

Bureau Veritas Consumer Product Services, Inc.	Test Report Number:
One Distribution Center Circle #1, Littleton, MA 01460	EY0476-4 Issue 2



CFR Title 47 FCC Parts



1.1307, 1.1310, 2.1091

RF Exposure Exhibit

Prepared for RSAE Labs, Inc.

Product Name: TGU-1 and MGU-1

Hardware Version: 03-2004-01

Prepared by Yunus Faziloglu Sr. Wireless Engineer	Approved by Ahmed Ait Ahmed EMC Manager
	
Issue Date: Jan 15, 2025	Issue Number: 2



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1 Device Under Test

1.1 Product Information

Project Number:	EY0476	
Applicant Information:	RSAE Labs, Inc.	
	1002 Arthur Drive Suite 200, Lynn Haven, FL 32444	
Product Marketing Name:	TGU-1 and MGU-1	
Hardware Version	03-2004-01	
Additional Versions	Product Marketing Name	Hardware Version Identification Number
	TGU-1	03-2001-05
	TGU-1	03-2001-06
	TGU-1	03-2001-07
	TGU-1	03-2001-08
	TGU-1	03-2001-09
	MGU-1	03-2004-01
	MGU-1	03-2004-02
	MGU-1	03-2004-03
	MGU-1	03-2004-04
	MGU-1	03-2004-05
	MGU-1	03-2004-06
	Version variants are for marketing purposes only. All versions are electrically identical to the tested version indicated in bold above.	
Separation Distance:	20cm	
Exposure Category of DUT:	Mobile	
Multiple Simultaneous RF Sources:	Yes	
Type of Evaluation:	MPE Calculation	
Evaluation Method:	447498 D01 General RF Exposure Guidance v06	
Deviations from Standard:	None	

1.2 Technical Information

Radio 1 (Built into EUT)	2.4GHz 802.15.4
FCC ID:	2ASIM-TGU1
Exposure Category of Transmitter:	Mobile
Maximum Conducted Output Power (mW):	2.61mW (Average)
Maximum Tune-up Tolerance (dB):	N/A
Maximum Antenna Gain (dBi):	2.62dBi Peak Customer supplied information

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Radio 2 (Integrated Module into EUT)	LTE CAT-M1
FCC ID:	XPYUBX19KM01
Exposure Category of Transmitter:	Mobile
Maximum Conducted Output Power (mW):	(From the RF Exposure exhibit of the original filing on FCC database) Band 2: 316.23mW Band 4: 316.23mW Band 12: 316.23mW
Maximum Tune-up Tolerance (dB):	(From the RF Exposure exhibit of the original filing on FCC database) Not listed
Maximum Antenna Gain (dBi):	4.6dBi Peak (for all LTE Bands) Customer supplied information

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2 Test Laboratory Information

Location of Test Lab:	One Distribution Center Circle #1 Littleton, MA 01460 (978) 486-8880
Key Contact:	Yunus Faziloglu Yunus.faziloglu@bureauveritas.com
Laboratory Accreditations:	BUREAU VERITAS CONSUMER PRODUCTS SERVICES, INC is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
ISO/IEC 17025:2017:	1627-01
FCC Test Site Number:	US1028

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3 RF Exposure Limit:

According to CFR Title 47 FCC section 1.1310, the criteria listed in the following table shall be used to evaluate Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

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)	Averaging time (minutes)
(i) LIMITS FOR OCCUPATIONAL/CONTROLLED EXPOSURE				
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
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

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4 RF Exposure – MPE Evaluation

Power density can be calculated as follows

$$S = EIRP / 4\pi r^2$$

where,

S Power Density in mW/cm^2

EIRP Effective Isotropic Radiated Power in mW

r Separation Distance from Antenna in cm

Power densities for each radio and their ratio to corresponding limits are as follows:

Radio	f(MHz)	Distance (cm)	AntGain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (mW)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit Ratio
802.15.4	2440	20	2.62	4.163	6.783	4.767602	0.0009	1	0.0009
LTE Band 2	1850.7	20	4.6	25	29.6	912.0108	0.1814	1	0.1814
LTE Band 4	1710.7	20	4.6	25	29.6	912.0108	0.1814	1	0.1814
LTE Band 12	699.7	20	4.6	25	29.6	912.0108	0.1814	0.4665	0.3889

Simultaneous transmission configurations:

802.15.4 Radio can simultaneously transmit with any of the LTE bands listed above. Since Band 12 has the highest ratio to its limit, worst-case combination would be with LTE Band 12.

Sum of power density to limit ratios

802.15.4 0.0009

LTE Band 12 0.3889

Sum 0.3898 < 1

Result: Pass

5 Conclusion

Therefore device complies with 1.1307, 1.1310 and 2.1091 of the FCC rules for RF radiation exposure limits for general population as a mobile device ($d > 20cm$).

Document Revisions

Issue No.	Summary of Changes	Date Issued	Prepared by	Approved by
1	Original Release	Nov 27, 2024	YF	AA
2	Updated applicant address	Jan 15, 2025	YF	AA

End of Report