



TESTING CERT #3478.01



TEST REPORT

EUT Description	GSM, WCDMA and LTE Cellular adapter card
Brand Name	INTEL
Model Name	7262M2WW
Serial Number	IMEI: 004402523029712 (see section 4)
FCC/IC ID	FCC ID: PD97262WW / IC ID: 1000M-7262WW
Antenna type	Dipole, Pulse, Part Number SPDA24700/2700
Hardware/Software Version	HW PR2.3, SW 1509
Date of Sample Receipt	2015-05-11
Date of Test Start / End	2015-05-27 / 2015-06-17
Features	2G: GSM/GPRS/EDGE 850 / 1900 3G: WCDMA/HSPA/DC-HSDPA FDD II / IV / V 4G LTE- FDD 2, 4, 5, 7, 12, 13, 17, 30 LTE-TDD 41 (see section 5)


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Reference Standards	FCC CFR Title 47 Part 2, 22, 24, 27 RSS 132 issue 3, RSS 133 issue 6, RSS 139 issue 2, RSS-195 issue 2 (see section 1)
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Test Report number	15051102.TR02
Revision Control	Rev. 01

The test results relate only to the samples tested.
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1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 2 - Subpart J - EQUIPMENT AUTHORIZATION PROCEDURES
2. FCC 47 CFR part 22 - Subpart H - Cellular Radiotelephone Service
3. FCC 47 CFR part 24 – Subpart E - Broadband PCS.
4. FCC 47 CFR part 27 – Subpart L - 1695-1710, 1710-1755 MHz, 1755-1780 MHz, 2110-2155 MHz, 2155-2180 MHz, 2180-2200 MHz Bands
5. FCC 47 CFR part 90 – Subpart S—Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands
6. FCC OET KDB 971168 D01 v02r02 Measurement guidance for certification of licensed digital transmitters
7. RSS130 issue 1 - Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz
8. RSS 132 issue 3 - Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz
9. RSS 133 issue 6 - 2 GHz Personal Communications Services
10. RSS 139 issue 2 - Advanced Wireless Services Equipment Operating in the Bands 1710–1755 MHz and 2110–2155 MHz
11. RSS-195 issue 2 - Wireless Communication Service (WCS) Equipment Operating in the Bands 2305-2320 MHz and 2345-2360 MHz
12. TIA 603 - D June 2010 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
13. ANSI C63.4-2009 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by IC, with IC Assigned Code 1000Y.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	20.1°C ± 1°C
Humidity	59% ± 10%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt
#01	15051102.S02	Cellular module	7262M2WW	004402523029712	2015-05-11
	14112401.S07	Antenna	Pulse SPDA24700/2700	NA	2014-11-24
	14112401.S08	Antenna	Pulse SPDA24700/2700	NA	2014-11-24
	15051102.S04	Extender Board	SB0NFF2BK0D	NFFTC00332500211	2015-05-11

NA: Not Applicable

- ✓ Sample #01 has undergone all the test(s) requested by the applicant, following the standards specified in section 1.

5. EUT features

These are the detailed bands and modes supported by the Equipment Under Test:

GSM / GPRS / EDGE	GSM 850 (824.2 – 848.8 MHz) PCS 1900 (1850.2 – 1909.9 MHz)
WCDMA / HSPA+	FDD II (1850.0 – 1910.0 MHz) FDD IV (1710.0 – 1755.0 MHz) FDD V (824.0 – 849.0 MHz)
LTE FDD	Band 2 (1850.0 – 1910.0 MHz) Band 4 (1710.0 – 1755.0 MHz) Band 5 (824.0 – 849.0 MHz) Band 7 (2500 – 2570 MHz) Band 12 (699 – 716 MHz) Band 13 (777 – 787 MHz) Band 17 (704.0 – 716.0 MHz) Band 26 (814 – 849 MHz) Band 30 (2305 – 2315 MHz)
LTE TDD	Band 41 (2496 – 2690 MHz)

Emission designator for IC cert:

LTE emission designator

Band	Type of modulation	
	QPSK	16QAM
LTE Band 2, Bandwidth 1.4MHz	1M11G7D	1M11W7D
LTE Band 2, Bandwidth 3MHz	2M73G7D	2M74W7D
LTE Band 2, Bandwidth 5MHz	4M52G7D	4M52W7D
LTE Band 2, Bandwidth 10MHz	9M04G7D	9M04W7D
LTE Band 2, Bandwidth 15MHz	13M5G7D	13M5W7D
LTE Band 2, Bandwidth 20MHz	17M92G7D	17M91W7D
LTE Band 4, Bandwidth 1.4MHz	1M11G7D	1M11W7D
LTE Band 4, Bandwidth 3MHz	2M73G7D	2M72W7D
LTE Band 4, Bandwidth 5MHz	4M53G7D	4M51W7D
LTE Band 4, Bandwidth 10MHz	9M04G7D	9M02W7D
LTE Band 4, Bandwidth 15MHz	13M57G7D	13M51W7D
LTE Band 4, Bandwidth 20MHz	17M87G7D	17M9W7D
LTE Band 5, Bandwidth 1.4MHz	1M10G7D	1M10W7D
LTE Band 5, Bandwidth 3MHz	2M74G7D	2M73W7D
LTE Band 5, Bandwidth 5MHz	4M51G7D	4M51W7D
LTE Band 5, Bandwidth 10MHz	9M04G7D	9M03W7D
LTE Band 12, Bandwidth 1.4MHz	1M11G7D	1M10W7D
LTE Band 12, Bandwidth 3MHz	2M74G7D	2M73W7D
LTE Band 12, Bandwidth 5MHz	4M50G7D	4M51W7D
LTE Band 12, Bandwidth 10MHz	9M03G7D	9M04W7D

Band	Type of modulation	
	QPSK	16QAM
LTE Band 17, Bandwidth 5MHz	4M52G7D	4M54W7D
LTE Band 17, Bandwidth 10MHz	9M05G7D	9M02W7D
LTE Band 13, Bandwidth 5MHz	4M51G7D	4M51W7D
LTE Band 13, Bandwidth 10MHz	8M99G7D	8M98W7D
LTE Band 26, Bandwidth 1.4MHz	1M10G7D	1M10W7D
LTE Band 26, Bandwidth 3MHz	2M72G7D	2M73W7D
LTE Band 26, Bandwidth 5MHz	4M51G7D	4M52W7D
LTE Band 26, Bandwidth 10MHz	9M05G7D	9M04W7D
LTE Band 41, Bandwidth 5MHz	4M52G7D	4M54W7D
LTE Band 41, Bandwidth 10MHz	9M02G7D	9M01W7D
LTE Band 41, Bandwidth 15MHz	13M5G7D	13M5W7D
LTE Band 41, Bandwidth 20MHz	17M9G7D	17M9W7D
LTE Band 7, Bandwidth 5MHz	4M51G7D	4M51W7D
LTE Band 7, Bandwidth 10MHz	9M04G7D	9M02W7D
LTE Band 7, Bandwidth 15MHz	13M6G7D	13M5W7D
LTE Band 7, Bandwidth 20MHz	17M9G7D	17M9W7D

Band	Type of modulation	
	QPSK	16QAM
LTE Band 30, Bandwidth 5MHz	4M51G7D	4M54W7D
LTE Band 30, Bandwidth 10MHz	9M01G7D	9M02W7D

6. Remarks and comments

1. According to Applicants declaration, between the EUT version HW PR2.0, SW 1445, EUT version HW PR2.1 SW 1449 and EUT version HW PR2.3, SW 1509 there are no differences regarding the GSM850, GSM1900, WCDMA II, IV, V and LTE band 2, 4, 5, 7, 12, 13, 17, 26 and 41. For these bands only worst cases radiated found on EUT PR2.0 and EUT PR 2.1 are reported (Annex C).

7. Test Verdicts summary

7.1. GSM/EDGE/GPRS

Mode	FCC part	RSS part	Test name	Verdict
PCS 1900	24.238	133-ch.6.5.1	Radiated spurious emission	P
GSM 850	22.917, 2.1053	RSS.132-ch.5.5	Radiated spurious emission	P

P: Pass
 F: Fail
 NM: Not Measured
 NA: Not Applicable

7.2. WCDMA

Mode	Band	FCC part	RSS part	Test name	Verdict
WCDMA / HSPA+ FDD	2	24.238	133-ch.6.5.1	Radiated spurious emission	P
WCDMA / HSPA+ FDD	4	27.53, 2.1053	139-ch.6.5	Radiated spurious emission	P
WCDMA / HSPA+ FDD	5	22.917, 2.1053	RSS.132-ch.5.5	Radiated spurious emission	P

P: Pass
 F: Fail
 NM: Not Measured
 NA: Not Applicable

7.3. LTE

Mode	Band	FCC part	RSS part	Test name	Verdict
LTE	2	24.238	133-ch.6.5.1	Radiated spurious emission	P
LTE	4	27.53, 2.1053	139-ch.6.5	Radiated spurious emission	P
LTE	5	22.917, 2.1053	132-ch.5.5	Radiated spurious emission	P
LTE	7	27.53 (m), 2.1053	199-ch.4.6	Radiated spurious emission	P
LTE	12	27.53 (g), 2.1053	130-ch.4.6	Radiated spurious emission	P
LTE	13	27.53 (c), 2.1053	130-ch.4.6	Radiated spurious emission	P
LTE	17	27.53 (g), 2.1053	130-ch.4.6	Radiated spurious emission	P
LTE	26	22.917, 2.1053, 90.691	-	Radiated spurious emission	P
LTE	30	2.1046	Gen-ch.6.12	Conducted output power	P
		27.50 (a)	195-ch.5.5	Equivalent isotropic radiated power	P
		27.53 (a)		Emission bandwidth	P
		2.1049	Gen-ch.6.6	Occupied bandwidth (99%)	P
		-	195-ch.5.5	Peak to average ratio	P
		27.54, 2.1055	195-ch.5.4	Frequency Stability	P
		27.53 (a), 2.1051	195-ch.5.6	Conducted band-edge	P
		27.53 (a)	195-ch.5.6	Conducted spurious emission	P
		27.53 (a), 2.1053	195-ch.5.6	Radiated spurious emission	P
LTE	41	27.53 (m), 2.1053	-	Radiated spurious emission	P

P: Pass
 F: Fail
 NM: Not Measured
 NA: Not Applicable

8. Document Revision History

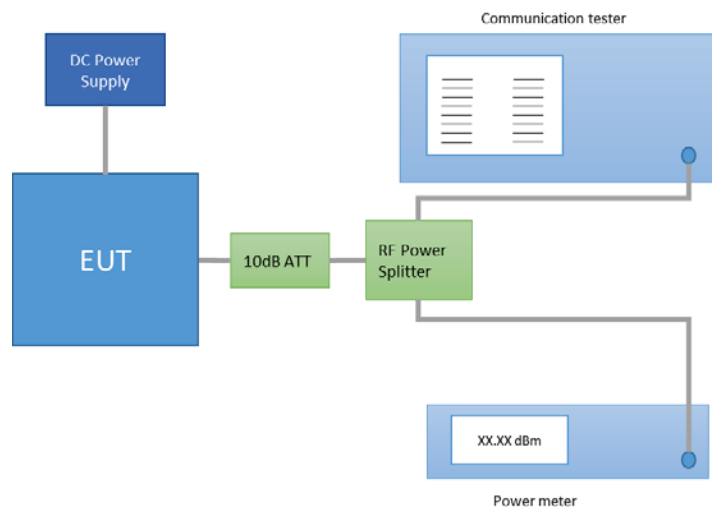
Revision #	Date	Modified by	Details
Rev. 00	2015-06-18	O. Fargant	First Issue
Rev. 01	2015-06-24	O. Fargant	Minor modification according to Steven Hackett

Annex A. Test & System Description

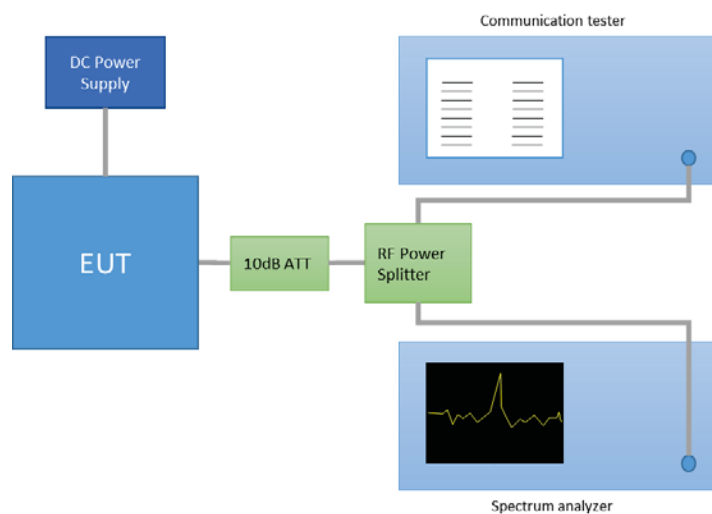
A.1 Measurement system

Measurements were performed using the following setups. A communication tester was used to establish a communication link with the EUT, and the communication tester parameters were set to get the maximum output power from the EUT.

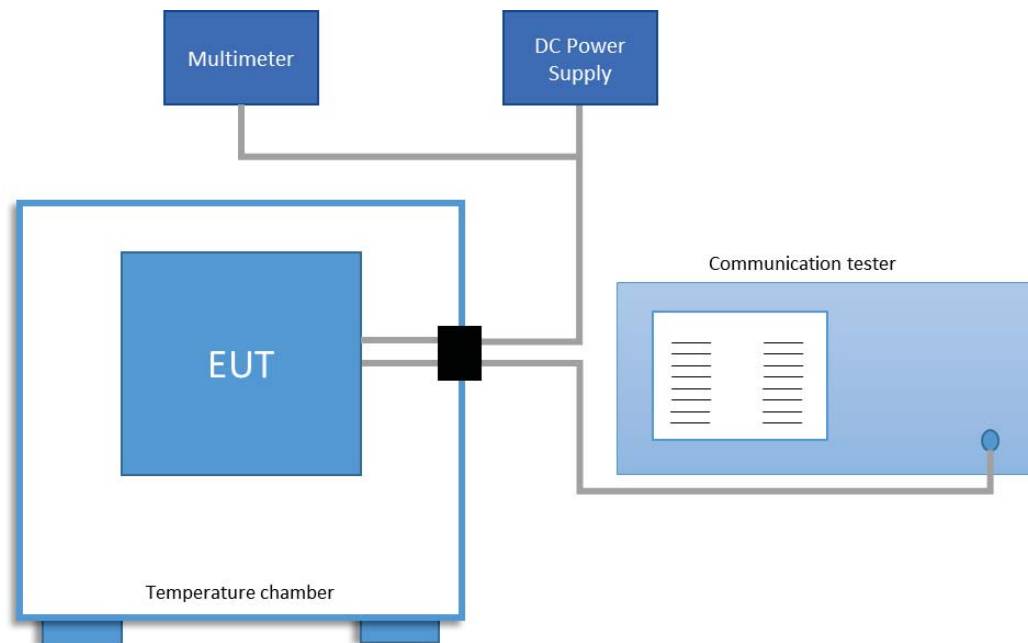
Conducted Setup 1



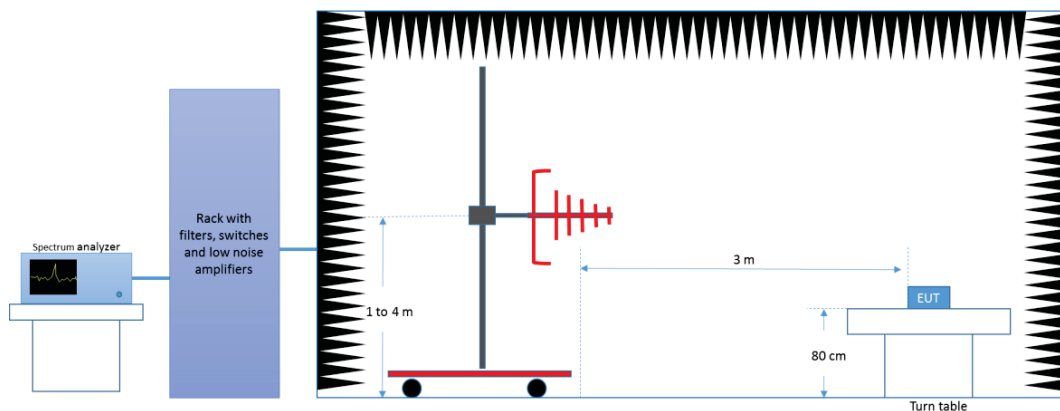
Conducted Setup 2



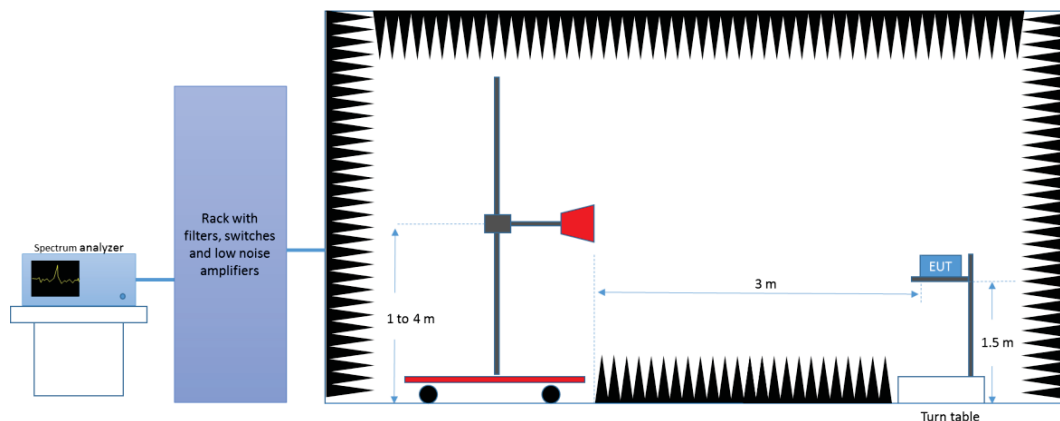
Conducted Setup 3



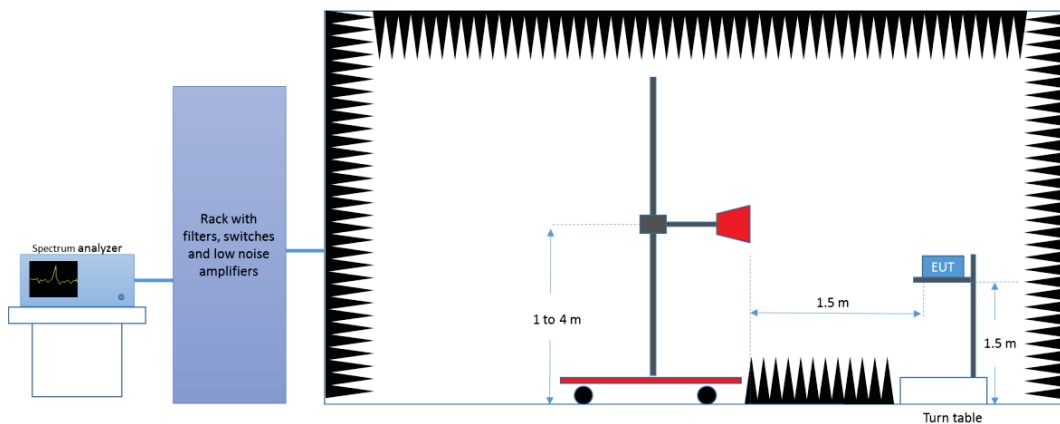
Radiated Setup < 1GHz



Radiated Setup Frequency range 1 GHz to 18 GHz



Radiated Setup > 18GHz



A.2 Test Equipment List

Conducted Setup

ID Number	Device	Type/Model	Serial Number	Manufacturer	Calibration Date	Calibration Due Date
0319	Communication tester	CMW500	129337	Rohde & Schwarz	2015-03-19	2017-03-19
00315	Spectrum analyzer	FSV30	103307	Rohde & Schwarz	2015-03-20	2017-03-20
0046	Power splitter	11667B	MY51360447	Agilent	NA	NA
0098	USB Power sensor	NRP-Z81	102278	Rohde & Schwarz	2013-07-17	2015-07-17
NA	10 dB attenuator	NA	4882640	RS	NA	NA
0036	Multimeter	IDM103	03902163	ISO Tech	2014-01-06	2016-01-06
0293	Power supply	E3640A	MY40006885	Agilent	NA	NA
0300	Climatic Chamber	SLT34/40	56746020930010	SECASI	2015-03-09	2017-03-09

Radiated Setup

ID Number	Device	Type/Model	Serial Number	Manufacturer	Calibration Date	Calibration Due Date
0210	Communication tester	CMW500	147712	Rohde & Schwarz	NA	NA
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2014-05-03	2016-05-03
0137	Log Antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2014-05-03	2016-05-03
0138	Horn Antenna 1 GHz – 18 GHz	3117	00152266	ETS Lindgren	2014-03-04	2016-03-04
0141	Horn Antenna + Preamplifier 1 GHz – 18 GHz	3117P	00157736	ETS Lindgren	2014-06-03	2016-06-03
0139	Horn Antenna 18 GHz – 26 GHz	114514	00167100	ETS Lindgren	2014-04-25	2016-04-25
0135	Anechoic chamber	Fact 3	RFD_FA_100	ETS Lindgren	NA	NA

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty [\pm dB]
Conducted Power (power meter)	± 1.0
Conducted spurious emission	± 2.9
Radiated test < 1GHz	± 3.8
Radiated test 1GHz - 26 GHz	± 4.7

Annex B. Test Results

B.1 Test Conditions

For cellular transmission modes GPRS/EGPRS/WCDMA and LTE, the device was put into operation by using an R&S CMW 500 as base station simulator.

The output power of the device was set to transmit at maximum power for all tests.

B.2 Test results

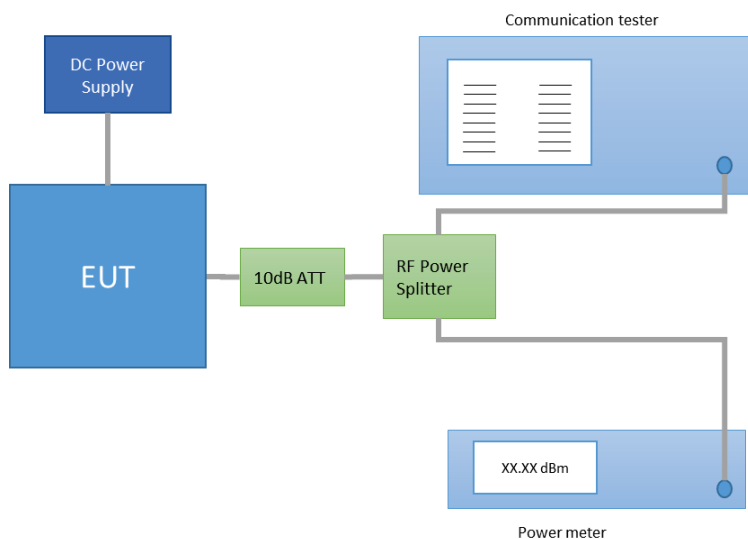
B.2.1 Conducted RF output power

Test limits

BAND	FCC part	RSS part	Power Limits [Watts]	Max Antenna Gain [dBi]	Power Limit at antenna terminal [dBm]
LTE 30	2.1046, 27.50	195-ch.5.5	< 50 mW/5MHz EIRP	2.0	< 31.0

Test procedure

The setup below was used to measure the conducted output power. The antenna terminal of the EUT is connected to the power meter and the communication tester through an attenuator and a power splitter. The power meter reading is compensated to include the RF. This test was performed according to the KDB 971168 D01 § 5.2.



Results tables

Band	BW [MHz]	Channel Number	Freq [MHz]	Modulation.	#RB	RB position	Avg [dBm]	Peak [dBm]
LTE 30	5	27685	2307.5	QPSK	1	0	23.2	27.9
						12	23.2	27.7
						24	23.2	28.0
					12	0	22.2	28.4
						6	22.1	28.4
						11	22.1	28.5
				25	0	22.1	28.6	
				16QAM	1	0	22.1	28.1
						12	22.1	28.3
						24	21.9	28.3
					12	0	21.2	28.3
						6	21.2	28.3
		11	21.2			28.4		
		25	0	21.1	28.4			
		27710	2310	QPSK	1	0	23.0	28.7
						12	23.1	28.7
						24	23.0	28.7
					12	0	22.2	28.5
						6	22.2	28.7
						11	22.1	28.6
				25	0	22.2	28.7	
				16QAM	1	0	22.1	28.3
						12	22.2	28.3
						24	22.1	28.6
					12	0	21.3	28.4
						6	21.2	28.4
		11	21.2			28.5		
		25	0	21.2	28.6			
		27735	2312.5	QPSK	1	0	23.1	28.4
						12	23.3	28.4
						24	23.0	28.3
					12	0	22.2	28.3
						6	22.2	28.3
						11	22.2	28.3
				25	0	22.2	28.6	
				16QAM	1	0	22.3	28.1
12	22.4					28.3		
24	22.2					28.3		
12	0				21.2	28.5		
	6				21.2	28.6		
	11	21.2	28.5					
25	0	21.2	28.7					

Max values
Min values

Band	BW [MHz]	Channel Number	Freq [MHz]	Modulation.	#RB	RB position	Avg [dBm]	Peak [dBm]	
LTE 30	10	27710	2310	QPSK	1	0	23.3	28.1	
						24	23.3	28.5	
						49	23.2	28.4	
					25	0	22.3	28.5	
						12	22.2	28.7	
						24	22.2	28.7	
					50	0	22.2	28.6	
					16QAM	1	0	22.6	28.2
							24	22.4	28.5
				49			22.4	28.4	
				25		0	21.3	28.5	
						12	21.2	28.7	
				24	21.2	28.7			
				50	0	21.2	28.6		

Max values

Min values

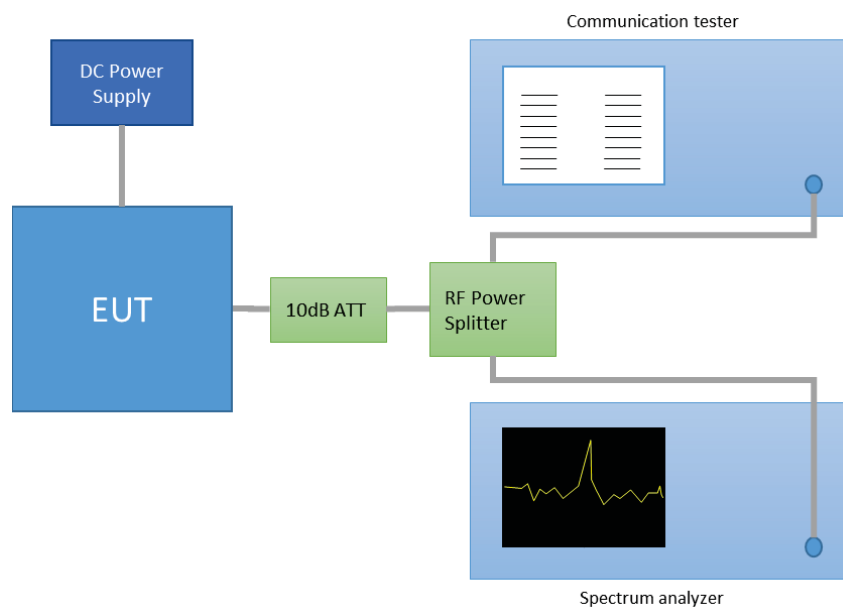
B.2.2 Occupied bandwidth

Standard references

BAND	FCC part	RSS part
LTE 30	2.1049, 27.53	Gen-ch.6.6

Test procedure

The setup below was used to measure the transmitted occupied bandwidth. The antenna terminal of the EUT is connected to the spectrum analyzer and the communication tester through an attenuator and a power splitter. This test was performed according to the KDB 971168 D01 § 4. The occupied bandwidth was measured on the worst case configuration selected from the chapter B.2.1 and on the low, middle and high channel.

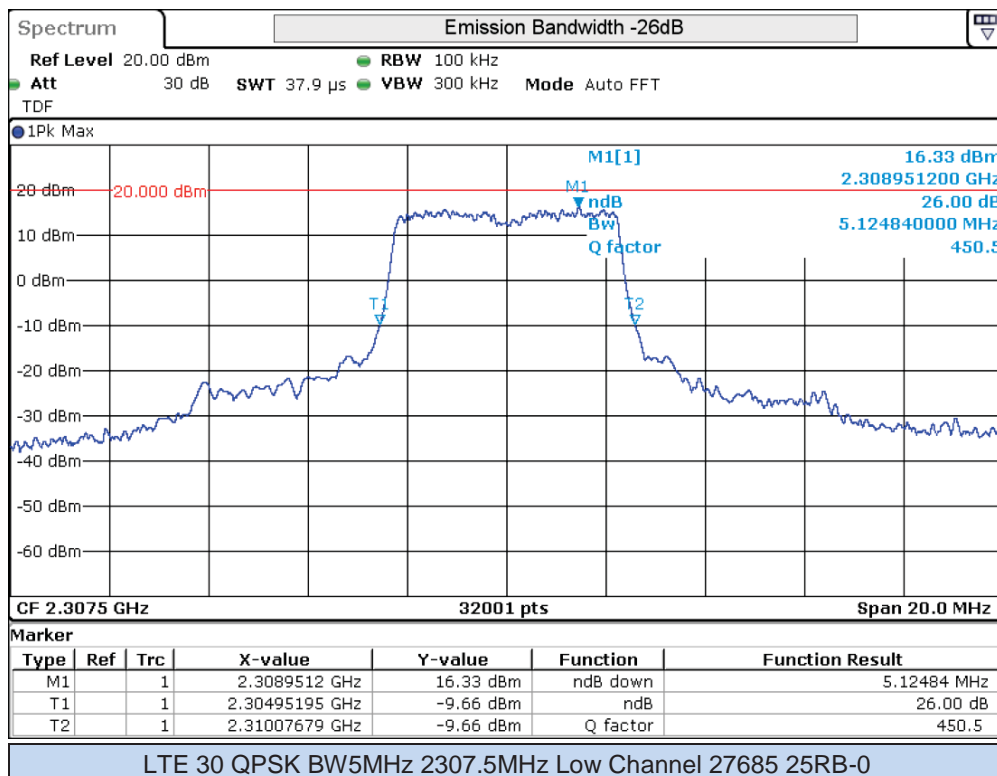
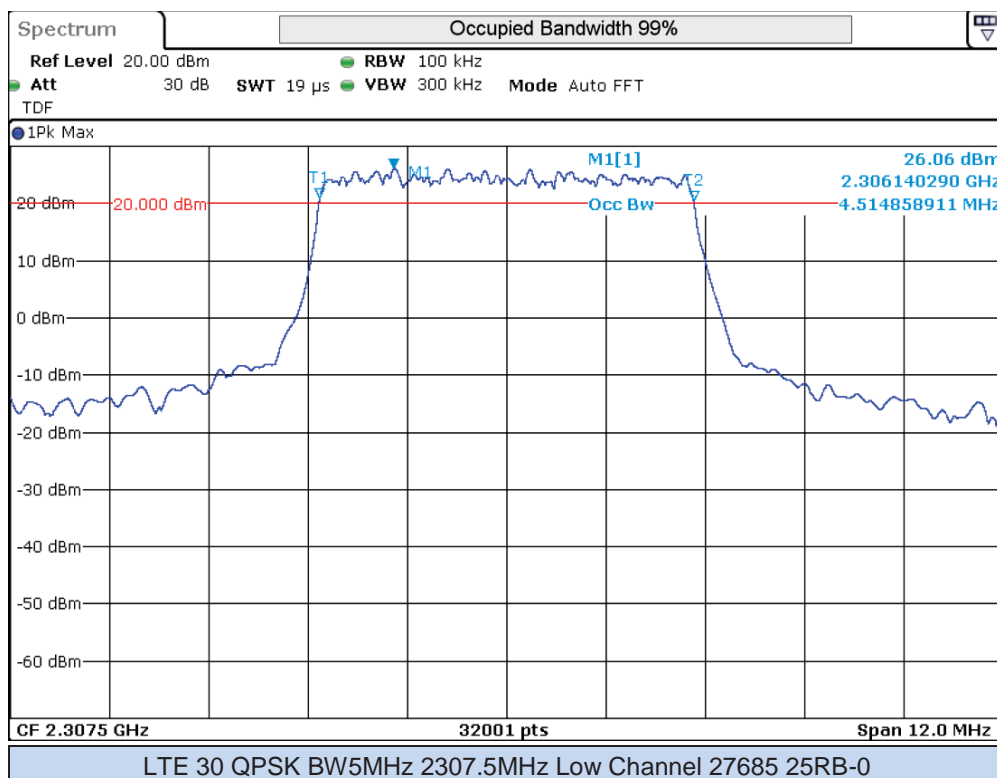


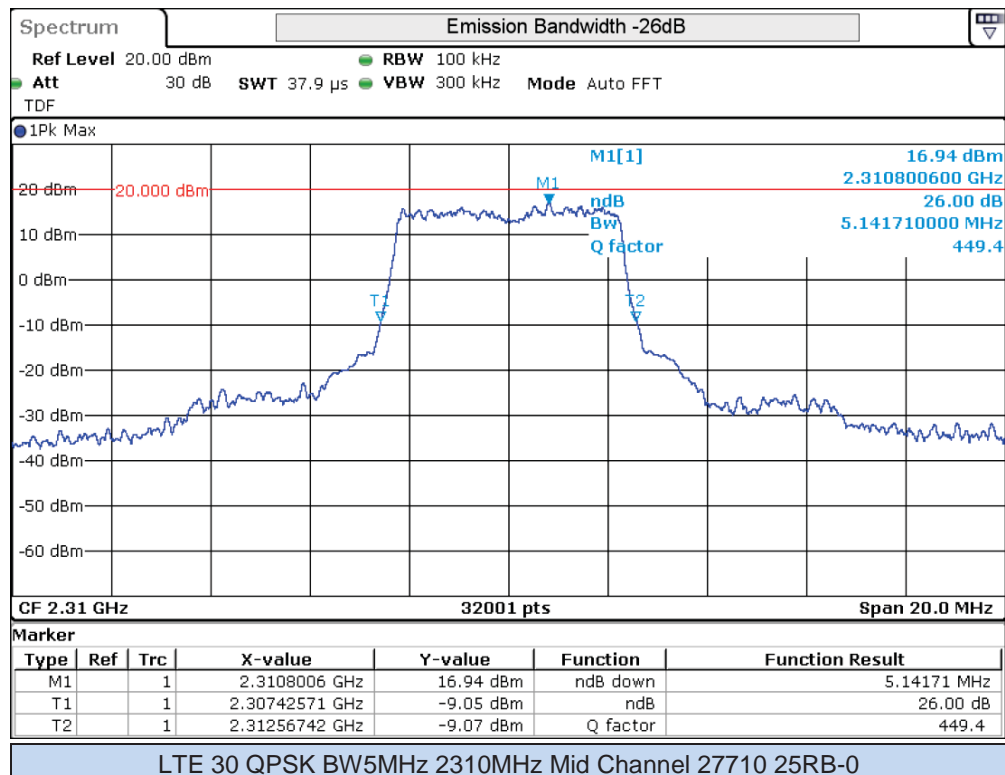
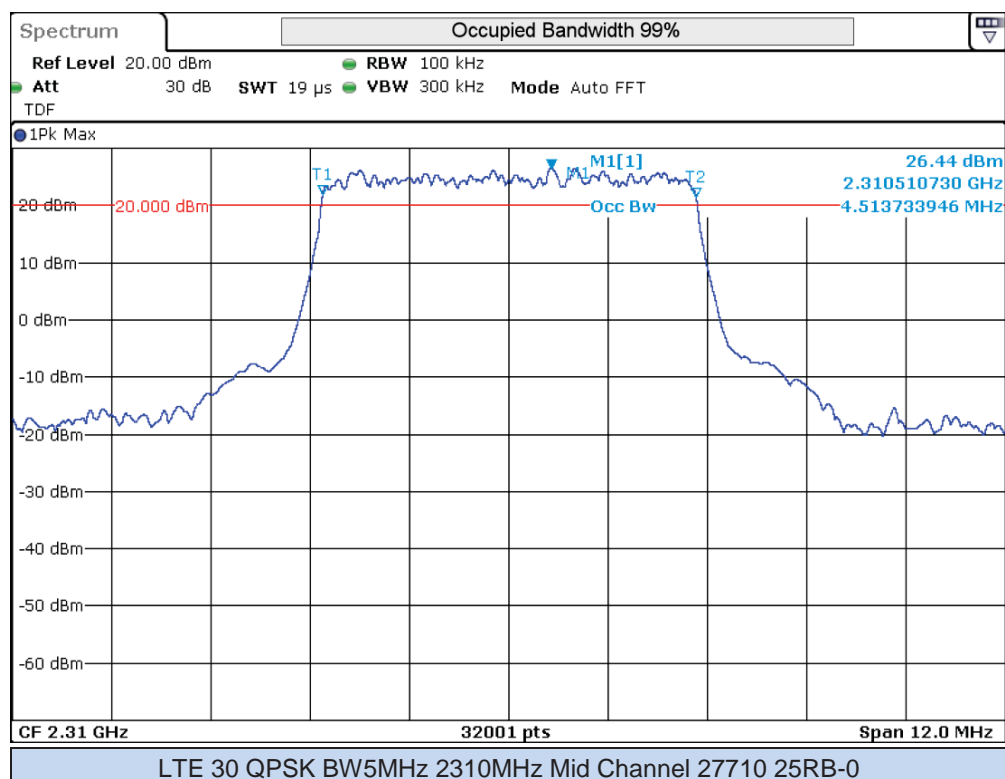
Results tables

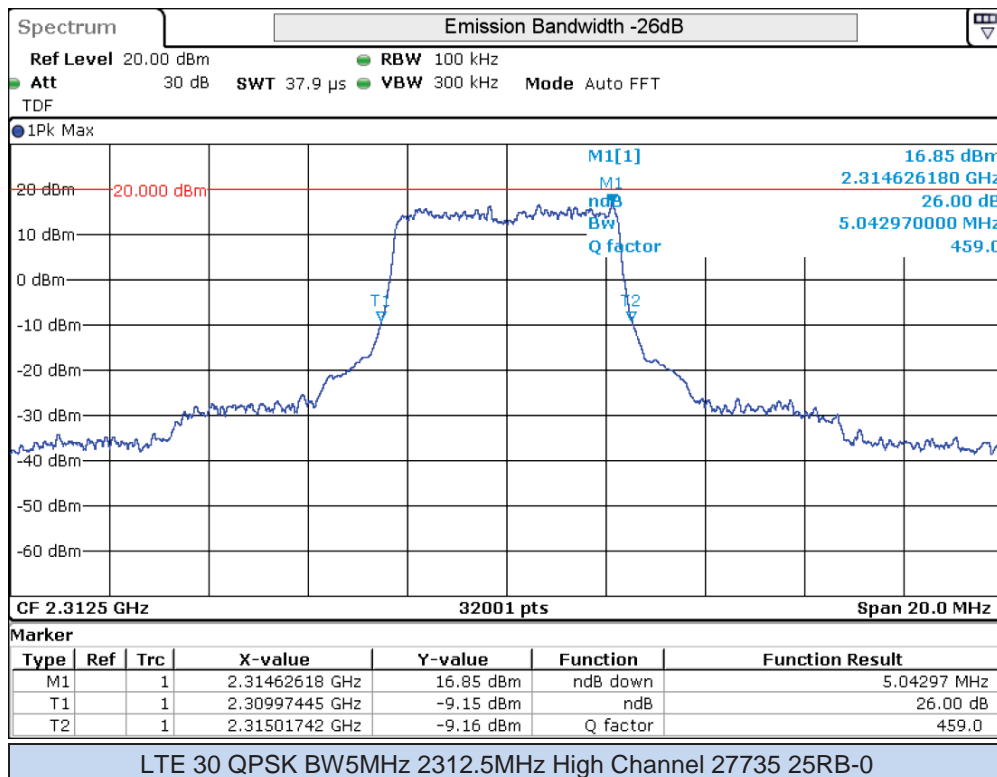
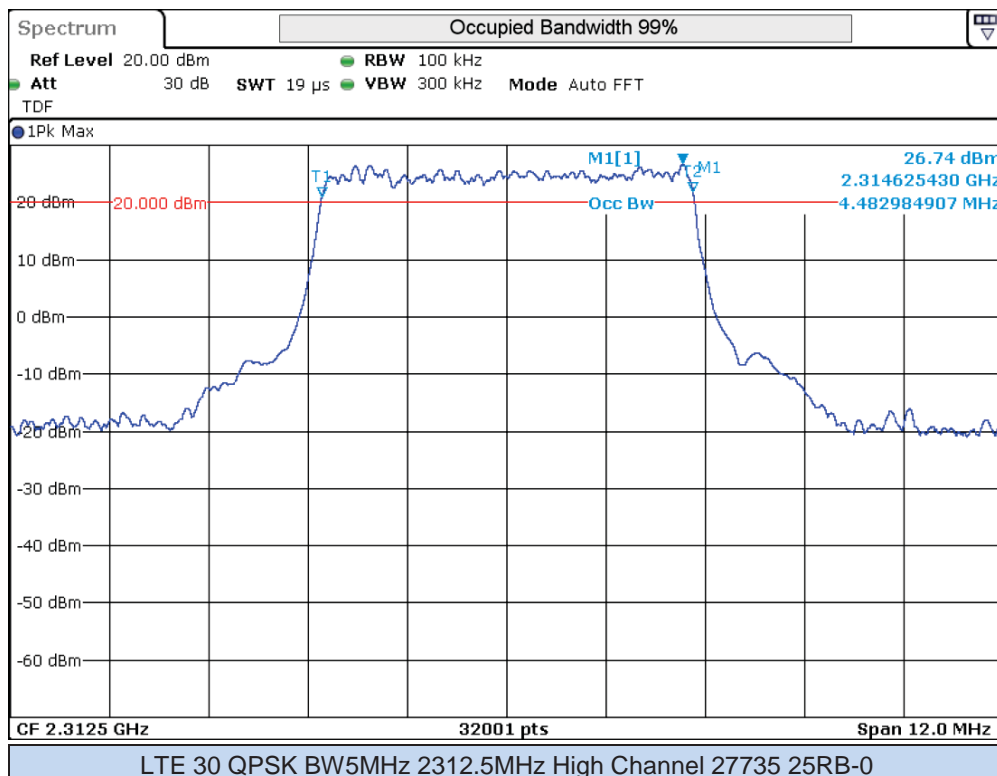
Band	BW [MHz]	Modulation.	Channel Number	Freq [MHz]	#RB	RB position	EBW [MHz]	OBW [MHz]
LTE 30	5	QPSK	27685	2307.5	25	0	5.12	4.51
			27710	2310		0	5.14	4.51
			27735	2312.5		0	5.04	4.48
		16QAM	27685	2307.5		0	5.09	4.54
			27710	2310		0	5.06	4.50
			27735	2312.5		0	5.16	4.53
	10	QPSK	27710	2310	50	0	10.24	9.01
						0	10.31	9.02
		16QAM						

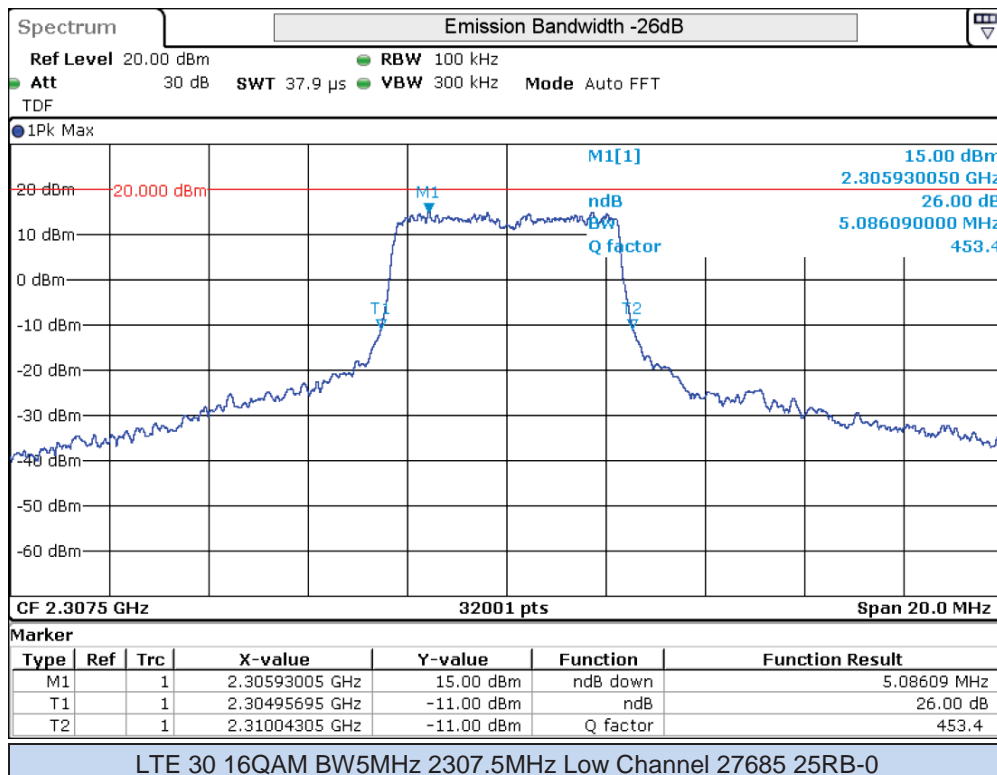
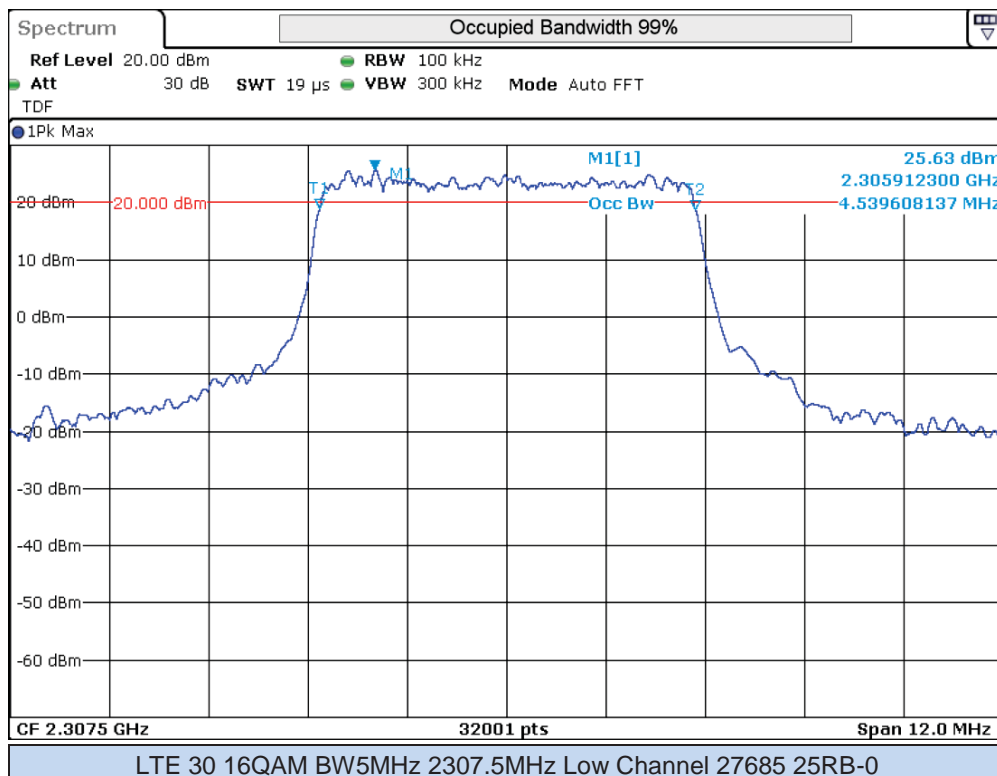
Max values

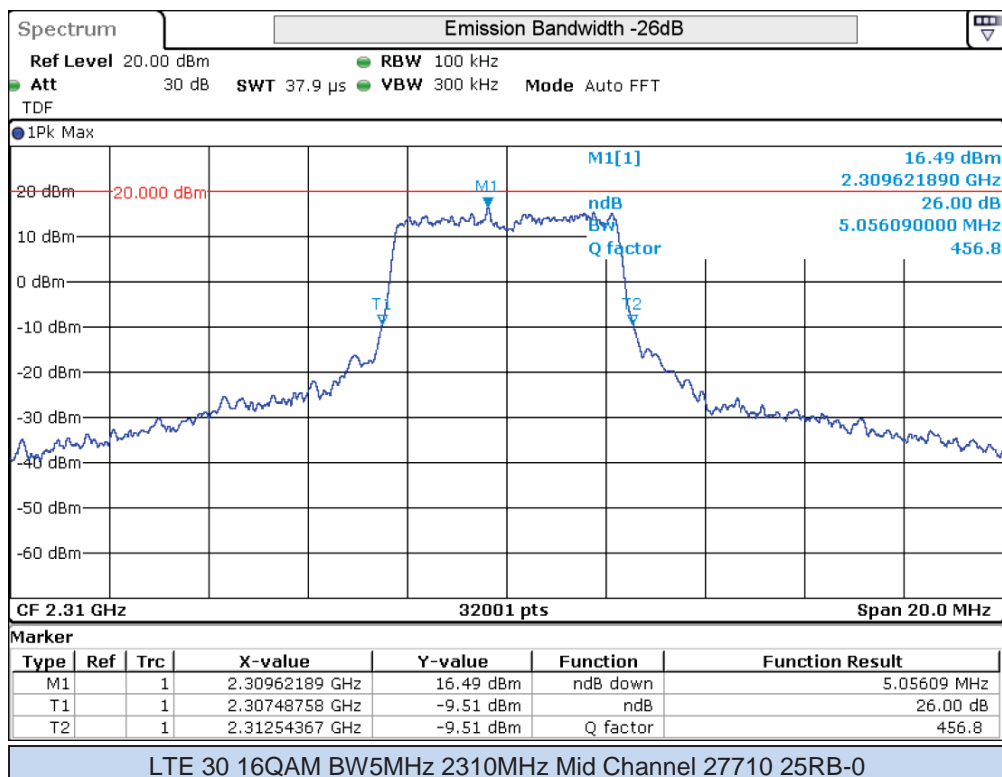
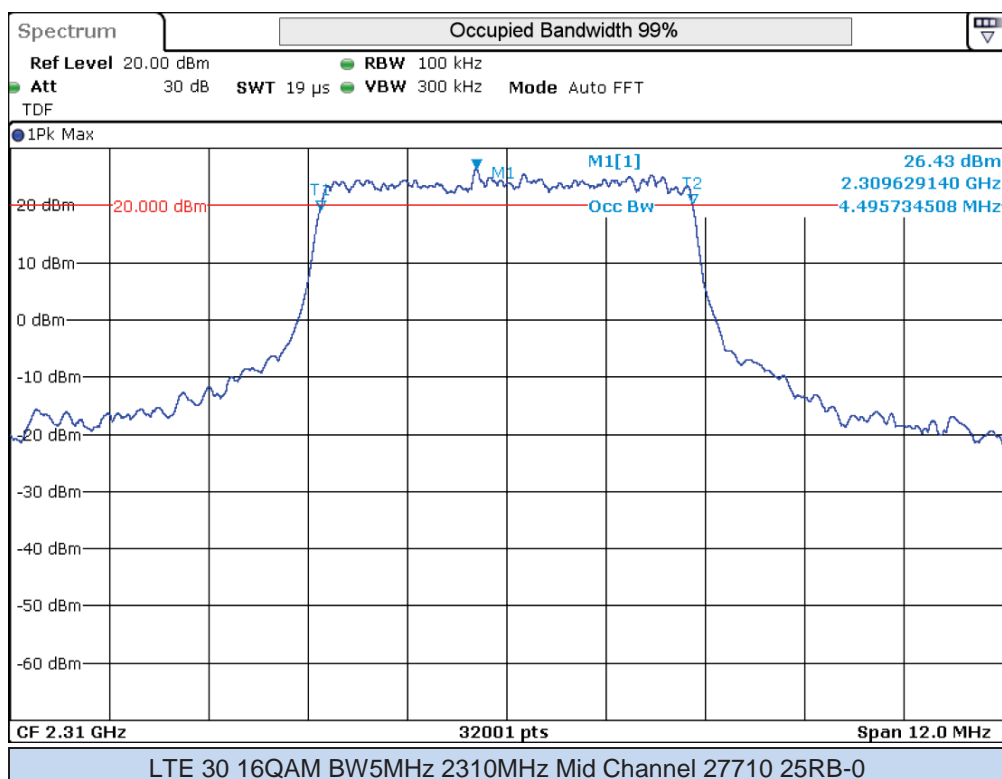
Results screenshot

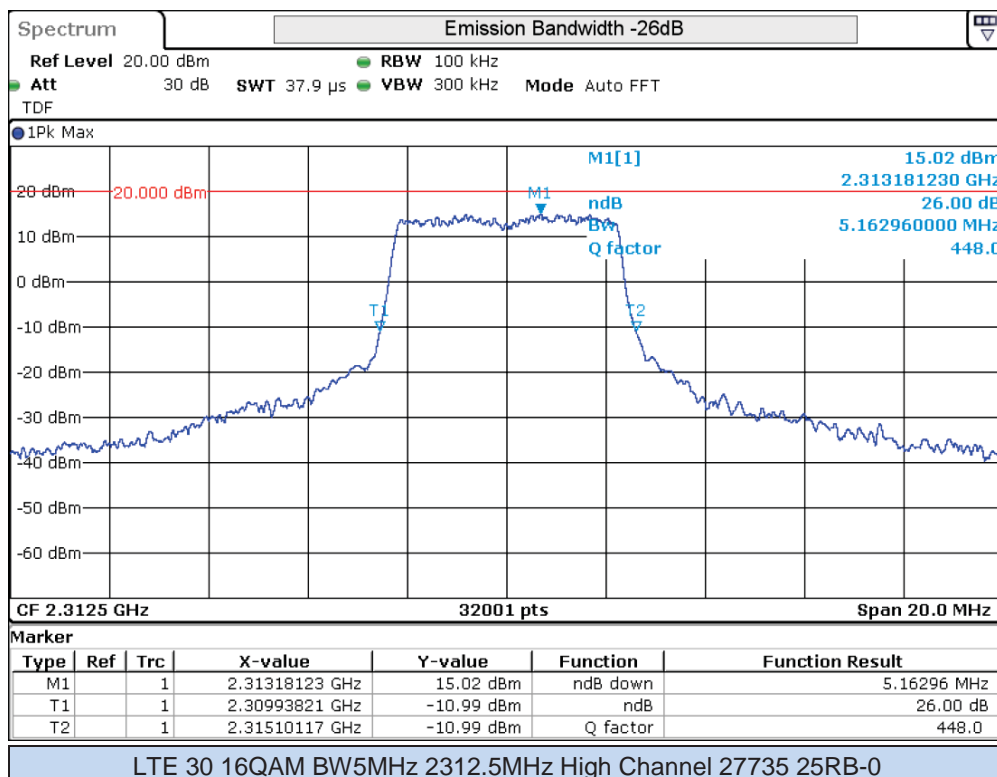
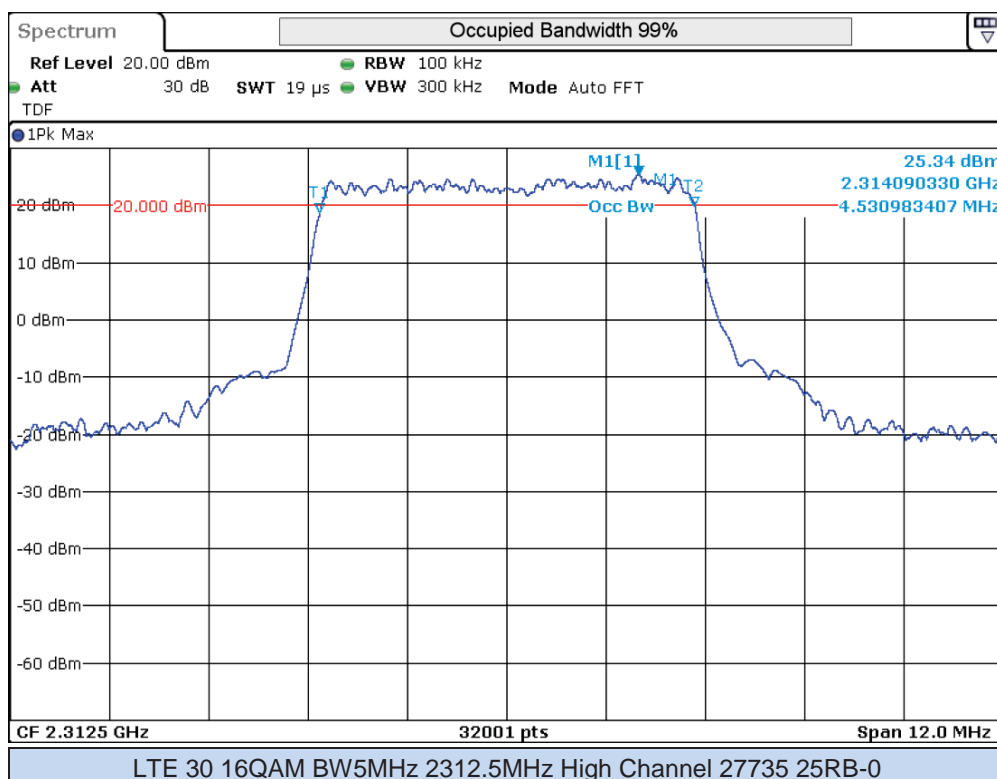


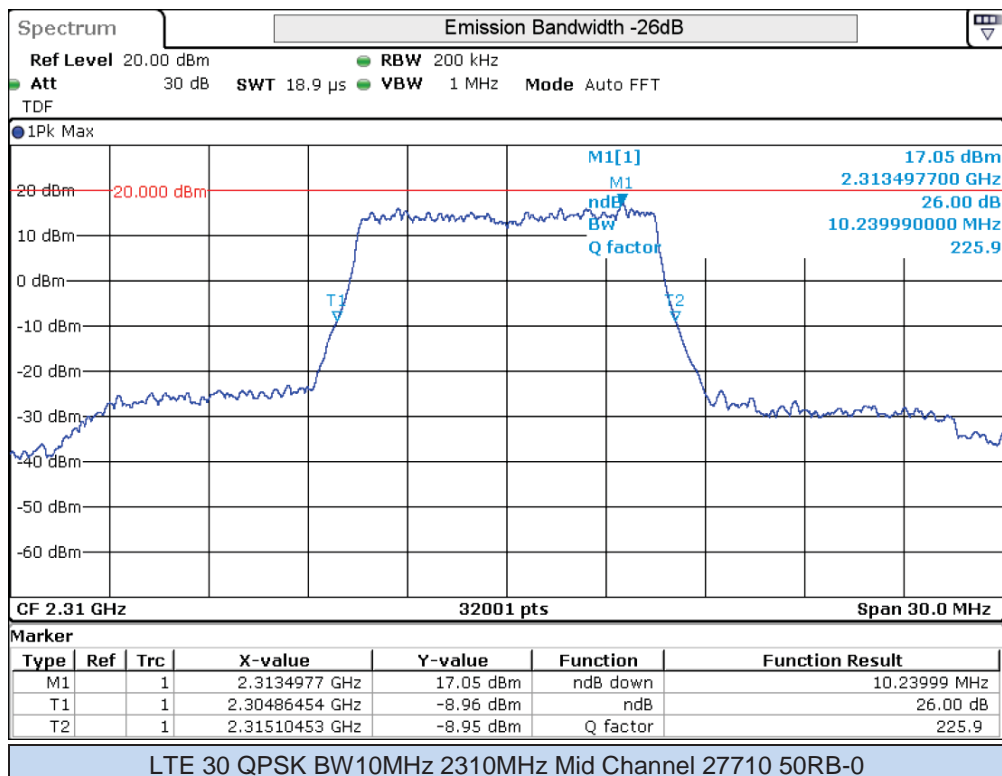
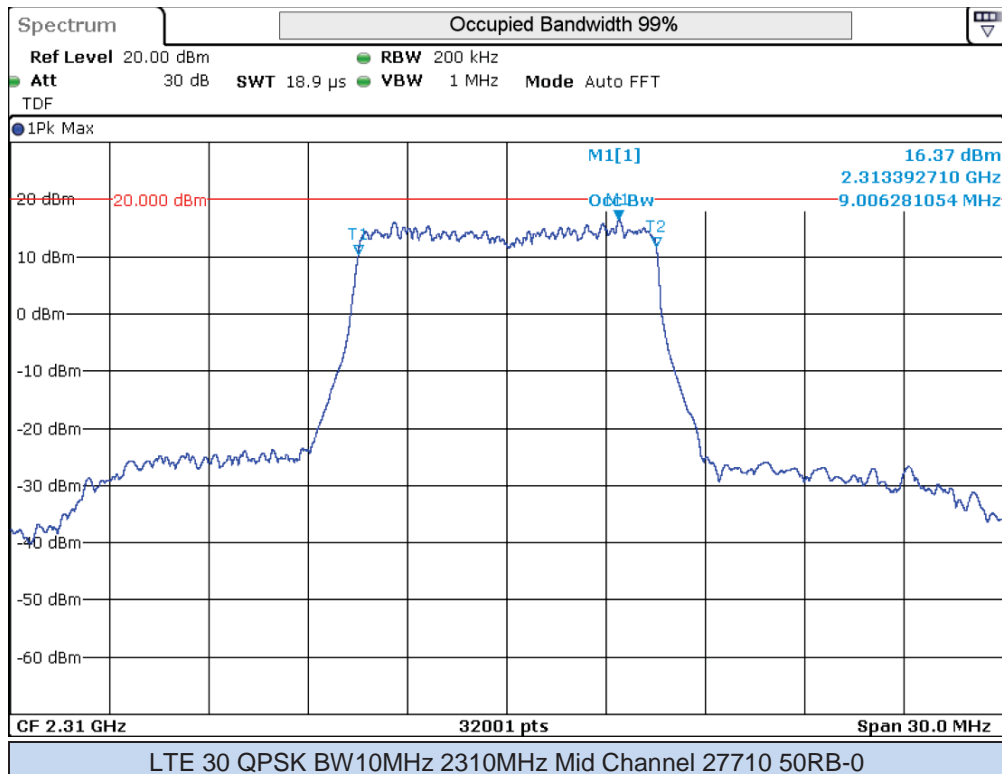


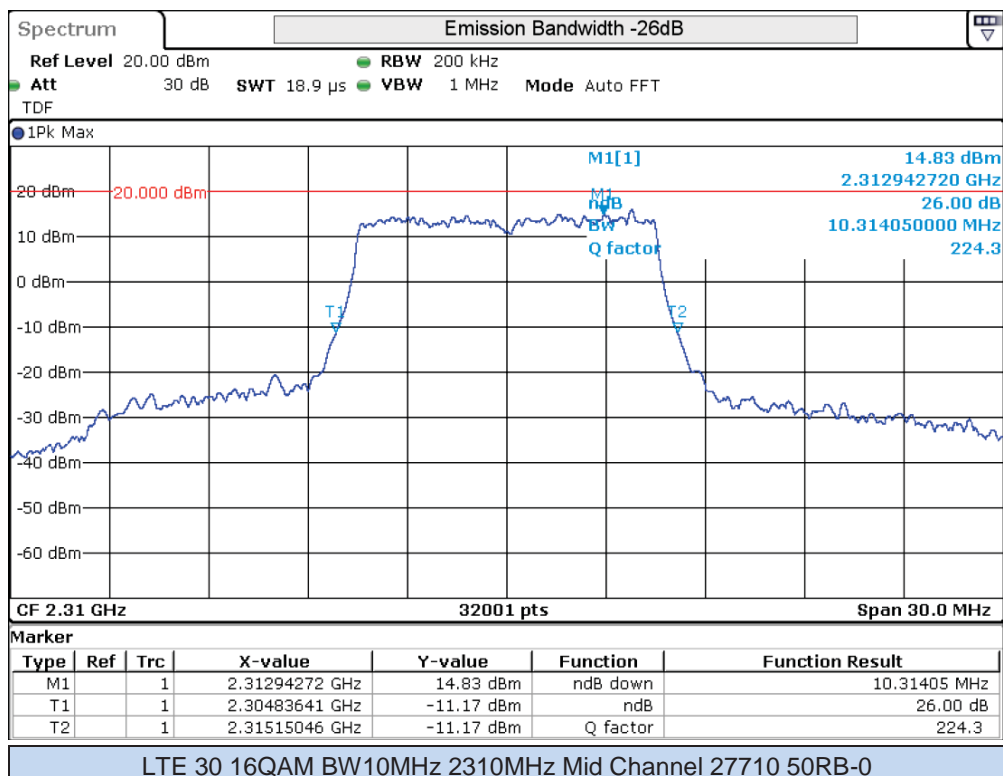
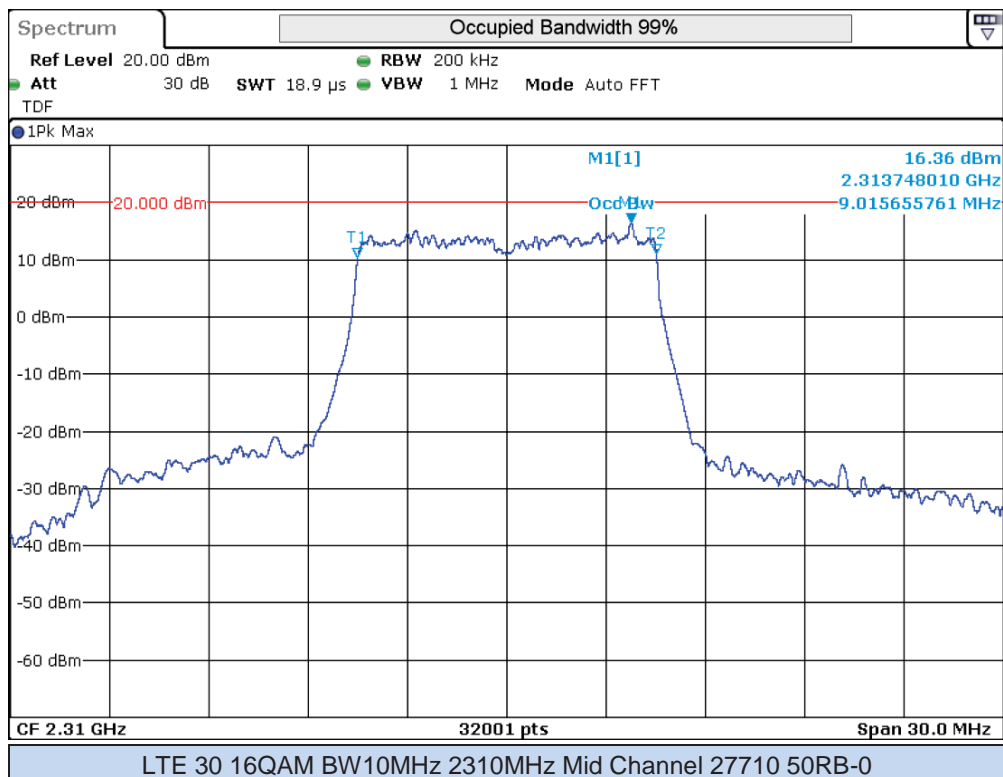












B.2.3 Peak to average ratio

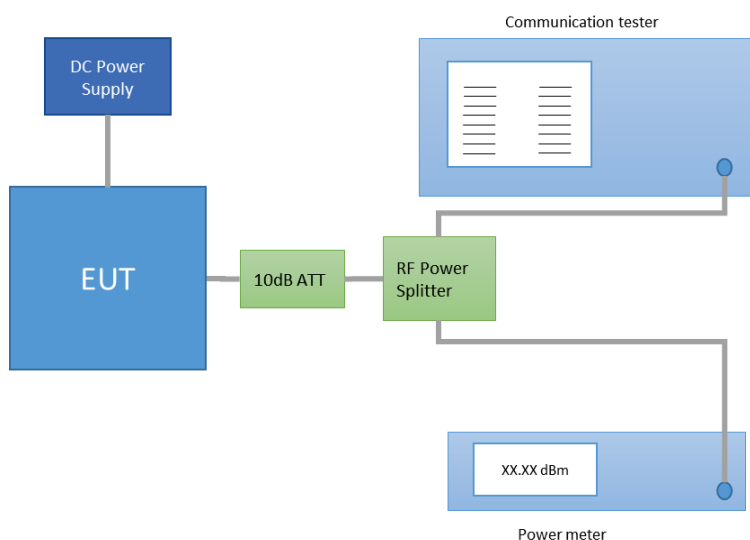
Standard references

BAND	FCC part	RSS part	Peak to average ratio limit
LTE 30	-	195-ch.5.5	< 13 dB

Test procedure

The setup below was used to measure the transmitted peak power. The antenna terminal of the EUT is connected to the peak power meter and the communication tester through an attenuator and a power splitter. This test was performed according to the KDB 971168 D01 § 5.1. Then the Peak to average power ratio is computed from the average power measured previously.

The transmitted peak power was measured on the worst case configuration selected from the chapter **Error! Reference source not found.** and on the middle channel.



Results table

Band	BW [MHz]	Channel	Channel Number	Freq [MHz]	Mod.	#RB UL Slots	RB/UL slots position	PAPR [dB]	
LTE 30	5	Mid	27710	2310	QPSK	1	0	5.65	
							12	5.61	
							24	5.69	
						12	0	6.32	
							6	6.51	
							11	6.48	
						25	0	6.56	
						16QAM	1	0	6.17
								12	6.08
					24			6.54	
					12		0	7.10	
							6	7.20	
	11						7.34		
	25				0	7.43			
	QPSK				1	0	4.76		
						24	5.09		
						49	5.18		
						0	6.14		
						12	6.43		
						24	6.45		
					50	0	6.34		
					16QAM	1	0	5.55	
							24	5.91	
	49						6.00		
25	0	7.31							
	12	7.41							
	24	7.41							
50	0	7.39							

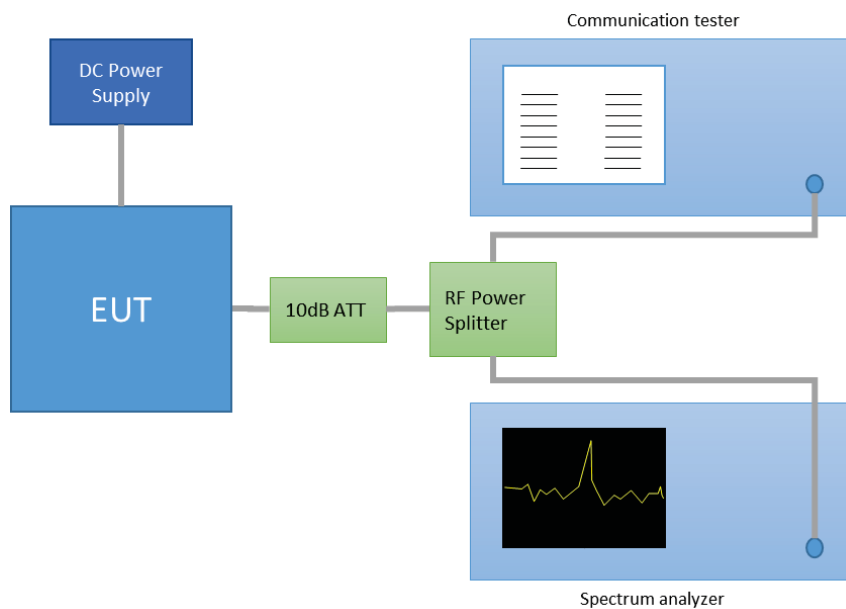
B.2.4 Conducted band-edge and spurious emission

Standard references

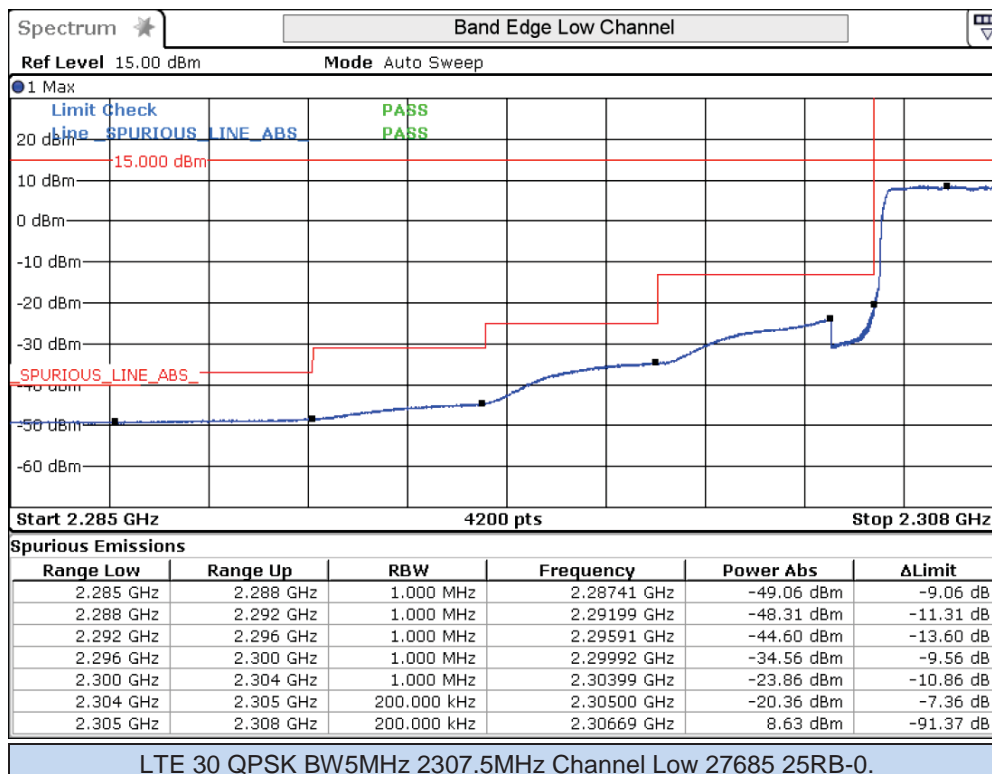
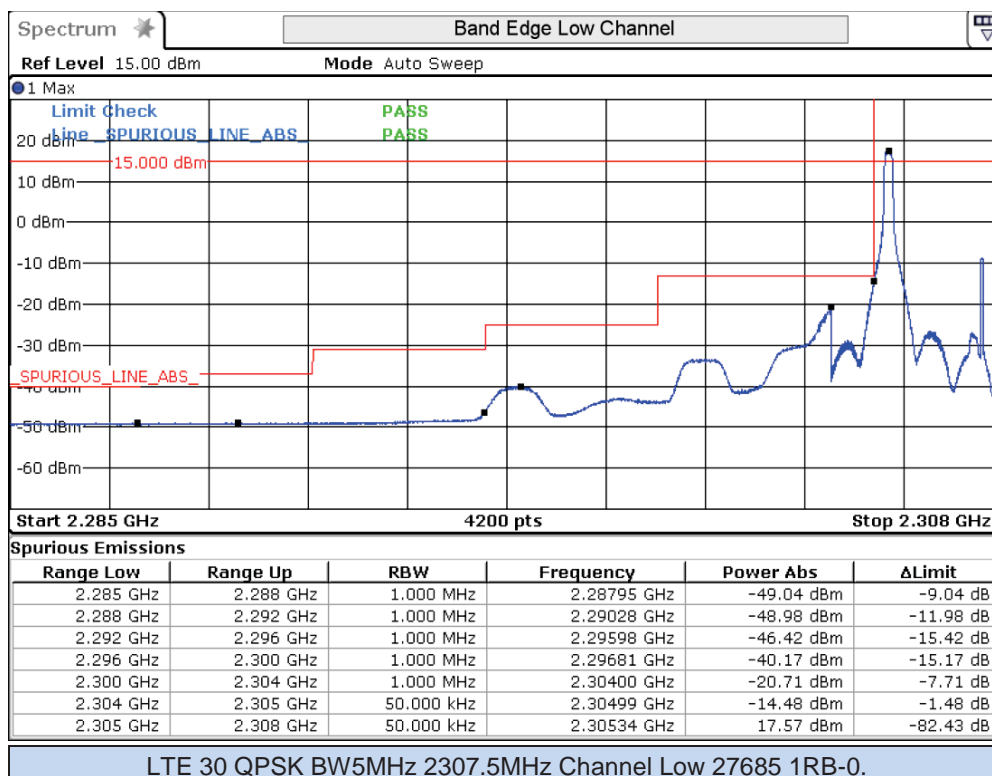
BAND	FCC part	RSS part	Limits
LTE 30	27.53 (a), 2.1051	195-ch.5.6	<p>The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P):</p> <p>By a factor of not less than: $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 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</p> <p>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</p> <p>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.</p>

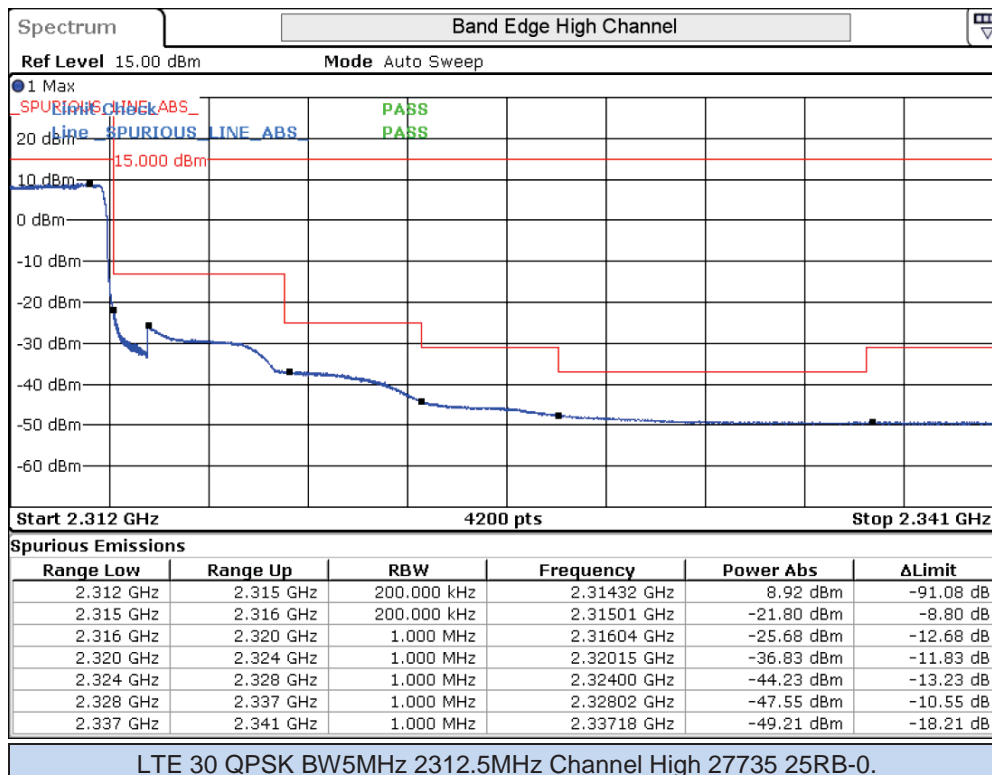
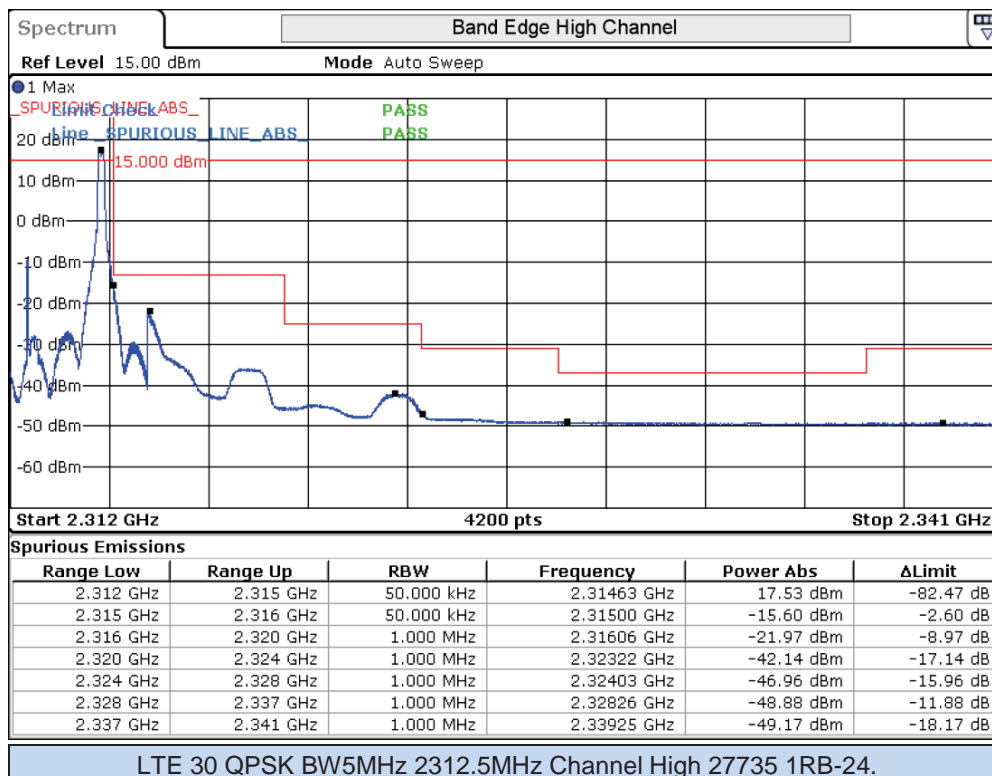
Test procedure

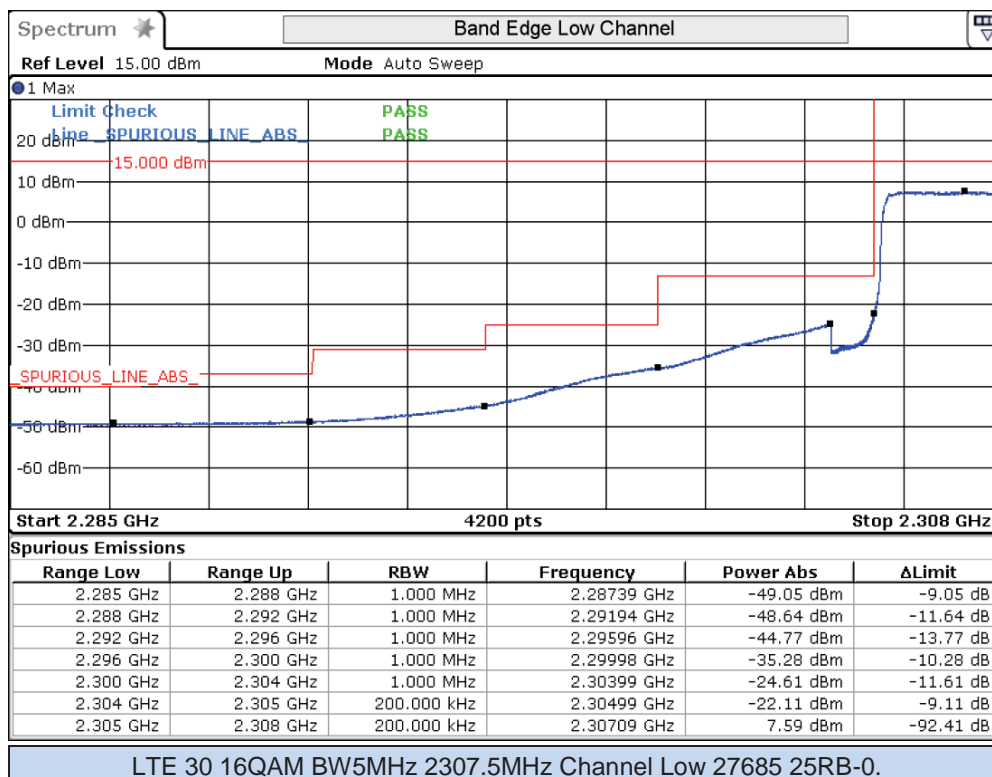
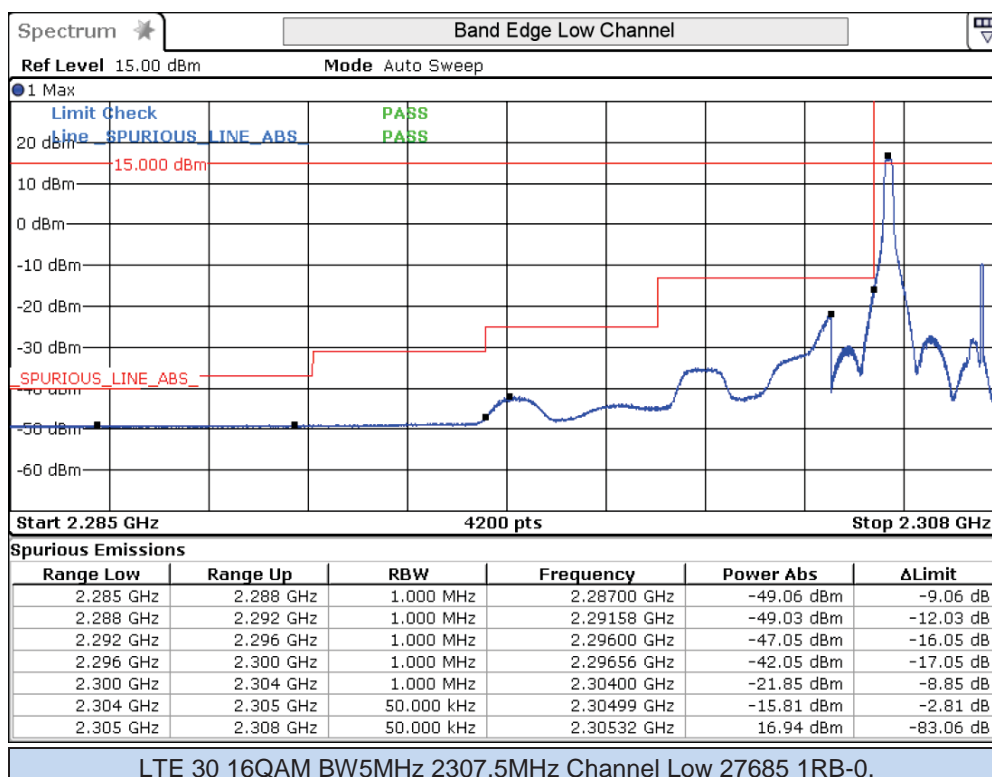
The setup below was used to measure the band-edge and the conducted spurious. The antenna terminal of the EUT is connected to the spectrum analyzer and the communication tester through an attenuator and a power splitter. According to the standard reference, at 1 MHz immediately outside and adjacent to the authorized operating frequency range, a resolution bandwidth of at least 1% has been applied. The video bandwidth was set to three times the resolution bandwidth.

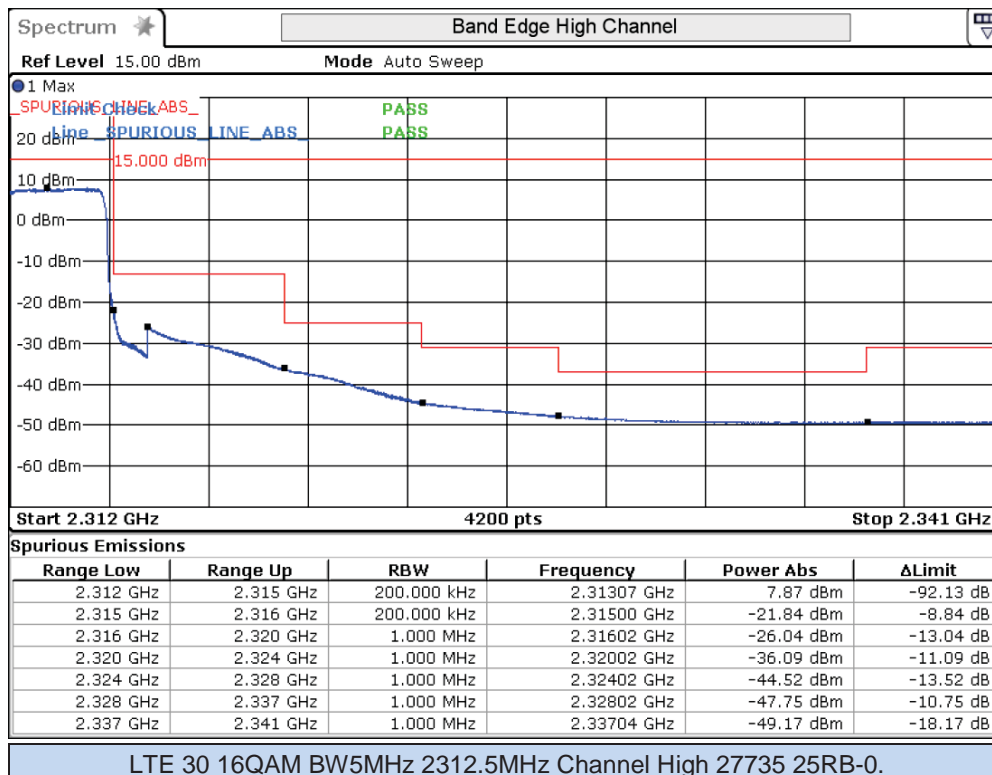
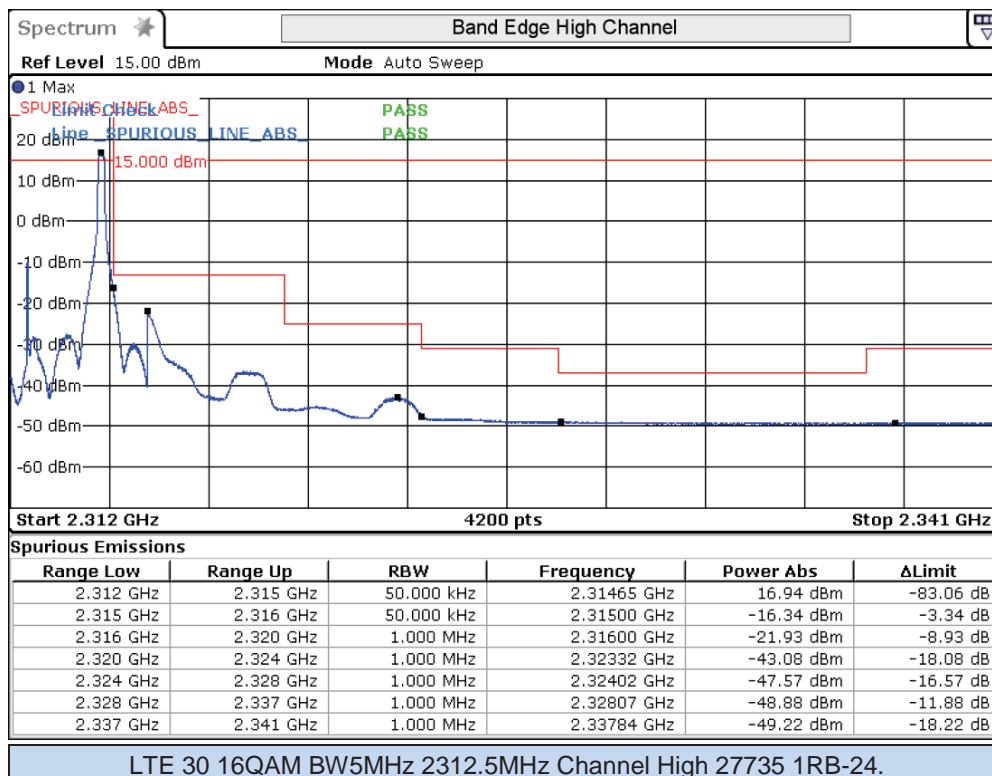


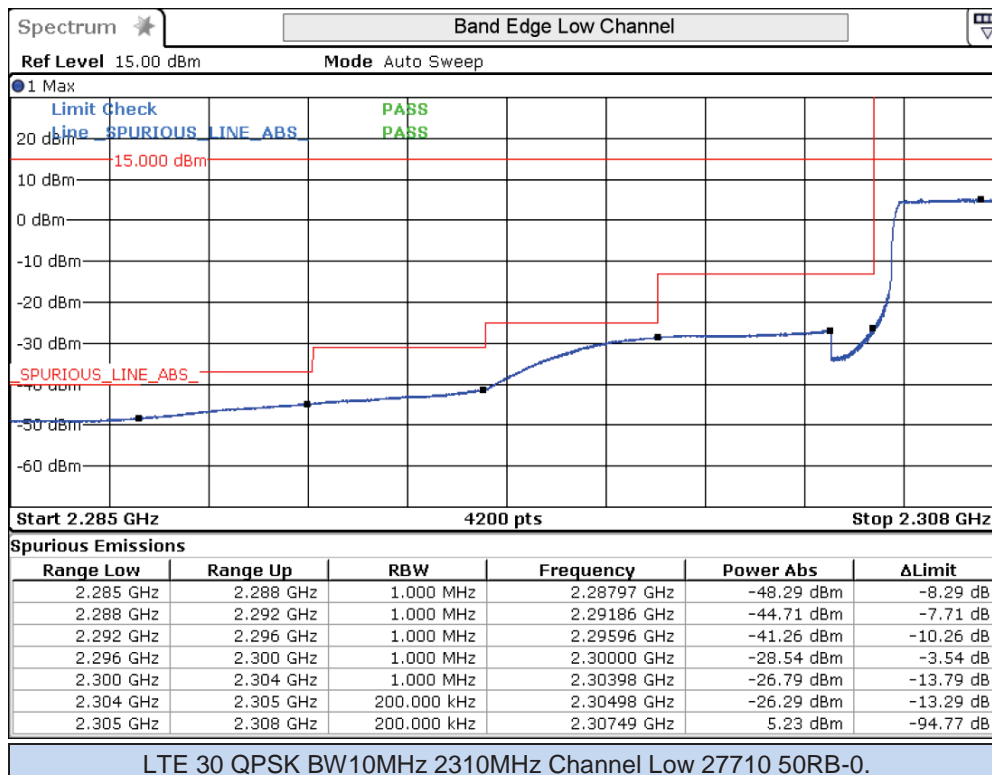
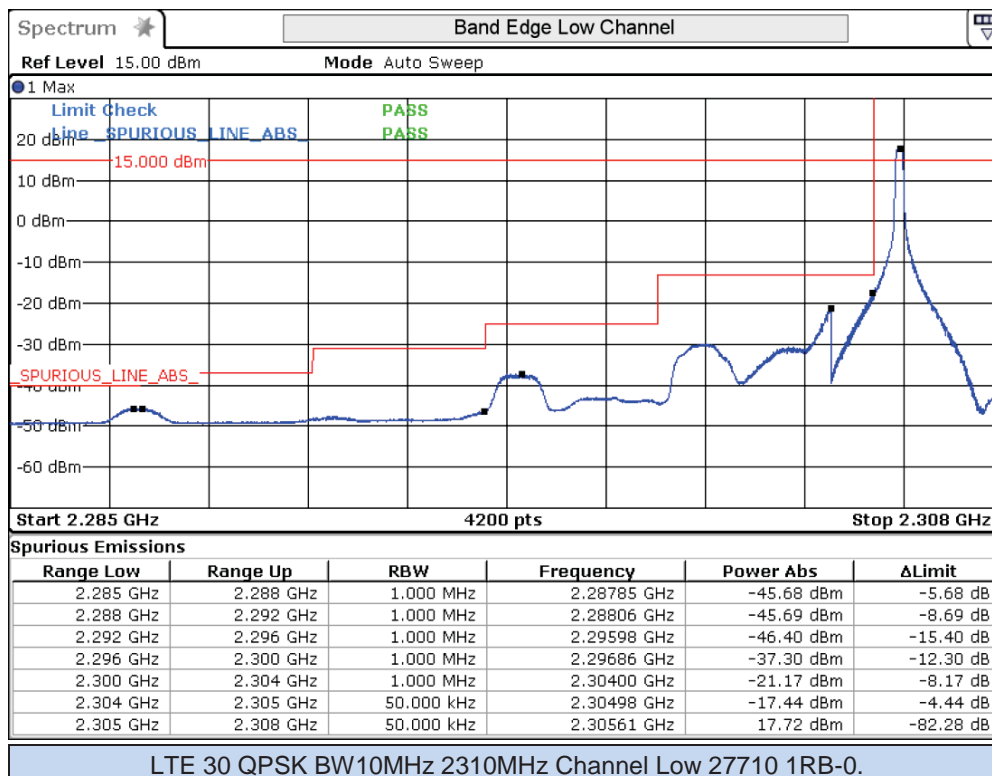
Band-edge emission screenshot results

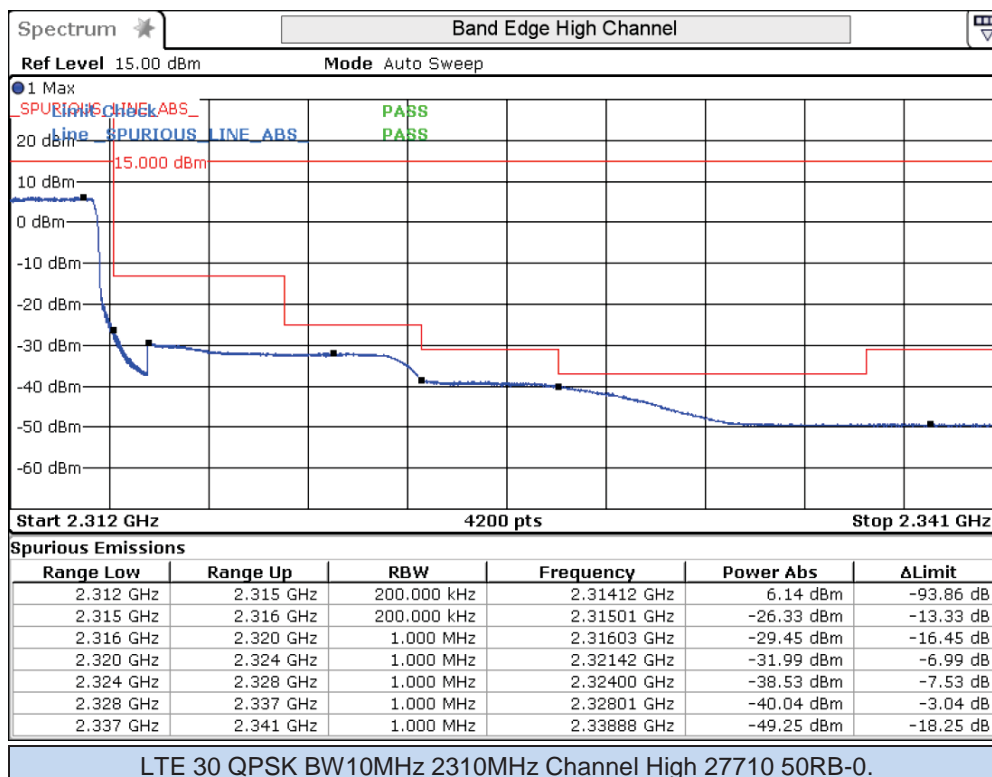
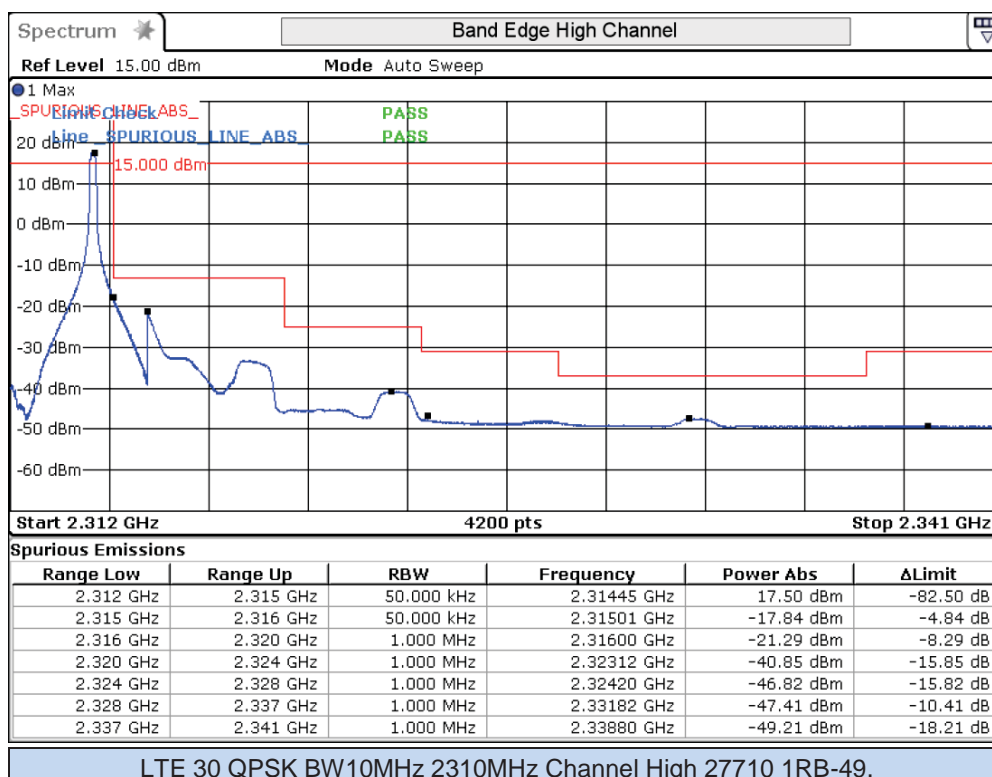


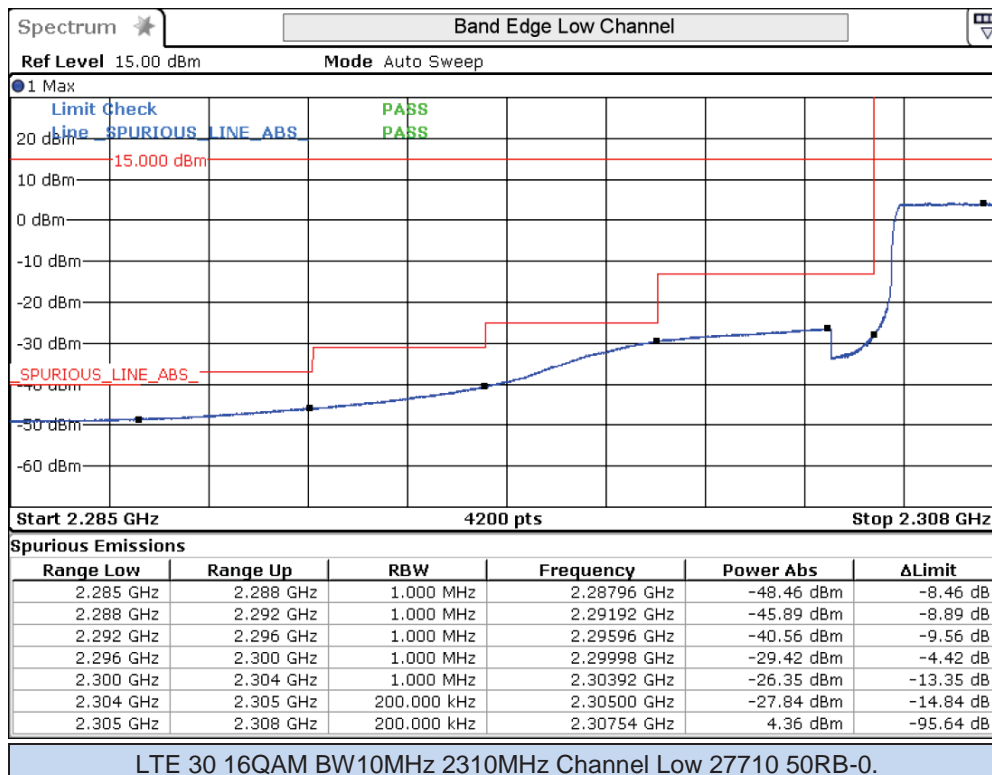
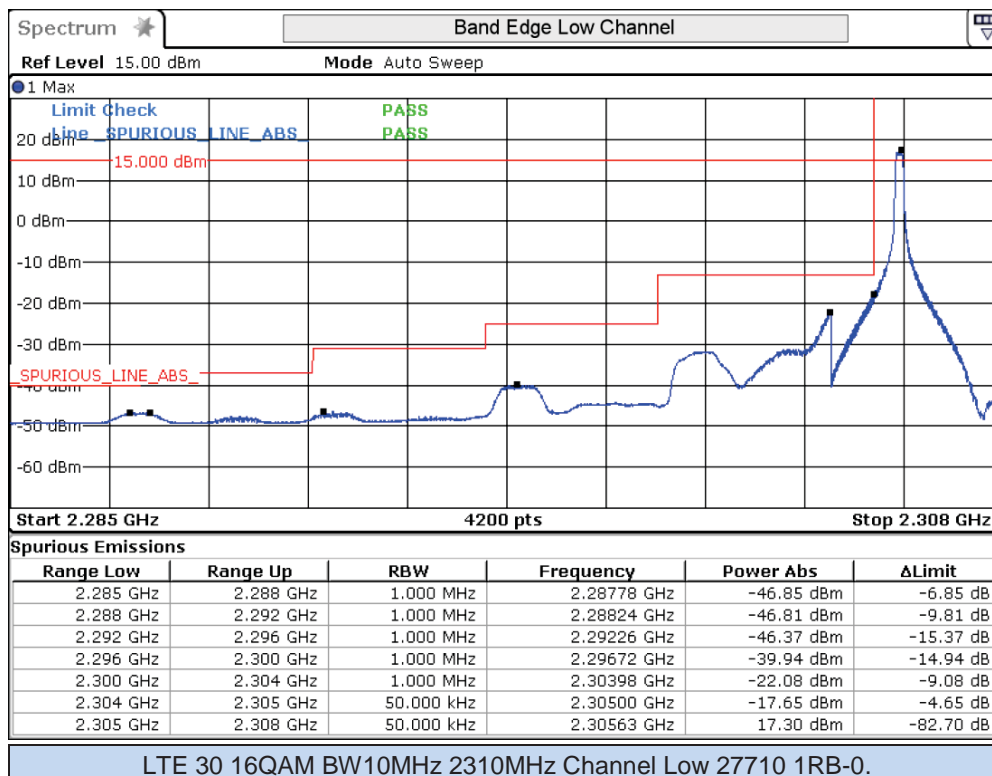


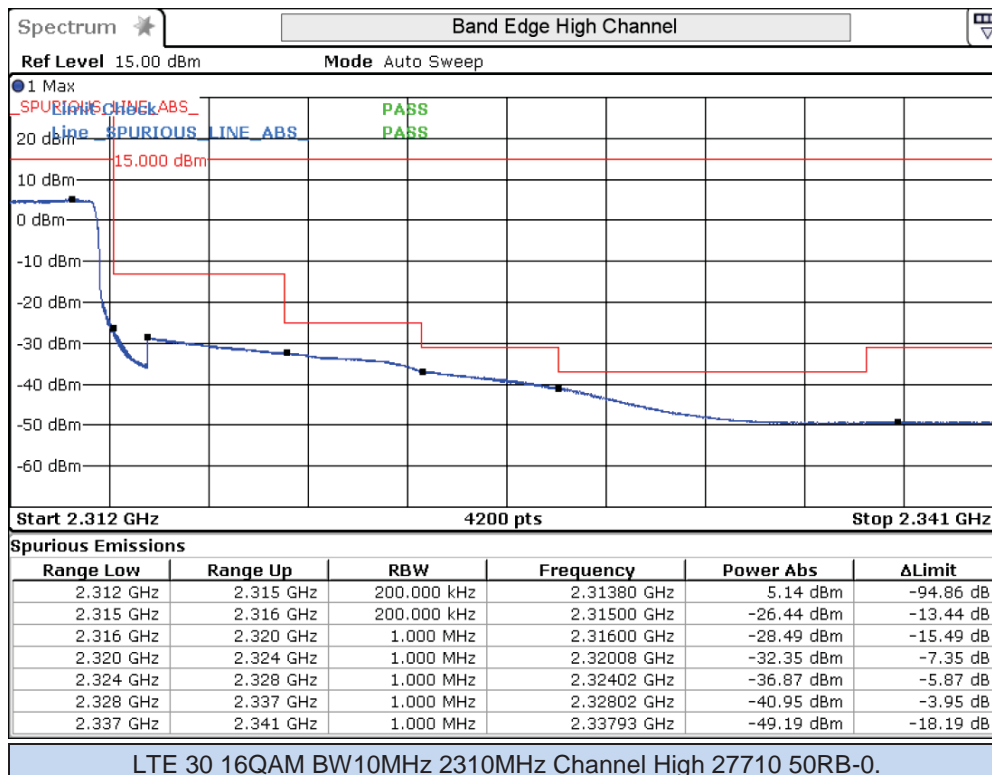
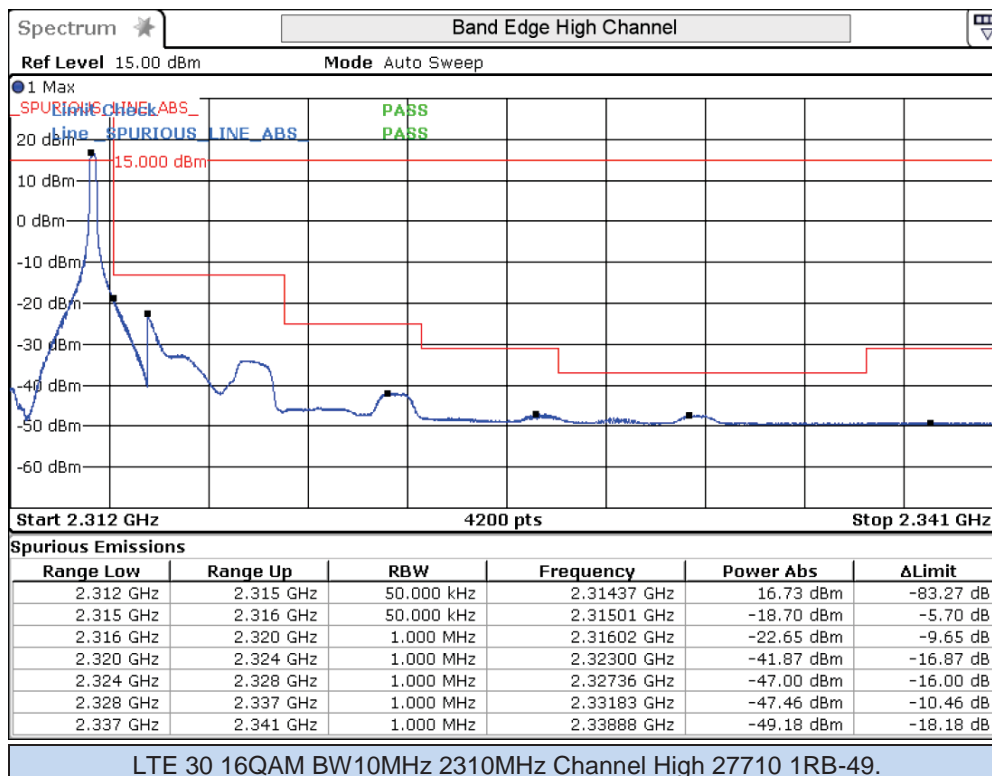


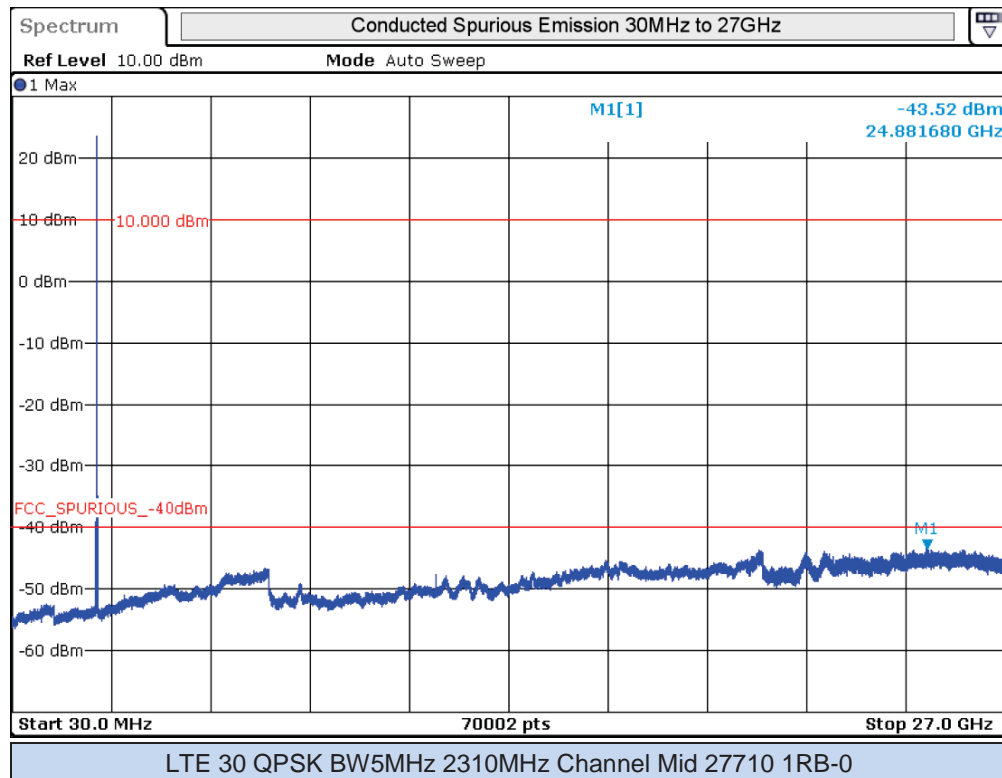
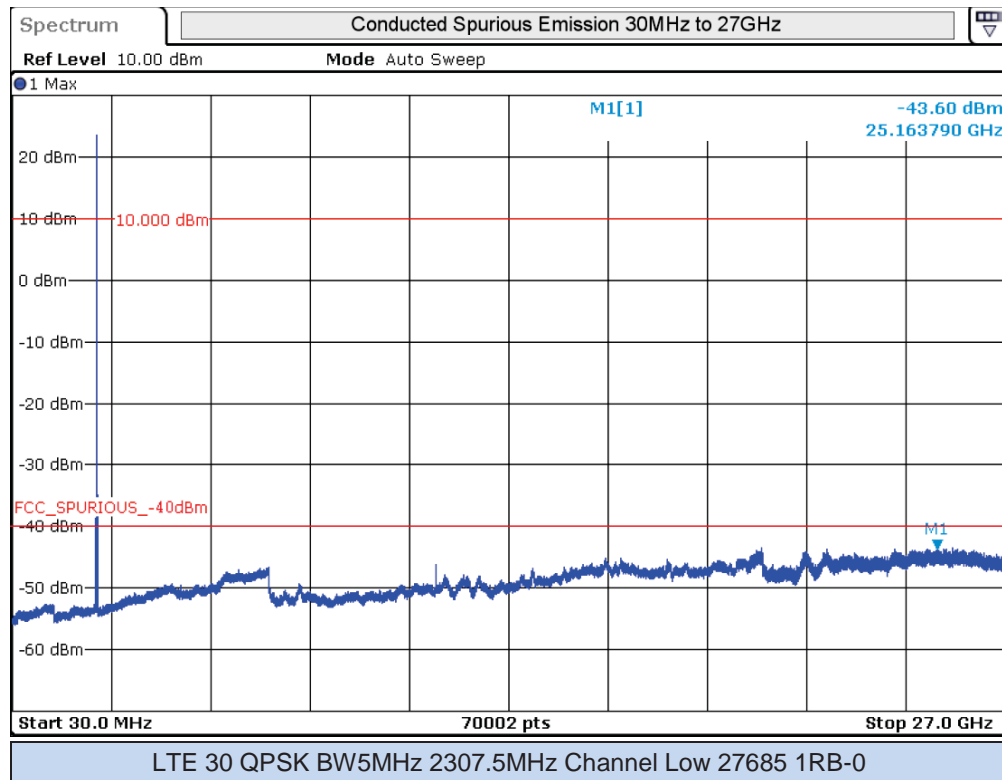


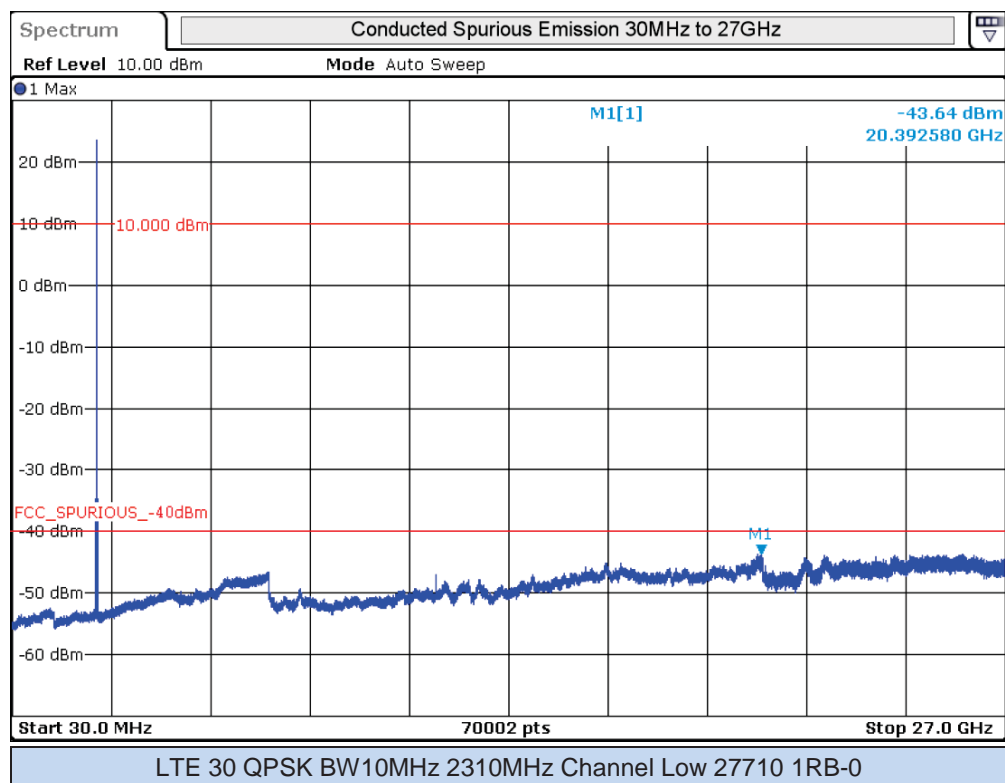
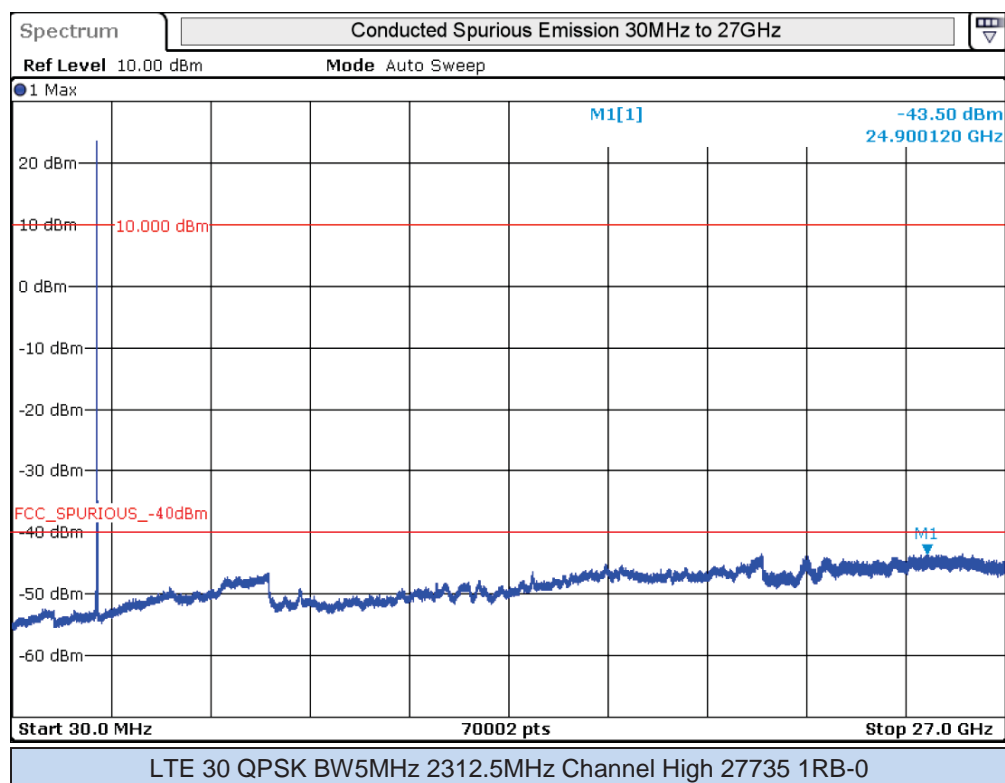


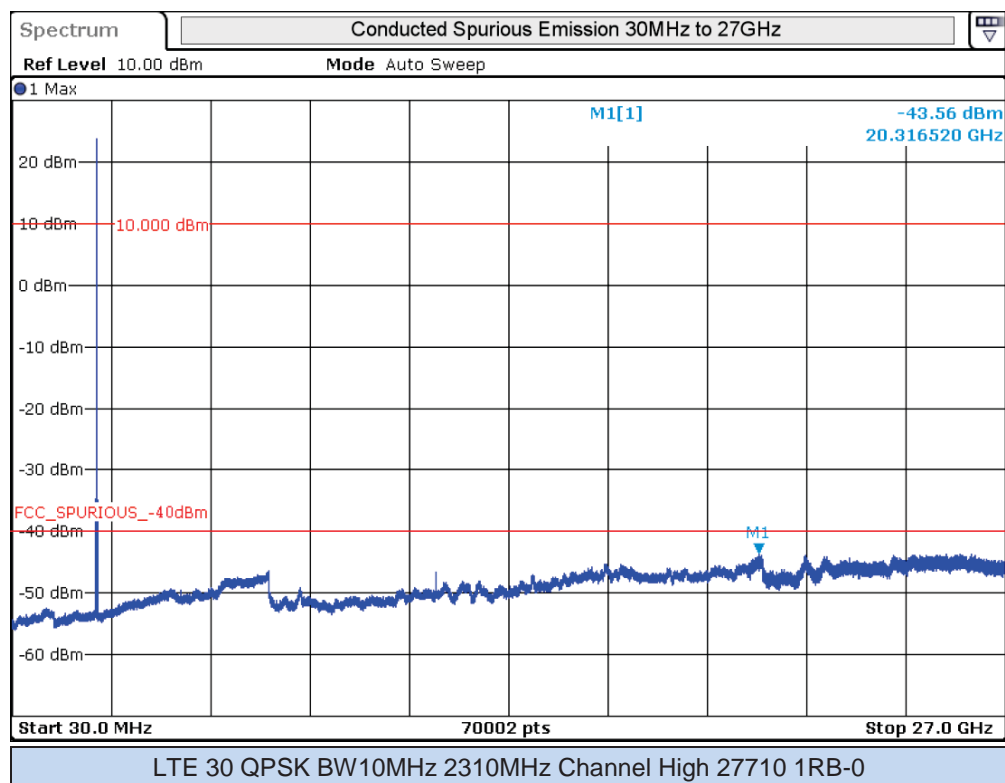
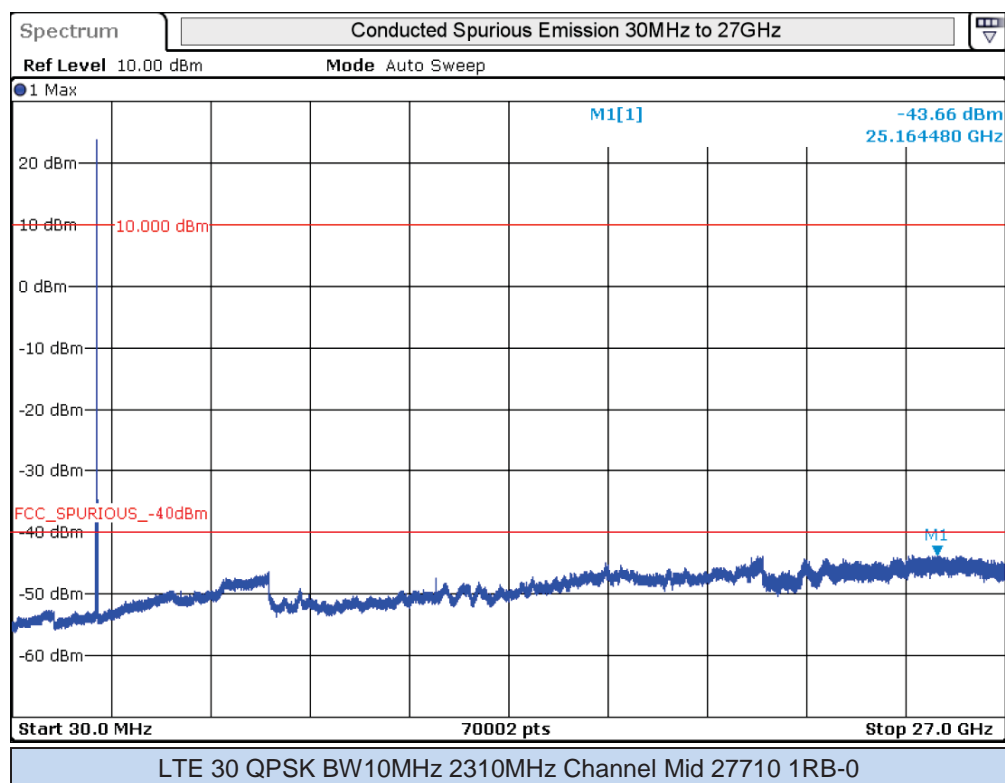






Conducted spurious emission screenshot results





B.2.5 Radiated spurious emission

Standard references

BAND	FCC part	RSS part	Limits
LTE 30	27.53 (a), 2.1051	195-ch.5.6	<p>The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P):</p> <p>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</p> <p>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</p> <p>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.</p>

Test procedure

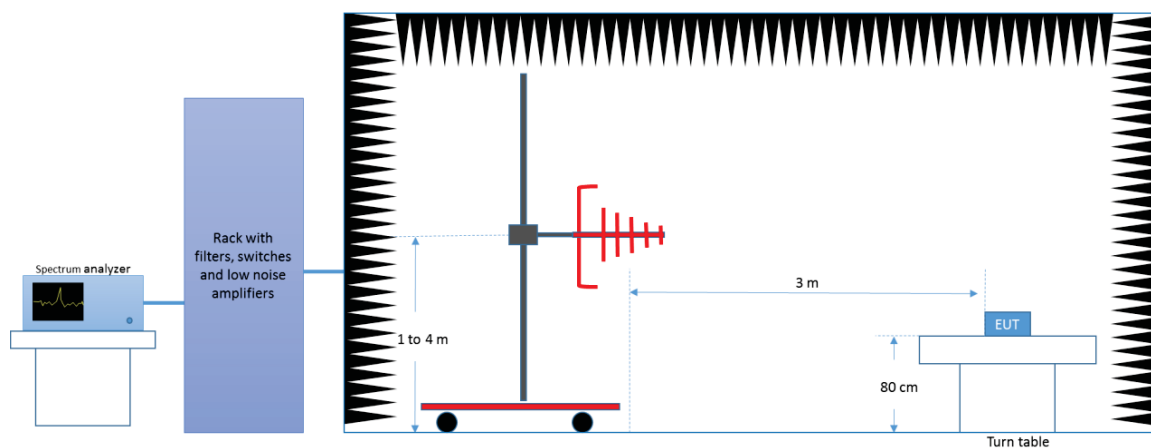
The setup below was used to measure the radiated spurious emissions. The test was done following the FCC OET KDB 971168 D01 v02r02 § 7.

Depending of the frequency range and bands being tested, different antennas and filters were used.

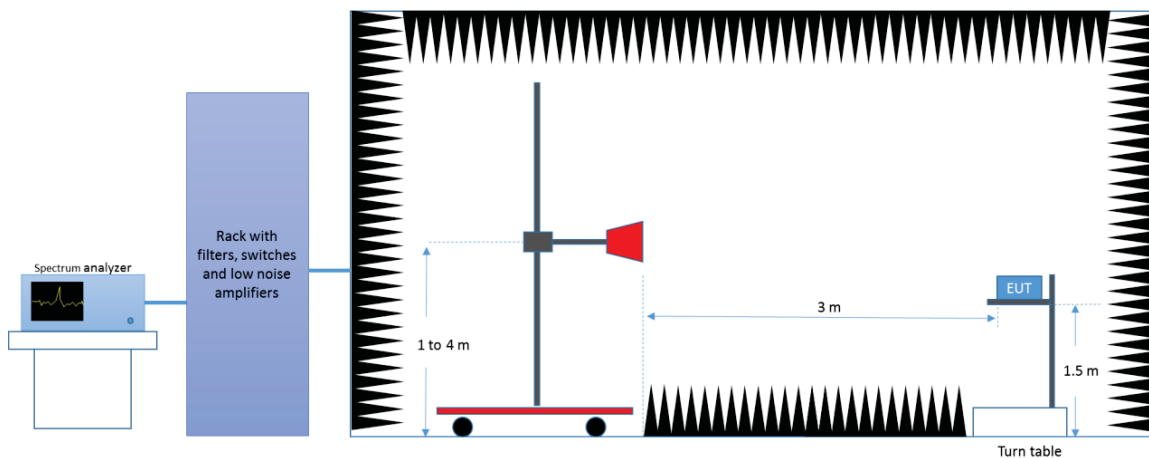
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.

The radiated spurious emission was measured on the worst case configuration selected from the chapter B.2.1 and on the low, middle and high channel.

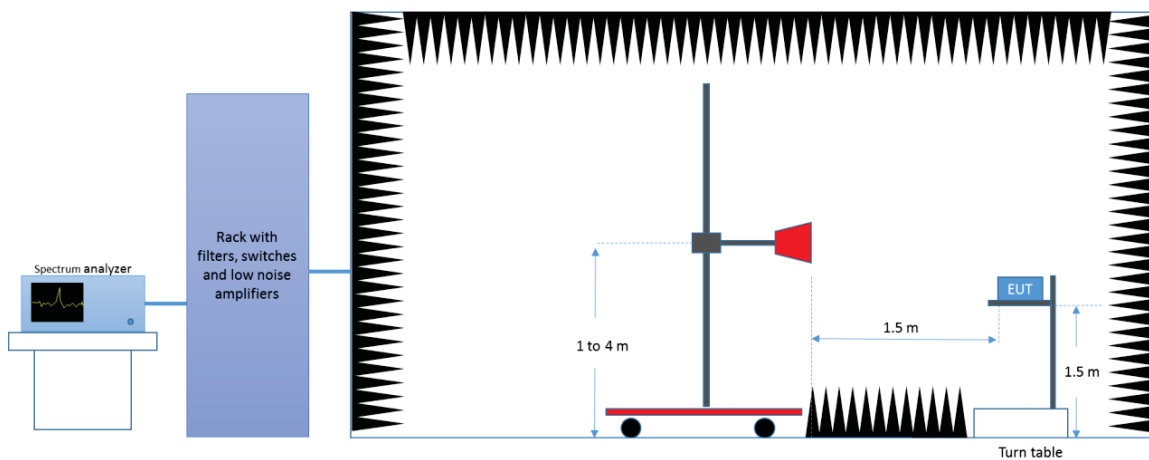
Radiated Setup < 1GHz



Radiated Setup Frequency range 1 GHz to 18 GHz



Radiated Setup > 18GHz



Test results LTE Band 30
Radiated measurement from 30MHz to 26.5GHz

LTE Band 30 QPSK 1RB Low channel 39675

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-61.8	---	150.0	H	45.0	-100.5	-40
32.61	---	-63.1	150.0	H	45.0	-100.5	-40
2857.8	-42.0	---	150.0	H	0.0	-57.6	-40
2857.8	---	-43.5	150.0	H	0.0	-57.6	-40
9241.0	---	-50.5	150.0	H	15.0	-98.3	-40
9241.03	-48.6	---	150.0	H	15.0	-98.3	-40
18088.9	---	-49.0	150.0	V	65.0	-90.7	-40
18112.7	-43.3	---	150.0	H	341.0	-90.8	-40

LTE Band 30 QPSK 1RB Mid channel 40620

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-61.3	---	150.0	H	45.0	-100.5	-40
32.6	---	-63.2	150.0	H	45.0	-100.5	-40
2857.3	-44.5	---	150.0	H	0.0	-57.6	-40
2857.3	---	-42.4	150.0	H	0.0	-57.6	-40
9241.3	---	-50.5	150.0	H	15.0	-98.3	-40
9241.3	-48.6	---	150.0	H	15.0	-98.3	-40
18088.9	---	-49.6	150.0	V	65.0	-90.7	-40
18112.9	-43.5	---	150.0	H	341.0	-90.8	-40

LTE Band 30 QPSK 1RB High channel 41565

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-61.8	---	150.0	H	45.0	-100.5	-40
32.6	---	-63.1	150.0	H	45.0	-100.5	-40
2857.2	-42.6	---	150.0	H	0.0	-57.6	-40
2857.2	---	-44.8	150.0	H	0.0	-57.6	-40
9241.0	---	-51.2	150.0	H	15.0	-98.3	-40
9241.0	-49.1	---	150.0	H	15.0	-98.3	-40
18112.3	---	-47.9	150.0	V	65.0	-90.7	-40
18112.3	-43.8	---	150.0	H	341.0	-90.8	-40

B.2.6 Frequency stability over voltage and temperature variations

Standard references

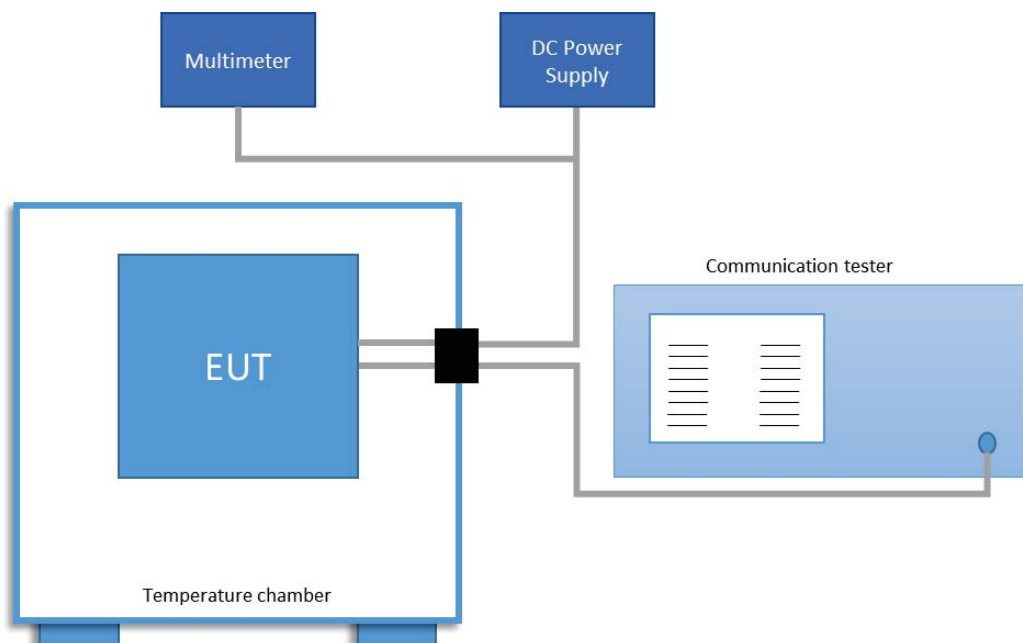
BAND	FCC part	RSS part	Comment
LTE 30	27.54, 2.1055	195-ch.5.6	<p>The frequency stability shall be measured with variation of ambient temperature from -30° to $+50^{\circ}$ centigrade.</p> <p>Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range.</p> <p>The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.</p> <p>The frequency stability shall be measured with variation of primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.</p>

Test procedure

The EUT is placed inside a temperature chamber and supplied by an external power supply. The supply voltage is monitored with the multimeter.

For the transmission modes tested, the device was put into operation by using an R&S CMW 500 as base station simulator, the output power of the device was set to transmit at maximum power.

The temperature is varied from $+50^{\circ}\text{C}$ to -30°C by 10°C increment. For each temperature increment the frequency error is measured. For voltage variation test the temperature was set to 25°C , the frequency error was measured for voltage set at 85% and 115% of nominal voltage.



Results tables of tests over temperatures
FDD Band 30, channel frequency 2310 MHz

MODULATION QPSK (10MHz, RB 50)

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-23.75	-0.010281385	-0.000001028
+40	-16.78	-0.007264069	-0.000000726
+30	-28.75	-0.012445887	-0.000001245
+20	-20.13	-0.008714286	-0.000000871
+10	-26.01	-0.01125974	-0.000001126
0	-24.49	-0.010601732	-0.000001060
-10	-22.13	-0.009580087	-0.000000958
-20	-20.24	-0.008761905	-0.000000876
-30	-23.73	-0.010272727	-0.000001027

FDD Band 30, channel frequency 2310 MHz

MODULATION 16QAM (10MHz, RB 50)

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-20.77	-0.008991342	-0.000000899
+40	-20.46	-0.008857143	-0.000000886
+30	-22	-0.00952381	-0.000000952
+20	-21.36	-0.009246753	-0.000000925
+10	-19.38	-0.00838961	-0.000000839
0	-17.56	-0.007601732	-0.000000760
-10	-23.11	-0.010004329	-0.000001000
-20	-19.32	-0.008363636	-0.000000836
-30	-22.67	-0.009813853	-0.000000981

Results tables of tests over voltages**FDD Band 30, channel frequency 2310 MHz**

MODULATION QPSK (10MHz, RB 50)

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.8	10.87	0.004192056	0.000000419
Vmin	2.8	-21.5	-0.009307359	-0.000000931

FDD Band 30, channel frequency 2310 MHz

MODULATION 16QAM (10MHz, RB 50)

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.8	-24.43	-0.010575758	-0.000001058
Vmin	2.8	-23.74	-0.010277056	-0.000001028

Annex C. Spot Check

C.1 Radiated spurious emission

Test results GSM850

Radiated measurement from 30MHz to 18GHz

GSM850 GPRS/GMSK Mid channel 190

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
623.4	-37.2	---	150.0	H	257.0	-64.9	-13
625.5	---	-47.1	150.0	H	16.0	-64.5	-13
6321.0	-42.0	---	150.0	V	144.0	-91.5	-13
6313.0	---	-54.0	150.0	V	321.0	-91.5	-13
17983.5	-36.5	---	150.0	H	0.0	-83.5	-13
17999.0	---	-48.1	150.0	H	318.0	-83.1	-13

GSM850 EDGE/8PSK Mid channel 190

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
624.9	---	-48.2	150.0	H	90.0	-64.5	-13
625.5	-35.5	---	150.0	H	255.0	-64.5	-13
6321.0	-43.0	---	150.0	V	144.0	-91.5	-13
6313.0	---	-55.0	150.0	V	321.0	-91.5	-13
17987.4	-35.0	---	150.0	H	62.0	-83.4	-13
17999.0	---	-47.1	150.0	H	159.0	-83.1	-13

Test results GSM1900

Radiated measurement from 30MHz to 26GHz

GSM1900 GPRS/GMSK Mid channel 661

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
146.5	---	-51.1	100.0	V	164.0	-109.8	-13
146.6	-46.6	---	100.0	V	122.0	-109.9	-13
2995.0	---	-51.6	150.0	H	4.0	-57.1	-13
2996.0	-39.2	---	150.0	H	179.0	-57.1	-13
17995.1	-36.8	---	150.0	H	43.0	-83.2	-13
17999.0	---	-48.0	150.0	H	62.0	-83.1	-13
18089.5	-42.2	---	150.0	H	261.0	-90.7	-13
18094.2	---	-53.8	150.0	H	38.0	-90.7	-13

GSM1900 EDGE/8PSK Mid channel 661

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
858.563830	-46.5	---	100.0	H	202.0	-96.6	-13
858.617021	---	-52.5	100.0	H	202.0	-96.6	-13
2995.000000	---	-51.6	150.0	H	4.0	-57.1	-13
2996.000000	-39.2	---	150.0	H	179.0	-57.1	-13
17999.034483	-35.9	---	150.0	H	198.0	-83.1	-13
17999.034483	---	-48.1	150.0	H	198.0	-83.1	-13
18089.523810	-42.2	---	150.0	H	261.0	-90.7	-13
18094.285714	---	-53.8	150.0	H	38.0	-90.7	-13

Test results WCDMA 2
Radiated measurement from 30MHz to 26.5GHz

WCDMA 2 RMC 12.2Kbps Mid channel 9400

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-63.4	---	150.0	H	315.0	-100.5	-13
32.6	---	-65.1	150.0	H	315.0	-100.5	-13
2951.8	-44.2	---	150.0	H	135.0	-57.2	-13
2951.8	---	-45.3	150.0	H	135.0	-57.2	-13
17991.3	-37.7	---	150.0	H	174.0	-83.3	-13
17991.3	---	-44.9	150.0	H	226.0	-83.2	-13
18064.2	---	-48.5	150.0	H	12.0	-90.6	-13
18064.2	-43.1	---	150.0	V	199.0	-90.7	-13

Test results WCDMA 4
Radiated measurement from 30MHz to 26.5GHz

WCDMA 4 RMC 12.2Kbps Mid channel 1413

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-65.1	---	150.0	H	315.0	-100.5	-13
32.6	---	-66.7	150.0	H	315.0	-100.5	-13
2821.8	-42.5	---	150.0	H	0.0	-57.8	-13
2821.8	---	-45.4	150.0	H	0.0	-57.8	-13
17997.1	---	-45.5	150.0	H	237.0	-83.2	-13
17997.1	-37.7	---	150.0	H	237.0	-83.2	-13
18064.2	---	-49.1	150.0	H	12.0	-90.6	-13
18064.2	-42.3	---	150.0	V	199.0	-90.7	-13

Test results WCDMA 5

Radiated measurement from 30MHz to 18GHz

WCDMA 5 RMC 12.2Kbps Mid channel 4180

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
813.8	-40.7	---	150.0	H	225.0	-67.6	-13
813.8	---	-41.1	150.0	H	225.0	-67.6	-13
6304.4	-44.5	---	150.0	V	0.0	-91.5	-13
6304.4	---	-50.9	150.0	V	270.0	-91.5	-13
17994.2	---	-45.5	150.0	H	248.0	-83.2	-13
17994.2	-38.8	---	150.0	H	234.0	-83.2	-13

Test results LTE Band 2

Radiated measurement from 30MHz to 26.5GHz

LTE Band 2 QPSK 1RB Mid channel 18900

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-63.1	---	150.0	H	45.0	-100.5	-13
32.6	---	-64.4	150.0	H	45.0	-100.5	-13
2970.0	-43.1	---	150.0	H	270.0	-57.2	-13
2970.0	---	-45.0	150.0	H	270.0	-57.2	-13
17991.3	-38.9	---	150.0	H	310.0	-83.3	-13
17999.0	---	-43.6	150.0	H	140.0	-83.1	-13
18110.6	---	-49.5	150.0	V	344.0	-90.8	-13
18116.6	-43.0	---	150.0	H	128.0	-90.8	-13
18110.697674	---	-49.5	150.0	V	344.0	-90.8	-13
18116.627907	-43.0	---	150.0	H	128.0	-90.8	-13

Test results LTE Band 4

Radiated measurement from 30MHz to 26.5GHz

LTE Band 4 QPSK 1RB Mid channel 20175

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
628.7	-68.2	---	150.0	H	225.0	-95.4	-13
628.7	---	-69.1	150.0	H	225.0	-95.4	-13
2131.8	-42.5	---	150.0	V	315.0	-57.7	-13
2131.8	---	-43.7	150.0	V	315.0	-57.7	-13
17991.3	-38.9	---	150.0	H	310.0	-83.3	-13
17999.0	---	-43.6	150.0	H	140.0	-83.1	-13
17991.3	-39.9	---	150.0	H	310.0	-83.3	-13
17999.0	---	-42.6	150.0	H	140.0	-83.1	-13

Test results LTE Band 5.

Radiated measurement from 30MHz to 18GHz

LTE Band 5 QPSK 1RB Mid channel 20525

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
629.0	-49.3	---	150.0	H	0.0	-65.1	-13
629.0	---	-49.6	150.0	H	0.0	-65.1	-13
6145.4	-43.2	---	150.0	V	225.0	-91.9	-13
6145.4	---	-47.6	150.0	V	225.0	-91.9	-13
17940.0	-37.9	---	150.0	H	34.0	-84.4	-13
17940.0	---	-44.0	150.0	H	96.0	-84.1	-13

Test results LTE Band 7

Radiated measurement from 30MHz to 26.5GHz

LTE Band 7 QPSK 1RB Mid channel 21100

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.61	-63.1	---	150.0	H	45.0	-100.5	-25
32.61	---	-64.2	150.0	H	45.0	-100.5	-25
1979.0	-34.7	---	150.0	V	180.0	-58.2	-25
1979.0	---	-37.2	150.0	V	180.0	-58.2	-25
7605.4	---	-46.1	150.0	V	88.0	-98.6	-25
7605.4	-43.8	---	150.0	V	88.0	-98.6	-25
10141.0	---	-43.8	150.0	V	358.0	-98.4	-25
10141.0	-40.3	---	150.0	V	358.0	-98.4	-25
18116.6	-43.2	---	150.0	V	53.0	-90.8	-25
18120.5	---	-48.9	150.0	H	22.0	-90.8	-25
27725.9	-49.0	---	150.0	V	80.0	-84.7	-25
27725.9	---	-55.3	150.0	H	0.0	-84.6	-25

Test results LTE Band 12

Radiated measurement from 30MHz to 18GHz

LTE Band 12 QPSK 1RB Mid channel 23095

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
851.6	-48.3	---	150.0	H	135.0	-65.7	-13
851.6	---	-48.1	150.0	H	135.0	-65.7	-13
6367.2	-44.2	---	150.0	V	315.0	-91.5	-13
6367.2	---	-48.7	150.0	V	315.0	-91.5	-13
17970.0	-37.8	---	150.0	H	39.0	-83.7	-13
17970.0	---	-42.7	150.0	H	324.0	-83.1	-13

Test results LTE Band 13

Radiated measurement from 30MHz to 18GHz

LTE Band 13 QPSK 1RB Mid channel 23230

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
851.5	-47.5	---	150.0	H	135.0	-65.7	-13
851.5	---	-46.9	150.0	H	135.0	-65.7	-13
5939.0	-42.1	---	150.0	H	135.0	-93.1	-13
5939.0	---	-44.7	150.0	H	135.0	-93.1	-13
17970.0	-36.6	---	150.0	H	39.0	-83.7	-13
17970.0	---	-42.6	150.0	H	324.0	-83.1	-13

Test results LTE Band 17

Radiated measurement from 30MHz to 18GHz

LTE Band 17 QPSK 1RB Mid channel 23790

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
828.6	-48.3	---	150.0	H	0.0	-66.2	-13
828.6	---	-49.7	150.0	H	0.0	-66.2	-13
6231.2	-44.5	---	150.0	V	315.0	-91.5	-13
6231.2	---	-48.2	150.0	V	315.0	-91.5	-13
17970.0	-37.7	---	150.0	H	39.0	-83.7	-13
17998.0	---	-43.5	150.0	H	324.0	-83.1	-13

Test results LTE Band 41

Radiated measurement from 30MHz to 27GHz

LTE Band 41 QPSK 1RB Mid channel 40620

Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.	Limit
MHz	dBm	dBm	cm		deg	dB	dBm
32.6	-64.8	---	150.0	H	315.0	-100.5	-25
32.6	---	-66.0	150.0	H	315.0	-100.5	-25
2011.8	-42.2	---	150.0	V	270.0	-57.9	-25
2011.8	---	-43.3	150.0	V	270.0	-57.9	-25
7779.9	-48.3	---	322.1	V	135.0	-99.0	-25
7779.9	---	-55.7	390.1	V	151.0	-99.0	-25
18086.9	---	-47.9	150.0	V	7.0	-90.7	-25
18086.9	-41.8	---	150.0	V	7.0	-90.7	-25
26978.4	-48.5	---	150.0	H	193.0	-83.2	-25
26978.4	---	-55.3	150.0	H	241.0	-83.1	-25