



Maximum Permissible Exposure Evaluation

FCC ID: 2A56E-NSP01

IC: 28519-NSP01

1. Client Information

Applicant	:	Nooie LLC
Address	:	1603 s main st, suite A, Milpitas, CA 95035
Manufacturer	:	Nooie LLC
Address	:	1603 s main st, suite A, Milpitas, CA 95035

2. General Description of EUT

EUT Name	:	Smart Plug
HVIN/Models No.	:	NSP01, NSP01 Pro, NSP01 Plus, NSP02, NSP02 Pro, NSP02 Plus, NSP03, NSP04, NSP05
Model Different	:	All these models are identical in the same PCB, layout and electrical circuit, The only difference is appearance of the color.
Sample ID	:	RW-C-202205-0309-7-1#&RW-C-202205-0309-7-2#
Product Description	:	Operation Frequency: 802.11b/g/n(HT20): 2412MHz~2462MHz
Power Rating	:	Input: AC 100-240V~50/60Hz
Software Version	:	V1.0
Hardware Version	:	V1.0
Remark	:	The adapter and antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.

Method Of Measurement for FCC

1. Max. Antenna Gain:

2.4G WIFI PCB Antenna: 2dBi.

2. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3. Exposure Evaluation:

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=(PG)/4\pi R^2$$

Where

S: power density

P: power input to the antenna

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

Simultaneous transmission MPE Considerations

According to KDB447498: All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

This means that:

$$\sum \text{ of MPE ratios } \leq 1.0$$

4. Test Result:

2.4G WiFi Worst Maximum MPE Result								
Mode	N _{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/ cm ²) [S]
802.11b	1	2412	17.04	17±1	18	2	20	0.0199
		2437	17.00	17±1	18	2	20	0.0199
		2462	16.86	17±1	18	2	20	0.0199
802.11g	1	2412	16.55	17±1	18	2	20	0.0199
		2437	16.62	17±1	18	2	20	0.0199
		2462	16.66	17±1	18	2	20	0.0199
802.11n (HT20)	1	2412	16.15	16±1	17	2	20	0.0158
		2437	16.61	17±1	18	2	20	0.0199
		2462	16.72	17±1	18	2	20	0.0199

Note:
 N_{TX}= Number of Transmit Antennas
 RF Output power specifies that Maximum Conducted Peak Output Power.

5. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Power density (mW/ cm ²)
300-1,500	F/1500
1,500-100,000	1.0

For:2412~2462 MHz

MPE limit S: 1mW/ cm²

The MPE is calculated as $0.0199mW / cm^2 < limit 1mW / cm^2$.

So, RF exposure limit warning or SAR test are not required.

The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR2.1091

(b). The RF Exposure Information page from the manual is included here for reference.

Method Of Measurement for IC

1. Applicable Standard

[Radio Standards Specification 102](#), Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands), sets out the requirements and measurement techniques used to evaluate radio frequency (RF) exposure compliance of radio communication apparatus designed to be used within the vicinity of the human body.

[ANSI C95.1–1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

2. Evaluation Method and Limit

According to RSS-102 §4 Table 4, RF Filed Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}

Note: *f* is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Frequency Band	<i>f</i> (MHz)	Limit of Power Density (W/m ²)
2.4G WLAN	2412	5.37

Note: Limit=0.02619 *f*^{0.6834} (where *f* is in MHz).
The *f* in the limit is the frequency of the lowest Channel.

3. Calculation Formula

Prediction of power density at the distance of the applicable MPE limit:

$$S = \frac{PG}{4\pi R^2} = \text{Power density (in appropriate units, e.g W/m}^2\text{)}$$

P=power input to antenna (in appropriate units, e.g W)

G=power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R=distance to the center of radiation of the antenna (in appropriate units, e.g m)

4. Evaluation Results

Standalone MPE Evaluation:

2.4G WiFi Worst Data					
Mode	N _{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]
802.11b	1	2412	17.04	17±1	18
		2437	17.00	17±1	18
		2462	16.86	17±1	18
802.11g	1	2412	16.55	17±1	18
		2437	16.62	17±1	18
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		2437	16.61	17±1	18
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Worst MPE Result

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (m) [R]	Power Density At 20 cm (W/m ²)	Power Density Limit (W/m ²)
	dBm	W					
2.4G WiFi	18	0.063	2	1.585	0.20	0.199	5.37

Remark:

- Output power including turn-up tolerance;
- Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
- MPE evaluate distance is 20cm from user manual provide by manufacturer.

Note

For a more detailed features description, please refer to the RF Test Report.

-----END OF REPORT-----