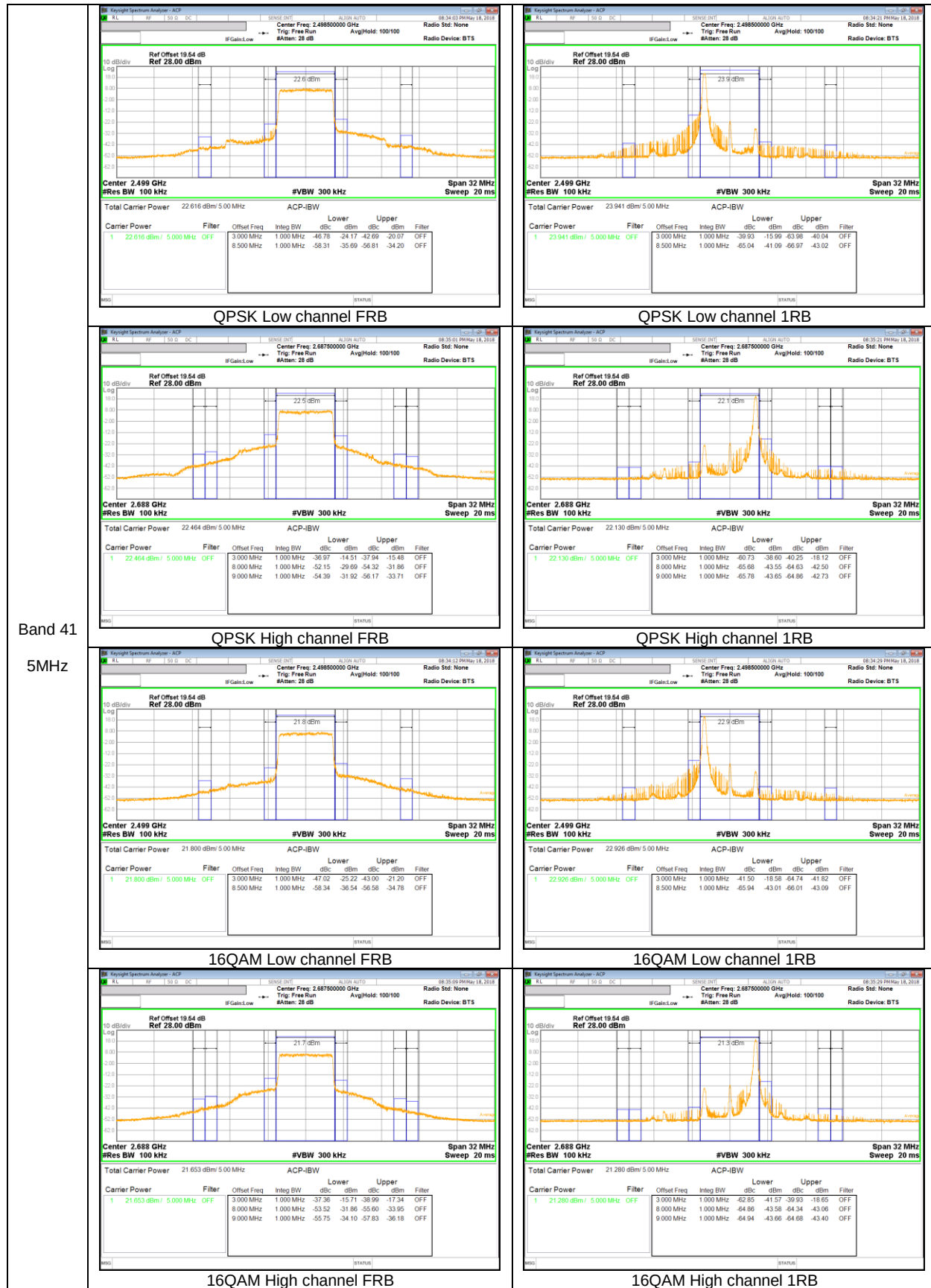




### 9.3. OUT OF BAND EMISSIONS

#### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27. 53

#### LIMITS

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.

Part 27: (m)(4) For mobile station, the attenuation factor shall be not less than  $43 + 10 \log (P)$  dB at the channel edge and  $(55 + 10 \log (P))$  dB at the 5.5 MHz from the channel edges.

#### TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

- a) Set the RBW = 100KHz for emission below 1GHz and 1MHz for emissions above 1GHz  
(Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points = Max (40001);
- g) Trace mode = average(WCDMA, LTE), Maxhold(GSM, LTE Band41);

## RESULTS

### GSM

| Band    | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|---------|-------|---------|----------------|-------------|
| GSM850  | GPRS  | 824.2   | -24.85         | -13.00      |
|         |       | 836.6   | -24.78         |             |
|         |       | 848.8   | -24.72         |             |
|         | EGPRS | 824.2   | -24.16         |             |
|         |       | 836.6   | -24.62         |             |
|         |       | 848.8   | -25.08         |             |
| GSM1900 | GPRS  | 1850.2  | -24.13         |             |
|         |       | 1880.0  | -24.43         |             |
|         |       | 1909.8  | -24.65         |             |
|         | EGPRS | 1850.2  | -24.07         |             |
|         |       | 1880.0  | -24.71         |             |
|         |       | 1909.8  | -23.28         |             |

### WCDMA

| Band   | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|--------|-------|---------|----------------|-------------|
| Band 5 | REL99 | 826.4   | -42.629        | -13.00      |
|        |       | 836.6   | -42.531        |             |
|        |       | 846.6   | -42.694        |             |
|        | HSDPA | 826.4   | -42.629        |             |
|        |       | 836.6   | -42.621        |             |
|        |       | 846.6   | -42.648        |             |
| Band 4 | REL99 | 1712.4  | -42.159        |             |
|        |       | 1732.6  | -42.307        |             |
|        |       | 1752.6  | -42.217        |             |
|        | HSDPA | 1712.4  | -42.261        |             |
|        |       | 1732.6  | -42.075        |             |
|        |       | 1752.6  | -42.300        |             |
| Band 2 | REL99 | 1852.4  | -42.131        |             |
|        |       | 1880.0  | -42.055        |             |
|        |       | 1907.6  | -42.295        |             |
|        | HSDPA | 1852.4  | -42.235        |             |
|        |       | 1880.0  | -42.205        |             |
|        |       | 1907.6  | -42.287        |             |

**LTE 2**

| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|-----------|-------|---------|----------------|-------------|
| 20 MHz    | QPSK  | 1860.0  | -42.121        | -13.00      |
|           |       | 1880.0  | -42.006        |             |
|           |       | 1900.0  | -42.296        |             |
|           | 16QAM | 1860.0  | -42.204        |             |
|           |       | 1880.0  | -42.266        |             |
|           |       | 1900.0  | -42.026        |             |
| 15 MHz    | QPSK  | 1857.5  | -42.143        |             |
|           |       | 1880.0  | -42.281        |             |
|           |       | 1902.5  | -42.202        |             |
|           | 16QAM | 1857.5  | -42.183        |             |
|           |       | 1880.0  | -42.080        |             |
|           |       | 1902.5  | -42.165        |             |
| 10 MHz    | QPSK  | 1855.0  | -42.387        |             |
|           |       | 1880.0  | -42.155        |             |
|           |       | 1905.0  | -41.989        |             |
|           | 16QAM | 1855.0  | -42.035        |             |
|           |       | 1880.0  | -42.225        |             |
|           |       | 1905.0  | -42.192        |             |
| 5 MHz     | QPSK  | 1852.5  | -42.278        |             |
|           |       | 1880.0  | -42.087        |             |
|           |       | 1907.5  | -42.222        |             |
|           | 16QAM | 1852.5  | -42.300        |             |
|           |       | 1880.0  | -42.034        |             |
|           |       | 1907.5  | -42.164        |             |
| 3 MHz     | QPSK  | 1851.5  | -41.997        |             |
|           |       | 1880.0  | -42.284        |             |
|           |       | 1908.5  | -42.345        |             |
|           | 16QAM | 1851.5  | -42.155        |             |
|           |       | 1880.0  | -42.053        |             |
|           |       | 1908.5  | -42.291        |             |
| 1.4 MHz   | QPSK  | 1850.7  | -42.087        |             |
|           |       | 1880.0  | -42.332        |             |
|           |       | 1909.3  | -42.349        |             |
|           | 16QAM | 1850.7  | -42.220        |             |
|           |       | 1880.0  | -42.321        |             |
|           |       | 1909.3  | -42.028        |             |

**LTE 5**

| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|-----------|-------|---------|----------------|-------------|
| 10 MHz    | QPSK  | 829.0   | -44.858        | -13.00      |
|           |       | 836.5   | -44.879        |             |
|           |       | 844.0   | -44.773        |             |
|           | 16QAM | 829.0   | -44.678        |             |
|           |       | 836.5   | -44.678        |             |
|           |       | 844.0   | -44.757        |             |
| 5 MHz     | QPSK  | 826.5   | -44.790        |             |
|           |       | 836.5   | -44.944        |             |
|           |       | 846.5   | -44.988        |             |
|           | 16QAM | 826.5   | -44.911        |             |
|           |       | 836.5   | -44.911        |             |
|           |       | 846.5   | -44.718        |             |
| 3 MHz     | QPSK  | 825.5   | -44.800        |             |
|           |       | 836.5   | -44.690        |             |
|           |       | 847.5   | -44.747        |             |
|           | 16QAM | 825.5   | -44.529        |             |
|           |       | 836.5   | -44.746        |             |
|           |       | 847.5   | -44.965        |             |
| 1.4 MHz   | QPSK  | 824.7   | -44.666        |             |
|           |       | 836.5   | -44.779        |             |
|           |       | 848.3   | -44.511        |             |
|           | 16QAM | 824.7   | -44.845        |             |
|           |       | 836.5   | -44.771        |             |
|           |       | 848.3   | -44.632        |             |

### **LTE 12**

| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|-----------|-------|---------|----------------|-------------|
| 10 MHz    | QPSK  | 704.0   | -44.704        | -13.00      |
|           |       | 707.5   | -44.708        |             |
|           |       | 711.0   | -44.618        |             |
|           | 16QAM | 704.0   | -44.724        |             |
|           |       | 707.5   | -44.609        |             |
|           |       | 711.0   | -44.853        |             |
| 5 MHz     | QPSK  | 701.5   | -44.870        |             |
|           |       | 707.5   | -44.793        |             |
|           |       | 713.5   | -44.759        |             |
|           | 16QAM | 701.5   | -44.661        |             |
|           |       | 707.5   | -44.741        |             |
|           |       | 713.5   | -44.587        |             |
| 3 MHz     | QPSK  | 700.5   | -44.698        |             |
|           |       | 707.5   | -44.855        |             |
|           |       | 714.5   | -44.820        |             |
|           | 16QAM | 700.5   | -44.704        |             |
|           |       | 707.5   | -44.664        |             |
|           |       | 714.5   | -44.827        |             |
| 1.4 MHz   | QPSK  | 699.7   | -44.518        |             |
|           |       | 707.5   | -44.771        |             |
|           |       | 715.3   | -44.711        |             |
|           | 16QAM | 699.7   | -44.883        |             |
|           |       | 707.5   | -44.411        |             |
|           |       | 715.3   | -44.566        |             |

### **LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE 41**

| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|-----------|-------|---------|----------------|-------------|
| 20 MHz    | QPSK  | 2506.0  | -32.92         | -25.00      |
|           |       | 2593.0  | -33.39         |             |
|           |       | 2680.0  | -33.56         |             |
|           | 16QAM | 2506.0  | -33.35         |             |
|           |       | 2593.0  | -33.27         |             |
|           |       | 2680.0  | -33.44         |             |
| 15 MHz    | QPSK  | 2503.5  | -32.88         |             |
|           |       | 2593.0  | -33.60         |             |
|           |       | 2682.5  | -32.97         |             |
|           | 16QAM | 2503.5  | -33.35         |             |
|           |       | 2593.0  | -32.27         |             |
|           |       | 2682.5  | -33.61         |             |
| 10 MHz    | QPSK  | 2501.0  | -33.21         |             |
|           |       | 2593.0  | -33.57         |             |
|           |       | 2685.0  | -33.00         |             |
|           | 16QAM | 2501.0  | -32.72         |             |
|           |       | 2593.0  | -32.90         |             |
|           |       | 2685.0  | -32.94         |             |
| 5 MHz     | QPSK  | 2498.5  | 33.18          |             |
|           |       | 2593.0  | -32.20         |             |
|           |       | 2687.5  | -32.13         |             |
|           | 16QAM | 2498.5  | -33.56         |             |
|           |       | 2593.0  | -33.17         |             |
|           |       | 2687.5  | -32.94         |             |

**LTE 66**

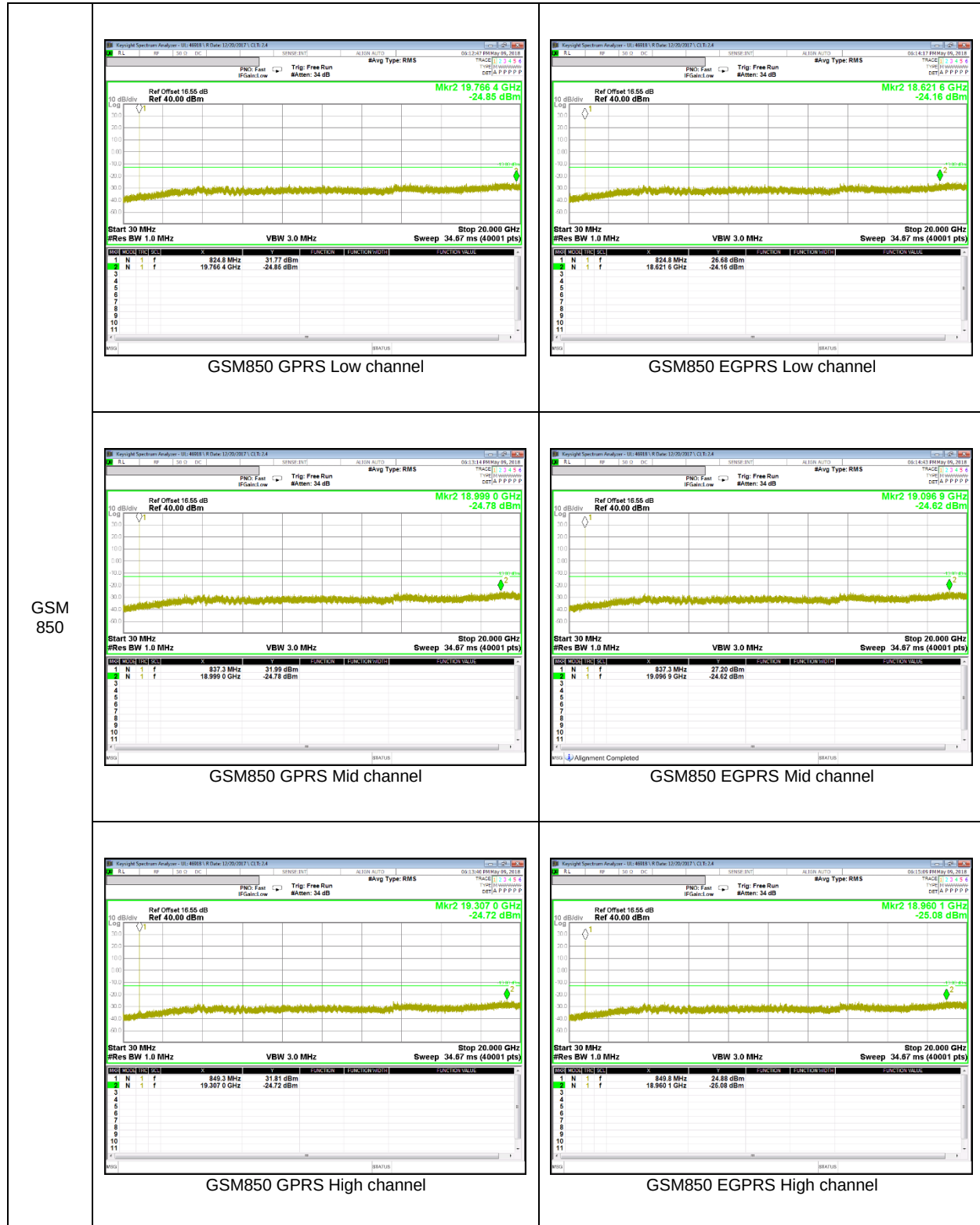
| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] |
|-----------|-------|---------|----------------|-------------|
| 20 MHz    | QPSK  | 1720.0  | -42.266        | -13.00      |
|           |       | 1745.0  | -42.222        |             |
|           |       | 1770.0  | -42.163        |             |
|           | 16QAM | 1720.0  | -41.938        |             |
|           |       | 1745.0  | -42.143        |             |
|           |       | 1770.0  | -42.162        |             |
| 15 MHz    | QPSK  | 1717.5  | -42.057        |             |
|           |       | 1745.0  | -42.175        |             |
|           |       | 1772.5  | -42.095        |             |
|           | 16QAM | 1717.5  | -42.364        |             |
|           |       | 1745.0  | -42.162        |             |
|           |       | 1772.5  | -42.291        |             |
| 10 MHz    | QPSK  | 1715.0  | -42.029        |             |
|           |       | 1745.0  | -42.259        |             |
|           |       | 1775.0  | -42.193        |             |
|           | 16QAM | 1715.0  | -42.350        |             |
|           |       | 1745.0  | -42.342        |             |
|           |       | 1775.0  | -41.881        |             |
| 5 MHz     | QPSK  | 1712.5  | -42.205        |             |
|           |       | 1745.0  | -42.023        |             |
|           |       | 1777.5  | -42.270        |             |
|           | 16QAM | 1712.5  | -42.227        |             |
|           |       | 1745.0  | -42.306        |             |
|           |       | 1777.5  | -41.884        |             |
| 3 MHz     | QPSK  | 1711.5  | -42.269        |             |
|           |       | 1745.0  | -42.206        |             |
|           |       | 1778.5  | -42.400        |             |
|           | 16QAM | 1711.5  | -42.213        |             |
|           |       | 1745.0  | -42.138        |             |
|           |       | 1778.5  | -42.272        |             |
| 1.4 MHz   | QPSK  | 1710.7  | -42.195        |             |
|           |       | 1745.0  | -42.299        |             |
|           |       | 1779.3  | -42.204        |             |
|           | 16QAM | 1710.7  | -42.274        |             |
|           |       | 1745.0  | -42.119        |             |
|           |       | 1779.3  | -42.228        |             |

**LTE Band 4**

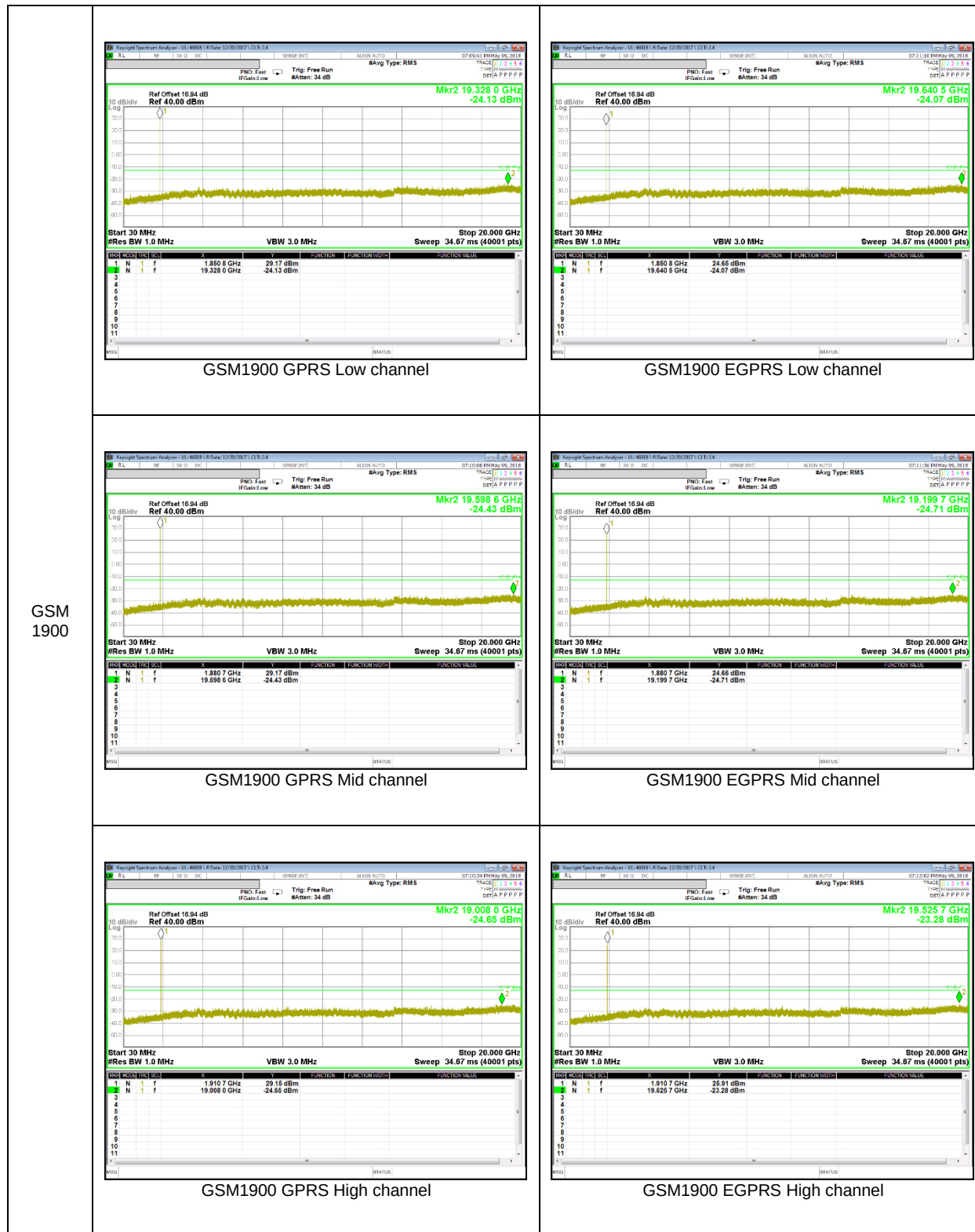
LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, lower(0.5dB) maximum tune-up limit and same channel bandwidth.

### 9.3.1. OUT OF BAND EMISSIONS PLOTS

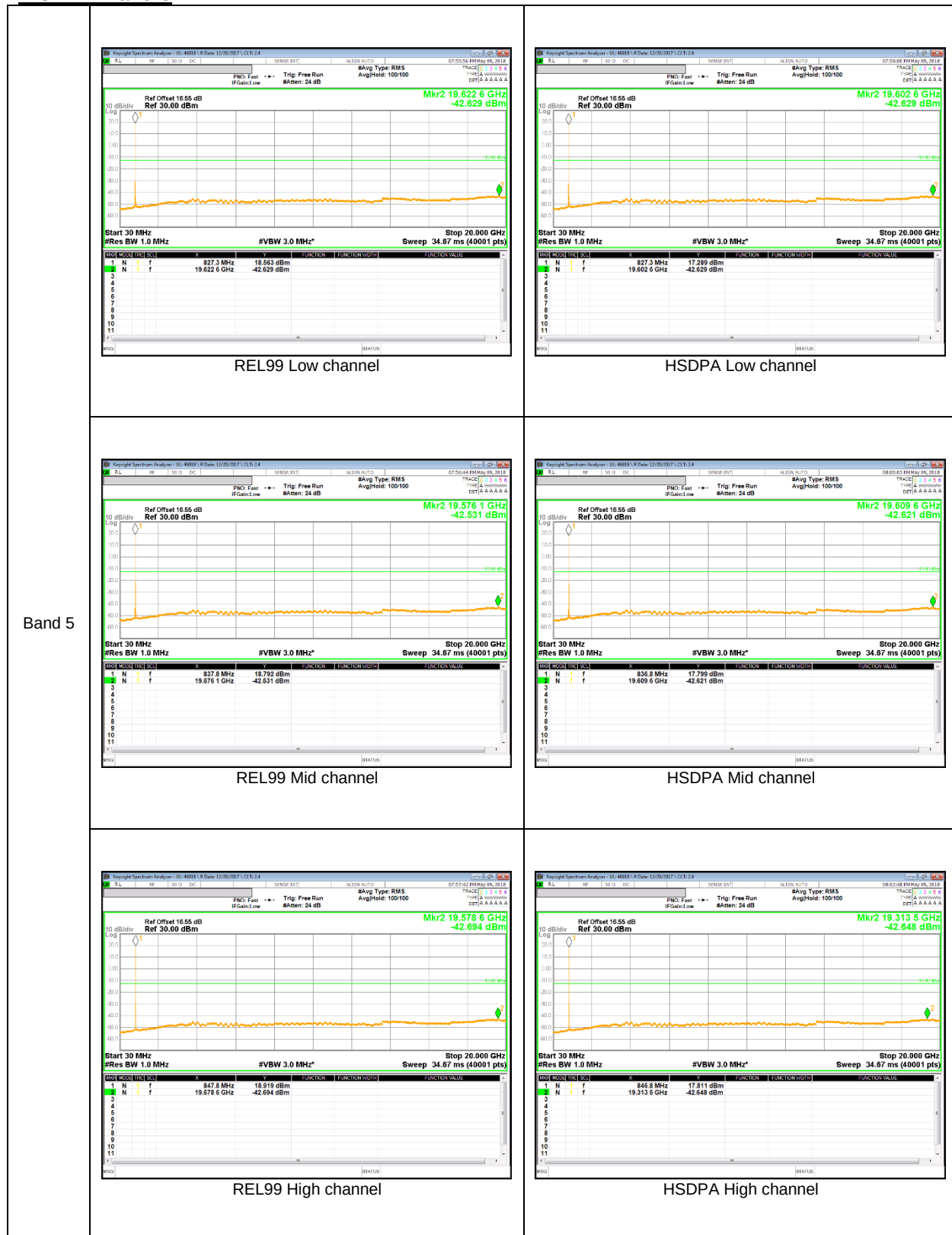
#### GSM 850



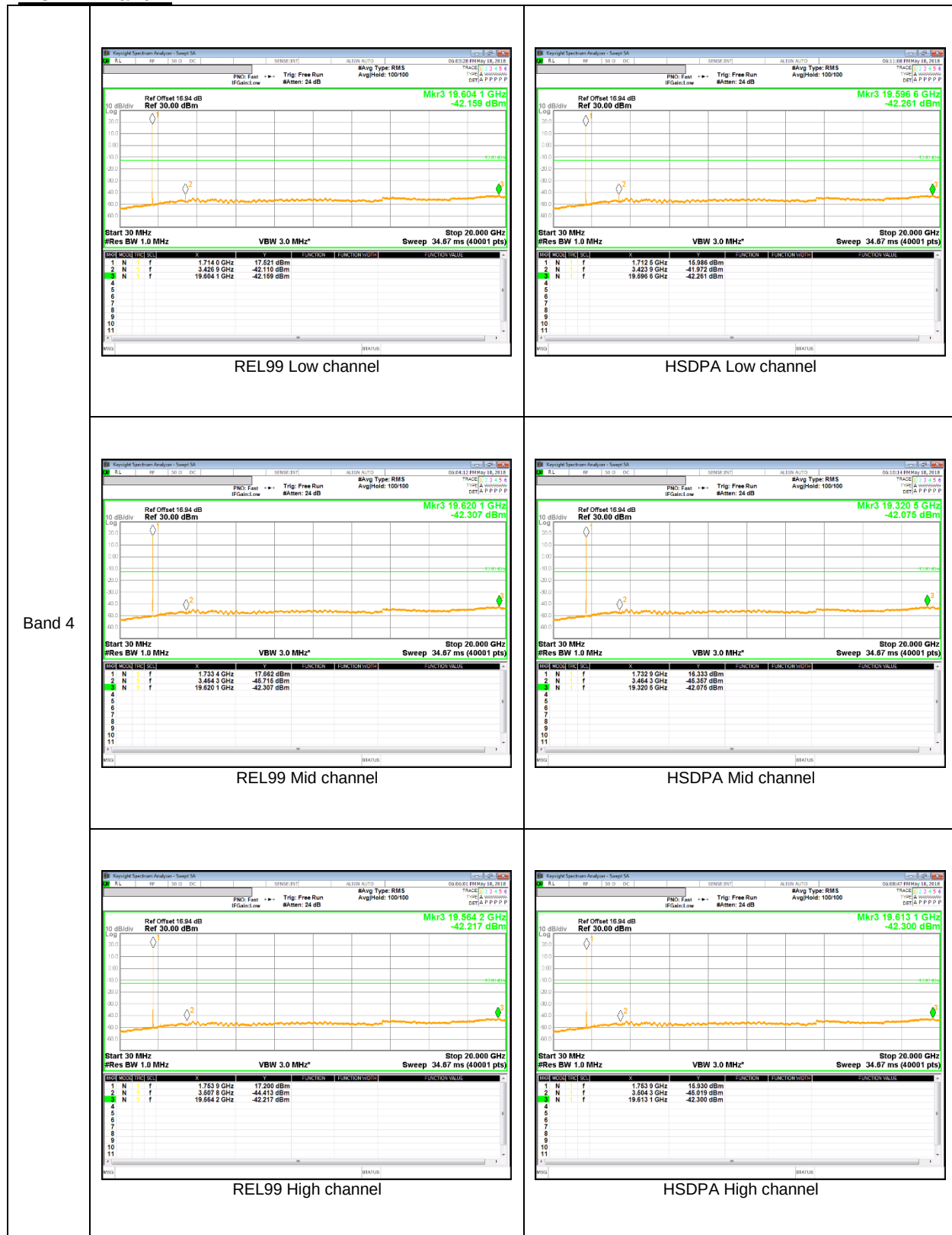
# **GSM 1900**



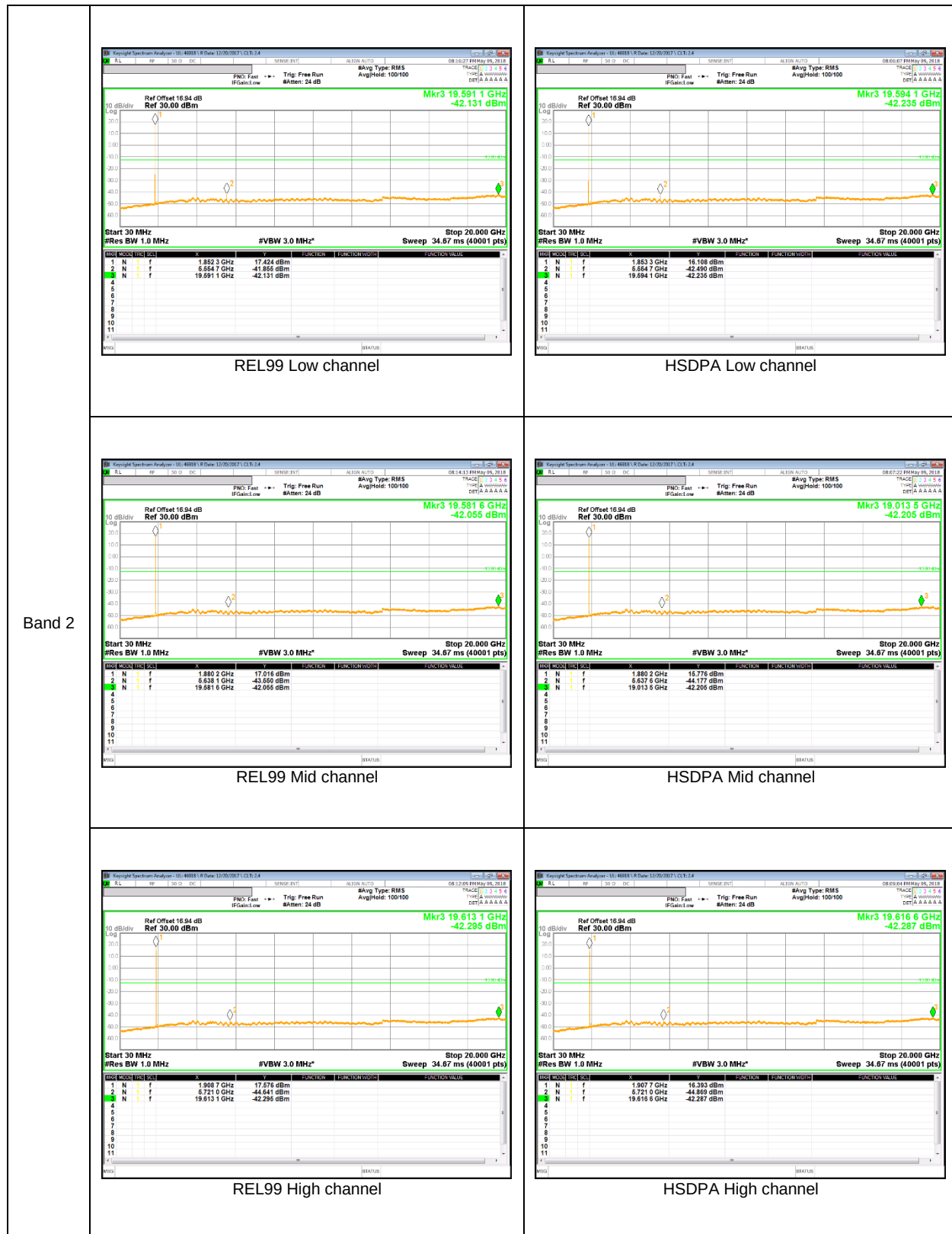
WCDMA Band 5



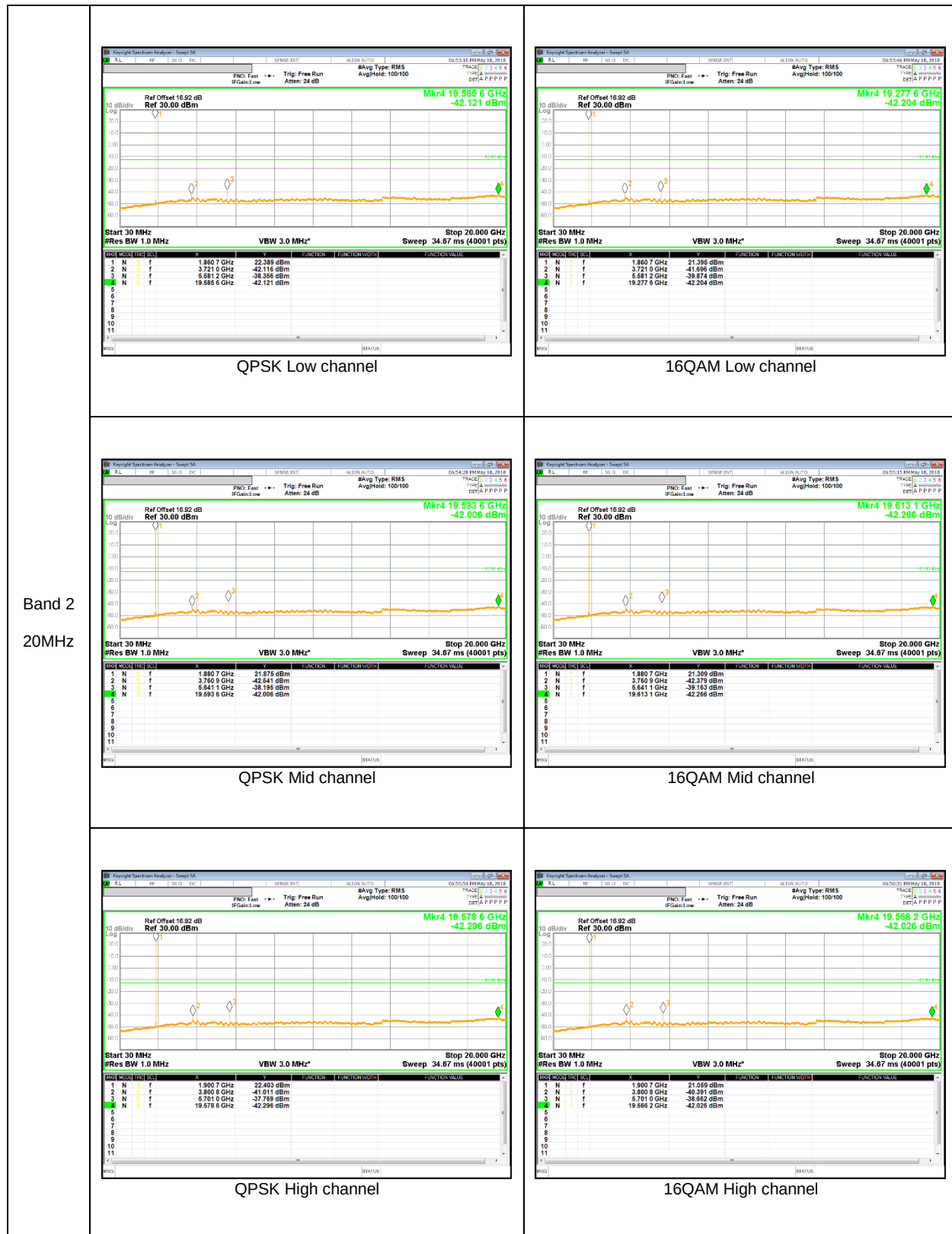
WCDMA Band 4

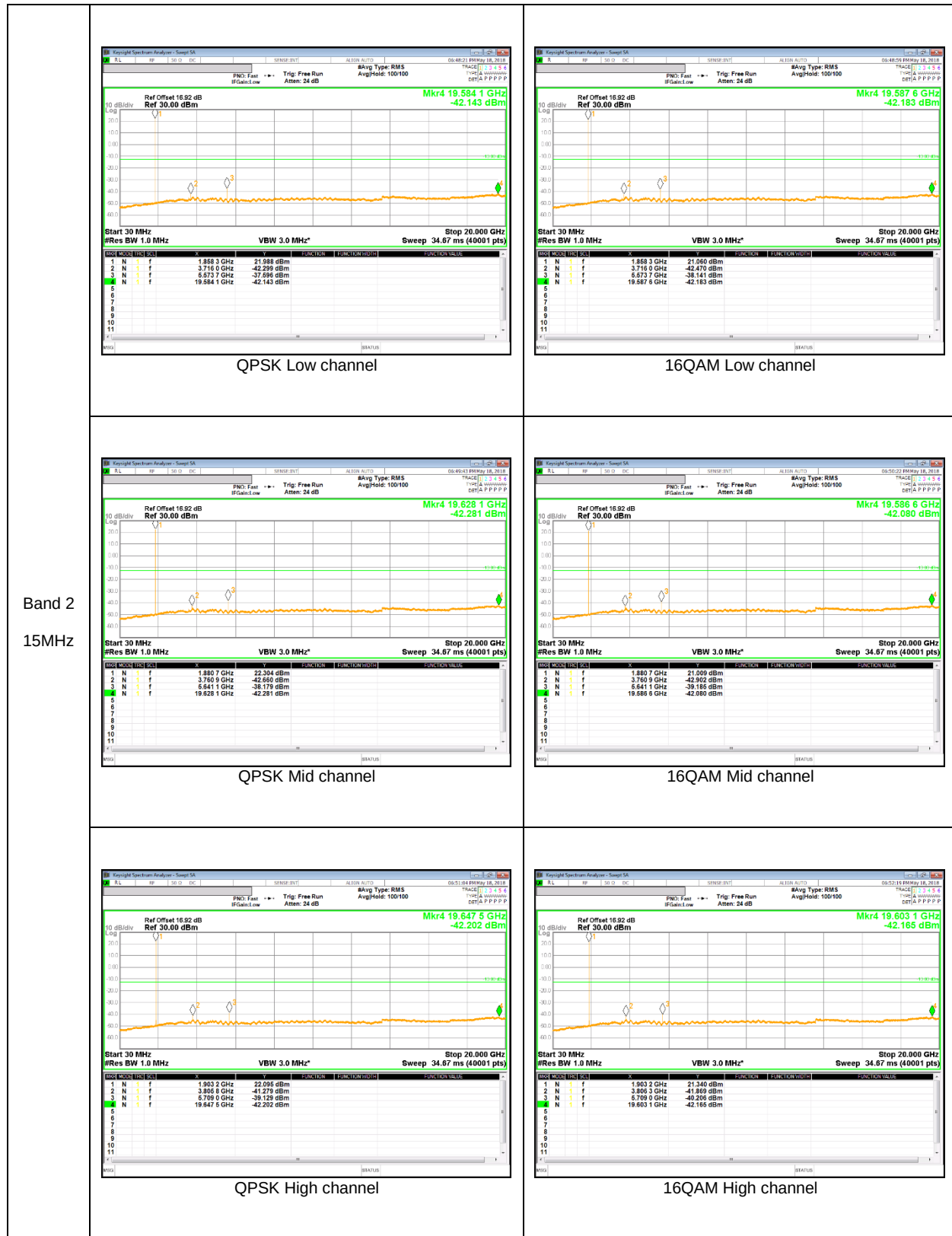


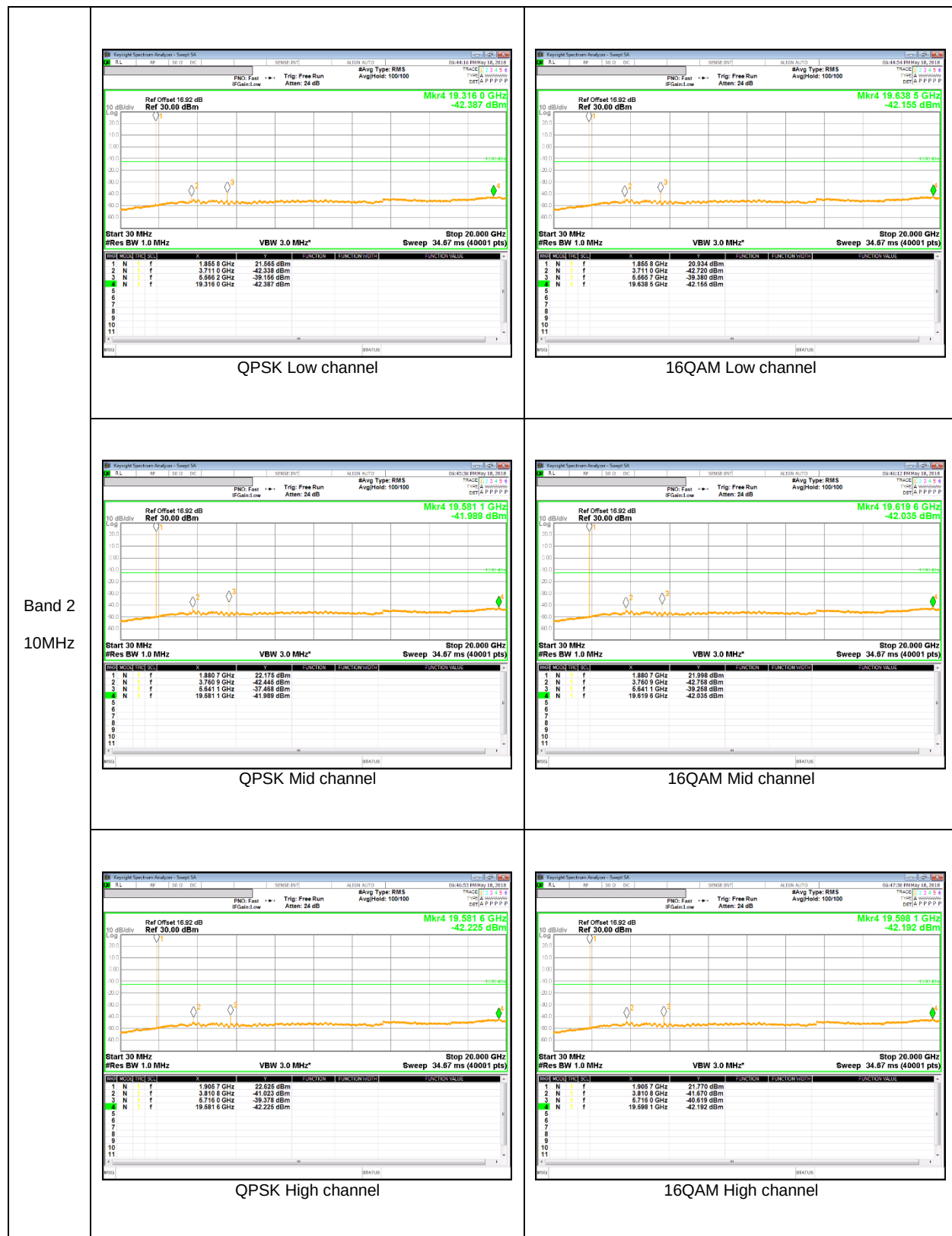
# WCDMA Band 2

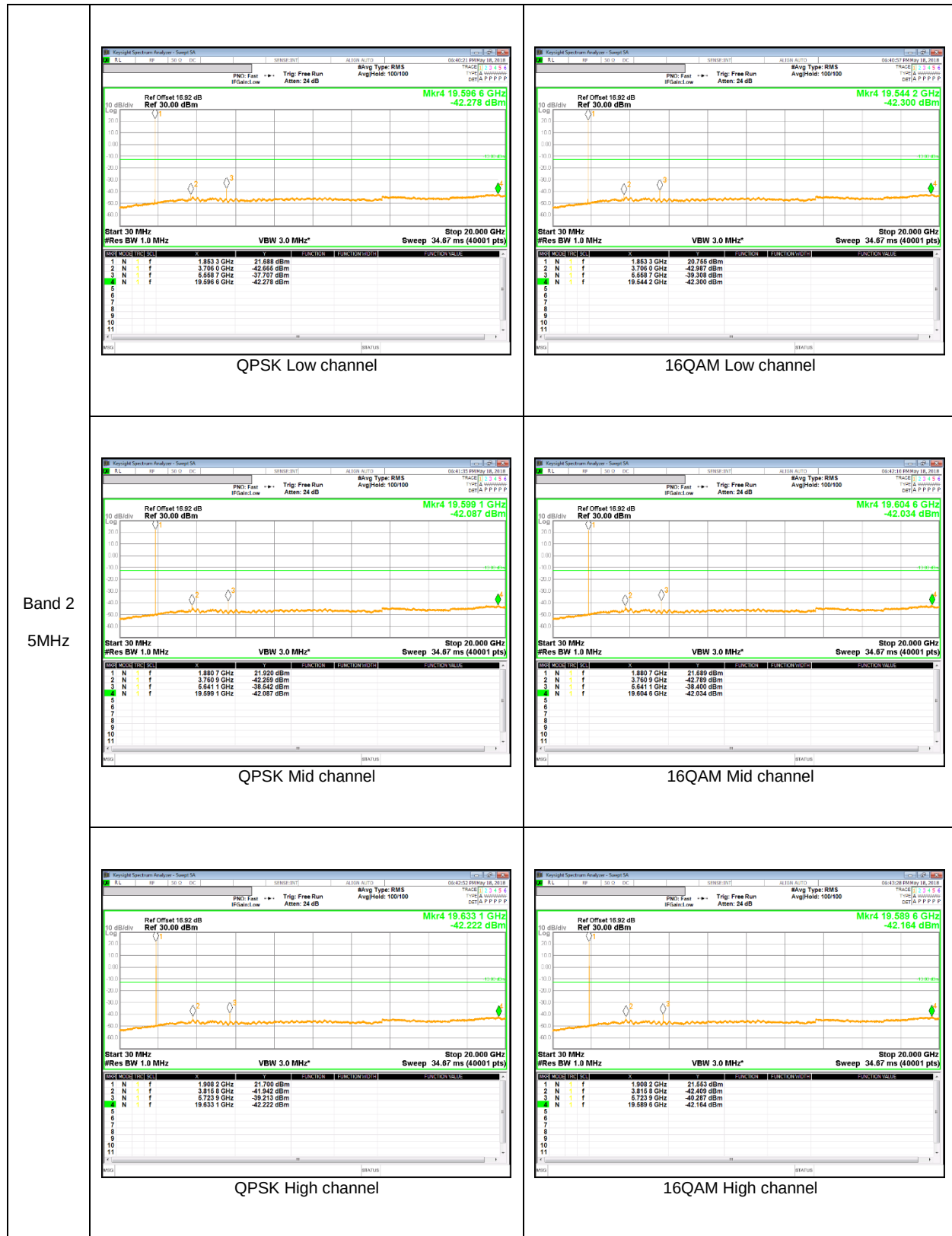


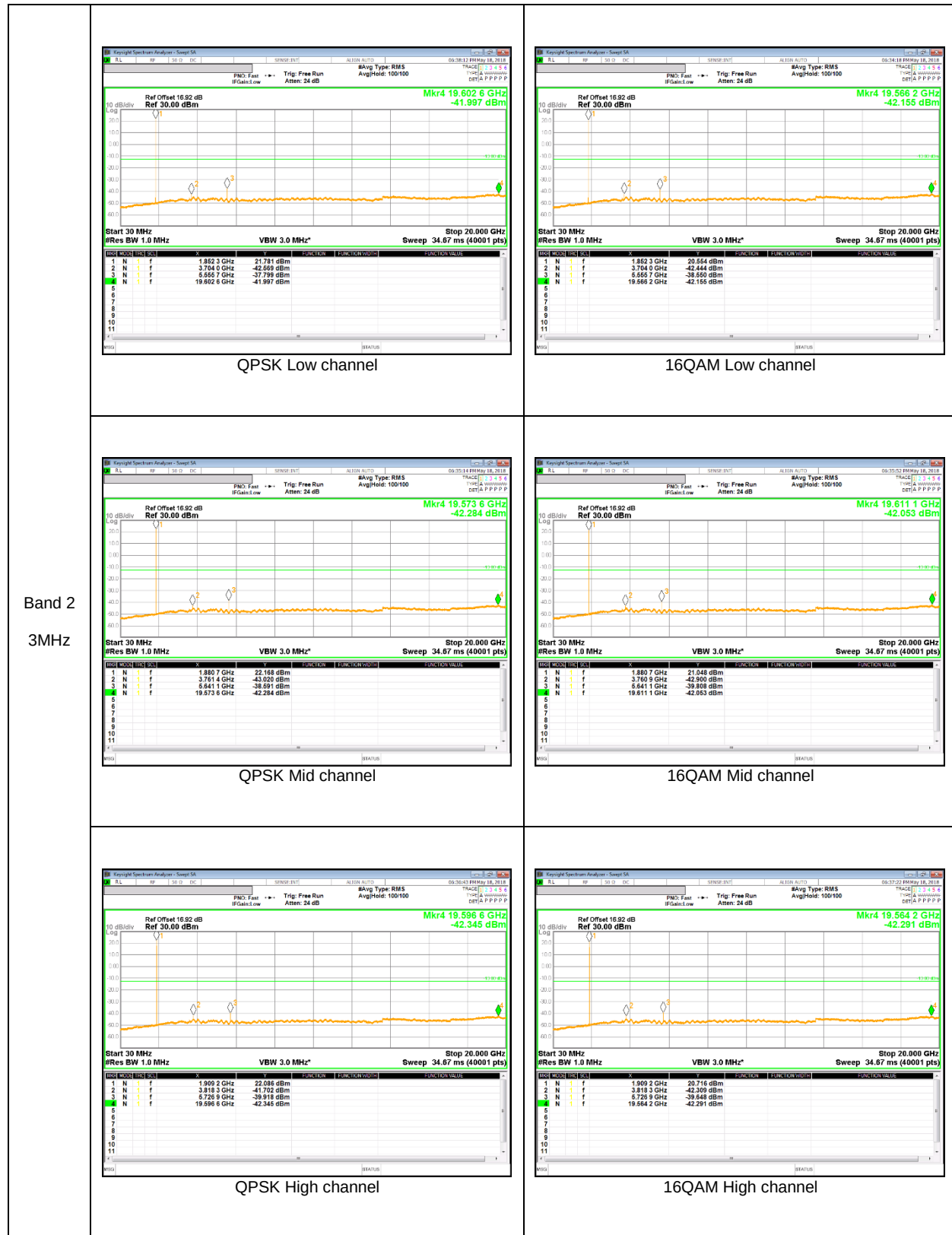
**LTE Band 2**

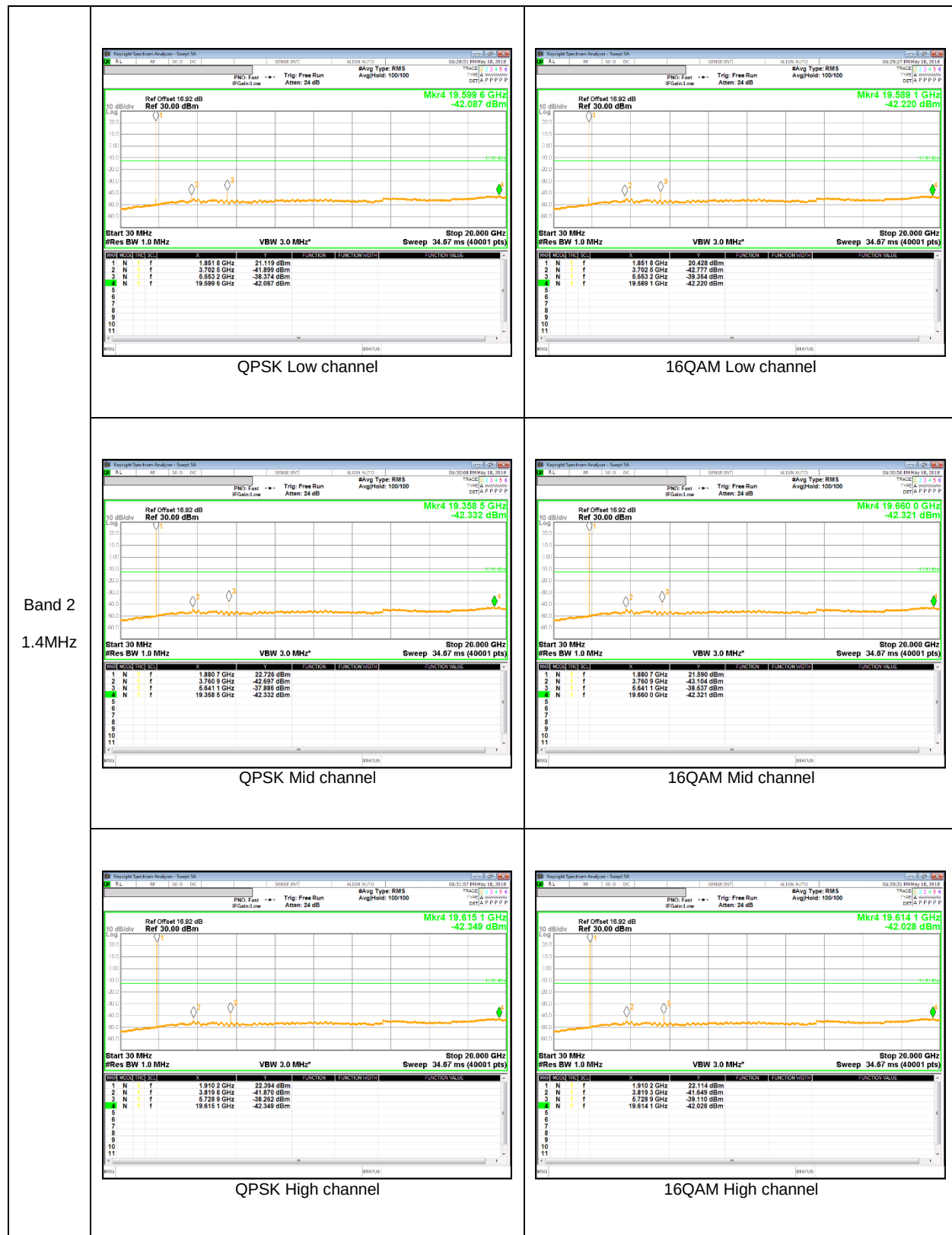




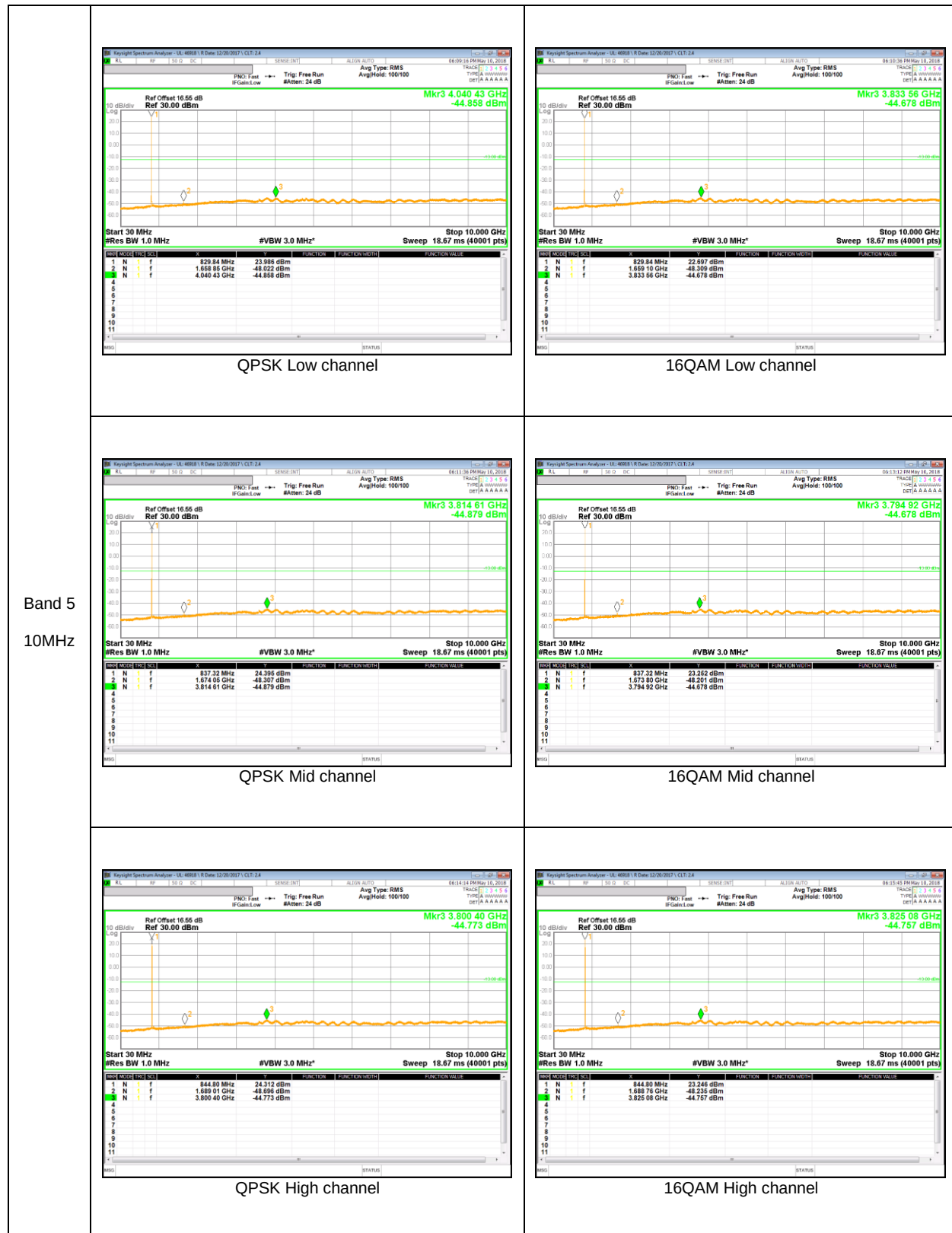


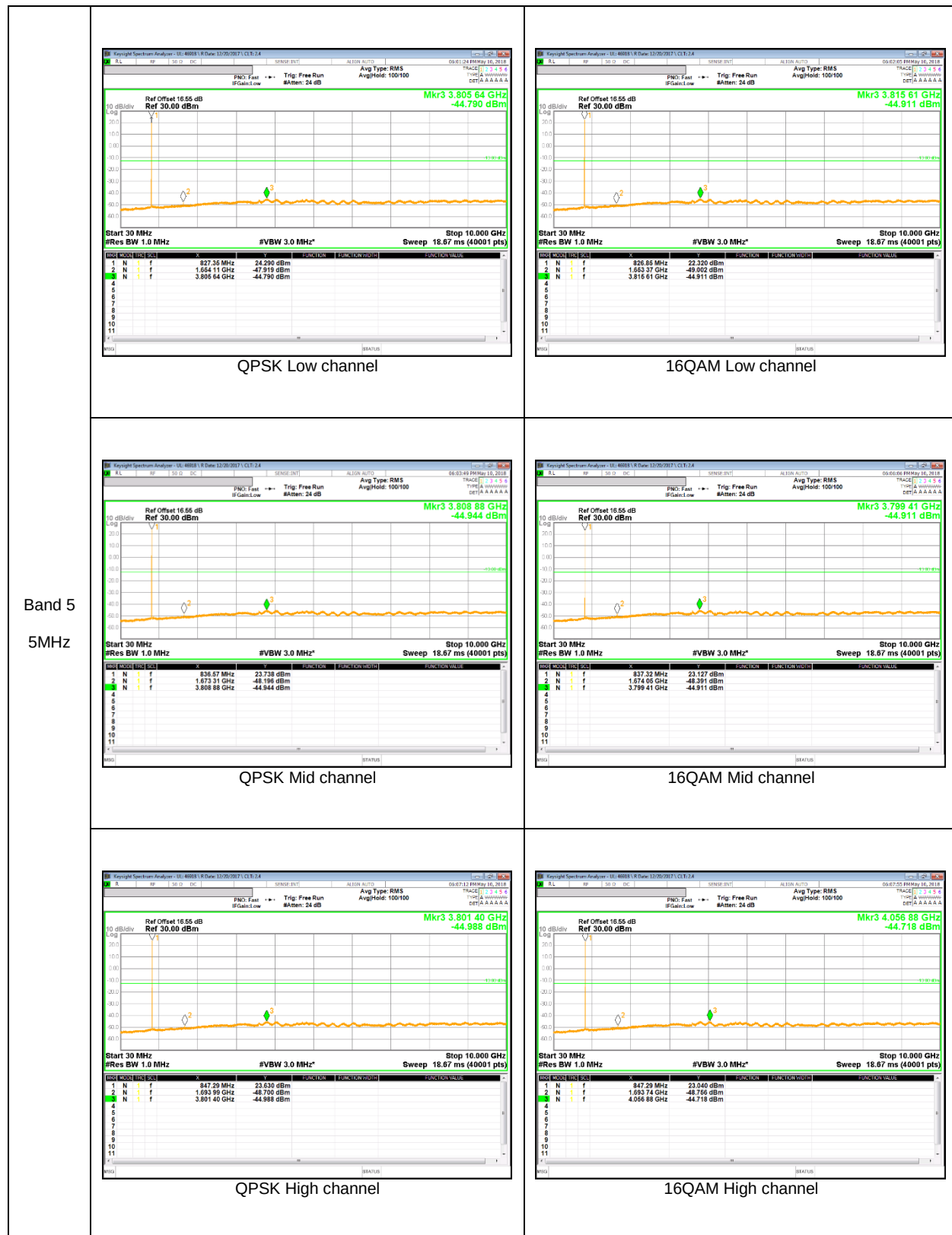


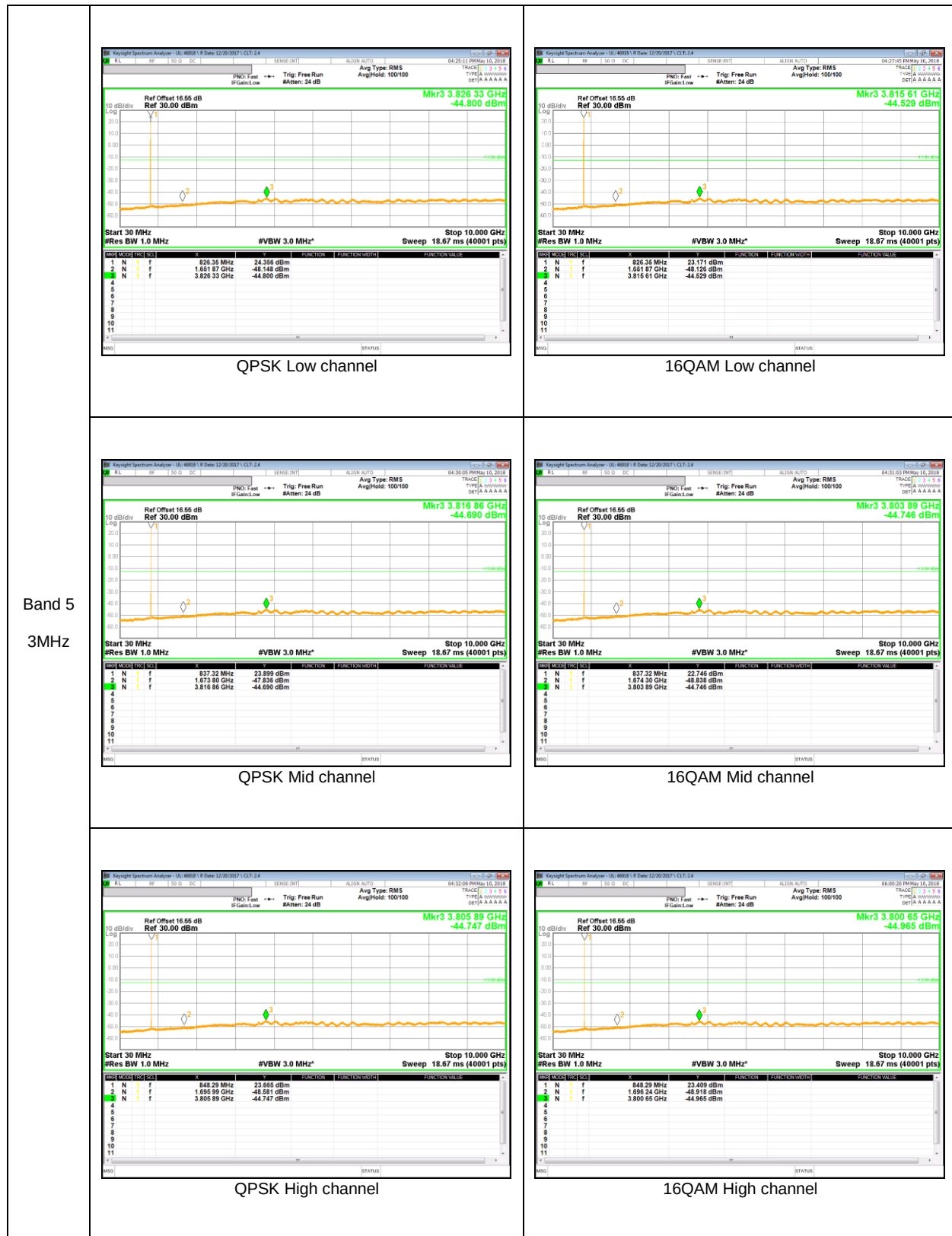


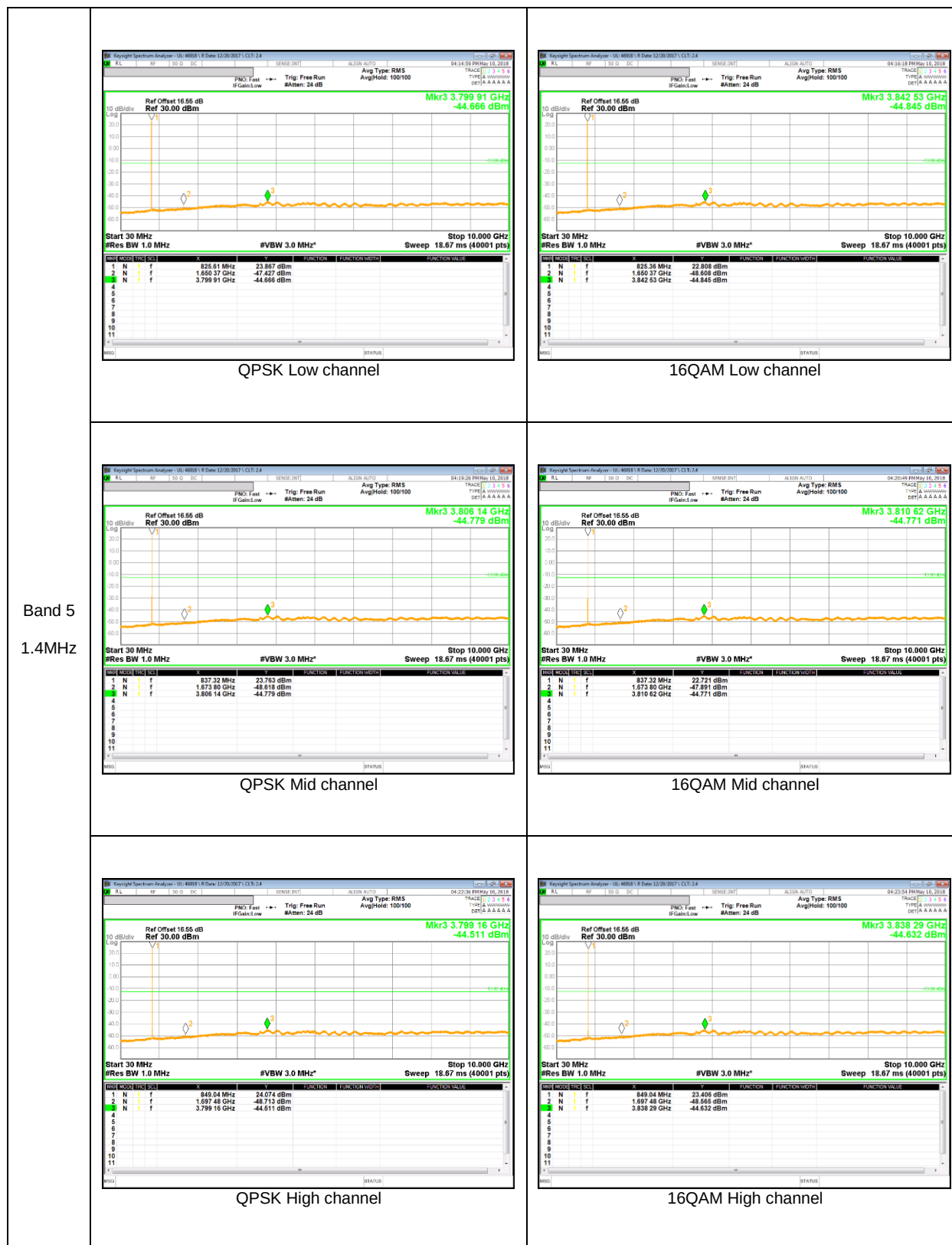


**LTE Band 5**









**LTE Band 12**

