



RF Test Report

Applicant: TESLA INC
Address: 3500 Deer Creek Rd, Palo Alto, CA 94304 USA
Product: 5G NR Module
Model No.: TAG555Q-GL
Brand Name: TESLA
FCC ID: 2AEIM-TAG555Q
Standards: 47 CFR Part 2.1093
Report No.: PD20240042RF03
Issue Date: 2024/07/25
Test Result: PASS *

* Testing performed at Hefei Panwin Technology Co., Ltd. on the above equipment indicates the product meets the requirements of the relevant standards.

Reviewed By: Charlie Wang

Approved By: Alec Yang

Hefei Panwin Technology Co., Ltd.

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Revision History

Report No.	Version	Description	Issue Date	Note
PD20240042RF03	01	Initial Report	2024/07/25	Valid

Remark:

- The samples tested have been evaluated in accordance with 47 CFR Part2.1093/47 CFR Part 1.1307, and have been proven to meet the applicable limit requirements.

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1 Test Laboratory

1.1 Notes of the Test Report

This report is invalid without signature of auditor and approver or with any alterations. The report shall not be partially reproduced without written approval of the testing company. Entrusted test results are only responsible for incoming samples. If there is any objection to the testing report, it shall be raised to the testing company within 15 days from the date of receiving the report. In the test results, "NA" means "not applicable", and the test items marked with "Δ" are subcontracted projects.

1.2 Testing Laboratory

Company Name	Hefei Panwin Technology Co., Ltd.
Address	Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province, China
Telephone	+86-0551-63811775
Post Code	230031

2 General Description of Equipment under Test

2.1 Details of Application

Applicant	TESLA INC
Applicant Address	3500 Deer Creek Rd, Palo Alto, CA 94304 USA
Manufacturer	TESLA INC
Manufacturer Address	3500 Deer Creek Rd, Palo Alto, CA 94304 USA

2.2 Details of EUT

Product	5G NR Module
Model	TAG555Q-GL
Hardware Version	R1.0
Software Version	TAG555QGLABR06A01M8G_OCPU
Antenna Type	☒ External ☐ Integrated
Note: The declared of product specification for EUT and/or Antenna presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.	

3 Test Condition

3.1 Laboratory Environment

Temperature	Min.= 20℃, Max.=30℃
Relative Humidity	Min.= 25%, Max.=75%
Ground System Resistance	< 1 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

4 RF Exposure Exemption

1. Per 1.1307(b)(3), (i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

$$\text{Where } x = -\log_{10}\left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}}\right) \text{ and } f \text{ is in GHz}$$

$$\text{and } ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} < f \leq 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} < f \leq 6 \text{ GHz} \end{cases}$$

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C)—Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$
1.34-30	$3,450 R^2 / f^2$
30-300	$3.83 R^2$
300-1,500	$0.0128 R^2 f$
1,500-100,000	$19.2 R^2$

2. For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

P_{th,i} = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j = the ERP of fixed, mobile, or portable RF source j.

ERP_{th,j} = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluated_k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit_k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter. The relationship between EIRP and ERP is: ERP (dBm) = EIRP - 2.15, Where EIRP is the sum of the conducted power (dBm) and the antenna gain (dBi)

The sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance.

Appendix A – Test Results

A.1 Maximum Measured Conducted Output Power and Antenna Gain

Mode	Burst average power(dBm)		TX Freq. (MHz)		Maximum Antenna Gain (dBi)	
	GSM 850	GSM 1900	GSM 850	GSM 1900	GSM 850	GSM 1900
GPRS (GMSK, 1 Tx slot)	35.00	32.00	824 to 849	1850 to 1910	2.68	0.25
GPRS (GMSK, 2 Tx slots)	35.00	32.00				
GPRS (GMSK, 3 Tx slots)	33.20	30.20				
GPRS (GMSK, 4 Tx slots)	32.00	29.00				
EDGE (8PSK, 1 Tx slot)	30.00	29.00				
EDGE (8PSK, 2 Tx slot)	30.00	29.00				
EDGE (8PSK, 3 Tx slot)	28.20	27.20				
EDGE (8PSK, 4 Tx slot)	27.00	26.00				

Band	TX Freq. (MHz)	Maximum conducted output power (dBm)	Maximum Antenna Gain (dBi)
WCDMA Band II	1850 to 1910	25.00	0.25
WCDMA Band IV	1710 to 1755	25.00	1.47
WCDMA Band V	824 to 849	25.00	2.68
LTE Band 2	1850 to 1910	25.00	0.25
LTE Band 4	1710 to 1755	25.00	1.47
LTE Band 5	824 to 849	25.00	2.68
LTE Band 7	2500 to 2570	25.00	0.55
LTE Band 12	699 to 716	25.00	-0.20
LTE Band 13	777 to 787	25.00	1.54
LTE Band 14	788 to 798	25.00	2.42
LTE Band 17	704 to 716	25.00	-0.20
LTE Band 25	1850 to 1915	25.00	0.25
LTE Band 26	814 to 849	25.00	2.87
LTE Band 38	2570 to 2620	25.00	-0.23
LTE Band 41	2496 to 2690	25.00	0.78
LTE Band 42 (3450 to 3550)	3450 to 3550	25.00	1.61
LTE Band 48	3550 to 3700	21.60	-3.65
LTE Band 66	1710 to 1780	25.00	1.47
LTE Band 71	663 to 698	25.00	1.22
NR Band n2	1850 to 1910	25.00	0.25
NR Band n5	824 to 849	25.00	2.68

NR Band n7	2500 to 2570	25.00	0.55
NR Band n12	699 to 716	25.00	-0.20
NR Band n14	788 to 798	25.00	2.42
NR Band n25	1850 to 1915	25.00	0.25
NR Band n26	814 to 849	25.00	2.87
NR Band n38	2570 to 2620	25.00	-0.23
NR Band n41	2496 to 2690	25.00	0.78
NR Band n48	3550 to 3700	21.60	-3.65
NR Band n66	1710 to 1780	25.00	1.47
NR Band n71	663 to 698	25.00	1.22
NR Band n77 (3450 to 3550)	3450 to 3550	27.00	1.61
NR Band n77 (3700 to 3980)	3700 to 3980	27.00	2.59
NR Band n78 (3450 to 3550)	3450 to 3550	27.00	1.61
NR Band n78 (3700 to 3800)	3700 to 3800	27.00	2.59
MIMO n77 (3450 to 3550)	3450 to 3550	27.00	1.61
MIMO n77 (3700 to 3980)	3700 to 3980	27.00	2.59
MIMO n78 (3450 to 3550)	3450 to 3550	27.00	1.61
MIMO n78 (3700 to 3800)	3700 to 3800	27.00	2.59

A.2 SAR - Based Exemption

Separation Distance = 13.0 cm

Band	Frequency (MHz) Low	Frequency (MHz) High	Maximum Power (dBm)	Antenna Gain (dBi)	Average EIRP (mW)	Average ERP (mW)	Maximum Average Power (mW)	Pi [Maximum Average ERP or Power] (mW)	Part1.13 07 option(b) Threshold (mW)	Part1.13 07 option(b) Pi/Pth ratio
GSM 850 GPRS 1 Tx slot	824.0	849.0	35.00	2.68	732.67	446.59	395.28	446.59	917.55	0.487
GSM 850 GPRS 2 Tx slots	824.0	849.0	35.00	2.68	1465.35	893.18	790.57	893.18	917.55	0.973
GSM 850 GPRS 3 Tx slots	824.0	849.0	33.20	2.68	1452.22	885.18	783.49	885.18	917.55	0.965
GSM 850 GPRS 4 Tx slots	824.0	849.0	32.00	2.68	1468.82	895.30	792.45	895.30	917.55	0.976
GSM 850 EGPRS 1 Tx slot	824.0	849.0	30.00	2.68	231.69	141.22	125.00	141.22	917.55	0.154
GSM 850 EGPRS 2 Tx slots	824.0	849.0	30.00	2.68	463.38	282.45	250.00	282.45	917.55	0.308
GSM 850 EGPRS 3 Tx slots	824.0	849.0	28.20	2.68	459.23	279.92	247.76	279.92	917.55	0.305
GSM 850 EGPRS 4 Tx slots	824.0	849.0	27.00	2.68	464.48	283.12	250.59	283.12	917.55	0.309
GSM 1900 GPRS 1 Tx slot	1850.0	1910.0	32.00	0.25	209.85	127.91	198.11	198.11	1384.41	0.143
GSM 1900 GPRS 2 Tx slots	1850.0	1910.0	32.00	0.25	419.70	255.82	396.22	396.22	1384.41	0.286
GSM 1900 GPRS 3 Tx slots	1850.0	1910.0	30.20	0.25	415.94	253.53	392.67	392.67	1384.41	0.284
GSM 1900 GPRS 4 Tx slots	1850.0	1910.0	29.00	0.25	420.70	256.43	397.16	397.16	1384.41	0.287
GSM 1900 EGPRS 1 Tx slot	1850.0	1910.0	29.00	0.25	210.35	128.22	198.58	198.58	1384.41	0.143
GSM 1900 EGPRS 2 Tx slots	1850.0	1910.0	29.00	0.25	210.35	128.22	198.58	198.58	1384.41	0.143
GSM 1900 EGPRS 3 Tx slots	1850.0	1910.0	27.20	0.25	208.46	127.07	196.80	196.80	1384.41	0.142
GSM 1900 EGPRS 4 Tx slots	1850.0	1910.0	26.00	0.25	210.85	128.52	199.05	199.05	1384.41	0.144
WCDMA Band II	1850.0	1910.0	25.00	0.25	334.97	204.17	316.23	316.23	1384.41	0.228
WCDMA Band IV	1710.0	1755.0	25.00	1.47	443.61	270.40	316.23	316.23	1394.64	0.227
WCDMA Band V	824.0	849.0	25.00	2.68	586.14	357.27	316.23	357.27	917.55	0.389
LTE Band 2	1850.0	1910.0	25.00	0.25	334.97	204.17	316.23	316.23	1384.41	0.228
LTE Band 4	1710.0	1755.0	25.00	1.47	443.61	270.40	316.23	316.23	1394.64	0.227
LTE Band 5	824.0	849.0	25.00	2.68	586.14	357.27	316.23	357.27	917.55	0.389
LTE Band 7	2500.0	2570.0	25.00	0.55	358.92	218.78	316.23	316.23	1345.96	0.235
LTE Band 12	699.0	716.0	25.00	-0.20	302.00	184.08	316.23	316.23	815.14	0.388
LTE Band 13	777.0	787.0	25.00	1.54	450.82	274.79	316.23	316.23	879.60	0.360
LTE Band 14	788.0	798.0	25.00	2.42	552.08	336.51	316.23	336.51	888.54	0.379
LTE Band 17	704.0	716.0	25.00	-0.20	302.00	184.08	316.23	316.23	819.33	0.386
LTE Band 25	1850.0	1915.0	25.00	0.25	334.97	204.17	316.23	316.23	1384.41	0.228
LTE Band 26	814.0	849.0	25.00	2.87	612.35	373.25	316.23	373.25	909.53	0.410
LTE Band 38	2570.0	2620.0	25.00	-0.23	189.85	115.72	200.17	200.17	1342.49	0.149
LTE Band 41	2496.0	2690.0	25.00	0.78	239.55	146.02	200.17	200.17	1346.16	0.149
LTE Band 42 (3450 to 3550)	3450.0	3550.0	25.00	1.61	290.00	176.77	200.17	200.17	1306.02	0.153

LTE Band 48	3550.0	3700.0	21.60	-3.65	39.48	24.07	91.50	91.50	1302.53	0.070
LTE Band 66	1710.0	1780.0	25.00	1.47	443.61	270.40	316.23	316.23	1394.64	0.227
LTE Band 71	663.0	698.0	25.00	1.22	418.79	255.27	316.23	316.23	784.72	0.403
5G NR n2	1850.0	1910.0	25.00	0.25	334.97	204.17	316.23	316.23	1384.41	0.228
5G NR n5	824.0	849.0	25.00	2.68	586.14	357.27	316.23	357.27	917.55	0.389
5G NR n7	2500.0	2570.0	25.00	0.55	358.92	218.78	316.23	316.23	1345.96	0.235
5G NR n12	699.0	716.0	25.00	-0.20	302.00	184.08	316.23	316.23	815.14	0.388
5G NR n14	788.0	798.0	25.00	2.42	552.08	336.51	316.23	336.51	888.54	0.379
5G NR n25	1850.0	1915.0	25.00	0.25	334.97	204.17	316.23	316.23	1384.41	0.228
5G NR n26	814.0	849.0	25.00	2.87	612.35	373.25	316.23	373.25	909.53	0.410
5G NR n38	2570.0	2620.0	25.00	-0.23	299.92	182.81	316.23	316.23	1342.49	0.236
5G NR n41	2496.0	2690.0	25.00	0.78	378.44	230.67	316.23	316.23	1346.16	0.235
5G NR n66	1710.0	1780.0	25.00	1.47	443.61	270.40	316.23	316.23	1394.64	0.227
5G NR n71	663.0	698.0	25.00	1.22	418.79	255.27	316.23	316.23	784.72	0.403
5G NR n48	3550.0	3700.0	21.60	-3.65	62.37	38.02	144.54	144.54	1302.53	0.111
NR Band n77 (3450 to 3550)	3450.0	3550.0	27.00	1.61	726.11	442.59	501.19	501.19	1306.02	0.384
NR Band n77 (3700 to 3980)	3700.0	3980.0	27.00	2.59	909.91	554.63	501.19	554.63	1297.50	0.427
NR Band n78 (3450 to 3550)	3450.0	3550.0	27.00	1.61	726.11	442.59	501.19	501.19	1306.02	0.384
NR Band n78 (3700 to 3800)	3700.0	3800.0	27.00	2.59	909.91	554.63	501.19	554.63	1297.50	0.427
MIMO n77 (3450 to 3550)	3450.0	3550.0	27.00	1.61	726.11	442.59	501.19	501.19	1306.02	0.384
MIMO n77 (3700 to 3980)	3700.0	3980.0	27.00	2.59	909.91	554.63	501.19	554.63	1297.50	0.427
MIMO n78 (3450 to 3550)	3450.0	3550.0	27.00	1.61	726.11	442.59	501.19	501.19	1306.02	0.384
MIMO n78 (3700 to 3800)	3700.0	3800.0	27.00	2.59	909.91	554.63	501.19	554.63	1297.50	0.427

Note:

1. Chose the maximum power to do MPE analysis.
2. The MIMO mode is completely uncorrelated, so selected the higher SISO gain among all antennas as MIMO gain to perform MPE calculation.

A.3 Simultaneous Transmission with SAR - based Test Exemption

LTE Pi/Pth Ratio	LTE Pi/Pth Ratio	Sum of the Ratio LTE + LTE
0.410	0.410	0.820

LTE Pi/Pth Ratio	LTE Pi/Pth Ratio	Sum of the Ratio LTE + 5G NR
0.410	0.427	0.837

Note:

1. According to Part 1.1307 (b)(3)(i)(B), the Pi/Pth Ratio is used for Sim-Tx analysis, above table was showing summation ratio is smaller than 1.

Conclusion:

According to 47 CFR §1.1307 (b)(3)(i)(B), the RF exposure analysis concludes that the RF Exposure is FCC compliant.

Appendix B – The EUT Appearance

Refer to “Attachment A.1: External Photograph” and “ Attachment A.2: Internal Photograph” file.

***** End of the Report *****