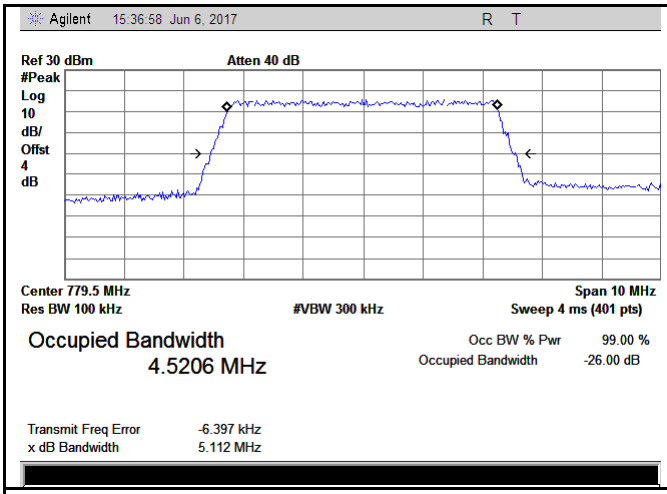
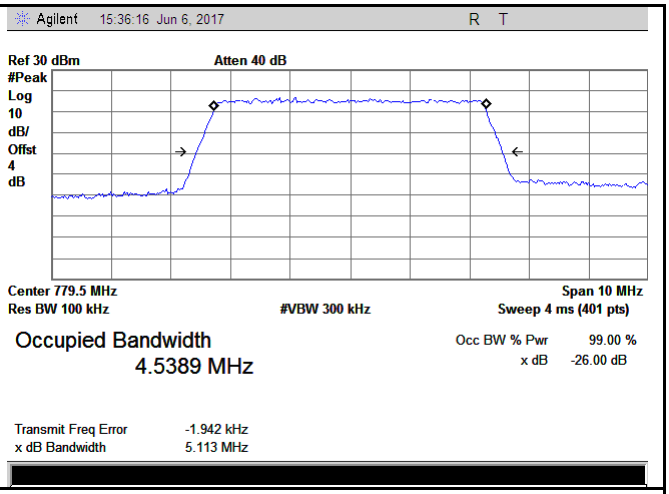
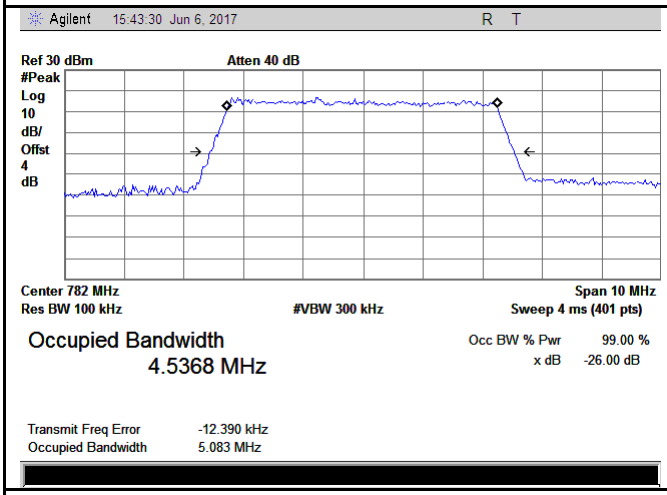
## LTE band XIII (Part 27)



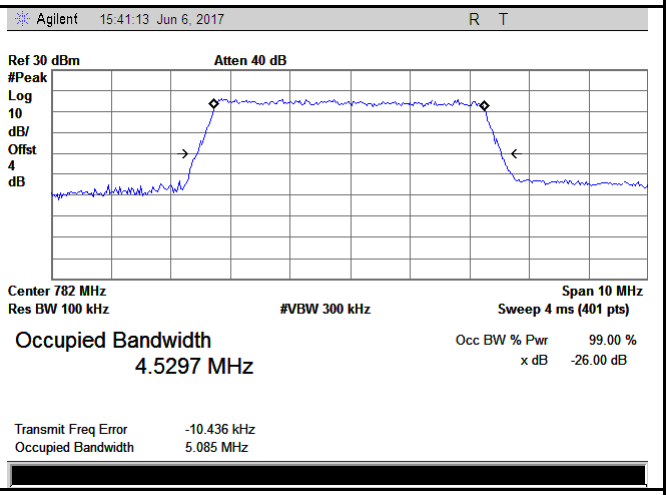

LTE band XIII - Low CH QPSK-5



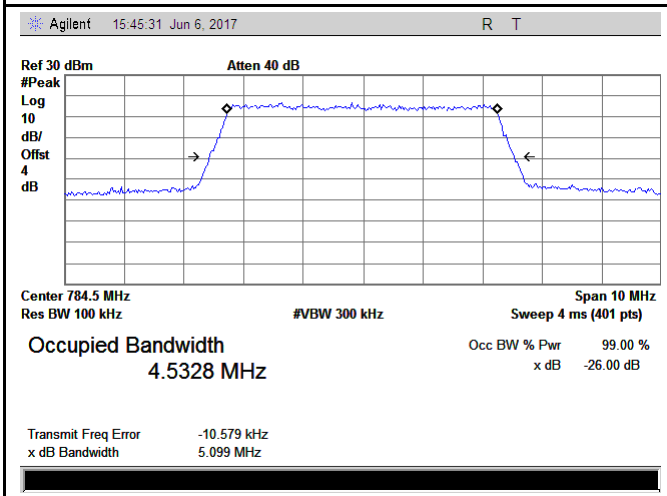

LTE band XIII - Low CH 16QAM-5



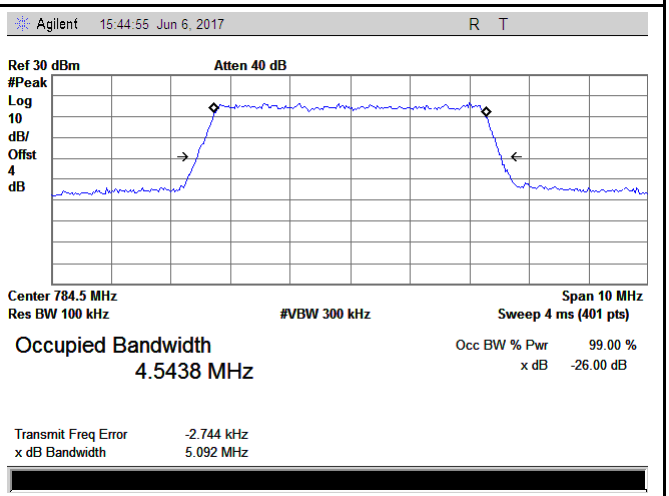

LTE band XIII - Middle CH QPSK-5



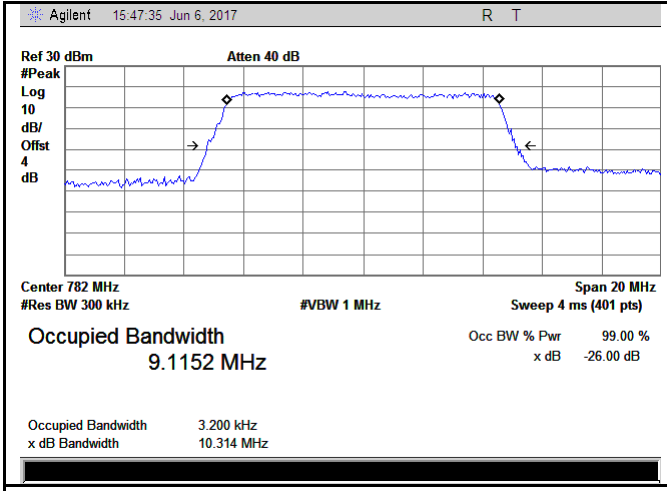

LTE band XIII - Middle CH 16QAM-5



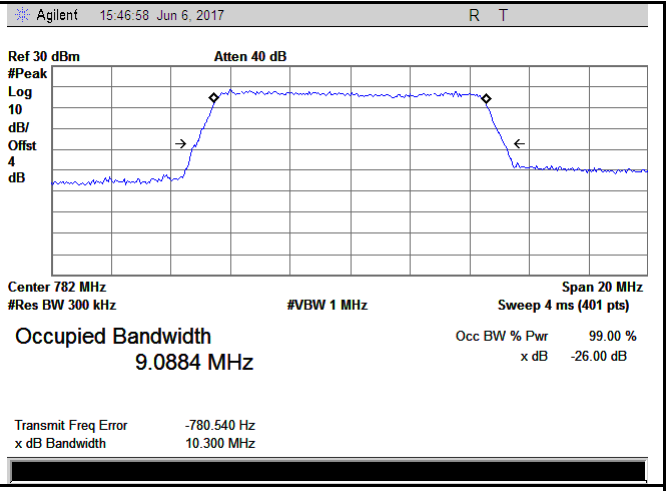

LTE band XIII - High CH QPSK-5




LTE band XIII - High CH 16QAM-5




LTE band XIII - QPSK-10

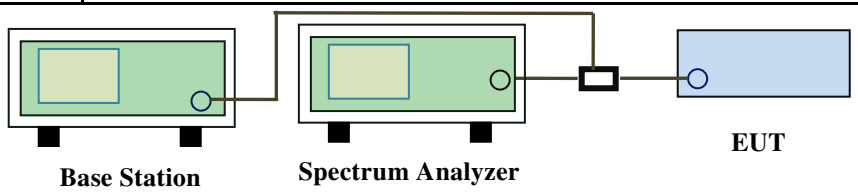



LTE band XIII - 16QAM-10

## 6.5 Spurious Emissions at Antenna Terminals

| | |
| --- | --- |
| Temperature | 23 °C |
| Relative Humidity | 58% |
| Atmospheric Pressure | 1006mbar |
| Test date : | June 06, 2017 |
| Tested By : | Leen Yang |

**Requirement(s):**

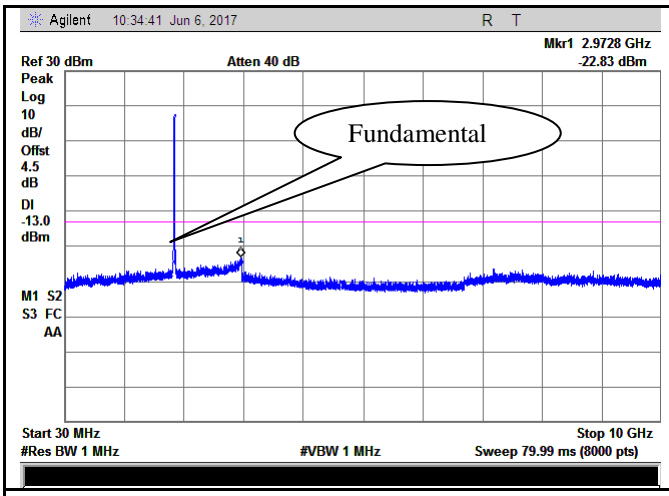
| Spec | Item | Requirement | Applicable |
| --- | --- | --- | --- |
| §2.1051, §22.917(a)& §24.238(a) § 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB | ☑ |
| Test Setup |  | | |
| Test Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The Band Edges of low and high channels for the highest RF powers were measured.<br>- Setting RBW as roughly BW/100. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

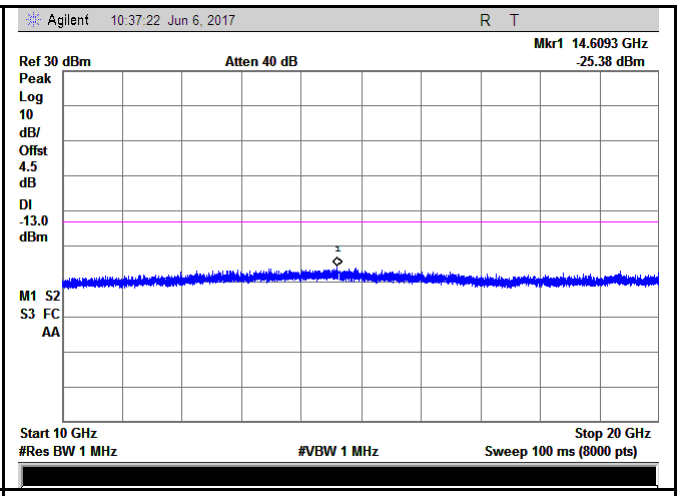
**Test Plot** ☑ Yes (See below) ☐ N/A

## Test Plots 30MHz-5GHz

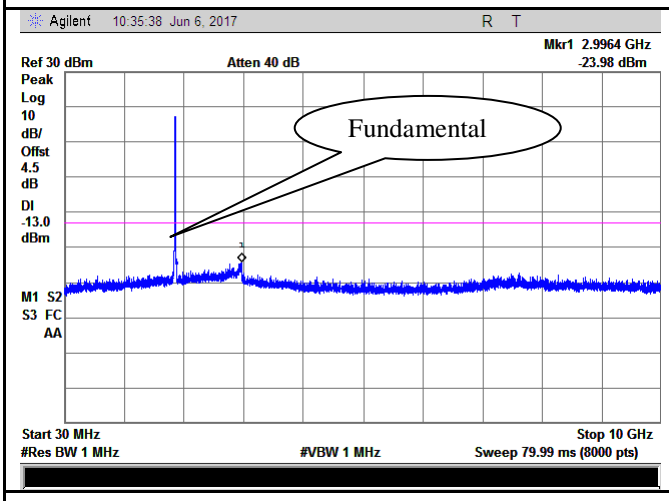
### LTE band II (Part 24E)



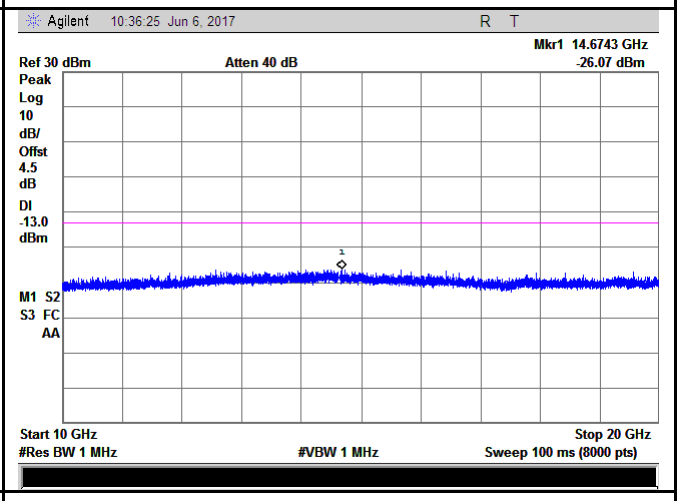

LTE band II - Low Channel-1



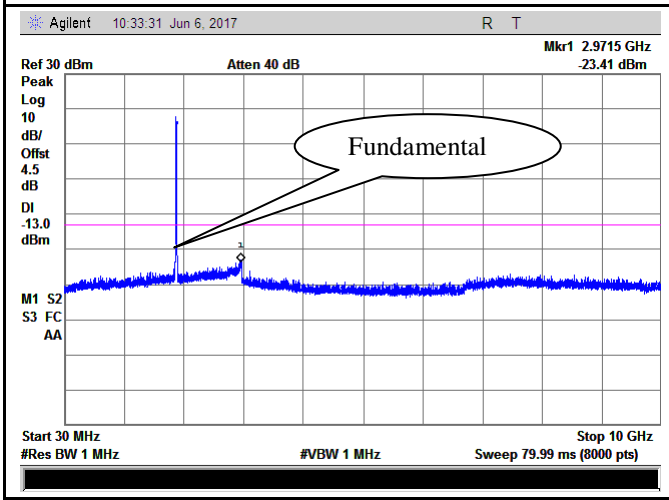

LTE band II - Low Channel-2



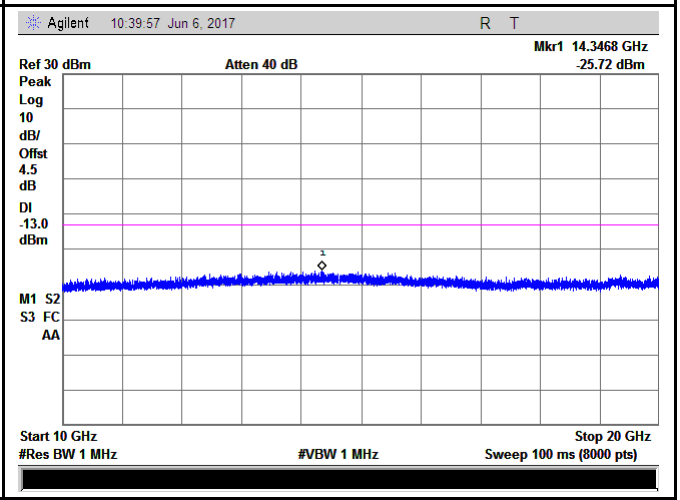

LTE band II Middle Channel-1




LTE band II Middle Channel-2

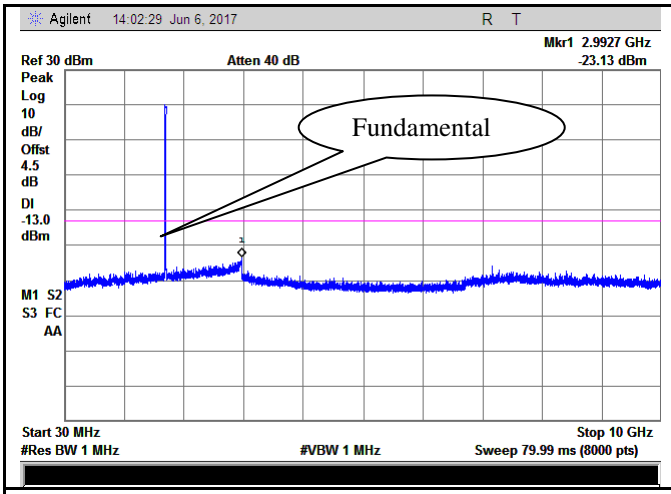



LTE band II - High Channel-1

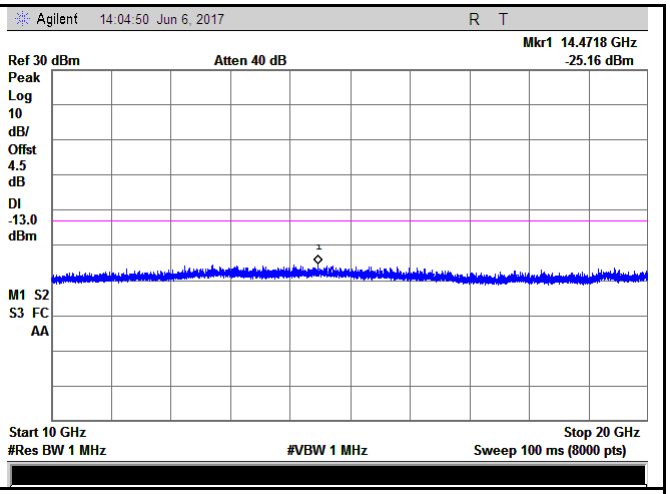



LTE band II - High Channel-2

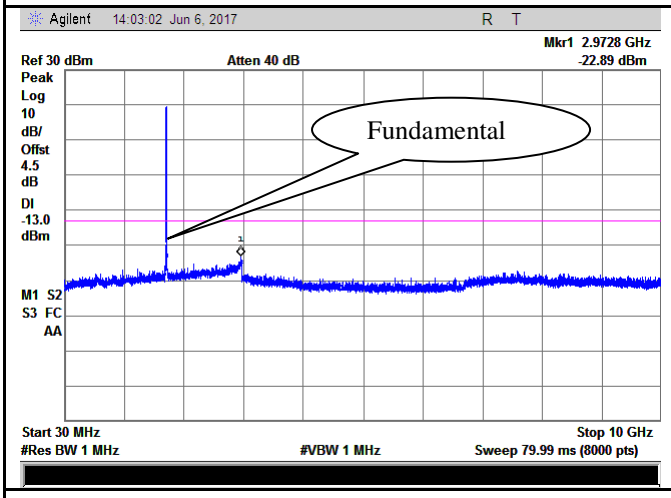
## LTE band IV (Part27) result



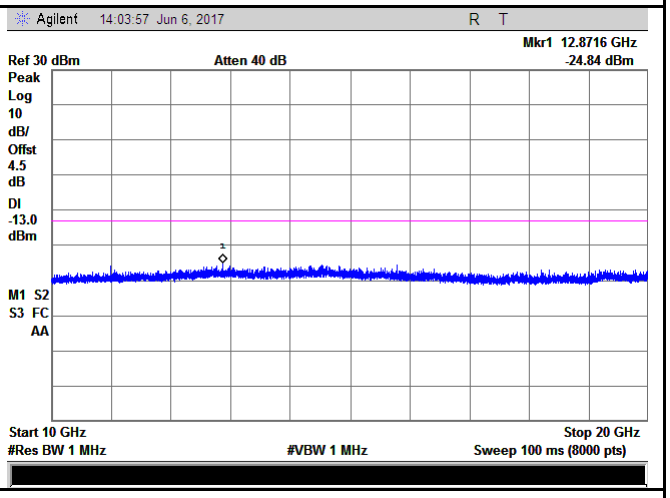

LTE band IV - Low Channel-1



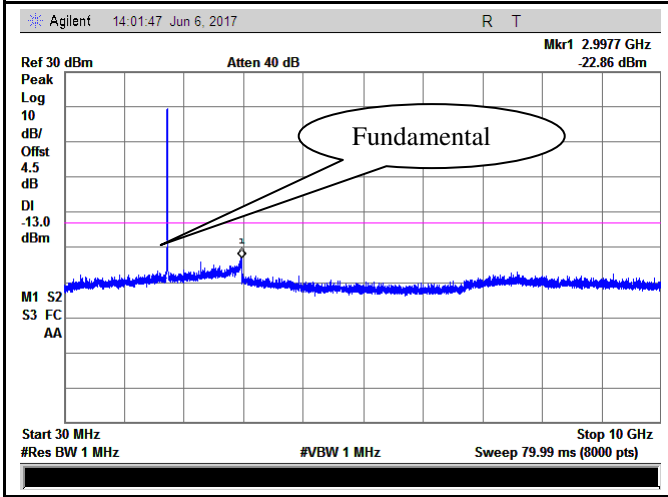

LTE band IV - Low Channel-2



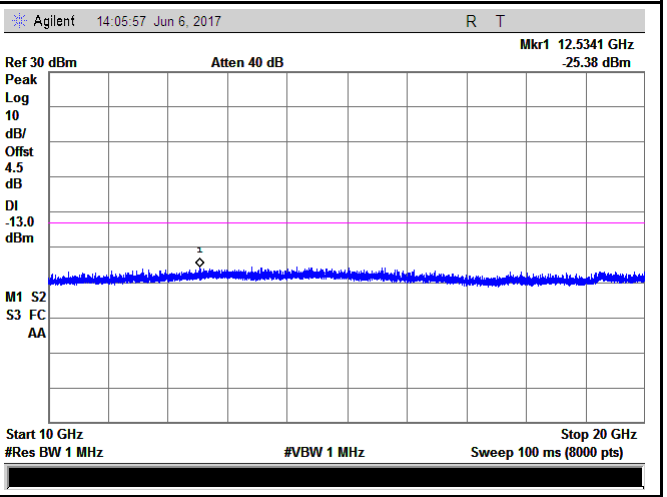

LTE band IV - Middle Channel-1




LTE band IV - Middle Channel-2

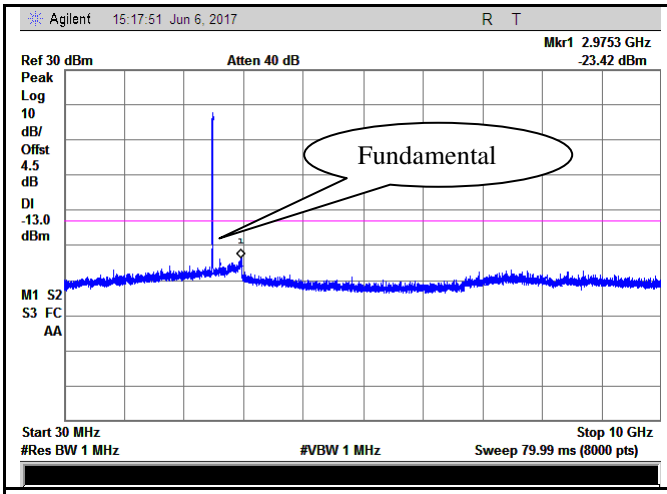



LTE band IV - High Channel-1

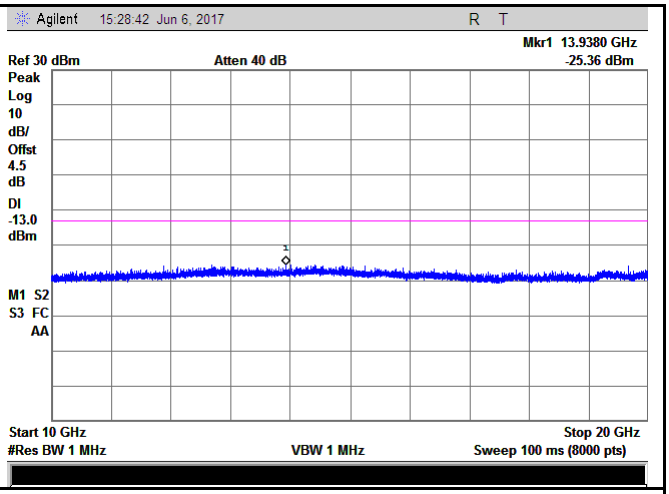



LTE band IV - High Channel-2

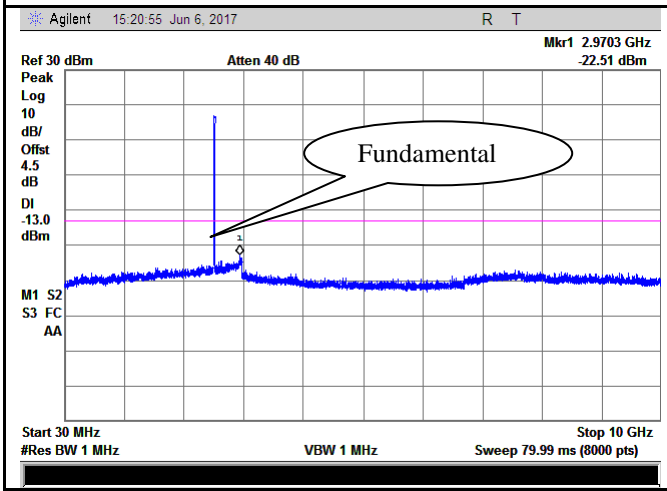
## LTE band VII (Part 27)



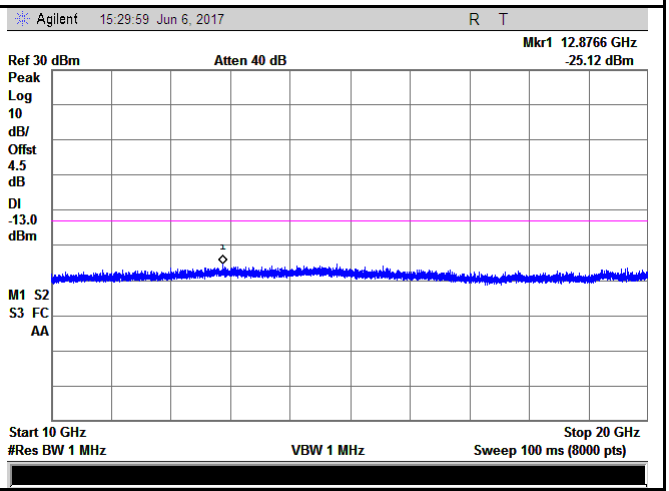

LTE band VII - Low Channel-1



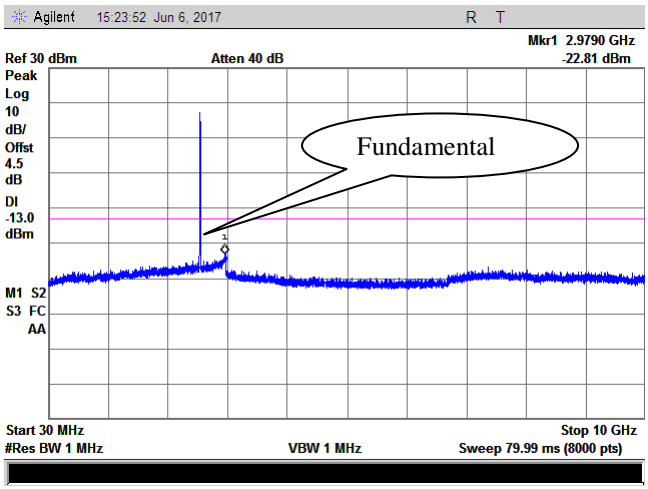

LTE band VII - Low Channel-2



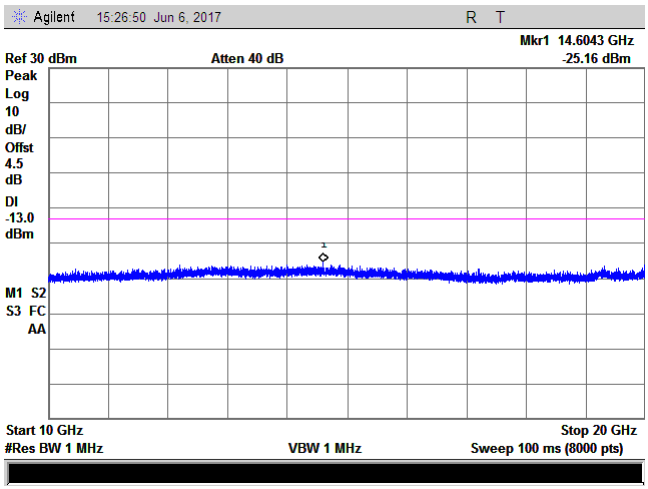

LTE band VII- Middle Channel-1




LTE band VII - Middle Channel-2

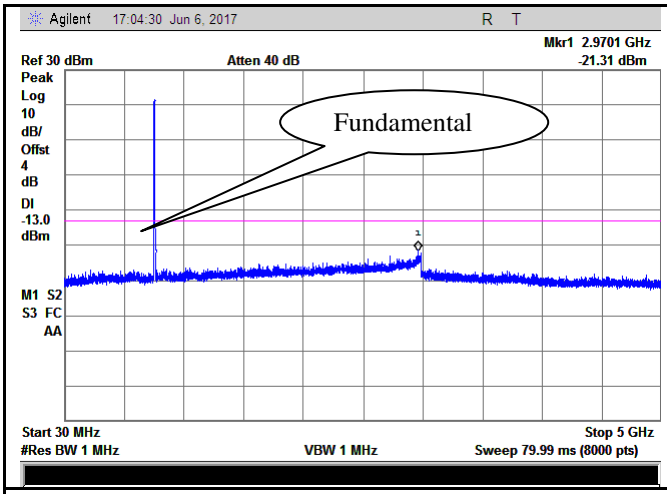



LTE band VII - High Channel-1

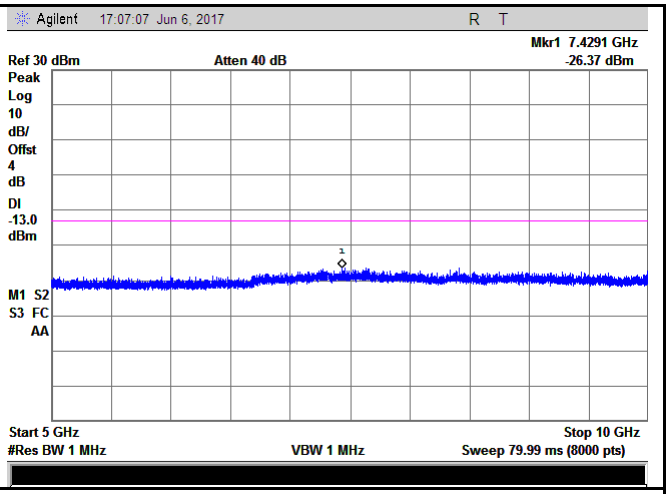



LTE band VII - High Channel-2

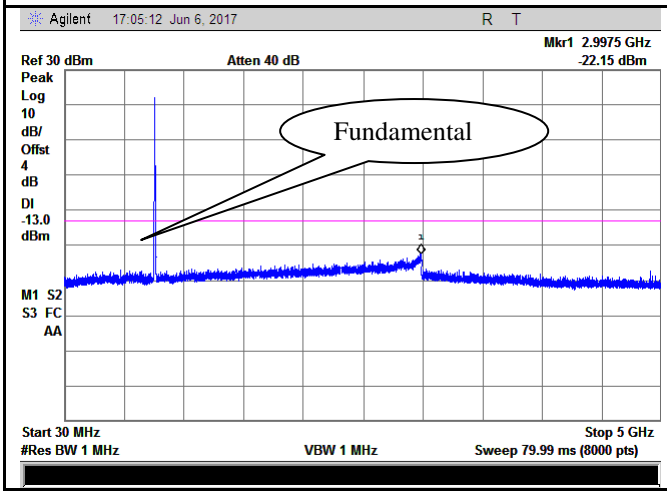
## LTE band XIII (Part 27)



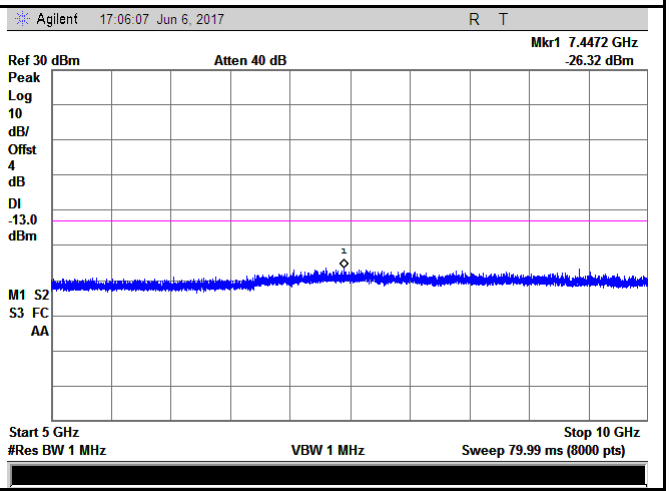

LTE band XIII - Low Channel-1



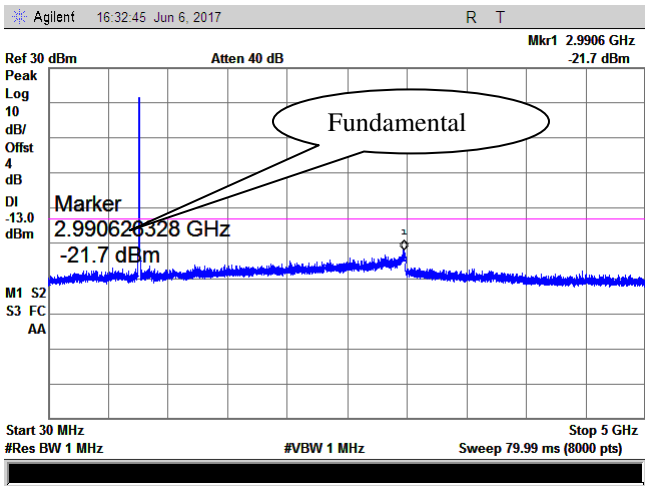

LTE band XIII - Low Channel-2



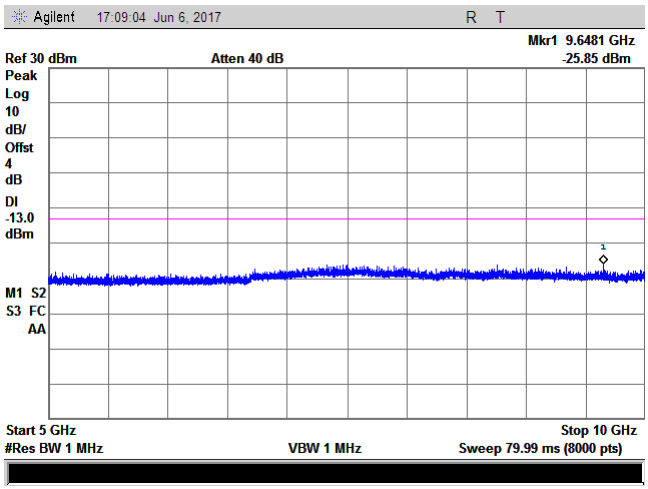

LTE band XIII- Middle Channel-1




LTE band XIII - Middle Channel-2




LTE band XIII - High Channel-1




LTE band XIII - High Channel-2

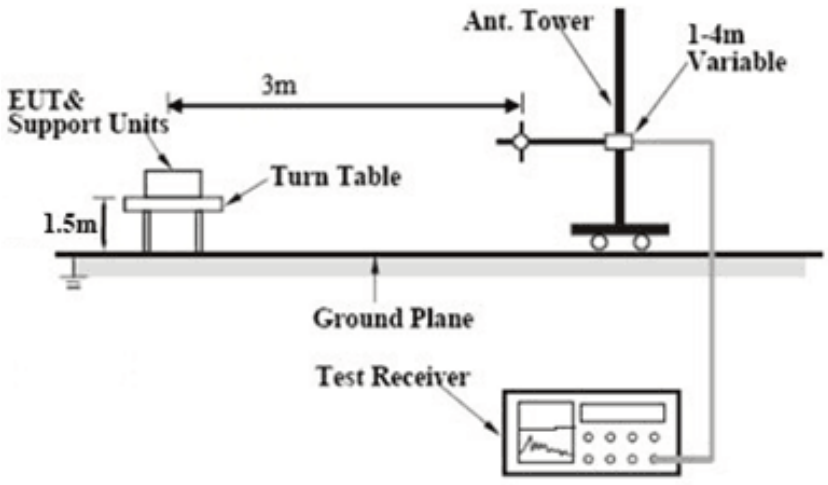
## 6.6 Spurious Radiated Emissions

| | |
|---|---|
| Temperature | 24 °C |
| Relative Humidity | 59% |
| Atmospheric Pressure | 1007mbar |
| Test date : | June 07, 2016 |
| Tested By : | Leen Yang |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1053, §22.917 & §24.238 § 27.53(h) | a) | 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 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic. | ☑ |

**Test setup**




**Test Procedure**

1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Sample Calculation:

EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)

| Remark | |
| --- | --- |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## LTE band II (Part 24E) result

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3720 | -46.85 | V | 10.25 | 2.73 | -39.33 | -13 | -26.33 |
| 3720 | -46.93 | H | 10.25 | 2.73 | -39.41 | -13 | -26.41 |
| 50.2 | -45.37 | V | -4.2 | 0.11 | -49.68 | -13 | -36.68 |
| 203.4 | -48.77 | H | 4.6 | 0.18 | -44.35 | -13 | -31.35 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3760 | -46.45 | V | 10.25 | 2.73 | -38.93 | -13 | -25.93 |
| 3760 | -47.28 | H | 10.25 | 2.73 | -39.76 | -13 | -26.76 |
| 50.2 | -45.12 | V | -4.2 | 0.11 | -49.43 | -13 | -36.43 |
| 203.4 | -48.56 | H | 4.6 | 0.18 | -44.14 | -13 | -31.14 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3800 | -46.27 | V | 10.36 | 2.73 | -38.64 | -13 | -25.64 |
| 3800 | -46.98 | H | 10.36 | 2.73 | -39.35 | -13 | -26.35 |
| 50.2 | -45.34 | V | -4.2 | 0.11 | -49.65 | -13 | -36.65 |
| 203.4 | -47.85 | H | 4.6 | 0.18 | -43.43 | -13 | -30.43 |

**Note:**

*1, The testing has been conformed to 10*1907.5MHz=19,075MHz*
*2, All other emissions more than 30 dB below the limit*
*3, X-Axis, Y-Axis and –Axis were investigated. The results above show only the worst case.*

## LTE band IV(Part27) result

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3440 | -46.31 | V | 10.06 | 2.52 | -38.77 | -13 | -25.77 |
| 3440 | -47.28 | H | 10.06 | 2.52 | -39.74 | -13 | -26.74 |
| 50.2 | -45.59 | V | -4.2 | 0.11 | -49.9 | -13 | -36.9 |
| 203.4 | -48.62 | H | 4.6 | 0.18 | -44.2 | -13 | -31.2 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3465 | -46.43 | V | 10.09 | 2.52 | -38.86 | -13 | -25.86 |
| 3465 | -47.16 | H | 10.09 | 2.52 | -39.59 | -13 | -26.59 |
| 50.2 | -46.69 | V | -4.2 | 0.11 | -51 | -13 | -38 |
| 203.4 | -49.37 | H | 4.6 | 0.18 | -44.95 | -13 | -31.95 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3490 | -46.38 | V | 10.09 | 2.52 | -38.81 | -13 | -25.81 |
| 3490 | -47.22 | H | 10.09 | 2.52 | -39.65 | -13 | -26.65 |
| 50.2 | -46.71 | V | -4.2 | 0.11 | -51.02 | -13 | -38.02 |
| 203.4 | -49.26 | H | 4.6 | 0.18 | -44.84 | -13 | -31.84 |

**Note:**

*1, The testing has been conformed to 10*1752.5MHz=17,525MHz*
*2, All other emissions more than 30 dB below the limit*
*3, X-Axis, Y-Axis and –Axis were investigated. The results above show only the worst case.*

## LTE band VII(Part27) result

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 5020 | -48.33 | V | 10.29 | 0.98 | -39.02 | -13 | -26.02 |
| 5020 | -47.95 | H | 10.29 | 0.98 | -38.64 | -13 | -25.64 |
| 50.2 | -46.44 | V | -4.2 | 0.11 | -50.75 | -13 | -37.75 |
| 203.4 | -48.28 | H | 4.6 | 0.18 | -43.86 | -13 | -30.86 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 5070 | -48.01 | V | 10.3 | 0.99 | -38.7 | -13 | -25.7 |
| 5070 | -47.86 | H | 10.3 | 0.99 | -38.55 | -13 | -25.55 |
| 50.2 | -46.13 | V | -4.2 | 0.11 | -50.44 | -13 | -37.44 |
| 203.4 | -48.47 | H | 4.6 | 0.18 | -44.05 | -13 | -31.05 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 5120 | -48.25 | V | 10.32 | 1 | -38.93 | -13 | -25.93 |
| 5120 | -48.32 | H | 10.32 | 1 | -39 | -13 | -26 |
| 50.2 | -46.24 | V | -4.2 | 0.11 | -50.55 | -13 | -37.55 |
| 203.4 | -47.85 | H | 4.6 | 0.18 | -43.43 | -13 | -30.43 |

**Note:**

*1, The testing has been conformed to 10*2567.5MHz=25,675MHz*
*2, All other emissions more than 30 dB below the limit*
*3, X-Axis, Y-Axis and –Axis were investigated. The results above show only the worst case.*

## LTE band XIII(Part27) result

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1564 | -49.12 | V | 6.4 | 0.64 | -43.36 | -13 | -30.36 |
| 1564 | -45.87 | H | 6.4 | 0.64 | -40.11 | -13 | -27.11 |
| 586.2 | -55.31 | V | 6.1 | 0.37 | -49.58 | -13 | -36.58 |
| 855.94 | -52.34 | H | 6.2 | 0.44 | -46.58 | -13 | -33.58 |

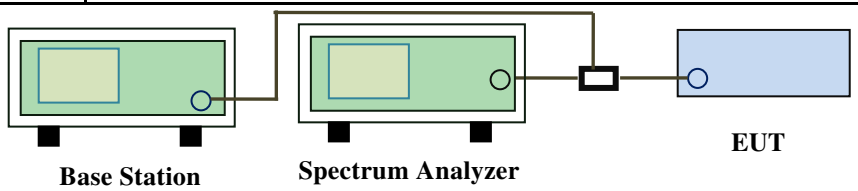
**Note:**

*1, The testing has been conformed to 10*713.5MHz=7,135MHz*
*2, All other emissions more than 30 dB below the limit*
*3, X-Axis, Y-Axis and –Axis were investigated. The results above show only the worst case.*

## 6.7 Band Edge

| | |
| --- | --- |
| Temperature | 23 °C |
| Relative Humidity | 58% |
| Atmospheric Pressure | 1006mbar |
| Test date : | June 06, 2017 |
| Tested By : | Leen Yang |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
| --- | --- | --- | --- |
| §22.917(a)<br>§24.238(a)<br>§ 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. | ☑ |
| Test setup |  | | |
| Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

## LTE band II (Part 24E) result

| BW(MHz) | Channel | Frequency (MHz) | Mode | Emission (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- |
| 1.4 | 18607 | 1850 | QPSK | -26.53 | -13 |
| | | | 16QAM | -26.60 | -13 |
| 1.4 | 18900 | 1910 | QPSK | -22.87 | -13 |
| | | | 16QAM | -23.03 | -13 |
| 3 | 18615 | 1850 | QPSK | -19.10 | -13 |
| | | | 16QAM | -19.62 | -13 |
| 3 | 19185 | 1910 | QPSK | -20.84 | -13 |
| | | | 16QAM | -20.72 | -13 |
| 5 | 18625 | 1850 | QPSK | -18.21 | -13 |
| | | | 16QAM | -16.75 | -13 |
| 5 | 19175 | 1910 | QPSK | -17.05 | -13 |
| | | | 16QAM | -17.40 | -13 |
| 10 | 18650 | 1850 | QPSK | -17.51 | -13 |
| | | | 16QAM | -20.05 | -13 |
| 10 | 19150 | 1910 | QPSK | -17.29 | -13 |
| | | | 16QAM | -17.90 | -13 |
| 15 | 18675 | 1850 | QPSK | -19.64 | -13 |
| | | | 16QAM | -17.68 | -13 |
| 15 | 19125 | 1910 | QPSK | -20.83 | -13 |
| | | | 16QAM | -21.07 | -13 |
| 20 | 18700 | 1848 | QPSK | -26.84 | -13 |
| | | | 16QAM | -25.35 | -13 |
| 20 | 19100 | 1911 | QPSK | -22.03 | -13 |
| | | | 16QAM | -21.06 | -13 |

## LTE band IV (Part 27) result

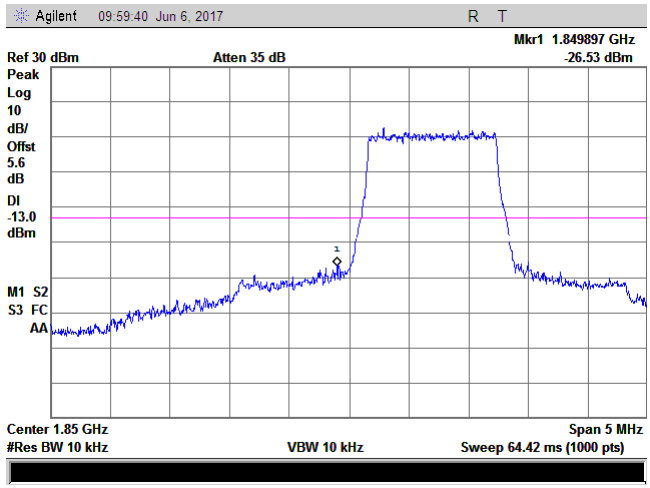
| BW(MHz) | Channel | Frequency (MHz) | Mode | Emission (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 1.4 | 19957 | 1710 | QPSK | -23.41 | -13 |
| | | | 16QAM | -23.23 | -13 |
| 1.4 | 20393 | 1755 | QPSK | -22.76 | -13 |
| | | | 16QAM | -23.65 | -13 |
| 3 | 19965 | 1710 | QPSK | -18.81 | -13 |
| | | | 16QAM | -17.12 | -13 |
| 3 | 20385 | 1755 | QPSK | -20.97 | -13 |
| | | | 16QAM | -19.56 | -13 |
| 5 | 19975 | 1710 | QPSK | -20.50 | -13 |
| | | | 16QAM | -17.50 | -13 |
| 5 | 20375 | 1755 | QPSK | -18.83 | -13 |
| | | | 16QAM | -17.79 | -13 |
| 10 | 20000 | 1710 | QPSK | -18.27 | -13 |
| | | | 16QAM | -17.72 | -13 |
| 10 | 20350 | 1755 | QPSK | -18.86 | -13 |
| | | | 16QAM | -17.10 | -13 |
| 15 | 20025 | 1710 | QPSK | -20.50 | -13 |
| | | | 16QAM | -20.54 | -13 |
| 15 | 20325 | 1755 | QPSK | -21.40 | -13 |
| | | | 16QAM | -18.75 | -13 |
| 20 | 20050 | 1710 | QPSK | -24.13 | -13 |
| | | | 16QAM | -23.18 | -13 |
| 20 | 20300 | 1755 | QPSK | -21.30 | -13 |
| | | | 16QAM | -22.45 | -13 |

## LTE band XIII (Part 27) result

| BW(MHz) | Channel | Frequency (MHz) | Mode | Emission (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- |
| 5 | 23755 | 703.9 | QPSK | -14.20 | -13 |
| | | | 16QAM | -14.65 | -13 |
| 5 | 23825 | 716 | QPSK | -15.41 | -13 |
| | | | 16QAM | -16.54 | -13 |
| 10 | 23780 | 703.9 | QPSK | -14.21 | -13 |
| | | | 16QAM | -14.62 | -13 |
| 10 | 23800 | 716 | QPSK | -15.21 | -13 |
| | | | 16QAM | -15.27 | -13 |

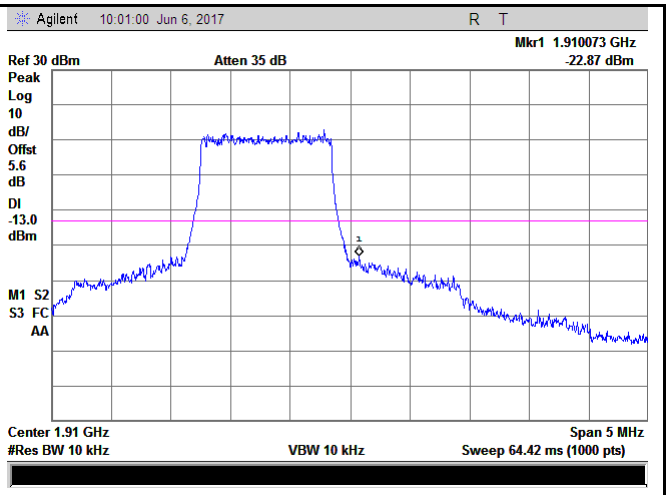
## Test Plots

### LTE band II (Part 24E)



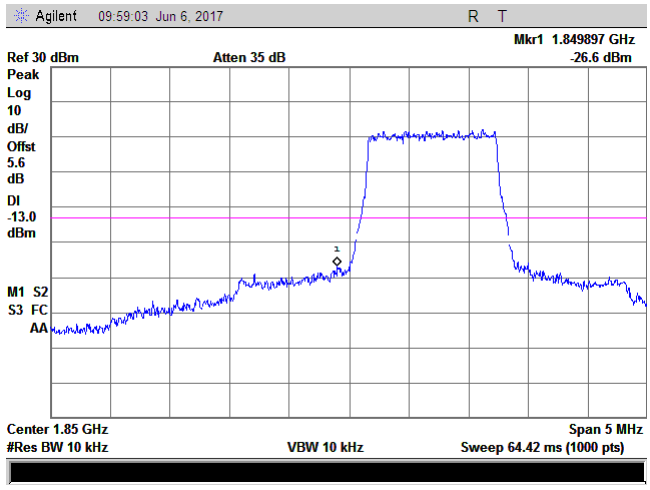

LTE band II - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.81/10)=4.5+1.1=5.6dB



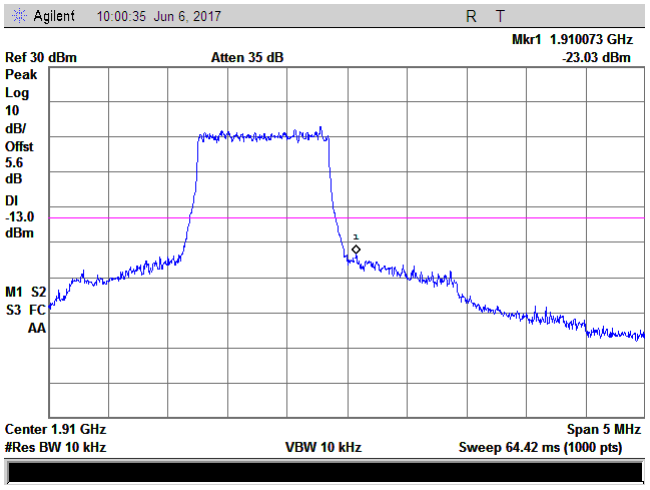

LTE band II - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.91/10)=4.5+1.1=5.6dB



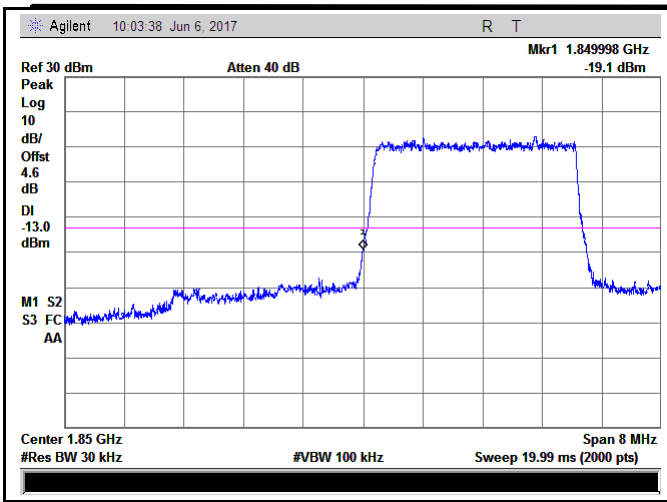

LTE band II - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (12.90/10)=4.5+1.1=5.6 dB



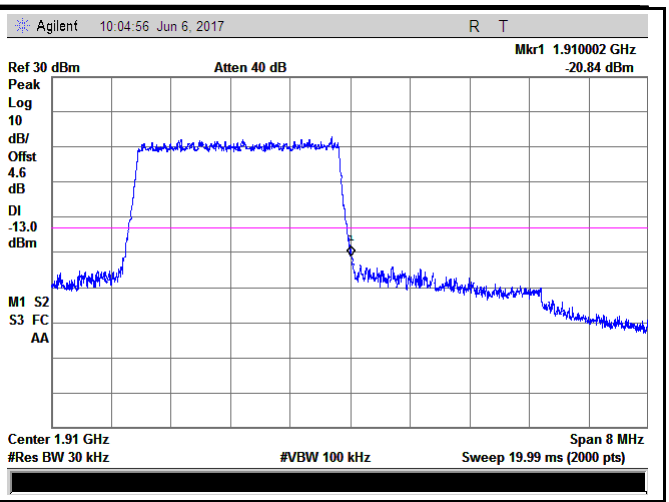

LTE band II - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (12.90/10)=4.5+1.1=5.6 dB



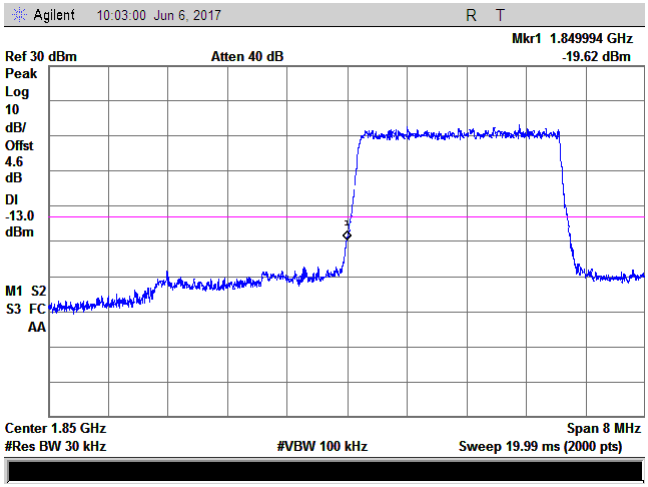

LTE band II - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (30.89/30)=4.5+0.1=4.6 dB



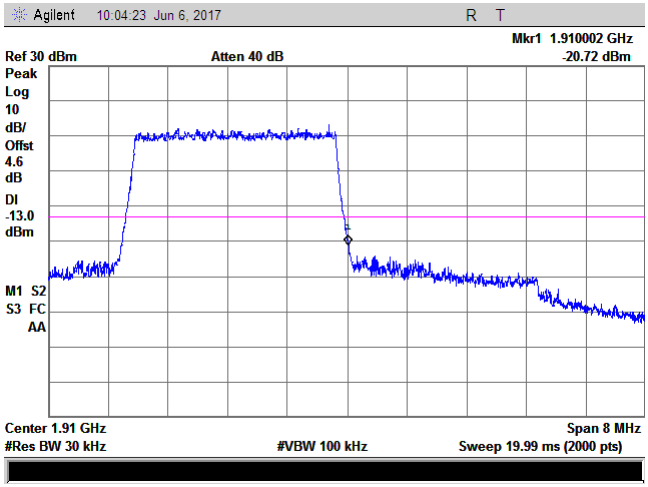

LTE band II - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (30.94/30)=4.5+0.1=4.6 dB



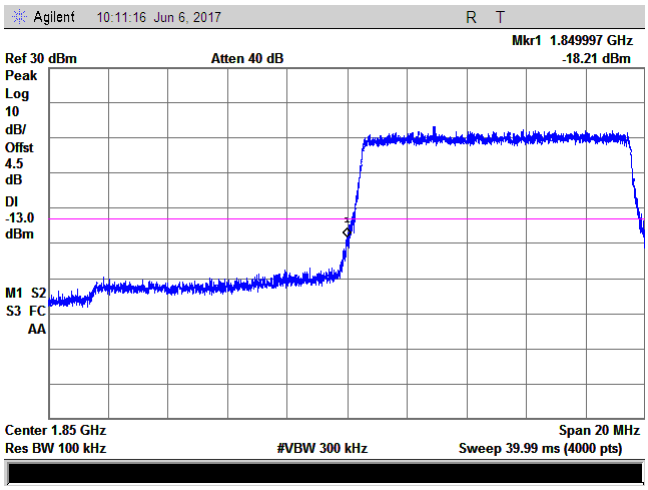

LTE band II - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (30.98/30)=4.5+0.1=4.6 dB



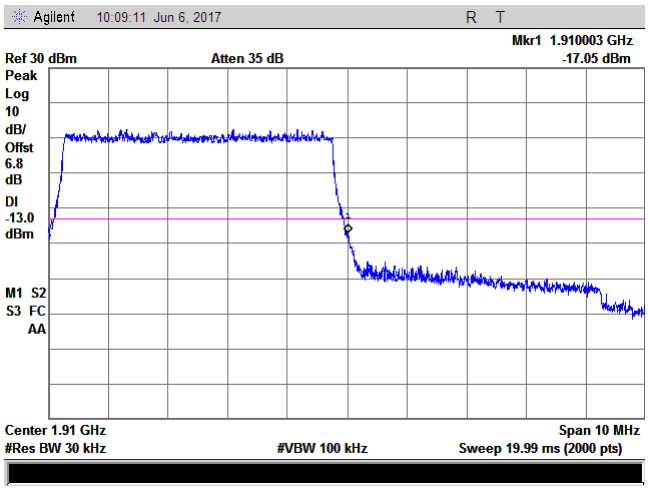

LTE band II - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (30.92/30)=4.5+0.1=4.6 dB



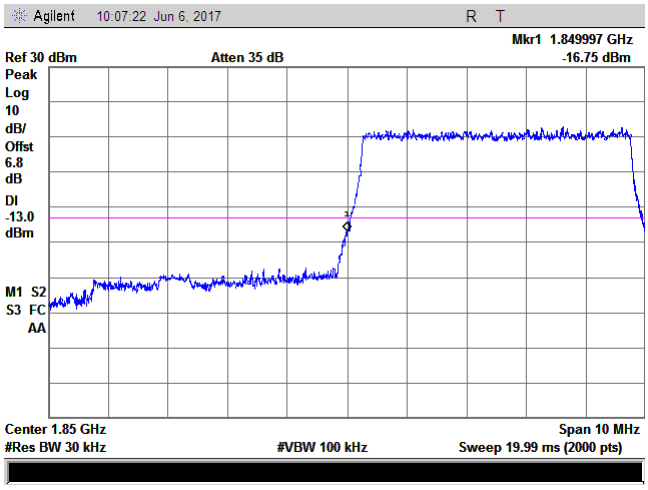

LTE band II - Low Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.94/30)=4.5+0.0=4.5 dB



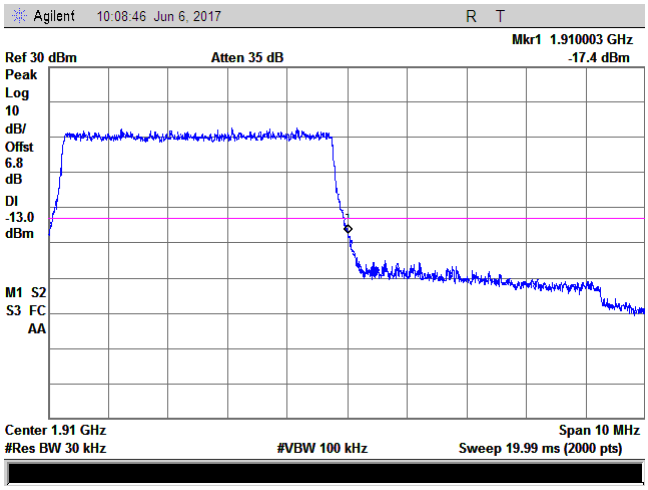

LTE band II - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.97/30)=4.5+2.3=6.8 dB



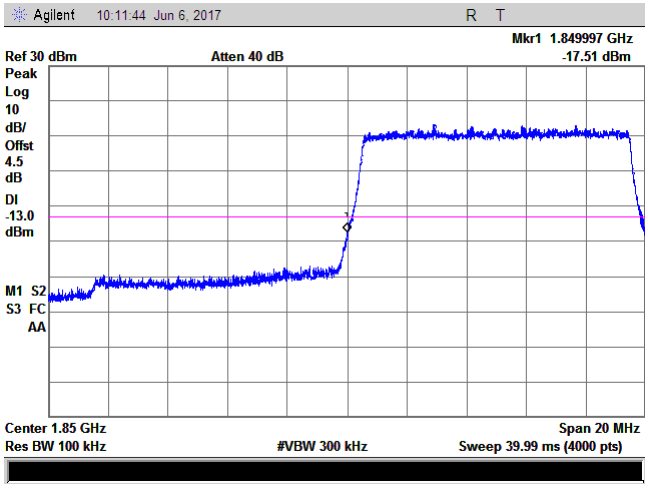

LTE band II - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.85/30)=4.5+2.3=6.8 dB

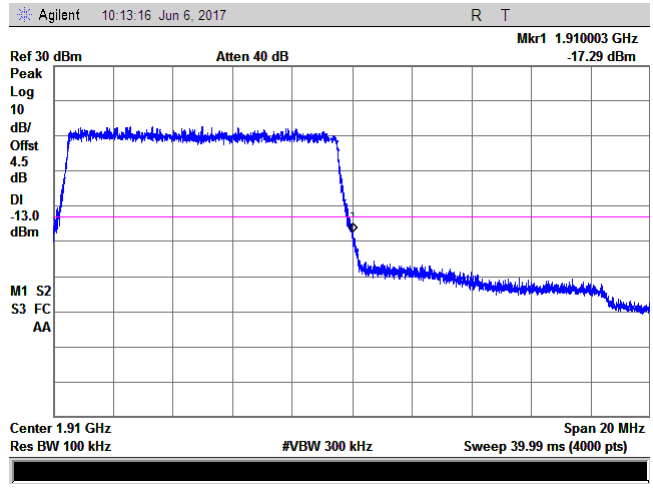



LTE band II - High Channel 16QAM-5

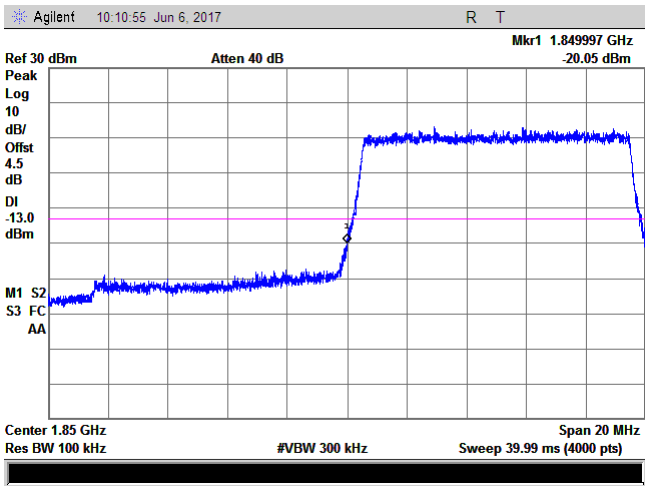
Note: Offset=Cable loss (4.5) + 10log (50.84/30)=4.5+2.3=6.8 dB




LTE band II - Low Channel QPSK-10

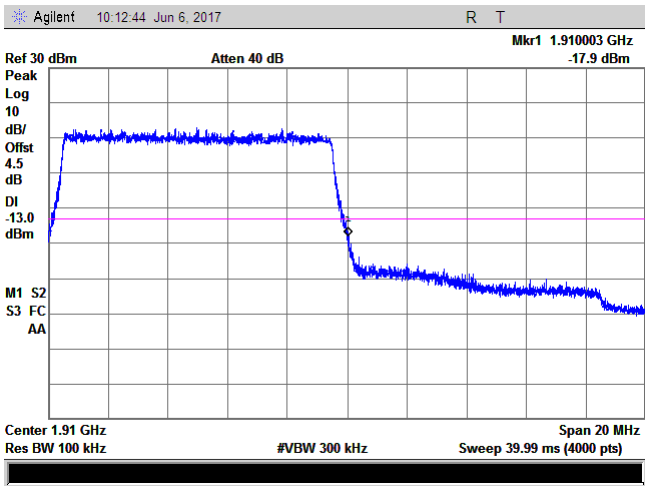



LTE band II - High Channel QPSK-10



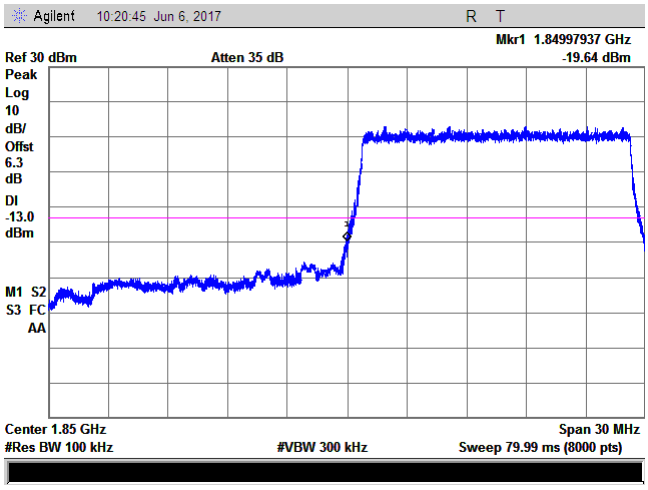

LTE band II - Low Channel 16QAM-10

Note: Offset=Cable loss (4.5) + 10log (102.49/100)=4.5+0.0=4.5 dB



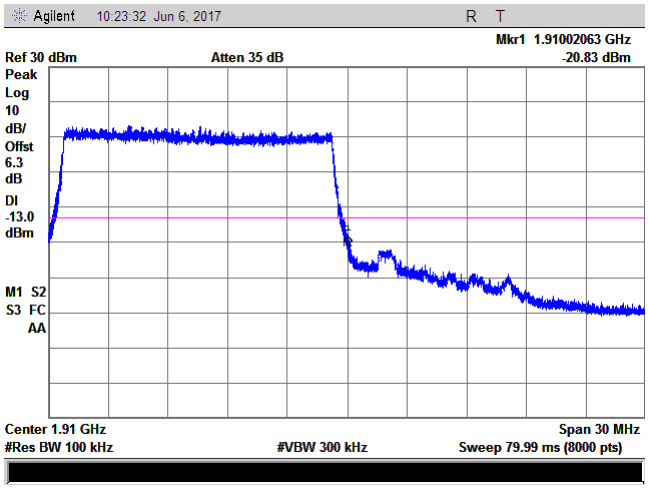

LTE band II - High Channel 16QAM-10

Note: Offset=Cable loss (4.5) + 10log (102.59/100)=4.5+0.0=4.5 dB



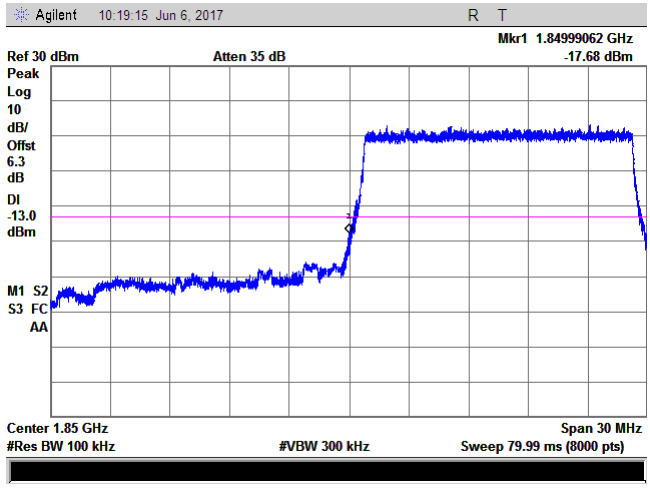

LTE band II - Low Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (150.02/100)=4.5+1.8=6.3 dB



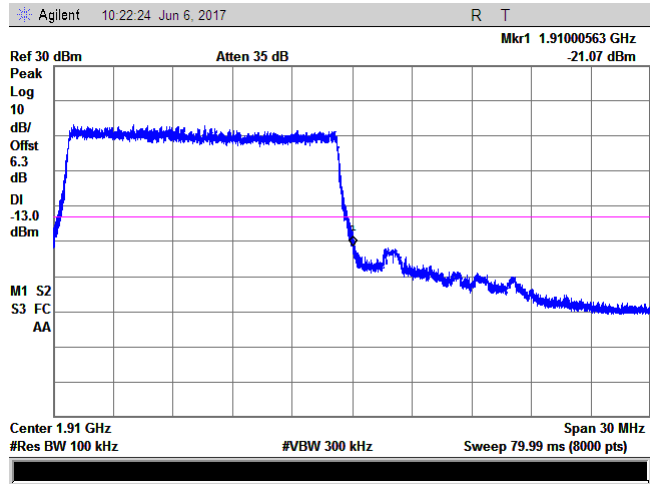

LTE band II - High Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (150.15/100)=4.5+1.8=6.3 dB



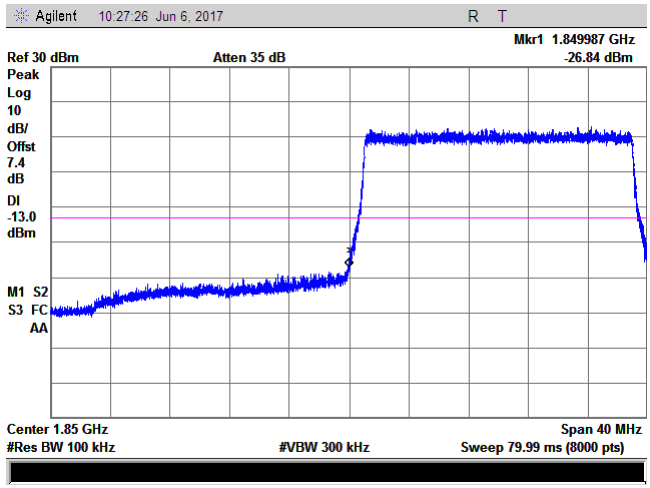

LTE band II - Low Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (150.09/100)=4.5+1.8=6.3 dB



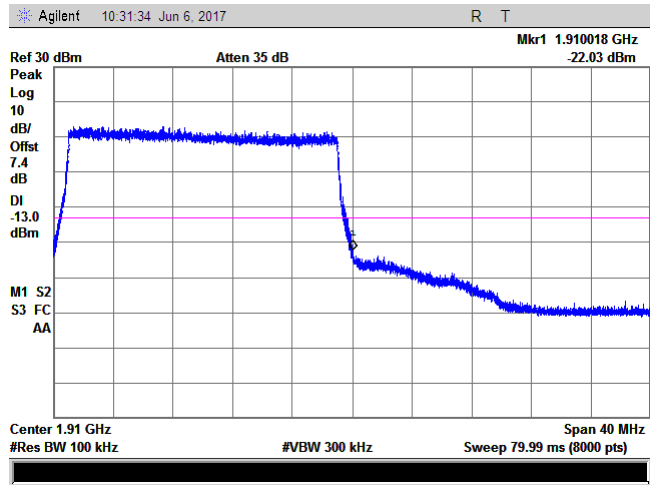

LTE band II - High Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (150.07/100)=4.5+1.8=6.3 dB



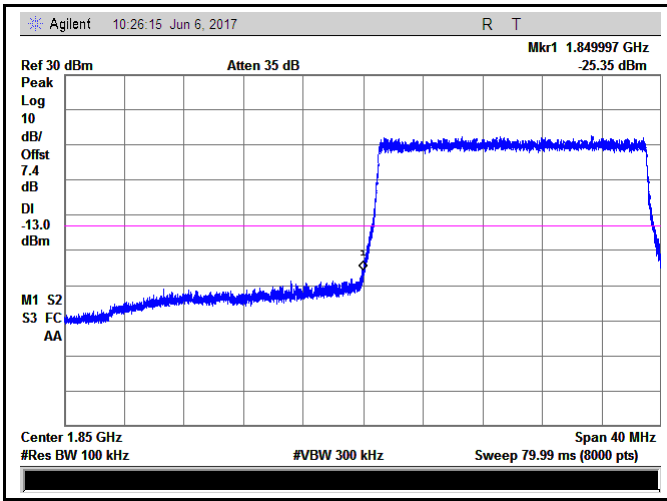

LTE band II - Low Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (195.19/100)=4.5+2.9=7.4 dB



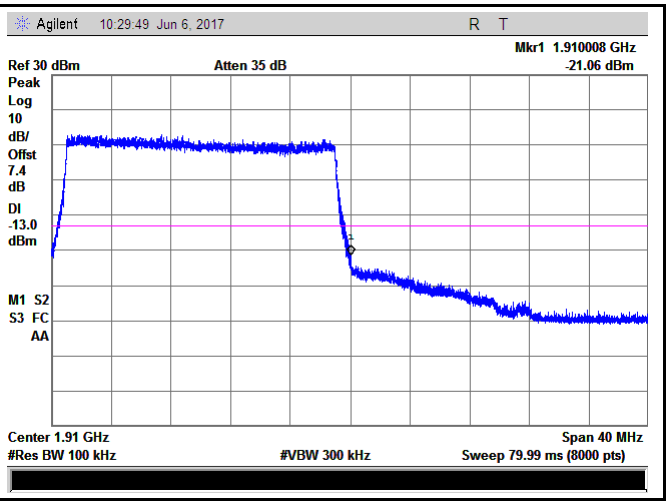

LTE band II - High Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (195.65/100)=4.5+2.9=7.4 dB




LTE band II - Low Channel 16QAM-20

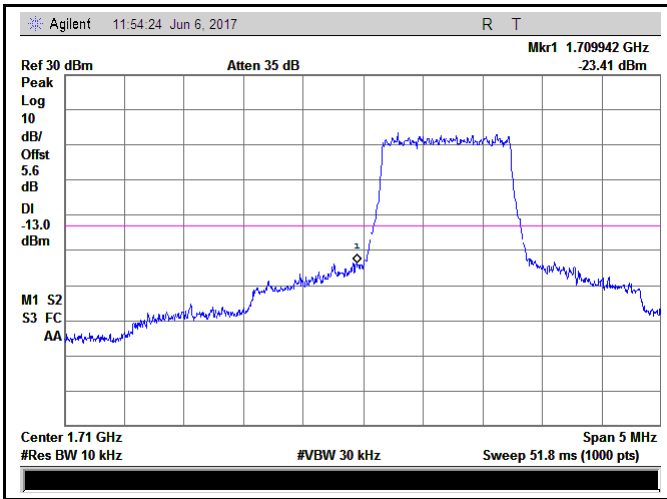
Note: Offset=Cable loss (4.5) + 10log (194.64/100)=4.5+2.9=7.4 dB




LTE band II - High Channel 16QAM-20

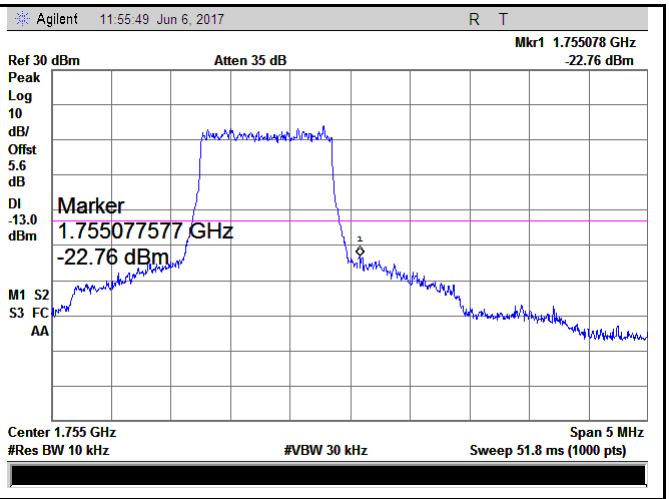
Note: Offset=Cable loss (4.5) + 10log (195.88/100)=4.5+2.9=7.4 dB

## LTE band IV (Part 27)



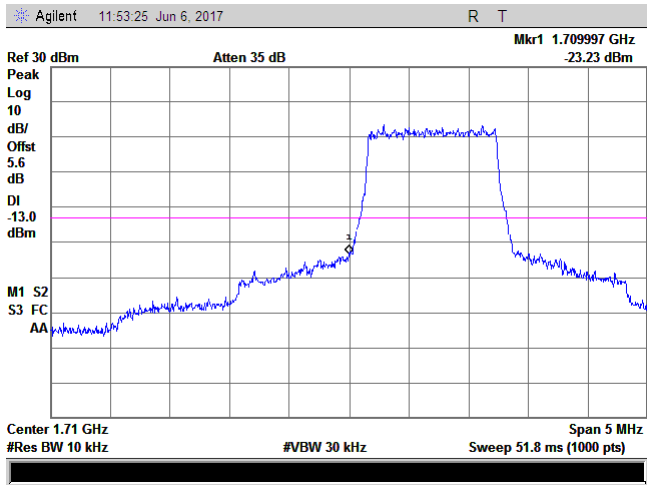

LTE band IV - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.96/10)=4.5+1.1=5.6 dB



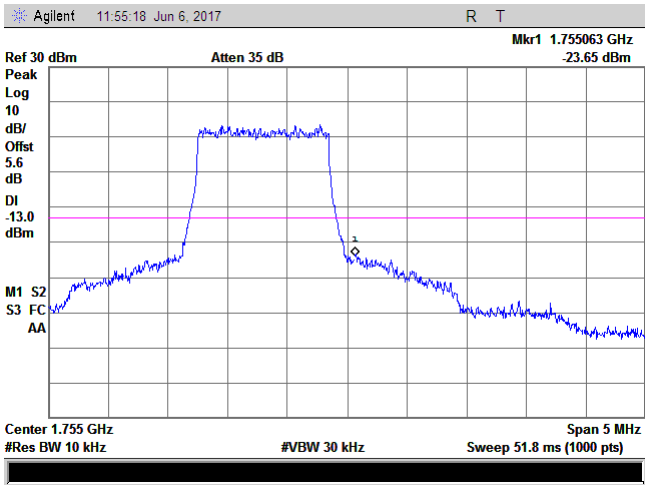

LTE band IV - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.85/10)=4.5+1.1=5.6 dB



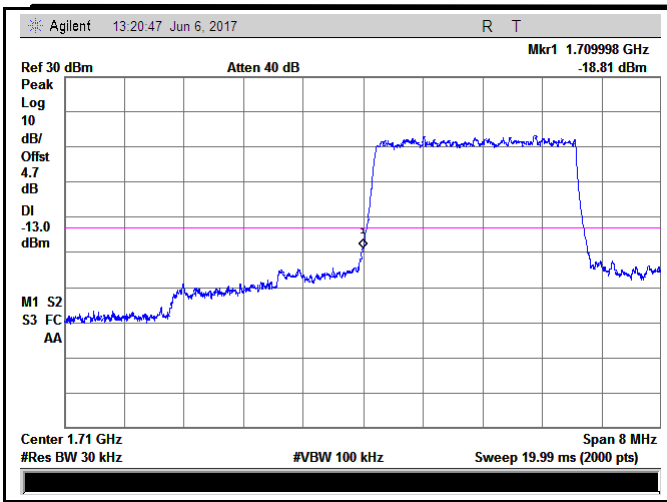

LTE band IV - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (12.90/10)=4.5+1.1=5.6 dB



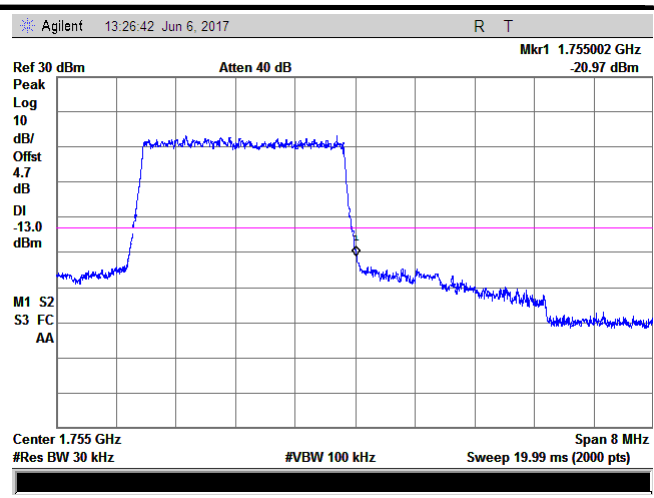

LTE band IV - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log ((12.87/10)=4.5+1.1=5.6 dB



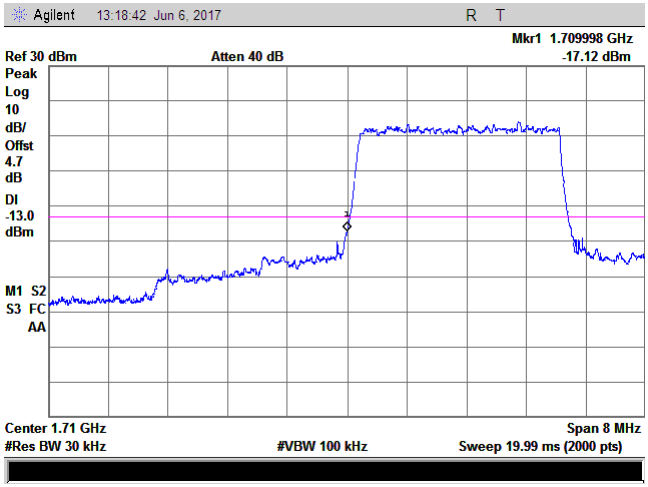

LTE band IV - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.15/30)=4.5+0.2=4.7 dB



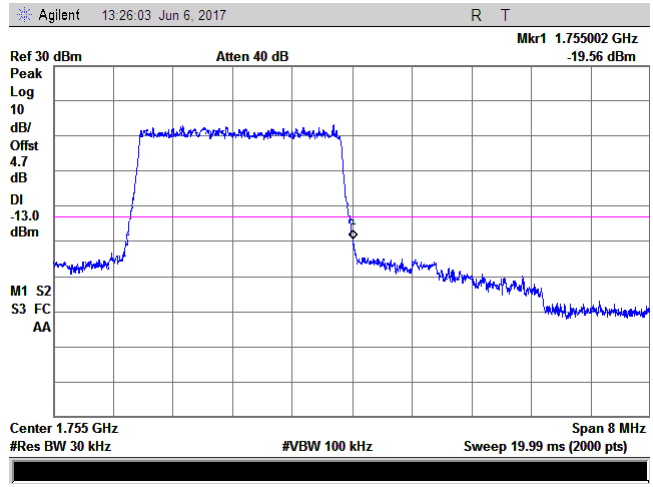

LTE band IV - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.26/30)=4.5+0.2=4.7 dB



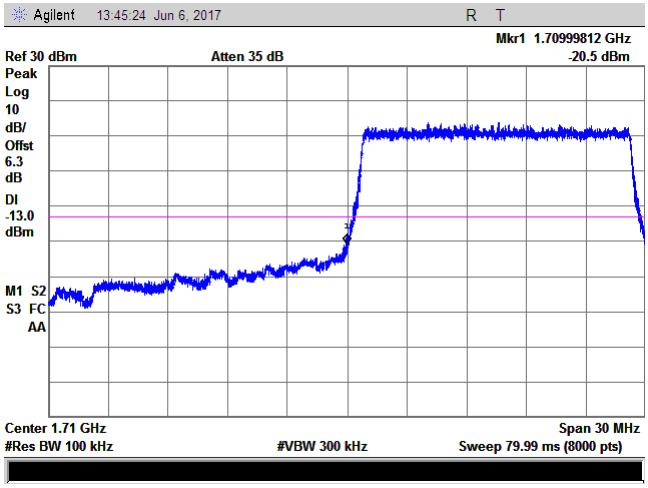

LTE band IV - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.24/30)=4.5+0.2=4.7 dB



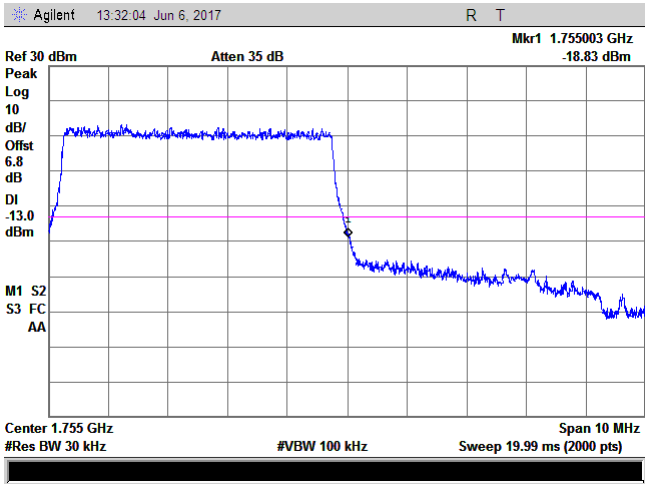

LTE band IV - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.24/30)=4.5+0.2=4.7 dB



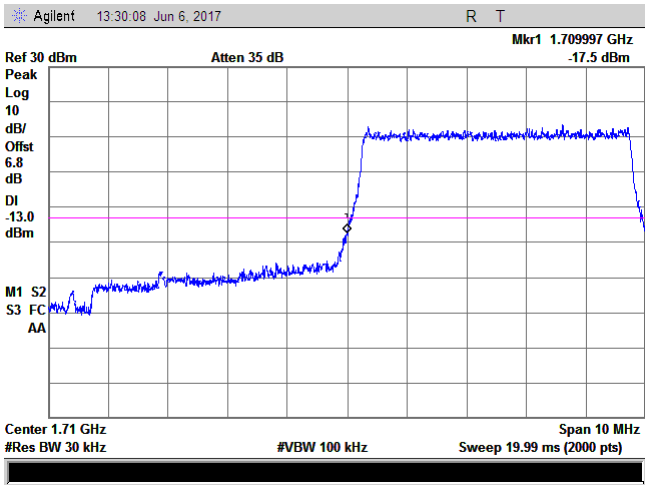

LTE band IV - Low Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.92/30)=4.5+1.8=6.8 dB



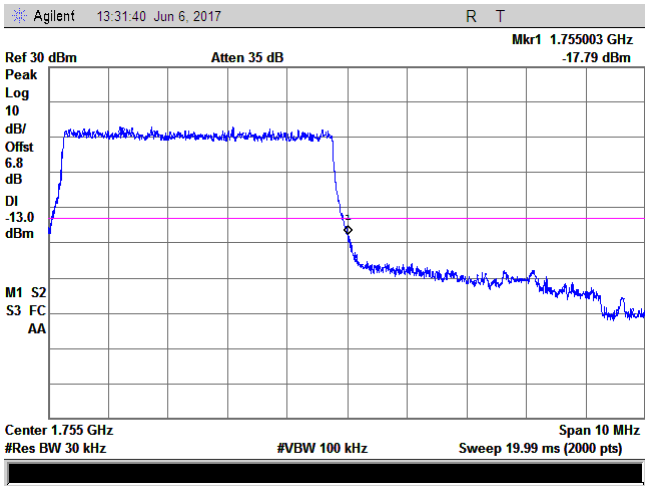

LTE band IV - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.74/30)=4.5+2.3=6.8 dB



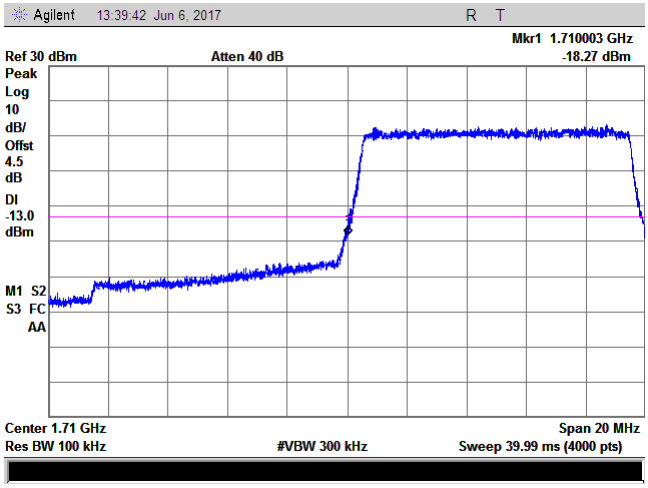

LTE band IV - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (51.01/30)=4.5+2.3=6.8 dB

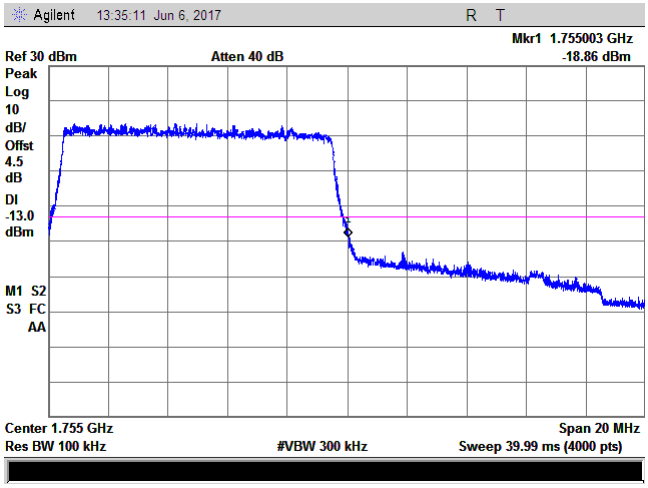



LTE band IV - High Channel 16QAM-5

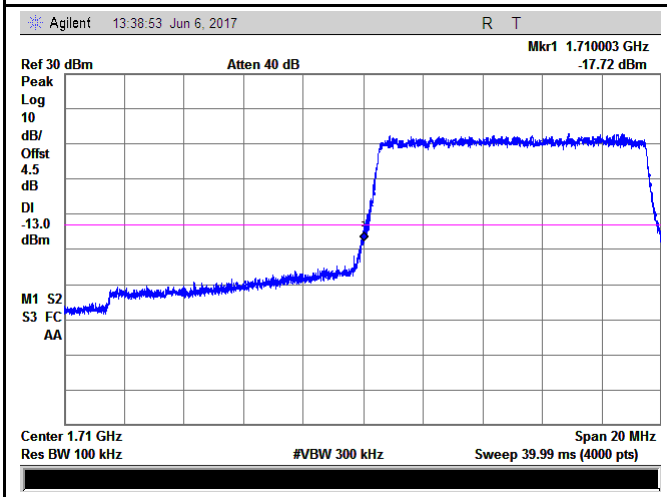
Note: Offset=Cable loss (4.5) + 10log (50.74/30)=4.5+2.3=6.8 dB



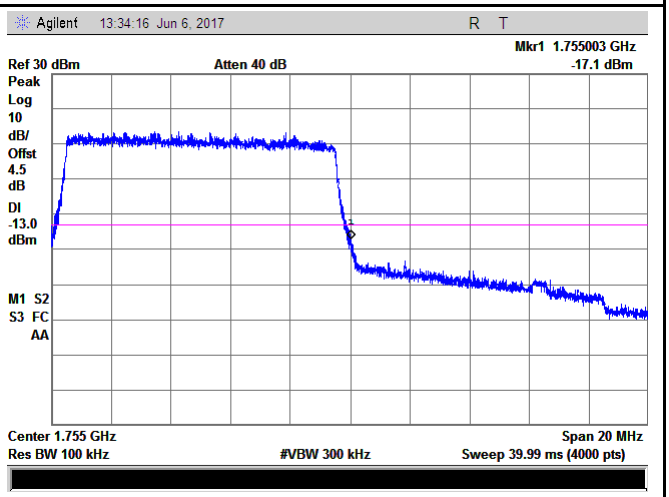

LTE band IV - Low Channel QPSK-10



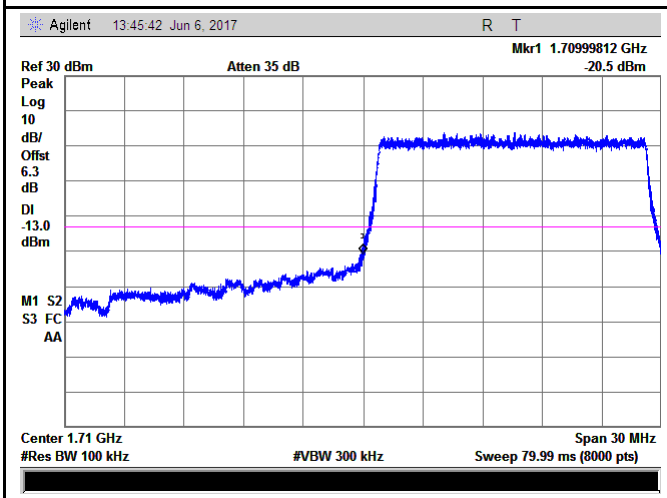

LTE band IV - High Channel QPSK-10



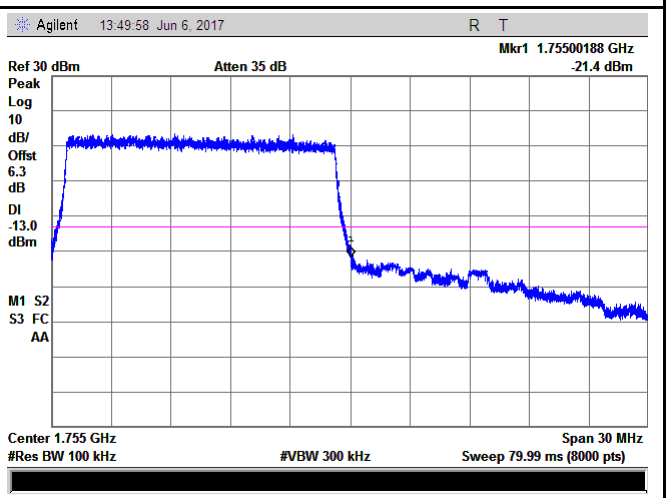

LTE band IV - Low Channel 16QAM-10




LTE band IV - High Channel 16QAM-10



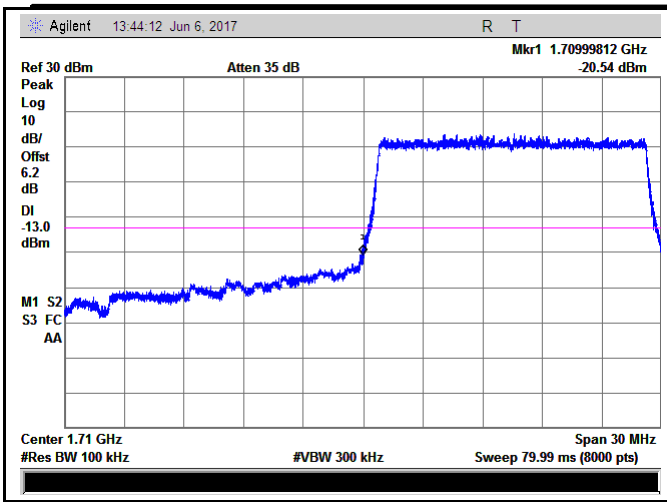

LTE band IV - Low Channel QPSK-15




LTE band IV - High Channel QPSK-15

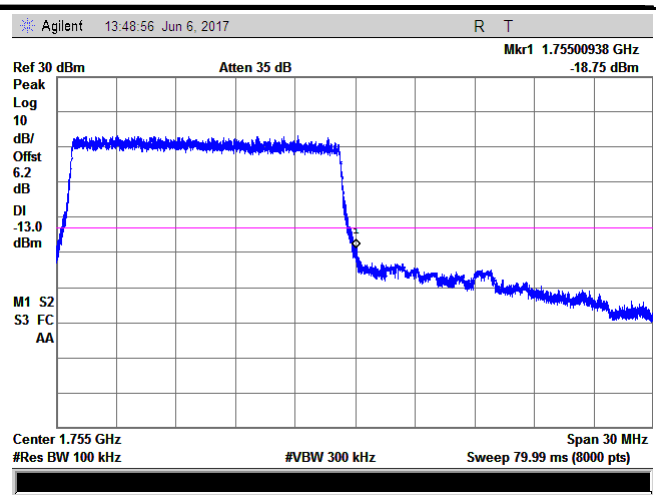
Note: Offset=Cable loss (4.5) + 10log (150.13/100)=4.5+1.8=6.3 dB

Note: Offset=Cable loss (4.5) + 10log (149.98/100)=4.5+1.8=6.3 dB



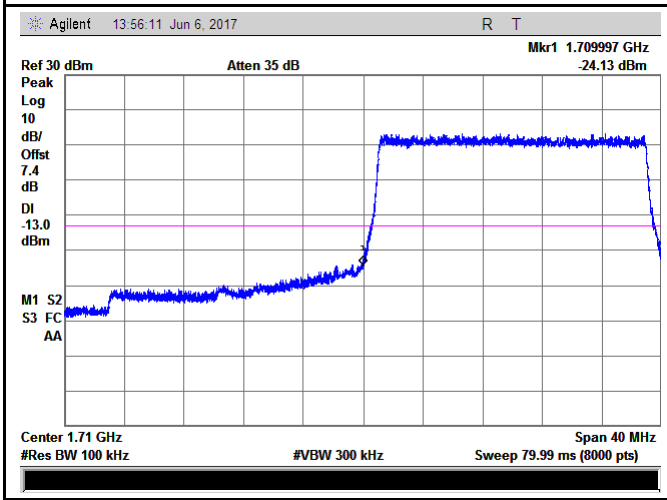

LTE band IV - Low Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (149.37/100)=4.5+1.7=6.2 dB



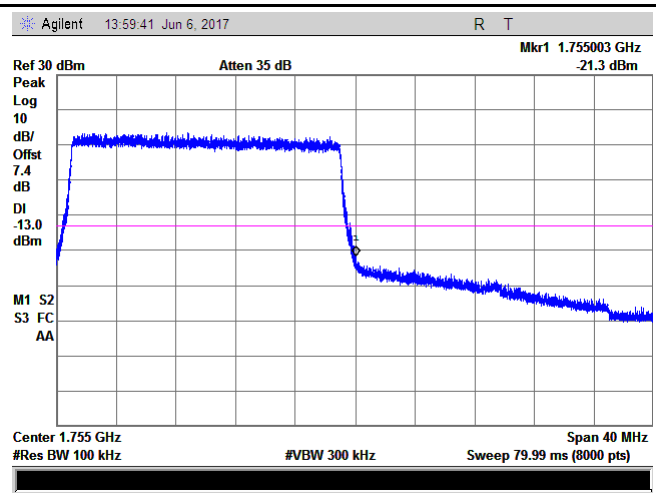

LTE band IV - High Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (149.6/100)=4.5+1.7=6.2 dB



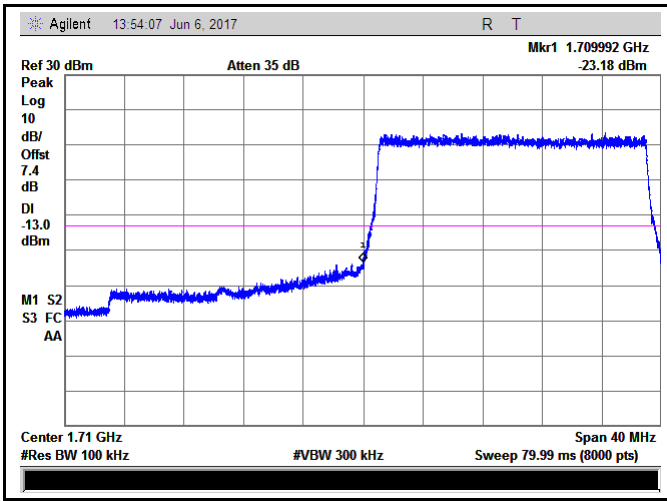

LTE band IV - Low Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (195.16/100)=4.5+2.9=7.4 dB



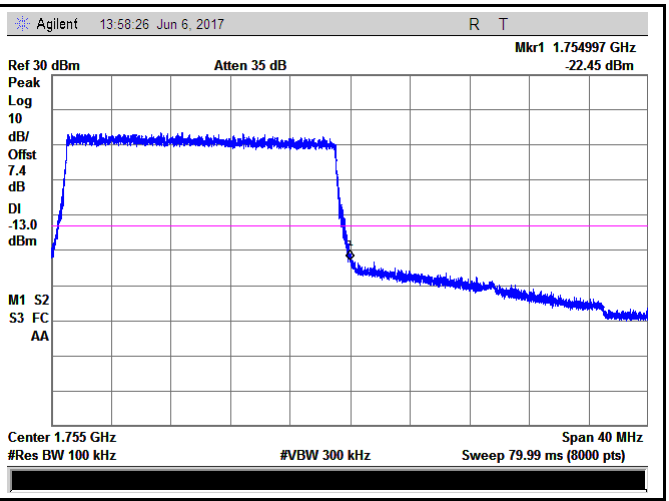

LTE band IV - High Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (195.29/100)=4.5+2.9=7.4 dB




LTE band IV - Low Channel 16QAM-20

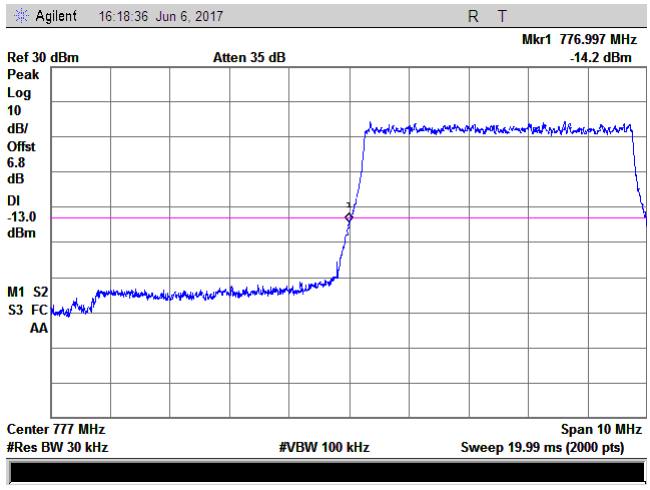
Note: Offset=Cable loss (4.5) + 10log (195.62/100)=4.5+2.9=7.4dB




LTE band IV - High Channel 16QAM-20

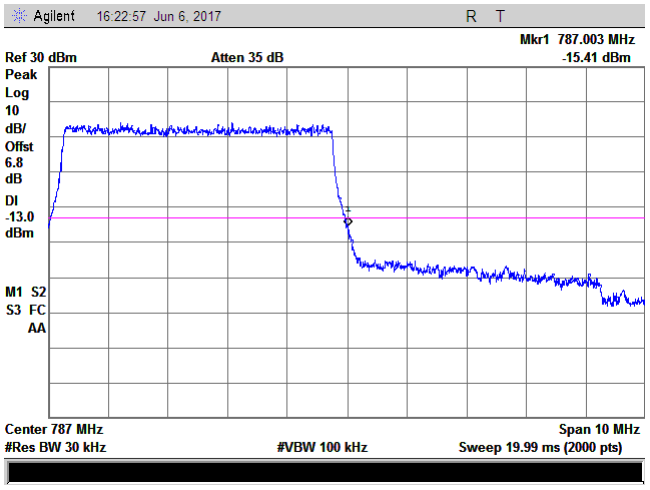
Note: Offset=Cable loss (4.5) + 10log (195.13/100)=4.5+2.9=7.4 dB

## LTE band XIII (Part 27)



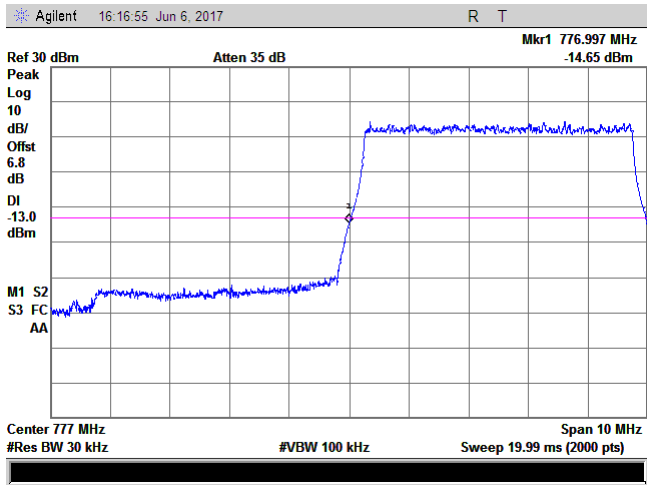

LTE band XIII - Low Channel QPSK-5

Note: Offset=Cable loss (4.0) + 10log (51.12/30)=4.0+2.8=6.8 dB



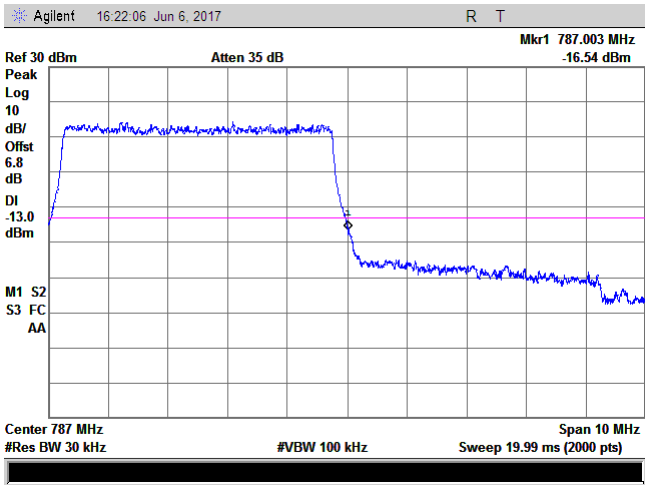

LTE band XIII - High Channel QPSK-5

Note: Offset=Cable loss (4.0) + 10log (50.99/30)=4.0+2.8=6.8 dB



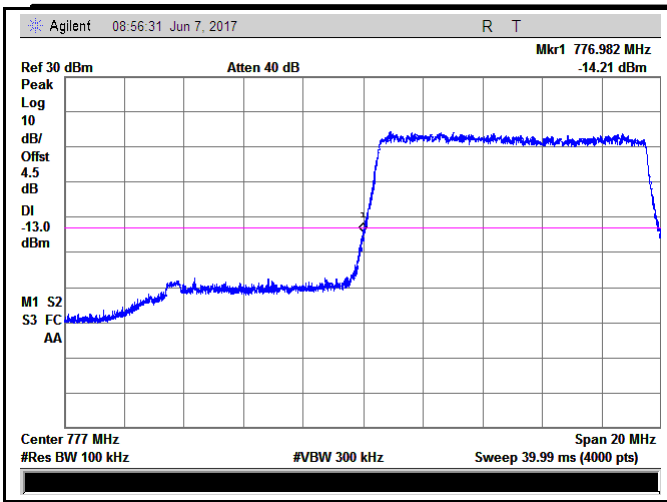

LTE band XIII - Low Channel 16QAM-5

Note: Offset=Cable loss (4.0) + 10log (51.13/30)=4.0+2.8=6.8 dB

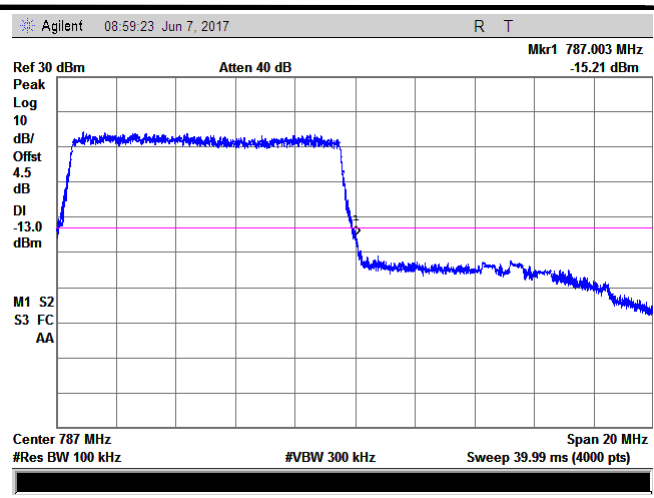



LTE band XIII - High Channel 16QAM-5

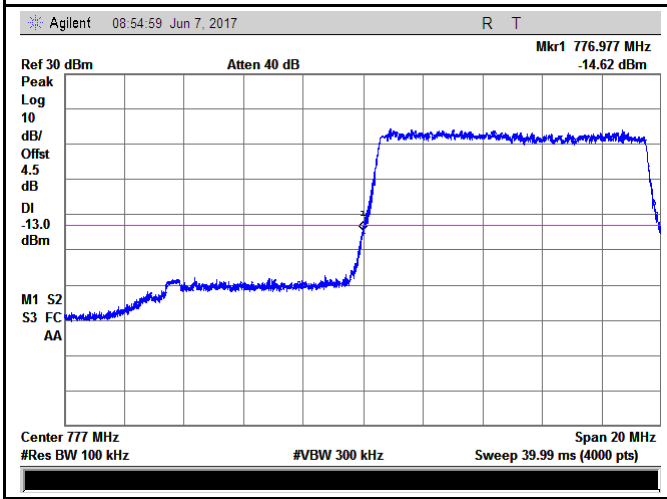
Note: Offset=Cable loss (4.0) + 10log (50.92/30)=4.0+2.8=6.8 dB



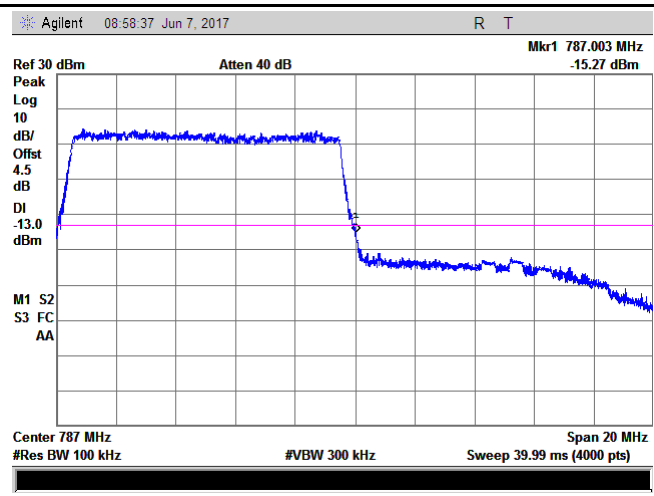

LTE band XIII - Low Channel QPSK-10




LTE band XIII - High Channel QPSK-10




LTE band XIII - Low Channel 16QAM-10

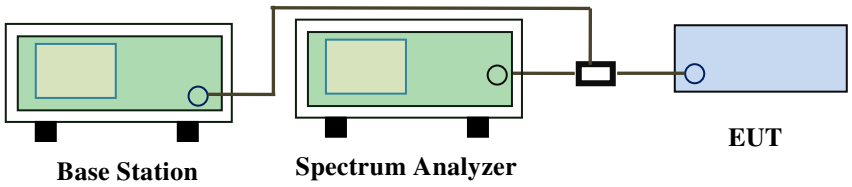



LTE band XIII - High Channel 16QAM-10

## 6.8 Band Edge 27.53(m)

| | |
| --- | --- |
| Temperature | 23 °C |
| Relative Humidity | 58% |
| Atmospheric Pressure | 1006mbar |
| Test date : | June 06, 2017 |
| Tested By : | Leen Yang |

**Requirement(s):**

| Spec | Requirement | Applicable |
| --- | --- | --- |
| §27.53(m) | According to FCC 27.53(m)(4) specified that power of any emmission ouutside of the channel edge must be attenuated below the transmitting power(P) by a factor shall be not less than 43+10log (P)dB at the channel edge, the limit of emission equal to -13dBm. And 55+10log (P)dB at 5.5MHz from the channel edges, the limit of emission equal to -25dBm. In the 1MHz bands immediately outside and adjacent to the frenqency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. | ☑ |
| Test Setup |  | |
| Test Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers. | |
| Remark | | |
| Result | ☑ Pass ☐ Fail | |

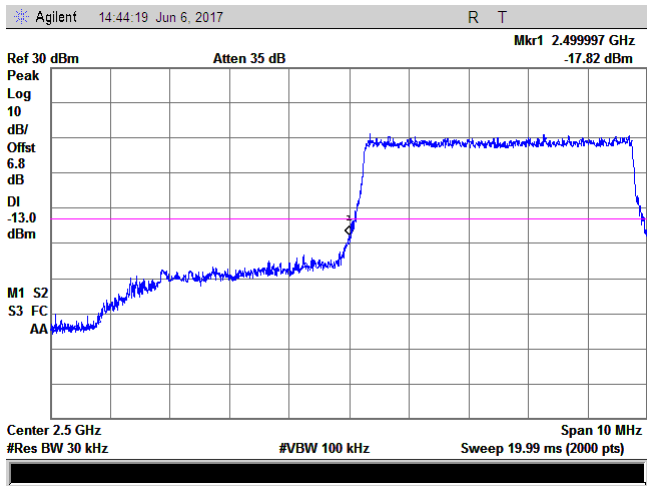
**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

## LTE band VII (Part 27) result

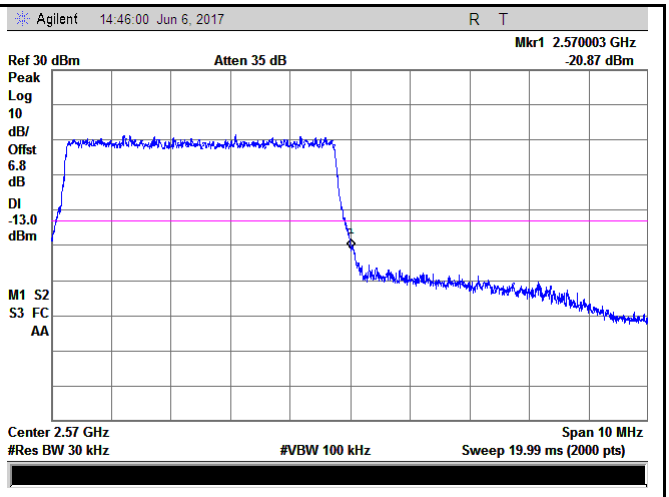
| BW(MHz) | Channel | Frequency (MHz) | Mode | Emission (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- |
| 5 | 20775 | 2500 | QPSK | -17.82 | -13 |
| | | | 16QAM | -17.17 | -13 |
| 5 | 21425 | 2570 | QPSK | -20.87 | -13 |
| | | | 16QAM | -19.31 | -13 |
| 10 | 20800 | 2500 | QPSK | -18.29 | -13 |
| | | | 16QAM | -19.55 | -13 |
| 10 | 21400 | 2570 | QPSK | -18.40 | -13 |
| | | | 16QAM | -18.45 | -13 |
| 15 | 20825 | 2500 | QPSK | -19.70 | -13 |
| | | | 16QAM | -22.14 | -13 |
| 15 | 21400 | 2570 | QPSK | -21.35 | -13 |
| | | | 16QAM | -19.72 | -13 |
| 20 | 20850 | 2500 | QPSK | -22.79 | -13 |
| | | | 16QAM | -23.15 | -13 |
| 20 | 21350 | 2570 | QPSK | -22.86 | -13 |
| | | | 16QAM | -22.81 | -13 |

## LTE band VII (Part 27)



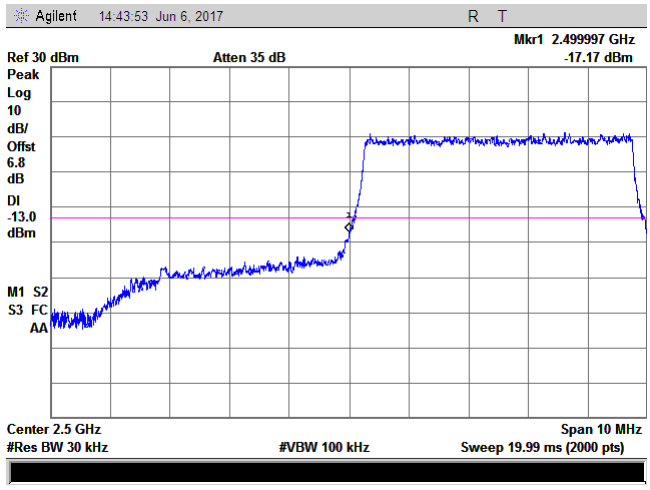

LTE band VII - Low Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (51.09/30)=4.5+2.3=6.8 dB



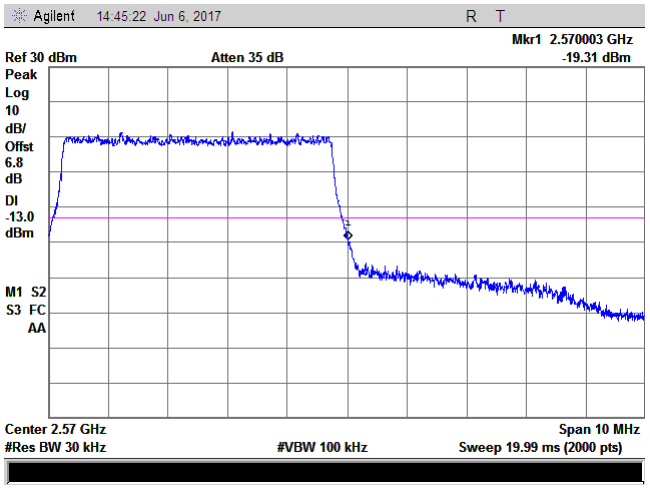

LTE band VII - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (51.13/30)=4.5+2.3=6.8 dB



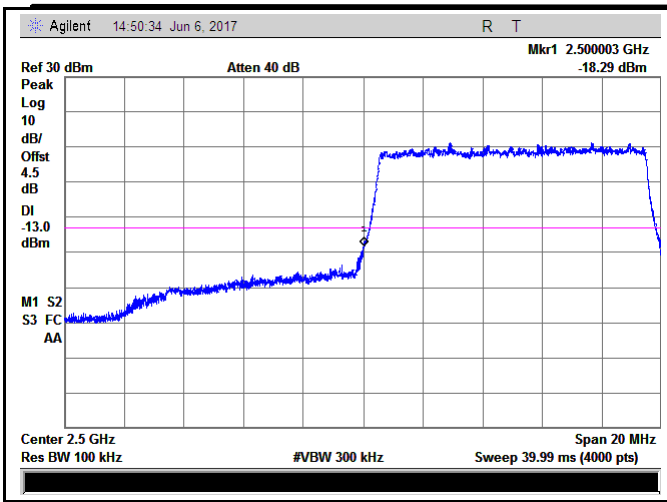

LTE band VII - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (51.06/30)=4.5+2.3=6.8 dB

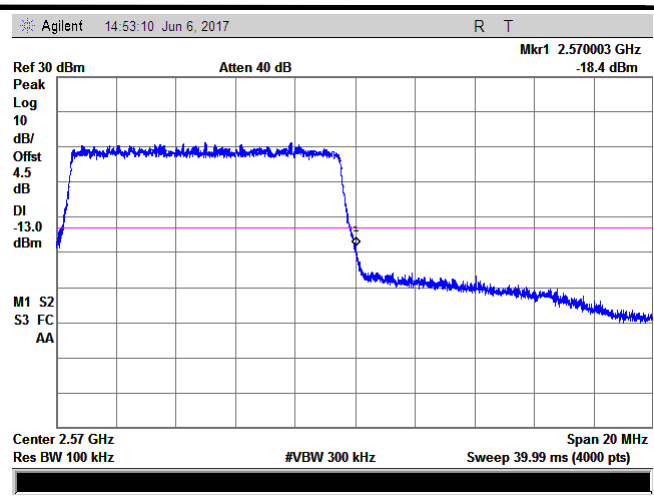



LTE band VII - High Channel 16QAM-5

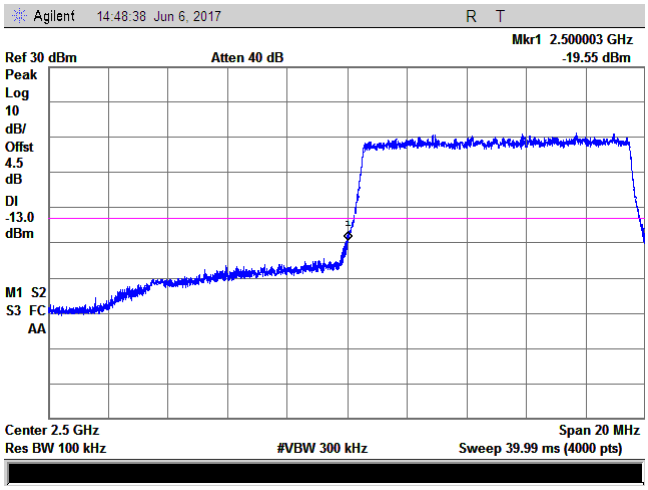
Note: Offset=Cable loss (4.5) + 10log (50.95/30)=4.5+2.3=6.8 dB



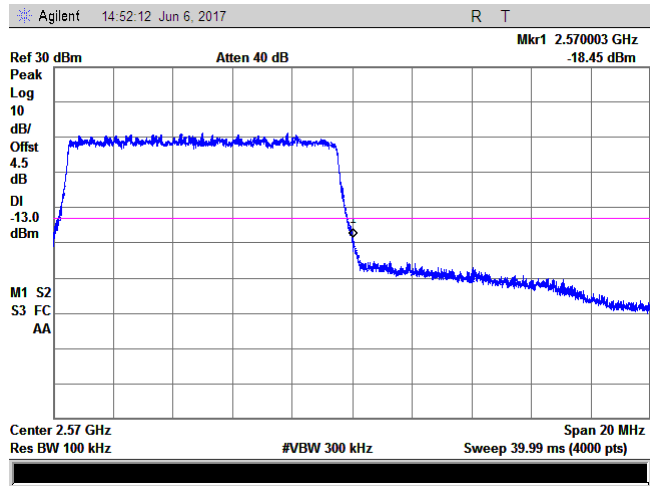

LTE band VII - Low Channel QPSK-10



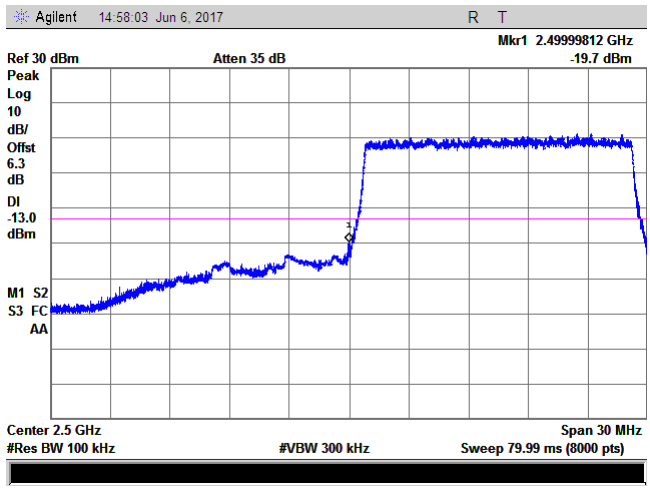

LTE band VII - High Channel QPSK-10




LTE band VII - Low Channel 16QAM-10

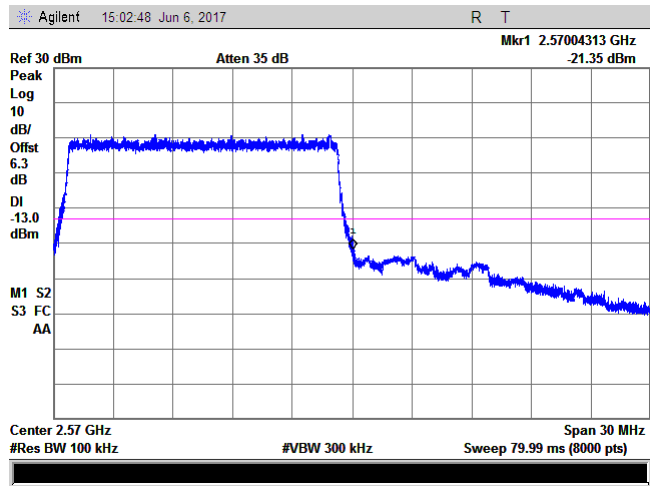



LTE band VII - High Channel 16QAM-10



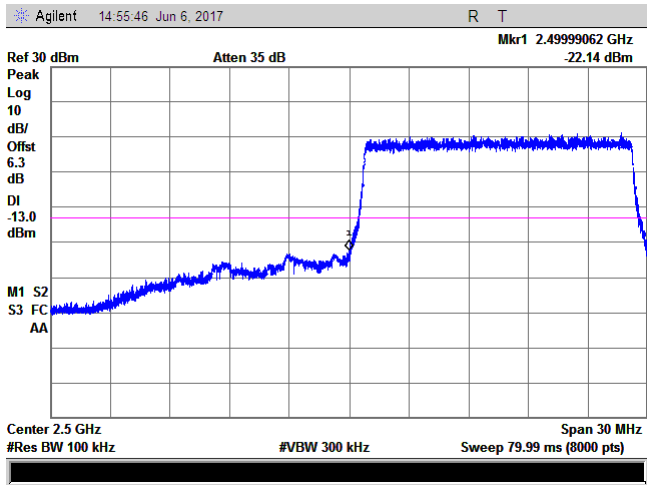

LTE band VII - Low Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (149.8/100)=4.5+1.8=6.3 dB



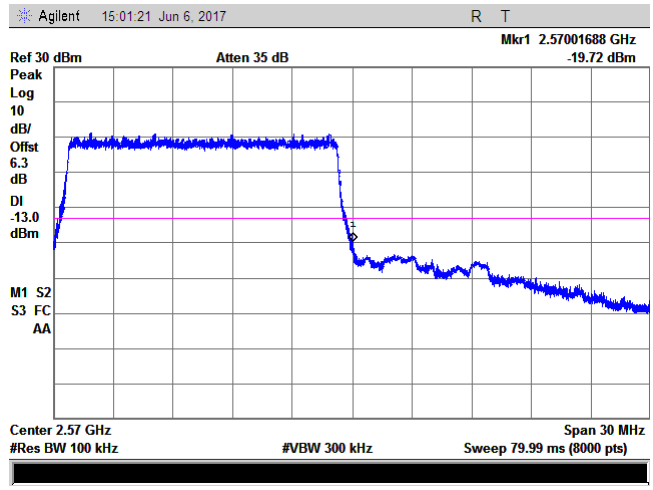

LTE band VII - High Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (150.18/100)=4.5+1.8=6.3 dB



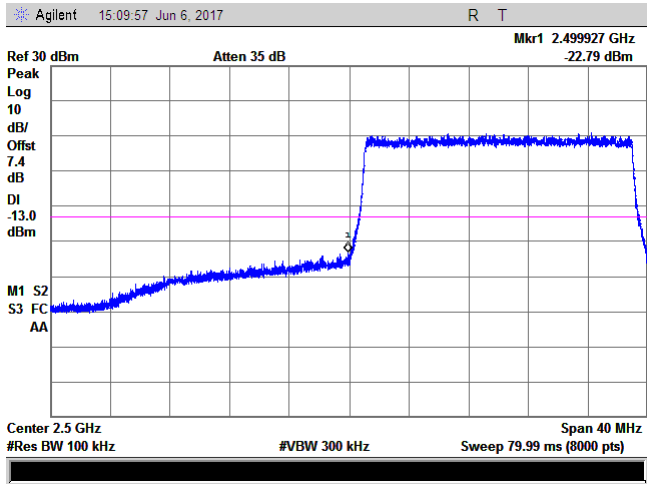

LTE band VII - Low Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (149.98/100)=4.5+1.8=6.3 dB



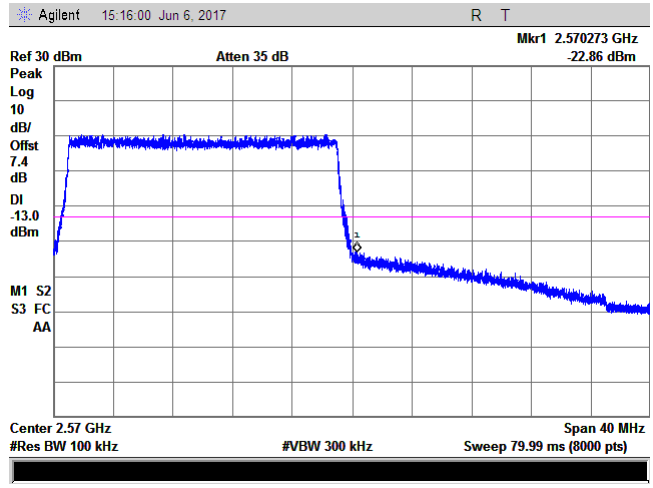

LTE band VII - High Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (150.08/100)=4.5+1.8=6.3 dB



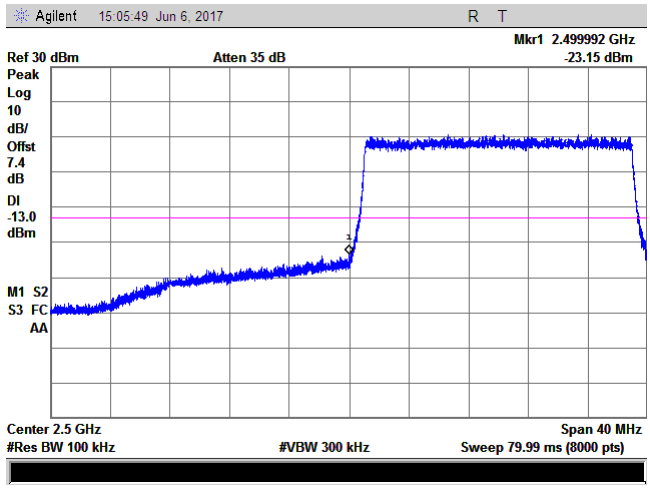

LTE band VII - Low Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (195.63/100)=4.5+2.9=7.4 dB



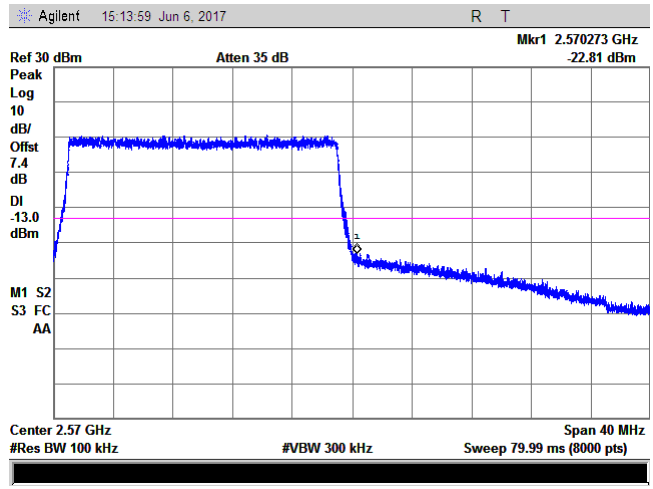

LTE band VII - High Channel QPSK-20

Note: Offset=Cable loss (4.5) + 10log (195.43/100)=4.5+2.9=7.4 dB




LTE band VII - Low Channel 16QAM-20

Note: Offset=Cable loss (4.5) + 10log (195.01/100)=4.5+2.9=7.4 dB




LTE band VII - High Channel 16QAM-20

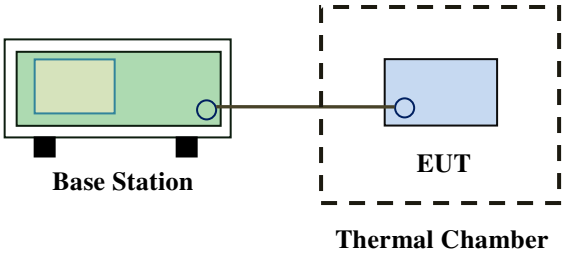
Note: Offset=Cable loss (4.5) + 10log (195.46/100)=4.5+2.9=7.4 dB

## 6.9 Frequency Stability

| | |
|---|---|
| Temperature | 23 °C |
| Relative Humidity | 58% |
| Atmospheric Pressure | 1006mbar |
| Test date : | June 06, 2017 |
| Tested By : | Leen Yang |

**Requirement(s):**

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:<br>Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>□□to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>450 to 512</td><td>2.5</td><td>5.0</td><td>5□0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to 929.</td><td>5.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.<br>According to §27.54, The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.</td><td>☑</td></tr>
</table>

| | |
| --- | --- |
| Test setup |  |
| Procedure | A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.<br>Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. |
| Remark | Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within 2.5ppm of the operating frequency over a temperature variation of -10ºC to +55ºC at normal supply voltage. |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## LTE band II (Part 24E) result

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | -7 | 0.0037 | 2.5 |
| 0 | | -12 | 0.0064 | 2.5 |
| 10 | | -15 | 0.0080 | 2.5 |
| 20 | | -14 | 0.0074 | 2.5 |
| 30 | | -13 | 0.0069 | 2.5 |
| 40 | | -14 | 0.0074 | 2.5 |
| 50 | | -15 | 0.0080 | 2.5 |
| 55 | | -17 | 0.0090 | 2.5 |
| 25 | 4.2 | -16 | 0.0085 | 2.5 |
| | 3.5 | -14 | 0.0074 | 2.5 |

## LTE band IV (Part 27) result

| Middle Channel, $f_o$ = 1732.5 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | -12 | 0.0069 | 2.5 |
| 0 | | -15 | 0.0087 | 2.5 |
| 10 | | -16 | 0.0092 | 2.5 |
| 20 | | -14 | 0.0081 | 2.5 |
| 30 | | -13 | 0.0075 | 2.5 |
| 40 | | -14 | 0.0081 | 2.5 |
| 50 | | -12 | 0.0069 | 2.5 |
| 55 | | -16 | 0.0092 | 2.5 |
| 25 | 4.2 | -12 | 0.0069 | 2.5 |
| | 3.5 | -15 | 0.0087 | 2.5 |

## LTE band VII (Part 27) result

| Middle Channel, $f_o$ = 2535 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | -14 | 0.0055 | 2.5 |
| 0 | | -16 | 0.0063 | 2.5 |
| 10 | | -17 | 0.0067 | 2.5 |
| 20 | | -12 | 0.0047 | 2.5 |
| 30 | | -10 | 0.0039 | 2.5 |
| 40 | | -11 | 0.0043 | 2.5 |
| 50 | | -13 | 0.0051 | 2.5 |
| 55 | | -12 | 0.0047 | 2.5 |
| 25 | 4.2 | -14 | 0.0055 | 2.5 |
| | 3.5 | -12 | 0.0047 | 2.5 |

## LTE band XIII (Part 27) result

| Middle Channel, $f_o$ = 710 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | -14 | 0.0055 | 2.5 |
| 0 | | -15 | 0.0059 | 2.5 |
| 10 | | -16 | 0.0063 | 2.5 |
| 20 | | -14 | 0.0055 | 2.5 |
| 30 | | -11 | 0.0043 | 2.5 |
| 40 | | -12 | 0.0047 | 2.5 |
| 50 | | -14 | 0.0055 | 2.5 |
| 55 | | -13 | 0.0051 | 2.5 |
| 25 | 4.2 | -14 | 0.0055 | 2.5 |
| | 3.5 | -14 | 0.0055 | 2.5 |

# Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| Agilent ESA-E SERIES SPECTRUM ANALYZER | E4407B | MY45108319 | 09/15/2016 | 09/14/2017 | ☑ |
| Power Splitter | 1# | 1# | 08/31/2016 | 08/30/2017 | ☑ |
| Universal Radio Communication Tester | CMU200 | 121393 | 09/24/2016 | 09/23/2017 | ☑ |
| Temperature/Humidity Chamber | UHL-270 | 001 | 10/08/2016 | 10/07/2017 | ☑ |
| DC Power Supply | E3640A | MY40004013 | 09/16/2016 | 09/15/2017 | ☑ |
| RF Power Sensor | Dare RPR3006C/P/W | AY554013 | 09/16/2016 | 09/15/2017 | ☑ |
| **Radiated Emissions** | | | | | |
| EMI test receiver | ESL6 | 100262 | 09/16/2016 | 09/15/2017 | ☑ |
| OPT 010 AMPLIFIER (0.1-1300MHz) | 8447E | 2727A02430 | 08/31/2016 | 08/30/2017 | ☑ |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B | 3008A02402 | 03/23/2017 | 03/22/2018 | ☑ |
| Bilog Antenna (30MHz~6GHz) | JB6 | A110712 | 09/20/2016 | 09/19/2017 | ☑ |
| Bilog Antenna (30MHz~2GHz) | JB1 | A112017 | 09/20/2016 | 09/19/2017 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71259 | 09/23/2016 | 09/22/2017 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/23/2016 | 09/22/2017 | ☑ |
| SYNTHESIZED SIGNAL GENERATOR | 8665B | 3744A01293 | 09/16/2016 | 09/15/2017 | ☑ |
| Power Amplifier | SMC150D | R1553-0313 | 03/08/2017 | 03/07/2018 | ☑ |
| Power Amplifier | S41-25D | R1553-0314 | 05/26/2017 | 05/25/2018 | ☑ |
| Tunable Notch Filter | 3NF-800/1000-S | AA4 | 08/31/2016 | 08/30/2017 | ☑ |

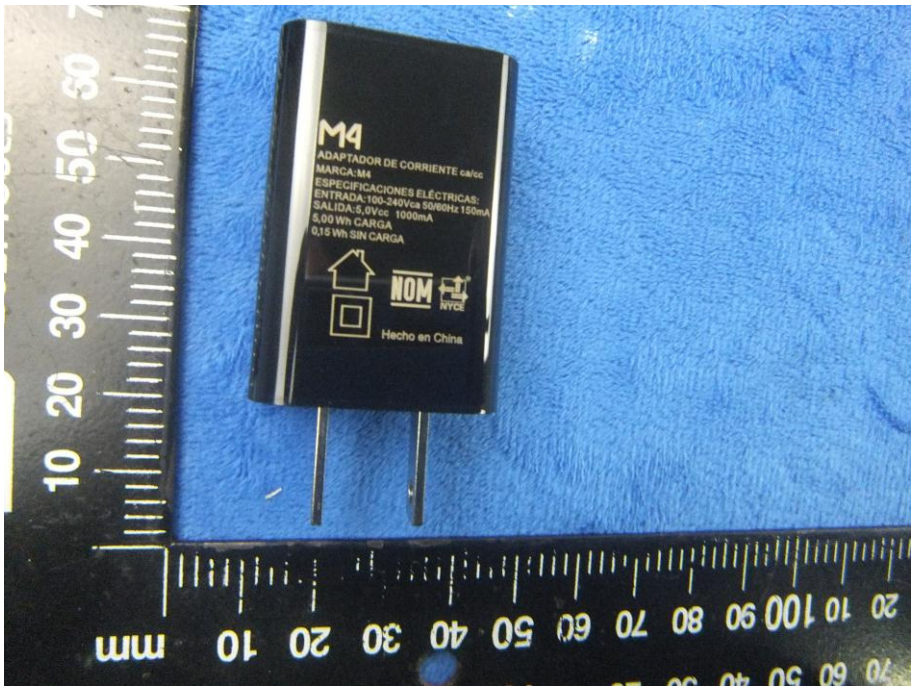
| | | | | | |
| --- | --- | --- | --- | --- | --- |
| Tunable Notch Filter | 3NF-1000/2000-S | AM 4 | 08/31/2016 | 08/30/2017 | ☑ |

# Annex B. EUT And Test Setup Photographs

## Annex B.i. Photograph: EUT External Photo

Whole Package View

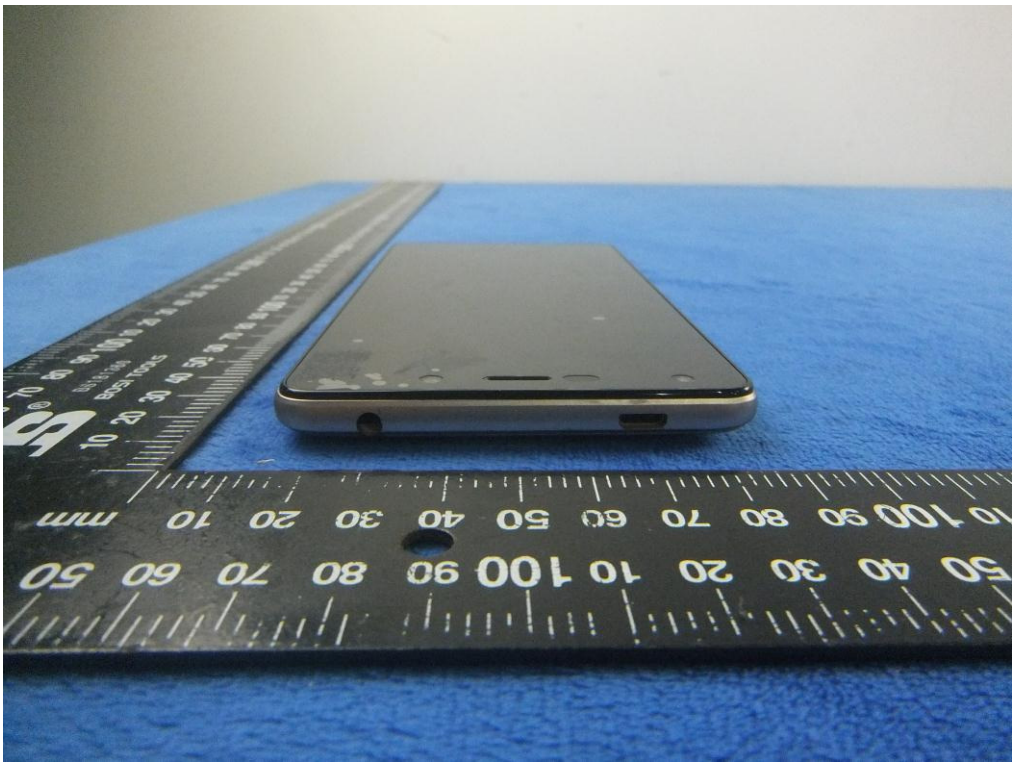
Adapter - Lable View



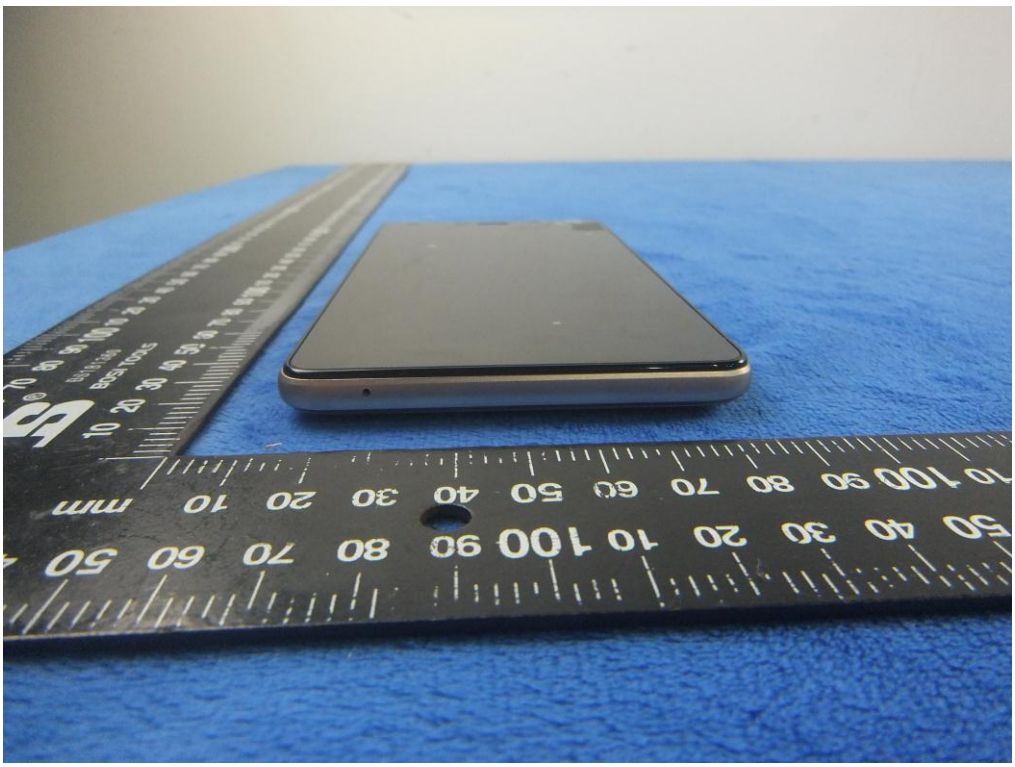
EUT - Front View

EUT - Rear View

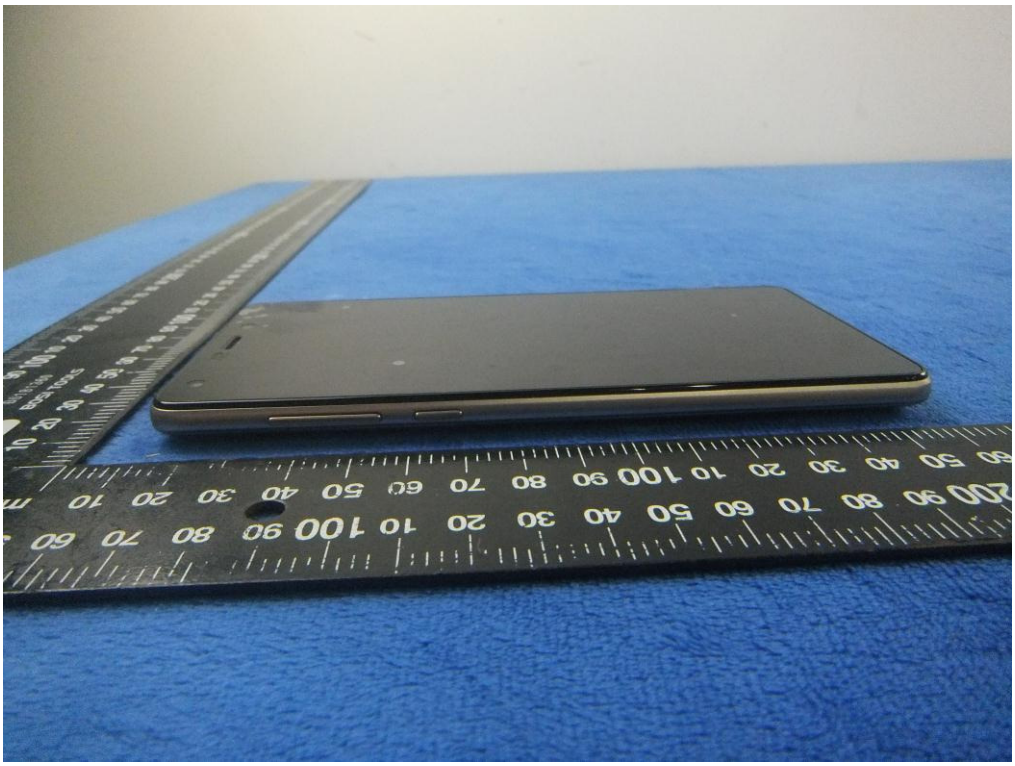
EUT - Top View



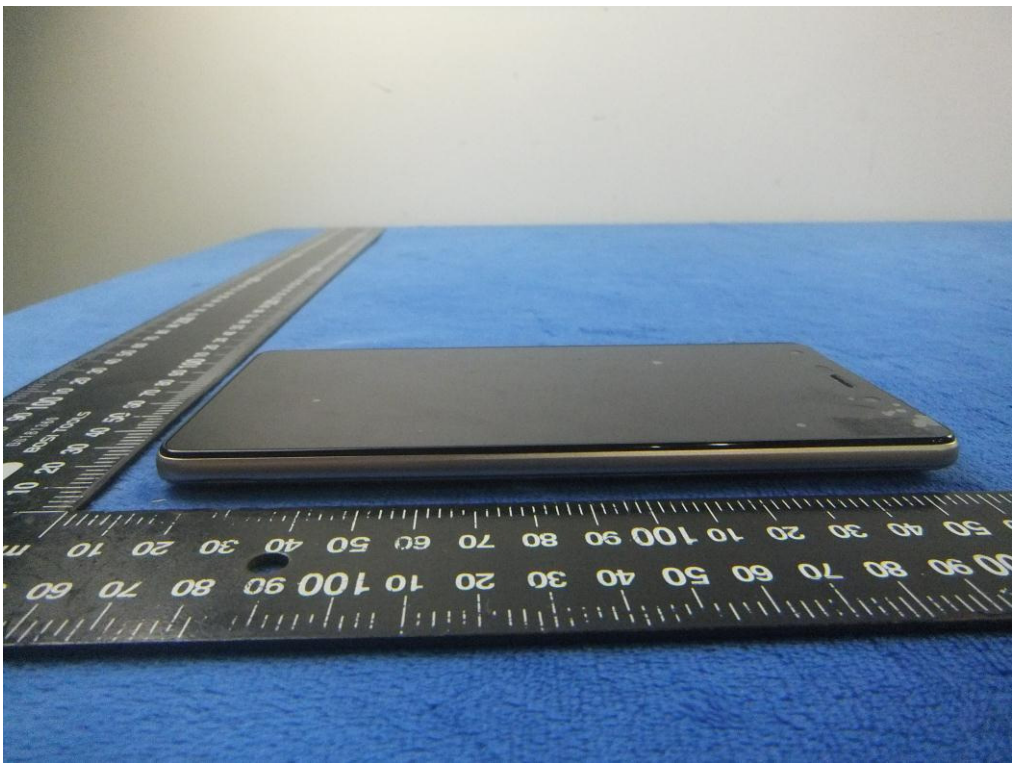
EUT - Bottom View



EUT - Left View



EUT - Right View



## Annex B.ii. Photograph: EUT Internal Photo

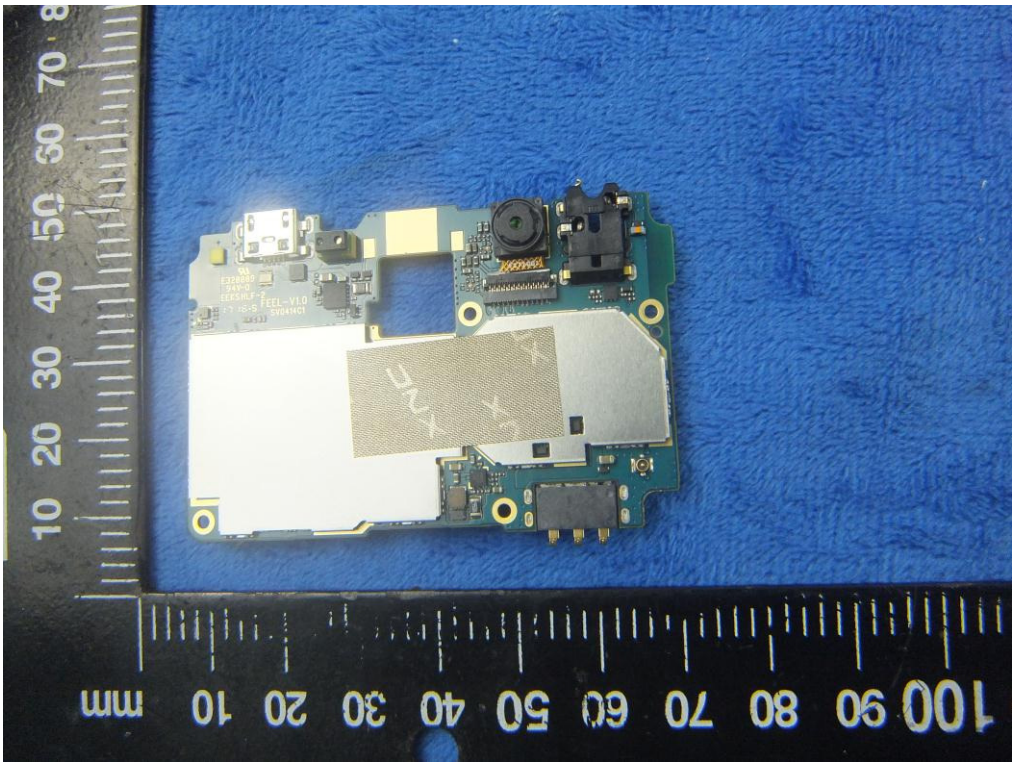
Cover Off - Top View 1


Cover Off - Top View 2

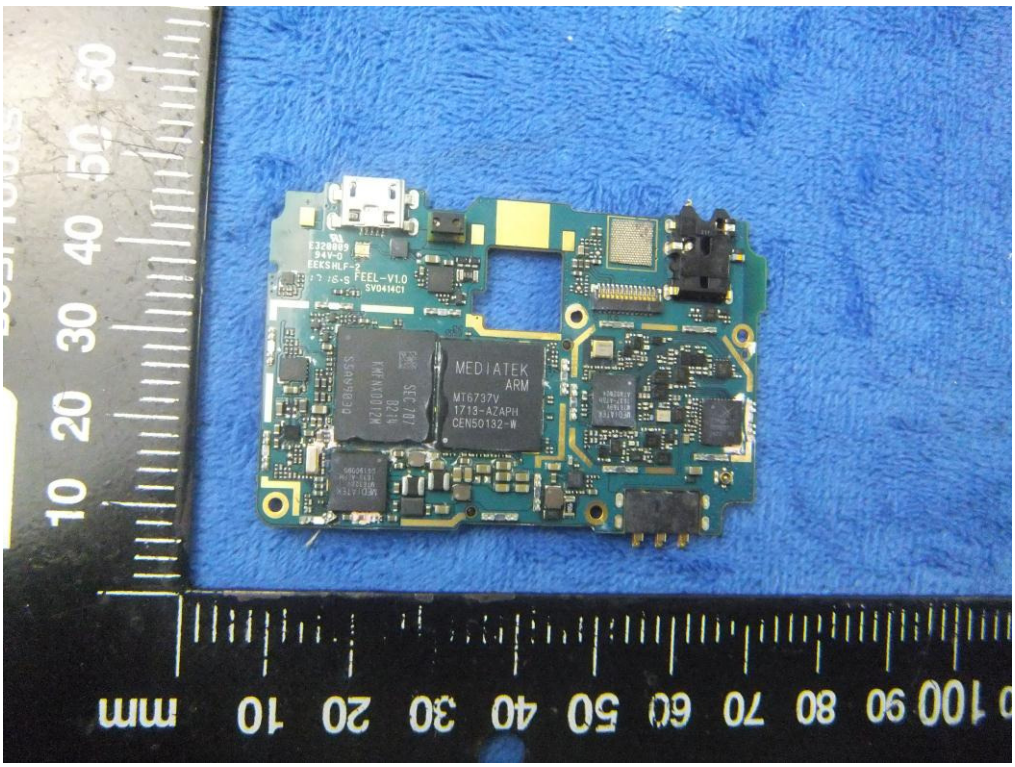
Battery - Front View


Battery - Rear View

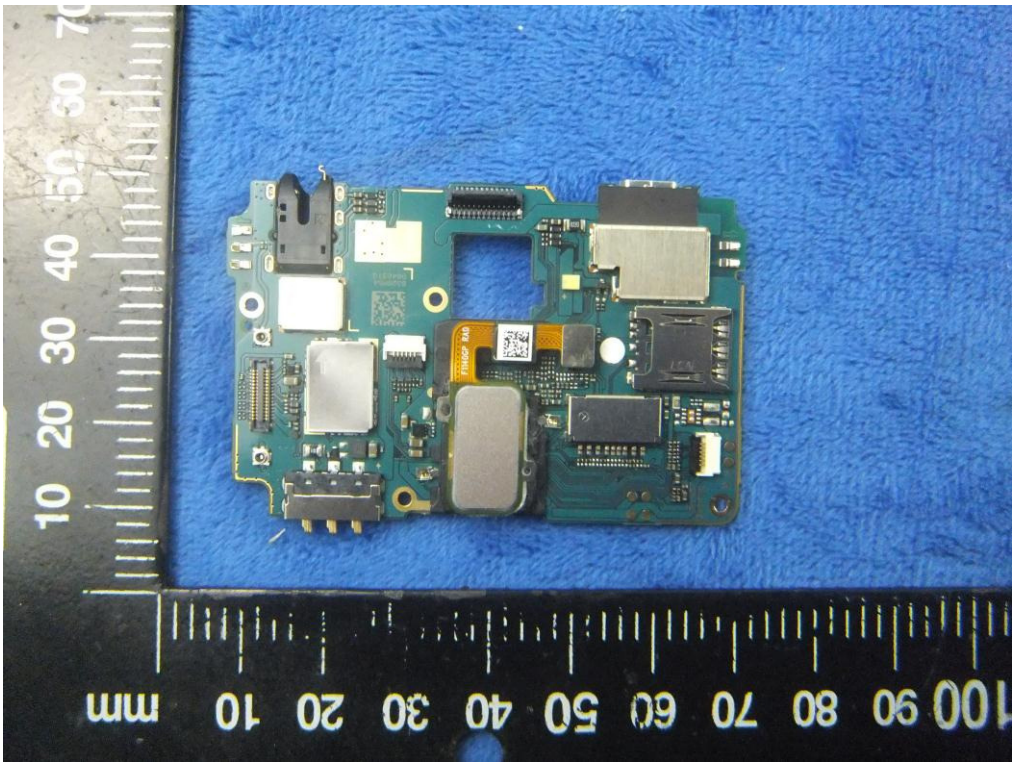
Mainboard with Shielding - Front View



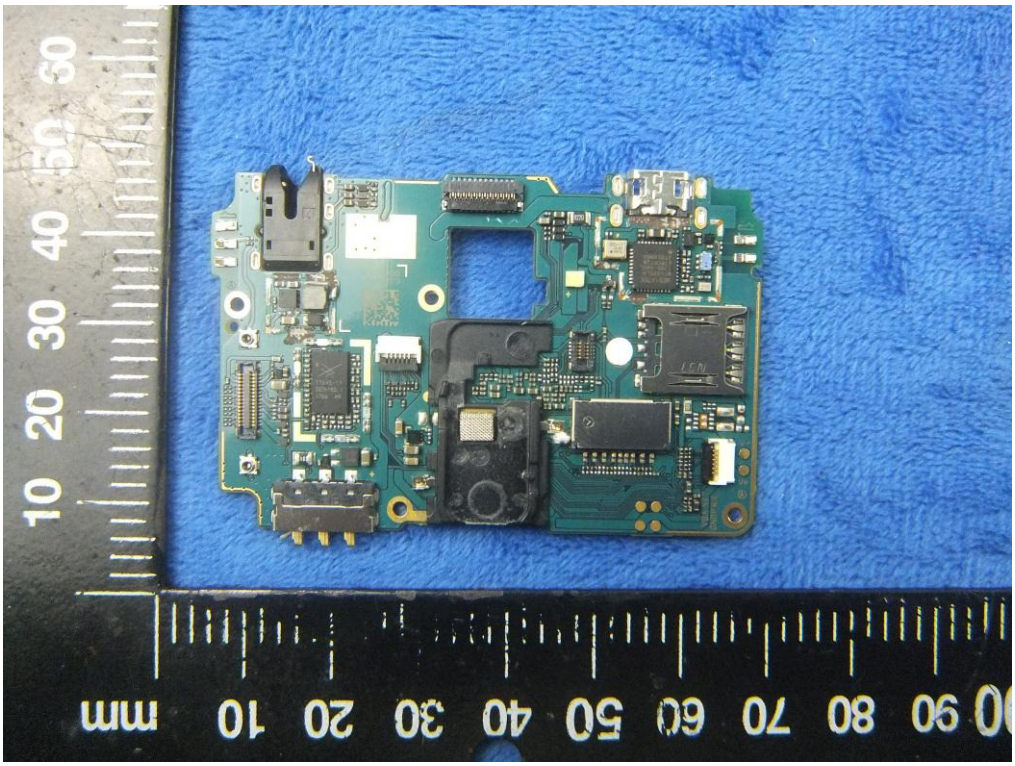
Mainboard without Shielding - Front View



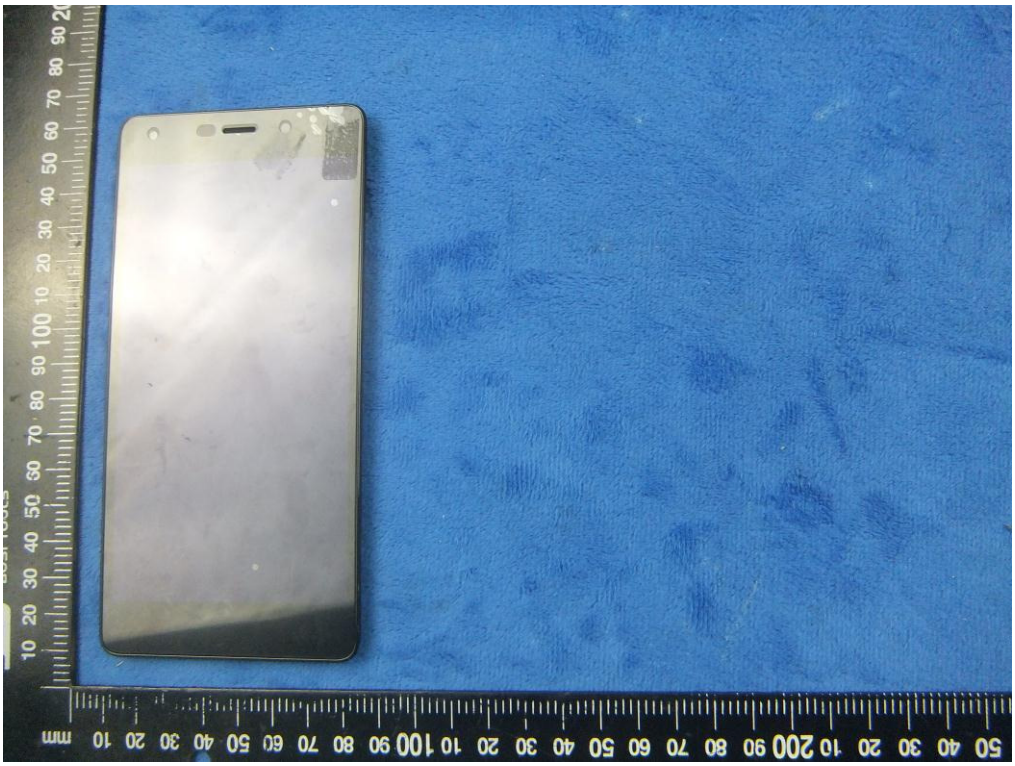
Mainboard with Shielding – Rear View



Mainboard without Shielding – Rear View



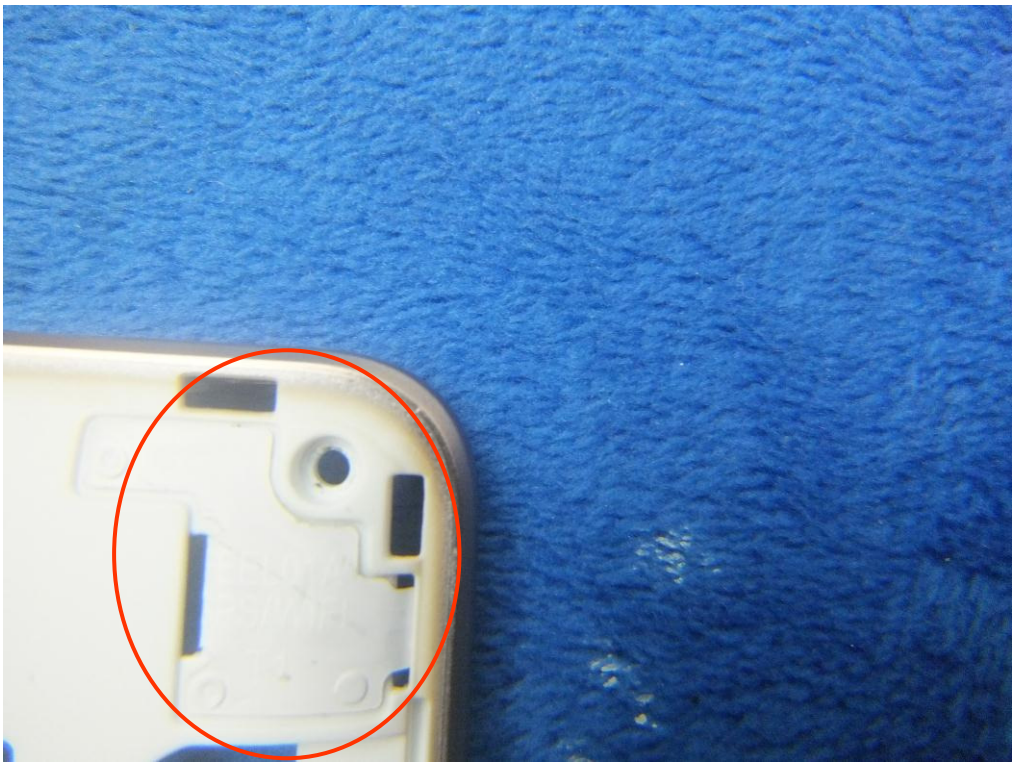
LCD – Front View



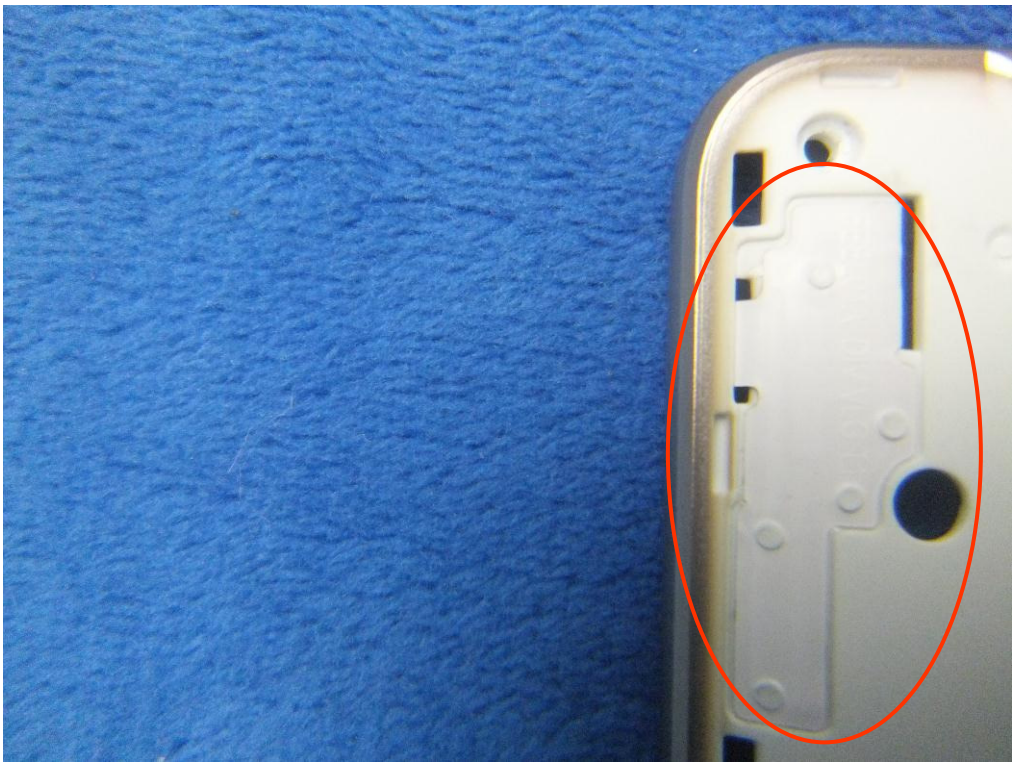
LCD – Rear View

GSM/PCS/UMTS-FDD Antenna View

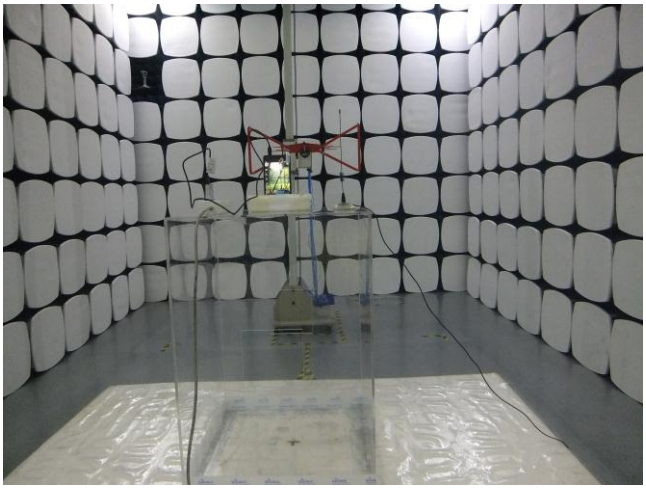
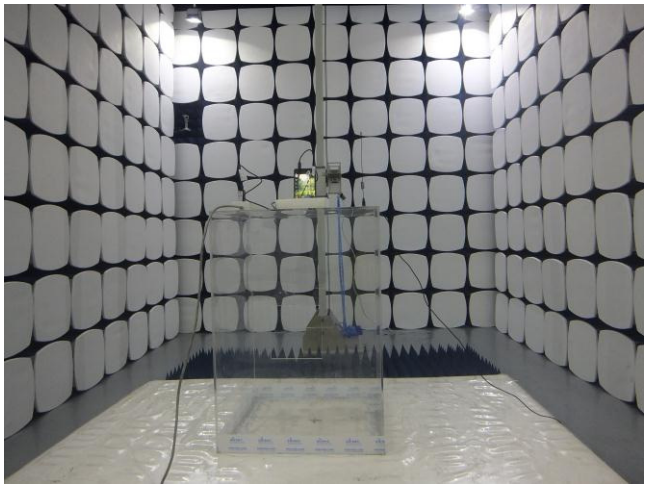
WIFI/BT/BLE - Antenna View



LTE - Antenna View



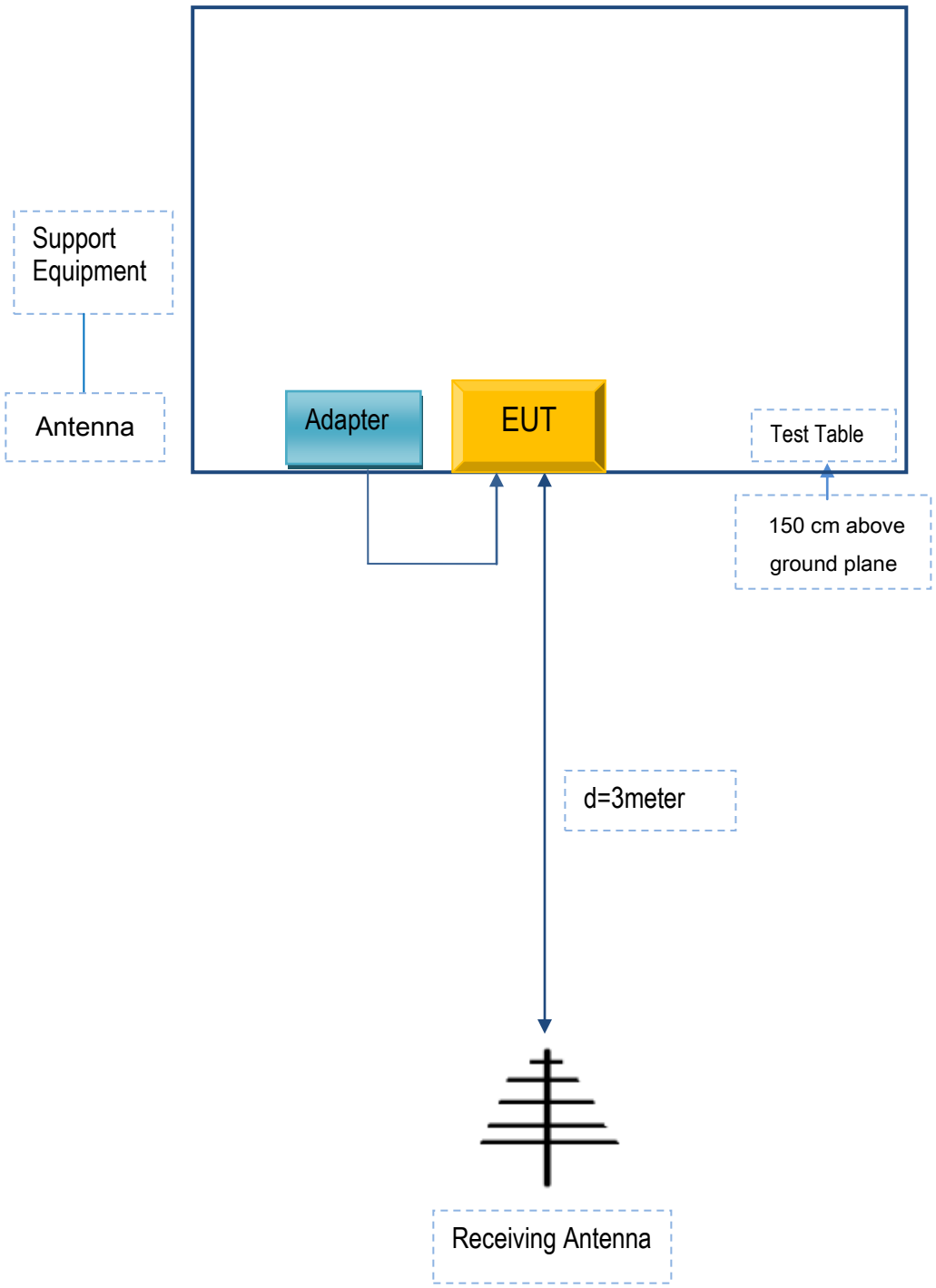
## Annex B.iii. Photograph: Test Setup Photo

| | |
| --- | --- |
|  |  |
| Radiated Spurious Emissions Test Setup Below 1GHz | Radiated Spurious Emissions Test Setup Above 1GHz |

# Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

## Annex C.ii. TEST SET UP BLOCK

### Block Configuration Diagram for Radiated Emissions



## Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

**Supporting Equipment:**

| Manufacturer | Equipment Description | Model | Serial No |
| --- | --- | --- | --- |
| MFOURTEL MEXICO S.A. DE C.V. | Adapter | A8-501000 | ST0852 |

**Supporting Cable:**

| Cable type | Shield Type | Ferrite Core | Length | Serial No |
| --- | --- | --- | --- | --- |
| USB Cable | Un-shielding | No | 0.8m | ST0852 |

# Annex C.ii. EUT OPERATING CONKITIONS

N/A

# Annex D. User Manual / Block Diagram / Schematics / Partlist

N/A

# Annex E. DECLARATION OF SIMILARITY

N/A