

Assessment report

467684-1R2ARFWL

Date of issue: August 24, 2022

Applicant:

Fujitsu Network Communications, Inc.

Product:

Gen2 Tri Band RU for North America

Model

G2_N71N29N26-RU

Type of assessment:


MPE Calculation Report

Specifications:

- ◆ FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310
- ◆ FCC 47 CFR Part 2 Subpart J, §2.1091
- ◆ KDB 447498 D01 General RF Exposure Guidance v06

Lab and test locations

Company name	Nemko USA, Inc.
Address	1110 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com

Prepared by	James Cunningham, EMC/MIL/WL Supervisor
Date	August 24, 2022
Signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Section 1 Evaluation summary

1.1 MPE exemption for stand-alone transmission

1.1.1 References, definition, and limits

FCC §2.1091(d)

- (2) For operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from the whole-body SAR limits and listed in Table 1 in paragraph (e)(1) of this section, may be used instead of whole-body SAR limits as set forth in paragraphs (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b) of this part, except for portable devices as defined in §2.1093 of this chapter as these evaluations shall be performed according to the SAR provisions in §2.1093.

Table 1.1-1: 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
300–1500			f / 300	<6
1500–100000			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
300–1500			f / 1500	<30
1500–100000			1.0	<30

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

Equation from Page 18 of OET Bulletin 64, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm² or W/m²)
P = power input to the antenna (mW or W)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (cm or m)

1.1.2 EUT technical information

Operational frequency	862 – 869 MHz (Band n26)
	717 – 728 MHz (Band n29)
	617 – 652 MHz (Band n71)
Antenna type	External (The EUT is professionally installed)
Antenna gain	See below
Number of antennas	4
Maximum transmitter conducted power	38.70 dBm (Band n26) (7.41 Watts)
	42.87 dBm (Band n29) (19.39 Watts)
	44.51 dBm (Band n71) (28.25 Watts)
Max power across four ports	44.72 dBm (Band n26) (29.65 Watts)
	48.49 dBm (Band n29) (77.45 Watts)
	50.53 dBm (Band n71) (112.98 Watts)

The maximum permitted antenna gain is calculated based on the transmitter conducted power and the maximum permitted EIRP or EIRP density (as appropriate).

Band n26:

Maximum permitted EIRP: 60 dBm (1 kW). From maximum transmitted power above, the maximum permitted antenna gain is: $(60 - 44.52) = 15.48$ dBi.

Band n29:

Maximum permitted EIRP density: 60 dBm/MHz. From measurement data, maximum measured power density is 44.15 dBm/MHz therefore the maximum permitted antenna gain is $(60 - 44.15) = 15.85$ dBi.

Band n71:

Maximum permitted EIRP density: 60 dBm/MHz. From measurement data, maximum measured power density is 45.83 dBm/MHz therefore the maximum permitted antenna gain is $(60 - 45.83) = 14.17$ dBi.

1.1.3 MPE exemption calculations

Note: In the calculations below, “number of antennas = 4” adds the correct $10\log(4)$ correction to account for correlated output of 4 antenna ports. For example, in band n26, the maximum single antenna gain is 15.48 dBi but the total system gain is 21.50 dBi reflecting the addition of $10\log(4)=6.02$ dB for the 4 antennas.

Band n26:

Fundamental transmit (prediction) frequency:	862 MHz
Maximum measured conducted peak output power:	38.70 dBm
Cable and/or jumper loss:	0 dB
Maximum peak power at antenna input terminal:	38.70 dBm
Tx On time:	1.000 ms
Tx period time:	1.000 ms
Average factor:	100 %
Maximum calculated average power at antenna input terminal:	7413 mW
Single Antenna gain (typical):	15.48 dBi
Number of antennas:	4
Total system gain:	21.50 dBi
FCC limit:	
MPE limit for uncontrolled exposure at prediction frequency:	0.574667 mW/cm²
	5.746667 W/m ²
Minimum calculated prediction distance for compliance:	120 cm
Typical (declared) distance:	381 cm
Average power density at prediction frequency:	0.574117 mW/cm²
	5.741167 W/m ²
Margin of Compliance:	0.00 dB
Maximum allowable antenna gain:	21.50 dBi

Band n29:

Fundamental transmit (prediction) frequency:	717 MHz
Maximum measured conducted peak output power:	42.87 dBm
Cable and/or jumper loss:	0 dB
Maximum peak power at antenna input terminal:	42.87 dBm
Tx On time:	1.000 ms
Tx period time:	1.000 ms
Average factor:	100 %
Maximum calculated average power at antenna input terminal:	19364 mW
Single Antenna gain (typical):	15.85 dBi
Number of antennas:	4
Total system gain:	21.87 dBi

FCC limit:

MPE limit for uncontrolled exposure at prediction frequency:	0.478000 mW/cm ²
	4.780000 W/m ²
Minimum calculated prediction distance for compliance:	120 cm
Typical (declared) distance:	705 cm
Average power density at prediction frequency:	0.476949 mW/cm ²
	4.769489 W/m ²
Margin of Compliance:	0.01 dB
Maximum allowable antenna gain:	21.88 dBi

Band n71:

Fundamental transmit (prediction) frequency:	617 MHz
Maximum measured conducted peak output power:	44.51 dBm
Cable and/or jumper loss:	0 dB
Maximum peak power at antenna input terminal:	39.81 dBm
Tx On time:	1.000 ms
Tx period time:	1.000 ms
Average factor:	100 %
Maximum calculated average power at antenna input terminal:	9572 mW
Single Antenna gain (typical):	14.17 dBi
Number of antennas:	4
Total system gain:	20.19 dBi

FCC limit:

MPE limit for uncontrolled exposure at prediction frequency:	0.411333 mW/cm ²
	4.113333 W/m ²
Minimum calculated prediction distance for compliance:	120 cm
Typical (declared) distance:	440 cm
Average power density at prediction frequency:	0.411097 mW/cm ²
	4.110974 W/m ²
Margin of Compliance:	0.00 dB
Maximum allowable antenna gain:	20.19 dBi

1.1.4 Verdict

This worst case calculation is below the limit; therefore, the product is compliant with the RF exposure requirements for the declared distance.

End of test report