

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: Turnils North America
Address of applicant: 1750 Satellite Blvd, Suite 100, Buford GA 30518

Manufacturer: Ningbo Dooya Mechanic & Electronic Technology Co.,Ltd
Address of manufacturer: NO.168 shengguang road Luotuo street Zhenhai District
Ningbo,P.R.China

General Description of EUT:

Product Name: AMP Bridge
Trade Name: /
Model No.: AMP Bridge WIFI and RF with Serial Port
Adding Model(s): /
Rated Voltage: DC 5V 1000mA
FCC ID: 2AU29AMPSBV2
Equipment Type: Mobile Device

Technical Characteristics of EUT:

Frequency Range: 433.92 MHz
Max. Field Strength: 433.92MHz: 84.84dBuV/m(3m)
Data Rate: /
Modulation: FSK
Antenna Type: PCB Antenna
Antenna Gain: 0dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz; * = Plane-wave equivalent power density

1.3 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

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

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., cm)

1.4 MPE Calculation Result

For SRD (433.92MHz)

Power input to the antenna = EIRP-Gain = (E-104.8+20logD)-Gain = (84.84-104.8+20log3)-0 = -10.42dBm

Maximum Tune-Up output power: -10.0(dBm)

Maximum peak output power at antenna input terminal: 0.10 (mW)

Prediction distance: >20(cm)

Prediction frequency: 433.92 (MHz)

Antenna gain: 0.0 (dBi)

Directional gain (numeric gain): 1.0

The worst case is power density at prediction frequency at 20cm: 0.0001 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.2893 (mw/cm²)

For Wi-Fi & Bluetooth Internet of Things Module (FCC ID: 2AC7Z-ESPWROOM32D)

The worst case is power density at prediction frequency at 20cm: $\underline{0.0295+0.0013=0.0308}<1$

Mode for Simultaneous Multi-band Transmission

SRD (433.92MHz) + Wi-Fi & Bluetooth Internet of Things Module (FCC ID: 2AC7Z-ESPWROOM32D)

The worst case is power density at prediction frequency at 20cm: $\underline{0.0001/0.2893+0.0308=0.0312}<1$

Result: Pass