

Report Number: F690501/RF-RTL013501 Page: 121 248

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 dB.

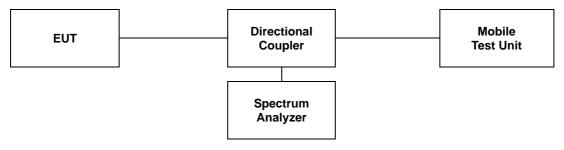
- §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance 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 dB.
- §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 dB.

5.2. Test Procedure

The test follows section 5.7.2 of FCC KDB Publication 971168 D01 v03r01.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

- a. Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.
- b. Set the number of counts to a value that stabilizes the measured CCDF curve.
- c. Set the measurement interval as follows:
 - 1) For continuous transmissions, set to greater of [10 x (number of points in sweep) x (transmission symbol
 - 2) 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.
 - 3) 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.
- d. Record the maximum PAPR level associated with a probability of 0.1 %.
- e. The peak power level is calculated form the sum of the PAPR value from step d) to the measured average power.





Report Number: F690501/RF-RTL013501 Page: 122 of 248

5.3 Test Results

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

Band	Mode	Frequency (酏)	PAR (dB)
2 (1.4 吨)	QPSK	1 850.7	4.81
		1 880.0	5.16
		1 909.3	4.81
	QPSK	1 851.5	4.81
2 (3 吨)		1 880.0	4.93
		1 908.5	4.87
	QPSK	1 852.5	4.90
2 (5 M±)		1 880.0	4.90
		1 907.5	4.84
	QPSK	1 855.0	5.01
2 (10 吨)		1 880.0	4.87
		1 905.0	4.84
2 (15 吨)	QPSK	1 857.5	5.28
		1 880.0	5.16
		1 902.5	5.04
2 (20 Mz)	QPSK	1 860.0	4.87
		1 880.0	4.90
		1 900.0	4.81



Report Number: F690501/RF-RTL013501 Page: 123 of 248

Band	Mode	Frequency (쌘)	PAR (dB)
		1 710.7	5.10
4 (1.4 吨)	QPSK	1 732.5	4.96
		1 754.3	5.16
4 (3 Mb)	QPSK	1 711.5	5.13
		1 732.5	4.81
		1 753.5	5.04
4 (5 Mb)		1 712.5	5.07
	QPSK	1 732.5	4.84
		1 752.5	5.07
4 (10 Mb)	QPSK	1 715.0	5.01
		1 732.5	4.84
		1 750.0	5.01
4 (15 Mb)	QPSK	1 717.5	5.25
		1 732.5	5.01
		1 747.5	5.30
	QPSK	1 720.0	4.87
4 (20 MHz)		1 732.5	4.78
		1 745.0	5.07

Band	Mode	Frequency (眦)	PAR (dB)
5 (1.4 贴)	QPSK	824.7	4.72
		836.5	4.93
		848.3	5.19
5 (3 Mb)	QPSK	825.5	4.70
		836.5	4.84
		847.5	5.01
5 (5 MHz)	QPSK	826.5	4.78
		836.5	4.90
		846.5	4.90
5 (10 吨)	QPSK	829.0	4.87
		836.5	4.90
		844.0	4.78

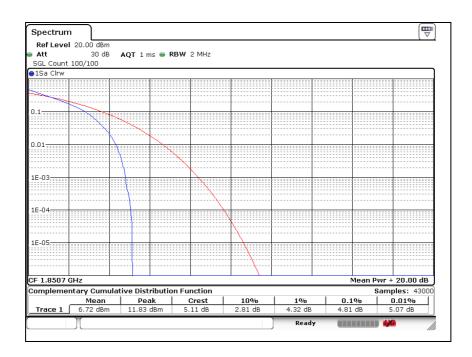
Band	Mode	Frequency (쌘)	PAR (dB)
13 (5 吨)	QPSK	779.5	4.38
		782.0	4.49
		784.5	4.64
13 (10 MHz)	QPSK	-	-
		782.0	4.55
		-	-



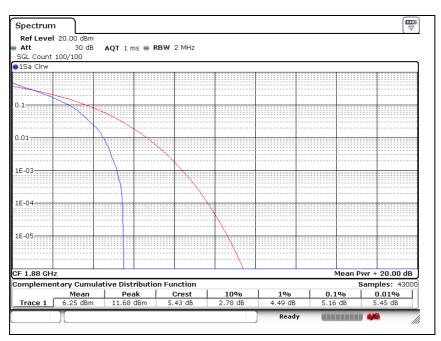
Report Number: F690501/RF-RTL013501 Page: 124 of 248

LTE band 2 (1.4 \https://doi.org/10.1016

Low Channel



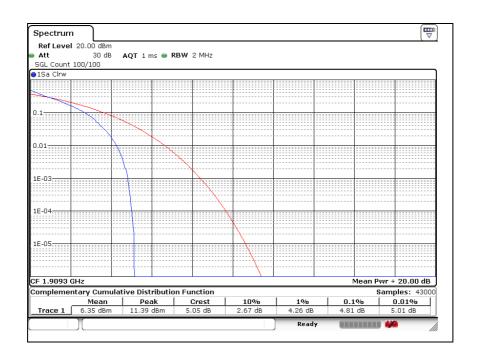
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 125 248 of

High Channel

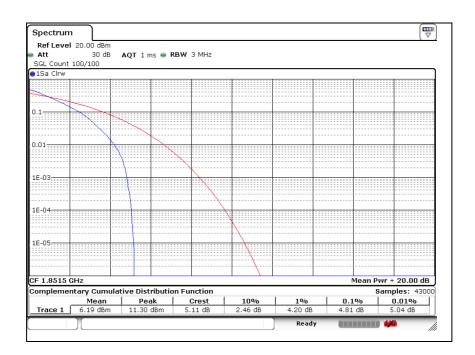




Report Number: F690501/RF-RTL013501 Page: 126 of 248

LTE band 2 (3 胍 - QPSK)

Low Channel



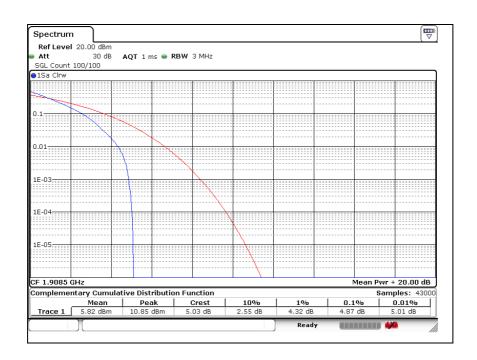
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 127 248 of

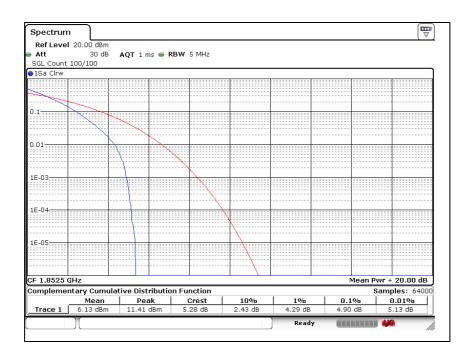
High Channel



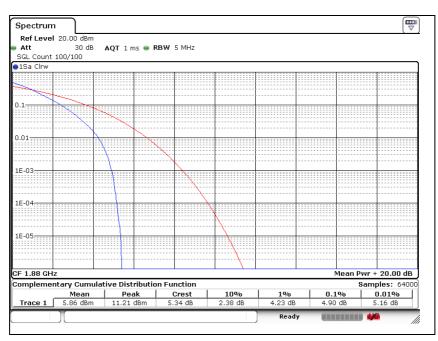


Report Number: F690501/RF-RTL013501 Page: 128 of 248

Low Channel



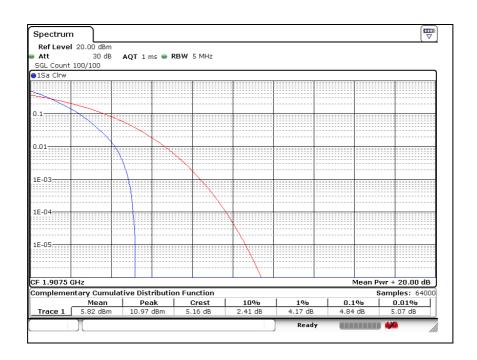
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 129 248 of

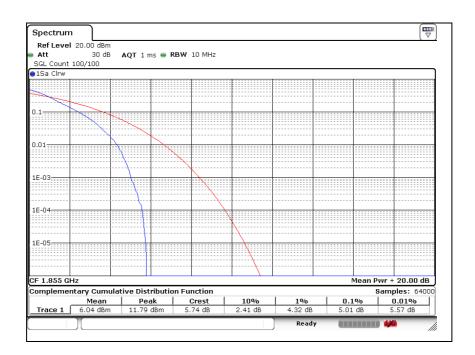
High Channel



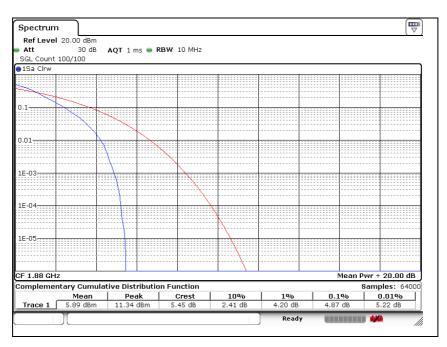


Report Number: F690501/RF-RTL013501 Page: 130 of 248

Low Channel



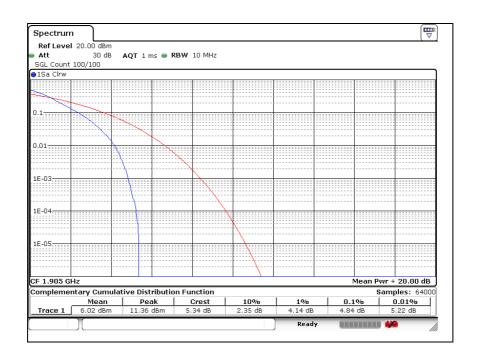
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 131 248 of

High Channel

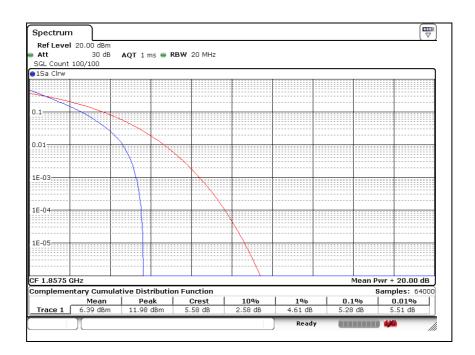




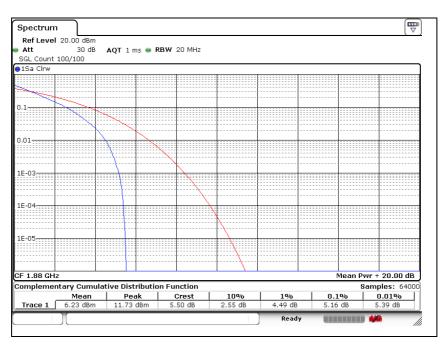
Report Number: F690501/RF-RTL013501 Page: 132 of 248

LTE band 2 (15 上 - QPSK)

Low Channel



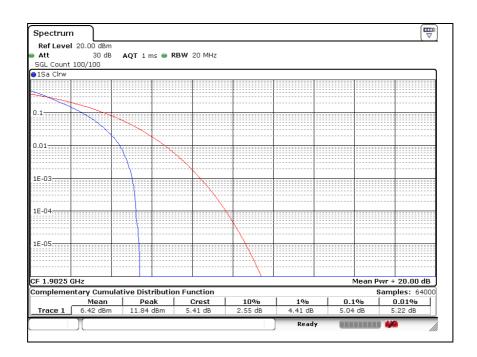
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 133 248 of

High Channel

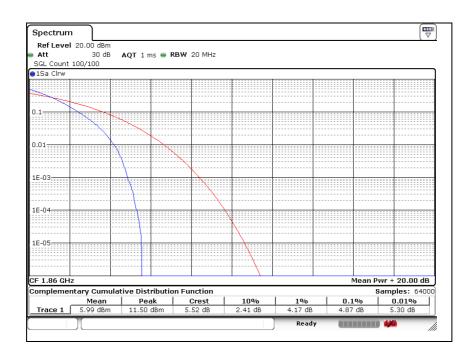




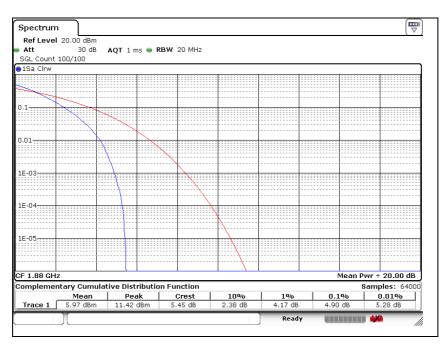
Report Number: F690501/RF-RTL013501 Page: 134 of 248

LTE band 2 (20 Mb - QPSK)

Low Channel



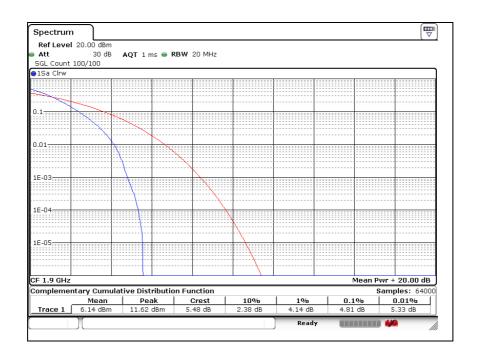
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 135 248 of

High Channel



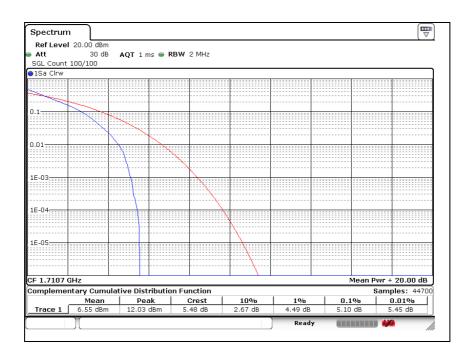
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation.

RTT5041-19(2017.07.10)(0)

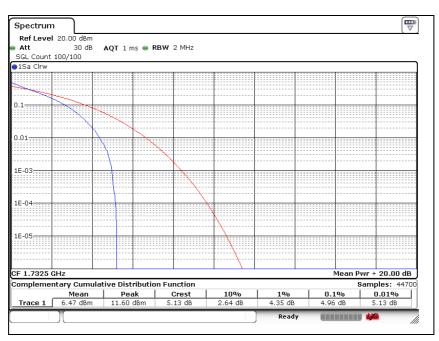


Report Number: F690501/RF-RTL013501 Page: 136 of 248

Low Channel



Middle Channel





Report Number: F690501/RF-RTL013501 Page: 137 248 of

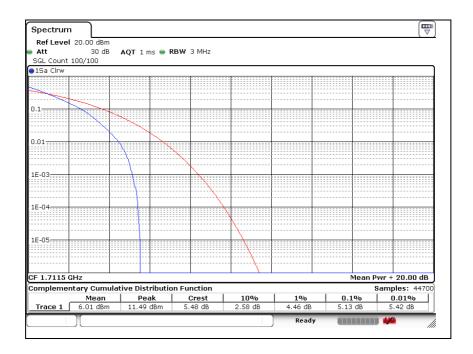
High Channel



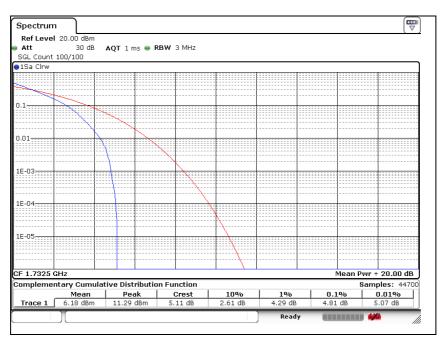


Report Number: F690501/RF-RTL013501 Page: 138 of 248

Low Channel



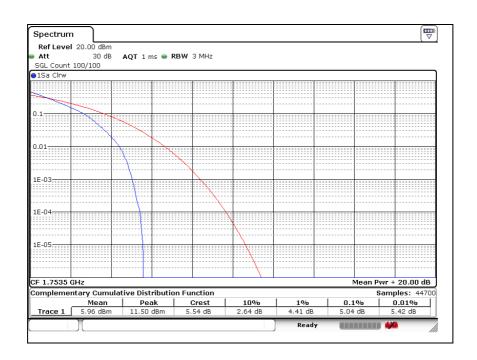
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 139 248 of

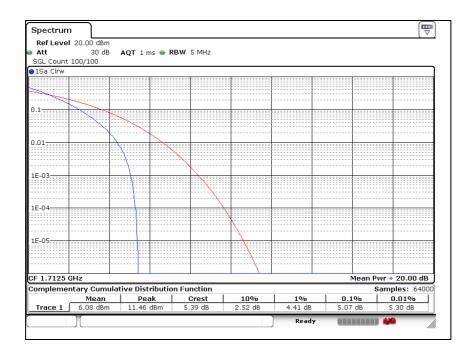
High Channel



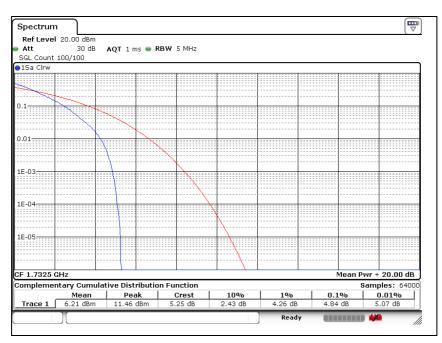


Report Number: F690501/RF-RTL013501 Page: 140 of 248

Low Channel



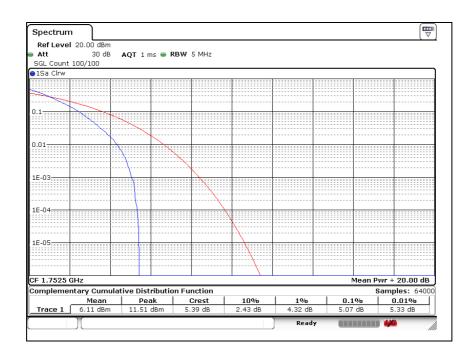
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 141 248 of

High Channel

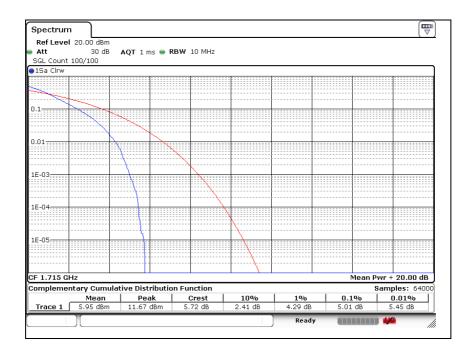




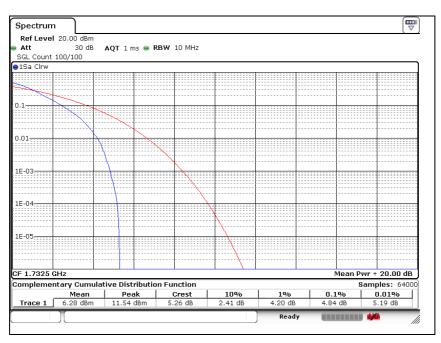
Report Number: F690501/RF-RTL013501 Page: 142 of 248

LTE band 4 (10 Mb - QPSK)

Low Channel



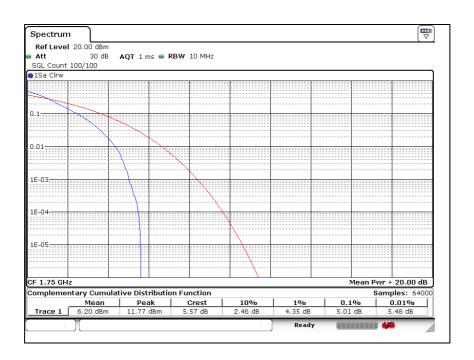
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 143 248 of

High Channel

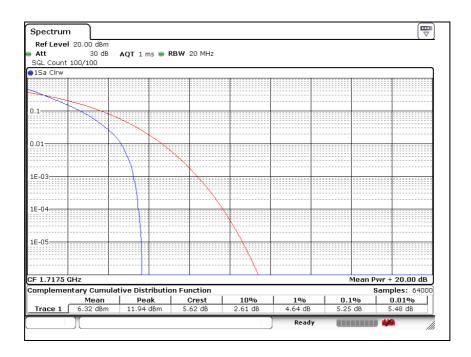




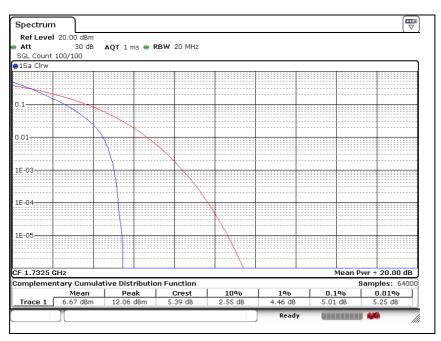
Report Number: F690501/RF-RTL013501 Page: 144 of 248

LTE band 4 (15 Mb - QPSK)

Low Channel



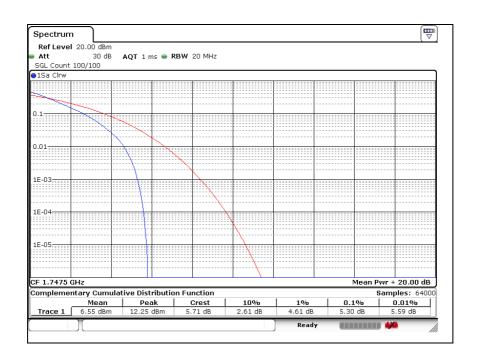
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 145 248 of

High Channel

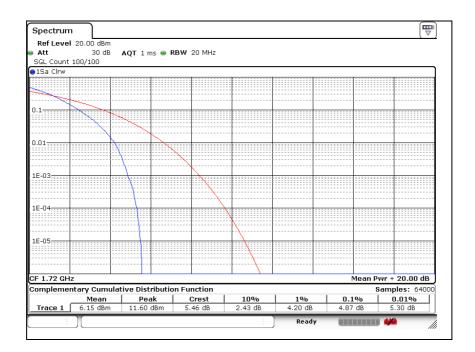




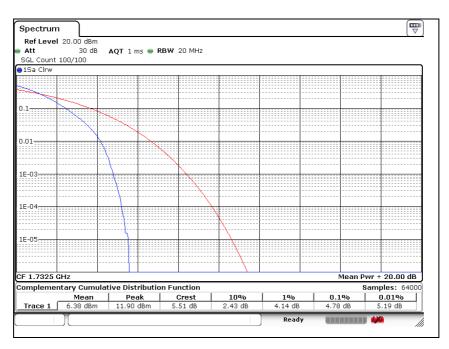
Report Number: F690501/RF-RTL013501 Page: 146 of 248

LTE band 4 (20 Mb - QPSK)

Low Channel



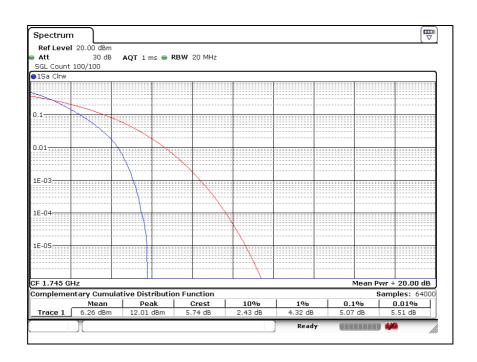
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 147 248 of

High Channel

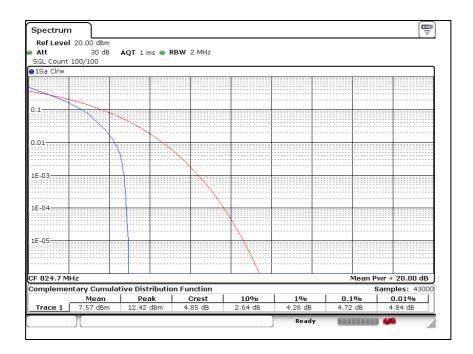




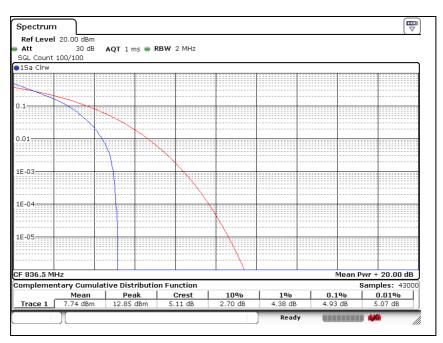
Report Number: F690501/RF-RTL013501 Page: 148 of 248

LTE band 5 (1.4 \https://doi.org/10.1016

Low Channel



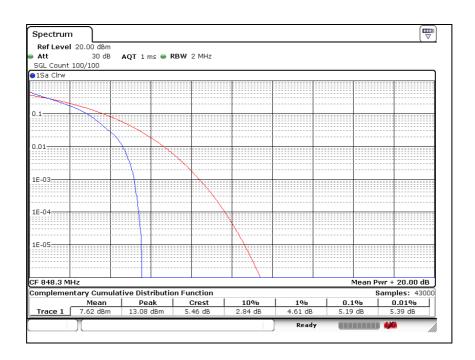
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 149 248 of

High Channel

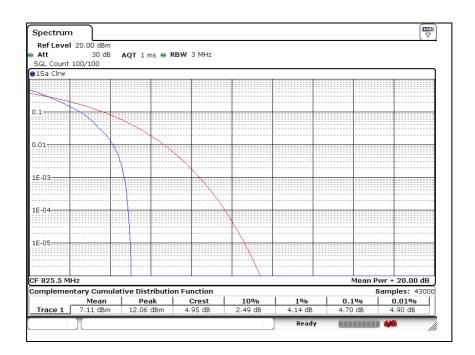




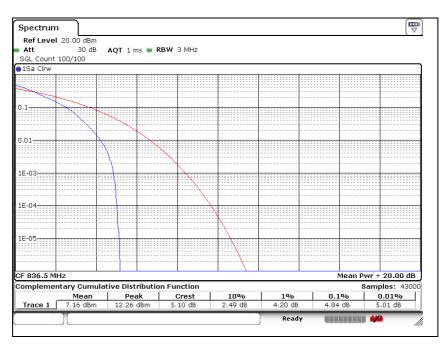
Report Number: F690501/RF-RTL013501 Page: 150 of 248

LTE band 5 (3 Mb - QPSK)

Low Channel



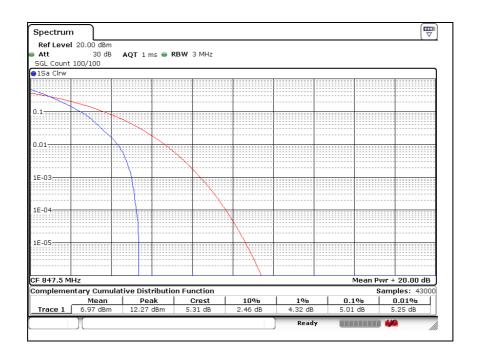
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 151 248 of

High Channel

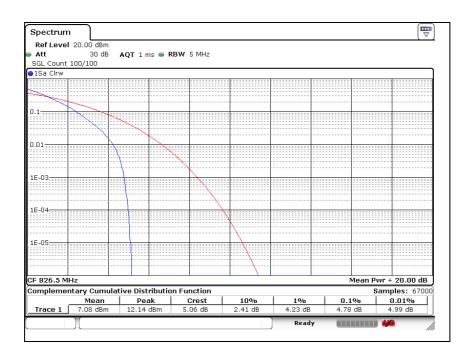




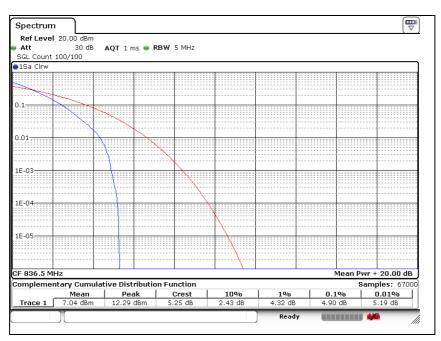
Report Number: F690501/RF-RTL013501 Page: 152 of 248

LTE band 5 (5 Mb - QPSK)

Low Channel



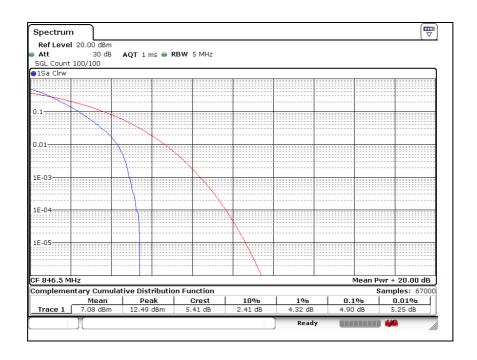
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 153 248 of

High Channel

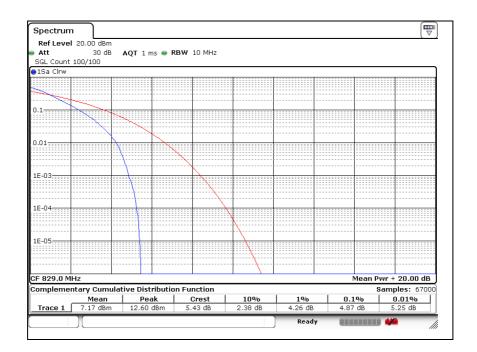




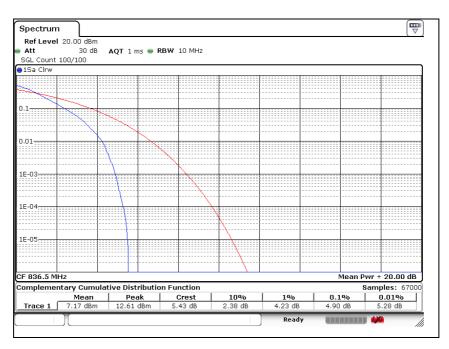
Report Number: F690501/RF-RTL013501 Page: 154 of 248

LTE band 5 (10 Mb - QPSK)

Low Channel



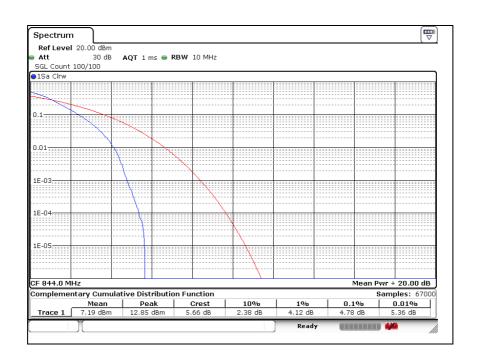
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 155 248 of

High Channel

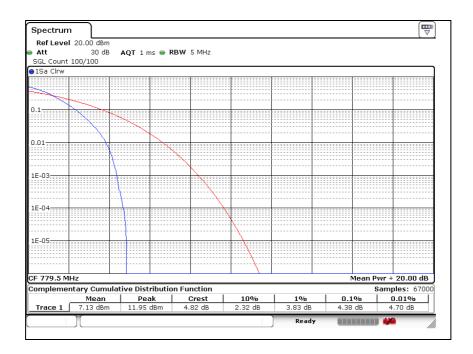




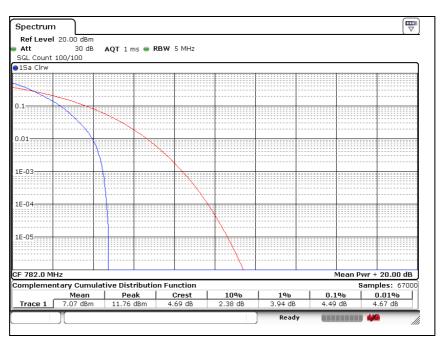
Report Number: F690501/RF-RTL013501 Page: 156 of 248

LTE band 13 (5 账 - QPSK)

Low Channel



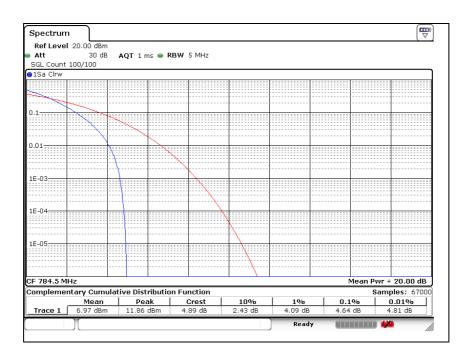
Middle Channel



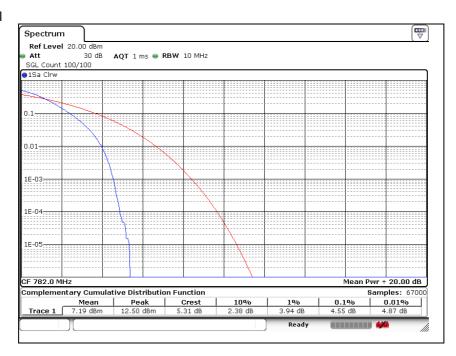


Report Number: F690501/RF-RTL013501 Page: 157 of 248

High Channel



Middle Channel





Report Number: F690501/RF-RTL013501 Page: 158 248

6. Spurious Emissions at Antenna Terminal

6.1. Limit

- <u>\$22.917(a)</u>, 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) dB.
- <u>\$24.238(a)</u>, 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) dB.
- §27.53(c)(2), on any frequency outside the 776-788 № band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.
- §27.53(h)(1), for operations in the 1 695-1 710 Mb, 1 710-1 755 Mb, 1 755-1 780 Mb, 1 915-1 920 Mb, 1 995-2 000 Mb, 2 000-2 020 Mb, 2 110-2 155 Mb, 2 155-2 180 Mb, and 2 180-2 200 Mb 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) dB.

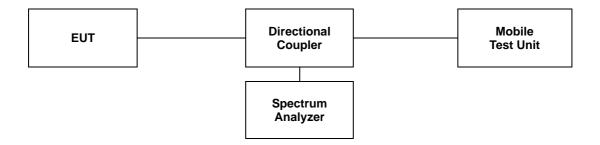


Report Number: F690501/RF-RTL013501 Page: 159 of 248

6.2. Test Procedure

The test follows section 6.1 of FCC KDB Publication 971168 D01 v03r01.

- a. Start frequency was set to 30 Mb and stop frequency was set to at least 10* the fundamental frequency.
- b. Detector = Peak.
- c. Trace mode = Max hold.
- d. Sweep time = Auto couple.
- e. The trace was allowed to stabilize.
- f. Please see notes below for RBW and VBW settings.
- g. For plots showing conducted spurious emissions from 30 Mb to 20 Gb, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



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 dB below the transmitter power.



Report Number: F690501/RF-RTL013501 Page: 160 of 248

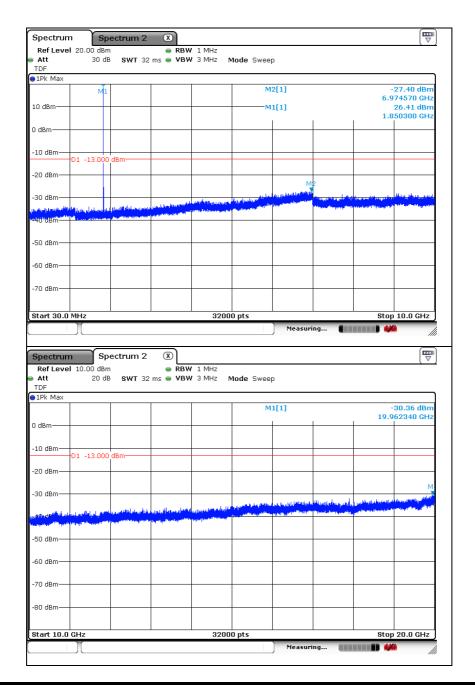
6.3. Test Results

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

Please refer to the following plots.

LTE band 2 (1.4 Mb - QPSK)

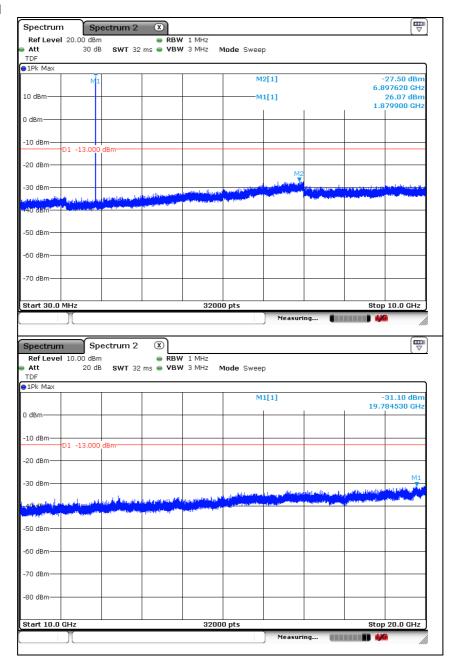
Low Channel





Report Number: F690501/RF-RTL013501 Page: 161 of 248

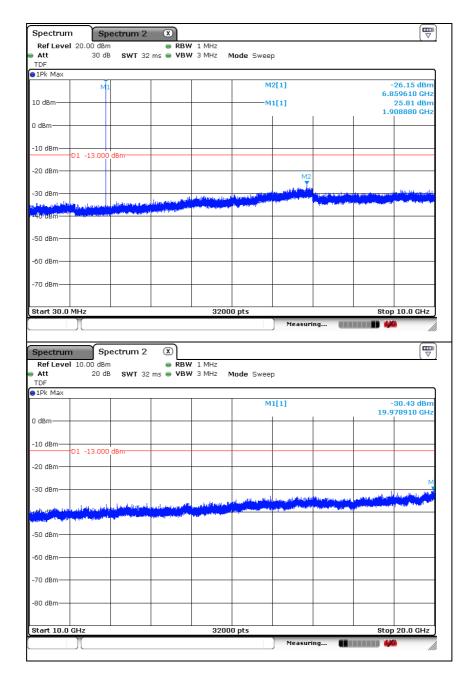
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 162 of 248

High Channel

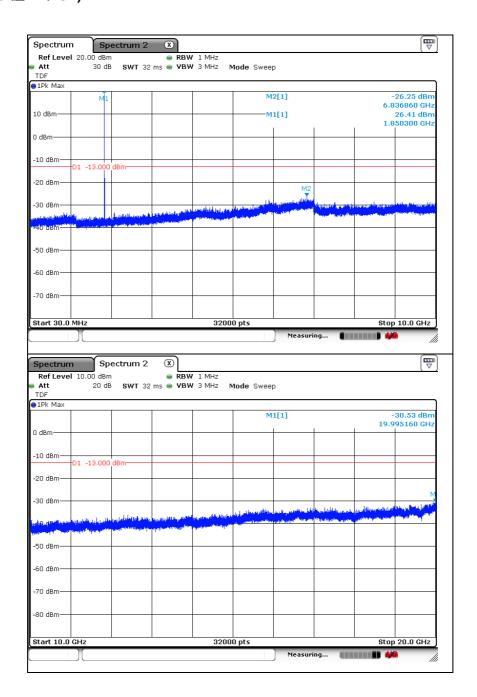




Report Number: F690501/RF-RTL013501 Page: 163 of 248

LTE band 2 (3 胍 - QPSK)

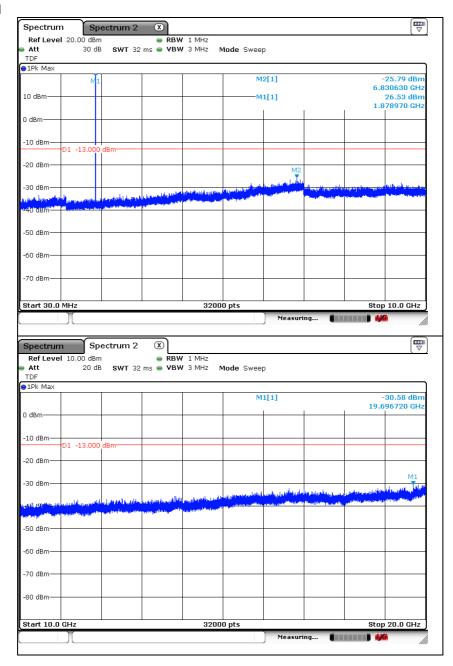
Low Channel





Report Number: F690501/RF-RTL013501 Page: 164 of 248

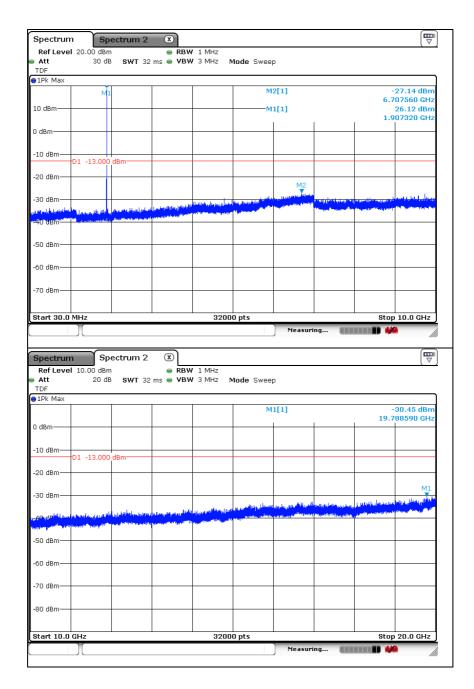
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 165 of 248

High Channel

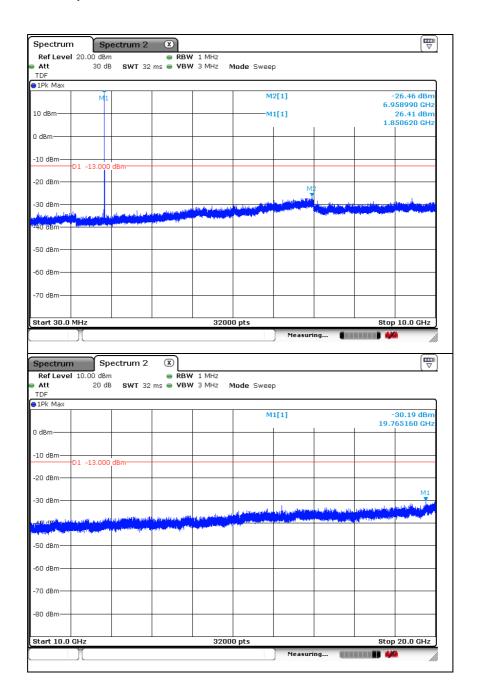




Report Number: F690501/RF-RTL013501 Page: 166 of 248

LTE band 2 (5 胍 - QPSK)

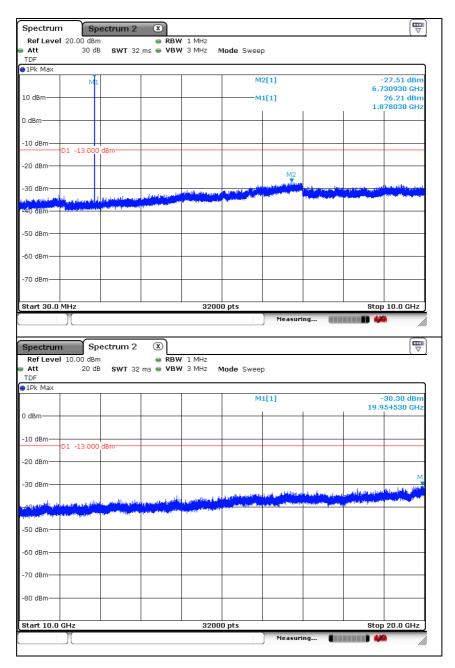
Low Channel





Report Number: F690501/RF-RTL013501 Page: 167 of 248

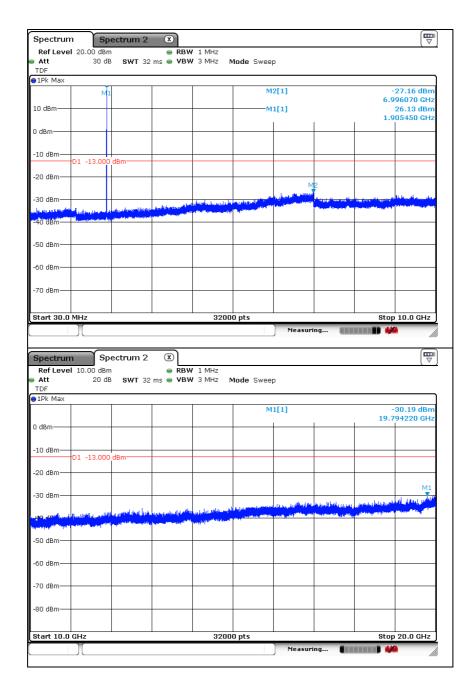
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 168 of 248

High Channel

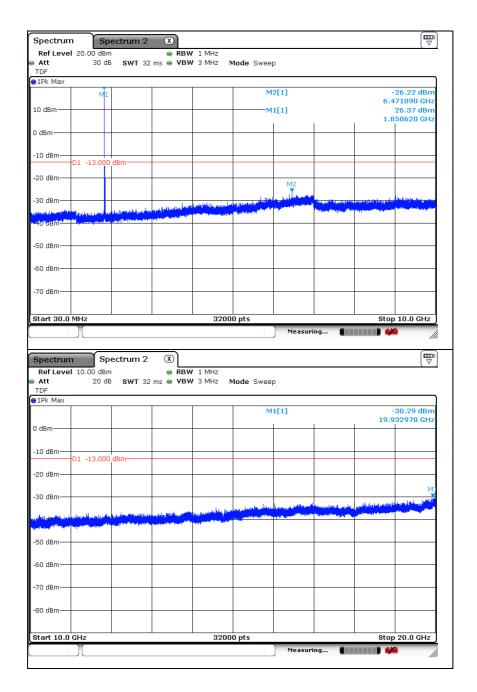




Report Number: F690501/RF-RTL013501 Page: 169 of 248

LTE band 2 (10 脏 - QPSK)

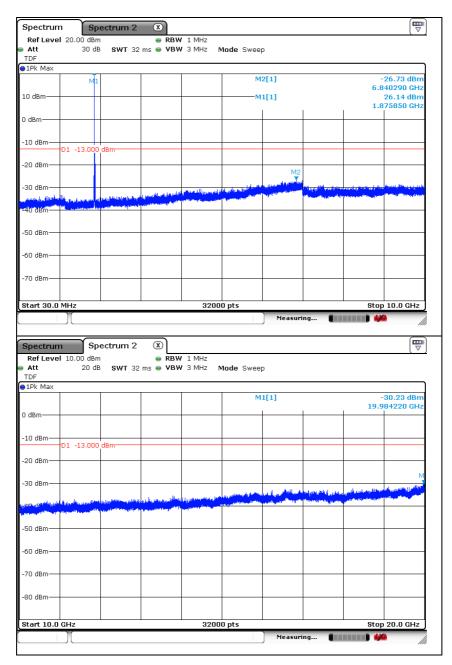
Low Channel





Report Number: F690501/RF-RTL013501 Page: 170 of 248

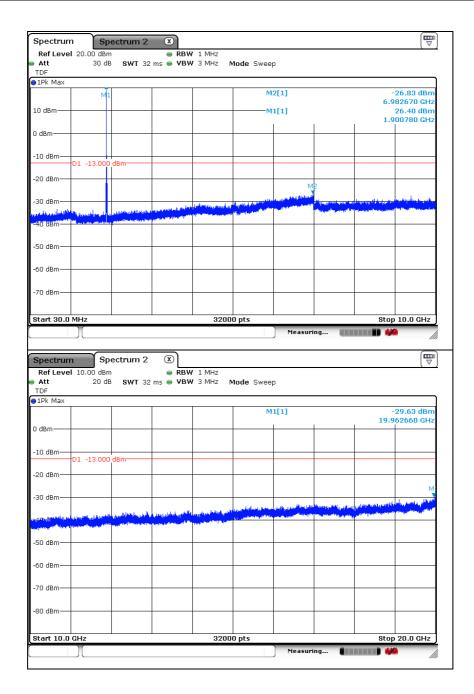
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 171 of 248

High Channel

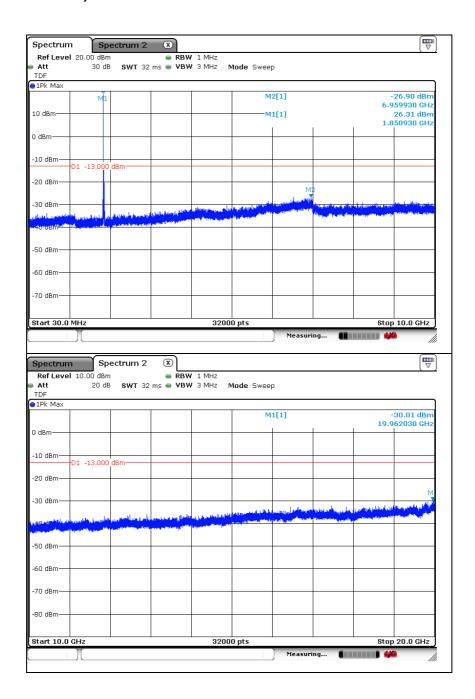




Report Number: F690501/RF-RTL013501 Page: 172 of 248

LTE band 2 (15 Mb - QPSK)

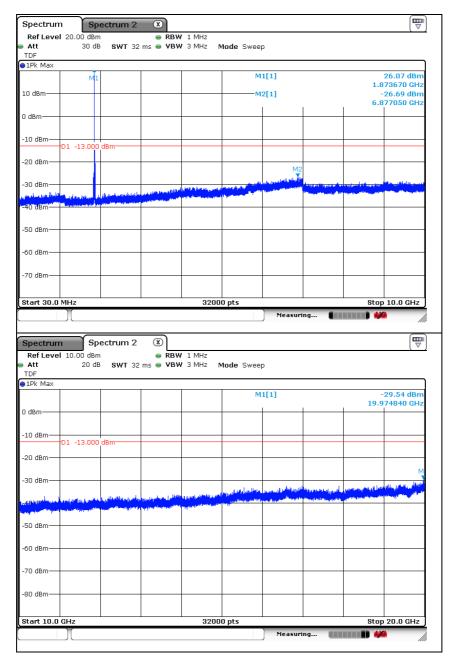
Low Channel





Report Number: F690501/RF-RTL013501 Page: 173 of 248

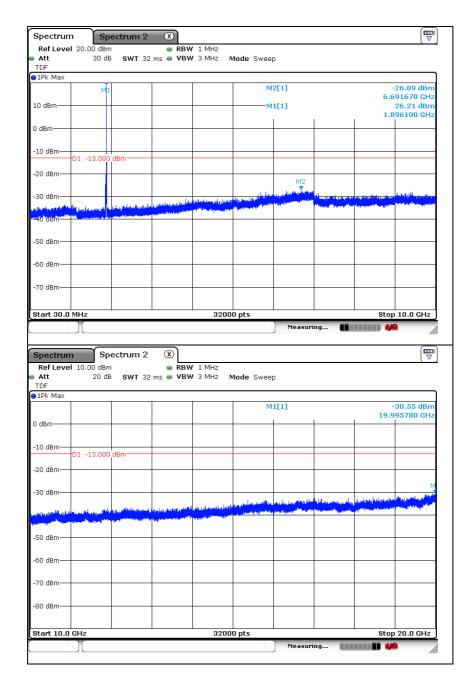
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 174 of 248

High Channel

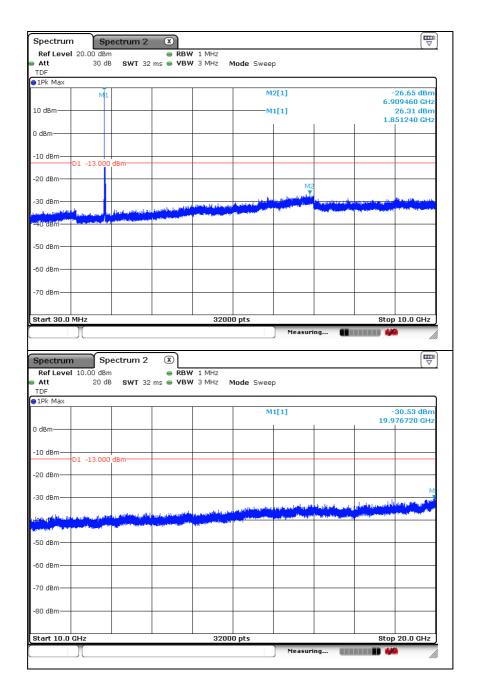




Report Number: F690501/RF-RTL013501 Page: 175 of 248

LTE band 2 (20 Mb - QPSK)

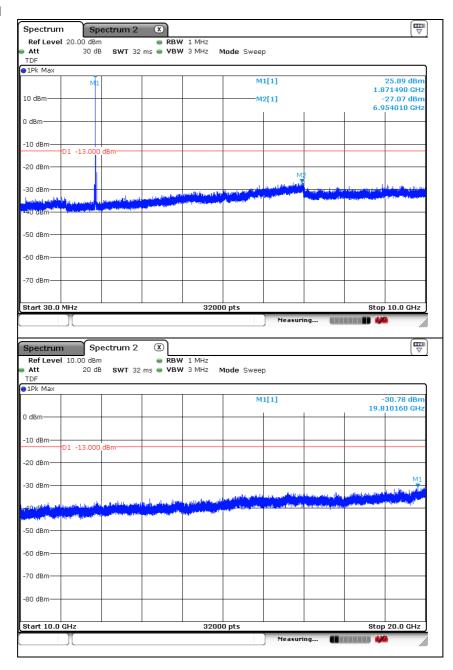
Low Channel





Report Number: F690501/RF-RTL013501 Page: 176 of 248

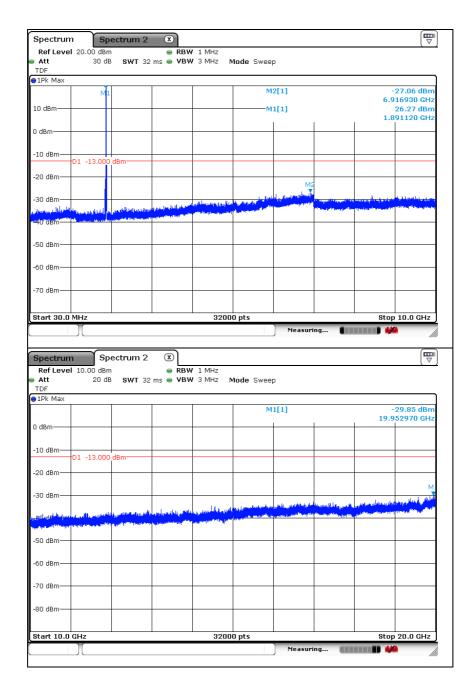
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 177 of 248

High Channel

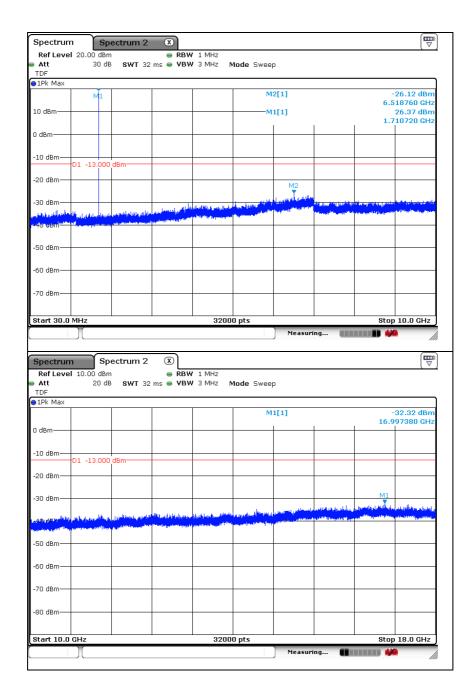




Report Number: F690501/RF-RTL013501 Page: 178 of 248

LTE band 4 (1.4 \m - QPSK)

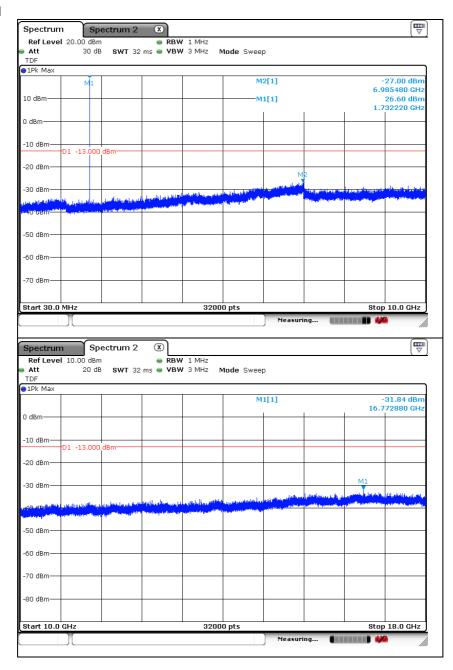
Low Channel





Report Number: F690501/RF-RTL013501 Page: 179 of 248

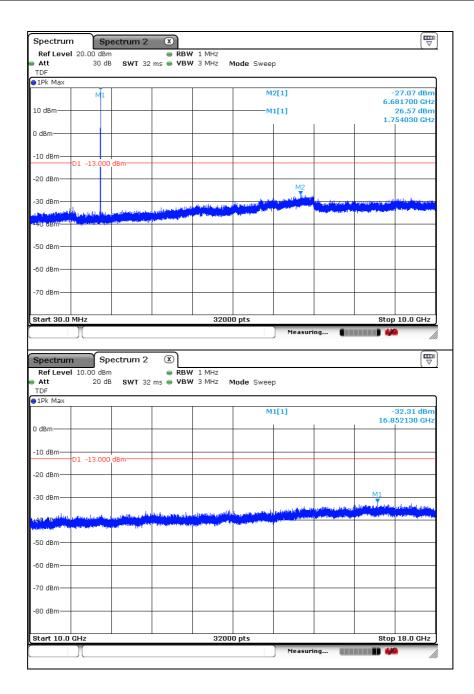
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 180 of 248

High Channel

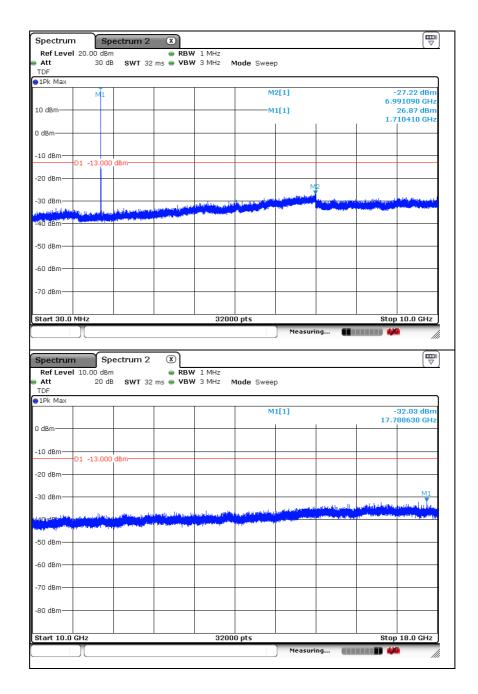




Report Number: F690501/RF-RTL013501 Page: 181 of 248

LTE band 4 (3 胍 - QPSK)

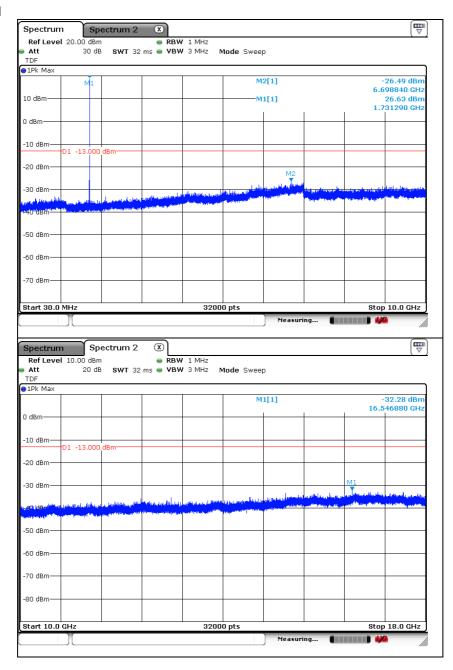
Low Channel





Report Number: F690501/RF-RTL013501 Page: 182 of 248

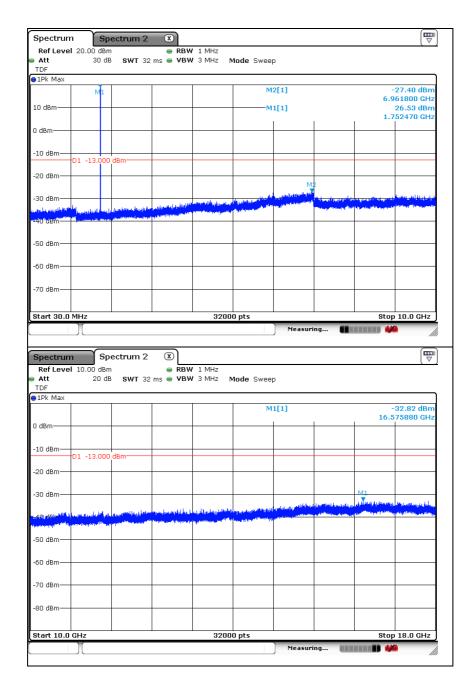
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 183 of 248

High Channel

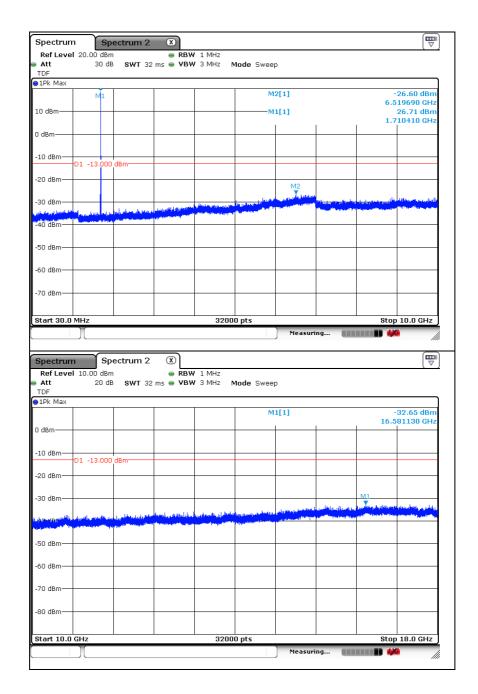




Report Number: F690501/RF-RTL013501 Page: 184 of 248

LTE band 4 (5 胍 - QPSK)

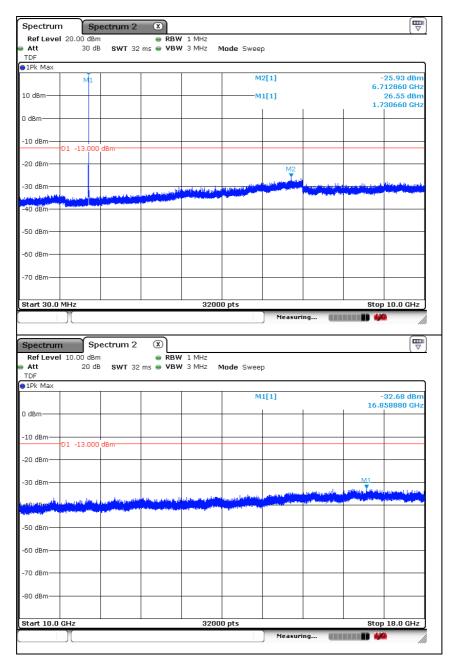
Low Channel





Report Number: F690501/RF-RTL013501 Page: 185 of 248

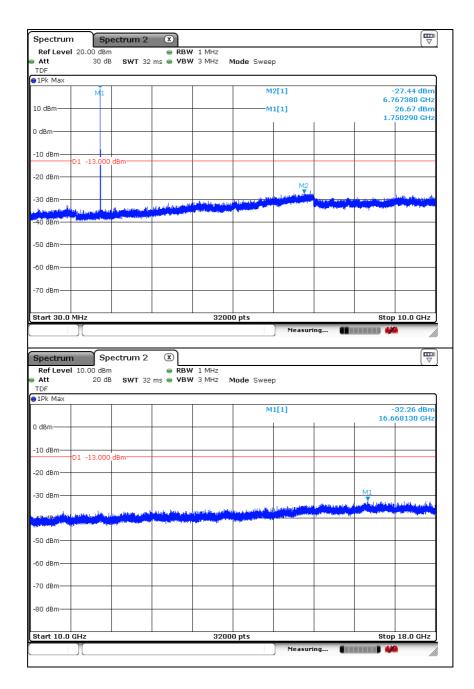
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 186 of 248

High Channel

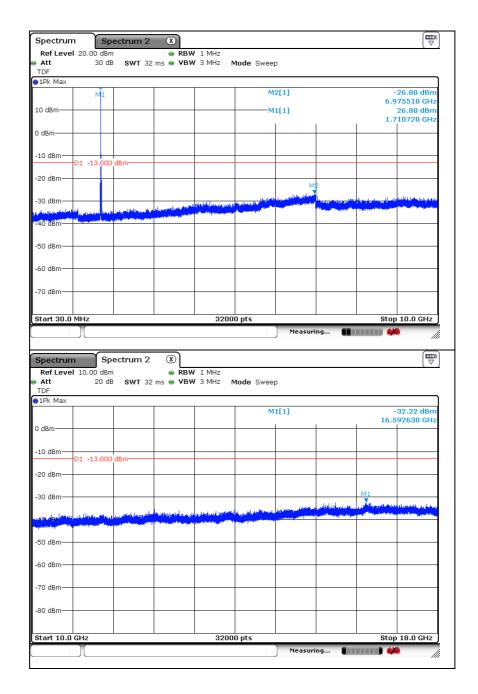




Report Number: F690501/RF-RTL013501 Page: 187 of 248

LTE band 4 (10 Mb - QPSK)

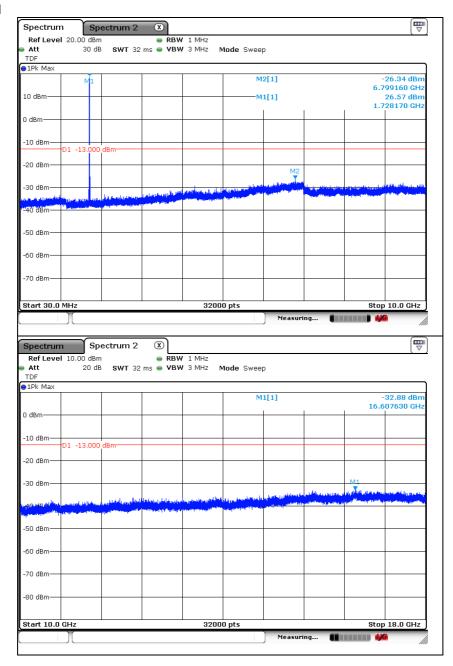
Low Channel





Report Number: F690501/RF-RTL013501 Page: 188 of 248

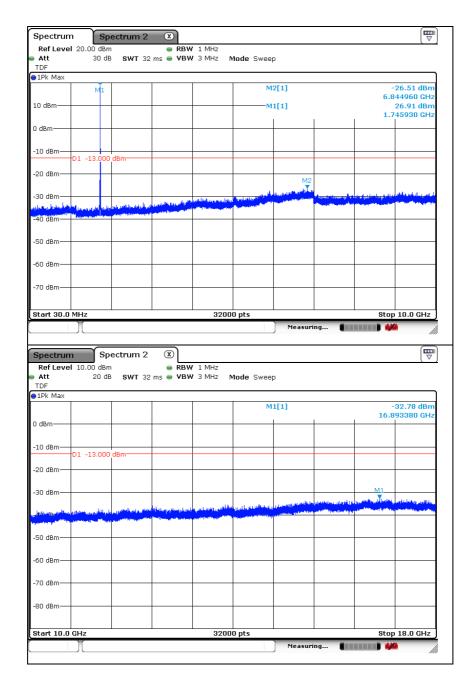
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 189 of 248

High Channel

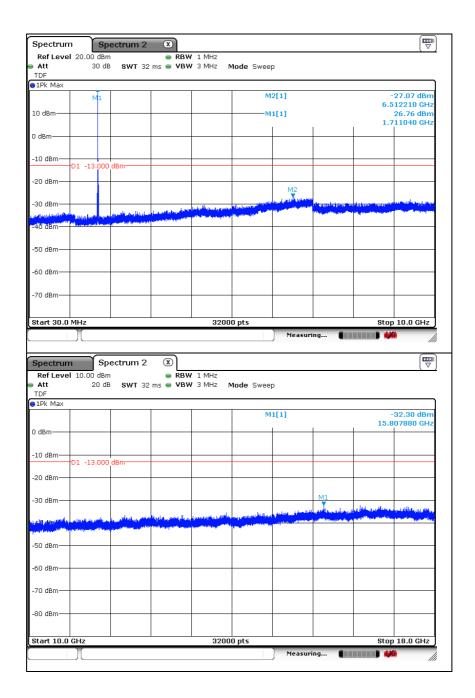




Report Number: F690501/RF-RTL013501 Page: 190 of 248

LTE band 4 (15 上 - QPSK)

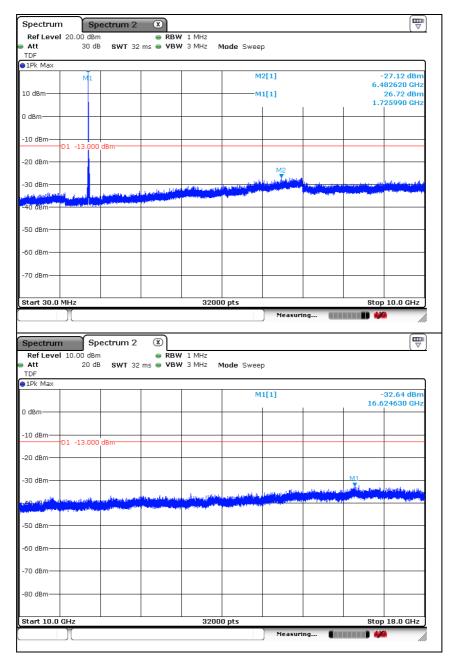
Low Channel





Report Number: F690501/RF-RTL013501 Page: 191 of 248

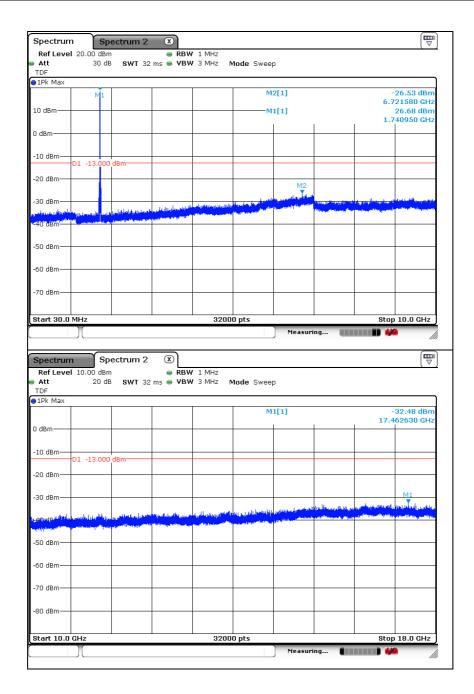
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 192 of 248

High Channel

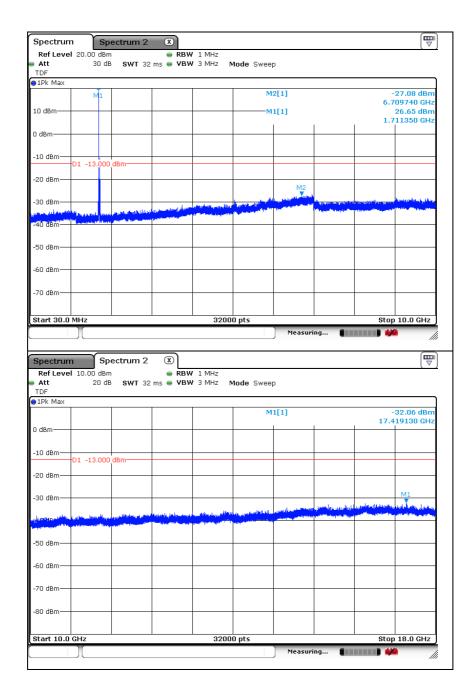




Report Number: F690501/RF-RTL013501 Page: 193 of 248

LTE band 4 (20 Mb - QPSK)

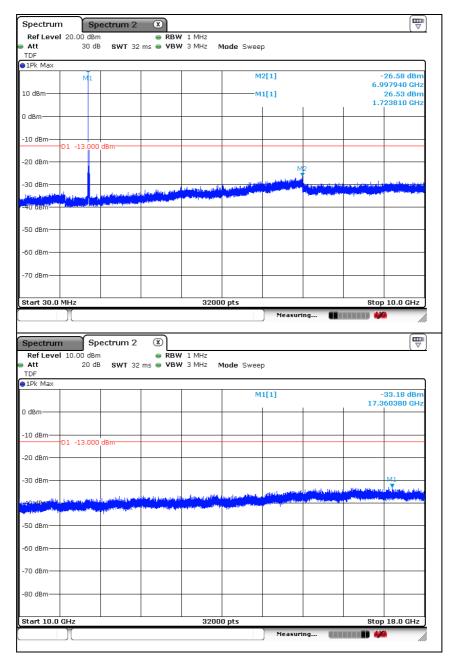
Low Channel





Report Number: F690501/RF-RTL013501 Page: 194 of 248

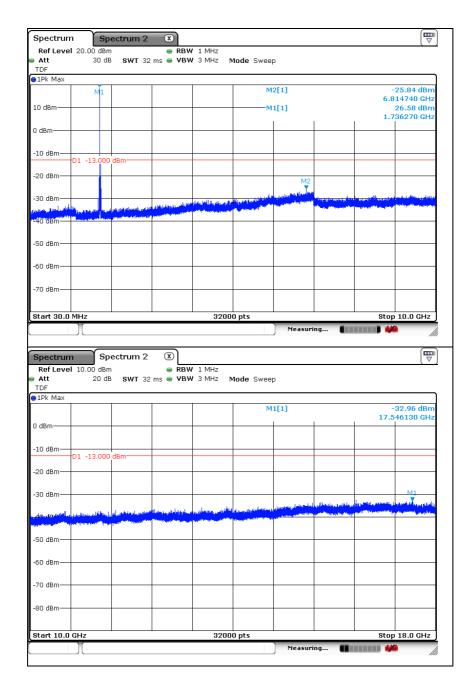
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 195 of 248

High Channel

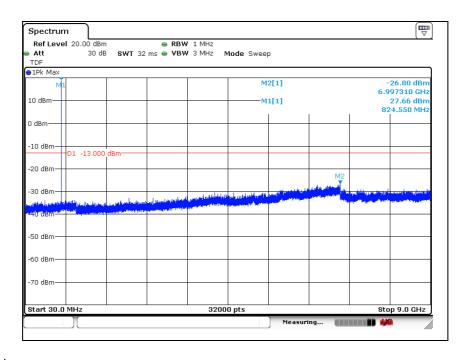




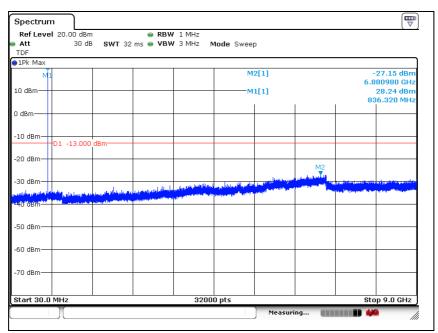
Report Number: F690501/RF-RTL013501 Page: 196 of 248

LTE band 5 (1.4 胍 - QPSK)

Low Channel



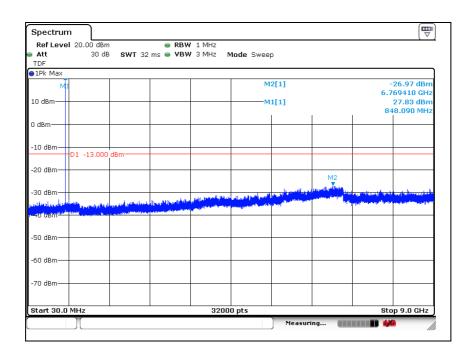
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 197 248 of

High Channel

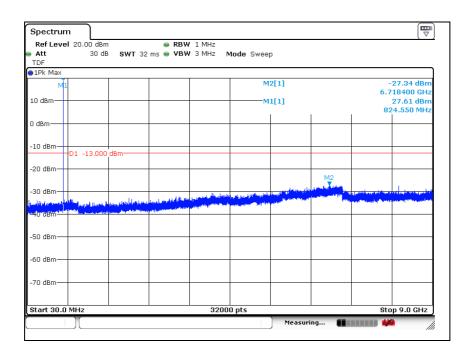




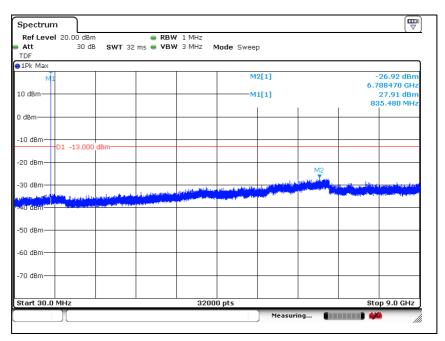
Report Number: F690501/RF-RTL013501 Page: 198 of 248

LTE band 5 (3 Mb - QPSK)

Low Channel



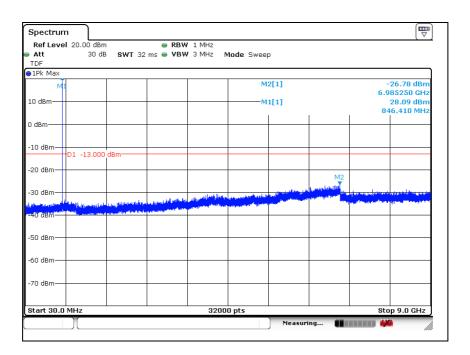
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 199 248 of

High Channel

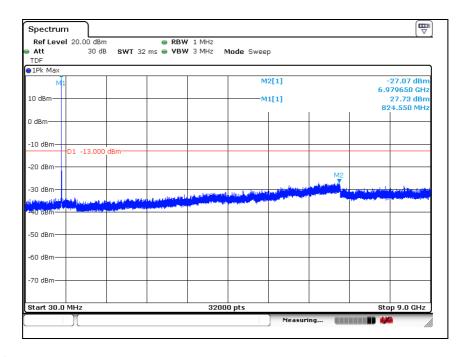




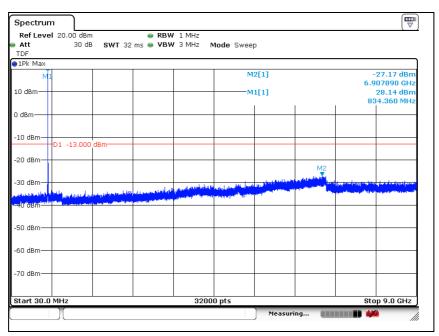
Report Number: F690501/RF-RTL013501 Page: 200 of 248

LTE band 5 (5 Mb - QPSK)

Low Channel



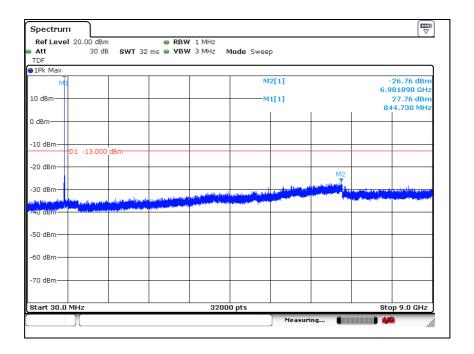
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 201 248 of

High Channel

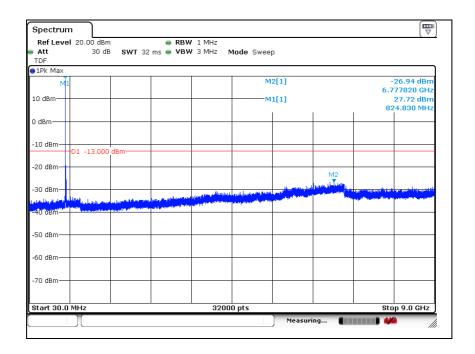




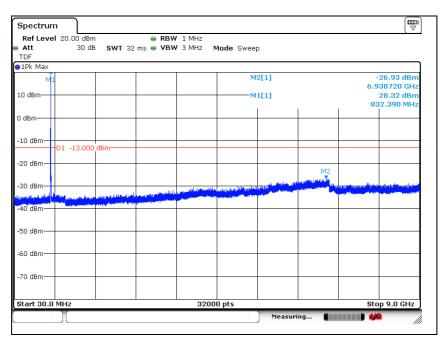
Report Number: F690501/RF-RTL013501 Page: 202 of 248

LTE band 5 (10 Mb - QPSK)

Low Channel



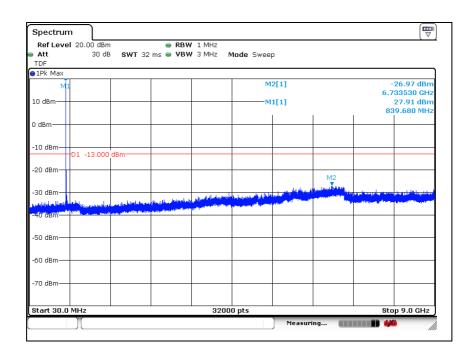
Middle Channel





Report Number: F690501/RF-RTL013501 Page: 203 248 of

High Channel

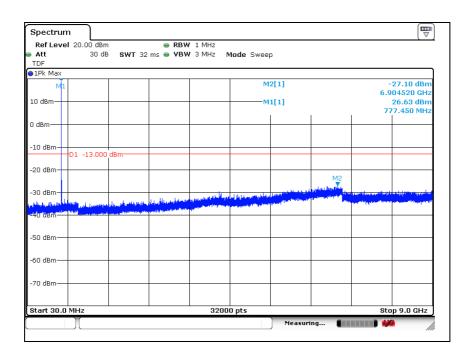




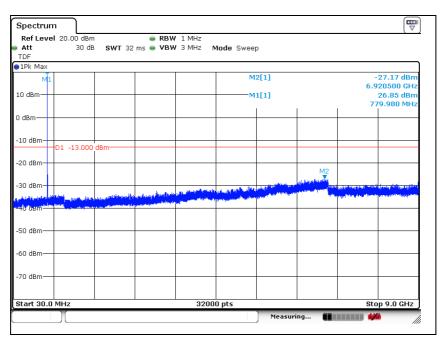
Report Number: F690501/RF-RTL013501 Page: 204 of 248

LTE band 13 (5 账 - QPSK)

Low Channel



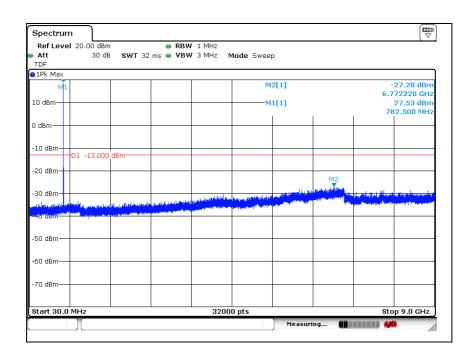
Middle Channel





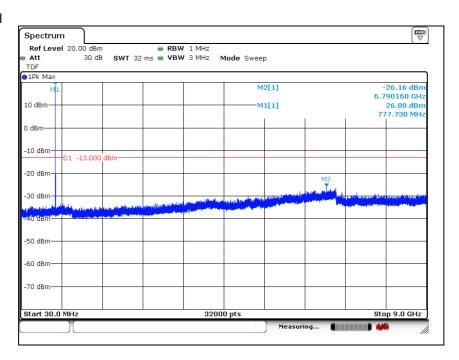
Report Number: F690501/RF-RTL013501 Page: 205 of 248

High Channel



LTE band 13 (10 \m - QPSK)

Middle Channel





Report Number: F690501/RF-RTL013501 Page: 206 of 248

7. Band Edge

7.1. 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) dB.
- §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) dB.
- §27.53(c)(2), on any frequency outside the 776-788 Mb band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.
- \$27.53(h)(1), for operations in the 1 695-1 710 Mb, 1 710-1 755 Mb, 1 755-1 780 Mb, 1 915-1 920 Mb, 1 995-2 000 Mb, 2 000-2 020 Mb, 2 110-2 155 Mb, 2 155-2 180 Mb, and 2 180-2 200 Mb 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) dB.

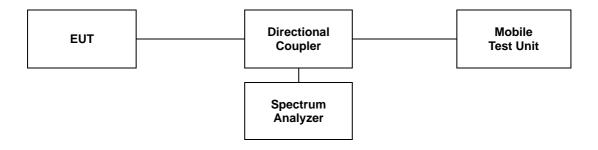


Report Number: F690501/RF-RTL013501 Page: 207 of 248

7.2. Test Procedure

The test follows section 6.0 of FCC KDB Publication 971168 D01 v03r01.

- a. Span was set large enough so as to capture all out of band emissions near the band edge.
- b. RBW ≥ 1 % of OBW
- c. $VBW \ge 3 \times RBW$.
- d. Detector = RMS.
- e. Trace mode = Average.
- f. Sweep time = Auto.
- g. The trace was allowed to stabilize.
- h. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.



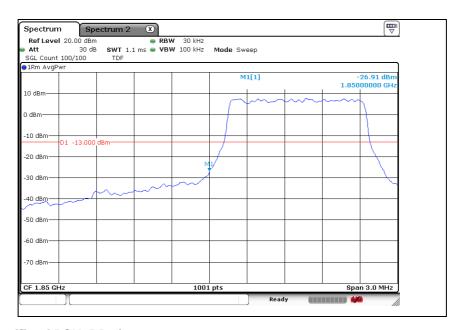


Report Number: F690501/RF-RTL013501 Page: 208 of 248

7.3. Test Results

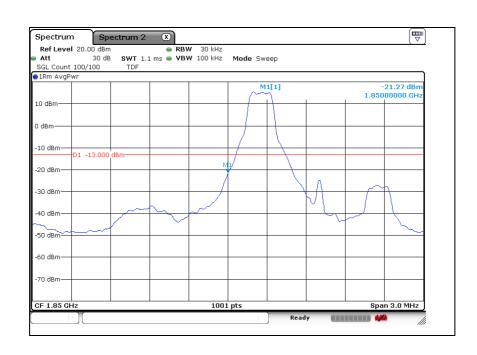
Ambient temperature : **(23** ± **1)** ℃ Relative humidity : 47 % R.H.

Low Channel



LTE band 2 (1.4 \m - QPSK_RB 1)

Low Channel

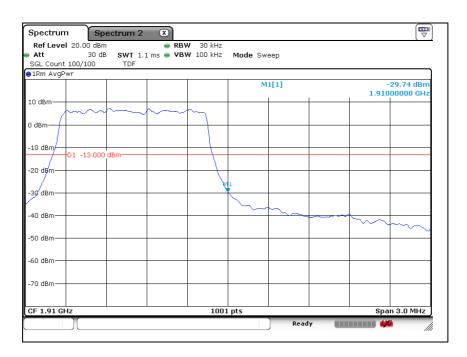




Report Number: F690501/RF-RTL013501 Page: 209 of 248

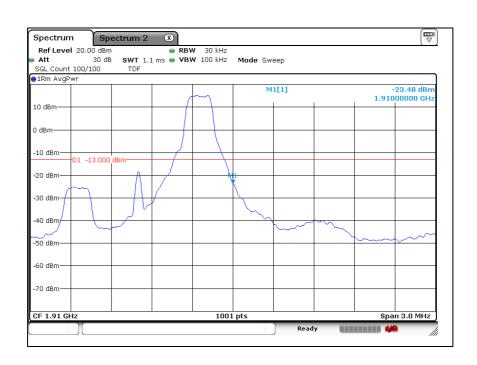
LTE band 2 (1.4 \m - QPSK_RB 6)

High Channel



LTE band 2 (1.4 \https://doi.org/10.1016

High Channel

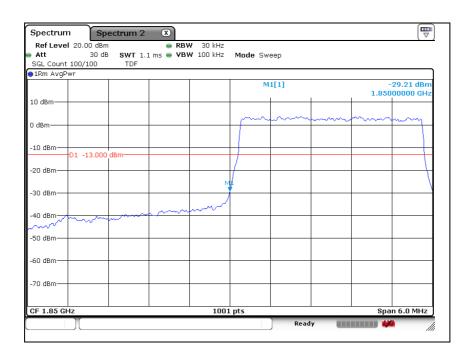




Report Number: F690501/RF-RTL013501 Page: 210 of 248

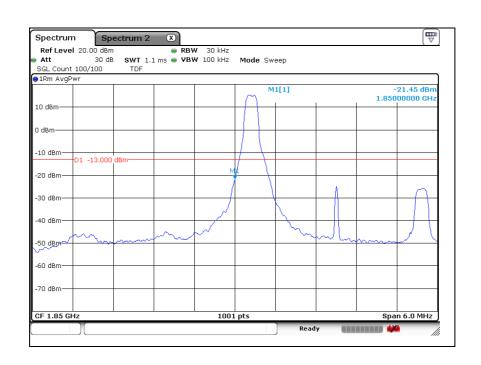
LTE band 2 (3 版 - QPSK_RB 15)

Low Channel



LTE band 2 (3 Mb - QPSK_RB 1)

Low Channel

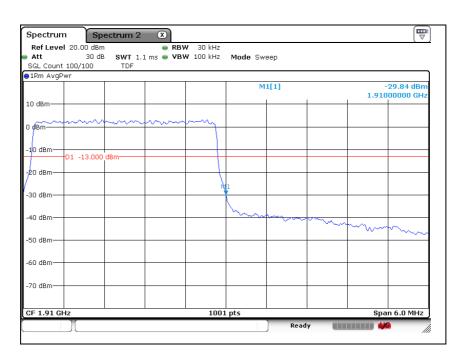




Report Number: F690501/RF-RTL013501 Page: 211 of 248

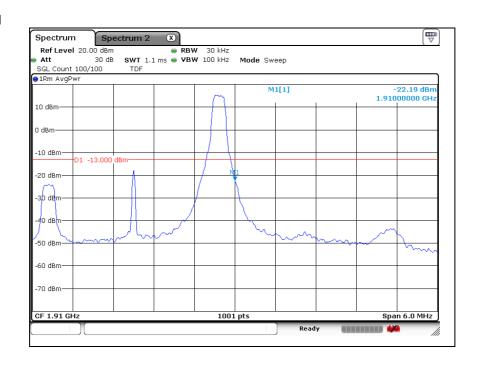
LTE band 2 (3 版 - QPSK_RB 15)

High Channel



LTE band 2 (3 Mb - QPSK_RB 1)

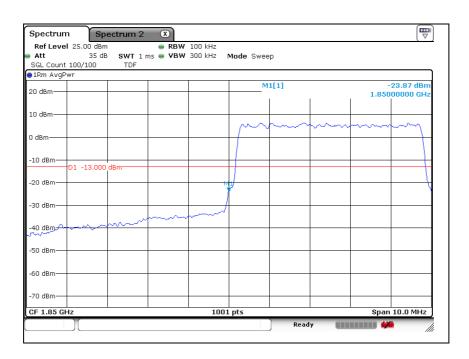
High Channel





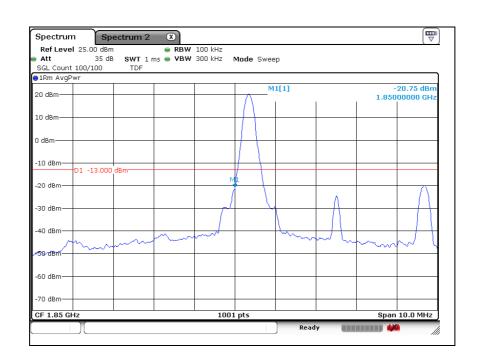
Report Number: F690501/RF-RTL013501 Page: 212 of 248

Low Channel



LTE band 2 (5 Mb - QPSK_RB 1)

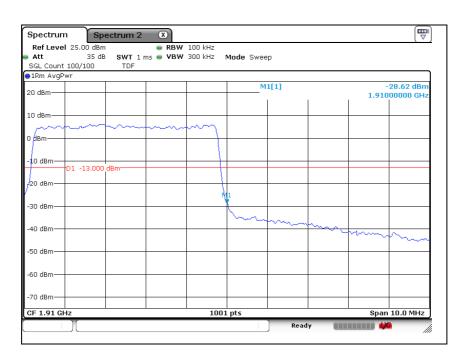
Low Channel





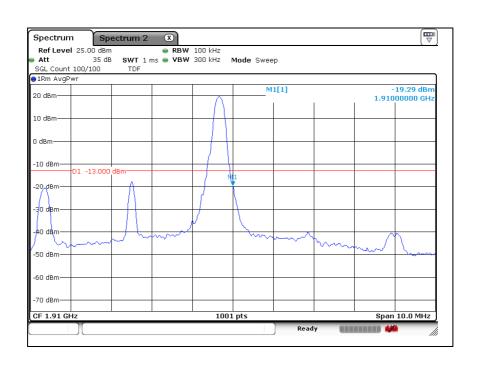
Report Number: F690501/RF-RTL013501 Page: 213 of 248

High Channel



LTE band 2 (5 Mb - QPSK_RB 1)

High Channel

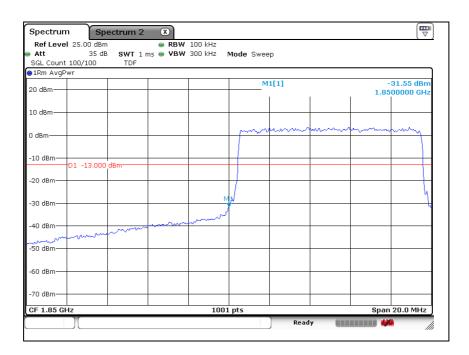




Report Number: F690501/RF-RTL013501 Page: 214 of 248

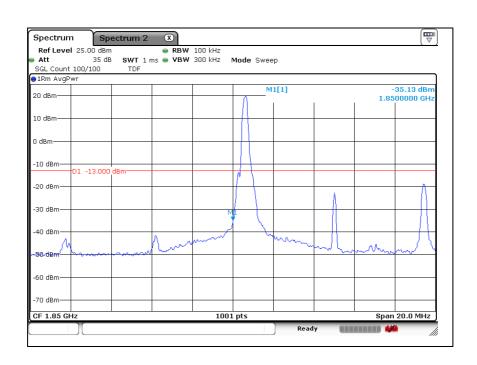
LTE band 2 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 2 (10 \https://doi.org/10.1011/10.10

Low Channel

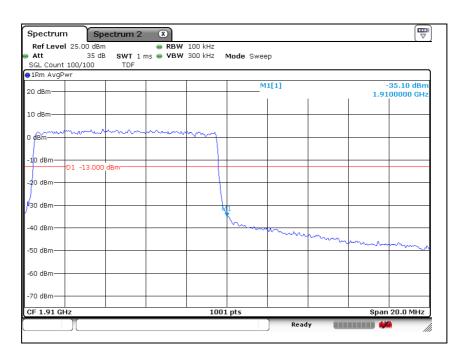




Report Number: F690501/RF-RTL013501 Page: 215 of 248

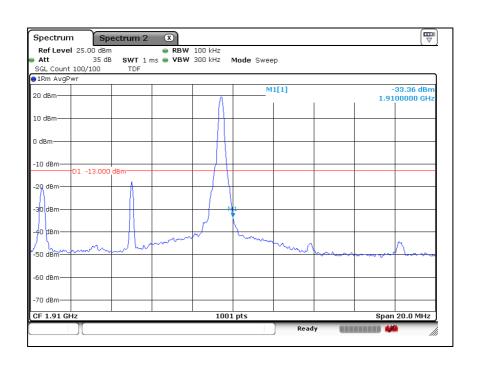
LTE band 2 (10 Mb - QPSK_RB 50)

High Channel



LTE band 2 (10 \https://doi.org/10.1011/10.10

High Channel

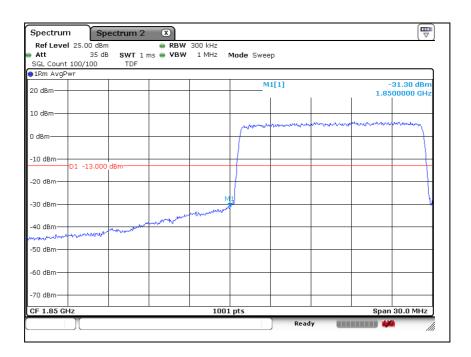




Report Number: F690501/RF-RTL013501 Page: 216 of 248

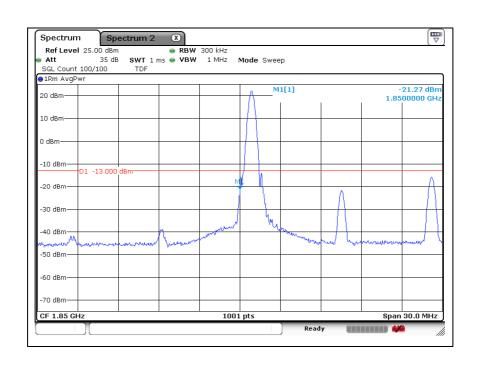
LTE band 2 (15 Mb - QPSK_RB 75)

Low Channel



LTE band 2 (15 \https://example.com/ LTE band 2

Low Channel

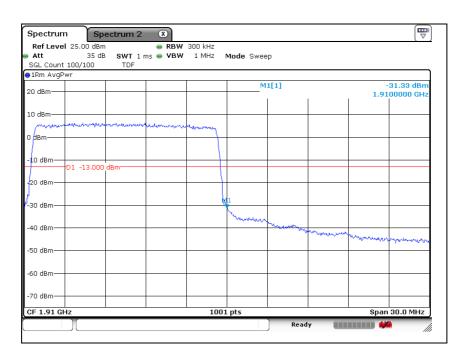




Report Number: F690501/RF-RTL013501 Page: 217 of 248

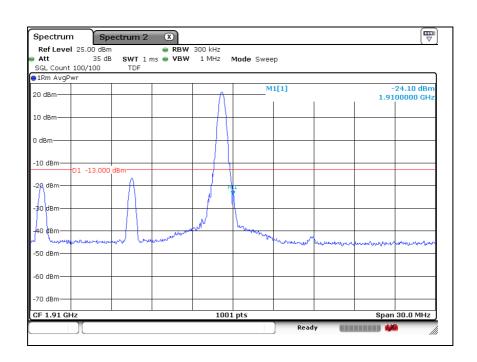
LTE band 2 (15 \(\mu \) - QPSK_RB 75)

High Channel



LTE band 2 (15 \https://example.com/ LTE band 2

High Channel

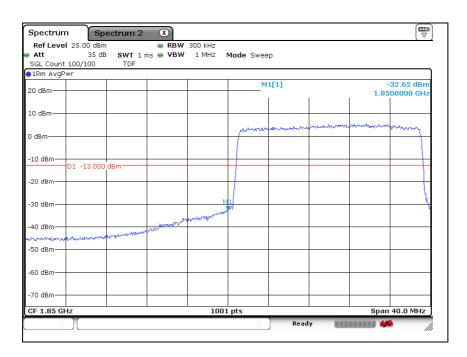




Report Number: F690501/RF-RTL013501 Page: 218 of 248

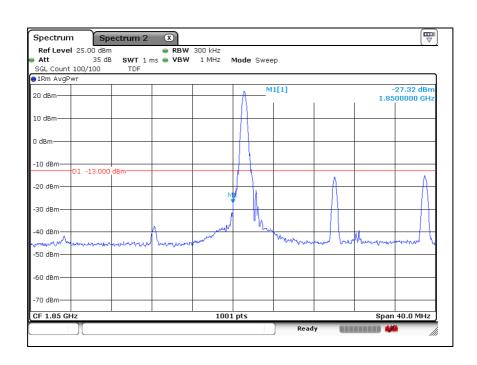
LTE band 2 (20 Mb - QPSK_RB 100)

Low Channel



LTE band 2 (20 \https://doi.org/10.1016/10.10

Low Channel





Report Number: F690501/RF-RTL013501 Page: 219 of 248

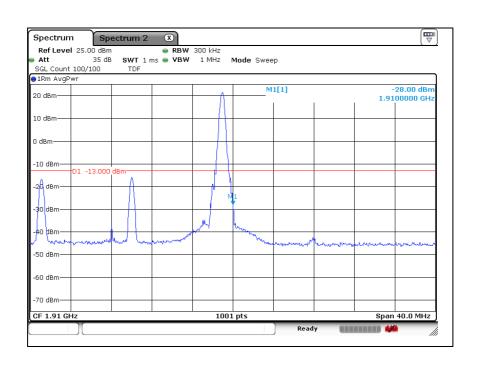
LTE band 2 (20 Mb - QPSK_RB 100)

High Channel



LTE band 2 (20 \https://doi.org/10.1016/10.10

High Channel

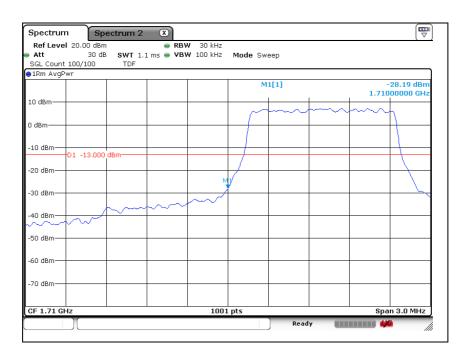




Report Number: F690501/RF-RTL013501 Page: 220 of 248

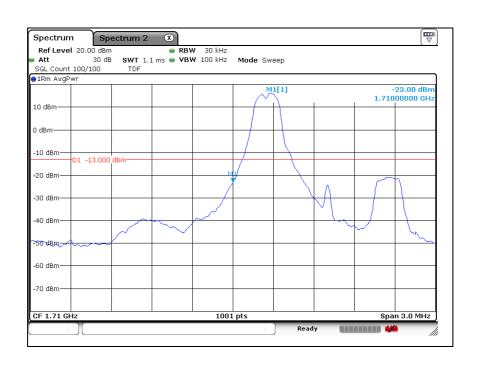
LTE band 4 (1.4 \m - QPSK_RB 6)

Low Channel



LTE band 4 (1.4 \https://doi.org/10.1016

Low Channel

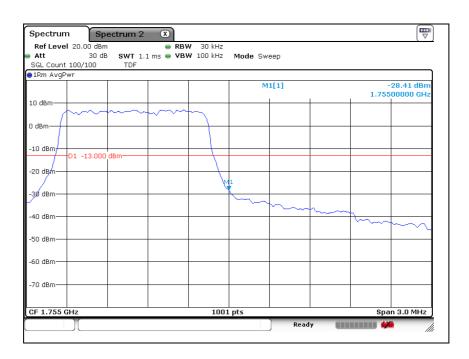




Report Number: F690501/RF-RTL013501 Page: 221 of 248

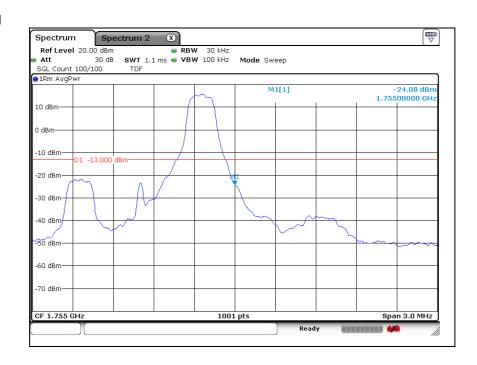
LTE band 4 (1.4 \m - QPSK_RB 6)

High Channel



LTE band 4 (1.4 \https://doi.org/10.1016

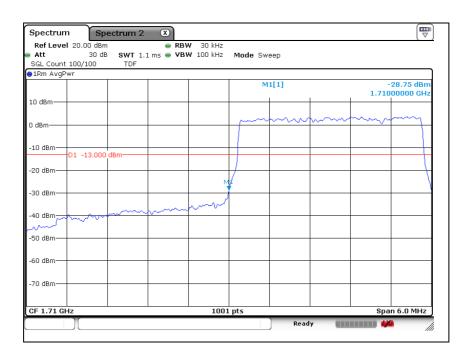
High Channel





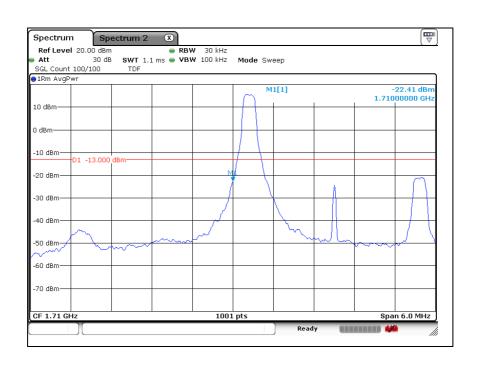
Report Number: F690501/RF-RTL013501 Page: 222 of 248

Low Channel



LTE band 4 (3 Mb - QPSK_RB 1)

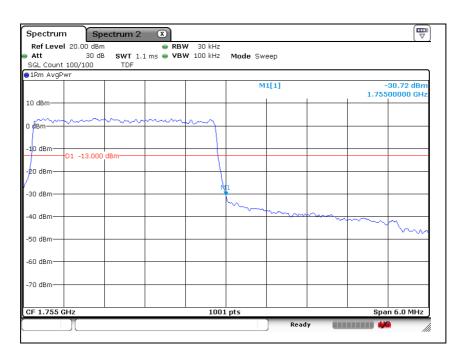
Low Channel





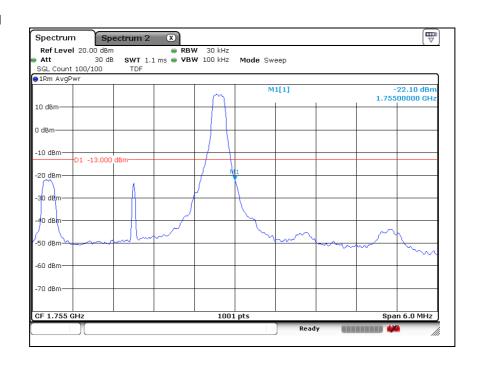
Report Number: F690501/RF-RTL013501 Page: 223 of 248

High Channel



LTE band 4 (3 Mb - QPSK_RB 1)

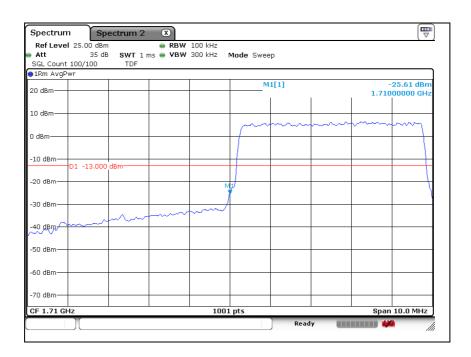
High Channel





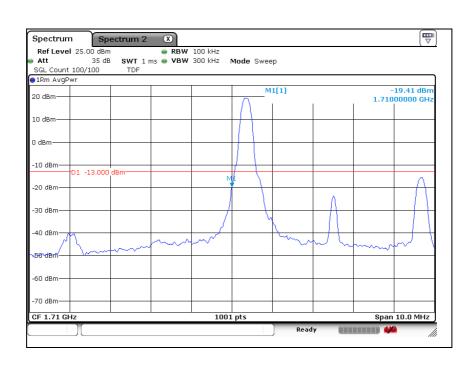
Report Number: F690501/RF-RTL013501 Page: 224 of 248

Low Channel



LTE band 4 (5 Mb - QPSK_RB 1)

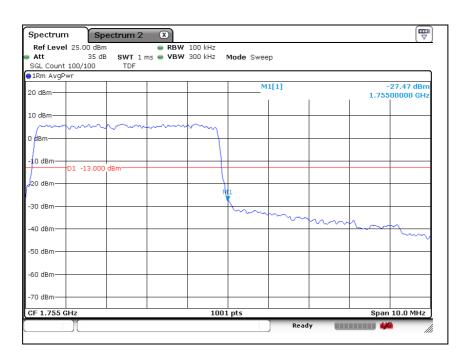
Low Channel





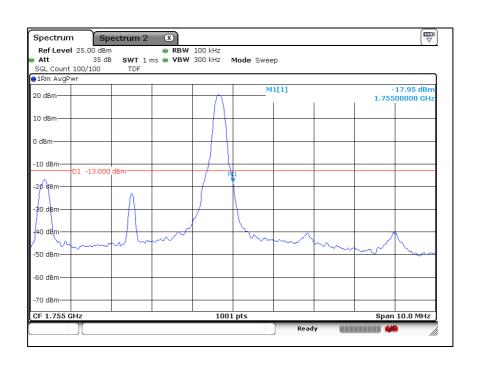
Report Number: F690501/RF-RTL013501 Page: 225 of 248

High Channel



LTE band 4 (5 Mb - QPSK_RB 1)

High Channel

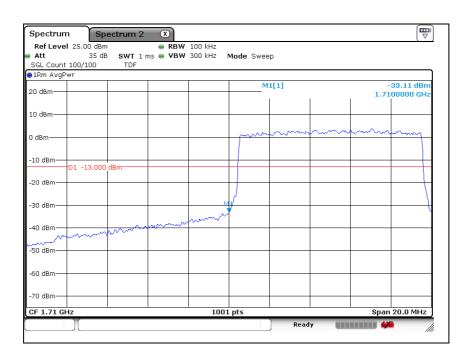




Report Number: F690501/RF-RTL013501 Page: 226 of 248

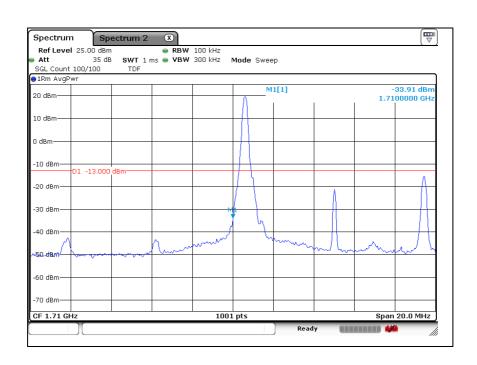
LTE band 4 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 4 (10 \https://doi.org/10.1016/10.10

Low Channel

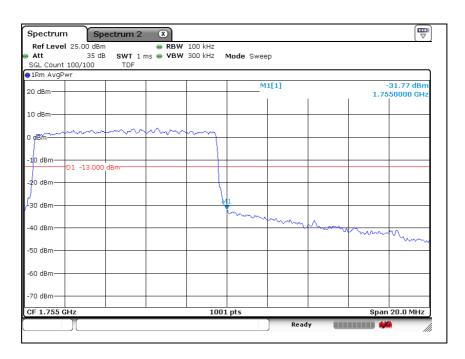




Report Number: F690501/RF-RTL013501 Page: 227 of 248

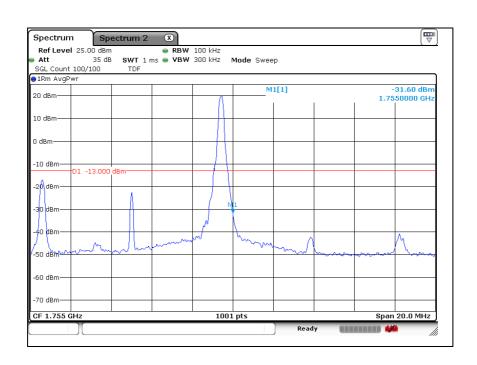
LTE band 4 (10 Mb - QPSK_RB 50)

High Channel



LTE band 4 (10 \https://doi.org/10.1016/10.10

High Channel

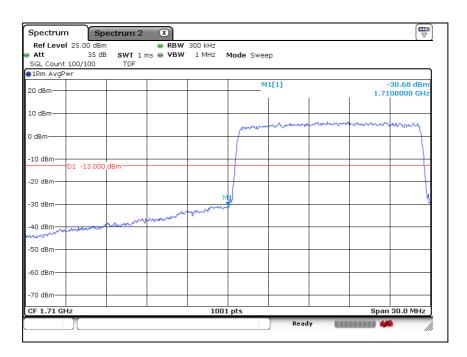




Report Number: F690501/RF-RTL013501 Page: 228 of 248

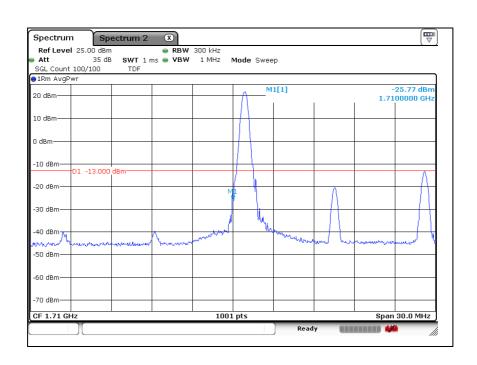
LTE band 4 (15 Mb - QPSK_RB 75)

Low Channel



LTE band 4 (15 \https://example.com/ LTE band 4

Low Channel

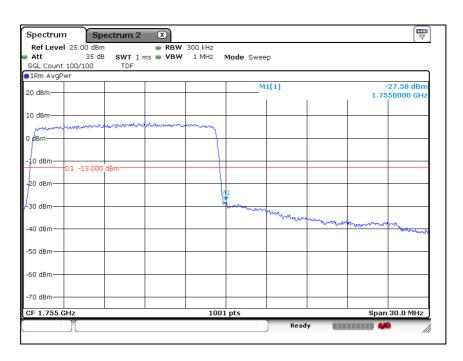




Report Number: F690501/RF-RTL013501 Page: 229 of 248

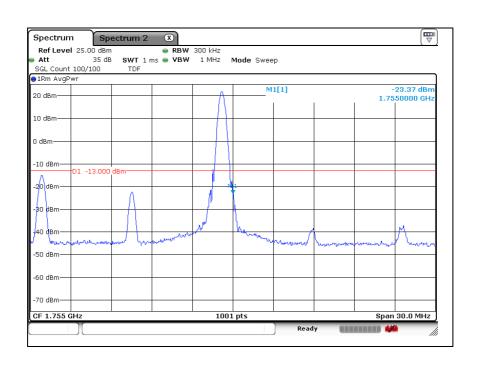
LTE band 4 (15 Mb - QPSK_RB 75)

High Channel



LTE band 4 (15 \https://example.com/ LTE band 4

High Channel

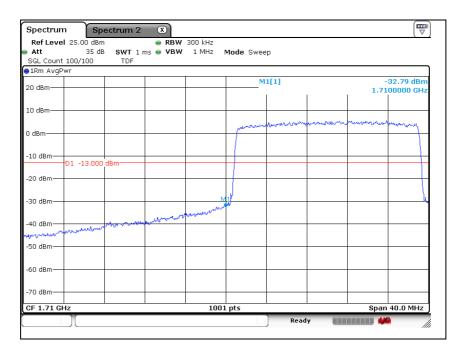




Report Number: F690501/RF-RTL013501 Page: 230 of 248

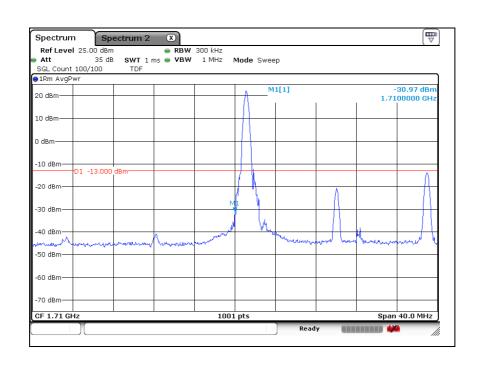
LTE band 4 (20 Mb - QPSK_RB 100)

Low Channel



LTE band 4 (20 \(\mathbb{M}\mathbb{D} - QPSK_RB 1 \)

Low Channel

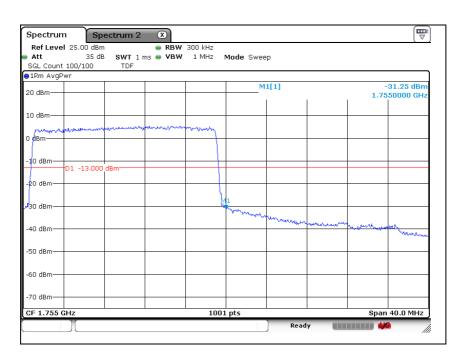




Report Number: F690501/RF-RTL013501 Page: 231 of 248

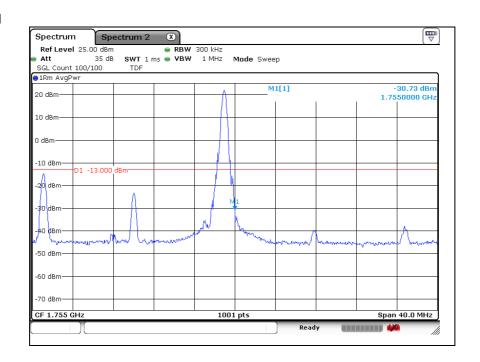
LTE band 4 (20 Mb - QPSK_RB 100)

High Channel



LTE band 4 (20 \(\mathbb{M}\mathbb{D} - QPSK_RB 1 \)

High Channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation.

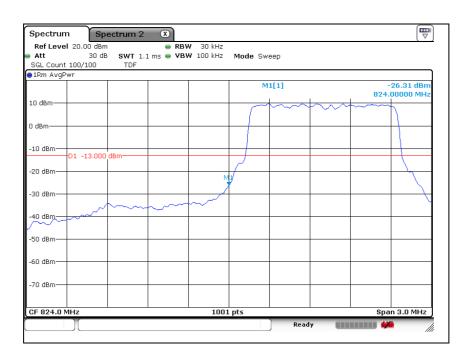
RTT5041-19(2017.07.10)(0)



Report Number: F690501/RF-RTL013501 Page: 232 of 248

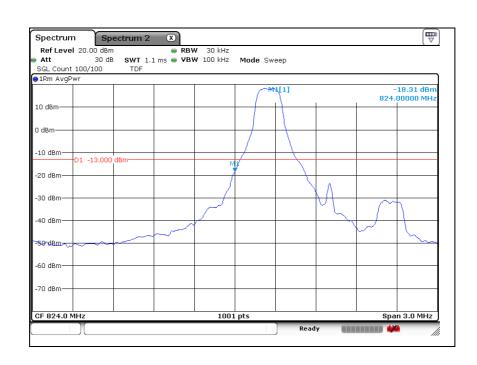
LTE band 5 (1.4 \mathbb{Mb} - QPSK_RB 6)

Low Channel



LTE band 5 (1.4 \https://doi.org/10.1016

Low Channel

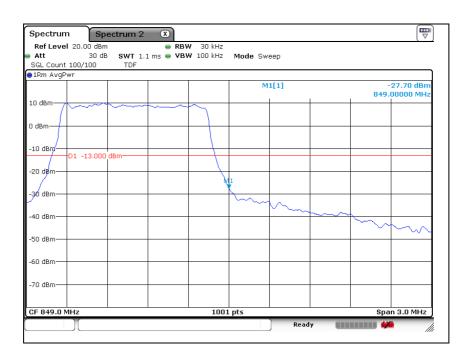




Report Number: F690501/RF-RTL013501 Page: 233 of 248

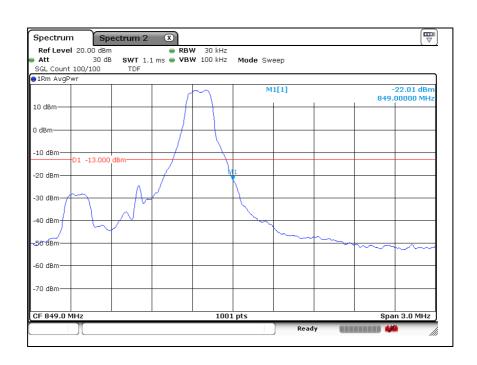
LTE band 5 (1.4 \mathbb{Mb} - QPSK_RB 6)

High Channel



LTE band 5 (1.4 \https://doi.org/10.1016

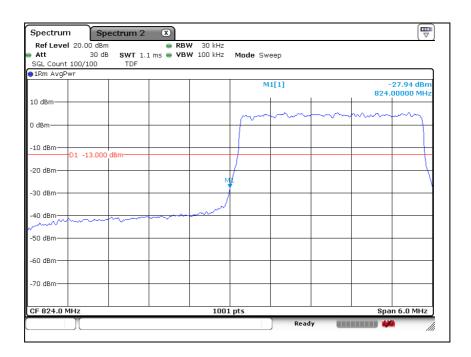
High Channel





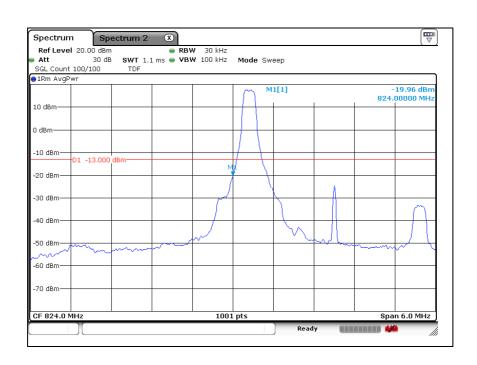
Report Number: F690501/RF-RTL013501 Page: 234 of 248

Low Channel



LTE band 5 (3 Mb - QPSK_RB 1)

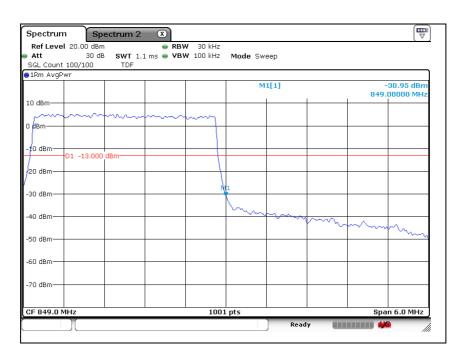
Low Channel





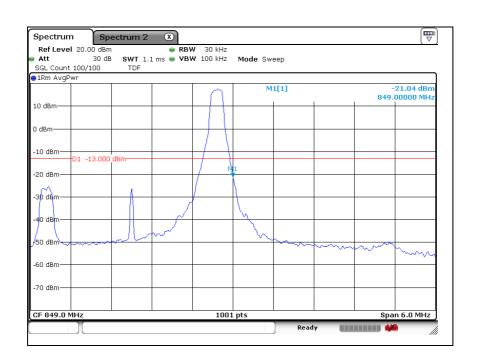
Report Number: F690501/RF-RTL013501 Page: 235 of 248

High Channel



LTE band 5 (3 Mb - QPSK_RB 1)

High Channel

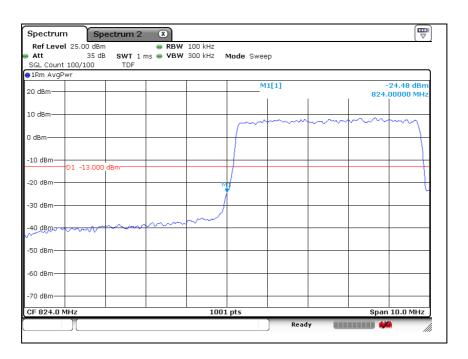




Report Number: F690501/RF-RTL013501 Page: 236 of 248

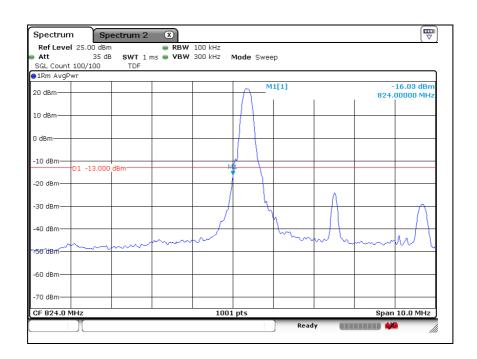
LTE band 5 (5 版 - QPSK_RB 25)

Low Channel



LTE band 5 (5 Mb - QPSK_RB 1)

Low Channel

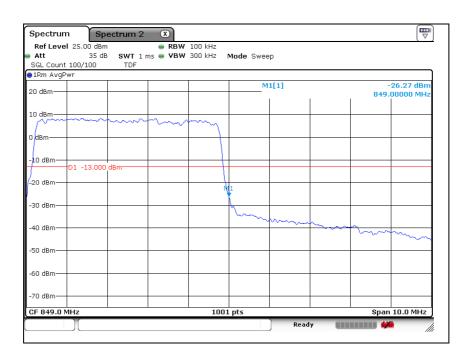




Report Number: F690501/RF-RTL013501 Page: 237 of 248

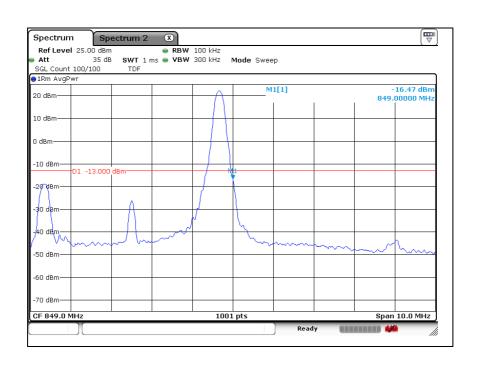
LTE band 5 (5 版 - QPSK_RB 25)

High Channel



LTE band 5 (5 Mb - QPSK_RB 1)

High Channel

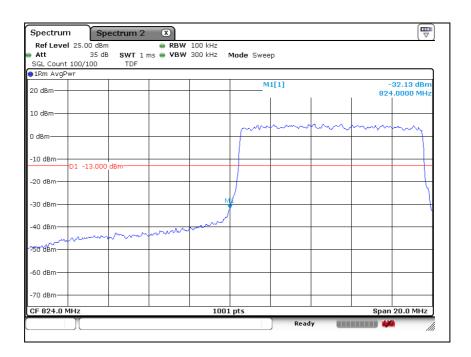




Report Number: F690501/RF-RTL013501 Page: 238 of 248

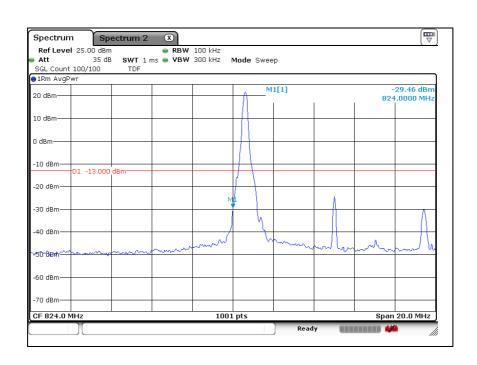
LTE band 5 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 5 (10 \(\mathbb{M}\mathbb{L} - QPSK_RB 1 \)

Low Channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation.

RTT5041-19(2017.07.10)(0)



Report Number: F690501/RF-RTL013501 Page: 239 of 248

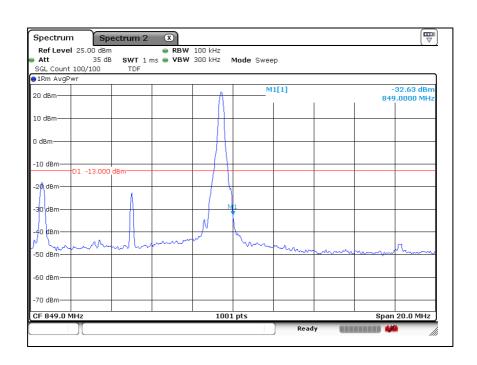
LTE band 5 (10 Mb - QPSK_RB 50)

High Channel



LTE band 5 (10 \(\mathbb{M}\mathbb{L} - QPSK_RB 1 \)

High Channel

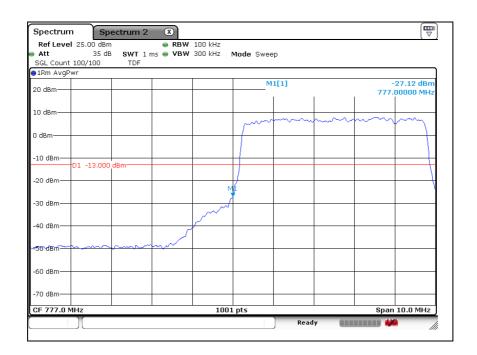




Report Number: F690501/RF-RTL013501 Page: 240 of 248

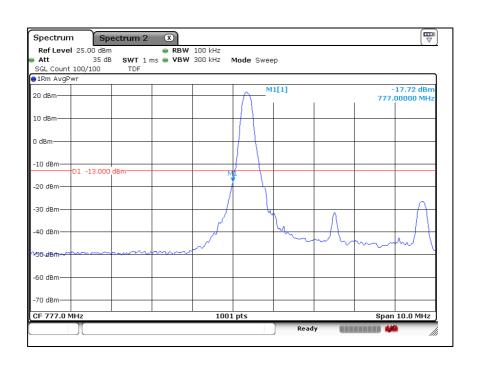
LTE band 13 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 13 (5 版 - QPSK_RB 1)

Low Channel

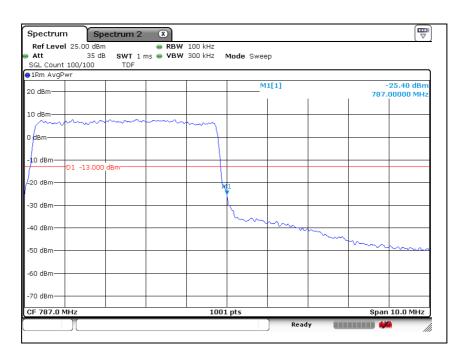




Report Number: F690501/RF-RTL013501 Page: 241 of 248

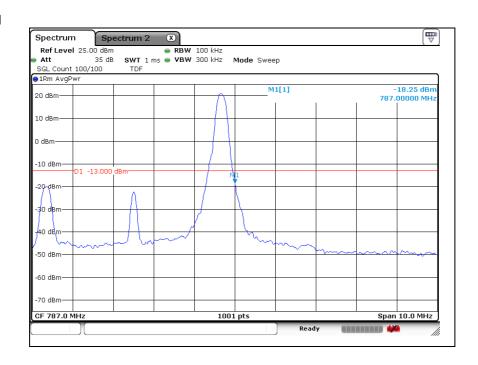
LTE band 13 (5 Mb - QPSK_RB 25)

High Channel



LTE band 13 (5 版 - QPSK_RB 1)

High Channel

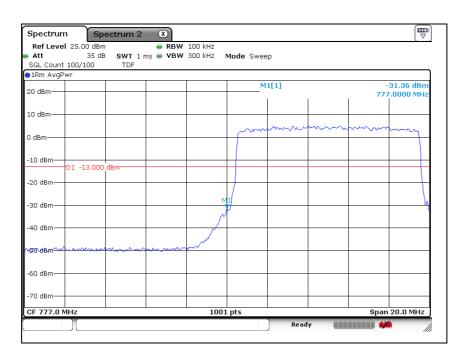




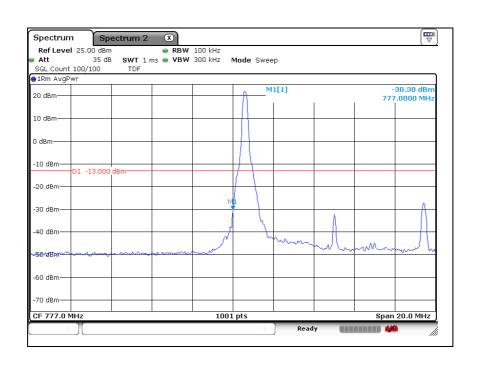
Report Number: F690501/RF-RTL013501 Page: 242 of 248

LTE band 13 (10 \(\mu \) - QPSK_RB 50)

Low Channel



Low Channel

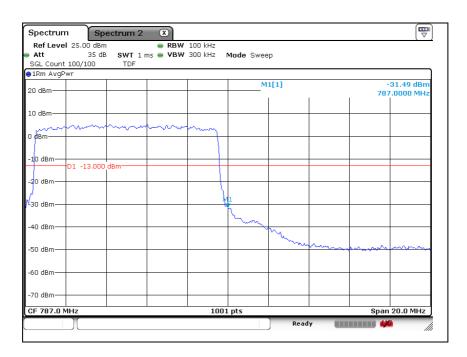




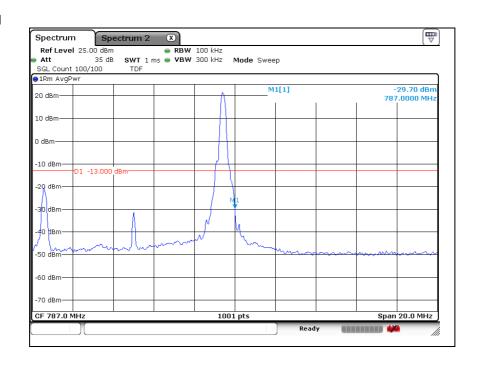
Report Number: F690501/RF-RTL013501 Page: 243 of 248

LTE band 13 (10 \(\mu \) - QPSK_RB 50)

High Channel



High Channel





Report Number: F690501/RF-RTL013501 Page: 244 of 248

8. Frequency Stability

8.1. Limit

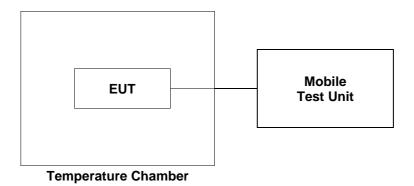
- §2.1055 (a), §2.1055 (d) & following:
- <u>§22.355</u>, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.

For Mobile devices operating in the 824 to 849 Mb band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

- §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
- §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

8.2. Test Procedure

- 1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Mobile Test Unit via feed-through attenuators.
- 2. The EUT was placed inside the temperature chamber.
- 3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from Mobile Test Unit.





Report Number: F690501/RF-RTL013501 Page: 245 of 248

8.3. Test Results

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

LTE band 2 at middle channel

Reference Frequency: 1 880.0 Mb

Frequency Stability versus Temperature

Environment	Power	Frequency Measure	with Time Elapse
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
50		-4	-0.002 1
40		-1	-0.000 5
30	4.0	2	0.001 1
23		-6	-0.003 2
10		1	0.000 5
0		2	0.001 1
-10		-3	-0.001 6
-20		2	0.001 1
-30		-4	-0.002 1

Frequency Stability versus Power Supply

Environment	iment Power		ure with Time Elapse	
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm	
22	4.6	-5	-0.002 7	
23	3.4	-3	-0.001 6	



Report Number: F690501/RF-RTL013501 Page: 246 248 of

LTE band 4 at middle channel

Reference Frequency: 1 732.5 M	Reference	Frequency:	1	732.5	MHz
--------------------------------	-----------	------------	---	-------	-----

Frequency Stability versus Temperature

Environment			
Temperature (°C)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
50		5	0.002 9
40		1	0.000 6
30	4.0	-3	-0.001 7
23		-1	-0.000 6
10		2	0.001 2
0		4	0.002 3
-10		-5	-0.002 9
-20		2	0.001 2
-30		-3	-0.001 7

Frequency Stability versus Power Supply

Environment	Power	Frequency Measure with Time Elaps	
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
22	4.6	2	0.001 2
23	3.4	-1	-0.000 6



Report Number: F690501/RF-RTL013501 Page: 247 248 of

LTE band 5 at middle channel

Reference Frequency: 836.5 Mb

Frequency Stability versus Temperature

Environment	Power	Frequency Measure with Time Elapse	
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
50		-3	-0.003 6
40		1	0.001 2
30	4	2	0.002 4
23		2	0.002 4
10		2	0.002 4
0		-1	-0.001 2
-10		-3	-0.003 6
-20		1	0.001 2
-30		-3	-0.003 6

Frequency Stability versus Power Supply

Environment	Power	Frequency Measure with Time Ela	
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
23	4.6	-2	-0.002 4
	3.4	1	0.001 2



Report Number: F690501/RF-RTL013501 Page: 248 248 of

LTE band 13 at middle channel

Reference Frequency: 782.0 Mb

Frequency Stability versus Temperature

Environment	Power	Frequency Measure with Time Elapse	
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
50		-3	-0.003 8
40		-2	-0.002 6
30		2	0.002 6
23		-4	-0.005 1
10	4	-1	-0.001 3
0		1	0.001 3
-10		-2	-0.002 6
-20		4	0.005 1
-30		2	0.002 6

Frequency Stability versus Power Supply

Environment	Power	Frequency Measure	with Time Elapse
Temperature (℃)	Supplied (V _{dc})	Frequency Error (Hz)	ppm
22	4.6	-2	-0.002 6
23	3.4	-3	-0.003 8

- End of the Test Report -