

Product Name: LTE Module	Report No: FCC022022-05506RF14
Product Model: EG915N-LA	Security Classification: Open
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TIRT Testing Report



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FCC RF EXPOSURE REPORT

FCC ID: XMR202210EG915NLA

Equipment : LTE Module
Brand Name : Quectel
Test Model : EG915N-LA
Series Model : N/A
Applicant : Quectel Wireless Solutions Co., Ltd
Address : Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer : Quectel Wireless Solutions Co., Ltd
Address : Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Date of Receipt : 2022.09.09
Issued Date : 2022.11.09
Report Version : V1.1
Test Sample : Engineering Sample No.: 20221020018542
Standard(s) : KDB 447498 D04 Interim General RF Exposure Guidance v01

- The test result referred exclusively to the presented test model /sample.
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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
FCC022022-05506RF14	V1.0	Original Report	2022.10.20	Invalid
FCC022022-05506RF14	V1.1	Revised report to address TCB's comments.	2022.11.09	Valid

1. TEST FACILITY

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2. GENERAL CONCLUSION

According to FCC §§1.1307 and KDB 447498 D04, 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).

1) Option A. 1-Mw Test Exemption

Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 Mw, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

2) Option B. SAR-Based Exemption

A more comprehensive exemption, considering a variable power threshold that depends on both the separation distance and power, is provided in § 1.1307(b)(3)(i)(B). This exemption is applicable to the frequency range between 300 MHz and 6 GHz, with test separation distances between 0.5 cm and 40 cm, and for all RF sources in fixed, mobile, and portable device exposure conditions.

Accordingly, a RF source is considered an RF exempt device if its available maximum time-averaged (matched conducted) power or its effective radiated power (ERP), whichever is greater, are below a specified threshold.

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:

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

Where

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

and

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

d = the separation distance (cm);

Table B2-Example Power Thresholds (Mw)

Frequency (MHz)	Distance(mm)										
	Mw	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	

3) Option C MPE-Based Exemption

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	$1,920 R^2$
1.34	–	30	35.6 m	–	1.6 m	$3,450 R^2/f^2$
30	–	300	1.6 m	–	159 mm	$3.83 R^2$
300	–	1,500	159 mm	–	31.8 mm	$0.0128 R^2 f$
1,500	–	100,000	31.8 mm	–	0.5 mm	$19.2R^2$

Subscripts L and H are low and high; λ is wavelength.
 From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

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.

3. PRDUCT INFO

Band	Freq. (MHz)	AVGP (dBm)	Ant. Gain (dBi)	ERP (dBm)	Distances (mm)	Duty (%)	AVGP (Mw)	ERP (Mw)
PCS1900	1909.8	22	8	27.85	200	100%	158.49	609.54
GSM850	848.8	24	9	30.85	200	100%	251.19	1216.19
4Gband 2	1880	25	8	30.85	200	100%	316.23	1216.19
4Gband 5	844	24	9	30.85	200	100%	251.19	1216.19
4Gband 4	1716	25	5	27.85	200	100%	316.23	609.54
4Gband 7	2505	25	8	30.85	200	100%	316.23	1216.19
4Gband 66	1715	25	5	27.85	200	100%	316.23	609.54
BT	2480	15	5	17.85	200	100%	31.62	60.95
2.4G	2462	24	6	27.85	200	100%	251.19	609.54
5G	5825	24	6	27.85	200	100%	251.19	609.54

Note:1:

Band	Burst Turn up Power(dBm)	Division Factors(dB)	Time-Averaged Tune up Power(dBm)
GSM 850	35.00	-9.03	25.97
PCS 1900	32.00	-9.03	22.97

Note:

Division Factors

To average the power, the division factor is as follow:

1Txslot=1 transmit time slot out of 8 time slots=>conducted power divided by(8/1) =>-9.03dB

2Txslot=2 transmit time slot out of 8 time slots=>conducted power divided by(8/2) =>-6.02dB

3Txslot=3 transmit time slot out of 8 time slots=>conducted power divided by(8/3) =>-4.26dB

4Txslot=4 transmit time slot out of 8 time slots=>conducted power divided by(8/4) =>-3.01dB

2: AVGP is output power , output power including tune up tolerance.

3: This MPE analysis is applicable to any collocated transmitters with Max. peak output power for WLAN2.4G & WLAN5G: 24dBm /BT 15dBm

4: A maximum antenna gain of 6 dBi for WLAN/5 dBi for BT has been assumed for all collocated antennas.

5: All antenna gains in this report are the maximum gains calculated according to customer requirements

4. TEST RESULTS

Option B

Band	Freq (MHz)	Pth (mW)	PW (mW)	X	ERP 20cm (mW)	Result Option B
PCS1900	1909.8	3060.00	609.54	1.848	3060	exempt
GSM850	848.8	1731.55	1216.19	1.425	1731.552	exempt
4Gband 2	1880	3060.00	1216.19	1.845	3060	exempt
4Gband 5	844	1721.76	1216.19	1.421	1721.76	exempt
4Gband 4	1716	3060.00	609.54	1.825	3060	exempt
4Gband 7	2505	3060.00	1216.19	1.907	3060	exempt
4Gband 66	1715	3060.00	609.54	1.825	3060	exempt
BT	2480	3060.00	60.95	1.905	3060	exempt
2.4G	2462	3060.00	609.54	1.903	3060	exempt
5G	5825	3060.00	609.54	2.090	3060	exempt

Simultaneous Analysis:

Freq (MHz)	PSD Require	PSD (mW/cm ²)	PSD Limit (mW/cm ²)	Ratio
1909.8	exempt	0.199	1.000	0.20
848.8	exempt	0.397	0.550	0.70
1715	exempt	0.397	1.000	0.40
2480	exempt	0.397	0.550	0.71
2462	exempt	0.199	1.000	0.20
5825	exempt	0.397	1.000	0.40
1715	exempt	0.199	1.000	0.20
2480	exempt	0.199	1.000	0.02
2462	exempt	0.199	1.000	0.20
5825	exempt	0.199	1.000	0.20

BT	WLAN	WWAN	TOTAL	LIMIT	TEST RESULT
0.02	0.20	0.71	0.93	1	PASS

Note:

- (1) Output power including tune up tolerance.
- (2) SAR and MPE evaluation is not required(For A). SAR evaluation is not required(For B). Or MPE evaluation is not required(For C).

End of Test Report