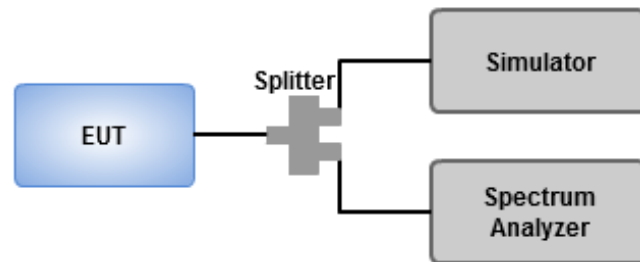


## 3.5 Occupied and 26 dB Bandwidth

### 3.5.1 Test Procedures

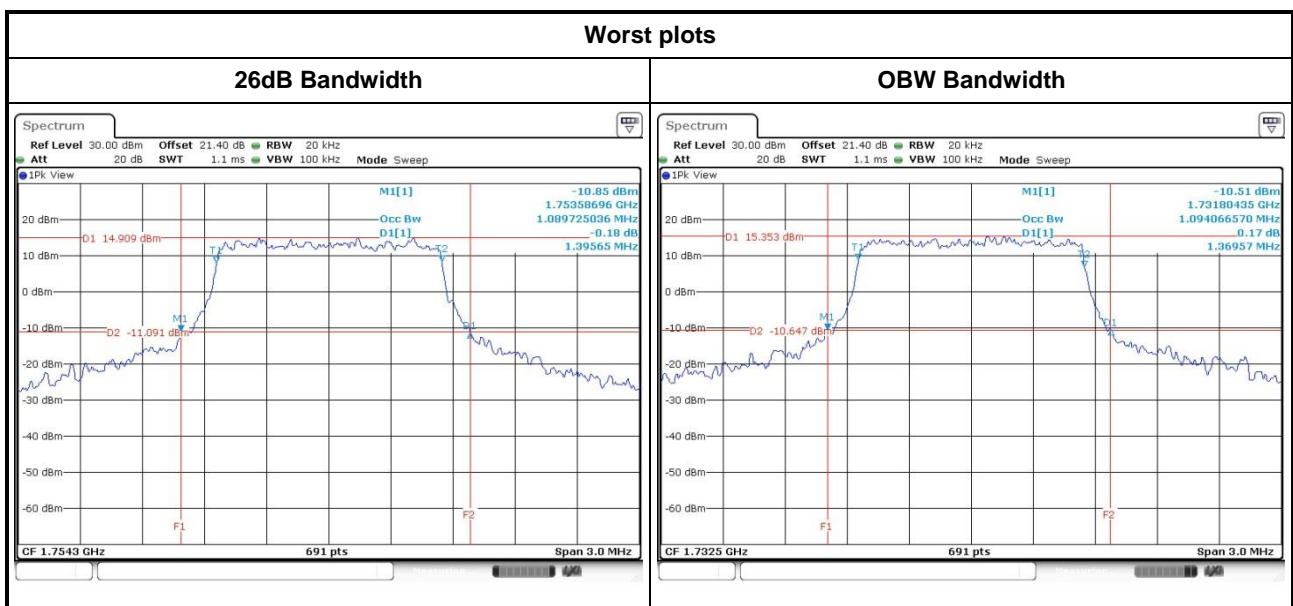
1. Set RBW = 20 / 50 / 100 / 200 / 200 / 300 kHz, VBW = 100 / 200 / 300 / 1000 / 1000 / 1000 kHz for channel bandwidth 1.4 / 3 / 5 / 10 / 15 / 20 MHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Using occupied bandwidth measurement function of spectrum analyzer to measure occupied bandwidth.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 26dB relative to the maximum level measured in the fundamental emission.

### 3.5.2 Test Setup

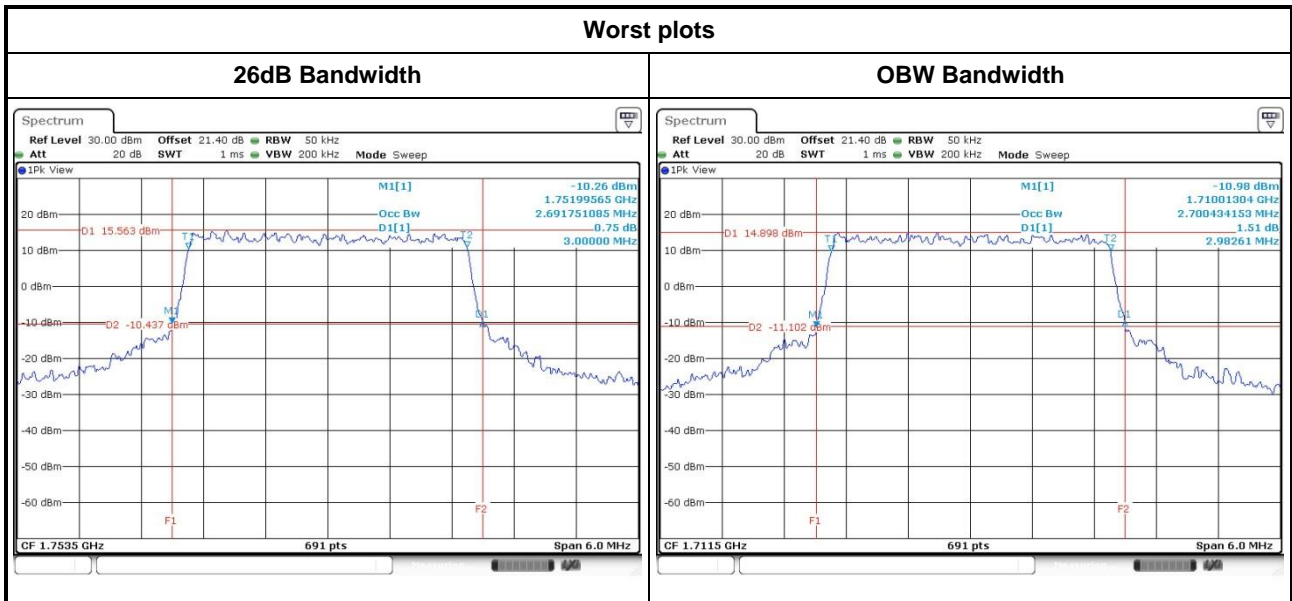


### 3.5.3 Test Result of Occupied Bandwidth

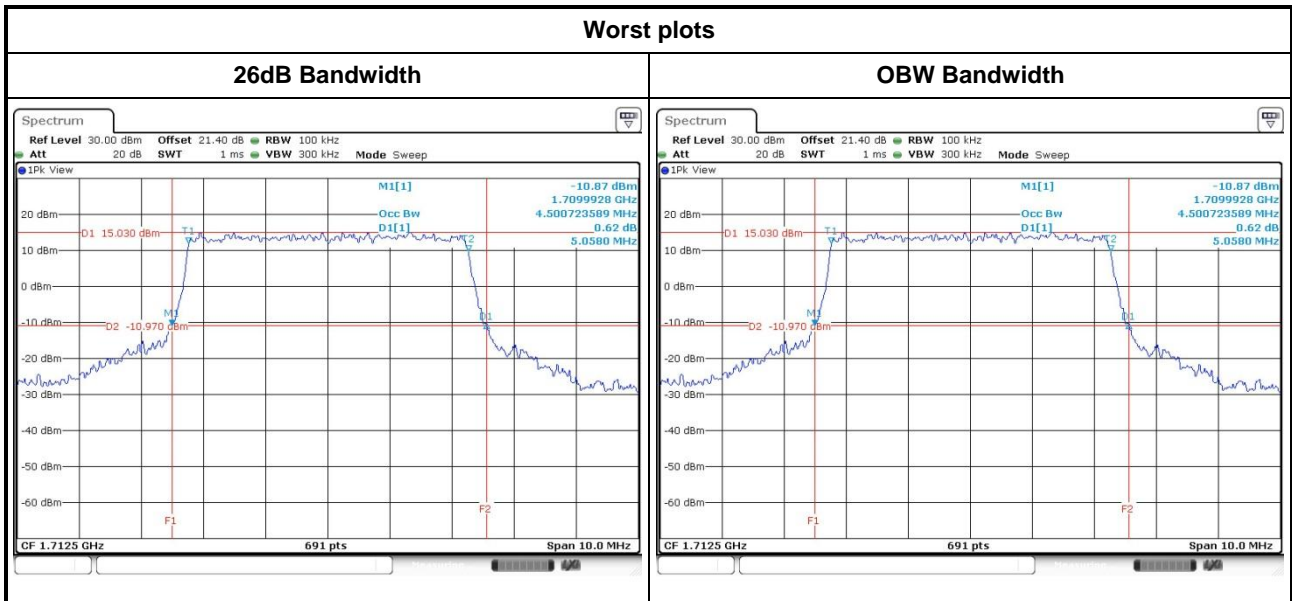
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | 26dB BW (MHz) | 99% OBW (MHz) |
|------------|----------|------------|---------|-----------------|---------------|---------------|
| LTE Band 4 | 1.4      | QPSK       | 19957   | 1710.7          | 1.32609       | 1.0897        |
| LTE Band 4 | 1.4      | QPSK       | 20175   | 1732.5          | 1.36957       | 1.0941        |
| LTE Band 4 | 1.4      | QPSK       | 20393   | 1754.3          | 1.39565       | 1.0897        |
| LTE Band 4 | 1.4      | 16QAM      | 19957   | 1710.7          | 1.33913       | 1.0941        |
| LTE Band 4 | 1.4      | 16QAM      | 20175   | 1732.5          | 1.33913       | 1.0897        |
| LTE Band 4 | 1.4      | 16QAM      | 20393   | 1754.3          | 1.36522       | 1.0941        |



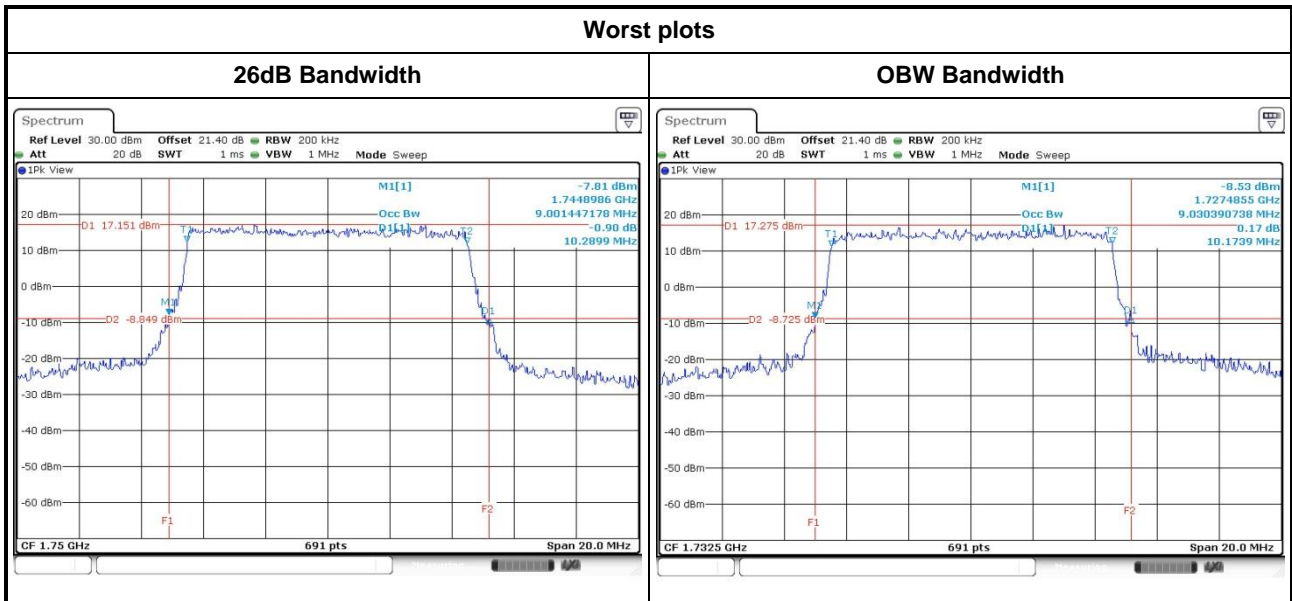
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | 26dB BW (MHz) | 99% OBW (MHz) |
|------------|----------|------------|---------|-----------------|---------------|---------------|
| LTE Band 4 | 3        | QPSK       | 19965   | 1711.5          | 2.9739        | 2.6918        |
| LTE Band 4 | 3        | QPSK       | 20175   | 1732.5          | 2.9565        | 2.6918        |
| LTE Band 4 | 3        | QPSK       | 20385   | 1753.5          | 3.0000        | 2.6918        |
| LTE Band 4 | 3        | 16QAM      | 19965   | 1711.5          | 2.9826        | 2.7004        |
| LTE Band 4 | 3        | 16QAM      | 20175   | 1732.5          | 2.9913        | 2.7004        |
| LTE Band 4 | 3        | 16QAM      | 20385   | 1753.5          | 3.0000        | 2.6918        |



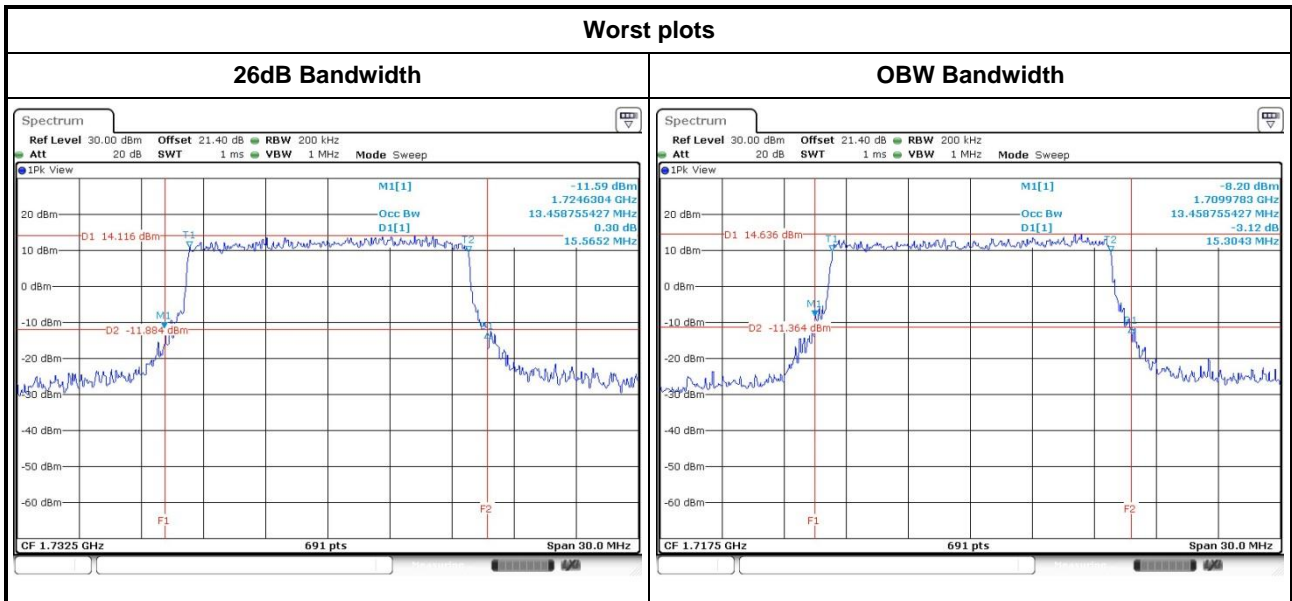
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | 26dB BW (MHz) | 99% OBW (MHz) |
|------------|----------|------------|---------|-----------------|---------------|---------------|
| LTE Band 4 | 5        | QPSK       | 19975   | 1712.5          | 5.0435        | 4.5007        |
| LTE Band 4 | 5        | QPSK       | 20175   | 1732.5          | 5.0435        | 4.5007        |
| LTE Band 4 | 5        | QPSK       | 20375   | 1752.5          | 5.0435        | 4.4862        |
| LTE Band 4 | 5        | 16QAM      | 19975   | 1712.5          | 5.0580        | 4.5007        |
| LTE Band 4 | 5        | 16QAM      | 20175   | 1732.5          | 5.0580        | 4.5007        |
| LTE Band 4 | 5        | 16QAM      | 20375   | 1752.5          | 5.0435        | 4.5007        |



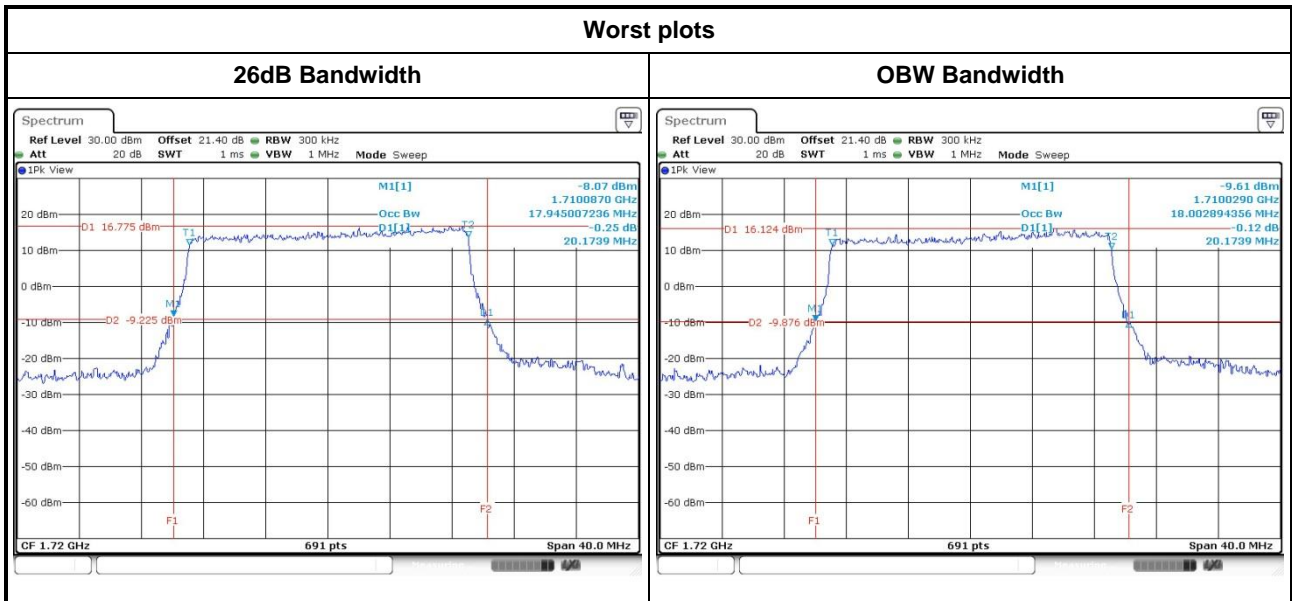
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | 26dB BW (MHz) | 99% OBW (MHz) |
|------------|----------|------------|---------|-----------------|---------------|---------------|
| LTE Band 4 | 10       | QPSK       | 20000   | 1715.0          | 10.2319       | 9.0014        |
| LTE Band 4 | 10       | QPSK       | 20175   | 1732.5          | 10.1739       | 9.0303        |
| LTE Band 4 | 10       | QPSK       | 20350   | 1750.0          | 10.2899       | 9.0014        |
| LTE Band 4 | 10       | 16QAM      | 20000   | 1715.0          | 10.2029       | 9.0014        |
| LTE Band 4 | 10       | 16QAM      | 20175   | 1732.5          | 9.9710        | 9.0014        |
| LTE Band 4 | 10       | 16QAM      | 20350   | 1750.0          | 10.1739       | 8.9725        |



| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | 26dB BW (MHz) | 99% OBW (MHz) |
|------------|----------|------------|---------|-----------------|---------------|---------------|
| LTE Band 4 | 15       | QPSK       | 20025   | 1717.5          | 15.3478       | 13.4153       |
| LTE Band 4 | 15       | QPSK       | 20175   | 1732.5          | 15.2174       | 13.4153       |
| LTE Band 4 | 15       | QPSK       | 20325   | 1747.5          | 15.3043       | 13.4587       |
| LTE Band 4 | 15       | 16QAM      | 20025   | 1717.5          | 15.3043       | 13.4587       |
| LTE Band 4 | 15       | 16QAM      | 20175   | 1732.5          | 15.5652       | 13.4587       |
| LTE Band 4 | 15       | 16QAM      | 20325   | 1747.5          | 15.3478       | 13.4153       |



| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | 26dB BW (MHz) | 99% OBW (MHz) |
|------------|----------|------------|---------|-----------------|---------------|---------------|
| LTE Band 4 | 20       | QPSK       | 20050   | 1720.0          | 20.1739       | 17.9450       |
| LTE Band 4 | 20       | QPSK       | 20175   | 1732.5          | 20.1739       | 17.9450       |
| LTE Band 4 | 20       | QPSK       | 20300   | 1745.0          | 20.0000       | 17.9450       |
| LTE Band 4 | 20       | 16QAM      | 20050   | 1720.0          | 20.1739       | 18.0029       |
| LTE Band 4 | 20       | 16QAM      | 20175   | 1732.5          | 20.0580       | 17.8871       |
| LTE Band 4 | 20       | 16QAM      | 20300   | 1745.0          | 19.8841       | 18.0028       |



## 3.6 Peak to Average Ratio

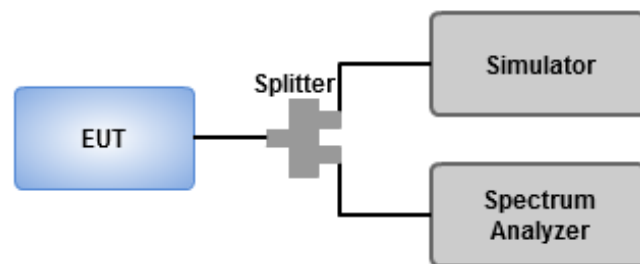
### 3.6.1 Limit of Peak to Average Ratio

The Peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 3.6.2 Test Procedures

1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Set the measurement interval to 1 ms.
4. Record the maximum PAPR level associated with a probability of 0.1%.

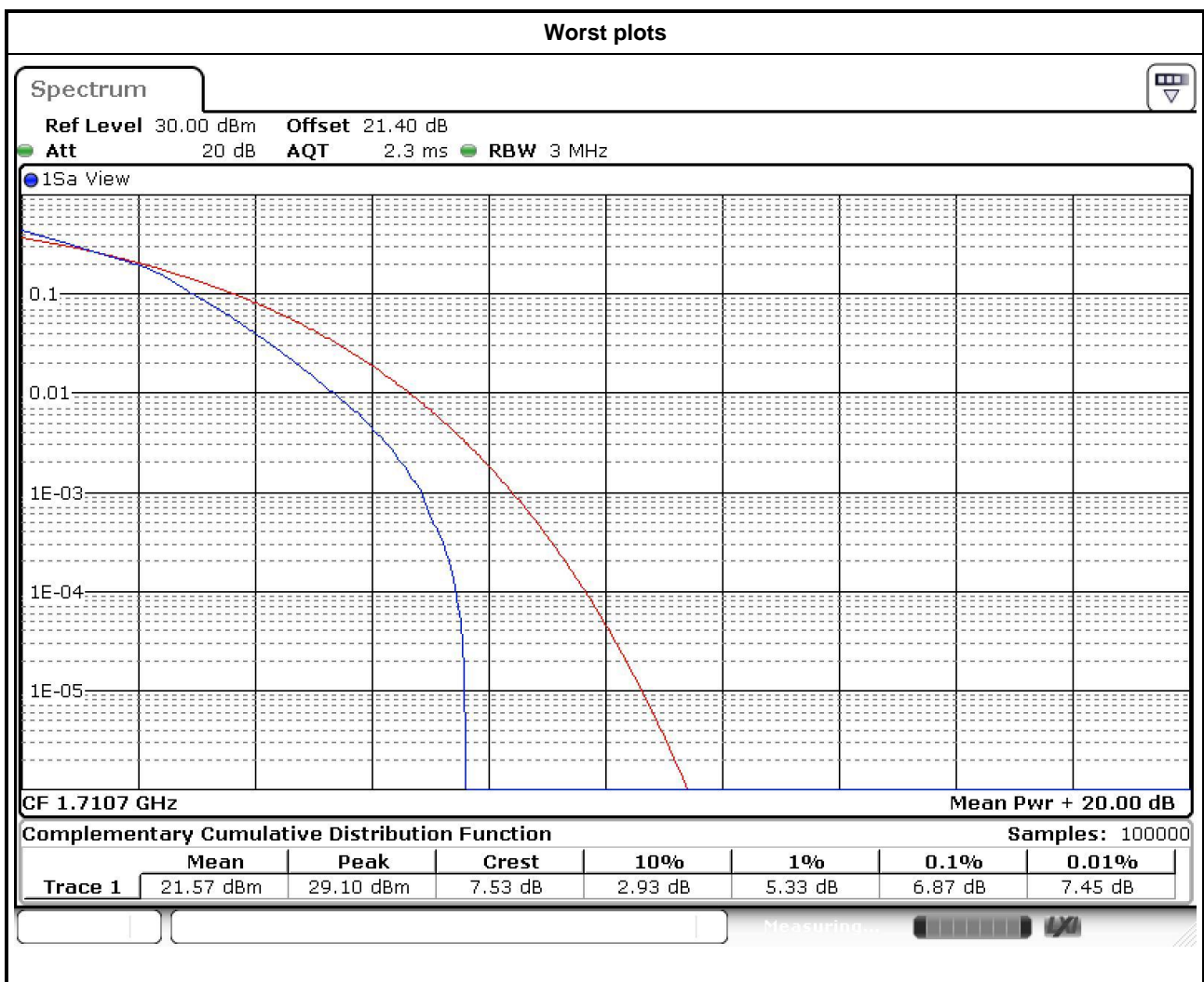
### 3.6.3 Test Setup



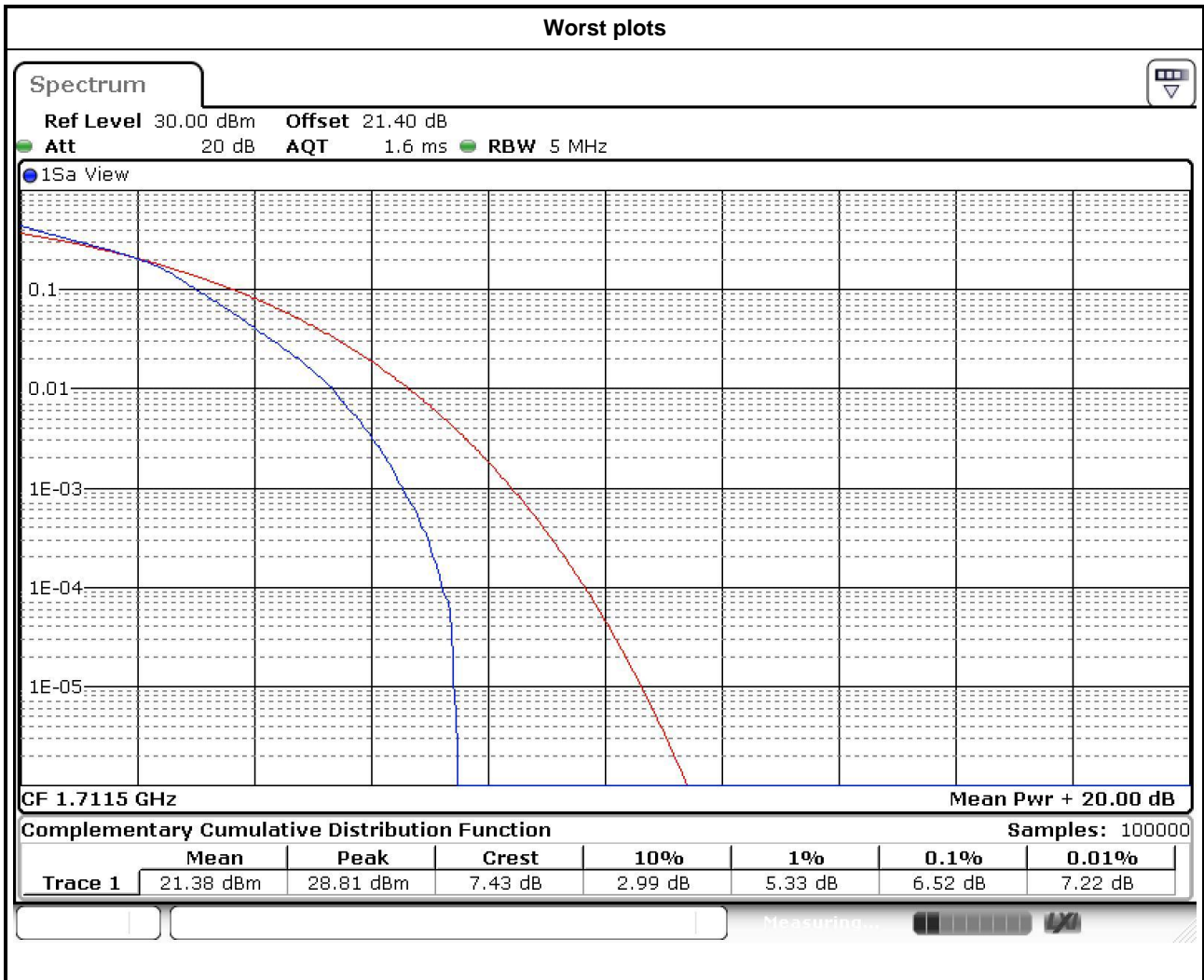


### 3.6.4 Test Result of Peak to Average Ratio

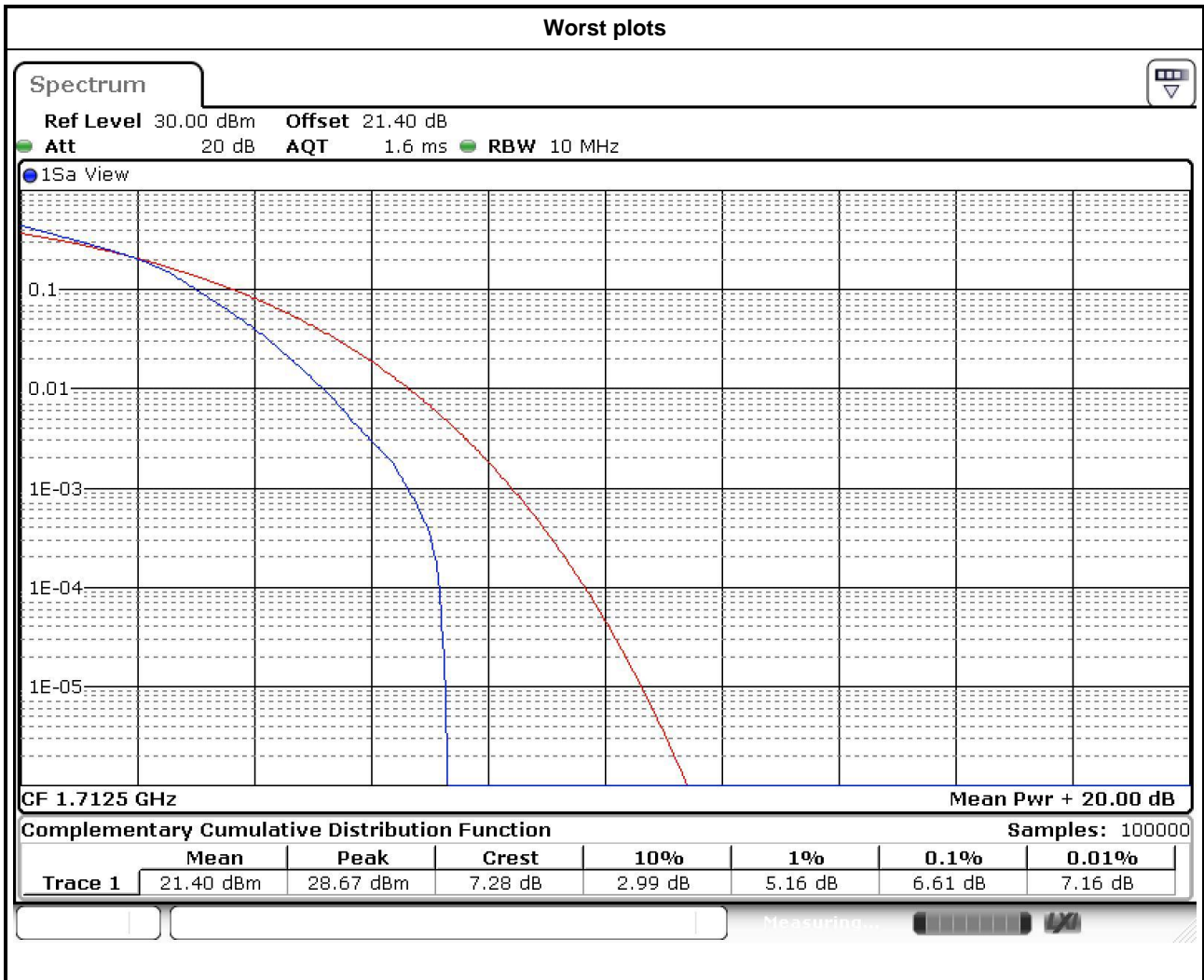
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|------------|----------|------------|---------|-----------------|----------------------------|
| LTE Band 4 | 1.4      | QPSK       | 19957   | 1710.7          | 5.80                       |
| LTE Band 4 | 1.4      | QPSK       | 20175   | 1732.5          | 5.28                       |
| LTE Band 4 | 1.4      | QPSK       | 20393   | 1754.3          | 5.77                       |
| LTE Band 4 | 1.4      | 16QAM      | 19957   | 1710.7          | 6.87                       |
| LTE Band 4 | 1.4      | 16QAM      | 20175   | 1732.5          | 6.17                       |
| LTE Band 4 | 1.4      | 16QAM      | 20393   | 1754.3          | 6.64                       |



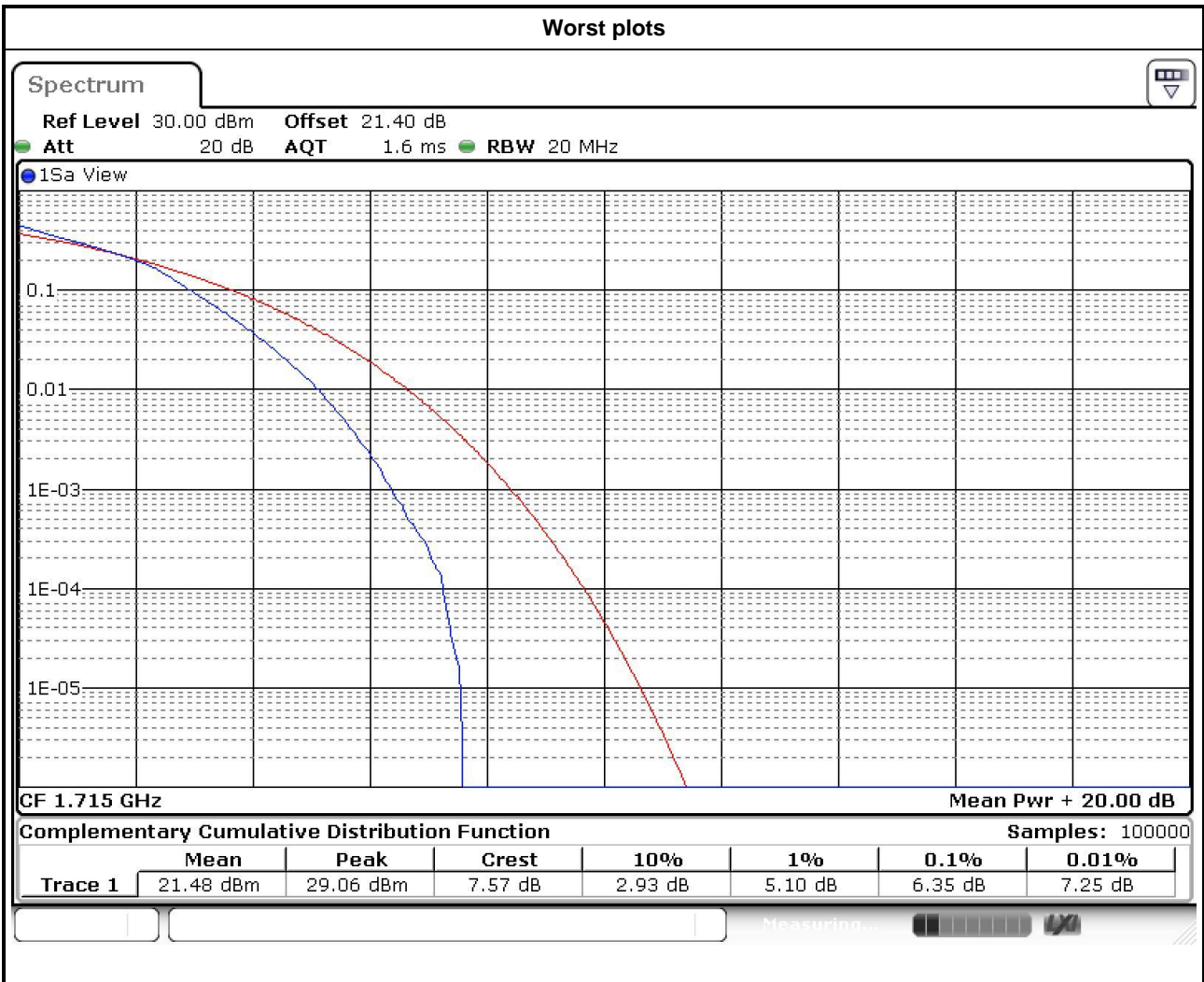
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|------------|----------|------------|---------|-----------------|----------------------------|
| LTE Band 4 | 3        | QPSK       | 19965   | 1711.5          | 5.74                       |
| LTE Band 4 | 3        | QPSK       | 20175   | 1732.5          | 5.36                       |
| LTE Band 4 | 3        | QPSK       | 20385   | 1753.5          | 5.57                       |
| LTE Band 4 | 3        | 16QAM      | 19965   | 1711.5          | 6.52                       |
| LTE Band 4 | 3        | 16QAM      | 20175   | 1732.5          | 6.20                       |
| LTE Band 4 | 3        | 16QAM      | 20385   | 1753.5          | 6.52                       |



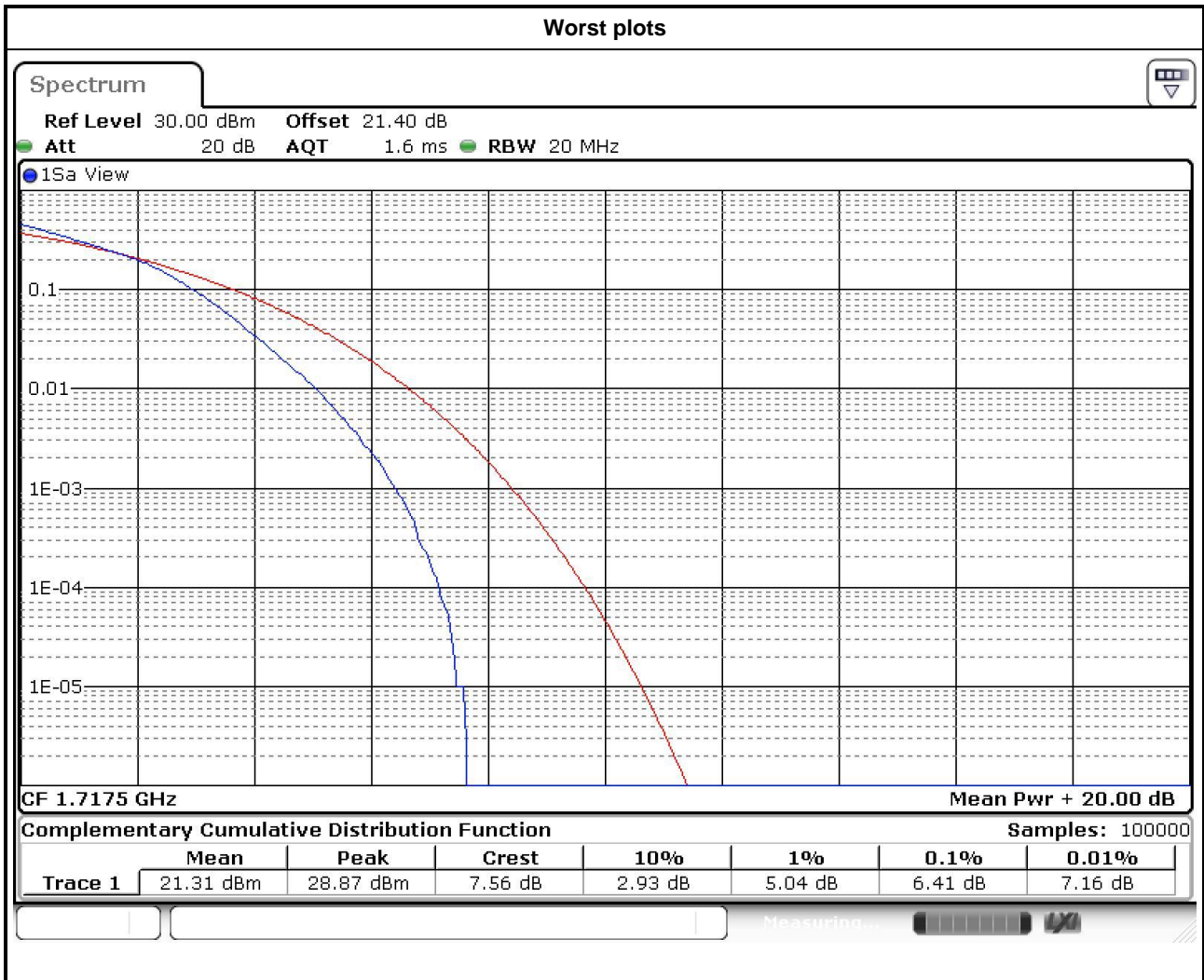
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|------------|----------|------------|---------|-----------------|----------------------------|
| LTE Band 4 | 5        | QPSK       | 19975   | 1712.5          | 5.8                        |
| LTE Band 4 | 5        | QPSK       | 20175   | 1732.5          | 5.28                       |
| LTE Band 4 | 5        | QPSK       | 20375   | 1752.5          | 5.68                       |
| LTE Band 4 | 5        | 16QAM      | 19975   | 1712.5          | 6.61                       |
| LTE Band 4 | 5        | 16QAM      | 20175   | 1732.5          | 6.03                       |
| LTE Band 4 | 5        | 16QAM      | 20375   | 1752.5          | 6.38                       |



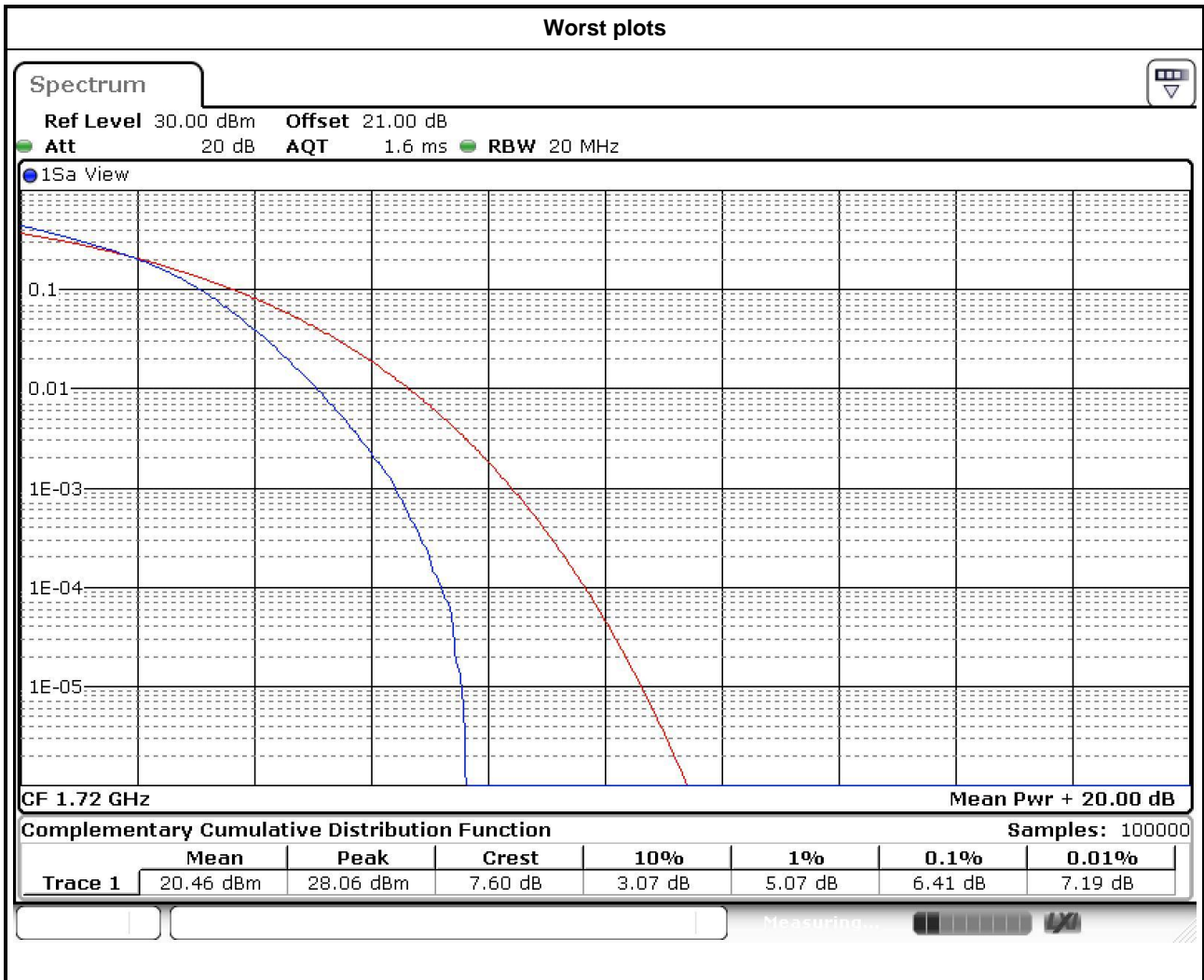
| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|------------|----------|------------|---------|-----------------|----------------------------|
| LTE Band 4 | 10       | QPSK       | 20000   | 1715.0          | 5.86                       |
| LTE Band 4 | 10       | QPSK       | 20175   | 1732.5          | 5.30                       |
| LTE Band 4 | 10       | QPSK       | 20350   | 1750.0          | 5.80                       |
| LTE Band 4 | 10       | 16QAM      | 20000   | 1715.0          | 6.35                       |
| LTE Band 4 | 10       | 16QAM      | 20175   | 1732.5          | 6.00                       |
| LTE Band 4 | 10       | 16QAM      | 20350   | 1750.0          | 6.35                       |



| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|------------|----------|------------|---------|-----------------|----------------------------|
| LTE Band 4 | 15       | QPSK       | 20025   | 1717.5          | 5.62                       |
| LTE Band 4 | 15       | QPSK       | 20175   | 1732.5          | 5.16                       |
| LTE Band 4 | 15       | QPSK       | 20325   | 1747.5          | 5.48                       |
| LTE Band 4 | 15       | 16QAM      | 20025   | 1717.5          | 6.41                       |
| LTE Band 4 | 15       | 16QAM      | 20175   | 1732.5          | 6.03                       |
| LTE Band 4 | 15       | 16QAM      | 20325   | 1747.5          | 6.29                       |



| Mode       | CB (MHz) | Modulation | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|------------|----------|------------|---------|-----------------|----------------------------|
| LTE Band 4 | 20       | QPSK       | 20050   | 1720.0          | 5.48                       |
| LTE Band 4 | 20       | QPSK       | 20175   | 1732.5          | 5.16                       |
| LTE Band 4 | 20       | QPSK       | 20300   | 1745.0          | 5.25                       |
| LTE Band 4 | 20       | 16QAM      | 20050   | 1720.0          | 6.41                       |
| LTE Band 4 | 20       | 16QAM      | 20175   | 1732.5          | 6.17                       |
| LTE Band 4 | 20       | 16QAM      | 20300   | 1745.0          | 6.23                       |



## 3.7 Frequency Stability

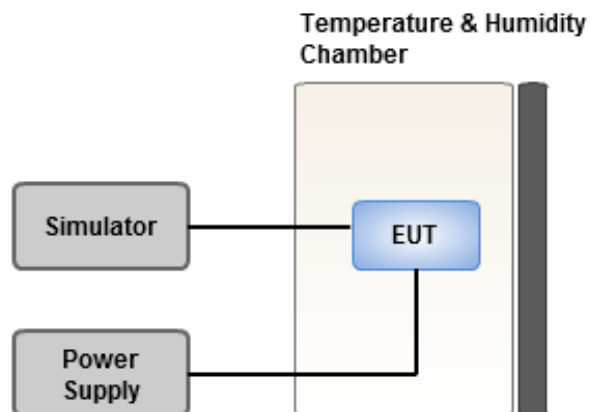
### 3.7.1 Limit of Frequency Stability

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

### 3.7.2 Test Procedures

1. EUT was placed at temperature chamber and connected to an external power supply.
2. Temperature and voltage condition shall be tested to confirm frequency stability.
3. Temperature range is from -30~55°C and voltage range is from lowest to highest working voltage.
4. Tem Link up EUT and simulator. Confirm frequency drift value of simulator and record it.

### 3.7.3 Test Setup



### 3.7.4 Test Result of Frequency Stability

| Temperature (°C) | Voltage (Vdc) | Frequency Drift (ppm) |         |         |          |          |          |
|------------------|---------------|-----------------------|---------|---------|----------|----------|----------|
|                  |               | CB:1.4MHz             | CB:3MHz | CB:5MHz | CB:10MHz | CB:15MHz | CB:20MHz |
| 55               | 3.7           | 0.012                 | 0.013   | 0.013   | 0.015    | 0.014    | 0.015    |
| 50               | 3.7           | 0.011                 | 0.012   | 0.014   | 0.013    | 0.012    | 0.013    |
| 40               | 3.7           | 0.009                 | 0.012   | 0.013   | 0.012    | 0.012    | 0.013    |
| 30               | 3.7           | 0.010                 | 0.011   | 0.012   | 0.012    | 0.011    | 0.012    |
| 20               | 3.7           | 0.012                 | 0.013   | 0.011   | 0.009    | 0.010    | 0.011    |
| 10               | 3.7           | 0.013                 | 0.010   | 0.012   | 0.010    | 0.010    | 0.012    |
| 0                | 3.7           | 0.013                 | 0.012   | 0.010   | 0.011    | 0.012    | 0.010    |
| -10              | 3.7           | 0.012                 | 0.012   | 0.012   | 0.013    | 0.013    | 0.013    |
| -20              | 3.7           | 0.010                 | 0.011   | 0.012   | 0.010    | 0.011    | 0.012    |
| -30              | 3.7           | 0.011                 | 0.013   | 0.013   | 0.012    | 0.012    | 0.012    |
| 20               | 4.5           | 0.014                 | 0.013   | 0.013   | 0.014    | 0.014    | 0.013    |
| 20               | 3.2           | 0.012                 | 0.013   | 0.013   | 0.012    | 0.013    | 0.012    |



## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website <http://www.icertifi.com.tw>.

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