5. Peak-Average Ratio

5.1. Limit

- §22.913(d) Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 ㏈.

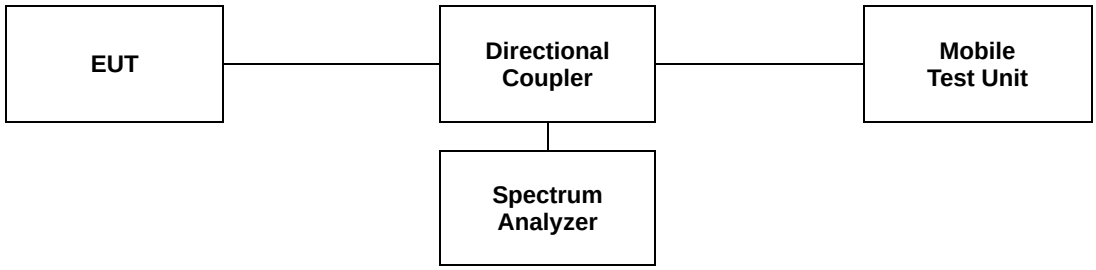
- §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 ㏈.

- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 ㏈.

5.2. Test Procedure

The test follows section 5.7.2 of FCC KDB Publication 971168 D01 v03.

1. Refer to the instruction manual of the instrument for details on how to use the power statistics/CCDF function.
2. Set resolution/measurement bandwidth ≥ OBW of the signal, or ≥ signal's occupied bandwidth.
3. Set the number of counts to a value that stabilizes the measured CCDF curve.
4. Set the measurement interval as follows:
   a) For continuous transmissions, set to [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 interval to a time that is less than or equal to the burst duration.
   c) If there are multiple carriers (i.e., multiple emission signals with specific associated necessary bandwidths) in a single antenna port, the peak power for that port shall be determined for each individual carrier by disabling the other carriers while measuring the required carrier, then the total peak power is calculated from the sum of the individual carrier peak powers.
5. Record the maximum PAPR level associated with a probability of 0.1 %.



5.3 Test Results

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

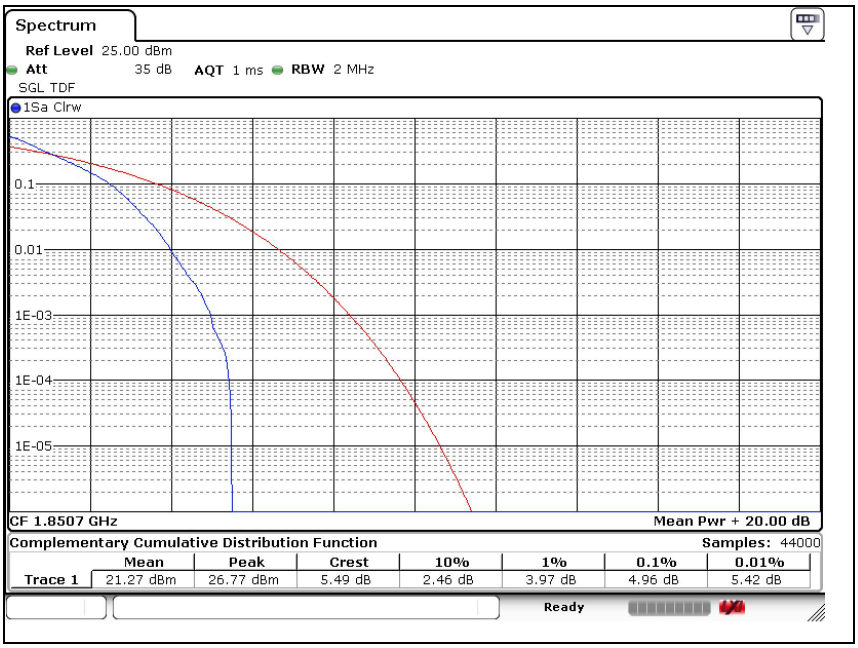
Band	Mode	Frequency (㎒)	PAR (㏈)
2 (1.4 ㎒)	QPSK	1 850.7	4.96
		1 880.0	4.72
		1 909.3	4.87
2 (3 ㎒)	QPSK	1 851.5	4.87
		1 880.0	4.67
		1 908.5	4.64
2 (5 ㎒)	QPSK	1 852.5	4.67
		1 880.0	4.61
		1 907.5	4.70
2 (10 ㎒)	QPSK	1 855.0	4.64
		1 880.0	4.58
		1 905.0	4.67
2 (15 ㎒)	QPSK	1 857.5	4.90
		1 880.0	4.72
		1 902.5	5.19
2 (20 ㎒)	QPSK	1 860.0	4.64
		1 880.0	4.72
		1 900.0	4.99

Band	Mode	Frequency (㎒)	PAR (㏈)
4 (1.4 ㎒)	QPSK	1 710.7	5.16
		1 732.5	5.42
		1 754.3	4.75
4 (3 ㎒)	QPSK	1 711.5	5.28
		1 732.5	5.30
		1 753.5	4.49
4 (5 ㎒)	QPSK	1 712.5	5.19
		1 732.5	5.33
		1 752.5	4.55
4 (10 ㎒)	QPSK	1 715.0	4.72
		1 732.5	5.16
		1 750.0	4.61
4 (15 ㎒)	QPSK	1 717.5	5.04
		1 732.5	5.42
		1 747.5	5.07
4 (20 ㎒)	QPSK	1 720.0	4.72
		1 732.5	5.07
		1 745.0	4.84

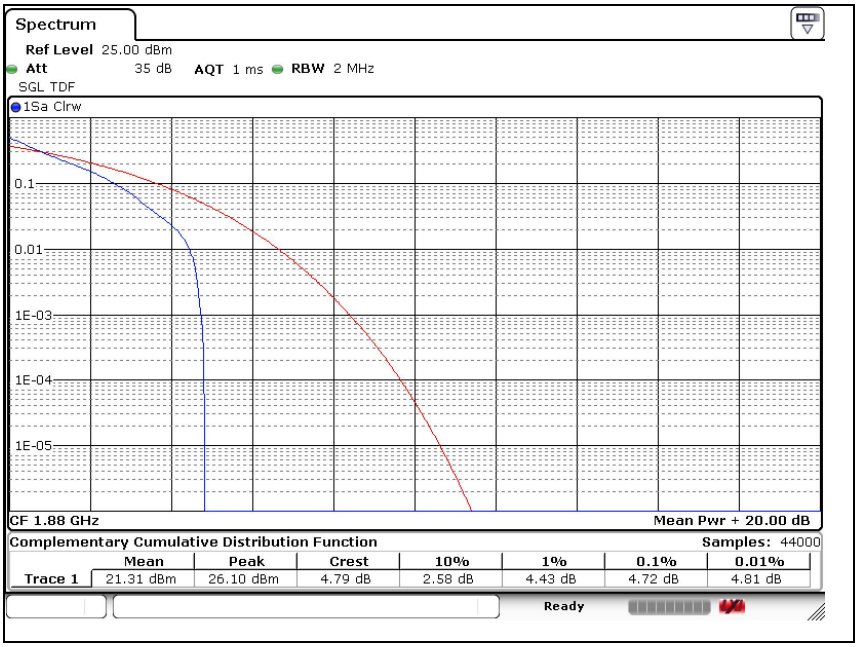
Band	Mode	Frequency (㎒)	PAR (㏈)
5 (1.4 ㎒)	QPSK	824.7	5.01
		836.5	5.36
		848.3	5.19
5 (3 ㎒)	QPSK	825.5	4.70
		836.5	4.93
		847.5	4.90
5 (5 ㎒)	QPSK	826.5	4.72
		836.5	4.99
		846.5	4.84
5 (10 ㎒)	QPSK	829.0	4.75
		836.5	5.01
		844.0	4.75

LTE band 2 (1.4 ㎒ - QPSK)

Low Channel



Middle Channel



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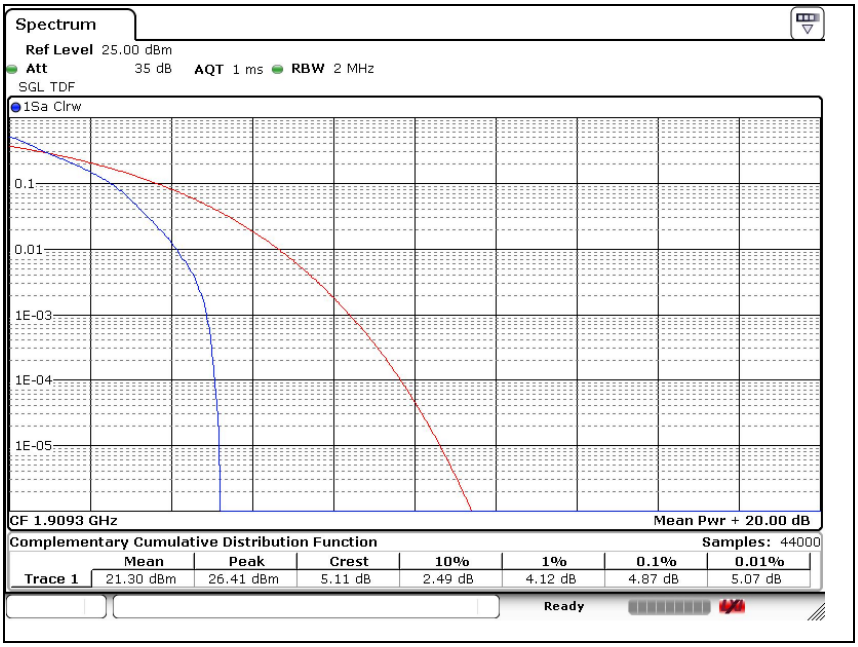
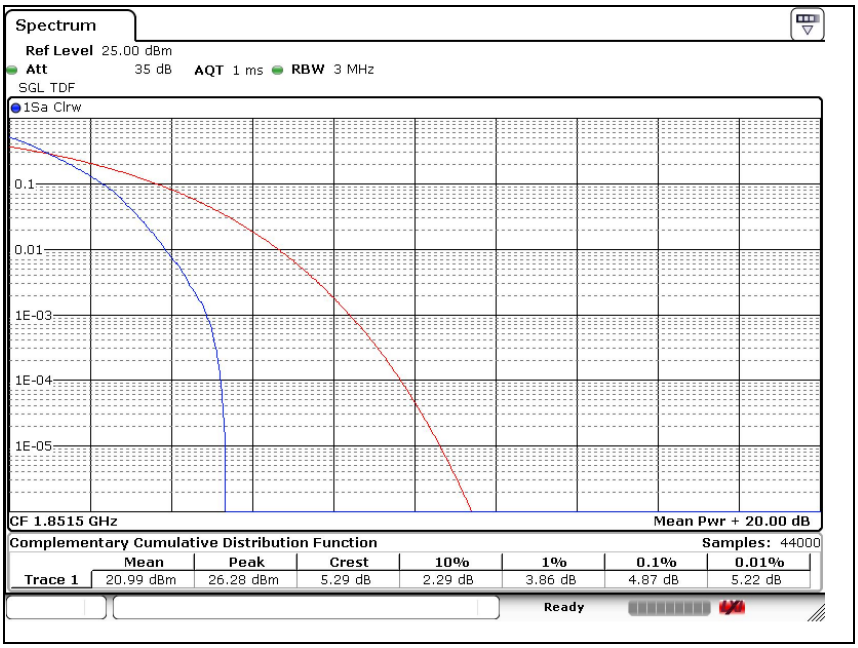
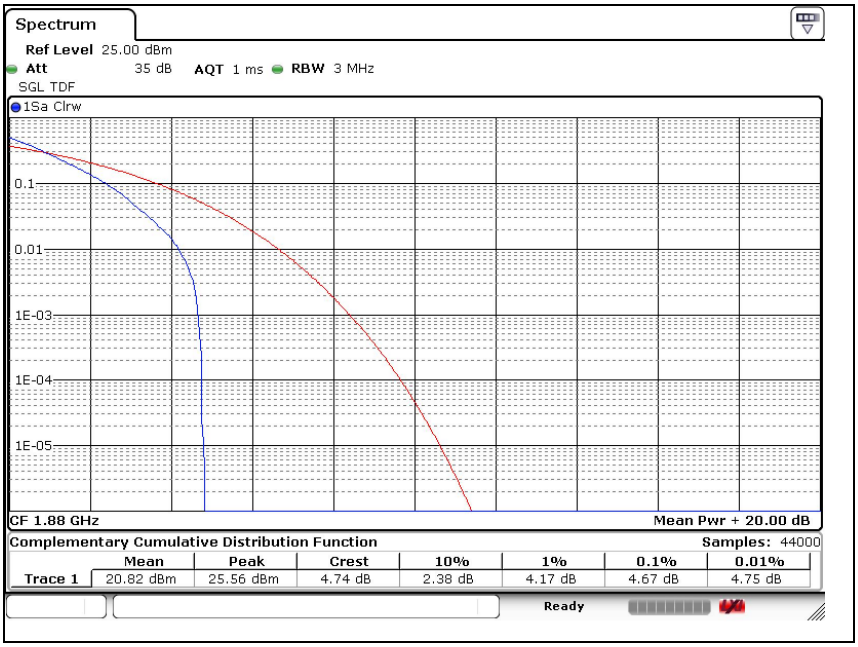


LTE band 2 (3 ㎒ - QPSK)

Low Channel



Middle Channel



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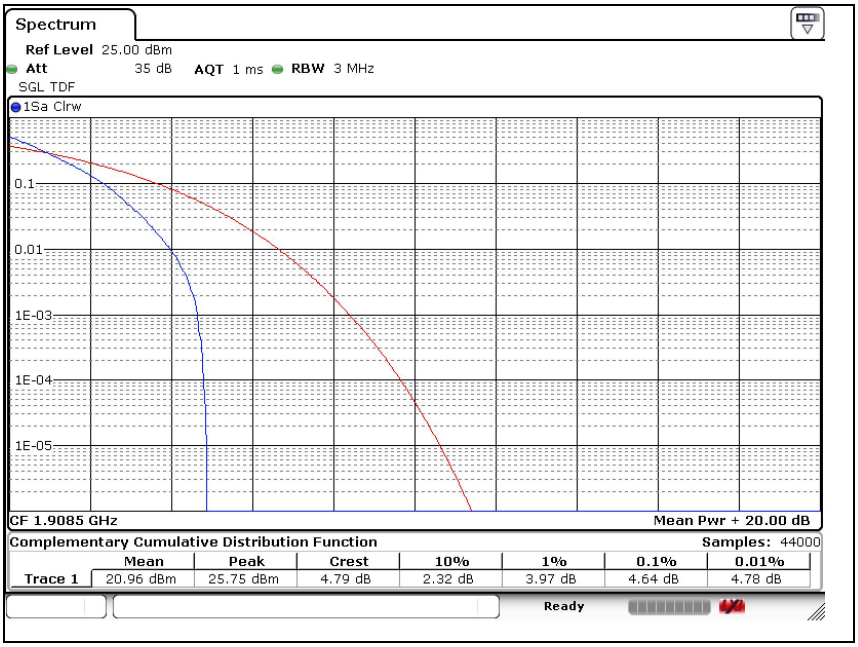
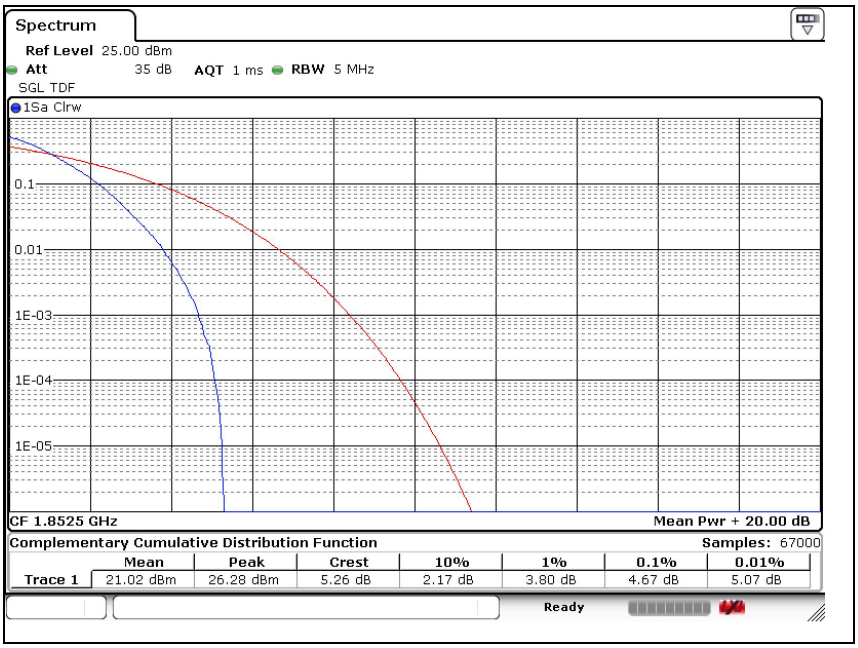


LTE band 2 (5 ㎒ - QPSK)

Low Channel



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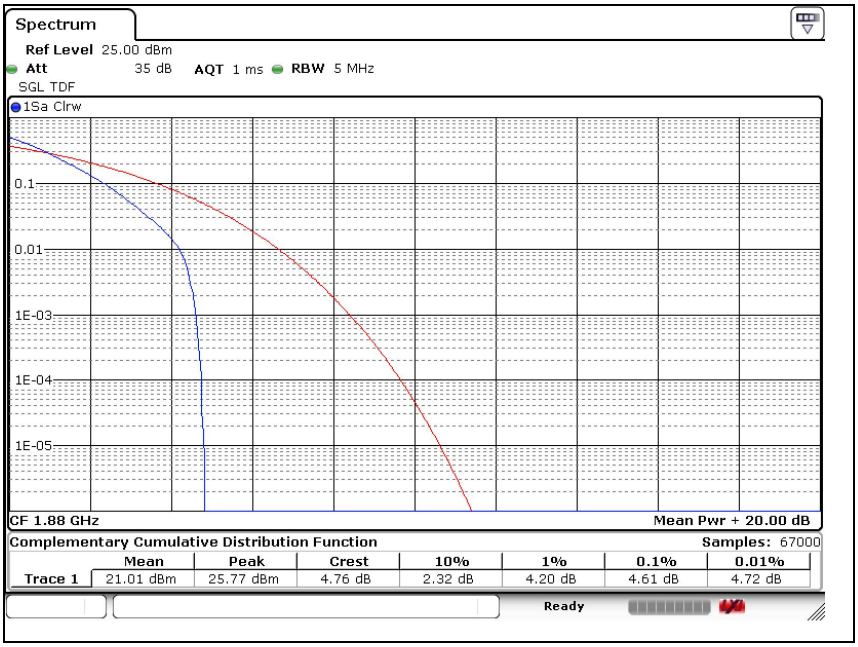

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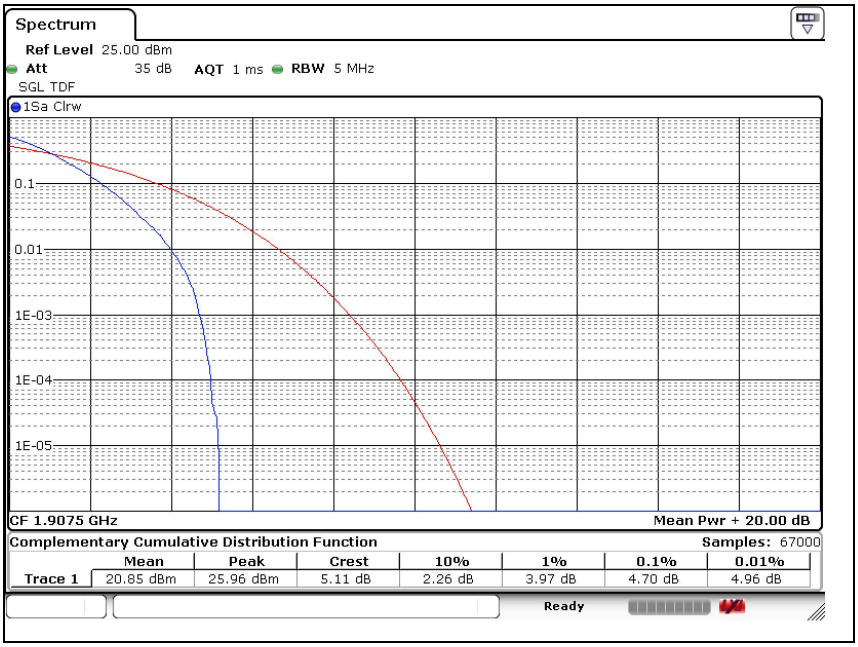
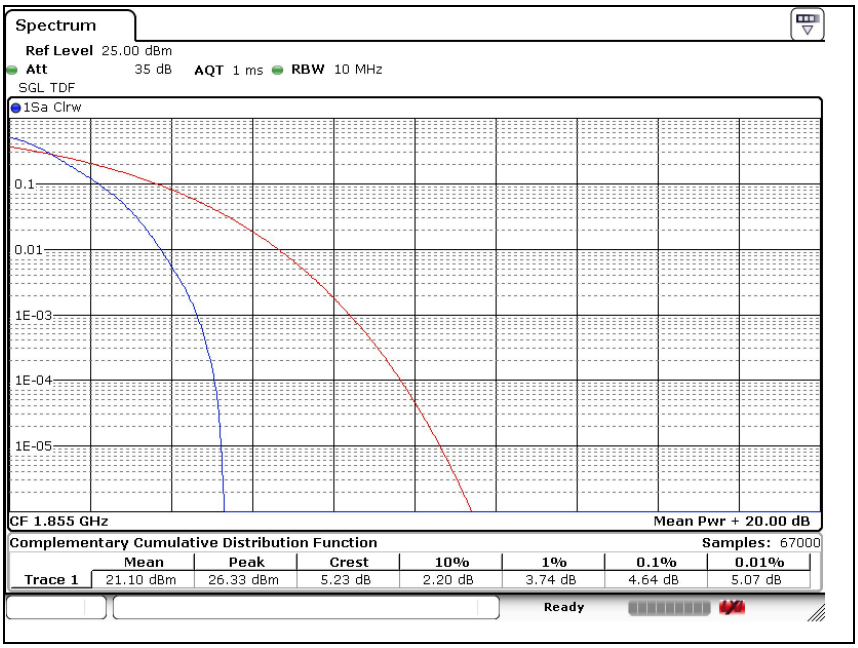


LTE band 2 (10 ㎒ - QPSK)

Low Channel



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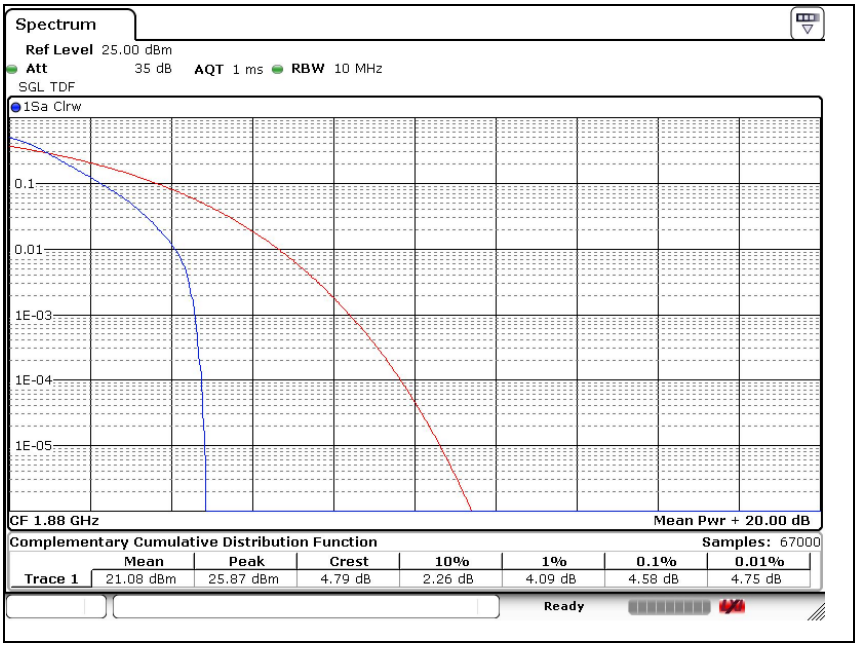

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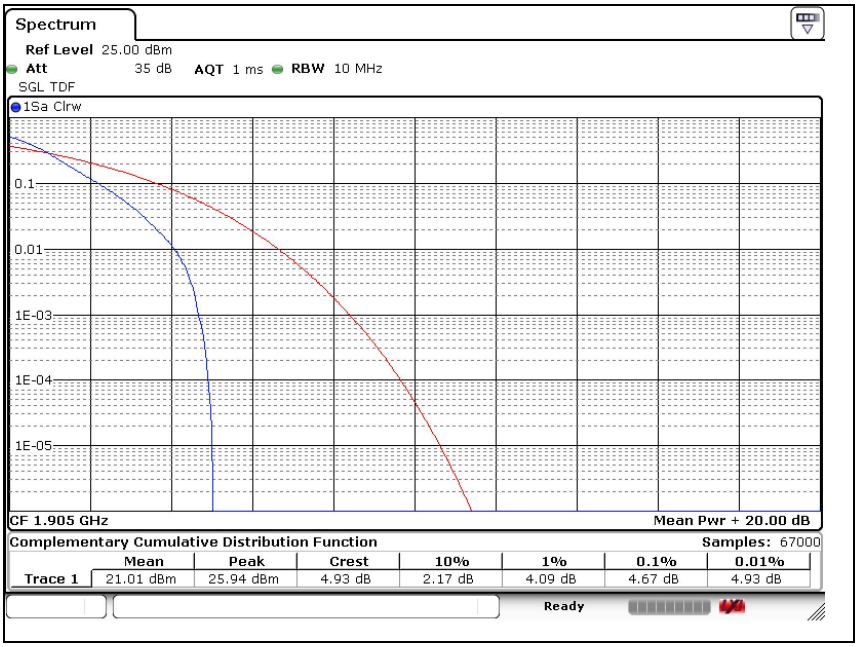
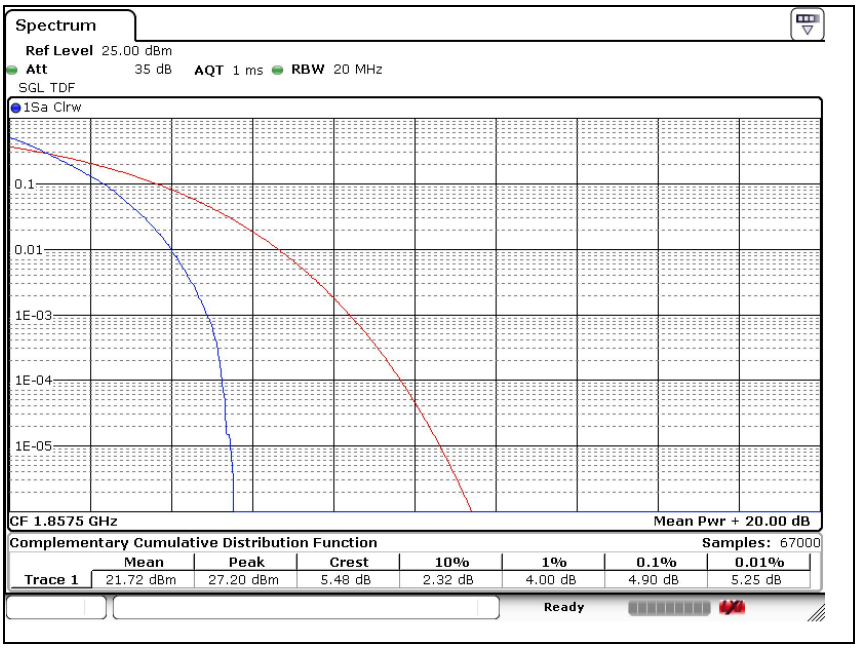


LTE band 2 (15 ㎒ - QPSK)

Low Channel



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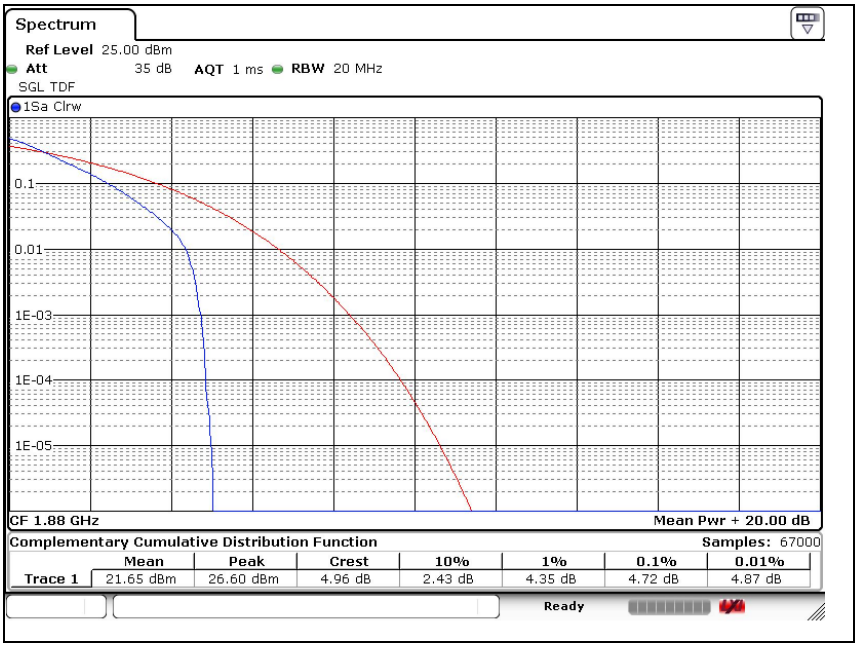

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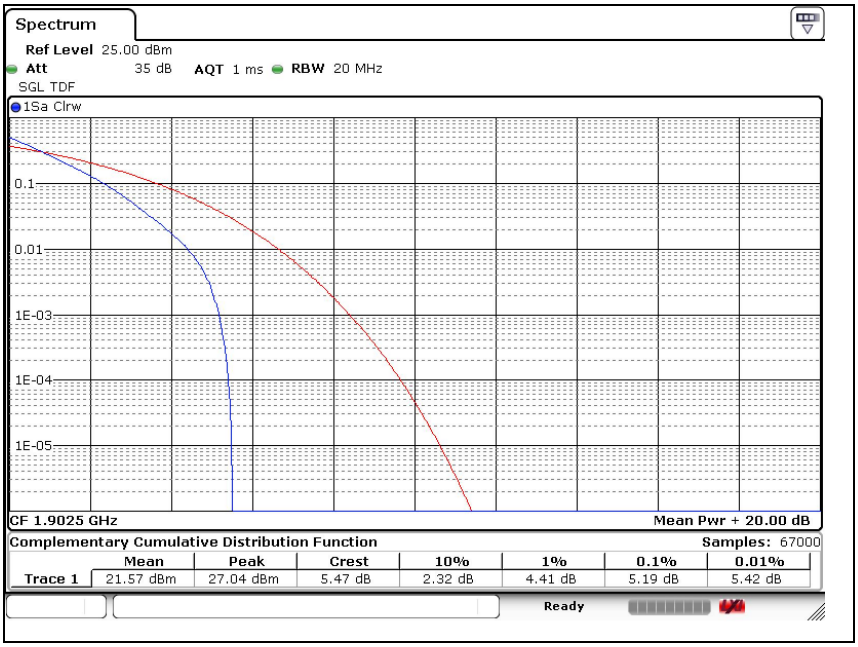
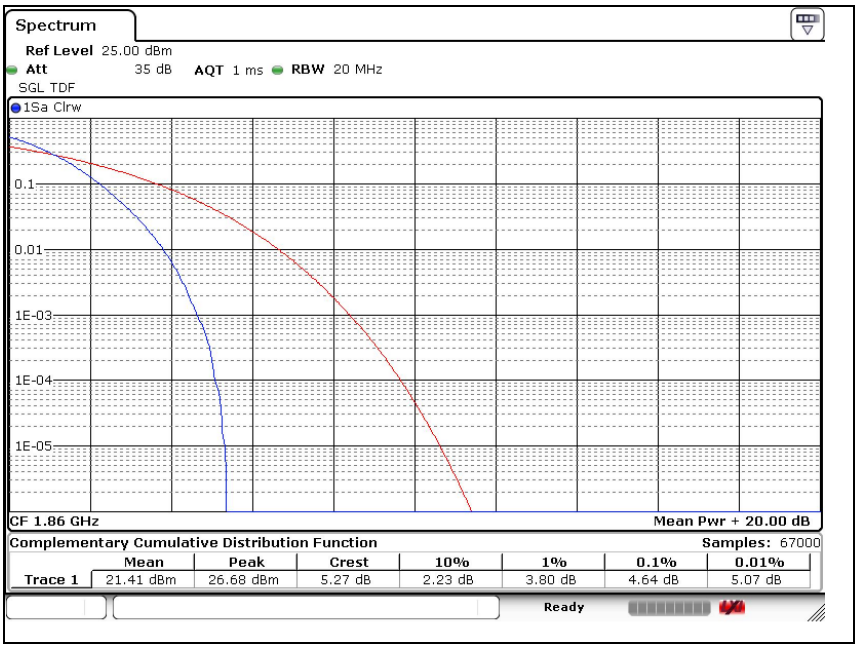


LTE band 2 (20 ㎒ - QPSK)

Low Channel



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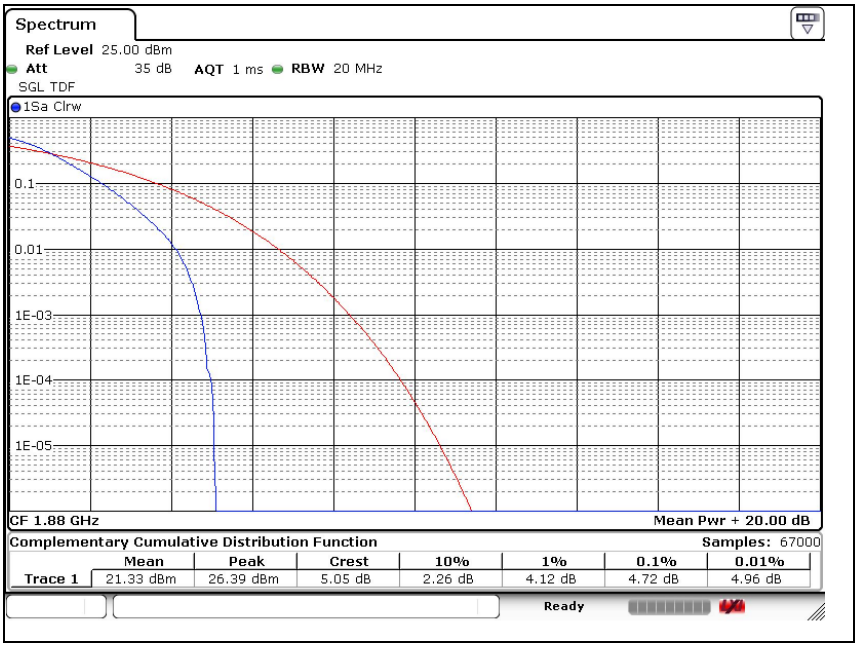

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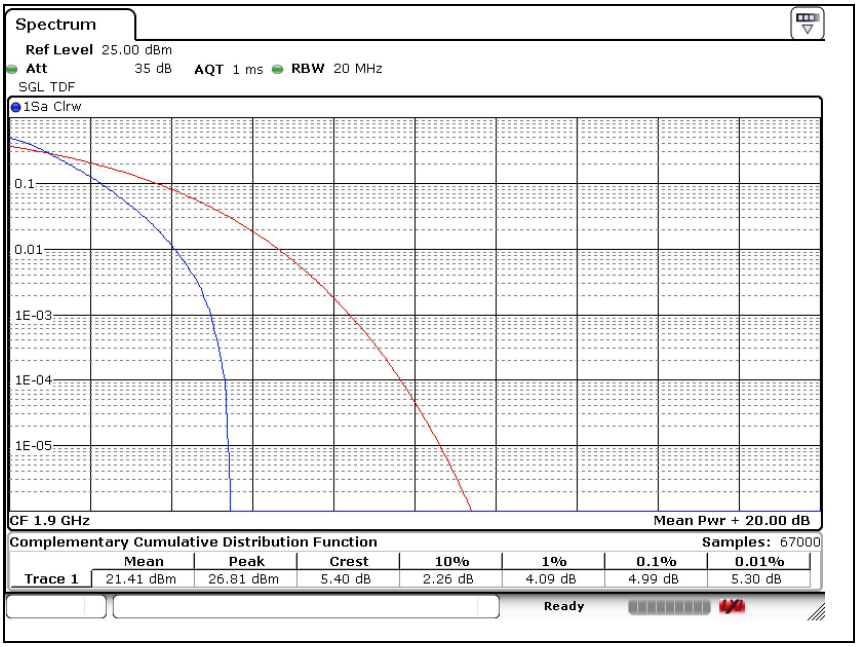
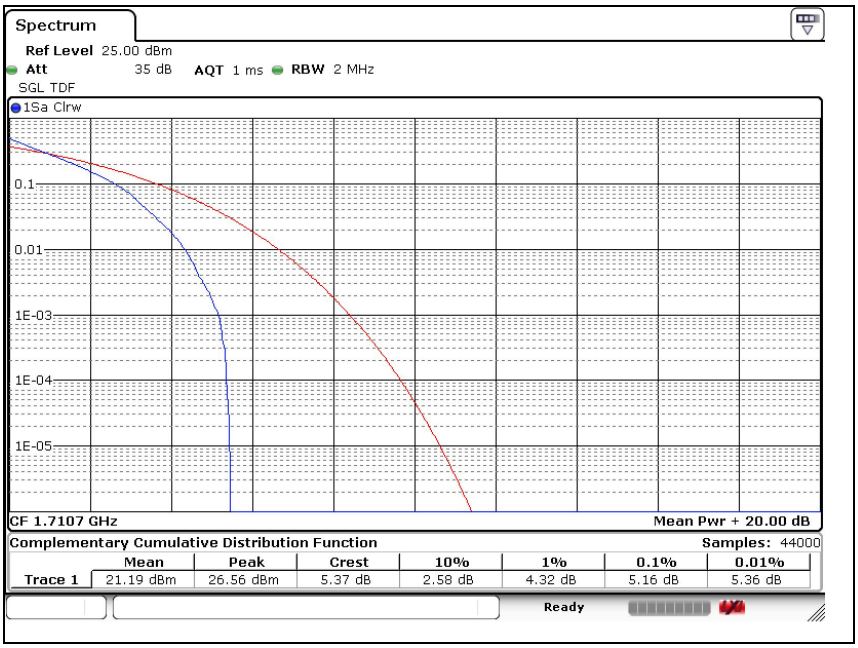


LTE band 4 (1.4 ㎒ - QPSK)

Low Channel



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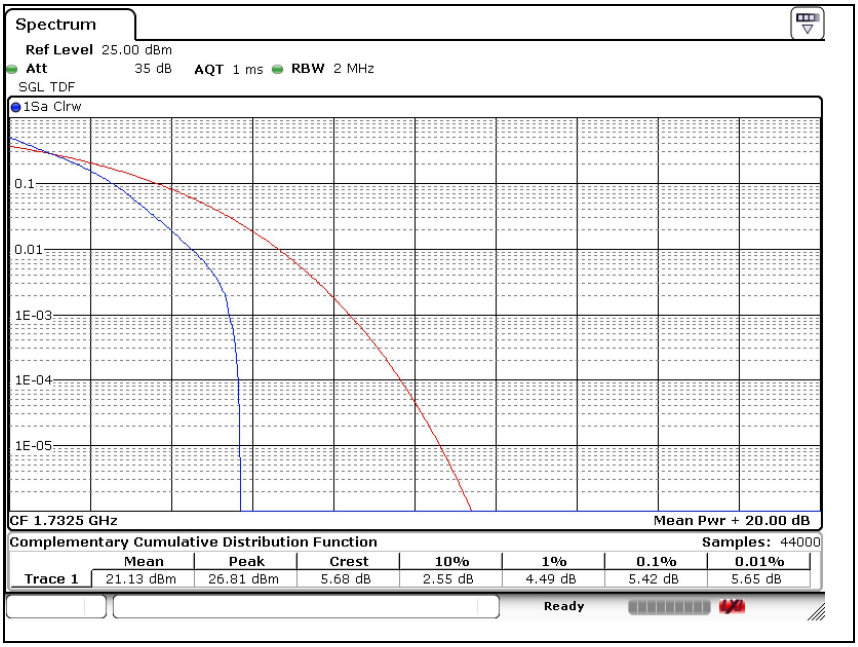

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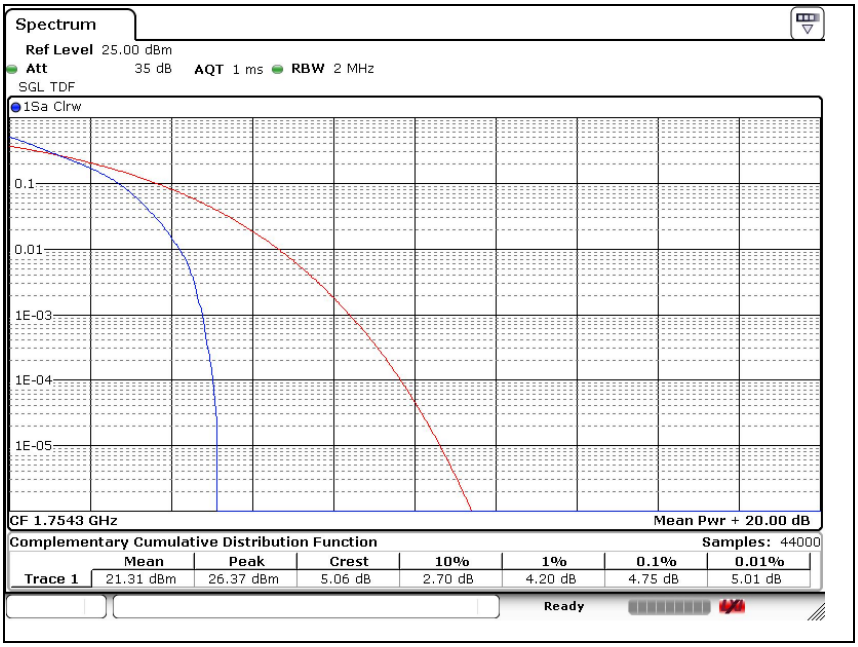
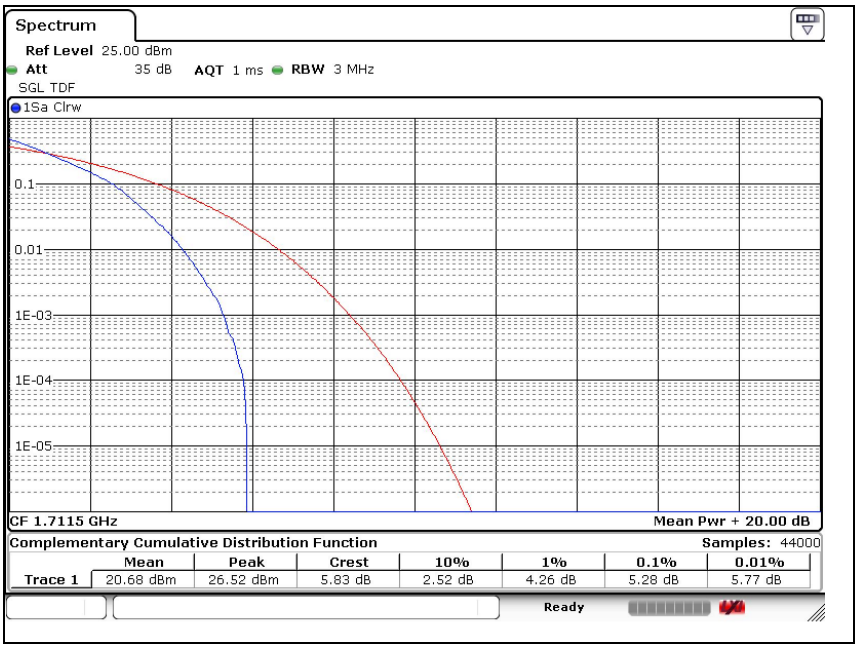


LTE band 4 (3 ㎒ - QPSK)

Low Channel



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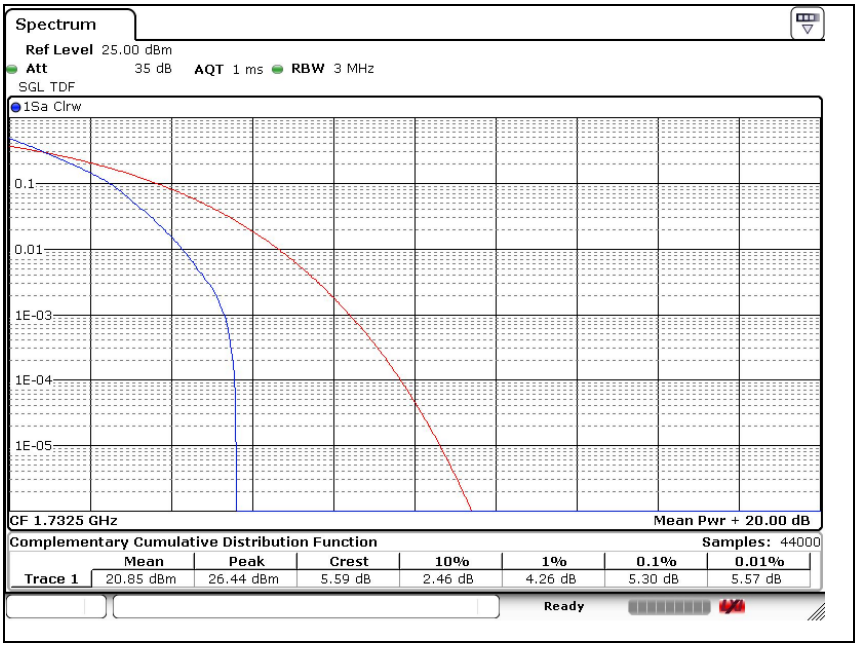

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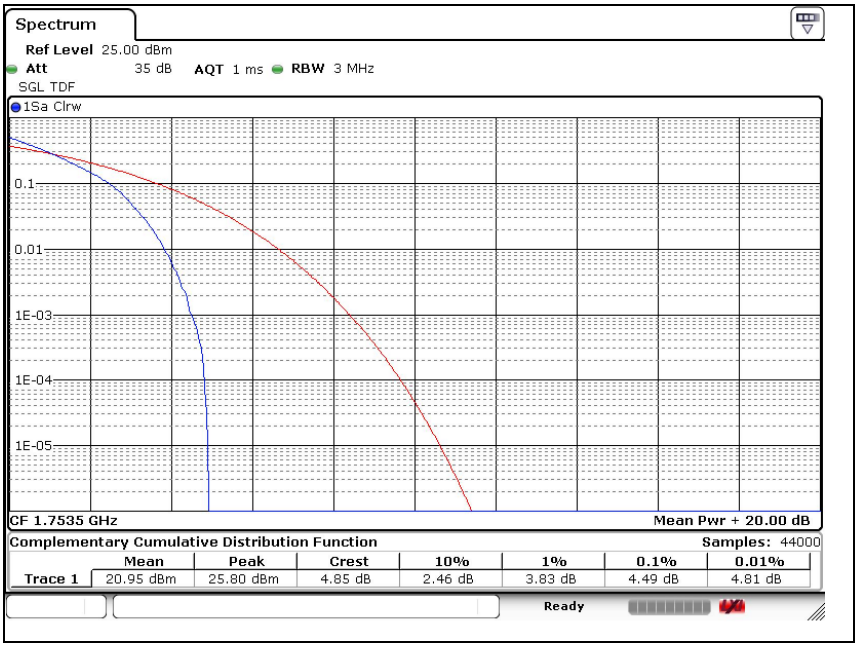
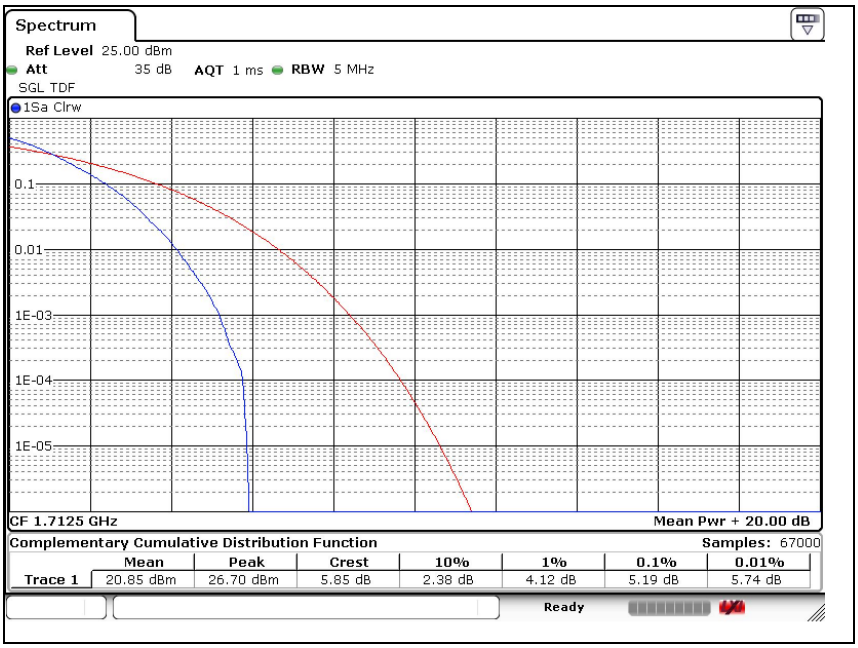


LTE band 4 (5 ㎒ - QPSK)

Low Channel



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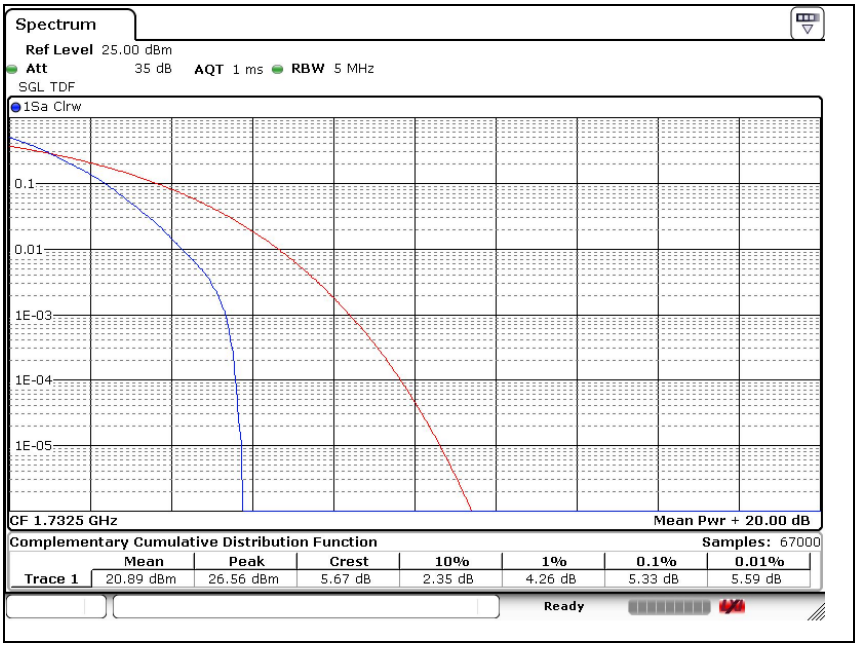

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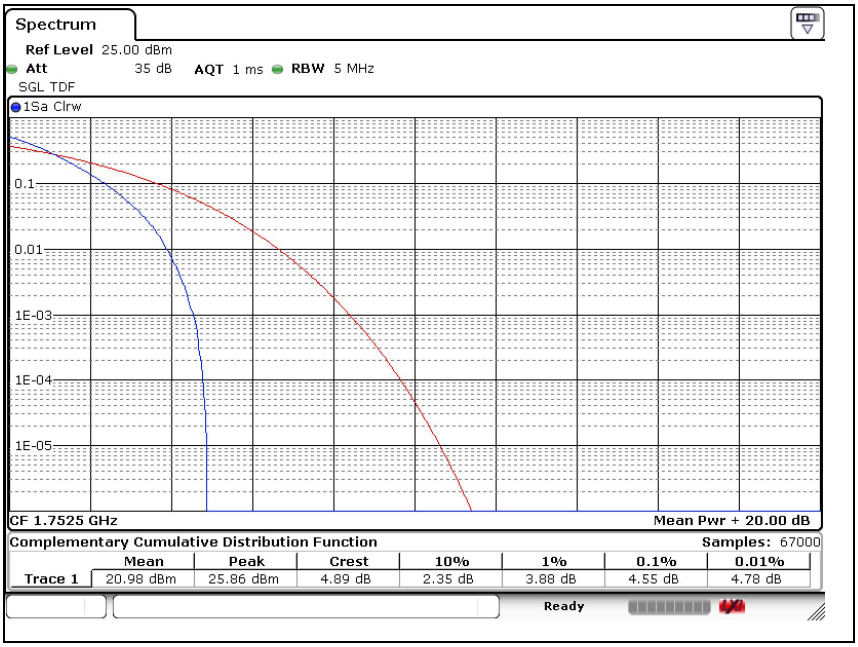
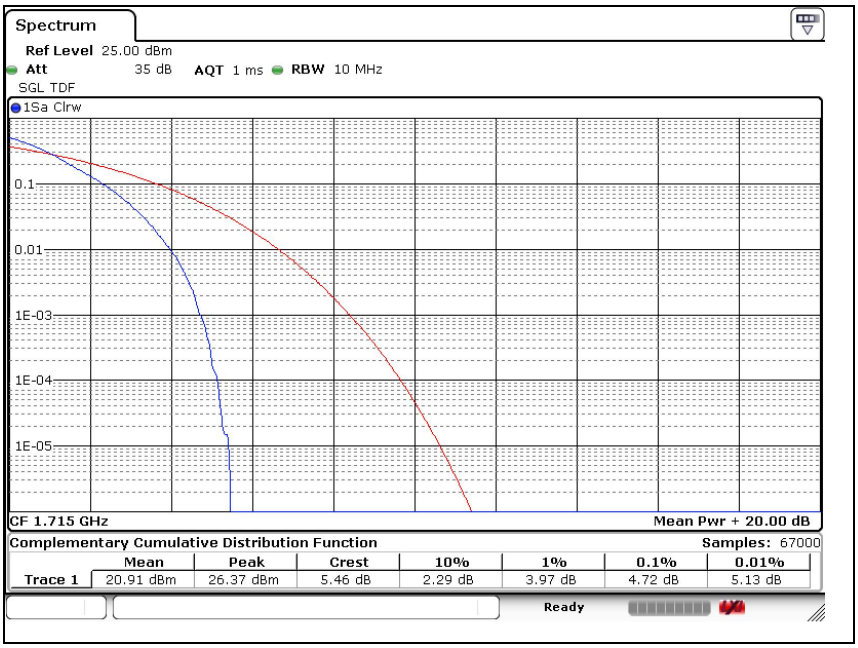


LTE band 4 (10 ㎒ - QPSK)

Low Channel



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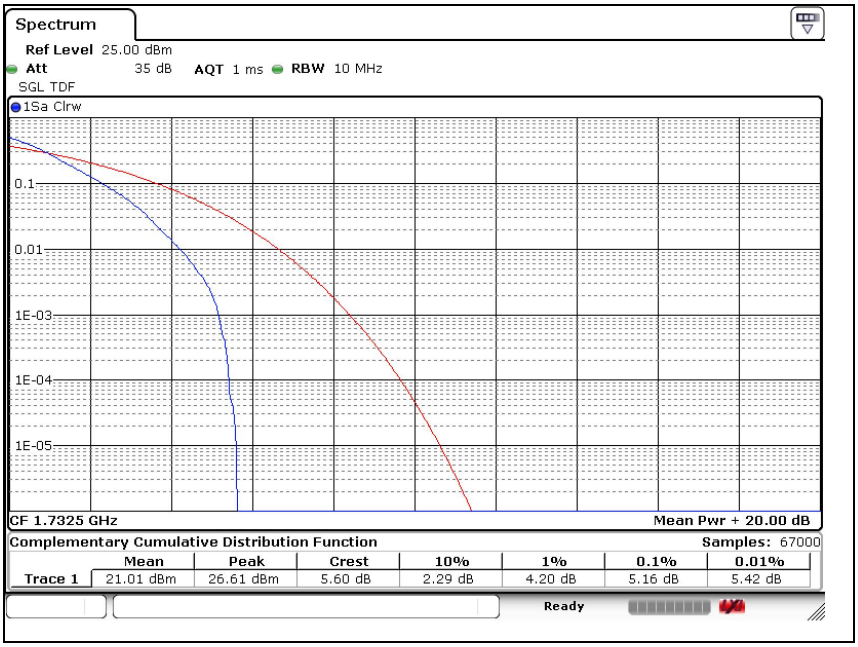

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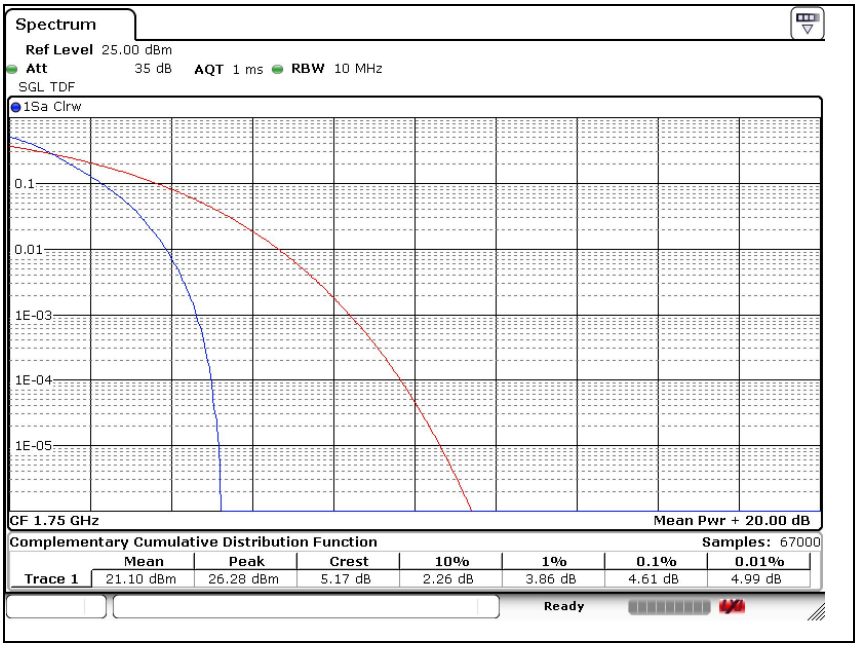
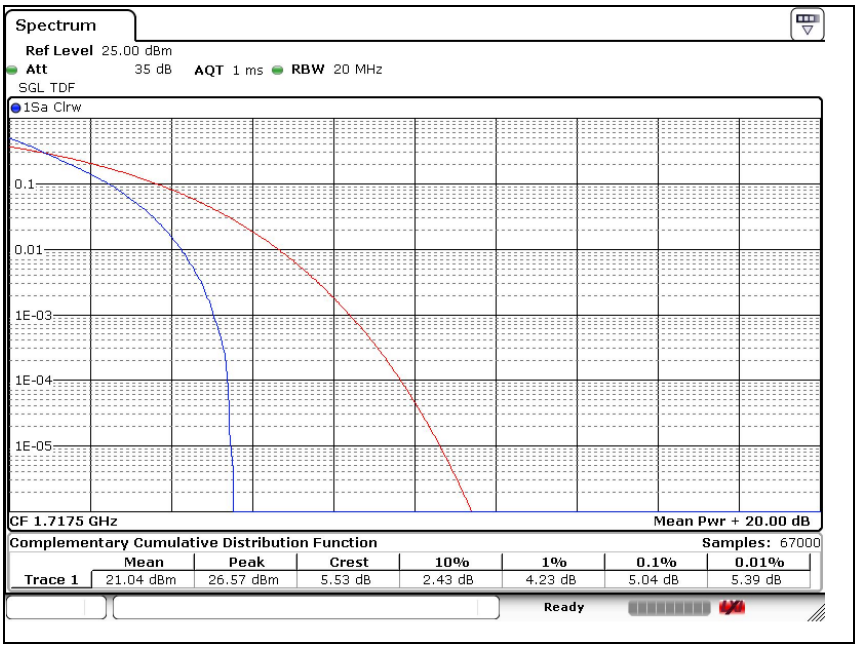


LTE band 4 (15 ㎒ - QPSK)

Low Channel



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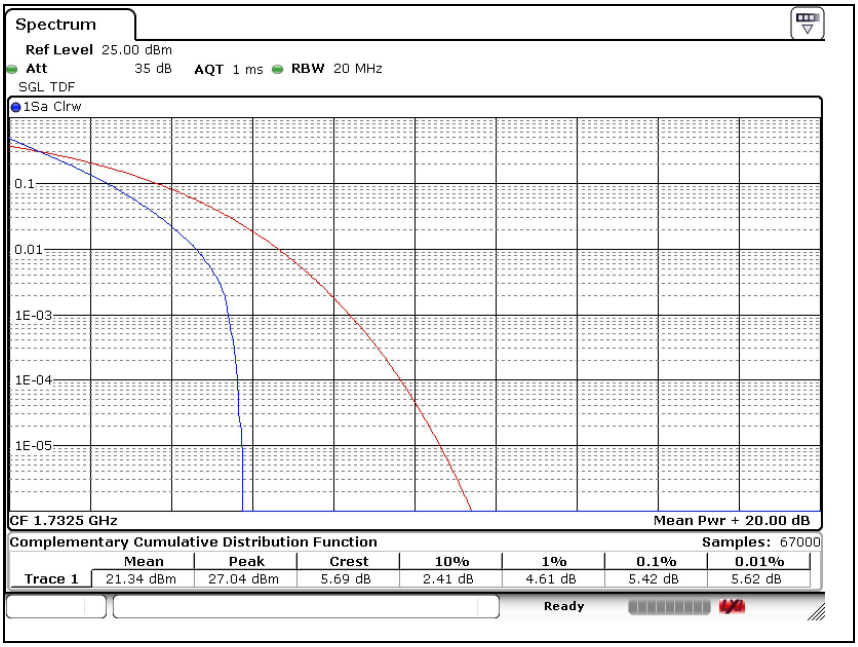

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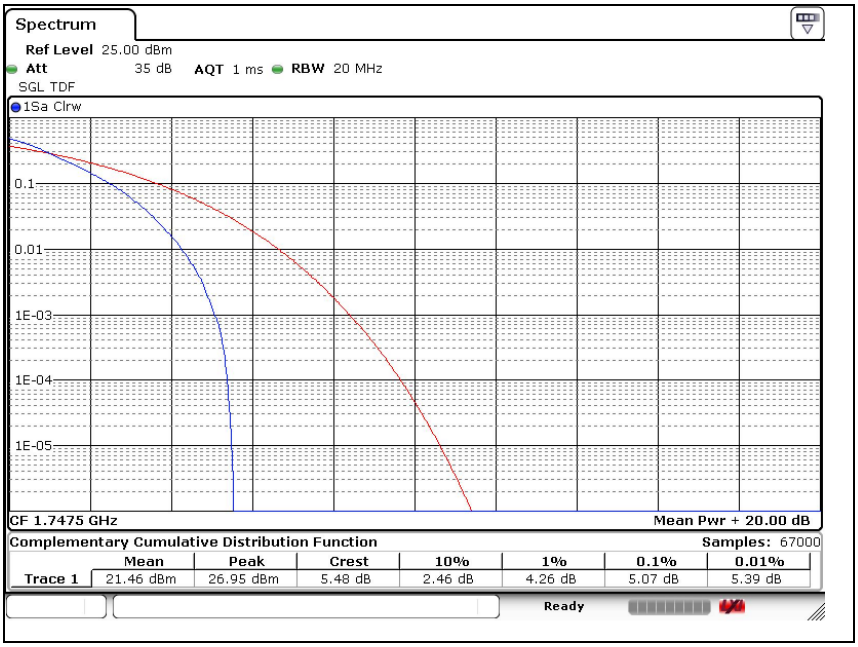
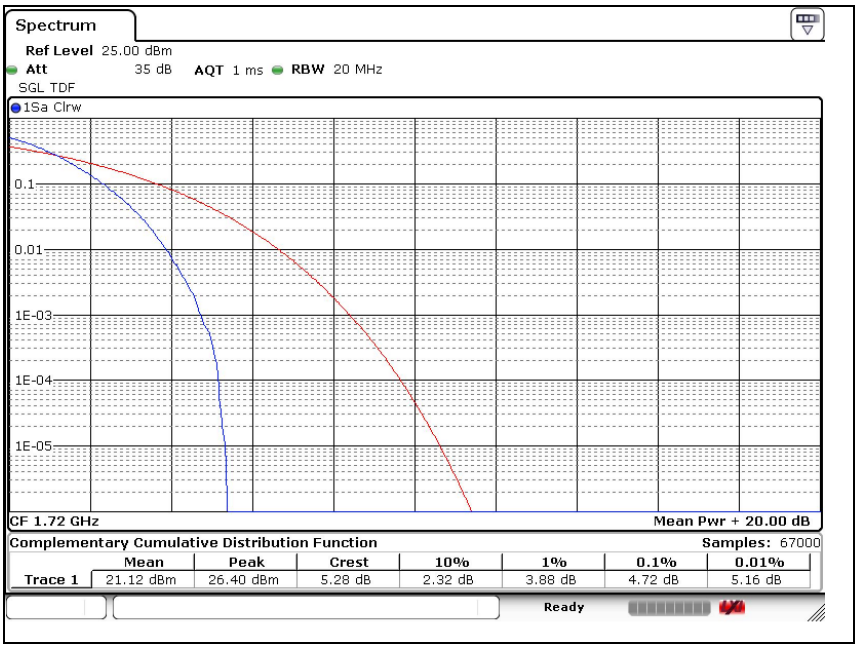


LTE band 4 (20 ㎒ - QPSK)

Low Channel



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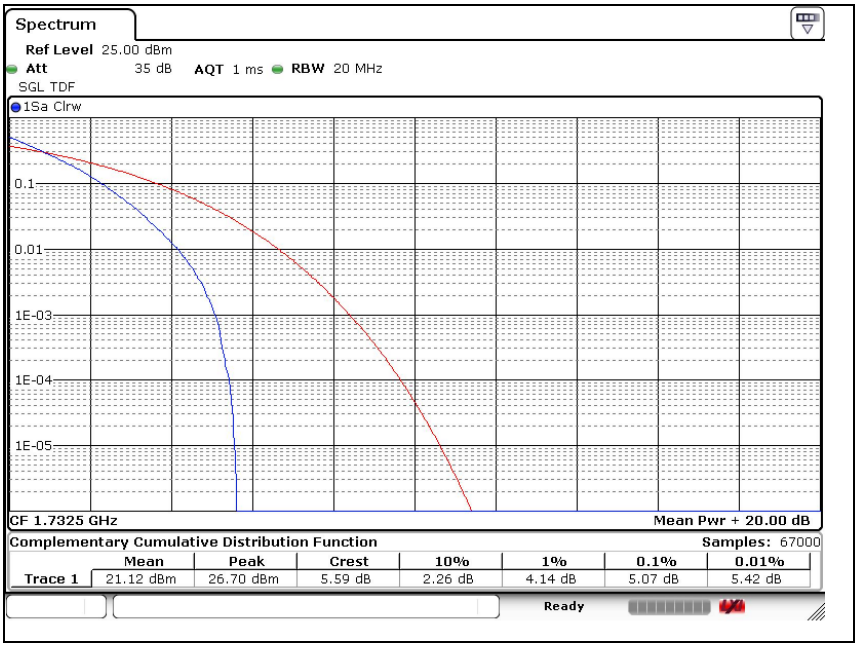

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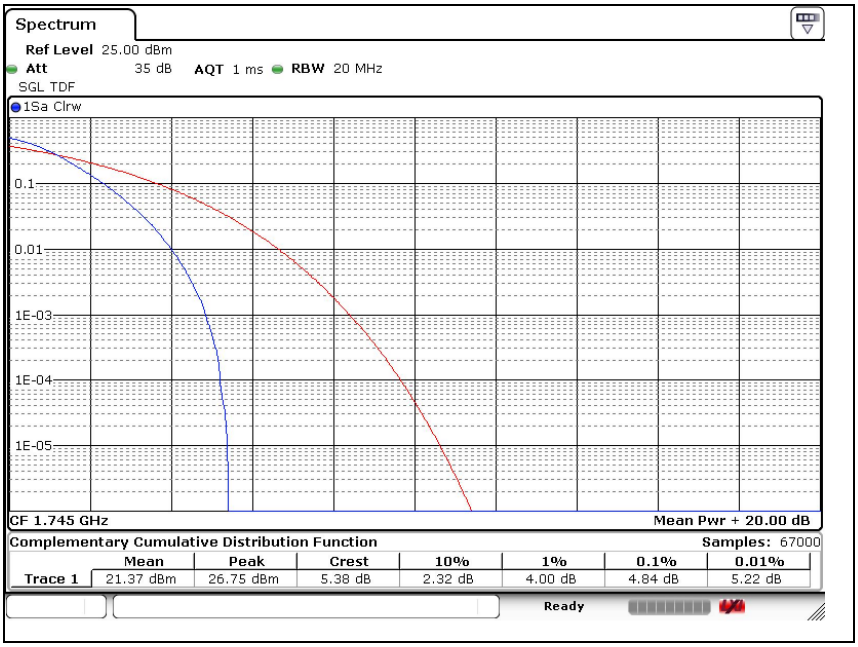
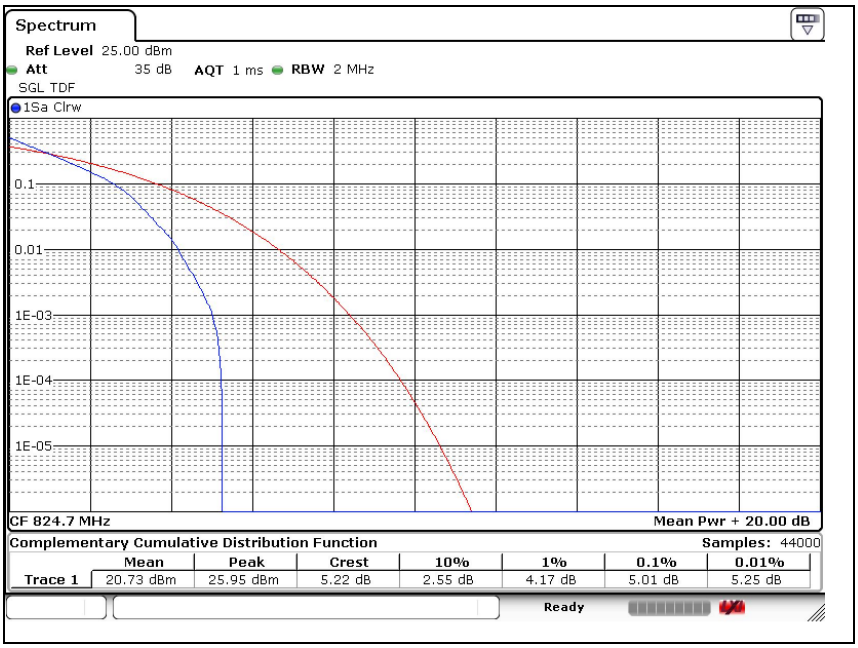


LTE band 5 (1.4 ㎒ - QPSK)

Low Channel



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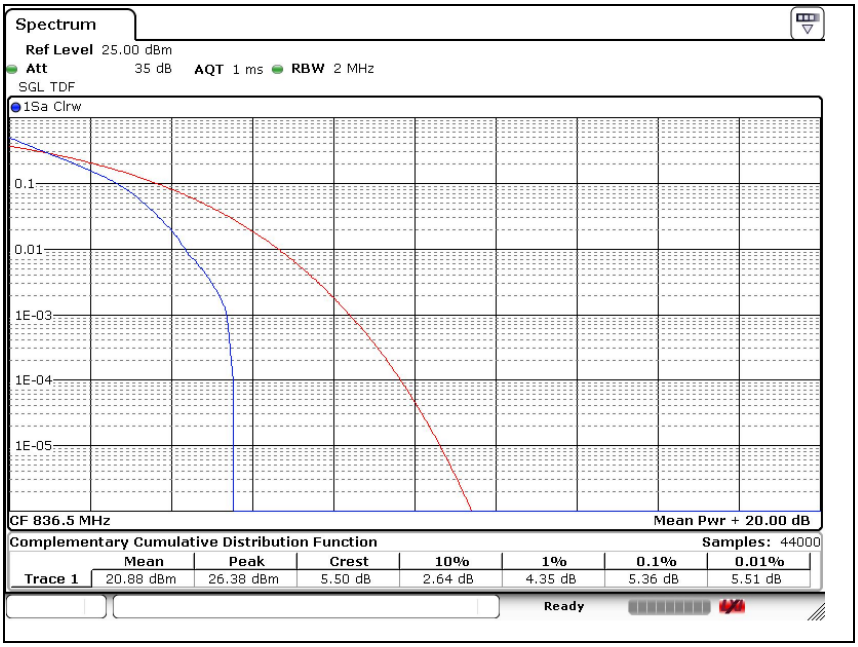

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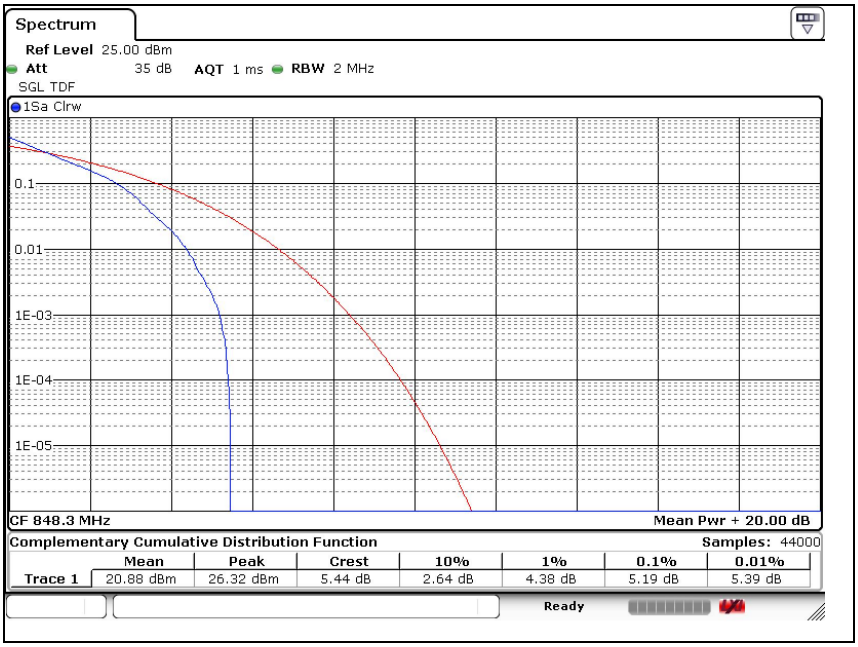
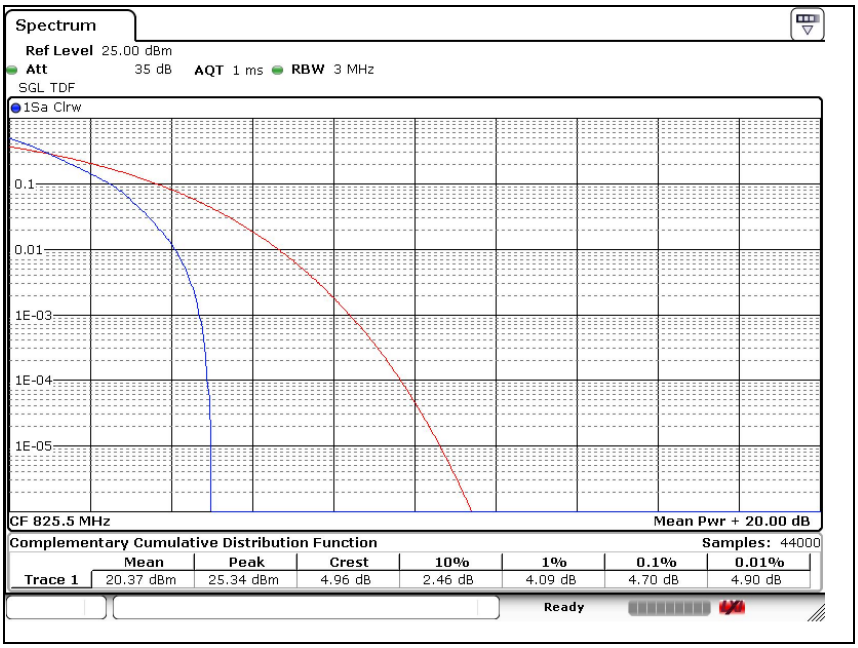
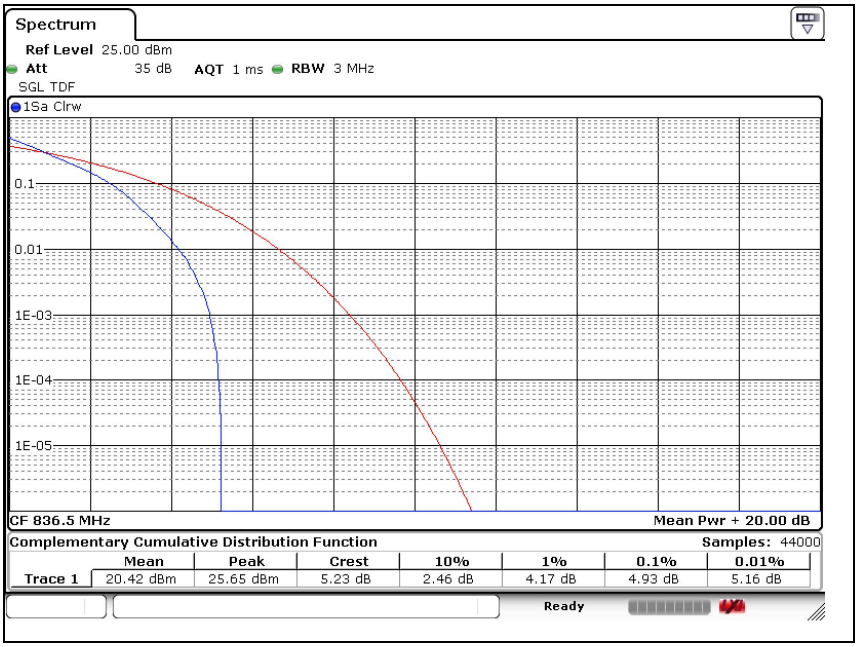


LTE band 5 (3 ㎒ - QPSK)

Low Channel



Middle Channel



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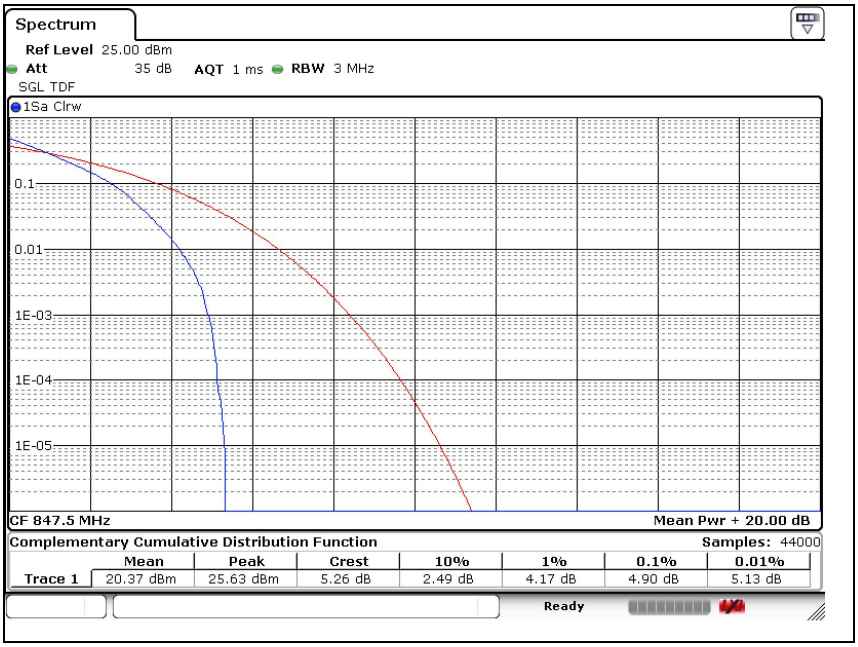
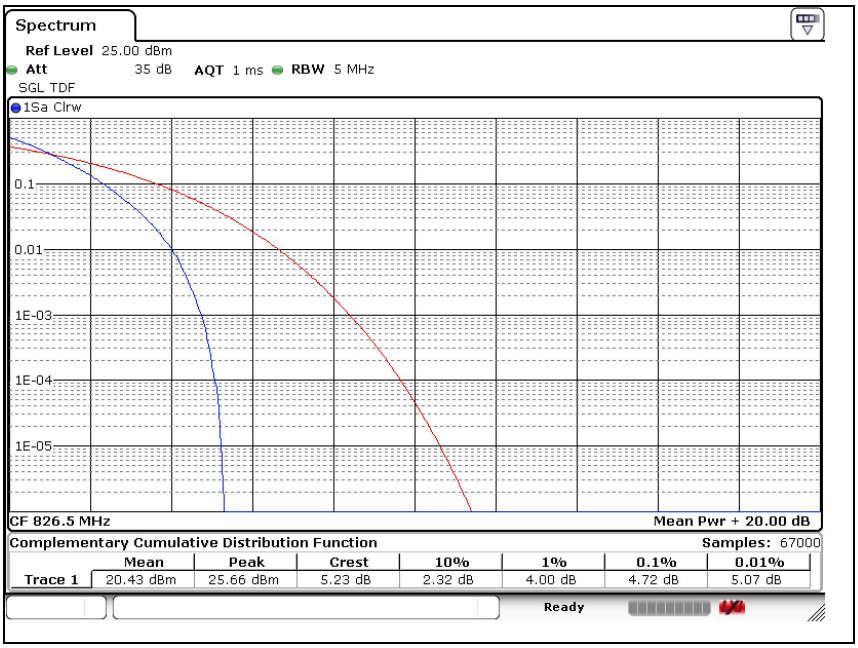
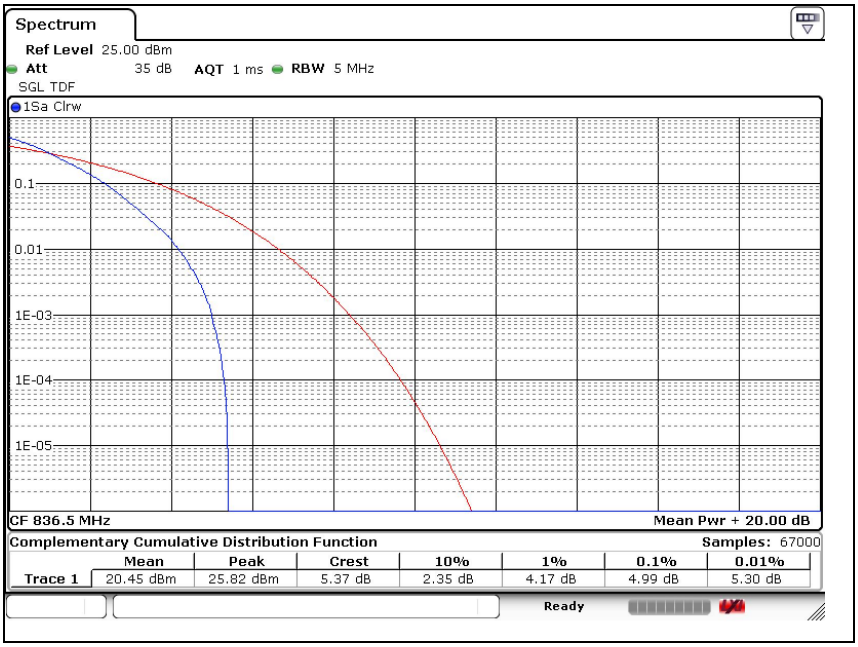


LTE band 5 (5 ㎒ - QPSK)

Low Channel



Middle Channel



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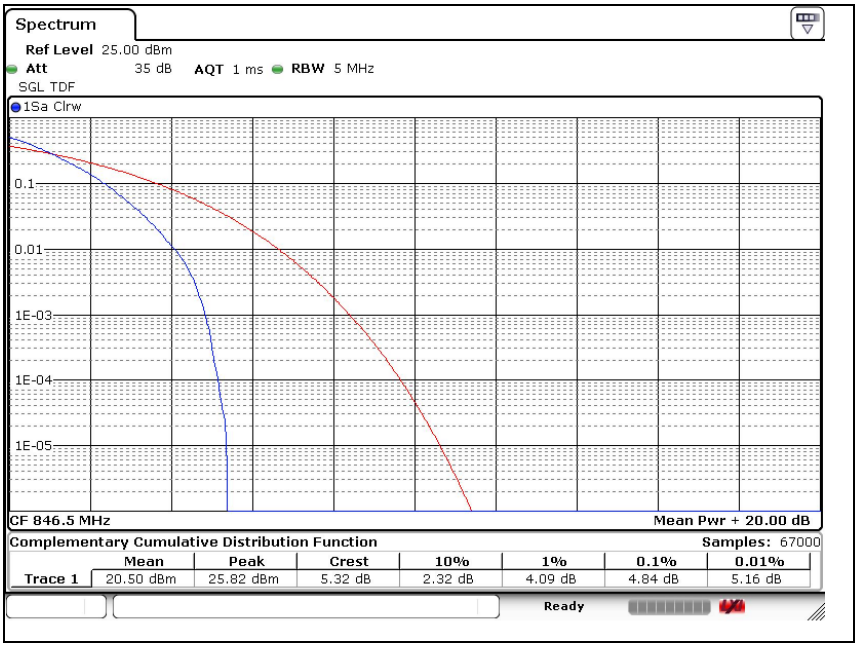
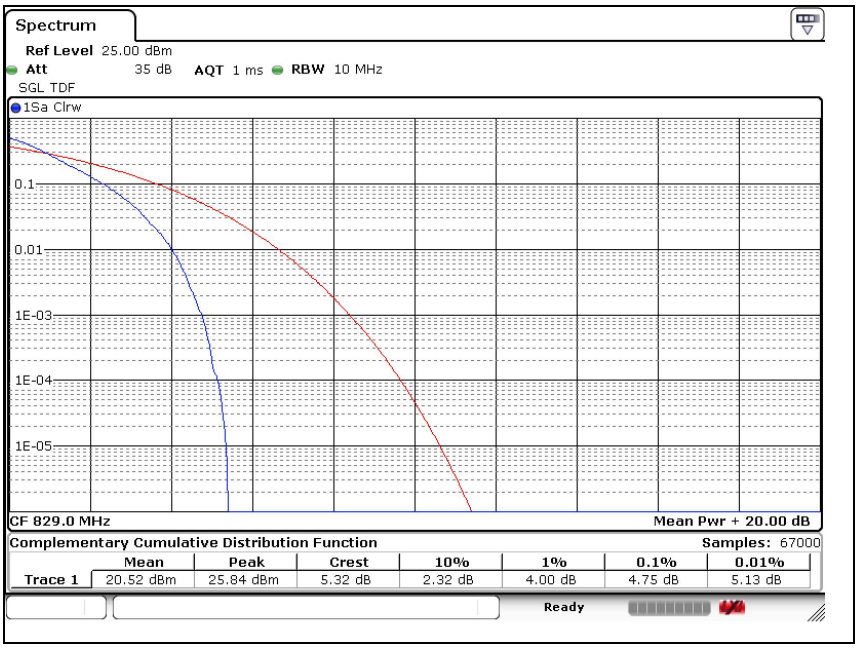
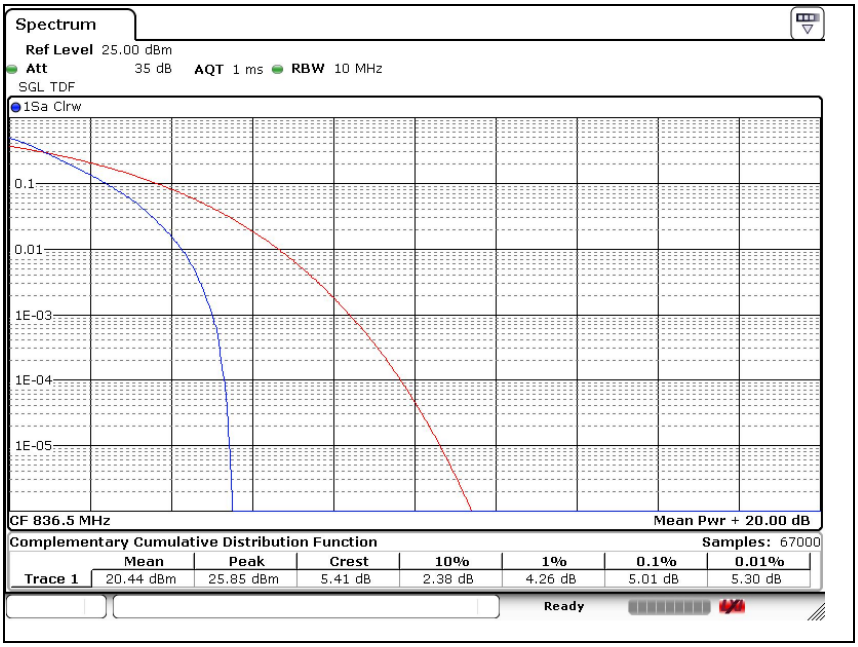


LTE band 5 (10 ㎒ - QPSK)

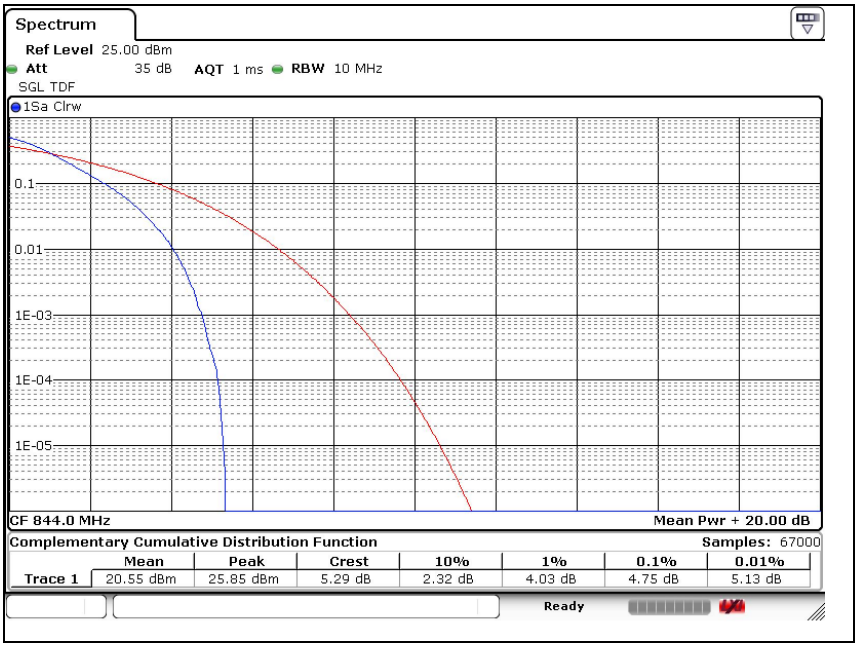
Low Channel



Middle Channel



High Channel



6. Spurious Emissions at Antenna Terminal

6.1. Limit

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) ㏈.

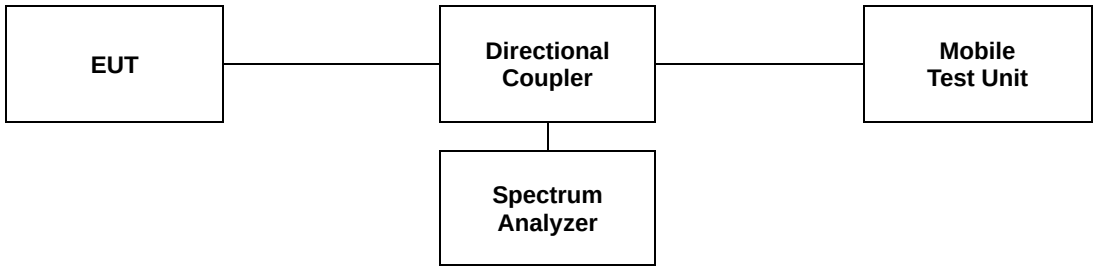
- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) ㏈.

- §27.53(h)(1), for operations in the 1 695-1 710 ㎒, 1 710-1 755 ㎒, 1 755-1 780 ㎒, 1 915-1 920 ㎒, 1 995-2 000 ㎒, 2 000-2 020 ㎒, 2 110-2 155 ㎒, 2 155-2 180 ㎒, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) ㏈.

6.2. Test Procedure

The test follows section 6.1 of FCC KDB Publication 971168 D01 v03.

1. Start frequency was set to 30 ㎒ and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = Peak.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 30 ㎒ to 20 ㎓, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as correction factor.



Notes;

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and frequencies greater than 1 ㎓. 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 employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 ㏈ below the transmitter power.

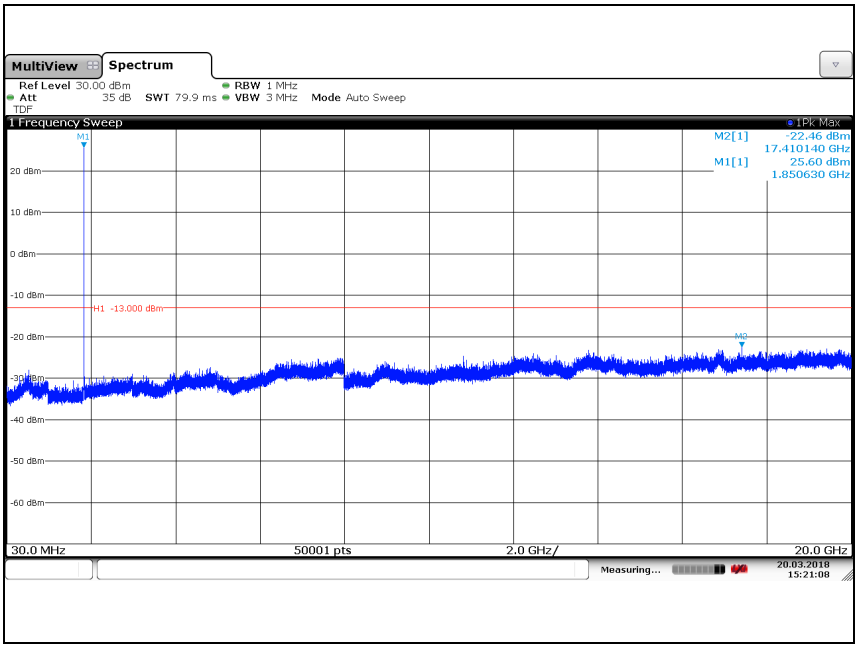
6.3. Test Results

Ambient temperature	:	(23 ± 1) ℃
Relative humidity	:	47 % R.H.

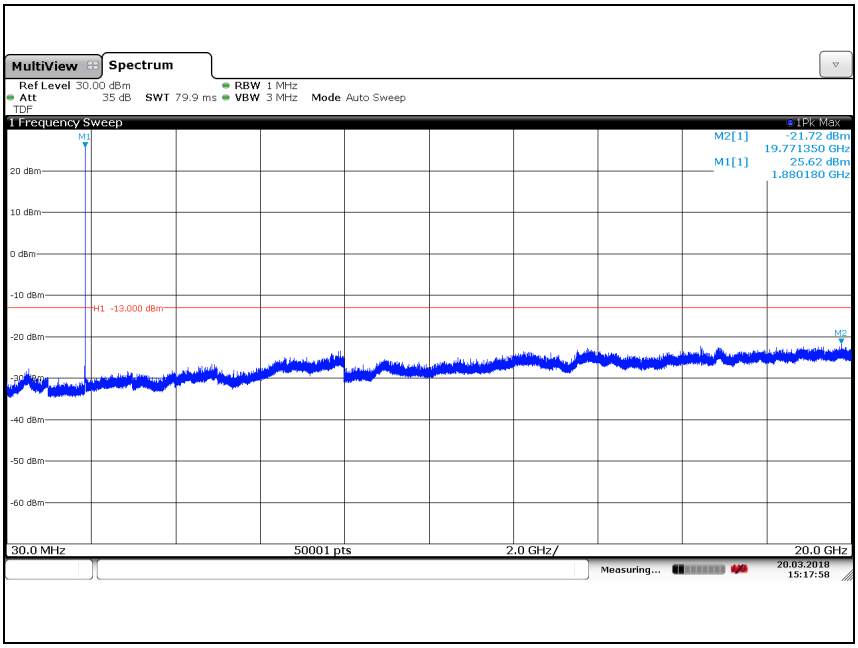
Please refer to the following plots.

LTE band 2 (1.4 ㎒ - QPSK)

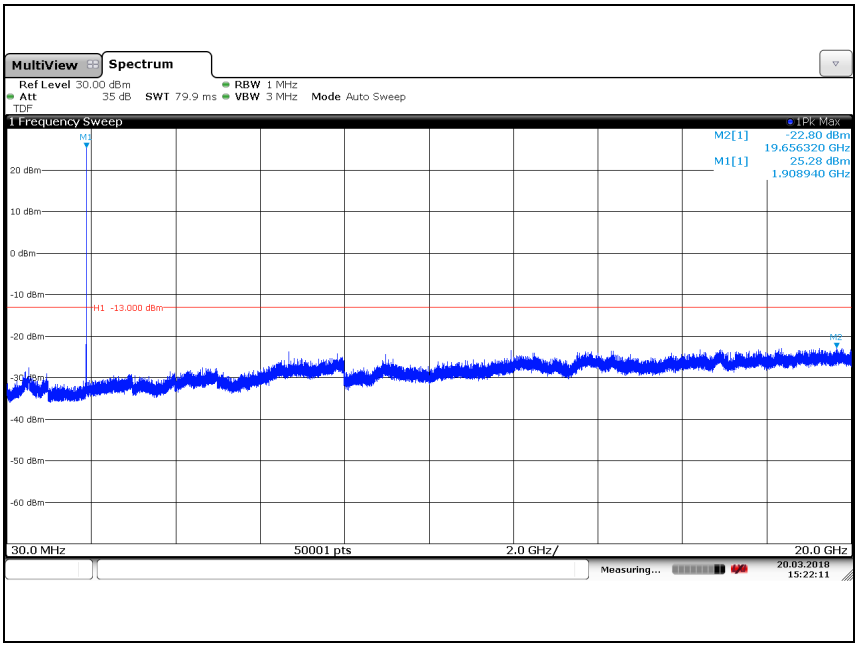
Low Channel



Middle Channel

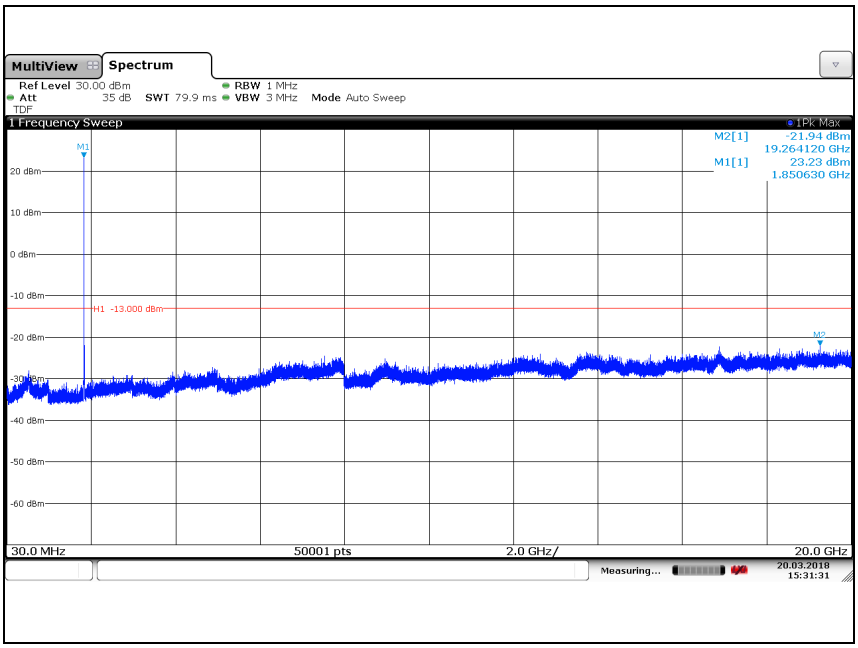


High Channel

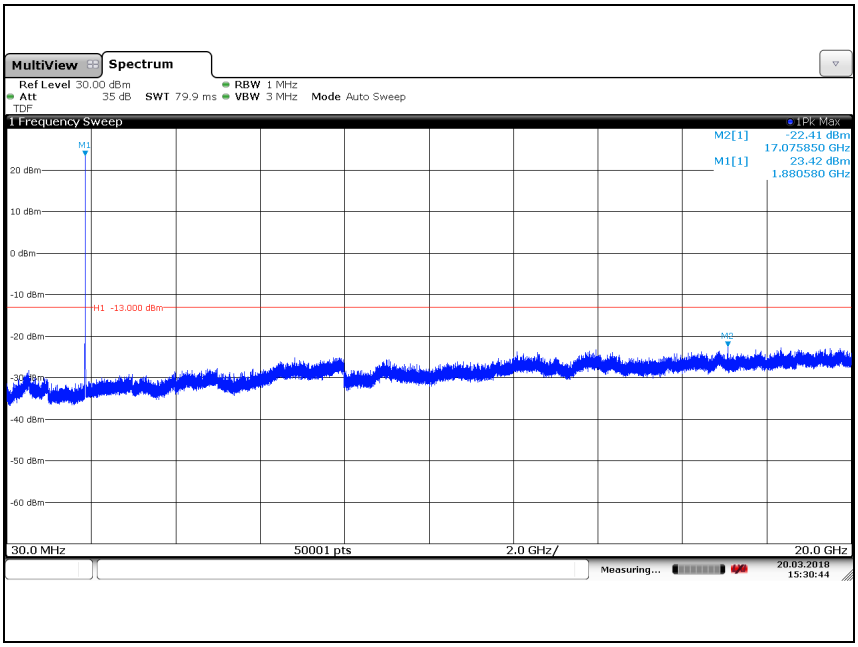


LTE band 2 (3 ㎒ - QPSK)

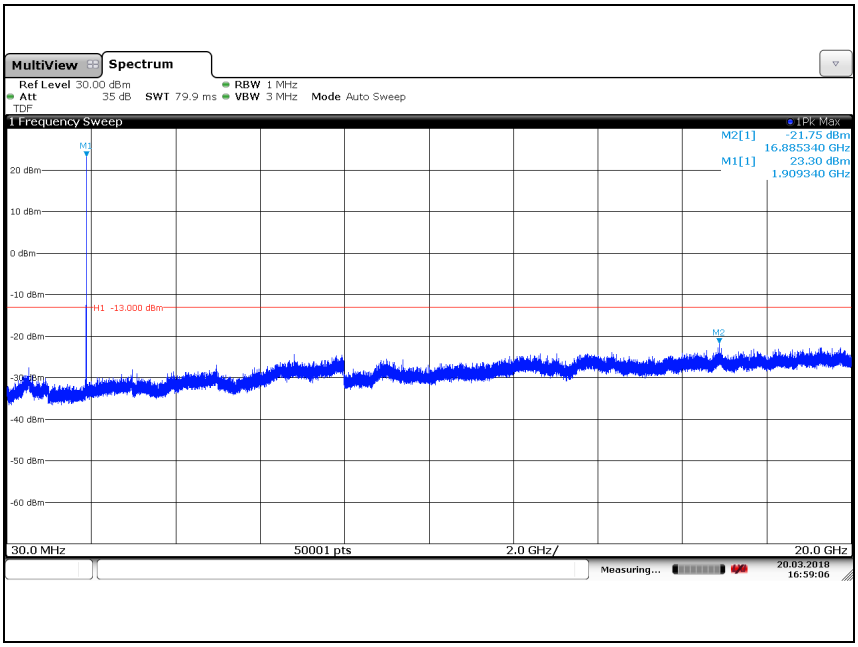
Low Channel



Middle Channel

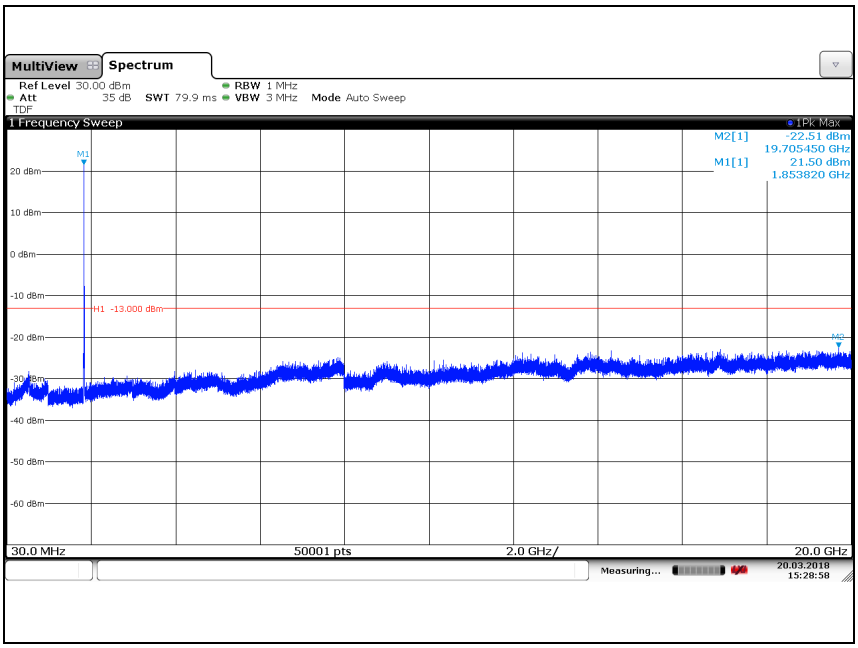


High Channel

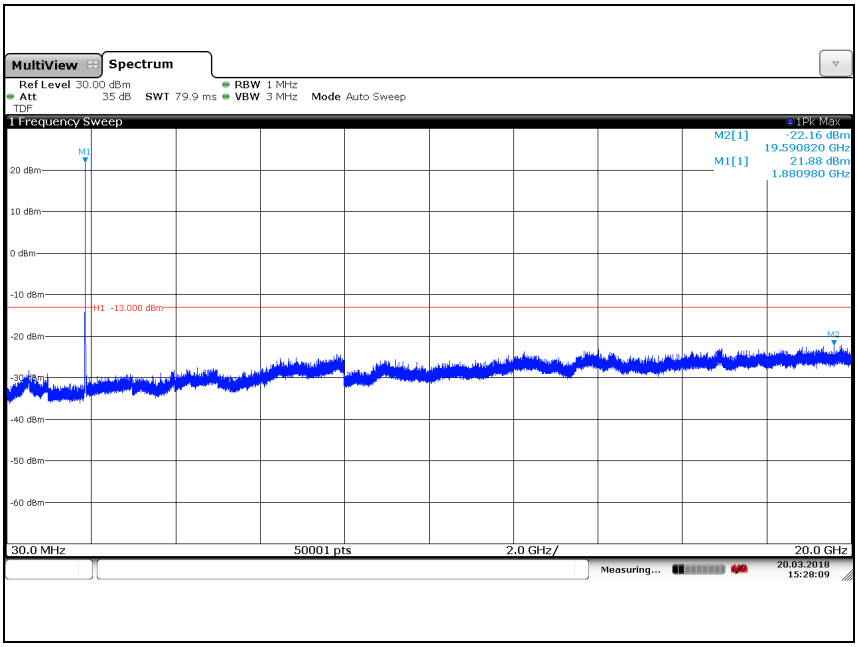


LTE band 2 (5 ㎒ - QPSK)

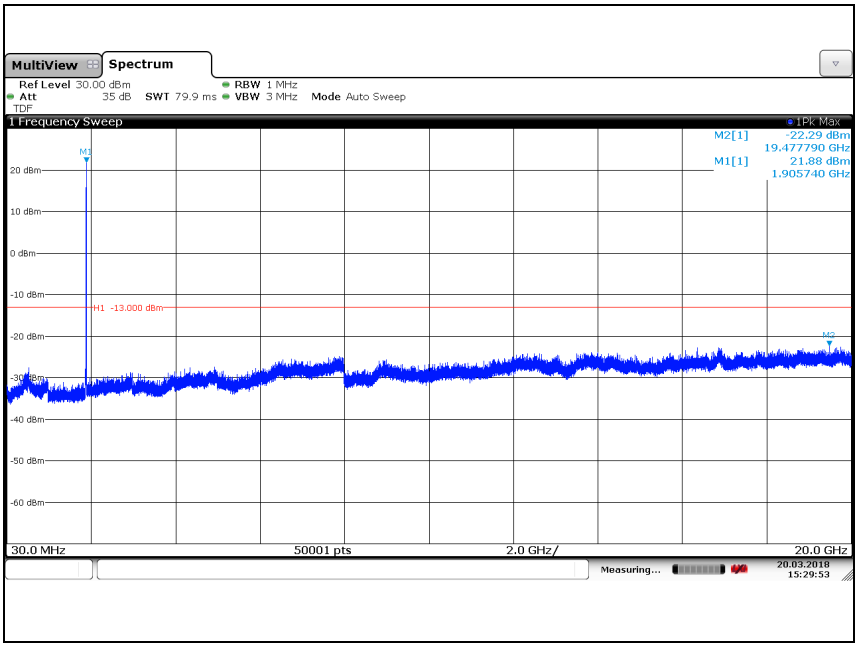
Low Channel



Middle Channel

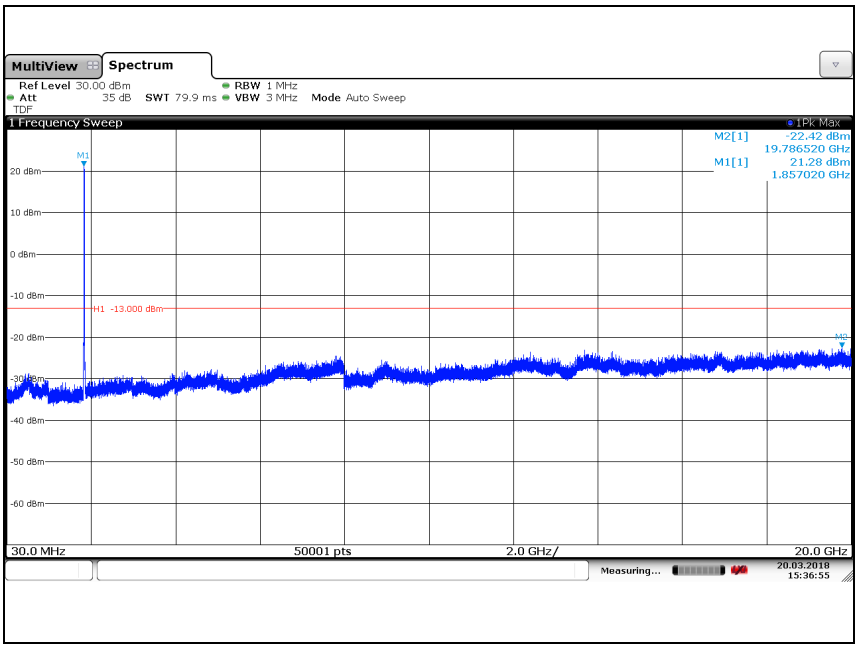


High Channel

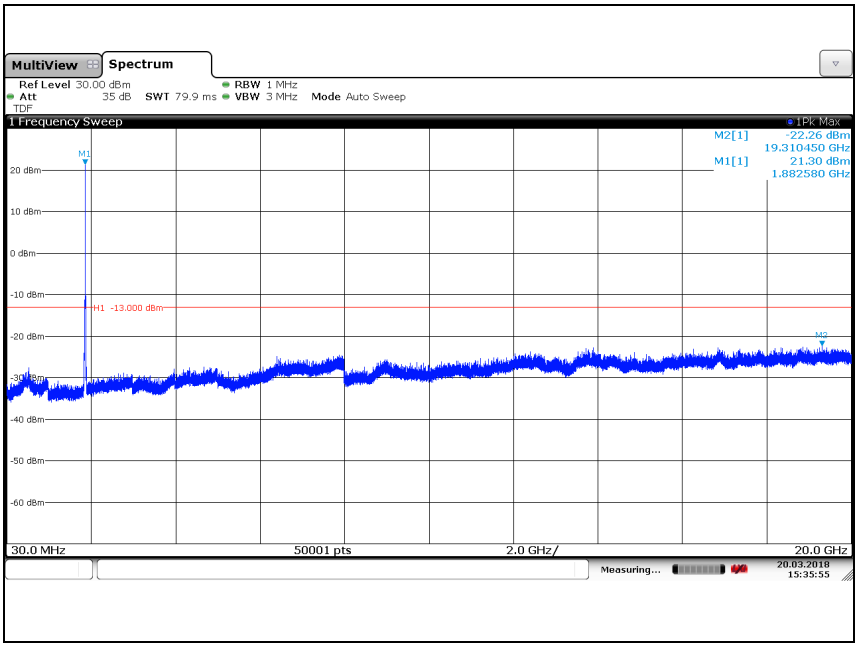


LTE band 2 (10 ㎒ - QPSK)

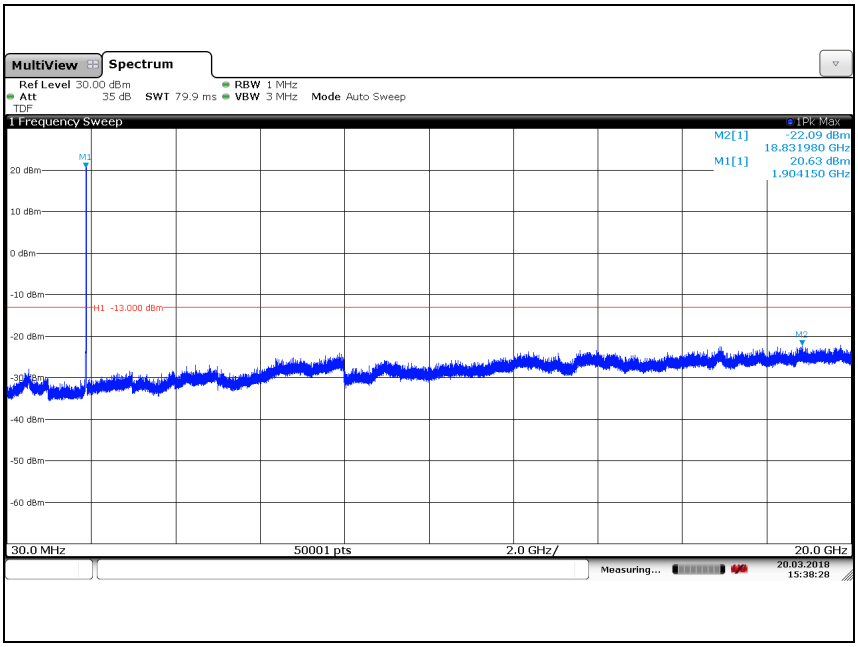
Low Channel



Middle Channel

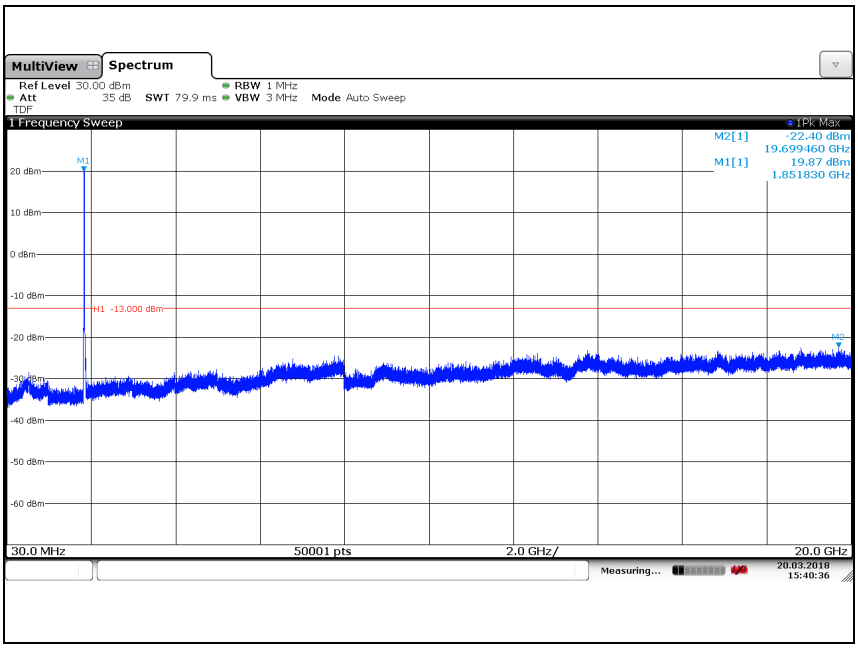


High Channel

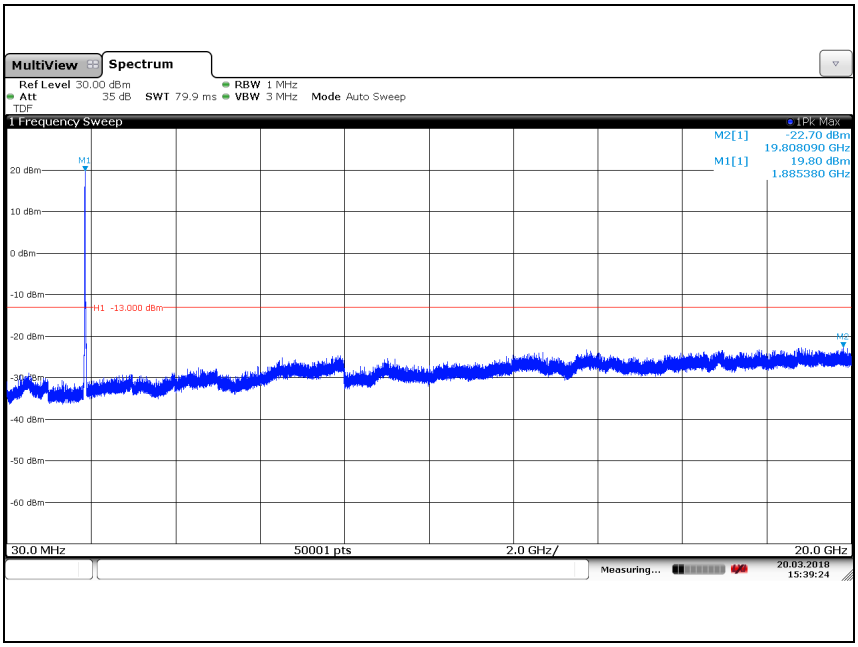


LTE band 2 (15 ㎒ - QPSK)

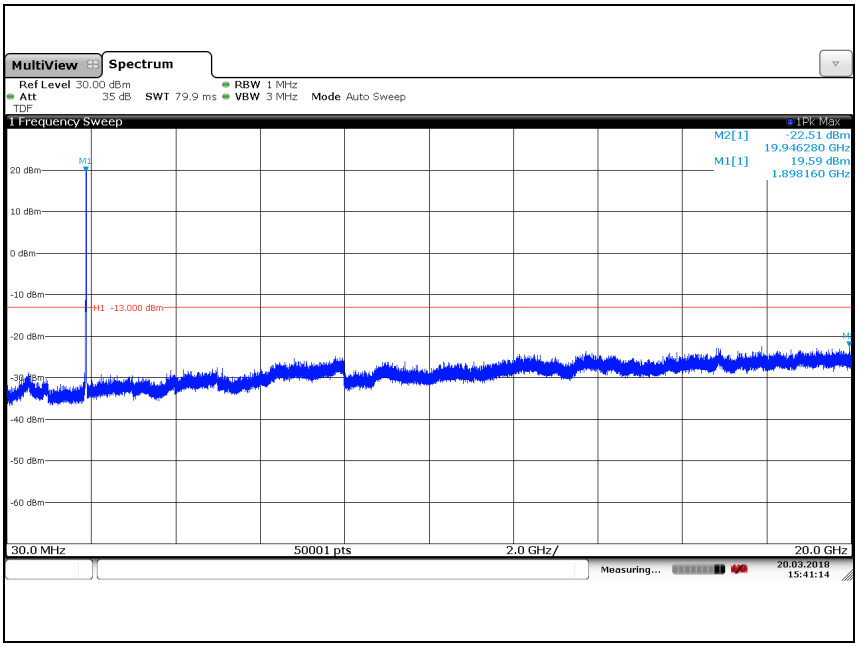
Low Channel



Middle Channel

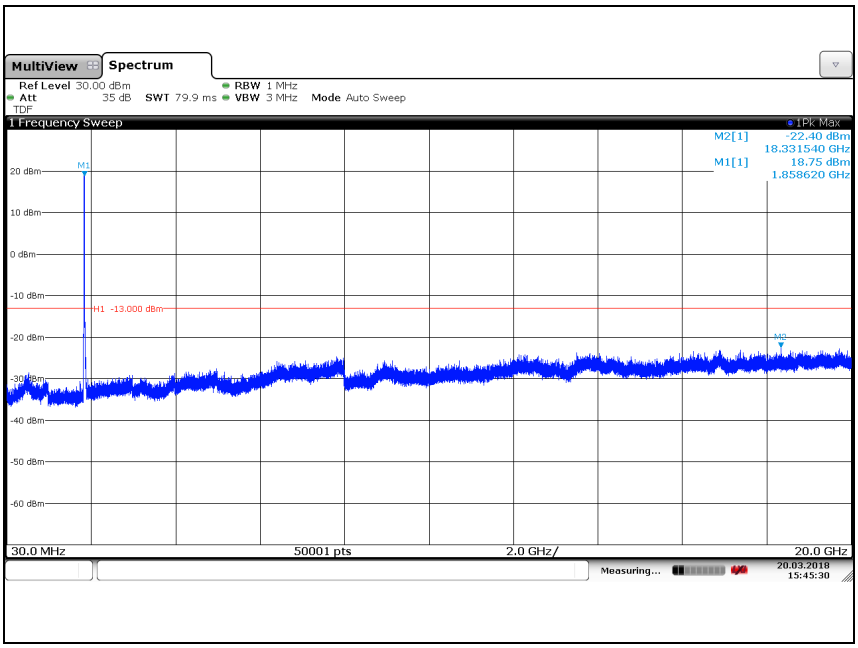


High Channel

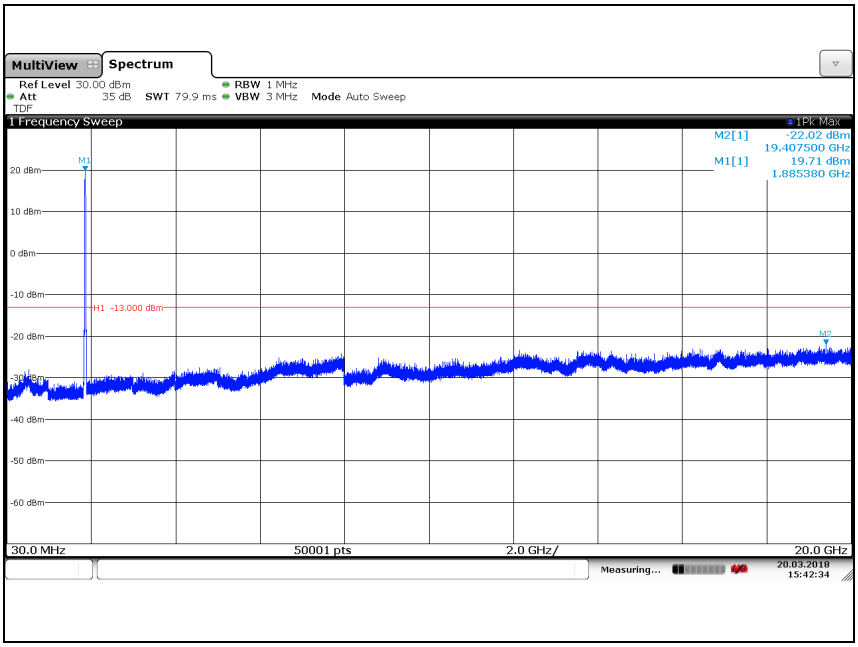


LTE band 2 (20 ㎒ - QPSK)

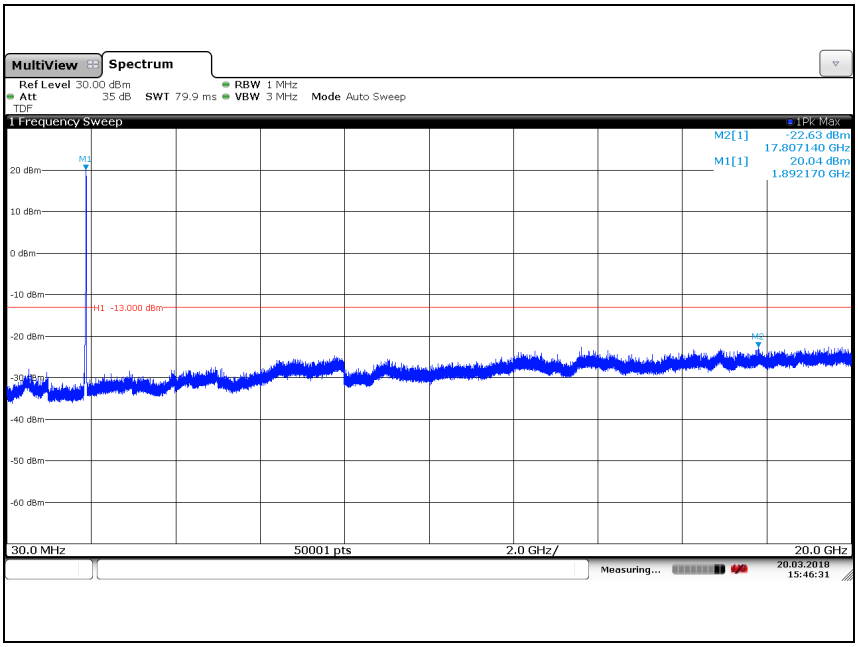
Low Channel



Middle Channel

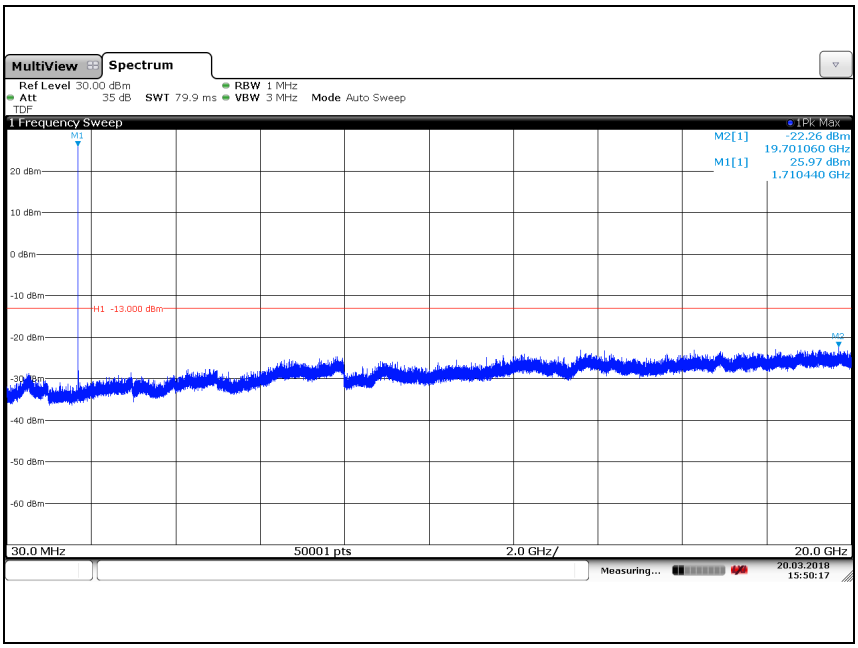


High Channel

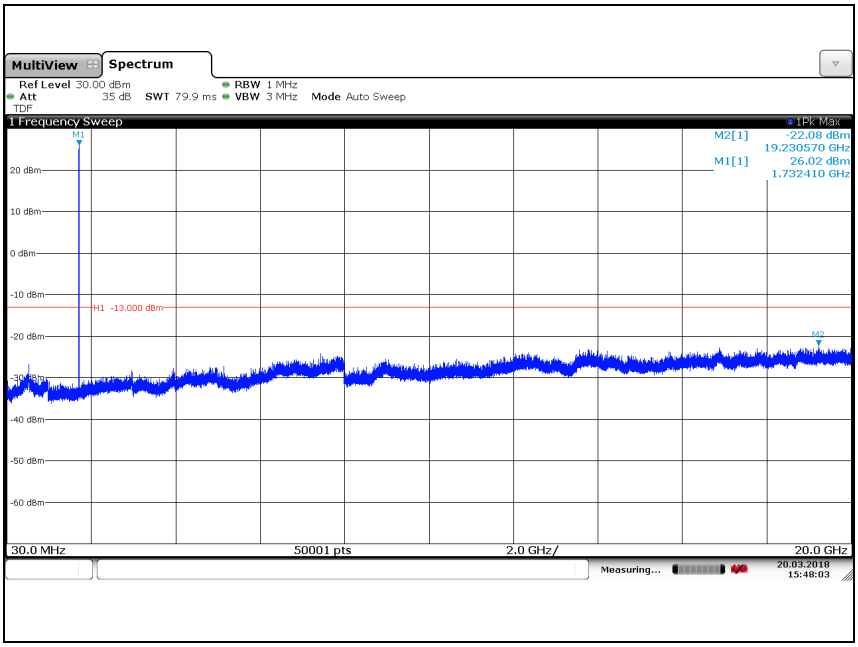


LTE band 4 (1.4 ㎒ - QPSK)

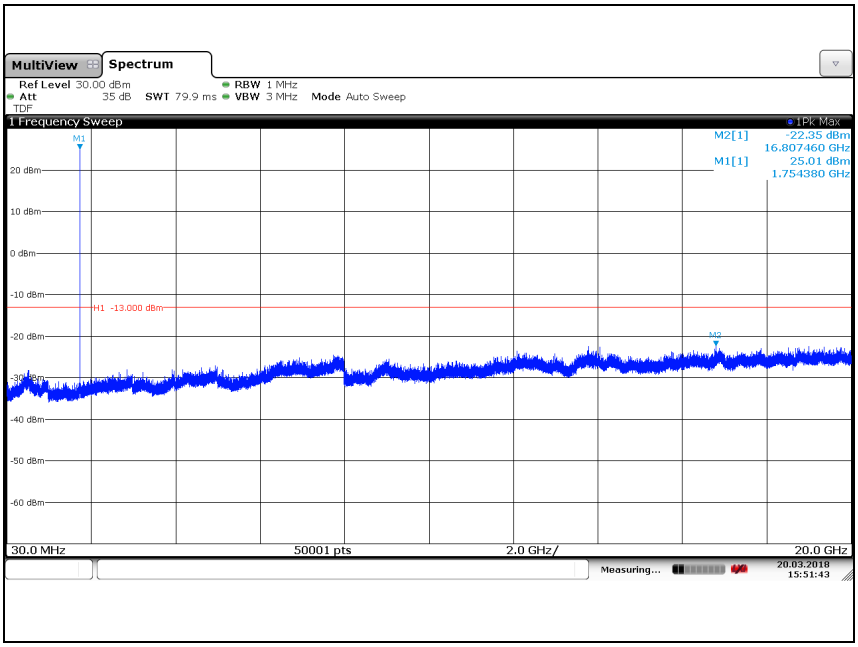
Low Channel



Middle Channel

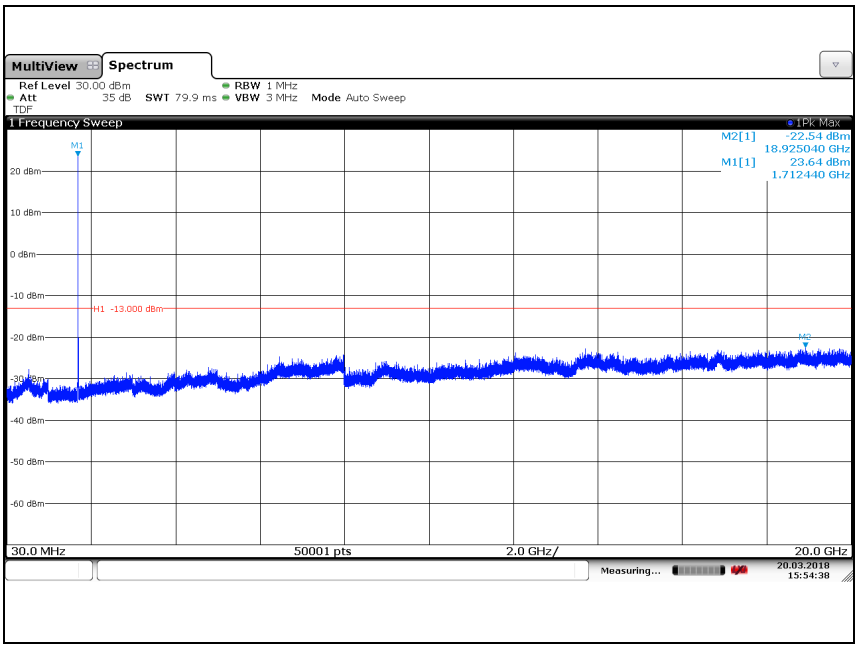


High Channel

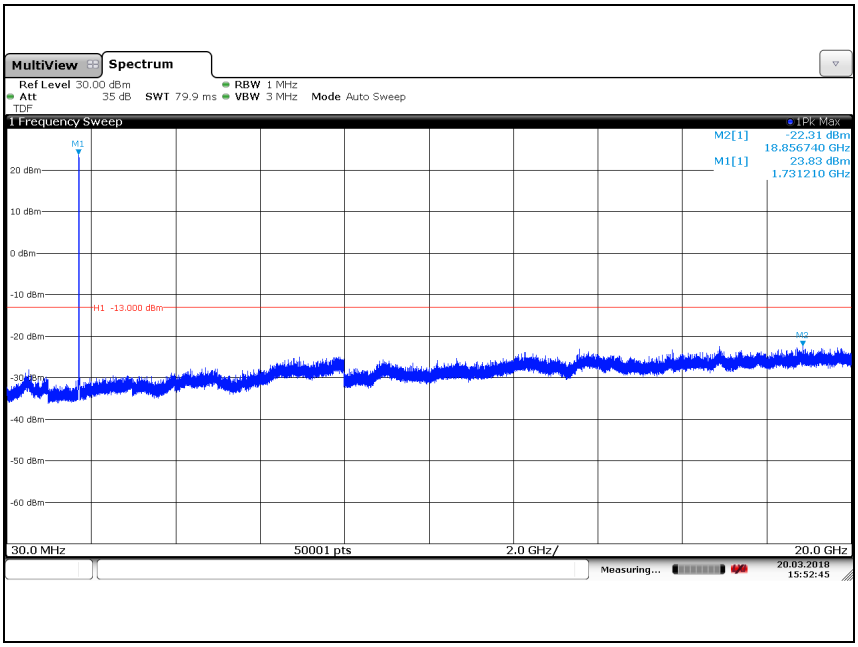


LTE band 4 (3 ㎒ - QPSK)

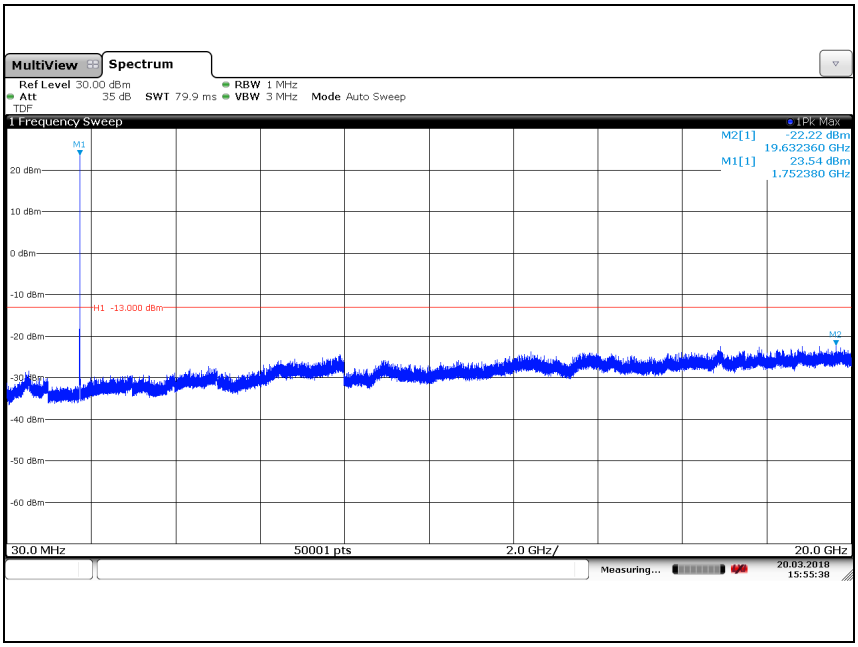
Low Channel



Middle Channel

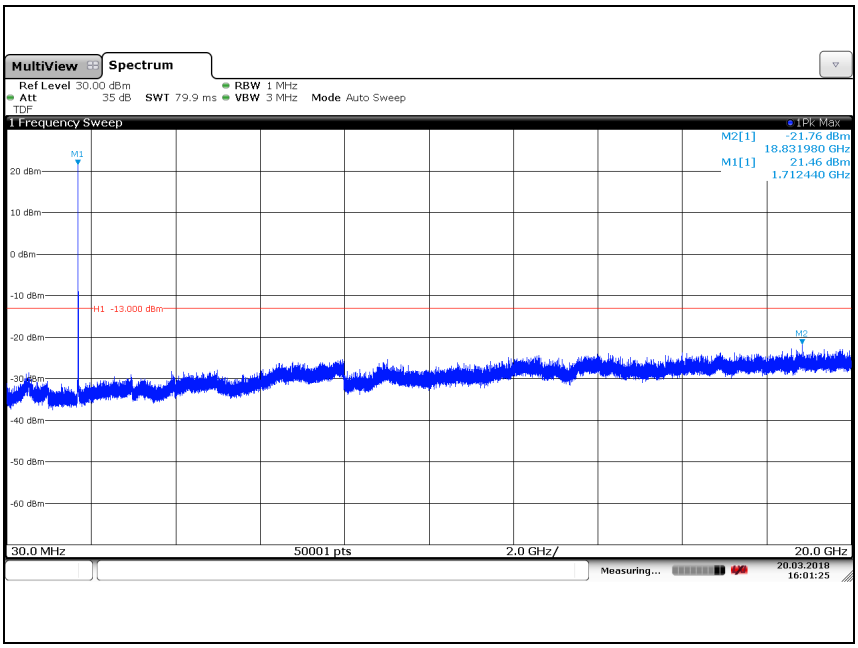


High Channel

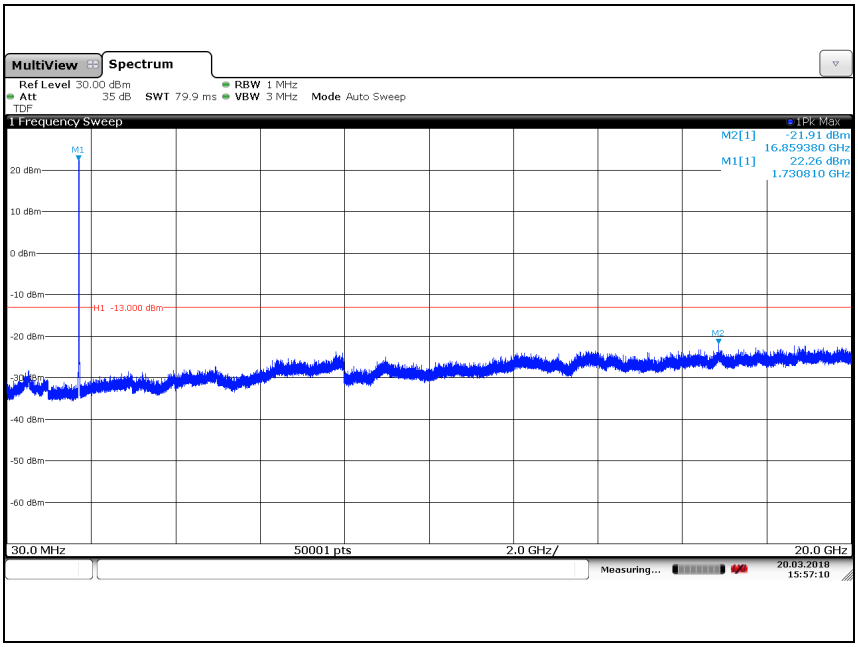


LTE band 4 (5 ㎒ - QPSK)

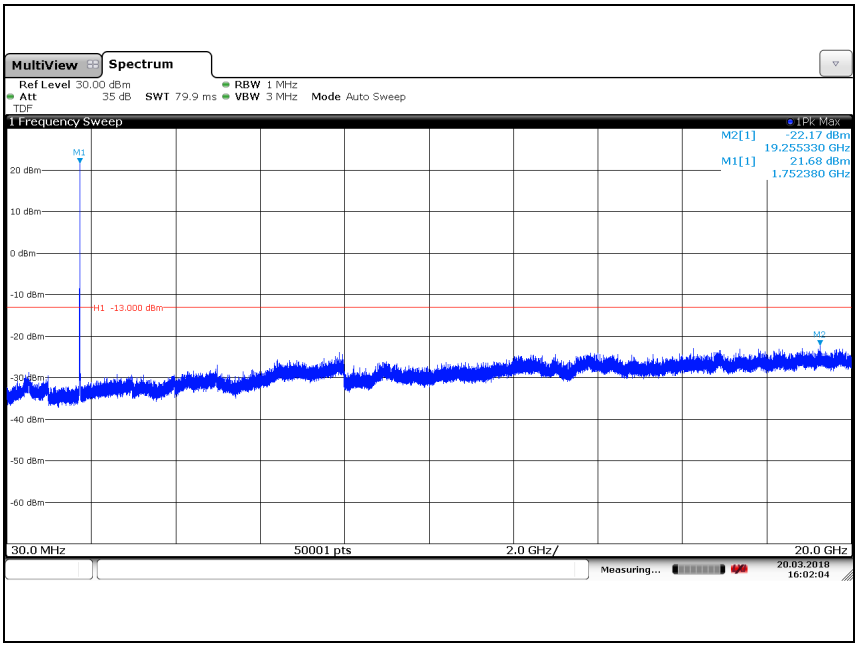
Low Channel



Middle Channel

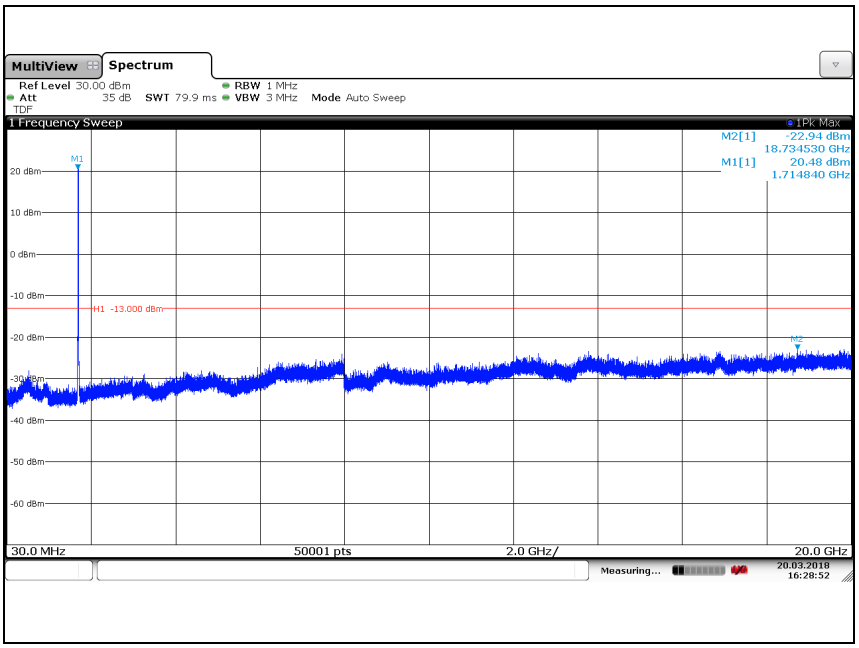


High Channel

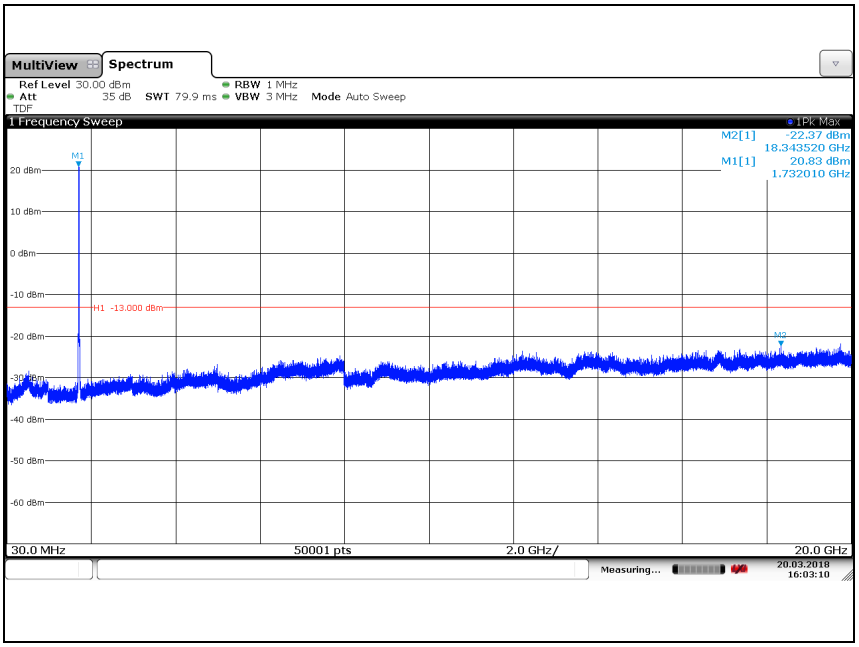


LTE band 4 (10 ㎒ - QPSK)

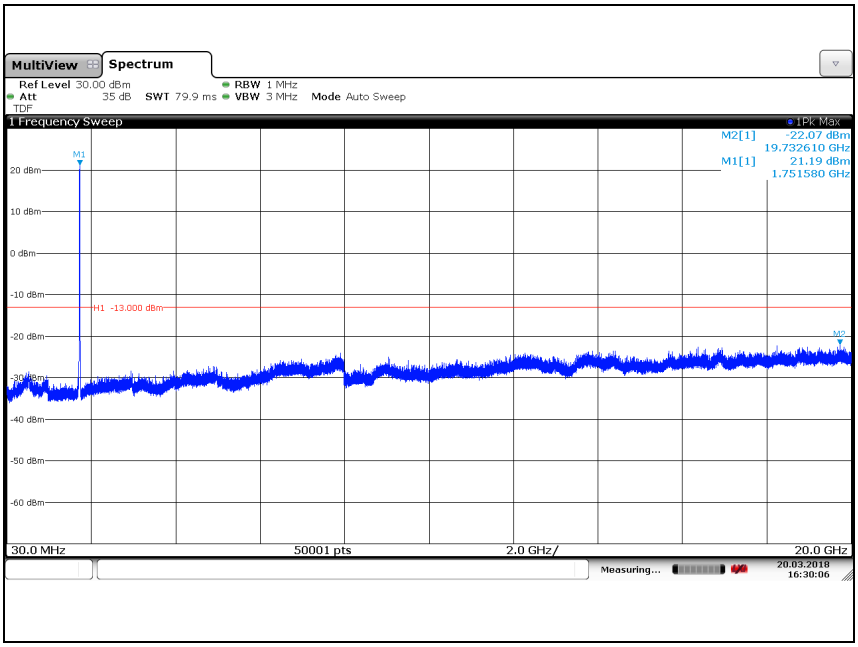
Low Channel



Middle Channel

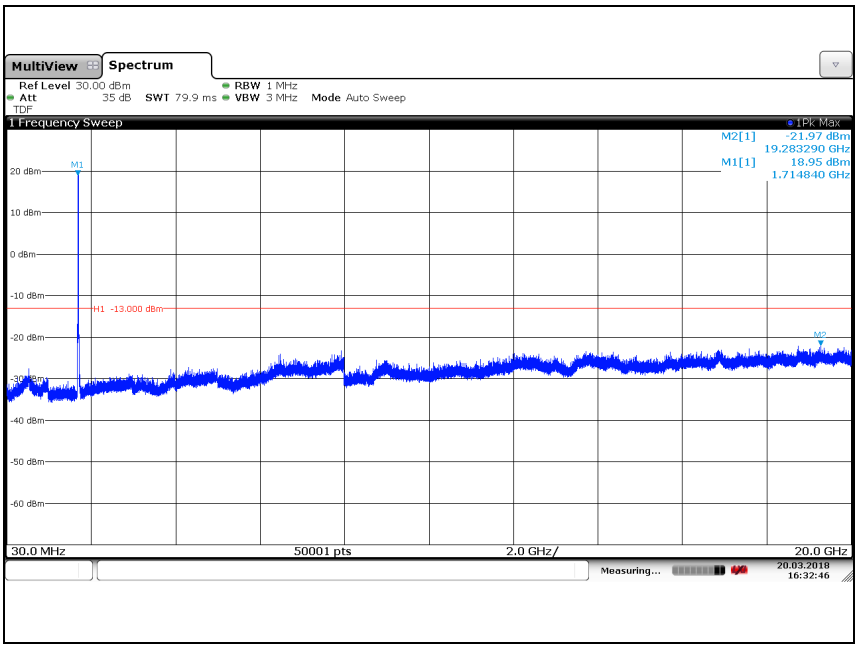


High Channel

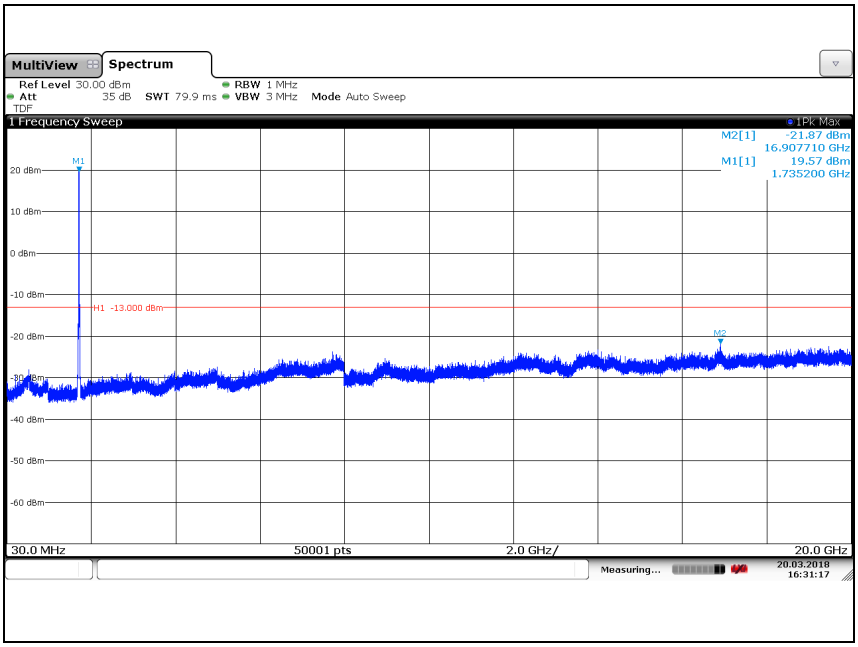


LTE band 4 (15 ㎒ - QPSK)

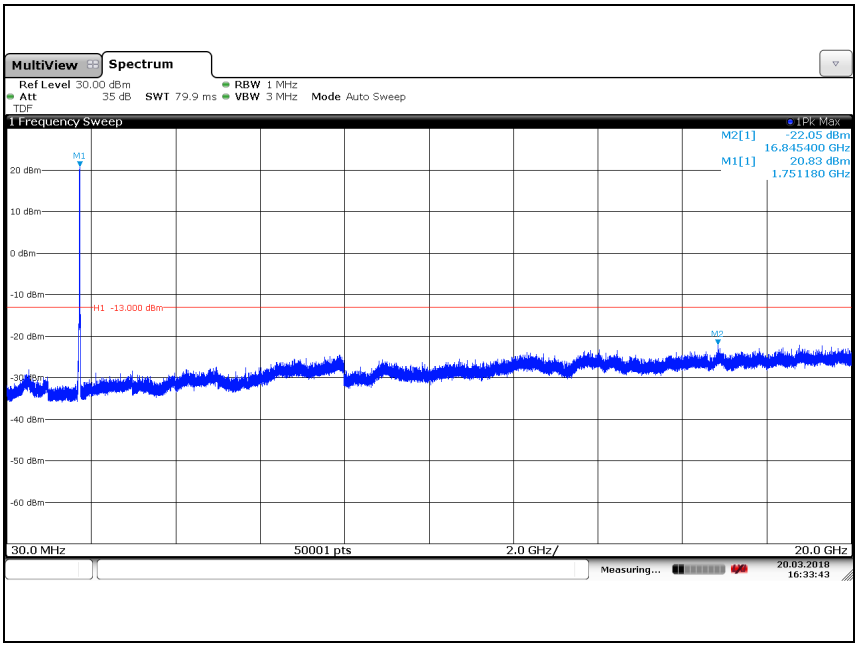
Low Channel



Middle Channel

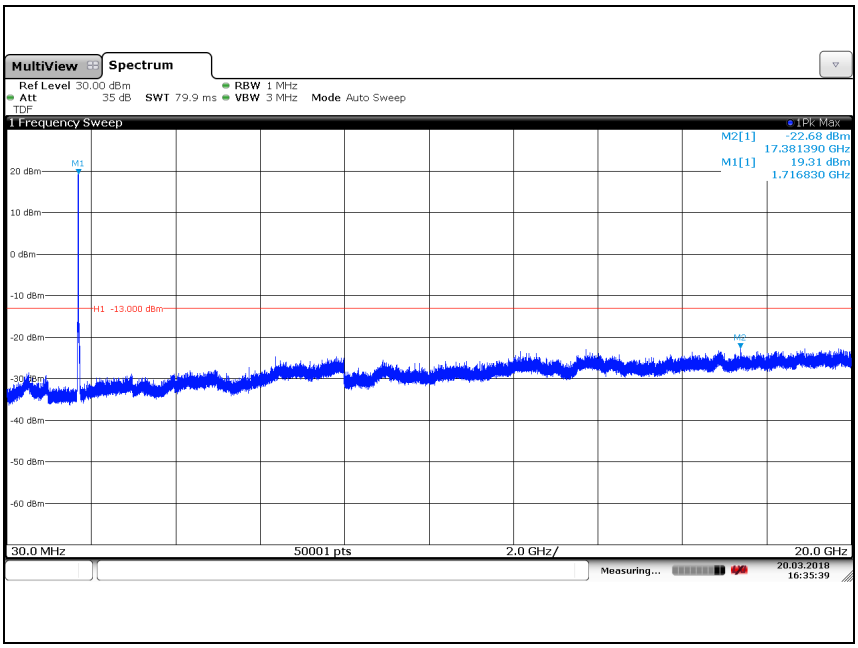


High Channel

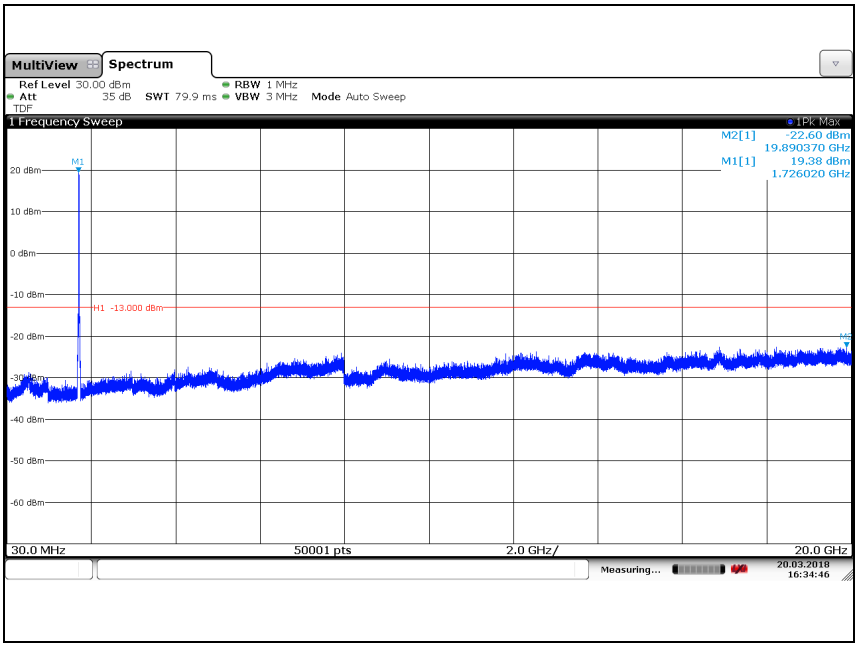


LTE band 4 (20 ㎒ - QPSK)

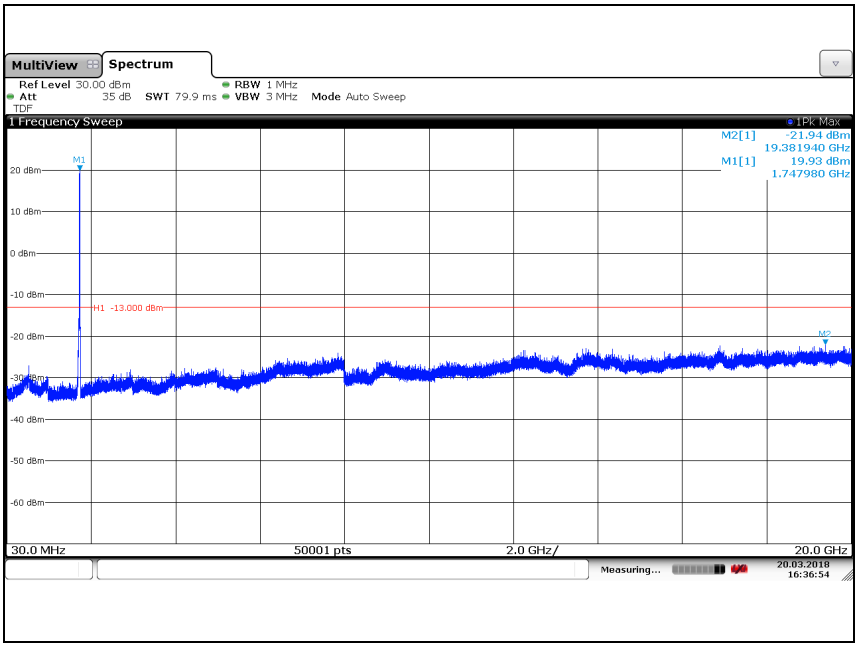
Low Channel



Middle Channel

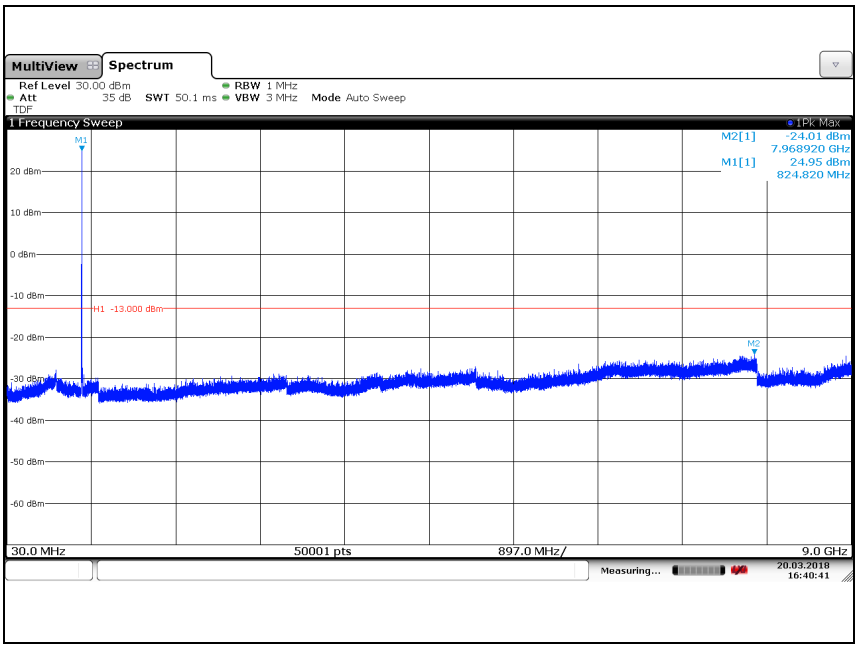


High Channel

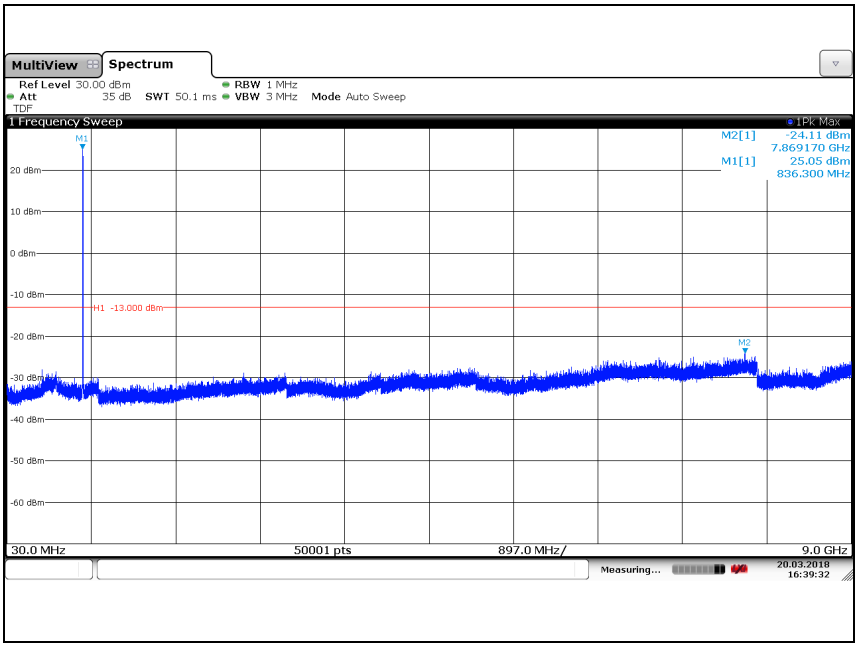


LTE band 5 (1.4 ㎒ - QPSK)

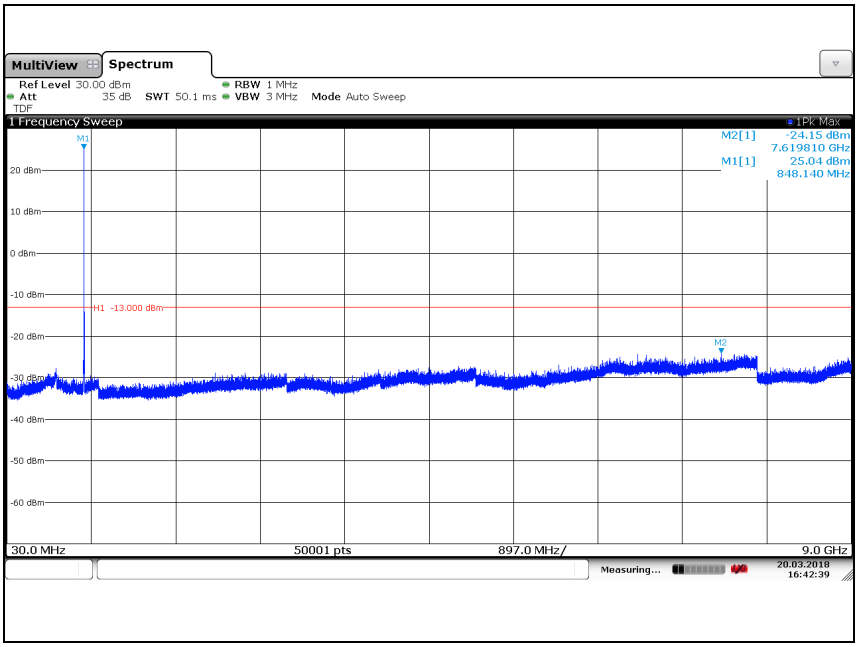
Low Channel



Middle Channel

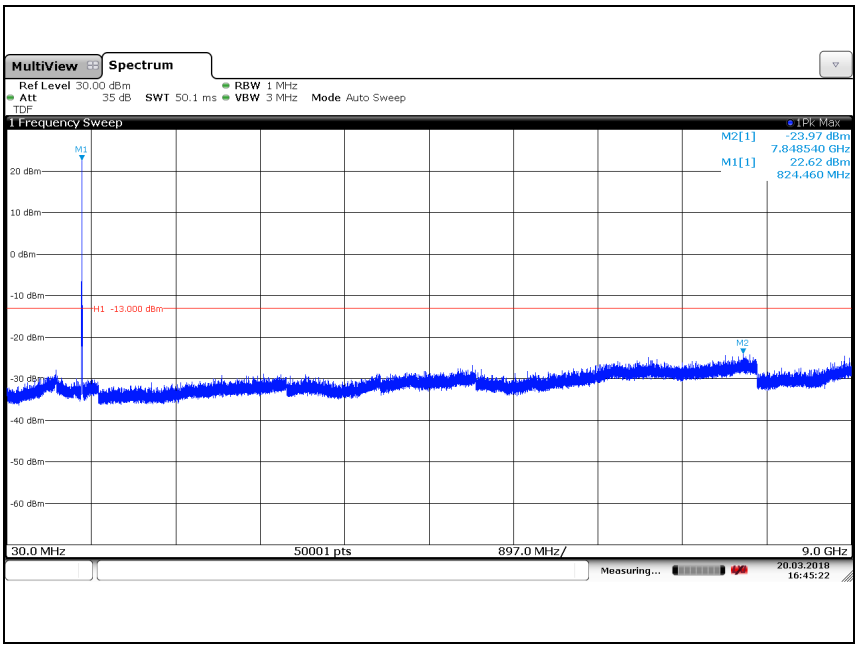


High Channel

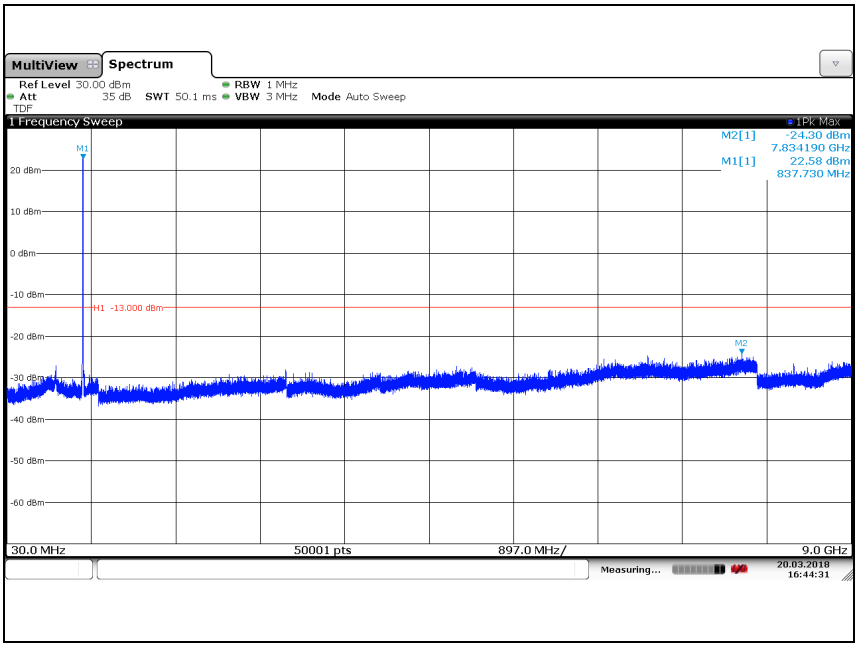


LTE band 5 (3 ㎒ - QPSK)

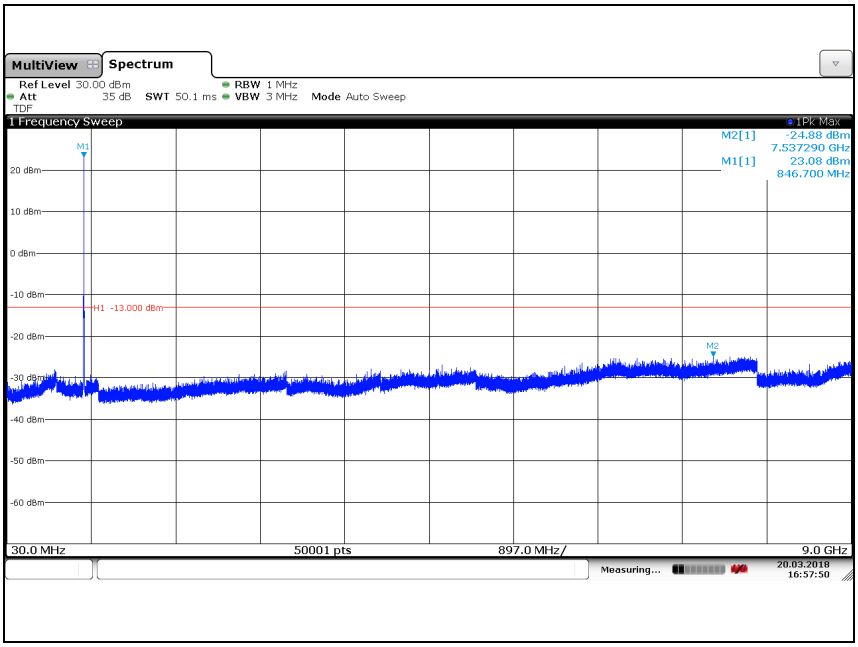
Low Channel



Middle Channel

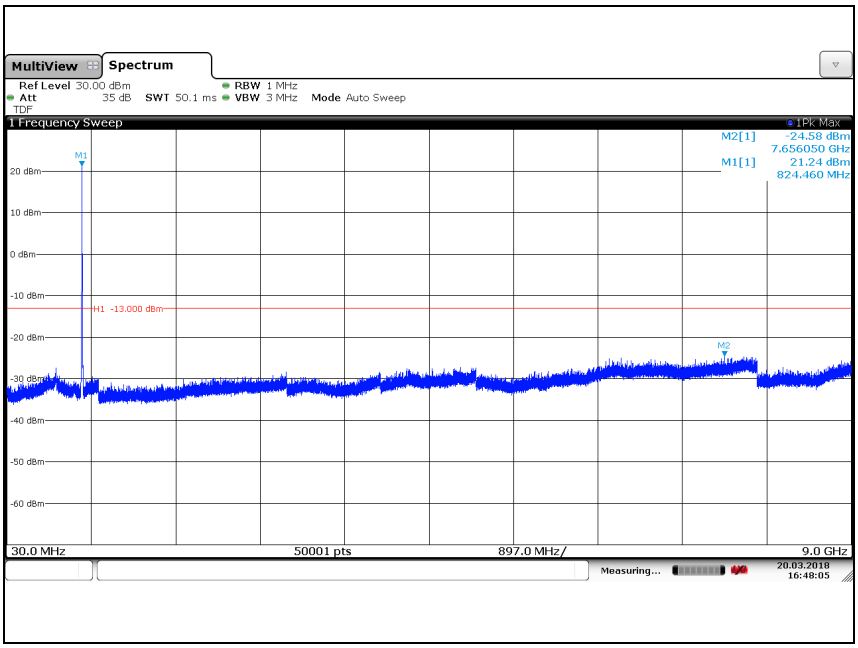


High Channel

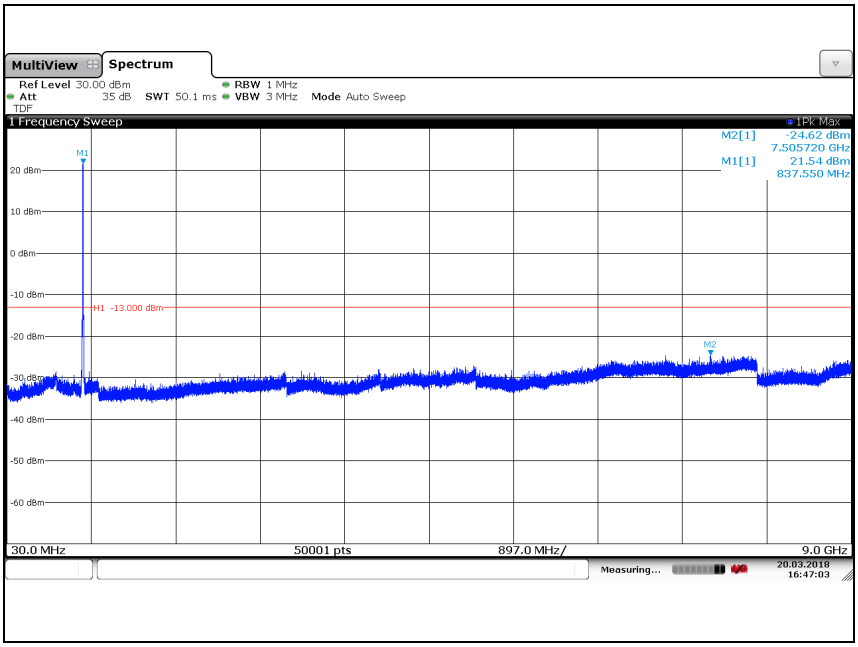


LTE band 5 (5 ㎒ - QPSK)

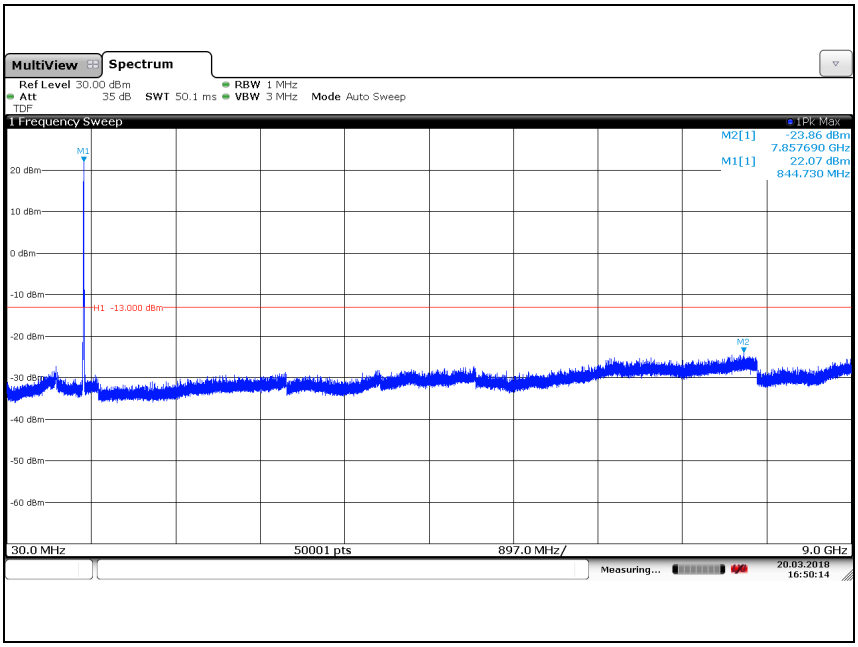
Low Channel



Middle Channel

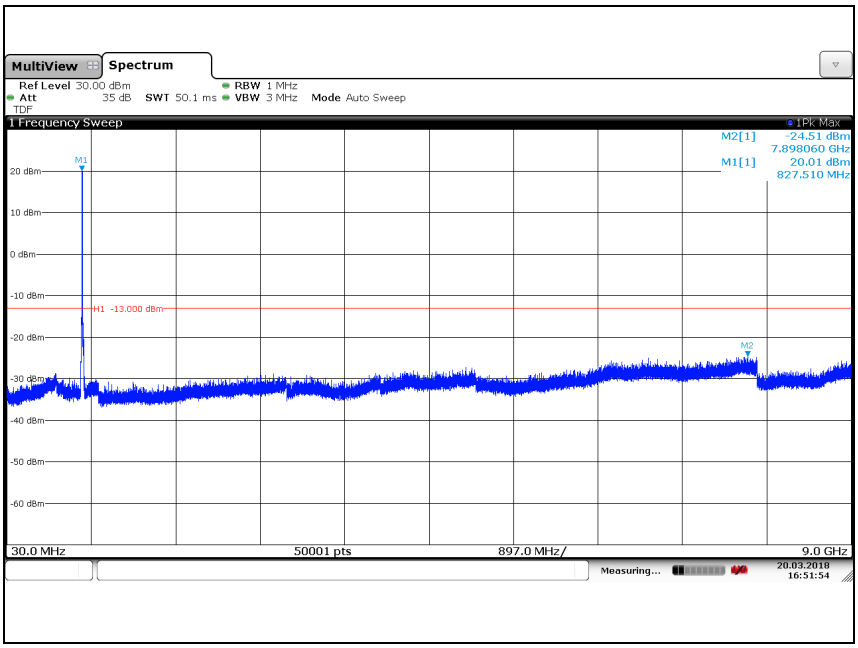


High Channel

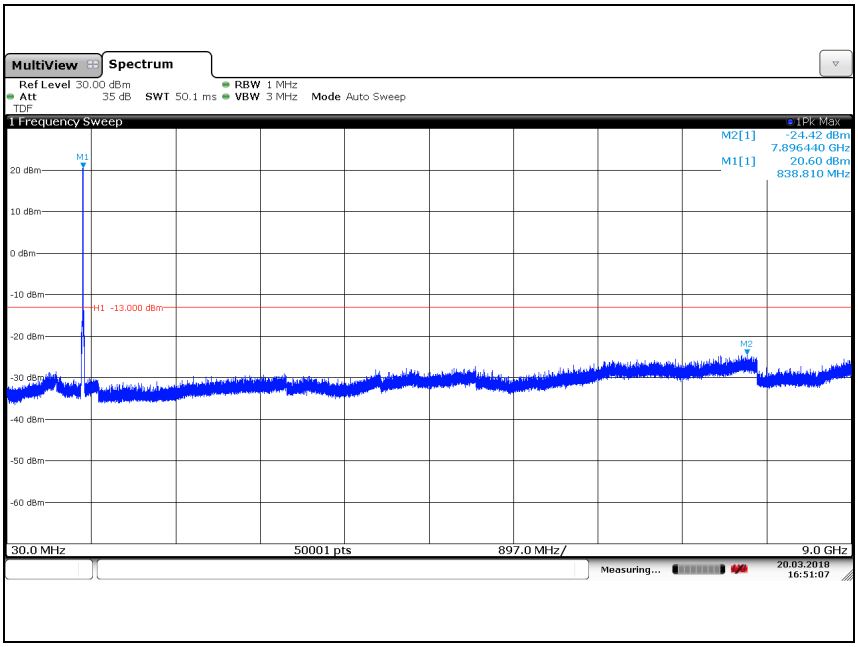


LTE band 5 (10 ㎒ - QPSK)

Low Channel



Middle Channel



High Channel