DEKRA Testing and Certification, S.A.U.
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c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
75462RRF.003

Test Report
USA FCC Part 27
CANADA RSS-130, RSS-139, RSS-Gen

(*) Identification of item tested	LTE Cat-4
(*) Trademark	Sequans Communications
(*) Model and /or type reference	CA410
Other identification of the product	FCC ID: 2AAGMCA410A IC: 12732A-CA410A
(*) Features	LTE Cat-4 HW version: V1 SW version: LR4.1.6.0-CBRSA-59334
Applicant	SEQUANS COMMUNICATIONS 55 Boulevard Charles de Gaulle, 92700 Colombes, France
Test method requested, standard	USA FCC Part 27 (10-1-21 Edition). CANADA RSS-130 Issue 2, February 2019. CANADA RSS-139 Issue 4, September 2022, Amendment October 2022. CANADA RSS-Gen Issue 5, April 2018 ANSI C63.26-2015. KDB 971168 D01 Power Meas License Digital Systems v03r01, April. 2018.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager  Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456) Fecha: 2023.10.23 17:41:41 +02'00'
Date of issue	2023-10-17
Report template No.	FDT08_24 (*) "Data provided by the client"

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DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

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Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample CA410 is ideal for adding LTE connectivity to electronics devices for industrial Internet of Things (IoT), Machine-to-Machine (M2M) and broadband consumer applications. CA410 is compliant with CBRS networks operating on LTE band 48 in USA, with US B8 – known as Anterix band - and with other US MNO bands: bands 2/4/5/12/13/66 as well as Firstnet LTE band 14 and band 26 used in private networks.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
75462C/015	LTE Cat-4	CA410-EVK	FOX-23-26-0660	25-07-2023

Sample S/01 has undergone the following test(s): The conducted tests indicated in Appendix A.

- Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
75462C/014	LTE Cat-4	CA410-EVK	FOX-23-26-0647	25-07-2023
75462C/007	Antenna	-	-	25-07-2023
75462C/008	Antenna	-	-	25-07-2023

Sample S/02 has undergone the following test(s): The radiated tests indicated in Appendix A.

Test sample description

<table>
<tr><td rowspan="2">Ports……:</td><td rowspan="2">Port name and description</td><td colspan="4">Cable</td></tr>
<tr><td>Specified max length [m]</td><td>Attached during test</td><td>Shielded</td><td>Coupled to patient(3)</td></tr>
<tr><td></td><td>USB</td><td></td><td>☒</td><td>☐</td><td>☐</td></tr>
<tr><td>Supplementary information to the ports……:</td><td colspan="5">-</td></tr>
<tr><td rowspan="5">Rated power supply ..... :</td><td colspan="2" rowspan="2">Voltage and Frequency</td><td colspan="4">Reference poles</td></tr>
<tr><td>L1</td><td>L2</td><td>L3</td><td>N</td><td>PE</td></tr>
<tr><td>☐</td><td>AC:</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td></tr>
<tr><td>☐</td><td>AC:</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td></tr>
<tr><td>☒</td><td colspan="5">DC: 3.2V Min, 3.3V Typ, 4.6V Max</td></tr>
<tr><td></td><td>☐</td><td colspan="5">DC:</td></tr>
<tr><td>Rated Power..... :</td><td colspan="6">-</td></tr>
<tr><td>Clock frequencies..... :</td><td colspan="6">-</td></tr>
<tr><td>Other parameters ..... :</td><td colspan="6">-</td></tr>
<tr><td>Software version..... :</td><td colspan="6">-</td></tr>
<tr><td>Hardware version ..... :</td><td colspan="6">-</td></tr>
<tr><td>Dimensions in cm (W x H x D) ... :</td><td colspan="6">-</td></tr>
<tr><td rowspan="4">Mounting position ..... :</td><td>☒</td><td colspan="5">Table top equipment</td></tr>
<tr><td>☐</td><td colspan="5">Wall/Ceiling mounted equipment</td></tr>
<tr><td>☐</td><td colspan="5">Floor standing equipment</td></tr>
<tr><td>☐</td><td colspan="5">Hand-held equipment</td></tr>
</table>

	☐ Other:		
Modules/parts..... :	Module/parts of test item	Type	Manufacturer
	-	-	-
Accessories (not part of the test item) ..... :	Description	Type	Manufacturer
	USB Cable	USB	-
	Antenna	Antenna	-
Documents as provided by the applicant..... :	Description	File name	Issue date
	-	-	-

(3) Only for Medical Equipment

Identification of the client

SEQUANS COMMUNICATIONS
55 Boulevard Charles de Gaulle, 92700, Colombes, France

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-08-02
Date (finish)	2023-09-26

Document history

Report number	Date	Description
75462RRF.003	2023-10-17	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semi-anechoic chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC

Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Ireneo Bibang, Rafael Fernández, Carmen Vázquez, Pablo Redondo, Fernando Chito, Valentín Andarias, Francisco López.

Used instrumentation:

Control No.	Equipment	Next Calibration
8002	Climatic Chamber BINDER MK 56	2024-03
6157	Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2023-10
9229	Wideband Radio Communication Tester ROHDE AND SCHWARZ CMW500	2024-06
6794	Shielded Room ETS LINDGREN S101	N/A
7798	EMC/RF Testing SW ROHDE AND SCHWARZ WMS32	N/A
6791	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A
6792	Shielded Room ETS LINDGREN S101	N/A
6143	Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2023-10
4612	Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2024-07
3783	RF Preamplifier G>30dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-3A	2023-12
7817	EMI Test Receiver 2 Hz - 44 GHz, ROHDE AND SCHWARZ ESW44	2023-12
6667	Wideband Radio Communication Tester ROHDE AND SCHWARZ CMW500	2024-06
4848	EMC/RF Testing SW ROHDE AND SCHWARZ EMC32	N/A

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

LTE Cat-4 Bands 4, 8, 12, 13, 66:

FCC PART 27 / RSS-130, RSS-139, RSS-Gen PARAGRAPH		
Requirement – Test case	**Verdict**	**Remark**
FCC 27.50 / RSS-130 4.6, RSS-139 5.5: RF Output Power	P	
FCC 2.1047 / RSS-130 4.2, RSS-139 5.3: Modulation Characteristics	P	
FCC 27.54 / RSS-130 4.5, RSS-139 5.4: Frequency Stability	P	
FCC 2.1049 / RSS-Gen 6.7: Occupied Bandwidth	P	
FCC 27.53 / RSS-130 4.7, RSS-139 5.6: Spurious Emissions at Antenna Terminals	P	
FCC 27.53 / RSS-130 4.7, RSS-139 5.6: Spurious Emissions at Antenna Terminals at Block Edges	P	
FCC 27.53 / RSS-130 4.7, RSS-139 5.6: Radiated Emissions	P	
Supplementary information and remarks: None.		

Appendix A: Test results for FCC 27 / RSS-130, RSS-139, RSS-Gen: LTE Cat-4 Bands 4, 8, 12, 13, 66

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TEST CONDITIONS

(*): Declared by the Applicant.

POWER SUPPLY (*):

Vnominal: 3.2 Vdc
Vminimum: 3.3 Vdc
Vmaximum: 4.6 Vdc

Type of Power Supply: DC External.

ANTENNA (*):

Low Bands	Gain (dBi)	Type of Antenna
LTE Cat-4 Band 8	-1.1	External (reference 2JW1183-C952B)
LTE Cat-4 Band 12	-1.1	External (reference 2JW1183-C952B)
LTE Cat-4 Band 13	-1.1	External (reference 2JW1183-C952B)
High Bands	Gain (dBi)	Type of Antenna
LTE Cat-4 Band 4	-1.1	External (reference 2JW1183-C952B)
LTE Cat-4 Band 66	+0.5	External (reference 2JW1183-C952B)

TEST FREQUENCIES:

LTE Cat-4 Band 4. QPSK and 16QAM:

	Channel per BW=(Frequency, MHz)					
	BW = 1.4 MHz	BW = 3 MHz	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Low	19957 (1710.7)	19965 (1711.5)	19975 (1712.5)	20000 (1715.0)	20025 (1717.5)	20050 (1720.0)
Middle	20175 (1732.5)	20175 (1732.5)	20175 (1732.5)	20175 (1732.5)	20175 (1732.5)	20175 (1732.5)
High	20393 (1754.3)	20385 (1753.5)	20375 (1752.5)	20350 (1750.0)	20325 (1747.5)	20300 (1745.0)

NOTE: LTE Cat-4 Band 4 is completely included in LTE Cat-4 Band 66, so the channels of LTE Cat-4 Band 66 were tested to give conformity to the assigned block.

LTE Cat-4 Band 8. QPSK and 16QAM:

	Channel (Frequency, MHz)	
	BW = 1.4 MHz	BW = 3 MHz
Low	21632 (898.2)	
Middle		21640 (899)
High	21648 (899.8)	

LTE Cat-4 Band 12. QPSK and 16QAM:

	Channel (Frequency, MHz)			
	BW = 1.4 MHz	BW = 3 MHz	BW = 5 MHz	BW = 10 MHz
Low	23017 (699.7)	23025 (700.5)	23035 (701.5)	23060 (704.0)
Middle	23095 (707.5)	23095 (707.5)	23095 (707.5)	23095 (707.5)
High	23173 (715.3)	23165 (714.5)	23155 (713.5)	23130 (711.0)

LTE Cat-4 Band 13. QPSK and 16QAM:

	Channel (Frequency, MHz)	
	BW = 5 MHz	BW = 10 MHz
Low	23205 (779.5)	
Middle	23230 (782.0)	23230 (782.0)
High	23255 (784.5)	

LTE Cat-4 Band 66. QPSK and 16QAM:

	Channel per BW=(Frequency, MHz)					
	BW = 1.4 MHz	BW = 3 MHz	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Low	131979 (1710.7)	131987 (1711.5)	131997 (1712.5)	132022 (1715.0)	132047 (1717.5)	132072 (1720.0)
Middle	132322 (1745)	132322 (1745)	132322 (1745)	132322 (1745)	132322 (1745)	132322 (1745)
High	132665 (1779.3)	132657 (1778.5)	132647 (1777.5)	132622 (1775)	132597 (1772.5)	132572 (1770)

RF Output Power

Limits

1. LTE Cat-4 Band 8. FCC §27.1507 (a) & (d).

FCC §27.1507 (a) & (d):

(a) *Maximum ERP*. The power limits specified in this section are applicable to operations in areas more than 110 km (68.4 miles) from the U.S./Mexico border and 140 km (87 miles) from the U.S./Canada border.

(3) *Mobile, control and auxiliary test stations*. Mobile, control and auxiliary test stations must not exceed 10 watts ERP.

(4) *Portable stations*. Portable stations must not exceed 3 watts ERP.

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

2. LTE Cat-4 Band 12. FCC §27.50 (c) (10) / RSS-130 Clause 4.6.

FCC §27.50 (c) (10):

Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

RSS-130 Clause 4.6:

4.6.1 General

The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the High PAPR during periods of continuous transmission.

4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

3. LTE Cat-4 Band 13. FCC §27.50 (b) (10) / RSS-130 Clause 4.6.

FCC §27.50 (b) (10):

Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

RSS-130 Clause 4.6:

4.6.1 General

The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the High PAPR during periods of continuous transmission.

4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

4. LTE Cat-4 Band 66. FCC §27.50 (d) / RSS-139 5.5.

FCC §27.50 (d):

> (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.
>
> (5) 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.

RSS-139 5.5:

> The maximum output power of the equipment shall comply with the limits specified below. In the tables, maximum power refers to the equivalent isotropically radiated power (e.i.r.p.) or total radiated power (TRP), measured in terms of average values.
>
> The limits in this RSS are specified for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-513 and SRSP-519 for more details on the bands 2110-2180 MHz and 2180-2200 MHz respectively.

Table 3: Maximum power of equipment in the band 1710-1780 MHz	
Equipment type	**Maximum power**
Fixed station and base station	30 dBm e.i.r.p./channel bandwidth
Subscriber equipment	30 dBm e.i.r.p./channel bandwidth

> In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

Method

The conducted RF output power measurements were made at the RF output terminals of the EUT using the power meter of the Universal Radio Communication tester CMW500, selecting maximum transmission power of the EUT and different modes of modulation.

The peak-to-average power ratio (PAPR) is measured using an attenuator, power splitter and spectrum analyser with a Complementary Cumulative Distribution Function implemented.

The maximum equivalent isotropically radiated power (e.i.r.p.) is calculated by adding the declared maximum antenna gain (dBi).

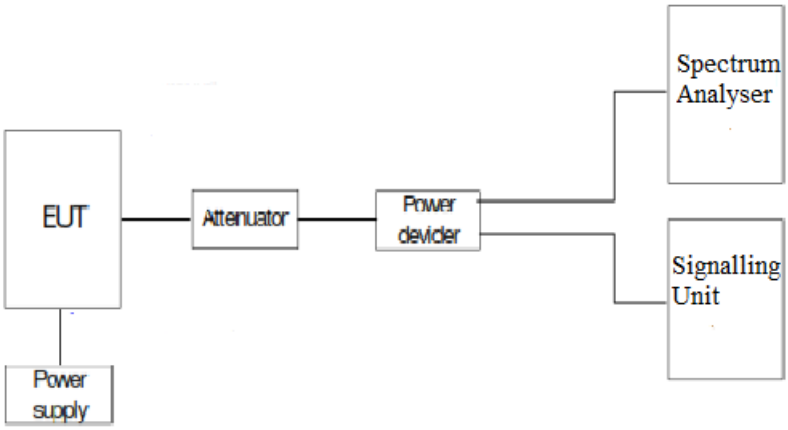
The maximum effective radiated power e.r.p. is calculated from the maximum equivalent isotropically radiated power (e.i.r.p.) by subtracting 2.15 dB:

E.R.P. = E.I.R.P. - 2.15 dB

Test Setup

1. CONDUCTED AVERAGE POWER:

2. PEAK-TO-AVERAGE POWER RATIO (PAPR) and Conducted Average power:



Results

1. CONDUCTED AVERAGE POWER:

LTE Cat-4 Band 8:

Worst-case of RF Power is BW=1.4 MHz, Low Channel, QPSK, RB Size=3, RB Offset=0.

BANDWIDTH (MHz)	CHANNEL	FREQUENCY (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
1.4	Low 21632	898.2 MHz	QPSK	1	0	23.85
				1	2	23.67
				1	5	23.75
				3	0	23.92
				3	1	23.61
				3	2	23.69
				6	0	22.66
			16-QAM	1	0	22.6
				1	2	22.46
				1	5	22.52
				3	0	22.92
				3	1	22.7
				3	2	22.74
				6	0	21.76
	High 21648	899.8 MHz	QPSK	1	0	23.57
				1	2	23.54
				1	5	23.13
				3	0	23.48
				3	1	23.48
				3	2	23.43
				6	0	22.51
			16-QAM	1	0	22.54
				1	2	22.58
				1	5	22.2
				3	0	22.57
				3	1	22.58
				3	2	22.55
				6	0	21.64

BW=1.4 MHz. QPSK:

MAX POWER	QPSK COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	23.92	-1.1	22.82	20.67
HIGH	23.57	-1.1	22.47	20.32
MAX:	23.92		22.82	20.67

BW=1.4 MHz. 16QAM:

MAX POWER	16QAM COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	22.92	-1.1	21.82	19.67
HIGH	22.58	-1.1	21.48	19.33
MAX:	22.92		21.82	19.67

LTE Cat-4 Band 12:

Worst-case of RF Power is BW=10 MHz, High Channel, QPSK, RB Size=1, RB Offset=24.

BANDWIDTH (MHz)	CHANNEL	FREQUENCY (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
10	Low 23060	704	QPSK	1	0	23.28
				1	24	23.37
				1	49	23.12
				25	0	22.7
				25	12	22.4
				25	24	22.54
				50	0	22.42
			16-QAM	1	0	22.63
				1	24	22.7
				1	49	22.53
				25	0	21.81
				25	12	21.33
				25	24	21.53
				50	0	21.4
	Middle 23095	707.5	QPSK	1	0	23.65
				1	24	23.1
				1	49	23.97
				25	0	22.52
				25	12	22.36
				25	24	22.79
				50	0	22.95
			16-QAM	1	0	22.56
				1	24	22.08
				1	49	22.92
				25	0	21.58
				25	12	21.33
				25	24	21.8
				50	0	21.94
	High 23130	711	QPSK	1	0	22.81
				1	24	24.06
				1	49	23.39
				25	0	22.8
				25	12	23.1
				25	24	22.47
				50	0	22.58
			16-QAM	1	0	21.77
				1	24	23.07
				1	49	22.43
				25	0	21.87
				25	12	22.04
				25	24	21.51
				50	0	21.57

BW=10 MHz. QPSK:

MAX POWER	QPSK COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	23.37	-1.10	22.27	20.12
HIGH	24.06	-1.10	22.96	20.81
MAX:	20.12		20.81	18.66

BW=10 MHz. 16QAM:

MAX POWER	16QAM COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	22.70	-1.10	23.07	20.92
HIGH	23.07	-1.10	21.97	19.82
MAX:	19.45		19.82	17.67

LTE Cat-4 Band 13:

Worst-case of RF Power is BW=10 MHz, Middle Channel, QPSK, RB Size=1, RB Offset=24.

BANDWIDTH (MHz)	CHANNEL	FREQUENCY (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
10	Middle 23230	782	QPSK	1	0	23.1
				1	24	23.83
				1	49	22.28
				25	0	22.94
				25	12	22.52
				25	24	22.23
				50	0	21.66
			16-QAM	1	0	22.21
				1	24	23.04
				1	49	21.58
				25	0	22.04
				25	12	21.66
				25	24	21.36
				50	0	20.44

BW=10 MHz. QPSK:

MAX POWER	QPSK COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
MIDDLE	23.83	-1.1	22.73	20.58
MAX:	23.83		22.73	20.58

BW=10 MHz. 16QAM:

MAX POWER	16QAM COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
MIDDLE	23.04	-1.1	21.94	19.79
MAX:	23.04		21.94	19.79

LTE Cat-4 Band 66:

Worst-case of RF Power is BW=5 MHz, Low Channel, QPSK, RB Size=1, RB Offset=12.

BANDWIDTH (MHz)	CHANNEL	FREQUENCY (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
5	Low 131997	1712.5	QPSK	1	0	22.91
				1	12	23.34
				1	24	22.91
				12	0	22.06
				12	6	22.19
				12	11	22.13
				25	0	22.16
			16-QAM	1	0	21.85
				1	12	22.37
				1	24	21.95
				12	0	21.12
				12	6	21.3
				12	11	21.22
				25	0	21.13
	Middle 132322	1745	QPSK	1	0	22.37
				1	12	22.71
				1	24	22.5
				12	0	21.64
				12	6	21.7
				12	11	21.72
				25	0	21.64
			16-QAM	1	0	21.37
				1	12	21.78
				1	24	21.64
				12	0	20.58
				12	6	20.75
				12	11	20.72
				25	0	20.63
	High 132647	1777.5	QPSK	1	0	22.68
				1	12	22.88
				1	24	22.4
				12	0	21.72
				12	6	21.82
				12	11	21.74
				25	0	21.74
			16-QAM	1	0	21.81
				1	12	22.18
				1	24	21.65
				12	0	20.75
				12	6	20.83
				12	11	20.74
				25	0	20.77

BW=5 MHz. QPSK:

MAX POWER	QPSK COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	23.34	0.5	23.84	21.69
MIDDLE	22.71	0.5	23.21	21.06
HIGH	22.88	0.5	23.38	21.23
MAX:	23.34		23.84	21.69

BW=5 MHz. 16QAM:

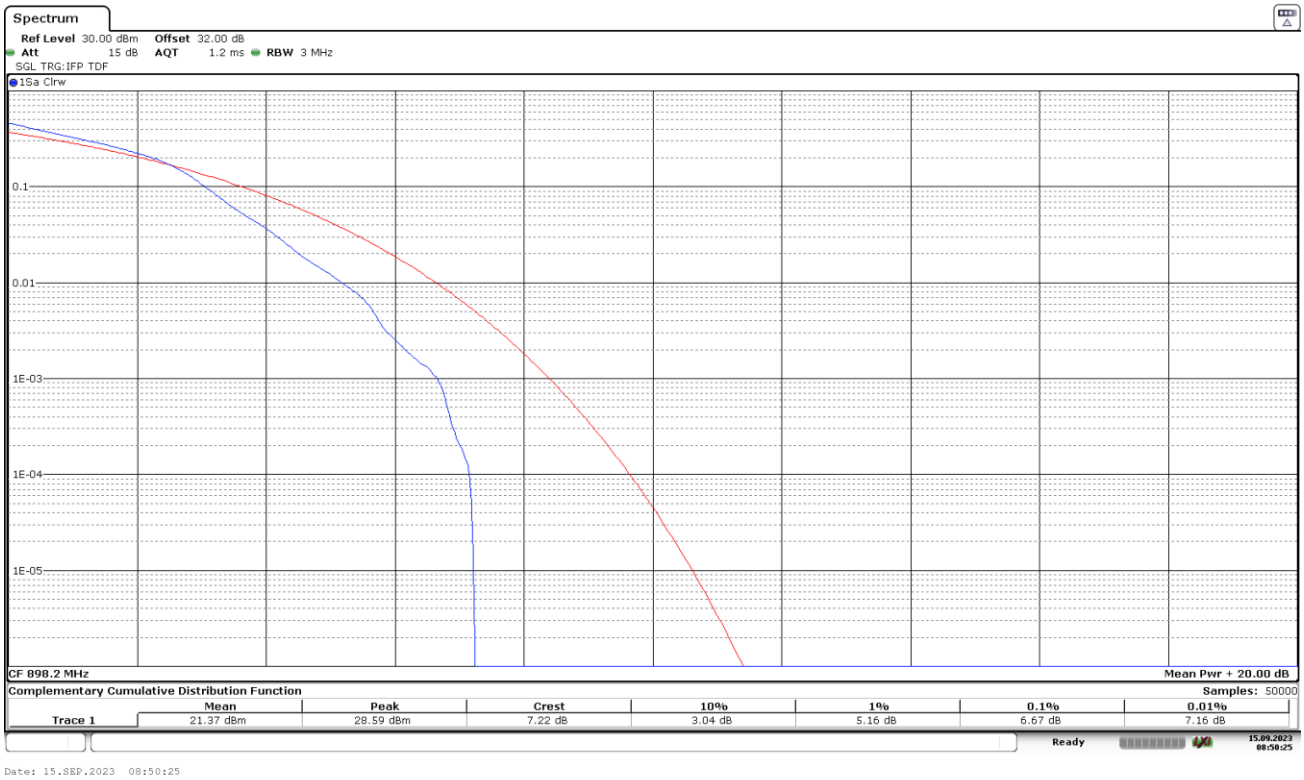
MAX POWER	16QAM COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	22.37	0.5	22.87	20.72
MIDDLE	21.78	0.5	22.28	20.13
HIGH	22.18	0.5	22.68	20.53
MAX:	22.37		22.87	20.72

2. PEAK-TO-AVERAGE POWER RATIO (PAPR)

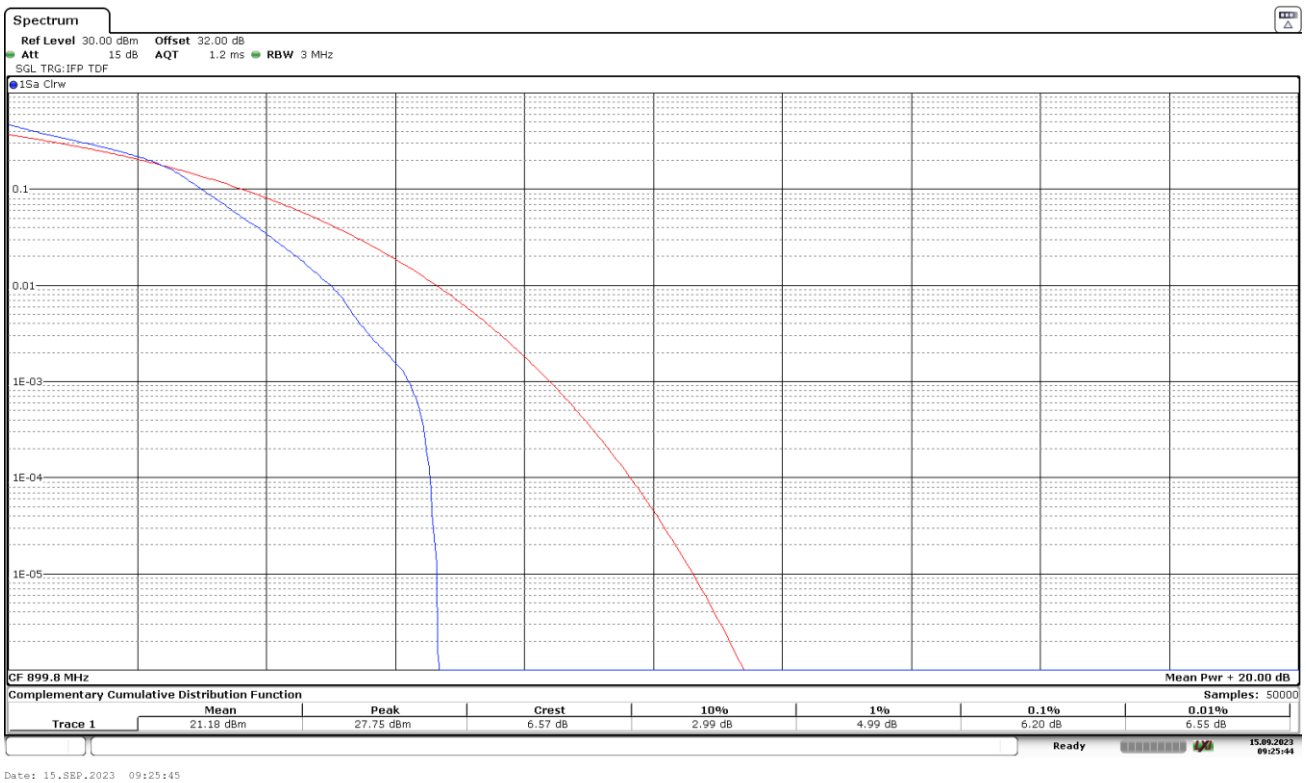
LTE Cat-4 Band 8:

Worst-case of PAPR is BW=1.4 MHz, Low Channel, 16QAM, RB Size=6, RB Offset=0.

Low Channel:



High Channel:



16QAM	Low	High
PAPR (dB)	6.67	6.20

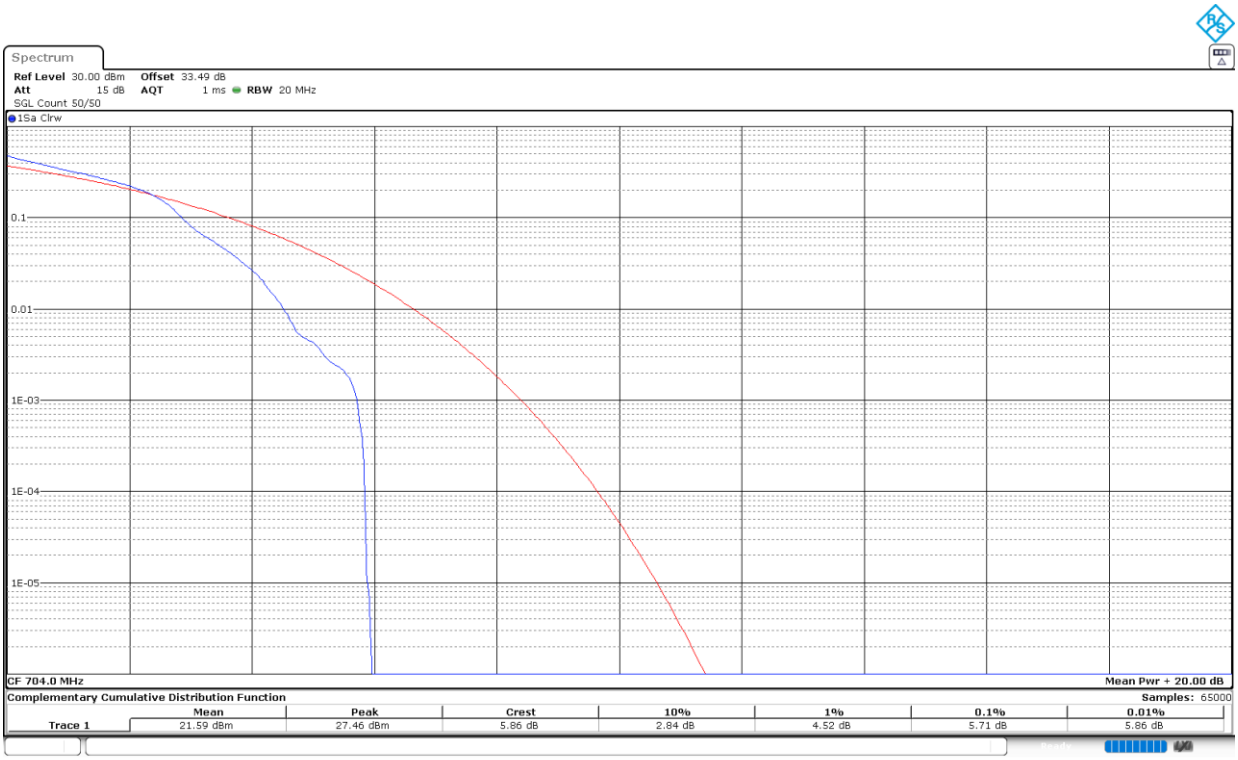
Verdict

Pass

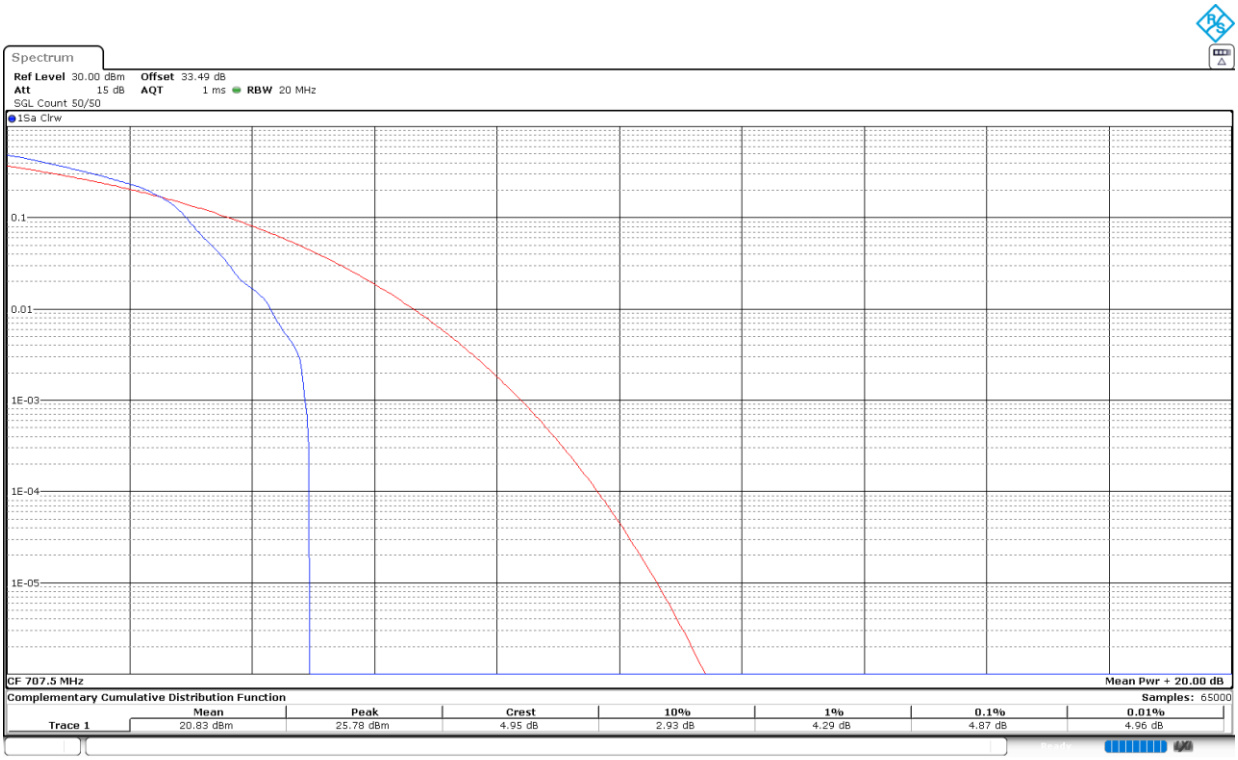
LTE Cat-4 Band 12:

Worst-case of PAPR is BW=10 MHz, High Channel, 16QAM, RB Size=1, RB Offset=0.

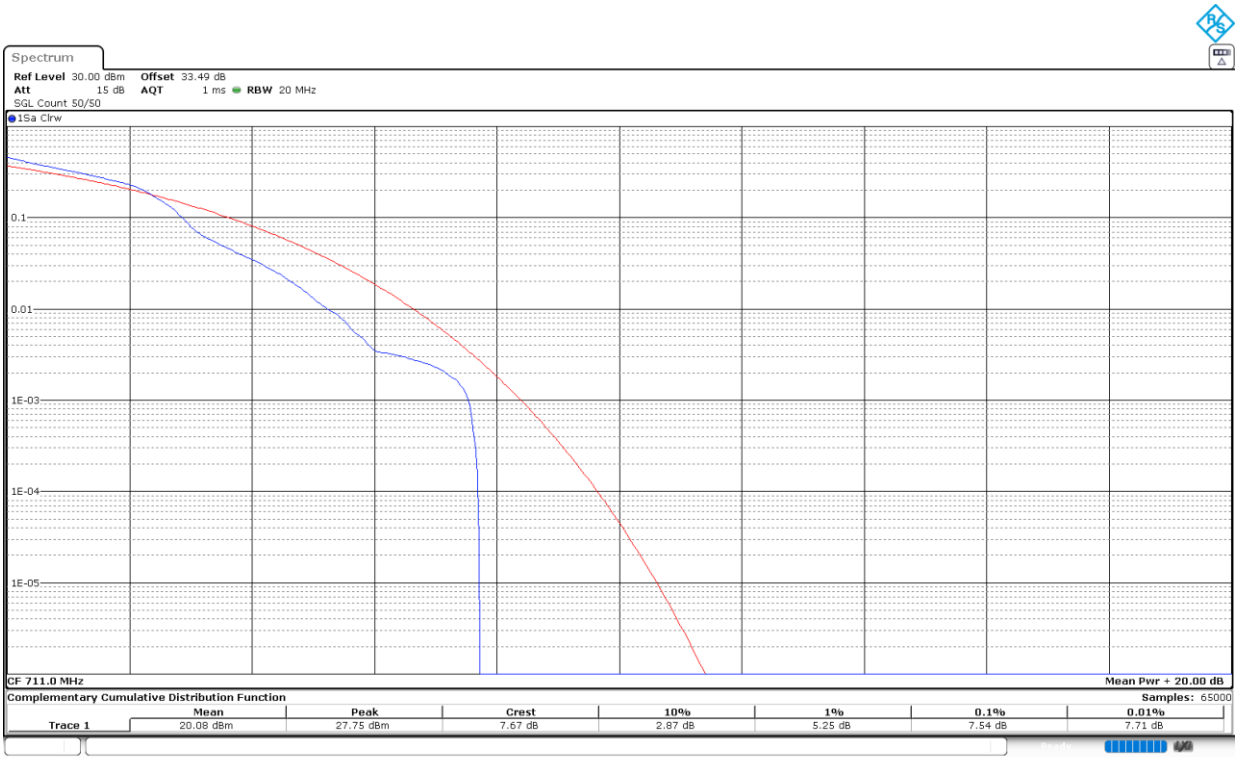
Low Channel:



Middle Channel:



High Channel:



16QAM	Low	Middle	High
PAPR (dB)	5.71	4.87	7.54

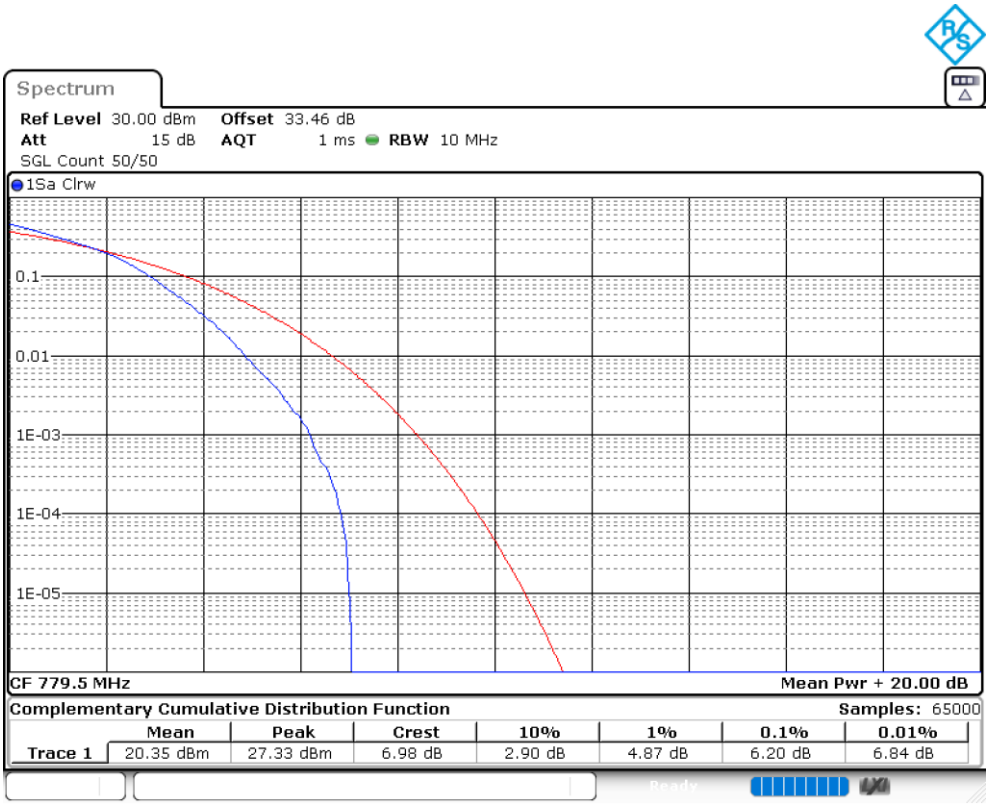
Verdict

Pass

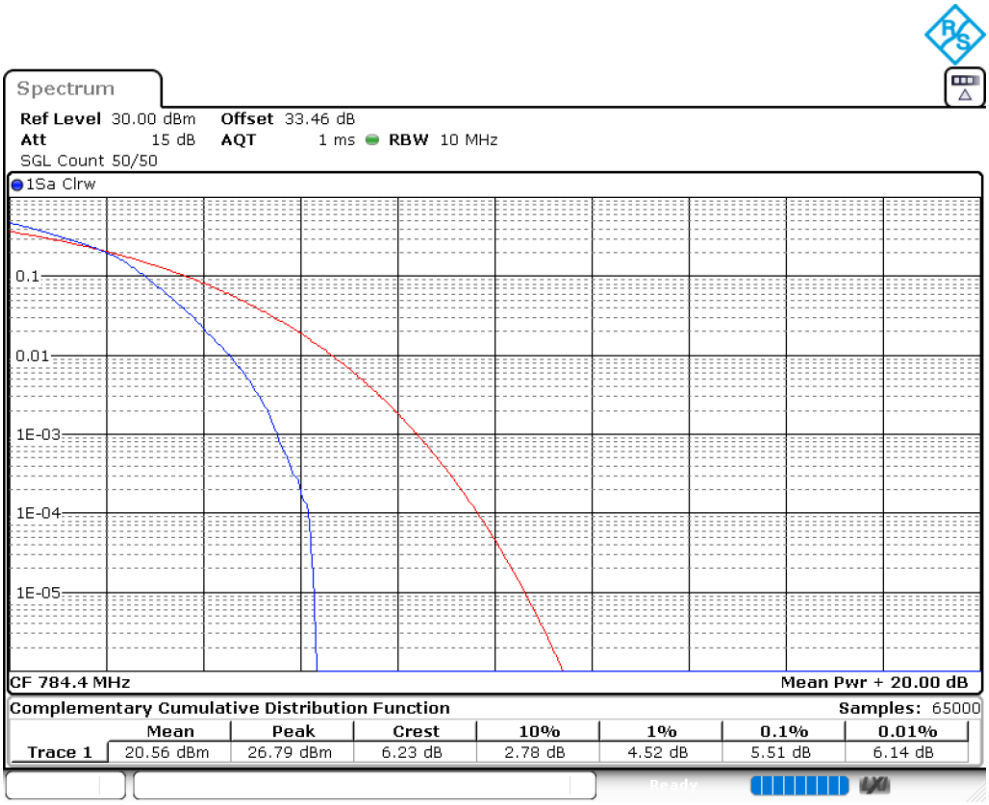
LTE Cat-4 Band 13:

Worst-case of PAPR is BW= 5 MHz, Low Channel, 16QAM, RB Size=25, RB Offset=0.

Low Channel:



High Channel:



16QAM	Low	High
PAPR (dB)	6.20	5.51

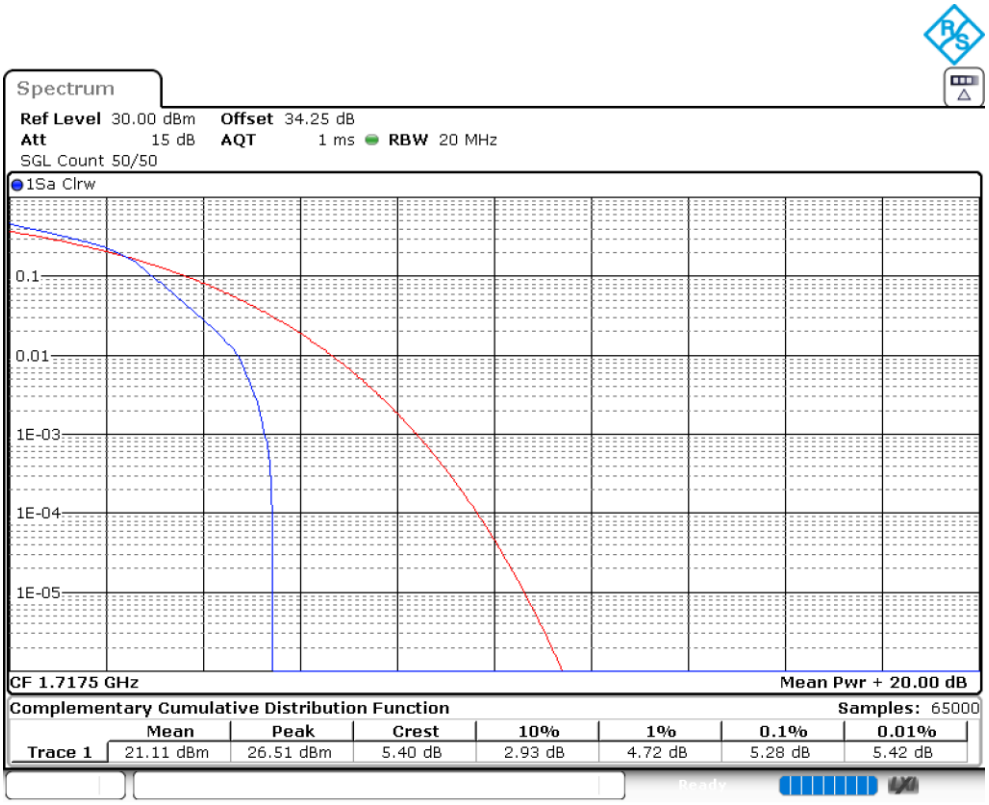
Verdict

Pass

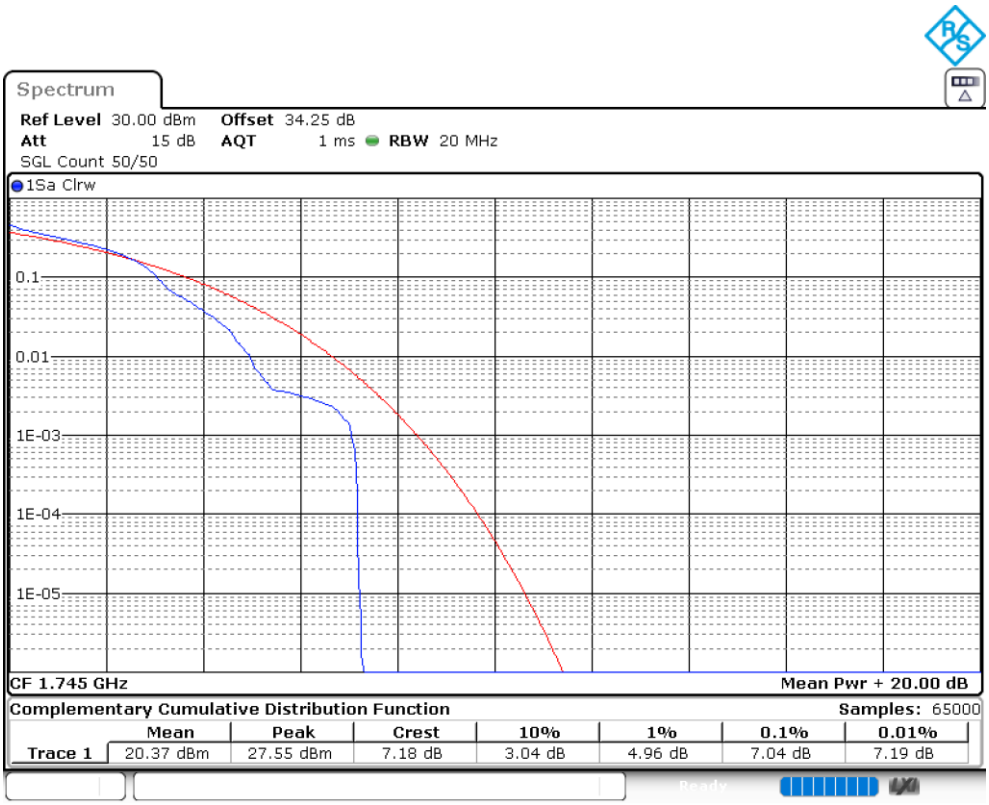
LTE Cat-4 Band 66:

Worst-case of PAPR is BW= 15 MHz, Middle Channel, 16QAM, RB Size=1, RB Offset=37.

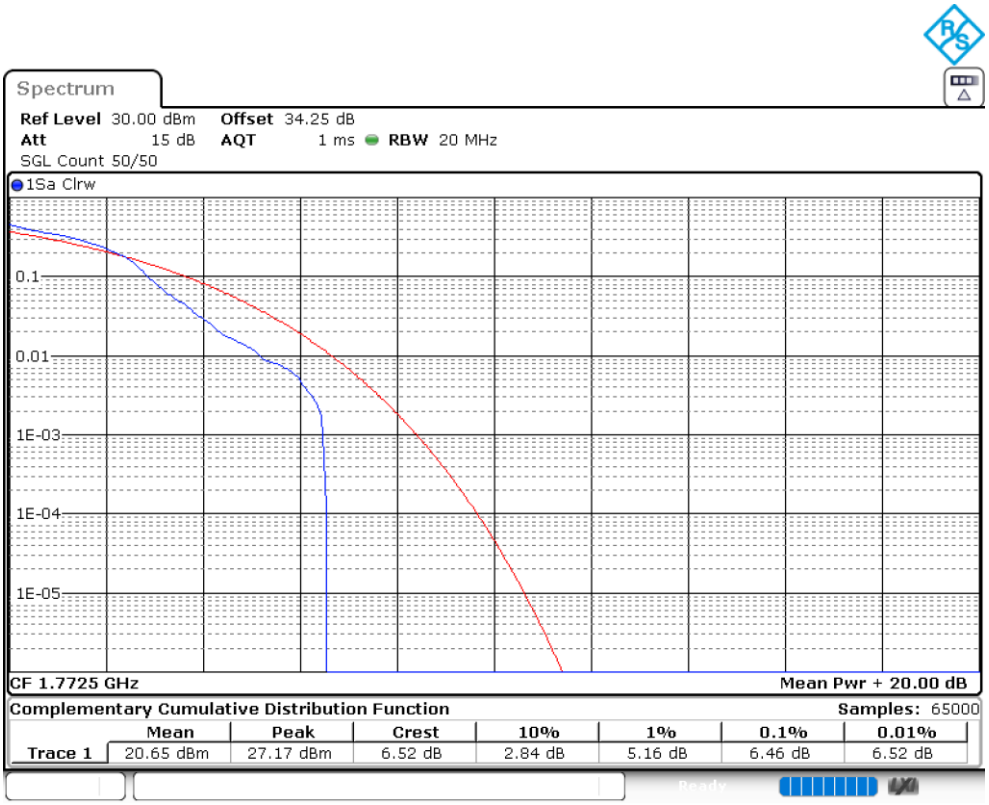
Low Channel:



Middle Channel:



High Channel:



16QAM	Low	Middle	High
PAPR (dB)	5.28	7.04	6.46

Verdict

Pass

Frequency Stability

Limits

1. LTE Cat-4 Band 8.

* FCC §27.54: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

* FCC § 2.1055:

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

2. LTE Cat-4 Bands 12, 13.

* FCC §27.54: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

* FCC § 2.1055:

(d) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(e) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(f) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

* RSS-130, 4.5:

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

3. LTE Cat-4 Band 66.

* FCC §27.54: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

* FCC § 2.1055:

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

* RSS-139, 5.4:

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

Method

The frequency tolerance measurements over temperature variations were made over the temperature range of –30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.
The supply voltage was varied between 85% and 115% of nominal voltage.

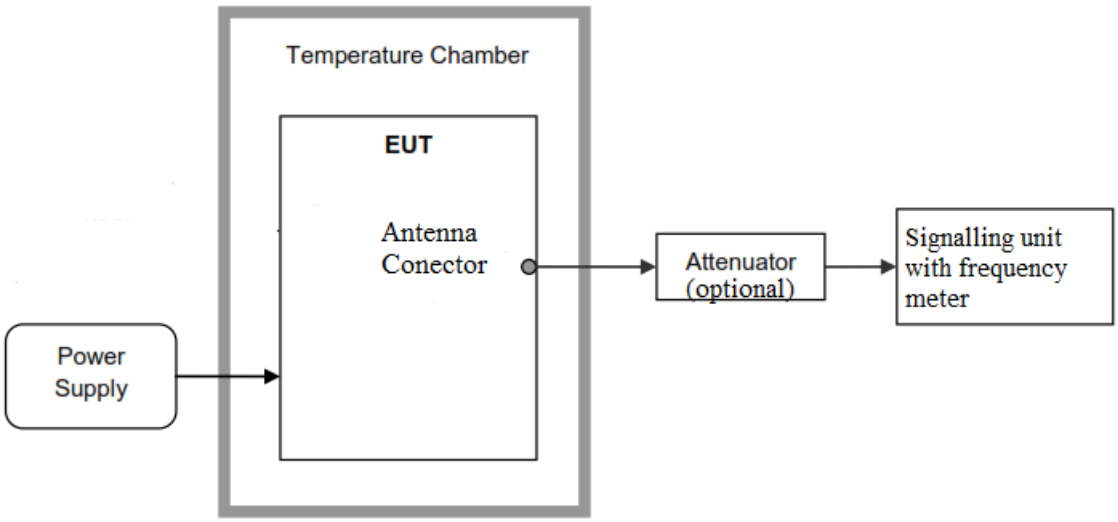
The EUT was set in “Radio Resource Control (RRC) mode” on the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.
The worst case LTE mode for conducted power was used for the test.

In order to check that the frequency stability is sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point is established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation are identified as fL and fH respectively. The worst-case frequency offset determined in the above methods is added or subtracted from the values of fL and fH to check that the resulting frequencies remain within the band.

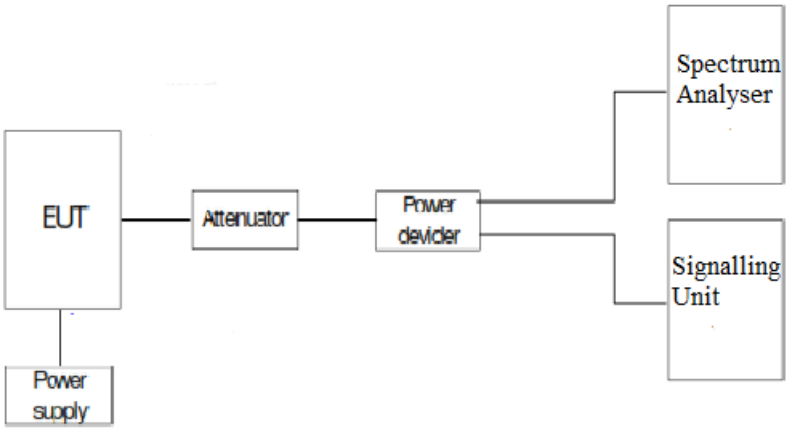
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

Test Setup

Frequency tolerance:



Reference points *f*L and *f*H:



Results

1. FREQUENCY TOLERANCE:

- **Frequency stability over temperature variations:**

LTE Cat-4 Band 8:

The worst case modulation in terms of Frequency Stability is BW=1.4 MHz, QPSK.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+65	1,78	0,001981741
+60	2,62	0,002916945
+50	3,28	0,003651748
+40	3,78	0,004208417
+30	4,9	0,005455355
+20	3,45	0,003841015
+10	8,58	0,009552438
0	-2,44	-0,002716544
-10	2,64	0,002939212
-20	-1,19	-0,001324872
-30	-0,71	-0,00079047
-40	-1,42	-0,00158094

LTE Cat-4 Band 12:

The worst case modulation in terms of Frequency Stability is BW=5 MHz, QPSK.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+65	-5,45	-0,00770318
+60	-1,45	-0,00204947
+50	1.17	0.00165371
+40	-0.41	-0.000579505
+30	0.64	0.000904594
+20	0.57	0.000805654
+10	-0.89	-0.001257951
0	-0.36	-0.000508834
-10	-0.37	-0.000522968
-20	1.27	0.001795053
-30	1.76	0.002487633
-40	5,26	0,007434629

LTE Cat-4 Band 13:

The worst case modulation in terms of Frequency Stability is BW=5 MHz, QPSK.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+65	-4,26	-0,00544757
+60	9,41	0,012033248
+50	4.72	0.006035806
+40	5.28	0.006751918
+30	2.98	0.003810742
+20	5.55	0.007097187
+10	1.86	0.002378517
0	5.35	0.006841432
-10	2.23	0.002851662
-20	5.38	0.006879795
-30	2.43	0.003107417
-40	1,57	0,002007673

LTE Cat-4 Band 66:

The worst case modulation in terms of Frequency Stability is BW=5 MHz, QPSK.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+65	-2,59	-0,001484241
+60	-5	-0,00286533
+50	-2.62	-0.001501433
+40	-2.16	-0.001237822
+30	-1.52	-0.00087106
+20	1.46	0.000836676
+10	-1.54	-0.000882521
0	1.39	0.000796562
-10	-2	-0.001146132
-20	0.74	0.000424069
-30	-4.06	-0.002326648
-40	0,49	0,000280802

- **Frequency stability over voltage variations:**

LTE Cat-4 Band 8:

The worst case modulation in terms of Frequency Stability is BW=1.4 MHz, QPSK.

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.6	3,57	0,003974616
Vmin	3.2	6,73	0,007492763

LTE Cat-4 Band 12:

The worst case modulation in terms of Frequency Stability is BW=5 MHz, QPSK.

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4,6	0,56	0,000791519
Vmin	3,2	1,14	0,001611307

LTE Cat-4 Band 13:

The worst case modulation in terms of Frequency Stability is BW=5 MHz, QPSK.

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4,6	-1,66	-0,002122762
Vmin	3,2	0,57	0,0007289

LTE Cat-4 Band 66:

The worst case modulation in terms of Frequency Stability is BW=5 MHz, QPSK.

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4,6	2,34	0,001340974
Vmin	3,2	1,23	0,000704871

2. REFERENCE FREQUENCY POINTS fL AND fH:

The worst-case frequency offsets added or subtracted per band and bandwidth:

LTE Cat-4 Band 8: BW=1.4 MHz. QPSK.

*f*L (MHz)	897.5476
*f*H (MHz)	900.4394

LTE Cat-4 Band 12: BW=5 MHz. QPSK.

*f*L (MHz)	699.0138
*f*H (MHz)	715.9826

LTE Cat-4 Band 13: BW=5 MHz. QPSK.

*f*L (MHz)	777.0784
*f*H (MHz)	786.9145

LTE Cat-4 Band 66: BW=5 MHz. QPSK.

*f*L (MHz)	1710.0754
*f*H (MHz)	1779.9267

The reference frequency points fL and fH stay within the authorized blocks for the band above.

Measurement uncertainty (Hz): <±207.77

Verdict

PASS

Modulation Characteristics

Limits

1. LTE Cat-4 Band 8.

* FCC §2.1047 Measurements required: Modulation characteristics.

2. LTE Cat-4 Bands 12, 13.

* FCC §2.1047 Measurements required: Modulation characteristics.

* RSS-130 4.2: Equipment certified under this standard shall employ digital modulation.

3. LTE Cat-4 Band 66.

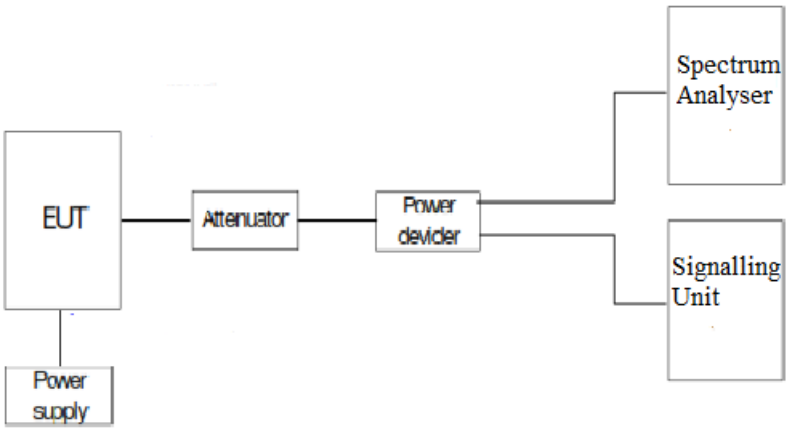
* FCC §2.1047 Measurements required: Modulation characteristics.

* RSS-139 5.3: Devices may use any type of modulation technique. The type of modulation shall be documented in the test report.

Method

For LTE the EUT operates with QPSK and 16QAM modulation modes in which the information is digitised and coded into a bit stream. The RF transmission is multiplexed using *Orthogonal Frequency Division Multiplexing (OFDM)* using different possible arrangement of subcarriers (Resource Blocks RB).

Test Setup

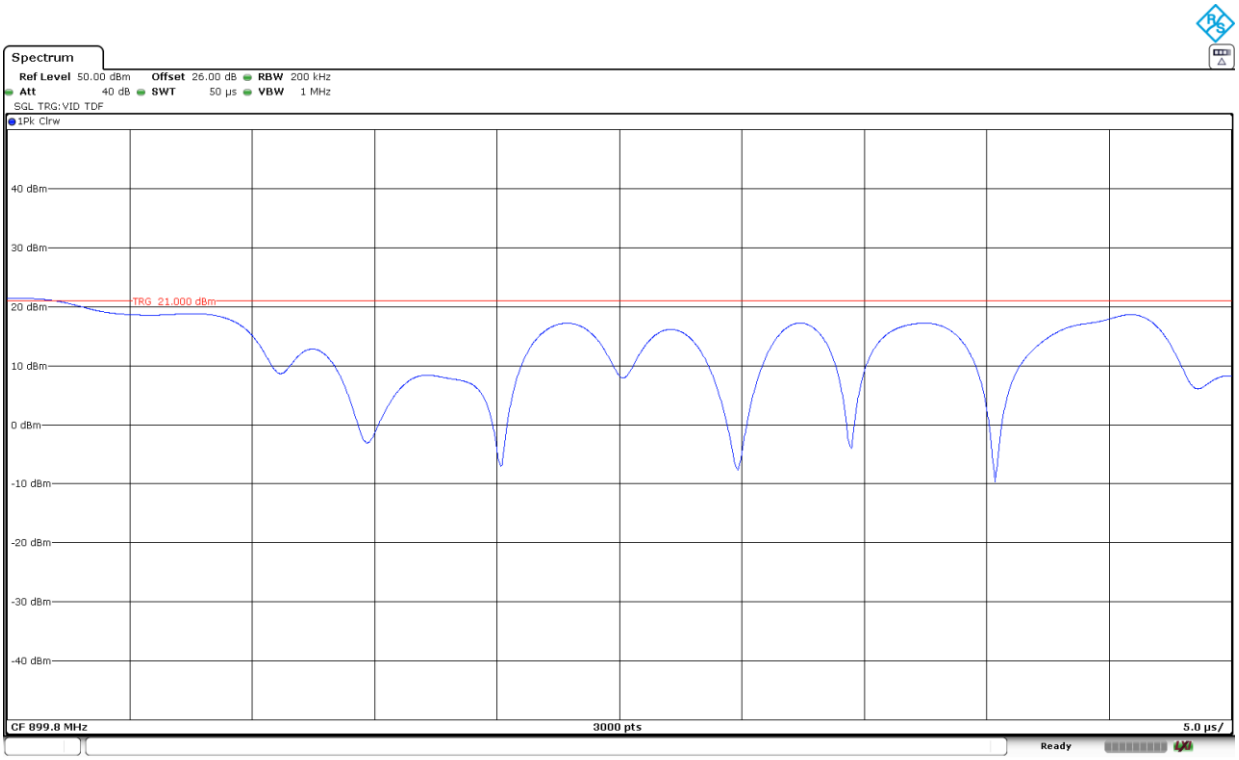


Results

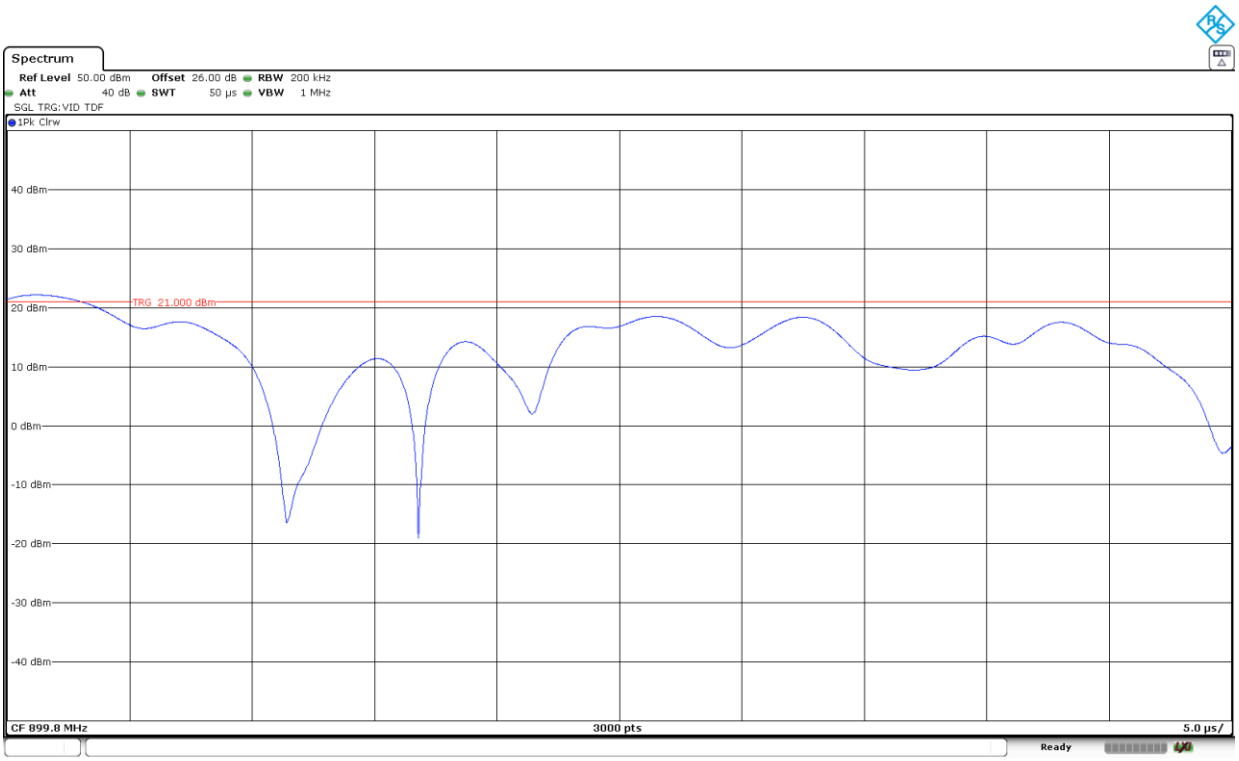
The following plots show the modulation schemes in the EUT.

LTE Cat-4 Band 8:

QPSK. BW=1.4 MHz.

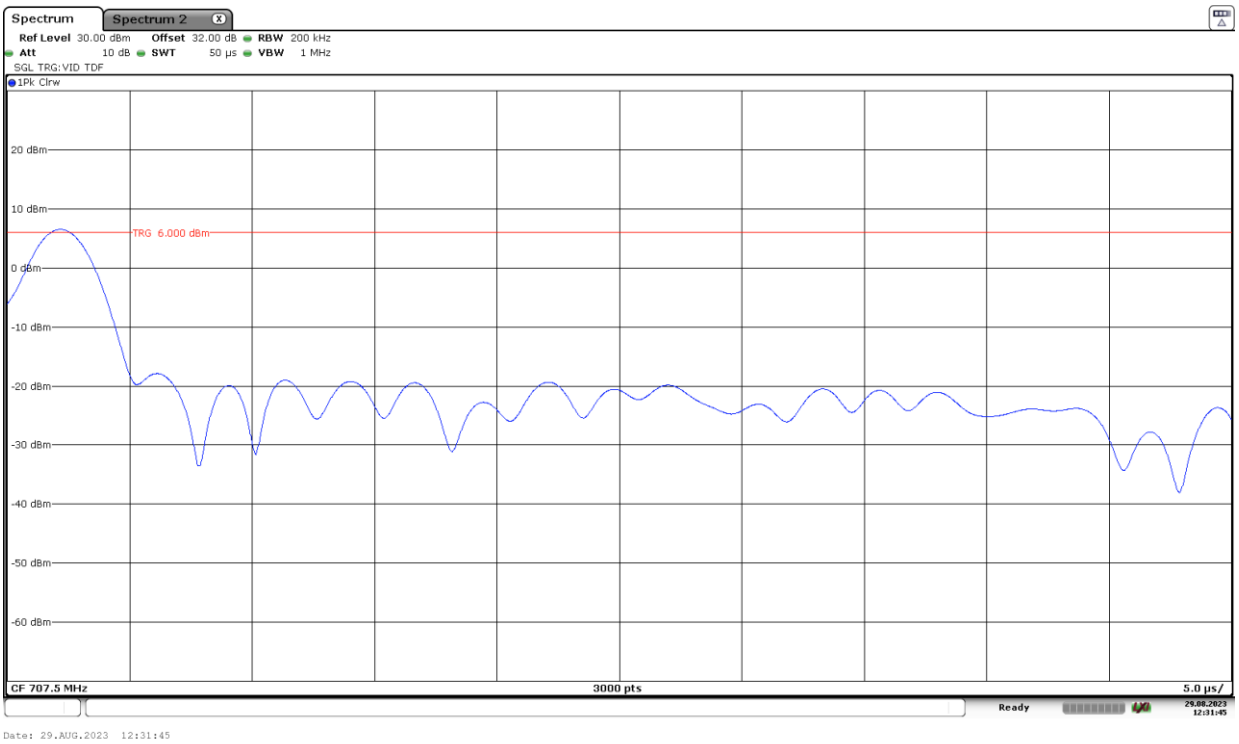


16QAM. BW=1.4 MHz.

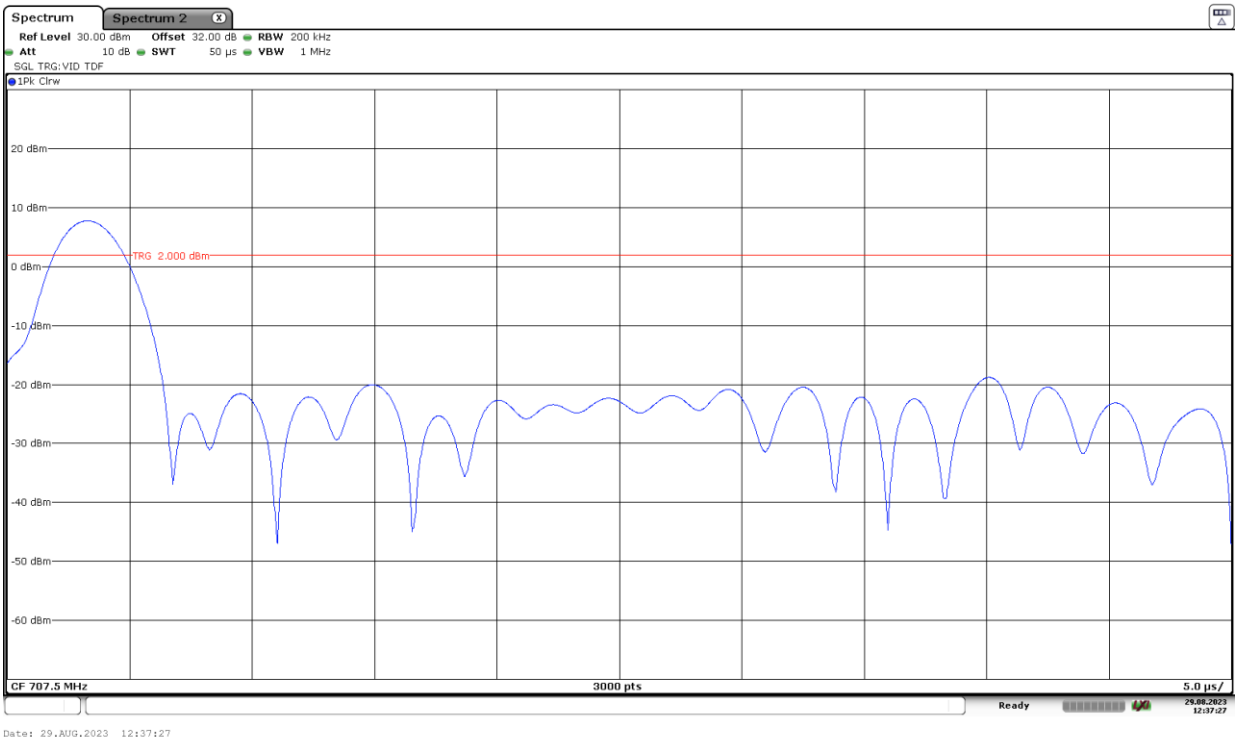


LTE Cat-4 Band 12:

QPSK. BW=1.4 MHz.

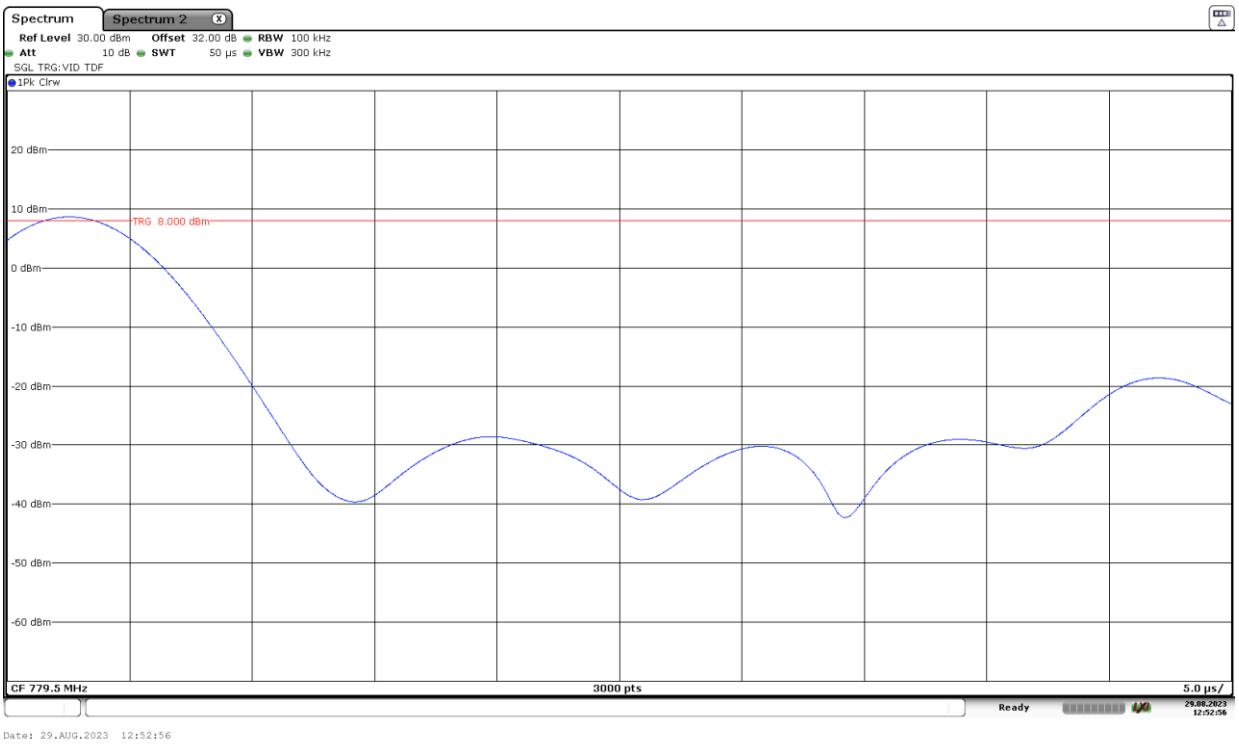


16QAM. BW=1.4 MHz.

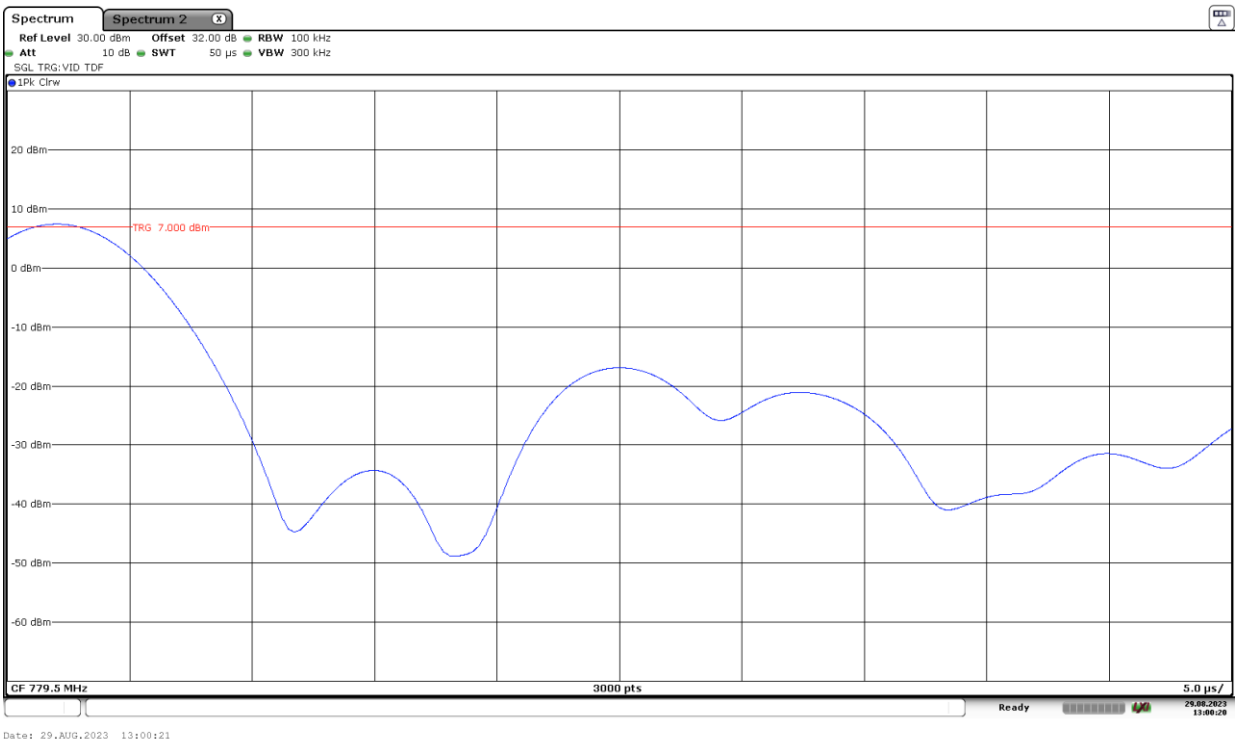


LTE Cat-4 Band 13:

QPSK. BW=5 MHz.

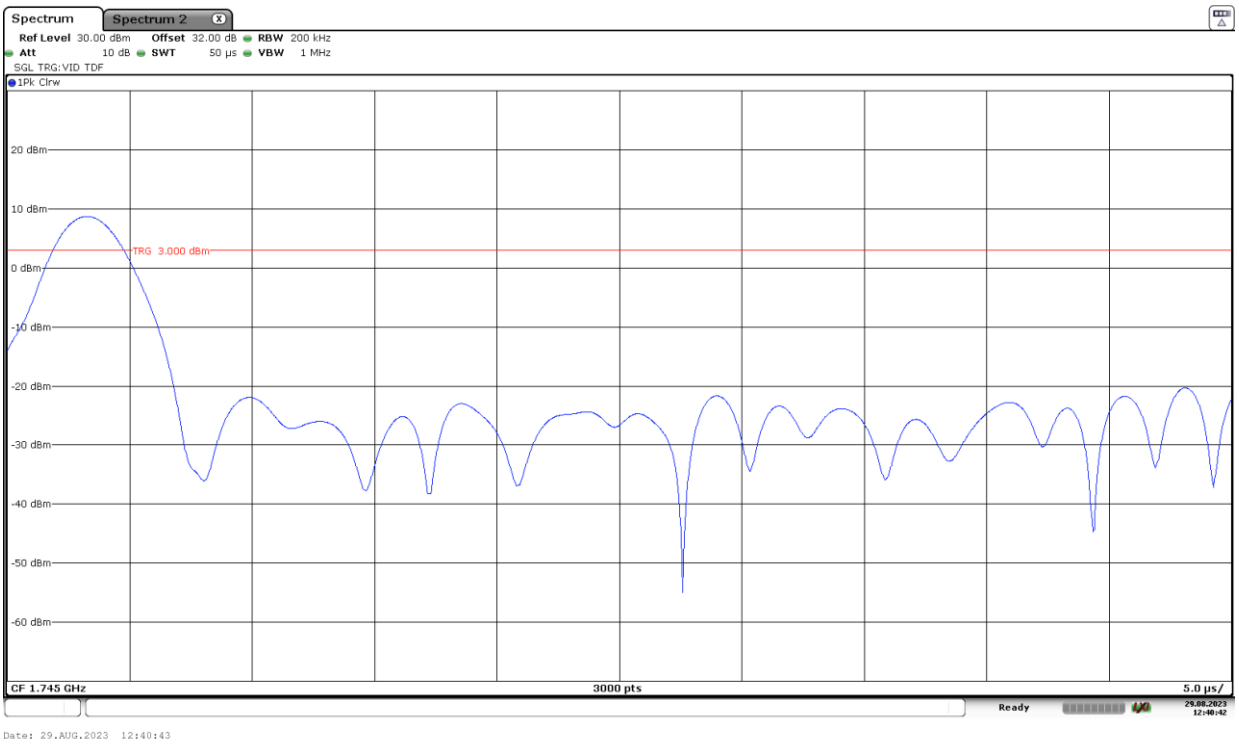


16QAM. BW=5 MHz.

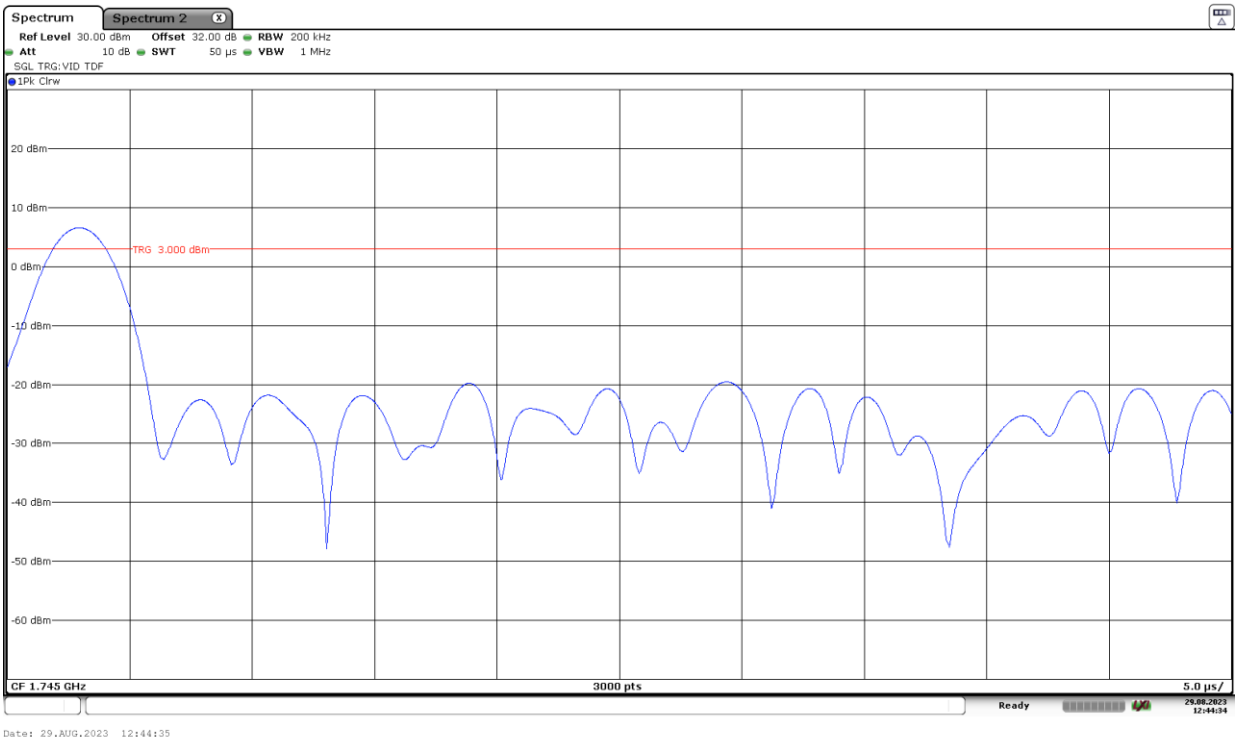


LTE Cat-4 Band 66:

QPSK. BW=1.4 MHz.



16QAM. BW=1.4 MHz.



Occupied Bandwidth

Limits

1. LTE Cat-4 Band 8.

* FCC §2.1049: Measurements required: Occupied bandwidth.

2. LTE Cat-4 Bands 12, 13, 66.

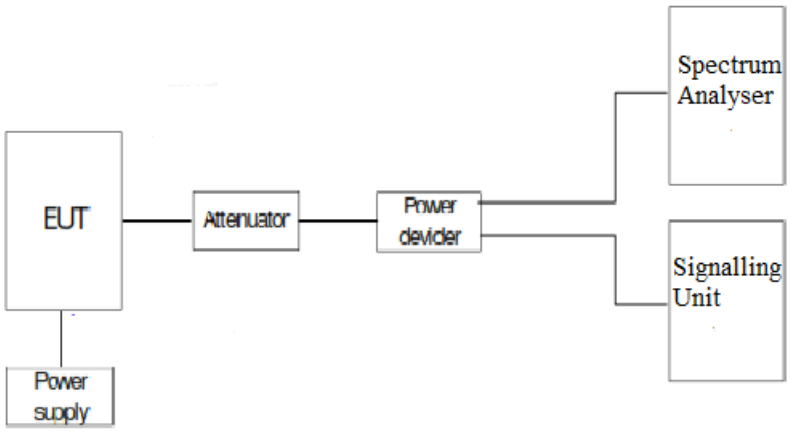
* FCC §2.1049: Measurements required: Occupied bandwidth.

* RSS-Gen 6.7: Occupied bandwidth (or 99% emission bandwidth).

Method

The occupied bandwidth measurement was performed at the output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser.

Test Setup



Results

The worst case of occupied bandwidth corresponds to Resource Blocks (RB) Size All regardless the Bandwidth selected.

LTE Cat-4 Band 8:

LTE Cat-4 Band 8. BW=1.4 MHz. QPSK. RB Size=All.

Channel	Low	High
99% Occupied Bandwidth (MHz)	1.106	1.108
-26 dBc Bandwidth (MHz)	1.373	1.399
Measurement uncertainty (kHz)	<±3.75	

LTE Cat-4 Band 8. BW=1.4 MHz. 16QAM. RB Size=All.

Channel	Low	High
99% Occupied Bandwidth (MHz)	1.101	1.116
-26 dBc Bandwidth (MHz)	1.380	1.404
Measurement uncertainty (kHz)	<±3.75	

LTE Cat-4 Band 8. BW=3 MHz. QPSK. RB Size=All.

Channel	Middle
99% Occupied Bandwidth (MHz)	2.744
-26 dBc Bandwidth (MHz)	3.177
Measurement uncertainty (kHz)	<±3.75

LTE Cat-4 Band 8. BW=3 MHz. 16QAM. RB Size=All.

Channel	Middle
99% Occupied Bandwidth (MHz)	2.743
-26 dBc Bandwidth (MHz)	3.177
Measurement uncertainty (kHz)	<±3.75

LTE Cat-4 Band 12:

LTE Cat-4 Band 12. BW=1.4 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.112	1.104	1.106
-26 dBc Bandwidth (MHz)	1.376	1.3763	1.369
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=1.4 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.109	1.112	1.110
-26 dBc Bandwidth (MHz)	1.379	1.3897	1.386
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=3 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	2.73000	2.74600	2.748
-26 dBc Bandwidth (MHz)	3.17650	3.17230	3.170
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=3 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	2.738	2.744	2.742
-26 dBc Bandwidth (MHz)	3.169	3.170	3.150
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=5 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	4.547	4.590	4.567
-26 dBc Bandwidth (MHz)	5.956	6.504	5.803
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=5 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	4.550	4.623	4.560
-26 dBc Bandwidth (MHz)	5.994	6.097	5.981
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=10 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	9.167	9.300	9.100
-26 dBc Bandwidth (MHz)	11.474	11.723	11.401
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 12. BW=10 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	9.133	9.333	9.107
-26 dBc Bandwidth (MHz)	11.476	11.940	11.155
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 13:

LTE Cat-4 Band 13. BW=5 MHz. QPSK. RB Size=All.

Channel	Low	High
99% Occupied Bandwidth (MHz)	4.595	4.590
-26 dBc Bandwidth (MHz)	6.062	5.994
Measurement uncertainty (kHz)	<±3.75	

LTE Cat-4 Band 13. BW=5 MHz. 16QAM. RB Size=All.

Channel	Low	High
99% Occupied Bandwidth (MHz)	4.580	4.605
-26 dBc Bandwidth (MHz)	5.998	6.025
Measurement uncertainty (kHz)	<±3.75	

LTE Cat-4 Band 13. BW=10 MHz. QPSK. RB Size=All.

Channel	Middle
99% Occupied Bandwidth (MHz)	9.140
-26 dBc Bandwidth (MHz)	11.501
Measurement uncertainty (kHz)	<±3.75

LTE Cat-4 Band 13. BW=10 MHz. 16QAM. RB Size=All.

Channel	Middle
99% Occupied Bandwidth (MHz)	9.087
-26 dBc Bandwidth (MHz)	11.188
Measurement uncertainty (kHz)	<±3.75

LTE Cat-4 Band 66:

LTE Cat-4 Band 66. BW=1.4 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.104	1.107	1.103
-26 dBc Bandwidth (MHz)	1.362	1.370	1.388
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=1.4 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.114	1.114	1.106
-26 dBc Bandwidth (MHz)	1.409	1.380	1.382
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=3 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	2.741	2.747	2.738
-26 dBc Bandwidth (MHz)	3.148	3.191	3.175
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=3 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	2.740	2.738	2.749
-26 dBc Bandwidth (MHz)	3.178	3.181	3.207
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=5 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	4.573	4.570	4.567
-26 dBc Bandwidth (MHz)	5.987	5.934	5.938
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=5 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	4.558	4.580	4.575
-26 dBc Bandwidth (MHz)	5.913	6.016	5.972
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=10 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	9.162	9.042	9.076
-26 dBc Bandwidth (MHz)	11.791	11.471	11.487
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=10 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	9.198	9.048	9.048
-26 dBc Bandwidth (MHz)	11.699	11.437	11.393
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=15 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	13.575	13.614	13.5800
-26 dBc Bandwidth (MHz)	16.573	16.477	16.4424
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=15 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	13.581	13.614	13.587
-26 dBc Bandwidth (MHz)	16.653	16.606	16.469
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=20 MHz. QPSK. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	17.9790	18.004	17.9670
-26 dBc Bandwidth (MHz)	20.6850	20.581	20.5379
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 66. BW=20 MHz. 16QAM. RB Size=All.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	18.020	18.004	17.988
-26 dBc Bandwidth (MHz)	20.517	20.584	20.508
Measurement uncertainty (kHz)	<±3.75		

LTE Cat-4 Band 8. BW=1.4 MHz. QPSK. RB Size=All.

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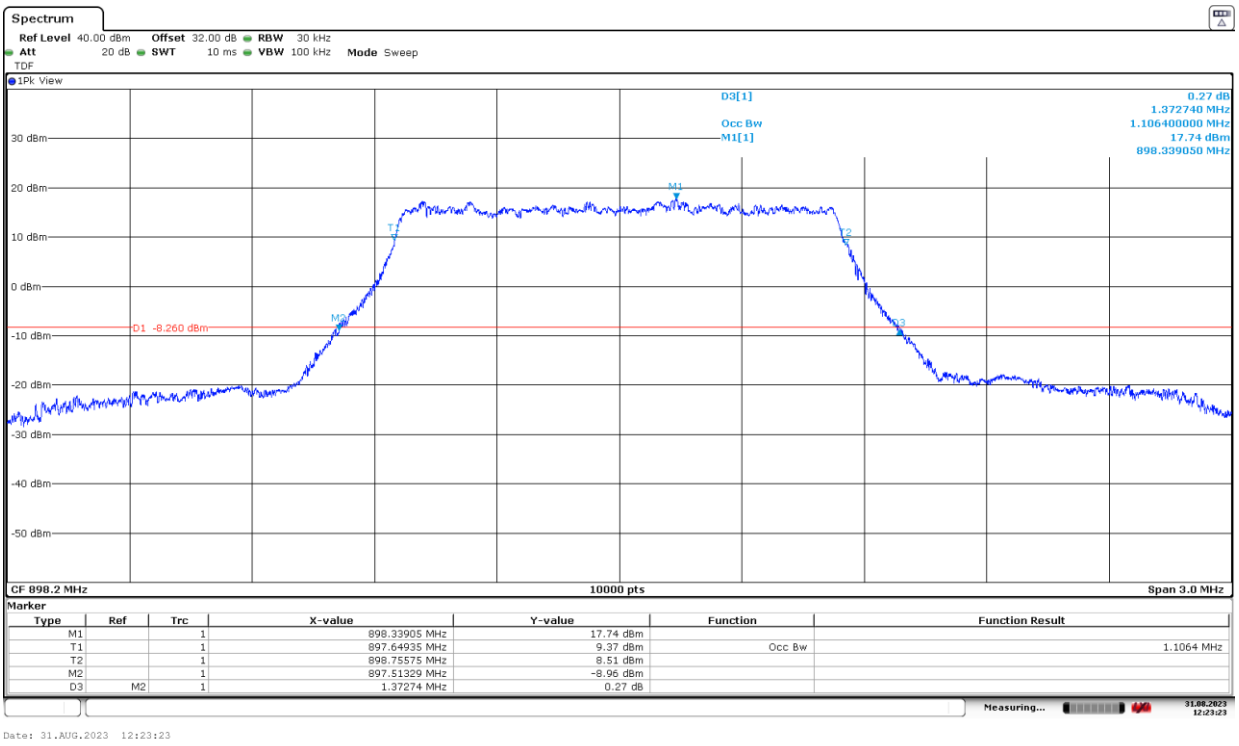

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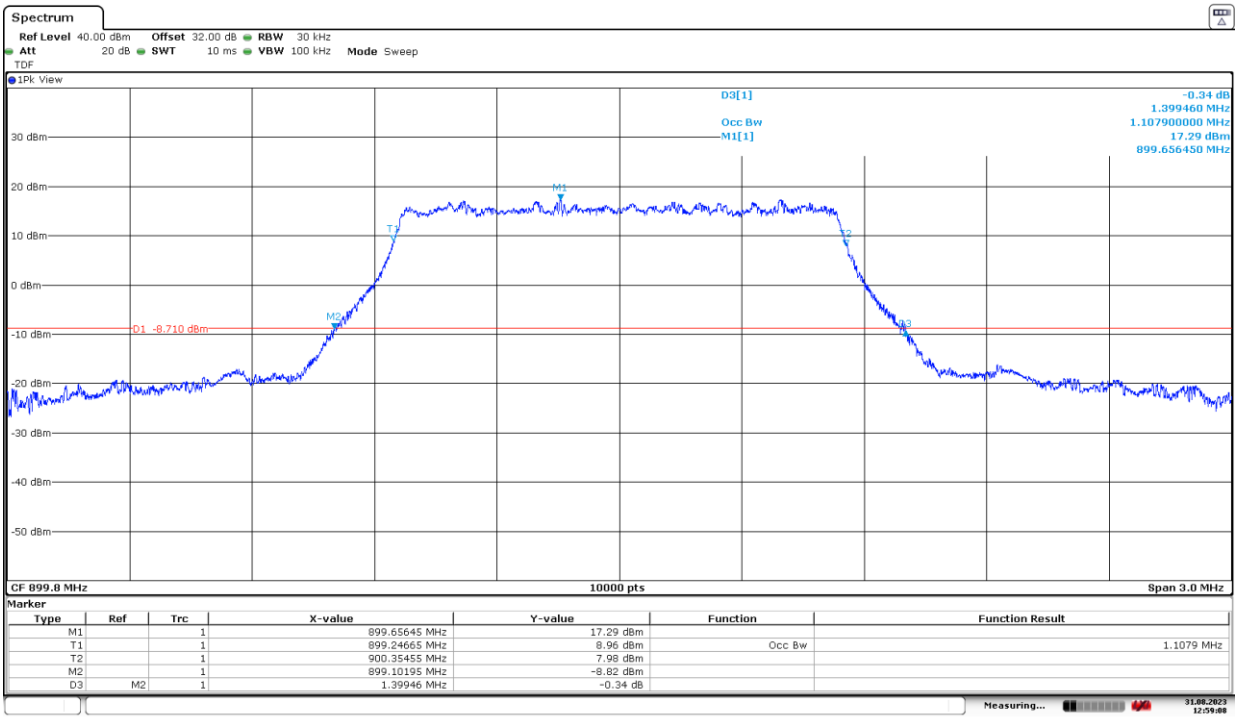

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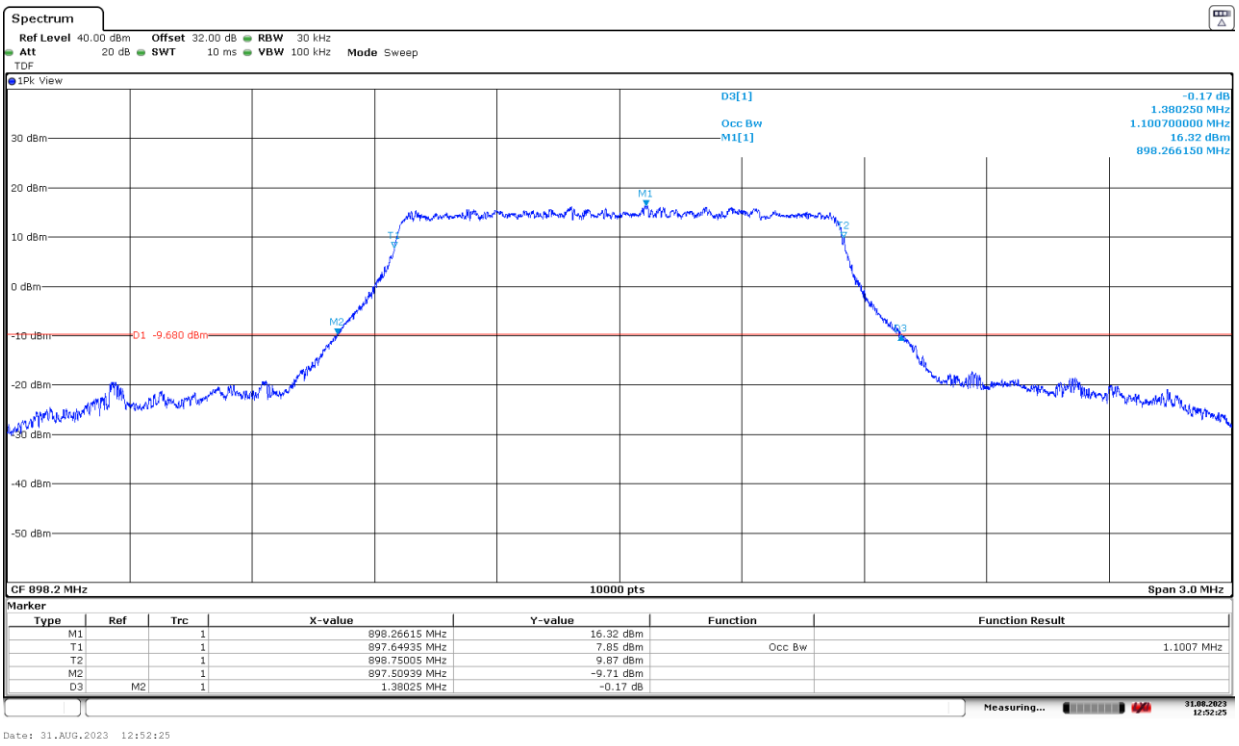

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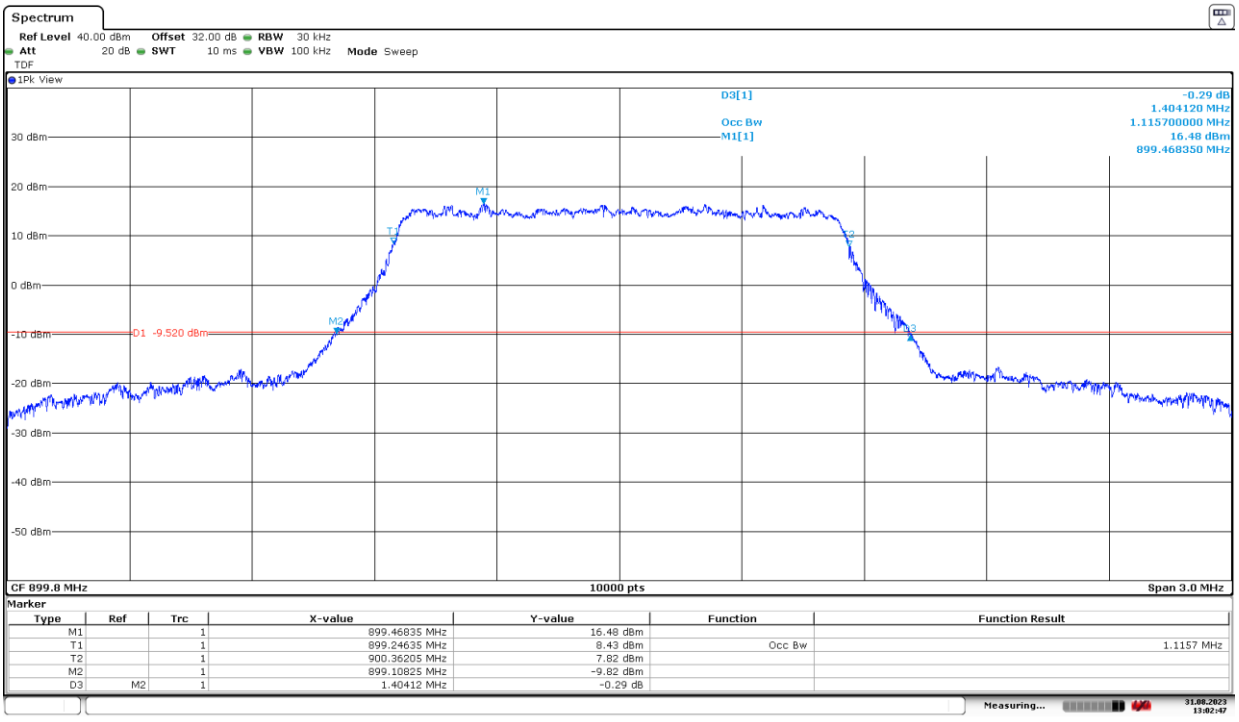

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LTE Cat-4 Band 8. BW=3 MHz. QPSK. RB Size=All.

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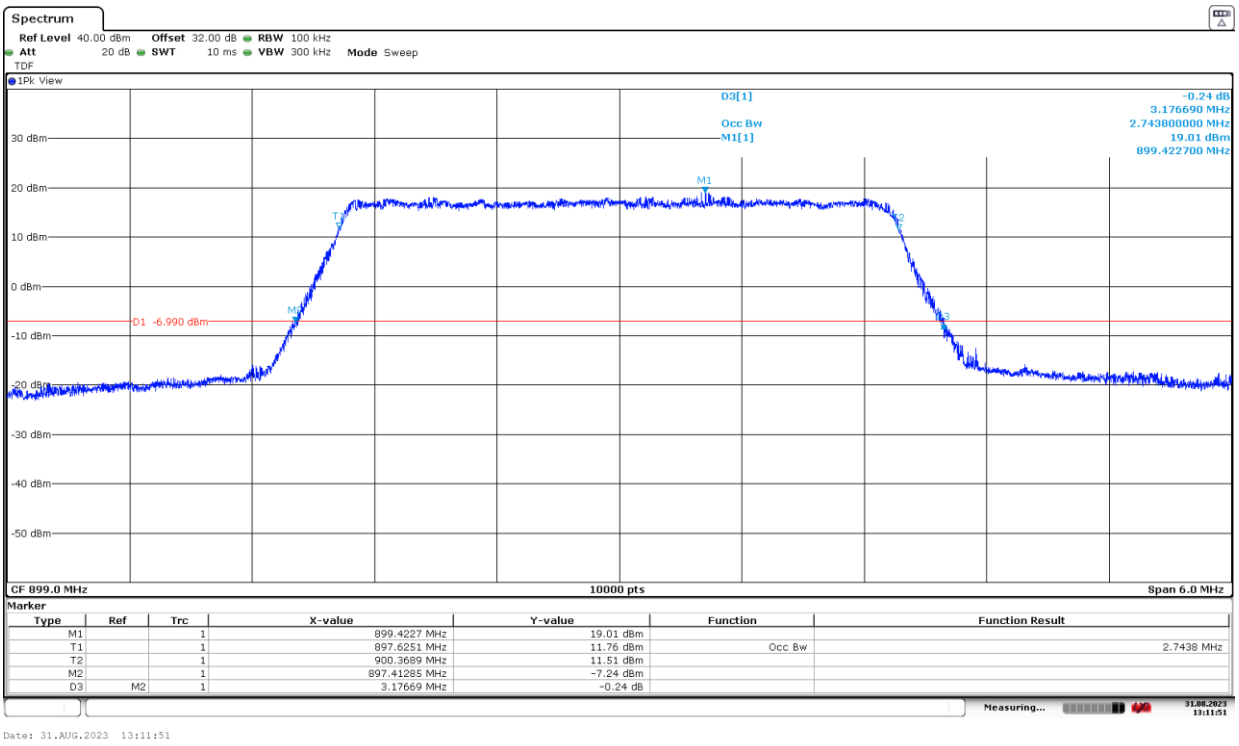

LTE Cat-4 Band 8. BW=3 MHz. 16QAM. RB Size=All.

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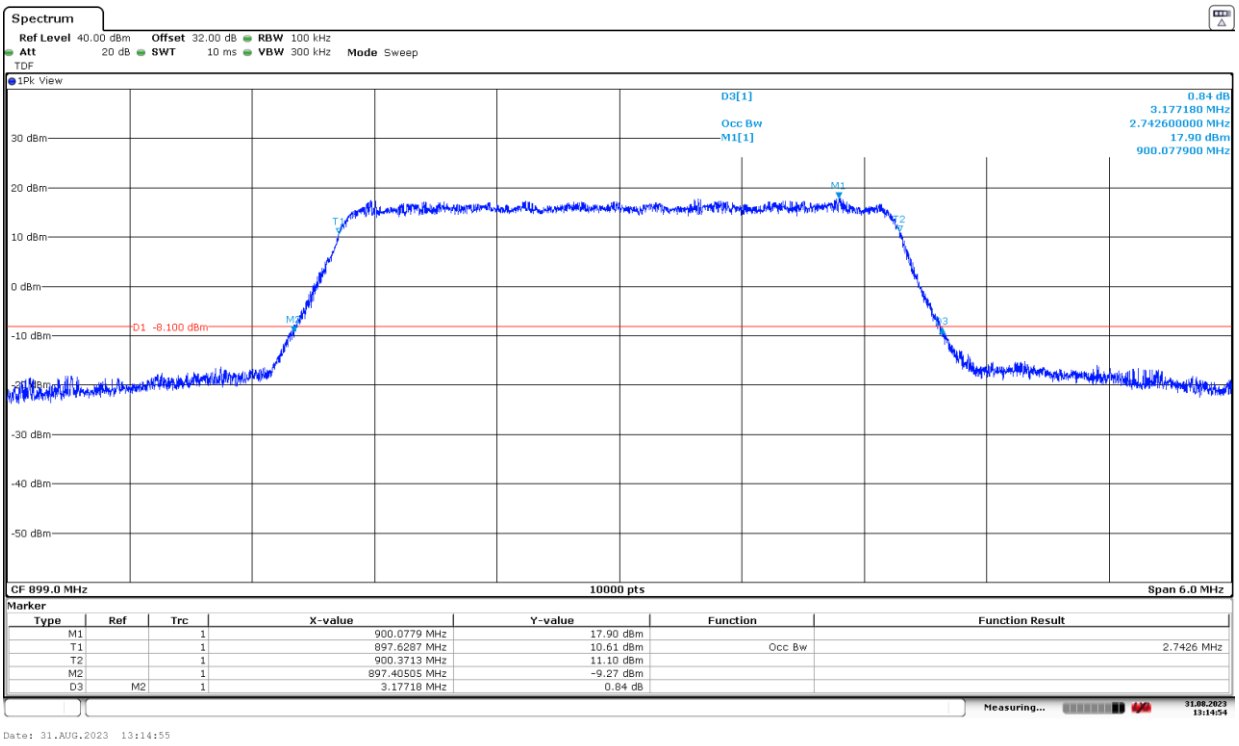

LTE Cat-4 Band 12. BW=1.4 MHz. QPSK. RB Size=All.

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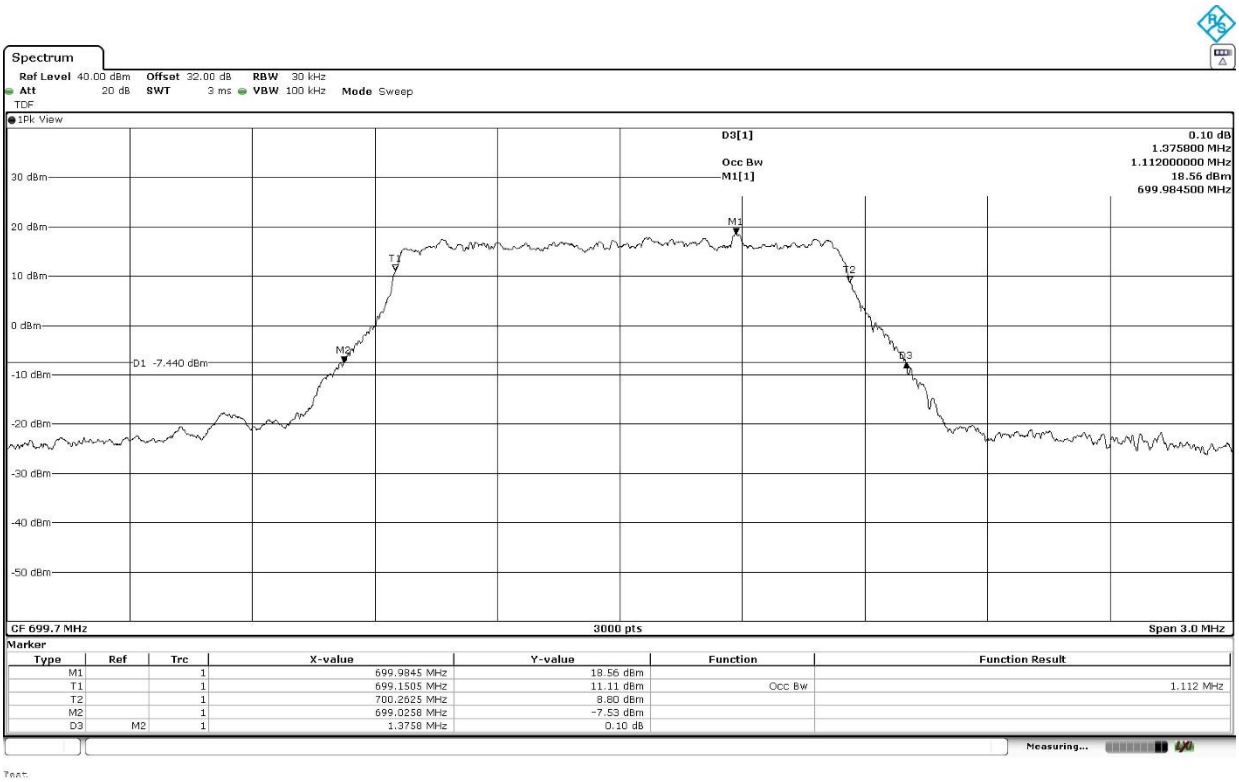

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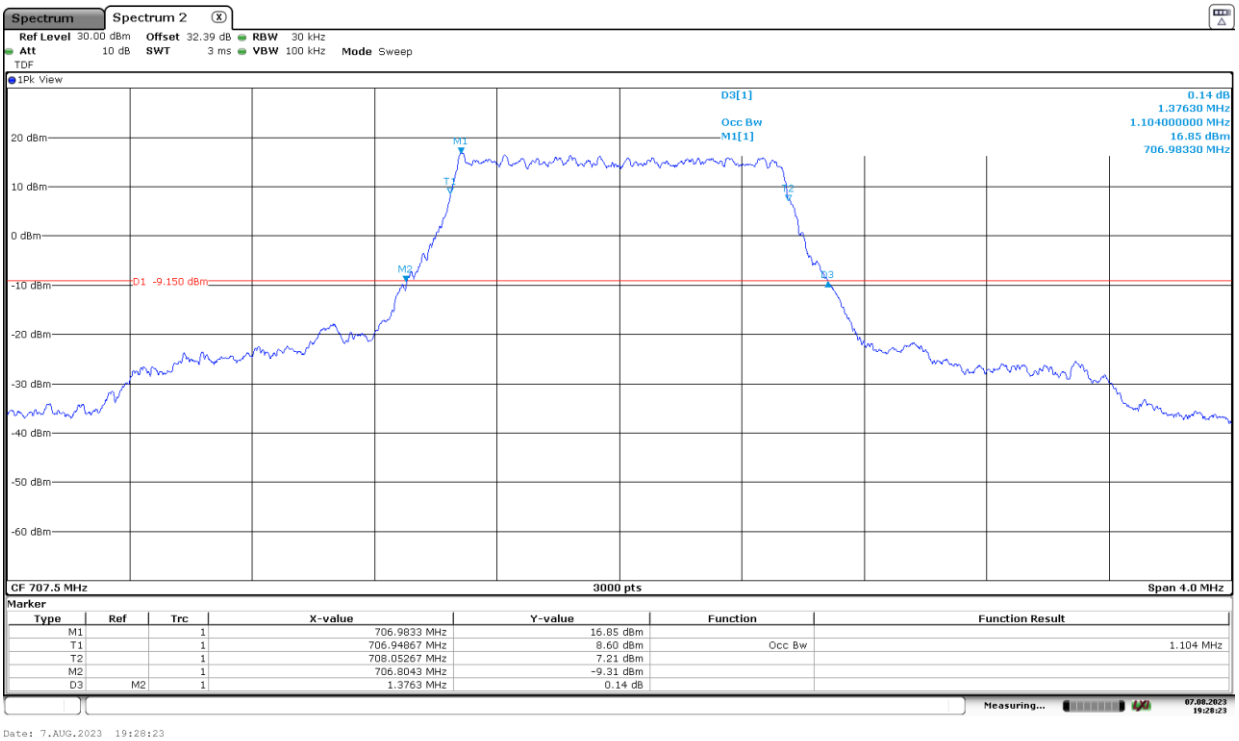

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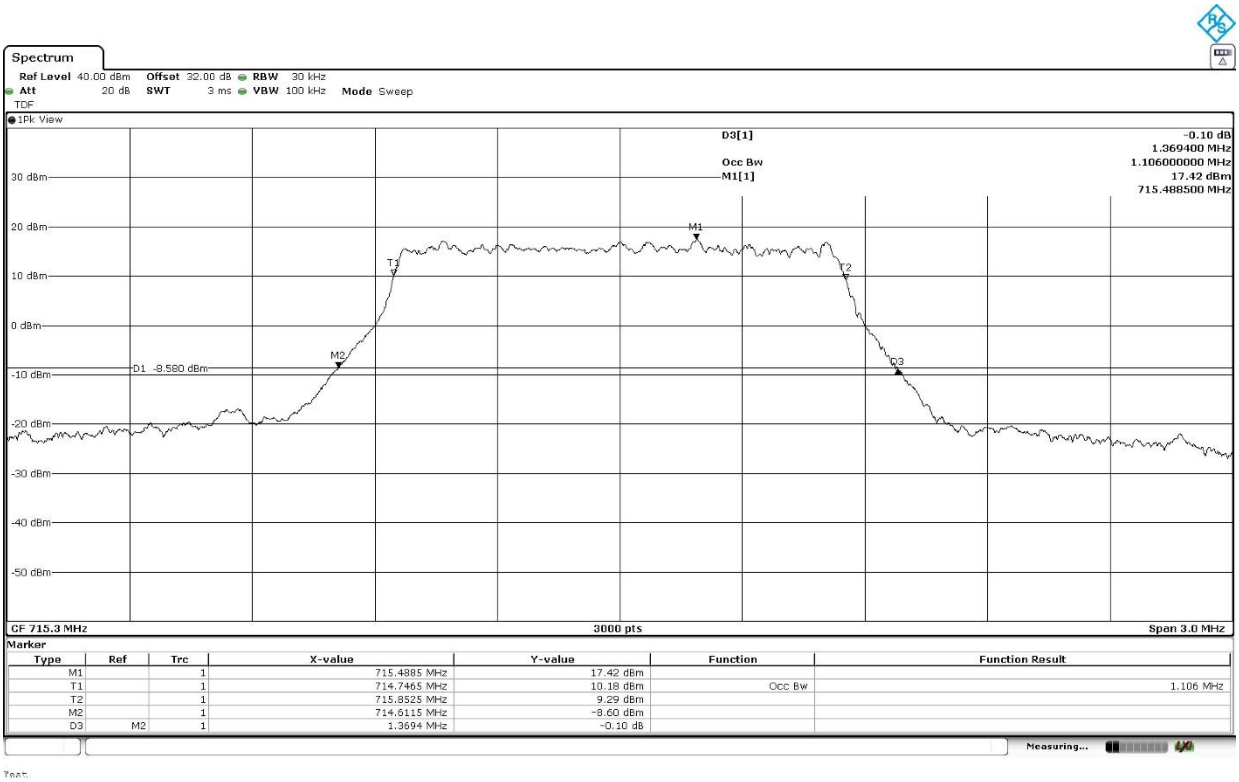

LTE Cat-4 Band 12. BW=1.4 MHz. 16QAM. RB Size=All.

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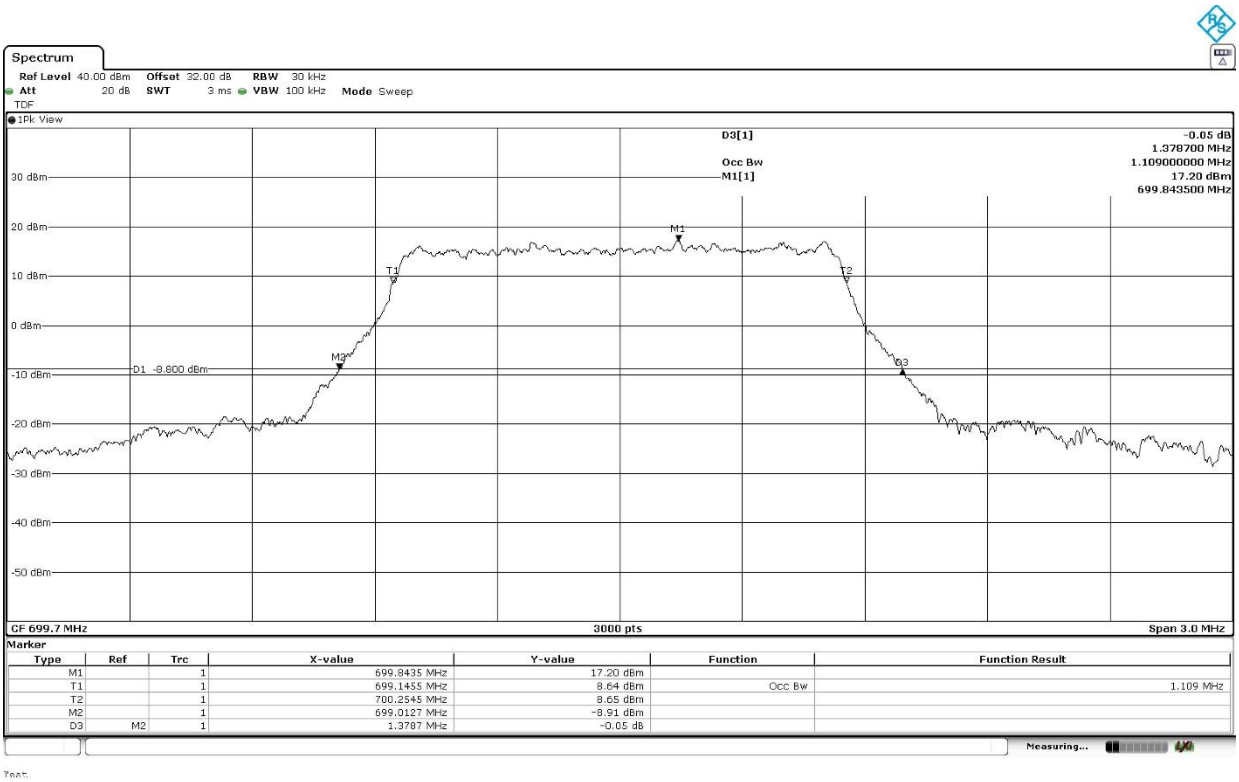

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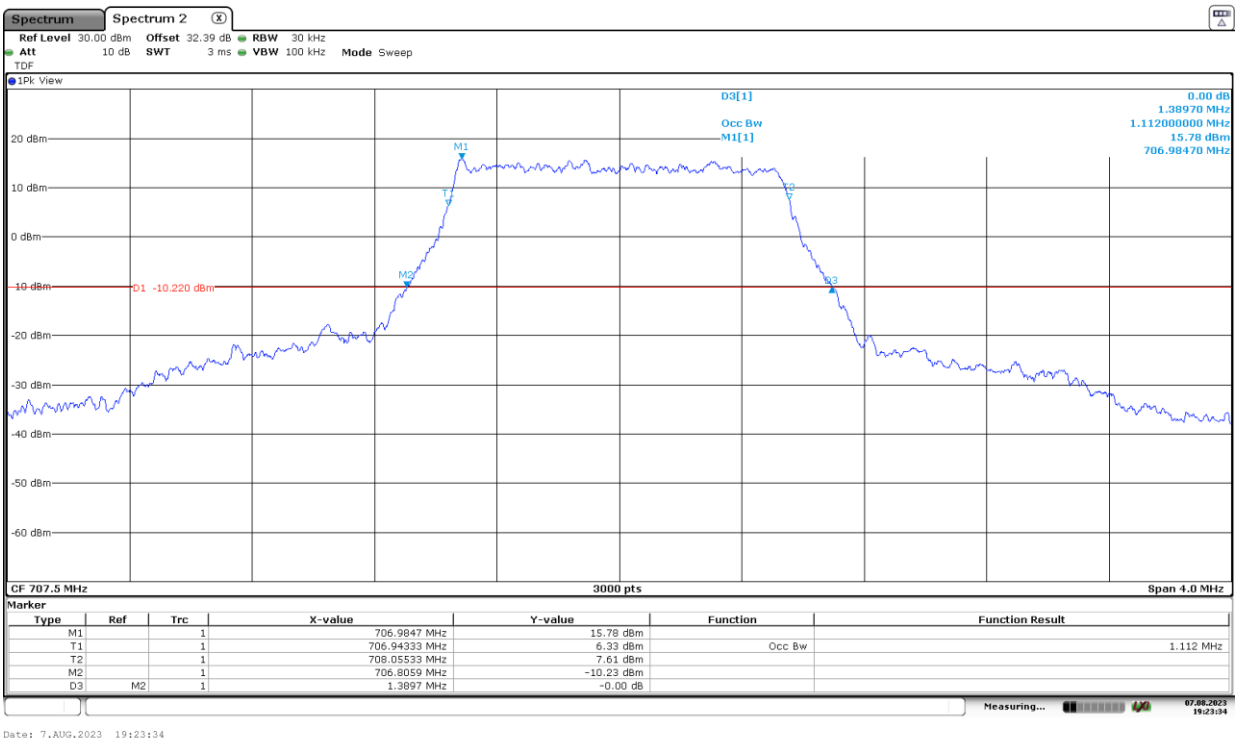

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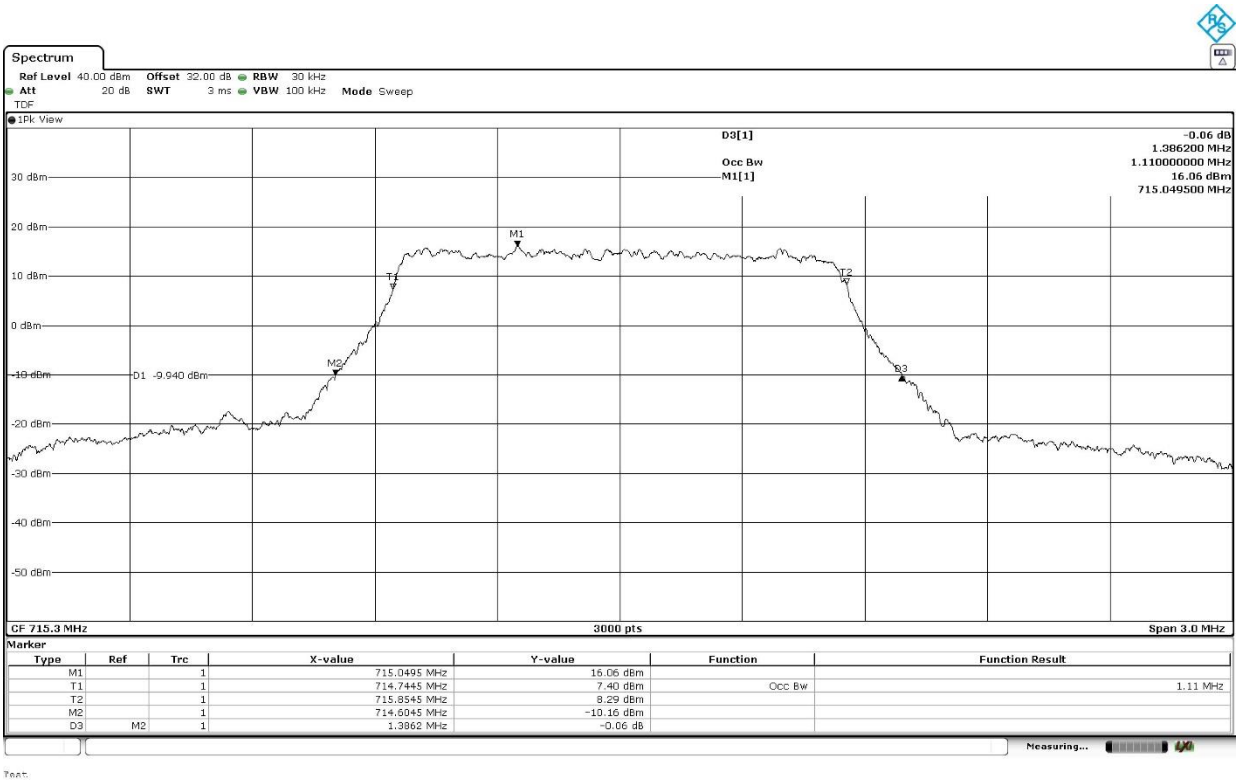

LTE Cat-4 Band 12. BW=3 MHz. QPSK. RB Size=All.

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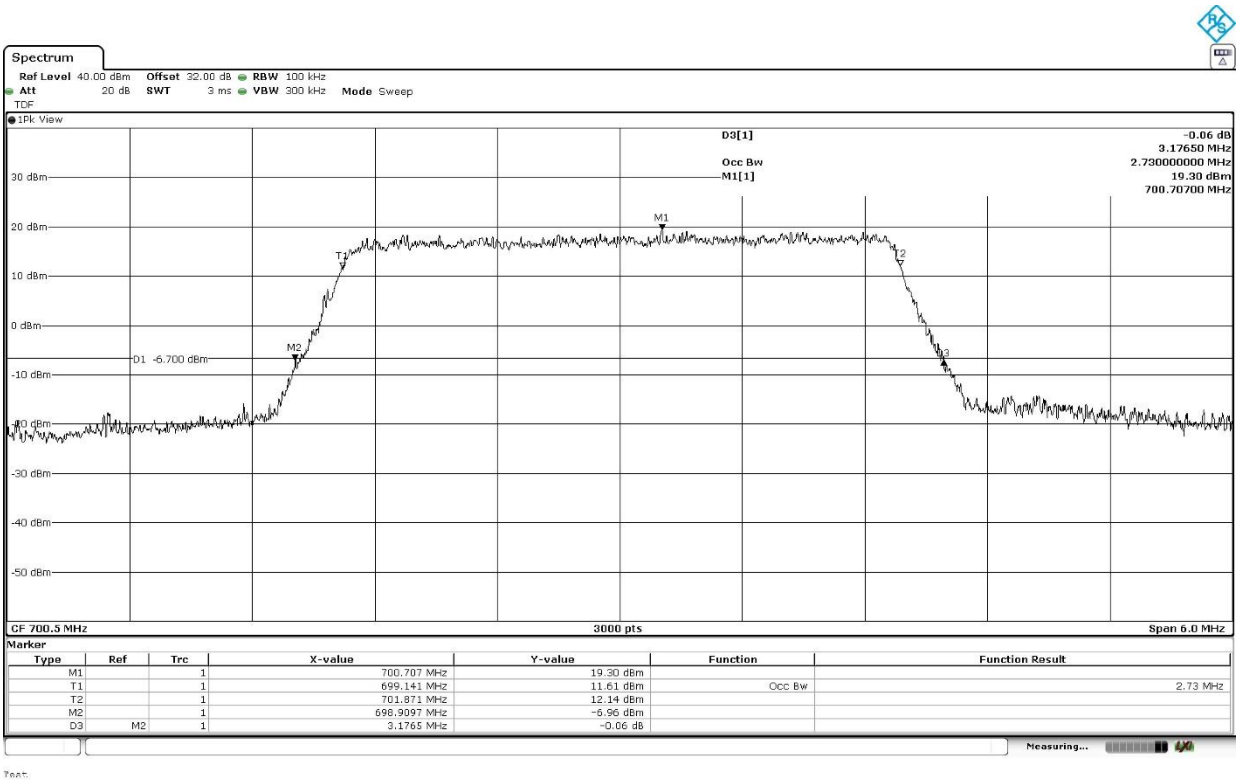

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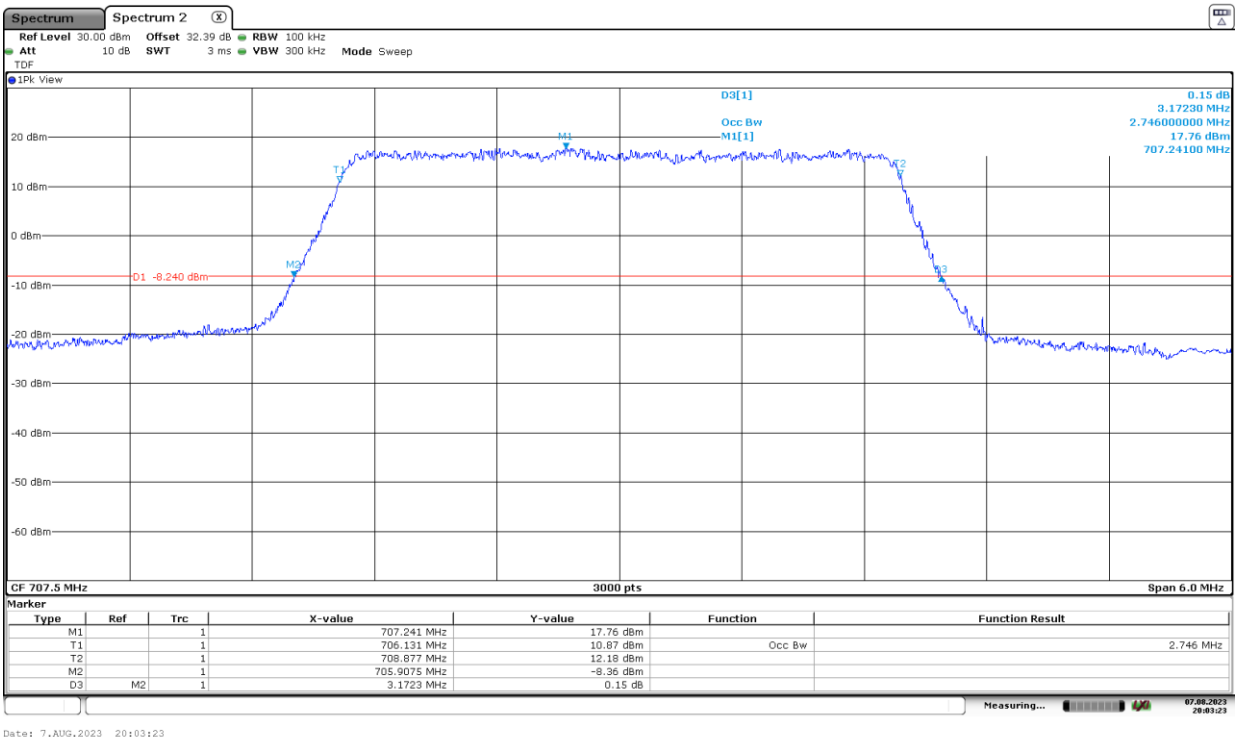

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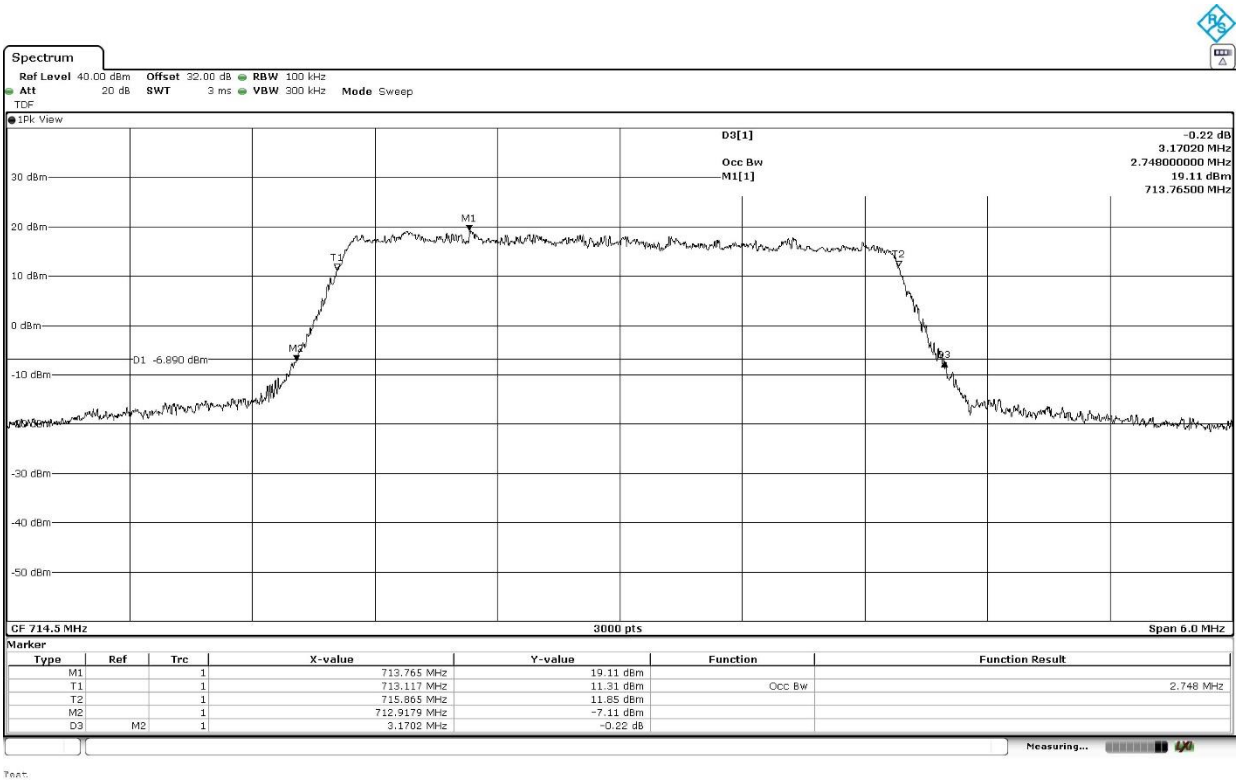
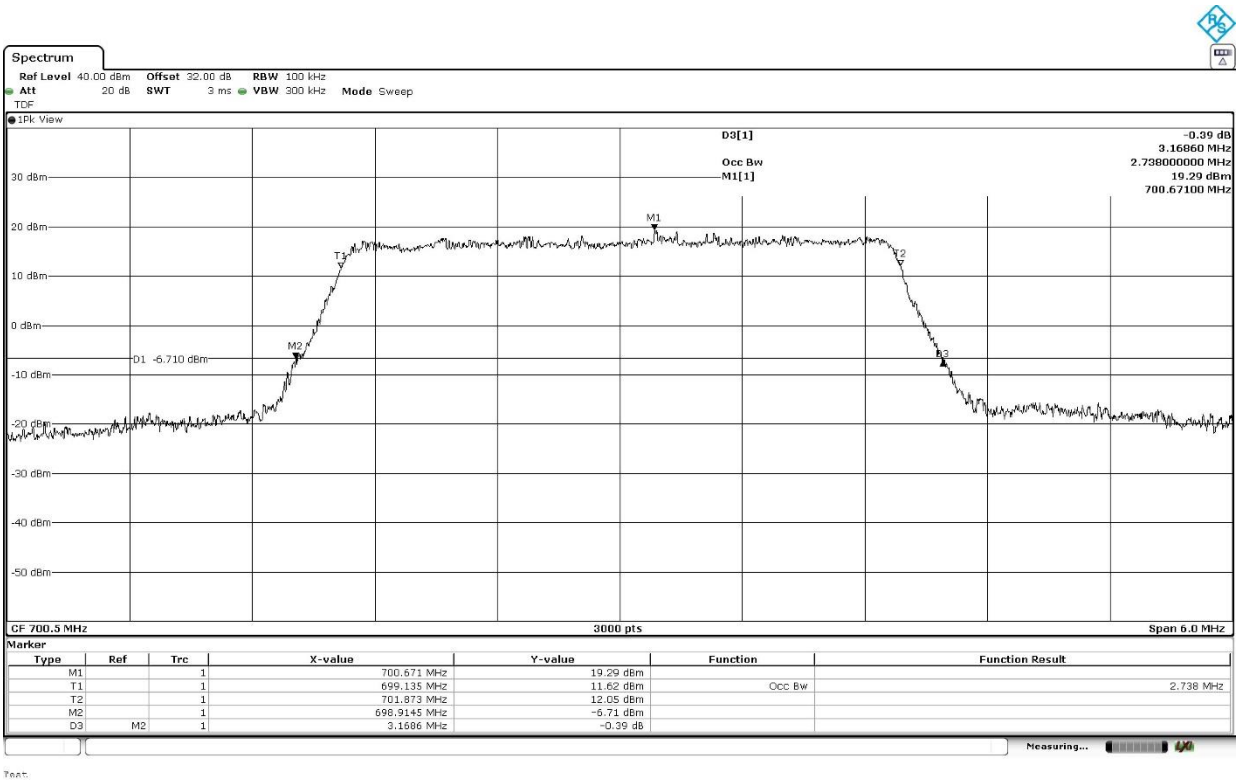


LTE Cat-4 Band 12. BW=3 MHz. 16QAM. RB Size=All.

Low Channel:



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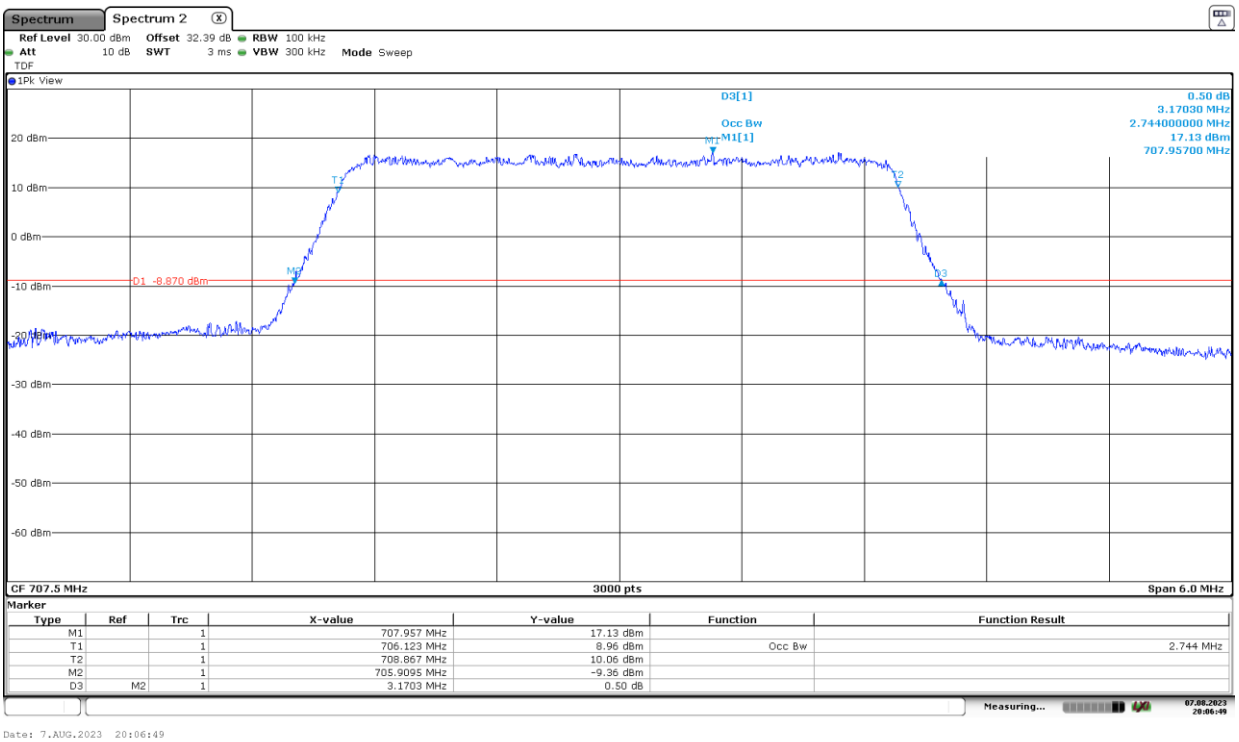

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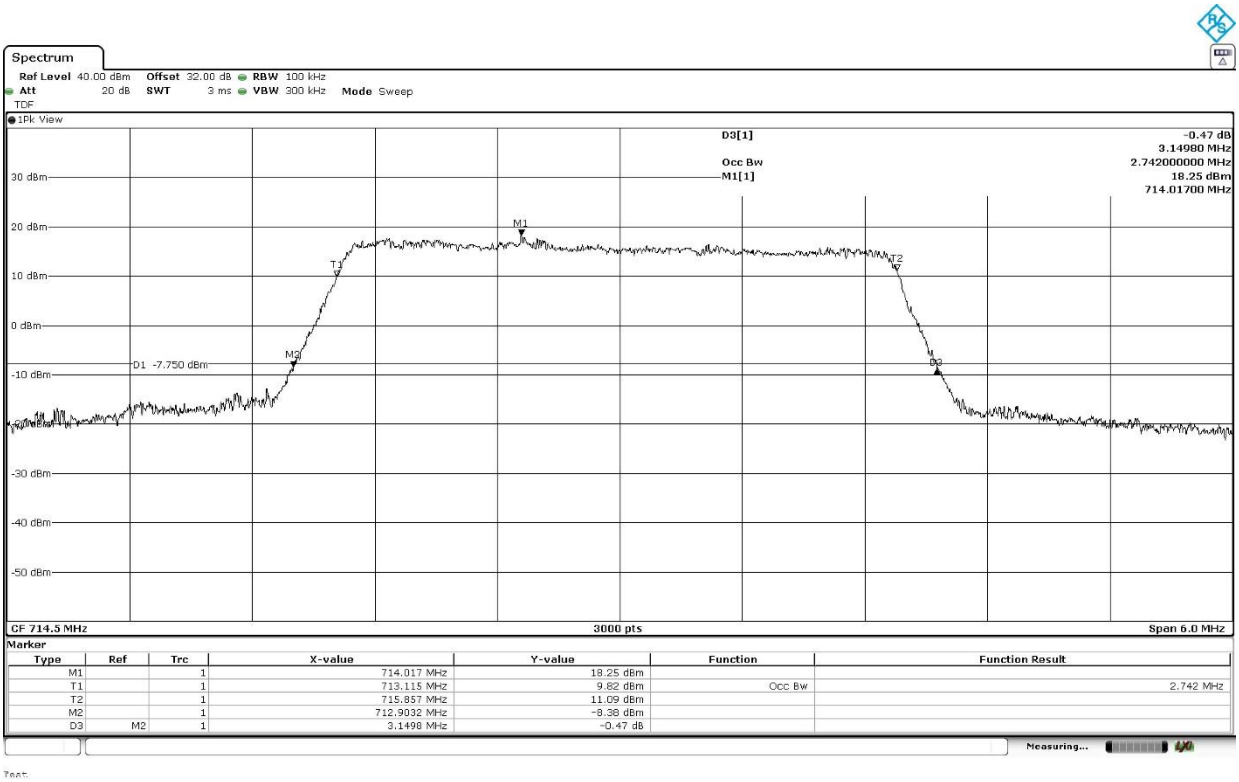
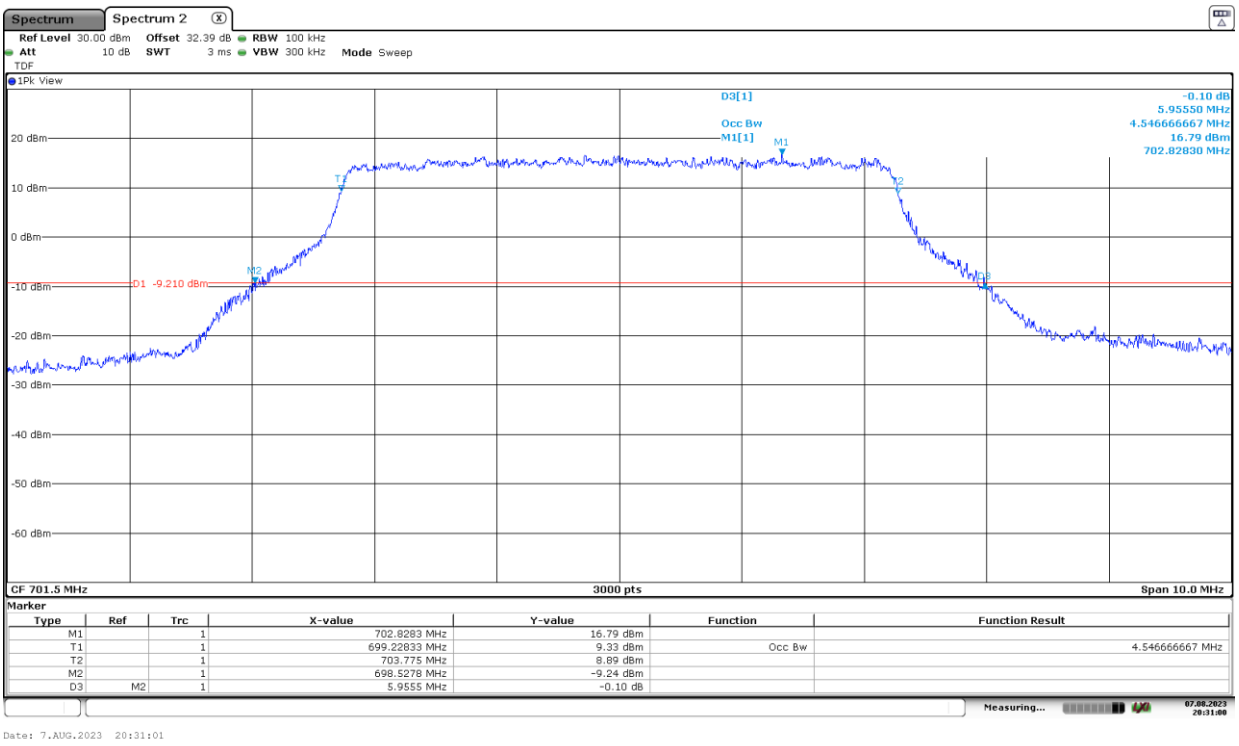


LTE Cat-4 Band 12. BW=5 MHz. QPSK. RB Size=All.

Low Channel:



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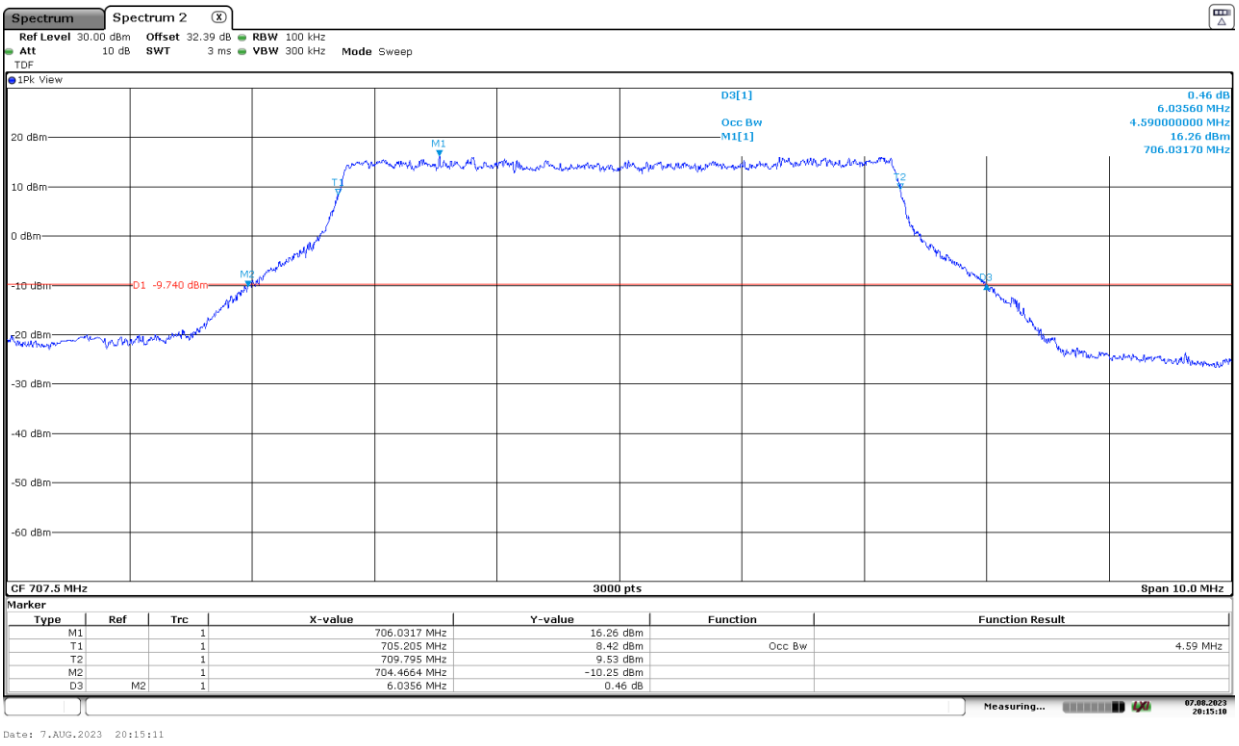

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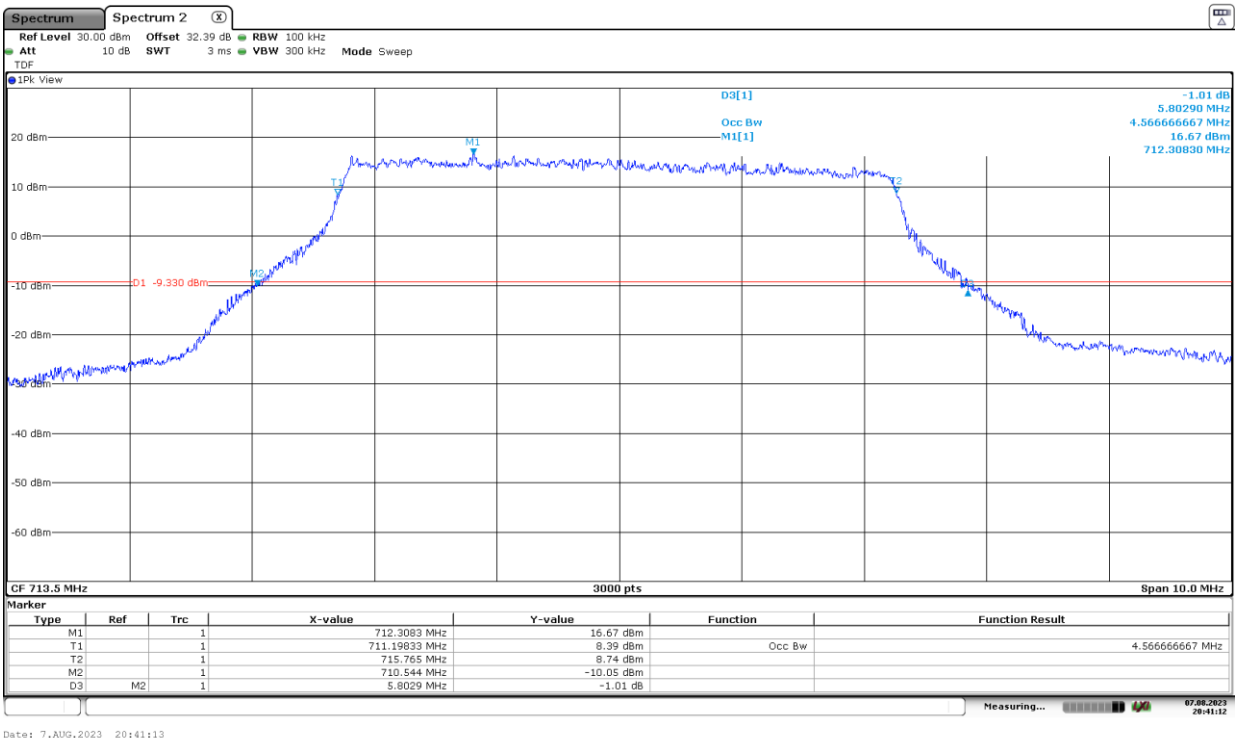
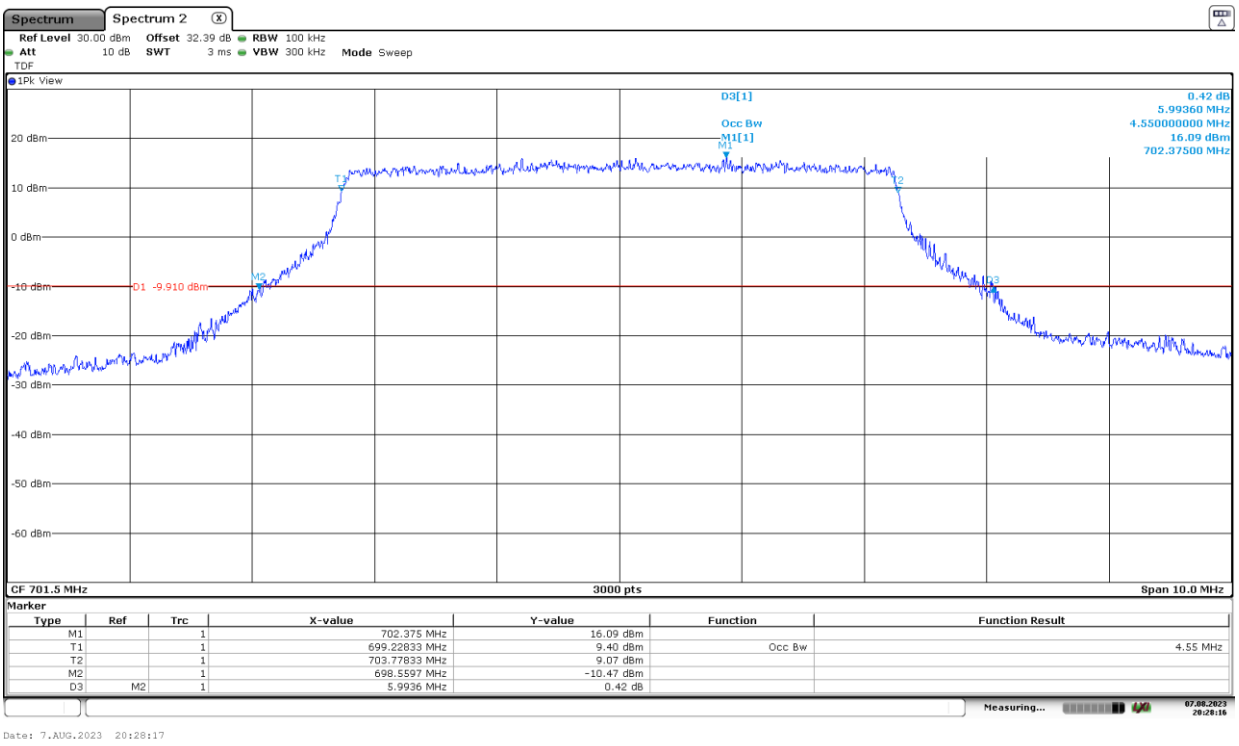


LTE Cat-4 Band 12. BW=5 MHz. 16QAM. RB Size=All.

Low Channel:



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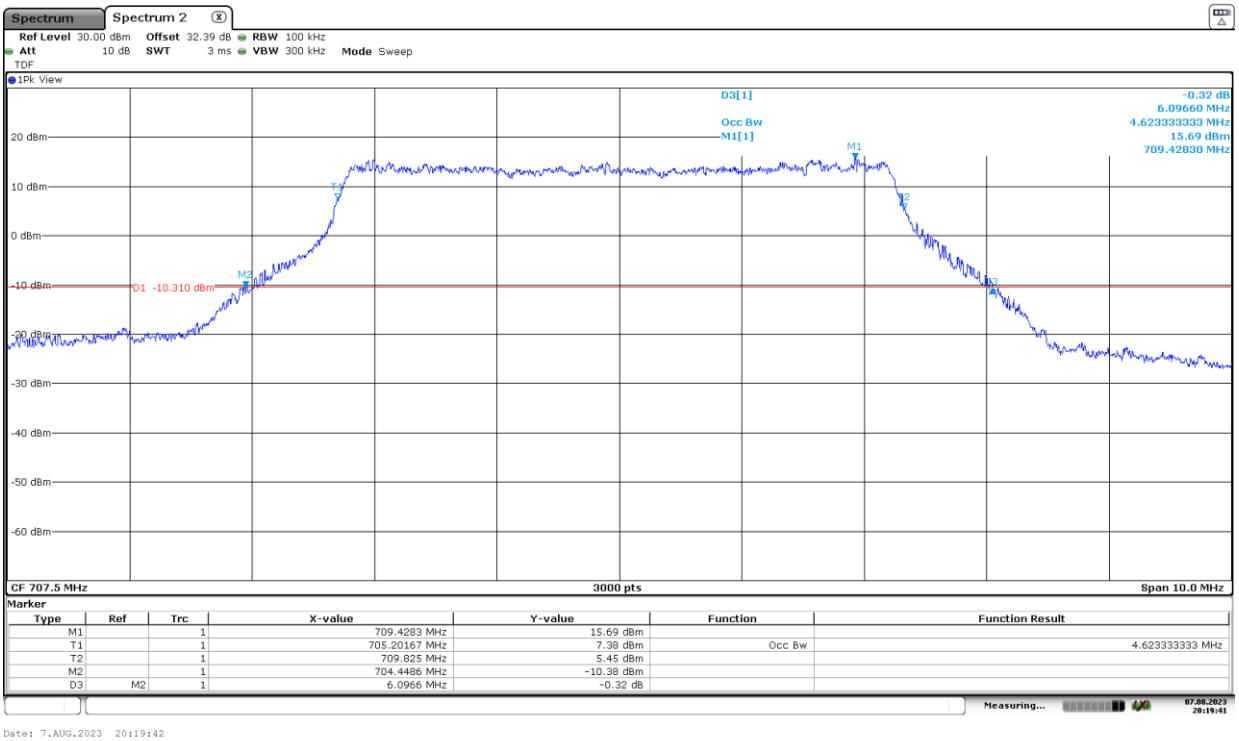

High Channel: