | 23.78 | 23.78 | 23.50 | 23.74 | 23.75 |
| EDGE 3 Tx slots | 22.00 | 21.83 | 21.98 | 21.95 | 21.71 | 21.97 | 21.98 |
| EDGE 4 Tx slots | 21.00 | 20.66 | 20.87 | 20.90 | 20.72 | 20.98 | 20.97 |

| WCDMA V | | FCC ID ZNFX240YK Average power (dBm) | | | FCC ID ZNFX240DS Average power (dBm) | | |
|---|---|---|---|---|---|---|---|
| TX Channel | Tune-up Limit (dBm) | 4132 | 4182 | 4233 | 4132 | 4182 | 4233 |
| Frequency (MHz) | | 826.4 | 836.4 | 846.6 | 826.4 | 836.4 | 846.6 |
| AMR 12.2Kbps | 25.00 | 24.87 | 24.80 | 24.91 | 24.98 | 24.95 | 24.99 |
| RMC 12.2Kbps | 25.00 | 24.89 | 24.86 | **24.98** | 24.99 | 24.96 | **25.00** |
| HSDPA Subtest-1 | 24.00 | 23.94 | 23.83 | 23.87 | 23.93 | 23.92 | 24.00 |
| HSDPA Subtest-2 | 24.00 | 23.93 | 23.85 | 23.91 | 23.99 | 23.96 | 24.00 |
| HSDPA Subtest-3 | 23.50 | 23.50 | 23.44 | 23.45 | 23.44 | 23.47 | 23.50 |
| HSDPA Subtest-4 | 23.50 | 23.41 | 23.38 | 23.47 | 23.50 | 23.45 | 23.49 |
| DC-HSDPA Subtest-1 | 24.00 | 23.76 | 23.71 | 23.74 | 23.91 | 23.90 | 23.95 |
| DC-HSDPA Subtest-2 | 24.00 | 23.75 | 23.70 | 23.72 | 23.96 | 23.95 | 23.94 |
| DC-HSDPA Subtest-3 | 23.50 | 23.35 | 23.26 | 23.30 | 23.43 | 23.45 | 23.44 |
| DC-HSDPA Subtest-4 | 23.50 | 23.25 | 23.27 | 23.31 | 23.49 | 23.43 | 23.47 |
| HSUPA Subtest-1 | 24.00 | 21.89 | 21.86 | 21.97 | 22.10 | 22.06 | 22.04 |
| HSUPA Subtest-2 | 22.00 | 21.93 | 21.90 | 21.91 | 22.00 | 21.91 | 21.97 |
| HSUPA Subtest-3 | 23.00 | 22.92 | 22.89 | 22.88 | 23.00 | 22.91 | 22.97 |
| HSUPA Subtest-4 | 22.00 | 21.41 | 21.37 | 21.47 | 21.45 | 21.39 | 21.50 |
| HSUPA Subtest-5 | 24.00 | 23.90 | 23.80 | 23.90 | 23.97 | 23.86 | 23.93 |

| LTE Band 7 / 20MHz | | | | FCC ID ZNFX240YK Average power (dBm) | | | FCC ID ZNFX240DS Average power (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|
| TX Channel | | | Tune-up Limit (dBm) | 20850 | 21100 | 21350 | 20850 | 21100 | 21350 |
| Frequency (MHz) | | | | 2510 | 2535 | 2560 | 2510 | 2535 | 2560 |
| Modulation | RB Size | RB offset | | | | | | | |
| QPSK | 1 | 0 | L : 23.3 | **23.24** | 22.79 | 21.92 | **23.18** | 22.51 | 21.99 |
| QPSK | 1 | 49 | M : 22.8 | 23.23 | 22.70 | 21.55 | 23.17 | 22.50 | 21.32 |
| QPSK | 1 | 99 | H : 22.0 | 23.10 | 22.58 | 21.57 | 22.88 | 22.20 | 21.06 |
| QPSK | 50 | 0 | L : 22.3 | 22.30 | 21.77 | 20.77 | 22.29 | 21.57 | 20.23 |
| QPSK | 50 | 24 | M : 21.8 | 22.29 | 21.71 | 20.71 | 22.27 | 21.49 | 19.91 |
| QPSK | 50 | 50 | H : 21.0 | 22.27 | 21.80 | 20.75 | 22.18 | 21.41 | 19.94 |
| QPSK | 100 | 0 | | 22.26 | 21.78 | 20.70 | 22.21 | 21.46 | 20.06 |
| 16QAM | 1 | 0 | L : 22.3 | 22.29 | 21.76 | 20.97 | 22.23 | 21.76 | 20.93 |
| 16QAM | 1 | 49 | M : 21.8 | 22.27 | 21.73 | 20.75 | 22.26 | 21.70 | 20.10 |
| 16QAM | 1 | 99 | H : 21.0 | 22.26 | 21.77 | 20.79 | 22.10 | 21.47 | 20.08 |
| 16QAM | 50 | 0 | L : 21.3 | 21.25 | 20.79 | 19.71 | 21.25 | 20.53 | 19.20 |
| 16QAM | 50 | 24 | M : 20.8 | 21.23 | 20.75 | 19.56 | 21.24 | 20.44 | 18.86 |
| 16QAM | 50 | 50 | H : 20.0 | 21.22 | 20.75 | 19.60 | 21.11 | 20.36 | 18.90 |
| 16QAM | 100 | 0 | | 21.21 | 20.63 | 19.62 | 21.16 | 20.40 | 19.01 |

# A.2 Radiated Spurious Emission

## A.2.1 Test Procedures

**DSS**

6. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
7. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
8. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
9. Set to the maximum power setting and enable the EUT transmit continuously.
10. Use the following spectrum analyzer settings:
    (1) Span shall wide enough to fully capture the emission being measured;
    (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
    (3) For average measurement: use duty cycle correction factor method per 15.35(c).
    Duty cycle = On time/100 milliseconds
    On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
    Where $N_1$ is number of type 1 pulses, $L_1$ is length of type 1 pulses, etc.
    Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
11. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.82dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

## DTS

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

## PCS

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking 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.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
15. For Band 7:
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)

## A.2.2 Test results

### 2.4GHz BT/WLAN

| Mode | Ch | Freq. (MHz) | Peak /Avg. | FCC ID ZNFX240H | | | | | | FCC ID ZNFX240DS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Band edge | | | Harmonic | | | Band edge | | | Harmonic | | |
| | | | | Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) |
| BT(1Mbps) | CH 78 | 2480 | P | 2484.64 | 44.26 | 74 | 7440 | 38.86 | 74 | 2483.76 | 45.02 | 74 | 7440 | 40.91 | 74 |
| | | | A | 2484.64 | 19.44 | 54 | | | | 2483.76 | 20.2 | 54 | | | |
| BLE | CH 39 | 2480 | P | 2491.2 | 54.28 | 74 | 7440 | 37.65 | 74 | 2498.2 | 53.45 | 74 | 7440 | 39.7 | 74 |
| | | | A | 2488.68 | 44.71 | 54 | | | | 2492.36 | 45.05 | 54 | | | |
| 802.11n-HT40 | CH 03 | 2422 | P | 2389.94 | 59.53 | 74 | 7266 | 37.88 | 74 | 2388.82 | 57.5 | 74 | 7266 | 40.06 | 74 |
| | | | A | 2389.38 | 46.76 | 54 | | | | 2389.66 | 46.32 | 54 | | | |

## Note symbol

| | |
|---|---|
| * | **Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| ! | Test result is **over limit** line. |
| P/A | **P**eak or **A**verage |
| H/V | **H**orizontal or **V**ertical |
| -L | **Low channel location** |
| -R | **High channel location** |

## 2.4GHz 2400~2483.5MHz

### BT (Band Edge @ 3m)

| BT | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BT CH 78 2480MHz | * | 2480 | 103.93 | - | - | 101.08 | 27.45 | 8.98 | 33.58 | 179 | 208 | P | H |
| | * | 2480 | 79.11 | - | - | - | - | - | - | - | - | A | H |
| | | 2483.76 | 45.02 | -28.98 | 74 | 42.17 | 27.45 | 8.98 | 33.58 | 179 | 208 | P | H |
| | | 2483.76 | 20.2 | -33.8 | 54 | - | - | - | - | - | - | A | H |
| | * | 2480 | 100.26 | - | - | 97.41 | 27.45 | 8.98 | 33.58 | 389 | 357 | P | V |
| | * | 2480 | 75.44 | - | - | - | - | - | - | - | - | A | V |
| | | 2492.44 | 44.4 | -29.6 | 74 | 41.49 | 27.5 | 8.98 | 33.57 | 389 | 357 | P | V |
| | | 2492.44 | 19.58 | -34.42 | 54 | - | - | - | - | - | - | A | V |

### BT (Harmonic @ 3m)

| BT | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BT CH 78 2480MHz | | 4960 | 36.1 | -37.9 | 74 | 57.67 | 31.94 | 11.12 | 64.63 | 100 | 0 | P | H |
| | | 4960 | 11.28 | -42.72 | 54 | - | - | - | - | - | - | A | H |
| | | 7440 | 40.31 | -33.69 | 74 | 54.87 | 37.44 | 12.88 | 64.88 | 100 | 0 | P | H |
| | | 7440 | 15.49 | -38.51 | 54 | - | - | - | - | - | - | A | H |
| | | 4960 | 36.74 | -37.26 | 74 | 58.31 | 31.94 | 11.12 | 64.63 | 100 | 0 | P | V |
| | | 4960 | 11.92 | -42.08 | 54 | - | - | - | - | - | - | A | V |
| | | 7440 | 40.91 | -33.09 | 74 | 55.47 | 37.44 | 12.88 | 64.88 | 100 | 0 | P | V |
| | | 7440 | 16.09 | -37.91 | 54 | - | - | - | - | - | - | A | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 2.4GHz 2400~2483.5MHz

### BLE (Band Edge @ 3m)

| BLE | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | ( dBµV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BLE CH 39 2480MHz | * | 2480 | 96.73 | - | - | 93.88 | 27.45 | 8.98 | 33.58 | 185 | 353 | P | H |
| | * | 2480 | 96 | - | - | 93.15 | 27.45 | 8.98 | 33.58 | 185 | 353 | A | H |
| | | 2498.2 | 53.45 | -20.55 | 74 | 50.54 | 27.5 | 8.98 | 33.57 | 185 | 353 | P | H |
| | | 2492.36 | 45.05 | -8.95 | 54 | 42.14 | 27.5 | 8.98 | 33.57 | 185 | 353 | A | H |
| | * | 2480 | 93.11 | - | - | 90.26 | 27.45 | 8.98 | 33.58 | 326 | 280 | P | V |
| | * | 2480 | 92.56 | - | - | 89.71 | 27.45 | 8.98 | 33.58 | 326 | 280 | A | V |
| | | 2484.12 | 53.95 | -20.05 | 74 | 51.1 | 27.45 | 8.98 | 33.58 | 326 | 280 | P | V |
| | | 2485.8 | 45.02 | -8.98 | 54 | 42.17 | 27.45 | 8.98 | 33.58 | 326 | 280 | A | V |

### BLE (Harmonic @ 3m)

| BLE | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | ( dBµV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BLE CH 39 2480MHz | | 4960 | 36.43 | -37.57 | 74 | 58 | 31.94 | 11.12 | 64.63 | 100 | 0 | P | H |
| | | 7440 | 39.56 | -34.44 | 74 | 54.12 | 37.44 | 12.88 | 64.88 | 100 | 0 | P | H |
| | | 4960 | 35.69 | -38.31 | 74 | 57.26 | 31.94 | 11.12 | 64.63 | 100 | 0 | P | V |
| | | 7440 | 39.7 | -34.3 | 74 | 54.26 | 37.44 | 12.88 | 64.88 | 100 | 0 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 2.4GHz 2400~2483.5MHz

## WIFI 802.11n HT40 (Band Edge @ 3m)

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBµV/m ) | Over Limit ( dB ) | Limit Line ( dBµV/m ) | Read Level ( dBµV ) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2388.82 | 57.5 | -16.5 | 74 | 55.02 | 27.19 | 8.89 | 33.6 | 214 | 10 | P | H |
| | | 2389.66 | 46.32 | -7.68 | 54 | 43.84 | 27.19 | 8.89 | 33.6 | 214 | 10 | A | H |
| | * | 2422 | 102.24 | - | - | 99.6 | 27.29 | 8.94 | 33.59 | 214 | 10 | P | H |
| | * | 2422 | 92.83 | - | - | 90.19 | 27.29 | 8.94 | 33.59 | 214 | 10 | A | H |
| 802.11n | | 2484.25 | 53.55 | -20.45 | 74 | 50.7 | 27.45 | 8.98 | 33.58 | 214 | 10 | P | H |
| HT40 | | 2483.69 | 45.1 | -8.9 | 54 | 42.25 | 27.45 | 8.98 | 33.58 | 214 | 10 | A | H |
| CH 03 | | 2389.52 | 56.25 | -17.75 | 74 | 53.77 | 27.19 | 8.89 | 33.6 | 393 | 352 | P | V |
| 2422MHz | | 2388.26 | 45.21 | -8.79 | 54 | 42.73 | 27.19 | 8.89 | 33.6 | 393 | 352 | A | V |
| | * | 2422 | 98.92 | - | - | 96.28 | 27.29 | 8.94 | 33.59 | 393 | 352 | P | V |
| | * | 2422 | 89 | - | - | 86.36 | 27.29 | 8.94 | 33.59 | 393 | 352 | A | V |
| | | 2490.62 | 53.72 | -20.28 | 74 | 50.82 | 27.5 | 8.98 | 33.58 | 393 | 352 | P | V |
| | | 2485.93 | 44.96 | -9.04 | 54 | 42.11 | 27.45 | 8.98 | 33.58 | 393 | 352 | A | V |

## WIFI 802.11n HT40 (Harmonic @ 3m)

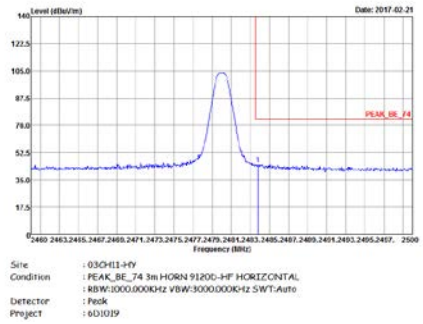
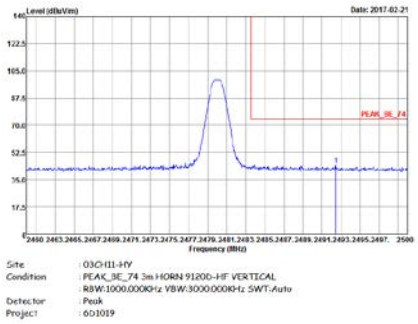
| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBµV/m ) | Over Limit ( dB ) | Limit Line ( dBµV/m ) | Read Level ( dBµV ) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11n | | 4844 | 34.89 | -39.11 | 74 | 57.12 | 31.72 | 10.77 | 64.72 | 100 | 0 | P | H |
| HT40 | | 7266 | 40.06 | -33.94 | 74 | 54.9 | 37.23 | 12.74 | 64.81 | 100 | 0 | P | H |
| CH 03 | | 4844 | 33.95 | -40.05 | 74 | 56.18 | 31.72 | 10.77 | 64.72 | 100 | 0 | P | V |
| 2422MHz | | 7266 | 39.77 | -34.23 | 74 | 54.61 | 37.23 | 12.74 | 64.81 | 100 | 0 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

# Note symbol

| | |
|---|---|
| -L | **Low channel location** |
| -R | **High channel location** |

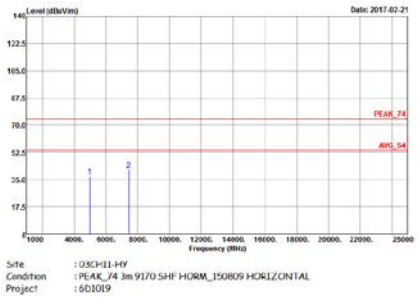
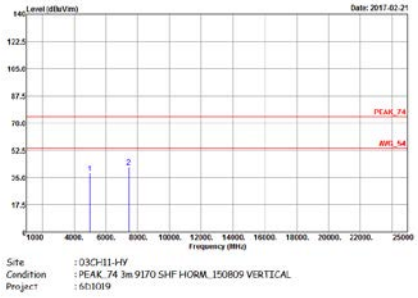
## 2.4GHz 2400~2483.5MHz

## BT (Band Edge @ 3m)

| BT | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | |
|---|---|---|
| ANT | BT CH78 2480MHz | |
| 1 | Horizontal | Vertical |
| Peak |  |  |

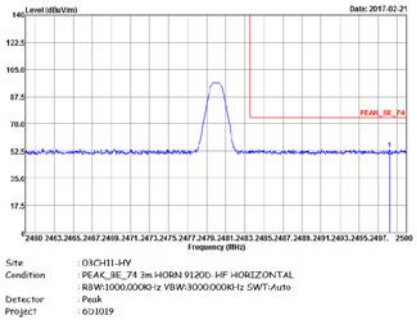
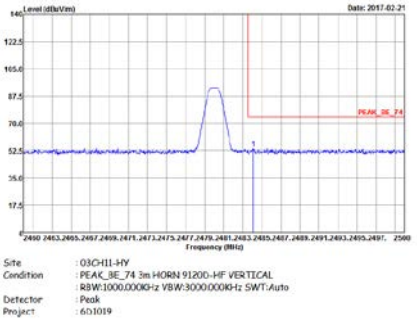
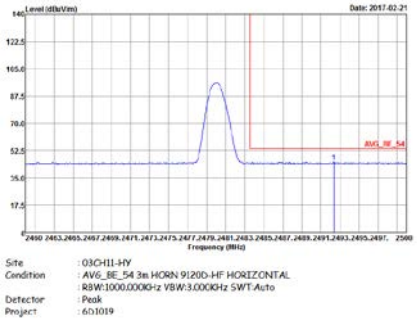
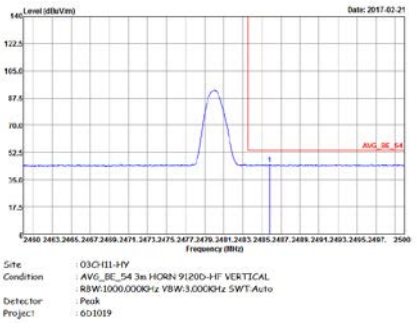
## 2.4GHz 2400~2483.5MHz

## BT (Harmonic @ 3m)

| BT | 2.4GHz 2400~2483.5MHz Harmonic @ 3m | |
|---|---|---|
| ANT | BT CH78 2480MHz | |
| 1 | Horizontal | Vertical |
| Peak<br>Avg. |  |  |

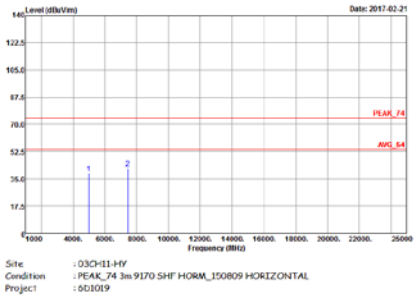
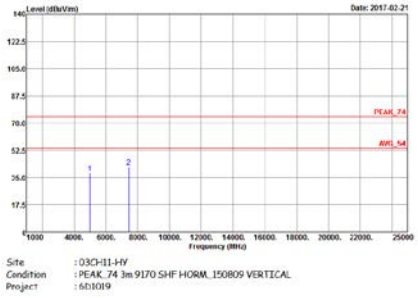
## 2.4GHz 2400~2483.5MHz

## BLE (Band Edge @ 3m)

| BLE | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | |
|---|---|---|
| ANT | BLE CH39 2480MHz | |
| 1 | Horizontal | Vertical |
| Peak |  |  |
| Avg. |  |  |

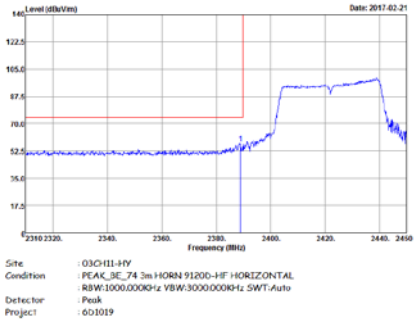
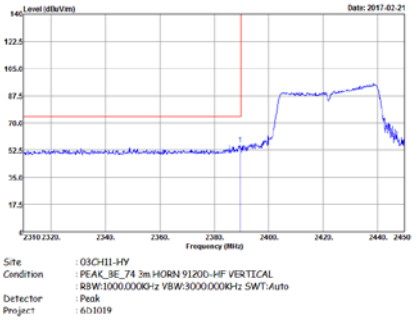
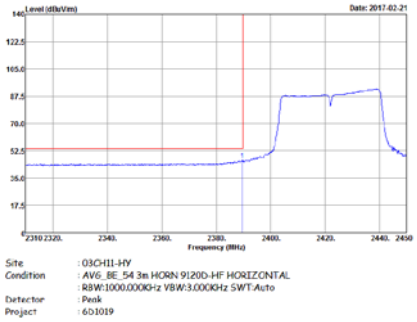
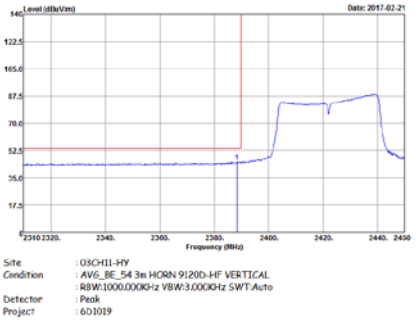
## 2.4GHz 2400~2483.5MHz

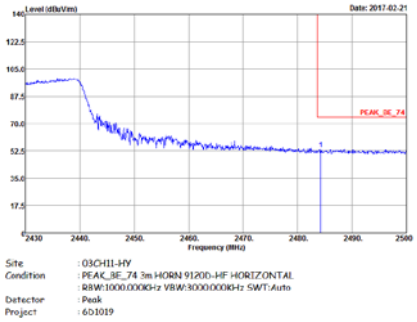
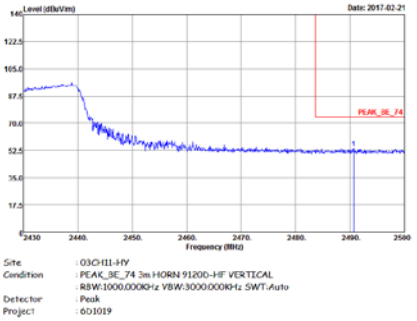
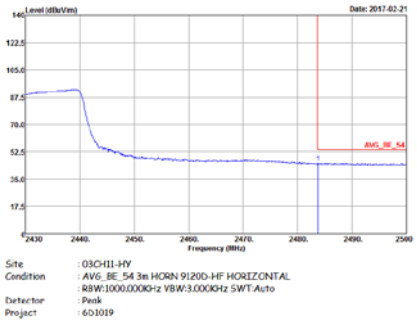
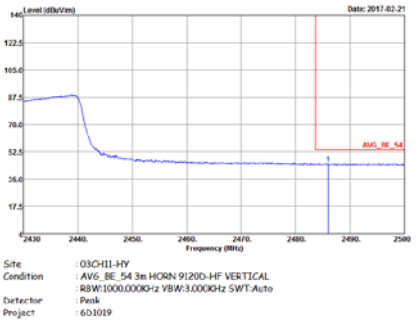
## BLE (Harmonic @ 3m)

| BLE | 2.4GHz 2400~2483.5MHz Harmonic @ 3m | |
|---|---|---|
| ANT | BLE CH39 2480MHz | |
| 1 | Horizontal | Vertical |
| Peak<br>Avg. |  |  |

## 2.4GHz 2400~2483.5MHz

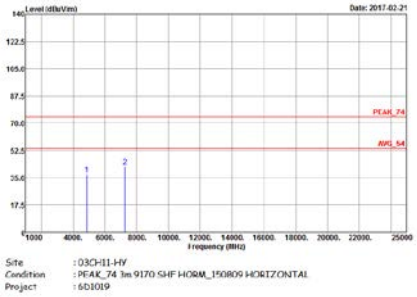
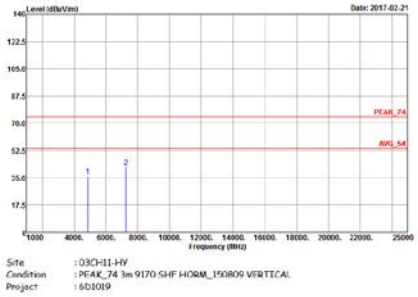
## WIFI 802.11n HT40 (Band Edge @ 3m)

| WIFI | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | |
|---|---|---|
| ANT | 802.11n HT40 CH03 2422MHz - L | |
| 1 | Horizontal | Vertical |
| Peak |  |  |
| Avg. |  |  |

| WIFI | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | |
|---|---|---|
| ANT | 802.11n HT40 CH03 2422MHz - R | |
| 1 | Horizontal | Vertical |
| Peak |  |  |
| Avg. |  |  |

## 2.4GHz 2400~2483.5MHz

## WIFI 802.11n HT40 (Harmonic @ 3m)

| WIFI | 2.4GHz 2400~2483.5MHz Harmonic @ 3m | |
|---|---|---|
| ANT | 802.11n HT40 CH03 2422MHz | |
| 1 | Horizontal | Vertical |
| Peak<br>Avg. |  |  |

**WWAN**

| Mode | Ch | Freq. (MHz) | Modulation | FCC ID ZNFX240YK | | | FCC ID ZNFX240DS | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Frequency (MHz) | Level (dBm) | Limit (dBm) | Frequency (MHz) | Level (dBm) | Limit (dBm) |
| GSM850 | CH 128 | 824.2 | GPRS class 8 | 1648 | -45.91 | -13 | 1648 | -45.76 | -13 |
| GSM1900 | CH 810 | 1909.8 | GPRS class 8 | 7641 | -35.86 | -13 | 7641 | -36.35 | -13 |
| LTE Band VII | CH 20775 | 2502.5 | QPSK / 5MHz | 10008 | -40.90 | -25 | 10008 | -40.77 | -25 |

# GSM850

| GSM850 (GPRS class 8) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | ERP ( 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 | 1648 | -45.76 | -13 | -32.76 | -59.27 | -47.52 | 0.98 | 4.89 | H |
| | 2472 | -47.16 | -13 | -34.16 | -63.8 | -49.04 | 1.28 | 5.32 | H |
| | 3296 | -59.24 | -13 | -46.24 | -79.23 | -62.65 | 1.54 | 7.10 | H |
| | 4120 | -57.54 | -13 | -44.54 | -79.32 | -62.18 | 1.83 | 8.62 | H |
| | 1648 | -47.43 | -13 | -34.43 | -60.94 | -49.19 | 0.98 | 4.89 | V |
| | 2472 | -47.85 | -13 | -34.85 | -64.49 | -49.73 | 1.28 | 5.32 | V |
| | 3296 | -59.25 | -13 | -46.25 | -79.24 | -62.66 | 1.54 | 7.10 | V |
| | 4120 | -53.47 | -13 | -40.47 | -75.25 | -58.11 | 1.83 | 8.62 | V |

# GSM1900

| GSM1900 (GPRS class 8) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 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) |
| Highest | 3819 | -49.71 | -13 | -36.71 | -70.69 | -56.39 | 1.70 | 8.38 | H |
| | 5730 | -50.32 | -13 | -37.32 | -77.8 | -57.35 | 2.76 | 9.79 | H |
| | 7641 | -37.70 | -13 | -24.70 | -71.63 | -47.2 | 2.38 | 11.88 | H |
| | 3819 | -53.87 | -13 | -40.87 | -74.85 | -60.55 | 1.70 | 8.38 | V |
| | 5730 | -52.29 | -13 | -39.29 | -79.77 | -59.32 | 2.76 | 9.79 | V |
| | 7641 | -36.35 | -13 | -23.35 | -70.27 | -45.85 | 2.38 | 11.88 | V |

# LTE Band 7

| LTE Band 7 / 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 | 5004 | -51.25 | -25 | -26.25 | -76.84 | -58.61 | 2.34 | 9.70 | H |
| | 7500 | -46.10 | -25 | -21.10 | -79.8 | -55.47 | 2.43 | 11.80 | H |
| | 10008 | -40.77 | -25 | -15.77 | -80.85 | -50.28 | 2.70 | 12.20 | H |
| | 5004 | -54.35 | -25 | -29.35 | -79.94 | -61.71 | 2.34 | 9.70 | V |
| | 7500 | -45.99 | -25 | -20.99 | -79.69 | -55.36 | 2.43 | 11.80 | V |
| | 10008 | -41.35 | -25 | -16.35 | -81.43 | -50.86 | 2.70 | 12.20 | V |

# Appendix B. Measuring Instruments

## List of Measuring Equipment for DSS and DTS

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Power Meter | Agilent | ML2495A | 0932001 | 300MHz~40GHz | Sep. 29, 2016 | Feb. 09, 2017~ Feb. 27, 2017 | Sep. 28, 2017 | Conducted |
| Power Sensor | Agilent | MA2411B | 0846202 | 300MHz~40GHz | Sep. 29, 2016 | Feb. 09, 2017~ Feb. 27, 2017 | Sep. 28, 2017 | Conducted |
| Power Meter | Agilent | E4416A | GB41292344 | 300MHz~40GHz | Dec. 26, 2016 | Feb. 09, 2017~ Feb. 27, 2017 | Dec. 25, 2017 | Conducted |
| Power Sensor | Agilent | E9327A | US40441548 | 300MHz~40GHz | Dec. 26, 2016 | Feb. 09, 2017~ Feb. 27, 2017 | Dec. 25, 2017 | Conducted |
| BT Base Station(Measure) | Rohde & Schwarz | CBT | 101136 | BT 3.0 | Sep. 21, 2016 | Feb. 09, 2017~ Feb. 27, 2017 | Sep. 20, 2017 | Conducted |
| Spectrum Analyzer | Rohde & Schwarz | FSP40 | 100055 | 9kHz-40GHz | Jul. 17, 2016 | Feb. 09, 2017~ Feb. 27, 2017 | Jul. 16, 2017 | Conducted |
| Amplifier | SONOMA | 310N | 187312 | 9kHz~1GHz | Nov. 10, 2016 | Feb. 20, 2017~ Feb. 27, 2017 | Nov. 09, 2017 | Radiation |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100315 | 9 kHz~30 MHz | Sep .2, 2015 | Feb. 20, 2017~ Feb. 27, 2017 | Sep .1, 2017 | Radiation |
| Bilog Antenna | TESEQ | CBL 6111D | 35414 | 30MHz~1GHz | Oct. 15, 2016 | Feb. 20, 2017~ Feb. 27, 2017 | OCt. 14, 2017 | Radiation |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1522 | 1GHz ~ 18GHz | Mar. 30, 2016 | Feb. 20, 2017~ Feb. 27, 2017 | Mar. 31, 2017 | Radiation |
| Preamplifier | Keysight | 83017A | MY53270080 | 1GHz~26.5GHz | Nov. 10, 2016 | Feb. 20, 2017~ Feb. 27, 2017 | Nov. 09, 2017 | Radiation |
| Spectrum Analyzer | Keysight | N9010A | MY53250276 | 10Hz ~ 44GHZ | Mar. 21, 2016 | Feb. 20, 2017~ Feb. 27, 2017 | Mar. 20, 2017 | Radiation |
| Controller | EMEC | EM 1000 | N/A | Control Turn table & Ant Mast | N/A | Feb. 20, 2017~ Feb. 27, 2017 | N/A | Radiation |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1~4m | N/A | Feb. 20, 2017~ Feb. 27, 2017 | N/A | Radiation |
| Turn Table | EMEC | TT 2000 | N/A | 0~360 Degree | N/A | Feb. 20, 2017~ Feb. 27, 2017 | N/A | Radiation |
| Preamplifier | MITEQ | AMF-7D-00101800 | 2025787 | 1GHz~18GHz | Feb. 13, 2017 | Feb. 20, 2017~ Feb. 27, 2017 | Feb. 12, 2018 | Radiation |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170584 | 18GHz- 40GHz | Nov. 08, 2016 | Feb. 20, 2017~ Feb. 27, 2017 | Nov. 07, 2017 | Radiation |

## List of Measuring Equipment for PCS

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Base Station(Measure) | Rohde & Schwarz | CMU200 | 117995 | GSM / GPRS / WCDMA / CDMA | Aug. 03, 2016 | Feb. 10, 2017 | Aug,04, 2017 | Conducted |
| LTE Base Station | Anritsu | MT8820C | 6201432821 | GSM/GPRS /WCDMA/LTE | Oct. 11, 2016 | Feb. 10, 2017 | Oct. 10, 2017 | Conducted |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1241 | 1GHz ~ 18GHz | Apr. 25, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Apr. 24, 2017 | Radiation |
| Amplifier | Sonoma-Instrument | 310 N | 187282 | 9KHz~1GHz | Dec. 21, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Dec. 20, 2017 | Radiation |
| Bilog Antenna | TESEQ | CBL 6111D&00800N1D01N-06 | 40103&04 | 30MHz to 1GHz | Jan. 07, 2017 | Feb. 17, 2017~ Feb. 22, 2017 | Jan. 06, 2018 | Radiation |
| Amplifier | Sonoma-Instrument | 310 N | 187282 | 9KHz~1GHz | Dec. 21, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Dec. 20, 2017 | Radiation |
| Preamplifier | MITEQ | AMF-7D-00101800-30-10P | 1590074 | 1GHz~18GHz | Jun. 27, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Jun. 26, 2017 | Radiation |
| Preamplifier | MITEQ | JS44-18004000-33-8P | 1840917 | 18GHz ~ 40GHz | Jun. 14, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Jun. 13, 2017 | Radiation |
| Preamplifier | Keysight | 83017A | MY53270147 | 1GHz~26.5GHz | Jan. 09, 2017 | Feb. 17, 2017~ Feb. 22, 2017 | Jan. 08, 2018 | Radiation |
| Spectrum Analyzer | Keysight | N9010A | MY55370526 | N/A | Mar. 14, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Mar. 13, 2017 | Radiation |
| Controller | EMEC | EM1000 | N/A | Control Turn table & Ant Mast | N/A | Feb. 17, 2017~ Feb. 22, 2017 | N/A | Radiation |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1m~4m | N/A | Feb. 17, 2017~ Feb. 22, 2017 | N/A | Radiation |
| Turn Table | EMEC | TT2000 | N/A | 0~360 Degree | N/A | Feb. 17, 2017~ Feb. 22, 2017 | N/A | Radiation |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170251 | 18GHz- 40GHz | Nov. 08, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Nov. 07, 2017 | Radiation |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1522 | 1G~18GHz | Mar. 31, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Mar. 30, 2017 | Radiation |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170584 | 18GHz- 40GHz | Nov. 08, 2016 | Feb. 17, 2017~ Feb. 22, 2017 | Nov. 07, 2017 | Radiation |
| Signal Generator | Anritsu | MG3694C | 163401 | 0.1Hz~40GHz | Jan. 04, 2017 | Feb. 17, 2017~ Feb. 22, 2017 | Jan. 03, 2018 | Radiation |

End of this report