

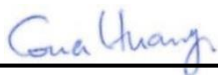
RF EXPOSURE EVALUATION REPORT

FCC ID : GKRRMLN1T
Equipment : 5G LGA Module
Brand Name : COMPAL
Model Name : RML-N1t
Applicant : Compal Electronics, Inc.
No.581 & 581-1, Ruiguang Rd., Neihu
District, Taipei, (114) Taiwan
Manufacturer : Compal Electronics, Inc.
No.581 & 581-1, Ruiguang Rd., Neihu
District, Taipei, (114) Taiwan
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



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Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	5
3. DETERMINATION OF EXEMPTION	6
4. RF EXPOSURE EVALUATION	7
4.1. Standalone assessment	7



History of this test report

Report No.	Version	Description	Issued Date
FA2N2510-01	Rev. 01	Initial issue of report	Mar. 16, 2023
FA2N2510-01	Rev. 02	Update Antenna Port in page 5 and 8	Mar. 24, 2023

**1. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	5G LGA Module
Brand Name	COMPAL
Model Name	RML-N1t
FCC ID	GKRRMLN1T
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz
Mode	LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM

Reviewed by: Jason Wang**Report Producer: Paula Chen**

2. Maximum RF average output power among production units

Technology	Band	Maximum Conducted Power (dBm)
LTE	Band 2 (OAI2/DA2/EA2)	25.00
	Band 4 (OAI2/DA2/OAI4/DA4)	25.00
	Band 4 (EA2/EA4)	24.50
	Band 5 (OAI0)	25.00
	Band 12 (OAI0)	25.00
	Band25 (OAI2/DA2/EA2)	25.00
	Band41 (OAI2/DA2/EA2)	25.00
	Band 48 (OA5)	20.50
	Band 48 (EA1_5)	19.00
	Band 66 (OAI2/DA2/OAI4/DA4)	25.00
	Band 66(EA2/EA4)	24.50
	Band 71 (OAI0)	25.00
5G NR	n25 (OAI2/DA2/EA2) (OAI4/DA4/EA4)	25.00
	n41 (OAI1/EA1_5/OAI2/DA2/EA2/OAI3/EA3_6/OAI4/DA4/EA4)	26.20
	n48 (OA5/EA1_5)	19.00
	n66(OAI2/DA2/OAI4/DA4)	25.00
	n66(EA2/EA4)	24.50
	n71 (OAI0)	25.00
	n77 (OA5/OAI2/DA2/OA6/OAI4/DA4)	27.80
	n77 (EA1_5/EA2/EA3_6/EA4)	26.00

3. Determination of exemption

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 Pth (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). Pth is given by:

$$P_{th} \text{ (mW)} = ERP_{20cm} (d / 20)^x \text{ for distance } d \leq 20cm$$

$$P_{th} \text{ (mW)} = ERP_{20cm} \text{ for distance } 20cm < d \leq 40cm$$

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

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

- (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	$19.2 R^2$.

4. RF Exposure Evaluation

4.1. Standalone assessment

General Note:

1. Pi is mean 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
2. Pth is mean the exemption threshold power (Pth) according to the § 1.1307(b)(3)(i)(B) formula for fixed, mobile, or portable RF source i.
3. In this report was used Part1.1307(b)(3)(i)(B) perform RF Exposure evaluation
4. The distance of 20cm is for this device
5. The sum of the ratios of the applicable terms for MPE-based and MPE shall be less than 1, to determine LTE + NR simultaneous transmission exposure compliance.

Antenna	Band	Standalone Allow Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum ERP (dBm)	Maximum EIRP (mW)	Maximum ERP (mW)	Pi (dBm)	Pi (mW)	RSE EIRP Limit (mW)	Part1.1307 option(b) Threshold (mW)	Part1.1307 option(b) Pi/Pth
OAI	LTE Band 2	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
DA	LTE Band 2	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
EA	LTE Band 2	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
OAI	LTE Band 4	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
DA	LTE Band 4	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
EA	LTE Band 4	5.50	24.50	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
OAI	LTE Band 5	6.00	25.00	31.0	28.85	1258.93	767.36	28.85	767.36	7000	1680.960	0.457
OAI	LTE Band 12	5.50	25.00	30.5	28.35	1122.02	683.91	28.35	683.91	3000	1425.960	0.480
OAI	LTE Band 25	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
DA	LTE Band 25	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
EA	LTE Band 25	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
OAI	LTE Band 41	6.80	25.00	31.8	29.65	1513.56	922.57	29.65	922.57	2000	3060.000	0.301
DA	LTE Band 41	6.80	25.00	31.8	29.65	1513.56	922.57	29.65	922.57	2000	3060.000	0.301
EA	LTE Band 41	6.80	25.00	31.8	29.65	1513.56	922.57	29.65	922.57	2000	3060.000	0.301
OAI	LTE Band 41	6.80	25.00	31.8	29.65	1513.56	922.57	29.65	922.57	2000	3060.000	0.301
DA	LTE Band 41	6.80	25.00	31.8	29.65	1513.56	922.57	29.65	922.57	2000	3060.000	0.301
EA	LTE Band 41	6.80	25.00	31.8	29.65	1513.56	922.57	29.65	922.57	2000	3060.000	0.301
OA	LTE Band 48	2.50	20.50	23.0	20.85	199.53	121.62	20.85	121.62	200	3060.000	0.040
EA	LTE Band 48	4.00	19.00	23.0	20.85	199.53	121.62	20.85	121.62	200	3060.000	0.040
OAI	LTE Band 66	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
DA	LTE Band 66	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
EA	LTE Band 66	5.50	24.50	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
OAI	LTE Band 71	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	3000	1352.520	0.451
OAI	5G NR n25	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
DA	5G NR n25	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
EA	5G NR n25	8.00	25.00	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
OAI	5G NR n41	6.80	26.20	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
DA	5G NR n41	6.80	26.20	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
EA	5G NR n41	6.80	26.20	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
OAI	5G NR n41	6.80	26.20	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
DA	5G NR n41	6.80	26.20	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
EA	5G NR n41	6.80	26.20	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000	0.397
EA	5G NR n48	4.00	19.00	23.0	20.85	199.53	121.62	20.85	121.62	200	3060.000	0.040
OAI	5G NR n66	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
DA	5G NR n66	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
EA	5G NR n66	5.50	24.50	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
OAI	5G NR n71	5.00	25.00	30.0	27.85	1000.00	609.54	27.85	609.54	3000	1352.520	0.451
OA	5G NR n77	2.20	27.80	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
EA	5G NR n77	4.00	26.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
OA	5G NR n77	2.20	27.80	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199
EA	5G NR n77	4.00	26.00	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000	0.199

Maximum LTE Pi/Pth Ratio	Maximum 5G NR Pi/Pth Ratio	Σ (Pi/Pth Ratio) of LTE + 5G NR
0.480	0.451	0.931

**Conclusion:**

Based on FCC 47 CFR §1.1307, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Device	Technology	Band	Maximum Conducted Power (dBm)	Standalone Allow Antenna Gain (dBi)
RML-N1t	LTE	Band 2 (OAI2/DA2/EA2)	25.00	8.00
		Band 4 (OAI2/DA2/OAI4/DA4)	25.00	5.00
		Band 4 (EA2/EA4)	24.50	5.50
		Band 5 (OAI0)	25.00	6.00
		Band 12 (OAI0)	25.00	5.50
		Band25 (OAI2/DA2/EA2)	25.00	8.00
		Band41 (OAI2/DA2/EA2)	25.00	6.80
		Band 48 (OA5)	20.50	2.50
		Band 48 (EA1_5)	19.00	4.00
		Band 66 (OAI2/DA2/OAI4/DA4)	25.00	5.00
		Band 66 (EA2/EA4)	24.50	5.50
		Band 71 (OAI0)	25.00	5.00
	5G NR	n25 (OAI2/DA2/EA2) (OAI4/DA4/EA4)	25.00	8.00
		n41 (OAI1/EA1_5/OAI2/DA2/ EA2/OAI3/EA3_6/OAI4/DA4/EA4)	26.20	6.80
		n48 (OA5/EA1_5)	19.00	4.00
		n66 (OAI2/DA2/OAI4/DA4)	25.00	5.00
		n66 (EA2/EA4)	24.50	5.50
		n71 (OAI0)	25.00	5.00
		n77 (OA5/OAI2/DA2/OA6/OAI4/DA4)	27.80	2.20
		n77 (EA1_5/EA2/EA3_6/EA4)	26.00	4.00