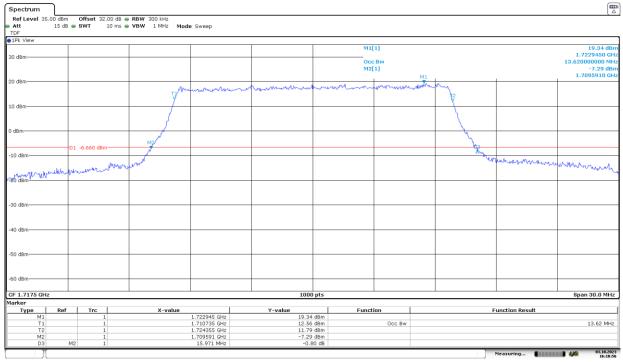


LTE Cat 1bis Band 66. BW=15 MHz. QPSK. RB Size All.

Low Channel:



Date: 3.0CT.2023 16:10:56

Middle Channel:

Ref Level 35. Att	00 dBm 15 dB 👄 :		8 - RBW 300 kHz 8 - VBW 1 MHz Mod	e Sweep								
TDF												
1Pk View												
							M1	[1]				19.07 dE
30 dBm						+	Occ M2	c Bw [1]				1.7421050 G 13.650000000 M -7.23 di
20 dBm					M1						1	1.7368520 G
20 dBill			TJ ~~~	muntullion	norman	when	Monton	monthere	unnully	2		
10 dBm			Y							[
			للمريد									
0 dBm			M2 New M			+				Muyer		
	D1	-6.930 dBm	and we have			-				A		-
-10 dBm	whenhall	^M LA. I. CONTINUM.								Jun	where metamonder	with with dur
-20 dBm												-
-30 dBm												
-40 dBm												
-50 dBm												
-60 dBm						+						
CF 1.745 GHz					10	100 pts						Span 30.0 MH
1arker	D-f 1	T	w	1	M		F	1			Function Result	
Type M1	Ref	1 Trc	X-value	1.742105 GHz	Y-value 19.	07 dBm	Funct	ion			runction Result	
Τ1		1		1.738145 GHz		14 dBm		Occ Bw				13.65 MH
T2		1		1.751795 GHz	12.	46 dBm						
M2 D3	M2	1		1.736852 GHz 16.297 MHz		23 dBm 0.17 dB						

Date: 3.0CT.2023 16:33:49



High Channel:

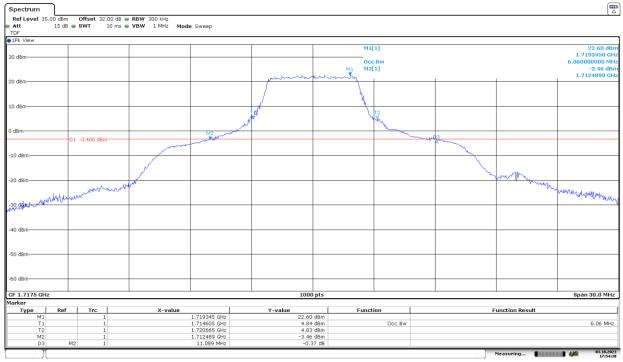
Spectrum														
Ref Level 35.00 d		Offset 32.00 dB 👄												
Att 15 TDF	dB 😑	SWT 10 ms 👄	VBW 1 MHz Mode	a Sweep										
1Pk View														
							M1[1]						18.45 dBm
30 dBm	-						Occ	B						27850 GHz 10000 MHz
							M2[-7.98 dBm
20 dBm						M1							1.764	15150 GHz
20 UBIII					Mr. Mummun	men	moneyed	. margaret du		~ 1				
			T.	and mental and a second		1			****	2				
10 dBm	_													
			/											
0 dBm	+		JT ⁴							<u> </u>				
			M2/"							103				
-10 dBm		-7.550 dBm	Ť							- A				
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-20 dBm	_													· 4
-30 dBm														
-40 dBm														
-50 dBm	-													
60 db														
-60 dBm														
CF 1.7725 GHz					1000) pts							Span (30.0 MHz
Marker														
	ef	Trc	X-value	1 330305 011-	Y-value	10	Functi	on			Function Re	sult		
M1 T1		1		1.772785 GHz 1.765705 GHz	18.45			Occ Bw					1	3.59 MHz
T2		1		1.779295 GHz	12.56	dBm								
M2 D3	M2	1		1.764515 GHz 15.939 MHz	-7.98	dBm 30 dB								
	.****	*		201707 Mile	0.0						Measuring		100	03.10.2023 16:43:25

Date: 3.0CT.2023 16:43:25



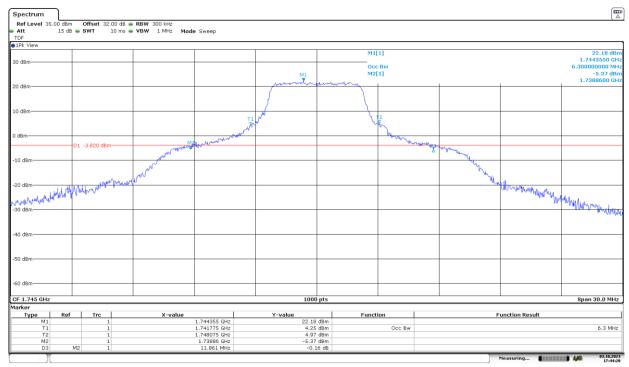
LTE Cat 1bis Band 66. BW=15 MHz. 16QAM. RB Size All.

Low Channel:



Date: 3.0CT.2023 17:54:39

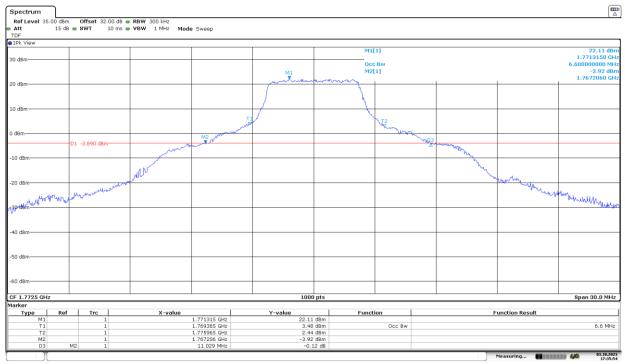
Middle Channel:



Date: 3.0CT.2023 17:44:20



High Channel:

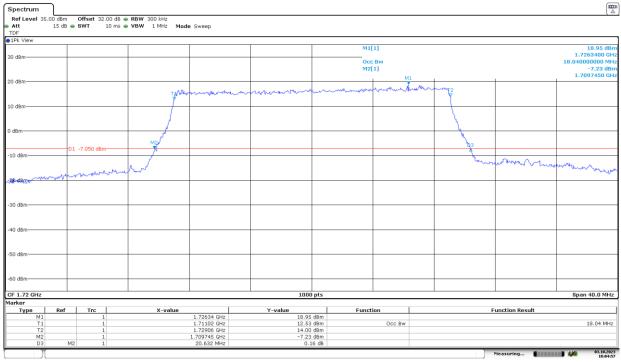


Date: 3.0CT.2023 17:35:54



LTE Cat 1bis Band 66. BW=20 MHz. QPSK. RB Size All.

Low Channel:



Date: 3.0CT.2023 18:04:57

Middle Channel:

Ref Level 35.	00 dBm 15 dB 👄		IB RBW 300 kHz									
Att TDF	12 GR 🖷	5w/I 10 n	ns 🖶 VBW 1 MHz Mod	в эмеер								
1Pk View												
30 dBm								c Bw				18.33 d 1.7461000 d 18.080000000 M
							M2	[1]				-8.16 d 1.7345290 d
20 dBm			The	mannen	umman all when when	months	hour	Jum mundown	winne	2		
10 dBm			7						1	Ź.		
to dom												
0 dBm			M2			1				63		
10 dBm	D1	-7.670 dBm	and the second s							À,		
menteent	mon	Law Anno								9 mar	Murranshan	motherestingen
-20 dBm												
30 dBm						<u> </u>						
40 dBm												
-50 dBm						<u> </u>						
-60 dBm						<u> </u>						
CF 1.745 GHz					100	0 pts		·				Span 40.0 Mi
larker Type	Ref	Trc	X-value	1	Y-value		Funct	tion			Function Result	
M1	Kei	1	v-Aging	1.7461 GHz	18.3	3 dBm	Funct				uncton Result	
T1 T2		1		1.73594 GHz 1.75402 GHz		7 dBm 5 dBm		Occ Bw				18.08 M
M2		1		1.734529 GHz		6 dBm						

Date: 3.0CT.2023 18:11:23



High Channel:

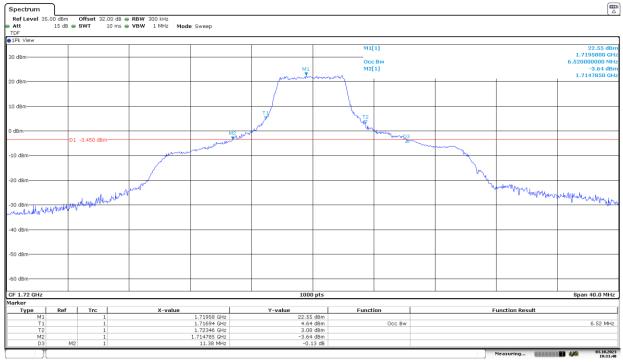
Spectrum	ר														
Ref Level 35.0 Att															
TDF	15 UB	- 3WI 10 ms	VBW 1 MHz Mode	a Sweep											
●1Pk View															
								M1[1]						17.76 dBm
30 dBm								Occ	Bw						72600 GHz 00000 MHz
								M2[-9.13 dBm
20 dBm										M1				1.75	96500 GHz
20 0811			71.		A .			montonon		A AL	when you				
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10 dBm															
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0 dBm			N								1				
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-10 dBm		D1 -8.240 dBm													
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-20 dBm															· ~ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-30 dBm															
-40 dBm															
-50 dBm							-								
-60 dBm															
-60 UBIII-															
CF 1.77 GHz						1000) pts							Span	40.0 MHz
Marker															
Type	Ref	Trc	X-value	1 77706 01-		Y-value	dData	Functi	on			Funct	ion Result		
M1 T1		1		1.77726 GHz 1.76102 GHz		17.76			Occ Bw	1					18.0 MHz
T2		1		1.77902 GHz		13.15	dBm								
M2 D3		1 M2 1		1.75965 GHz 20.685 MHz		-9.13	77 dB								
		in a l		201000 11112		0.1				1		Meas	uring	4,00	03.10.2023

Date: 3.0CT.2023 19:01:50



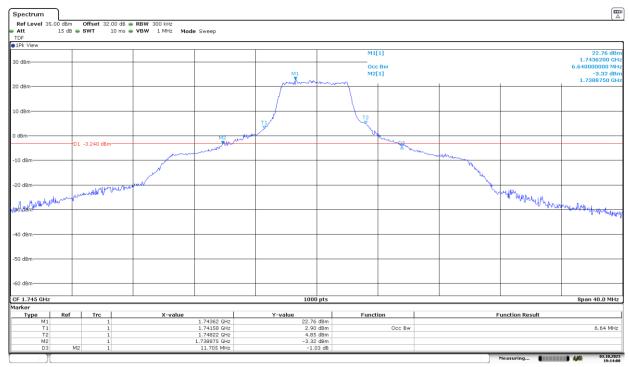
LTE Cat 1bis Band 66. BW=20 MHz. 16QAM. RB Size All.

Low Channel:



Date: 3.0CT.2023 19:31:40

Middle Channel:



Date: 3.0CT.2023 19:14:00



High Channel:

Spectrum	
Ref Level 35.00 dBm Offset 32.00 kHz Att 15 dB SWT 10 ms VBW 1 MHz Mode Sweep TDF TOF TOF TOF TOF TOF TOF	X
IDF 9 IPK View	
M1[1]	22.85 dBm
30 dBm Occ Bw M1 M2[1] 20 dBm	1.7712200 GHz 6.880000000 MHz -5.06 dBm 1.7640010 GHz
10 dBm	
01 -3.150 dBm	
-10 dem	
-20 dem-	Mon Matuke and a solution of the
Showadt .	a Breen Mar
-40 dBm	
-50 dBm	
-60 dam	
CF 1.77 GHz 1000 pts	Span 40.0 MHz
Marker Type Ref Trc X-value Y-value Function Function Result	
M1 1 1.77122 GHz 22.85 dBm	
T1 1 1.76589 GHz 2.43 dBm Occ Bw T2 1 1.77326 GHz 2.42 dBm MI M2 1 1.76400 GHz -5.66 dBm MI	6.88 MHz
D3 M2 1 11.406 MHz 1.53 dB Nessuring	03.10.2023

Date: 3.0CT.2023 19:07:45



Spurious Emissions at Antenna Terminals

Limits

1. LTE Cat 1bis Band 12.

* FCC §27.53 (g):

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

* RSS-130, 4.7:

4.7.1 General unwanted emissions limits:

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

4.7.2 Additional unwanted emissions limits:

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - i. 76 + 10 log10 p (watts), dB, for base and fixed equipment and
 - ii. 65 + 10 log10 p (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

2. LTE Cat 1bis Band 13.

* FCC §27.53 (c):

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;



(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

* RSS-130, 4.7:

4.7.1 General unwanted emissions limits:

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

4.7.2 Additional unwanted emissions limits:

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - i. 76 + 10 log10 p (watts), dB, for base and fixed equipment and
 - ii. 65 + 10 log10 p (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

3. LTE Cat 1bis Band 66.

* FCC §27.53 (h):

AWS emission limits:

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

(3) Measurement procedure.

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.



(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

* RSS-139, 5.6:

Unwanted emissions shall be measured in terms of average value.

Equipment shall have the TRP or conducted power (all antenna connectors), of unwanted emissions outside the frequency block or frequency block group not exceeding the limits shown in the next table:

Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤1 MHz	-13 dBm/(1% of OB)
>1 MHz	-13 dBm/MHz

Where OB is the occupied bandwith.

At Po transmitting power, the specified minimum attenuation becomes 43+10 log (Po), and the level in dBm relative to Po becomes:

At Po transmitting power, the specified minimum attenuation becomes 65+10 log (Po), and the level in dBm relative to Po becomes:

Po (dBm) – [65 + 10 log (Po in mW) - 30] = -35 dBm

Method

The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power divider.

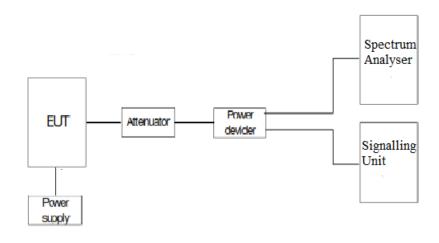
The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

The configuration of Resource Blocks and modulation which is the worst case for conducted power was used.

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



Test Setup





Results

LTE Cat 1bis Band 12: BW=10 MHz. QPSK. RB Size 1, RB Offset 24.

-	Low Channel:	No spurious frequencies at less than 20 dB below the limit.
-	Middle Channel:	No spurious frequencies at less than 20 dB below the limit.
-	High Channel:	No spurious frequencies at less than 20 dB below the limit

LTE Cat 1bis Band 13: BW=5 MHz. QPSK. RB Size 1. RB Offset 12.

- Low Channel: No spurious frequencies at less than 20 dB below the limit.
- High Channel: No spurious frequencies at less than 20 dB below the limit.

LTE Cat 1bis Band 66: BW=5 MHz. QPSK. RB Size 1. RB Offset 0.

- Low Channel: No spurious frequencies at less than 20 dB below the limit.
- Middle Channel: No spurious frequencies at less than 20 dB below the limit.
- High Channel: No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB): <±2.76

Verdict

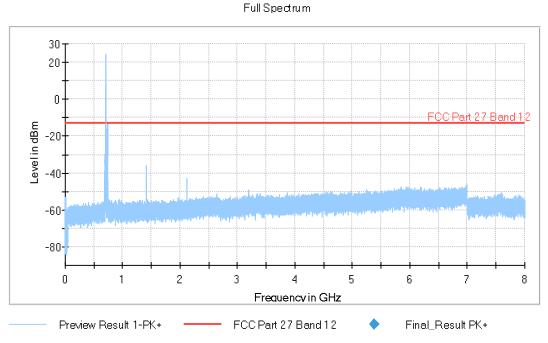
PASS



LTE Cat 1bis Band 12. BW=10 MHz. QPSK. RB Size 1. RB Offset 24.

Preamp
) dB
) dB
) dB
) dB
)))

Low Channel:

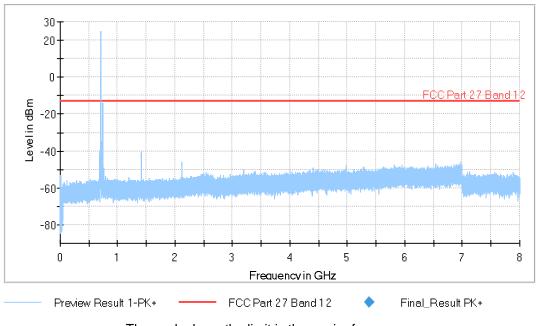


The peak above the limit is the carrier frequency.

The highest peak next to the carrier is the Downlink frequency.

Middle Channel:

Full Spectrum

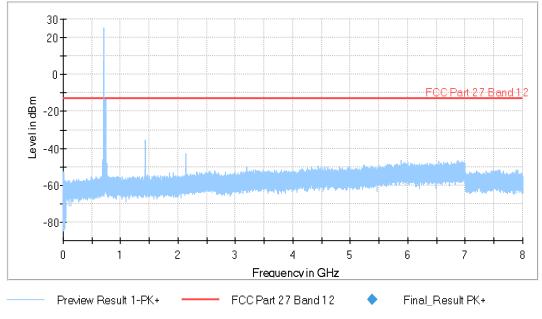


The peak above the limit is the carrier frequency. The highest peak next to the carrier is the Downlink frequency.



High Channel:

Full Spectrum



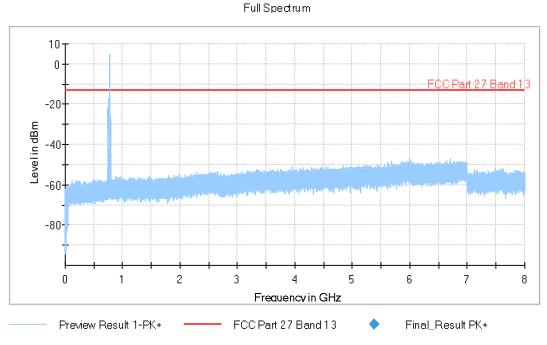
The peak above the limit is the carrier frequency. The highest peak next to the carrier is the Downlink frequency.



LTE Cat 1bis Band 13. BW=5 MHz. QPSK. RB Size 1. RB Offset 12.

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
9 kHz - 150 kHz	14,1 Hz	PK+	300 Hz	Coupled	0 dB
150 kHz - 30 MHz	932,812 Hz	PK+	10 kHz	Coupled	0 dB
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 10 GHz	281,25 kHz	PK+	1 MHz	Coupled	0 dB

Low Channel:



The peak above the limit is the carrier frequency.

									(
Spectrum Ref Level 0.00 dBr Att 0 d TDF	m Offset 25.00 dB 👄 F B SWT 30.8 ms 👄 V	RBW 6.25 kHz VBW 20 kHz Mode	Sweep						
●1Pk View					-	-			
-10 dBm									
-20 dBm									
-30 dBm									
-40 dBm	D1 -35.000 dBm								
-50 dBm									
-60 dBm									
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-80 dBm									
-90 dBm									
Start 763.0 MHz				3000	0 pts				Stop 775.0 MHz
								Measuring	

Date: 16.0CT.2023 20:45:28



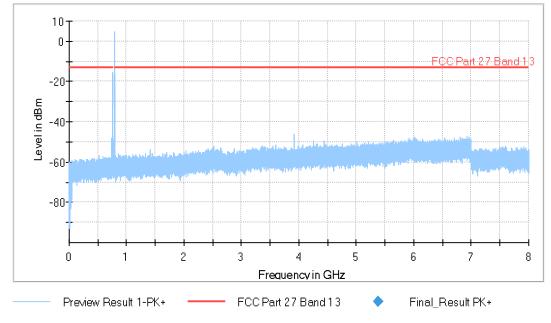
Spectrum Ref Level 0.00 dBm	Offset 26.00 dB 👄 F	RBW 6.25 kHz							
Att 0 dB TDF	SWT 30.8 ms 🖷 🕻	BW 20 kHz Mode	Sweep						
●1Pk View									
-10 dBm									
-20 dBm									
-20 UDIII									
20.40									
-30 dBm									
	-D1 -35.000 dBm								
-40 dBm									
-50 dBm									
-50 dbm									
-60 dBm									
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80 d8									
-80 dBm									
-90 dBm									
Start 793.0 MHz				3000) pts			Measuring	Stop 805.0 MHz

Date: 16.0CT.2023 20:48:42



High Channel:

Full Spectrum



The peak above the limit is the carrier frequency.

	Bm Offset 26.00 dB 👄 dB SWT 30.8 ms 👄		Sween						
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1Pk View									
10 dBm									
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20 dBm									
30 dBm									
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30 dBm									
o uolli									
90 dBm									
tart 763.0 MHz		·	·	3000	0 pts				Stop 775.0 M
								Measuring	

Date: 16.0CT.2023 20:54:13



									<u></u>
Spectrum									
	Offset 26.00 dB	RBW 6.25 kHz /BW 20 kHz Mode	Sween						
TDF									
●1Pk View									
-10 dBm									
-20 dBm									
-30 dBm									
	D1 -35.000 dBm								
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-80 dBm									
-90 dBm									
Start 793.0 MHz				3000) pts				Stop 805.0 MHz
								Measuring	

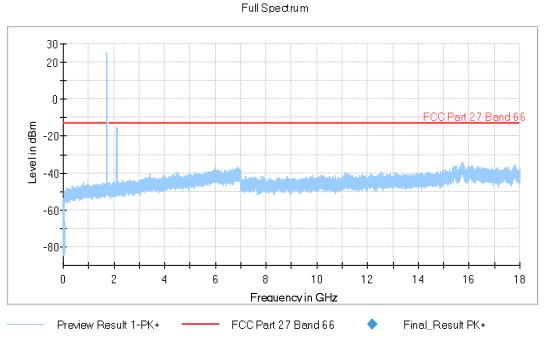
Date: 16.0CT.2023 20:53:08



LTE Cat 1bis Band 66. BW=5 MHz. QPSK. RB Size 1. RB Offset 0.

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
9 kHz - 150 kHz	14,1 Hz	PK+	300 Hz	Coupled	0 dB
150 kHz - 30 MHz	932,812 Hz	PK+	10 kHz	Coupled	0 dB
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 10 GHz	281,25 kHz	PK+	1 MHz	Coupled	0 dB

Low Channel:

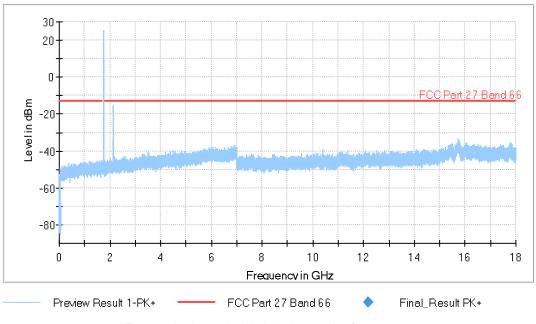


The peak above the limit is the carrier frequency.

The highest peak next to the carrier is the Downlink frequency.

Middle Channel:

Full Spectrum

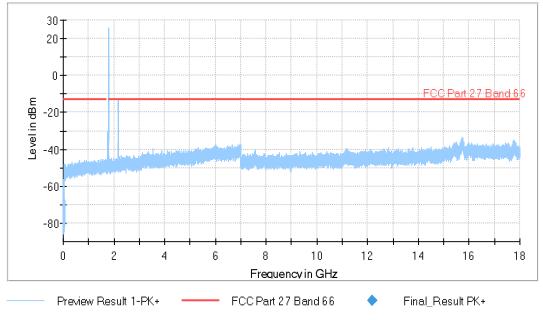


The peak above the limit is the carrier frequency. The highest peak next to the carrier is the Downlink frequency.



High Channel:

Full Spectrum



The peak above the limit is the carrier frequency. The highest peak next to the carrier is the Downlink frequency.



Spurious Emissions at Antenna Terminals at Block Edges

Limits

1. LTE Cat 1bis Bands 12, 17.

* FCC §27.53 (g):

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

* RSS-130, 4.7:

4.7.1 General unwanted emissions limits:

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

4.7.2 Additional unwanted emissions limits:

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - i. 76 + 10 log10 p (watts), dB, for base and fixed equipment and
 - ii. 65 + 10 log10 p (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

2. LTE Cat 1bis Band 13.

* FCC §27.53 (c):

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;



(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

* RSS-130, 4.7:

4.7.1 General unwanted emissions limits:

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

4.7.2 Additional unwanted emissions limits:

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - i. 76 + 10 log10 p (watts), dB, for base and fixed equipment and
 - ii. 65 + 10 log10 p (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

3. LTE Cat 1bis Bands 4, 66.

* FCC §27.53 (h):

AWS emission limits:

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

(3) Measurement procedure.

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.



(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

* RSS-139, 5.6:

Unwanted emissions shall be measured in terms of average value.

Equipment shall have the TRP or conducted power (all antenna connectors), of unwanted emissions outside the frequency block or frequency block group not exceeding the limits shown in the next table:

Offset from the edge of the frequency block or frequency block group	Unwanted emission limits	
≤1 MHz	-13 dBm/(1% of OB)	
>1 MHz	-13 dBm/MHz	

Where OB is the occupied bandwith.

At Po transmitting power, the specified minimum attenuation becomes 43+10 log (Po), and the level in dBm relative to Po becomes:

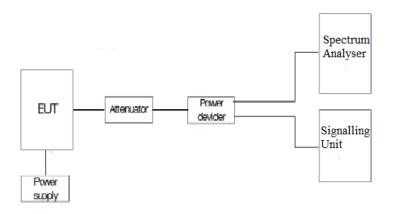
Po (dBm) - [43 + 10 log (Po in mW) - 30] = -13 dBm

Method

The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power splitter.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

Test Setup





Results

LTE Cat 1bis Band 4:

Note: Low Block Edge for LTE Cat 1bis Band 4 is the same as for Band 66.

Preliminary measurements determined QPSK, BW=5 MHz.

	RB=1.	RB=1.	RB=1.	RB=1.
LTE QPSK MODULATION:	Offset=Max.	Offset=Max.	Offset=Max.	Offset=Max.
	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Maximum measured level at <u>High Block</u> <u>Edge</u> at antenna port (dBm)	-16.74	-21.1	-26.37	-29.62

	RB = All.	RB = All.	RB = All.	RB = All.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Maximum measured level at <u>High</u> <u>Block Edge</u> at antenna port (dBm)	-17.28	-19.33	-21.48	-21.8

Measurement uncertainty: <±2.76 dB

Verdict

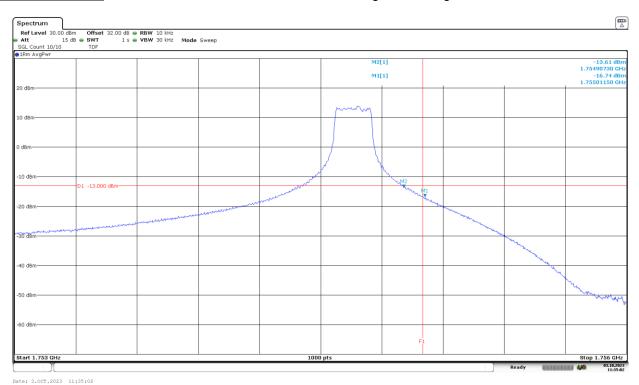
PASS



The plots below are for the worst case configuration specified before.

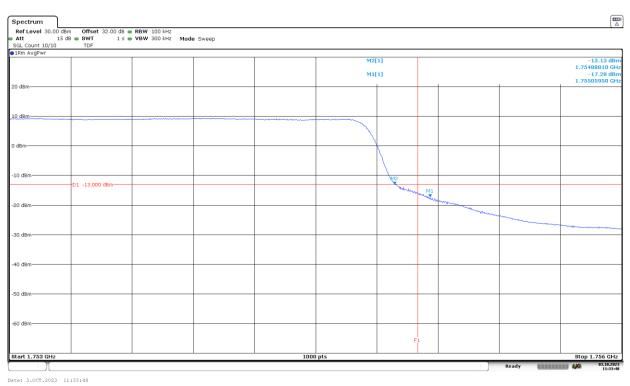
LTE Cat 1bis Band 4:

LTE Cat 1bis Band 4. BW=5 MHz. QPSK. RB=1. Offset=Max. High Block Edge:



The equipment transmits at the maximum output power

LTE Cat 1bis Band 4. BW=5 MHz. QPSK. RB=All. Offset=0. High Block Edge:



The equipment transmits at the maximum output power



LTE Cat 1bis Band 12:

Preliminary measurements determined QPSK, BW=5 MHz as the worst-case.

	RB=1.	RB=1.	
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.	
	BW = 5 MHz	BW = 10 MHz	
Maximum measured level at <u>Low Block</u> <u>Edge</u> at antenna port (dBm)	-13.02	-15.49	

	RB = All.	RB = All.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz
Maximum measured level at <u>Low Block</u> <u>Edge</u> at antenna port (dBm)	-19.61	-23.52

	RB=1.	RB=1.	
LTE QPSK MODULATION:	Offset=Max.	Offset=Max.	
	BW = 5 MHz	BW = 10 MHz	
Maximum measured level at <u>High Block</u> <u>Edge</u> at antenna port (dBm)	-13.01	-15.44	

	RB = All.	RB = All.	
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.	
	BW = 5 MHz	BW = 10 MHz	
Maximum measured level at <u>High</u> <u>Block Edge</u> at antenna port (dBm)	-21.05	-24.43	

Measurement uncertainty: <±2.76 dB

Verdict

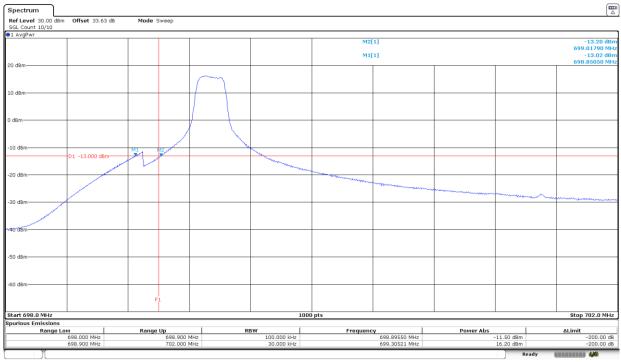
PASS



The plots below are for the worst case configuration specified before.

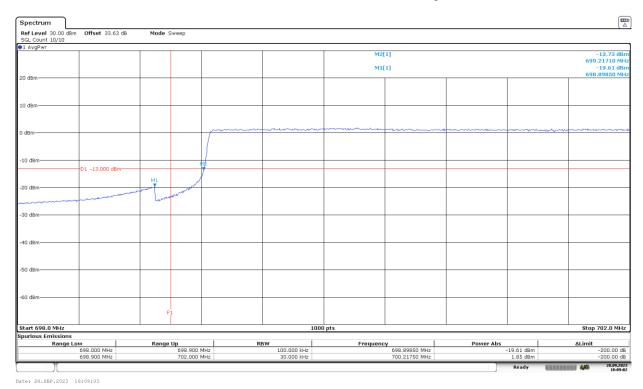
LTE Cat 1bis Band 12:

LTE Cat 1bis Band 12. BW=5 MHz. QPSK. RB=1. Offset=0. Low Block Edge:



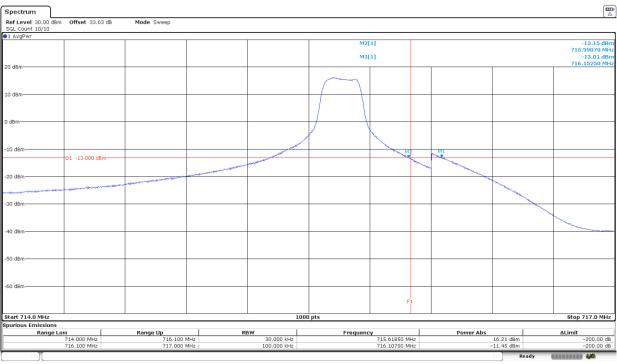
Date: 2.0CT.2023 13:12:44

LTE Cat 1bis Band 12. BW=5 MHz. QPSK. RB=All. Offset=0. Low Block Edge:



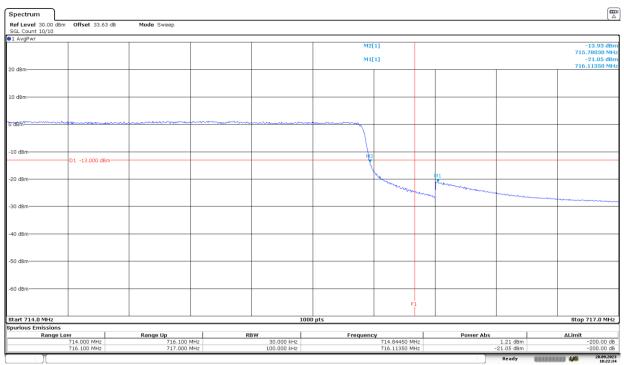


LTE Cat 1bis Band 12. BW=5 MHz. QPSK. RB=1. Offset=Max. High Block Edge:



Date: 2.0CT.2023 12:39:03

LTE Cat 1bis Band 12. BW=5 MHz. QPSK. RB=All. Offset=0. High Block Edge:



Date: 28.SEP.2023 18:22:34



LTE Cat 1bis Band 13:

	RB=1.	RB=1.
LTE QPSK:	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz
Maximum measured level at <u>Low Block</u> <u>Edge</u> at antenna port (dBm)	-15.66	-19.83

	RB = All.	RB = All.
LTE QPSK:	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz
Maximum measured level at <u>Low Block</u> <u>Edge</u> at antenna port (dBm)	-25.81	-31.92

	RB=1.	RB=1.	
LTE QPSK:	Offset=Max.	Offset=Max.	
	BW = 5 MHz	BW = 10 MHz	
Maximum measured level at <u>High Block</u> <u>Edge</u> at antenna port (dBm)	-15.17	-19.33	

	RB = All.	RB = All.	
LTE QPSK:	Offset = 0.	Offset = 0.	
	BW = 5 MHz	BW = 10 MHz	
Maximum measured level at <u>High</u> <u>Block Edge</u> at antenna port (dBm)	-26.16	-30.43	

Measurement uncertainty: <±2.76 dB

Verdict

PASS

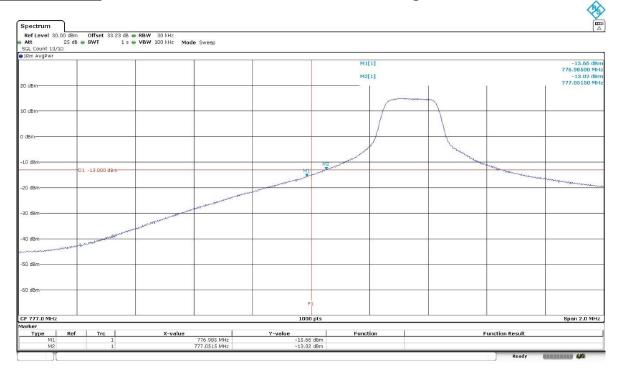
DEKRA Testing and Certification, S.A.U. Parque Tecnológico de Andalucía c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España C.I.F. A29507456



The plots below are for the worst case configuration specified before.

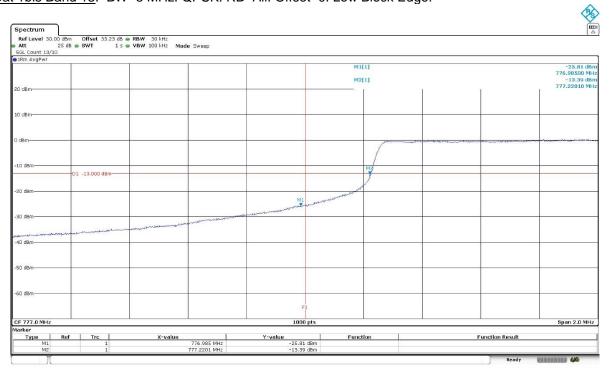
LTE Cat 1bis Band 13:

LTE Cat 1bis Band 13. BW=5 MHz. QPSK. RB=1. Offset=0. Low Block Edge:



The equipment transmits at the maximum output power

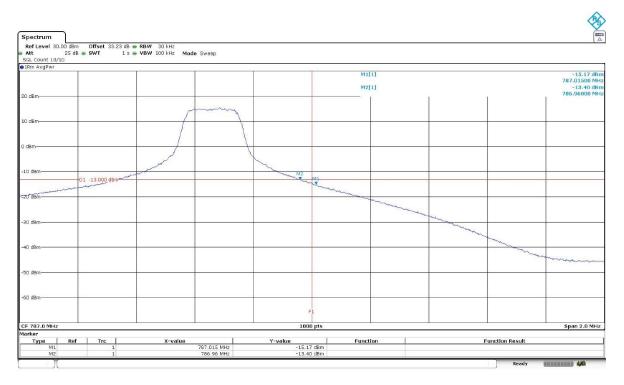
LTE Cat 1bis Band 13. BW=5 MHz. QPSK. RB=All. Offset=0. Low Block Edge:



The equipment transmits at the maximum output power

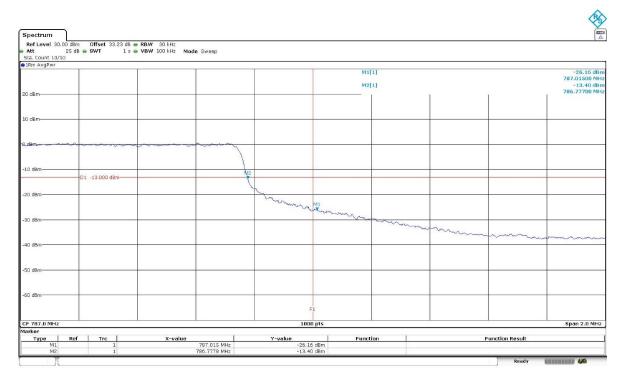


LTE Cat 1bis Band 13. BW=5 MHz. QPSK. RB=1. Offset=Max. High Block Edge:



The equipment transmits at the maximum output power

LTE Cat 1bis Band 13. BW=5 MHz. QPSK. RB=All. Offset=0. High Block Edge:



The equipment transmits at the maximum output power



LTE Cat 1bis Band 17:

	RB=1.	RB=1.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz
Maximum measured level at <u>Low Block</u> Edge at antenna port (dBm)	-13.21	-15.4

	RB = All.	RB = All.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz
Maximum measured level at <u>Low Block</u> Edge at antenna port (dBm)	-19.23	-24.66

Note: High Block Edge for LTE Cat 1bis Band 17 is the same as for Band 12.

Preliminary measurements determined QPSK, BW=5 MHz as the worst-case.

Measurement uncertainty: <±2.76 dB

Verdict

PASS

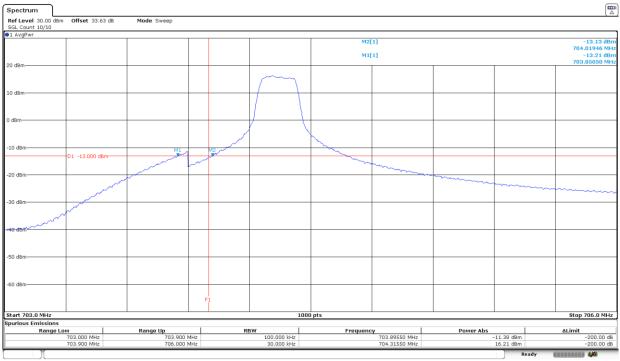
DEKRA Testing and Certification, S.A.U. Parque Tecnológico de Andalucía c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España C.I.F. A29507456



The plots below are for the worst case configuration specified before.

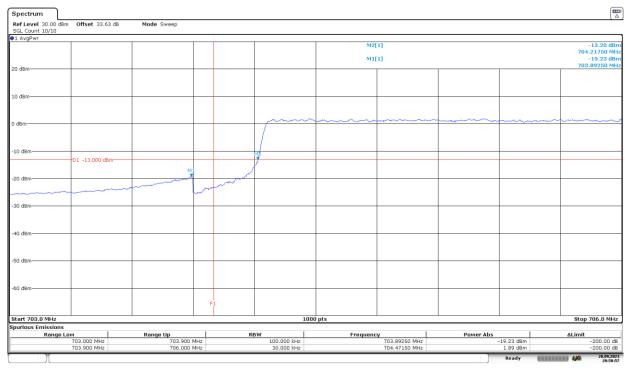
LTE Cat 1bis Band 17:

LTE Cat 1bis Band 17. BW=5 MHz. QPSK. RB=1. Offset=0. Low Block Edge:



Date: 2.0CT.2023 13:29:30

LTE Cat 1bis Band 17. BW=5 MHz. QPSK. RB=All. Offset=0. Low Block Edge:



Date: 28.SEP.2023 20:58:58



LTE Cat 1bis Band 66:

Preliminary measurements determined QPSK, BW=5 MHz.

	RB=1.	RB=1.	RB=1.	RB=1.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Maximum measured level at <u>Low Block</u> <u>Edge</u> at antenna port (dBm)	-15.91	-20.47	-25.35	-28.85

	RB = All.	RB = All.	RB = All.	RB = All.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Maximum measured level at <u>Low Block</u> <u>Edge</u> at antenna port (dBm)	-16.05	-18.81	-23.01	-23.72

	RB=1.	RB=1.	RB=1.	RB=1.
LTE QPSK MODULATION:	Offset=Max.	Offset=Max.	Offset=Max.	Offset=Max.
	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Maximum measured level at <u>High Block</u> <u>Edge</u> at antenna port (dBm)	-17.24	-21.64	-27.25	-30.04

	RB = All.	RB = All.	RB = All.	RB = All.
LTE QPSK MODULATION:	Offset = 0.	Offset = 0.	Offset = 0.	Offset = 0.
	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Maximum measured level at <u>High</u> <u>Block Edge</u> at antenna port (dBm)	-16.56	-19.01	-21.02	-21.62

Measurement uncertainty: <±2.76 dB

Verdict

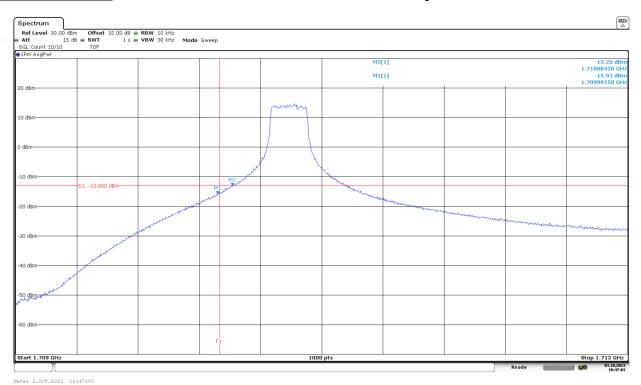
PASS



The plots below are for the worst case configuration specified before.

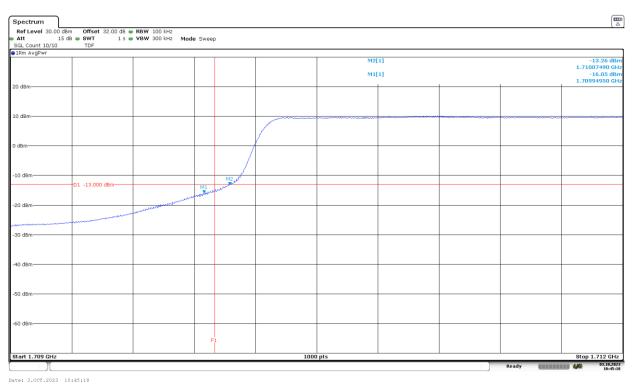
LTE Cat 1bis Band 66:

LTE Cat 1bis Band 66. BW=5 MHz. QPSK. RB=1. Offset=0. Low Block Edge:



The equipment transmits at the maximum output power

LTE Cat 1bis Band 66. BW=5 MHz. QPSK. RB=All. Offset=0. Low Block Edge:



The equipment transmits at the maximum output power



LTE Cat 1bis Band 66. BW=5 MHz. QPSK. RB=1. Offset=Max. High Block Edge:

RefLevel 30.00 dB Att 15 d	dB 😑 SWT 1 s 🗧	 RBW 10 kHz VBW 30 kHz Mode 	Sweep						
GL Count 10/10 IRm AvgPwr	TDF								
					M2	[1]			-13.31 d
					M1	1]			1.77989320 -17.24 d 1.78001150
) dBm									
) dBm					mound				
dBm					$f \rightarrow \langle$				
LO dBm					/	M2			
	D1 -13.000 dBm			man and and		MI MI			
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						F1			
art 1.778 GHz	1	1		1000	pts		I	1	Stop 1.781 0

The equipment transmits at the maximum output power

LTE Cat 1bis Band 66. BW=5 MHz. QPSK. RB=All. Offset=0. High Block Edge:

 Action
 Offset
 32.00 dB
 RBW
 100 kHz

 > Att
 15 db
 SWT
 1 s
 VBW
 300 kHz
 Mode
 Sweep

 SGL Count 10/10
 TDF
 Image: Second 10/10
 TDF
 Second 10/10
 TDF
 -13.42 dBm M2[1] -13.42 dBn 1.77989630 GH: -16.56 dBn 1.78005950 GH: M1[1] 20 dB 10 dBr -10 dB D1 -13.000 dBm M1 -20 dBi -30 dB -40 dBi -50 dB 60 dB Stop 1.781 GHz Start 1.778 GHz 1000 pts Ready 1111111111 (X JL Date: 3.0CT.2023 08:52:34

The equipment transmits at the maximum output power