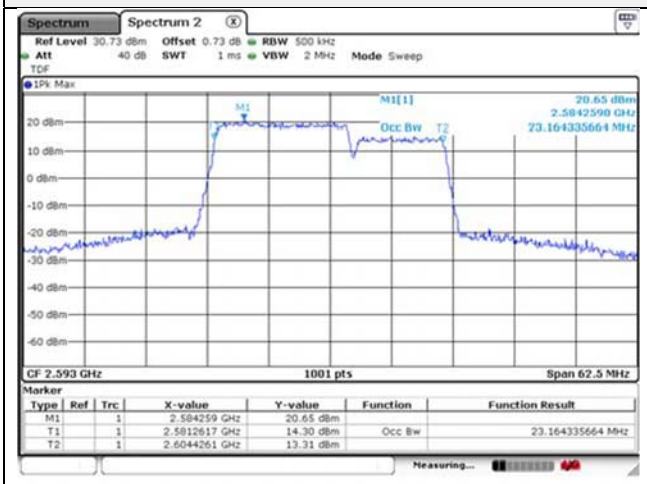
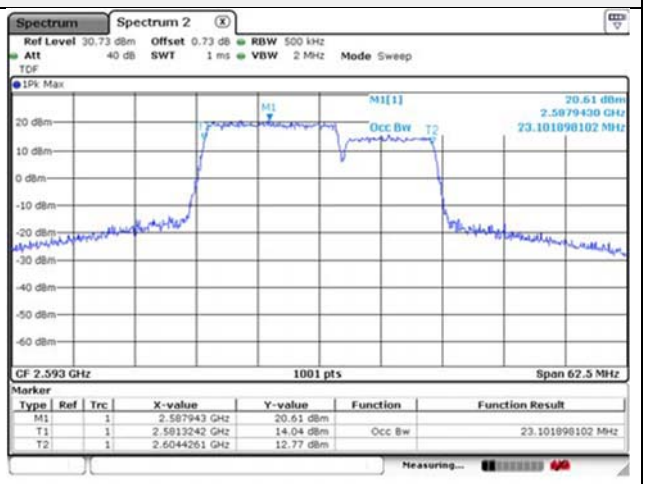
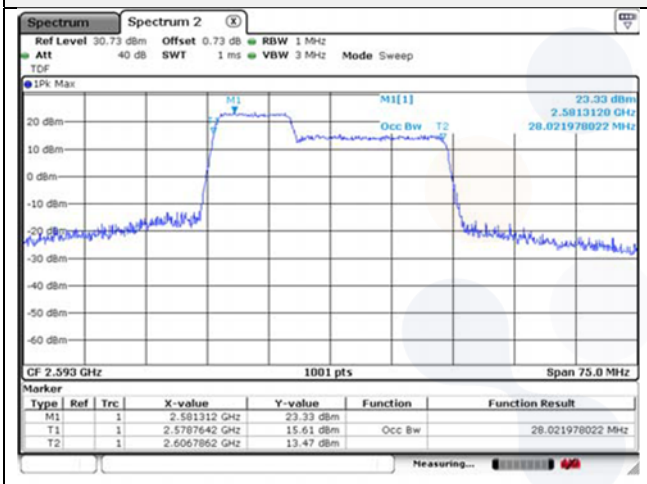
15M + 10M RB75/0 + RB50/0 QPSK Mid ch.



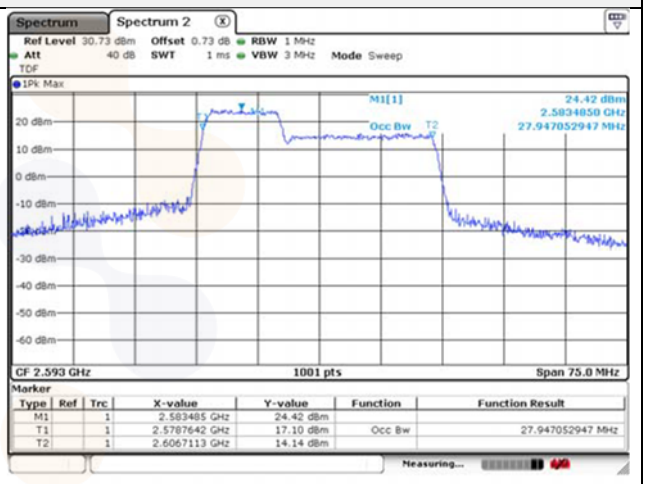
15M + 10M RB75/0 + RB50/0 16QAM Mid ch.



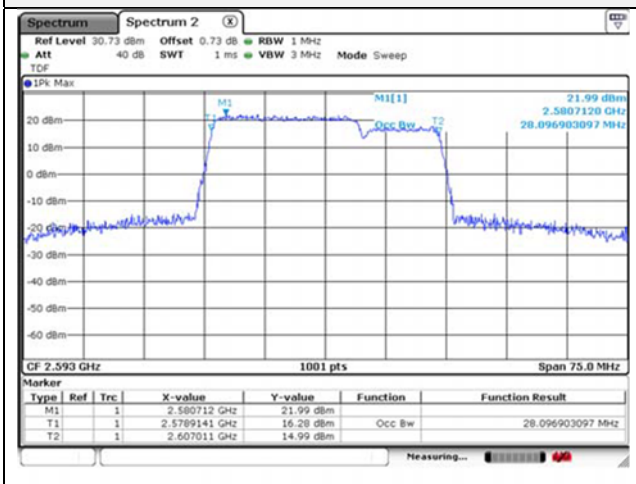
10M + 20M RB50/0 + RB100/0 QPSK Mid ch.



10M + 20M RB50/0 + RB100/0 16QAM Mid ch.



20M + 10M RB100/0 + RB50/0 QPSK Mid ch.



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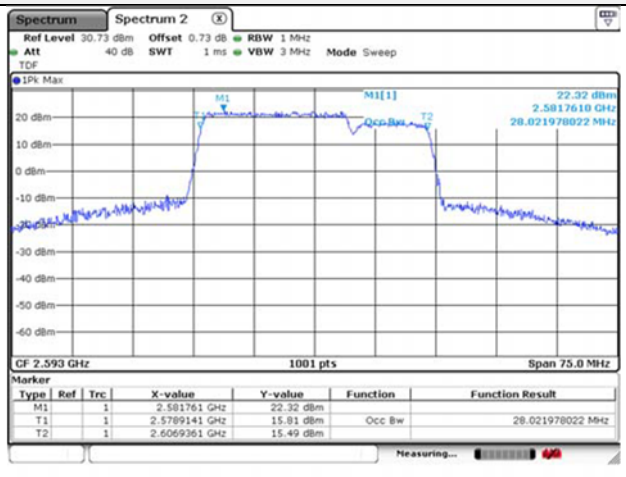
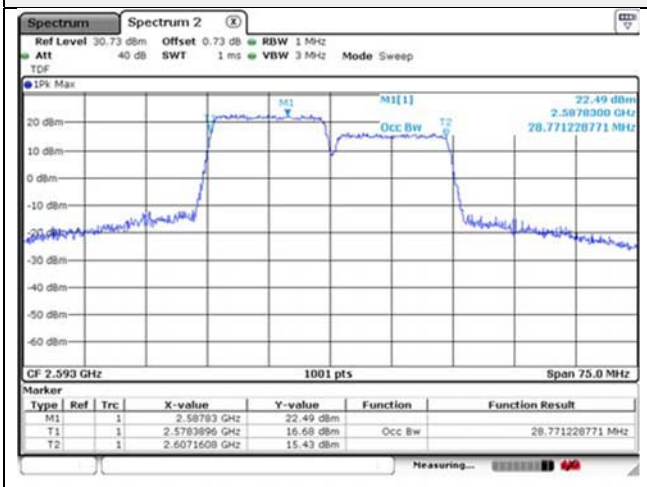
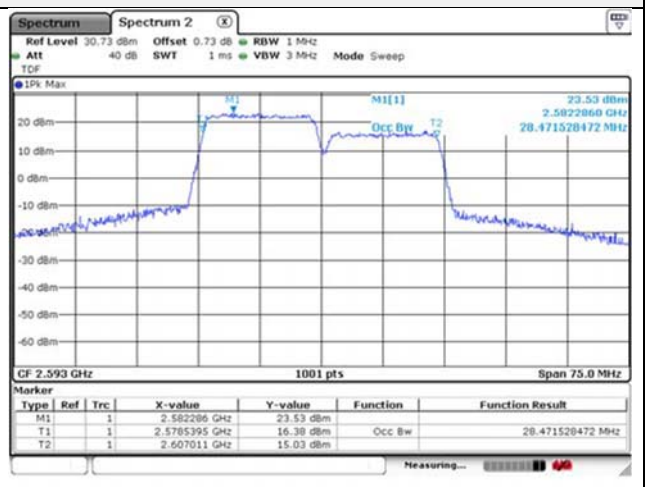


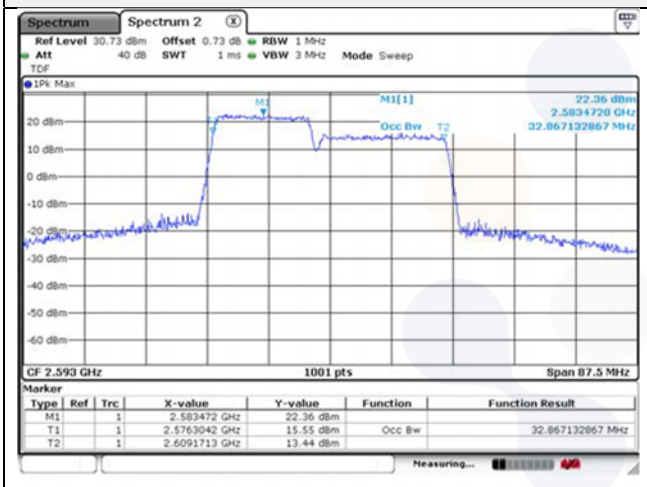
15M + 15M RB75/0 + RB75/0 QPSK Mid ch.



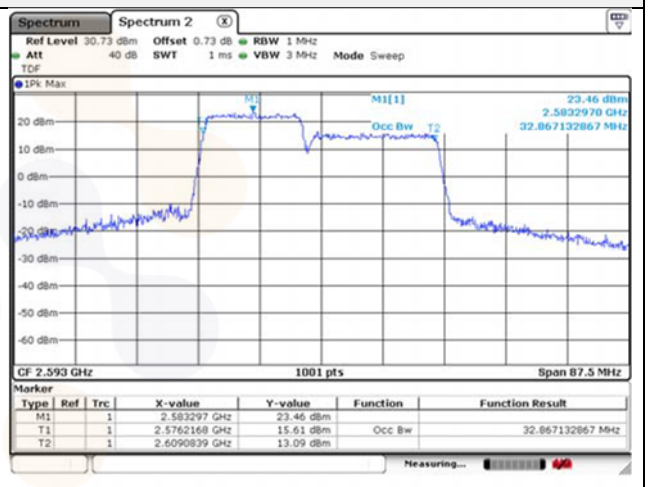
15M + 15M RB75/0 + RB75/0 16QAM Mid ch.



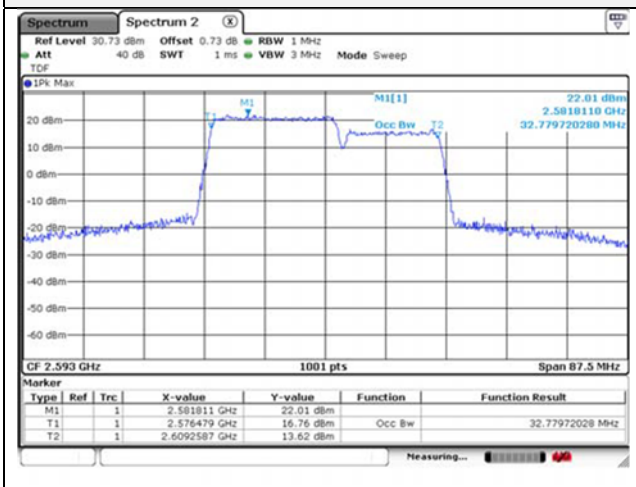
15M + 20M RB75/0 + RB100/0 QPSK Mid ch.



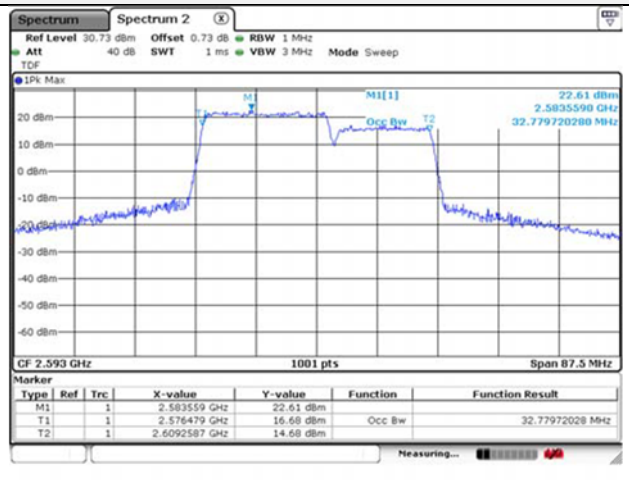
15M + 20M RB75/0 + RB100/0 16QAM Mid ch.

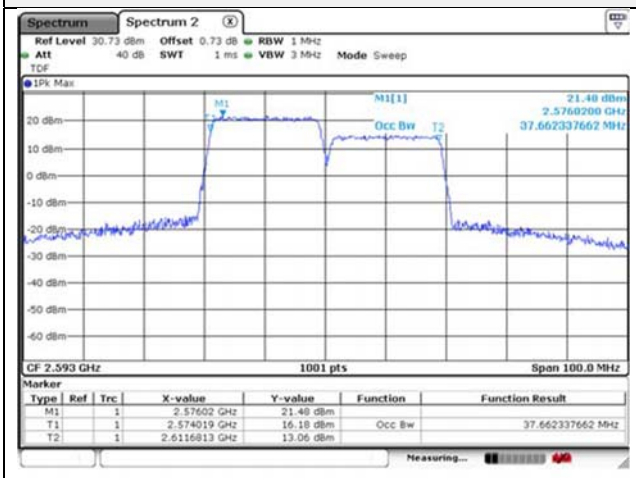
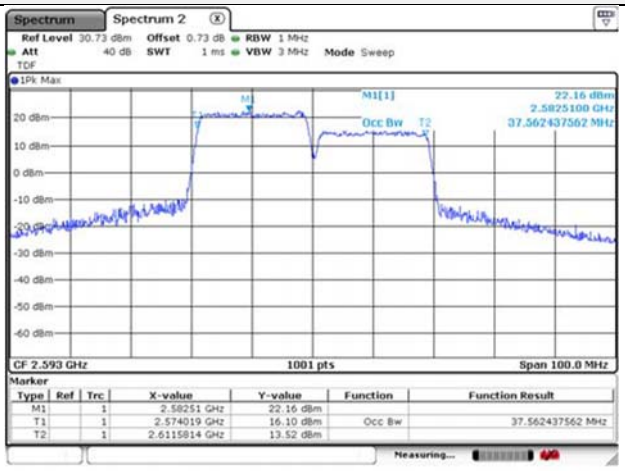


20M + 15M RB100/0 + RB75/0 QPSK Mid ch.



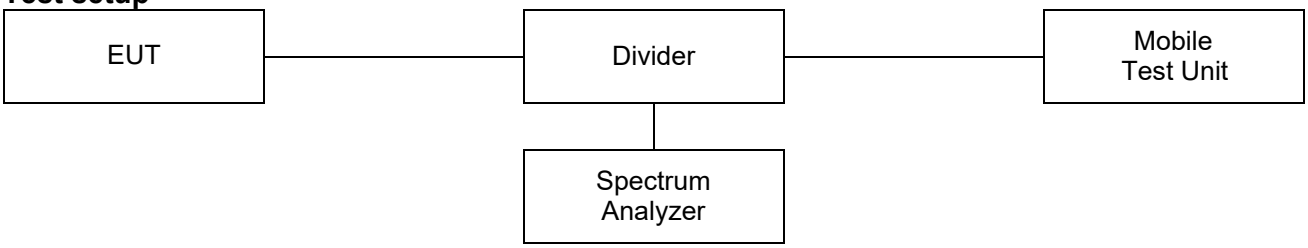
20M + 15M RB100/0 + RB75/0 16QAM Mid ch.



20M + 20M RB100/0 + RB100/0 QPSK Mid ch.	20M + 20M RB100/0 + RB100/0 16QAM Mid ch.
	

7.3. Band Edge Emissions at Antenna Terminal

Test setup



Limit

According to §27.53(m)(4);

For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) ㏈ on all frequencies between 2490.5 ㎒ and 2496 ㎒ and 55 + 10 log (P) ㏈ at or below 2490.5 ㎒. Mobile Satellite Service licensees operating on frequencies below 2495 ㎒ may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Test procedure

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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:

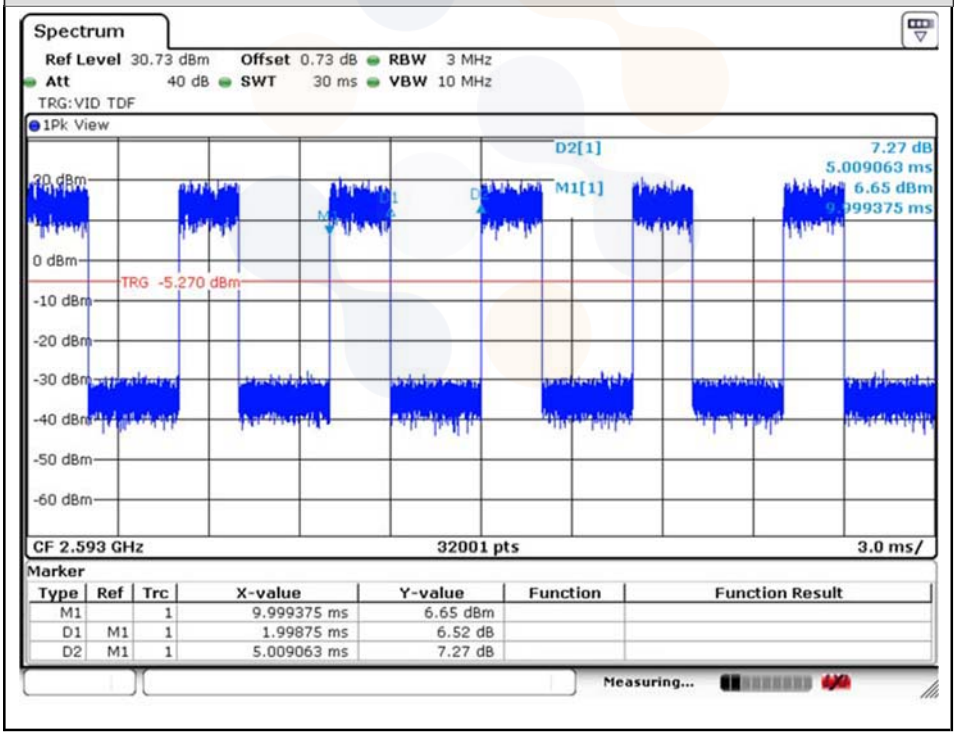
1. Per 27.53(m)(6), in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 ㎒, in which case a resolution bandwidth of at least one percent

   may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 ㎒).
2. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.
3. Duty cycle factor

Period (㎳)	On time (㎳)	Duty cycle		Duty Cycle Factor (㏈)
		(Linear)	(%)	
5.009 063	1.998 750	0.399 027	39.90	3.99

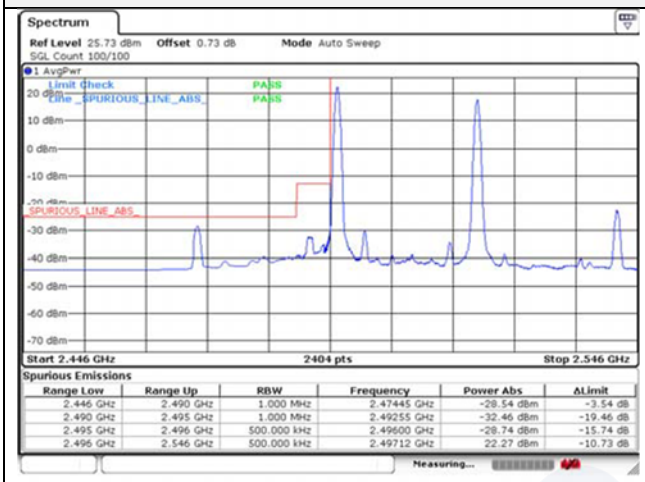
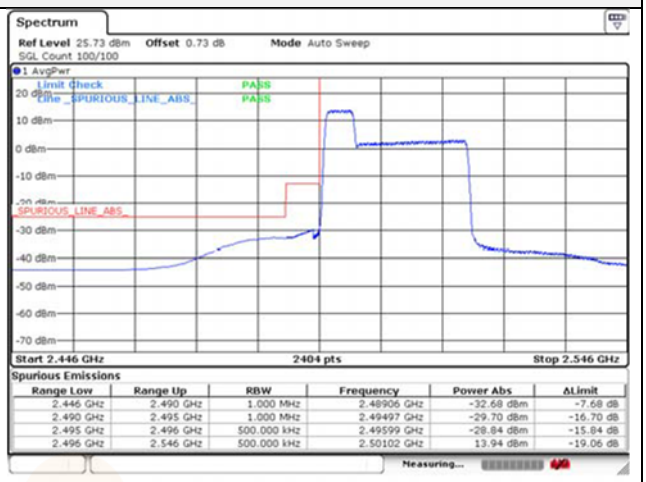
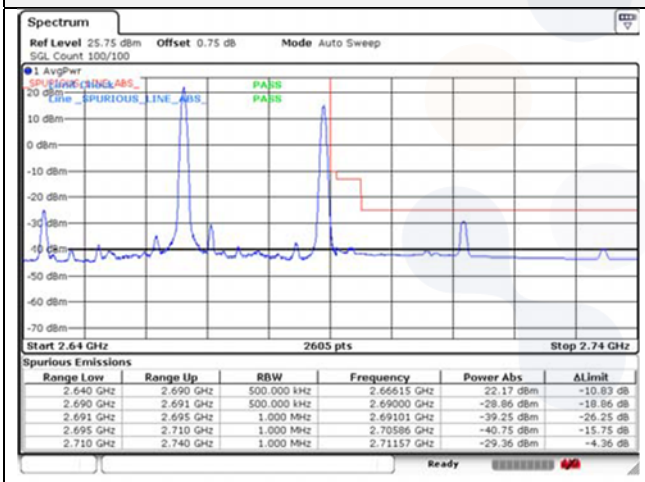
1) Duty cycle (Linear) = Ton time / Period
2) DCF(Duty cycle factor) = 10log(1/duty cycle)
3) Offset(㏈) = RF cable loss(㏈) + Divider(㏈) + Duty Cycle Factor(㏈)

ULCA 41C

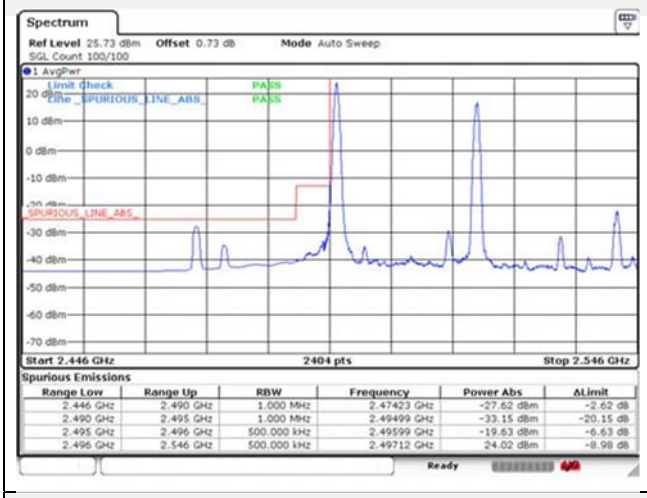


Test results

Test mode: LTE ULCA 41C

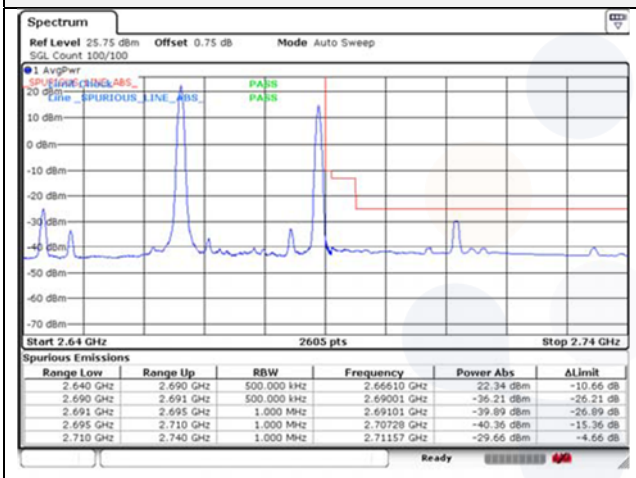
5M + 20M RB1/0 + RB1/99 QPSK Low ch.	5M + 20M RB25/0 + RB100/0 QPSK Low ch.
	
5M + 20M RB1/0 + RB1/99 QPSK High ch.	**5M + 20M RB25/0 + RB100/0 QPSK High ch.**
	

20M + 5M RB1/0 + RB1/24 QPSK Low ch.

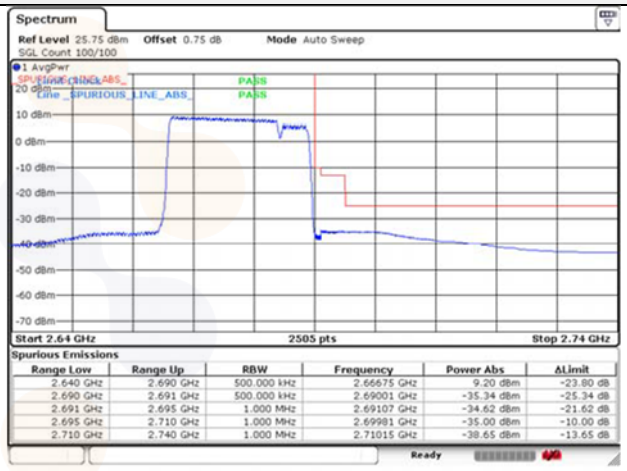


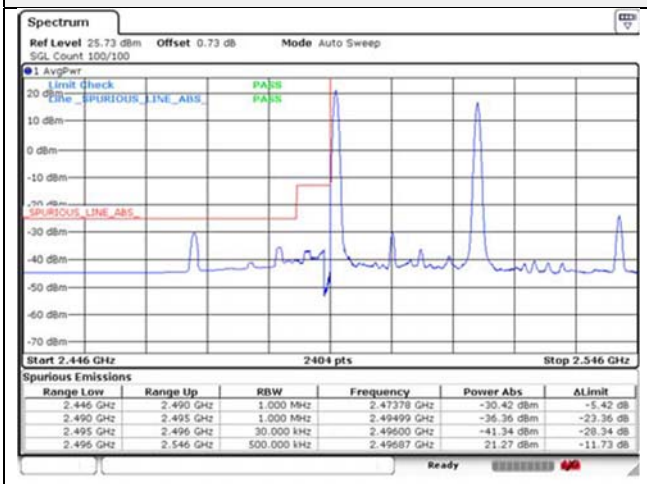
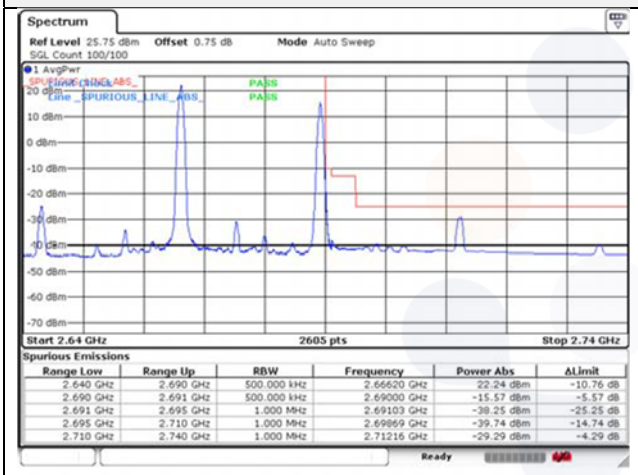
20M + 5M RB100/0 + RB25/0 QPSK Low ch.

20M + 5M RB1/0 + RB1/24 QPSK High ch.

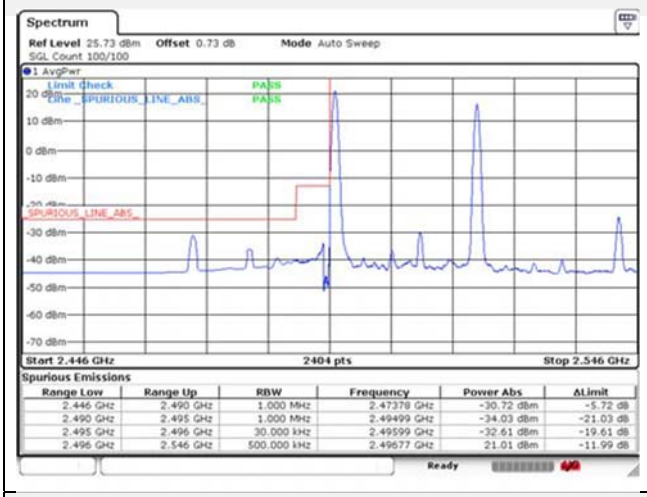


20M + 5M RB100/0 + RB25/0 QPSK High ch.



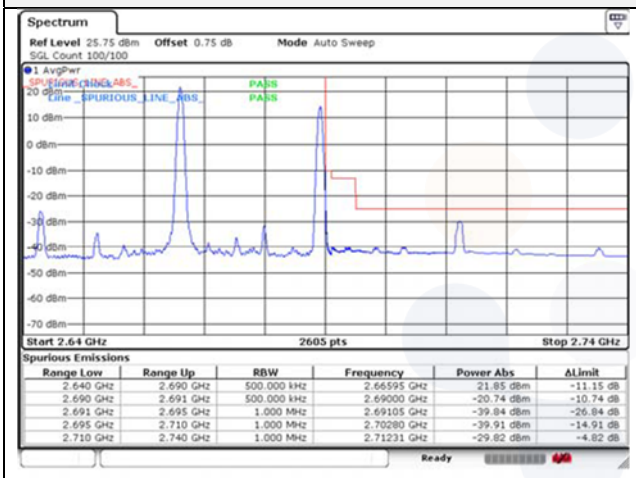
10M + 15M RB1/0 + RB1/74 QPSK Low ch.	10M + 15M RB50/0 + RB75/0 QPSK Low ch.
	
10M + 15M RB1/0 + RB1/74 QPSK Low ch.	**10M + 15M RB50/0 + RB75/0 QPSK High ch.**
	

15M + 10M RB1/0 + RB1/49 QPSK Low ch.

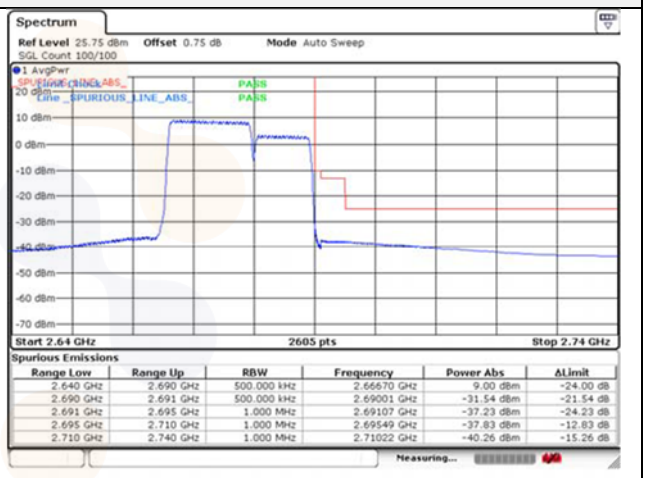


15M + 10M RB75/0 + RB50/0 QPSK Low ch.

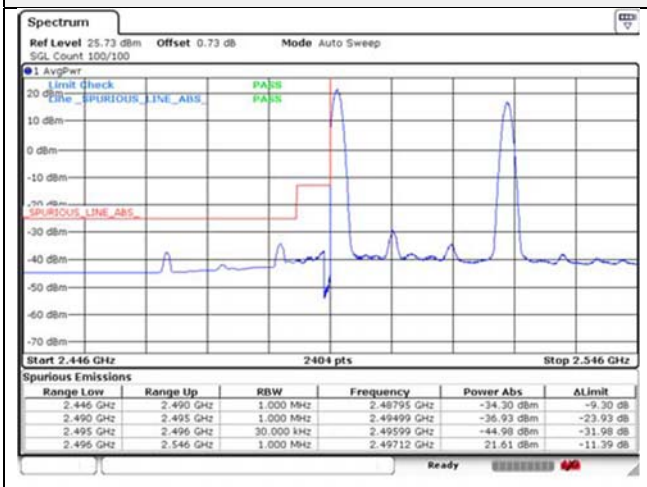
15M + 10M RB1/0 + RB1/49 QPSK High ch.



15M + 10M RB75/0 + RB50/0 QPSK High ch.

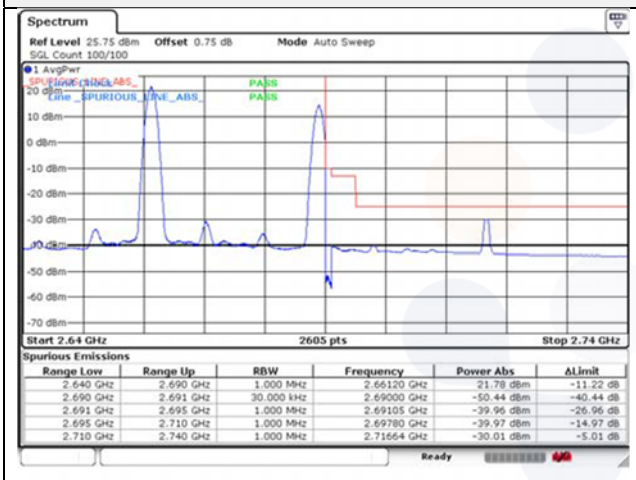


10M + 20M RB1/0 + RB1/99 QPSK Low ch.



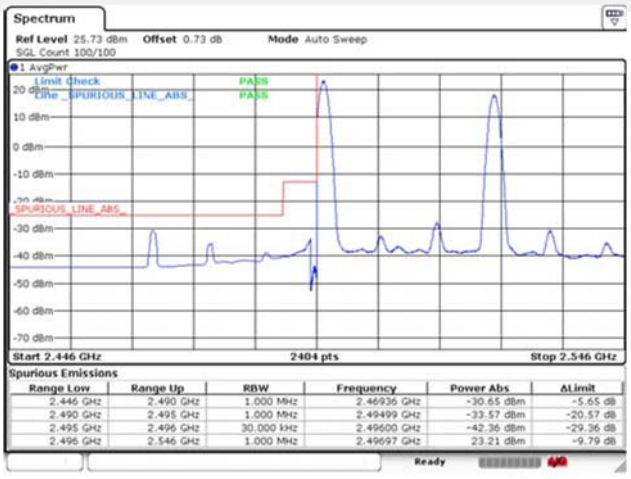
10M + 20M RB50/0 + RB100/0 QPSK Low ch.

10M + 20M RB1/0 + RB1/99 QPSK High ch.



10M + 20M RB50/0 + RB100/0 QPSK High ch.

20M + 10M RB1/0 + RB1/49 QPSK Low ch.



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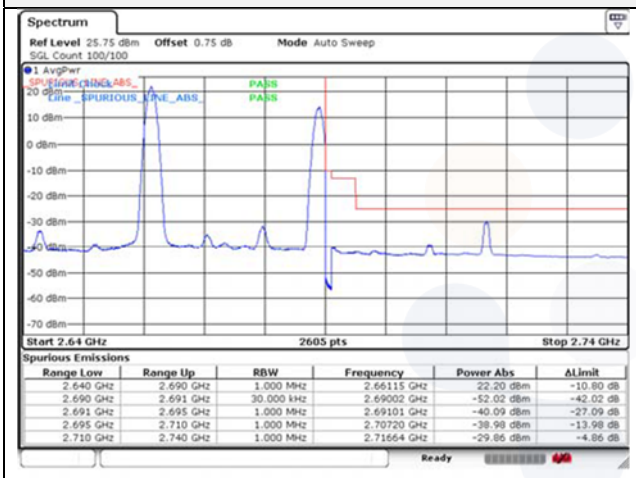
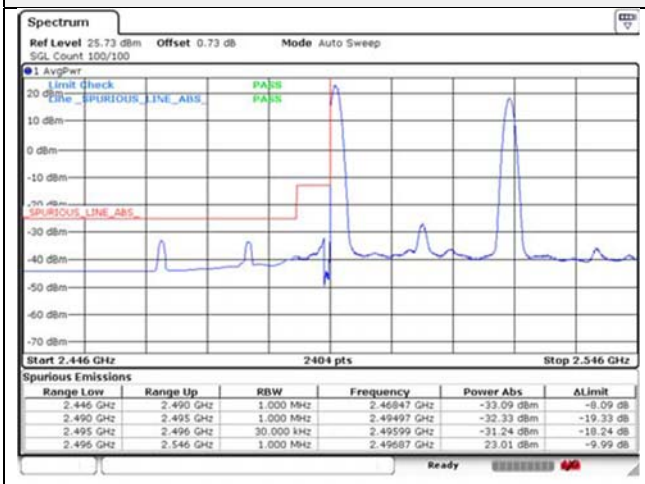
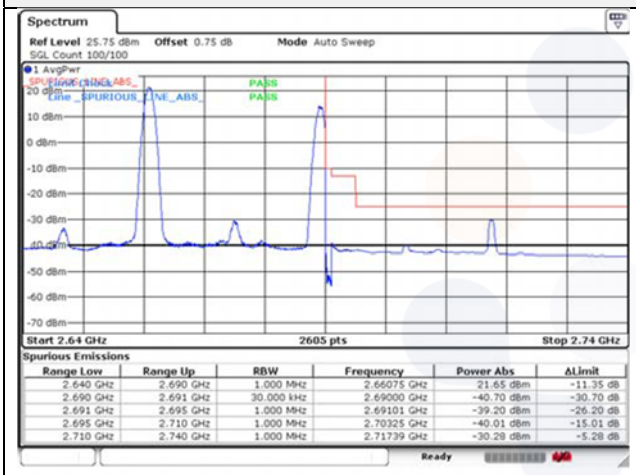
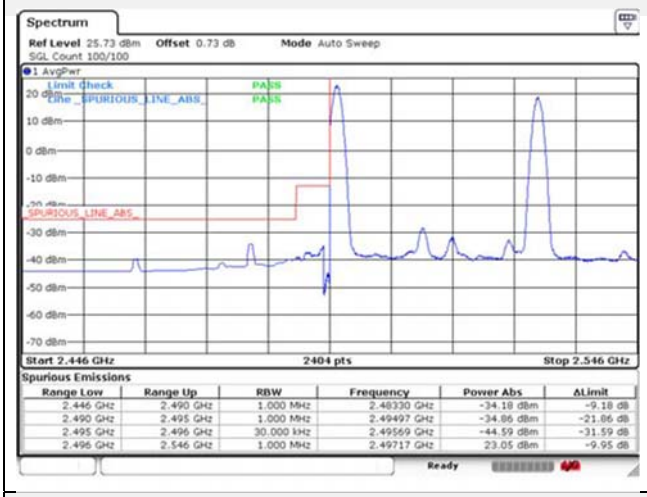
20M + 10M RB1/0 + RB1/49 QPSK High ch.



20M + 10M RB100/0 + RB50/0 QPSK High ch.

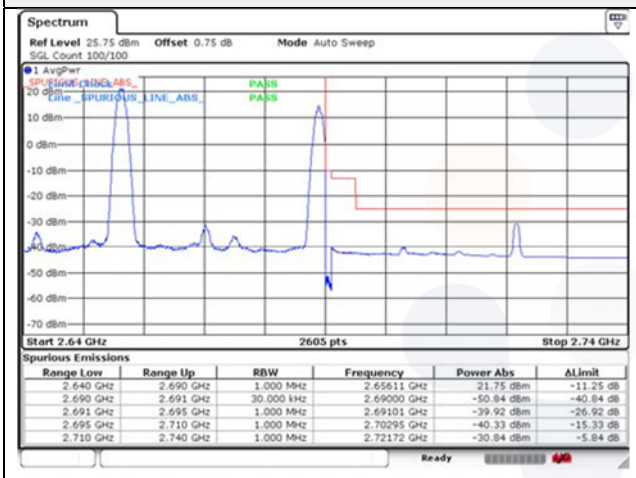
15M + 15M RB1/0 + RB1/74 QPSK Low ch.	15M + 15M RB75/0 + RB75/0 QPSK Low ch.
	
15M + 15M RB1/0 + RB1/74 QPSK High ch.	**15M + 15M RB75/0 + RB75/0 QPSK High ch.**
	

15M + 20M RB1/0 + RB1/99 QPSK Low ch.

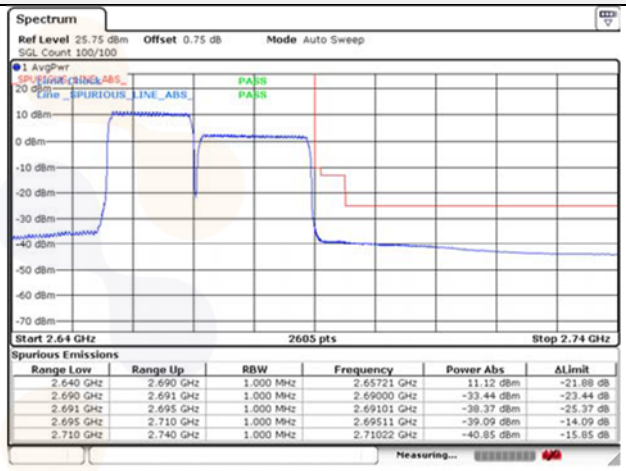


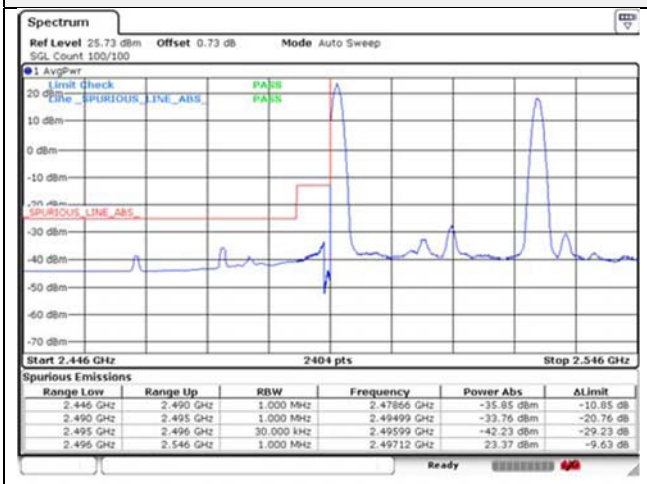
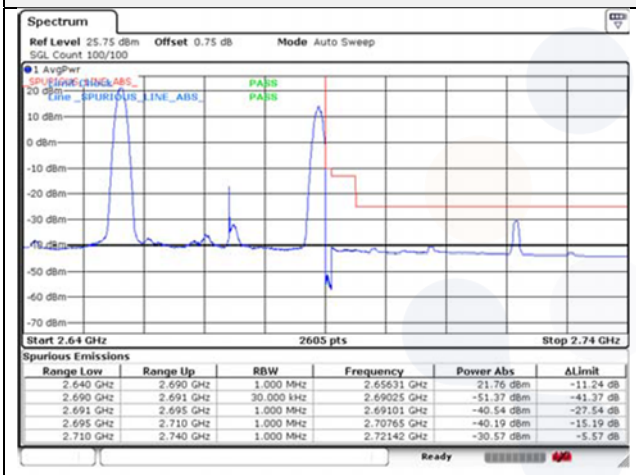
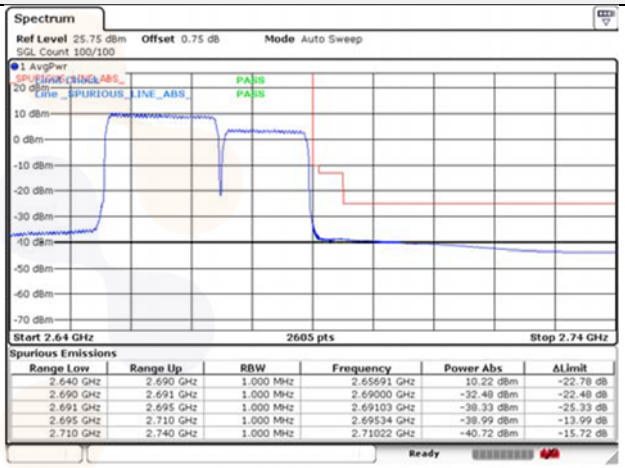
15M + 20M RB75/0 + RB100/0 QPSK Low ch.

15M + 20M RB1/0 + RB1/99 QPSK High ch.

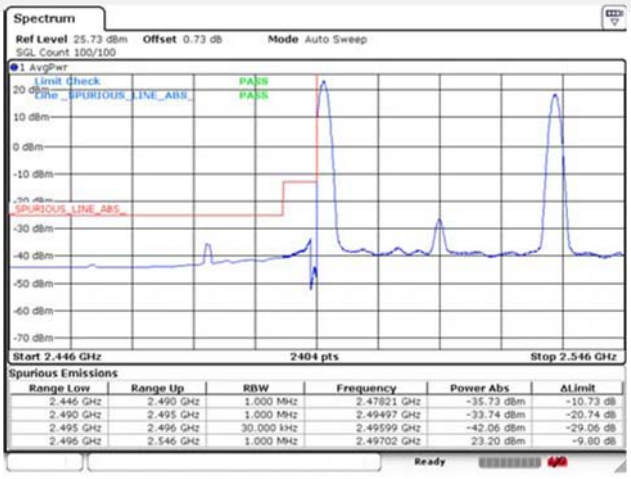


15M + 20M RB75/0 + RB100/0 QPSK High ch.



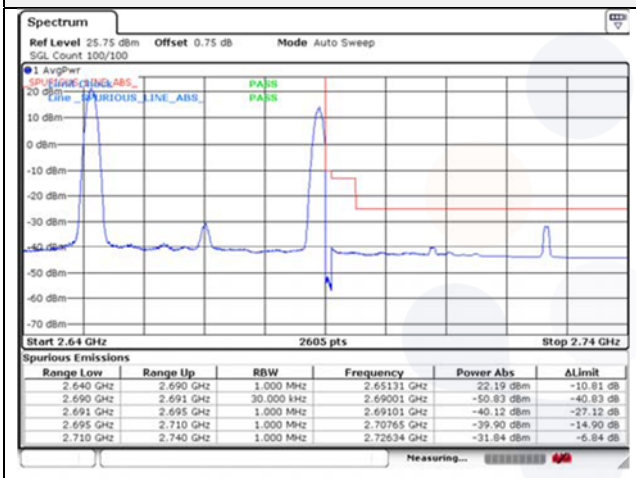
20M + 15M RB1/0 + RB1/74 QPSK Low ch.	20M + 15M RB100/0 + RB75/0 QPSK Low ch.
	
20M + 15M RB1/0 + RB1/74 QPSK High ch.	**20M + 15M RB100/0 + RB75/0 QPSK High ch.**
	

20M + 20M RB1/0 + RB1/99 QPSK Low ch.

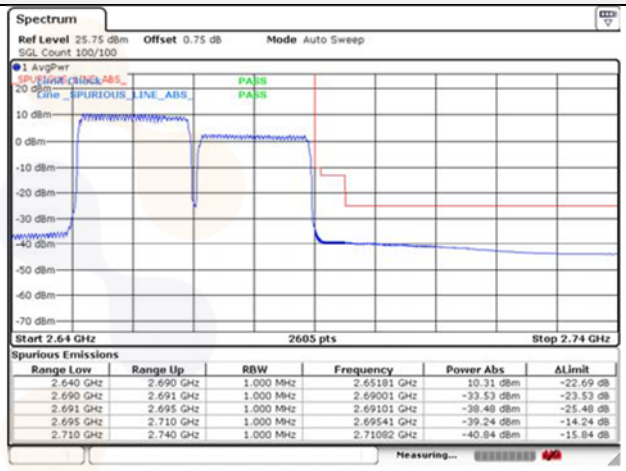


20M + 20M RB100/0 + RB100/0 QPSK Low ch.

20M + 20M RB1/0 + RB1/99 QPSK High ch.

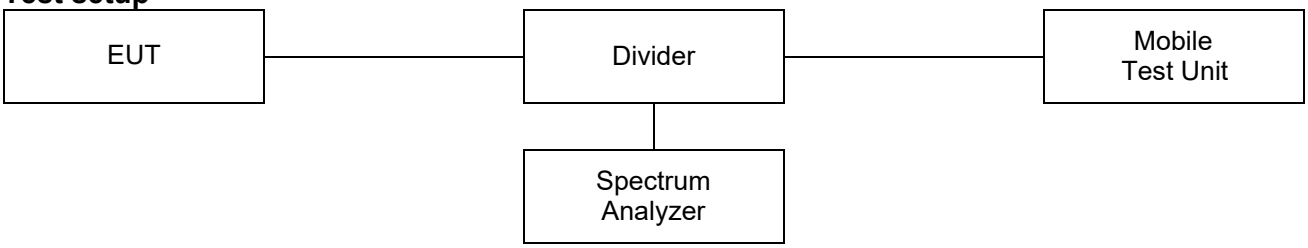


20M + 20M RB100/0 + RB100/0 QPSK High ch.



7.4. Spurious Emissions at Antenna Terminal

Test setup



Limit

According to §27.53(m)(4);

For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) ㏈ on all frequencies between 2490.5 ㎒ and 2496 ㎒ and 55 + 10 log (P) ㏈ at or below 2490.5 ㎒ . Mobile Satellite Service licensees operating on frequencies below 2495 ㎒ may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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.

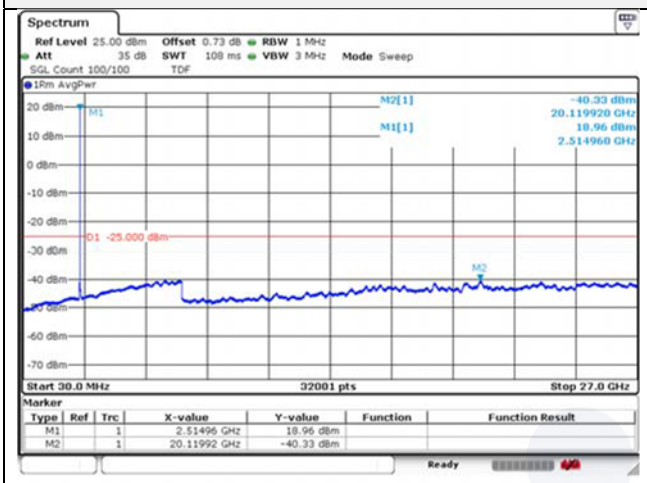
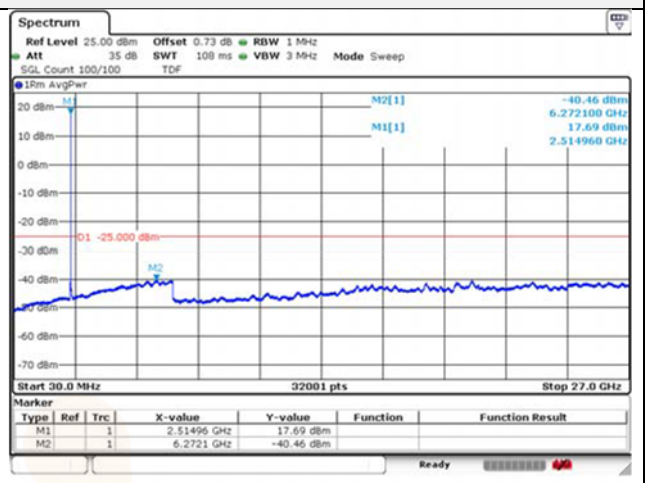
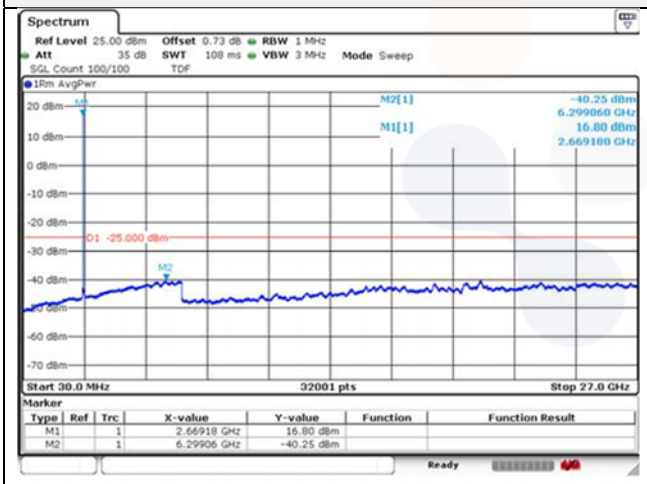
Notes:

1. Per 27.53(m)(6), 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.

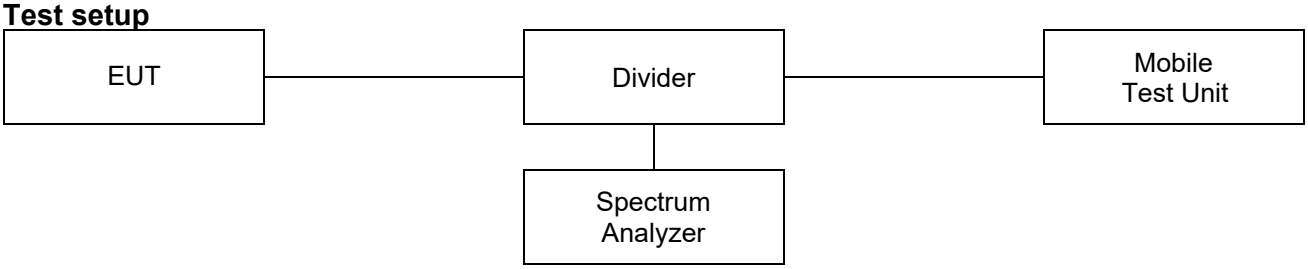
Test results

Test mode: LTE ULCA 41C

20M + 20M QPSK	
Low channel	**Middle channel**
	
High channel	**-**
	Blank

7.5. Peak to Average Power Ratio (PAPR)

Test setup



Limit

According to §27.50(d)(5)

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

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

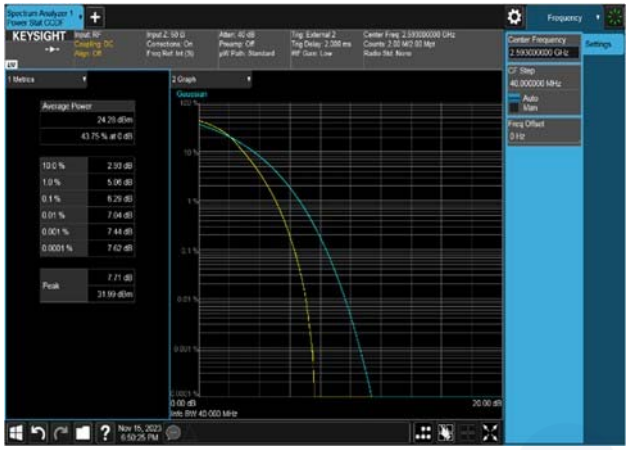
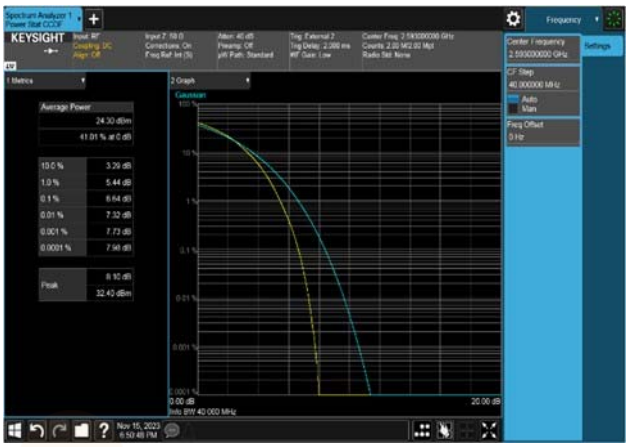
1) Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{PK}.
2) Use one of the applicable procedure presented 5.2(ANSI C63.26-2015) to measure the total average power and record as PAG. Determine the P.A.P.R from:
3) PAPR(㏈) = PPK (㏈m or ㏈W) - PAG(㏈m or ㏈W)

Notes:

1. All modes of operation were investigated and the worst-case configuration results are reported.

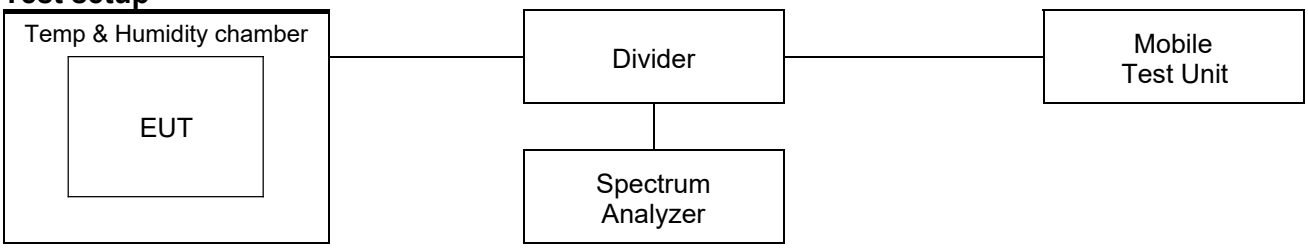
Test results

Test mode: LTE ULCA 41C

20M + 20M RB100/0 + RB100/0 QPSK Mid ch.	20M + 20M RB100/0 + RB100/0 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 radio beacons (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 §27.54

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

Test procedure

ANSI 63.26-2015 – Section 5.6

Test settings

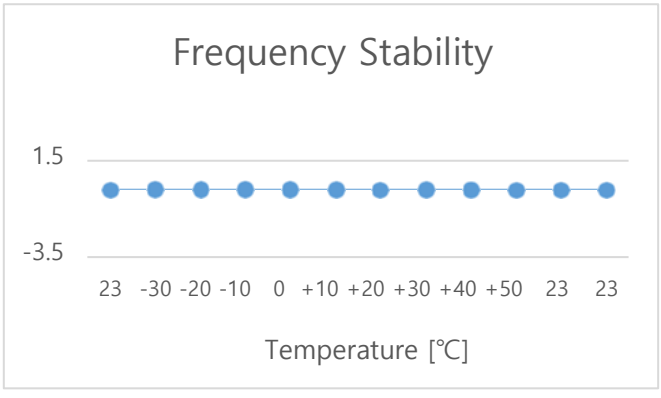
1) The carrier frequency of the transmitter is measured at room temperature. (20°C to provide a reference)
2) The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute 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

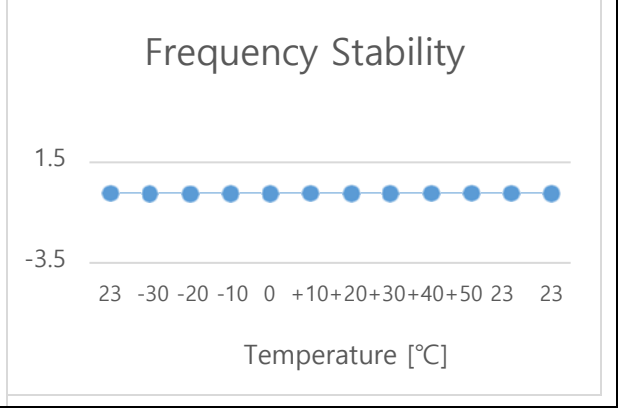
Test mode	:	LTE ULCA 41C	
Component Carrier	:	PCC	SCC
Frequency (㎐)	:	2 583 100 000	2 602 900 000
Channel	:	40521	40719
Bandwidth(㎒)	:	20	20
RB Size/Offset		100/0	100/0
Deviation limit	:	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.	

Power (V)	Temp. (°C)	PCC				SCC			
		Frequency	Tolerance	Deviation		Frequency	Tolerance	Deviation	
		(㎐)	(㎐)	(ppm)	(%)	(㎐)	(㎐)	(ppm)	(%)
3.85*	+23(Ref)	2,583,099,998	-2.27	0.0	0.000 000	2,602,899,996	-3.86	0.0	0.000 000
	-30	2,583,100,009	8.66	0.0	0.000 000	2,602,899,991	-9.45	0.0	0.000 000
	-20	2,583,100,005	5.09	0.0	0.000 000	2,602,899,988	-12.35	0.0	0.000 000
	-10	2,583,100,008	7.88	0.0	0.000 000	2,602,899,992	-8.10	0.0	0.000 000
	0	2,583,100,004	4.16	0.0	0.000 000	2,602,899,993	-7.08	0.0	0.000 000
	+10	2,583,100,001	1.38	0.0	0.000 000	2,602,899,996	-3.58	0.0	0.000 000
	+20	2,583,099,998	-2.03	0.0	0.000 000	2,602,899,996	-4.11	0.0	0.000 000
	+30	2,583,100,003	3.14	0.0	0.000 000	2,602,899,995	-5.36	0.0	0.000 000
	+40	2,583,100,001	1.09	0.0	0.000 000	2,602,899,998	-2.08	0.0	0.000 000
	+50	2,583,099,995	-4.58	0.0	0.000 000	2,602,899,999	-1.11	0.0	0.000 000
4.43*	+23(Ref)	2,583,099,998	-2.35	0.0	0.000 000	2,602,899,997	-2.62	0.0	0.000 000
3.40*	+23(Ref)	2,583,099,998	-2.35	0.0	0.000 000	2,602,899,995	-5.06	0.0	0.000 000

PCC



SCC

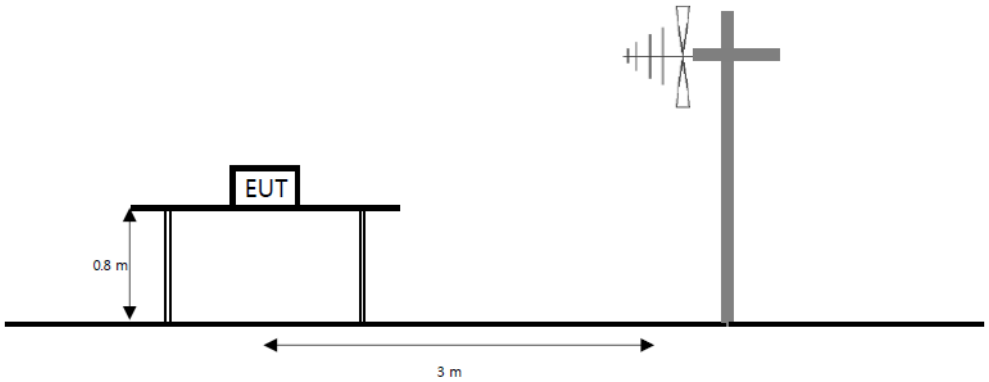


*Battery condition:
- Rated battery status: DC 3.85 V
- 115 % of rated battery status: DC 4.43 V
- End point: DC 3.40 V

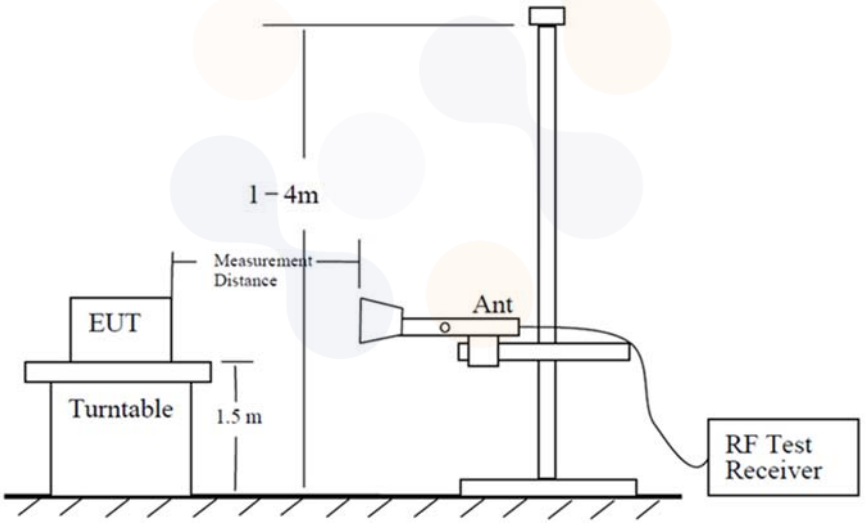
7.7. Radiated Power (ERP/EIRP)

Test setup

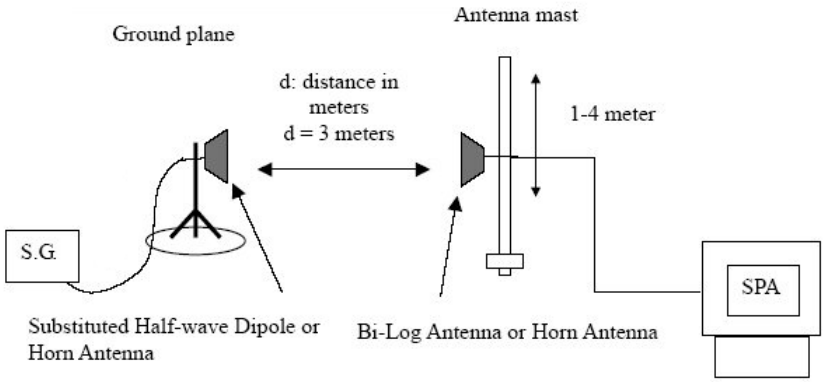
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 §27.50(h)(2)
Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test procedure
971168 D01 v03r01 - Section 5.2 and 5.8, 412172 D01 v01r01
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 ULCA 41C

Modulation: QPSK

Ch.	PCC				SCC				Pol. [V/H]	Antenna Gain [dBi]	C.L [dB]	Substitute Level [dBm]	EIRP	
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset					[dBm]	[W]
Low	5	2 499.3	1	24	20	2 511.0	1	0	H	6.00	10.86	31.35	26.49	0.446
	20	2 506.0	1	99	5	2 517.7	1	0	H	6.02	10.89	31.17	26.30	0.427
	10	2 501.3	1	49	15	2 513.3	1	0	H	6.00	10.87	31.56	26.69	0.467
	15	2 503.5	1	74	10	2 515.5	1	0	H	6.01	10.88	31.60	26.73	0.471
	10	2 501.5	1	49	20	2 515.9	1	0	H	6.00	10.87	31.83	26.96	0.497
	20	2 506.0	1	99	10	2 520.4	1	0	H	6.02	10.89	31.95	27.08	0.511
	15	2 503.5	1	74	15	2 518.5	1	0	H	6.01	10.88	31.75	26.88	0.488
	15	2 503.8	1	74	20	2 520.9	1	0	H	6.01	10.88	31.86	26.99	0.500
	20	2 506.0	1	99	15	2 523.1	1	0	H	6.02	10.89	31.55	26.68	0.466
	20	2 506.0	1	99	20	2 525.8	1	0	H	6.02	10.89	31.35	26.48	0.445
Mid	5	2 583.8	1	24	20	2 595.5	1	0	H	6.22	11.00	29.85	25.07	0.321
	20	2 590.5	1	99	5	2 602.2	1	0	H	6.24	11.01	28.53	23.76	0.238
	10	2 585.9	1	49	15	2 597.9	1	0	H	6.22	11.00	28.88	24.10	0.257
	15	2 588.1	1	74	10	2 600.1	1	0	H	6.23	11.00	28.12	23.35	0.216
	10	2 583.6	1	49	20	2 598.0	1	0	H	6.22	11.00	28.75	23.97	0.249
	20	2 588.1	1	99	10	2 602.5	1	0	H	6.23	11.00	28.97	24.20	0.263
	15	2 585.5	1	74	15	2 600.5	1	0	H	6.22	11.00	29.25	24.47	0.280
	15	2 583.3	1	74	20	2 600.4	1	0	H	6.22	11.00	29.33	24.55	0.285
	20	2 585.6	1	99	15	2 602.7	1	0	H	6.22	11.00	28.22	23.44	0.221
	20	2 583.1	1	99	20	2 602.9	1	0	H	6.22	11.00	28.94	24.16	0.261
High	5	2 668.3	1	24	20	2 680.0	1	0	H	6.44	11.23	29.00	24.21	0.264
	20	2 675.0	1	99	5	2 686.7	1	0	H	6.46	11.24	28.61	23.83	0.242
	10	2 670.5	1	49	15	2 682.5	1	0	H	6.44	11.23	28.74	23.95	0.248
	15	2 672.7	1	74	10	2 684.7	1	0	H	6.45	11.24	28.42	23.63	0.231
	10	2 665.6	1	49	20	2 680.0	1	0	H	6.43	11.23	28.69	23.89	0.245
	20	2 670.1	1	99	10	2 684.5	1	0	H	6.44	11.23	28.43	23.64	0.231
	15	2 667.5	1	74	15	2 682.5	1	0	H	6.44	11.23	28.38	23.59	0.229
	15	2 662.9	1	74	20	2 680.0	1	0	H	6.42	11.22	28.48	23.68	0.233
	20	2 665.1	1	99	15	2 682.2	1	0	H	6.43	11.23	28.24	23.44	0.221
	20	2 660.2	1	99	20	2 680.0	1	0	H	6.42	11.22	28.35	23.55	0.226

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

Modulation: 16QAM

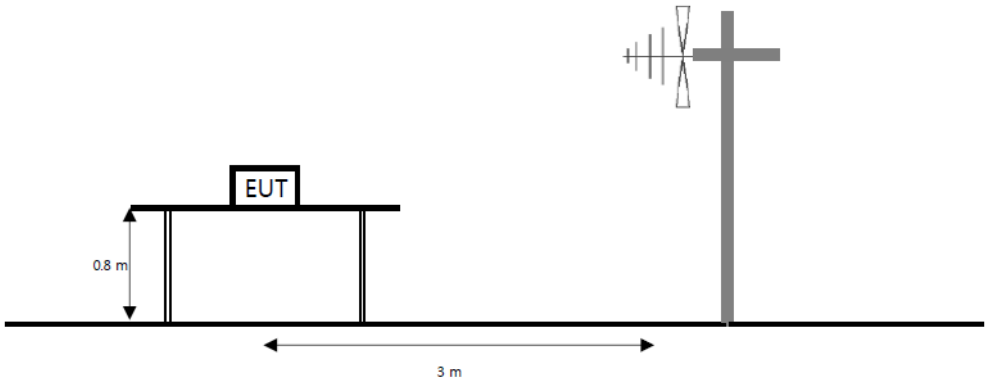
Ch.	PCC				SCC				Pol. [V/H]	Antenna Gain [dBi]	C.L [dB]	Substitute Level [dBm]	EIRP	
	BW (MHz)	Freq. (MHz)	RB	RB offset	BW (MHz)	Freq. (MHz)	RB	RB offset					[dBm]	[W]
Low	5	2 499.3	1	24	20	2 511.0	1	0	H	6.00	10.86	30.06	25.20	0.331
	20	2 506.0	1	99	5	2 517.7	1	0	H	6.02	10.89	30.06	25.19	0.330
	10	2 501.3	1	49	15	2 513.3	1	0	H	6.00	10.87	30.61	25.74	0.375
	15	2 503.5	1	74	10	2 515.5	1	0	H	6.01	10.88	30.78	25.91	0.390
	10	2 501.5	1	49	20	2 515.9	1	0	H	6.00	10.87	30.77	25.90	0.389
	20	2 506.0	1	99	10	2 520.4	1	0	H	6.02	10.89	31.44	26.57	0.454
	15	2 503.5	1	74	15	2 518.5	1	0	H	6.01	10.88	30.65	25.78	0.378
	15	2 503.8	1	74	20	2 520.9	1	0	H	6.01	10.88	30.88	26.01	0.399
	20	2 506.0	1	99	15	2 523.1	1	0	H	6.02	10.89	30.94	26.07	0.405
	20	2 506.0	1	99	20	2 525.8	1	0	H	6.02	10.89	30.53	25.66	0.368
Mid	5	2 583.8	1	24	20	2 595.5	1	0	H	6.22	11.00	29.06	24.28	0.268
	20	2 590.5	1	99	5	2 602.2	1	0	H	6.24	11.01	27.42	22.65	0.184
	10	2 585.9	1	49	15	2 597.9	1	0	H	6.22	11.00	27.99	23.21	0.209
	15	2 588.1	1	74	10	2 600.1	1	0	H	6.23	11.00	27.40	22.63	0.183
	10	2 583.6	1	49	20	2 598.0	1	0	H	6.22	11.00	28.03	23.25	0.211
	20	2 588.1	1	99	10	2 602.5	1	0	H	6.23	11.00	28.40	23.63	0.231
	15	2 585.5	1	74	15	2 600.5	1	0	H	6.22	11.00	28.64	23.86	0.243
	15	2 583.3	1	74	20	2 600.4	1	0	H	6.22	11.00	28.52	23.74	0.237
	20	2 585.6	1	99	15	2 602.7	1	0	H	6.22	11.00	27.45	22.67	0.185
	20	2 583.1	1	99	20	2 602.9	1	0	H	6.22	11.00	27.78	23.00	0.200
High	5	2 668.3	1	24	20	2 680.0	1	0	H	6.44	11.23	28.20	23.41	0.219
	20	2 675.0	1	99	5	2 686.7	1	0	H	6.46	11.24	27.88	23.10	0.204
	10	2 670.5	1	49	15	2 682.5	1	0	H	6.44	11.23	27.68	22.89	0.195
	15	2 672.7	1	74	10	2 684.7	1	0	H	6.45	11.24	27.54	22.75	0.188
	10	2 665.6	1	49	20	2 680.0	1	0	H	6.43	11.23	27.77	22.97	0.198
	20	2 670.1	1	99	10	2 684.5	1	0	H	6.44	11.23	27.57	22.78	0.190
	15	2 667.5	1	74	15	2 682.5	1	0	H	6.44	11.23	27.43	22.64	0.184
	15	2 662.9	1	74	20	2 680.0	1	0	H	6.42	11.22	27.39	22.59	0.182
	20	2 665.1	1	99	15	2 682.2	1	0	H	6.43	11.23	27.43	22.63	0.183
	20	2 660.2	1	99	20	2 680.0	1	0	H	6.42	11.22	27.52	22.72	0.187

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

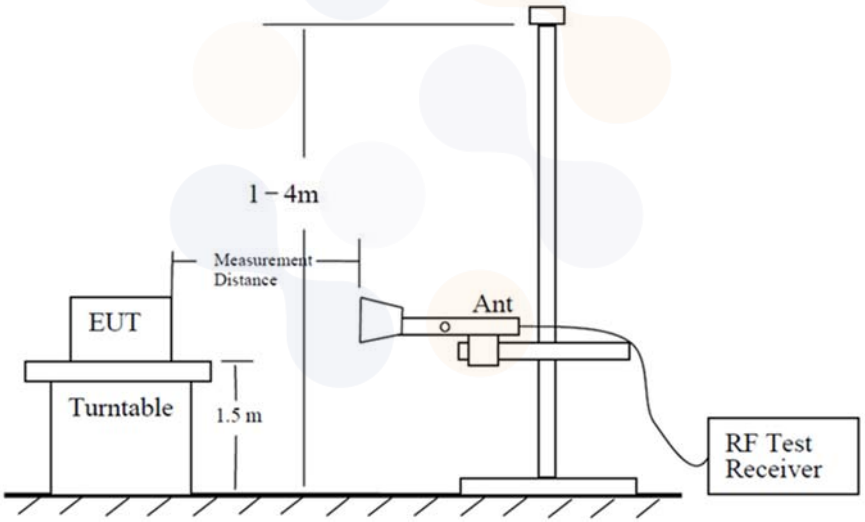
7.8. Radiated Spurious Emissions

Test setup

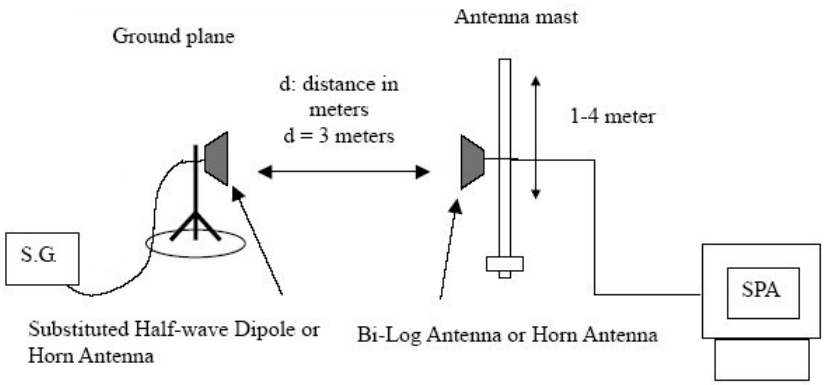
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 §27.53(m)(4);

For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) ㏈ on all frequencies between 2490.5 ㎒ and 2496 ㎒ and 55 + 10 log (P) ㏈ at or below 2490.5 ㎒ . Mobile Satellite Service licensees operating on frequencies below 2495 ㎒ may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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 = 100 ㎑ 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

Test mode: LTE ULCA 41C

Operating Frequency : Low

Test Mode	PCC				SCC			
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset
LTE ULCA 41C	20	2 506.0	1	99	10	2 520.4	1	0

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 031.00	V	10.32	14.93	-46.49	-51.10	-25.00	26.10
	7 545.75	V	12.14	19.51	-42.13	-49.50	-25.00	24.50
	10 061.25	V	13.11	23.28	-36.33	-46.50	-25.00	21.50
	12 579.00	H	13.23	26.57	-32.66	-46.00	-25.00	21.00

Operating Frequency : Middle

Test Mode	PCC				SCC			
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset
LTE ULCA 41C	20	2 588.1	1	99	10	2 602.5	1	0

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 196.75	V	10.42	15.59	-45.03	-50.20	-25.00	25.20
	7 791.00	V	12.33	19.97	-40.86	-48.50	-25.00	23.50
	10 389.00	V	13.18	23.78	-29.90	-40.50	-25.00	15.50
	12 987.75	V	13.40	27.33	-31.97	-45.90	-25.00	20.90

Operating Frequency : High

Test Mode	PCC				SCC			
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset
LTE ULCA 41C	20	2 670.1	1	99	10	2 684.5	1	0

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 361.75	H	10.52	16.00	-46.82	-52.30	-25.00	27.30
	8 040.00	V	12.54	20.10	-41.44	-49.00	-25.00	24.00
	10 716.75	V	13.20	24.31	-32.39	-43.50	-25.00	18.50
	13 402.50	H	13.96	27.67	-31.89	-45.60	-25.00	20.60

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*
PXA Signal Analyzer	KEYSIGHT	N9040B	US56050101	24.07.03
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