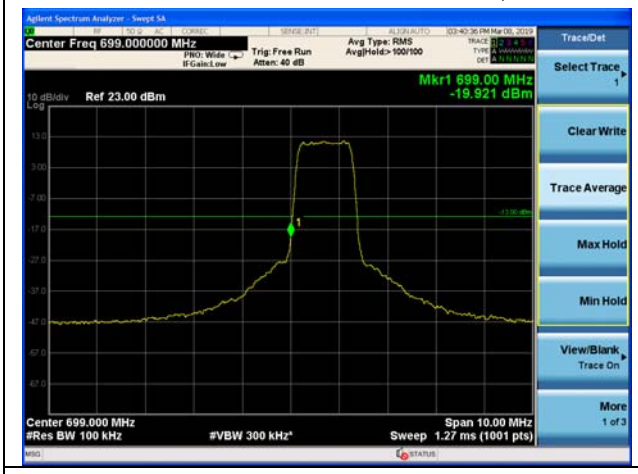
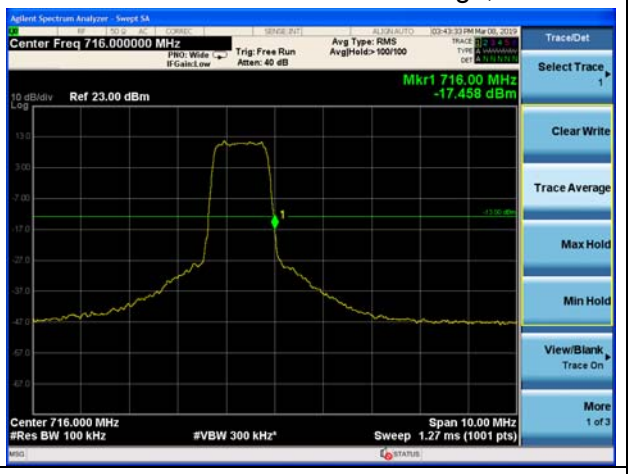
LTE Band 12 16QAM 1.4MHz CH-Low, 1 RB
698MHz~699MHz

LTE Band 12 16QAM 1.4MHz CH-High, 1 RB
716MHz~717MHz

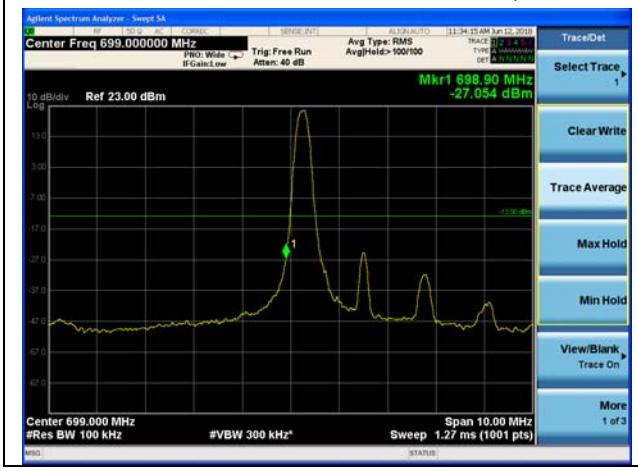
LTE Band 12 16QAM 1.4MHz CH-Low, 100%RB



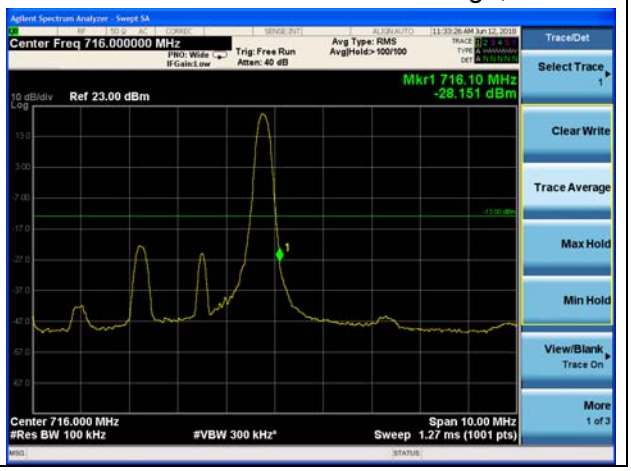

LTE Band 12 16QAM 1.4MHz CH-High, 100%RB




LTE Band 12 16QAM 3MHz CH-Low, 1 RB




LTE Band 12 16QAM 3MHz CH-High, 1 RB





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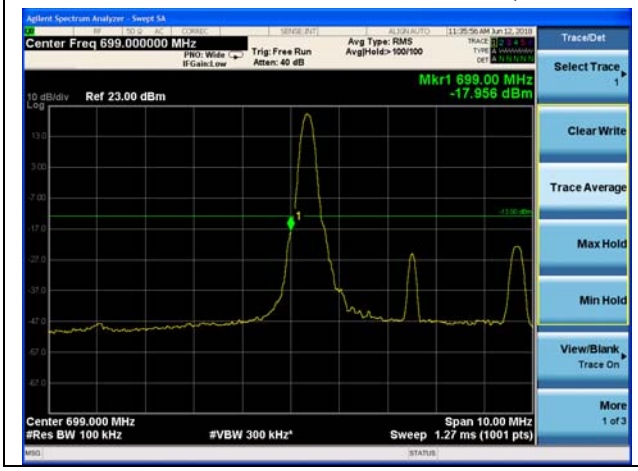
LTE Band 12 16QAM 3MHz CH-Low, 1 RB
698MHz~699MHz

LTE Band 12 16QAM 3MHz CH-High, 1 RB
716MHz~717MHz

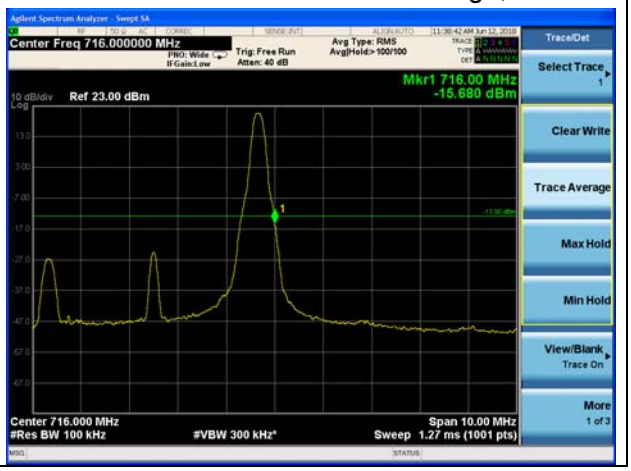
LTE Band 12 16QAM 3MHz CH-Low, 100%RB

LTE Band 12 16QAM 3MHz CH-High, 100%RB

LTE Band 12 16QAM 5MHz CH-Low, 1 RB




LTE Band 12 16QAM 5MHz CH-High, 1 RB





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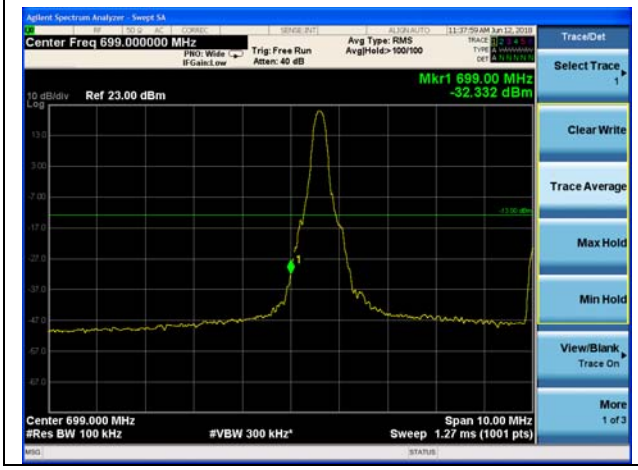
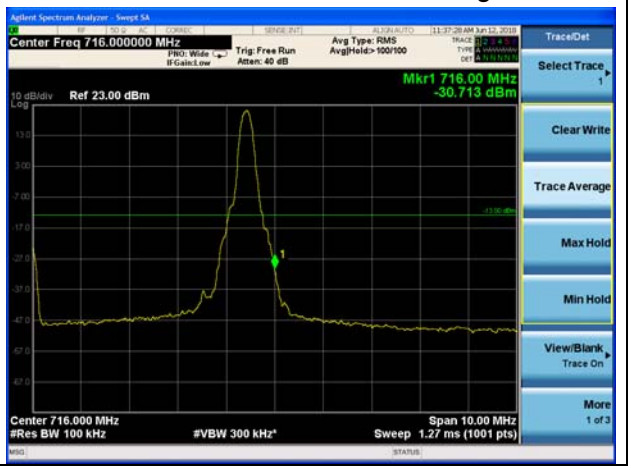
LTE Band 12 16QAM 5MHz CH-Low, 100%RB

LTE Band 12 16QAM 5MHz CH-High, 100%RB

LTE Band 12 16QAM 10MHz CH-Low, 1 RB




LTE Band 12 16QAM 10MHz CH-High, 1 RB





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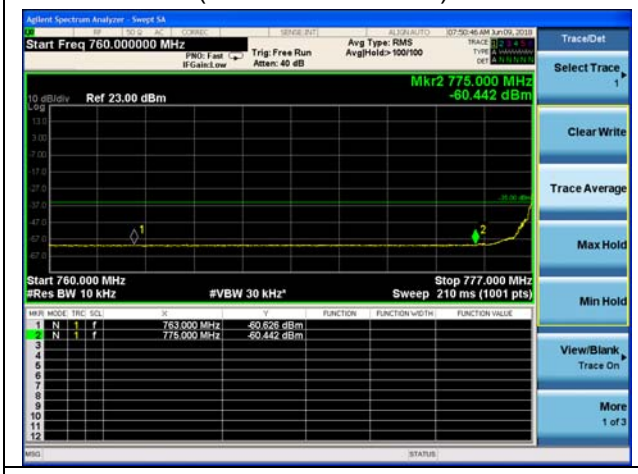
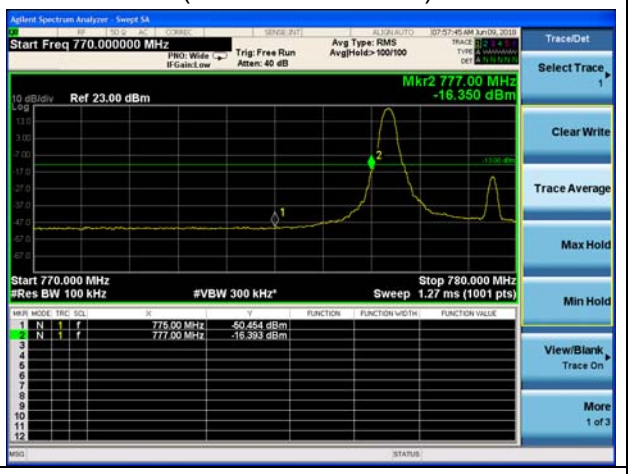
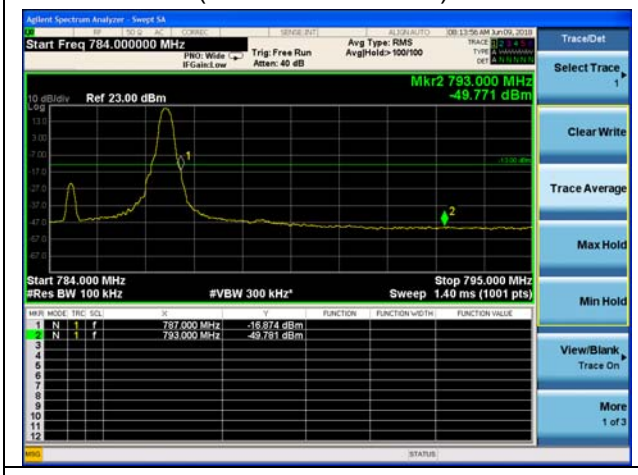
LTE Band 13 QPSK 5MHz CH-Low, 1 RB (763MHz ~775MHz)




LTE Band 13 QPSK 5MHz CH-Low, 1 RB (775MHz ~777MHz)




LTE Band 13 QPSK 5MHz CH-High, 1 RB (787MHz ~793MHz)




LTE Band 13 QPSK 5MHz CH-High, 1 RB (793MHz ~805MHz)

LTE Band 13 QPSK 5MHz CH-Low, 100%RB (763MHz ~775MHz)

LTE Band 13 QPSK 5MHz CH-Low, 100%RB (775MHz ~777MHz)

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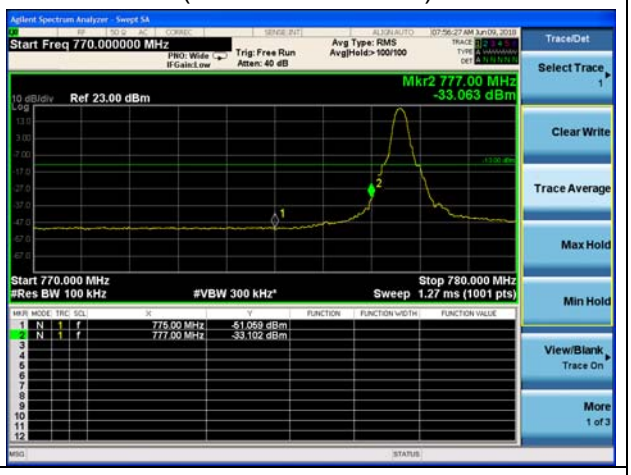
LTE Band 13 QPSK 5MHz CH-High, 100%RB (787MHz ~793MHz)

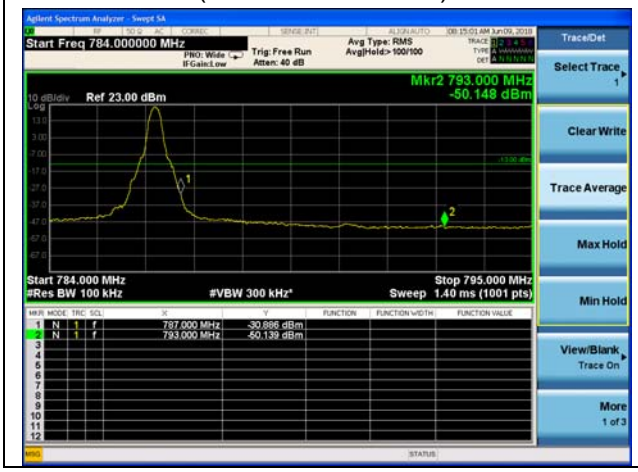
LTE Band 13 QPSK 5MHz CH-High, 100%RB (793MHz ~805MHz)

LTE Band 13 QPSK 10MHz CH-Low, 1 RB (763MHz ~775MHz)

LTE Band 13 QPSK 10MHz CH-Low, 1 RB (775MHz ~777MHz)




LTE Band 13 QPSK 10MHz CH-High, 1 RB (787MHz ~793MHz)




LTE Band 13 QPSK 10MHz CH-High, 1 RB (793MHz ~805MHz)

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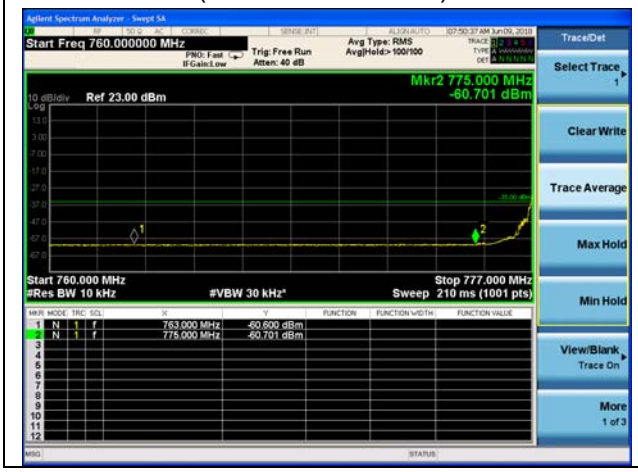
LTE Band 13 QPSK 10MHz CH-Low, 100%RB (763MHz ~775MHz)

LTE Band 13 QPSK 10MHz CH-Low, 100%RB (775MHz ~777MHz)

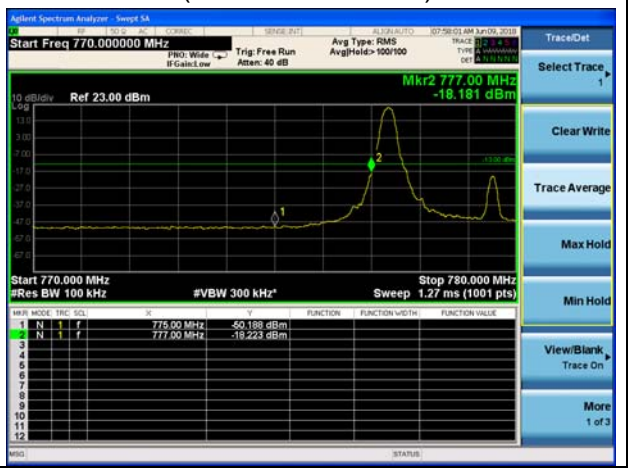
LTE Band 13 QPSK 10MHz CH-High, 100%RB (787MHz ~793MHz)

LTE Band 13 QPSK 10MHz CH-High, 100%RB (793MHz ~805MHz)

LTE Band 13 16QAM 5MHz CH-Low, 1 RB (763MHz ~775MHz)




LTE Band 13 16QAM 5MHz CH-Low, 1 RB (775MHz ~777MHz)





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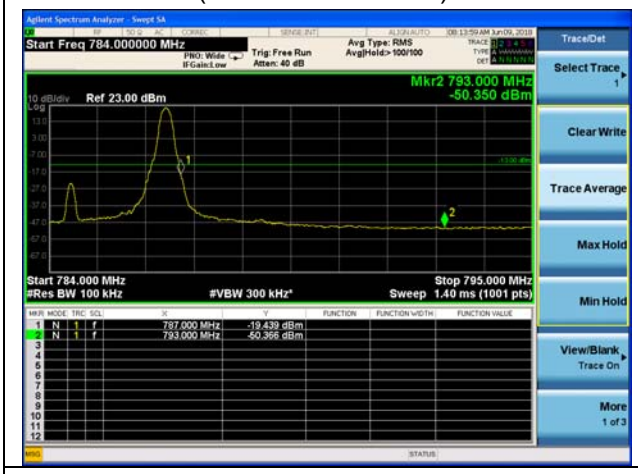
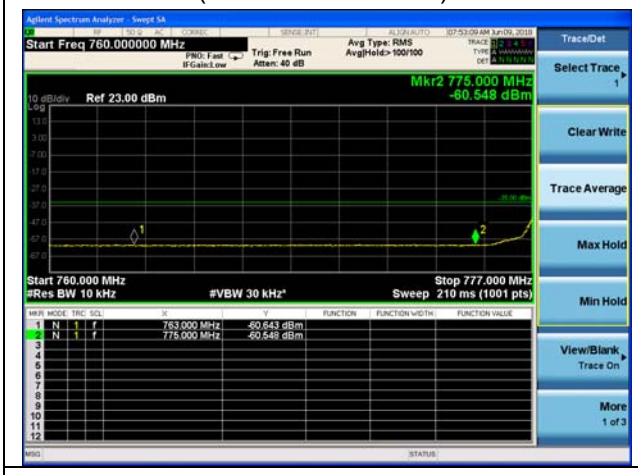
LTE Band 13 16QAM 5MHz CH-High, 1 RB (787MHz ~793MHz)

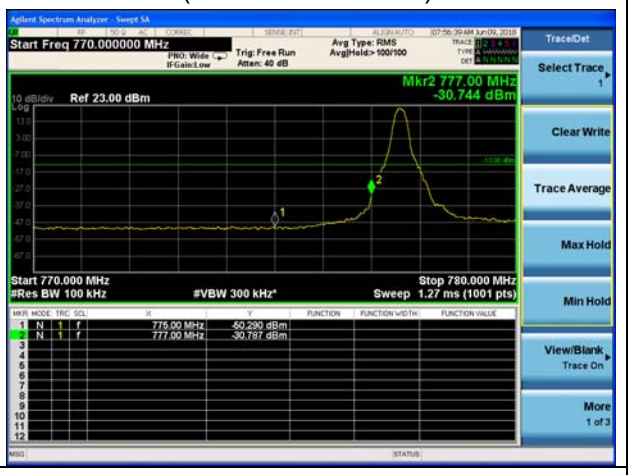



LTE Band 13 16QAM 5MHz CH-High, 1 RB (793MHz ~805MHz)

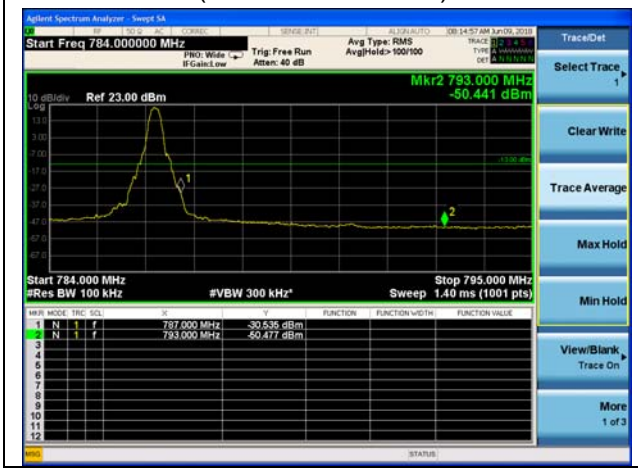
LTE Band 13 16QAM 10MHz CH-Low, 1 RB (763MHz ~775MHz)




LTE Band 13 16QAM 10MHz CH-Low, 1 RB (775MHz ~777MHz)




LTE Band 13 16QAM 10MHz CH-High, 1 RB (787MHz ~793MHz)




LTE Band 13 16QAM 10MHz CH-High, 1 RB (793MHz ~805MHz)

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## 5.5 Peak-to-Average Power Ratio (PAPR)

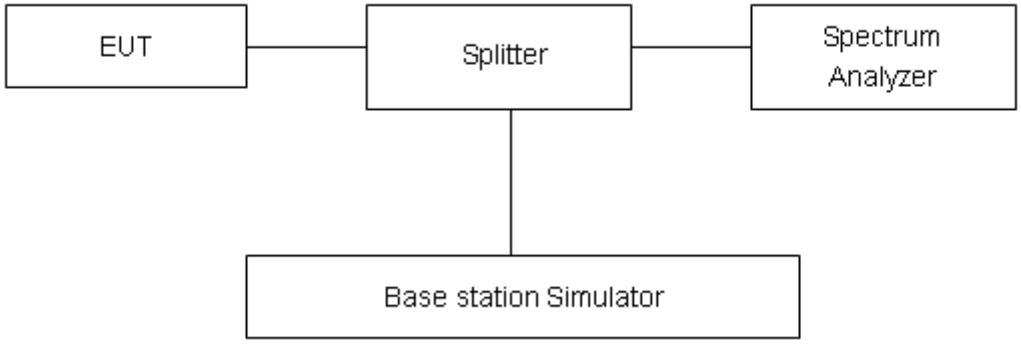
### Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

### Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

### Test Setup




### Limits

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for thenormal distribution is with the coverage factor k = 2, U= 0.4 dB.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## Test Results

| WCDMA Band IV | Channel | Frequency (MHz) | Peak (dBm) | Avg (dBm) | PAPR (dB) | Limit (dB) | Conclusion |
|---|---|---|---|---|---|---|---|
| RMC | 1312 | 1712.4 | 26.69 | 23.57 | 3.12 | ≤13 | PASS |
| | 1413 | 1732.6 | 26.78 | 23.56 | 3.22 | ≤13 | PASS |
| | 1513 | 1752.6 | 26.33 | 23.51 | 2.82 | ≤13 | PASS |

| LTE Band 4 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RB | Modulation | Bandwidth (MHz) | Channel | Frequency (MHz) | Peak (dBm) | Avg (dBm) | PAPR (dB) | Limit (dB) | Conclusion |
| 100% | QPSK | 1.4 | 19957 | 1710.7 | 28.43 | 23.06 | 5.37 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.31 | 22.95 | 5.36 | ≤13 | PASS |
| | | | 20393 | 1754.3 | 28.39 | 22.98 | 5.41 | ≤13 | PASS |
| | | 3 | 19965 | 1711.5 | 27.92 | 22.79 | 5.13 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.21 | 23.06 | 5.15 | ≤13 | PASS |
| | | | 20385 | 1753.5 | 28.13 | 22.93 | 5.20 | ≤13 | PASS |
| | | 5 | 19975 | 1712.5 | 28.31 | 22.77 | 5.54 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.54 | 23.05 | 5.49 | ≤13 | PASS |
| | | | 20375 | 1752.5 | 28.51 | 22.91 | 5.60 | ≤13 | PASS |
| | | 10 | 20000 | 1715 | 28.02 | 22.85 | 5.17 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.18 | 23.07 | 5.11 | ≤13 | PASS |
| | | | 20350 | 1750 | 28.17 | 22.95 | 5.22 | ≤13 | PASS |
| | | 15 | 20025 | 1717.5 | 29.16 | 22.83 | 6.33 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 29.36 | 23.03 | 6.33 | ≤13 | PASS |
| | | | 20325 | 1747.5 | 29.30 | 22.90 | 6.40 | ≤13 | PASS |
| | | 20 | 20050 | 1720 | 28.99 | 22.80 | 6.19 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 29.18 | 22.98 | 6.20 | ≤13 | PASS |
| | | | 20300 | 1745 | 29.17 | 22.86 | 6.31 | ≤13 | PASS |
| 1 | 16QAM | 1.4 | 19957 | 1710.7 | 29.81 | 23.39 | 6.42 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 29.39 | 23.01 | 6.38 | ≤13 | PASS |
| | | | 20393 | 1754.3 | 29.41 | 22.93 | 6.48 | ≤13 | PASS |
| | | 3 | 19965 | 1711.5 | 29.11 | 22.89 | 6.22 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.83 | 22.67 | 6.16 | ≤13 | PASS |
| | | | 20385 | 1753.5 | 29.90 | 23.60 | 6.30 | ≤13 | PASS |
| | | 5 | 19975 | 1712.5 | 28.13 | 22.66 | 5.47 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.84 | 22.92 | 5.92 | ≤13 | PASS |
| | | | 20375 | 1752.5 | 28.50 | 23.45 | 5.05 | ≤13 | PASS |
| | | 10 | 20000 | 1715 | 29.16 | 22.88 | 6.28 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.06 | 22.66 | 5.40 | ≤13 | PASS |
| | | | 20350 | 1750 | 28.68 | 23.59 | 5.09 | ≤13 | PASS |


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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 15 | 20025 | 1717.5 | 28.11 | 22.83 | 5.28 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 28.46 | 22.64 | 5.82 | ≤13 | PASS |
| | | | 20325 | 1747.5 | 29.47 | 23.57 | 5.90 | ≤13 | PASS |
| | | 20 | 20050 | 1720 | 29.53 | 22.81 | 6.72 | ≤13 | PASS |
| | | | 20175 | 1732.5 | 29.58 | 22.60 | 6.98 | ≤13 | PASS |
| | | | 20300 | 1745 | 29.42 | 23.52 | 5.90 | ≤13 | PASS |

| LTE Band 12 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RB | Modulation | Bandwidth (MHz) | Channel | Frequency (MHz) | Peak (dBm) | Avg (dBm) | PAPR (dB) | Limit (dB) | Conclusion |
| 100% | QPSK | 1.4 | 23017 | 699.7 | 28.93 | 22.70 | 6.23 | ≤13 | PASS |
| | | | 23095 | 707.5 | 29.11 | 22.78 | 6.33 | ≤13 | PASS |
| | | | 23173 | 715.3 | 29.61 | 22.83 | 6.78 | ≤13 | PASS |
| | | 3 | 23025 | 700.5 | 29.81 | 22.85 | 6.96 | ≤13 | PASS |
| | | | 23095 | 707.5 | 29.14 | 22.93 | 6.21 | ≤13 | PASS |
| | | | 23165 | 714.5 | 29.37 | 22.99 | 6.38 | ≤13 | PASS |
| | | 5 | 23035 | 701.5 | 29.98 | 22.83 | 7.15 | ≤13 | PASS |
| | | | 23095 | 707.5 | 29.62 | 22.89 | 6.73 | ≤13 | PASS |
| | | | 23155 | 713.5 | 29.69 | 22.94 | 6.75 | ≤13 | PASS |
| | | 10 | 23060 | 704 | 30.81 | 22.80 | 8.01 | ≤13 | PASS |
| | | | 23095 | 707.5 | 29.19 | 22.84 | 6.35 | ≤13 | PASS |
| | | | 23130 | 711 | 29.24 | 22.90 | 6.34 | ≤13 | PASS |
| 1 | 16QAM | 1.4 | 23017 | 699.7 | 30.96 | 23.53 | 7.43 | ≤13 | PASS |
| | | | 23095 | 707.5 | 30.33 | 23.16 | 7.17 | ≤13 | PASS |
| | | | 23173 | 715.3 | 30.29 | 22.71 | 7.58 | ≤13 | PASS |
| | | 3 | 23025 | 700.5 | 30.01 | 22.59 | 7.42 | ≤13 | PASS |
| | | | 23095 | 707.5 | 30.71 | 23.27 | 7.44 | ≤13 | PASS |
| | | | 23165 | 714.5 | 29.94 | 22.84 | 7.10 | ≤13 | PASS |
| | | 5 | 23035 | 701.5 | 29.53 | 22.54 | 6.99 | ≤13 | PASS |
| | | | 23095 | 707.5 | 30.74 | 23.25 | 7.49 | ≤13 | PASS |
| | | | 23155 | 713.5 | 30.27 | 22.82 | 7.45 | ≤13 | PASS |
| | | 10 | 23060 | 704 | 30.27 | 22.52 | 7.75 | ≤13 | PASS |
| | | | 23095 | 707.5 | 30.30 | 23.21 | 7.09 | ≤13 | PASS |
| | | | 23130 | 711 | 30.28 | 22.77 | 7.51 | ≤13 | PASS |


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| LTE Band 13 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RB | Modulation | Bandwidth (MHz) | Channel | Frequency (MHz) | Peak (dBm) | Avg (dBm) | PAPR (dB) | Limit (dB) | Conclusion |
| 100% | QPSK | 5 | 23205 | 779.5 | 29.31 | 22.76 | 6.55 | ≤13 | PASS |
| | | | 23230 | 782 | 30.14 | 22.78 | 7.36 | ≤13 | PASS |
| | | | 23255 | 784.5 | 29.72 | 22.89 | 6.83 | ≤13 | PASS |
| | | 10 | 23230 | 782 | 28.43 | 22.74 | 5.69 | ≤13 | PASS |
| 1 | 16QAM | 5 | 23205 | 779.5 | 29.04 | 22.88 | 6.16 | ≤13 | PASS |
| | | | 23230 | 782 | 28.95 | 22.86 | 6.09 | ≤13 | PASS |
| | | | 23255 | 784.5 | 29.33 | 22.46 | 6.87 | ≤13 | PASS |
| | | 10 | 23230 | 782 | 29.64 | 22.98 | 6.66 | ≤13 | PASS |


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## 5.6 Frequency Stability

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size.

(1)With all power removed, the temperature was decreased to -10°C and permitted to stabilize for three hours.

(2)Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

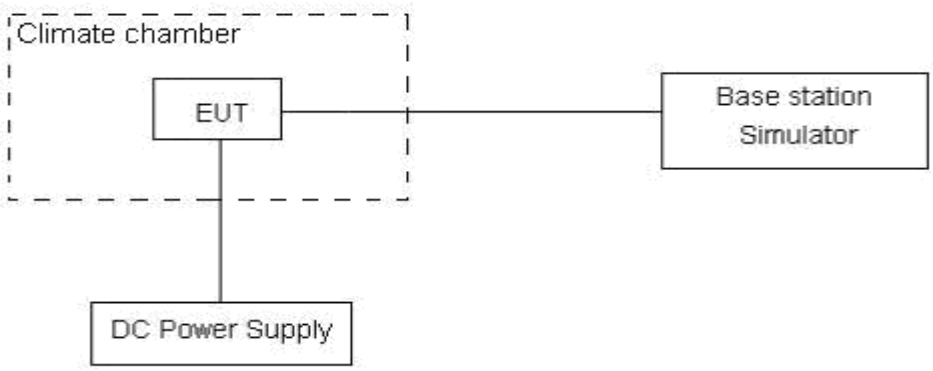
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.3 V and 4.3 V, with a nominal voltage of 3.8V.

**Test setup**




**Limits**

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor $k$ = 3,$U$=0.01ppm.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**Test Result**

| WCDMA Band IV | | | | | |
|---|---|---|---|---|---|
| (QPSK, 20MHz BANDWIDTH) | | | | | |
| Condition | | 1710 | 1755 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 1710.0287 | 1754.9121 | -1.38 | -0.00073 |
| Extreme（85°C） | | 1710.0289 | 1754.9120 | 2.15 | 0.00115 |
| Extreme（80°C） | | 1710.0284 | 1754.9124 | 1.05 | 0.00056 |
| Extreme（70°C） | | 1710.0299 | 1754.9109 | 1.39 | 0.00074 |
| Extreme（60°C） | | 1710.0280 | 1754.9130 | 0.82 | 0.00043 |
| Extreme（50°C） | | 1710.0277 | 1754.9131 | -1.40 | -0.00074 |
| Extreme（40°C） | | 1710.0292 | 1754.9116 | -1.42 | -0.00076 |
| Extreme（30°C） | | 1710.0281 | 1754.9127 | -1.45 | -0.00077 |
| Extreme（20°C） | | 1710.0279 | 1754.9130 | -2.26 | -0.00120 |
| Extreme（10°C） | | 1710.0294 | 1754.9114 | 0.17 | 0.00009 |
| Extreme（0°C） | | 1710.0285 | 1754.9123 | -2.53 | -0.00135 |
| Extreme（-10°C） | | 1710.0299 | 1754.9130 | -1.15 | -0.00061 |
| Extreme（-20°C） | | 1710.0331 | 1754.9161 | 2.38 | 0.00127 |
| Extreme（-30°C） | | 1710.0347 | 1754.9183 | 1.28 | 0.00068 |
| Extreme（-40°C） | | 1710.0353 | 1754.9195 | 1.62 | 0.00086 |
| 25°C | LV | 1710.0324 | 1754.9155 | -1.17 | -0.00062 |
| | HV | 1710.0311 | 1754.9164 | -1.19 | -0.00063 |

| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| (QPSK, 20MHz BANDWIDTH) | | | | | |
| Condition | | 1710 | 1755 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 1710.6556 | 1754.4320 | 3.01 | 0.00174 |
| Extreme（85°C） | | 1710.6567 | 1754.4332 | -1.78 | -0.00103 |
| Extreme（80°C） | | 1710.6534 | 1754.4293 | -0.43 | -0.00025 |
| Extreme（70°C） | | 1710.6547 | 1754.4312 | 2.52 | 0.00145 |
| Extreme（60°C） | | 1710.6533 | 1754.4303 | -2.60 | -0.00150 |
| Extreme（50°C） | | 1710.6539 | 1754.4304 | -0.33 | -0.00019 |
| Extreme（40°C） | | 1710.6552 | 1754.4317 | 2.18 | 0.00126 |
| Extreme（30°C） | | 1710.6559 | 1754.4324 | 0.55 | 0.00032 |
| Extreme（20°C） | | 1710.6541 | 1754.4303 | 4.58 | 0.00264 |
| Extreme（10°C） | | 1710.6550 | 1754.4315 | 3.12 | 0.00180 |
| Extreme（0°C） | | 1710.6537 | 1754.4302 | 0.49 | 0.00028 |
| Extreme（-10°C） | | 1710.6532 | 1754.4297 | -0.43 | -0.00025 |
| Extreme（-20°C） | | 1710.6543 | 1754.4309 | -2.60 | -0.00150 |


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| | | | | | |
|---|---|---|---|---|---|
| Extreme（-30°C） | | 1710.6576 | 1754.4341 | -0.33 | -0.00019 |
| Extreme（-40°C） | | 1710.6594 | 1754.4353 | 4.58 | 0.00264 |
| 25°C | LV | 1710.6540 | 1754.4305 | -1.28 | -0.00074 |
| | HV | 1710.6546 | 1754.4311 | -0.27 | -0.00016 |
| (16QAM,20MHz BANDWIDTH) | | | | | |
| Condition | | 1710 | 1755 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 1710.6405 | 1754.5123 | 5.32 | 0.00307 |
| Extreme（85°C） | | 1710.6387 | 1754.5112 | 1.28 | 0.00074 |
| Extreme（80°C） | | 1710.6426 | 1754.5151 | -0.41 | -0.00024 |
| Extreme（70°C） | | 1710.6407 | 1754.5132 | 3.52 | 0.00203 |
| Extreme（60°C） | | 1710.6421 | 1754.5146 | 1.62 | 0.00094 |
| Extreme（50°C） | | 1710.6415 | 1754.5140 | 1.15 | 0.00066 |
| Extreme（40°C） | | 1710.6402 | 1754.5127 | -0.27 | -0.00016 |
| Extreme（30°C） | | 1710.6395 | 1754.5120 | -3.42 | -0.00197 |
| Extreme（20°C） | | 1710.6416 | 1754.5141 | 3.35 | 0.00193 |
| Extreme（10°C） | | 1710.6404 | 1754.5129 | 0.76 | 0.00044 |
| Extreme（0°C） | | 1710.6417 | 1754.5142 | -0.25 | -0.00015 |
| Extreme（-10°C） | | 1710.6422 | 1754.5147 | 1.28 | 0.00074 |
| Extreme（-20°C） | | 1710.6411 | 1754.5136 | -0.41 | -0.00024 |
| Extreme（-30°C） | | 1710.6381 | 1754.5103 | 1.62 | 0.00094 |
| Extreme（-40°C） | | 1710.6366 | 1754.5091 | -0.27 | -0.00016 |
| 25°C | LV | 1710.6414 | 1754.5139 | 2.66 | 0.00153 |
| | HV | 1710.6409 | 1754.5133 | 4.17 | 0.00241 |

| | | | | | |
|---|---|---|---|---|---|
| LTE Band 12 | | | | | |
| (QPSK, 20MHz BANDWIDTH) | | | | | |
| Condition | | 699 | 716 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 699.2578 | 715.7329 | 3.48 | 0.00416 |
| Extreme（85°C） | | 699.2589 | 715.7317 | 2.84 | 0.00339 |
| Extreme（80°C） | | 699.2550 | 715.7278 | 1.86 | 0.00222 |
| Extreme（70°C） | | 699.2569 | 715.7297 | 2.81 | 0.00336 |
| Extreme（60°C） | | 699.2555 | 715.7283 | -0.98 | -0.00117 |
| Extreme（50°C） | | 699.2561 | 715.7289 | 0.75 | 0.00089 |
| Extreme（40°C） | | 699.2574 | 715.7302 | 1.74 | 0.00208 |
| Extreme（30°C） | | 699.2581 | 715.7309 | 1.49 | 0.00178 |
| Extreme（20°C） | | 699.2560 | 715.7288 | -0.94 | -0.00113 |
| Extreme（10°C） | | 699.2572 | 715.7300 | -0.10 | -0.00012 |


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| | | | | | |
|---|---|---|---|---|---|
| Extreme（0°C） | | 699.2559 | 715.7287 | -1.85 | -0.00221 |
| Extreme（-10°C） | | 699.2554 | 715.7282 | -2.80 | -0.00335 |
| Extreme（-20°C） | | 699.2565 | 715.7293 | -2.72 | -0.00325 |
| Extreme（-30°C） | | 699.2598 | 715.7330 | 0.13 | 0.00016 |
| Extreme（-40°C） | | 699.2610 | 715.7338 | 1.19 | 0.00142 |
| 25°C | LV | 699.2562 | 715.7290 | 3.32 | 0.00397 |
| | HV | 699.2568 | 715.7301 | 1.79 | 0.00214 |
| (16QAM,20MHz BANDWIDTH) | | | | | |
| Condition | | 699 | 716 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 699.3124 | 715.6811 | 0.69 | 0.00082 |
| Extreme（85°C） | | 699.3113 | 715.6800 | 1.13 | 0.00135 |
| Extreme（80°C） | | 699.3152 | 715.6839 | 1.35 | 0.00161 |
| Extreme（70°C） | | 699.3133 | 715.6820 | -1.74 | -0.00208 |
| Extreme（60°C） | | 699.3147 | 715.6834 | 2.05 | 0.00245 |
| Extreme（50°C） | | 699.3141 | 715.6828 | 2.81 | 0.00336 |
| Extreme（40°C） | | 699.3128 | 715.6815 | 0.45 | 0.00054 |
| Extreme（30°C） | | 699.3121 | 715.6808 | 6.34 | 0.00758 |
| Extreme（20°C） | | 699.3142 | 715.6829 | 1.74 | 0.00208 |
| Extreme（10°C） | | 699.3130 | 715.6817 | 0.02 | 0.00002 |
| Extreme（0°C） | | 699.3143 | 715.6830 | 0.09 | 0.00011 |
| Extreme（-10°C） | | 699.3148 | 715.6835 | -2.79 | -0.00334 |
| Extreme（-20°C） | | 699.3137 | 715.6824 | -3.89 | -0.00465 |
| Extreme（-30°C） | | 699.3104 | 715.6791 | 0.89 | 0.00106 |
| Extreme（-40°C） | | 699.3092 | 715.6779 | 1.05 | 0.00126 |
| 25°C | LV | 699.3140 | 715.6827 | 3.59 | 0.00430 |
| | HV | 699.3134 | 715.6821 | 2.14 | 0.00256 |

| LTE Band13 | | | | | |
|---|---|---|---|---|---|
| (QPSK, 20MHz BANDWIDTH) | | | | | |
| Condition | | 777 | 787 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 777.4400 | 786.5793 | 8.49 | 0.01015 |
| Extreme（85°C） | | 777.4401 | 786.5792 | 6.61 | 0.00790 |
| Extreme（80°C） | | 777.4397 | 786.5796 | -7.31 | -0.00874 |
| Extreme（70°C） | | 777.4412 | 786.5781 | 2.87 | 0.00343 |
| Extreme（60°C） | | 777.4393 | 786.5800 | 7.57 | 0.00905 |
| Extreme（50°C） | | 777.4390 | 786.5803 | 0.81 | 0.00097 |
| Extreme（40°C） | | 777.4405 | 786.5788 | 2.90 | 0.00347 |
| Extreme（30°C） | | 777.4394 | 786.5799 | -2.02 | -0.00241 |


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| | | | | | |
|---|---|---|---|---|---|
| Extreme（20°C） | | 777.4391 | 786.5802 | -4.06 | -0.00485 |
| Extreme（10°C） | | 777.4407 | 786.5786 | 2.22 | 0.00265 |
| Extreme（0°C） | | 777.4398 | 786.5795 | 8.48 | 0.01014 |
| Extreme（-10°C） | | 777.4393 | 786.5788 | -2.19 | -0.00262 |
| Extreme（-20°C） | | 777.4399 | 786.5802 | -0.42 | -0.00050 |
| Extreme（-30°C） | | 777.4393 | 786.5800 | -0.61 | -0.00073 |
| Extreme（-40°C） | | 777.4399 | 786.5794 | 1.43 | 0.00171 |
| 25°C | LV | 777.4393 | 786.5792 | 1.56 | 0.00186 |
| | HV | 777.4399 | 786.5781 | -5.37 | -0.00642 |
| (16QAM,20MHz BANDWIDTH) | | | | | |
| Condition | | 777 | 787 | Delta (Hz) | Frequency Stability(ppm) |
| Temperature | Voltage | F low@-13dBm(MHz) | F high@-13dBm(MHz) | | |
| Normal（25°C） | Normal | 777.5216 | 786.5049 | 3.01 | 0.00360 |
| Extreme（85°C） | | 777.5217 | 786.5048 | -1.03 | -0.00123 |
| Extreme（80°C） | | 777.5213 | 786.5052 | 0.23 | 0.00027 |
| Extreme（70°C） | | 777.5228 | 786.5168 | -0.40 | -0.00048 |
| Extreme（60°C） | | 777.5209 | 786.5056 | -4.43 | -0.00530 |
| Extreme（50°C） | | 777.5206 | 786.5059 | 1.84 | 0.00220 |
| Extreme（40°C） | | 777.5221 | 786.5044 | 4.73 | 0.00565 |
| Extreme（30°C） | | 777.5210 | 786.5055 | -5.95 | -0.00711 |
| Extreme（20°C） | | 777.5207 | 786.5058 | 8.12 | 0.00971 |
| Extreme（10°C） | | 777.5223 | 786.5042 | 9.14 | 0.01093 |
| Extreme（0°C） | | 777.5214 | 786.5051 | -7.45 | -0.00891 |
| Extreme（-10°C） | | 777.5213 | 786.5048 | 2.75 | 0.00329 |
| Extreme（-20°C） | | 777.5206 | 786.5168 | -3.12 | -0.00373 |
| Extreme（-30°C） | | 777.5210 | 786.5055 | -2.52 | -0.00301 |
| Extreme（-40°C） | | 777.5223 | 786.5042 | 1.75 | 0.00209 |
| 25°C | LV | 777.5209 | 786.5056 | -9.79 | -0.01170 |
| | HV | 777.5215 | 786.5050 | -2.67 | -0.00319 |


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## 5.7 Spurious Emissions at Antenna Terminals

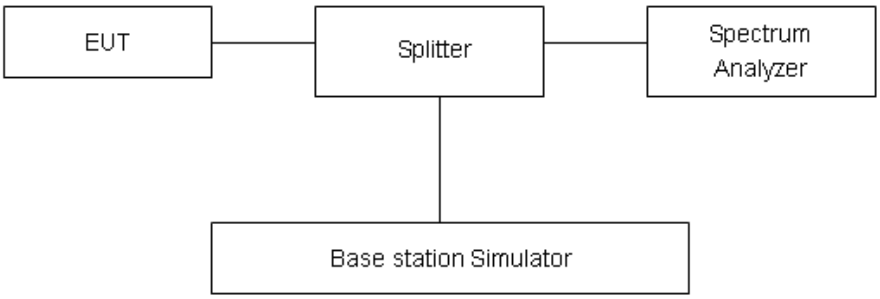
**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.
RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz
RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.
Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

**Test setup**




**Limits**

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB..”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically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radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

| | | |
|---|---|---|
| Part 27.53(h)/(g) Limit | | -13 dBm |
| Part 27.53(f) Limit | Limit out of the band 1559-1610 MHz | -13 dBm |
| | Limit in the band 1559-1610 MHz | -40 dBm |

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor *k* = 1.96.

| Frequency | Uncertainty |
|---|---|
| 9kHz-1GHz | 0.684 dB |
| 1GHz-27GHz | 1.407 dB |


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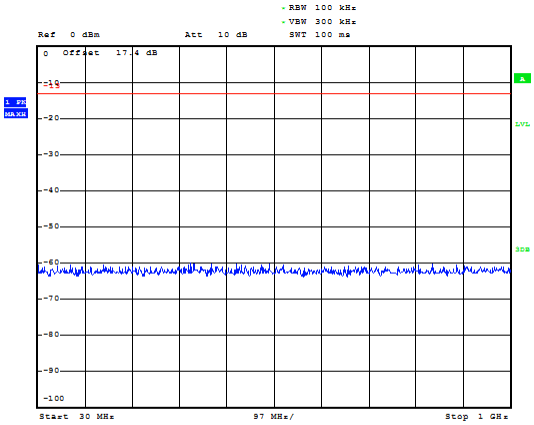
## Test Result

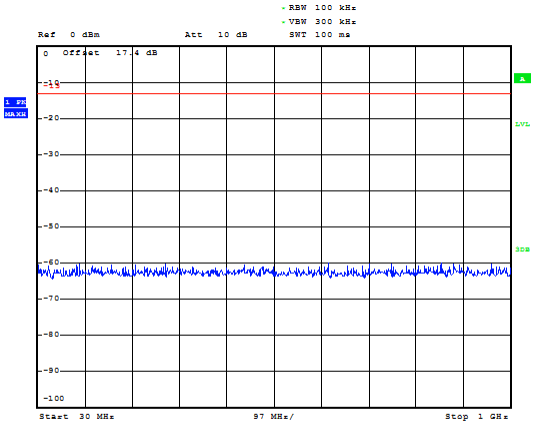
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

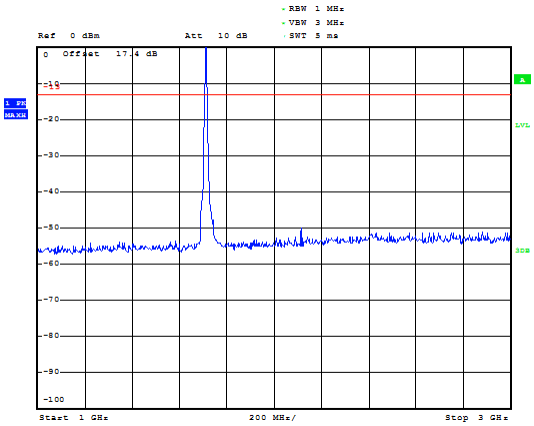
WCDMA Band IV CH-Low 30MHz~1GHz



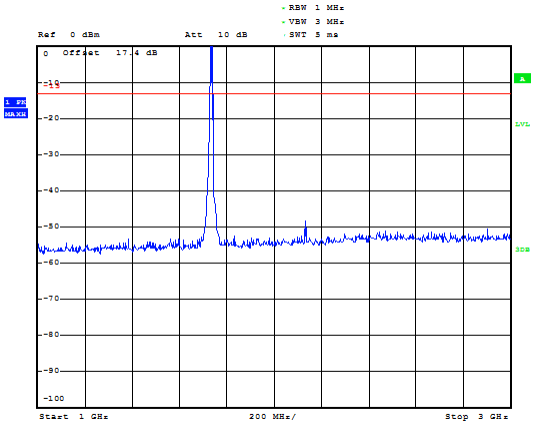

WCDMA Band IV CH-Middle 30MHz~1GHz



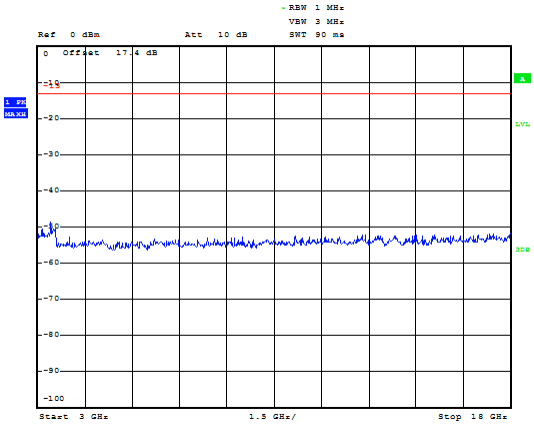

WCDMA Band IV CH-Low 1GHz~3GHz



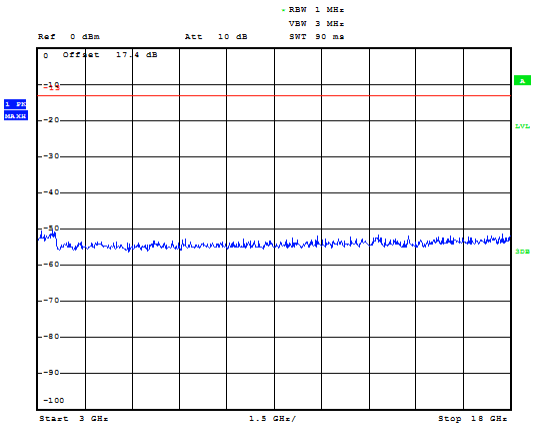

WCDMA Band IV CH-Middle 1GHz~3GHz




WCDMA Band IV CH-Low 3GHz~18GHz




WCDMA Band IV CH-Middle 3GHz~18GHz





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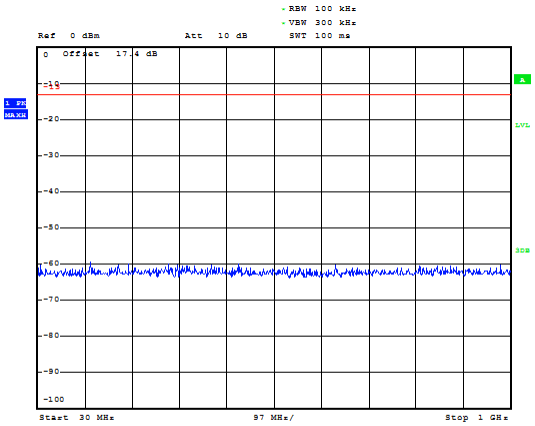
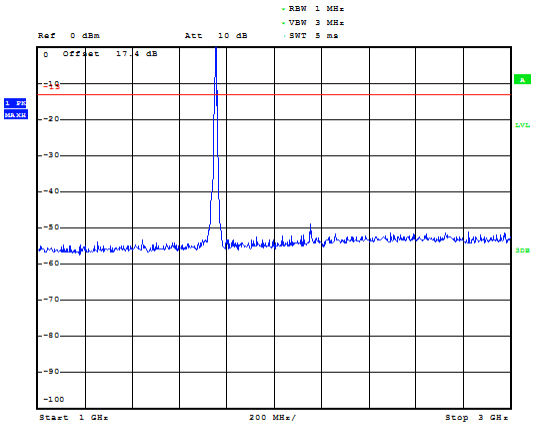
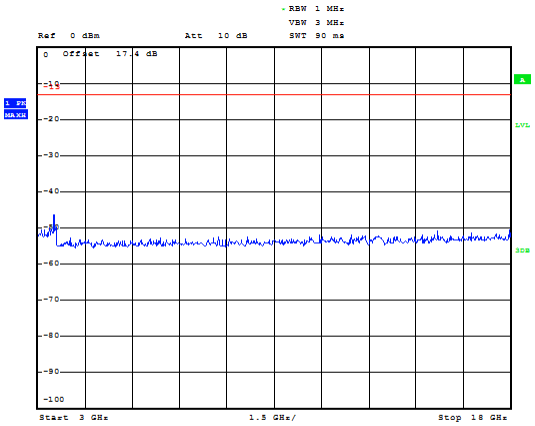
WCDMA Band IV CH-High 30MHz~1GHz




WCDMA Band IV CH-High 1GHz~3GHz




WCDMA Band IV CH-High 3GHz~18GHz





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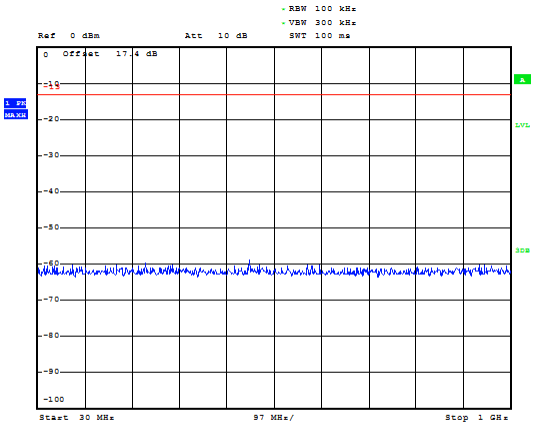
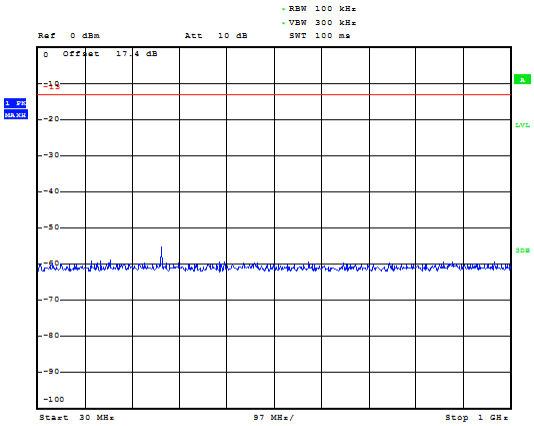
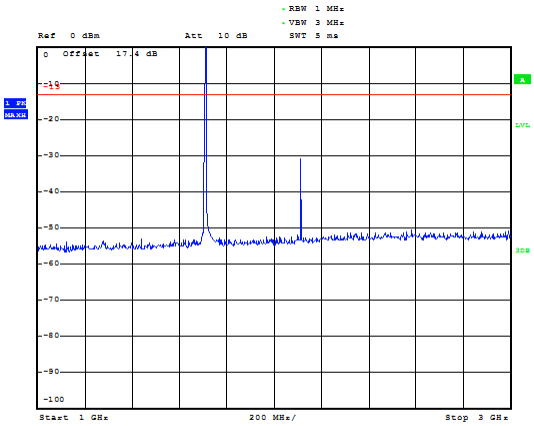
LTE Band 4 1.4MHz CH-Low 30MHz~1GHz



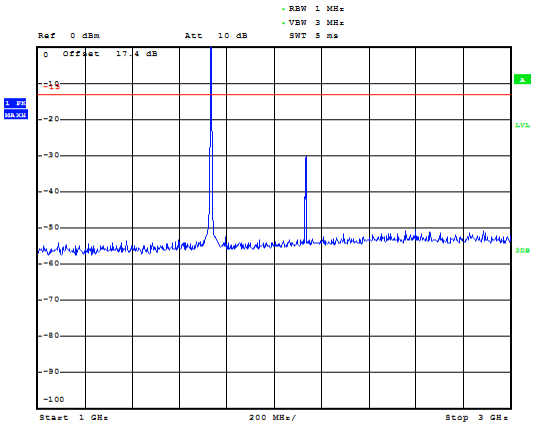

LTE Band 4 1.4MHz CH-Middle 30MHz~1GHz



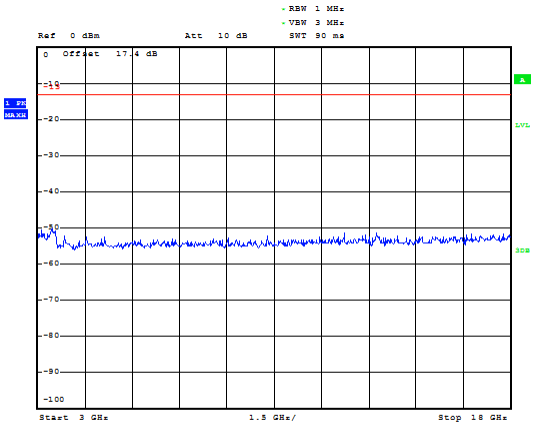

LTE Band 4 1.4MHz CH-Low 1GHz~3GHz



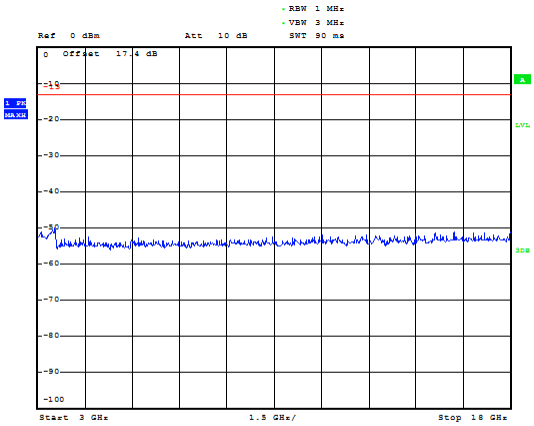

LTE Band 4 1.4MHz CH-Middle 1GHz~3GHz




LTE Band 4 1.4MHz CH-Low 3GHz~18GHz




LTE Band 4 1.4MHz CH-Middle 3GHz~18GHz





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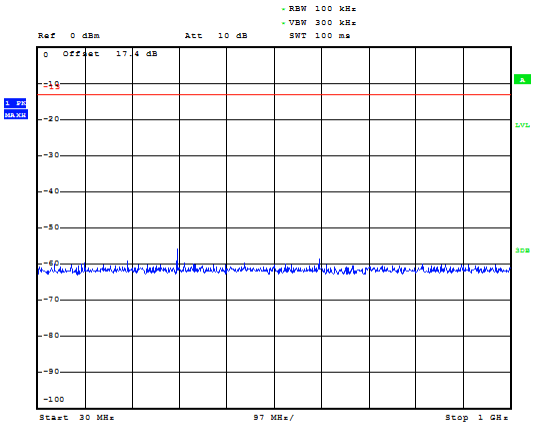
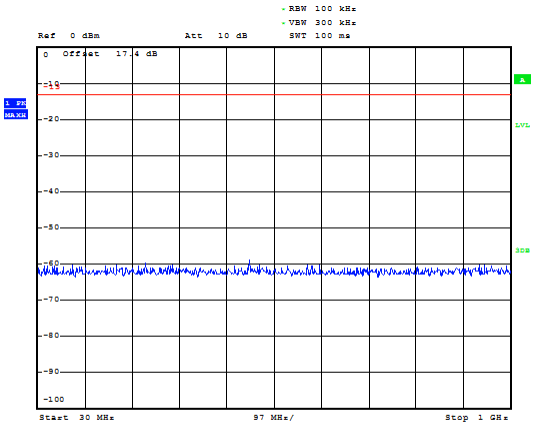
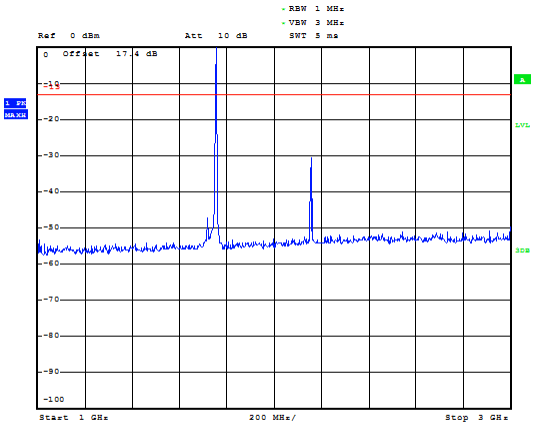
LTE Band 4 1.4MHz CH-High 30MHz~1GHz



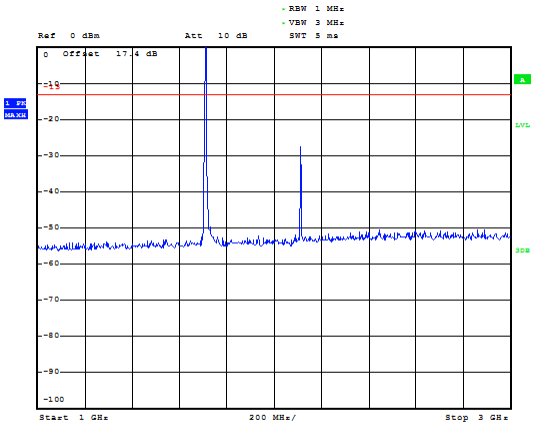

LTE Band 4 3MHz CH-Low 30MHz~1GHz



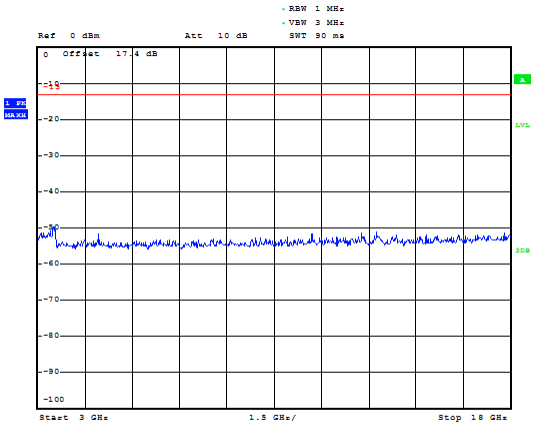

LTE Band 4 1.4MHz CH-High 1GHz~3GHz



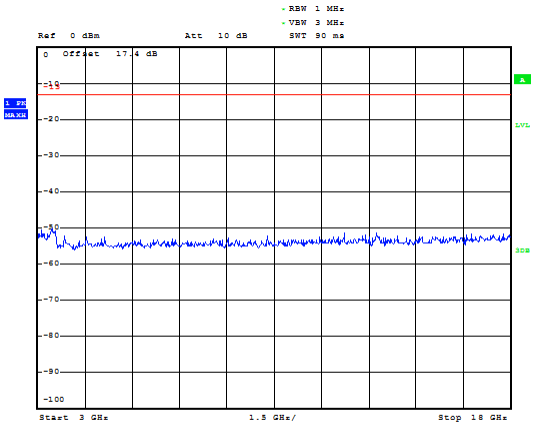

LTE Band 4 3MHz CH-Low 1GHz~3GHz




LTE Band 4 1.4MHz CH-High 3GHz~18GHz




LTE Band 4 3MHz CH-Low 3GHz~18GHz





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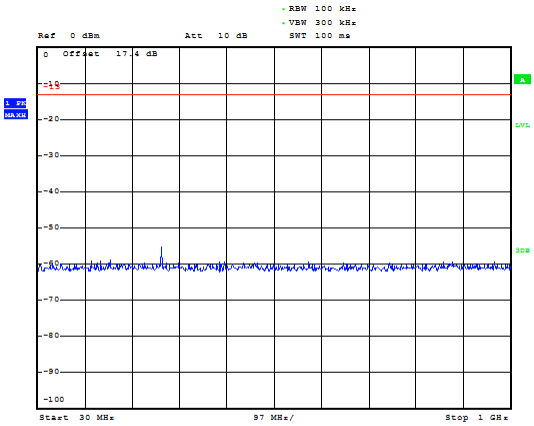
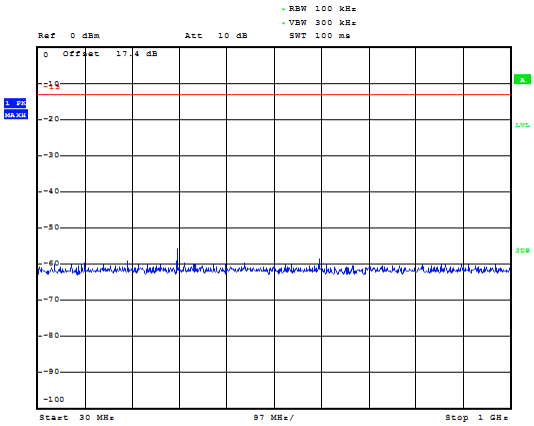
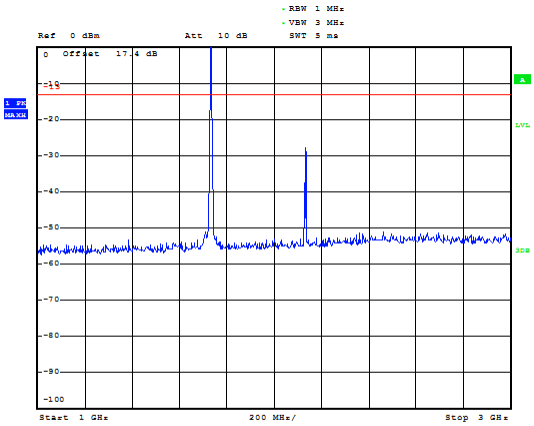
LTE Band 4 3MHz CH-Middle 30MHz~1GHz



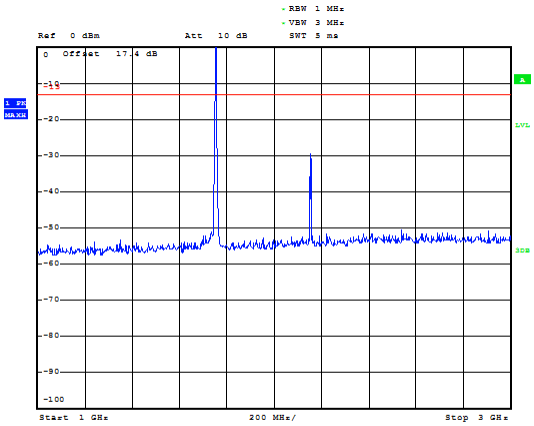

LTE Band 4 3MHz CH-High 30MHz~1GHz



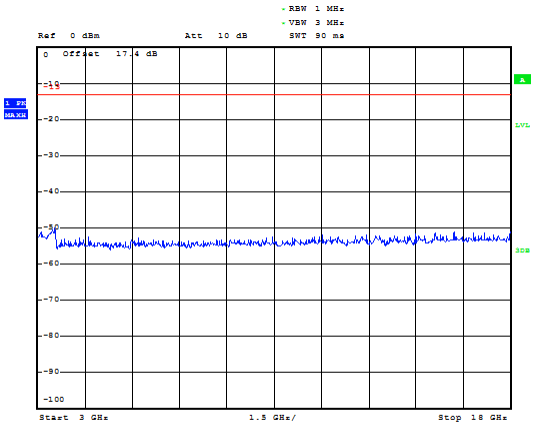

LTE Band 4 3MHz CH-Middle 1GHz~3GHz



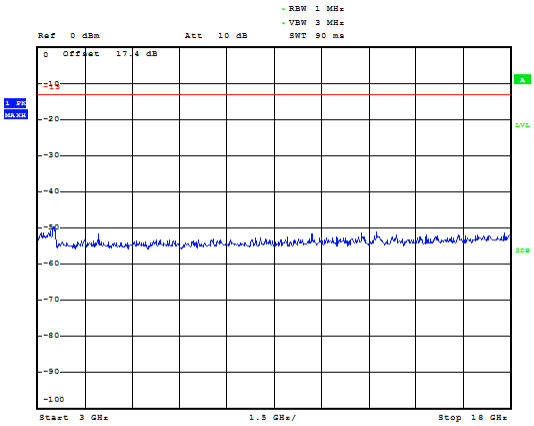

LTE Band 4 3MHz CH-High 1GHz~3GHz




LTE Band 4 3MHz CH-Middle 3GHz~18GHz




LTE Band 4 3MHz CH-High 3GHz~18GHz





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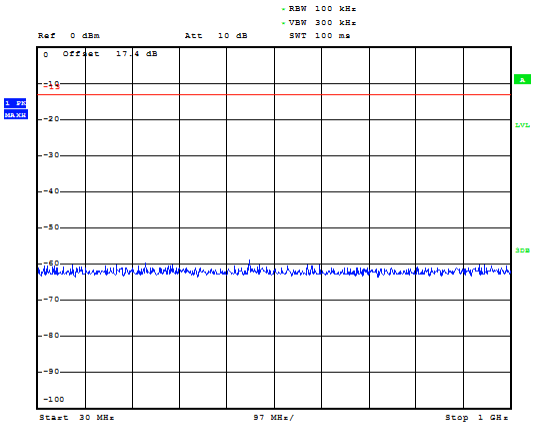
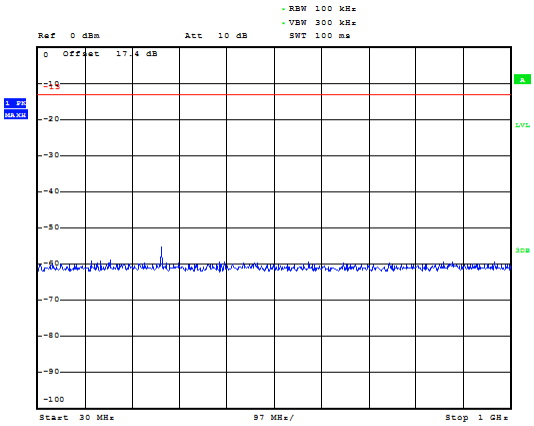
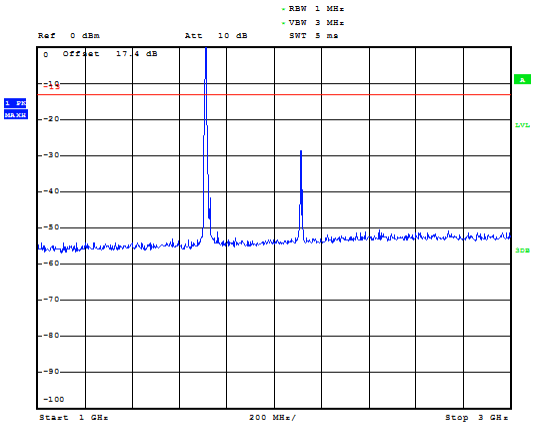
LTE Band 4 5MHz CH-Low 30MHz~1GHz



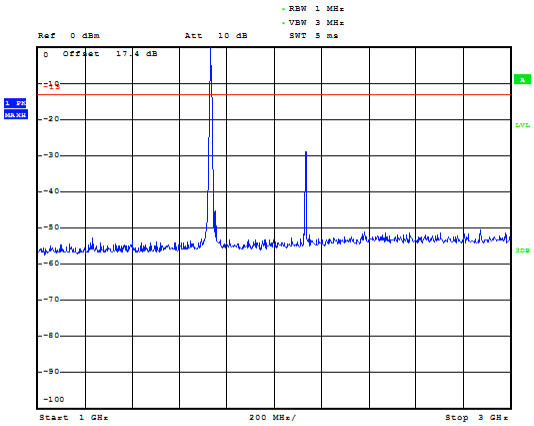

LTE Band 4 5MHz CH-Middle 30MHz~1GHz



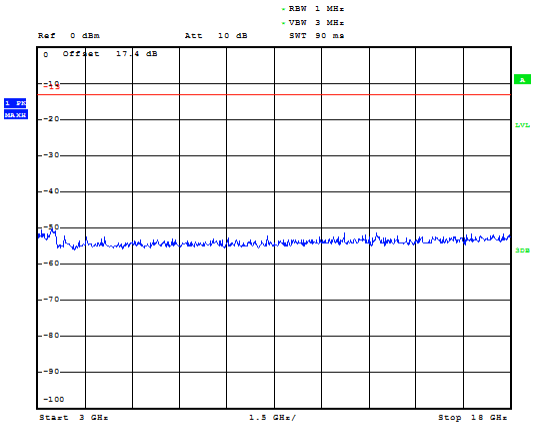

LTE Band 4 5MHz CH-Low 1GHz~3GHz



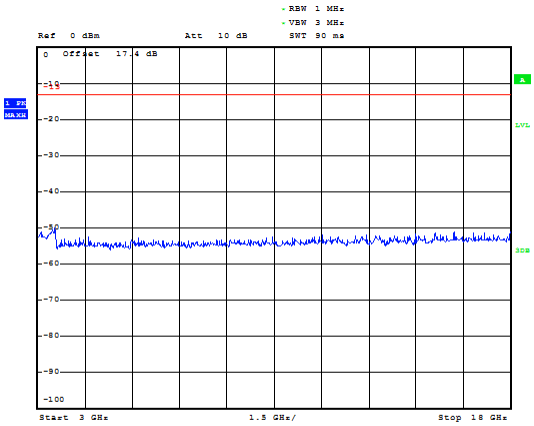

LTE Band 4 5MHz CH-Middle 1GHz~3GHz




LTE Band 4 5MHz CH-Low 3GHz~18GHz




LTE Band 4 5MHz CH-Middle 3GHz~18GHz





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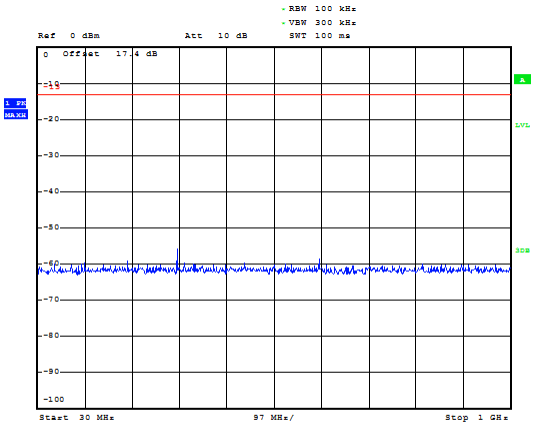
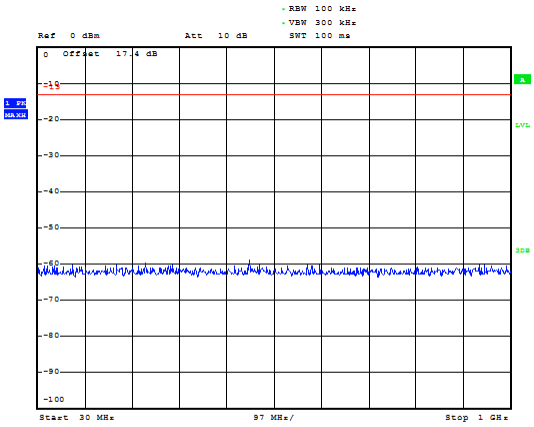
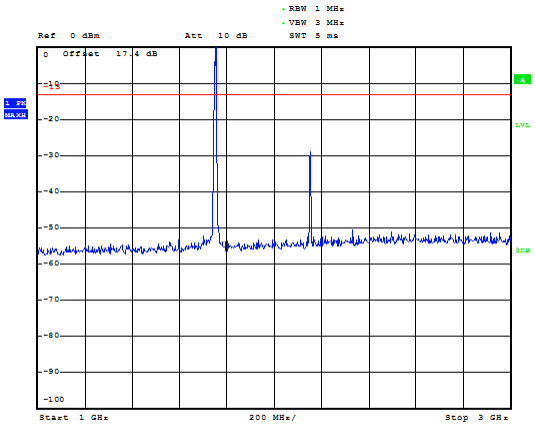
LTE Band 4 5MHz CH-High 30MHz~1GHz



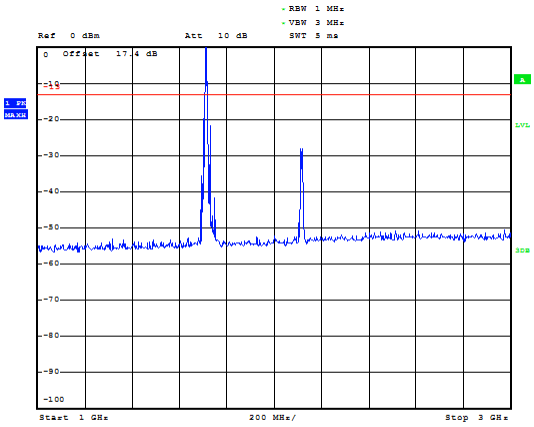

LTE Band 4 10MHz CH-Low 30MHz~1GHz



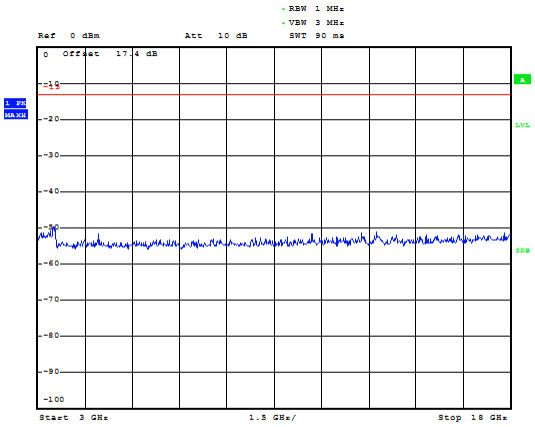

LTE Band 4 5MHz CH-High 1GHz~3GHz



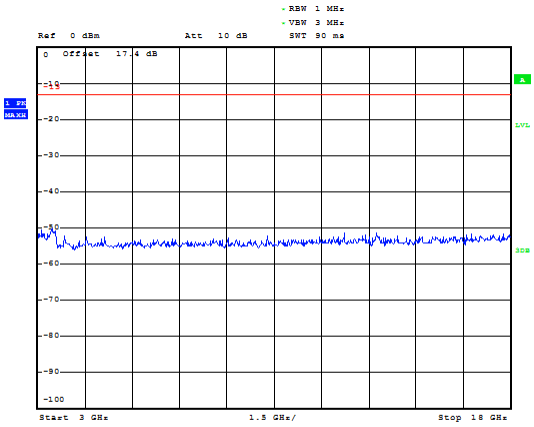

LTE Band 4 10MHz CH-Low 1GHz~3GHz




LTE Band 4 5MHz CH-High 3GHz~18GHz




LTE Band 4 10MHz CH-Low 3GHz~18GHz





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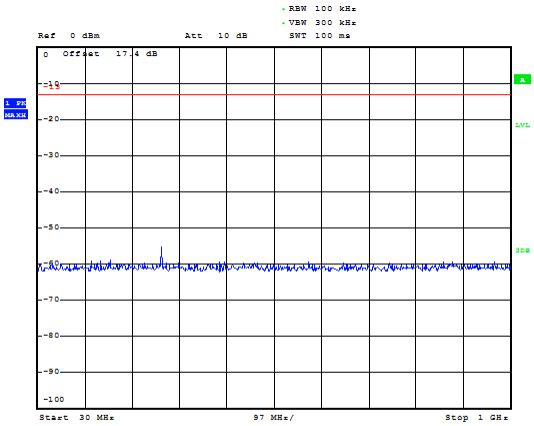
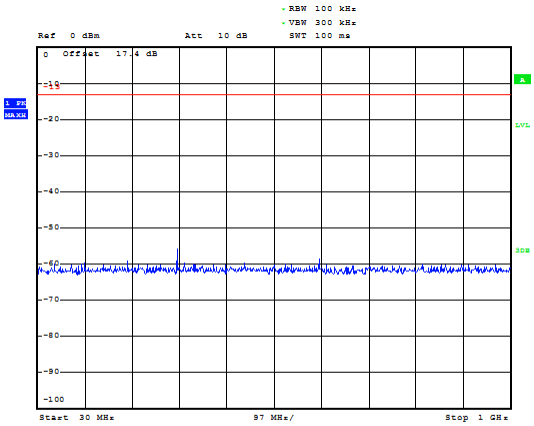
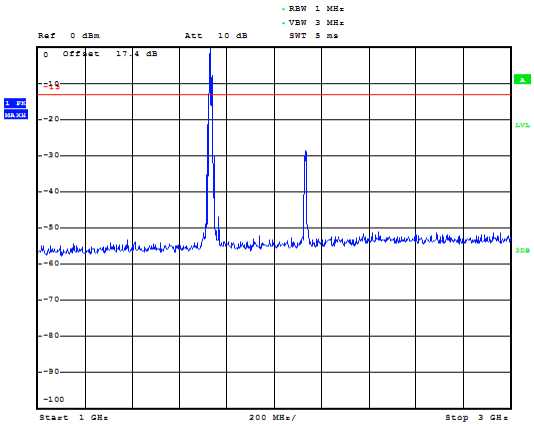
LTE Band 4 10MHz CH-Middle 30MHz~1GHz



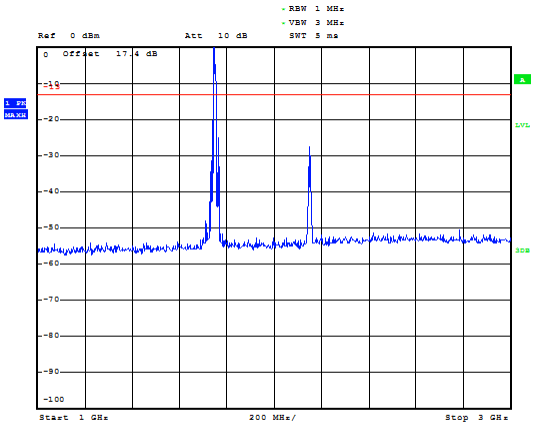

LTE Band 4 10MHz CH-High 30MHz~1GHz



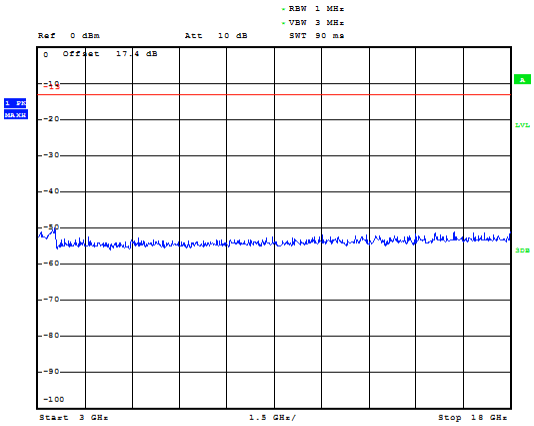

LTE Band 4 10MHz CH-Middle 1GHz~3GHz



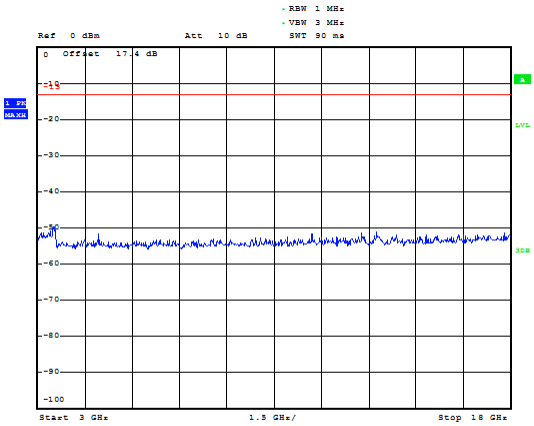

LTE Band 4 10MHz CH-High 1GHz~3GHz




LTE Band 4 10MHz CH-Middle 3GHz~18GHz




LTE Band 4 10MHz CH-High 3GHz~18GHz





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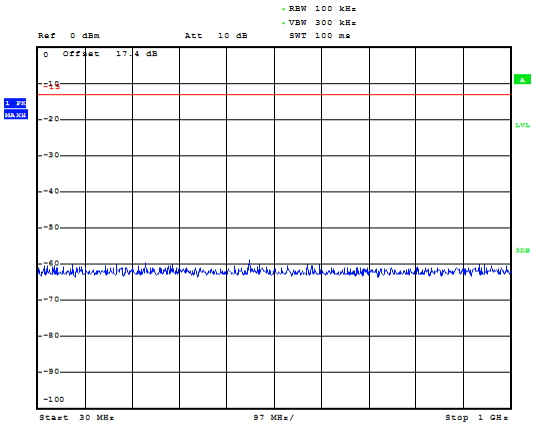
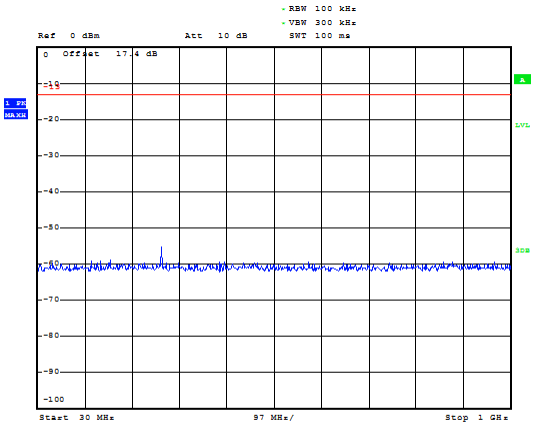
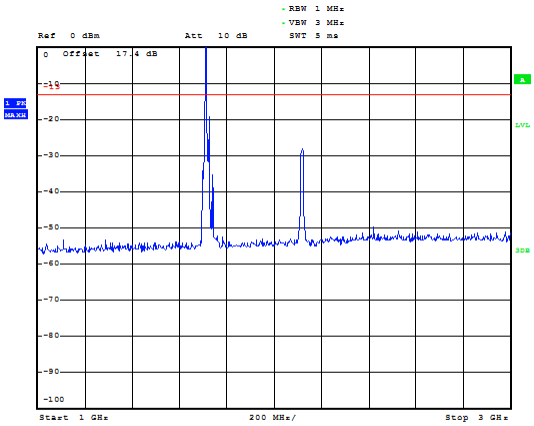
LTE Band 4 15MHz CH-Low 30MHz~1GHz



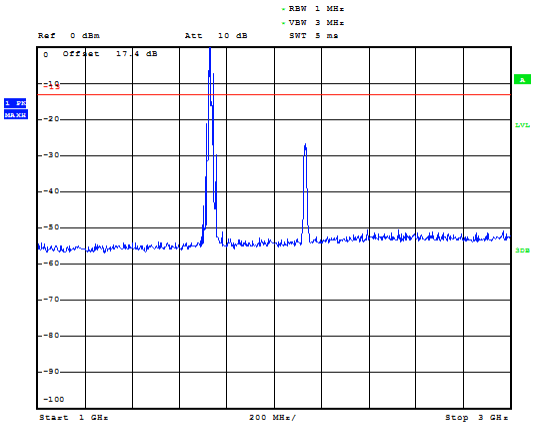

LTE Band 4 15MHz CH-Middle 30MHz~1GHz



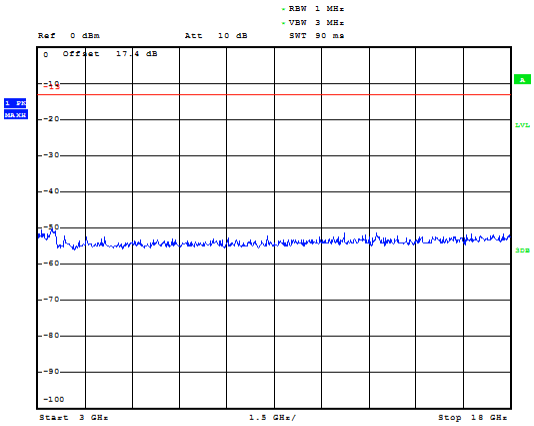

LTE Band 4 15MHz CH-Low 1GHz~3GHz



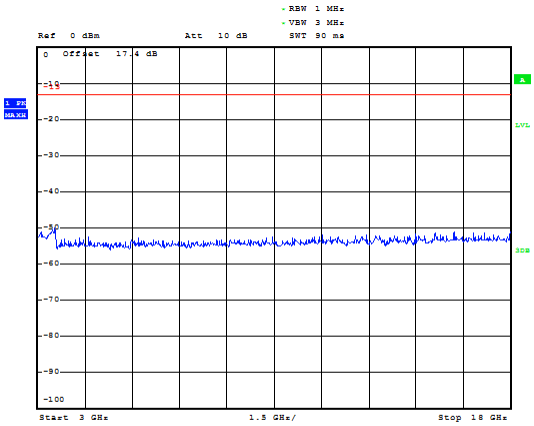

LTE Band 4 15MHz CH-Middle 1GHz~3GHz




LTE Band 4 15MHz CH-Low 3GHz~18GHz




LTE Band 4 15MHz CH-Middle 3GHz~18GHz





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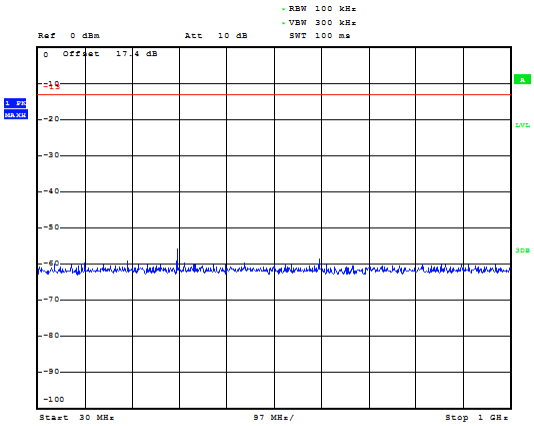
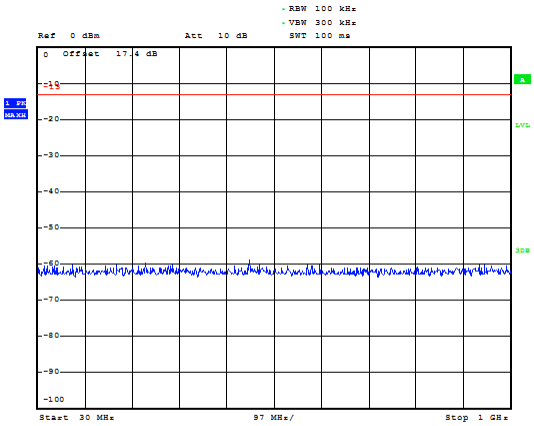
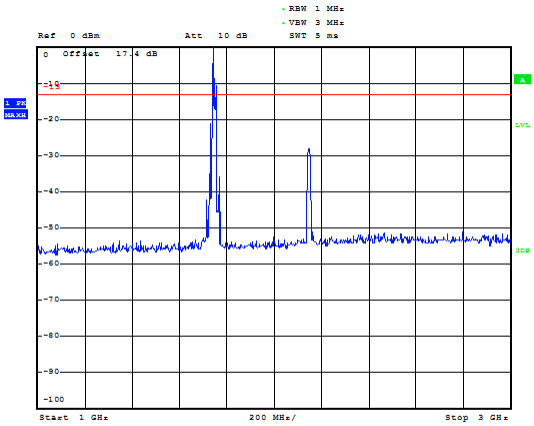
LTE Band 4 15MHz CH-High 30MHz~1GHz



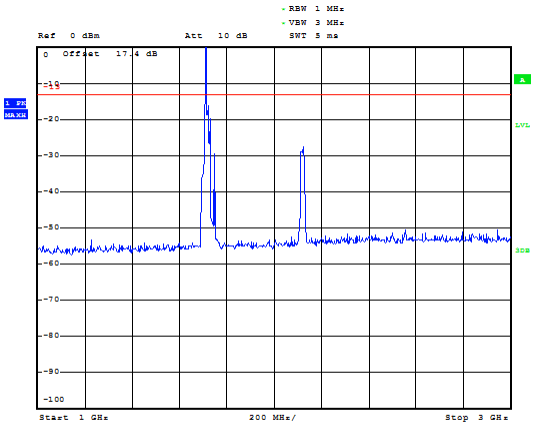

LTE Band 4 20MHz CH-Low 30MHz~1GHz



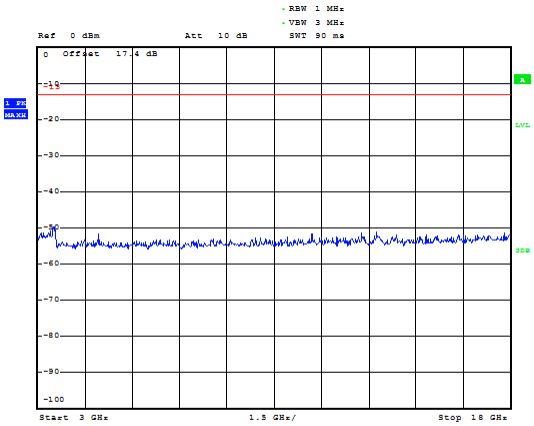

LTE Band 4 15MHz CH-High 1GHz~3GHz



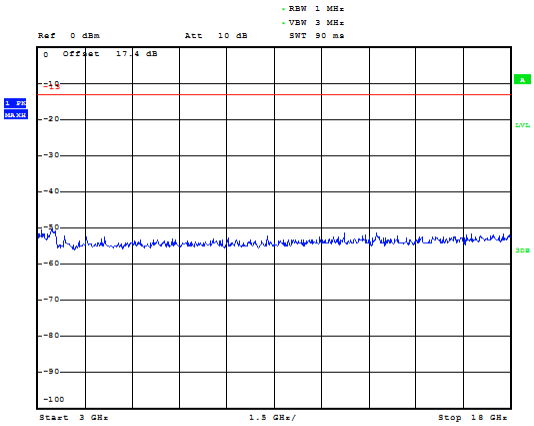

LTE Band 4 20MHz CH-Low 1GHz~3GHz




LTE Band 4 15MHz CH-High 3GHz~18GHz




LTE Band 4 20MHz CH-Low 3GHz~18GHz





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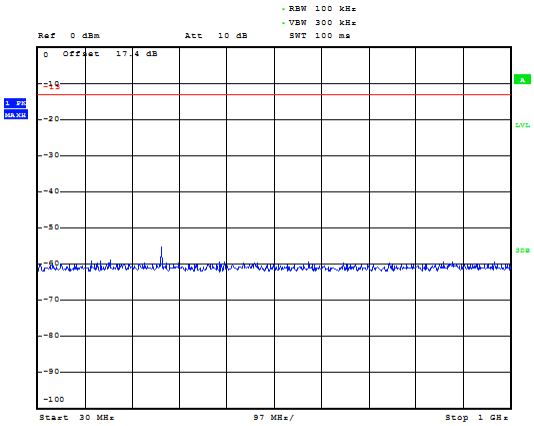
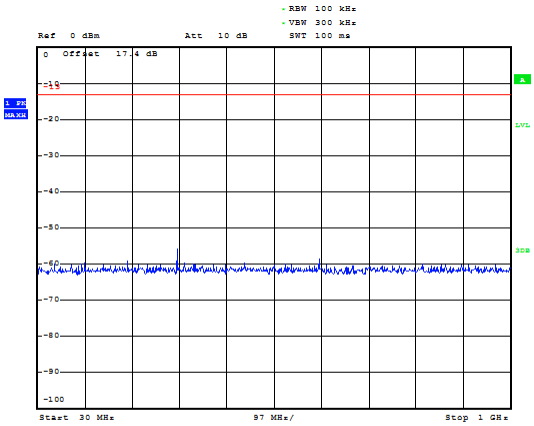
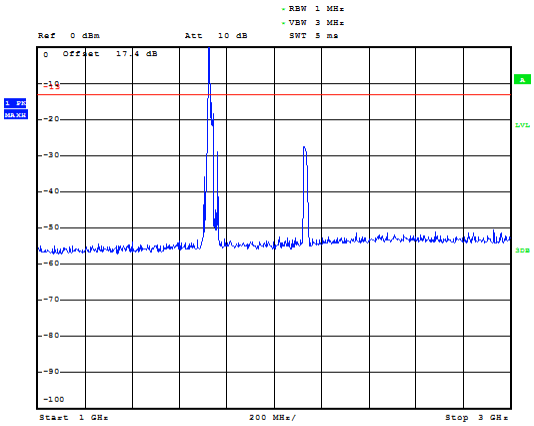
LTE Band 4 20MHz CH-Middle 30MHz~1GHz



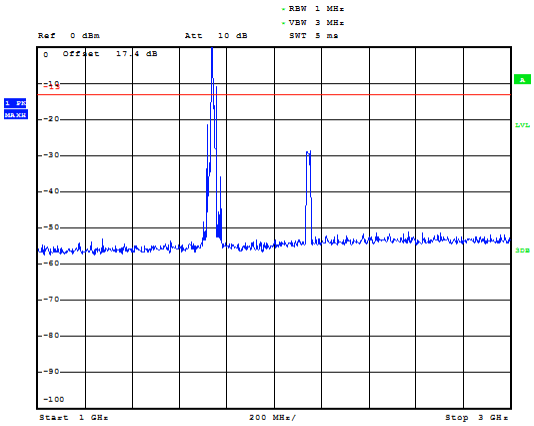

LTE Band 4 20MHz CH-High 30MHz~1GHz



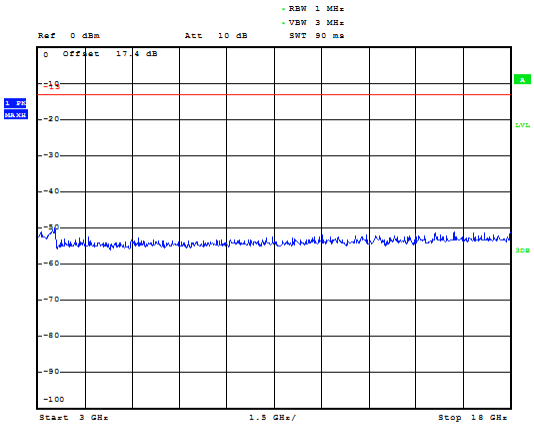

LTE Band 4 20MHz CH-Middle 1GHz~3GHz



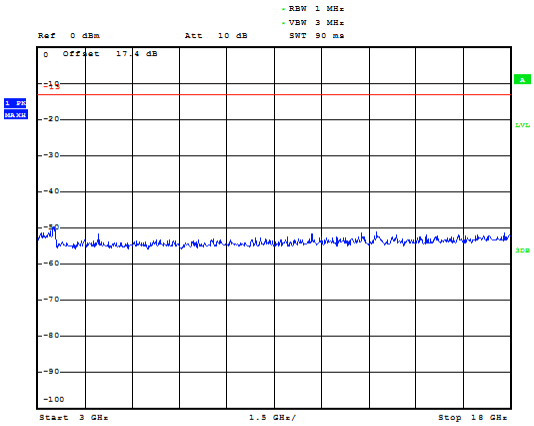

LTE Band 4 20MHz CH-High 1GHz~3GHz




LTE Band 4 20MHz CH-Middle 3GHz~18GHz




LTE Band 4 20MHz CH-High 3GHz~18GHz





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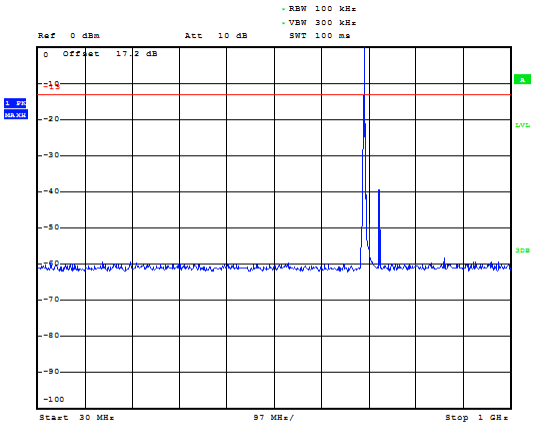
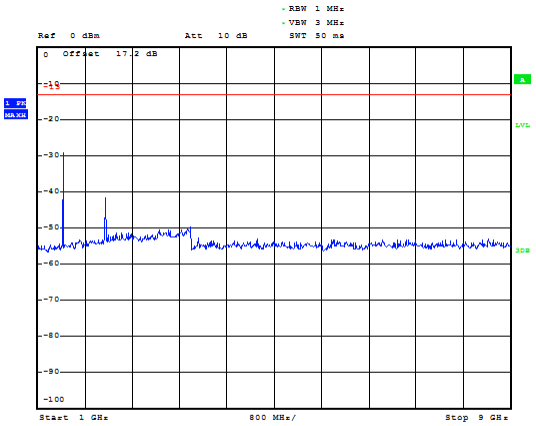
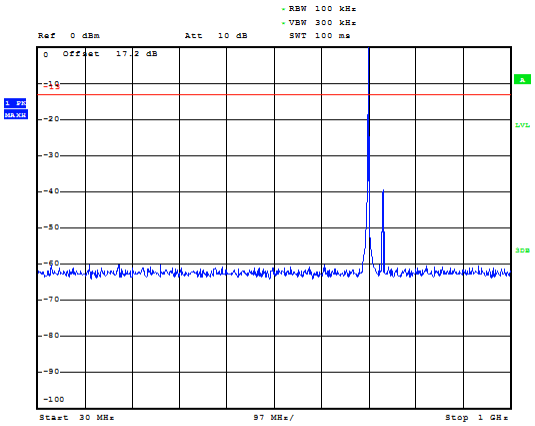
LTE Band 12 1.4MHz CH-Low 30MHz~1GHz



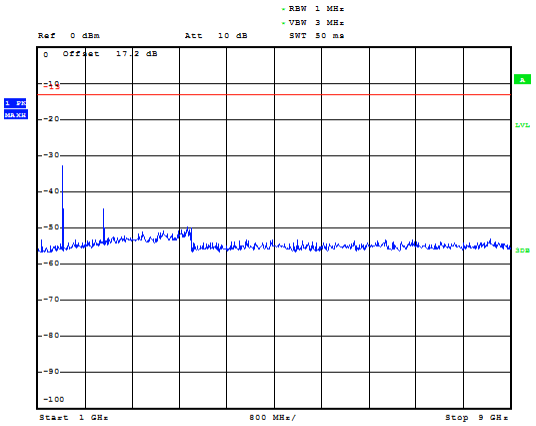

LTE Band 12 1.4MHz CH-Low 1GHz~9GHz



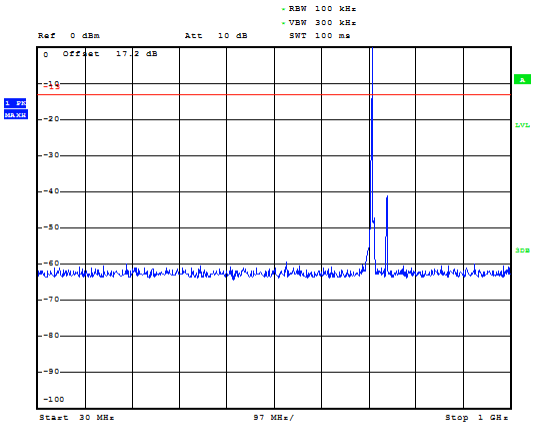

LTE Band 12 1.4MHz CH- Middle 30MHz~1GHz



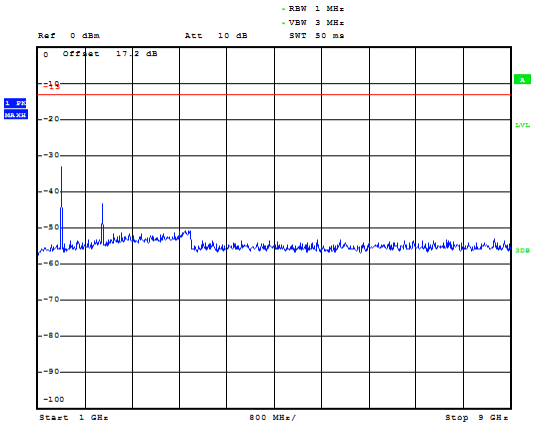

LTE Band 12 1.4MHz CH- Middle 1GHz~9GHz




LTE Band 12 1.4MHz CH-High 30MHz~1GHz




LTE Band 12 1.4MHz CH-High 1GHz~9GHz





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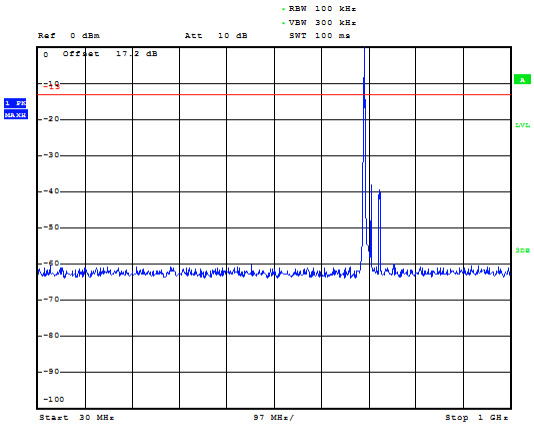
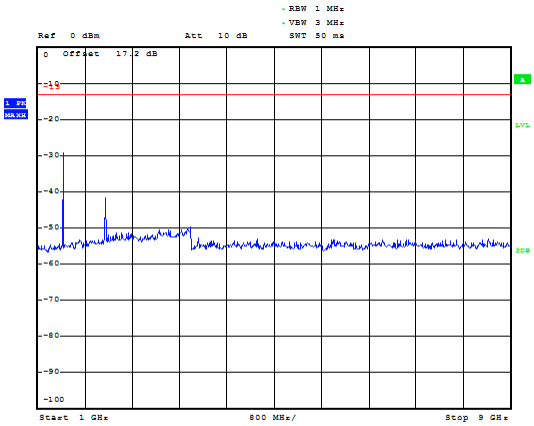
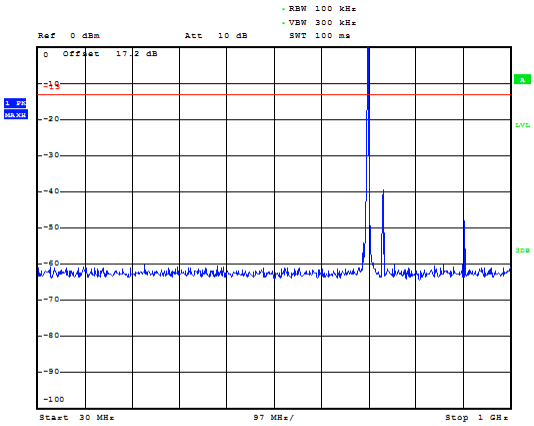
LTE Band 12 3MHz CH-Low 30MHz~1GHz



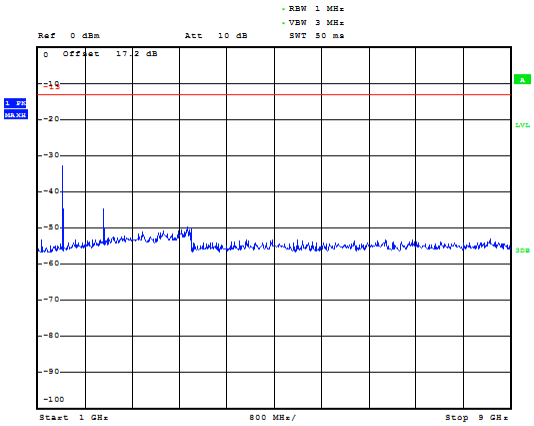

LTE Band 12 3MHz CH-Low 1GHz~9GHz



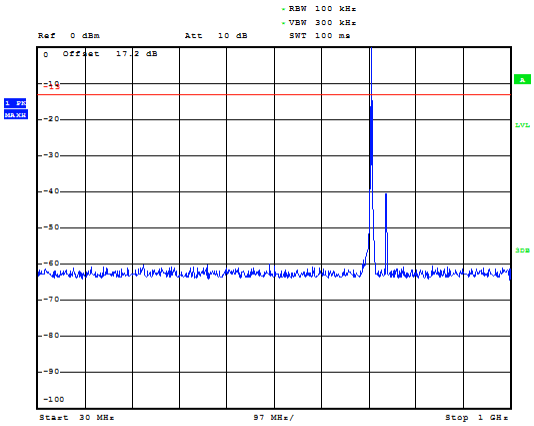

LTE Band 12 3MHz CH- Middle 30MHz~1GHz



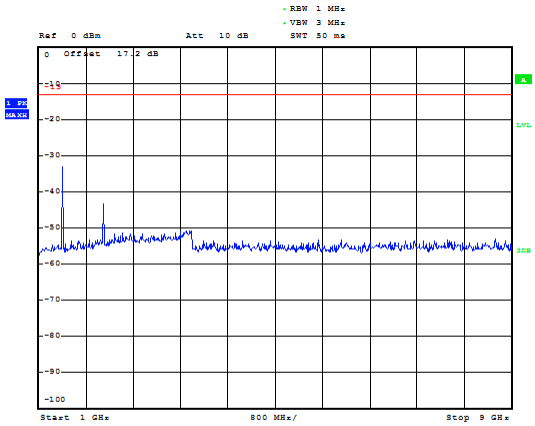

LTE Band 12 3MHz CH- Middle 1GHz~9GHz




LTE Band 12 3MHz CH-High 30MHz~1GHz




LTE Band 12 3MHz CH-High 1GHz~9GHz





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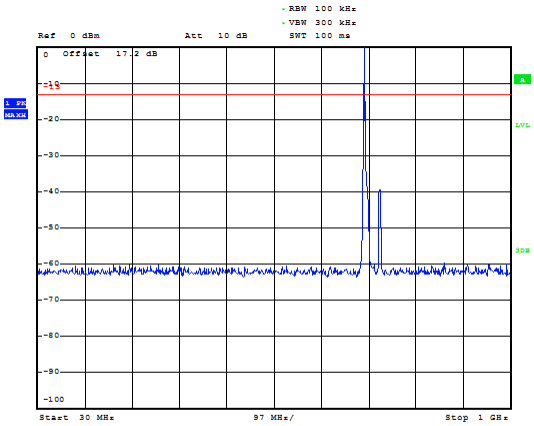
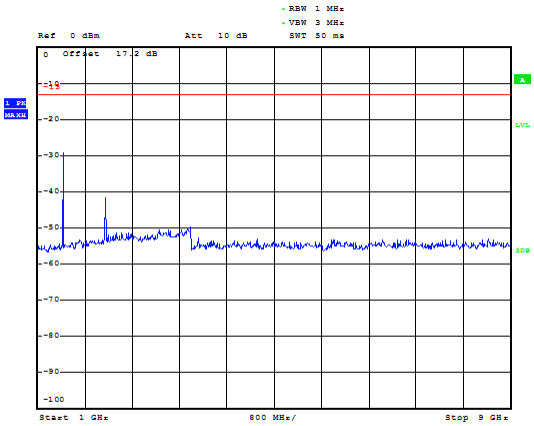
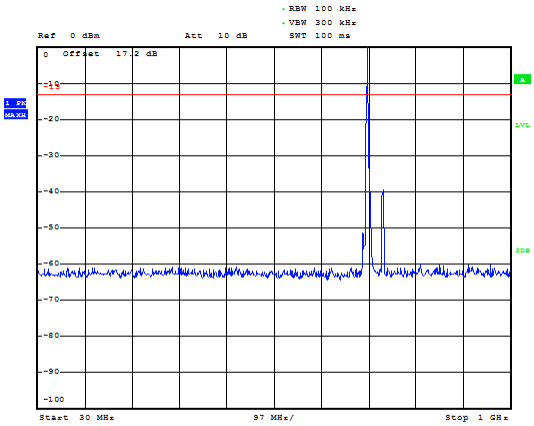
LTE Band 12 5MHz CH-Low 30MHz~1GHz



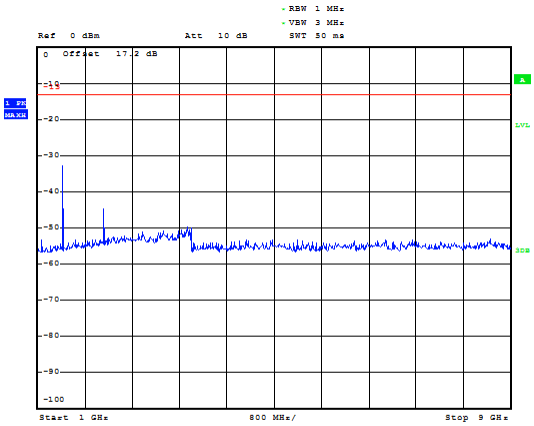

LTE Band 12 5MHz CH-Low 1GHz~9GHz



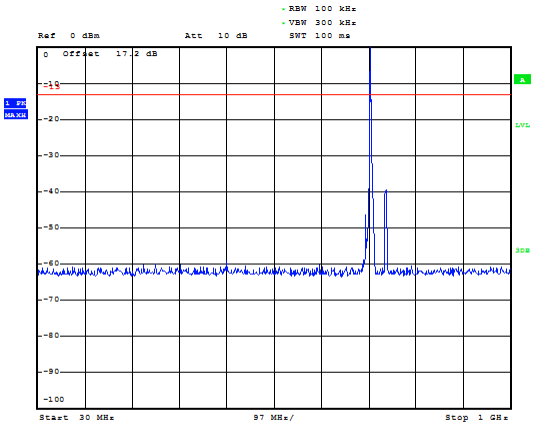

LTE Band 12 5MHz CH- Middle 30MHz~1GHz



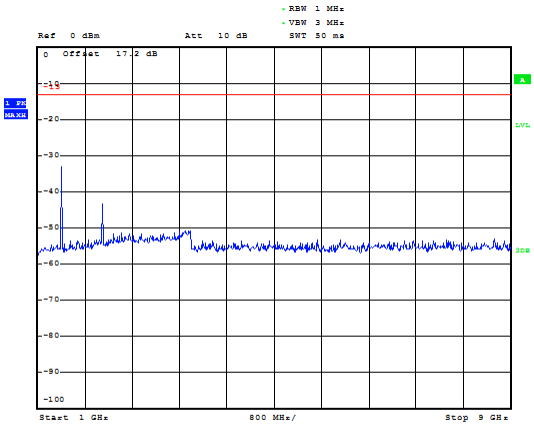

LTE Band 12 5MHz CH- Middle 1GHz~9GHz




LTE Band 12 5MHz CH-High 30MHz~1GHz




LTE Band 12 5MHz CH-High 1GHz~9GHz





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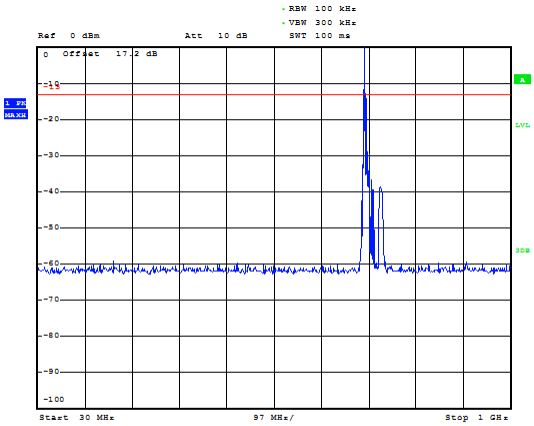
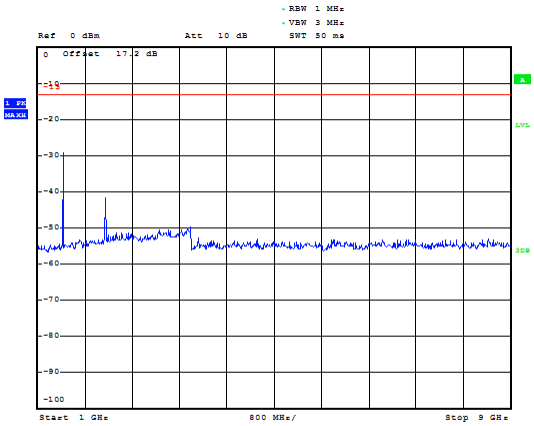
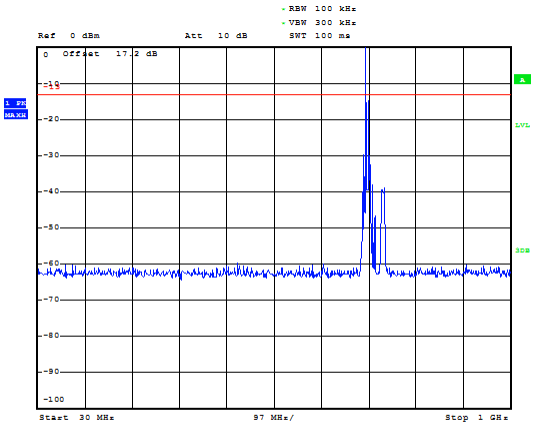
LTE Band 12 10MHz CH-Low 30MHz~1GHz



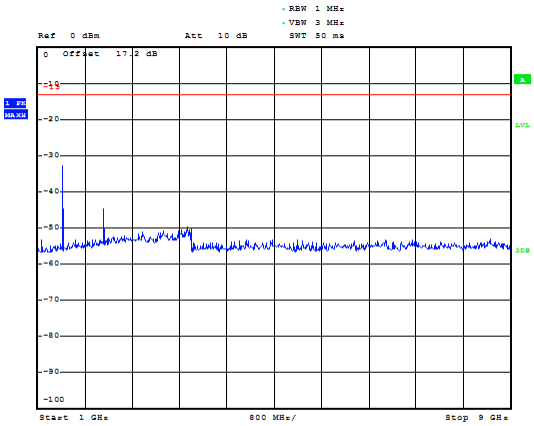

LTE Band 12 10MHz CH-Low 1GHz~9GHz



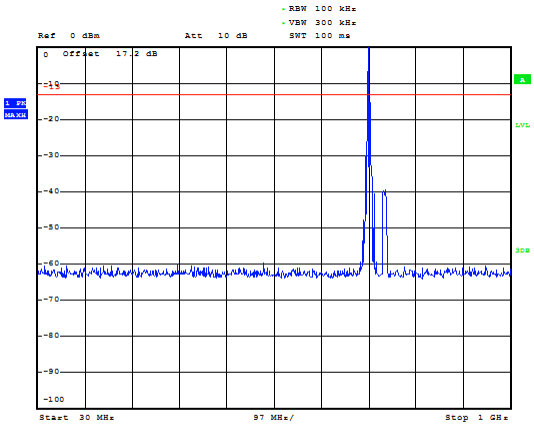

LTE Band 12 10MHz CH- Middle 30MHz~1GHz



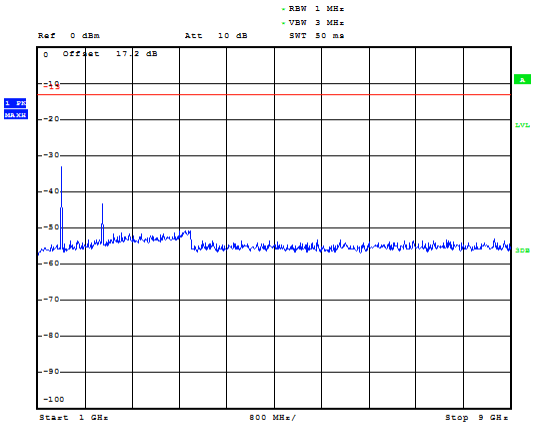

LTE Band 12 10MHz CH- Middle 1GHz~9GHz




LTE Band 12 10MHz CH-High 30MHz~1GHz




LTE Band 12 10MHz CH-High 1GHz~9GHz





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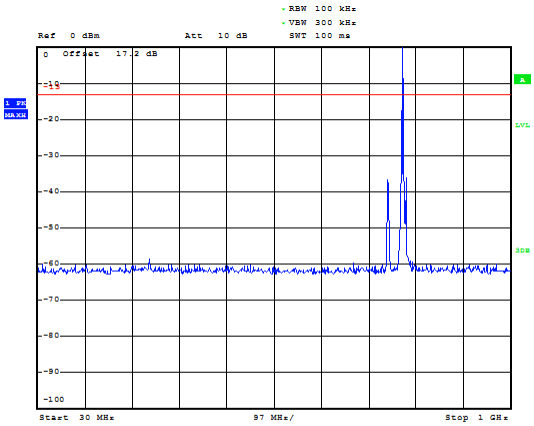
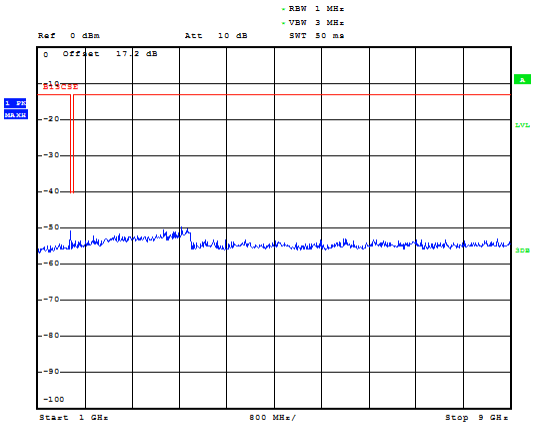
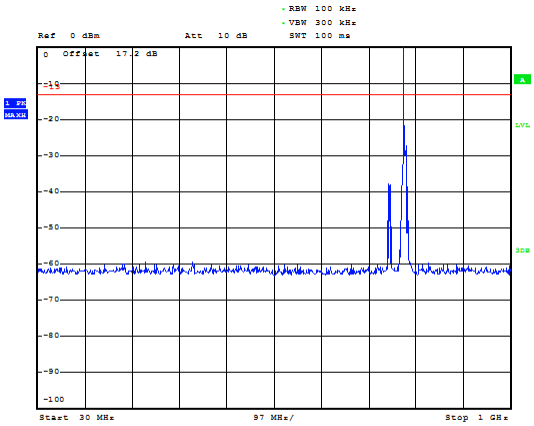
LTE Band 13 5MHz CH-Low 30MHz~1GHz



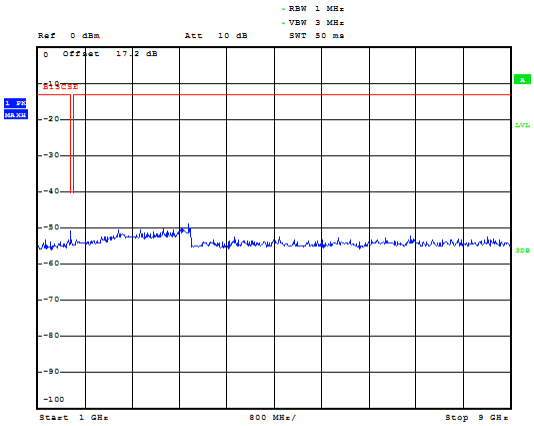

LTE Band 13 5MHz CH-Low 1GHz~9GHz



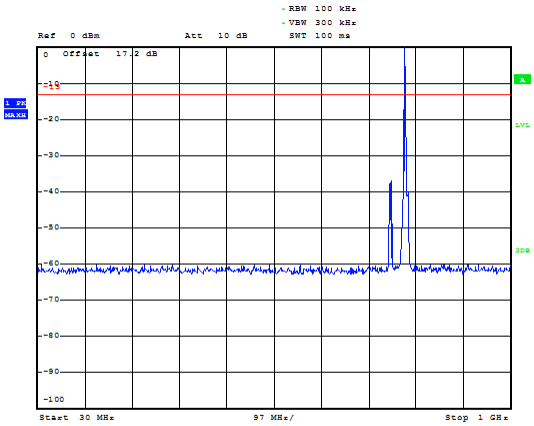

LTE Band 13 5MHz CH-Middle 30MHz~1GHz



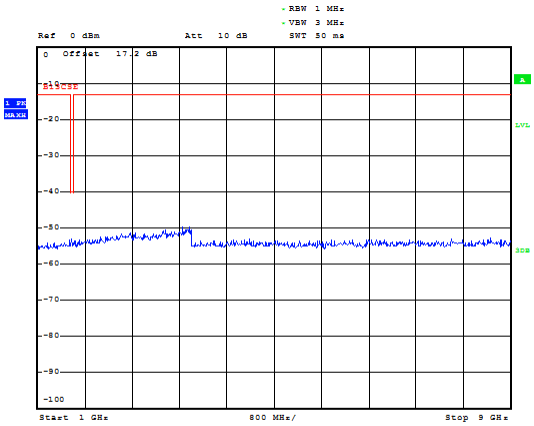

LTE Band 13 5MHz CH-Middle 1GHz~9GHz




LTE Band 13 5MHz CH-High 30MHz~1GHz




LTE Band 13 5MHz CH-High 1GHz~9GHz





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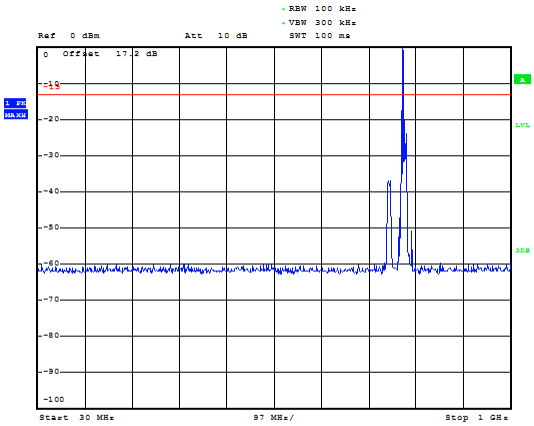
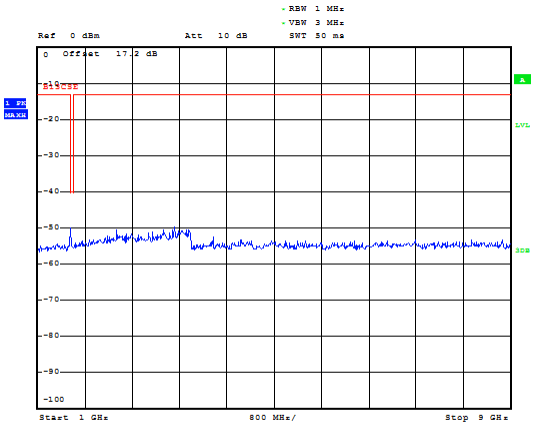
| LTE Band 13 10MHz CH-Middle 30MHz~1GHz | LTE Band 13 10MHz CH-Middle 1GHz~9GHz |
|---|---|
|  |  |

If disturbances were found more than 20dB below limit line, the mark is not required for the EUT. The signal beyond the limit is carrier in the following plots.

| Test Data File Name | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| B12_CHLOW_1.4M_RB1_1-9GHz | 1354.05 | -29.354 | -13 | 16.354 |
| B12_CHMID_1.4M_RB1_1-9GHz | 1363.76 | -32.162 | -13 | 19.162 |
| B12_CHLOW_3M_RB1_1-9GHz | 1359.87 | -29.333 | -13 | 16.333 |
| B12_CHMID_3M_RB1_1-9GHz | 1365.74 | -32.001 | -13 | 19.001 |
| B12_CHHIGH_3M_RB1_1-9GHz | 1384.85 | -32.764 | -13 | 19.764 |
| B12_CHLOW_5M_RB1_1-9GHz | 1366.47 | -28.969 | -13 | 15.969 |
| B12_CHMID_5M_RB1_1-9GHz | 1376.10 | -31.862 | -13 | 18.862 |
| B12_CHHIGH_5M_RB1_1-9GHz | 1388.19 | -32.753 | -13 | 19.753 |
| B12_CHLOW_10M_RB1_1-9GHz | 1372.20 | -29.043 | -13 | 16.043 |
| B12_CHMID_10M_RB1_1-9GHz | 1378.11 | -31.717 | -13 | 18.717 |
| B12_CHHIGH_10M_RB1_1-9GHz | 1397.18 | -32.472 | -13 | 19.472 |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## 5.8 Radiates Spurious Emission

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=200Hz,VBW=600Hz for 9kHz150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz ,RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP


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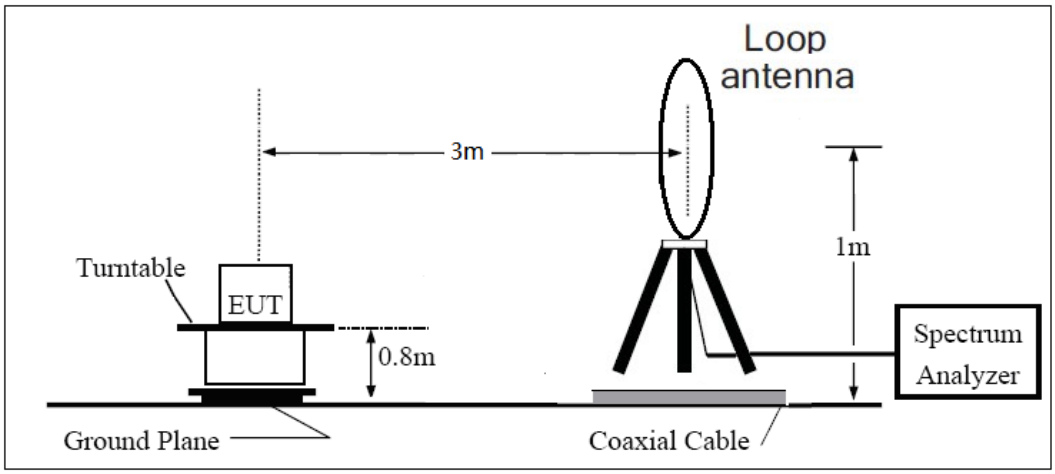
= EIRP-2.15dBi.

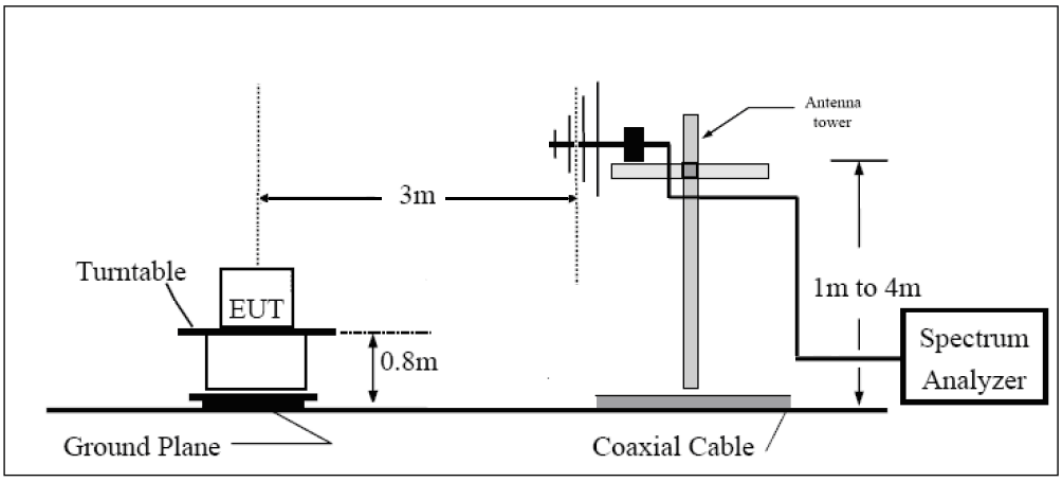
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

**Test setup**

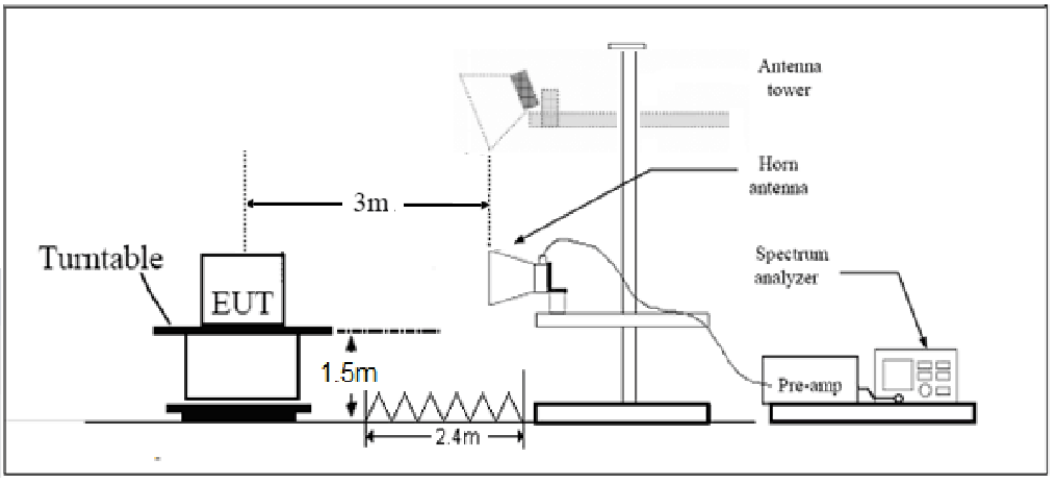
**9KHz ~ 30MHz**




**30MHz ~ 1GHz**




**Above 1GHz**




Note: Area side:2.4mX3.6m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**Limits**

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f)For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

| | | |
|---|---|---|
| Part 27.53(h)(g)Limit | | -13 dBm |
| Part 27.53(f) Limit | Limit out of the band 1559-1610 MHz | -13 dBm |
| | Limit in the band 1559-1610 MHz | -40 dBm |

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor $k$ = ±1.96, $U$= ±3.55 dB.


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**Test Result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

WCDMA Band IV CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3424.8 | -50.46 | 2.6 | 10.15 | Horizontal | -42.91 | -13.00 | 29.91 | 135 |
| 3 | 5137.2 | -52.02 | 2.4 | 11.35 | Horizontal | -43.07 | -13.00 | 30.07 | 180 |
| 4 | 6849.6 | -56.65 | 4.5 | 10.85 | Horizontal | -50.30 | -13.00 | 37.30 | 270 |
| 5 | 8562.0 | -55.04 | 5.1 | 11.35 | Horizontal | -48.79 | -13.00 | 35.79 | 45 |
| 6 | 10274.4 | -51.26 | 5.3 | 11.95 | Horizontal | -44.61 | -13.00 | 31.61 | 315 |
| 7 | 11986.8 | -53.09 | 5.5 | 13.55 | Horizontal | -45.04 | -13.00 | 32.04 | 90 |
| 8 | 13699.2 | -50.92 | 6.3 | 13.75 | Horizontal | -43.47 | -13.00 | 30.47 | 180 |
| 9 | 15411.6 | -54.50 | 6.7 | 13.85 | Horizontal | -47.35 | -13.00 | 34.35 | 135 |
| 10 | 17124.0 | -51.98 | 6.8 | 14.25 | Horizontal | -44.53 | -13.00 | 31.53 | 225 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

WCDMA Band IV CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3465.2 | -48.62 | 2.6 | 10.75 | Horizontal | -40.47 | -13.00 | 27.47 | 45 |
| 3 | 5197.8 | -52.33 | 2.4 | 11.05 | Horizontal | -43.68 | -13.00 | 30.68 | 90 |
| 4 | 6930.4 | -56.81 | 4.5 | 11.15 | Horizontal | -50.16 | -13.00 | 37.16 | 315 |
| 5 | 8663.0 | -55.21 | 5.1 | 11.35 | Horizontal | -48.96 | -13.00 | 35.96 | 225 |
| 6 | 10395.6 | -52.48 | 5.3 | 11.95 | Horizontal | -45.83 | -13.00 | 32.83 | 270 |
| 7 | 12128.2 | -53.37 | 5.5 | 13.55 | Horizontal | -45.32 | -13.00 | 32.32 | 225 |
| 8 | 13860.8 | -51.86 | 6.3 | 13.75 | Horizontal | -44.41 | -13.00 | 31.41 | 45 |
| 9 | 15593.4 | -54.13 | 6.7 | 13.85 | Horizontal | -46.98 | -13.00 | 33.98 | 180 |
| 10 | 17326.0 | -50.85 | 6.8 | 14.25 | Horizontal | -43.40 | -13.00 | 30.40 | 315 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.


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WCDMA Band IV CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3505.2 | -48.28 | 2.6 | 10.15 | Horizontal | -40.73 | -13.00 | 27.73 | 225 |
| 3 | 5254.1 | -55.57 | 2.4 | 11.05 | Horizontal | -46.92 | -13.00 | 33.92 | 45 |
| 4 | 7010.4 | -55.64 | 4.5 | 11.15 | Horizontal | -48.99 | -13.00 | 35.99 | 90 |
| 5 | 8763.0 | -54.29 | 5.1 | 11.35 | Horizontal | -48.04 | -13.00 | 35.04 | 315 |
| 6 | 10515.6 | -53.09 | 5.3 | 11.95 | Horizontal | -46.44 | -13.00 | 33.44 | 270 |
| 7 | 12268.2 | -53.64 | 5.5 | 13.55 | Horizontal | -45.59 | -13.00 | 32.59 | 45 |
| 8 | 14020.8 | -50.60 | 6.3 | 13.75 | Horizontal | -43.15 | -13.00 | 30.15 | 315 |
| 9 | 15773.4 | -53.86 | 6.7 | 13.85 | Horizontal | -46.71 | -13.00 | 33.71 | 90 |
| 10 | 17526.0 | -51.56 | 6.8 | 14.25 | Horizontal | -44.11 | -13.00 | 31.11 | 270 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 4 QPSK 20MHz CH-Low, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3440.0 | -45.18 | 2.6 | 10.15 | Horizontal | -37.63 | -13.00 | 24.63 | 135 |
| 3 | 5133.4 | -45.71 | 2.4 | 11.35 | Horizontal | -36.76 | -13.00 | 23.76 | 270 |
| 4 | 6880.0 | -54.49 | 4.5 | 10.85 | Horizontal | -48.14 | -13.00 | 35.14 | 90 |
| 5 | 8600.0 | -54.53 | 5.1 | 11.35 | Horizontal | -48.28 | -13.00 | 35.28 | 315 |
| 6 | 10320.0 | -52.61 | 5.3 | 11.95 | Horizontal | -45.96 | -13.00 | 32.96 | 45 |
| 7 | 12040.0 | -53.95 | 5.5 | 13.55 | Horizontal | -45.90 | -13.00 | 32.90 | 135 |
| 8 | 13760.0 | -51.44 | 6.3 | 13.75 | Horizontal | -43.99 | -13.00 | 30.99 | 225 |
| 9 | 15480.0 | -53.60 | 6.7 | 13.85 | Horizontal | -46.45 | -13.00 | 33.45 | 180 |
| 10 | 17200.0 | -51.22 | 6.8 | 14.25 | Horizontal | -43.77 | -13.00 | 30.77 | 270 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.


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LTE Band 4 QPSK 20MHz CH-Middle, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3465.0 | -47.38 | 2.6 | 10.75 | Horizontal | -39.23 | -13.00 | 26.23 | 45 |
| 3 | 5170.9 | -48.66 | 2.4 | 11.05 | Horizontal | -40.01 | -13.00 | 27.01 | 225 |
| 4 | 6930.0 | -55.10 | 4.5 | 11.15 | Horizontal | -48.45 | -13.00 | 35.45 | 315 |
| 5 | 8662.5 | -55.20 | 5.1 | 11.35 | Horizontal | -48.95 | -13.00 | 35.95 | 135 |
| 6 | 10395.0 | -52.64 | 5.3 | 11.95 | Horizontal | -45.99 | -13.00 | 32.99 | 90 |
| 7 | 12127.5 | -54.05 | 5.5 | 13.55 | Horizontal | -46.00 | -13.00 | 33.00 | 45 |
| 8 | 13860.0 | -51.37 | 6.3 | 13.75 | Horizontal | -43.92 | -13.00 | 30.92 | 90 |
| 9 | 15592.5 | -54.26 | 6.7 | 13.85 | Horizontal | -47.11 | -13.00 | 34.11 | 90 |
| 10 | 17325.0 | -51.02 | 6.8 | 14.25 | Horizontal | -43.57 | -13.00 | 30.57 | 135 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 4 QPSK 20MHz CH-High, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3472.1 | -45.33 | 2.6 | 10.15 | Horizontal | -37.78 | -13.00 | 24.78 | 315 |
| 3 | 5208.4 | -47.71 | 2.4 | 11.05 | Horizontal | -39.06 | -13.00 | 26.06 | 225 |
| 4 | 6980.0 | -54.52 | 4.5 | 11.15 | Horizontal | -47.87 | -13.00 | 34.87 | 135 |
| 5 | 8725.0 | -54.13 | 5.1 | 11.35 | Horizontal | -47.88 | -13.00 | 34.88 | 270 |
| 6 | 10470.0 | -51.86 | 5.3 | 11.95 | Horizontal | -45.21 | -13.00 | 32.21 | 315 |
| 7 | 12215.0 | -52.57 | 5.5 | 13.55 | Horizontal | -44.52 | -13.00 | 31.52 | 225 |
| 8 | 13960.0 | -51.69 | 6.3 | 13.75 | Horizontal | -44.24 | -13.00 | 31.24 | 270 |
| 9 | 15705.0 | -53.46 | 6.7 | 13.85 | Horizontal | -46.31 | -13.00 | 33.31 | 135 |
| 10 | 17450.0 | -50.43 | 6.8 | 14.25 | Horizontal | -42.98 | -13.00 | 29.98 | 315 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.


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LTE Band 12 QPSK 10MHz CH-Low, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1408.0 | -62.15 | 2.00 | 10.15 | Horizontal | -54.00 | -13.00 | 41.00 | 90 |
| 3 | 2112.0 | -61.99 | 2.51 | 11.35 | Horizontal | -53.15 | -13.00 | 40.15 | 45 |
| 4 | 2816.0 | -61.59 | 4.20 | 10.85 | Horizontal | -54.94 | -13.00 | 41.94 | 90 |
| 5 | 3520.0 | -62.49 | 5.20 | 11.35 | Horizontal | -56.34 | -13.00 | 43.34 | 135 |
| 6 | 4224.0 | -62.55 | 5.50 | 11.95 | Horizontal | -56.10 | -13.00 | 43.10 | 315 |
| 7 | 4928.0 | -62.33 | 5.70 | 13.55 | Horizontal | -54.48 | -13.00 | 41.48 | 270 |
| 8 | 5632.0 | -61.78 | 6.30 | 13.75 | Horizontal | -54.33 | -13.00 | 41.33 | 90 |
| 9 | 6336.0 | -59.07 | 6.80 | 13.85 | Horizontal | -52.02 | -13.00 | 39.02 | 315 |
| 10 | 7040.0 | -56.43 | 6.90 | 14.25 | Horizontal | -49.08 | -13.00 | 36.08 | 45 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 12 QPSK 10MHz CH-Middle, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1415.0 | -63.45 | 2.00 | 10.75 | Horizontal | -56.85 | -13.00 | 43.85 | 90 |
| 3 | 2122.5 | -59.55 | 2.51 | 11.05 | Horizontal | -53.16 | -13.00 | 40.16 | 135 |
| 4 | 2830.0 | -59.42 | 4.20 | 11.15 | Horizontal | -54.62 | -13.00 | 41.62 | 315 |
| 5 | 3537.5 | -61.76 | 5.20 | 11.15 | Horizontal | -57.96 | -13.00 | 44.96 | 135 |
| 6 | 4245.0 | -60.46 | 5.50 | 11.95 | Horizontal | -56.16 | -13.00 | 43.16 | 225 |
| 7 | 4952.5 | -60.52 | 5.70 | 13.55 | Horizontal | -54.82 | -13.00 | 41.82 | 180 |
| 8 | 5660.0 | -59.41 | 6.30 | 13.75 | Horizontal | -54.11 | -13.00 | 41.11 | 270 |
| 9 | 6367.5 | -57.22 | 6.80 | 13.85 | Horizontal | -52.32 | -13.00 | 39.32 | 45 |
| 10 | 7075.0 | -53.82 | 6.90 | 14.25 | Horizontal | -48.62 | -13.00 | 35.62 | 225 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.


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LTE Band 12 QPSK 10MHz CH-High, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1422.0 | -59.81 | 2.00 | 10.15 | Horizontal | -53.81 | -13.00 | 40.81 | 225 |
| 3 | 2133.0 | -57.93 | 2.51 | 11.05 | Horizontal | -51.54 | -13.00 | 38.54 | 135 |
| 4 | 2844.0 | -60.08 | 4.20 | 11.15 | Horizontal | -55.28 | -13.00 | 42.28 | 0 |
| 5 | 3555.0 | -49.05 | 5.20 | 11.15 | Horizontal | -45.25 | -13.00 | 32.25 | 315 |
| 6 | 4266.0 | -59.77 | 5.50 | 11.95 | Horizontal | -55.47 | -13.00 | 42.47 | 135 |
| 7 | 4977.0 | -59.42 | 5.70 | 13.55 | Horizontal | -53.72 | -13.00 | 40.72 | 90 |
| 8 | 5688.0 | -58.96 | 6.30 | 13.75 | Horizontal | -53.66 | -13.00 | 40.66 | 45 |
| 9 | 6399.0 | -56.53 | 6.80 | 13.85 | Horizontal | -51.63 | -13.00 | 38.63 | 0 |
| 10 | 7110.0 | -52.91 | 6.90 | 14.25 | Horizontal | -47.71 | -13.00 | 34.71 | 45 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 13 QPSK 10MHz CH-Low, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1556.5 | -56.78 | 2.00 | 10.15 | Horizontal | -50.78 | -13.00 | 37.78 | 45 |
| 3 | 2346.0 | -48.18 | 2.51 | 11.35 | Horizontal | -41.49 | -13.00 | 28.49 | 135 |
| 4 | 3128.0 | -62.04 | 4.20 | 10.85 | Horizontal | -57.54 | -13.00 | 44.54 | 225 |
| 5 | 3910.0 | -61.67 | 5.20 | 11.35 | Horizontal | -57.67 | -13.00 | 44.67 | 315 |
| 6 | 4692.0 | -60.20 | 5.50 | 11.95 | Horizontal | -55.90 | -13.00 | 42.90 | 135 |
| 7 | 5474.0 | -60.04 | 5.70 | 13.55 | Horizontal | -54.34 | -13.00 | 41.34 | 90 |
| 8 | 6256.0 | -57.68 | 6.30 | 13.75 | Horizontal | -52.38 | -13.00 | 39.38 | 45 |
| 9 | 7038.0 | -54.80 | 6.80 | 13.85 | Horizontal | -49.90 | -13.00 | 36.90 | 0 |
| 10 | 7820.0 | -54.42 | 6.90 | 14.25 | Horizontal | -49.22 | -13.00 | 36.22 | 45 |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.


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LTE Band 13 QPSK 10MHz CH-Middle, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1555.3 | -58.20 | 2.00 | 10.75 | Horizontal | -51.60 | -13.00 | 38.20 | 225 |
| 3 | 2346.0 | -47.88 | 2.51 | 11.05 | Horizontal | -41.49 | -13.00 | 28.49 | 180 |
| 4 | 3128.0 | -62.23 | 4.20 | 11.15 | Horizontal | -57.43 | -13.00 | 44.43 | 45 |
| 5 | 3910.0 | -59.59 | 5.20 | 11.15 | Horizontal | -55.79 | -13.00 | 42.79 | 225 |
| 6 | 4692.0 | -58.98 | 5.50 | 11.95 | Horizontal | -54.68 | -13.00 | 41.68 | 315 |
| 7 | 5474.0 | -60.30 | 5.70 | 13.55 | Horizontal | -54.60 | -13.00 | 41.60 | 135 |
| 8 | 6256.0 | -58.50 | 6.30 | 13.75 | Horizontal | -53.20 | -13.00 | 40.20 | 90 |
| 9 | 7038.0 | -53.86 | 6.80 | 13.85 | Horizontal | -48.96 | -13.00 | 35.96 | 45 |
| 10 | 7820.0 | -53.91 | 6.90 | 14.25 | Horizontal | -48.71 | -13.00 | 35.71 | 0 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

LTE Band 13 QPSK 10MHz CH-High, RB 1

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1564.0 | -57.25 | 2.00 | 10.15 | Horizontal | -51.25 | -40.00 | 11.25 | 270 |
| 3 | 2346.0 | -48.19 | 2.51 | 11.05 | Horizontal | -41.80 | -13.00 | 28.80 | 45 |
| 4 | 3128.0 | -62.04 | 4.20 | 11.15 | Horizontal | -57.24 | -13.00 | 44.24 | 45 |
| 5 | 3910.0 | -59.92 | 5.20 | 11.15 | Horizontal | -56.12 | -13.00 | 43.12 | 90 |
| 6 | 4692.0 | -58.82 | 5.50 | 11.95 | Horizontal | -54.52 | -13.00 | 41.52 | 45 |
| 7 | 5474.0 | -60.39 | 5.70 | 13.55 | Horizontal | -54.69 | -13.00 | 41.69 | 0 |
| 8 | 6256.0 | -58.63 | 6.30 | 13.75 | Horizontal | -53.33 | -13.00 | 40.33 | 45 |
| 9 | 7038.0 | -53.67 | 6.80 | 13.85 | Horizontal | -48.77 | -13.00 | 35.77 | 45 |
| 10 | 7820.0 | -53.91 | 6.90 | 14.25 | Horizontal | -48.71 | -13.00 | 35.71 | 225 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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# 6 Main Test Instruments

**May 25, 2018 ~ June 27, 2018**

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|---|---|---|---|---|---|
| Base Station Simulator | R&S | CMW500 | 113645 | 2018-05-20 | 2019-05-19 |
| Power Splitter | Hua Xiang | SHX-GF2-2-13 | 10120101 | 2018-05-20 | 2019-05-19 |
| Spectrum Analyzer | Key sight | N9010A | MY50210259 | 2018-05-20 | 2019-05-19 |
| Signal Analyzer | R&S | FSV30 | 100815 | 2017-12-17 | 2018-12-16 |
| Signal generator | R&S | SMB 100A | 102594 | 2018-05-20 | 2019-05-19 |
| EMI Test Receiver | R&S | ESCI | 100948 | 2018-05-20 | 2019-05-19 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2014-12-06 | 2019-12-05 |
| Trilog Antenna | SCHWARZBECK | VUBL 9163 | 9163-201 | 2017-11-18 | 2020-11-17 |
| Horn Antenna | R&S | HF907 | 100126 | 2014-12-06 | 2019-12-05 |
| Horn Antenna | ETS-Lindgren | 3160-09 | 00102643 | 2015-01-30 | 2020-01-29 |
| Climatic Chamber | Re Ce | PT-30B | 20101891 | 2015-07-18 | 2018-07-17 |
| RF Cable | Agilent | SMA 15cm | 0001 | NA | NA |
| Preampflier | R&S | SCU18 | 102327 | 2018-05-20 | 2019-05-19 |
| MOB COMMS DC SUPPLY | Keysight | 66319D | MY43004105 | 2018-05-20 | 2019-05-19 |
| Software | R&S | EMC32 | V 8.52.0 | NA | NA |


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**February 16, 2019 ~ March 10, 2019**

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|---|---|---|---|---|---|
| Base Station Simulator | R&S | CMW500 | 113824 | 2018-05-20 | 2019-05-19 |
| Power Splitter | Hua Xiang | SHX-GF2-2-13 | 10120101 | / | / |
| Spectrum Analyzer | Key sight | N9010A | MY50210259 | 2018-05-20 | 2019-05-19 |
| Signal Analyzer | R&S | FSV30 | 100815 | 2018-12-16 | 2019-12-15 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2017-09-26 | 2019-09-25 |
| Trilog Antenna | SCHWARZBECK | VUBL 9163 | 9163-201 | 2017-11-18 | 2019-11-17 |
| Horn Antenna | R&S | HF907 | 100126 | 2018-07-07 | 2020-07-06 |
| Horn Antenna | ETS-Lindgren | 3160-09 | 00102643 | 2018-06-20 | 2020-06-19 |
| Signal generator | R&S | SMB 100A | 102594 | 2018-05-20 | 2019-05-19 |
| Climatic Chamber | ESPEC | SU-242 | 93000506 | 2017-12-17 | 2020-12-16 |
| Preampflier | R&S | SCU18 | 102327 | 2018-05-20 | 2019-05-19 |
| MOB COMMS DC SUPPLY | Keysight | 66319D | MY43004105 | 2018-05-21 | 2019-05-20 |
| RF Cable | Agilent | SMA 15cm | 0001 | / | / |
| Software | R&S | EMC32 | 9.26.0 | / | / |

*******END OF REPORT *******


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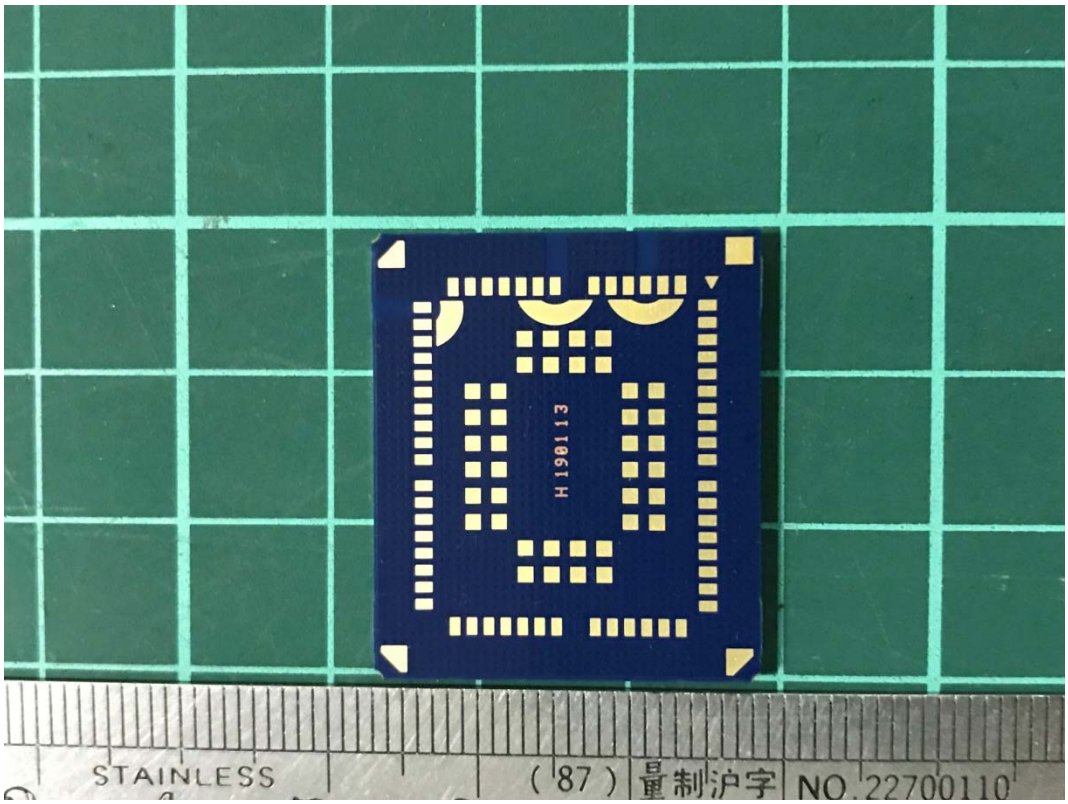
# ANNEX A: EUT Appearance and Test Setup

## A.1 EUT Appearance





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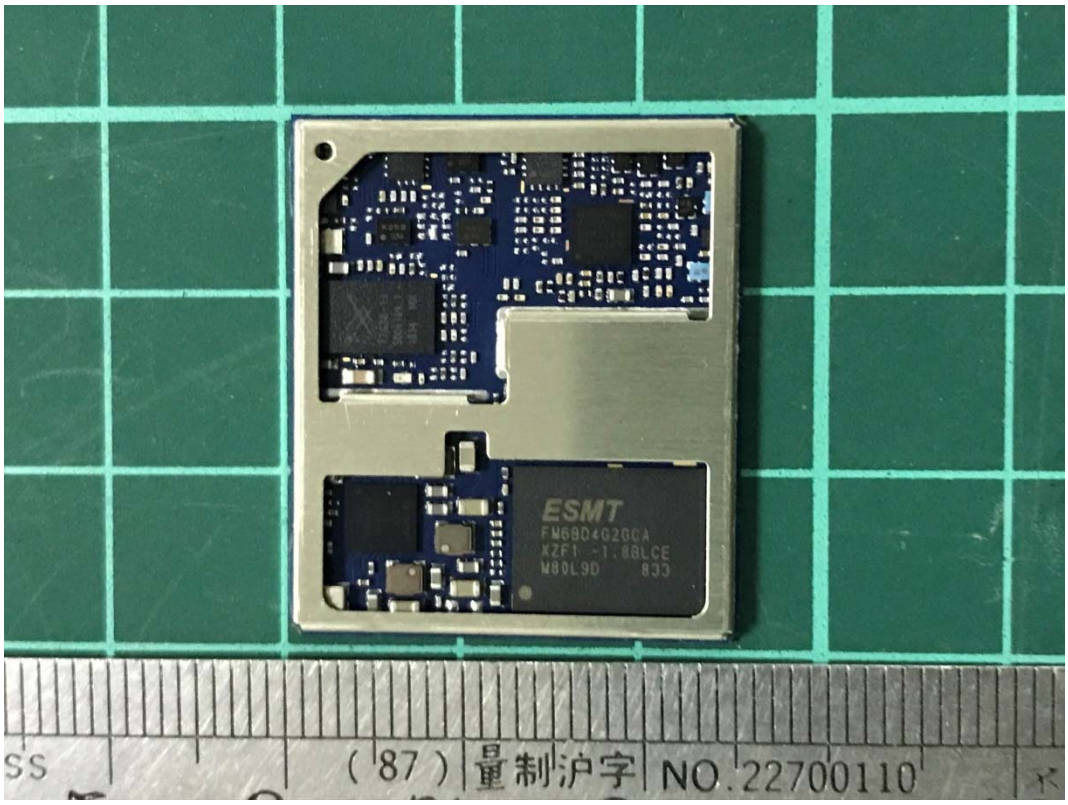


**Picture 1 EUT and Accessory**


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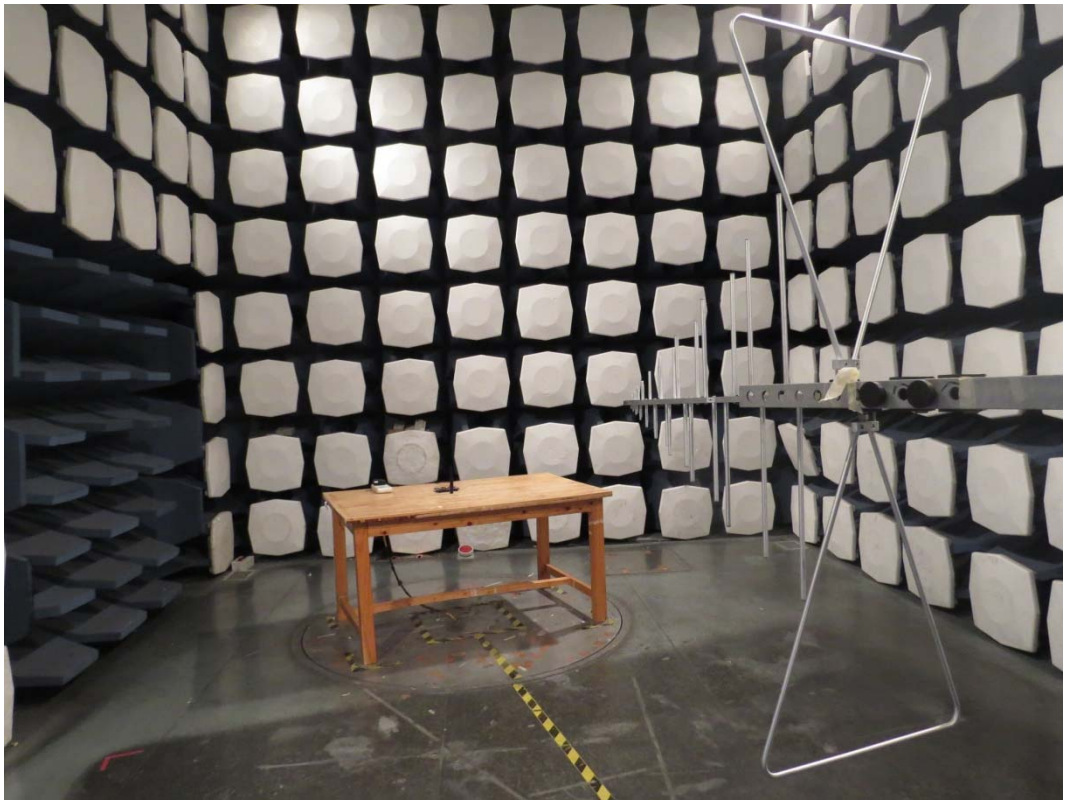
## A.2 Test Setup



**Picture 2 Radiated Spurious Emissions Test setup**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