

TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: 2AU39-NL002

Equipment Under Test : NAPAL-Frame
Model Name : NL002
Applicant : NAPAL Co., Ltd
Manufacturer : NAPAL Co., Ltd
Date of Receipt : 2019.11.12
Date of Test(s) : 2019.12.10 ~ 2020.01.08
Date of Issue : 2020.02.13

In the configuration tested, the EUT complied with the standards specified above.

Tested By:

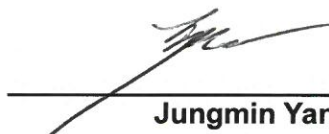


Nancy Park

Date:

2020.02.13

Technical
Manager:


Jungmin Yang

Date:

2020.02.13

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RTT5041-19(2019.04.24)(1)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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Telephone : +82 31 688 0901

FAX : +82 31 688 0921

1.2. Details of Applicant

Applicant : NAPAL Co., Ltd

Address : 31, Hasangok-ro, Hanam-si, Gyeonggi-do, South Korea, 13024

Contact Person : Lee, Sang-moon

Phone No. : +82 2 2138 5053

1.3. Details of Manufacturer

Company : Same as applicant

Address : Same as applicant

1.4. Description of EUT

Kind of Product	NAPAL-Frame
Model Name	NL002
Power Supply	DC 12 V
Frequency Range	2 402 MHz ~ 2 480 MHz (Bluetooth, Bluetooth Low Energy)
Modulation Technique	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79 channels (Bluetooth) 40 channels (Bluetooth Low Energy)
Antenna Type	SMD Antenna
Antenna Gain	2.1 dBi

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1.5. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL000183	2020.01.30	Initial
1	F690501-RF-RTL000183-1	2020.02.13	Added the comment of Maximum tune up tolerance

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2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time
(A) 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
300-1 500	-	-	f/300	6
1 500-100 000	-	-	5	6
(B) 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
300-1 500	-	-	f/1500	30
<u>1 500-100 000</u>	-	-	<u>1.0</u>	<u>30</u>

2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

Bluetooth

- Maximum tune up tolerance

Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 (mW/cm ²)	Limits (mW/cm ²)
2 402 ~ 2 480	5	2.1	0.001 020	1

Bluetooth Low Energy

- Maximum tune up tolerance

Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 402 ~ 2 480	7	2.1	0.001 617	1

Note;

- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm².
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dB i and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.
- According to KDB 447498 D01 RF Exposure Guidance 4.1.d, Output Average Power to Antenna applied Maximum Tune up power considering tolerance.

- End of the Test Report -

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