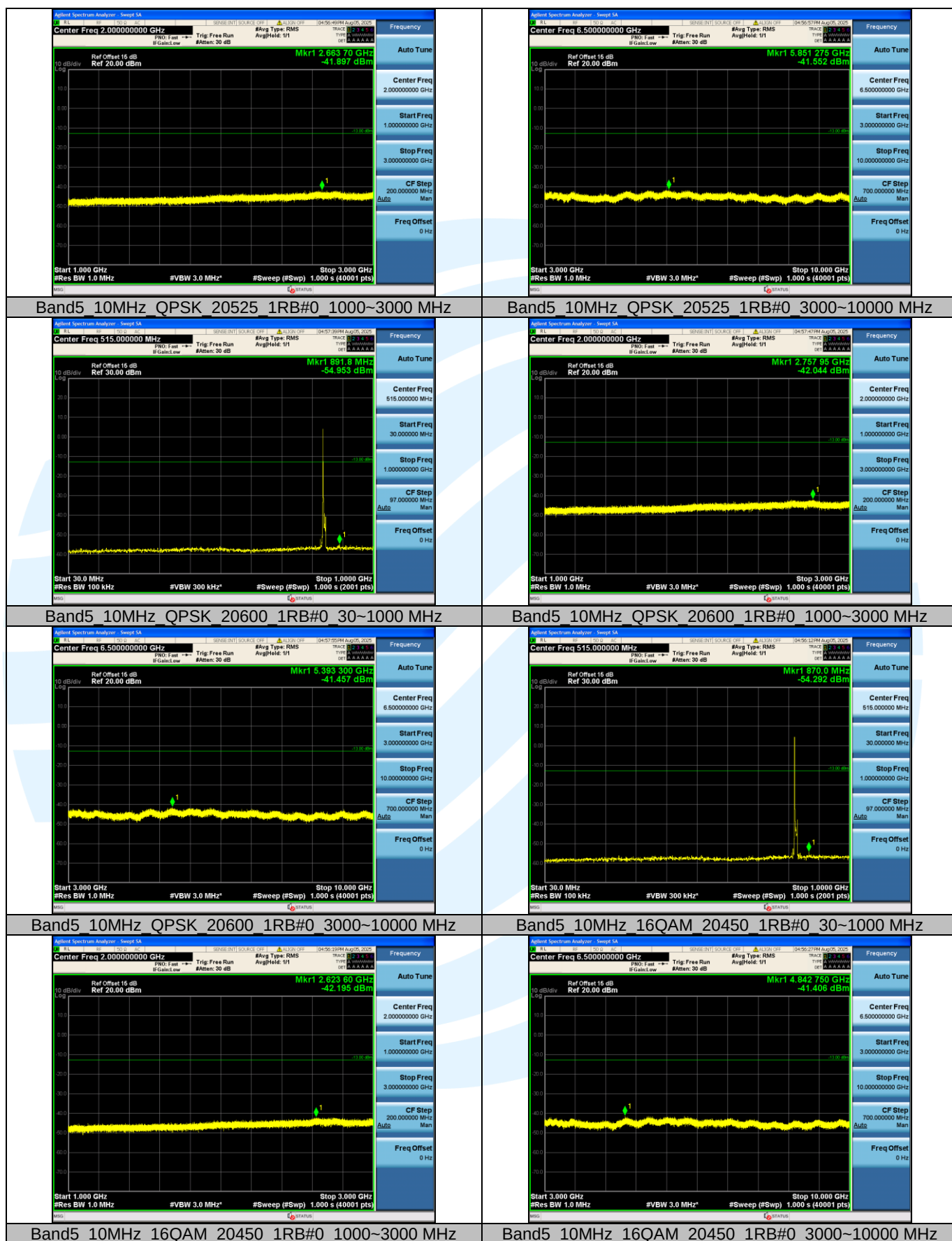
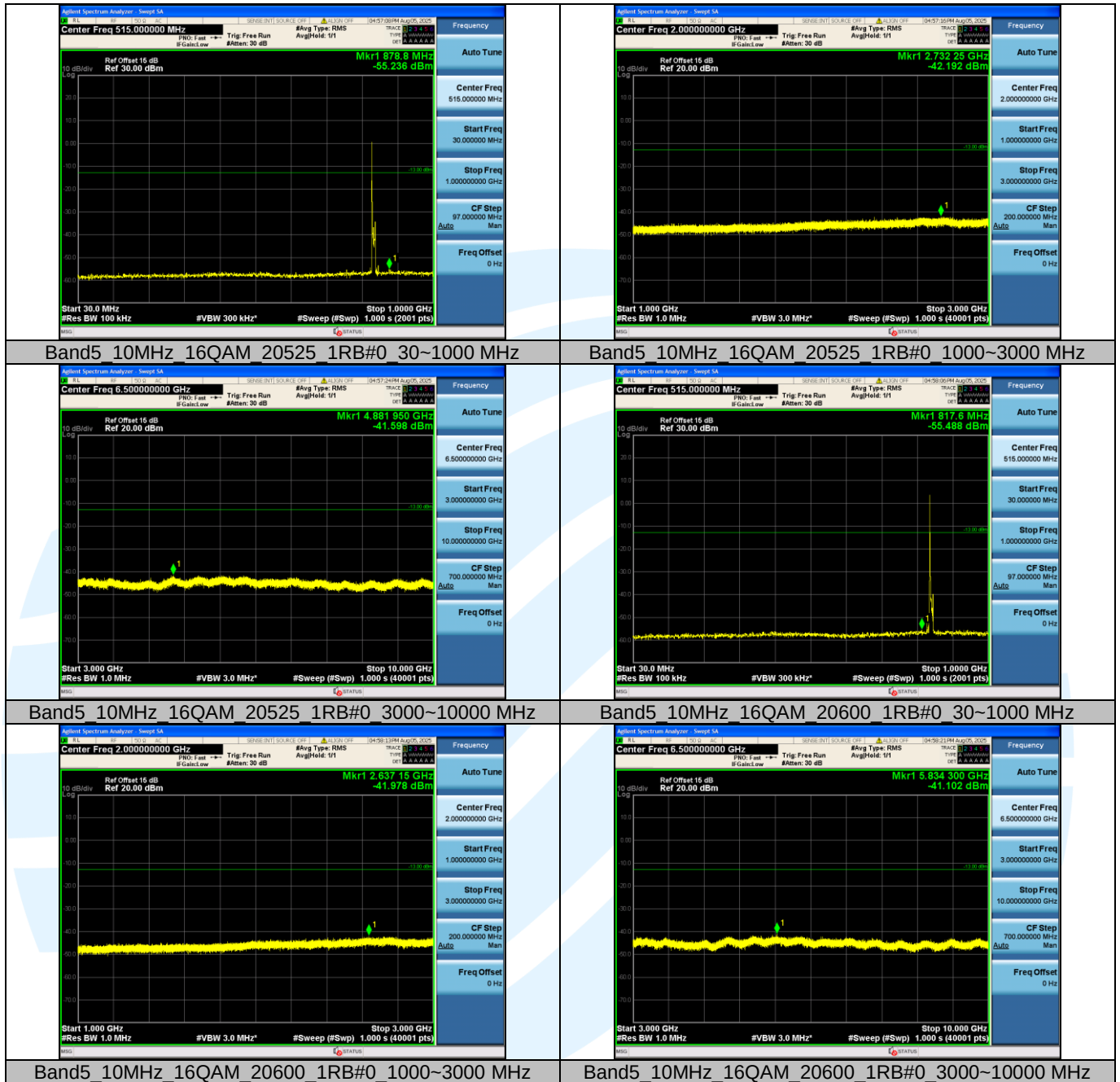






## 5.8 FIELD STRENGTH OF SPURIOUS RADIATION

**Test Requirement:** LTE Band 2: FCC 47 CFR Part 24.238(a)  
LTE Band 4: FCC 47 CFR Part 27.53(h)  
LTE Band 5: FCC 47 CFR Part 22.917(a)

**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01

**Receiver Setup:**

| Frequency        | Detector   | RBW     | VBW     | Remark |
|------------------|------------|---------|---------|--------|
| 0.009 MHz-30 MHz | Peak       | 10 kHz  | 30 KHz  | Peak   |
| 30 MHz-1 GHz     | Quasi-peak | 100 kHz | 300 KHz | Peak   |
| Above 1 GHz      | Peak       | 1 MHz   | 3 MHz   | Peak   |

**Limits:**

**FCC 47 CFR Part 24.238(a), 27.53(h)(1), 22.917(a), 27.53(c)(2):**

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. The emission limit equal to -13 dBm.

**Test Setup:** Refer to section 4.2.1 for details.

**Test Procedures:** KDB 971168 D01v03r01 Section 7

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

**The measurement data as follows:**

### 5.8.1 LTE Band 2

| LTE Band 2_ 20 MHz_ QPSK |           |            |                   |             |        |        |            |
|--------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                      | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                          | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| Lowest Channel           |           |            |                   |             |        |        |            |
| 1                        | 42.035    | -52.72     | -0.47             | -53.19      | -13.00 | -40.19 | Horizontal |
| 2                        | 64.08     | -45.00     | -8.09             | -53.09      | -13.00 | -40.09 | Horizontal |
| 3                        | 181.3     | -48.25     | -1.94             | -50.19      | -13.00 | -37.19 | Horizontal |
| 4                        | 3720      | -61.82     | 11.31             | -50.51      | -13.00 | -37.51 | Horizontal |
| 5                        | 5580      | -60.95     | 12.77             | -48.18      | -13.00 | -35.18 | Horizontal |
| 6                        | 36.268    | -51.37     | 2.25              | -49.12      | -13.00 | -36.12 | Vertical   |
| 7                        | 42.63     | -44.49     | -1.01             | -45.50      | -13.00 | -32.50 | Vertical   |
| 8                        | 64.08     | -43.48     | -8.09             | -51.57      | -13.00 | -38.57 | Vertical   |
| 9                        | 3720      | -62.01     | 11.31             | -50.70      | -13.00 | -37.70 | Vertical   |
| 10                       | 5580      | -61.16     | 12.77             | -48.39      | -13.00 | -35.39 | Vertical   |
| Middle Channel           |           |            |                   |             |        |        |            |
| 1                        | 42.035    | -52.88     | -0.47             | -53.35      | -13.00 | -40.35 | Horizontal |
| 2                        | 64.08     | -44.88     | -8.09             | -52.97      | -13.00 | -39.97 | Horizontal |
| 3                        | 222.281   | -55.67     | -0.32             | -55.99      | -13.00 | -42.99 | Horizontal |
| 4                        | 3760      | -63.57     | 11.55             | -52.02      | -13.00 | -39.02 | Horizontal |
| 5                        | 5640      | -61.98     | 12.89             | -49.09      | -13.00 | -36.09 | Horizontal |
| 6                        | 36.014    | -55.47     | 2.33              | -53.14      | -13.00 | -40.14 | Vertical   |
| 7                        | 42.035    | -45.81     | -0.47             | -46.28      | -13.00 | -33.28 | Vertical   |
| 8                        | 64.08     | -43.97     | -8.09             | -52.06      | -13.00 | -39.06 | Vertical   |
| 9                        | 3760      | -62.92     | 11.55             | -51.37      | -13.00 | -38.37 | Vertical   |
| 10                       | 5640      | -61.94     | 12.89             | -49.05      | -13.00 | -36.05 | Vertical   |
| Highest Channel          |           |            |                   |             |        |        |            |
| 1                        | 42.035    | -54.20     | -0.47             | -54.67      | -13.00 | -41.67 | Vertical   |
| 2                        | 64.08     | -45.22     | -8.09             | -53.31      | -13.00 | -40.31 | Vertical   |
| 3                        | 280.294   | -57.84     | 2.13              | -55.71      | -13.00 | -42.71 | Vertical   |
| 4                        | 3800      | -60.75     | 11.77             | -48.98      | -13.00 | -35.98 | Horizontal |
| 5                        | 5700      | -62.61     | 13.00             | -49.61      | -13.00 | -36.61 | Horizontal |
| 6                        | 42.63     | -45.03     | -1.01             | -46.04      | -13.00 | -33.04 | Vertical   |
| 7                        | 52.266    | -46.70     | -5.50             | -52.20      | -13.00 | -39.20 | Vertical   |
| 8                        | 64.08     | -43.97     | -8.09             | -52.06      | -13.00 | -39.06 | Vertical   |
| 9                        | 3800      | -63.13     | 11.77             | -51.36      | -13.00 | -38.36 | Vertical   |
| 10                       | 5700      | -62.16     | 13.00             | -49.16      | -13.00 | -36.16 | Vertical   |

### 5.8.2 LTE Band 4

| LTE Band 4_20 MHz_QPSK |                    |                        |                                |                         |                |                |            |
|------------------------|--------------------|------------------------|--------------------------------|-------------------------|----------------|----------------|------------|
| No.                    | Frequency<br>(MHz) | SA<br>Reading<br>(dBm) | Correction<br>factor<br>(dB/m) | EIRP<br>Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Ant. Pol.  |
| Lowest Channel         |                    |                        |                                |                         |                |                |            |
| 1                      | 42.035             | -54.42                 | -0.47                          | -54.89                  | -13.00         | -41.89         | Horizontal |
| 2                      | 64.08              | -45.22                 | -8.09                          | -53.31                  | -13.00         | -40.31         | Horizontal |
| 3                      | 222.281            | -55.89                 | -0.32                          | -56.21                  | -13.00         | -43.21         | Horizontal |
| 4                      | 3440               | -61.33                 | 9.91                           | -51.42                  | -13.00         | -38.42         | Horizontal |
| 5                      | 5160               | -61.70                 | 12.02                          | -49.68                  | -13.00         | -36.68         | Horizontal |
| 6                      | 42.035             | -44.56                 | -0.47                          | -45.03                  | -13.00         | -32.03         | Vertical   |
| 7                      | 52.266             | -46.85                 | -5.50                          | -52.35                  | -13.00         | -39.35         | Vertical   |
| 8                      | 64.08              | -44.26                 | -8.09                          | -52.35                  | -13.00         | -39.35         | Vertical   |
| 9                      | 3440               | -60.10                 | 9.91                           | -50.19                  | -13.00         | -37.19         | Vertical   |
| 10                     | 5160               | -61.75                 | 12.02                          | -49.73                  | -13.00         | -36.73         | Vertical   |
| Middle Channel         |                    |                        |                                |                         |                |                |            |
| 1                      | 42.63              | -54.66                 | -1.01                          | -55.67                  | -13.00         | -42.67         | Horizontal |
| 2                      | 64.08              | -45.36                 | -8.09                          | -53.45                  | -13.00         | -40.45         | Horizontal |
| 3                      | 278.331            | -56.97                 | 1.96                           | -55.01                  | -13.00         | -42.01         | Horizontal |
| 4                      | 3465               | -62.15                 | 9.98                           | -52.17                  | -13.00         | -39.17         | Horizontal |
| 5                      | 5197.5             | -62.69                 | 12.09                          | -50.60                  | -13.00         | -37.60         | Horizontal |
| 6                      | 36.268             | -53.00                 | 2.25                           | -50.75                  | -13.00         | -37.75         | Vertical   |
| 7                      | 42.63              | -44.56                 | -1.01                          | -45.57                  | -13.00         | -32.57         | Vertical   |
| 8                      | 64.08              | -43.98                 | -8.09                          | -52.07                  | -13.00         | -39.07         | Vertical   |
| 9                      | 3465               | -61.30                 | 9.98                           | -51.32                  | -13.00         | -38.32         | Vertical   |
| 10                     | 5197.5             | -62.60                 | 12.09                          | -50.51                  | -13.00         | -37.51         | Vertical   |
| Highest Channel        |                    |                        |                                |                         |                |                |            |
| 1                      | 42.63              | -53.70                 | -1.01                          | -54.71                  | -13.00         | -41.71         | Horizontal |
| 2                      | 64.08              | -45.28                 | -8.09                          | -53.37                  | -13.00         | -40.37         | Horizontal |
| 3                      | 222.281            | -56.36                 | -0.32                          | -56.68                  | -13.00         | -43.68         | Horizontal |
| 4                      | 3490               | -63.88                 | 10.04                          | -53.84                  | -13.00         | -40.84         | Horizontal |
| 5                      | 5235               | -60.91                 | 12.15                          | -48.76                  | -13.00         | -35.76         | Horizontal |
| 6                      | 36.268             | -53.50                 | 2.25                           | -51.25                  | -13.00         | -38.25         | Vertical   |
| 7                      | 42.63              | -45.24                 | -1.01                          | -46.25                  | -13.00         | -33.25         | Vertical   |
| 8                      | 64.08              | -44.39                 | -8.09                          | -52.48                  | -13.00         | -39.48         | Vertical   |
| 9                      | 3490               | -63.45                 | 10.04                          | -53.41                  | -13.00         | -40.41         | Vertical   |
| 10                     | 5235               | -60.20                 | 12.15                          | -48.05                  | -13.00         | -35.05         | Vertical   |

#### Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC4G-V1.1

### 5.8.3 LTE Band 5

| LTE Band 5_ 10 MHz_ QPSK |           |            |                   |             |        |        |            |
|--------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                      | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                          | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| Lowest Channel           |           |            |                   |             |        |        |            |
| 1                        | 42.035    | -64.42     | 28.65             | -35.77      | -13.00 | -22.77 | Horizontal |
| 2                        | 64.08     | -55.38     | 20.92             | -34.46      | -13.00 | -21.46 | Horizontal |
| 3                        | 222.281   | -66.35     | 28.31             | -38.04      | -13.00 | -25.04 | Horizontal |
| 4                        | 1658      | -64.06     | 2.36              | -61.70      | -13.00 | -48.70 | Horizontal |
| 5                        | 2487      | -63.45     | 6.60              | -56.85      | -13.00 | -43.85 | Horizontal |
| 6                        | 42.63     | -55.62     | 28.11             | -27.51      | -13.00 | -14.51 | Vertical   |
| 7                        | 46.381    | -56.13     | 25.49             | -30.64      | -13.00 | -17.64 | Vertical   |
| 8                        | 64.08     | -54.08     | 20.92             | -33.16      | -13.00 | -20.16 | Vertical   |
| 9                        | 1658      | -63.83     | 2.36              | -61.47      | -13.00 | -48.47 | Vertical   |
| 10                       | 2487      | -63.03     | 6.60              | -56.43      | -13.00 | -43.43 | Vertical   |
| Middle Channel           |           |            |                   |             |        |        |            |
| 1                        | 42.035    | -61.37     | 28.65             | -32.72      | -13.00 | -19.72 | Horizontal |
| 2                        | 64.08     | -55.02     | 20.92             | -34.10      | -13.00 | -21.10 | Horizontal |
| 3                        | 181.3     | -62.50     | 26.82             | -35.68      | -13.00 | -22.68 | Horizontal |
| 4                        | 1673      | -63.13     | 2.49              | -60.64      | -13.00 | -47.64 | Horizontal |
| 5                        | 2509.5    | -62.76     | 6.68              | -56.08      | -13.00 | -43.08 | Horizontal |
| 6                        | 42.035    | -57.05     | 28.65             | -28.40      | -13.00 | -15.40 | Vertical   |
| 7                        | 52.266    | -59.84     | 23.58             | -36.26      | -13.00 | -23.26 | Vertical   |
| 8                        | 64.08     | -57.18     | 20.92             | -36.26      | -13.00 | -23.26 | Vertical   |
| 9                        | 1673      | -63.55     | 2.49              | -61.06      | -13.00 | -48.06 | Vertical   |
| 10                       | 2509.5    | -62.48     | 6.68              | -55.80      | -13.00 | -42.80 | Vertical   |
| Highest Channel          |           |            |                   |             |        |        |            |
| 1                        | 42.035    | -64.15     | 28.65             | -35.50      | -13.00 | -22.50 | Horizontal |
| 2                        | 64.08     | -55.12     | 20.92             | -34.20      | -13.00 | -21.20 | Horizontal |
| 3                        | 222.281   | -65.90     | 28.31             | -37.59      | -13.00 | -24.59 | Horizontal |
| 4                        | 1688      | -63.20     | 2.63              | -60.57      | -13.00 | -47.57 | Horizontal |
| 5                        | 2532      | -63.00     | 6.77              | -56.23      | -13.00 | -43.23 | Horizontal |
| 6                        | 36.268    | -61.82     | 31.38             | -30.44      | -13.00 | -17.44 | Vertical   |
| 7                        | 42.63     | -54.91     | 28.11             | -26.80      | -13.00 | -13.80 | Vertical   |
| 8                        | 64.08     | -54.12     | 20.92             | -33.20      | -13.00 | -20.20 | Vertical   |
| 9                        | 1688      | -63.98     | 2.63              | -61.35      | -13.00 | -48.35 | Vertical   |
| 10                       | 2532      | -63.26     | 6.77              | -56.49      | -13.00 | -43.49 | Vertical   |

## 5.9 FREQUENCY STABILITY

**Test Requirement:** FCC 47 CFR Part 2.1055 &  
FCC 47 CFR Part 22.355 &  
FCC 47 CFR Part 24.235 &  
FCC 47 CFR Part 27.54

**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01

### Limits:

**FCC 47 CFR Part 22.355, FCC 47 CFR Part 90.213**

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

**FCC 47 CFR Part 24.235, FCC 47 CFR Part 27.54**

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**Test Setup:** Refer to section 4.2.2 for details.

### Test Procedures:

- 1) Use CMW 500 with Frequency Error measurement capability.
  - a) Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
  - b) Voltage = low voltage, 10.8 Vdc, Normal, 12 Vdc and High voltage, 13.2 Vdc.

- 2) Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

- 3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

**Equipment Used:** Refer to section 3 for details.

| Voltage |           |            |         |              |               |                              |                |                 |             |         |
|---------|-----------|------------|---------|--------------|---------------|------------------------------|----------------|-----------------|-------------|---------|
| Band    | Bandwidth | Modulation | Channel | RB Configure | Voltage [Vdc] | Temp. ( $^{\circ}\text{C}$ ) | Deviation (Hz) | Deviation (ppm) | Limit (ppm) | Verdict |
| Band2   | 20MHz     | QPSK       | 18900   | 100RB#0      | VN            | NT                           | -7.98          | -0.004245       | $\pm 2.5$   | PASS    |
| Band2   | 20MHz     | QPSK       | 18900   | 100RB#0      | VL            | NT                           | 7.74           | +0.004117       | $\pm 2.5$   | PASS    |
| Band2   | 20MHz     | QPSK       | 18900   | 100RB#0      | VH            | NT                           | -7.21          | -0.003835       | $\pm 2.5$   | PASS    |
| Band4   | 20MHz     | QPSK       | 20175   | 100RB#0      | VN            | NT                           | 11.03          | +0.006367       | Note 1      | PASS    |
| Band4   | 20MHz     | QPSK       | 20175   | 100RB#0      | VL            | NT                           | 11.53          | +0.006655       | Note 1      | PASS    |
| Band4   | 20MHz     | QPSK       | 20175   | 100RB#0      | VH            | NT                           | 8.15           | +0.004704       | Note 1      | PASS    |
| Band5   | 10MHz     | QPSK       | 20525   | 50RB#0       | VN            | NT                           | -8.93          | -0.010675       | $\pm 2.5$   | PASS    |
| Band5   | 10MHz     | QPSK       | 20525   | 50RB#0       | VL            | NT                           | -8.87          | -0.010604       | $\pm 2.5$   | PASS    |
| Band5   | 10MHz     | QPSK       | 20525   | 50RB#0       | VH            | NT                           | -5.78          | -0.006910       | $\pm 2.5$   | PASS    |

| Temperature |           |            |         |              |               |            |                |                 |             |         |
|-------------|-----------|------------|---------|--------------|---------------|------------|----------------|-----------------|-------------|---------|
| Band        | Bandwidth | Modulation | Channel | RB Configure | Voltage [Vdc] | Temp. (°C) | Deviation (Hz) | Deviation (ppm) | Limit (ppm) | Verdict |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | -30        | -7.37          | -0.003920       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | -20        | -14.12         | -0.007511       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | -10        | -7.28          | -0.003872       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | 0          | -9.80          | -0.005213       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | 10         | 14.63          | +0.007782       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | 20         | -12.82         | -0.006819       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | 30         | -21.23         | -0.011293       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | 40         | -17.60         | -0.009362       | ±2.5        | PASS    |
| Band2       | 20MHz     | QPSK       | 18900   | 100RB#0      | NV            | 50         | -12.20         | -0.006489       | ±2.5        | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | -30        | 8.54           | +0.004929       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | -20        | -9.53          | -0.005501       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | -10        | 14.05          | +0.008110       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | 0          | 7.25           | +0.004185       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | 10         | -9.30          | -0.005368       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | 20         | 11.74          | +0.006776       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | 30         | 15.44          | +0.008912       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | 40         | 12.39          | +0.007152       | Note 1      | PASS    |
| Band4       | 20MHz     | QPSK       | 20175   | 100RB#0      | NV            | 50         | -10.89         | -0.006286       | Note 1      | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | -30        | -8.74          | -0.010448       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | -20        | -6.45          | -0.007711       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | -10        | -8.34          | -0.009970       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | 0          | -6.71          | -0.008022       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | 10         | -6.24          | -0.007460       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | 20         | -6.14          | -0.007340       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | 30         | -8.30          | -0.009922       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | 40         | -8.44          | -0.010090       | ±2.5        | PASS    |
| Band5       | 10MHz     | QPSK       | 20525   | 50RB#0       | NV            | 50         | -11.50         | -0.013748       | ±2.5        | PASS    |

**Note 1:** The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

## APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

## APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

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The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.

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