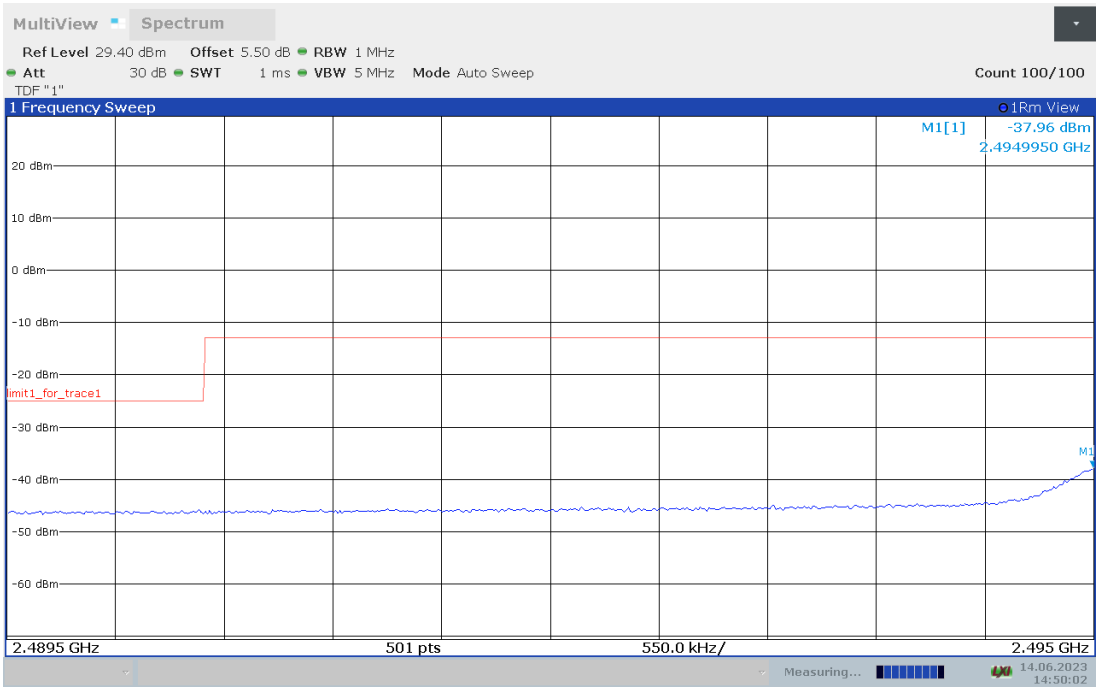
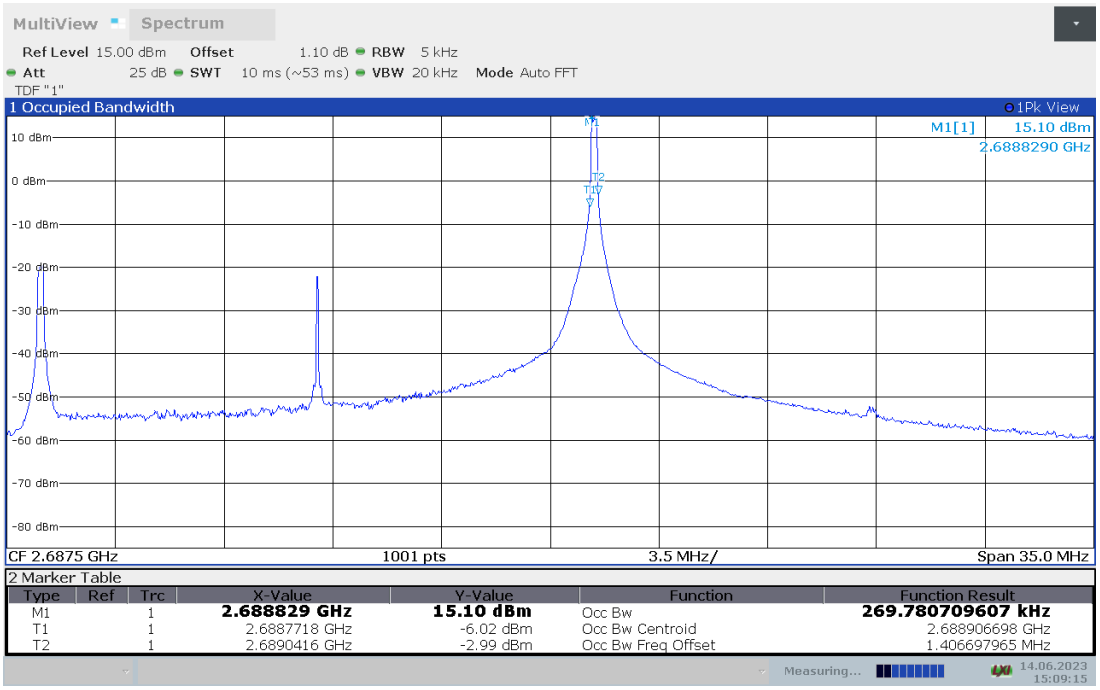
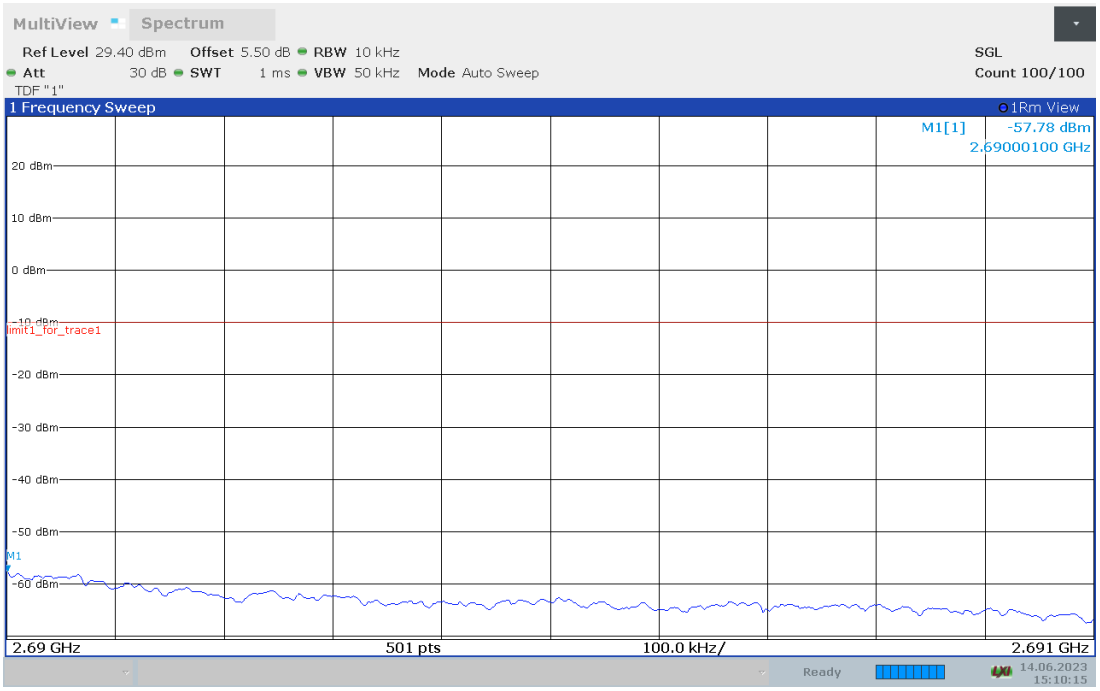
LOW BAND EDGE BLOCK-1RB-LOW_offset



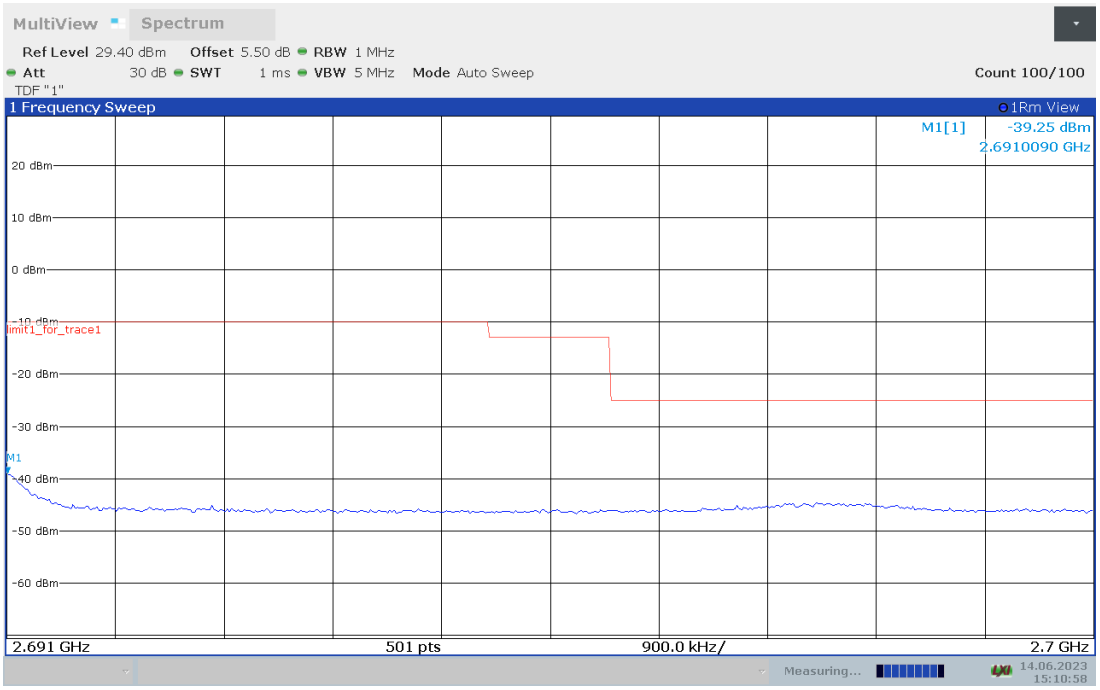
OBW: 1RB-HIGH_offset



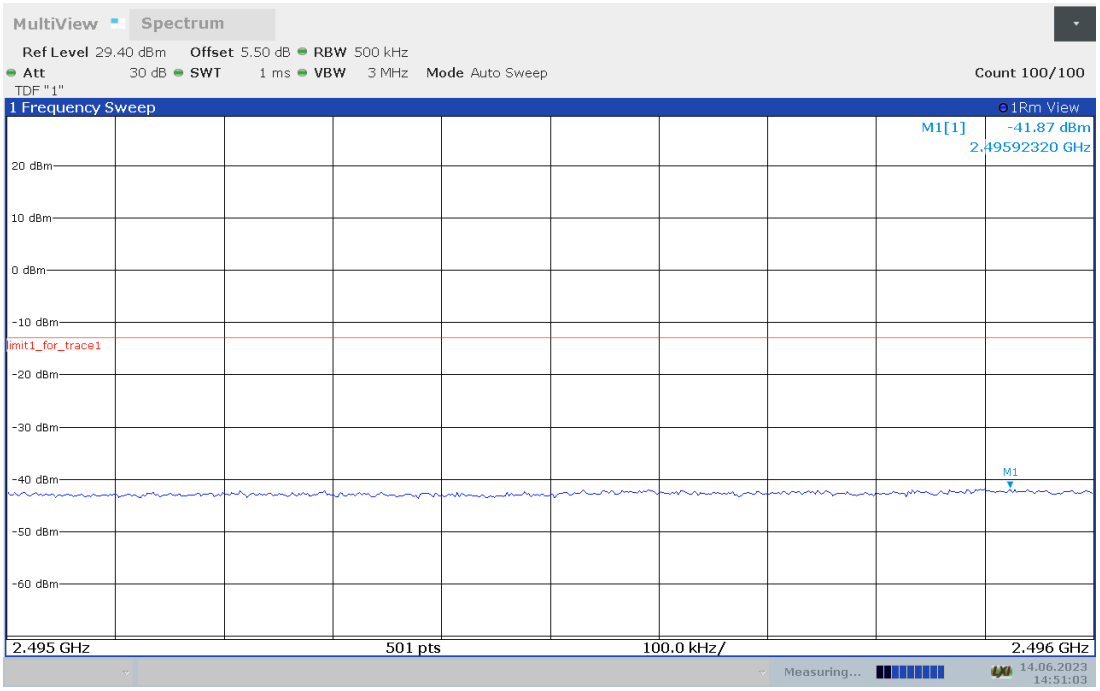
HIGH BAND EDGE BLOCK-1RB-HIGH_offset



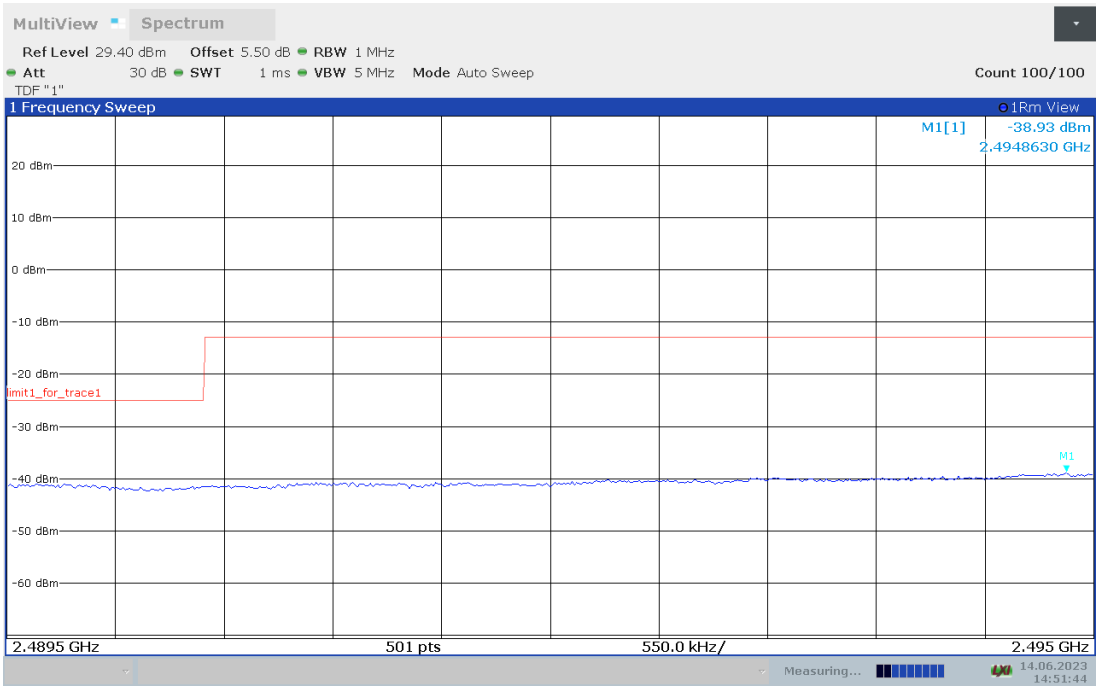
HIGH BAND EDGE BLOCK-1RB-HIGH_offset



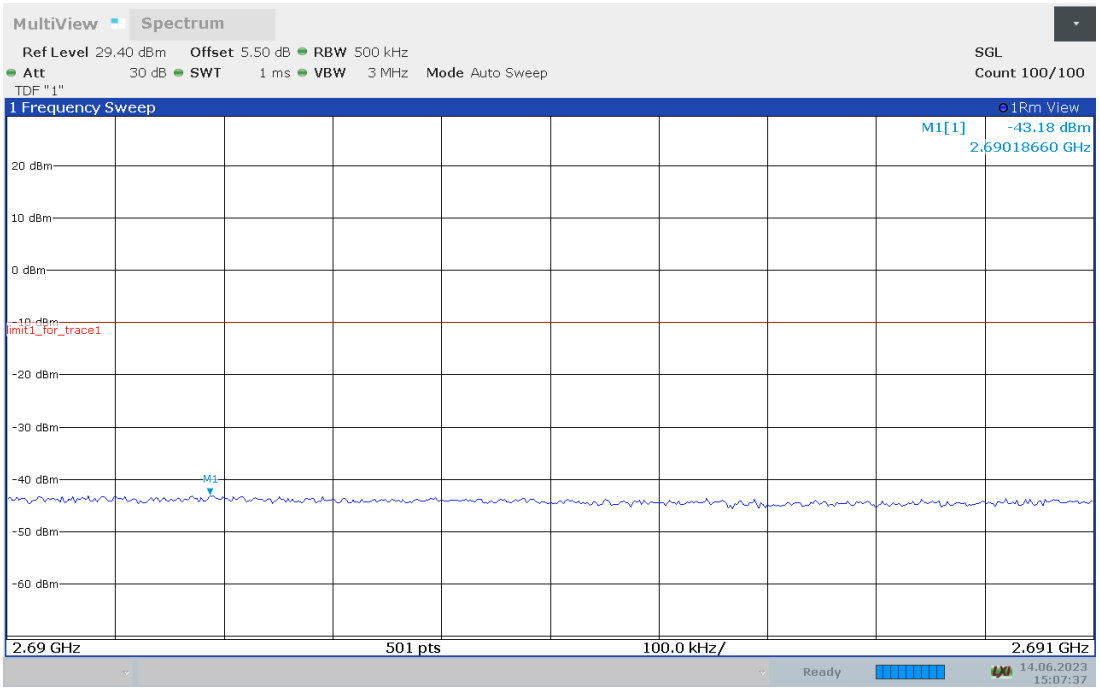
LOW BAND EDGE BLOCK-20M-100%RB



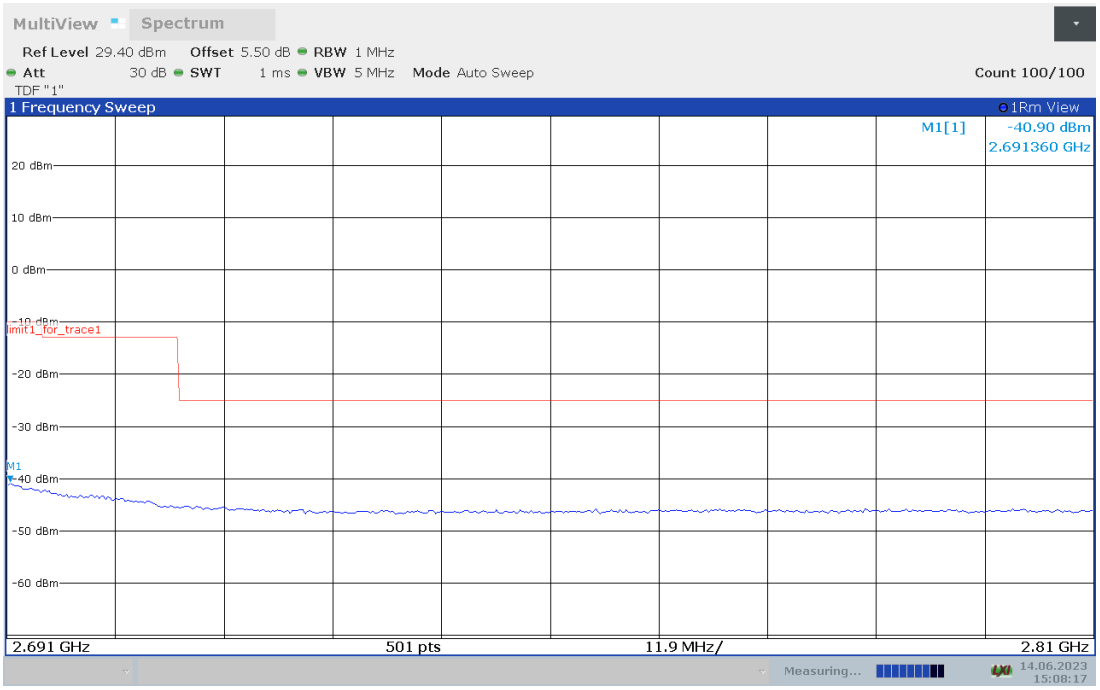
LOW BAND EDGE BLOCK-20M-100%RB



HIGH BAND EDGE BLOCK-20M-100%RB



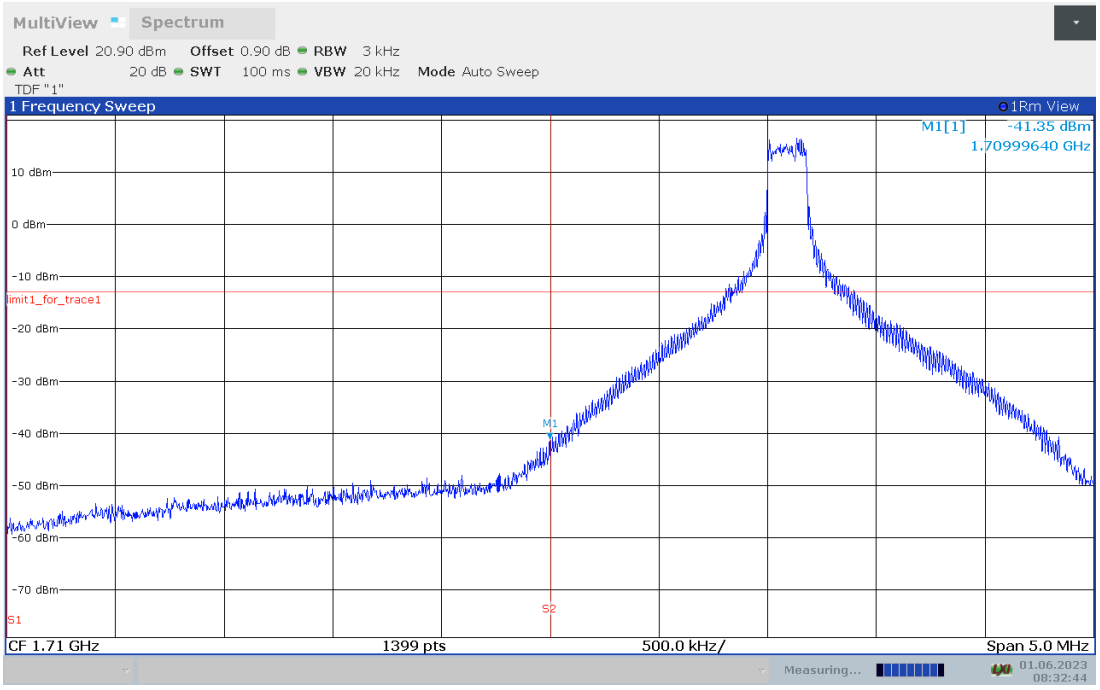
HIGH BAND EDGE BLOCK-20M-100%RB



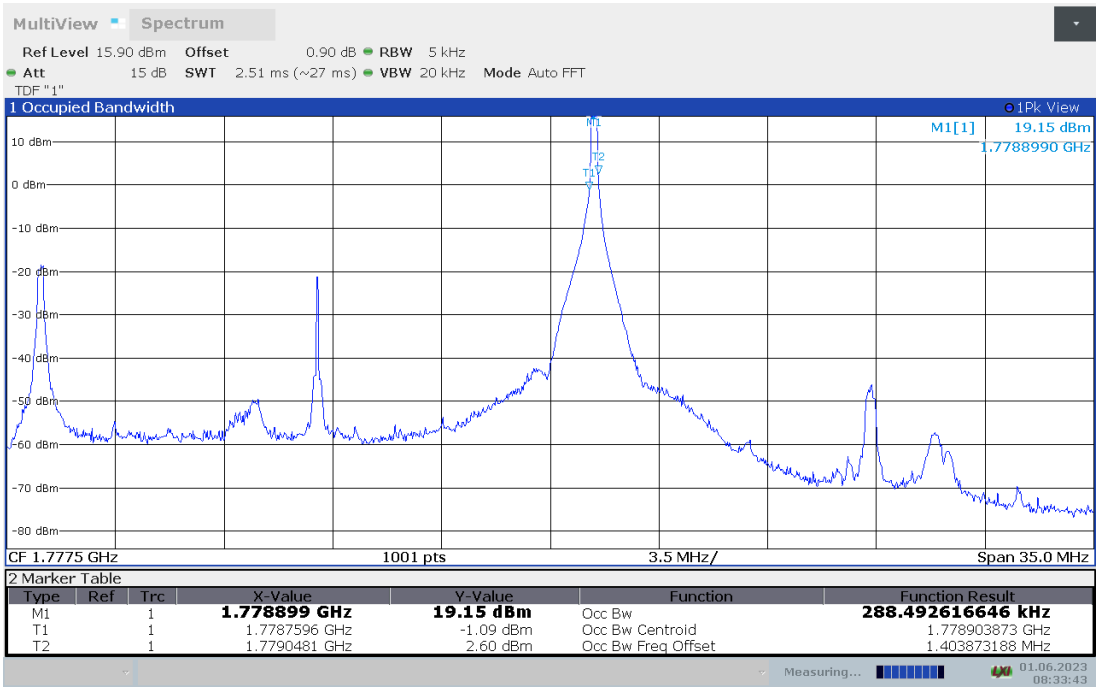
LTE band 66

OBW: 1RB-LOW_offset

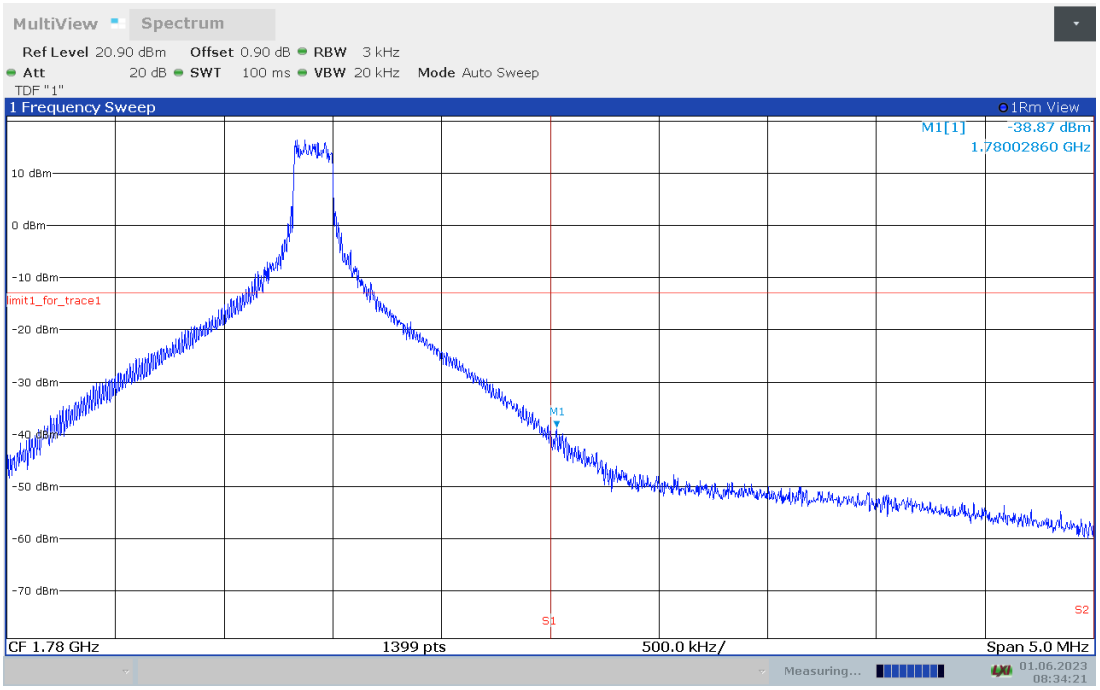
LOW BAND EDGE BLOCK-1RB-LOW_offset



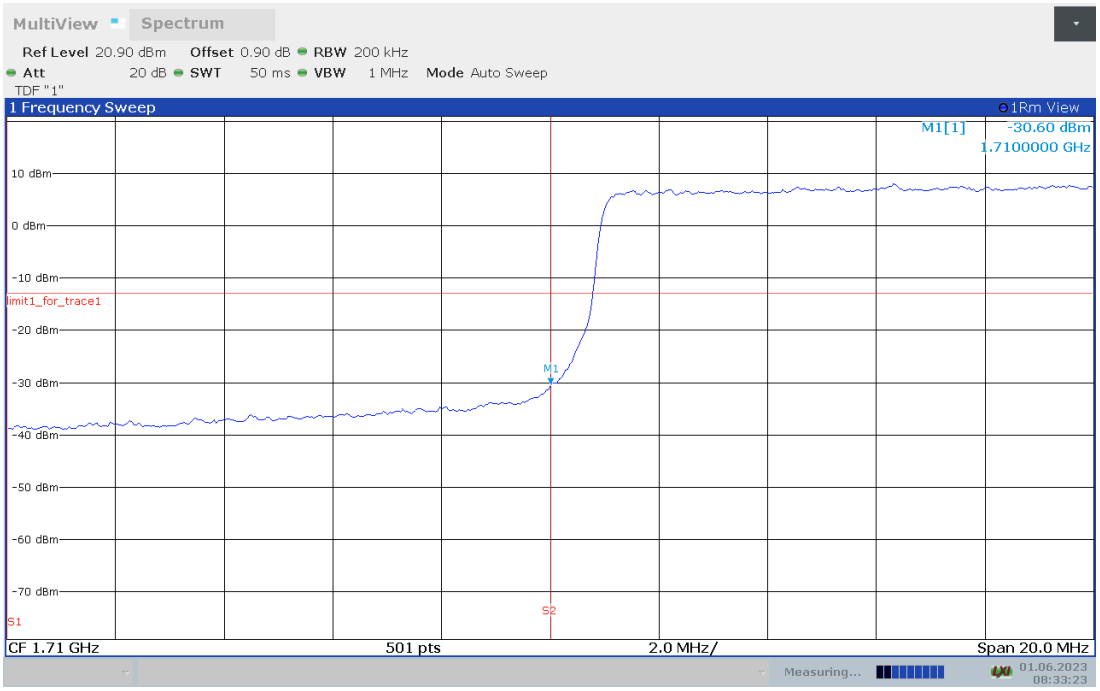
OBW: 1RB-HIGH_offset



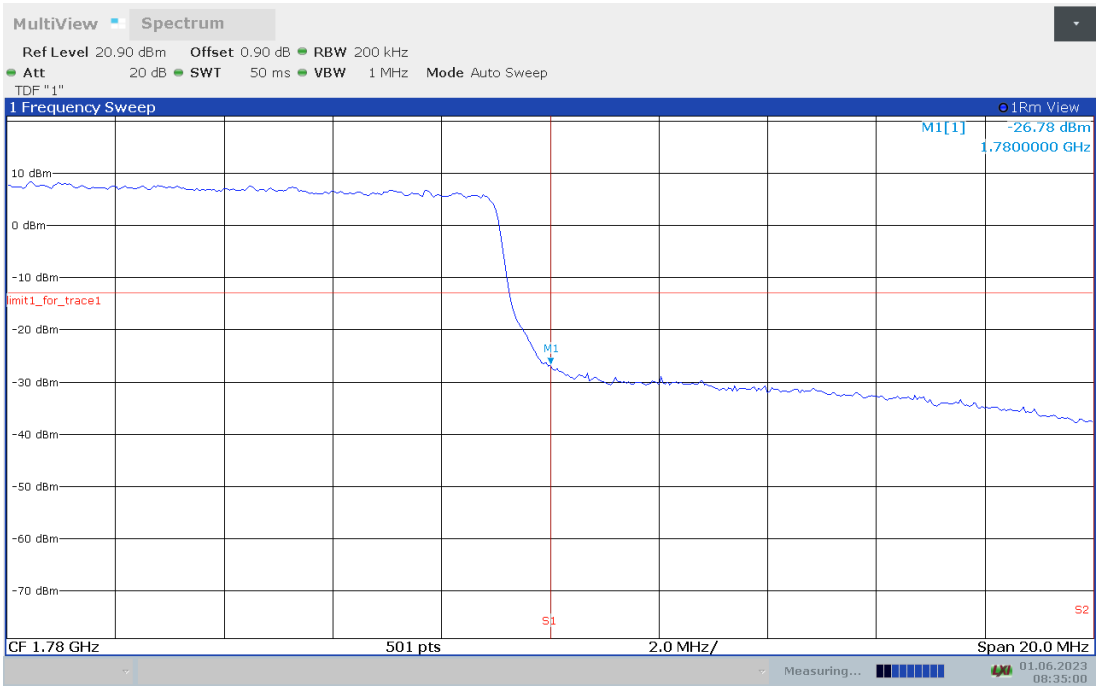
HIGH BAND EDGE BLOCK-1RB-HIGH_offset



LOW BAND EDGE BLOCK-20M-100%RB

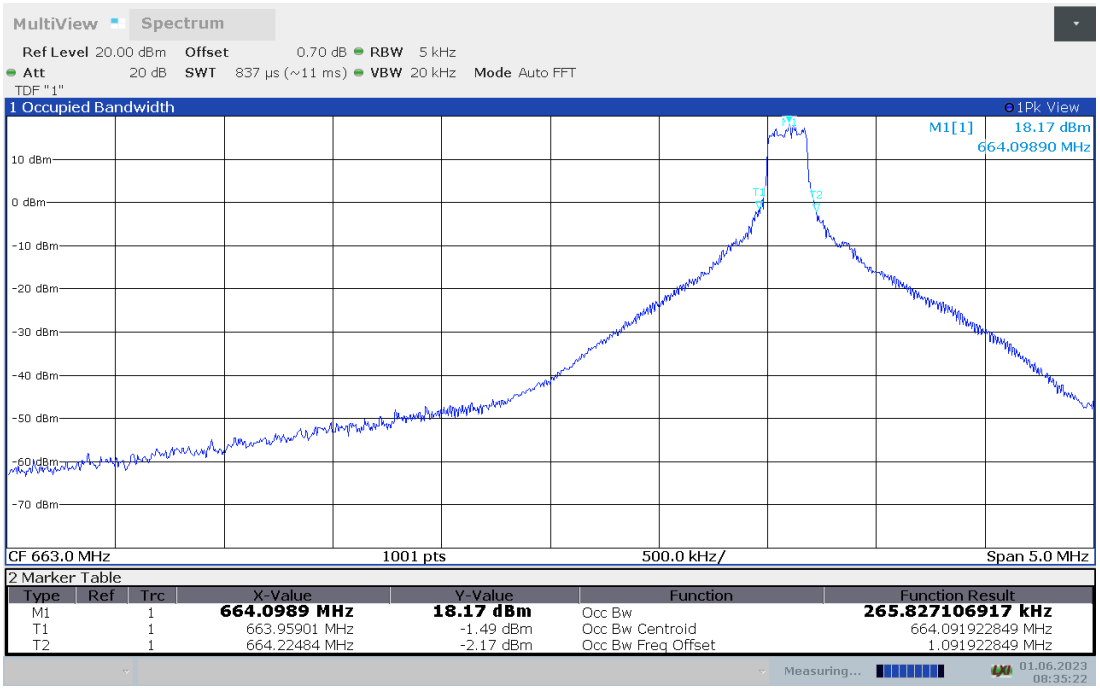


HIGH BAND EDGE BLOCK-20M-100%RB

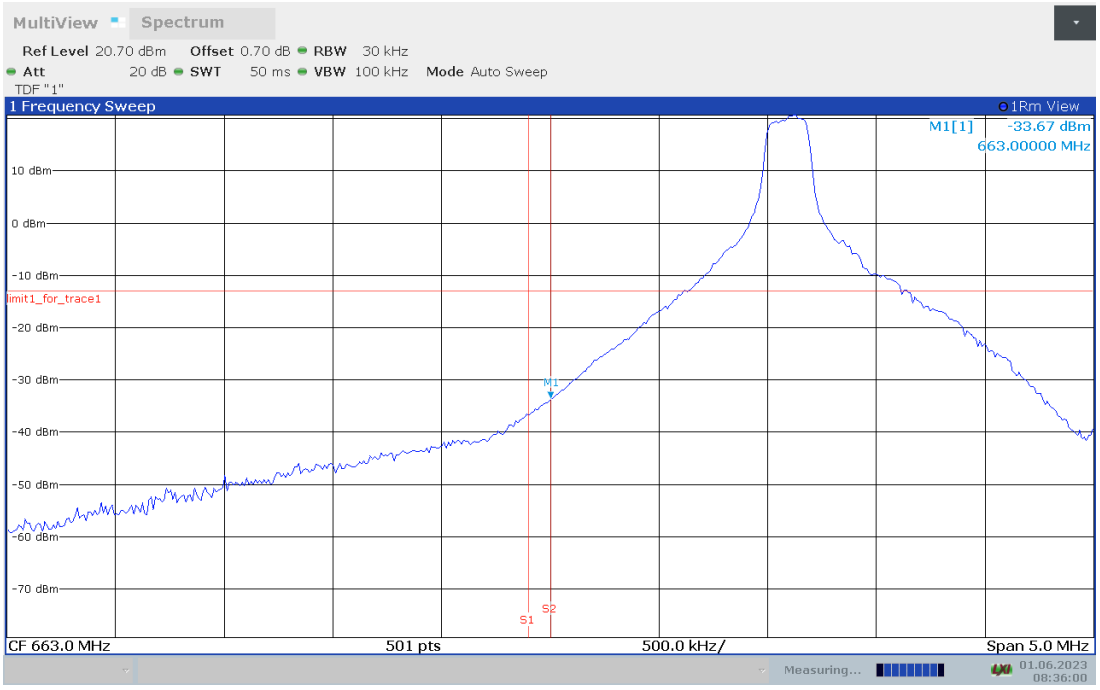


LTE band 71

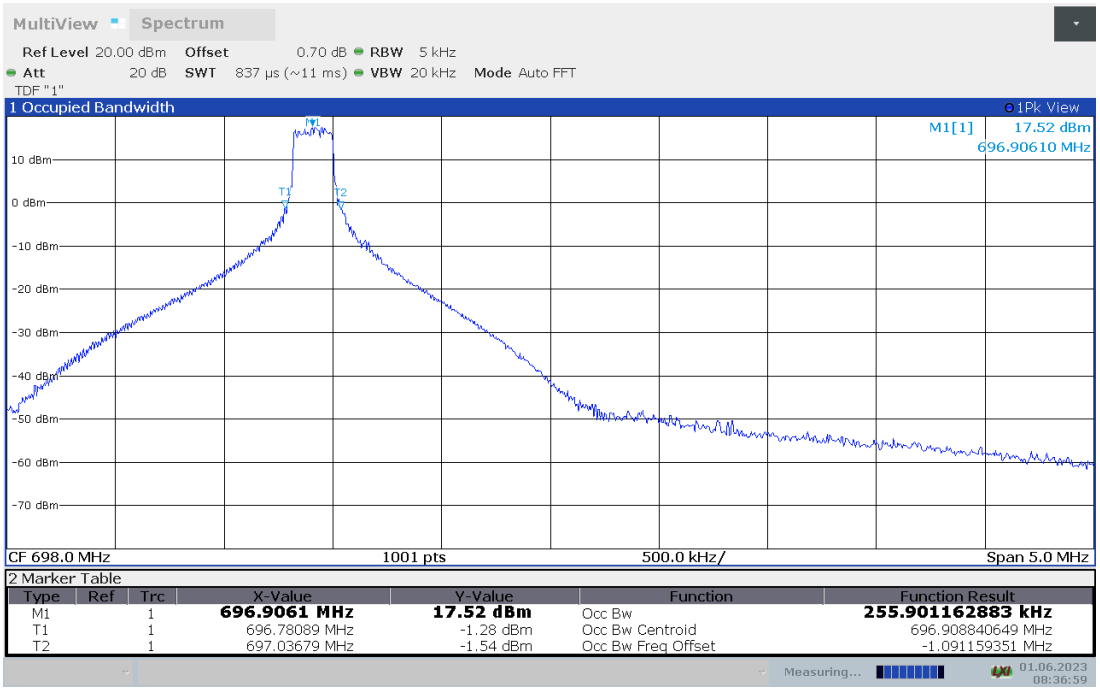
OBW: 1RB-LOW_offset



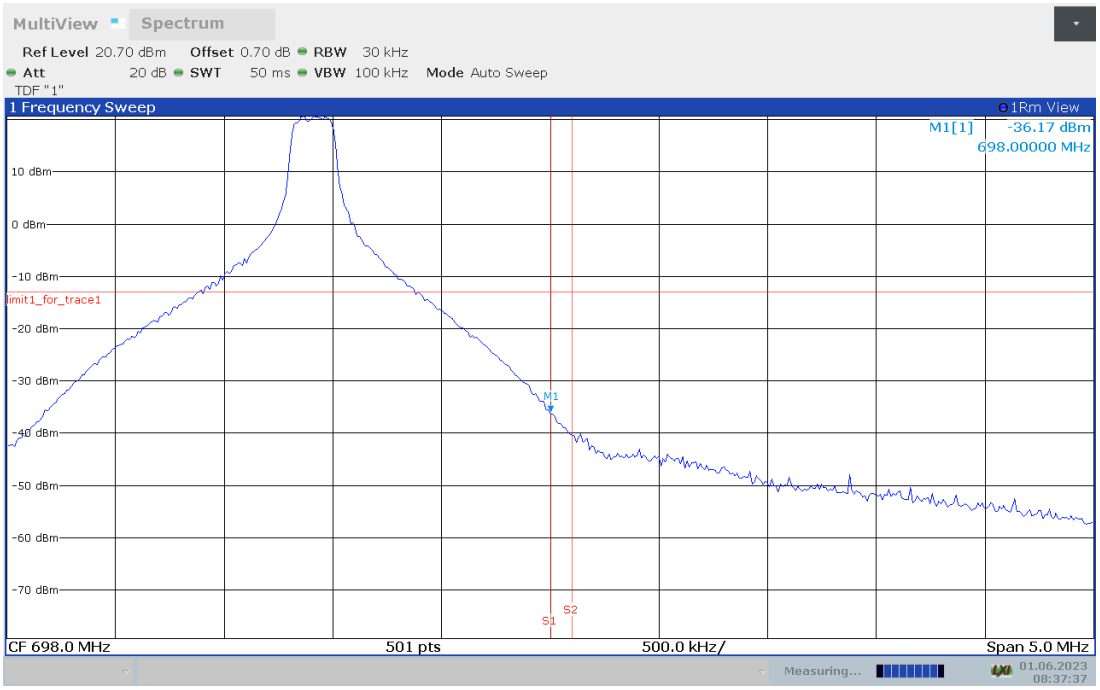
LOW BAND EDGE BLOCK-1RB-LOW_offset



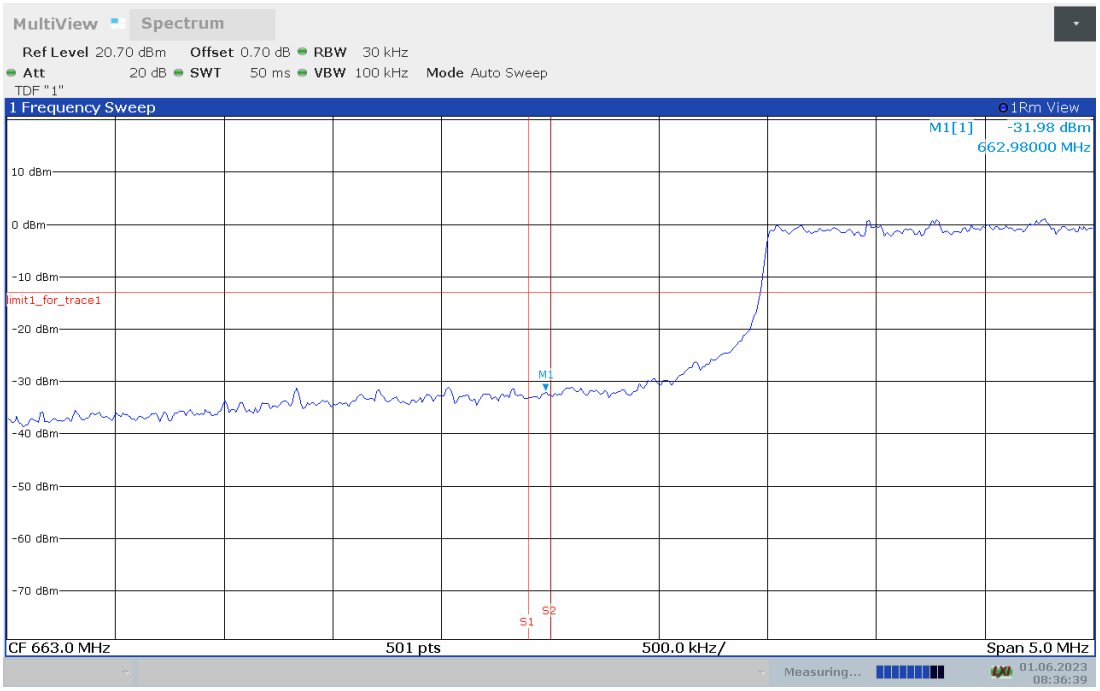
OBW: 1RB-HIGH_offset



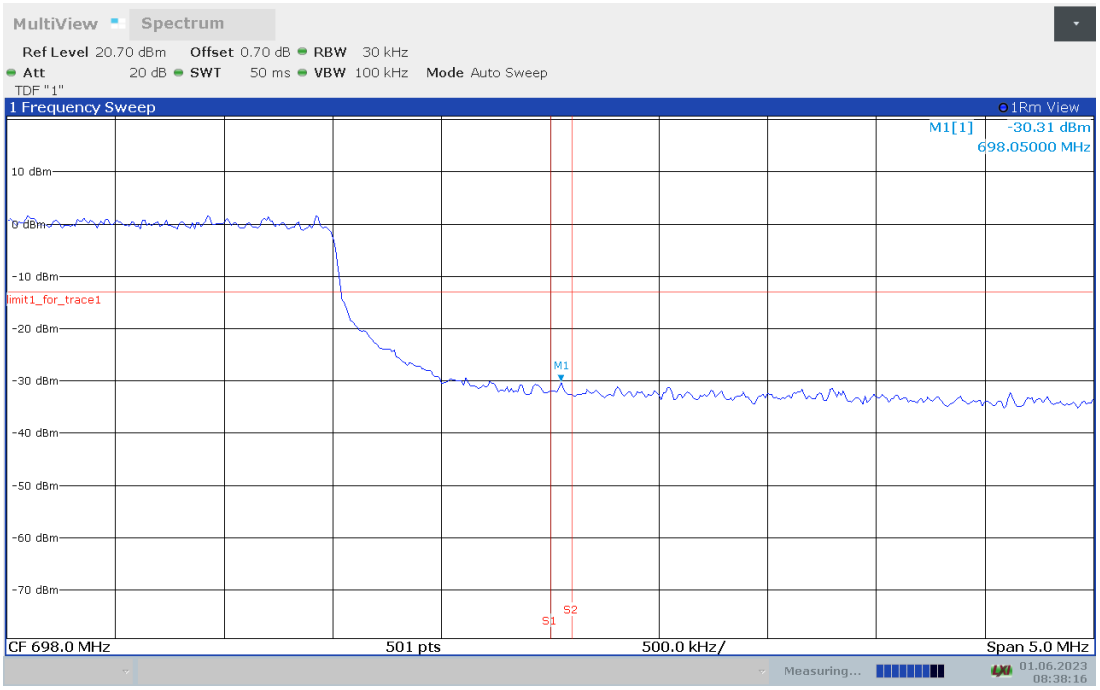
HIGH BAND EDGE BLOCK-1RB-HIGH_offset



LOW BAND EDGE BLOCK-20M-100%RB



HIGH BAND EDGE BLOCK-20M-100%RB



Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96

A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53, 90.691.

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1051 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

A. 7.2 Measurement Limit

Part 22.917 For operations in the 824–849MHz band, the FCC limit is 43 +10 log (P)dB below the transmitter power(P) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Part 24.238 and Part 27.53(h) specify that 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.

Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: (i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz; (ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz; (iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

Part 27.53(c) states for operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz 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; (2) On any frequency outside the 776–788 MHz 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; (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations; (4) Compliance with the

provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed; (5) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 +10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Part 27.53(m) specifies for mobile digital stations, the attenuation factor shall be not less than 40+ 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 90.543 states For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations. (2) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB. (3) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment. (4) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

Part 90.691 states that out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5

kHz.For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

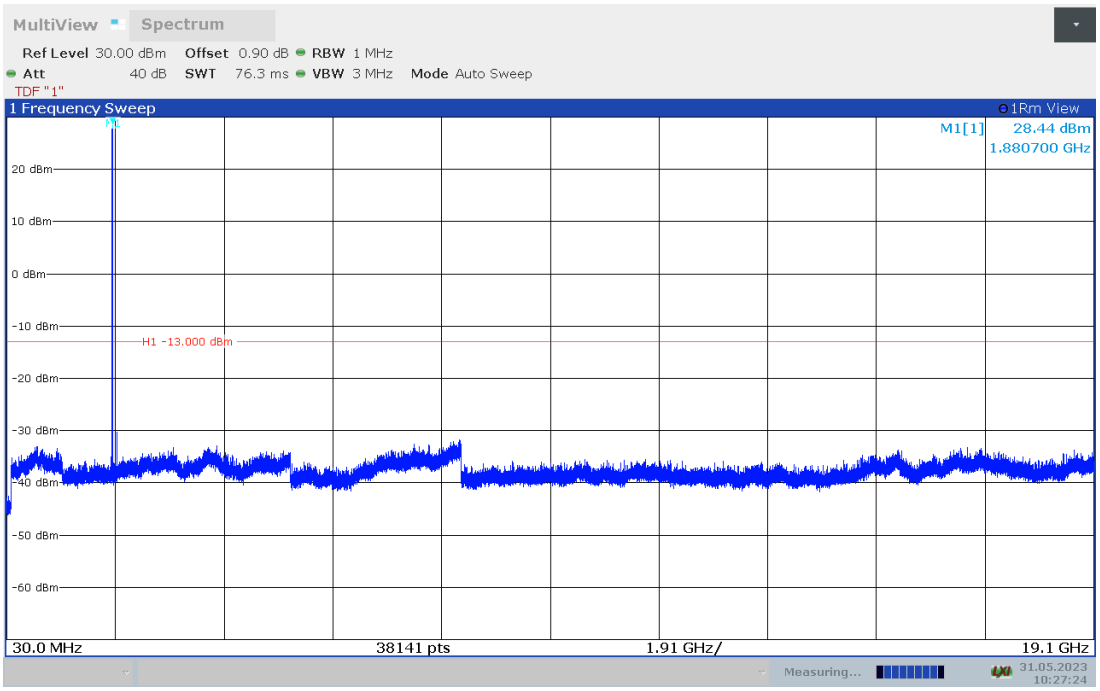
A. 7.3 Measurement result

Only worst case result is given below

LTE band 2 : 30MHz – 19.1GHz

Spurious emission limit –13dBm.

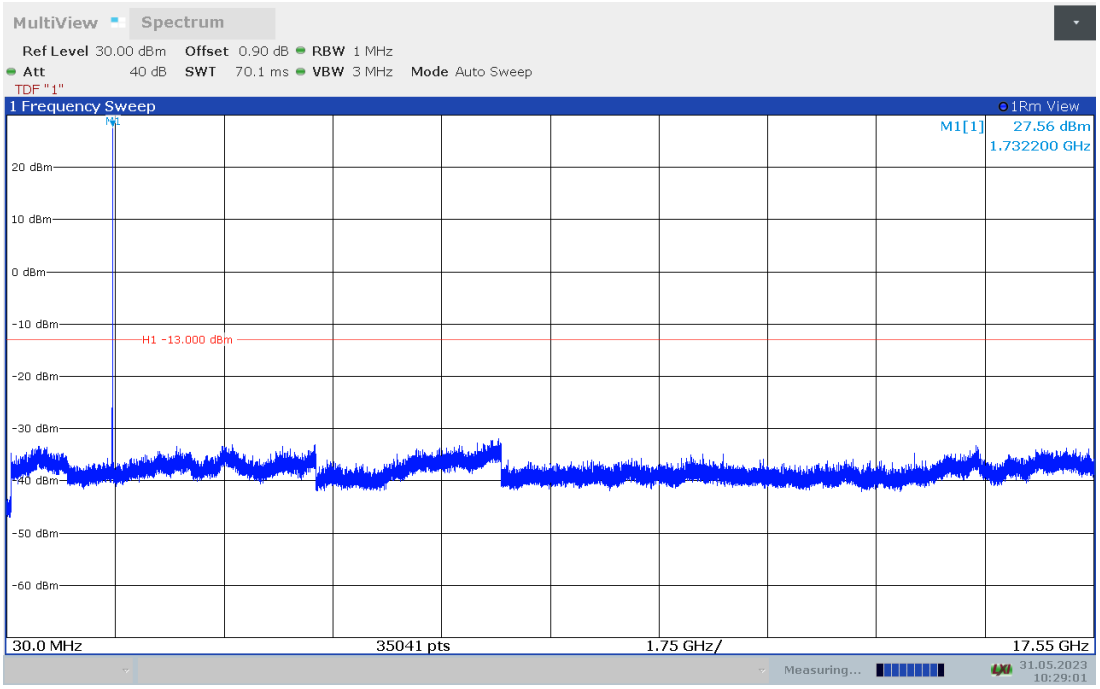
NOTE: peak above the limit line is the carrier frequency.



LTE band 4 : 30MHz – 17.55GHz

Spurious emission limit –13dBm.

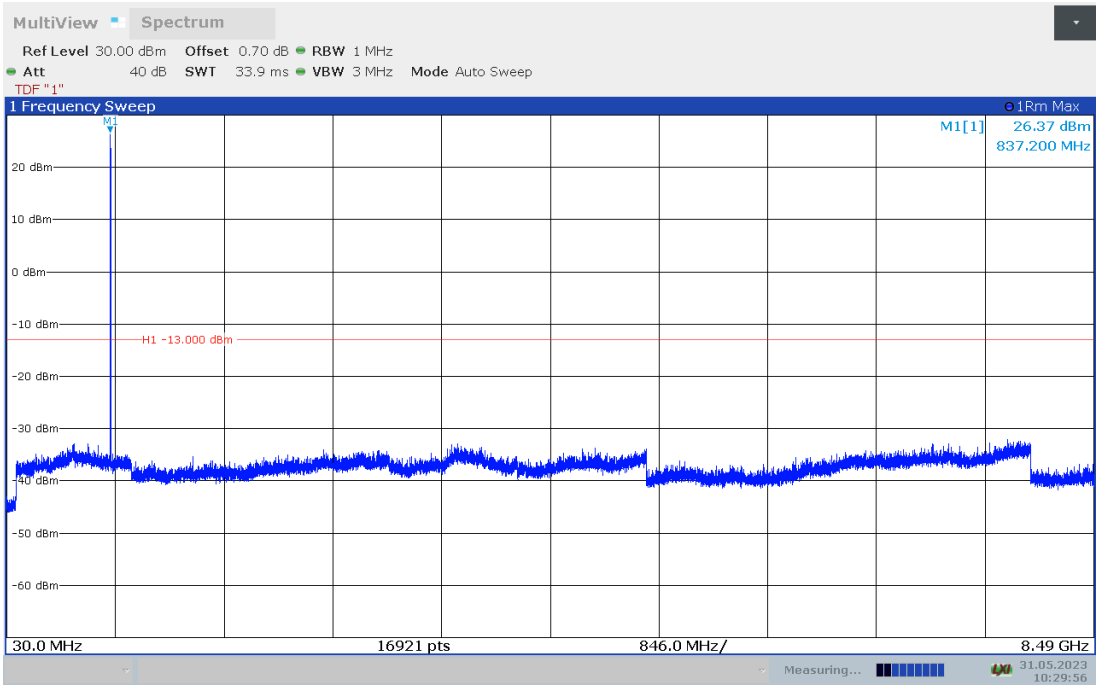
NOTE: peak above the limit line is the carrier frequency.



LTE band 5 20MHz QPSK: 30MHz – 8.49GHz

Spurious emission limit –25dBm.

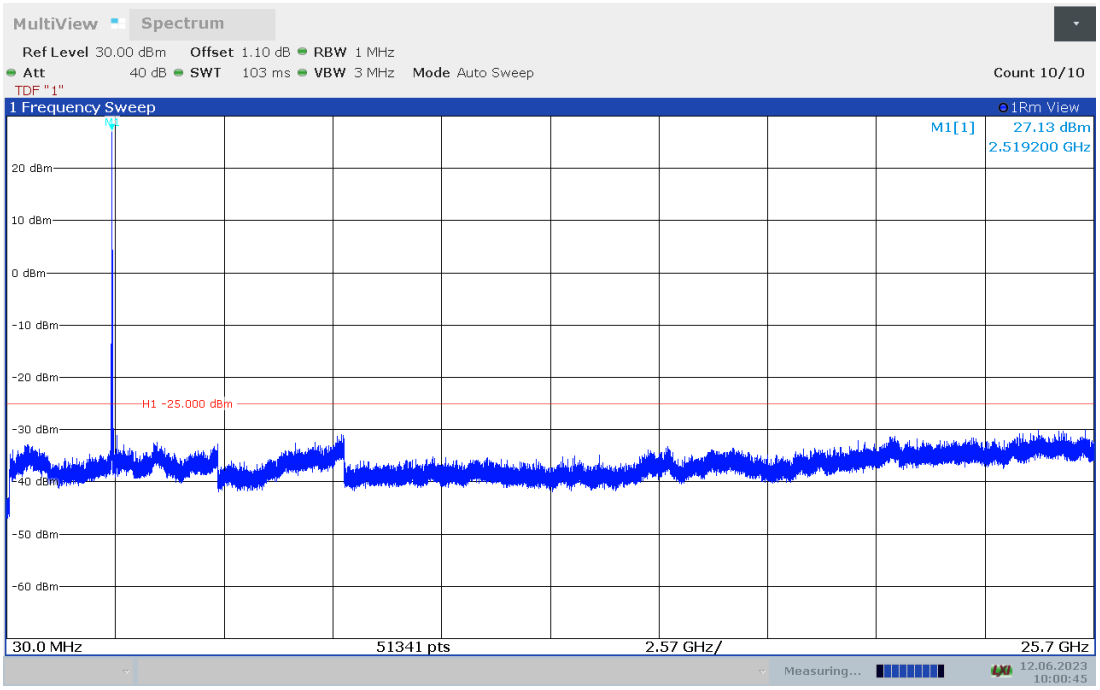
NOTE: peak above the limit line is the carrier frequency.



LTE band 7 20MHz QPSK: 30MHz – 25.7GHz

Spurious emission limit –25dBm.

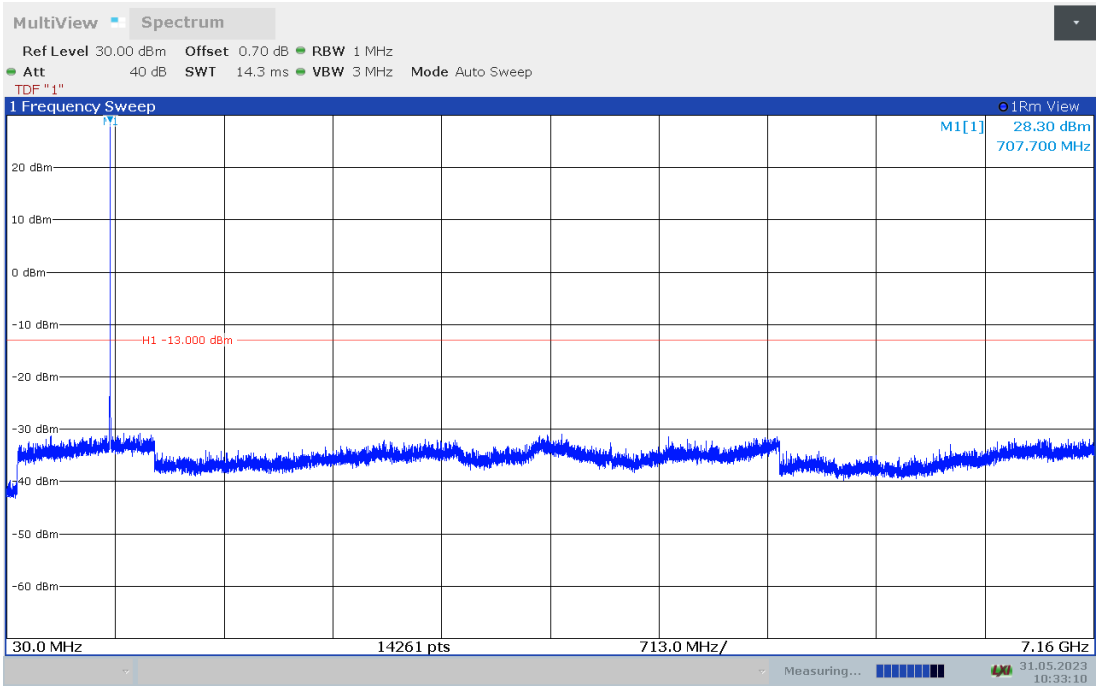
NOTE: peak above the limit line is the carrier frequency.



LTE band 12: 30MHz – 7.16GHz

Spurious emission limit –13dBm.

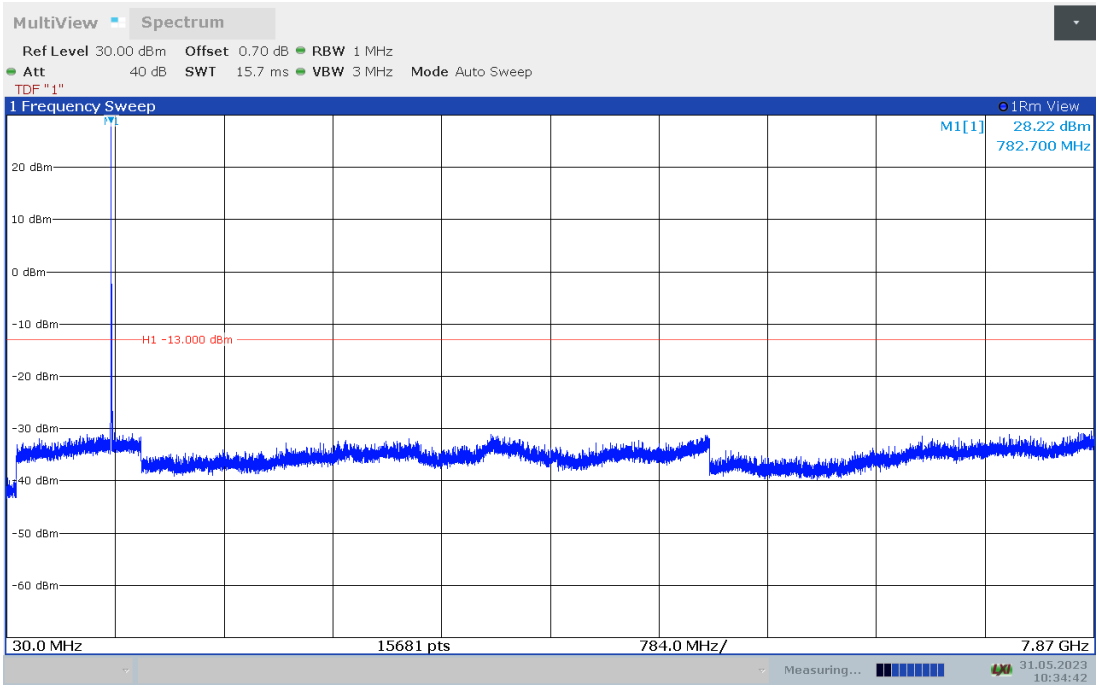
NOTE: peak above the limit line is the carrier frequency.

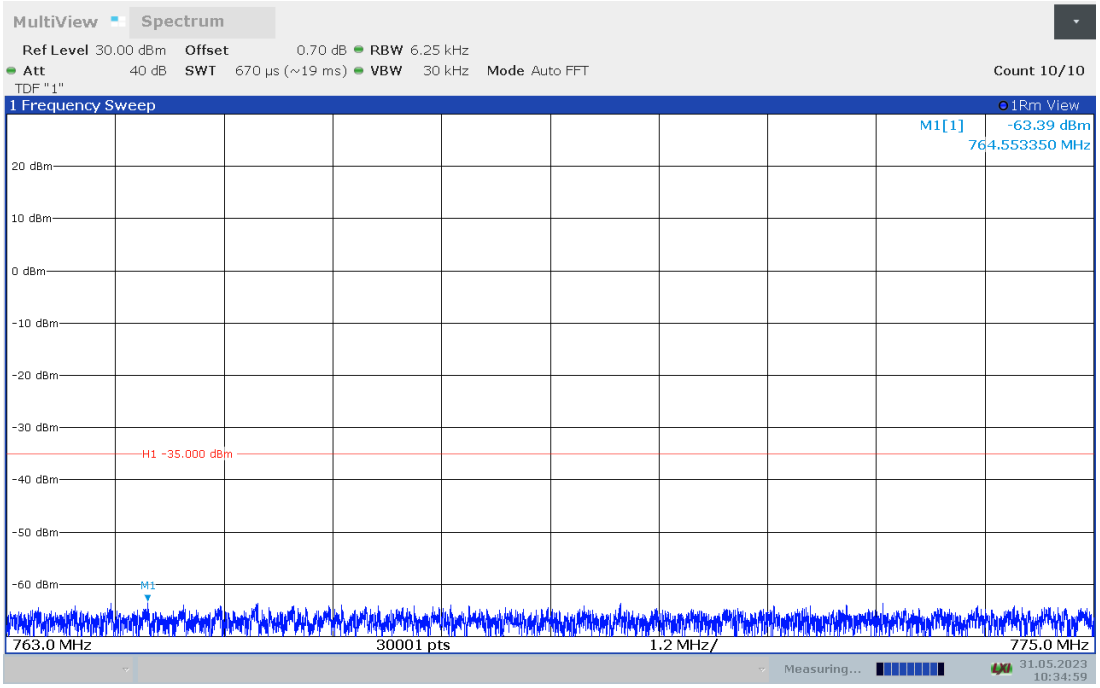


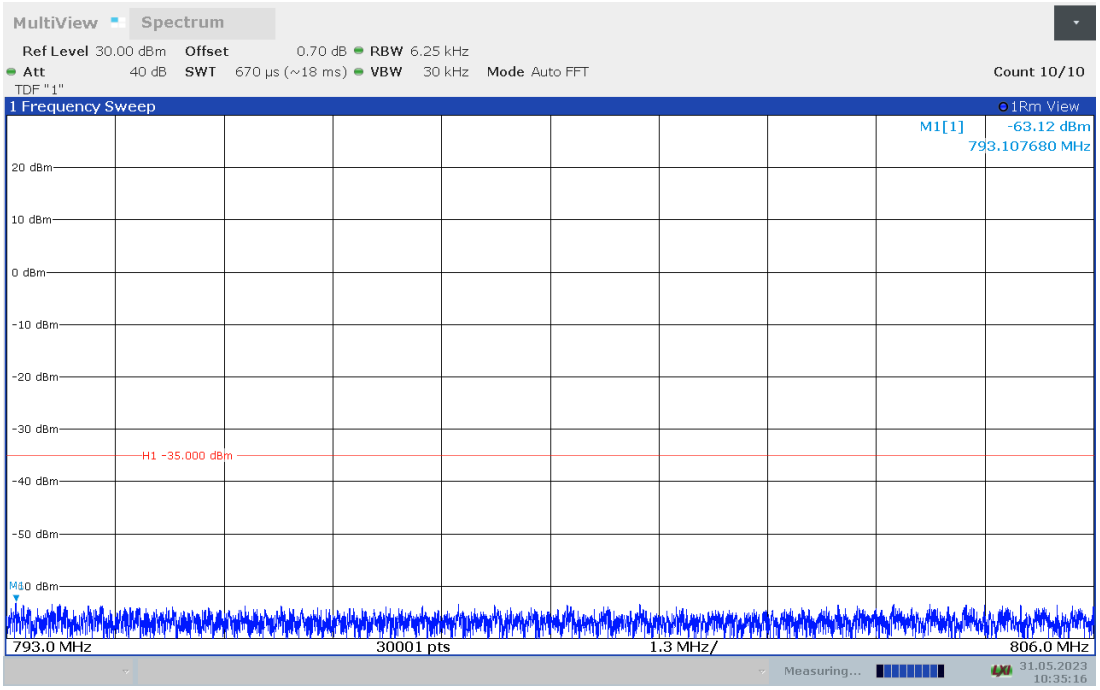
LTE band 13: 30MHz – 7.87GHz

Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



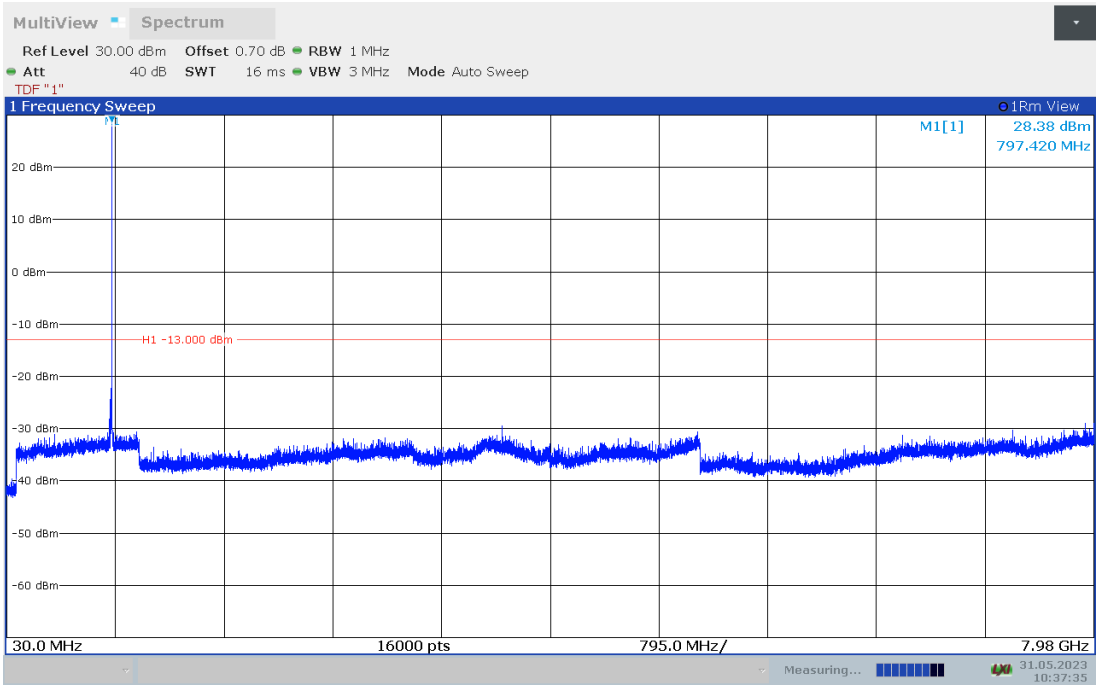


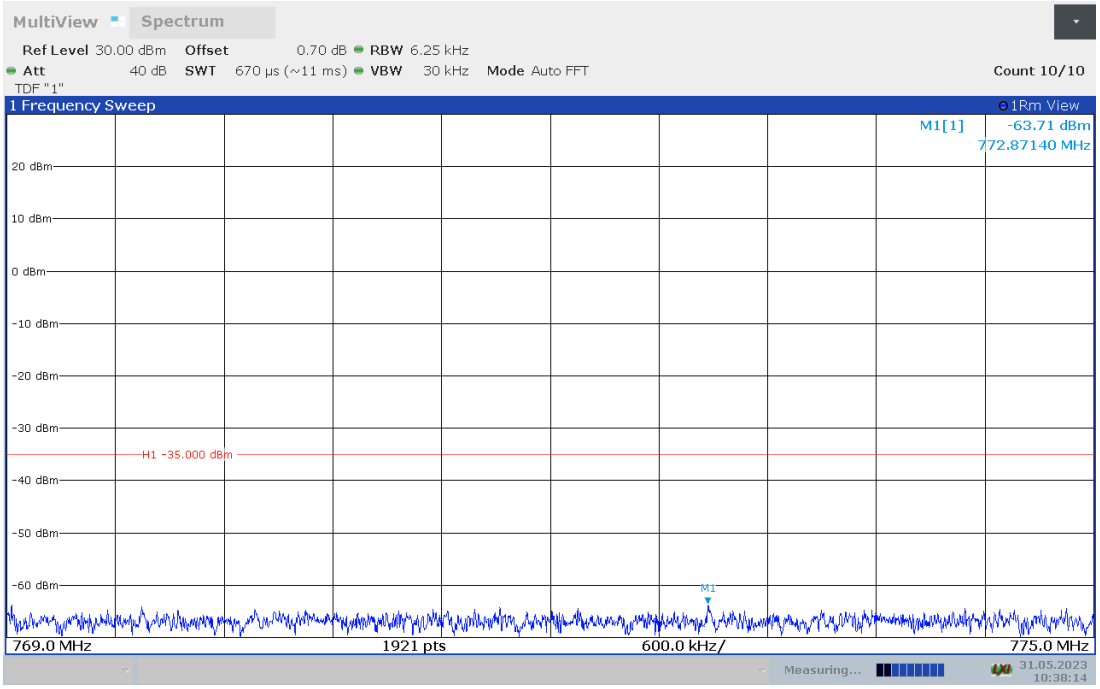


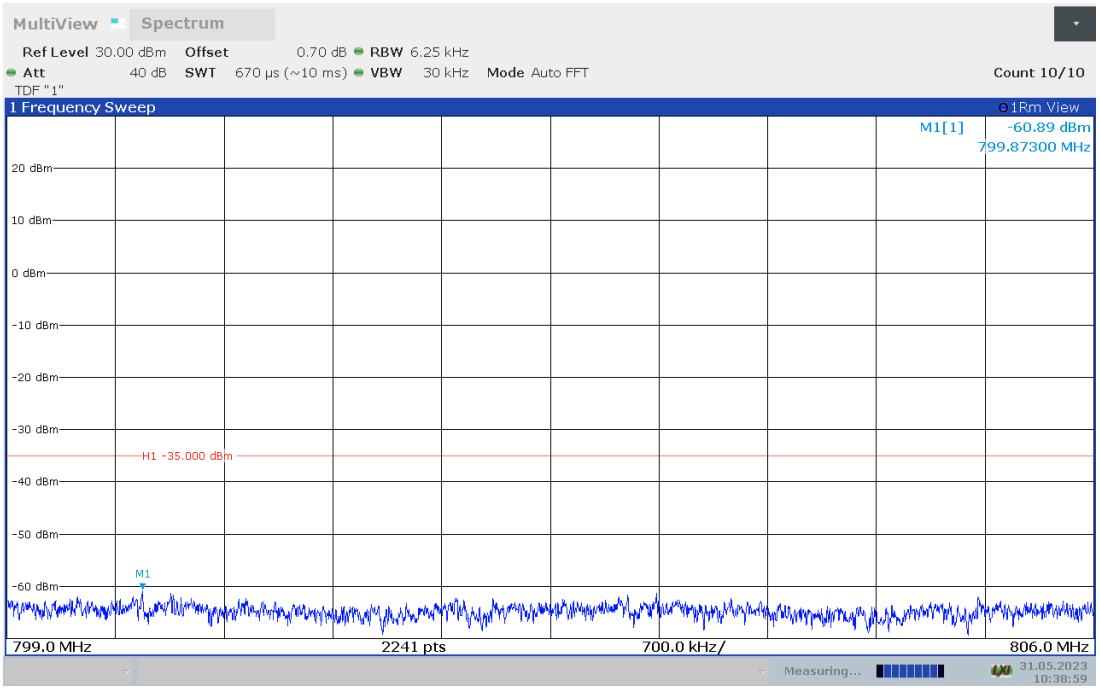
LTE band 14: 30MHz – 7.98GHz

Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



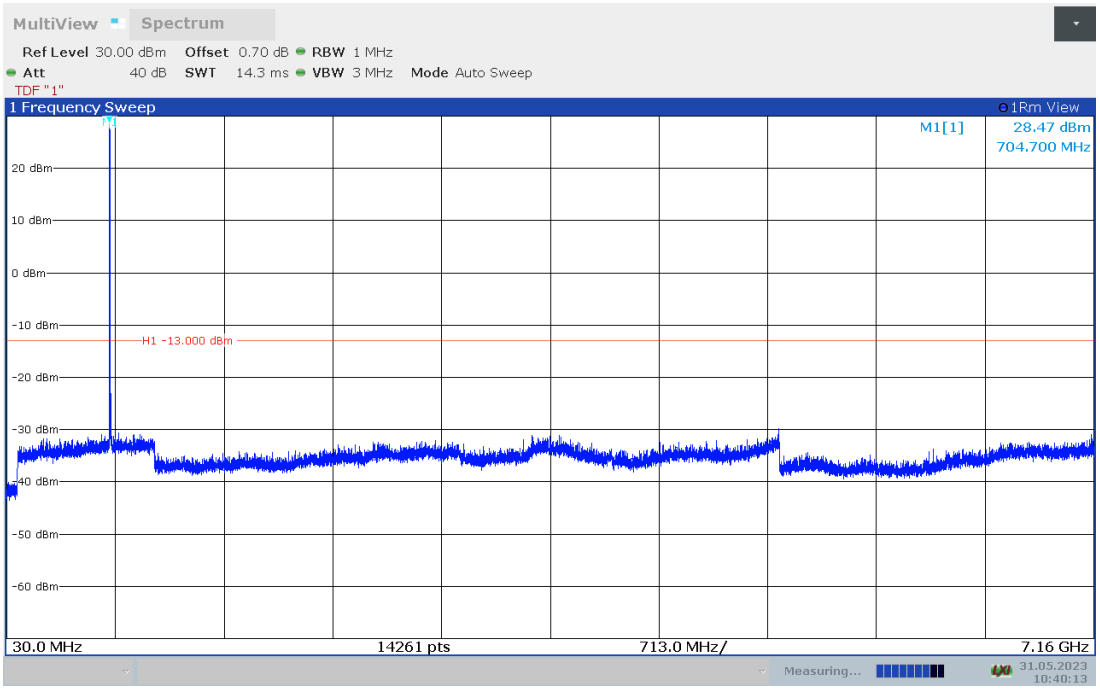




LTE band 17: 30MHz – 7.16GHz

Spurious emission limit –13dBm.

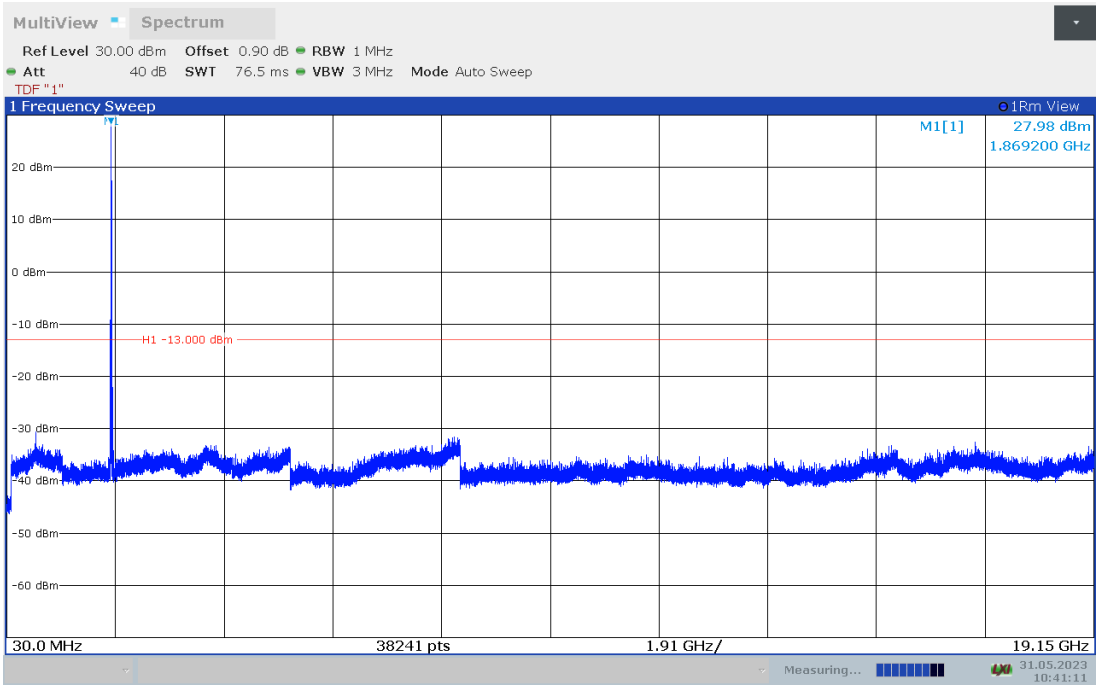
NOTE: peak above the limit line is the carrier frequency.



LTE band 25: 30MHz – 19.15GHz

Spurious emission limit –13dBm.

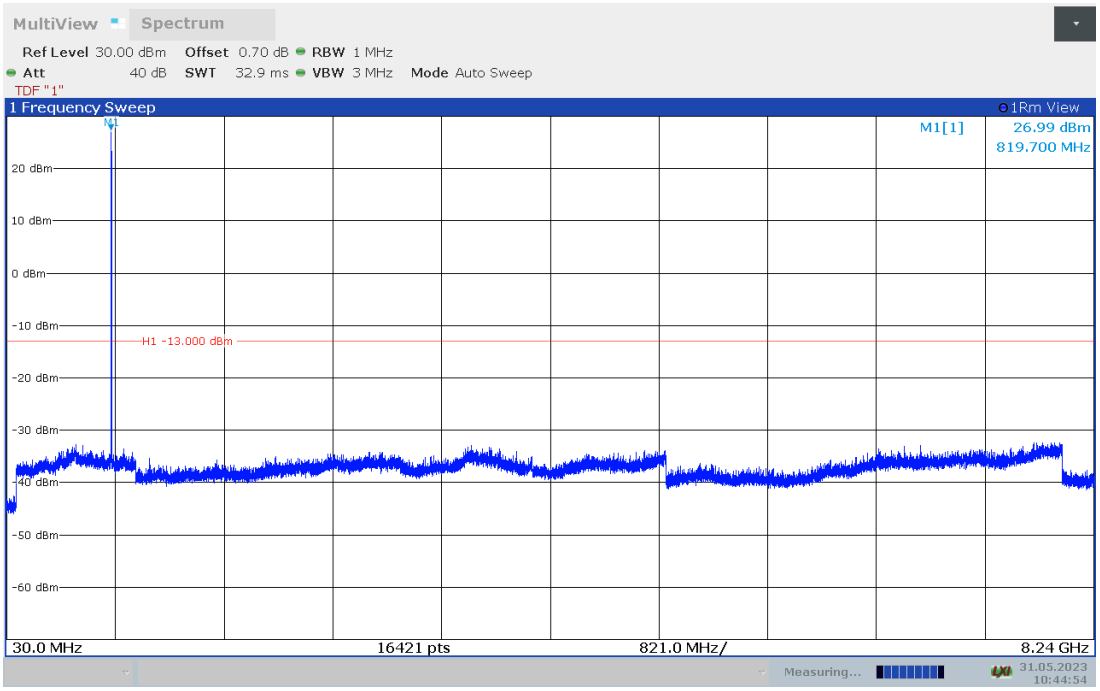
NOTE: peak above the limit line is the carrier frequency.



LTE band 26(814MHz-824MHz): 30MHz – 8.24GHz

Spurious emission limit –13dBm.

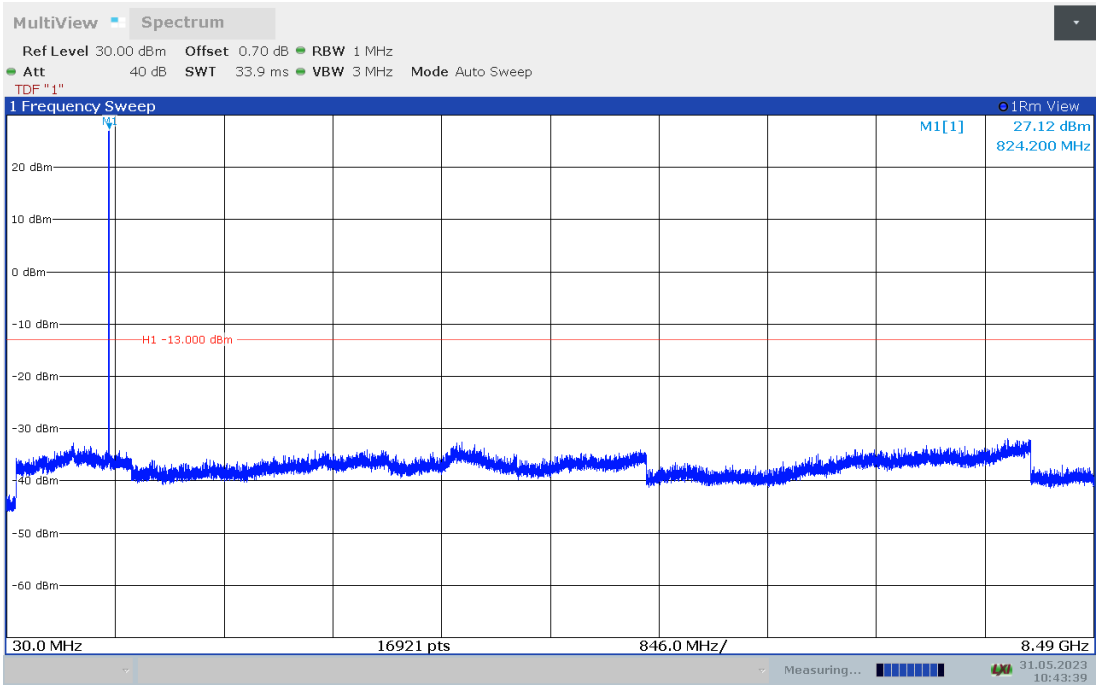
NOTE: peak above the limit line is the carrier frequency.



LTE band 26(824MHz-849MHz): 30MHz – 8.49GHz

Spurious emission limit –13dBm.

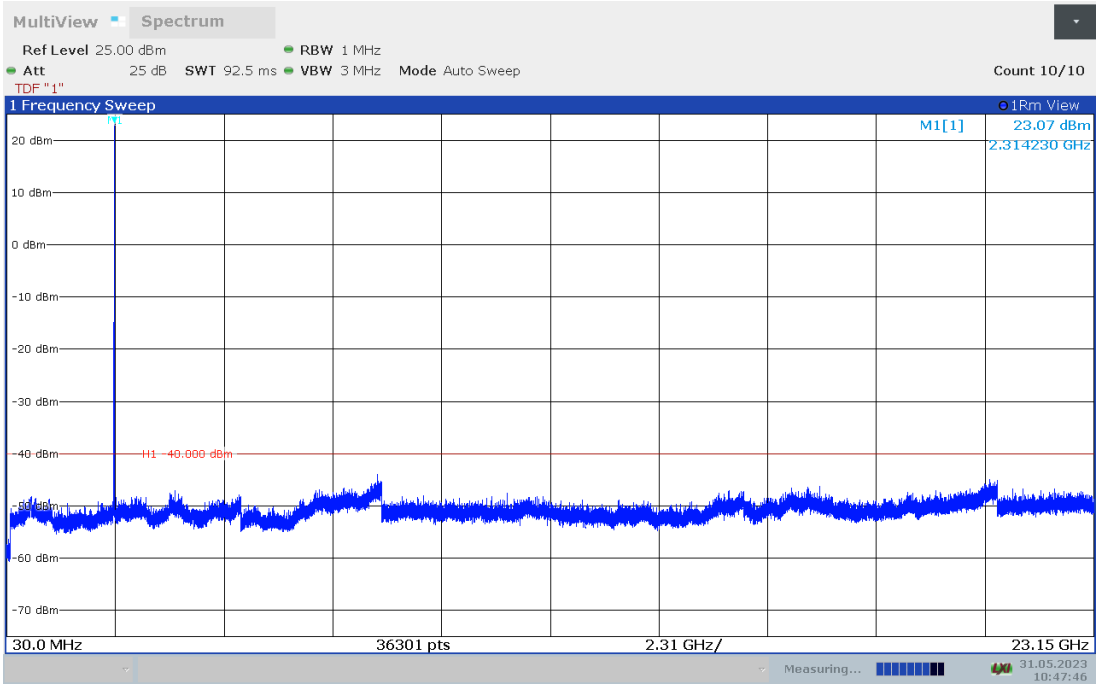
NOTE: peak above the limit line is the carrier frequency.



LTE band 30: 30MHz – 23.15GHz

Spurious emission limit –40dBm.

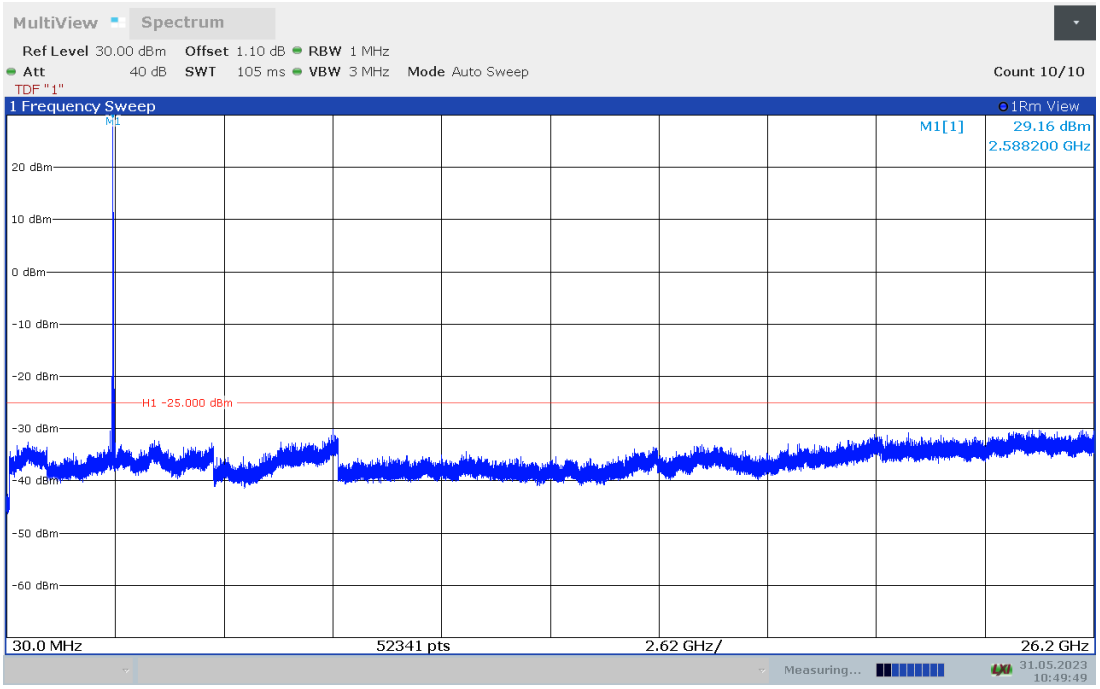
NOTE: peak above the limit line is the carrier frequency.



LTE band 38: 30MHz – 26.2GHz

Spurious emission limit –25dBm.

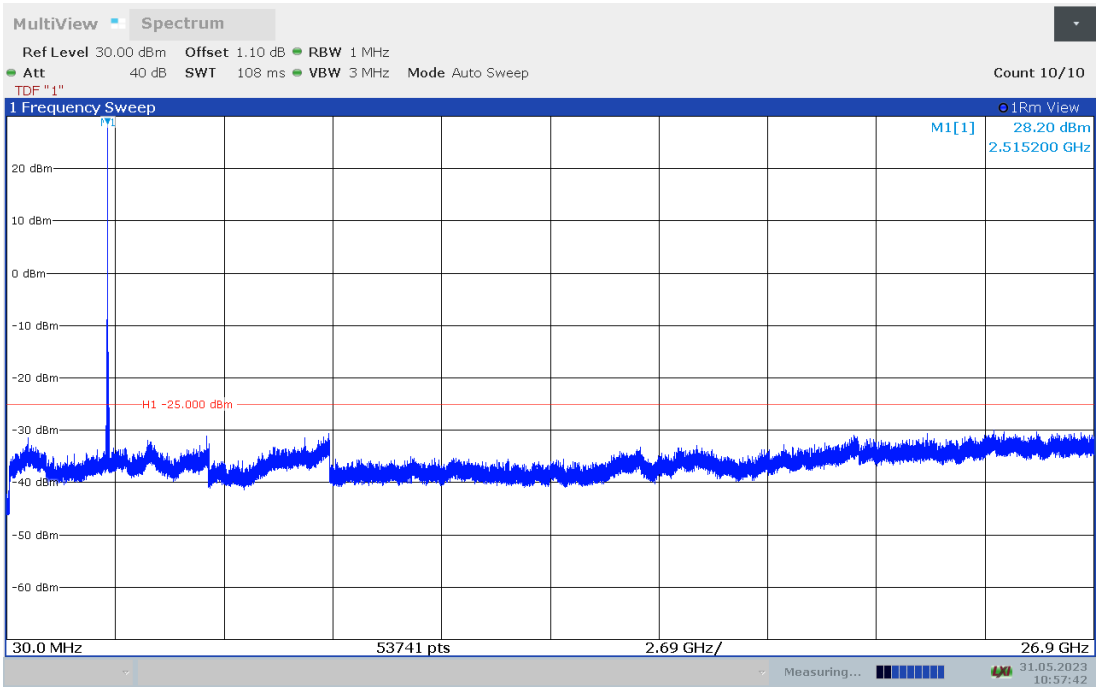
NOTE: peak above the limit line is the carrier frequency.



LTE band 41: 30MHz – 26.9GHz

Spurious emission limit –25dBm.

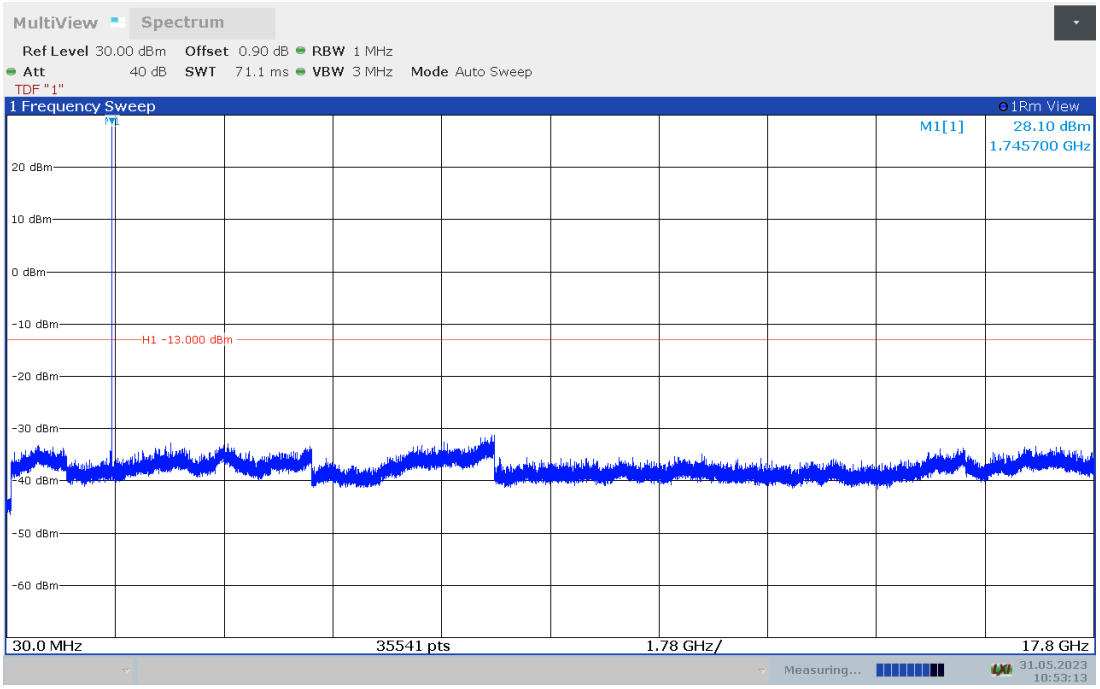
NOTE: peak above the limit line is the carrier frequency.



LTE Band 66: 30MHz – 17.8GHz

Spurious emission limit –13dBm.

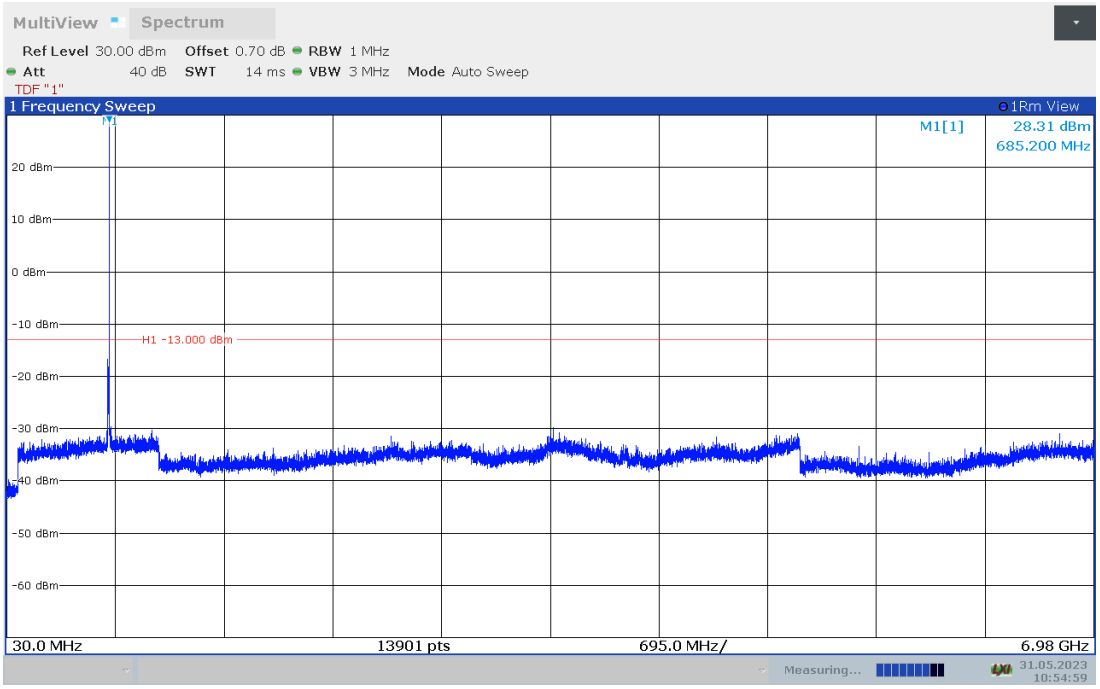
NOTE: peak above the limit line is the carrier frequency.



LTE Band 71: 30MHz – 6.98GHz

Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

The peak-to-average power ratio (PAPR) of the transmission may not exceed 13 dB

a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Record the maximum PAPR level associated with a probability of 0.1%.

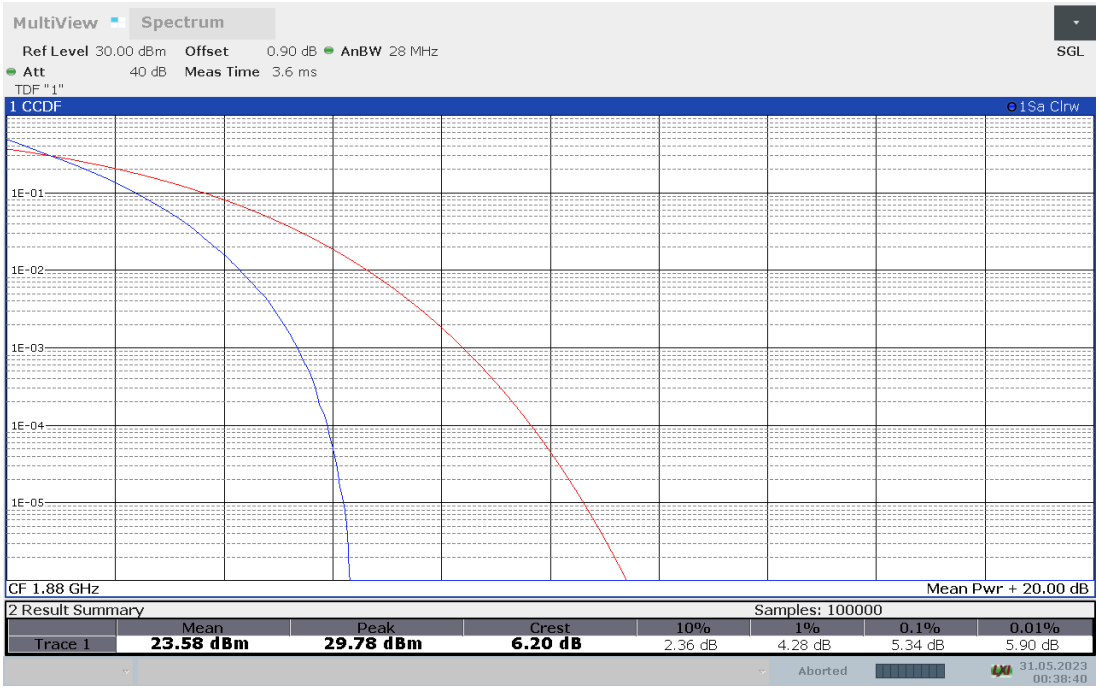
Measurement results

Only worst case result is given below

LTE band 2

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1880.0	20	5.34	6.14

LTE band 2, 20MHz Bandwidth, QPSK (PAPR)

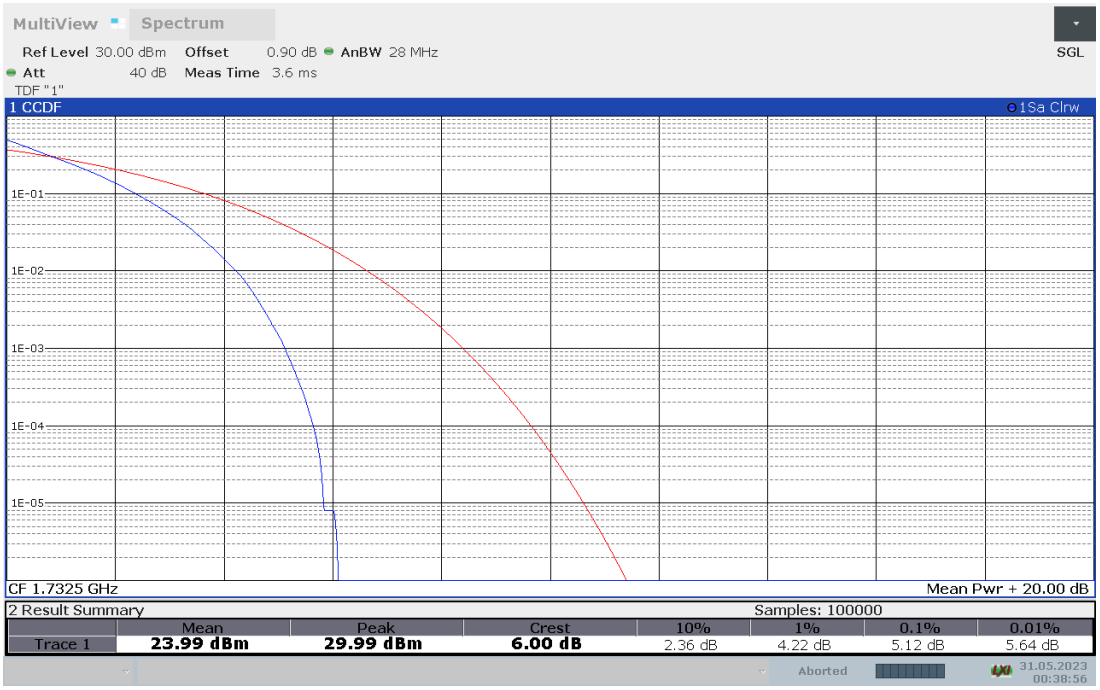


LTE band 2, 20MHz Bandwidth, 16QAM (PAPR)

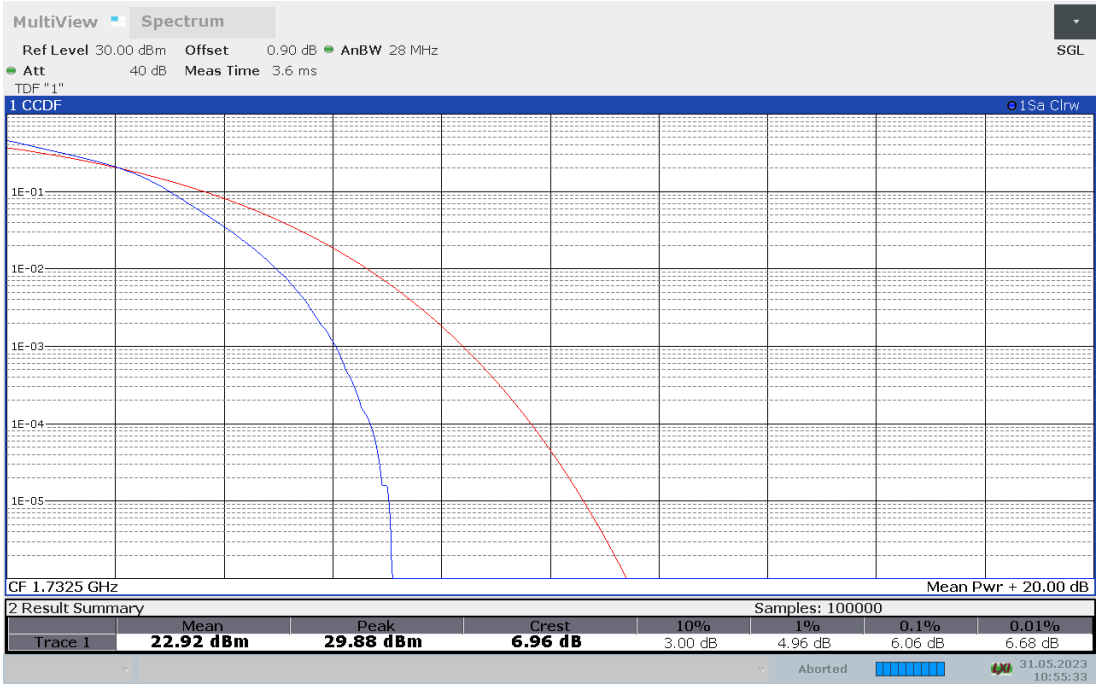
LTE band 4

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1732.5	20	5.12	6.06

LTE band 4, 20MHz Bandwidth, QPSK (PAPR)



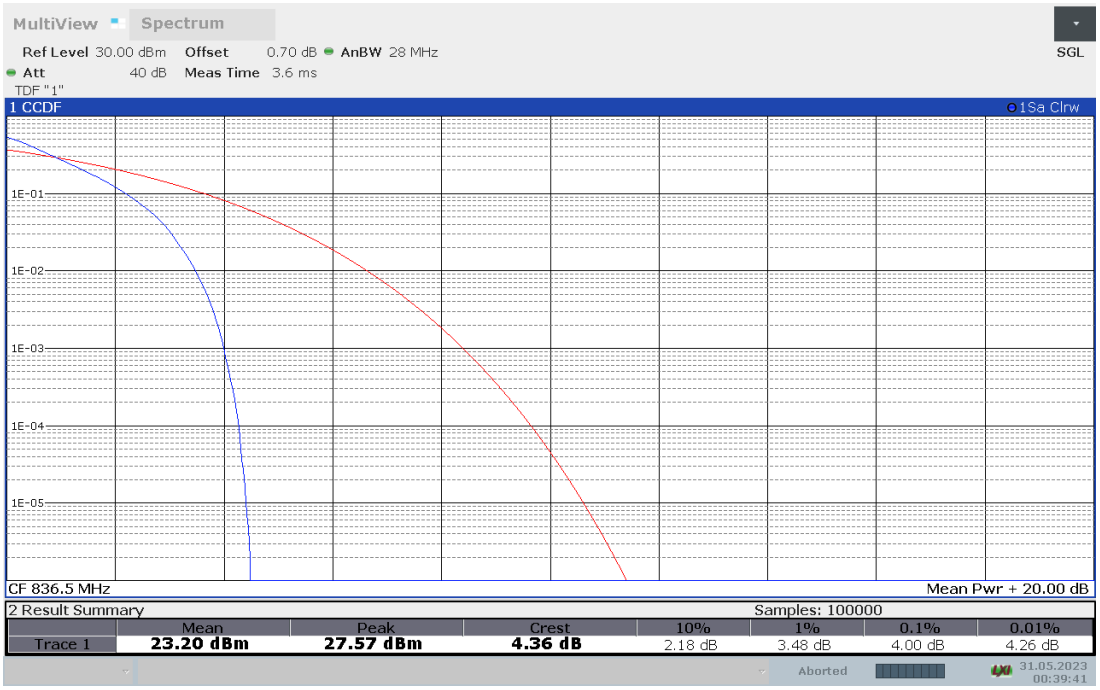
LTE band 4, 20MHz Bandwidth, 16QAM (PAPR)



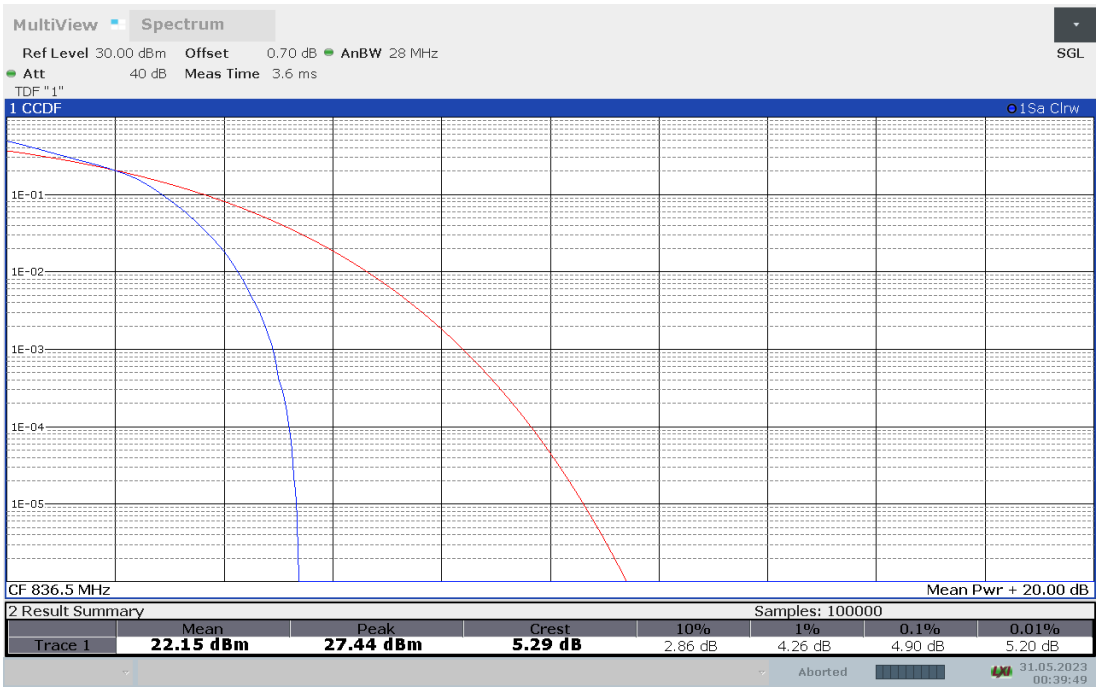
LTE band 5

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
826.5	10	4.00	4.90

LTE band 5, 10MHz Bandwidth, QPSK (PAPR)



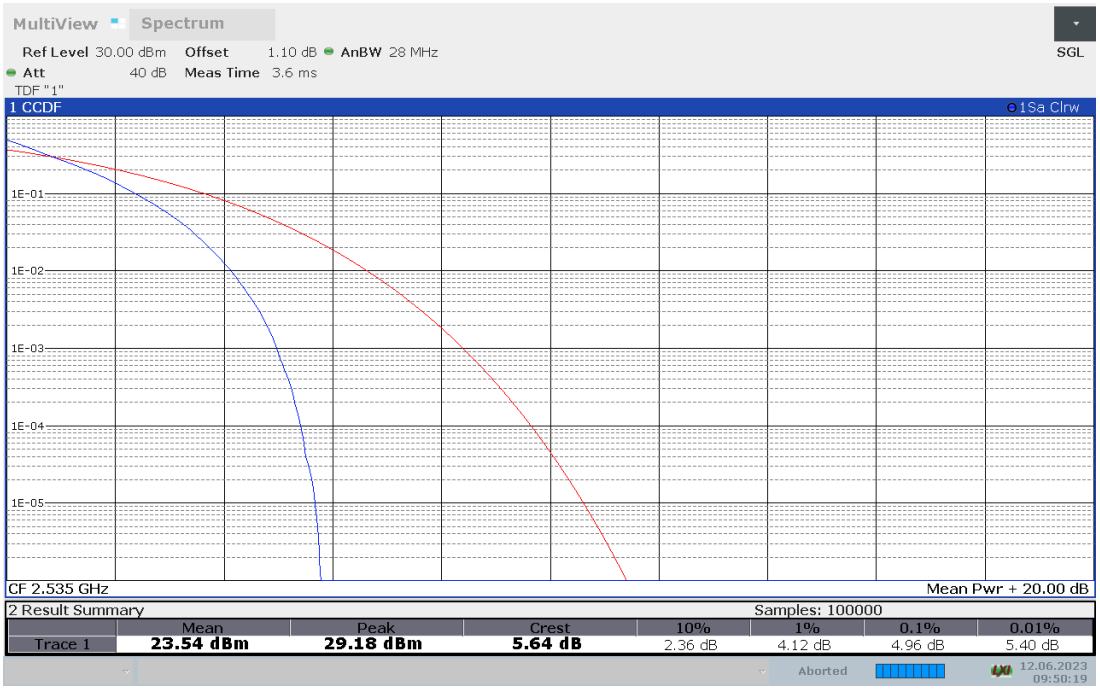
LTE band 5, 10MHz Bandwidth, 16QAM (PAPR)



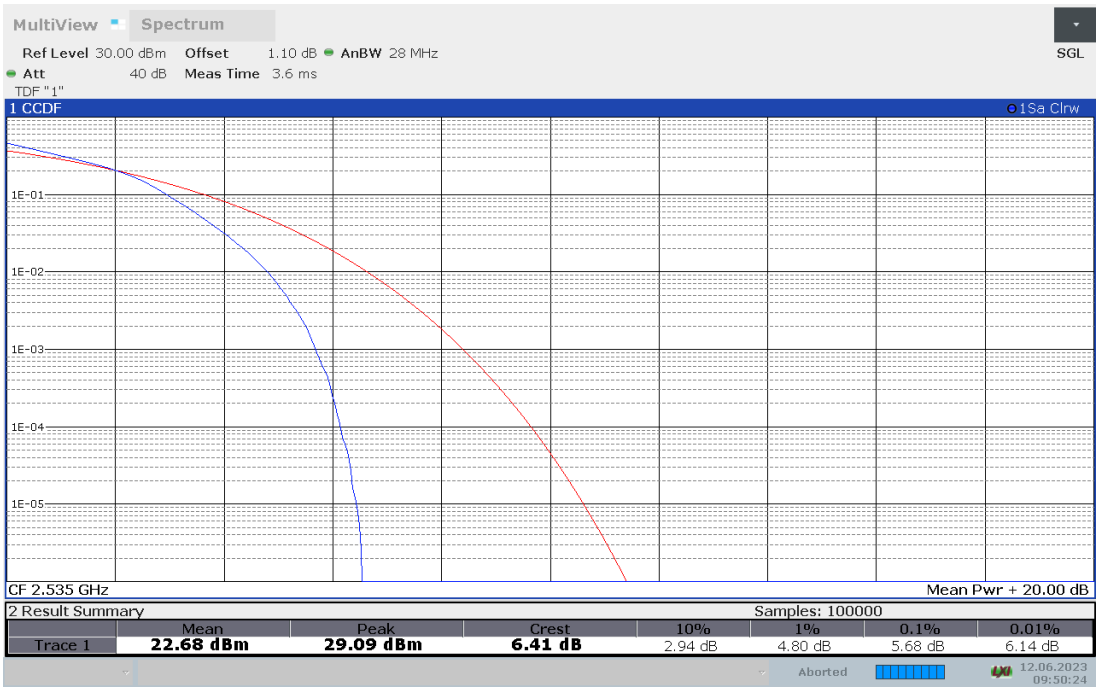
LTE band 7

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2535.0	20	4.96	5.68

LTE band 7, 20MHz Bandwidth, QPSK (PAPR)



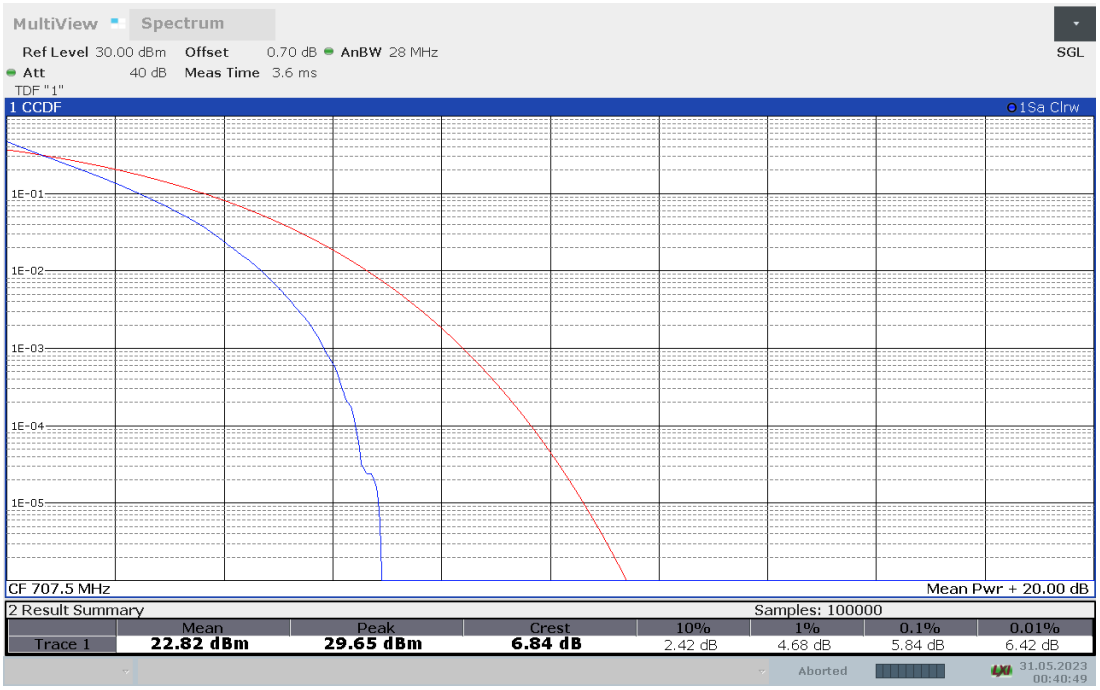
LTE band 7, 20MHz Bandwidth, 16QAM (PAPR)



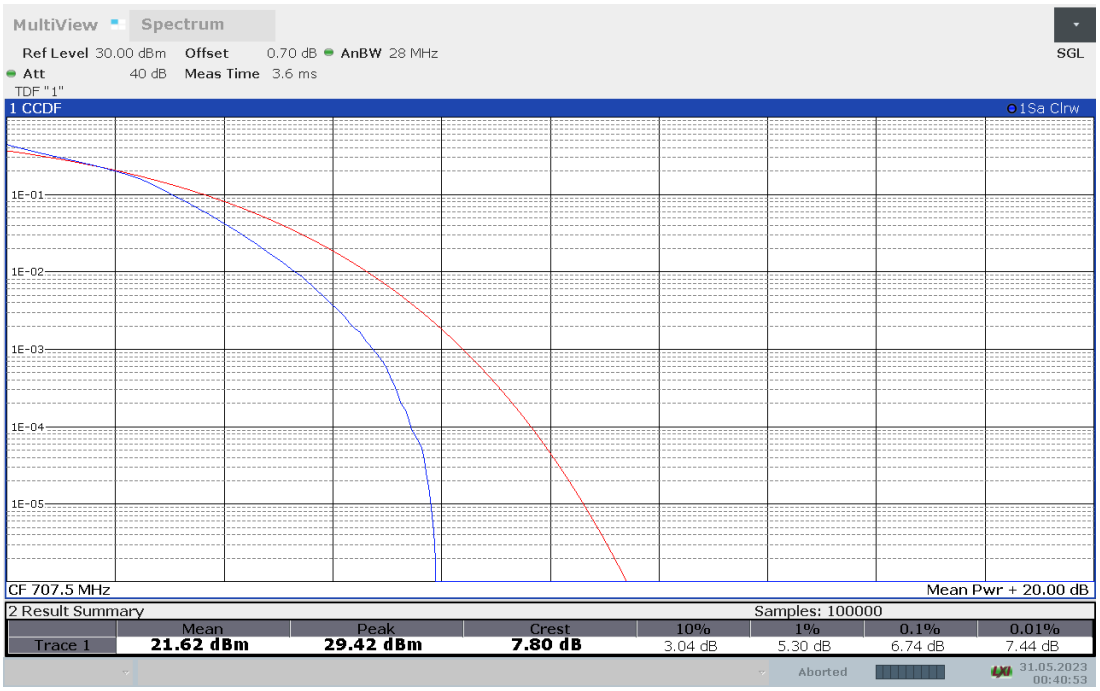
LTE band 12

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
707.5	10	5.84	6.74

LTE band 12, 10MHz Bandwidth, QPSK (PAPR)



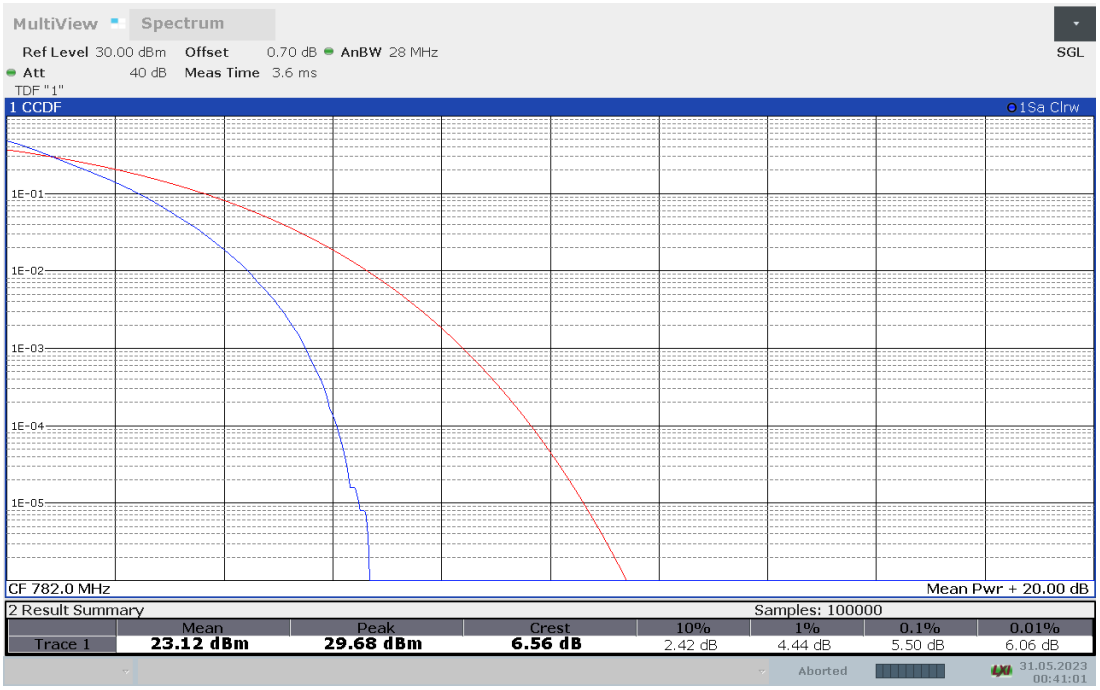
LTE band 12, 10MHz Bandwidth, 16QAM (PAPR)



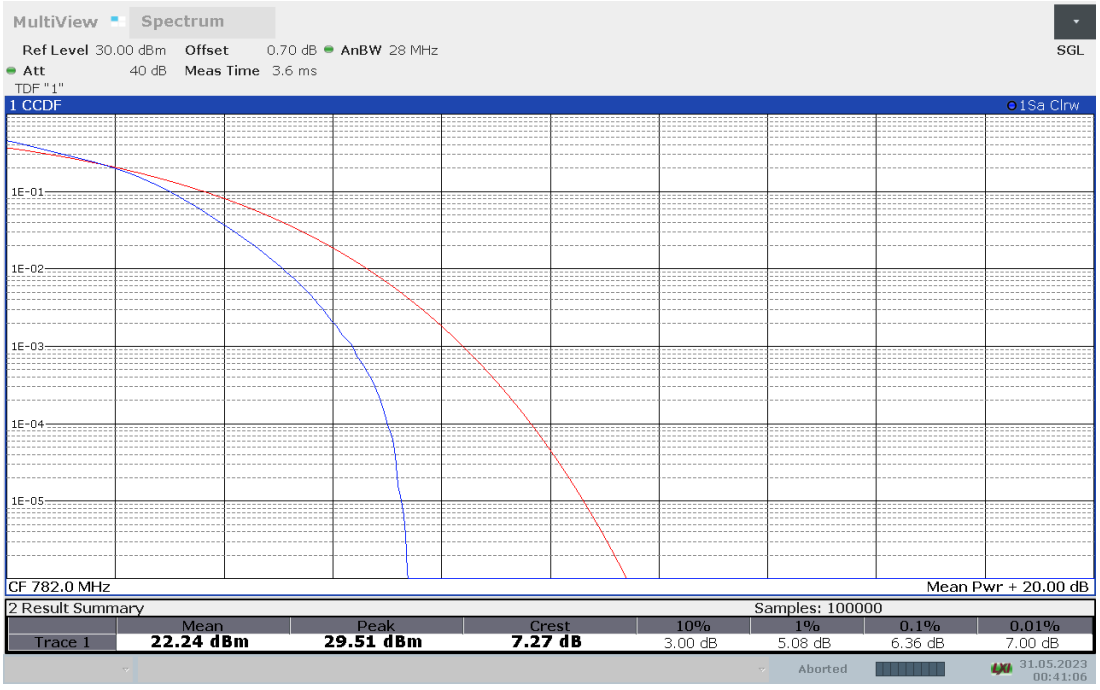
LTE band 13

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
782.0	10	5.50	6.36

LTE band 13, 10MHz Bandwidth, QPSK (PAPR)



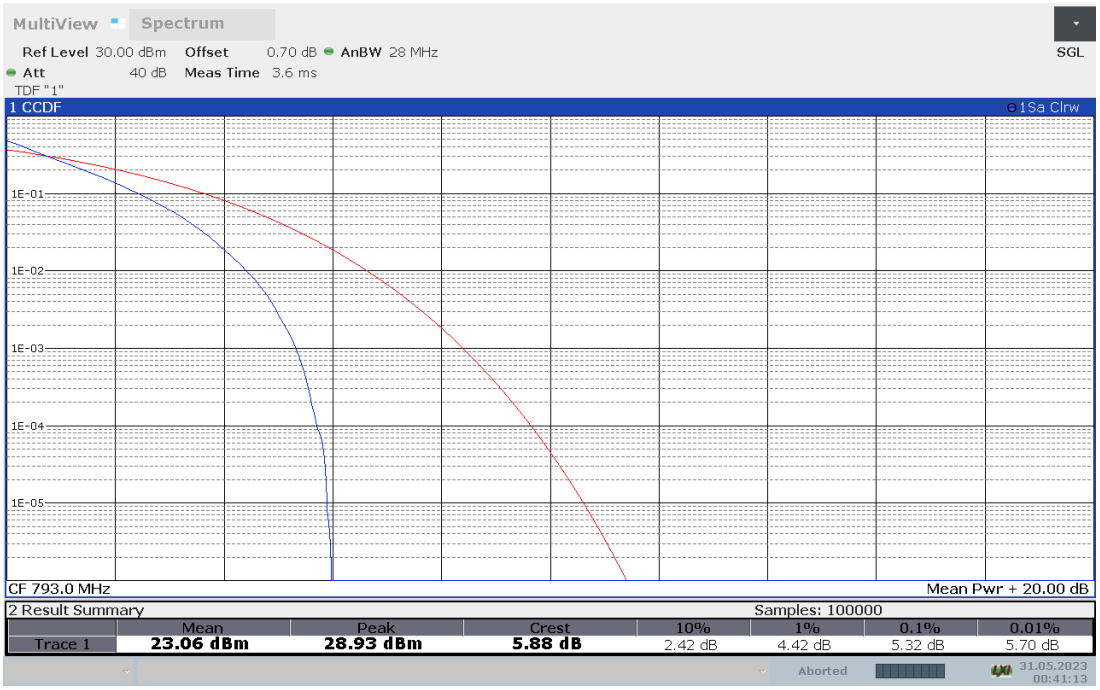
LTE band 13, 10MHz Bandwidth, 16QAM (PAPR)



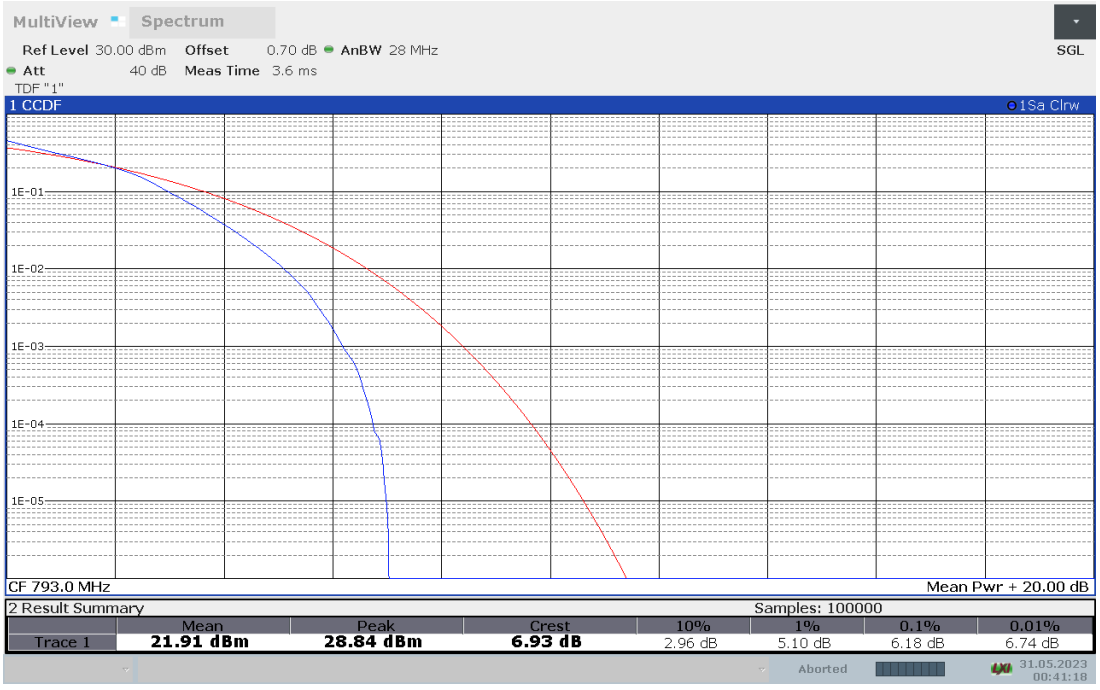
LTE band 14

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
793.0	10	5.32	6.18

LTE band 14, 10MHz Bandwidth, QPSK (PAPR)



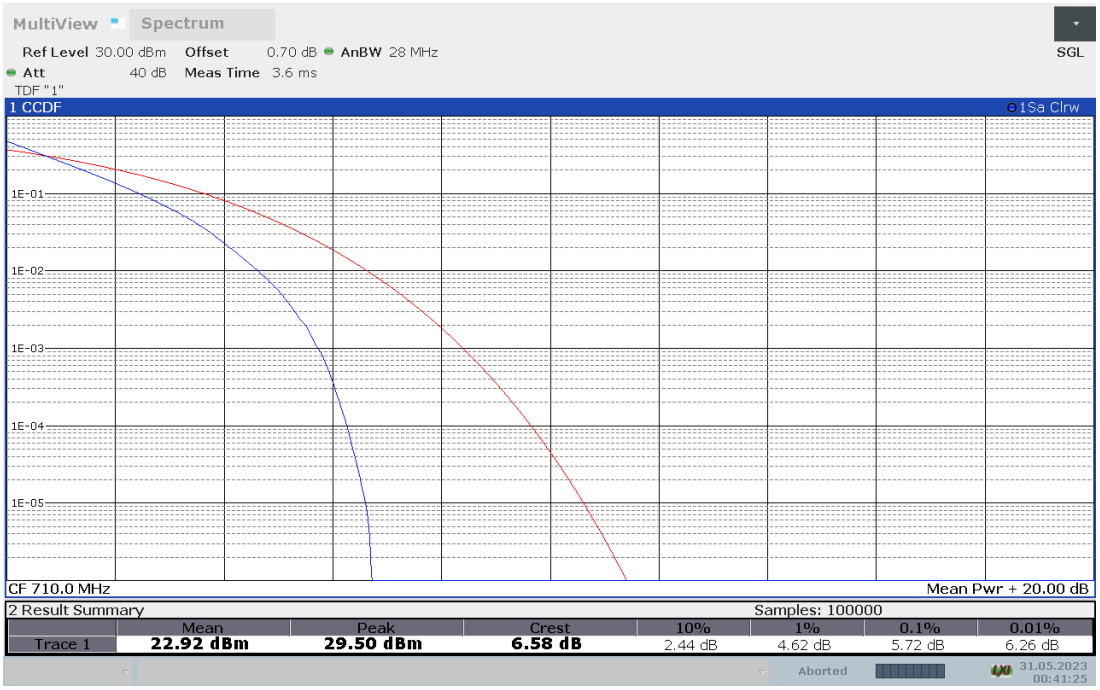
LTE band 14, 10MHz Bandwidth, 16QAM (PAPR)



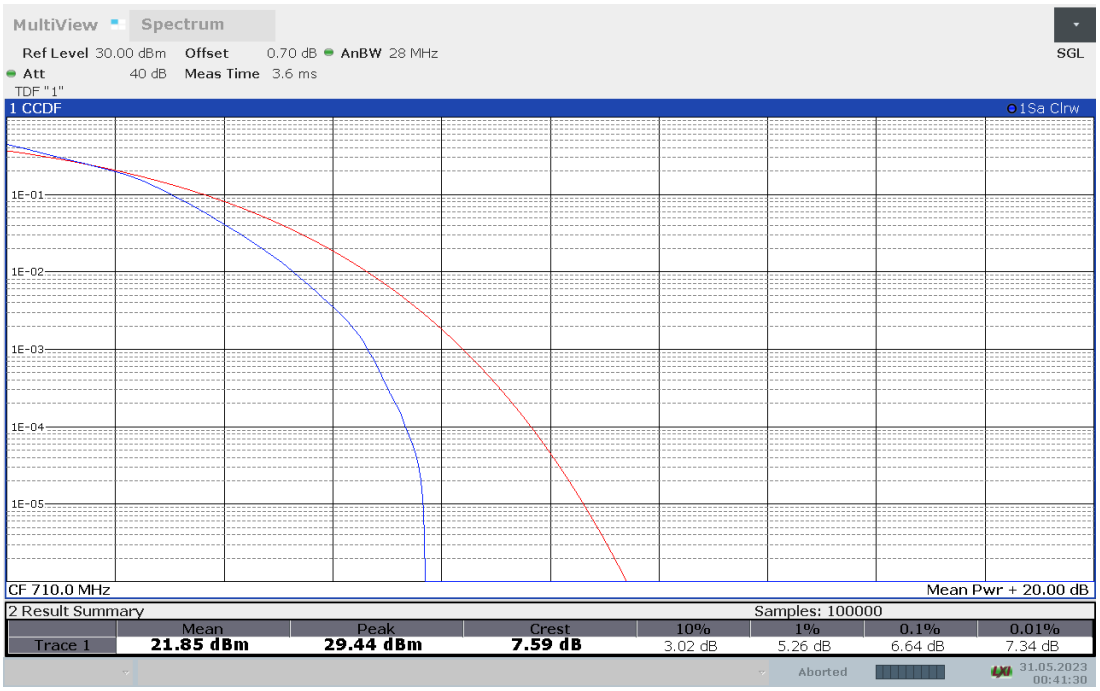
LTE band 17

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
710.0	10	5.72	6.64

LTE band 17, 10MHz Bandwidth, QPSK (PAPR)



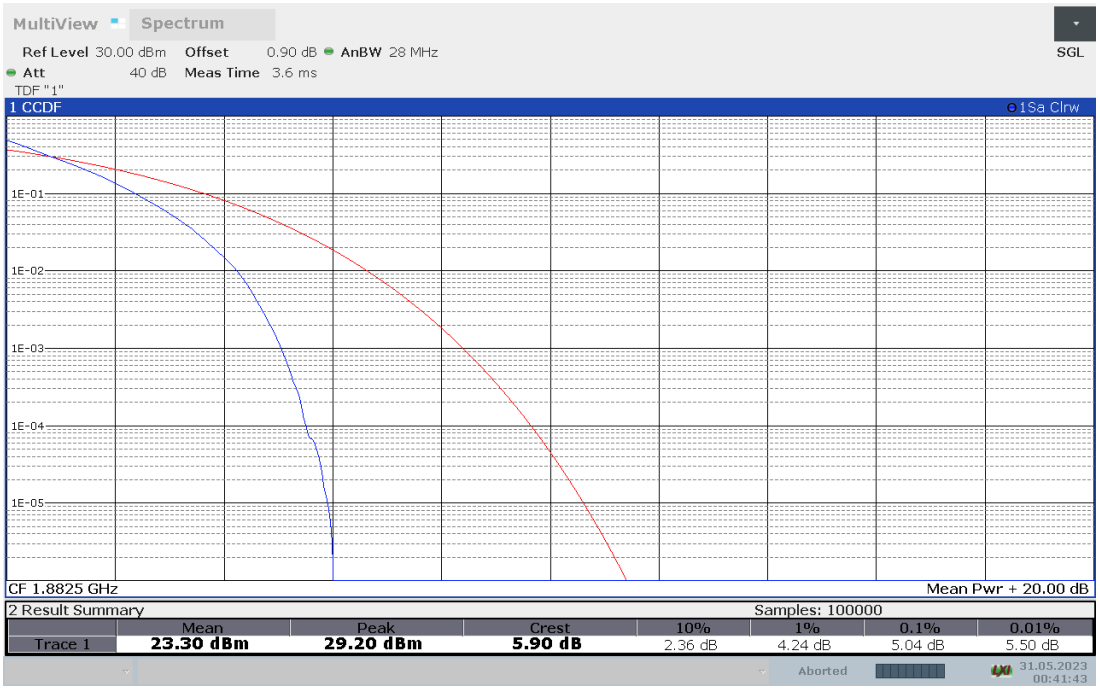
LTE band 17, 10MHz Bandwidth, 16QAM (PAPR)



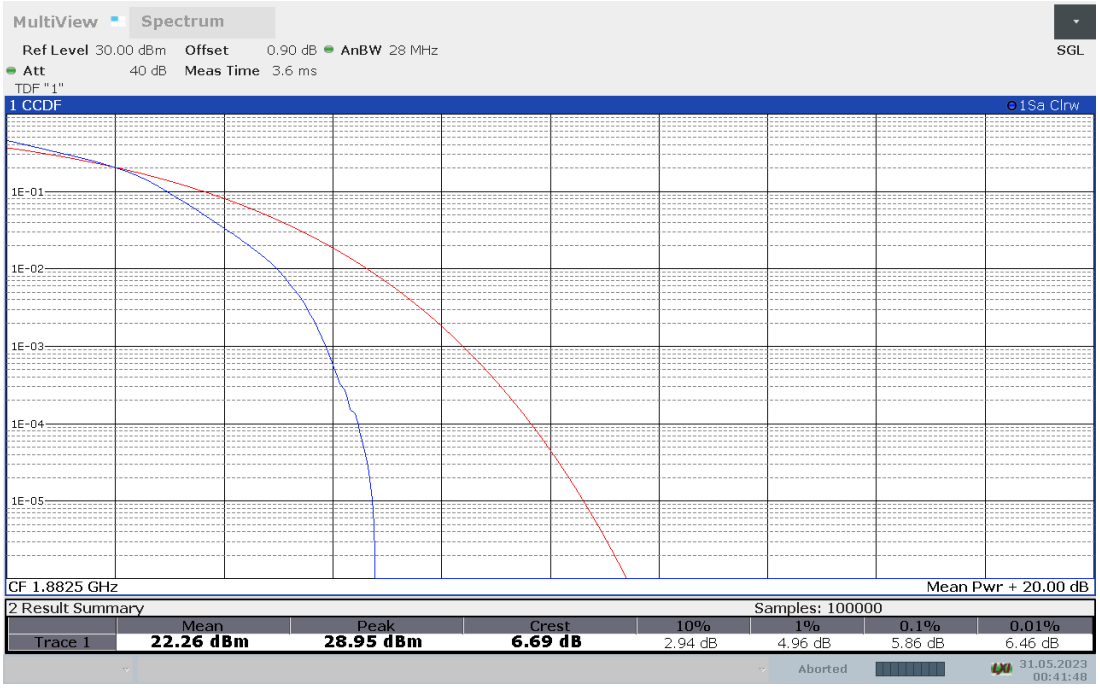
LTE band 25

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1882.5	20	5.04	5.86

LTE band 25, 20MHz Bandwidth, QPSK (PAPR)



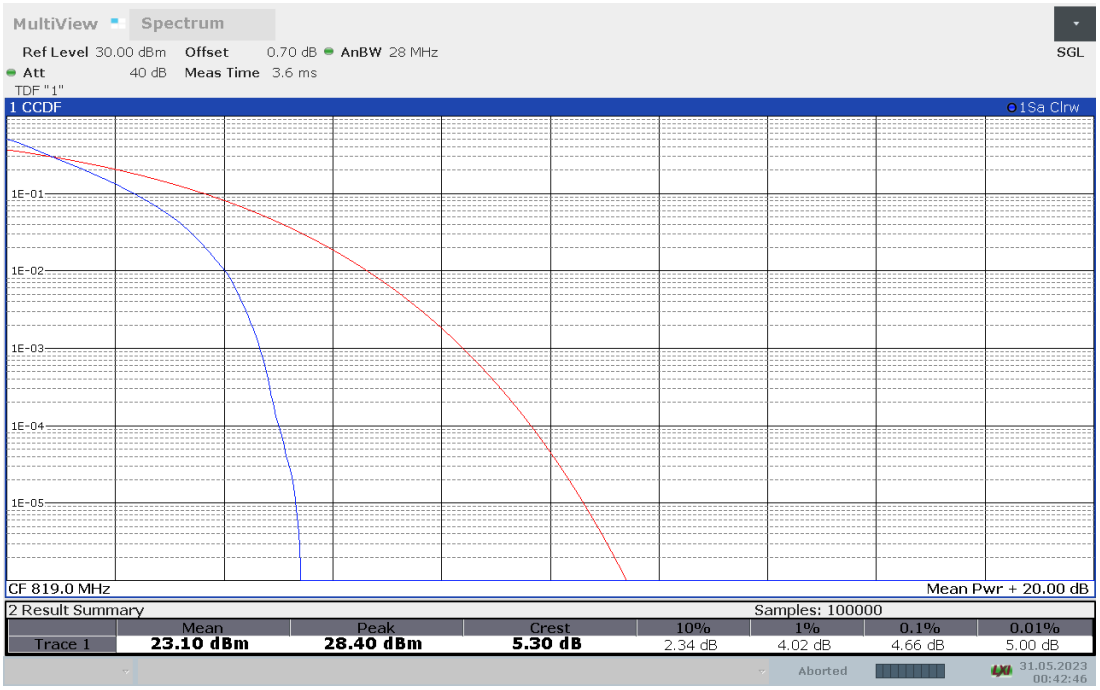
LTE band 25, 20MHz Bandwidth, 16QAM (PAPR)



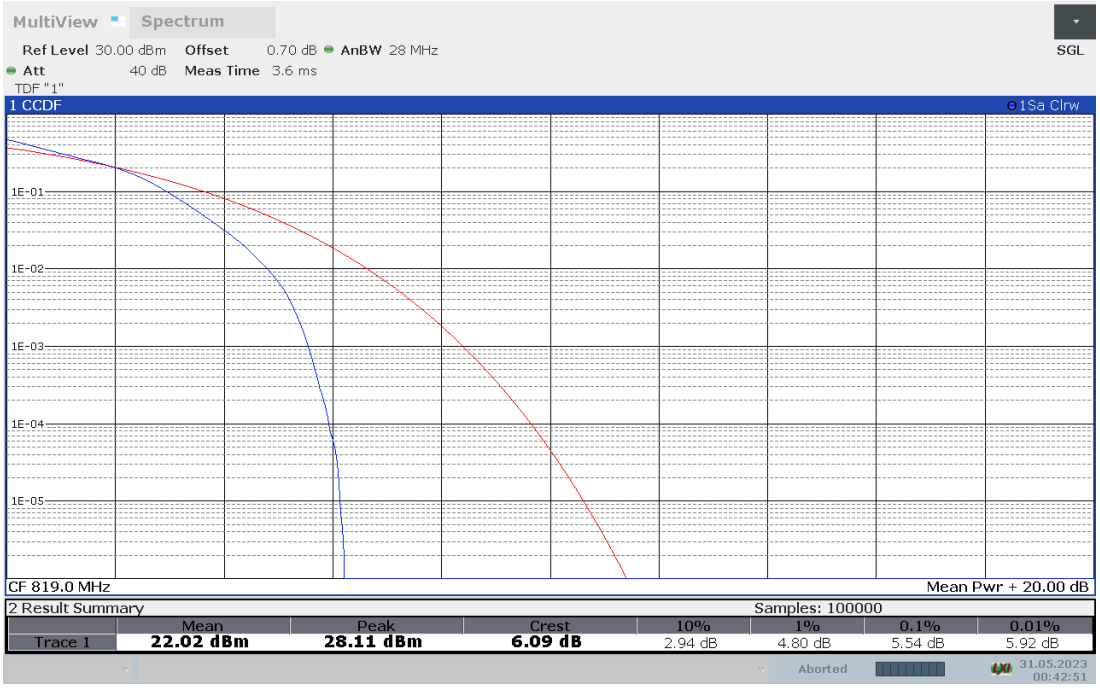
LTE band 26(814MHz -824MHz)

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
819.0	10	4.66	5.54

LTE band 26(814MHz -824MHz), 10MHz Bandwidth, QPSK (PAPR)



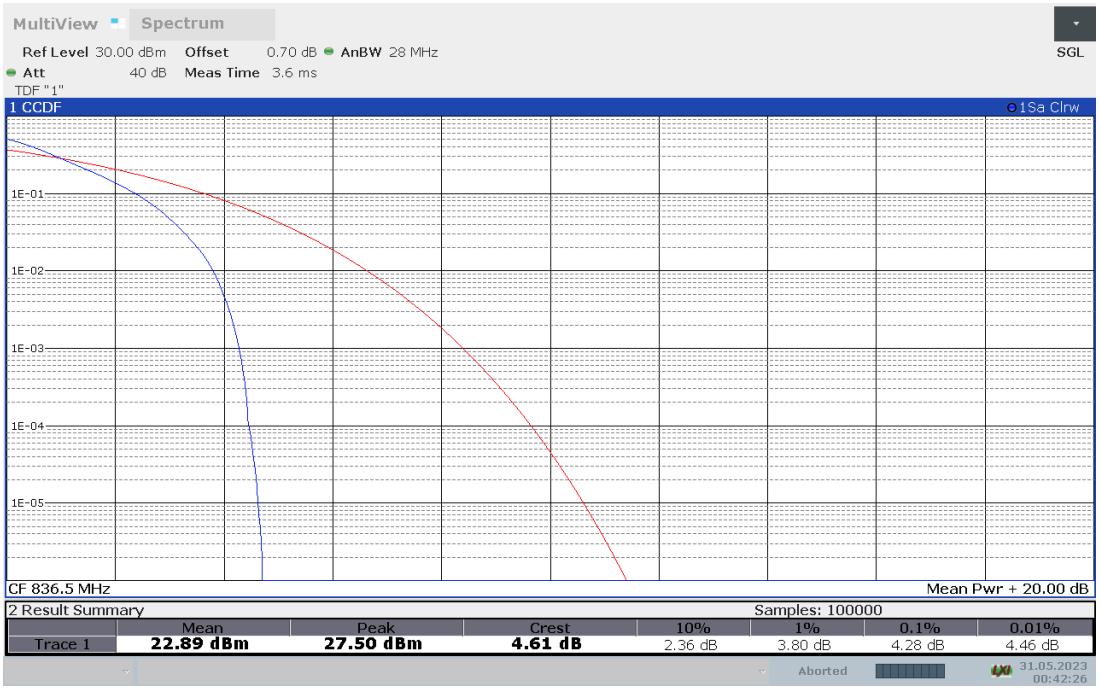
LTE band 26(814MHz -824MHz), 10MHz Bandwidth, 16QAM (PAPR)



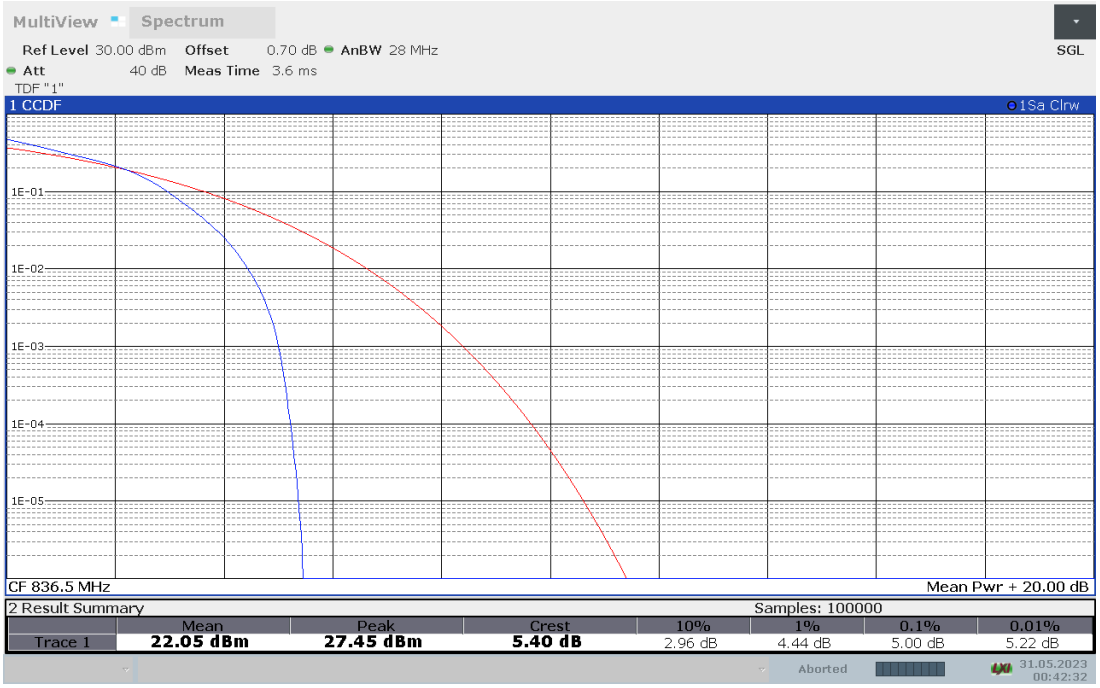
LTE band 26(824MHz -849MHz)

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
836.5	15	4.28	5.00

LTE band 26(824MHz -849MHz), 15MHz Bandwidth, QPSK (PAPR)



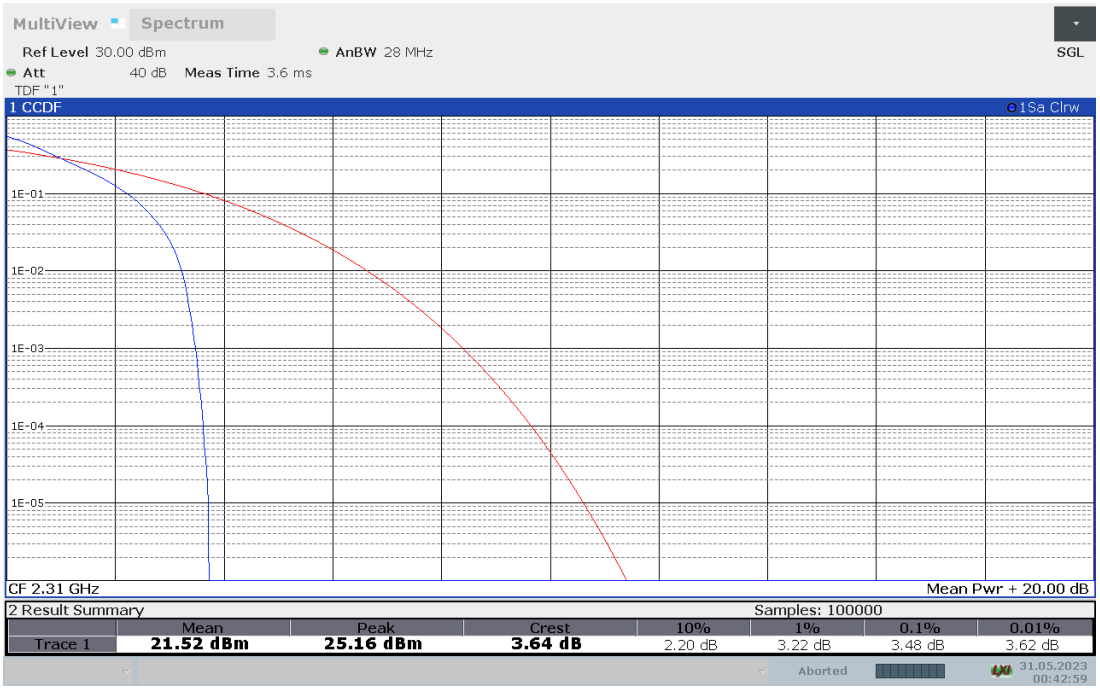
LTE band 26(824MHz -849MHz), 15MHz Bandwidth, 16QAM (PAPR)



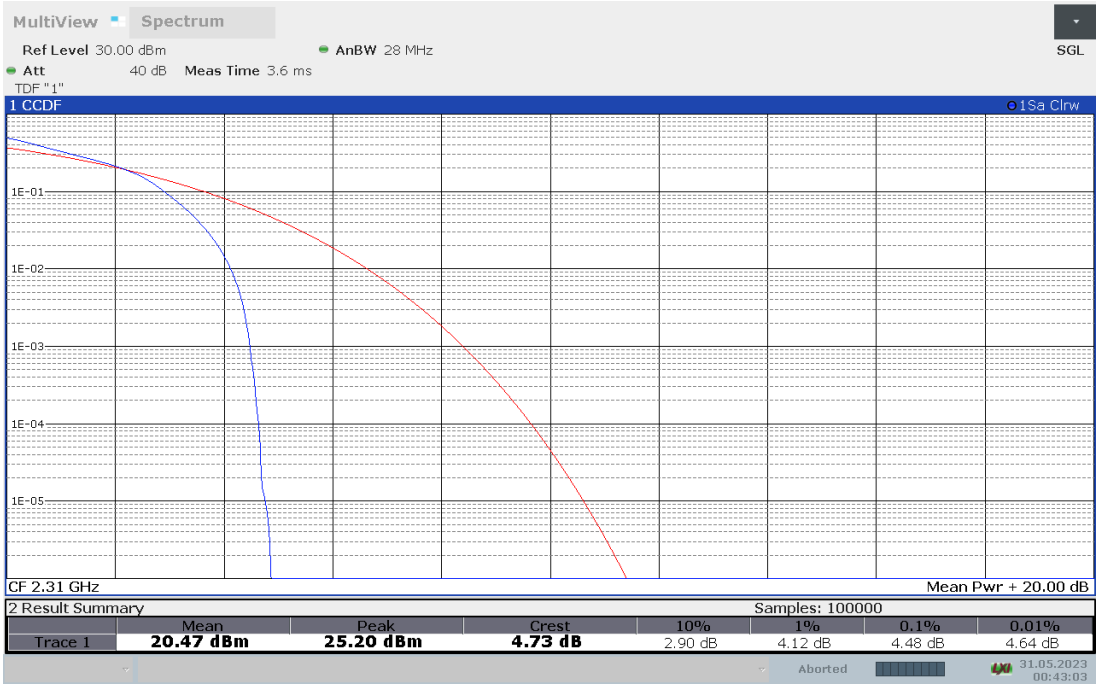
LTE band 30

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2310.0	10	3.48	4.48

LTE band 30, 10MHz Bandwidth, QPSK (PAPR)



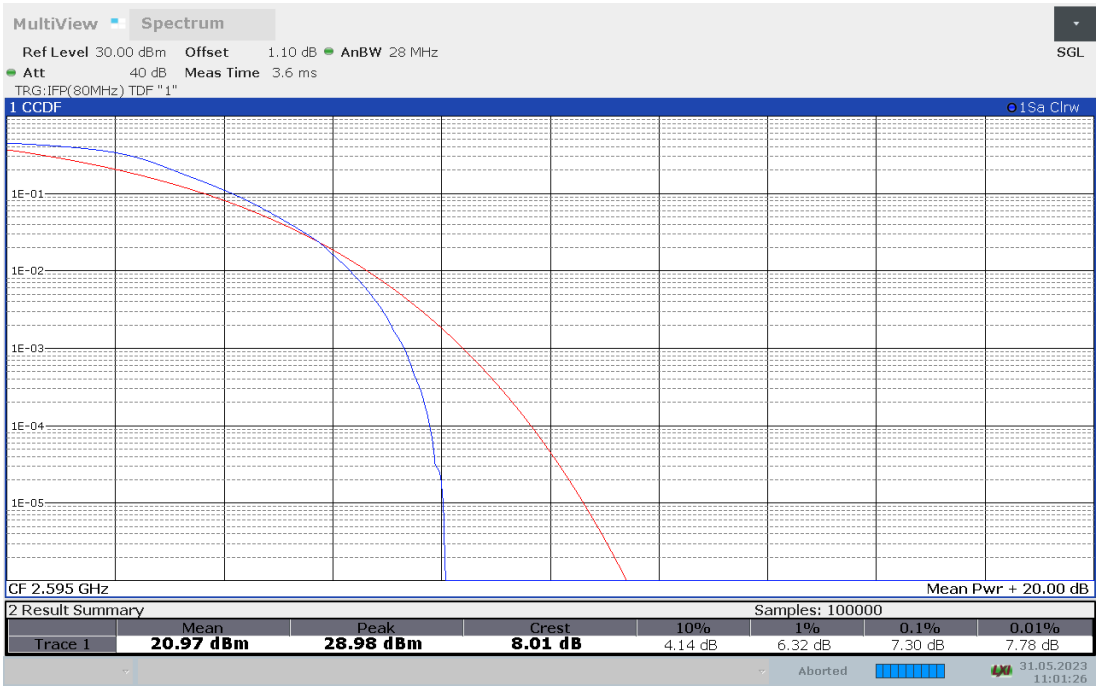
LTE band 30, 10MHz Bandwidth, 16QAM (PAPR)



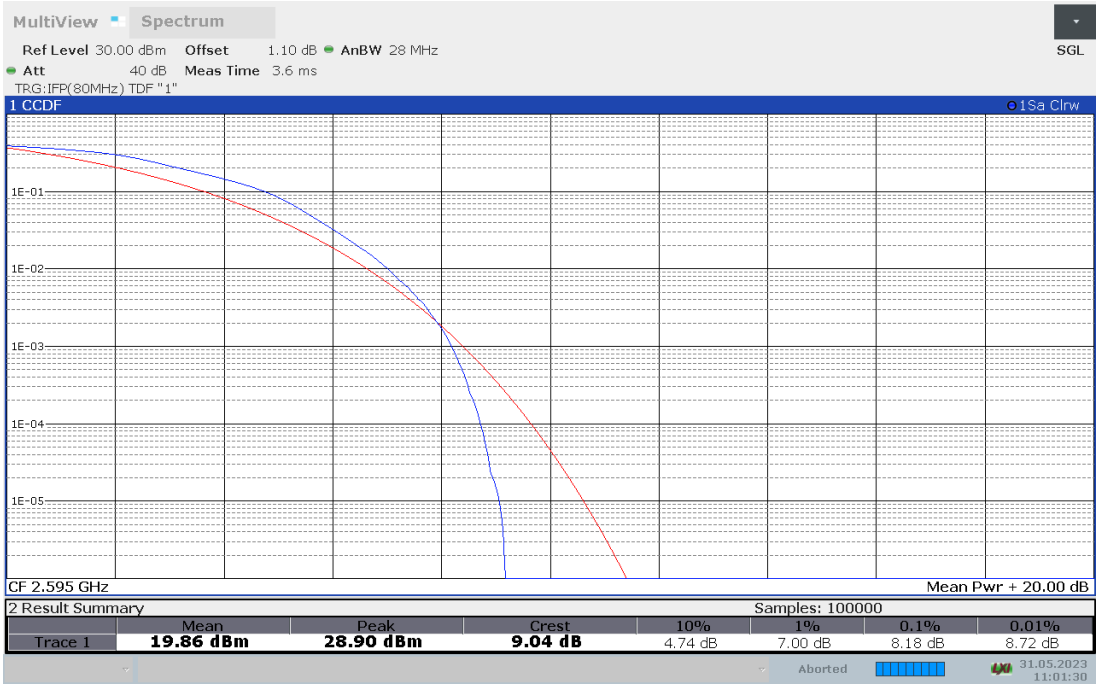
LTE band 38

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2595.0	20	7.30	8.18

LTE band 38, 20MHz Bandwidth, QPSK (PAPR)



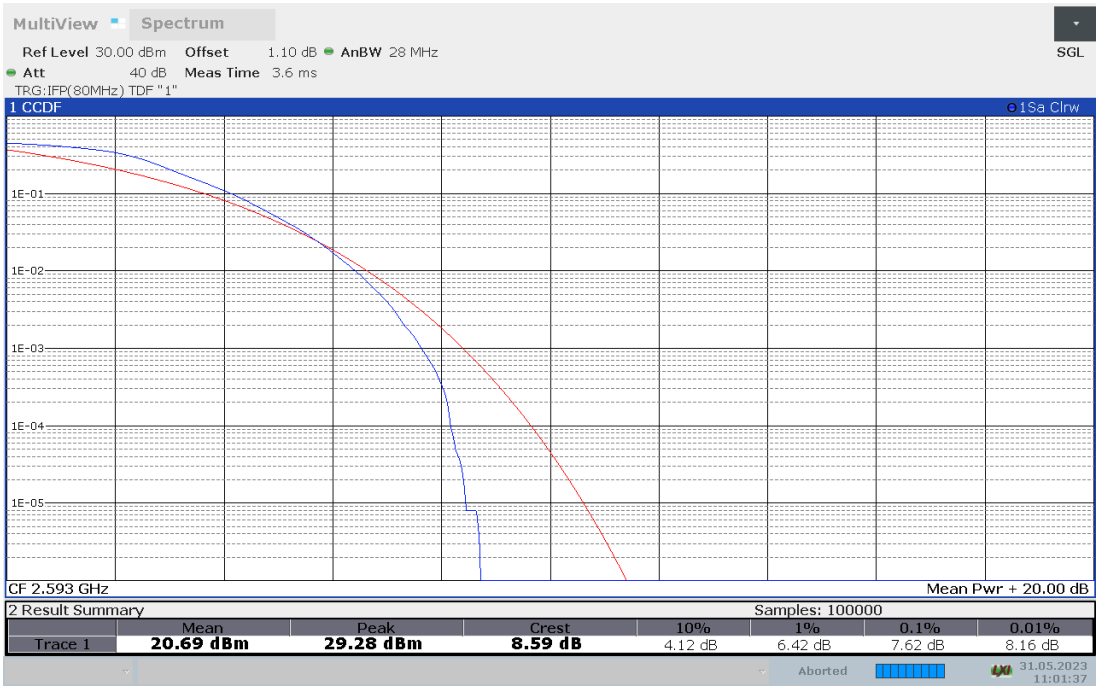
LTE band 38, 20MHz Bandwidth, 16QAM (PAPR)



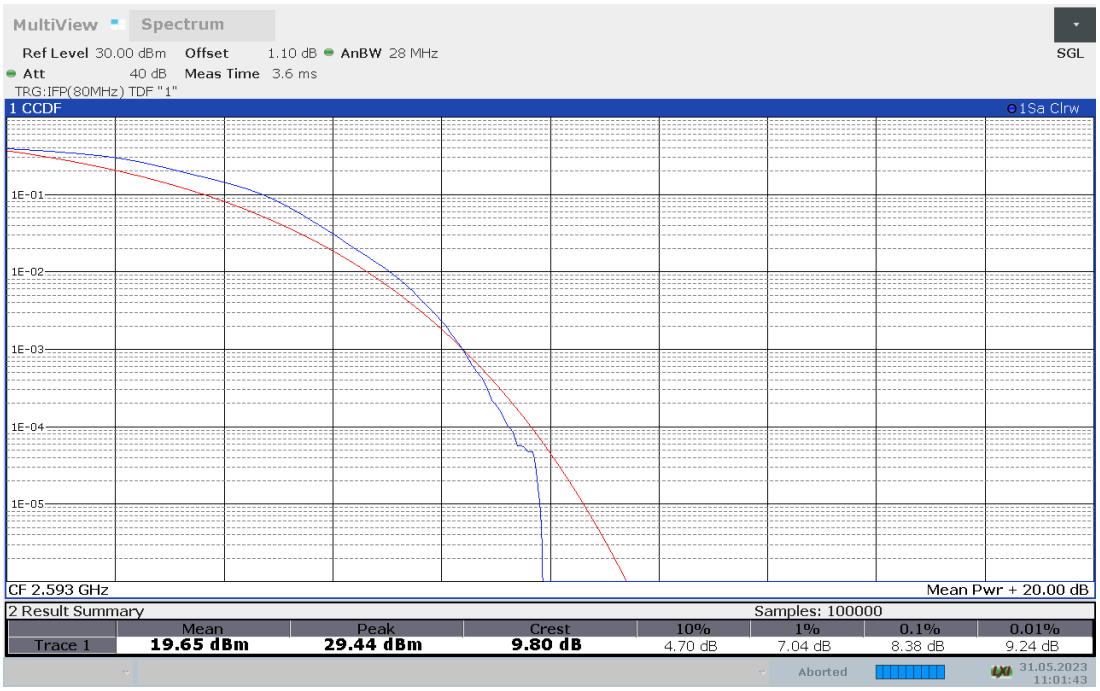
LTE band 41

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2593.0	20	7.62	8.38

LTE band 41, 20MHz Bandwidth, QPSK (PAPR)



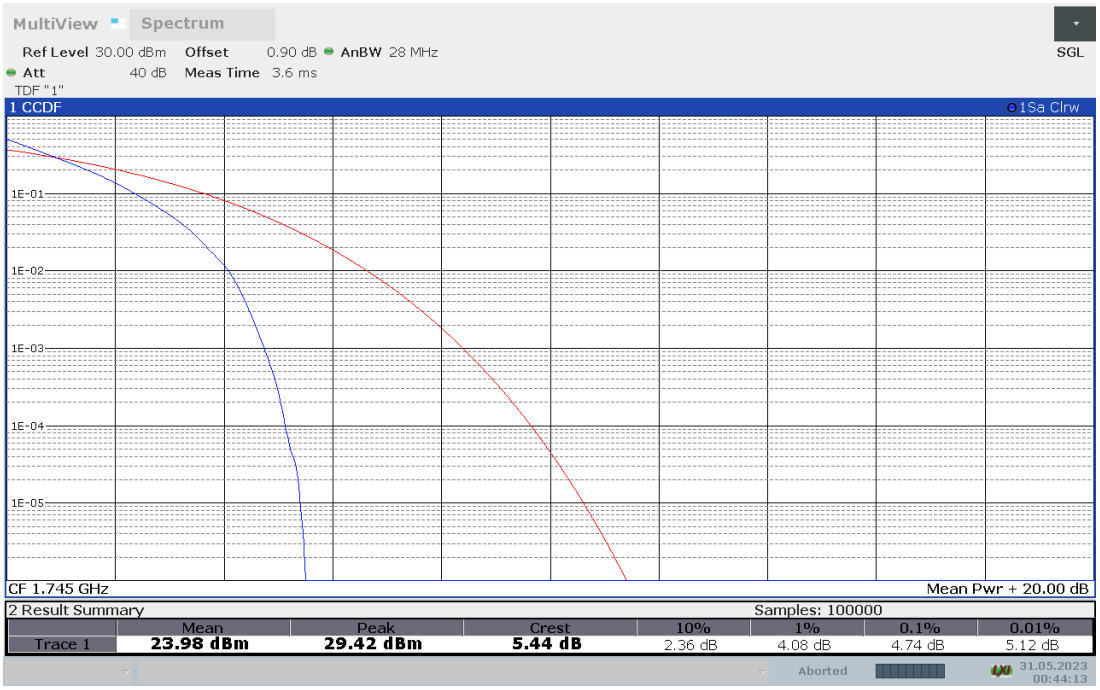
LTE band 41, 20MHz Bandwidth, 16QAM (PAPR)



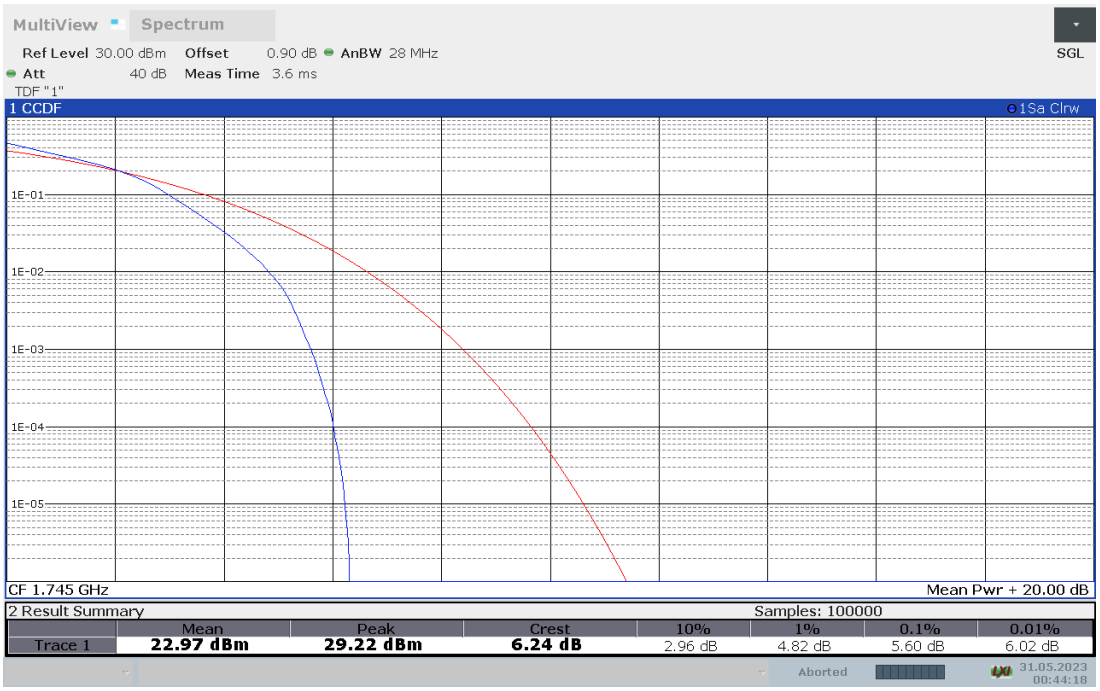
LTE band 66

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1745.0	20	4.74	5.60

LTE band 66, 20MHz Bandwidth, QPSK (PAPR)



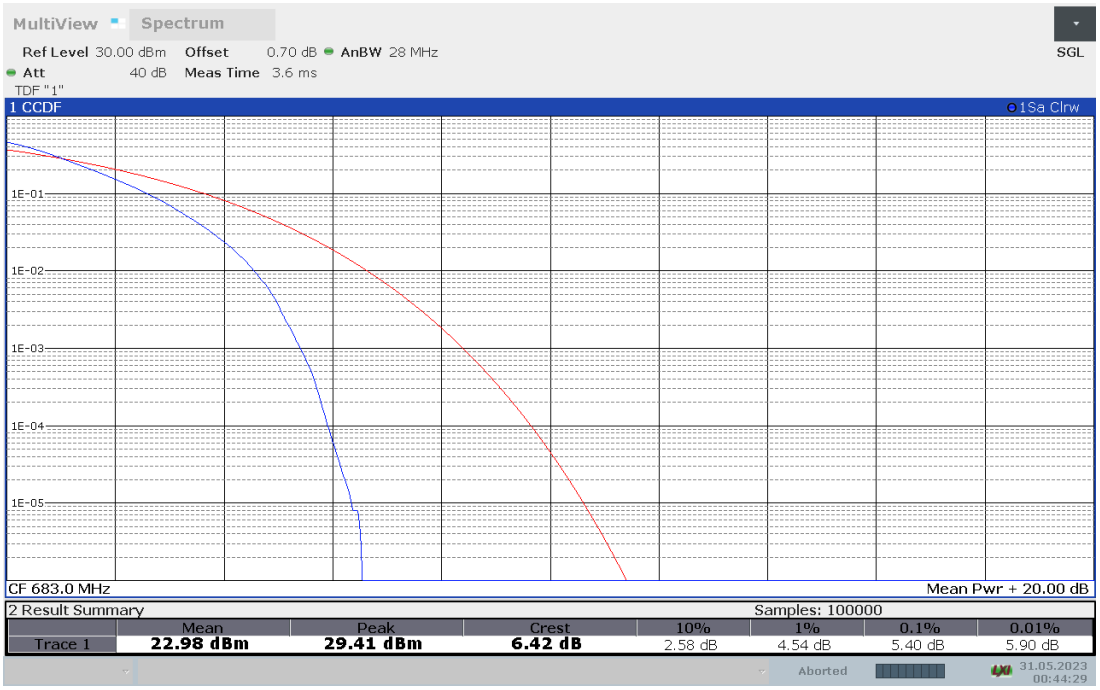
LTE band 66, 20MHz Bandwidth, 16QAM (PAPR)



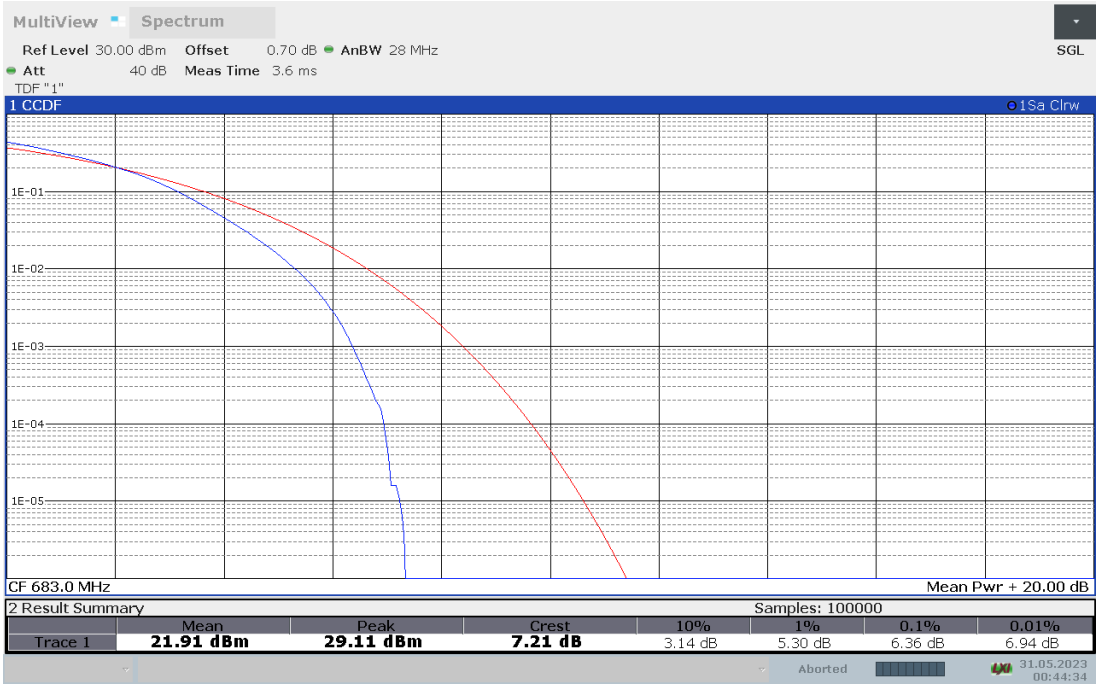
LTE band 71

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1745.0	20	5.40	6.36

LTE band 71, 20MHz Bandwidth, QPSK (PAPR)



LTE band 71, 20MHz Bandwidth, 16QAM (PAPR)



Note: Expanded measurement uncertainty is U = 0.48, k = 2

ANNEX B ccreditation Certificate

Accredited Laboratory

A2LA has accredited

SHENZHEN ACADEMY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Shenzhen, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 23rd day of November 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4353.01
Valid to November 30, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

ANNEX C Certificate of Brand Authorization

编号 No.：CTTL-001

TTL泰尔实验室

品牌授权书

Certificate of Brand Authorization

兹授权 **深圳信息通信研究院** 为“泰尔实验室”品牌实验室，可以使用“泰尔实验室”品牌开展检验检测相关业务，本授权书有效期至 **2024** 年 **10** 月 **31** 日。

This is to certify that **Shenzhen Academy of Information and Communications Technology** is authorized as the brand laboratory of “CTTL”, which may undertake inspection and testing related business using the “CTTL” brand. This certificate is valid for the period to **31 October 2024**.

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授权单位：中国信息通信研究院

China Academy of Information and Communication Technology（CAICT）

授权日期：2019 年 10 月 30 日

*****END OF REPORT*****