

**RF Exposure Report
(mobile devices)
47 CFR 2.1091
RSS-102 Issue 6**

Report No.: WIRS135823 – FCC & ISSED RF Exposure

Test Model: ATU1650MB

Received Date: 04/24/2025

Test Date(s): 04/24/2025

Issued Date: May 16, 2025

Applicant: CalAmp Wireless Networks Corporation

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1. Certificate of Conformity

Product: CalAmp

Brand: CalAmp

Test Model: ATU1650MB

Sample Status: Production

Applicant: CalAmp Wireless Networks Corporation

Test Date(s): 04/24/2025

Standard: 47 CFR FCC Part 2.1091 and FCC Part 1.1310
RSS-102 Issue 6



Chin Ming Lui
EMC Laboratory Engineer

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 22 Subpart H and Part 24 Subpart E and Part 27 Subpart L of the FCC Rules under normal use and maintenance.



Suresh Kondapalli
EMC & Wireless Engineering Manager

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	May 15, 2025	Initial Issue.
1	May 16, 2025	FCC ID and IC ID Updated.
2	May 16, 2025	ISED Limits under BLE + Cellular Radios Simultaneous Transmission on Page 9 of 11: Units Corrected to W/m ²
3	May 29, 2025	Removed Attachment.

1. EUT General info

The ATU1650MB is a battery powered, next generation wireless GPS tracking with compact discreet form factor. It is a single box enclosure incorporating smart Cellular modem, BLE chip and GNSS chip as follows:

Smart modem: BG95M5

FCC ID: XMR202005BG95M5 IC: 10224A-2020BG95M5

Using proprietary LDS antenna with peak gain of less than 1 dBi

Bluetooth Low Energy “BLE” using 2.4GHz designed by CalAmp Wireless Networks is based on the Texas instrument BLE Chip CC2652 with an operation range of 2402 - 2480 MHz. The Max Tx power from the BT Chip is +5 dBm using a chip antenna: EVELTA ACA5036

The BLE function will help connecting and communicating with other peripherals and co-transmit with cellular.

2. RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 issue 6 were followed.

2.1 FCC ID

FCC ID: ATU-1650MB

IC: 5843C-1650MB

2.2 FCC Limits

According to FCC 1.1310 Table 1: 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)

Table 1 to § 1.1310(e)(1) – 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				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300 - 1500	...	...	F/300	6
1500 - 100,000	...	...	5	6
(B) Limits For General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	*100	30
1.34 – 30	824/f	2.19/f	*180/f ²	30
30 – 300	27.5	0.073	0.2	30
300 - 1500	...	...	F/1500	30
1500 - 100,000	...	...	1.0	30

F = Frequency in MHz

* = plane wave equivalent density

2.3 Industry Canada Limits

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range	Electric Field	Magnetic Field	Power Density	Reference Period
(MHz)	(V/m rms)	(A/m rms)	(W/m ²)	(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	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$
Note: f is frequency in MHz. * Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

3 Test Results (Mobile Configuration)

3.1 Classification

Radio is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user's manual.

3.2 Maximum RF Power

BLE Radio:

Modulation	Frequency Range (MHz)	Max. RF output power ¹ (dBm)	Max. RF output Power with Tune Up ² (dBm)	Max. Antenna Gain ³ (dBi)	Max. EIRP ⁴ (dBm)	Max. EIRP (mWatts)
GFSK	2400 – 2483.5	5	6	2.4	8.4	6.918

¹Note: Max Tx Power declared by client in “ATU1650MB Operation Description”. Operational Description is attached in Appendix A.

²Note: Tune-up tolerance of +1 dB.

³Note: Max internal antenna gain obtained from “ATU1650 BT ANTENNA TEST REPORT” by Queclink. Antenna specification sheet is attached in Appendix A.

⁴Note: Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

Cellular Radio:

Band	Frequency Range (MHz)	Max. RF output power (dBm) ¹	Max. RF output Power with Tune Up ² (dBm)	Max. Antenna Gain ³ (dBi)	Max EIRP ⁴ (dBm)	Max EIRP (mWatts)
LTE CAT-M1 B12/85	698 – 716	23	24	-4.17	19.83	96.16
LTE CAT-M1 B13	777 – 787	23	24	-3.02	20.98	125.3
LTE CAT-M1 B5	824 – 849	23	24	-2.65	21.35	136.5
LTE CAT-M1 B4/66	1710 – 1780	23	24	-0.05	23.95	248.3
LTE CAT-M1 B2/25	1850 – 1915	23	24	0.55	24.55	285.1

¹Note: Maximum transmit power for LTE CAT-M1 user equipment (UE) as declared by client in “ATU1650MB Operation Description”. Operational Description is attached in Appendix A.

²Note: Tune-up tolerance of +1 dB.

³Note: Max internal antenna gain obtained from “ATU1650-gain” specification sheet (attached in Appendix A).

⁴Note: Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

3.3 RF Exposure Calculation

FCC limits

Calculations for this report are based on highest power declared for each band by module manufacturer

BLE Radio:

Modulation	Frequency Range (MHz)	Max. EIRP ¹ (dBm)	Max. EIRP (mW)	Power Density (mW/cm ²) @20 cm	FCC Limit (mW/cm ²)	Results
GFSK	2400 – 2483.5	8.4	6.918	0.001376	1.0	Complies

¹Note: Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

Cellular Radio:

Band	Frequency Range (MHz)	Max. EIRP ¹ (dBm)	Max. EIRP (mW)	Power Density (mW/cm ²) @20 cm	FCC Limit (mW/cm ²)	Results
LTE CAT-M1 B12/85	699 – 716	19.83	96.16	0.01913	0.466	Complies
LTE CAT-M1 B13	777 – 787	20.98	125.3	0.02493	0.518	Complies
LTE CAT-M1 B5	824 – 849	21.35	136.5	0.02716	0.549	Complies
LTE CAT-M1 B4/66	1710 – 1780	23.95	248.3	0.0494	1.0	Complies
LTE CAT-M1 B2/25	1850 – 1915	24.55	285.1	0.05672	1.0	Complies

¹Note: Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

BLE + Cellular Radios Simultaneous Transmission:

Worst-case scenario: BLE and LTE CAT-M1 B2/25 transmitting simultaneously.

Power Density of Simultaneous Transmitting Radios = $0.001376 \text{ mW/cm}^2 + 0.05672 \text{ mW/cm}^2 = 0.058096 \text{ mW/cm}^2$, which complies with the worst-case FCC limit of 0.466 mW/cm^2 .

ISED Limits

Calculations for this report are based on highest power declared for each band by module manufacturer

BLE Radio:

Modulation	Frequency Range (MHz)	Max. EIRP ¹ (dBm)	Max. EIRP (mW)	Power Density (W/m ²) @20 cm	RSS Limit (W/m ²)	Results
GFSK	2400 – 2483.5	8.4	6.918	0.01376	5.348	Complies

¹Note: Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

Cellular Radio:

Technology	Frequency Range (MHz)	Max. EIRP ¹ (dBm)	Max. EIRP (mW)	Power Density (W/m ²) @20 cm	RSS Limit (W/m ²)	Results
LTE CAT-M1 B12/85	699 – 716	20.98	125.3	0.1913	2.302	Complies
LTE CAT-M1 B13	777 – 787	21.35	136.5	0.2493	2.474	Complies
LTE CAT-M1 B5	824 – 849	23.95	248.3	0.2716	2.576	Complies
LTE CAT-M1 B4/66	1710 – 1780	24.55	285.1	0.494	4.242	Complies
LTE CAT-M1 B2/25	1850 – 1915	19.83	96.16	0.5672	4.476	Complies

¹Note: Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

BLE + Cellular Radios Simultaneous Transmission:

Worst-case scenario: BLE and LTE CAT-M1 B2/25 transmitting simultaneously.

Power Density of Simultaneous Transmitting Radios = 0.01376 W/m² + 0.5672 W/m² = 0.58096 W/m², which complies with the worst-case RSS limit of 2.302 W/m².

Power Density Calculation

$$P_d = (P_{out} * G) / (4 * \pi * R^2)$$

Where:

P_d = Power density in W/m²

P_{out} = Output power from the antenna in watts (W)

G = Gain of the antenna in linear scale

R = Distance between observation point and center of the radiator in meters (m)

4 Conclusion

This device is compliant with RF Exposure requirements of the limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 Issue 6 for General Public (Uncontrolled Environment).

Worst-case scenario of BLE and LTE CAT-M1 B2/25 simultaneous transmission comply with both FCC and ISED MPE limits.