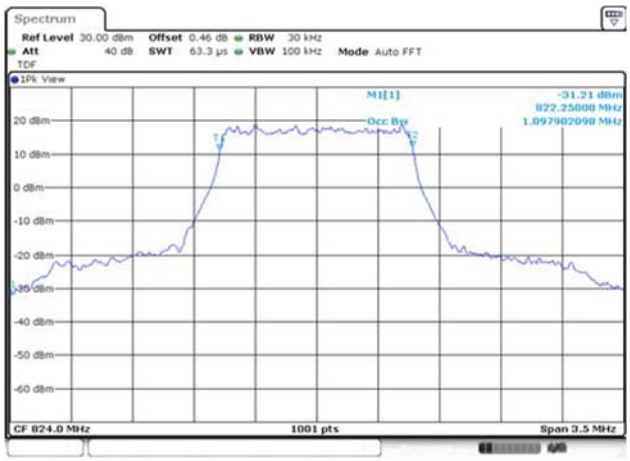
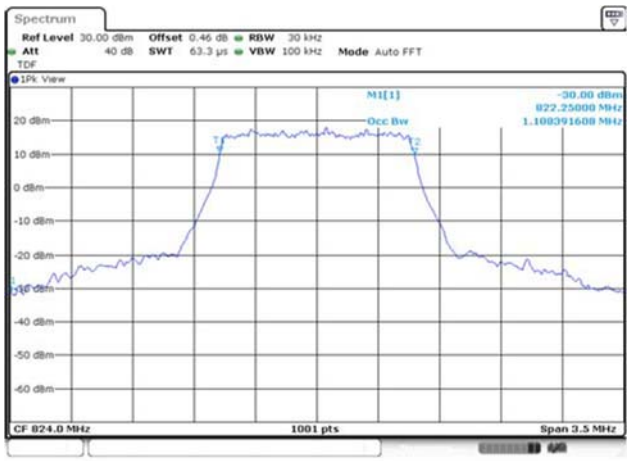
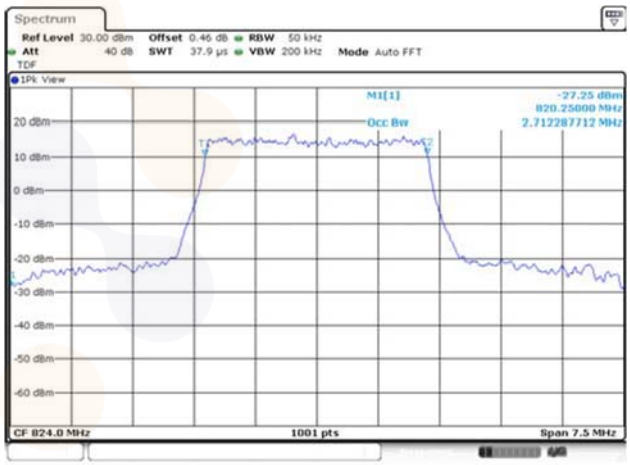
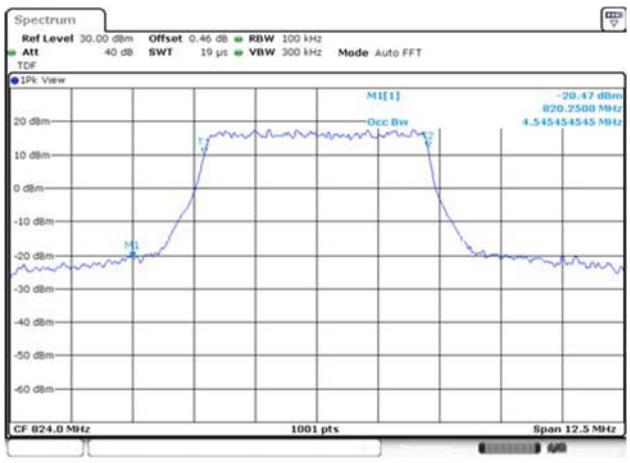
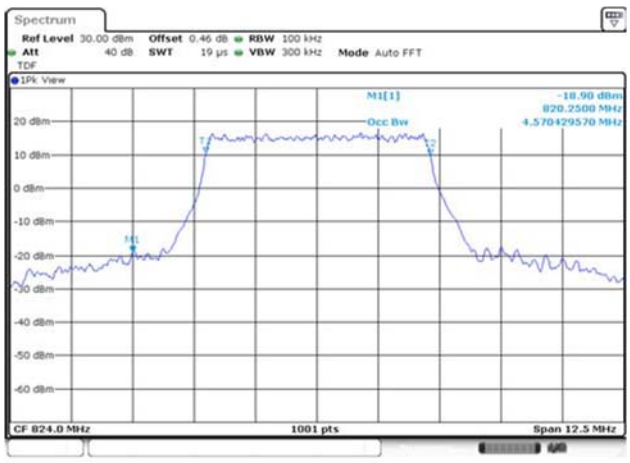
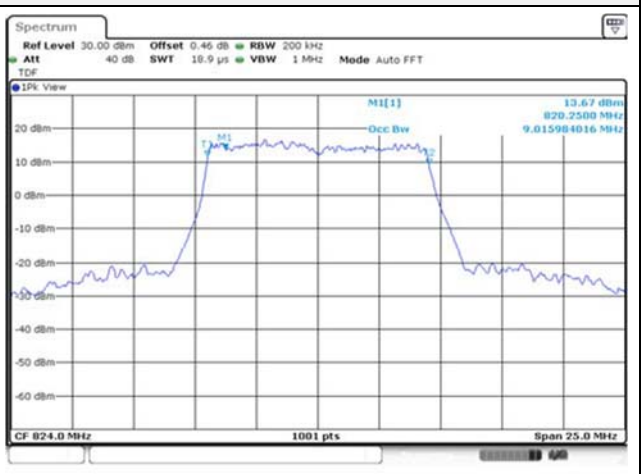
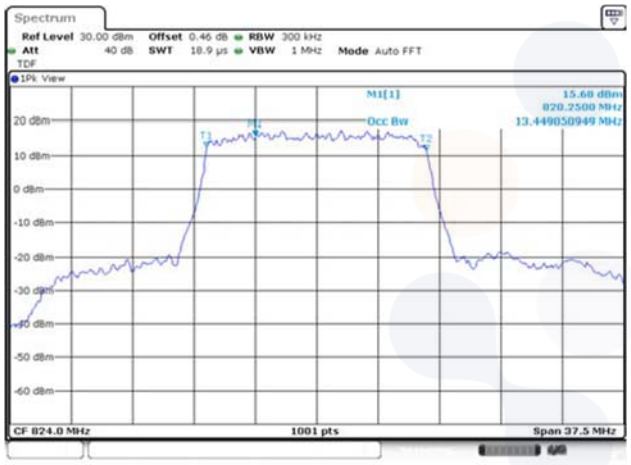
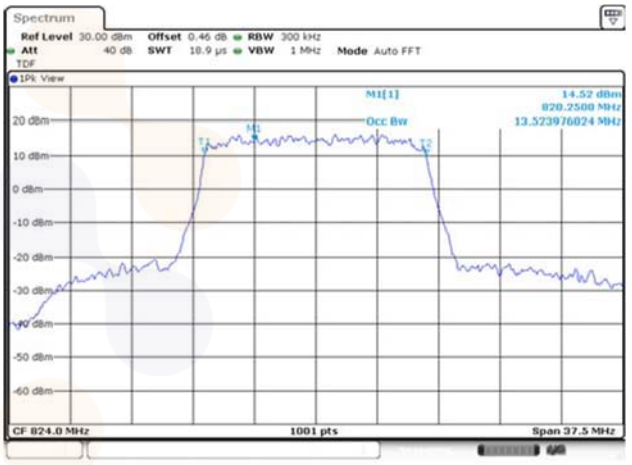
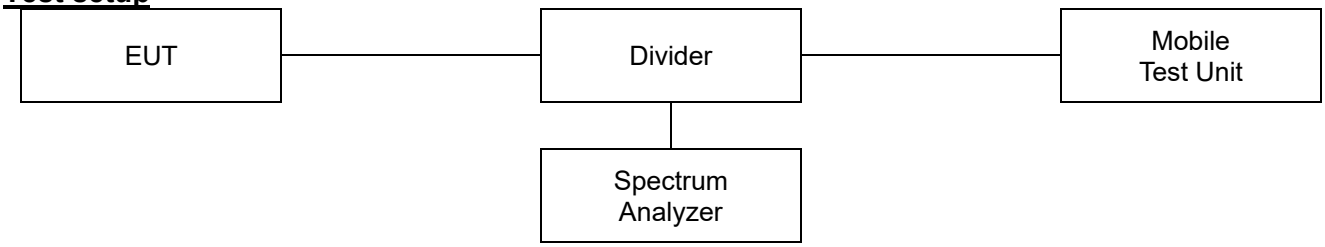
Straddle channel

1.4M BW QPSK	1.4M BW 16QAM
	
3M BW QPSK	**3M BW 16QAM**
	
5M BW QPSK	**5M BW 16QAM**
	

10M BW QPSK	10M BW 16QAM
	
15M BW QPSK	**15M BW 16QAM**
	

7.3. Band Edge Emissions at Antenna Terminal

Test setup



Limit

According to §90.543(e),
for operations in the 758-768 ㎒ and the 788-798 MHz 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 kHz 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 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz 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 + 10Log_{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 + 10Log_{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
971168 D02 v02r02 – Section VIII
ANSI C63.26-2015 – Section 5.7

Test settings

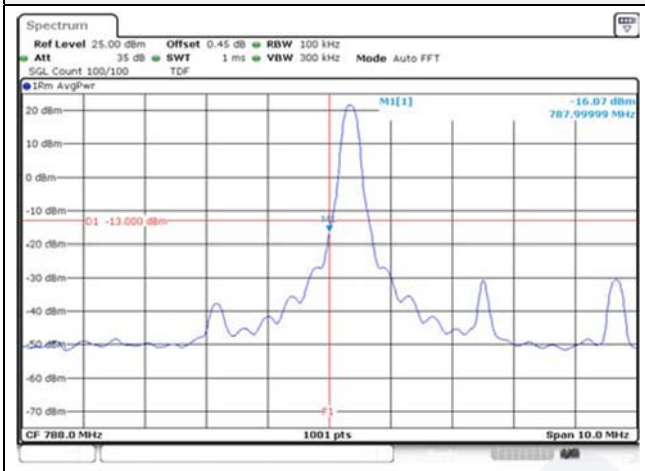
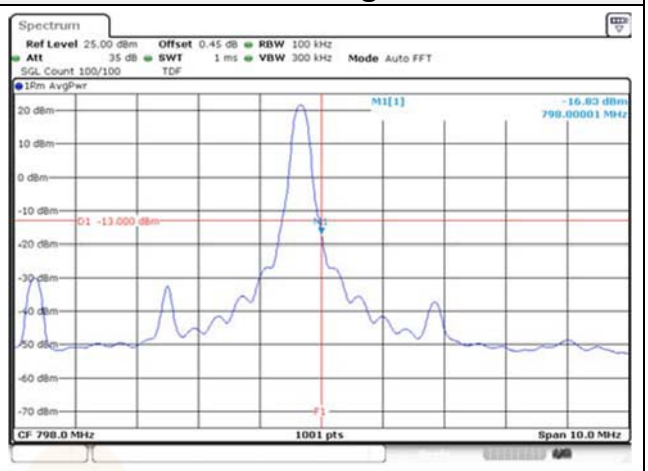
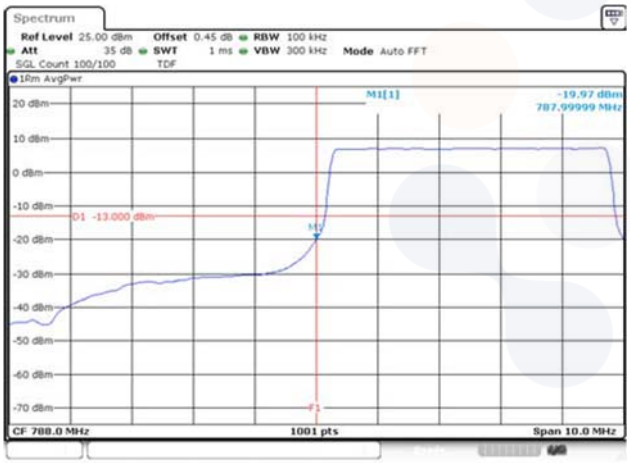
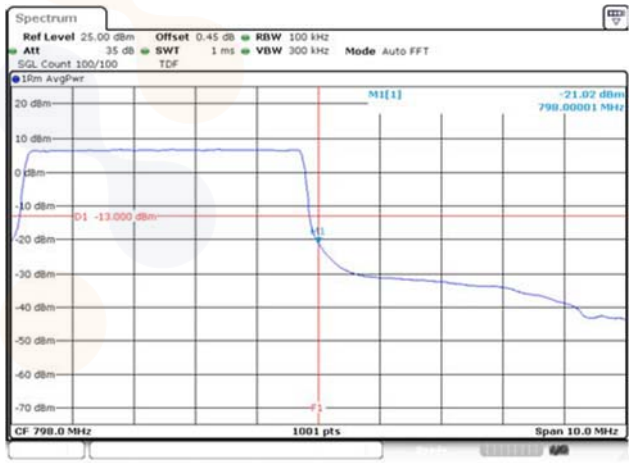
1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Span was set large enough so as to capture all out of band emissions near the band edge.
3) Set the RBW > 1% of the emission bandwidth.
4) Set the VBW ≥ 3 x RBW.
5) Set the number of sweep points ≥ 2 x Span/RBW
6) Detector = RMS
7) Trace mode = trace average
8) Sweep time should be auto for peak detection. For RMS detection the sweep time should be set as follows:
   a) If the device can be configured to transmit continuously (duty cycle ≥ 98%), set the (sweep time) > (number of points in sweep) x (symbol period) (e.g., by a factor of 10 x symbol period x number of points) Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols.
   b) If the device cannot transmit continuously (duty cycle < 98%), a gated sweep shall be used when possible (i.e., gate triggered such that the analyzer only sweeps when the device is transmitting at full power), set the sweep time > (number of points in sweep) x (symbol period) but the sweep time shall always be maintained at a value that is less than or equal to the minimum transmission time
   c) If the device cannot be configured to transmit continuously (duty cycle > 98%), and a free-running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).
   d) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold art necessary to ensure that the maximum power is measured.
9) Allow trace to fully stabilize.

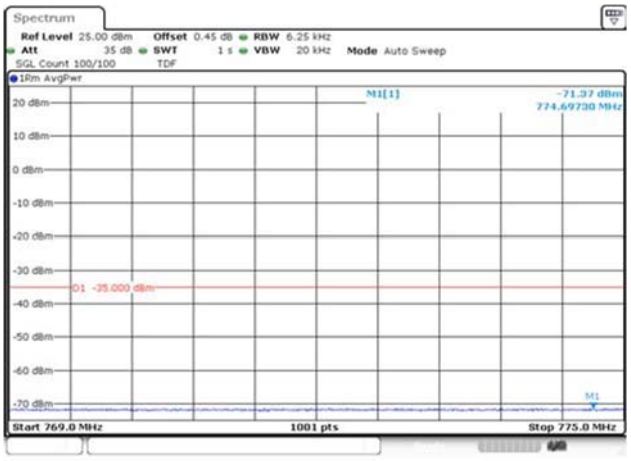
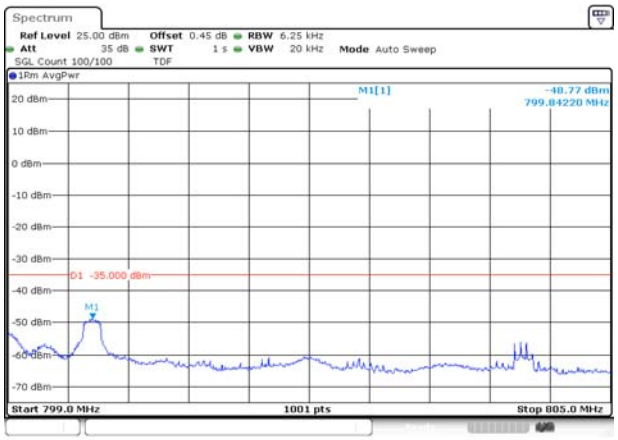
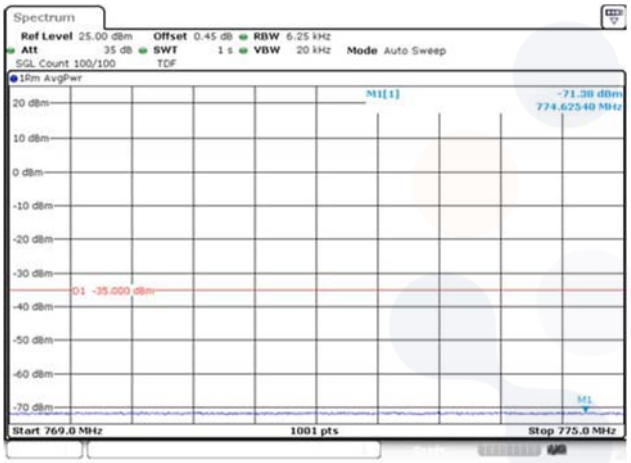
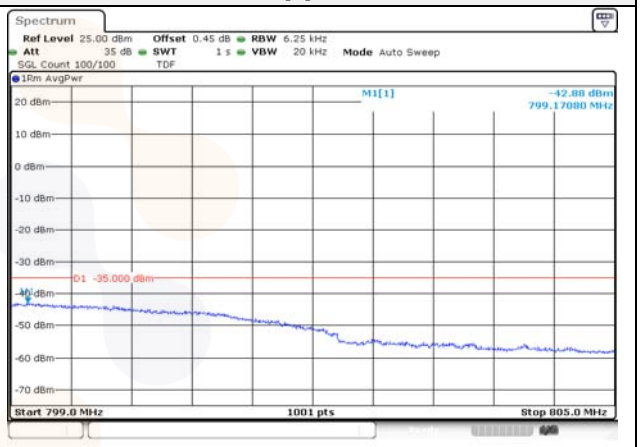
Notes:

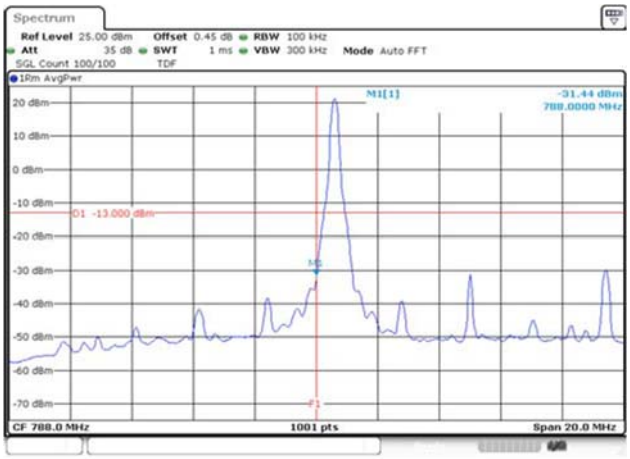
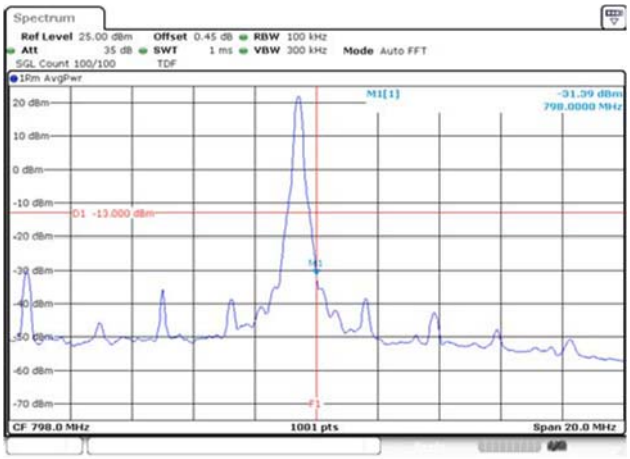
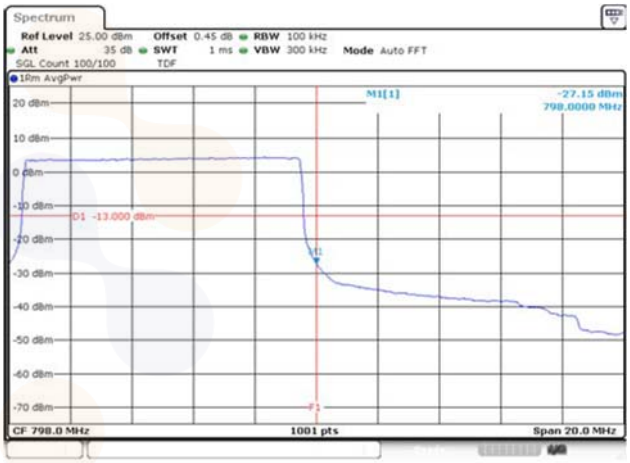
1. For Section 90.691(a) compliance testing, use RBW = 300 Hz for offsets less than 37.5 kHz from a channel edge; RBW = 100 kHz for offsets greater than 37.5 kHz is allowed.
2. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 ㎒ or greater. however in the 1 ㎒ bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be may be employed. 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.
3. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.

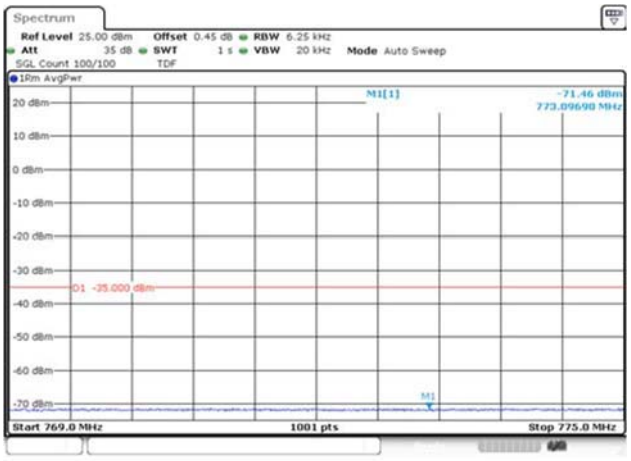
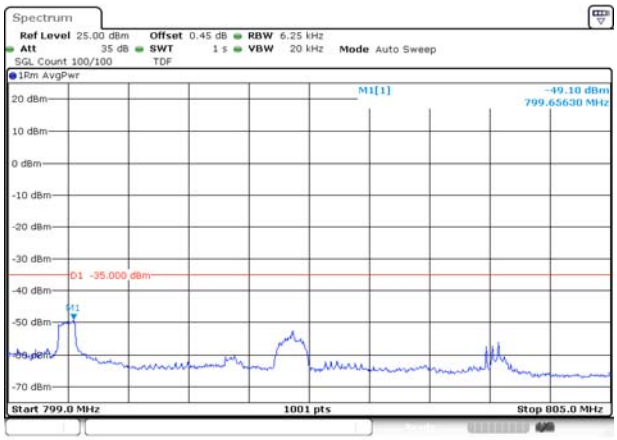
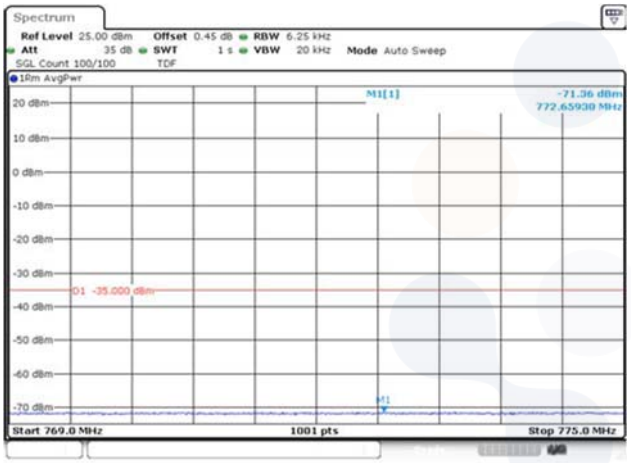
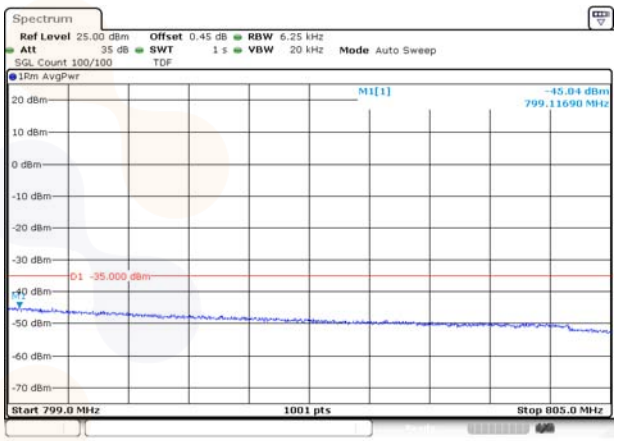
Test results

Test mode: LTE Band 14

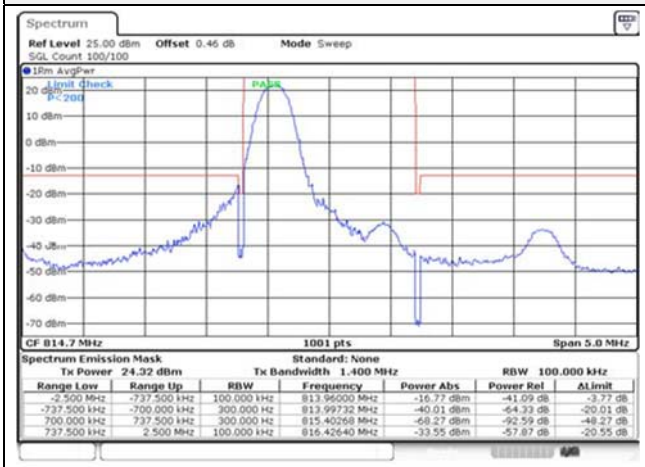
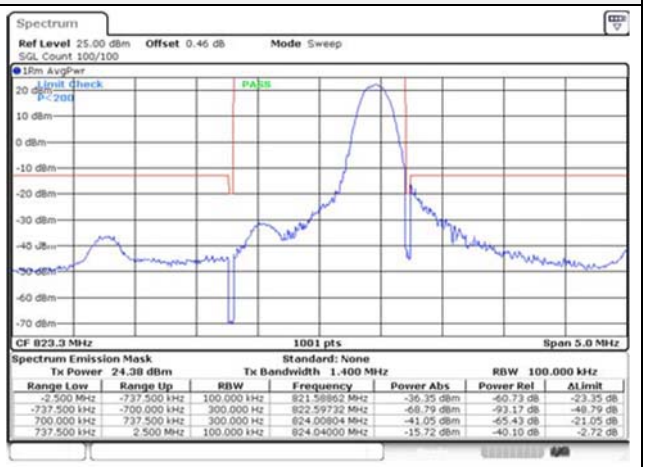
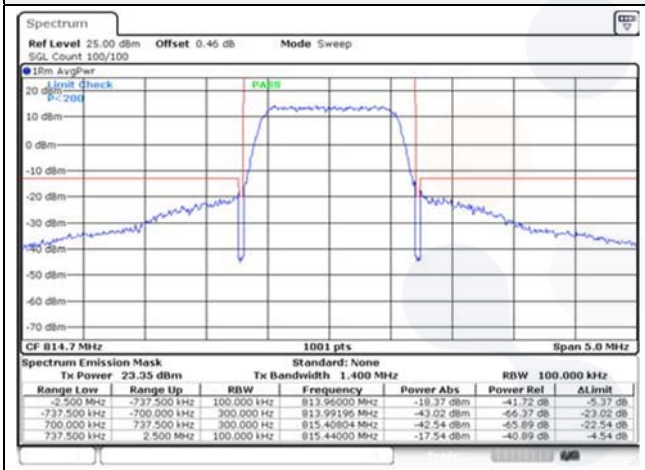
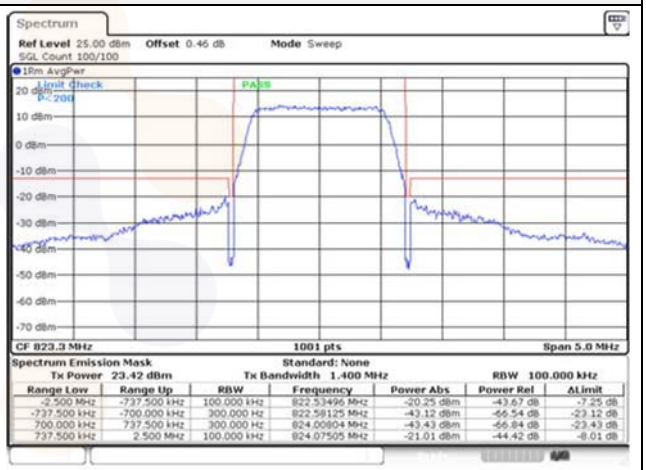
5M BW QPSK Low ch. 1RB	5M BW QPSK High ch. 1RB
	
5M BW QPSK Low ch. FRB	**5M BW QPSK High ch. FRB**
	

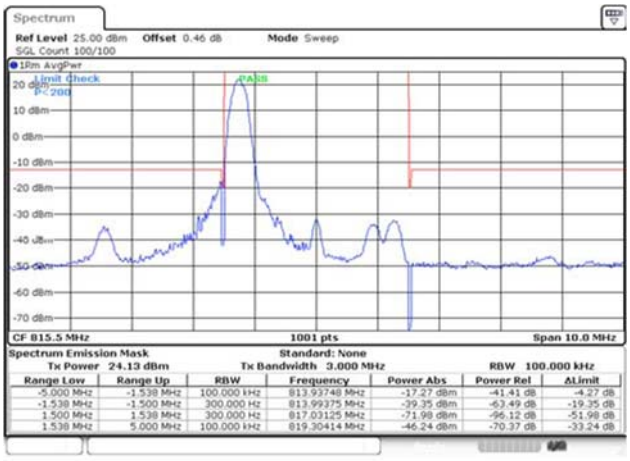
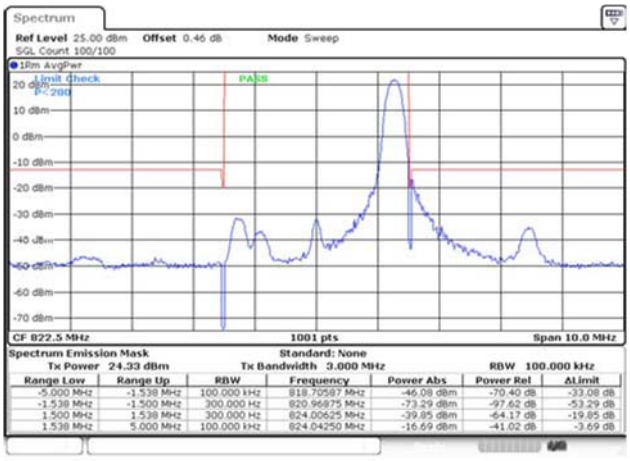
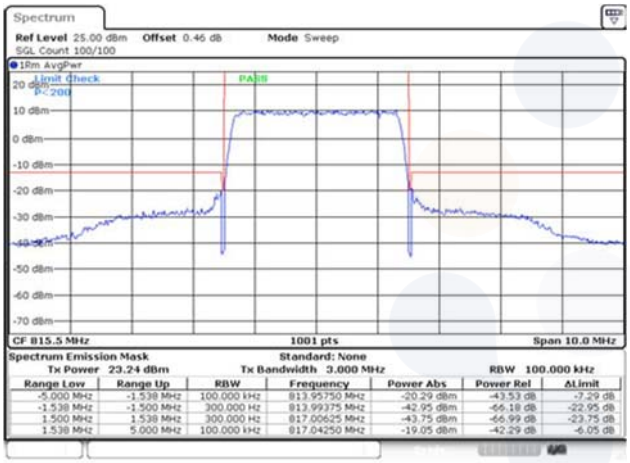
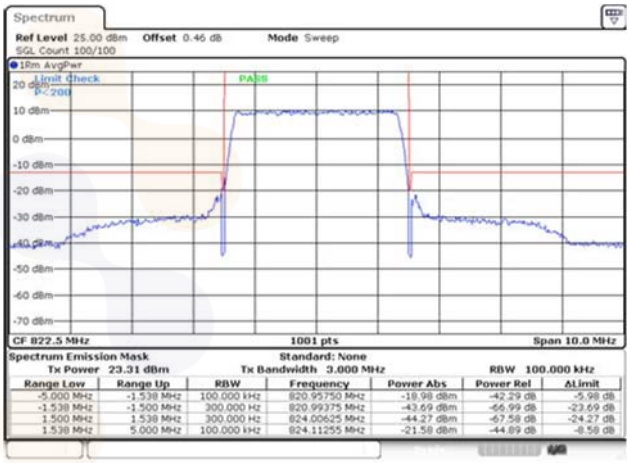
5M BW QPSK Lower extended 1RB	5M BW QPSK Upper extended 1RB
	
5M BW QPSK Lower extended FRB	**5M BW QPSK Upper extended FRB**
	

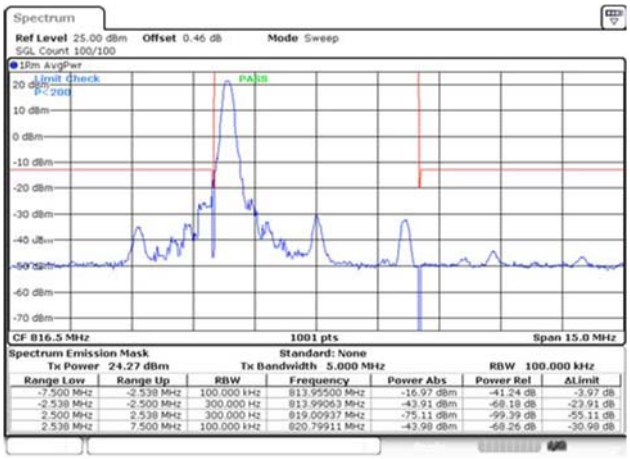
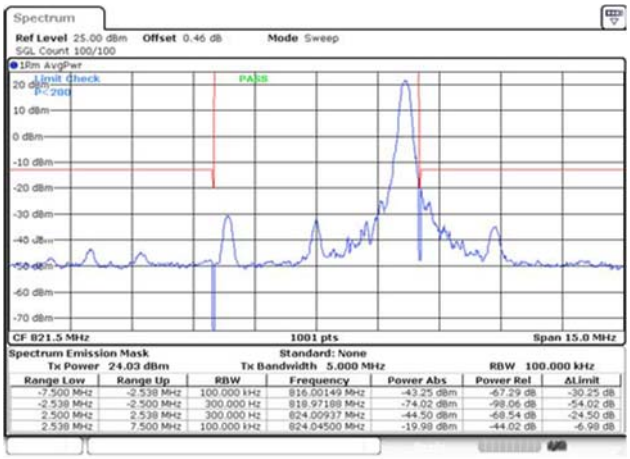
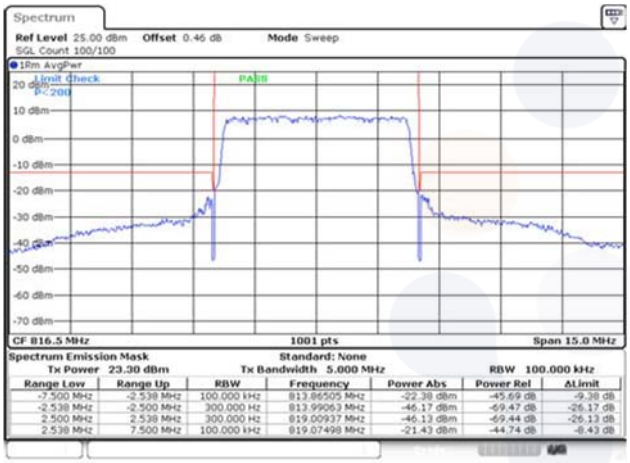
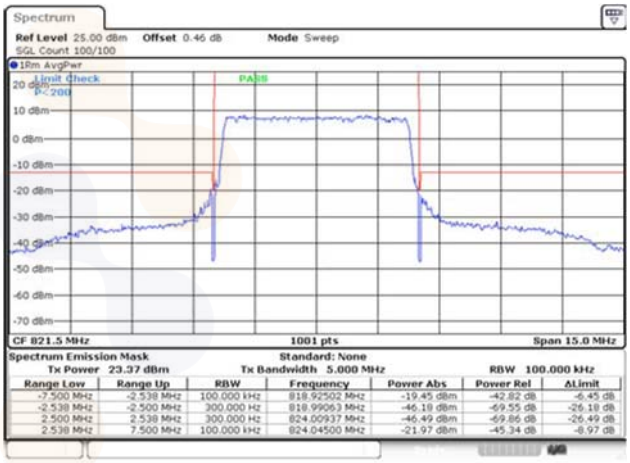
10M BW QPSK Mid ch. Lower 1RB	10M BW QPSK Mid ch. Upper 1RB
	
10M BW QPSK Mid ch. Lower FRB	**10M BW QPSK Mid ch. Upper FRB**
	

10M BW QPSK Lower extended 1RB	10M BW QPSK Upper extended 1RB
	
10M BW QPSK Lower extended FRB	**10M BW QPSK Upper extended FRB**
	

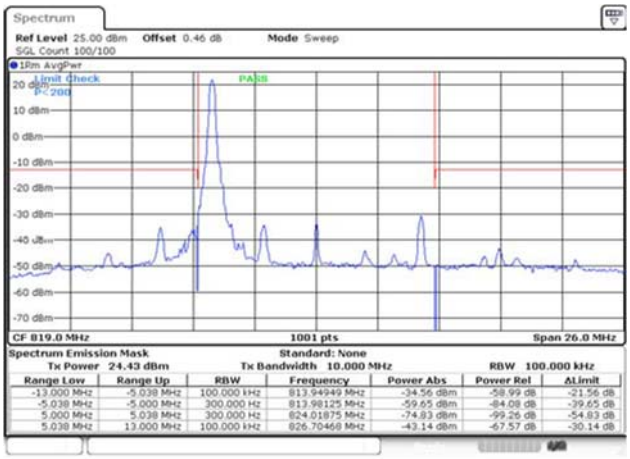
Test mode: LTE Band 26

1.4M BW QPSK Low ch. 1RB	1.4M BW QPSK High ch. 1RB
	
1.4M BW QPSK Low ch. FRB	**1.4M BW QPSK High ch. FRB**
	

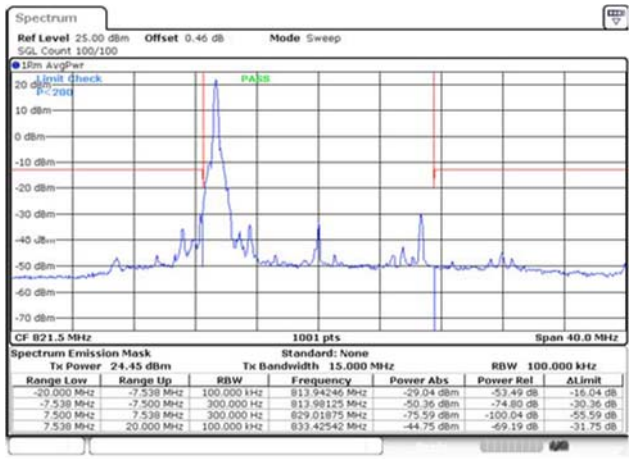
3M BW QPSK Low ch. 1RB	3M BW QPSK High ch. 1RB
	
3M BW QPSK Low ch. FRB	**3M BW QPSK High ch. FRB**
	

5M BW QPSK Low ch. 1RB	5M BW QPSK High ch. 1RB
	
5M BW QPSK Low ch. FRB	**5M BW QPSK High ch. FRB**
	

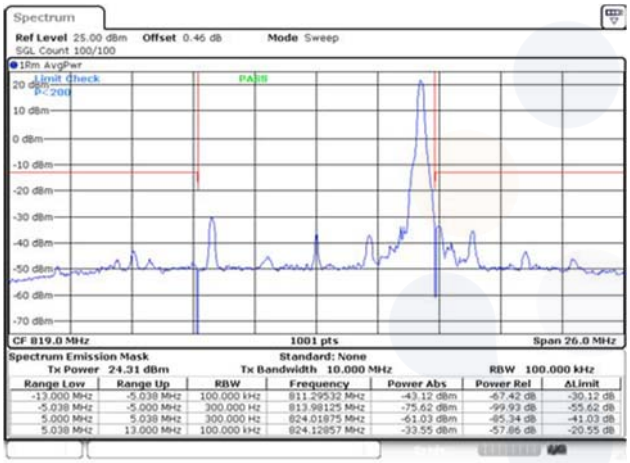
10M BW QPSK Mid ch. Lower 1RB



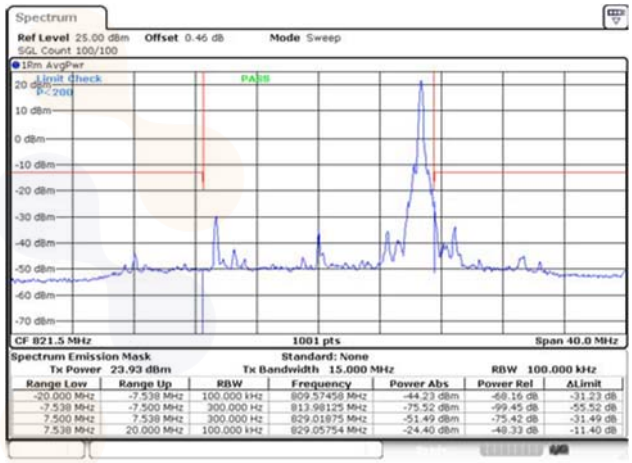
15M BW QPSK Mid ch. Lower 1RB



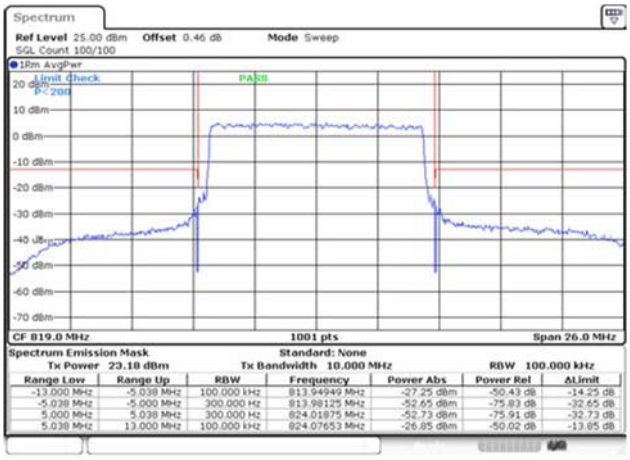
10M BW QPSK Mid ch. Upper 1RB



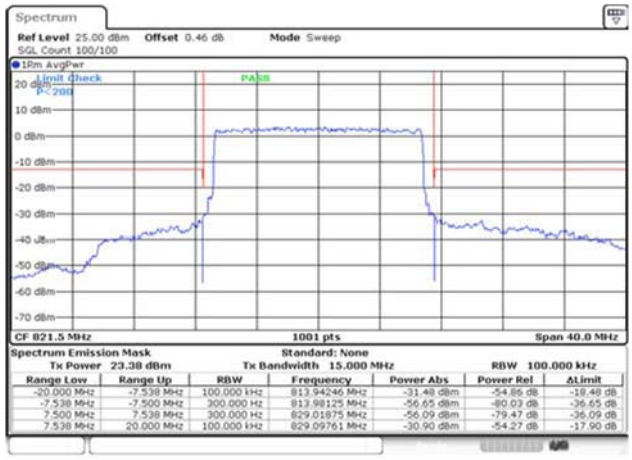
15M BW QPSK Mid ch. Upper 1RB



10M BW QPSK Mid ch. FRB

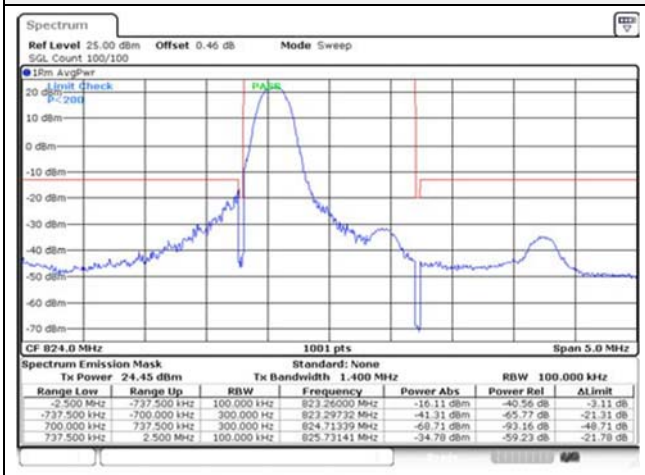


15M BW QPSK Mid ch. FRB

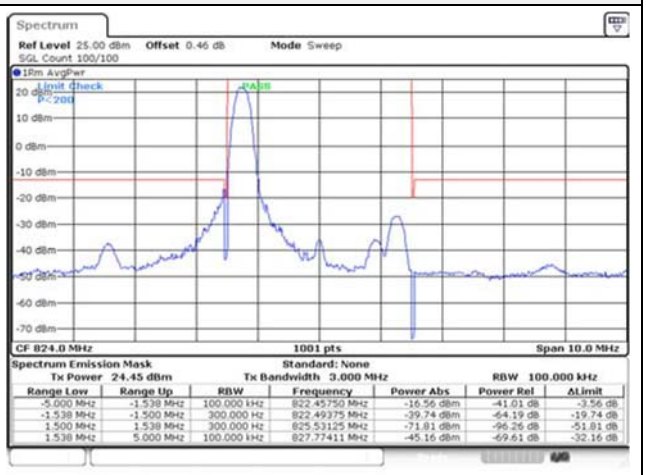


Straddle channel

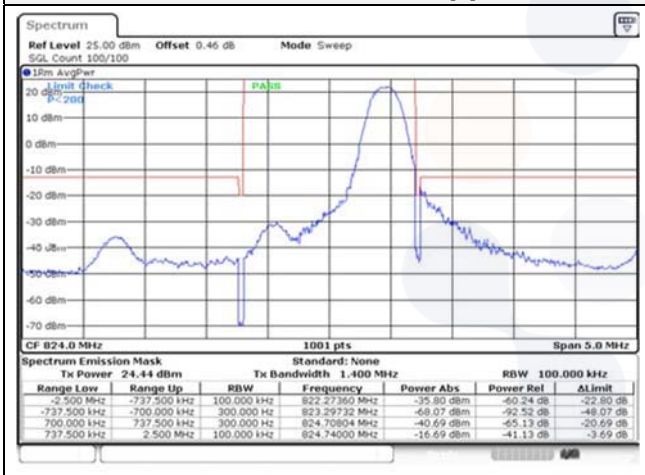
1.4M BW QPSK Mid ch. Lower 1RB



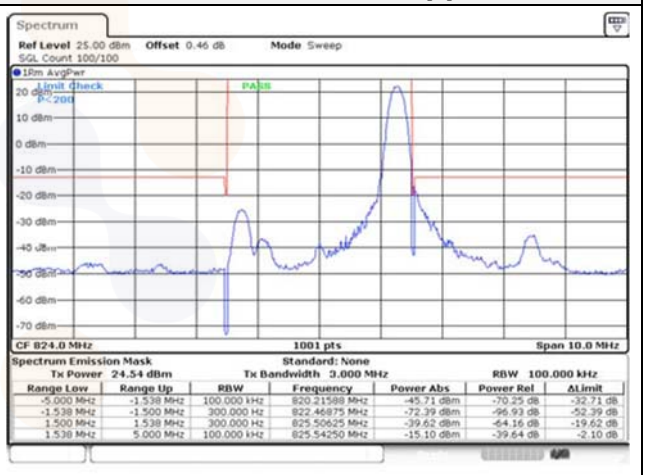
3M BW QPSK Mid ch. Lower 1RB



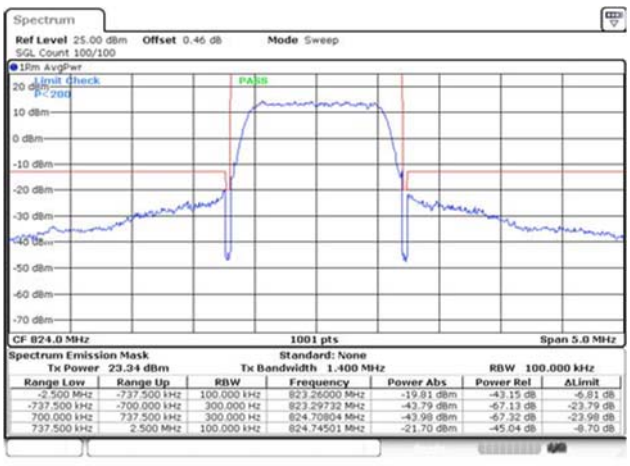
1.4M BW QPSK Mid ch. Upper 1RB



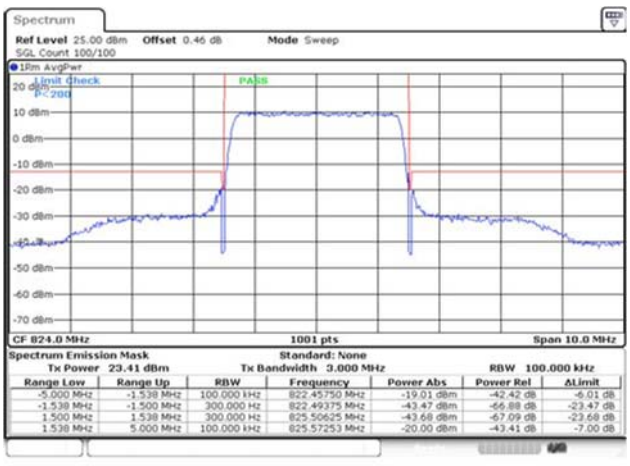
3M BW QPSK Mid ch. Upper 1RB



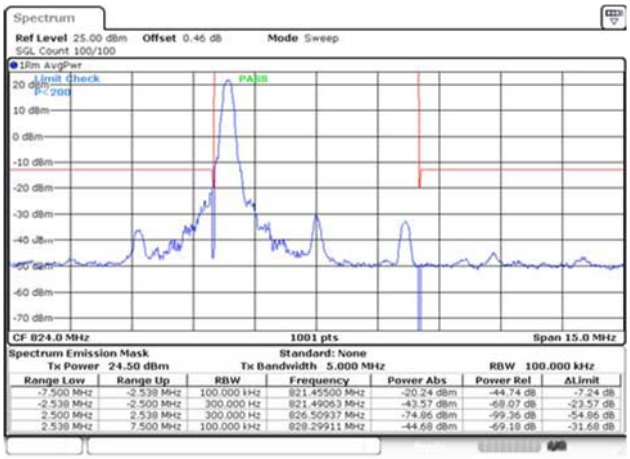
1.4M BW QPSK Mid ch. FRB



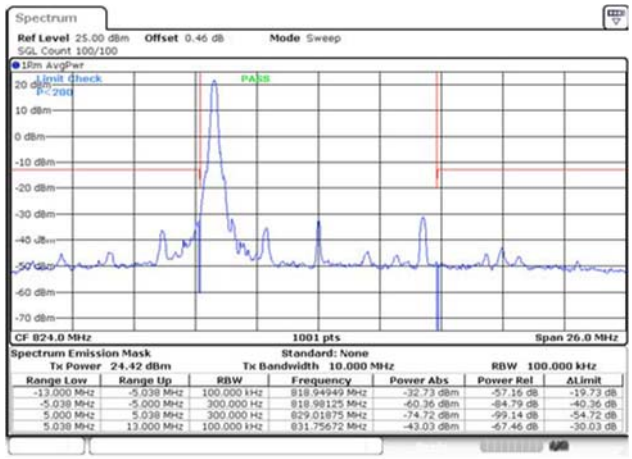
3M BW QPSK Mid ch. FRB



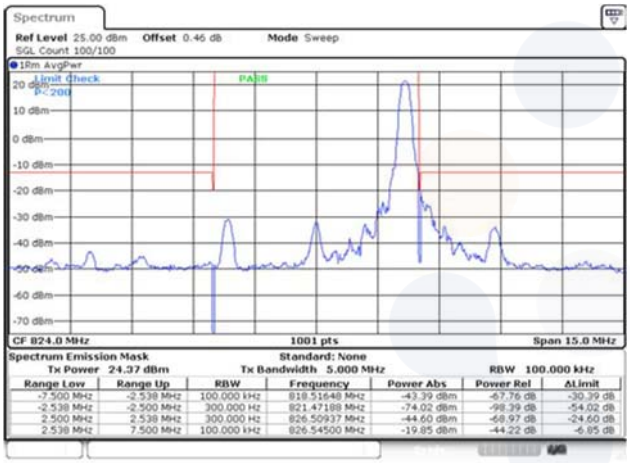
5M BW QPSK Mid ch. Lower 1RB



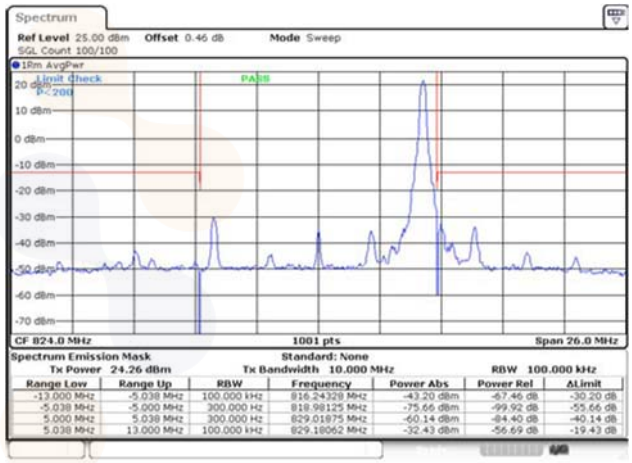
10M BW QPSK Mid ch. Lower 1RB



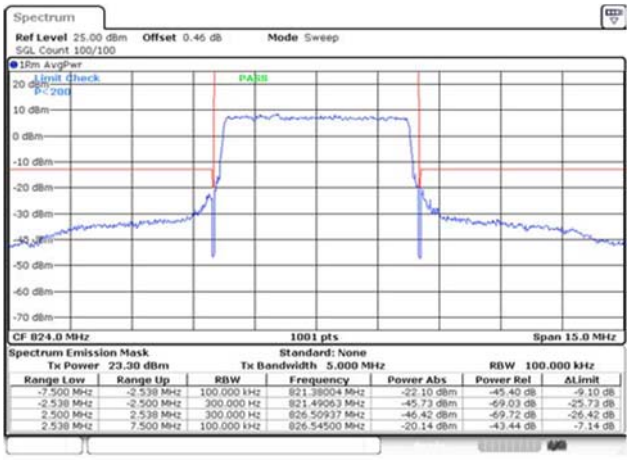
5M BW QPSK Mid ch. Upper 1RB



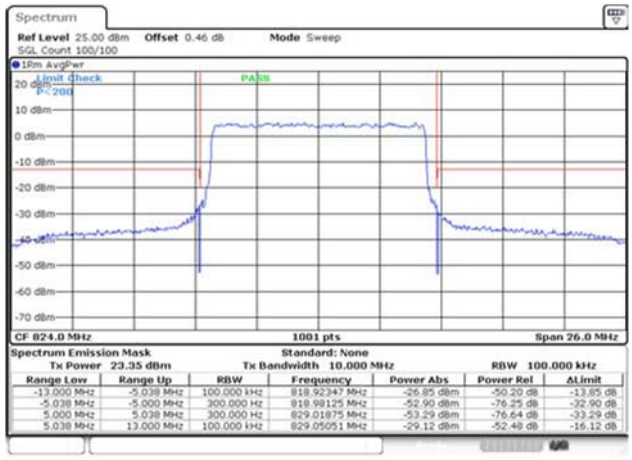
10M BW QPSK Mid ch. Upper 1RB

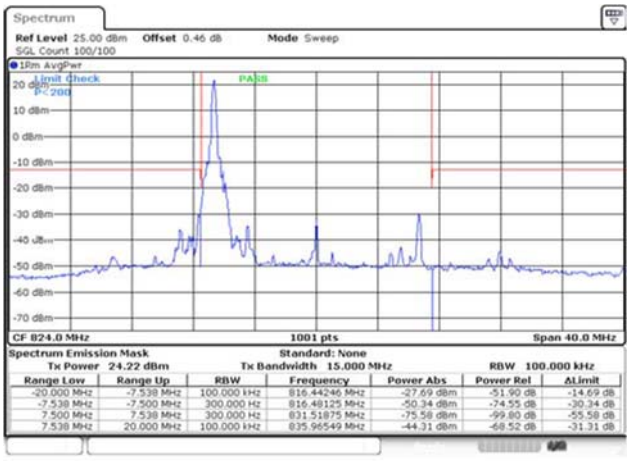
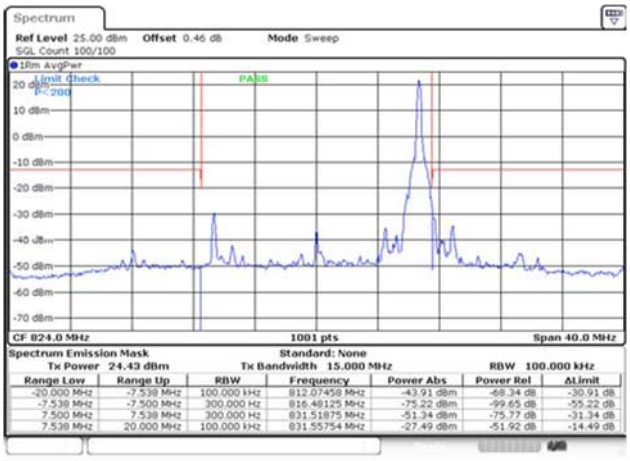
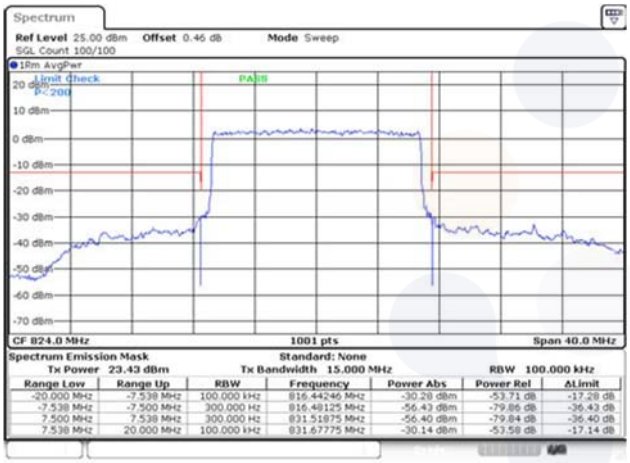


5M BW QPSK Mid ch. FRB



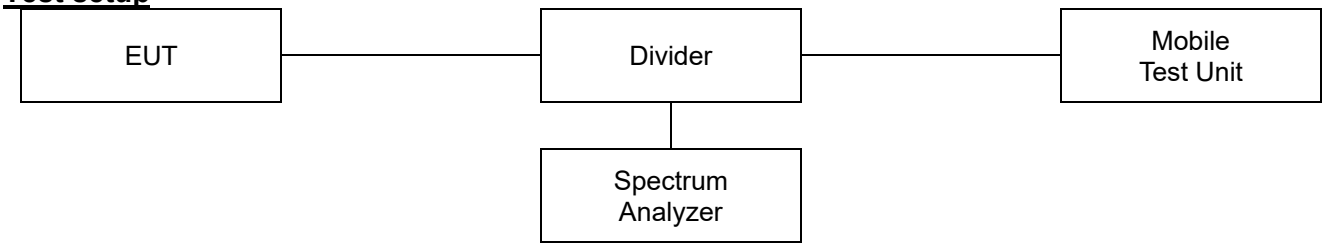
10M BW QPSK Mid ch. FRB



15M BW QPSK Mid ch. Lower 1RB	15M BW QPSK Mid ch. Upper 1RB
	
15M BW QPSK Mid ch. 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 kHz 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 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz 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 + 10Log_{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 + 10Log_{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.

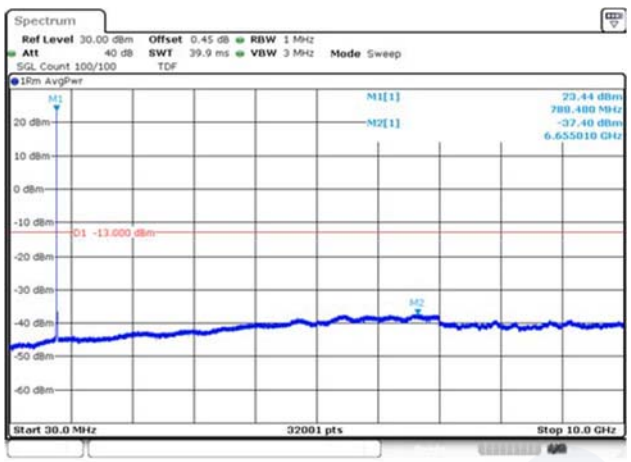
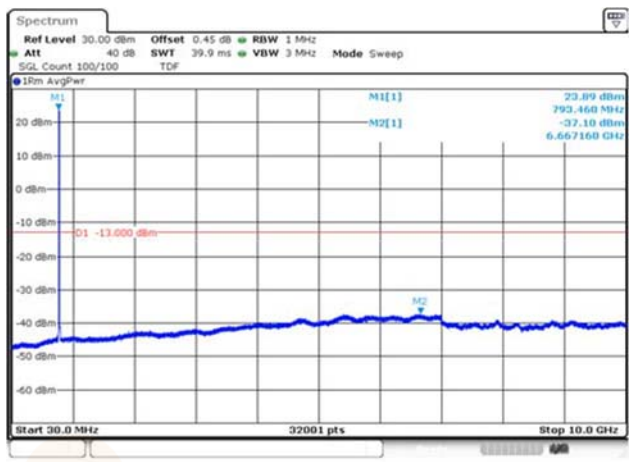
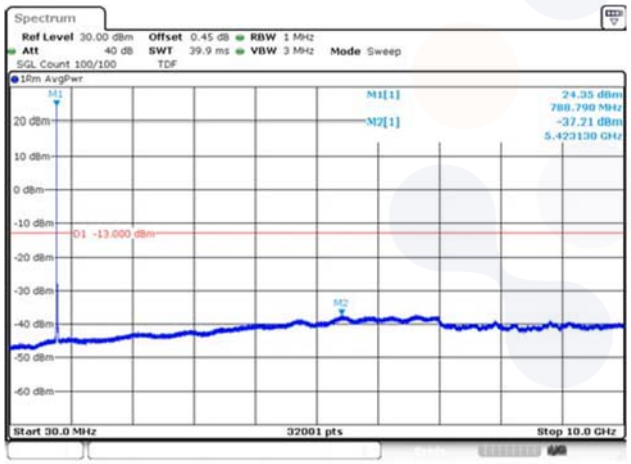
Notes:

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 ㎓.

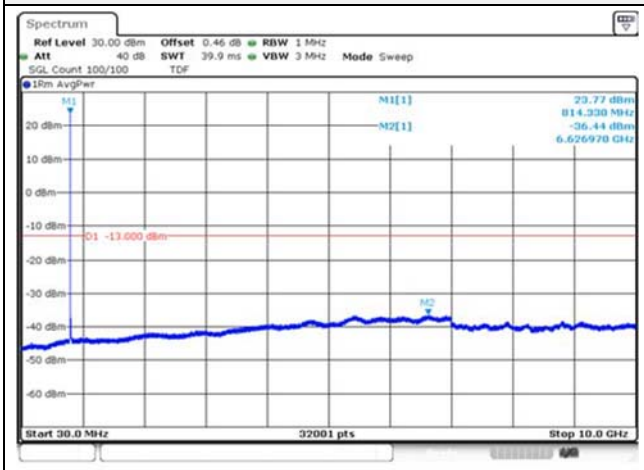
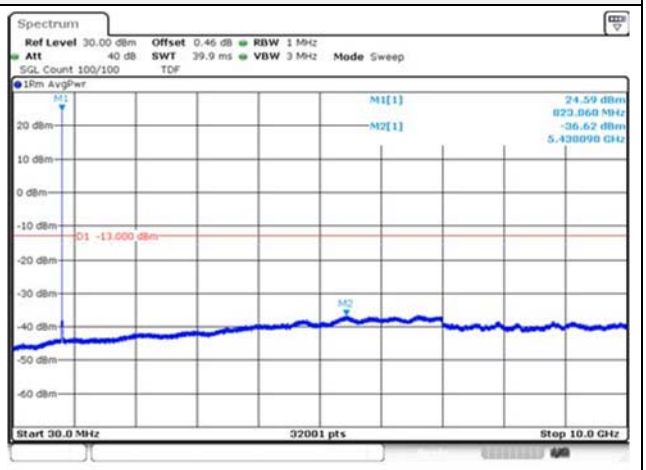
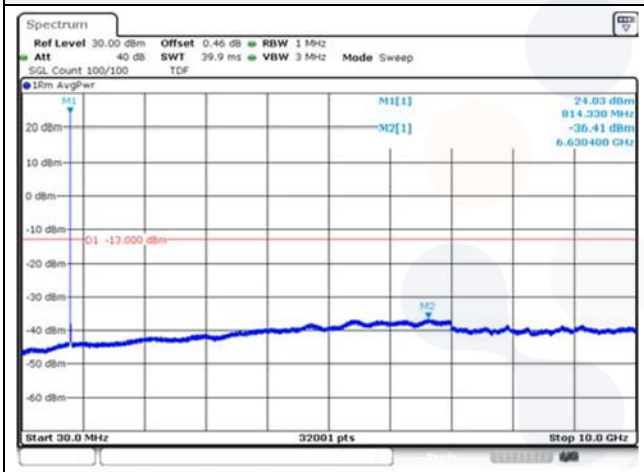
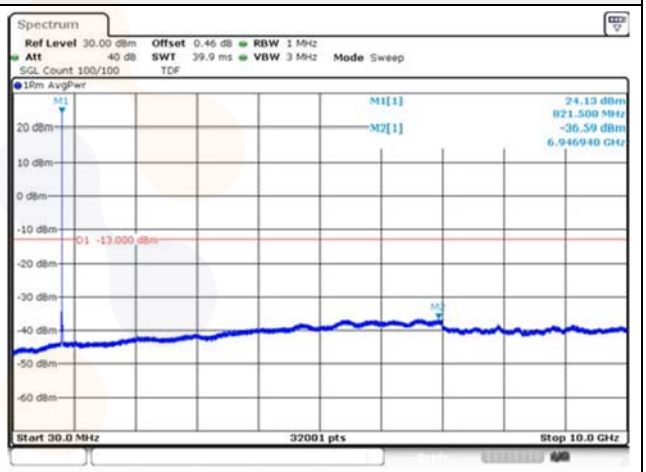
   The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.

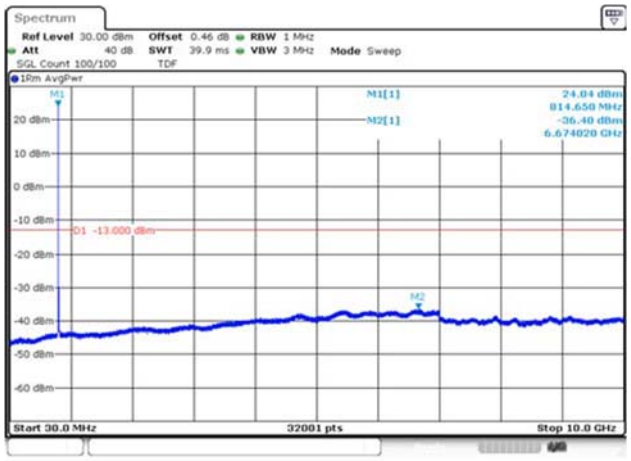
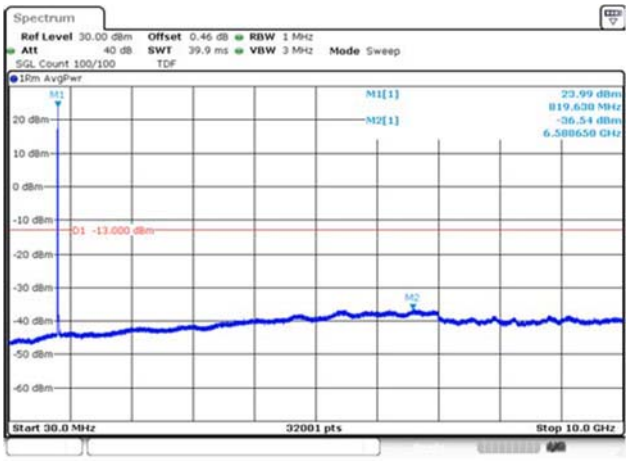
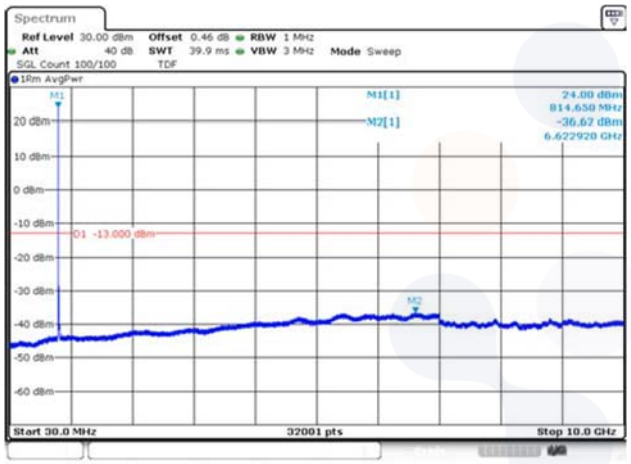
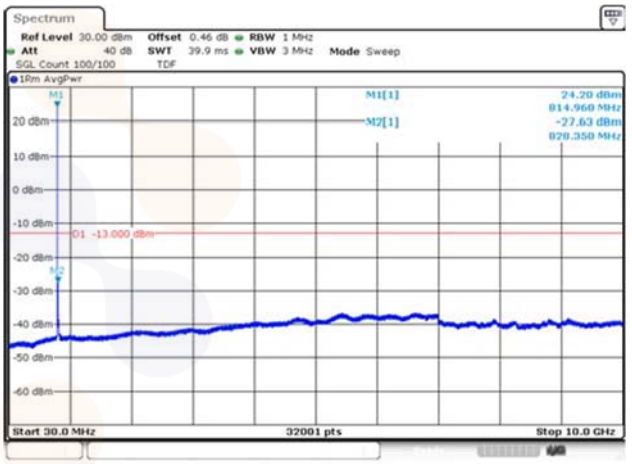
Test results

Test mode: LTE Band 14

5M BW QPSK Low ch.	5M BW QPSK High ch.
	
10M BW QPSK Mid ch.	**-**
	Blank

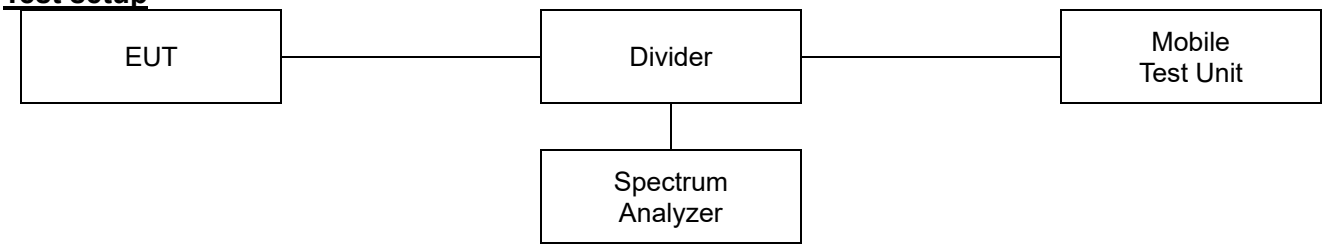
Test mode: LTE Band 26

1.4M BW QPSK Low ch.	1.4M BW QPSK High ch.
	
3M BW QPSK Low ch.	**3M BW QPSK High ch.**
	

5M BW QPSK Low ch.	5M BW QPSK High ch.
	
10M BW QPSK Mid ch.	**15M BW QPSK Mid ch.**
	

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%

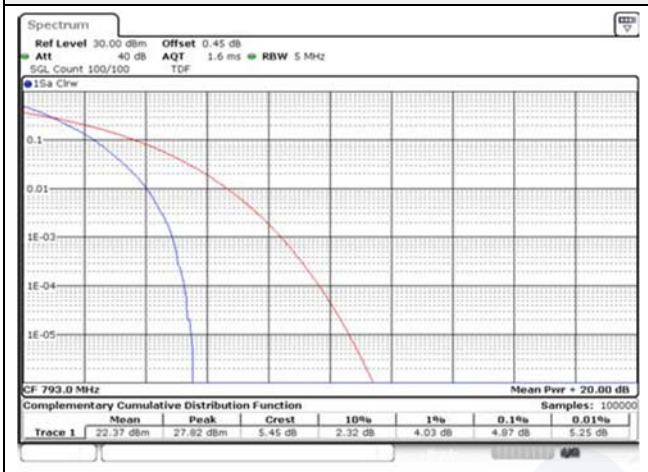
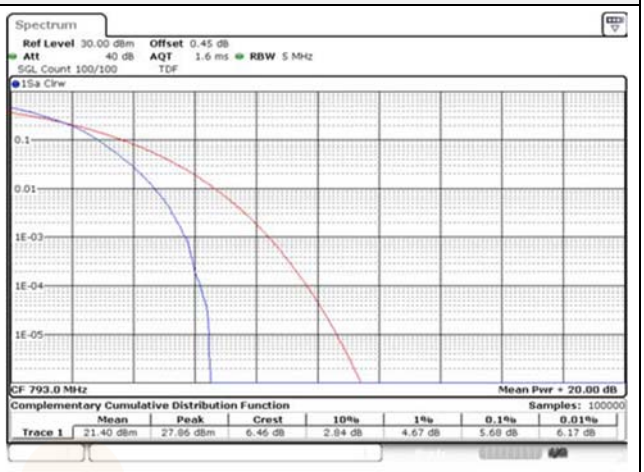
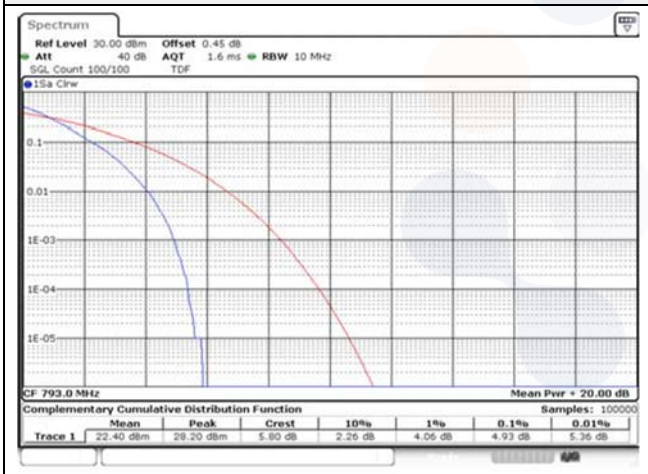
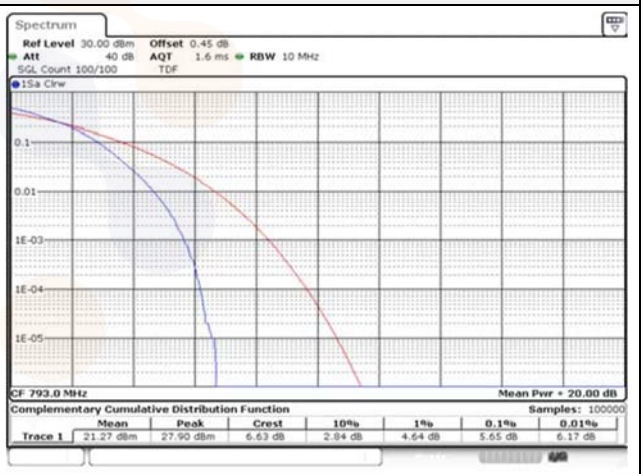
5.2.6 Peak-to-average power ratio

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:

$PAPR(dB) = P_{PK}(dBm \text{ or } dBW) - P_{AG}(dBm \text{ or } dBW)$

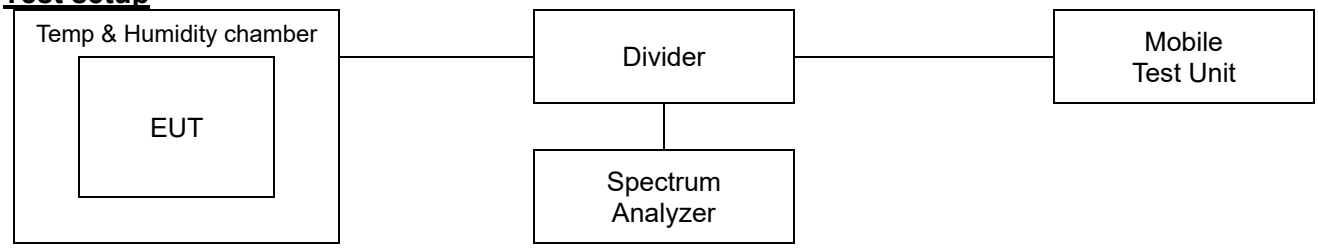
Test results

Test mode: LTE Band 14

5M BW QPSK Mid ch.	5M BW 16QAM Mid ch.
	
10M BW QPSK Mid ch.	**10M BW 16QAM Mid ch.**
	

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

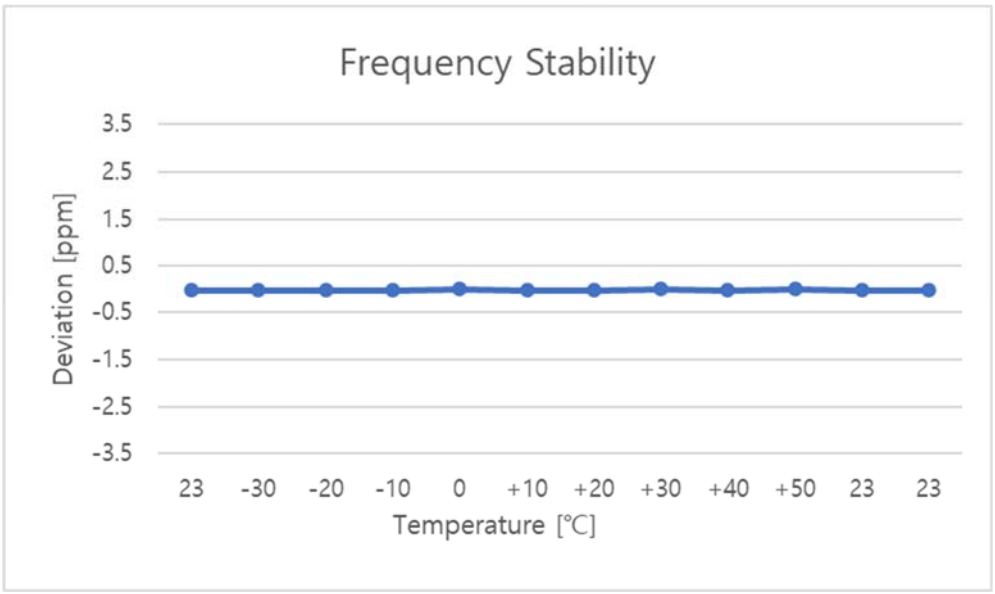
Test settings

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

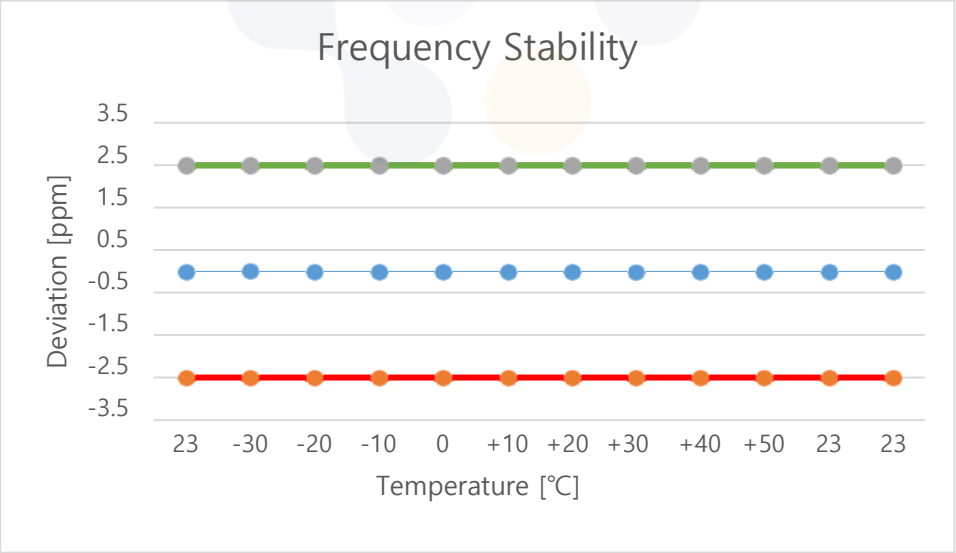
Test mode : LTE Band 14
Frequency (㎐) : 793 000 000
Channel : 23330
Deviation limit : The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	793,000,000	-0.29	0.0	0.000 000
		-30	792,999,996	-3.64	0.0	0.000 000
		-20	793,000,001	1.10	0.0	0.000 000
		-10	793,000,003	3.08	0.0	0.000 000
		0	793,000,004	4.44	0.0	0.000 001
		+10	793,000,002	2.19	0.0	0.000 000
		+20	793,000,002	1.52	0.0	0.000 000
		+30	793,000,006	6.18	0.0	0.000 001
		+40	793,000,003	2.55	0.0	0.000 000
		+50	793,000,005	4.89	0.0	0.000 001
115%	4.43	+23(Ref)	793,000,001	0.62	0.0	0.000 000
End point	3.40	+23(Ref)	792,999,999	-0.92	0.0	0.000 000



Test mode : LTE Band 26
Frequency (㎐) : 823 300 000
Channel : 26783
Deviation limit(FCC) : ±0.000 25% or 2.5ppm

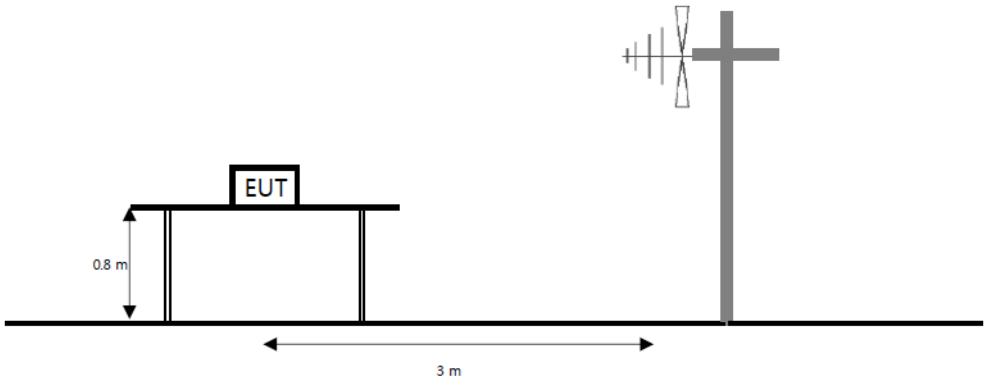
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	823,299,997	-3.19	0.0	0.000 000
		-30	823,300,006	5.69	0.0	0.000 001
		-20	823,300,001	1.07	0.0	0.000 000
		-10	823,300,004	3.66	0.0	0.000 000
		0	823,300,003	2.85	0.0	0.000 000
		+10	823,300,001	1.09	0.0	0.000 000
		+20	823,299,997	-3.10	0.0	0.000 000
		+30	823,299,995	-5.33	0.0	-0.000 001
		+40	823,299,998	-1.58	0.0	0.000 000
		+50	823,299,996	-4.09	0.0	0.000 000
115%	4.43	+23(Ref)	823,300,002	2.03	0.0	0.000 000
End point	3.40	+23(Ref)	823,299,999	-0.60	0.0	0.000 000



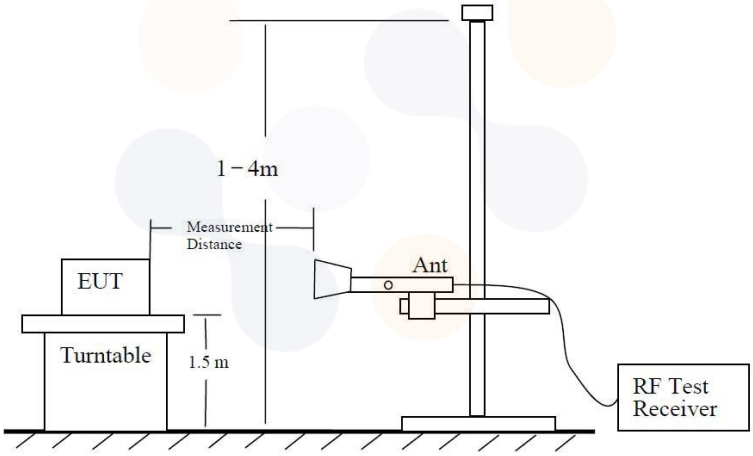
7.7. Radiated Power (ERP/EIRP)

Test setup

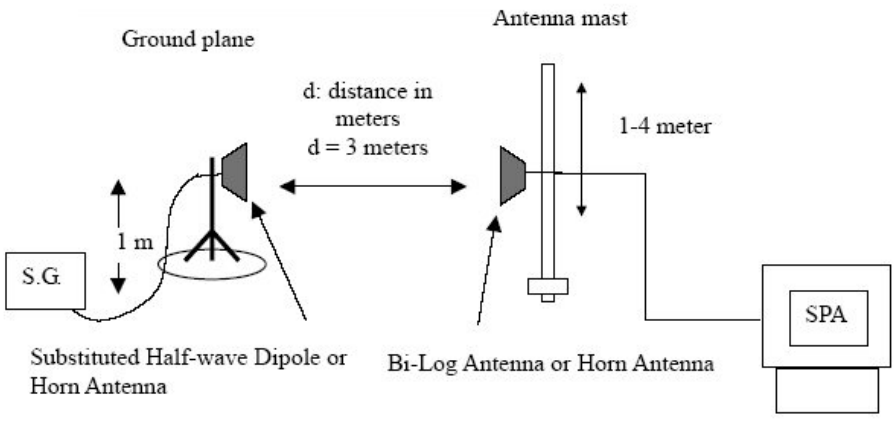
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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

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 Band 14

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	790.5	H	3.15	5.94	25.91	23.12	0.205
		793.0	H	3.15	5.95	25.62	22.82	0.191
		795.5	H	3.15	5.94	25.31	22.52	0.179
	16QAM	790.5	H	3.15	5.94	25.00	22.21	0.166
		793.0	H	3.15	5.95	24.58	21.78	0.151
		795.5	H	3.15	5.94	24.44	21.65	0.146
10 M	QPSK	793.0	H	3.15	5.95	26.15	23.35	0.216
	16QAM	793.0	H	3.15	5.95	24.72	21.92	0.156

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

Test mode: LTE Band 26

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	814.7	H	3.19	6.04	23.88	21.03	0.127
		823.3	H	3.38	6.11	23.76	21.03	0.127
	16QAM	814.7	H	3.19	6.04	23.08	20.23	0.105
		823.3	H	3.38	6.11	22.84	20.11	0.103
3 M	QPSK	815.5	H	3.22	6.05	23.93	21.09	0.129
		822.5	H	3.38	6.10	23.61	20.88	0.122
	16QAM	815.5	H	3.22	6.05	23.27	20.43	0.110
		822.5	H	3.38	6.10	22.60	19.87	0.097
5 M	QPSK	816.5	H	3.25	6.05	23.99	21.18	0.131
		821.5	H	3.37	6.09	23.57	20.84	0.121
	16QAM	816.5	H	3.25	6.05	23.02	20.21	0.105
		821.5	H	3.37	6.09	22.83	20.10	0.102
10 M	QPSK	819.0	H	3.32	6.06	24.07	21.33	0.136
	16QAM	819.0	H	3.32	6.06	23.18	20.44	0.111
15 M	QPSK	821.5	H	3.37	6.09	24.06	21.33	0.136
	16QAM	821.5	H	3.37	6.09	23.27	20.54	0.113

Straddle channel

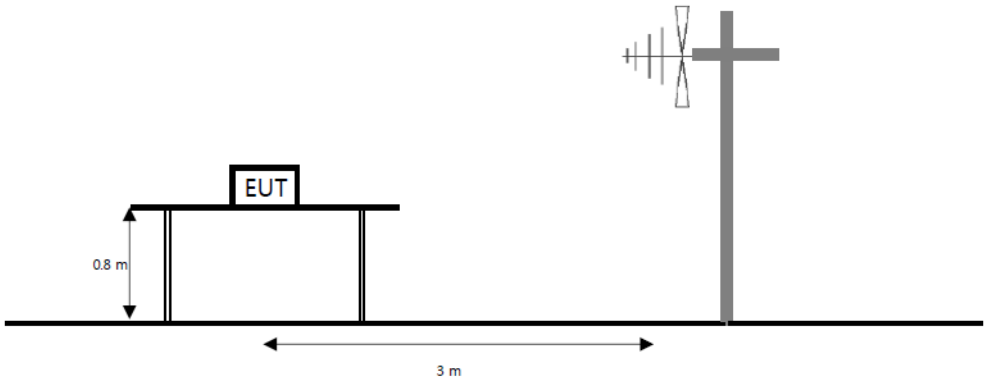
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	824.0	H	3.39	6.12	23.53	20.80	0.120
	16QAM		H	3.39	6.12	22.61	19.88	0.097
3 M	QPSK		H	3.39	6.12	23.56	20.83	0.121
	16QAM		H	3.39	6.12	22.67	19.94	0.099
5 M	QPSK		H	3.39	6.12	23.77	21.04	0.127
	16QAM		H	3.39	6.12	22.78	20.05	0.101
10 M	QPSK		H	3.39	6.12	24.08	21.35	0.136
	16QAM		H	3.39	6.12	23.20	20.47	0.111
15 M	QPSK		H	3.39	6.12	24.16	21.43	0.139
	16QAM		H	3.39	6.12	23.34	20.61	0.115

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

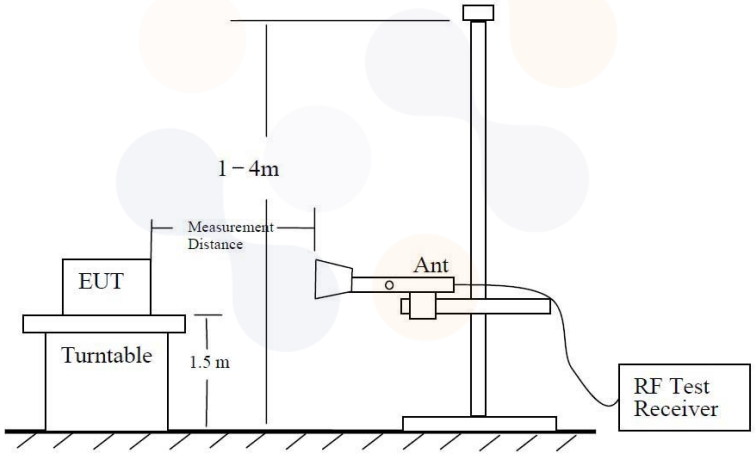
7.8. Radiated Spurious Emissions

Test setup

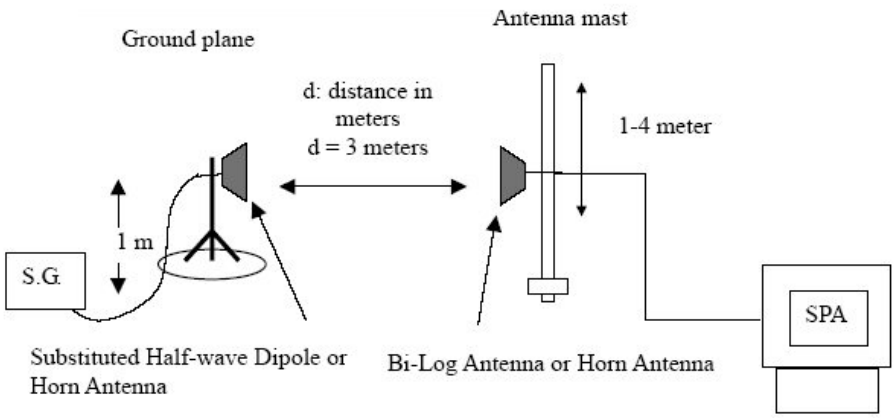
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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/MHz 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 + 10Log_{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 + 10Log_{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 Band 14
Frequency(㎒) : 793.0
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	1 578.40	V	5.96	8.49	-57.97	-60.50	-13.00	47.50
	2 364.40	V	5.65	10.57	-49.08	-54.00	-13.00	41.00
	3 149.60	H	7.60	11.81	-50.59	-54.80	-13.00	41.80
	3 944.80	V	9.10	12.75	-46.25	-49.90	-13.00	36.90

Test mode : LTE Band 14
Frequency(㎒) : 793.0 (1 559 – 1 610 ㎒)
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	1 560.47	H	6.02	8.44	-54.78	-57.20	-40.00	17.20

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)
   Limit Calculation of wide-band (dBm/㎒) = -70dBW/㎒ (-40 dBm/㎒)
   Limit Calculation of narrow-band (dBm) = -80dBW (-50dBm)
2. E.R.P & E.I.R.P(dB m) = Substitute Level(dB) + Antenna gain(dB i&dB d) - C.L(Cable loss) (dB)

Test mode : LTE Band 26
Frequency(㎒) : 821.0
Channel : 26765
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 625.60	V	5.82	8.65	-58.57	-61.40	-13.00	48.40
	2 439.60	H	5.84	10.72	-49.32	-54.20	-13.00	41.20
	3 259.20	V	7.82	11.94	-50.08	-54.20	-13.00	41.20
	4 067.60	V	9.25	13.21	-48.84	-52.80	-13.00	39.80

Test mode : LTE Band 26
Frequency(㎒) : 824.0
Channel : 26790
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 633.20	H	5.80	8.67	-58.73	-61.60	-13.00	48.60
	2 451.60	H	5.87	10.75	-48.62	-53.50	-13.00	40.50
	3 264.40	V	7.83	11.95	-50.58	-54.70	-13.00	41.70
	4 080.00	V	9.26	13.23	-49.63	-53.60	-13.00	40.60

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈i&㏈d) - C.L(Cable loss) (㏈)

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
Vector Signal Generator	R&S	SMBV100A	257566	24.07.04
Signal Generator	R&S	SMB100A	176206	24.01.19
Divider	Marki Microwave, Inc.	PD-0040	D0002	24.07.04
Wideband Radio Communication Tester	R&S	CMW500	141780	24.01.19
Wideband Radio Communication Tester	R&S	CMW500	132120	24.04.25
Temp & Humid Chamber	ESPEC CORP.	SH-642	93016978	24.01.19
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHNX10-4050-4500-26500-40CC	SN3	24.10.16*
High Pass Filter	QOTANA TECHNOLOGIES	DBHF0508004000A	20070100016	24.07.04
Bilog Antenna	Teseq GmbH	CBL 6112D	62027	24.11.17**
Bilog Antenna	ETS.LINDGREN	'3143B	228420	25.07.20
Horn Antenna	ETS-LINDGREN	3117	251528	24.02.02
Horn Antenna	ETS.LINDGREN	3117	227509	24.07.12
Horn Antenna	ETS-Lindgren	3116	00086635	24.03.20
Horn Antenna	ETS-LINDGREN	3116C	251516	24.02.02
Amplifier	SONOMA INSTRUMENT	310N	421822	24.10.12*
Amplifier	C&K Technologies, Inc.	BZR-00504000-551028-252525	27736	24.07.04
Amplifier	C&K Technologies, Inc.	BZRT-00504000-481055-382525	26299-27735	24.07.04
Antenna Mast	innco systems GmbH	MA4640-XP-ET	N/A	-
Controller	innco systems GmbH	CO3000	1175/4585031 9/P	-

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

End of test report