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RF EXPOSURE EVALUATION Maximum Permissible Exposure (MPE)

Applicant Name:
Telit Communications S.p.A.
Viale Stazione di Prosecco 5/b
Trieste, 34010
Italy

Date of Testing:
01/19/2024 - 01/21/2024
Test Report Issue Date:
01/24/2024
Test Site/Location:
Element Lab. Columbia, MD, USA
Test Report Serial No.:
1M2312260131-04.RI7

FCC ID:	RI7LE910C1SNX
IC:	5131A-LE910C1SNX
APPLICANT:	Telit Communications S.p.A.

Application Type:	Class II Permissive Change
ISED Application Type:	Class III Permissive Change
EUT Type:	Module
Model/HVIN:	LE910C4-SNX
Additional Model/HVIN:	LE910C4-SNXD
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part:	FCC Part 1 (§1.1310) and Part 2 (§2.1091)
ISED Specification:	RSS-102 Issue 6
Test Procedure(s):	KDB 447498 D01
Class III Permissive Change:	Software Update to change from LTE Cat.1 to LTE Cat.4
FCC Grant Date:	05/04/2023
ISED Grant Date:	05/17/2023

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC KDB 447498 D01. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez



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Executive Vice President

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1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations and RSS-102 of Industry Canada.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

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 (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

Table 1-1. FCC limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (W/cm ²)	Average Time (Minutes)
0.003-10	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 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}
f is frequency in MHz				

Table 1-2. ISED limits for Maximum Permissible Exposure (MPE)

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1.2 EUT Description

The **Telit Module FCC ID: RI7LE910C1SNX / IC: 5131A-LE910C1SNX** supports several LTE bands, including LTE bands B5, B2, B12, B13, B66/4.

The EUT is a Category 4 LTE module and is evaluated as a mobile device.

1.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements.

The power generated by each transmitter used in this product was initially measured by a power meter or spectrum analyzer and the powers were recorded.

Friis Transmission Formula

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

Where,

P_d = Power Density (mW/cm²)

π = 3.1416

P_{out} = output power to antenna (mW)

r = distance between observation point and center of the radiator (cm)

G = gain of antenna in linear scale

Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the information in Table 1-1.

Through use of the Friis formula and operation at 20cm distance, the power density is calculated by determining the highest allowed antenna gain that still shows compliance to the RF Exposure limits.

Frequency:	1850 MHz		
FCC Limit	1.000 mW/cm ²		
ISED Limit	4.476 W/m ²		
Distance (cm), R =	20 cm		
Power (dBm), P =	24 dBm	251.19 mW	
FCC TX Max Ant Gain (dB), G =	9.00 dBi		
ISED TX Max Ant Gain (dB), G =	9.00 dBi		
FCC Power Density (S) =	0.397 mW/cm ²	(at 20cm)	
ISED Power Density (S) =	3.969 W/m ²	(at 20cm)	

Table 1-3. Calculated MPE Data for LTE Band B2

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Frequency	824 MHz		
FCC Limit	0.549 mW/cm ²		
ISED Limit	2.576 W/m ²		
Distance (cm), R =	20 cm		
Power (dBm), P =	24 dBm	251.19 mW	
FCC TX Max Ant Gain (dB), G =	10.40 dBi		
ISED TX Max Ant Gain (dB), G =	7.12 dBi		
FCC Power Density (S) =	0.548 mW/cm ²	(at 20cm)	
ISED Power Density (S) =	2.575 W/m ²	(at 20cm)	

Table 1-4. Calculated MPE Data for LTE Band B5

Frequency	699 MHz		
FCC Limit	0.466 mW/cm ²		
ISED Limit	2.302 W/m ²		
Distance (cm), R =	20 cm		
Power (dBm), P =	24 dBm	251.19 mW	
FCC TX Max Ant Gain (dB), G =	9.69 dBi		
ISED TX Max Ant Gain (dB), G =	6.63 dBi		
FCC Power Density (S) =	0.465 mW/cm ²	(at 20cm)	
ISED Power Density (S) =	2.300 W/m ²	(at 20cm)	

Table 1-5. Calculated MPE Data for LTE Band B12

Frequency	777 MHz		
FCC Limit	0.518 mW/cm ²		
ISED Limit	2.474 W/m ²		
Distance (cm), R =	20 cm		
Power (dBm), P =	24 dBm	251.19 mW	
FCC TX Max Ant Gain (dB), G =	10.15 dBi		
ISED TX Max Ant Gain (dB), G =	6.94 dBi		
Power Density (S) =	0.517 mW/cm ²	(at 20cm)	
ISED Power Density (S) =	2.470 W/m ²	(at 20cm)	

Table 1-6. Calculated MPE Data for LTE Band B13

Frequency	1710 MHz		
FCC Limit	1.000 mW/cm ²		
ISED Limit	4.242 W/m ²		
Distance (cm), R =	20 cm		
Power (dBm), P =	24 dBm	251.19 mW	
FCC TX Max Ant Gain (dB), G =	6.00 dBi		
ISED TX Max Ant Gain (dB), G =	6.00 dBi		
FCC Power Density (S) =	0.199 mW/cm ²	(at 20cm)	
ISED Power Density (S) =	1.989 W/m ²	(at 20cm)	

Table 1-7. Calculated MPE Data for LTE Band B66/4

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1.4 Summary of Results

LTE Band	Frequency [MHz]	Maximum Antenna Gain [dBi]	MPE @ 20cm (mW/cm ²)	Limit (mW/cm ²)	Test Result
B12	699-716	9.69	0.465	0.466	PASS
B13	777-787	10.15	0.517	0.518	PASS
B5	824-849	10.40	0.548	0.549	PASS
B66/4	1710-1780	6.00	0.199	1.000	PASS
B2	1850-1910	9.00	0.397	1.000	PASS

Table 1-8. FCC Maximum Permissible Exposure Summary Table

LTE Band	Frequency [MHz]	Maximum Antenna Gain [dBi]	MPE @ 20cm (W/m ²)	Limit (W/m ²)	Test Result
B12	699-716	6.63	2.300	2.302	PASS
B13	777-787	6.94	2.470	2.474	PASS
B5	824-849	7.12	2.575	2.576	PASS
B66/4	1710-1780	6.00	1.989	4.242	PASS
B2	1850-1910	9.00	3.969	4.476	PASS

Table 1-9. ISED Maximum Permissible Exposure Summary Table

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2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 20cm separation distance as specified in §2.1091 of the FCC Rules and Regulations and Health Canada Safety Code 6. An appropriate RF exposure compliance statement will be placed in the user's manual.

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