

RF Exposure Evaluation Declaration

Product Name : Module
Trade Name : 
Model No. : LE910C1-LA, LE910C4-LA
FCC ID. : RI7LE910CXLA

Applicant : Telit Communications S.p.A.

Address : Viale Stazione di Prosecco, 5/B, 34010 Sgonico TRIESTE – ITALY

Date of Receipt : Jul. 15, 2019
Date of Declaration : Jul. 25, 2019
Report No. : 1970268R-RF-US-Exp
Report Version : V1.0



The declaration results relate only to the samples calculated.

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Trade Name : 

Applicable Standard : FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

Test Lab : Hsin Chu Laboratory

Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.
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Test Result : Complied

Approved By

:



(Louis Hsu / Deputy Manager)

1. RF Exposure Evaluation

1.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

According to IC RSS-102 Issue 5: For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline.

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-1021	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ f	-	6**
1.29-10	193/ f 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ f 0.25	0.3444/ f 0.25	44.72/ f 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 f 0.25	0.04138 f 0.25	0.6455 f 0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ f 1.2
150000-300000	0.354 f 0.5	9.40 x 10 ⁻⁴ f 0.5	3.33 x 10 ⁻⁴ f	616000/ f 1.2
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18°C and 78% RH.

1.3. Test Result of RF Exposure Evaluation

Product	LE910C1-LA, LE910C4-LA
Test Mode	Transmit
Test Condition	RF Exposure Evaluation

GSM	Usable maximum Antenna Gain by manufacturer's declaration (dBi)	Usable maximum Antenna Gain under limit of output power (dBi)
GSM 850	1.5	3.5
DCS1900	3.5	9.5

WCDMA	Usable maximum Antenna Gain by manufacturer's declaration (dBi)	Usable maximum Antenna Gain under limit of output power (dBi)
Band 2	3.5	13.0
Band 4	3.5	13.0
Band 5	1.5	10.0

LTE	Usable maximum Antenna Gain by manufacturer's declaration (dBi)	Usable maximum Antenna Gain under limit of output power (dBi)
Band 2	3.5	13.0
Band 4	3.5	13.0
Band 5	1.5	10.0
Band 7	3.0	13.0

GSM 850**Antenna Gain**

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 1.5 dBi or 1.41 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
824.2	33.5	2238.72	32.81	1909.85	0.315	0.549
836.6	33.5	2238.72	32.53	1790.61	0.315	0.558
848.8	33.5	2238.72	32.58	1811.34	0.315	0.566

DCS 1900**Antenna Gain**

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 3.5 dBi or 2.24 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
1850.2	30.5	1122.02	29.79	952.80	0.250	1.000
1880.0	30.5	1122.02	29.68	928.97	0.250	1.000
1909.8	30.5	1122.02	29.48	887.16	0.250	1.000

WCDMA Band 2

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 3.5 dBi or 2.24 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
1852.4	24.00	251.19	23.15	206.54	0.112	1.000
1880.0	24.00	251.19	23.01	199.99	0.112	1.000
1907.6	24.00	251.19	22.86	193.20	0.112	1.000

WCDMA Band 4

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 3.5 dBi or 2.24 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
1712.4	24.00	251.19	23.05	201.84	0.112	1.000
1732.6	24.00	251.19	21.06	127.64	0.112	1.000
1752.6	24.00	251.19	20.42	110.15	0.112	1.000

WCDMA Band 5

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 1.5 dBi or 1.41 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
826.4	24.00	251.19	23.37	217.27	0.071	0.551
836.6	24.00	251.19	21.42	138.68	0.071	0.558
846.6	24.00	251.19	21.04	127.06	0.071	0.558

LTE Band 2**Antenna Gain**

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 3.5 dBi or 2.24 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
1850.7	24.00	251.19	23.40	218.78	0.112	1.000
1880.0	24.00	251.19	23.37	217.27	0.112	1.000
1908.5	24.00	251.19	23.33	215.28	0.112	1.000

LTE Band 4**Antenna Gain**

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 3.5 dBi or 2.24 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
1711.5	24.00	251.19	22.99	199.07	0.112	1.000
1732.5	24.00	251.19	23.20	208.93	0.112	1.000
1745.0	24.00	251.19	23.11	204.64	0.112	1.000

LTE Band 5**Antenna Gain**

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 1.5 dBi or 1.41 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
826.5	24.00	251.19	23.36	216.77	0.071	0.551
836.5	24.00	251.19	23.28	212.81	0.071	0.558
848.3	24.00	251.19	23.49	223.36	0.071	0.566

LTE Band 7**Antenna Gain**

Based on the Maximum Conducted Output Power, the usable maximum antenna gain by manufacturer's declaration is 1.5 dBi or 2.0 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm ²)	FCC Limit (mW/cm ²)
	(dBm)	(mW)	(dBm)	(mW)		
2507.5	24.00	251.19	22.99	199.07	0.100	1.000
2535.0	24.00	251.19	23.48	222.84	0.100	1.000
2560.0	24.00	251.19	23.46	221.82	0.100	1.000