

TUV SUD BAPT TCB

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Date: **04/14/2016**

REF: **RF exposure analysis**

Model: **LE910-SV1** FCC ID: **R17LE910SVV2** IC: **5131A-LE910SVV2**

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 ²)	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 ²)	Averaging time (minutes)
300-6000	0.02619 f ^{0.6834}	6

EIRP/ERP limits

Frequency Band	FCC EIRP limit (W)	IC EIRP limit (W)"
700 MHz	4,92	5,00
1700 MHz	1,00	1,00
1900 MHz	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/cm²)
- 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.

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Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (Lowest freq.) (MHz)	Maximum conducted output power (per tune-up) (dBm)	Multi-slot Class	Maximum number of TX slots	Duty cycle (%)	FCC MPE limit (mW/cm ²)	IC MPE limit (mW/cm ²)	FCC ERP limit per §22.913, §24.232 and §27.60 (W)	IC ERP limit per SRSP-603, SRSP-610, SRSP-613 and SRSP-616 (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)	Maximum antenna gain to meet all the limits (dBi)	Maximum antenna gain to meet all the limits per frequency band (dBi)
FDD 13	LTE FDD	777 - 787	777,0	24,00	N/A	N/A	100%	0,518	0,247	4,92	5,00	20	10,15	6,94	12,91	12,98	6,94	Maximum antenna gain for 700 MHz frequency band: 6,94 dBi
FDD 4	LTE FDD	1710,7 - 1754,3	1710,7	24,00	N/A	N/A	100%	1,000	0,424	1,00	1,00	20	13,01	9,28	6,00	6,00	6,00	Maximum antenna gain for 1700 MHz frequency band: 6,00 dBi
FDD 2	LTE FDD	1850,7 - 1909,3	1850,7	24,00	N/A	N/A	100%	1,000	0,448	2,00	2,00	20	13,01	9,52	9,01	9,01	9,01	Maximum antenna gain for 1900 MHz frequency band: 9,01 dBi

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)	Multi-slot Class	Maximum number of TX slots	Duty cycle (%)	Antenna gain (dBi)	Evaluation distance for compliance with MPE limits (cm)	$S = \frac{PG}{4\pi R^2}$ (mW/cm ²)
FDD 13	LTE FDD	777 - 787	777,0	24,00	N/A	N/A	100%	6,94	20	0,247
FDD 4	LTE FDD	1710,7 - 1754,3	1710,7	24,00	N/A	N/A	100%	6,00	20	0,199
FDD 2	LTE FDD	1850,7 - 1909,3	1850,7	24,00	N/A	N/A	100%	9,01	20	0,398

If you have any doubt please do not hesitate to contact us.

Yours sincerely,


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 EMEA R&D Manager