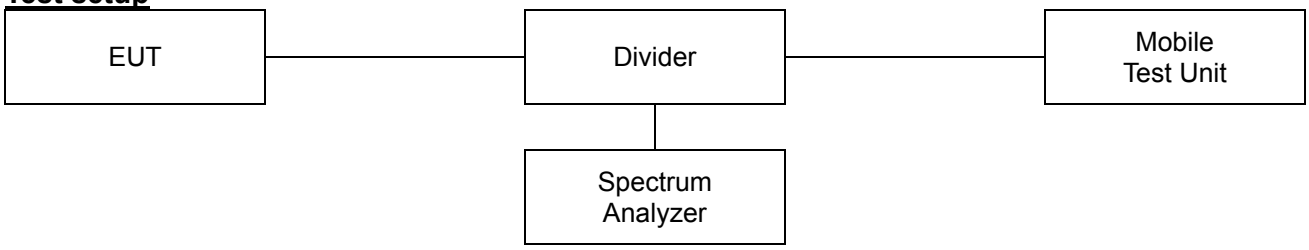
7.3. Spurious Emissions at Antenna Terminal

Test setup



Limit

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

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ANSI 63.26-2015 – Section 5.7

Test settings

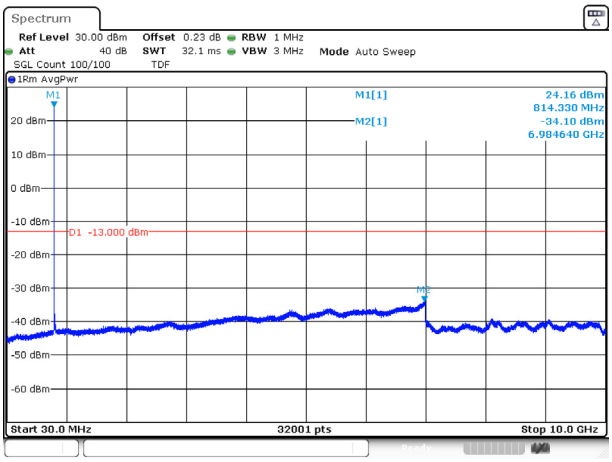
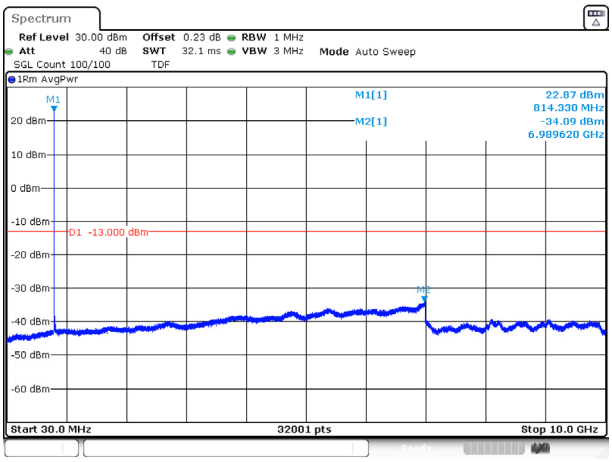
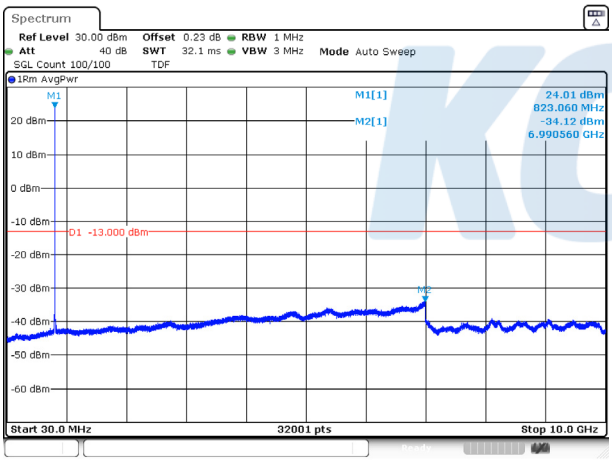
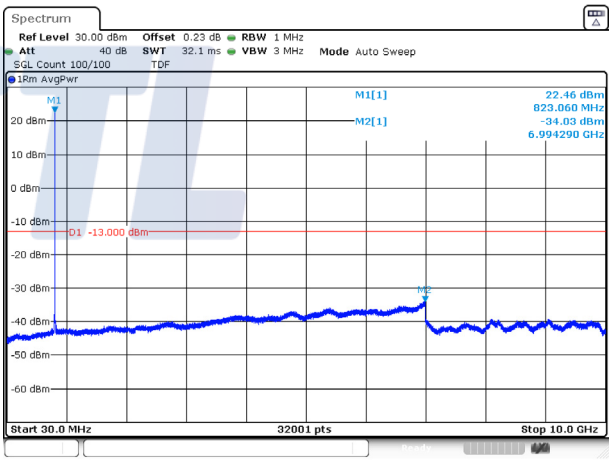
1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Detector = RMS
3) Sweep time = auto couple.
4) Trace mode = trace average
5) Allow trace to fully stabilize.
6) Please see test notes below RBW and VBW settings.

Notes:

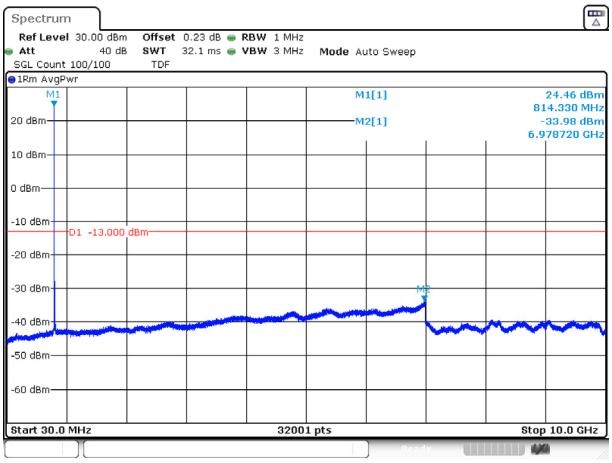
1. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and 1 ㎒ or greater for frequencies greater than 1 ㎓.
   The emission bandwidth is defined as the width of the signal between two points, 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

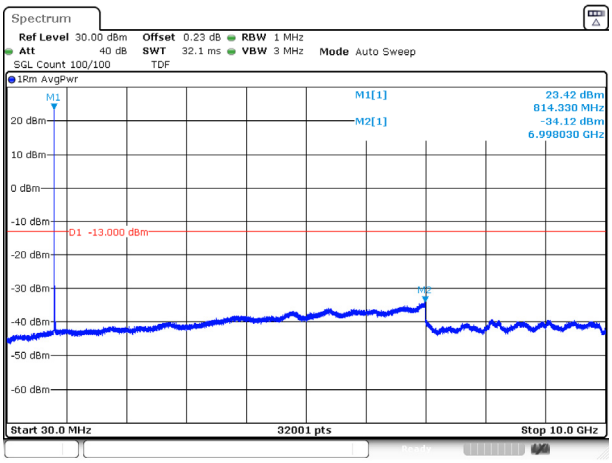
Test mode: LTE Band 26 (Part 90)

1.4M BW / QPSK / Low ch.	1.4M BW / 16QAM / Low ch.
	
1.4M BW / QPSK / High ch.	**1.4M BW / 16QAM / High ch.**
	

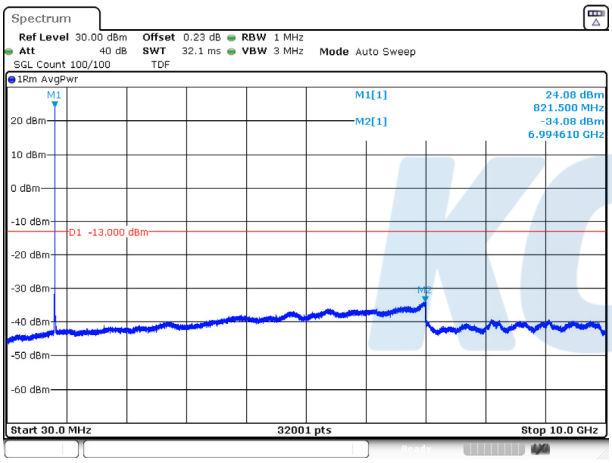
3M BW / QPSK / Low ch.



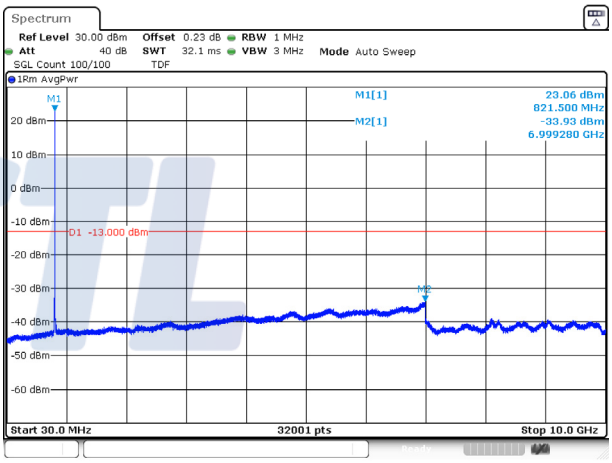
3M BW / 16QAM / Low ch.



3M BW / QPSK / High ch.



3M BW / 16QAM / High ch.



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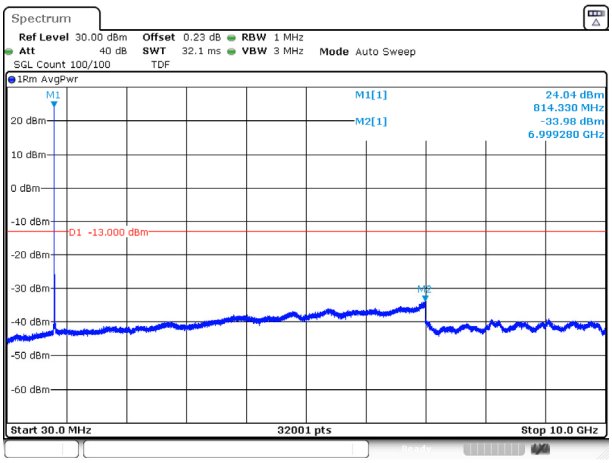
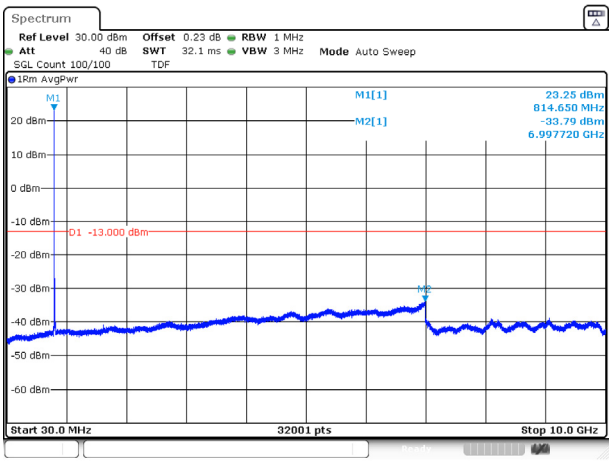
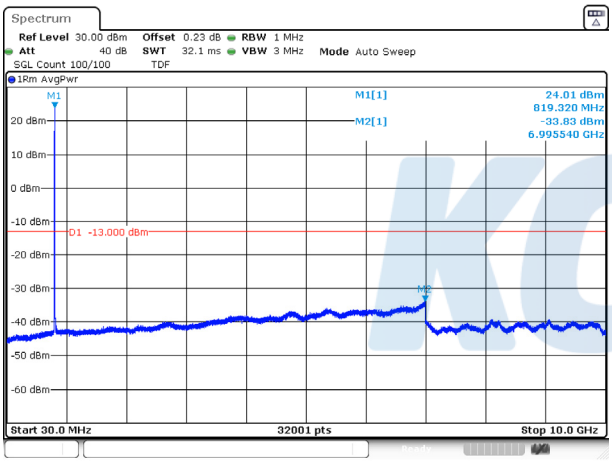
5M BW / QPSK / Low ch.



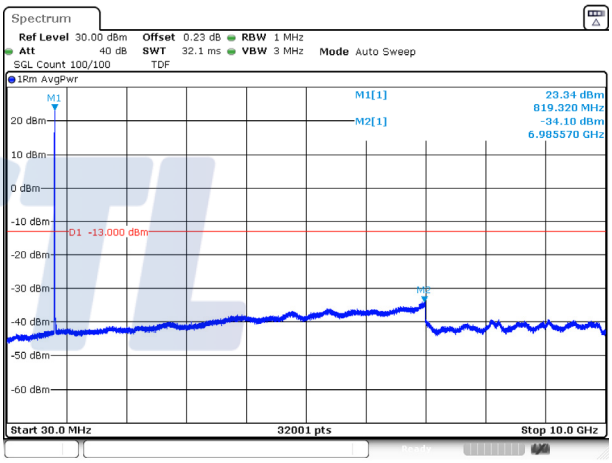
5M BW / 16QAM / Low ch.



5M BW / QPSK / High ch.

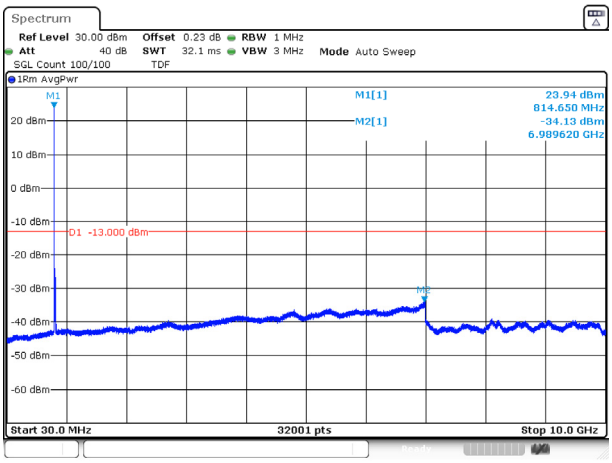


5M BW / 16QAM / High ch.

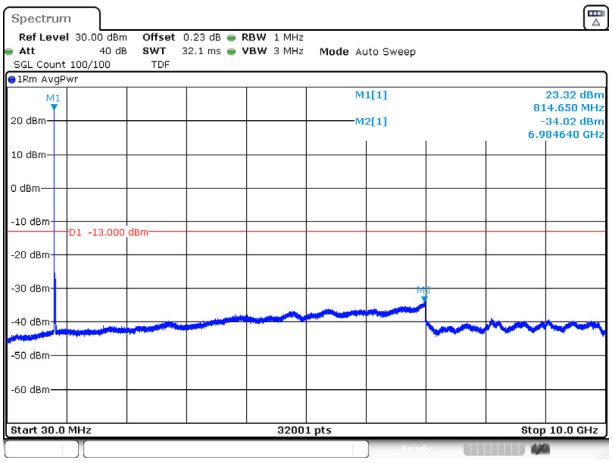


This test report shall not be reproduced, except in full, without the written approval

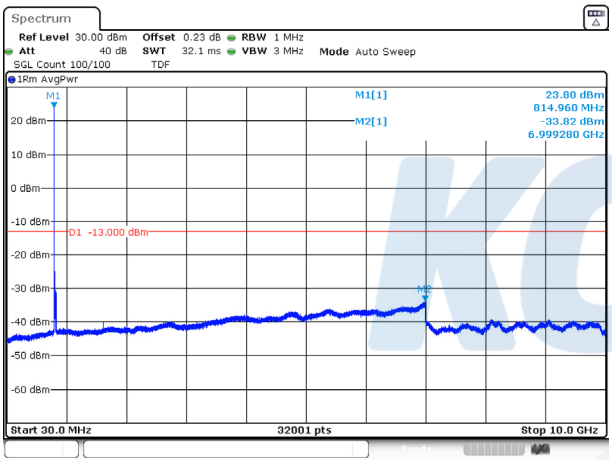
10M BW / QPSK / Mid ch.



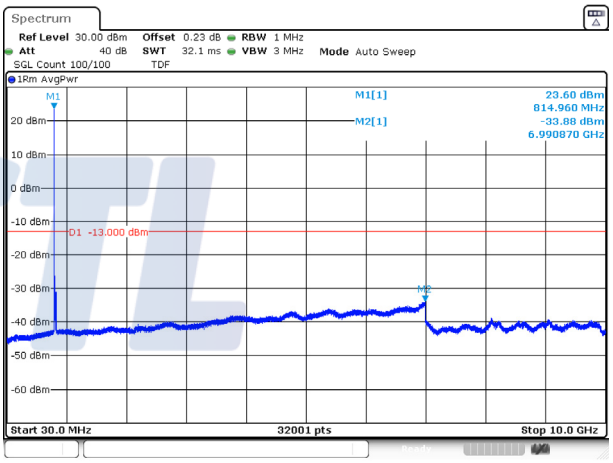
10M BW / 16QAM / Mid ch.



15M BW / QPSK / Mid ch.

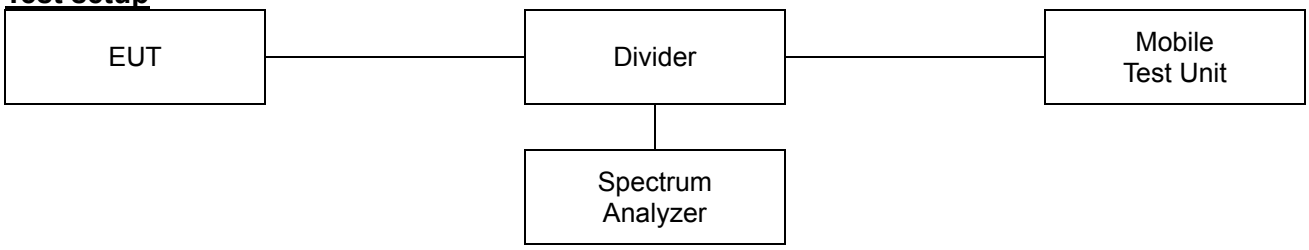


15M BW / 16QAM / Mid ch.



7.4. Band Edge Emissions at Antenna Terminal

Test setup



Limit

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

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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.

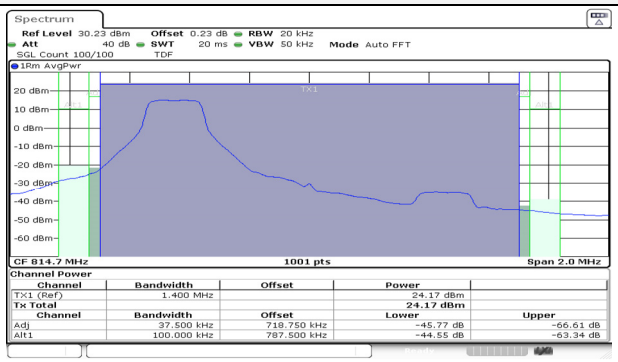
Notes:

1. 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.
2. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.

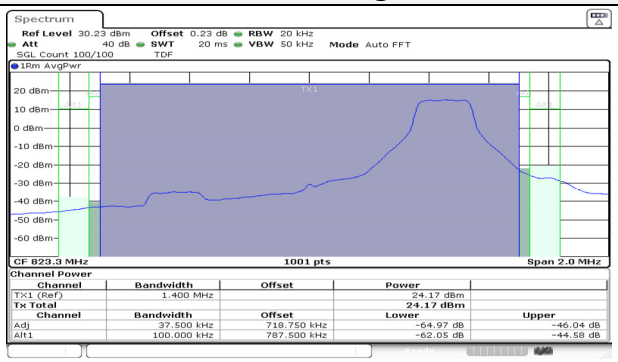
Test results

Test mode: LTE Band 26 (Part 90)

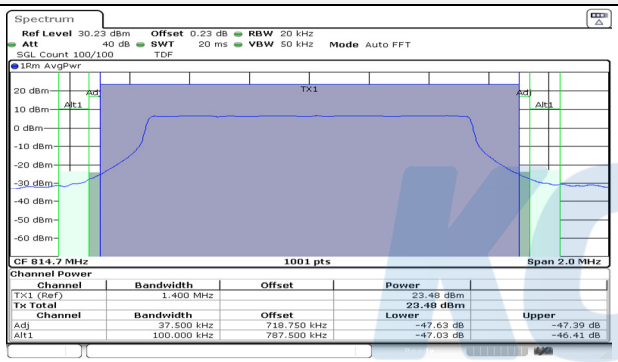
1.4M BW / QPSK / Low ch. / 1RB



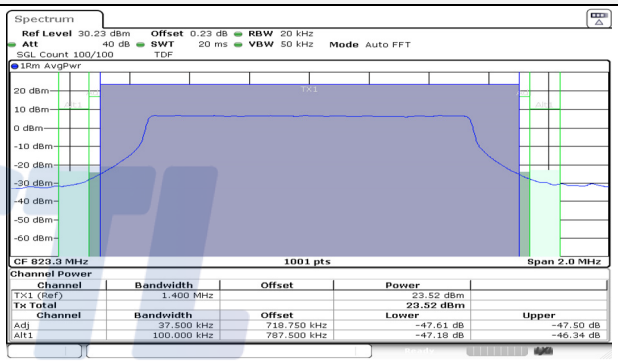
1.4M BW / QPSK / High ch. / 1RB



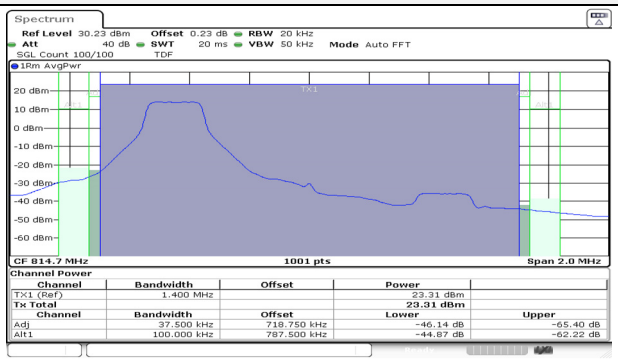
1.4M BW / QPSK / Low ch. / FRB



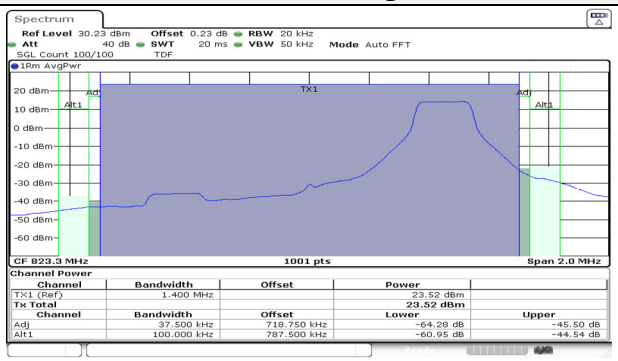
1.4M BW / QPSK / High ch. / FRB



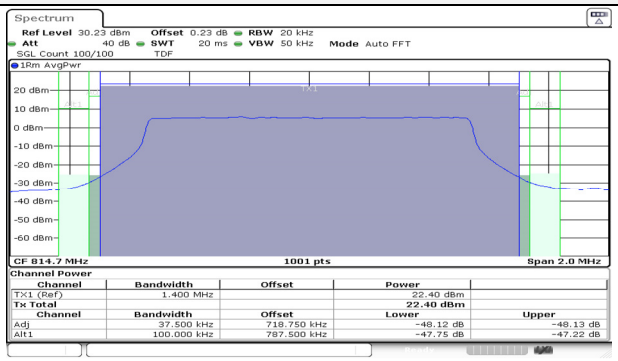
1.4M BW / 16QAM / Low ch. / 1RB



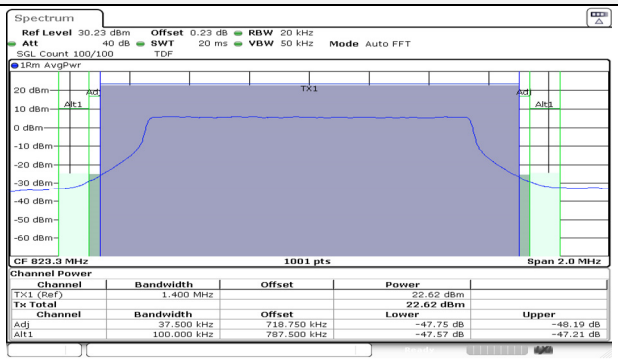
1.4M BW / 16QAM / High ch. / 1RB



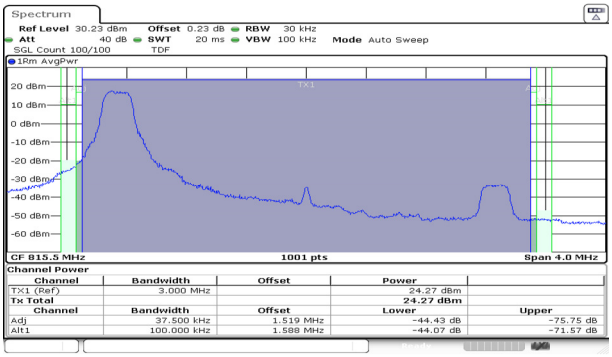
1.4M BW / 16QAM / Low ch. / FRB



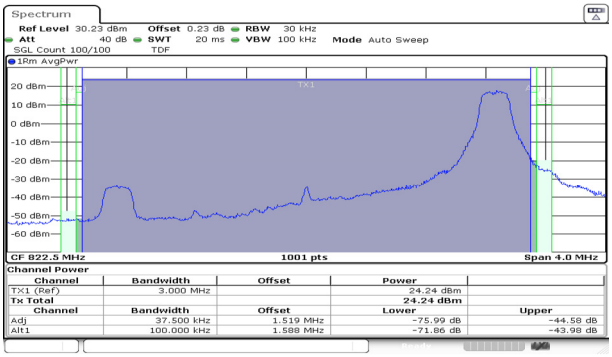
1.4M BW / 16QAM / High ch. / FRB



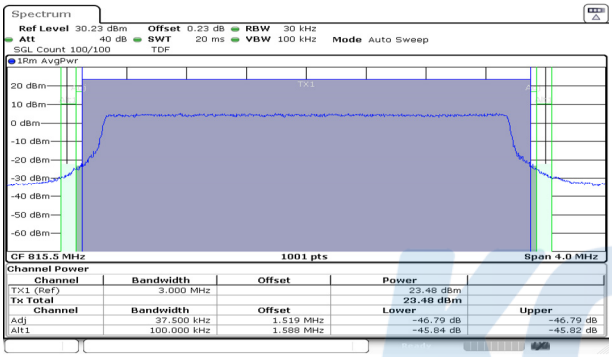
3M BW / QPSK / Low ch. / 1RB



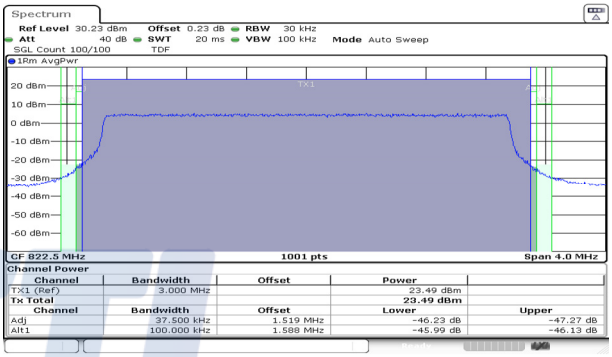
3M BW / QPSK / High ch. / 1RB



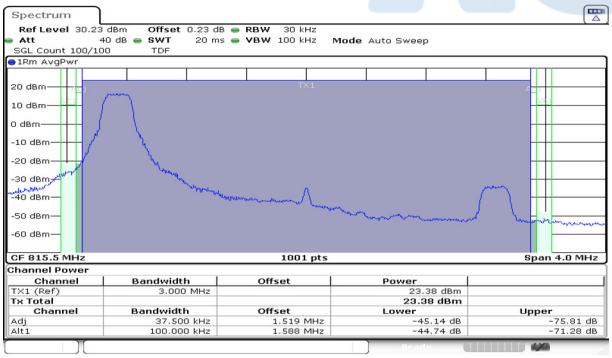
3M BW / QPSK / Low ch. / FRB



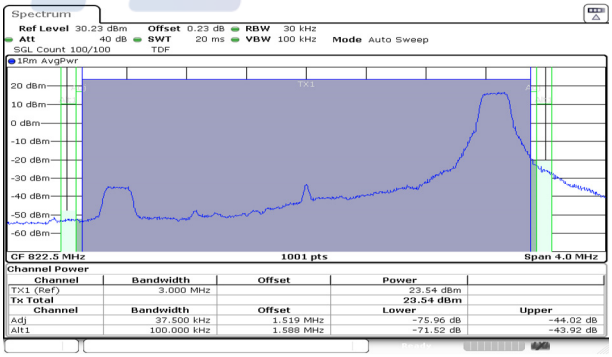
3M BW / QPSK / High ch. / FRB



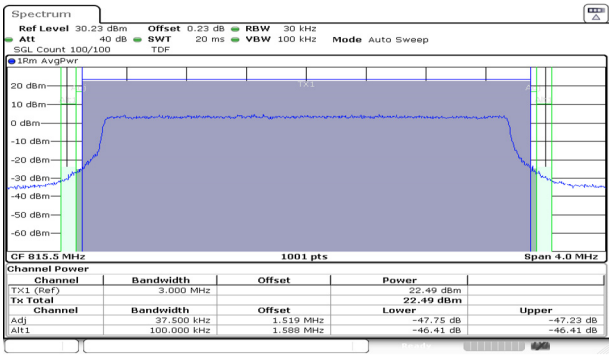
3M BW / 16QAM / Low ch. / 1RB



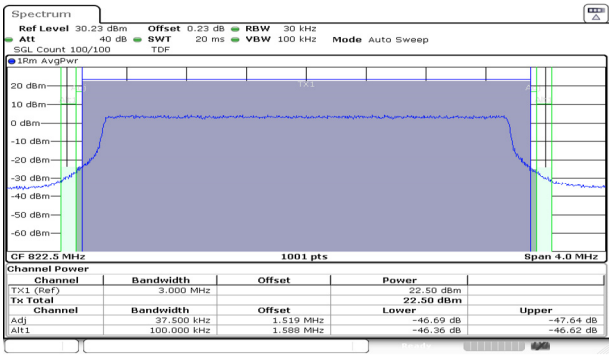
3M BW / 16QAM / High ch. / 1RB



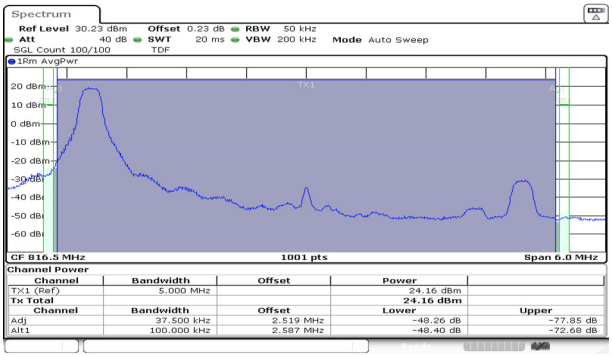
3M BW / 16QAM / Low ch. / FRB



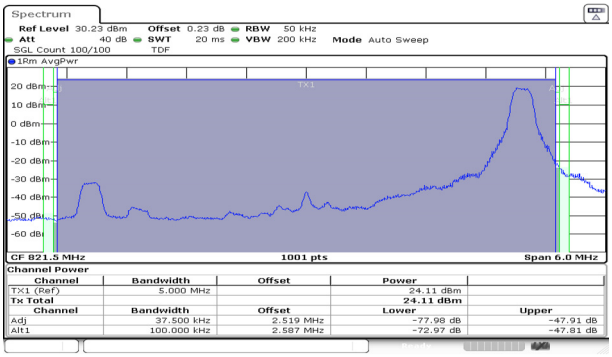
3M BW / 16QAM / High ch. / FRB



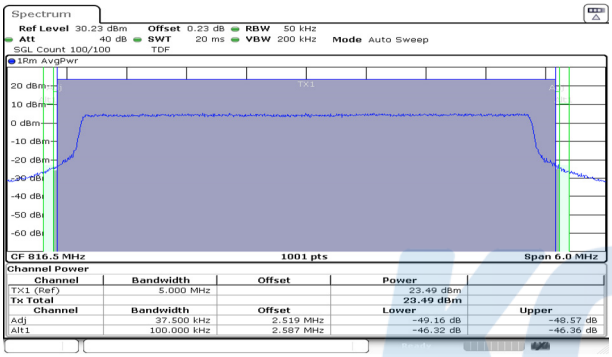
5M BW / QPSK / Low ch. / 1RB



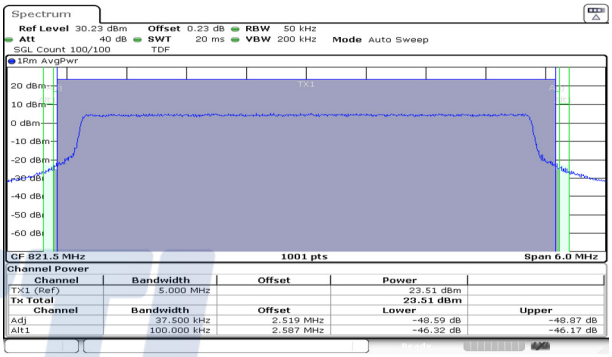
5M BW / QPSK / High ch. / 1RB



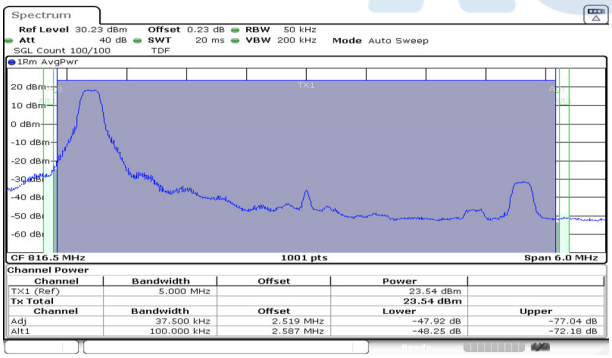
5M BW / QPSK / Low ch. / FRB



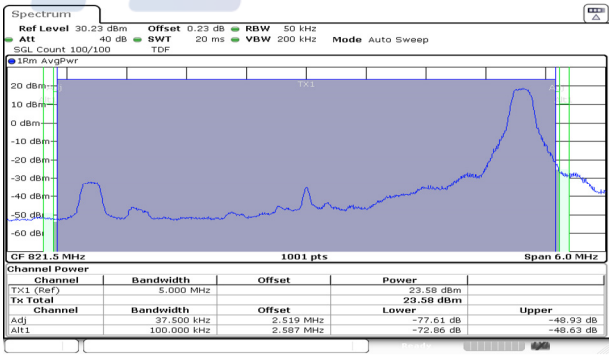
5M BW / QPSK / High ch. / FRB



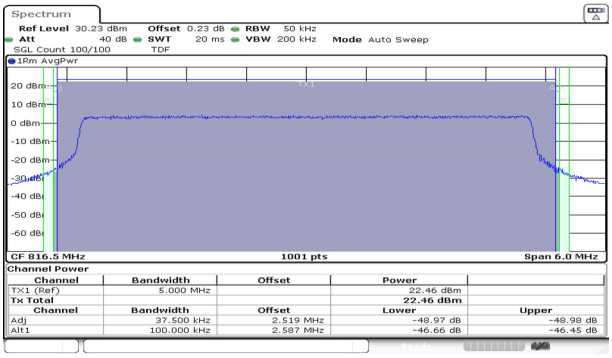
5M BW / 16QAM / Low ch. / 1RB



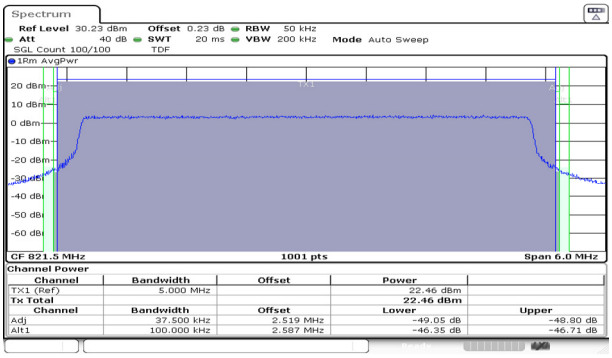
5M BW / 16QAM / High ch. / 1RB



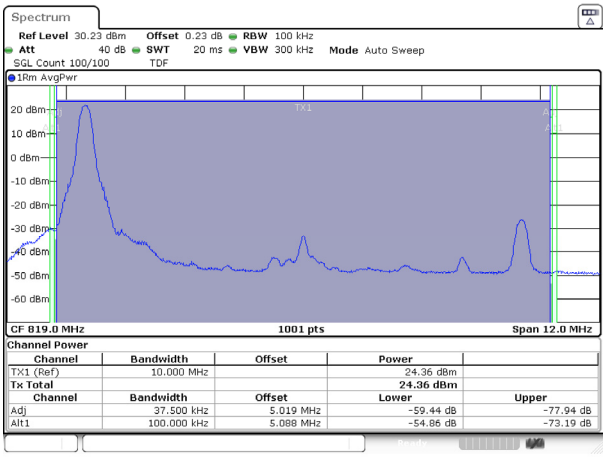
5M BW / 16QAM / Low ch. / FRB



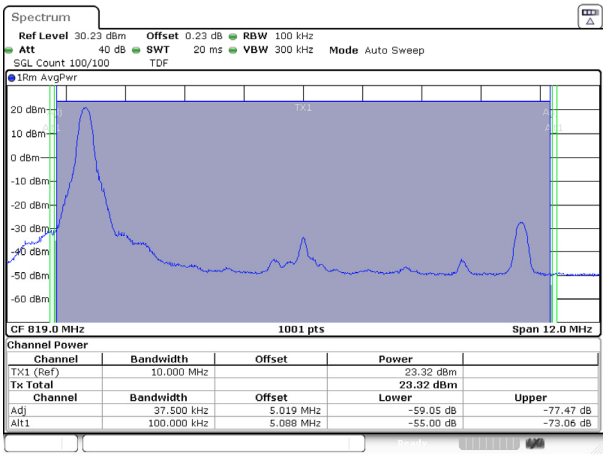
5M BW / 16QAM / High ch. / FRB



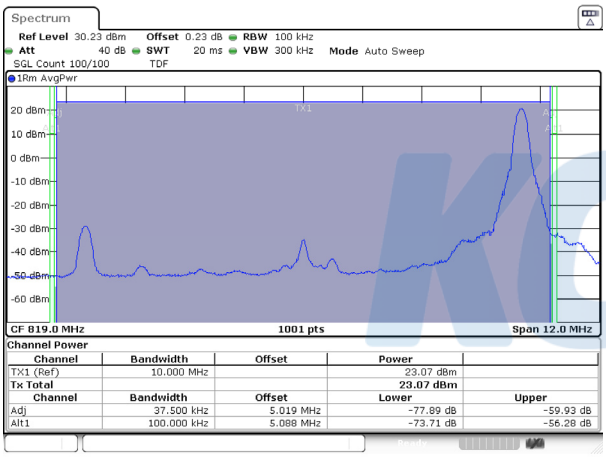
10M BW / QPSK / Mid ch. / Lower / 1RB



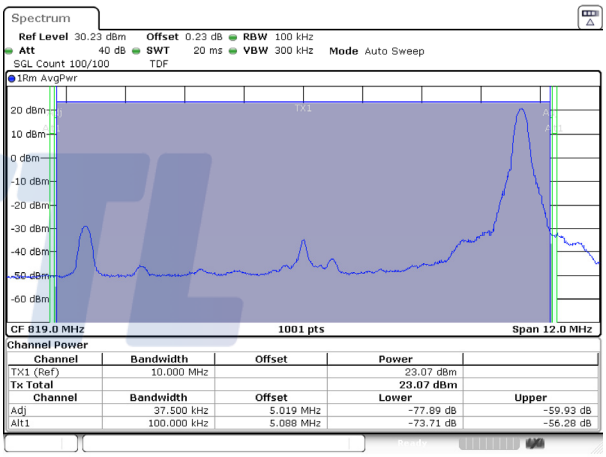
10M BW / 16QAM / Mid ch. / Lower / 1RB



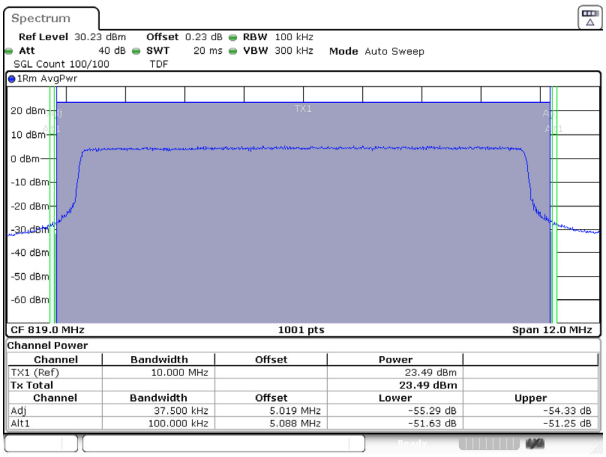
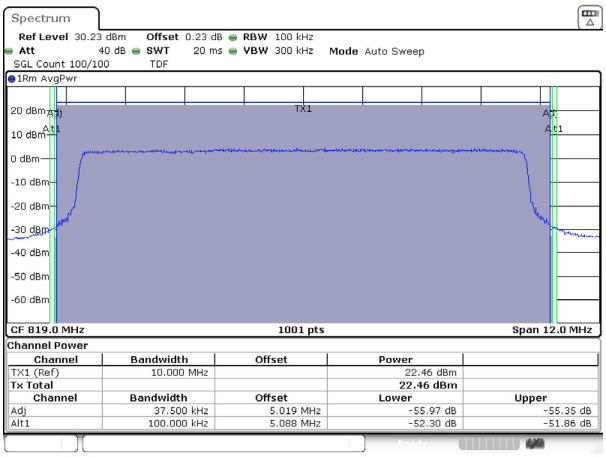
10M BW / QPSK / Mid ch. / Upper / 1RB



10M BW / 16QAM / Mid ch. / Upper / 1RB



10M BW / QPSK / Mid ch. / FRB



10M BW / 16QAM / Mid ch. / FRB