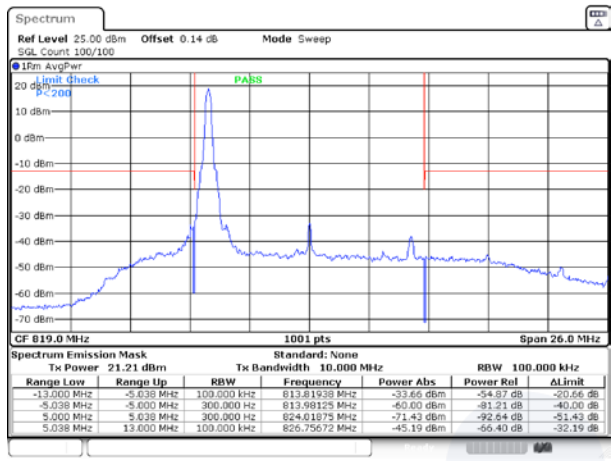
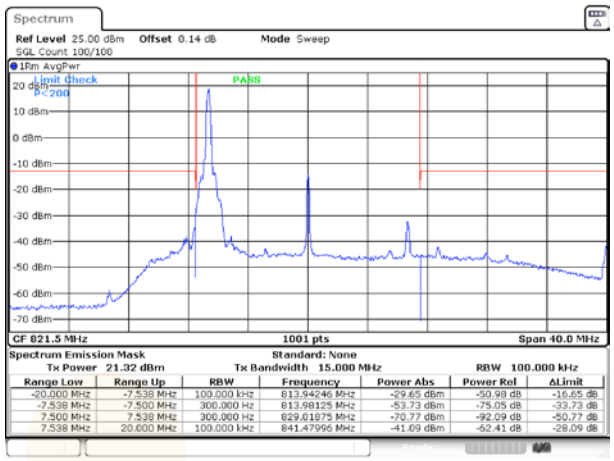
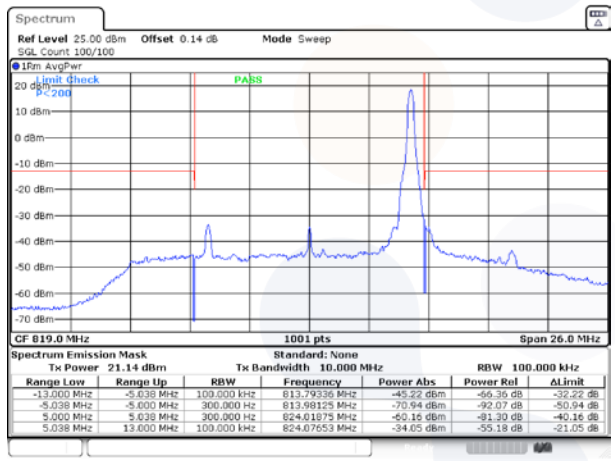
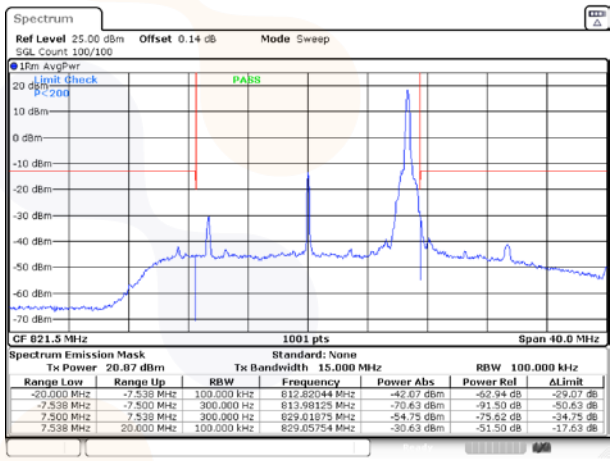
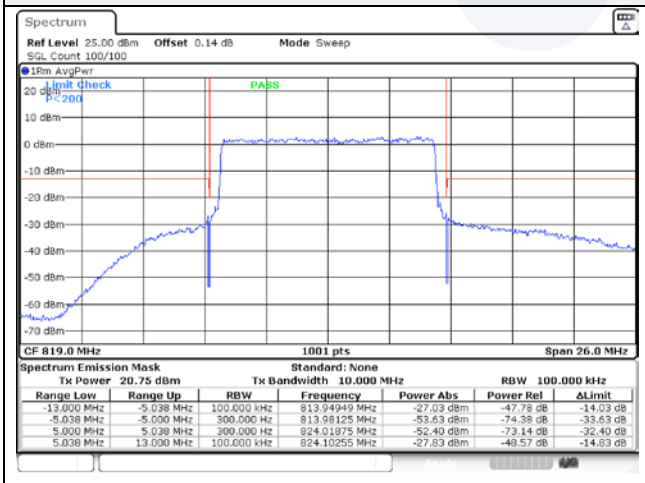
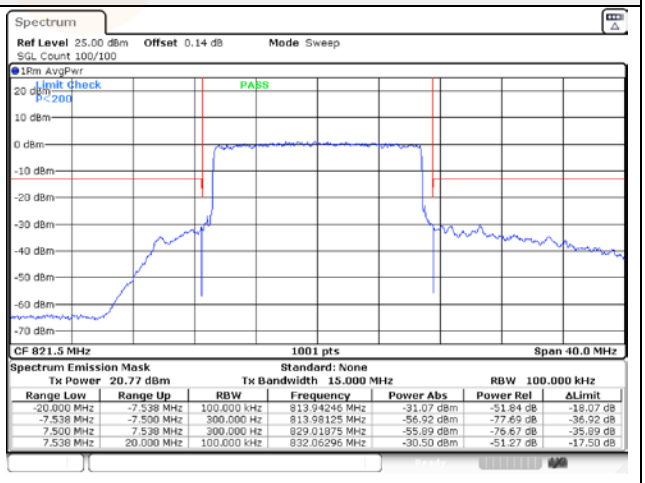
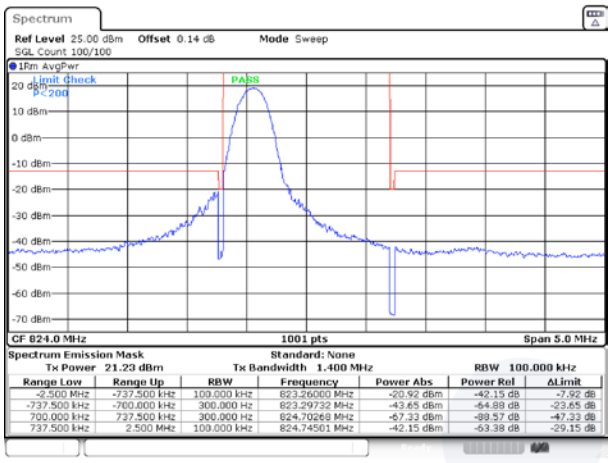
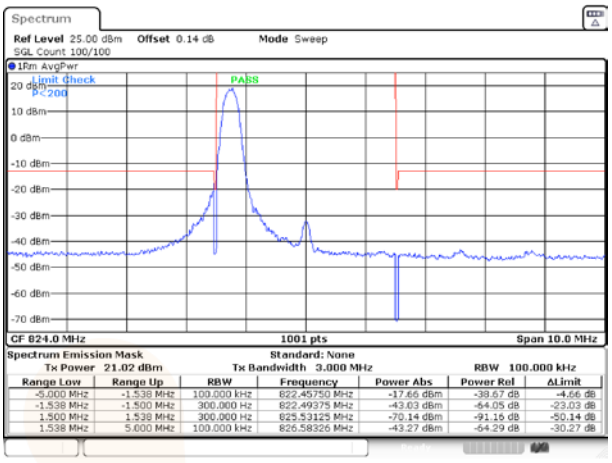
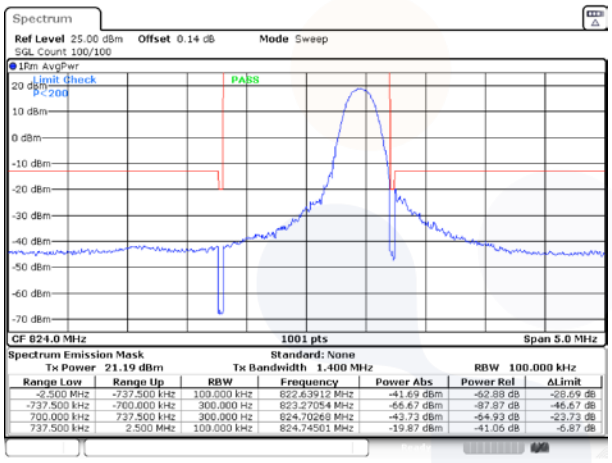
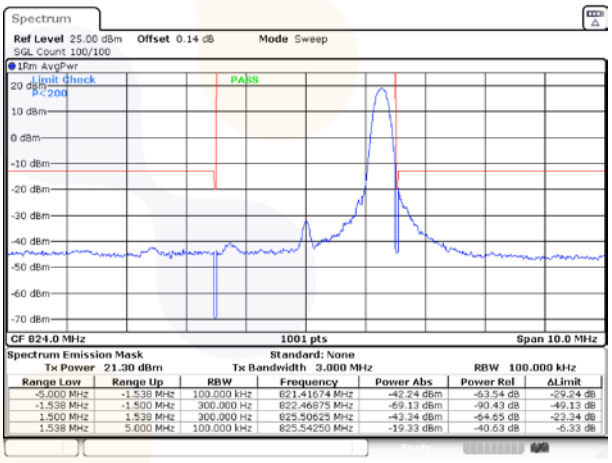
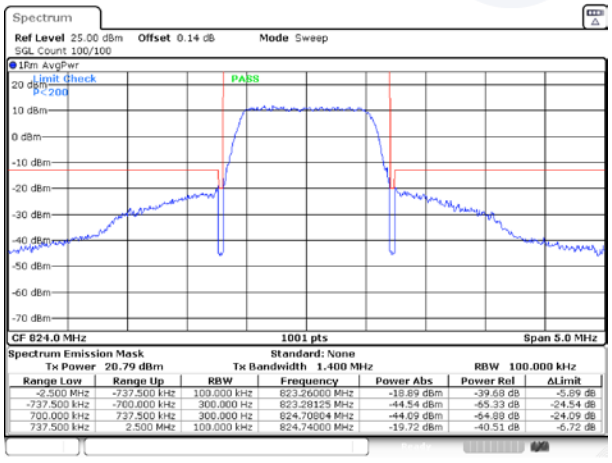
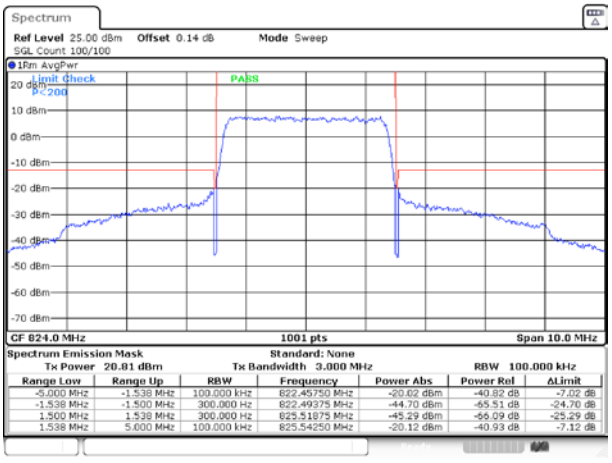
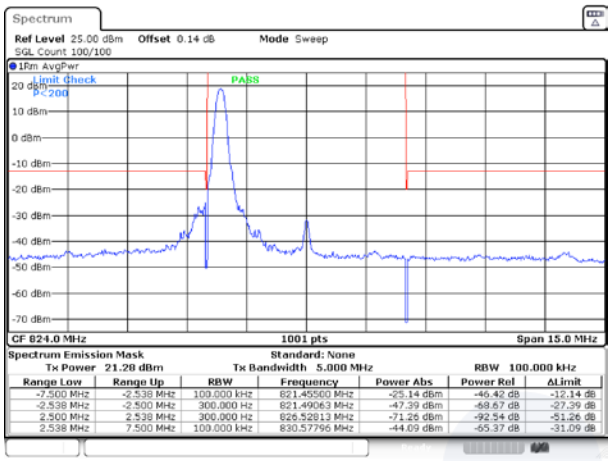
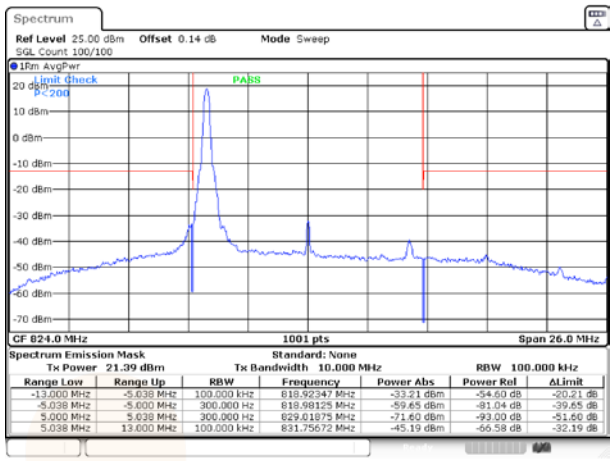
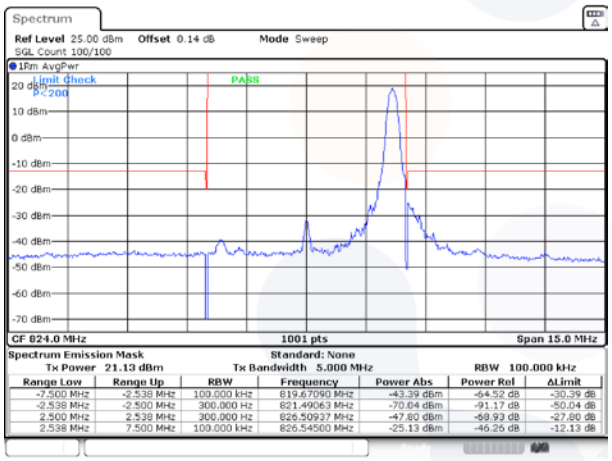
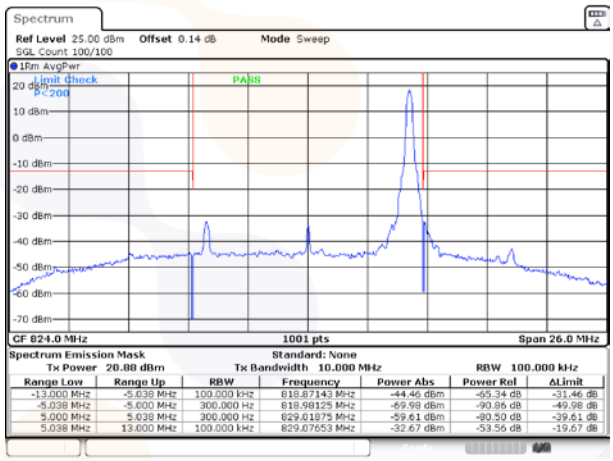
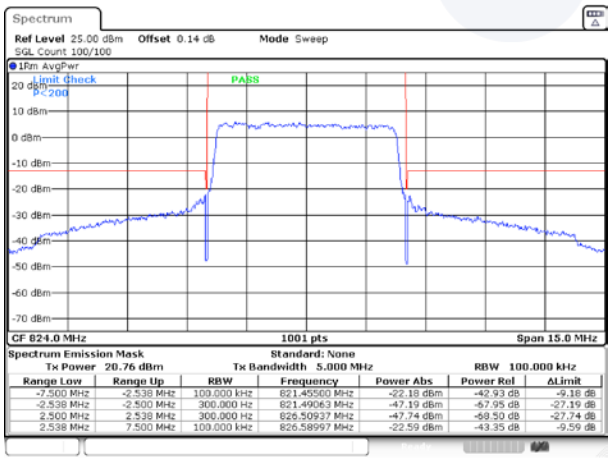
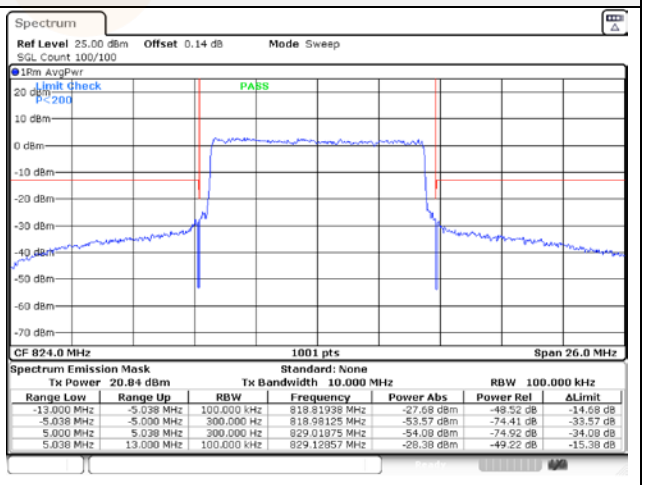
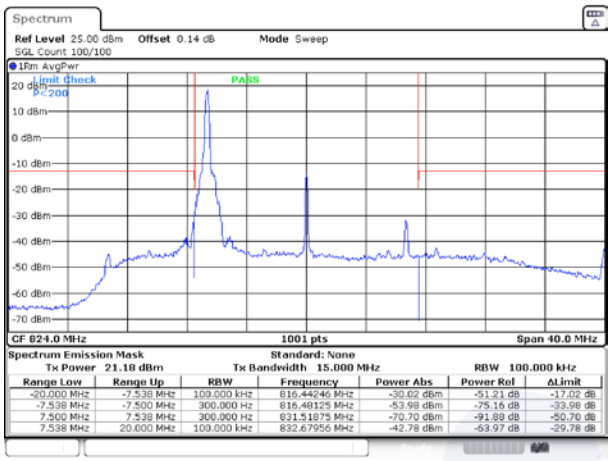
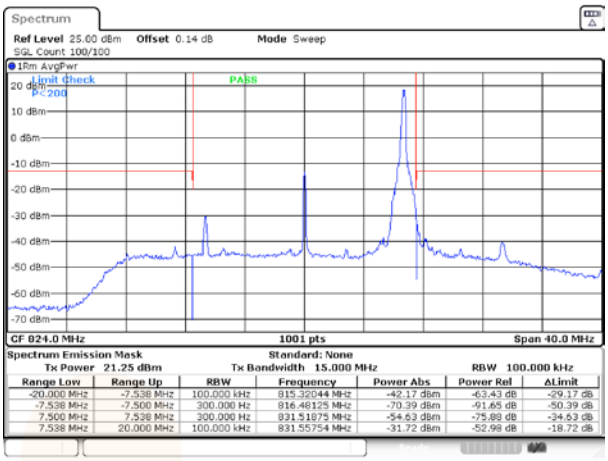
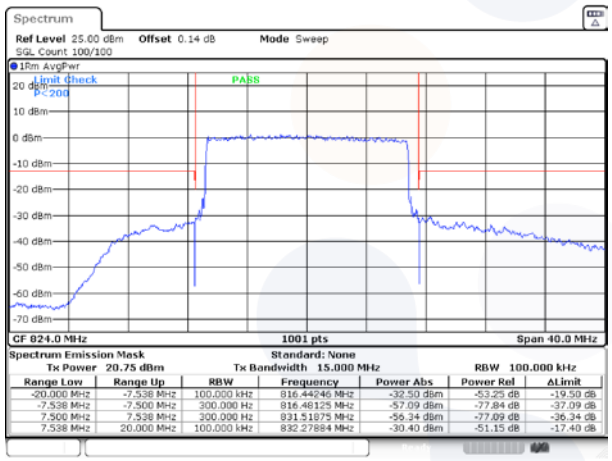
| 10M BW QPSK | 15M BW QPSK |
|---|---|
| **Middle channel Lower 1RB** | **Middle channel Lower 1RB** |
|  |  |
| **Middle channel Upper 1RB** | **Middle channel Upper 1RB** |
|  |  |
| **Middle channel FRB** | **Middle channel FRB** |
|  |  |

## LTE B26 (Straddle channel)

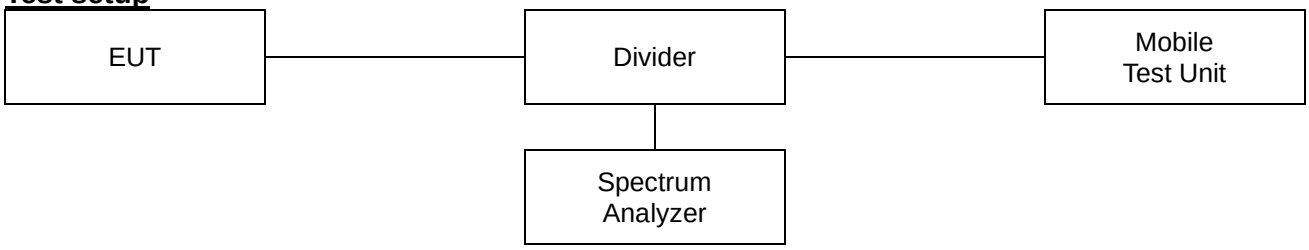
| 1.4M BW QPSK | 3M BW QPSK |
|---|---|
| **Middle channel Lower 1RB** | **Middle channel Lower 1RB** |
|  |  |
| **Middle channel Upper 1RB** | **Middle channel Upper 1RB** |
|  |  |
| **Middle channel FRB** | **Middle channel FRB** |
|  |  |

| 5M BW QPSK | 10M BW QPSK |
|---|---|
| **Middle channel Lower 1RB** | **Middle channel Lower 1RB** |
|  |  |
| **Middle channel Upper 1RB** | **Middle channel Upper 1RB** |
|  |  |
| **Middle channel FRB** | **Middle channel FRB** |
|  |  |

| 15M BW QPSK | |
|---|---|
| **Middle channel Lower 1RB** | **Middle channel Upper 1RB** |
|  |  |
| **Middle channel FRB** | - |
|  | Blank |

## 7.4. Spurious Emissions at Antenna Terminal

**Test setup**




**Limit**

**According to §90.543(e),**

for operations in the 758-768 ㎒ and the 788-798 ㎒ bands, the power of any emission outside the 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, in accordance with the following:

(1) On all frequencies between 769-775 ㎒ and 799-805 ㎒, by a factor not less than 76+10log(P) ㏈ in a 6.25 ㎑ band segment, for base and fixed stations.

(2) On all frequencies between 769-775 ㎒ and 799-805 ㎒, by a factor not less than 65+10log(P) ㏈ in a 6.25 ㎑ band segment, for mobile and portable stations.

(3) On any frequency between 775-788 ㎒, above 805 ㎒, and below 758 ㎒, by at least 43+10log(P) ㏈.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 ㎑ segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater. However, in the 100 ㎑ bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 ㎑ may be employed.

**According to §90.691(a),**

Out-of-band emission requirement shall apply only to the "outer" channels Included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 ㎑, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}$(f/6.1) decibels or 50 + 10$Log_{10}$(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz where f is greater than 12.5 ㎑.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 ㎑, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10$Log_{10}$(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 ㎑.

**Test procedure**

971168 D01 v03r01 - Section 6
ANSI 63.26-2015 – Section 5.7

**Test settings**

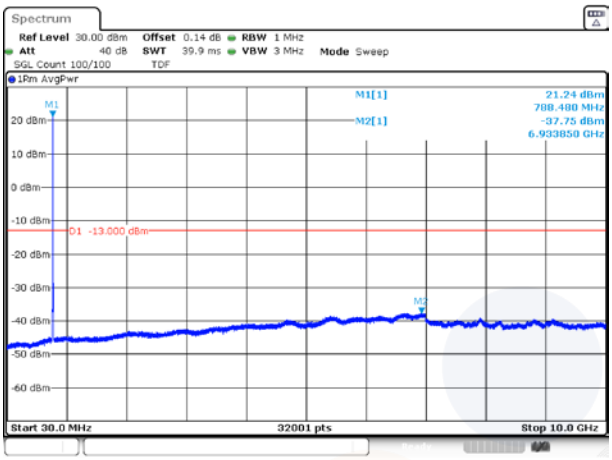
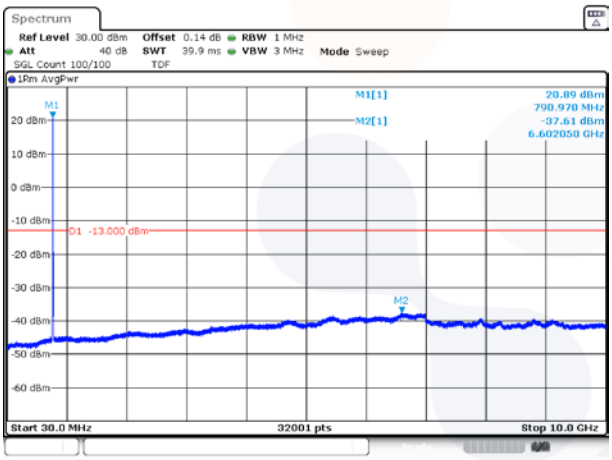
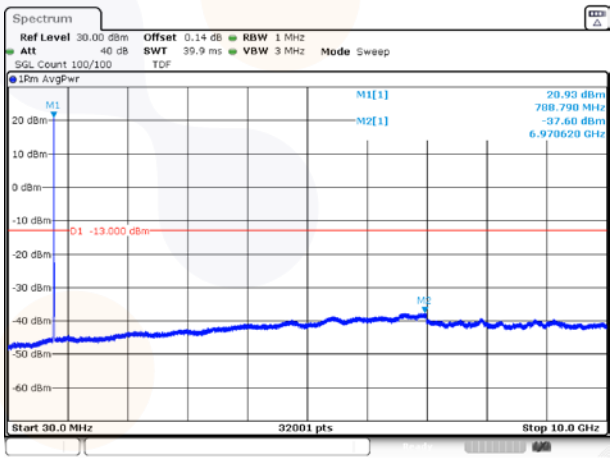
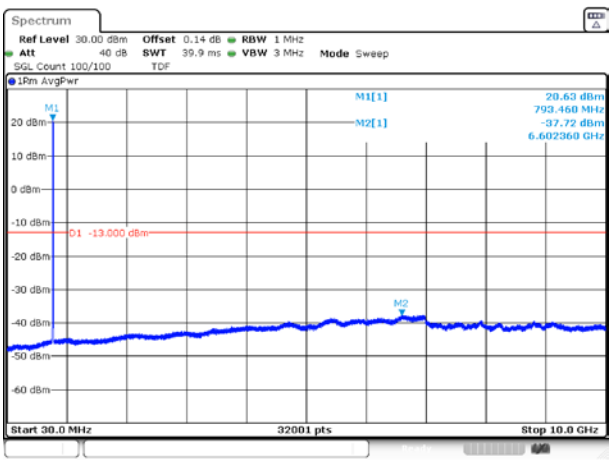
1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Detector = RMS
3) Sweep time = auto couple.
4) Trace mode = trace average
5) Allow trace to fully stabilize.
6) Please see test notes below RBW and VBW settings.

**Notes:**

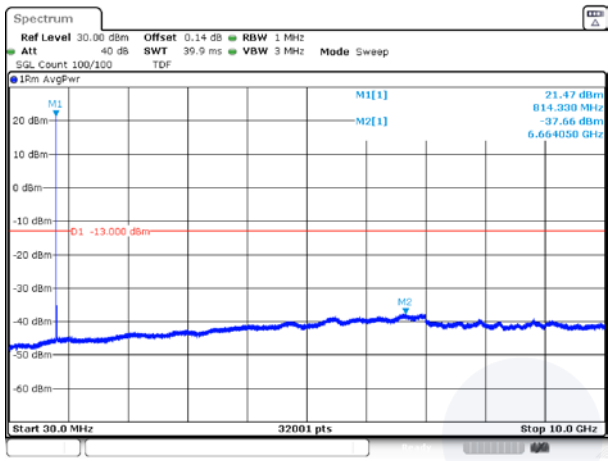
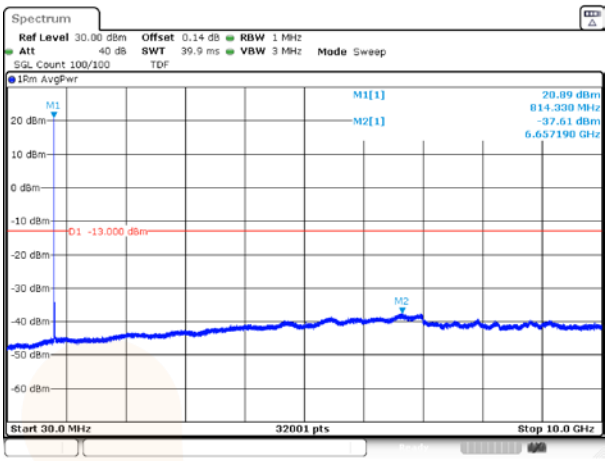
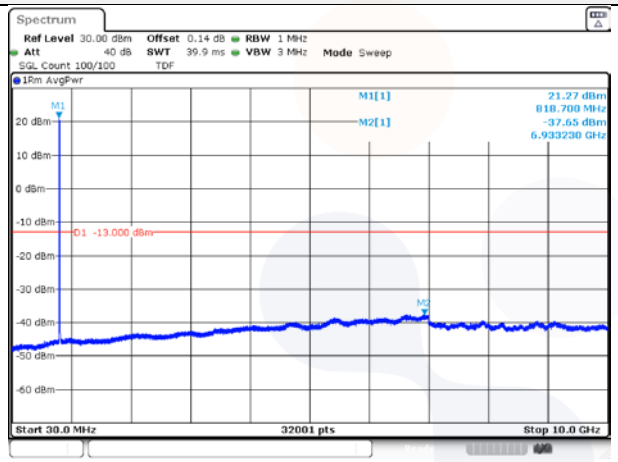
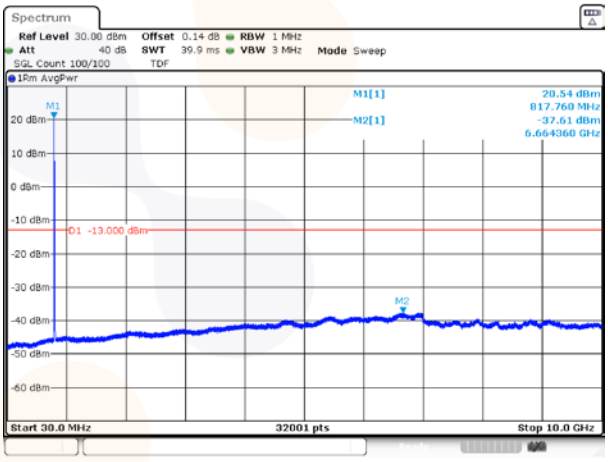
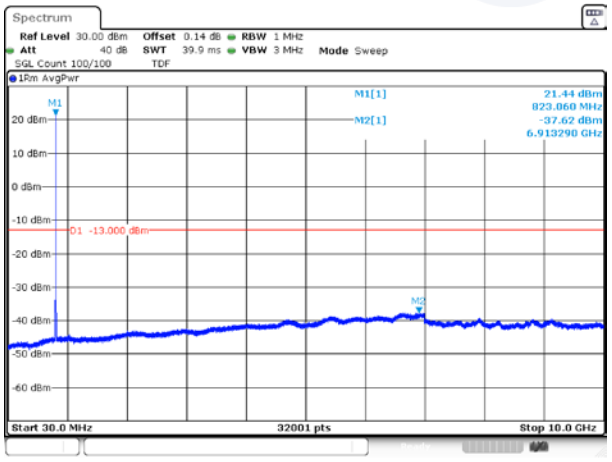
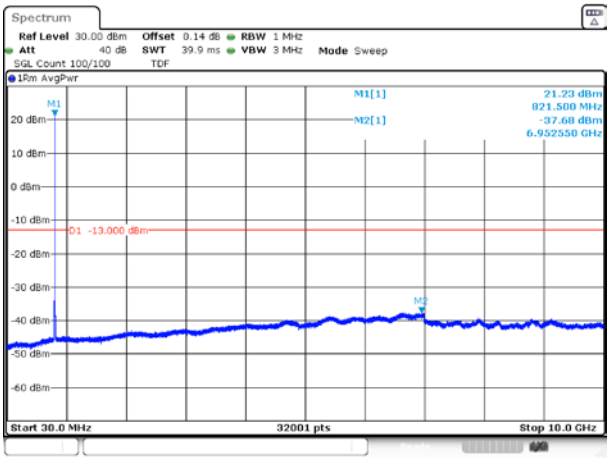
1. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and 1 ㎒ or greater for frequencies greater than 1 ㎓.
   The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.
2. All modes of operation were investigated and the worst-case configuration results are reported.

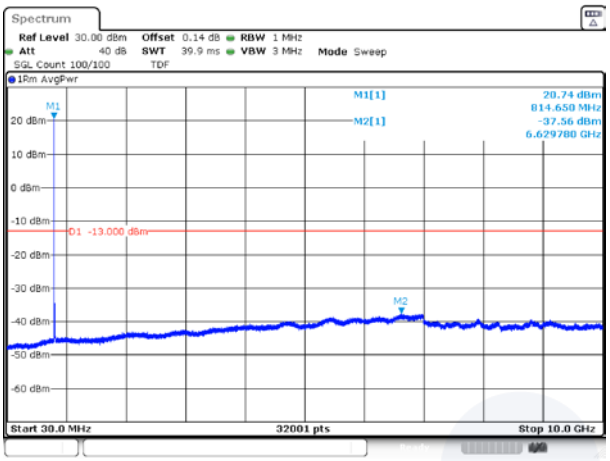
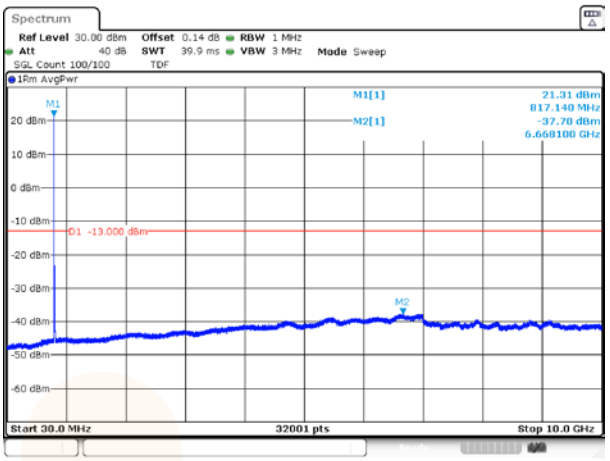
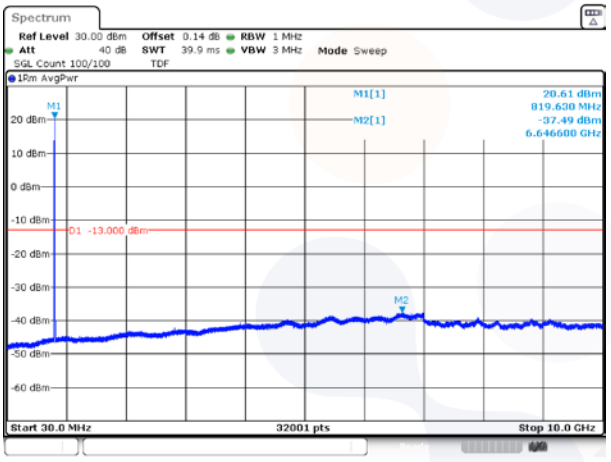
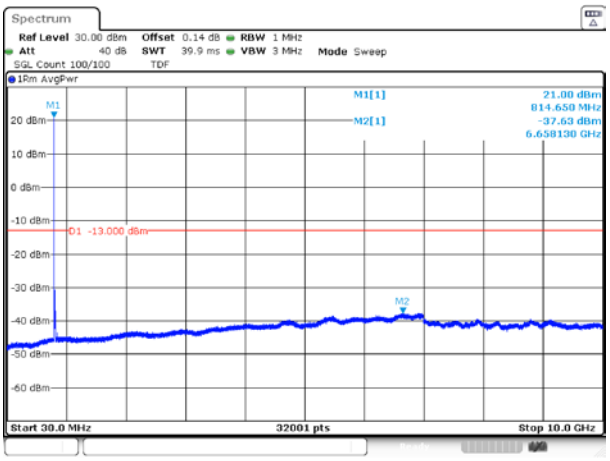
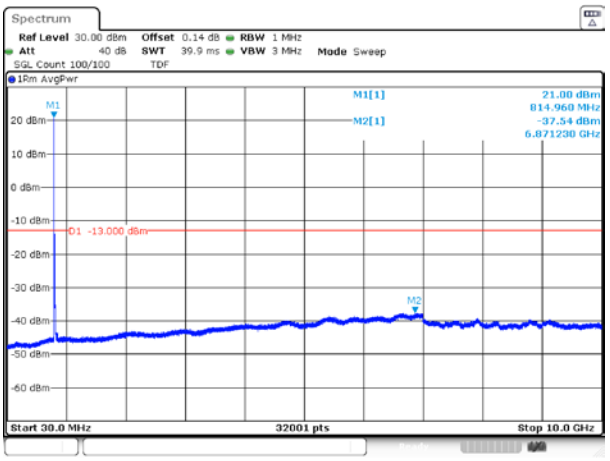
## Test results

### Test mode: LTE B14

| 5M BW QPSK | 10M BW QPSK |
|---|---|
| Low channel (30 ㎒ ~ 10 ㎓) | - |
|  | Blank |
| Middle channel (30 ㎒ ~ 10 ㎓) | Middle channel (30 ㎒ ~ 10 ㎓) |
|  |  |
| High channel (30 ㎒ ~ 10 ㎓) | - |
|  | Blank |

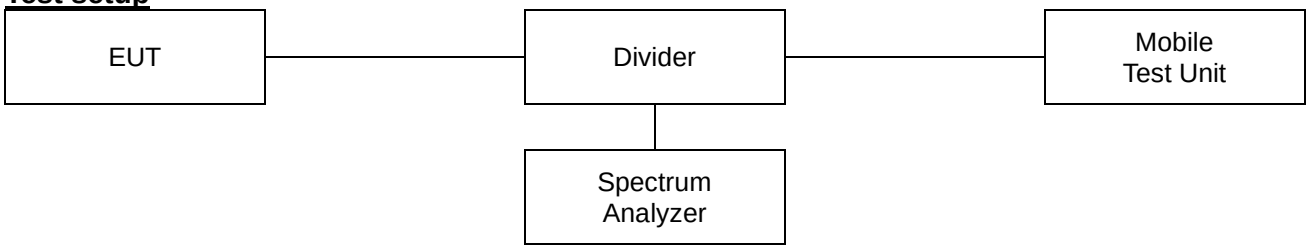
**Test mode: LTE B26**

| 1.4M BW QPSK | 3M BW QPSK |
|---|---|
| **Low channel (30 ㎒ ~ 10 ㎓)** | **Low channel (30 ㎒ ~ 10 ㎓)** |
|  |  |
| **Middle channel (30 ㎒ ~ 10 ㎓)** | **Middle channel (30 ㎒ ~ 10 ㎓)** |
|  |  |
| **High channel (30 ㎒ ~ 10 ㎓)** | **High channel (30 ㎒ ~ 10 ㎓)** |
|  |  |

| 5M BW QPSK | |
|---|---|
| **Low channel (30 ㎒ ~ 10 ㎓)** | **Middle channel (30 ㎒ ~ 10 ㎓)** |
|  |  |
| **High channel (30 ㎒ ~ 10 ㎓)** | **-** |
|  | Blank |
| **10M BW QPSK** | **15M BW QPSK** |
| **Middle channel (30 ㎒ ~ 10 ㎓)** | **Middle channel (30 ㎒ ~ 10 ㎓)** |
|  |  |

## 7.5. Peak to Average Power Ratio (PAPR)

**Test setup**




**Test procedure**

971168 D01 v03r01 - Section 5.7.2
971168 D02 v02r02 – Section VII
ANSI 63.26-2015 – Section 5.2.3.4

**Test settings**

**5.2.3.4 Measurement of peak power in a broadband noise-like signal using CCDF**

1) Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth
2) Set the number of counts to a value that stabilizes the measured CCDF curve.
3) Set the measurement interval as follows:
   a) For continuous transmissions, set to the greater of [10 x (number of points in sweep) x (transmission symbol period)] or 1 ㎳.
   b) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement internal to a time that is less than or equal to the burst duration.
   c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
4) Record the maximum PAPR level associated with a probability of 0.1%

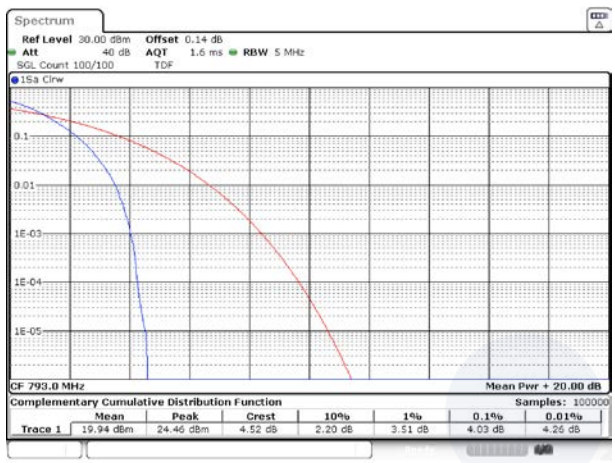
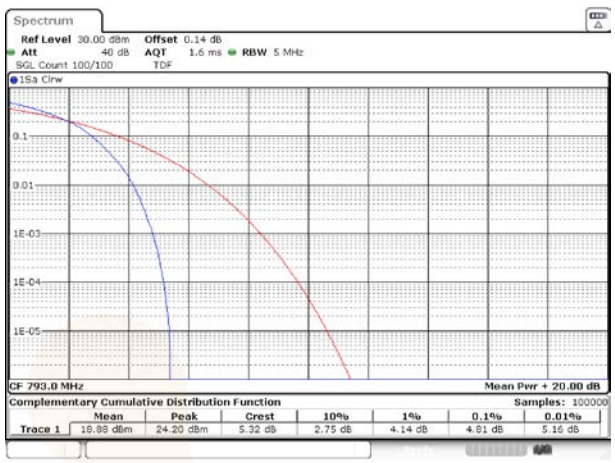
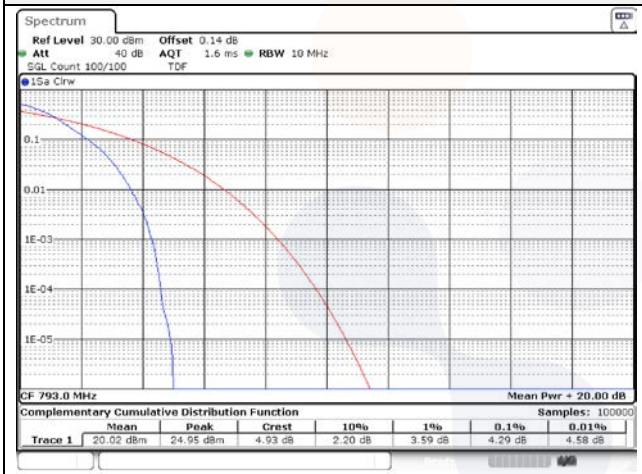
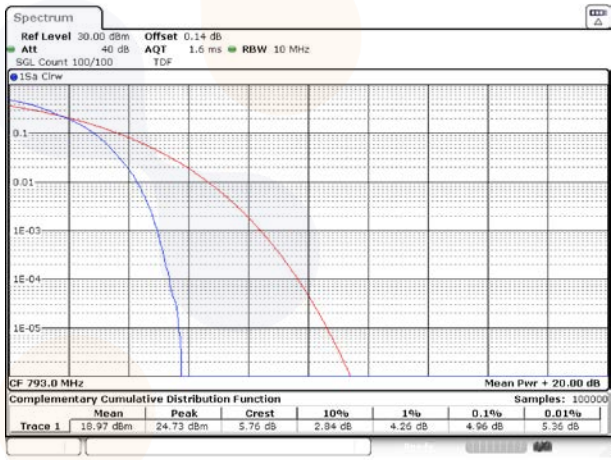
**5.2.6 Peak-to-average power ratio**

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as $P_{PK}$.
Use one of the applicable procedure presented 5.2(ANSI C63.26-2015) to measure the total average power and record as $P_{AG}$. Determine the P.A.P.R from:

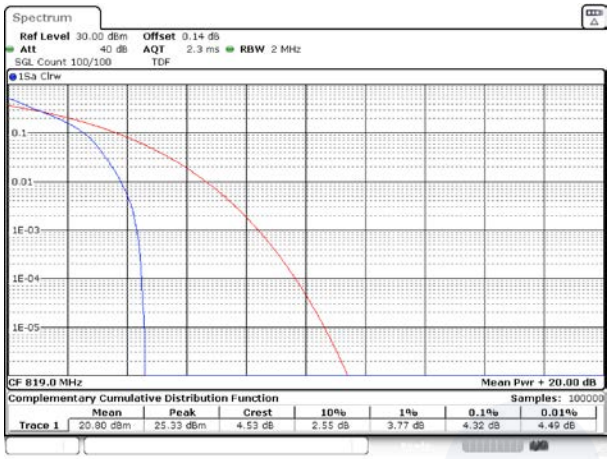
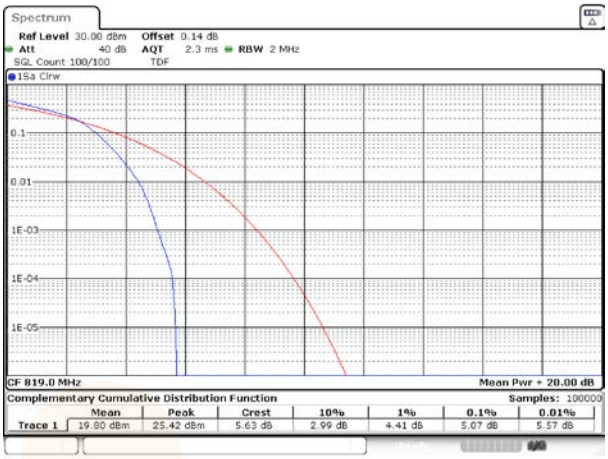
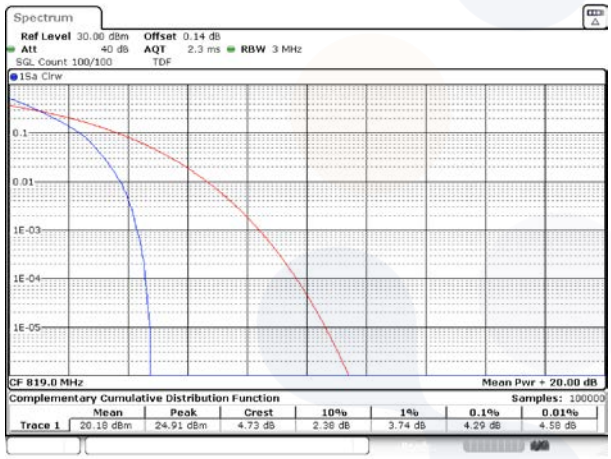
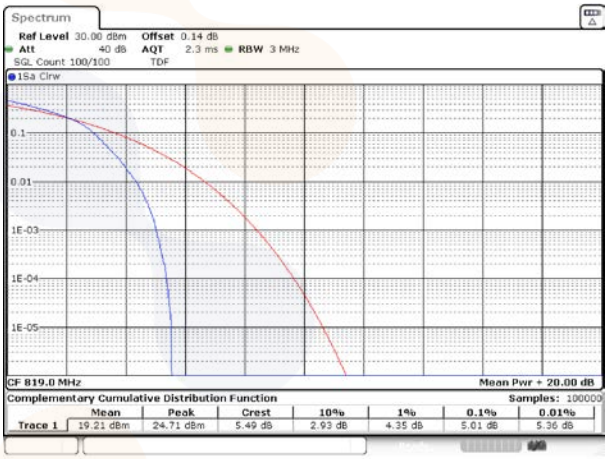
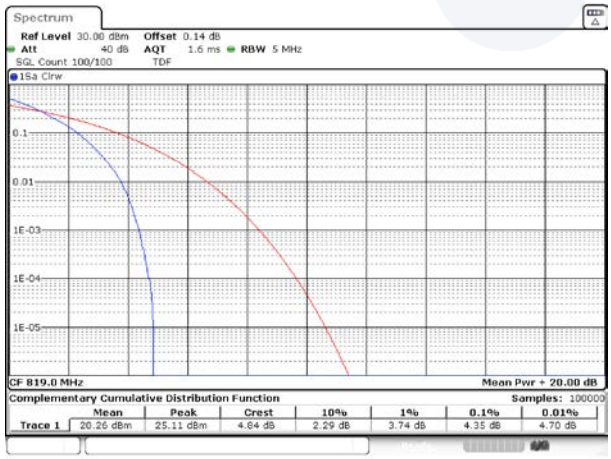
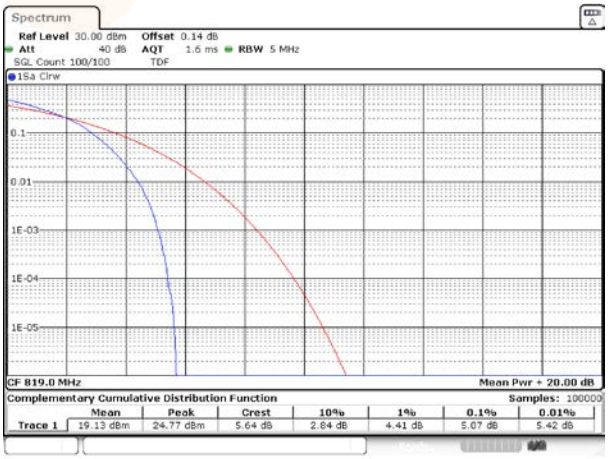
PAPR(㏈) = $P_{PK}$ (㏈m or ㏈W) - $P_{AG}$(㏈m or ㏈W)

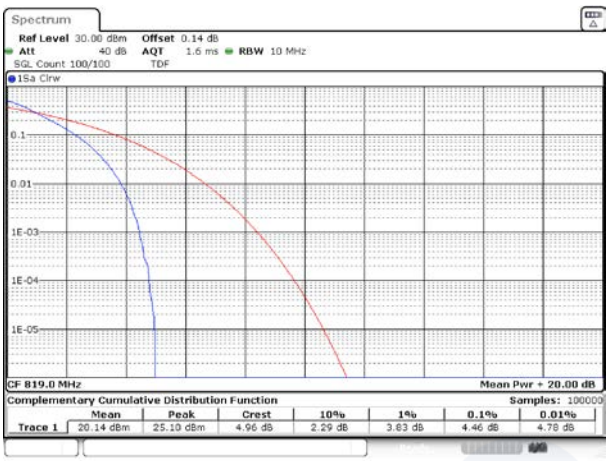
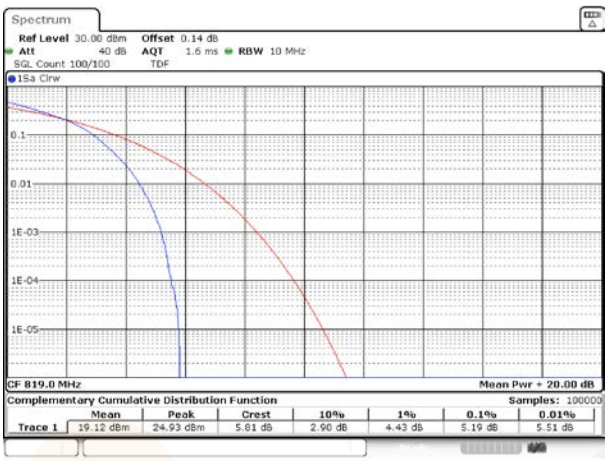
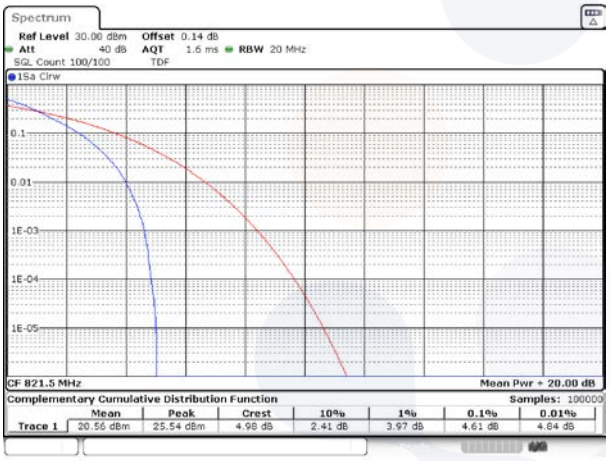
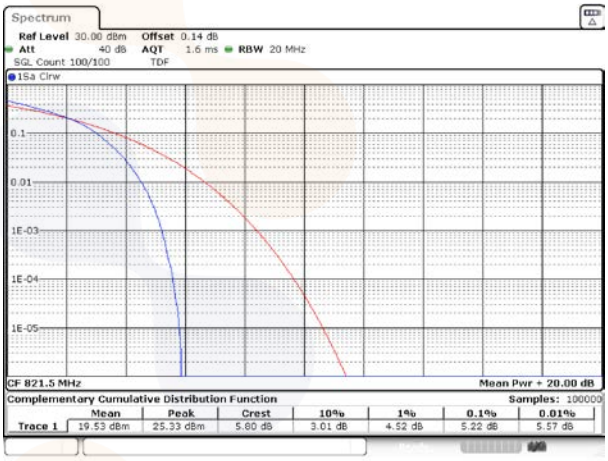
## Test results

### Test mode: LTE B14

| 5M BW QPSK Middle channel | 5M BW 16QAM Middle channel |
|---|---|
|  |  |
| **10M BW QPSK Middle channel** | **10M BW 16QAM Middle channel** |
|  |  |

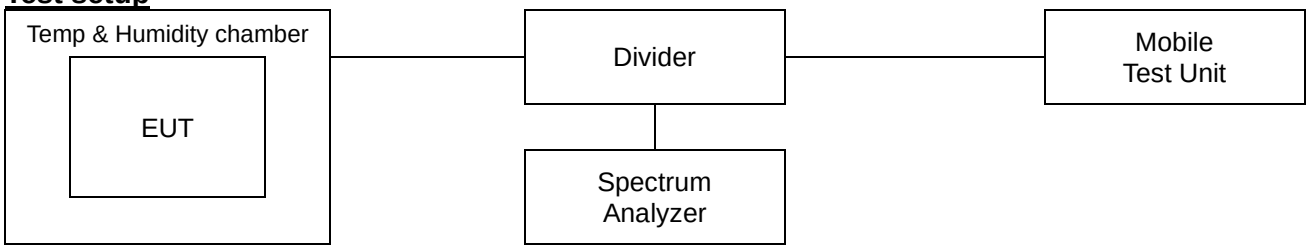
**Test mode: LTE B26**

| 1.4M BW QPSK Middle channel | 1.4M BW 16QAM Middle channel |
|---|---|
|  |  |
| **3M BW QPSK Middle channel** | **3M BW 16QAM Middle channel** |
|  |  |
| **5M BW QPSK Middle channel** | **5M BW 16QAM Middle channel** |
|  |  |

| 10M BW QPSK Middle channel | 10M BW 16QAM Middle channel |
|---|---|
|  |  |
| **15M BW QPSK Middle channel** | **15M BW 16QAM Middle channel** |
|  |  |

## 7.6. Frequency stability

**Test setup**




**Limit**

**According to §2.1055(a),**

The frequency stability shall be measured with variation of ambient temperature as follows:

1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
2) From -20° to + 50° centigrade for equipment to be licensed for use in the maritime services under part 80 of this chapter, except for class A, B, and S emergency position indicating radiobeacons (EPIRBS), and equipment to be licensed for use above 952 ㎒ at operational fixed stations in all services, stations in the local television transmission service and point-to-point microwave radio service under part 21 of this chapter, equipment licensed for use aboard aircraft in the aviation services under part 87 of this chapter, and equipment authorized for use in the family radio service under part 95 of this chapter.
3) From 0° to + 50° centigrade for equipment to be licensed for use in the radio broadcast Services under part 73 of this chapter.

**According to §2.1055(d),**

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 and point which shall be specified by the manufacturer.
3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

**According to §90.539(e),**

The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

**According to §90.213,**

For mobile devices operating in the 809 to 824 ㎒ band at a power level 2 Watts or less, the limit specified in Table is ±2.5 ppm.

**Test procedure**

ANSI 63.26-2015 – Section 5.6

**Test settings**

1) The carrier frequency of the transmitter is measured at room temperature. (20°C to provide a reference)
2) The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3) Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each Temperature level.

## Test results

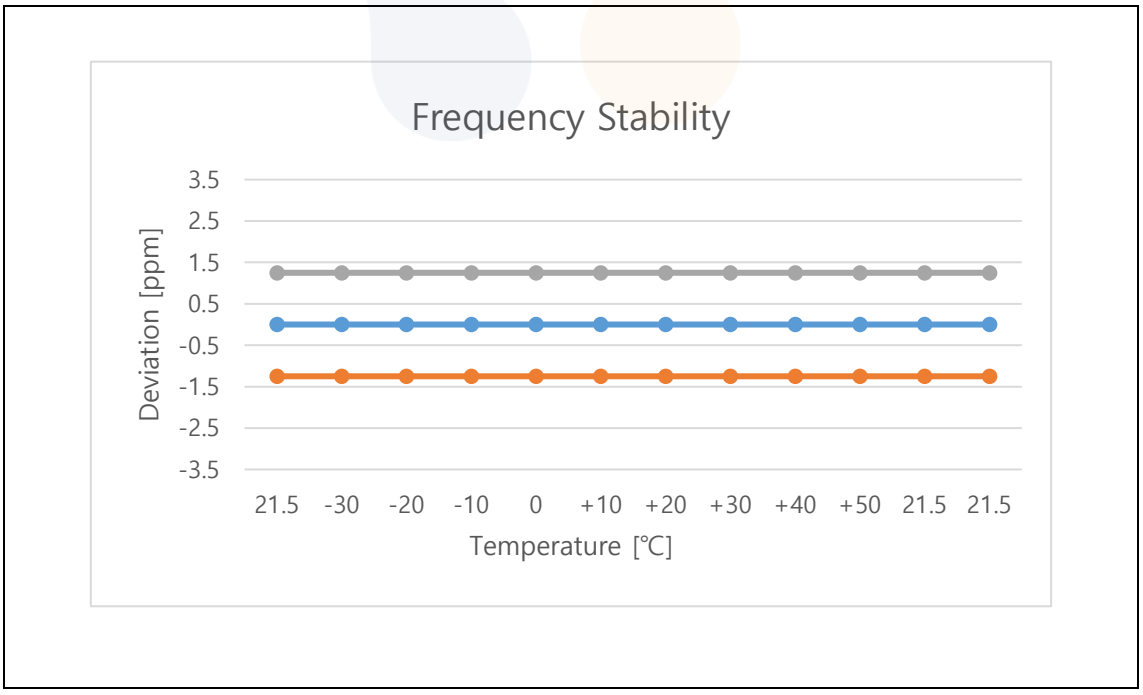
Test mode : LTE B14

Frequency (㎐) : 793 000 000

Channel : 23330

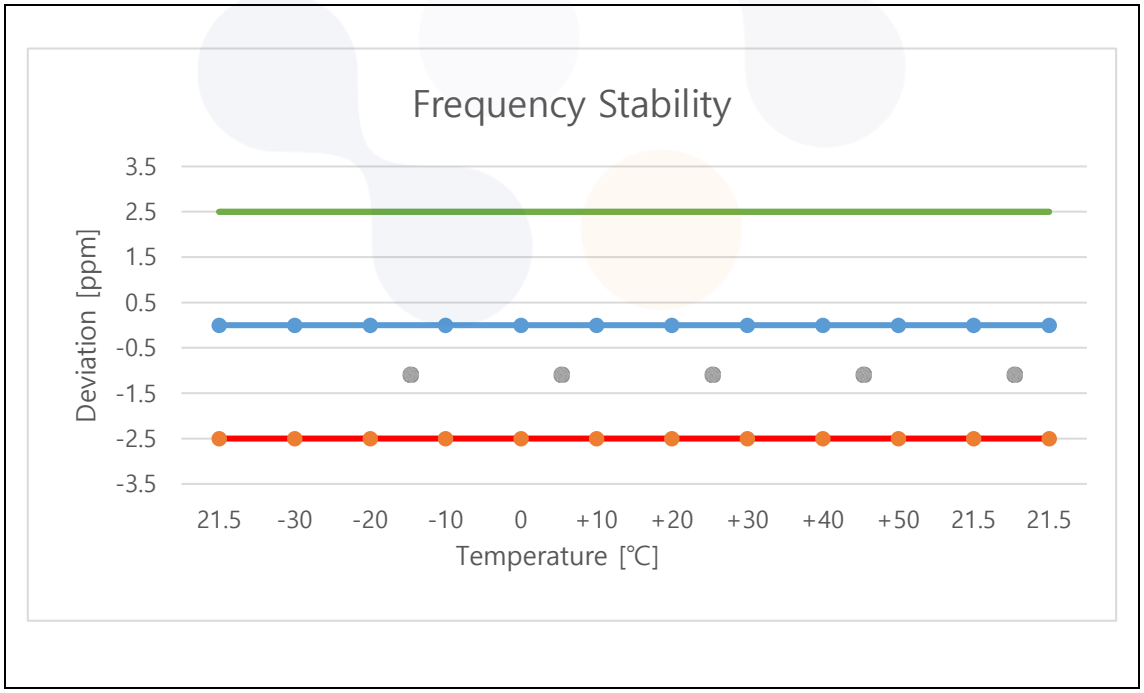
Deviation limit : The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

| Voltage (%) | Power (V) | Temp. (°C) | Frequency (㎐) | Frequency error (㎐) | Deviation | | Limit (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | (ppm) | (%) | |
| 100% | 3.88 | +21.5(Ref) | 792,999,999 | -1.43 | 0.0 | 0.000 000 | 1.25 |
| | | -30 | 792,999,998 | -2.47 | 0.0 | 0.000 000 | |
| | | -20 | 792,999,999 | -0.55 | 0.0 | 0.000 000 | |
| | | -10 | 792,999,998 | -1.86 | 0.0 | 0.000 000 | |
| | | 0 | 792,999,996 | -3.95 | 0.0 | 0.000 000 | |
| | | +10 | 792,999,998 | -2.19 | 0.0 | 0.000 000 | |
| | | +20 | 792,999,999 | -1.17 | 0.0 | 0.000 000 | |
| | | +30 | 792,999,999 | -0.77 | 0.0 | 0.000 000 | |
| | | +40 | 792,999,999 | -1.10 | 0.0 | 0.000 000 | |
| | | +50 | 792,999,998 | -2.26 | 0.0 | 0.000 000 | |
| 115% | 4.46 | +21.5(Ref) | 792,999,998 | -1.79 | 0.0 | 0.000 000 | |
| End point | 3.40 | +21.5(Ref) | 792,999,998 | -2.03 | 0.0 | 0.000 000 | |



Test mode : LTE B26
Frequency (㎐) : 819 000 000
Channel : 26740
Deviation limit : ±0.000 25% or 2.5ppm

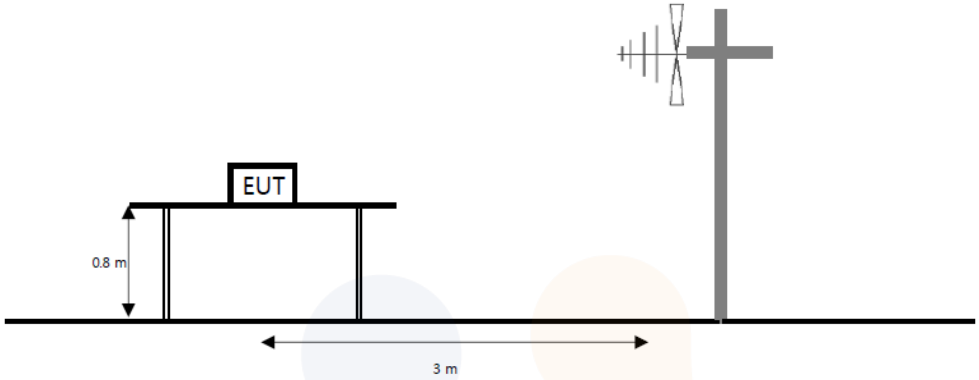
| Voltage (%) | Power (V) | Temp. (°C) | Frequency (㎐) | Frequency error (㎐) | Deviation | |
|---|---|---|---|---|---|---|
| | | | | | (ppm) | (%) |
| 100% | 3.88 | +21.5(Ref) | 818,999,998 | -1.56 | 0.0 | 0.000 000 |
| | | -30 | 818,999,999 | -1.02 | 0.0 | 0.000 000 |
| | | -20 | 818,999,998 | -1.78 | 0.0 | 0.000 000 |
| | | -10 | 818,999,998 | -2.01 | 0.0 | 0.000 000 |
| | | 0 | 818,999,999 | -1.40 | 0.0 | 0.000 000 |
| | | +10 | 818,999,998 | -2.06 | 0.0 | 0.000 000 |
| | | +20 | 818,999,997 | -2.78 | 0.0 | 0.000 000 |
| | | +30 | 818,999,999 | -1.04 | 0.0 | 0.000 000 |
| | | +40 | 818,999,999 | -0.81 | 0.0 | 0.000 000 |
| | | +50 | 818,999,996 | -3.84 | 0.0 | 0.000 000 |
| 115% | 4.46 | +21.5(Ref) | 818,999,998 | -2.33 | 0.0 | 0.000 000 |
| End point | 3.40 | +21.5(Ref) | 818,999,999 | -0.59 | 0.0 | 0.000 000 |



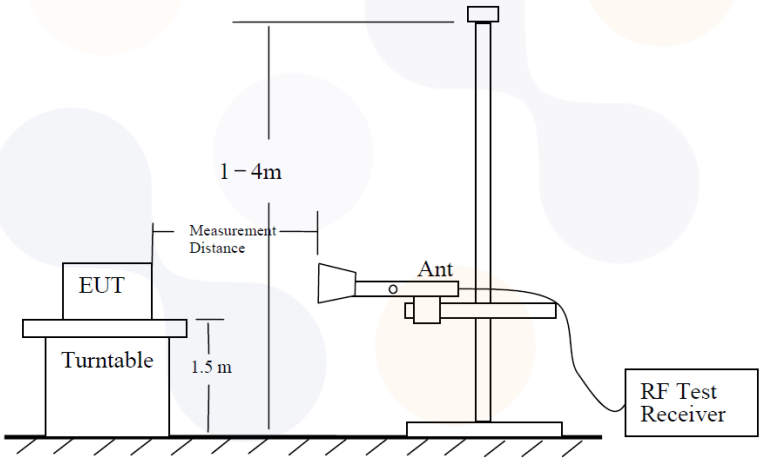
## 7.7. Radiated Power (ERP)

**Test setup**

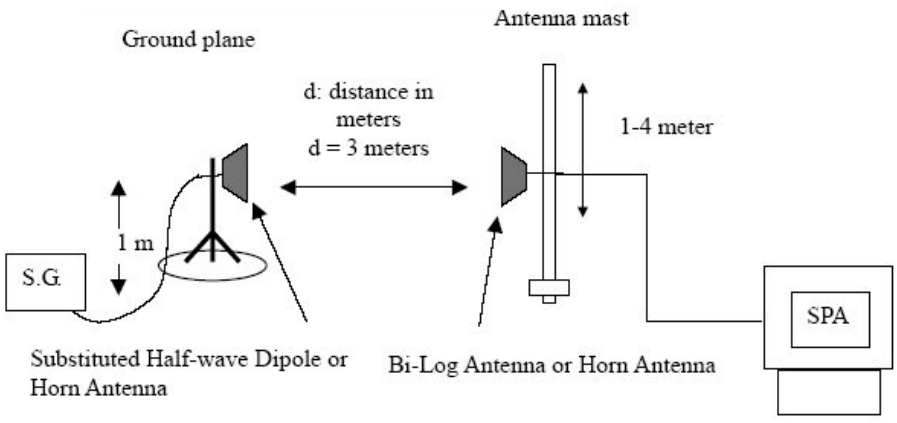
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.




The diagram below shows the test setup for substituted method.



**Limit**

**According to §90.542(a)(7),**

Portable stations (hand-held devices) transmitting in the 758-768 ㎒ band and the 788-798 ㎒ band are limited to 3 watts ERP.

**According to §90.635(b),**

The maximum output power of the transmitter for mobile stations is 100 watts(20 ㏈w).

**Test procedure**

412172 D01 v01r01
971168 D01 v03r01 - Section 5.2 and 5.8
ANSI 63.26-2015 – Section 5.2
ANSI/TIA-603-E-2016 - Section 2.2.17

**Test settings**

1) RBW = 1 % to 5 % of the OBW.
2) VBW ≥ 3 × RBW.
3) SPAN = 2 × to 3 × the OBW.
4) Number of measurement points in sweep ≥ 2 × span / RBW.
5) Sweep time :
   1) Auto couple, or
   2) ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6) Detector = RMS
7) If the EUT can be configured to transmit continuously, then set the trigger to free run.
8) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full -power transmissions).
9) Trace mode = trace averaging (RMS) over 100 sweeps.
10) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11) Allow trace to fully stabilize.

**Notes:**

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
   The power is calculated by the following formula;
   Pd(㏈m) = Pg(㏈m) – Cable loss (㏈) + Antenna gain (㏈)
   Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

## Test results

### Test mode: LTE B14

| Bandwidth [㎒] | Modulation | Channel | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|---|---|---|---|---|---|---|---|---|
| | | | [V/H] | [dBd] | [dB] | [dBm] | [dBm] | [W] |
| 5 | QPSK | Low | H | 3.15 | 5.90 | 17.48 | 14.73 | 0.030 |
| | | Middle | H | 3.15 | 5.92 | 16.89 | 14.12 | 0.026 |
| | | High | H | 3.15 | 5.91 | 16.51 | 13.75 | 0.024 |
| | 16QAM | Low | H | 3.15 | 5.90 | 16.42 | 13.67 | 0.023 |
| | | Middle | H | 3.15 | 5.92 | 15.92 | 13.15 | 0.021 |
| | | High | H | 3.15 | 5.91 | 15.53 | 12.77 | 0.019 |
| 10 | QPSK | Middle | H | 3.15 | 5.92 | 17.52 | 14.75 | 0.030 |
| | 16QAM | Middle | H | 3.15 | 5.92 | 16.56 | 13.79 | 0.024 |

**Note.**

1. E.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBd) – C.L(Cable loss) (dB)

**Test mode: LTE B26**

| Bandwidth [㎒] | Modulation | Channel | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|---|---|---|---|---|---|---|---|---|
| | | | [V/H] | [dBd] | [dB] | [dBm] | [dBm] | [W] |
| 1.4 | QPSK | Low | H | 3.19 | 6.01 | 14.52 | 11.70 | 0.015 |
| | | Middle | H | 3.32 | 6.03 | 14.39 | 11.68 | 0.015 |
| | | High | H | 3.38 | 6.07 | 14.41 | 11.73 | 0.015 |
| | 16QAM | Low | H | 3.19 | 6.01 | 13.51 | 10.69 | 0.012 |
| | | Middle | H | 3.32 | 6.03 | 13.40 | 10.69 | 0.012 |
| | | High | H | 3.38 | 6.07 | 13.57 | 10.88 | 0.012 |
| 3 | QPSK | Low | H | 3.22 | 6.01 | 14.53 | 11.73 | 0.015 |
| | | Middle | H | 3.32 | 6.03 | 14.37 | 11.66 | 0.015 |
| | | High | H | 3.38 | 6.05 | 14.28 | 11.61 | 0.014 |
| | 16QAM | Low | H | 3.22 | 6.01 | 13.48 | 10.69 | 0.012 |
| | | Middle | H | 3.32 | 6.03 | 13.30 | 10.59 | 0.011 |
| | | High | H | 3.38 | 6.05 | 13.34 | 10.66 | 0.012 |
| 5 | QPSK | Low | H | 3.25 | 6.03 | 14.42 | 11.63 | 0.015 |
| | | Middle | H | 3.32 | 6.03 | 14.30 | 11.59 | 0.014 |
| | | High | H | 3.37 | 6.04 | 14.29 | 11.61 | 0.014 |
| | 16QAM | Low | H | 3.25 | 6.03 | 13.39 | 10.60 | 0.011 |
| | | Middle | H | 3.32 | 6.03 | 13.19 | 10.48 | 0.011 |
| | | High | H | 3.37 | 6.04 | 13.35 | 10.67 | 0.012 |
| 10 | QPSK | Middle | H | 3.32 | 6.03 | 14.26 | 11.55 | 0.014 |
| | 16QAM | Middle | H | 3.32 | 6.03 | 14.34 | 11.63 | 0.015 |
| 15 | QPSK | Middle | H | 3.37 | 6.04 | 13.13 | 10.46 | 0.011 |
| | 16QAM | Middle | H | 3.37 | 6.04 | 13.37 | 10.70 | 0.012 |

**Test mode: LTE B26 (Straddle channel)**

| Bandwidth [㎒] | Modulation | Channel | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|---|---|---|---|---|---|---|---|---|
| | | | [V/H] | [dBd] | [dB] | [dBm] | [dBm] | [W] |
| 1.4 | QPSK | Middle | H | 3.39 | 6.08 | 14.52 | 11.83 | 0.015 |
| | 16QAM | | H | 3.39 | 6.08 | 13.53 | 10.85 | 0.012 |
| 3 | QPSK | | H | 3.39 | 6.08 | 14.41 | 11.73 | 0.015 |
| | 16QAM | | H | 3.39 | 6.08 | 13.36 | 10.67 | 0.012 |
| 5 | QPSK | | H | 3.39 | 6.08 | 14.39 | 11.70 | 0.015 |
| | 16QAM | | H | 3.39 | 6.08 | 13.33 | 10.64 | 0.012 |
| 10 | QPSK | | H | 3.39 | 6.08 | 14.60 | 11.91 | 0.016 |
| | 16QAM | | H | 3.39 | 6.08 | 14.52 | 11.84 | 0.015 |
| 15 | QPSK | | H | 3.39 | 6.08 | 13.62 | 10.94 | 0.012 |
| | 16QAM | | H | 3.39 | 6.08 | 13.57 | 10.89 | 0.012 |

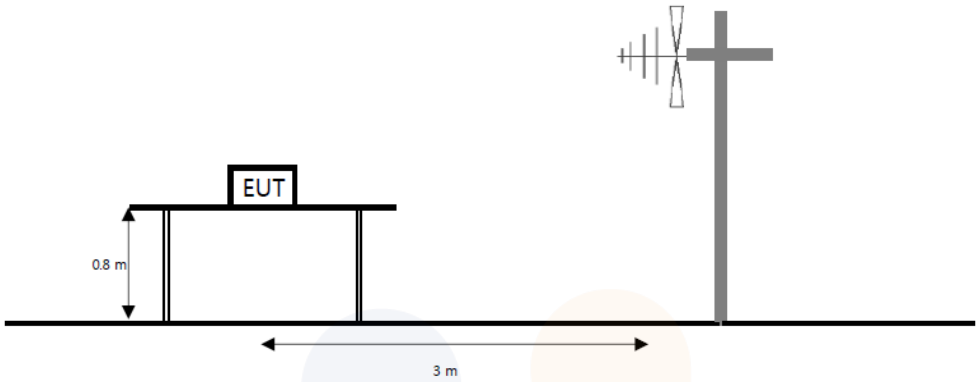
**Note.**

1. E.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBd) – C.L(Cable loss) (dB)

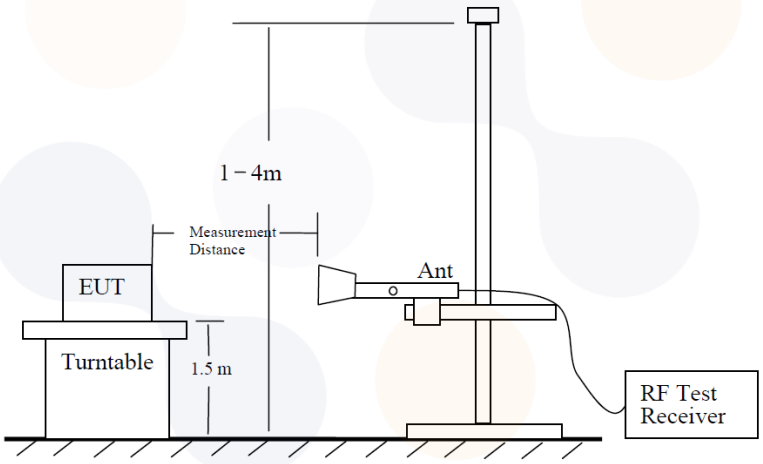
## 7.8. Radiated Spurious Emissions

**Test setup**

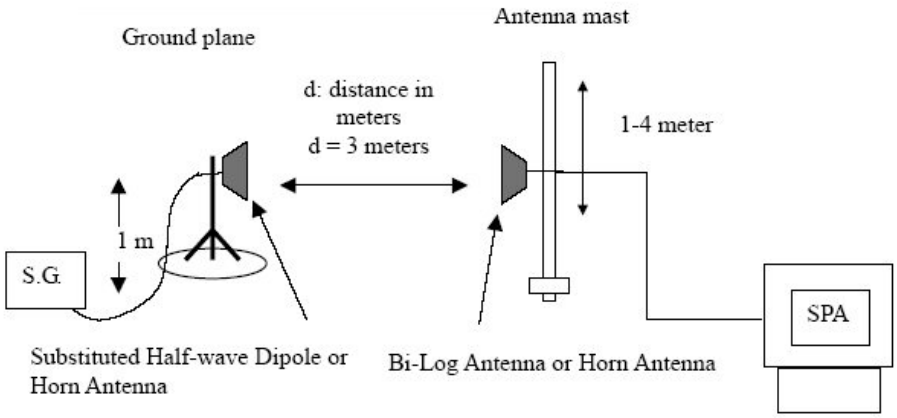
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.




The diagram below shows the test setup for substituted method.



**Limit**

**According to §90.543(e),**

for operations in the 758-768 ㎒ and the 788-798 ㎒ bands, the power of any emission outside the 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, in accordance with the following:

(1) On all frequencies between 769-775 ㎒ and 799-805 ㎒, by a factor not less than 76+10log(P) ㏈ in a 6.25 ㎑ band segment, for base and fixed stations.

(2) On all frequencies between 769-775 ㎒ and 799-805 ㎒, by a factor not less than 65+10log(P) ㏈ in a 6.25 ㎑ band segment, for mobile and portable stations.

(3) On any frequency between 775-788 ㎒, above 805 ㎒, and below 758 ㎒, by at least 43+10log(P) ㏈.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 ㎑ segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater. However, in the 100 ㎑ bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 ㎑ may be employed.

**According to §90.543(f),**

for operations in the 758-775 ㎒ and the 788-805 ㎒ bands, all emissions including harmonics in the band 1559 – 1610 ㎒ shall be limited to -70 ㏈W/㎒ equivalent isotropically radiated power (EIRP) for wideband signals, and -80 ㏈W EIRP for discrete emissions of less than 700 ㎐ 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.

**According to §90.691(a),**

Out-of-band emission requirement shall apply only to the "outer" channels Included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 ㎑, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}$(f/6.1) decibels or 50 + 10$Log_{10}$(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz where f is greater than 12.5 ㎑.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 ㎑, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10$Log_{10}$(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 ㎑.

**Test procedure**

971168 D01 v03r01 - Section 6.2
ANSI 63.26-2015 – Section 5.5
ANSI/TIA-603-E-2016 - Section 2.2.12

**Test settings**

1) RBW = 1 ㎑ for below 1 ㎓ and 1 ㎒ for above 1 ㎓.
2) VBW ≥ 3 × RBW.
3) Detector = RMS
4) Trace mode = Max hold
5) Sweep time = Auto couple
6) Number of sweep points ≥ 2 × span / RBW
7) Allow trace to fully stabilize.

**Notes:**

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

## Test results (Above 1 000 ㎒)

Test mode : LTE B14
Frequency(㎒) : 793
Channel : 23330
Bandwidth(㎒) : 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 575.62 | H | 5.97 | 8.42 | -51.85 | -54.30 | -40.00 | 14.30 |
| | 2 364.58 | V | 5.65 | 10.45 | -42.30 | -47.10 | -13.00 | 34.10 |
| | 3 151.91 | V | 7.60 | 12.15 | -40.15 | -44.70 | -13.00 | 31.70 |
| | 3 941.28 | V | 9.09 | 13.65 | -34.94 | -39.50 | -13.00 | 26.50 |

**Note.**

1. For the range 1 559 ~ 1 610 MHz, Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)
   Limit Calculation of wide-band (dBm/㎒) = -70 dBW/㎒ (-40 dBm/㎒)
   Limit Calculation of narrow-band (dBm) = -80 dBW (-50 dBm)
2. E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode : LTE B26
Frequency(㎒) : 819
Channel : 26740
Bandwidth(㎒) : 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 627.31 | V | 5.82 | 8.62 | -51.10 | -53.90 | -13.00 | 40.90 |
| | 2 442.13 | V | 5.85 | 10.60 | -42.35 | -47.10 | -13.00 | 34.10 |
| | 3 257.35 | V | 7.81 | 12.38 | -39.43 | -44.00 | -13.00 | 31.00 |
| | 4 070.93 | V | 9.26 | 13.92 | -37.44 | -42.10 | -13.00 | 29.10 |

Test mode : LTE B26
Frequency(㎒) : 824
Channel : 26790
Bandwidth(㎒) : 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 638.39 | V | 5.78 | 8.64 | -51.34 | -54.20 | -13.00 | 41.20 |
| | 2 456.49 | H | 5.89 | 10.62 | -41.77 | -46.50 | -13.00 | 33.50 |
| | 3 278.68 | H | 7.86 | 12.43 | -39.43 | -44.00 | -13.00 | 31.00 |
| | 4 095.13 | V | 9.28 | 13.96 | -36.42 | -41.10 | -13.00 | 28.10 |

**Note.**
1. E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

## 8. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV40-N | 101462 | 24.10.12 |
| Spectrum Analyzer | Agilent | N9040B | US55230151 | 24.07.03 |
| Divider | Marki Microwave, Inc. | PD-0040 | D0006 | 24.07.04 |
| DC Power Supply | AGILENT | E3632A | KR75304571 | 25.04.24* |
| Wideband Radio Communication Tester | R&S | CMW500 | 168683 | 25.02.13 |
| Wideband Radio Communication Tester | R&S | CMW500 | 141780 | 25.01.18 |
| Signal Generator | R&S | SMB100A | 176206 | 25.01.18 |
| Temp & Humid Chamber | Myeongseong R&P | CTHC-50P-DT | 20150824-2 | 25.01.18 |
| Bi-log Antenna | Teseq GmbH | CBL 6112D | 62027 | 24.11.17 |
| Bi-log Antenna | ETS-LINDGREN | 3143B | 00228420 | 25.07.20 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00251528 | 25.01.26 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00227509 | 24.07.12 |
| Amplifier | SONOMA INSTRUMENT | 310N | 421822 | 24.10.12 |
| Amplifier | B&Z Technologies | BZR-0050400-551028-252525 | 27736 | 24.07.04 |
| High pass Filter | Wainwright Instruments GmbH | WHKX10-900-1000-15000-40SS | 11 | 24.07.04 |

*This equipment was calibrated during the test period, and was used after calibration.

**End of test report**