

Radiated Emissions

Limits

FCC §90.691:

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

Method

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the High frequency generated within the equipment.

The EUT was placed on a 1 meter high non-conductive stand at a 3 meter distance from the measuring antenna. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the height and polarization of the measuring antenna. The maximum meter reading was recorded.

MEASUREMENT LIMIT:

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB, P in watts.

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

The maximum field strength (dBµV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

EIRP (dBm) = E (dB μ V/m) + 20 log(D) - 104.8; where D is the measurement distance (in the far field region) in m. D = 3 m

A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

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Test Setup

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



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Results

Measurements required on one frequency near top channel and one frequency near bottom channel, according to FCC § 15.31 (m).

LTE Cat NB1 Band 26. Sub-band 814-824 MHz:

A preliminary scan determined the Pi/2-BPSK, BW=15 kHz, Tone Number=1, Tone Offset=11, MSC/TBS=0 as the worst case. The following results are for this worst-case configuration.

- LOW CHANNEL:

Frequency range 30 MHz - 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz

No spurious frequencies at less than 20 dB below the limit.

- MIDDLE CHANNEL:

Frequency range 30 MHz - 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz

No spurious frequencies at less than 20 dB below the limit.

- HIGH CHANNEL:

Frequency range 30 MHz - 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz

No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB): < \pm 5.35 for f ≥ 30 MHz up to 1 GHz < \pm 4.32 for f ≥ 1 GHz up to 8.5 GHz

Verdict

Pass



LTE Cat NB1 Band 26. Sub-band 814-824 MHz:

FREQUENCY RANGE 30 MHz - 1 GHz:

- LOW CHANNEL:

MultiView 🎫 🖡	Receiver X	Spectrum	×						
Ref Level -10.00 Att 1 Input 3 TDE Input2 "Antenna	dBm Offset 2.15 dt 0 dB SWT 30 m 2 DC PS 01 6143 PRA" "ATT 3D	B ● RBW 1 MHz s ● VBW 3 MHz M ff Notch Off B 6021" "CABLE 670"	 lode Sweep 7 8M" "CABLE 9122	3M" "CABLE 9213 2	Ma.			Frequency 514	4.9000000 MHz
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The peak above the limit is the carrier frequency: LTE Cat NB1 Band 26. Sub-band 814-824 MHz, 819 MHz

- MIDDLE CHANNEL:

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MultiView Receiver X Spectru	ım 🗙			•
Ref Level -10.00 dBm Offset 2.15 dB RBW 3 • Att 10 dB SWT 30 ms VBW 3	I MHz 3 MHz Mode Sweep			Frequency 514.9000000 MHz
Input 2 DC PS Off Notch TDF Input2 "Antenna_6143_PRA","ATT_3DB_6021","CA	Off \BLE_6707_8M","CABLE_9122_3M","CABLE_	9213_2M"		
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13:03:10 24.05.2023

The peak above the limit is the carrier frequency: LTE Cat NB1 Band 26. Sub-band 814-824 MHz, 819 MHz

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- HIGH CHANNEL:

	
MultiView Receiver X Spectrum X	•
Ref Level -10.00 dBm Offset 2.15 dB RBW 1 MHz Att 10 dB SWT 30 ms VBW 3 MHz Mode Sweep Input 2 DC PS Off Notch Off	Frequency 514.9000000 MHz
TDF Input2 "Antenna_6143_PRA","ATT_3DB_6021","CABLE_6707_8M","CABLE_9122_3M","CABLE_9213_2M" 1 Erequency Sweep	o 1Pk View
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The peak above the limit is the carrier frequency: LTE Cat NB1 Band 26. Sub-band 814-824 MHz, 819 MHz

FREQUENCY RANGE 1 - 8.5 GHz:

- LOW CHANNEL:

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MultiView 📒 I	Receiver ×	Spectrum	×						-
Ref Level 0.00 dE Att 0 Taput 1	3m • F dB SWT 30 ms • V	XBW 1 MHz /BW 3 MHz Mode	Sweep					Frequency	4.7500000 GHz
TDF Input1 "ANTENA 1 Frequency Sweet	_6496_PIRE_3M","610	DO_CABLE_1m","AMPL	IFICADOR_3783","CA	BLE_9613_9M","CABL	E_9184_2M","FILTER	_4954_HPF_1GHz","C	CABLE_9123_3M"		01Pk View
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- MIDDLE CHANNEL:

MultiView	Receiver ×	Spectrum	×						•
Ref Level 0.00 dE Att 0	3m dB SWT 30 ms ● N	RBW 1 MHz /BW 3 MHz Mode	Sweep					Frequency	4.7500000 GHz
TDF Input ANTENA	_6496_PIRE_3M","61	00_CABLE_1m","AMPL	IFICADOR_3783","CA	BLE_9613_9M","CABL	E_9184_2M","FILTER	_4954_HPF_1GHz","C	CABLE_9123_3M"		
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~						measuring		19:32:05	0 0

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- HIGH CHANNEL:

				
MultiView Receiver	X Spectrum X			
Ref Level 0.00 dBm Att 0 dB SWT 30 ms Input 1 AC PS Off	RBW 1 MHz VBW 3 MHz Mode Sweep Notch Off			Frequency 4.7500000 GHz
TDF Input1 "ANTENA_6496_PIRE_3M", 1 Frequency Sweep	"6100_CABLE_1m","AMPLIFICADOR_3783","CA	ABLE_9613_9M","CABLE_9184_2M","FIL	TER_4954_HPF_1GHz","CABLE_9123	_3M" O 1Pk View
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1.0 GHz	30000 pt:	5	750.0 MHz/ Measuring	24.05.2023 Ref Level RBW

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LTE Cat NB1 Band 26. Cross-rule Channel 824 MHz:

A preliminary scan determined the Pi/2-BPSK, BW=15 kHz, Tone Number=1, Tone Offset=0, MSC/TBS=0 as the worst case. The following results are for this worst-case configuration.

- CROSS-RULE CHANNEL 824 MHz:

Frequency range 30 MHz - 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz:

No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB): < \pm 5.35 for f ≥ 30 MHz up to 1 GHz < \pm 4.32 for f ≥ 1 GHz up to 8.5 GHz

Verdict

Pass



LTE Cat NB1 Band 26. Cross-rule Channel 824 MHz:

FREQUENCY RANGE 30 MHz - 1 GHz:

- SINGLE CHANNEL (Cross-rule Channel 824 MHz):



20:41:17 24.05.2023

The peak above the limit is the carrier frequency: LTE Cat NB1 Band 26, 824 MHz

FREQUENCY RANGE 1 - 8.5 GHz:

- SINGLE CHANNEL (Cross-rule Channel 824 MHz):

MultiView - F	leceiver X	Spectrum	×						-
Ref Level 0.00 dB	m	BW 1 MHz	-					-	
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