TEST REPORT

Applicant:	Targa Telematics spa
Address:	Via Reginato, 87 – 31100 Treviso (TV) -Italy
Equipment Type:	Vehicle Tracker
Model Name:	GV301TP 4G WW
Brand Name:	Targa Telematics
FCC ID:	2AVLG-GV301TP4GWW
Test Standard:	47 CFR Part 2.1091 KDB 447498 D04 v01
Test Date:	Aug. 02, 2022 - Aug. 08, 2022
Date of Issue:	Aug. 23, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Julie Zhu **Checked by:** Liyao Zong **Approved by:** Wei Yanquan (Chief Engineer)

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Aug. 23, 2022	Initial Issue

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☑ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Targa Telematics spa
Address	Via Reginato, 87 – 31100 Treviso (TV) -Italy

2.2 Manufacturer Information

Manufacturer	Targa Telematics spa
Address	Via Reginato, 87 – 31100 Treviso (TV) -Italy

2.3 Factory Information

Factory	Queclink wireless Solutions Co., Ltd.
Address	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China

2.4 General Description for Equipment under Test (EUT)

EUT Name	Vehicle Tracker
Model Name Under Test	GV301TP 4G WW
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V1.06
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	BPI
	Model No.	PL 603450
	Serial No.	N/A
	Capacity	1100 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.2 V

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/900/1800/1900 MHz 4G Network FDD LTE-M1 Band 1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/B85 FDD LTE NB-IOT Band1/2/3/4/5/8/12/13/18/19/20/25/28/66/71/85 Bluetooth (BLE), GPS, GLONASS

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth, LTE FDD LTE-M1 LTE FDD NB-IOT		
Frequency Range	Bluetooth BLE	2400 ~ 2483.5 MHz	
	GSM 850	TX: 824~849 MHz	RX: 869~894 MHz
	GSM 1900	TX: 1850~1910 MHz	RX: 1930~1990 MHz
	LTE-M1 Band 2	TX: 1850~1910 MHz	RX: 1930~1990 MHz
	NB-IOT Band 2	TX: 1850~1910 MHz	RX: 1930~1990 MHz
	LTE-M1 Band 4	TX: 1710~1755 MHz	RX: 2110~2155 MHz
	LTE-M1 Band 5	TX: 824~849 MHz	RX: 869~894 MHz
	NB-IOT Band 5	TX: 824~849 MHz	RX: 869~894 MHz
	LTE-M1 Band 12	TX: 699~716 MHz	RX: 729~746 MHz
	LTE-M1 Band 13	TX: 777~787 MHz	RX: 746~756 MHz
	LTE-M1 Band 25	TX: 1850~1915 MHz	RX: 1930~1995 MHz
	NB-IOT Band 25	TX: 1850~1915 MHz	RX: 1930~1995 MHz
	LTE-M1 Band 26(Part22)	TX: 824~849 MHz	RX: 869~894 MHz
	LTE-M1 Band 26(Part90)	TX: 814~824 MHz	RX: 859~869 MHz
	LTE-M1 Band 66	TX: 1710~1780 MHz	RX: 2110~2180 MHz
	LTE-M1 Band 85	TX: 698~716 MHz	RX: 728~746 MHz
Antenna Type	Bluetooth	Ceramic Antenna	
	WWAN	PIFA Antenna	
Exposure Category	General Population/Uncontrolled Exposure		
EUT Stage	Mobile Device		

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices
2	KDB 447498 D04	447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Device:

CFR Title 47 §2.1091(b)

(b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP20cm in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{\text{th}}\ (\text{mW}) = ERP_{20\,\text{cm}}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \qquad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold Pth (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula (B.2).

$$P_{\text{th}}\,(\text{mW}) = \begin{cases} ERP_{20\,\text{cm}}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,\text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases} \qquad \text{(B.2)}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,\text{cm}}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1).
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

5 ASSESSMENT RESULT

5.1 Output Power

Bluetooth	
Mode	GFSK
Conducted Power (dBm)	2.77
ERP (dBm)	-1.98
Note: This report listed the worst case EIRP value, please refer to RF test report BL-EC2280024-601 issued by Shenzhen BALUN Technology Co., Ltd. On Aug. 09, 2022 for more details.	

GSM		
Mode	GPRS 850	GPRS 1900
Conducted Power (dBm)	32.47 Note 1	29.97 Note 2
Antenna Gain (dBd)	-5.5	-3.0
ERP (dBm)	26.97	26.97
Note1: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R1V1 issued by TA Technology (Shanghai) Co., Ltd. On July 23, 2020 for more details. Note2: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R2V1 issued by TA Technology (Shanghai) Co., Ltd. On July 23, 2020 for more details.		

LTE-NB-IoT			
Mode	Band 5	Band 2	Band 25
Conducted Power (dBm)	23.61 Note 1	23.95 Note 2	23.95 Note 2
Antenna Gain (dBd)	-5.5	-3.0	-3.0
ERP (dBm)	18.11	20.95	20.95
Note 1: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R5 issued by TA Technology (Shanghai) Co., Ltd. On July. 01, 2020 for more details. Note 2: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R6 issued by TA Technology (Shanghai) Co., Ltd. On July. 01, 2020 for more details.			

LTE-M1					
Mode	Band 2	Band 4	Band 5	Band 12	Band 13
Conducted Power (dBm)	23.64 Note 2	23.76 Note 4	23.98 Note 1	23.60 Note 4	23.33 Note 4
Antenna Gain (dBd)	-3.0	-3.5	-5.5	-6.9	-7.4
ERP (dBm)	20.64	20.26	18.48	16.70	15.93
Mode	Band 25	Band 26(Part22)	Band 26(Part90)	Band 66	Band 85
Conducted Power (dBm)	23.65 Note 2	23.99 Note 1	23.66 Note 3	23.89 Note 4	23.41 Note 4
Antenna Gain (dBd)	-3.0	-6.8	-6.8	-3.4	-6.9
ERP (dBm)	20.65	17.19	16.86	20.49	16.51
Note 1: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R1V1 issued by					

TA Technology (Shanghai) Co., Ltd. On July 23, 2020 for more details.

Note 2: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R2V1 issued by TA Technology (Shanghai) Co., Ltd. On July 23, 2020 for more details.

Note 3: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R3V1 issued by TA Technology (Shanghai) Co., Ltd. On July 23, 2020 for more details.

Note 4: This report listed the worst case Conducted Power value, please refer to RF test report R2005A0283-R4V1 issued by TA Technology (Shanghai) Co., Ltd. On August 5, 2020 for more details.

5.2 Turn-up power

Mode		Conducted power Range (dBm)	ERP Range (dBm)
Bluetooth		1.50-3.50	(-3.25)- (-1.25)
GSM	GPRS 850	30.00-33.00	24.50-27.50
	GPRS 1900	28.00-31.00	25.00-28.00
LTE	CatM1 Band 2	22.00-25.00	19.00-22.00
	NB-IOT Band 2	22.00-25.00	19.00-22.00
	CatM1 Band 4	22.00-25.00	18.50-21.50
	CatM1 Band 5	22.00-25.00	16.50-19.50
	NB-IOT Band 5	22.00-25.00	16.50-19.50
	CatM1 Band 12	22.00-25.00	15.10-18.10
	CatM1 Band 13	22.00-25.00	14.60-17.60
	CatM1 Band 25	22.00-25.00	19.00-22.00
	NB-IOT Band 25	22.00-25.00	19.00-22.00
	CatM1 Band 26(Part22)	22.00-25.00	15.20-18.20
	CatM1 Band 26(Part90)	22.00-25.00	15.20-18.20
	CatM1 Band 66	22.00-25.00	18.60-21.60
	CatM1 Band 85	22.00-25.00	15.10-18.10
Note1: ERP= EIRP -2.15dB. Note2: According KDB 447497 D04, used the greater of maximun conducted power and ERP to compare with the threshold value Pth.			

5.3 RF Exposure Evaluation Result

Evolution mode	Maximum power (dBm)	Antenna Gain (dBd)	Maximum ERP (mw)	Distance (cm)	Threshold Power (mW)	Power / Limit	Verdict
GPRS 850	33.00	-5.5	562.34	20.00	1680.960	0.3345	Pass
GPRS 1900	31.00	-3.0	630.96	20.00	3060.000	0.2062	Pass
CatM1 Band 2	25.00	-3.0	158.49	20.00	3060.000	0.0518	Pass
NB-IOT Band 2	25.00	-3.0	158.49	20.00	3060.000	0.0518	Pass
CatM1 Band 4	25.00	-3.5	141.25	20.00	3060.000	0.0462	Pass
CatM1 Band 5	25.00	-5.5	89.13	20.00	1680.960	0.0530	Pass
NB-IOT Band 5	25.00	-5.5	89.13	20.00	1680.960	0.0530	Pass
CatM1 Band 12	25.00	-6.9	64.57	20.00	1425.960	0.0453	Pass
CatM1 Band 13	25.00	-7.4	57.54	20.00	1585.080	0.0363	Pass
CatM1 Band 25	25.00	-3.0	158.49	20.00	3060.000	0.0518	Pass
NB-IOT Band 25	25.00	-3.0	158.49	20.00	3060.000	0.0518	Pass
CatM1 Band 26(Part22)	25.00	-6.8	66.07	20.00	1680.960	0.0393	Pass
CatM1 Band 26(Part90)	25.00	-6.8	66.07	20.00	1660.560	0.0398	Pass
CatM1 Band 66	25.00	-3.4	144.54	20.00	3060.000	0.0472	Pass
CatM1 Band 85	25.00	-6.9	64.57	20.00	1423.920	0.0453	Pass
Bluetooth	3.50	-4.75	0.75	20.00	3060.000	0.0002	Pass

5.4 Collocated Power Density Calculation

Evolution mode	Frequency(MHz)	Power Density/Limit	Σ(Power Density / Limit) of GPRS 850 + Bluetooth	Verdict
GPRS 850	824MHz ~ 849MHz	0.3345	**0.3347**	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.0002		

Evolution mode	Frequency(MHz)	Power Density/Limit	Σ(Power Density / Limit) of CatM1 Band 5 + Bluetooth	Verdict
CatM1 Band 5	824MHz ~ 849MHz	0.0530	0.0532	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.0002		

Evolution mode	Frequency(MHz)	Power Density/Limit	Σ(Power Density / Limit) of NB-IoT Band 5 + Bluetooth	Verdict
NB-IoT Band 5	824MHz ~ 849MHz	0.0530	0.0532	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.0002		

Note:

1. Σ(Power / Limit): This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for WWAN + Bluetooth.
2. Both of the Bluetooth /WWAN can transmit simultaneously, the formula of calculated the Power is
   CP1 / LP1 + CP2 / LP2 + ……etc. < 1
   CP = Calculation power
   LP = Limit of power
3. The worst-case situation is **0.3347**, which is less than “1”. This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
4. The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz, 699~716 MHz, 777~787 MHz,814~824 MHz, 824 MHz~ 849 MHz, 698~716 MHz, 1710~1755 MHz,1710~1780 MHz, 1850~1915 MHz, the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
5. More power list please refer to RF test report.

5.5 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

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--END OF REPORT--