



**TUV SUD BABT TCB**

Octagon House,  
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PO15 5RL

Date: **Feb. 11, 2016**

REF: **RF exposure analysis**

Model: **LE920-NA**      FCC ID: **RI7LE920NA1**      IC: **5131A-LE910NA1**

The device is a module designed to be installed in other devices. This device is to be used only for fixed and mobile applications. If the final product after integration is intended for portable use, new applications and FCC and IC are required.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter except as under the conditions described KDB 447498 D01 General RF Exposure Guidance.

**MPE exposure limits**

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1,0	30

The table below is excerpted from RSS-102, Issue 5, 4, titled “Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)”:

Frequency Range (MHz)	Power density (W/m <sup>2</sup> )	Averaging time (minutes)
300-6000	0.02619 f <sup>0.6834</sup>	6

**EIRP/ERP limits**

Frequency Band	FCC EIRP limit (W)	IC EIRP limit (W)"
<b>700 MHz</b>	4,92	5,00
<b>850 MHz</b>	11,48	11,50
<b>1700 MHz</b>	1,00	1,00
<b>1900 MHz</b>	2,00	2,00
<b>2600 MHz</b>	2,00	2,00

Using the equation  $S = \frac{PG}{4\pi R^2}$  to calculate the exposure to electromagnetic fields

- where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)
- P = power input to the antenna (in appropriate units, e.g., mW)
- G = power gain of the antenna in the direction of interest relative to an isotropic radiator
- R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

compliance with FCC/IC MPE and EIRP limits is demonstrated following the calculations shown in the following page.



Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (Lowest freq.) (MHz)	Maximum conducted output power (per tune-up) (dBm)	Duty cycle (%)	FCC MPE limit (mW/cm <sup>2</sup> )	IC MPE limit (mW/cm <sup>2</sup> )	FCC ERP limit per §22.913, §24.232 and §27.50 (W)	IC ERP limit per SRSP-503, SRSP-510, SRSP-513, SRSP-517 and SRSP-518 (W)	Evaluation distance for compliance with MPE limits (cm)	Antenna gain to meet FCC MPE limit (dBi)	Antenna gain to meet IC MPE limit (dBi)	Antenna gain to meet FCC ERP limit (dBi)	Antenna gain to meet IC ERP limit (dBi)	Maximun antenna gain to meet all the limits (dBi)	Maximun antenna gain to meet all the limits per frequency band (dBi)
FDD 17	LTE Cat. 3 - 5 MHz BW	706,5 - 713,5	706,5	25,00	100%	0,471	0,232	4,92	5,00	20	8,74	5,66	11,91	11,98	5,66	Maximun antenna gain for 700 MHz frequency band: 5,66
	LTE Cat. 3 - 10 MHz BW	709-711	709,0	25,00	100%	0,473	0,232	4,92	5,00	20	8,75	5,67	11,91	11,98	5,67	
FDD V	UMTS/HSPA	826,4 - 846,6	826,4	25,00	100%	0,551	0,258	11,48	11,50	20	9,42	6,13	15,59	15,60	6,13	Maximun antenna gain for 850 MHz frequency band: 6,13
FDD 5	LTE Cat. 3 - 5 MHz BW	826,5-846,5	826,5	25,00	100%	0,551	0,258	11,48	11,50	20	9,42	6,13	15,59	15,60	6,13	Maximun antenna gain for 850 MHz frequency band: 6,13
	LTE Cat. 3 - 10 MHz BW	829-844	829,0	25,00	100%	0,553	0,259	11,48	11,50	20	9,43	6,13	15,59	15,60	6,13	
FDD IV	UMTS/HSPA	1710-1755	1710,0	25,00	100%	1,000	0,424	1,00	1,00	20	12,01	8,28	5,00	5,00	5,00	Maximun antenna gain for 1700 MHz frequency band: 5,00
FDD 4	LTE Cat. 3 - 5 MHz BW	1712,5-1752,5	1712,5	25,00	100%	1,000	0,425	1,00	1,00	20	12,01	8,29	5,00	5,00	5,00	Maximun antenna gain for 1700 MHz frequency band: 5,00
	LTE Cat. 3 - 10 MHz BW	1715,0-1750,0	1715,0	25,00	100%	1,000	0,425	1,00	1,00	20	12,01	8,29	5,00	5,00	5,00	
	LTE Cat. 3 - 20 MHz BW	1720,0-1745,0	1720,0	25,00	100%	1,000	0,426	1,00	1,00	20	12,01	8,30	5,00	5,00	5,00	
FDD II	UMTS/HSPA	1852,4 - 1907,6	1852,4	25,00	100%	1,000	0,448	2,00	2,00	20	12,01	8,52	8,01	8,01	8,01	Maximun antenna gain for 1900 MHz frequency band: 8,01
LTE Cat. 3 - 5 MHz BW	1852,5 - 1907,5	1852,5	25,00	100%	1,000	0,448	2,00	2,00	20	12,01	8,52	8,01	8,01	8,01		
FDD 2	LTE Cat. 3 - 10 MHz BW	1855-1905	1855,0	25,00	100%	1,000	0,448	2,00	2,00	20	12,01	8,52	8,01	8,01	8,01	Maximun antenna gain for 1900 MHz frequency band: 8,01
	LTE Cat. 3 - 20 MHz BW	1860-1900	1860,0	25,00	100%	1,000	0,449	2,00	2,00	20	12,01	8,53	8,01	8,01	8,01	
	LTE Cat. 3 - 5 MHz BW	2502,5 - 2567,5	2502,5	25,00	100%	1,000	0,550	2,00	2,00	20	12,01	9,41	8,01	8,01	8,01	
FDD 7	LTE Cat. 3 - 10 MHz BW	2505 - 2560	2505,0	25,00	100%	1,000	0,551	2,00	2,00	20	12,01	9,42	8,01	8,01	8,01	Maximun antenna gain for 2600 MHz frequency band: 8,01
	LTE Cat. 3 - 20 MHz BW	2510 - 2560	2510,0	25,00	100%	1,000	0,551	2,00	2,00	20	12,01	9,42	8,01	8,01	8,01	
	LTE Cat. 3 - 5 MHz BW	2510 - 2560	2510,0	25,00	100%	1,000	0,551	2,00	2,00	20	12,01	9,42	8,01	8,01	8,01	

With this antenna gains the maximum RF exposure can be calculated as follows:

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (Lowest freq.) (MHz)	Maximum conducted output power (per tune-up) (dBm)	Duty cycle (%)	Antenna gain to meet FCC EIRP limit (dBi)	Evaluation distance for compliance with MPE limits (cm)	$S = \frac{PG}{4\pi R^2}$ (mW/cm <sup>2</sup> )
FDD 17	LTE Cat. 3 - 5 MHz BW	706,5 - 713,5	706,5	25,00	100%	5,66	20	0,232
	LTE Cat. 3 - 10 MHz BW	709-711	709,0	25,00	100%	5,66	20	0,232
FDD V	UMTS/HSPA	826,4 - 846,6	826,4	25,00	100%	3,64	20	0,145
FDD 5	LTE Cat. 3 - 5 MHz BW	826,5-846,5	826,5	25,00	100%	3,64	20	0,145
	LTE Cat. 3 - 10 MHz BW	829-844	829,0	25,00	100%	3,64	20	0,145
FDD IV	UMTS/HSPA	1710-1755	1710,0	25,00	100%	5,00	20	0,199
FDD 4	LTE Cat. 3 - 5 MHz BW	1712,5-1752,5	1712,5	25,00	100%	5,00	20	0,199
	LTE Cat. 3 - 10 MHz BW	1715,0-1750,0	1715,0	25,00	100%	5,00	20	0,199
	LTE Cat. 3 - 20 MHz BW	1720,0-1745,0	1720,0	25,00	100%	5,00	20	0,199
FDD II	UMTS/HSPA	1852,4 - 1907,6	1852,4	25,00	100%	2,51	20	0,112
FDD 2	LTE Cat. 3 - 5 MHz BW	1852,5 - 1907,5	1852,5	25,00	100%	2,51	20	0,112
	LTE Cat. 3 - 10 MHz BW	1855-1905	1855,0	25,00	100%	2,51	20	0,112
	LTE Cat. 3 - 20 MHz BW	1860-1900	1860,0	25,00	100%	2,51	20	0,112
FDD 7	LTE Cat. 3 - 5 MHz BW	2502,5 - 2567,5	2502,5	25,00	100%	8,01	20	0,398
	LTE Cat. 3 - 10 MHz BW	2505 - 2560	2505,0	25,00	100%	8,01	20	0,398
	LTE Cat. 3 - 20 MHz BW	2510 - 2560	2510,0	25,00	100%	8,01	20	0,398

Yours sincerely,

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