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## 8.2.10. LTE BAND 26 BANDEDGE (FCC PART 22)

### LIMITS

#### FCC: §22.917

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P) dB$ .

# Agilent 14:22:50 Mar 12, 2020 R L Freq/Channel	* Agilent 14:29:04 Mar 12, 2020 L Freq/Channel
Center Freq Ch Freq 824.7 MHz Trig Free Rdj Channel Power PRSS	Ch Freq 848.3 MHz Trig Free 848.300000 MHz 848.300000 MHz
UL: 50820 \ R Date: 03/09/2020 \ CLT: 2.8.1	AP2020.3.11,50820 EC,Cond B Start Freq
Ref 30 dBm •Atten 30 dB Stop Freq PAy PASS LIMIT1 828.700000 MHz	Ref 30 dBm •Atten 30 dB Stop Freq PAG PASS LIMIT1 852.300000 MHz
10 dB/ 0ffst 10,7 	10/ dB/ 0ffst 10.7 0/ 0/ 0/ 0/ 0/ 0/ 0/ 0/ 0/ 0/
dB Freq Offset   Center 824.700 MHz Span 8 MHz	dB Center 848.300 0 MHz Span 8 MHz Span 8 MHz
eRes BM 20 kHz VBM 62 kHz Sweep 60.61 ms (8192 pts)   RMS Results Freq Offset Ref BW dBc Lower dBm dBc Upper dBm On Off   ctoper 858.08 kHz 108.08 kHz -27.16 -75.86 -51.84 On Off	•Res BW 20 kHz VBW 62 kHz Sweep 60.61 ms (8192 pts) Signal Track   RMS Results Freq Offset Ref BW dBc Lower dBm dBc Upper dBm On On Off   Carrier Power 858.0 kHz 108.0 kHz -74.07 -58.03 -55.99 -31.95 On Off
24.02 Obin / 1.40000 MHz	24.04 dbm / 1.40000 MHz
UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1	UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1
LTE B26 1.4MHz QPSK Low Channel RB1-0	LTE B26 1.4MHz QPSK High Channel RB1-5
Agilent 14:24:58 Mar 12, 2020 L Freq/Channel	* Agilent 14:26:00 Mar 12, 2020 L Freq/Channel
Center Freq Ch Freq 824.7 MHz Trig Free Adj Channel Power PASS	Ch Freq 848.3 MHz Trig Free Center Freq 848.300000 MHz   Adj Channel Power PASS PASS 848.300000 MHz 848.300000 MHz
AP2020.3.11.50820 EC.Cond B Start Freq 820.700000 MHz	AP2020.3.11,50820 EC,Cond B
Ref 30 dBm +Atten 30 dB Stop Freq +Avg PRSS LIMIT1 828.700000 MHz	Ref 30 dBm •Atten 30 dB Stop Freq   •Avg PRSS LIMIT1 852.300000 MHz
10 dB/ 0ffst 10.7 CF Step 800,00000 kHz Puto Man	10 dB/ 0ffst 10.7 CF Step 800,00000 kHz Puto Man
dB Center 824.700 MHz Span 8 MHz 0.00000000 Hz	dB Freq Offset Center 848.300 0 MHz Span 8 MHz 0.00000000 Hz
Res BH 20 kHz VBM 62 kHz Sweep 60.61 ms (8192 pts) Signal Track   RMS Results Freq Offset Ref BH dBc Lower dam dBc Upper dam   Carrier Power Star bH 180 cb Lower dam dBc Upper dam   On Off Off Off Off Off Off	Res BW 20 kHz VBW 62 kHz Sweep 60.61 ms (8192 pts) Signal Track   RMS Results Freq Offset Ref BH dBc Lower dBa dBc Upper dBa 0n 0ff
23.25 dBm /	23.23 dBm /
UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1	UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1
LTE B26 1.4MHz QPSK Low Channel RB6-0	LTE B26 1.4MHz QPSK High Channel RB6-0

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* Agilent 15:01:49 Mar 12, 2020 L Freq.	/Channel	* Agilent 15:07:34 Mar 12, 2020	Freq/Channel
Ch Freq 831.5 MHz Trig Free Cen   Adj Channel Power PRSS	nter Freq 00000 MHz	Ch Freq 841.5 MHz Trig Free Adj Channel Power PRSS	Center Freq 841.500000 MHz
St 6P2020.3.11.50820 FC.Cond B	<b>tart Freq</b> 00000 MHz	P2020.3.11.50820 FC.Cond B	Start Freq 824.000000 MHz
Ref 30 dBm •Atten 30 dB • •Avg PASS LIMIT1 849.00	top Freq 00000 MHz	Ref 30 dBm •Atten 30 dB •PAys PASS LIMIT1	Stop Freq 859.000000 MHz
10 dB/ 0 10 3.5000	CF Step 00000 MHz	10 dB/ 0ffst	CF Step 3.50000000 MHz
10.7 dB	Man eq Offset	10.7 dB	<u>Auto</u> Man Freq Offset
Center 831.500 MHz Span 35 MHz 0.000 •Res BH 150 kHz •VBW 470 kHz Sweep 4.915 ms (8192 pts)	nal Track	Center 841.500 MHz Span 35 MHz •Res BM 150 kHz •VBW 470 kHz Sweep 4.915 ms (8192 pts)	0.00000000 Hz
RNS Results Freq Offset Ref BW dBc Lower dBm dBc Upper/dBm   Carrier Power 7.659 MHz 100.8 kHz -60.00 -36.79 -64.12 -40.91 0n   23.20 dBm / 15.0808 MHz 100.8 kHz -60.00 -36.79 -64.12 -40.91 0n	<u>Off</u>	RMS Results Freq Offset Ref Bul dBc Lower dBm dBc Upper dBm   Carrier Power 7.6580 MHz 100.0 kHz -53.46 -30.37 -53.98 -30.89   23.09 dBm / 15.0000 MHz 100.0 kHz -53.46 -30.37 -53.98 -30.89	On <u>Off</u>
UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1		UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1	
LTE B26 15MHz QPSK Low Channel RB75-0		LTE B26 15MHz QPSK High Channel RB7	5-0
* Agilent 15:03:35 Mar 12, 2020 L	/Channel	<b>∦ Agilent</b> 15:06:12 Mar 12, 2020 L	Freq/Channel
Ch Freq 831.5 MHz Trig Free Can   Adj Channel Power PASS	nter Freq 00000 MHz	Ch Freq 841.5 MHz Trig Free Adj Channel Power PASS	Center Freq 841.500000 MHz
AP2020.3.11,50820 EC,Cond B	<b>tart Freq</b> 00000 MHz	RP2020.3.11.50820 EC,Cond B	Start Freq 824.000000 MHz
Ref 30 dBm •Atten 30 dB •Avg PR\$S LIMIT1 849.00	<b>top Freq</b> 00000 MHz	Ref 30 dBm •Atten 30 dB •Avg PRSS LIMIT1	<b>Stop Freq</b> 859.000000 MHz
10 dB/ Offst	CF Step 00000 MHz	10 dB/ Offst	CF Step 3.50000000 MHz
	eq Offset		Freq Offset
Center 831.500 MHz Span 35 MHz •Res BH 150 kHz •VBH 470 kHz Sweep 4.915 ms (8192 pts) <b>CMS Decellet</b> scan bifact Red BU dec Lover dec Upper dec Upper dec	nal Track	Center 841.500 MHz Span 35 MHz PRES BW 150 kHz #VBW 470 kHz Sweep 4.915 ms (8192 pts) DBS Desuits Even defense . Ref BUL who Lover who . Upper who	Signal Track
Carrier Power 7.658 MHz 100.0 kHz -72.25 -49.13 -91.46 -68.34 On 23.12 48. 15.0000 MHz	<u>0ff</u>	Carrier Power 7,650 MHz 100.0 kHz -85,26 -61.60 -58,79 -35,21 23,50 dBm / 15,0000 MHz	On <u>Off</u>
UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1		UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1	
LTE B26 15MHz 16QAM Low Channel RB1-0		LTE B26 15MHz 16QAM High Channel RB1	-74
Agilent 15:02:32 Mar 12, 2020 L Freq/	/Channel	★ Agilent 15:06:53 Mar 12, 2020	Freq/Channel
Cen Ch Freq 831.5 MHz Trig Free Adj Channel Power PRS5	n <b>ter Freq</b> 00000 MHz	Ch Freq 841.5 MHz Trig Free Adj Channel Power PASS	Center Freq 841.500000 MHz
St 814.00	<b>tart Freq</b> 00000 MHz	P22020.3.11.50820 FC.Cond B	Start Freq 824.000000 MHz
Ref 30 dBm +Atten 30 dB	top Freq 00000 MHz	Ref 30 dBm •Atten 30 dB •Nyg PRSS LIMITI	<b>Stop Freq</b> 859.000000 MHz
10 dB/ Offst	CF Step 00000 MHz	10 dB/ Offst	CF Step 3.50000000 MHz
	Man eq Offset		Freq Offset
Center 831.500 MHz •Res BH 150 kHz •VBH 470 kHz Sweep 4.915 ms (8192 pts) CMD Sector 1 and 1	nal Track	Center 841.500 MHz Span 35 MHz •Res BW 150 kHz •VBW 470 kHz Sweep 4.915 ms (8192 pts) CML Spanta State 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Signal Track
Саггіст Росянов глад отгаєт кат ви авс собе авіт авс собе	<u>Off</u>	Carrier Power 7,650 MHz 100.0 kHz -56.32 -34.15 -63.25 -41.08 22.16 dBm / 15.8000 MHz	On <u>Off</u>
UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1		UL:50820 \ R Date:03/09/2020 \ CLT:2.8.1	
I TE B26 15MHz 16QAM Low Channel BB75-0		I TE B26 15MHz 160AM High Channel RB7	<u> </u>

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### 8.2.11. LTE BAND 30 ADJACENT CHANNEL POWER

#### <u>LIMITS</u>

#### FCC: §27.53

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

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## 8.2.12. LTE BAND 41 ADJACENT CHANNEL POWER

### **LIMITS**

#### FCC: §27.53

(m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between 5 between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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## 8.2.13. LTE BAND 66 BANDEDGE

### LIMITS

FCC: §27.53(h)

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



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Measure Meas Off

Channel Power

Occupied BW

Multi Carrier Power

Power Stat CCDF

> More 1 of 2

ACP

	Masaura	W Arthurd 10:00:00 One 15 0000 D T	
Ch Freq 1.72 GHz Trig Free	Measure Meas Off	Ch Freq 1.77 GHz Trig Free	
Adj Channel Power PASS	Channel Power	Adj Channel Power PASS	Chann
UL: 40002 ( K Date, 03/03/02/020 ( UL: 2.0.1 Ref 30 dB • •Rtten 30 dB •Avg PASS LIMIT1	Occupied BW	UL. 4000C YR Dafe. 057097092020 YCL1.2.6.1 Ref 30 dBm •Atten 30 dB •Avg PASS LIMIT1	0cc
10 dB/ Offst	ACP	10 dB/ 0ffst	
dB Start 1.700 000 GHz Stop 1.740 000 GHz	Multi Carrier Power	dB Start 1.750 000 GHz Stop 1.790 000 GHz	Mult
Res BH 200 kHz #VBW 620 kHz Sweep 3.276 ms (8192 pts)   RMS Results Freq Offset Ref BH dBc Lower dBm dBc Upper dBm   Carrier Power 11.50 MHz 1.000 MHz -43.04 -28.65 -44.96 -22.57	Power Stat CCDF	Res BM 200 kHz #VBM 620 kHz Sweep 3.276 ms (8192 pts)   RMS Results Freq Offset Ref BW dBc Lover dBm dBc Upper dBm   Carrier Pover 11.50 MHz 1.000 MHz -45.63 -22.95 -46.72 -24.04	Po
22.39 UDW / 28.0000 MHz	More 1 of 2	28.8000 MHz	
UL:40882 \ R Date:03/09/2020 \ CLT:2.8.1		UL:40882 \ R Date:03/09/2020 \ CLT:2.8.1	
LTE B66 20MHz 16QAM Low Channel RB10	00-0	LTE B66 20MHz 16QAM High Channel RB <sup>2</sup>	100-0

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# 8.3. OUT OF BAND EMISSIONS

#### TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm, -25dBm and -40dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

**RESULTS** 

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# 8.3.1. LTE BAND 2

## LIMITS

#### FCC: §24.238

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



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## 8.3.2. LTE BAND 4

#### LIMITS

FCC: §27.53 (h)

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



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# 8.3.3. LTE BAND 5

## LIMITS

#### FCC: §22.917

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



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# 8.3.4. LTE BAND 7

## LIMITS

FCC: §27.53 (m)

The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.



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Krysteft Spectrem Awayner- BL 5900 19 Cael (8/16/30) 9 CTT-27 KL 69 59 2 DC KL 69 59 2 DC KL 69 59 2 DC KL 70 50 2 DC KL 70 59 2 DC	Frequency	Krysteff Spectrum Analyzer- BL 50001 / B Eaer B0/15/2019 / CLT-27     202	Frequency
NE     INC Fac     The Free Run     The Free Run       Bef Offset 198 dB     Mkr2 25.524 G Hz     10 dB/dW     -30.99 dBm       10 dB/dW     -30.99 dBm     -30.99 dBm	Auto Tune	NFE     PHOC Fast     Ting: Pres Kun     Ting: Pres Kun       Bet Offset 11.98 dB     Mkr2 25.6247 GHz     56.247 GHz       10 dBidlay     Ref 30.00 dBm     -30.90 dBm	Auto Tune
	Center Freq 13.015000000 GHz		Center Freq 13.015000000 GHz
	Start Freq 30.000000 MHz	123	Start Freq 30.000000 MHz
	Stop Freq 26.00000000 GHz		Stop Freq 26.00000000 GHz
Start 30 MHz     Stop 26.00 GHz       #Res BW 1.0 MHz     VBW 3.0 MHz     Sweep 45.33 ms (40001 pt)       @sticboling Ged     x     Platcole     Sweep 45.33 ms (40001 pt)	CF Step 2.597000000 GHz Auto Man	Start 30 MHz     Stop 26.00 GHz       Res BW 1.0 MHz     VBW 3.0 MHz     Sweep 45.33 ms (4000 1pt)       D08 (node) (res 24.1 ms - 100 ms - 10	CF Step 2.597000000 GHz Auto Man
N 1 C 26610 GHz 27.10 dBm N C 26.625 4 GHz30.99 dBm	Freq Offset 0 Hz	1 N f 26510 GHz 2591 dBm N f 256247 GHz -30.90 dBm	Freq Offset 0 Hz
9 9 10 11	Scale Type	7 9 10 11 11	Scale Type Log Lin
ANG. ITATUS		es status	
LTE B7 20MHz QPSK High Channel RB1-0		LTE B7 20MHz 16QAM High Channel RB1-0	)

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## 8.3.5. LTE BAND 12

#### LIMITS

FCC: §27.53 (g)

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



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## 8.3.6. LTE BAND 13

#### LIMITS

#### FCC: §27.53 (c), (f)

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P) dB$  where transmitting power (P) in Watts. The band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

Note: Radiated data in section 9.1.6 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40dBm/MHz limit was used.



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Note: Radiated data in section 9.1.6 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

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# 8.3.7. LTE BAND 14

## LIMITS

#### FCC: §90.543 (e), (f)

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P) dB$  where transmitting power (P) in Watts. The band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

Note: Radiated data in section 9.1.7 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40dBm/MHz limit was used.



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Note: Radiated data in section 9.1.7 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

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## 8.3.8. LTE BAND 25

#### LIMITS

FCC: §24.238

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



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