

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

ASSESSMENT TO

EN 62311:2008

ASSESSMENT OF ELECTRONIC & ELECTRICAL EQUIPEMENT RELATED TO HUMAN EXPOSURE RESTRICTIONS FOR ELECTROMAGNETIC FIELDS (0 Hz – 300 GHz)

Client:	CNC3D Pty Ltd
Address:	3/24 Spencer Road, Nerang, QLD 4211, Australia
Report Number:	0927CNC_2.1_MPE(EN62311)
Date of Assessment	23 Sep 2022
File Number:	CNC220405

Equipment Name:	Nighthawk CNC Controller
Equipment Model No:	2.1
Equipment Trade/Brand Name:	CNC3D
Equipment Description:	Nighthawk CNC Controller

Result:	COMPLIES (General Public Exposure, Non-Aware User)
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Assessed by:	Phillip Kane
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Approved by:	Colin Gan
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Date of Issue:	27 Sep 2022
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Results appearing herein relate only to the sample(s) assessed through the submitted test report(s).
This report is issued errors and omissions exempt and is subject to withdrawal at Austest Laboratories discretion.

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EQUIPMENT DETAILS	
MANUFACTURER:	CNC3D Pty Ltd
MODEL:	2.1
OPERATING FREQUENCY:	Bluetooth: 2400-2483.5 MHz ^{Note 1} WiFi: 2400-2483.5 MHz ^{Note 2}
TRANSMITTER POWER INTO ANTENNA:	Bluetooth: 3.0 dBm (2 mW) ^{Note 1} WiFi: 16.02 dBm (40 mW) ^{Note 2}
TYPE OF ANTENNA:	Single integral monopole antenna ^{Note 3}
ANTENNA GAIN:	3.0 dBi ^{Note 3}
TRANSMISSION CAPABILITY:	Single transmission only possible.

Notes:

1. BT data extracted from FCC TCB Grant "esp32-wroom-32u_fcc_bt_certificate.pdf", dated 22 Jan 2018 for the ESP32-WROOM_32U BT/WiFi module [FCC ID: 2AC7Z-ESP32WROOM32U] provided by client.
2. WiFi data extracted from FCC TCB Grant "esp32-wroom-32u_fcc_wi-fi_bt4.0_certificate.pdf", dated 17 Jan 2018 for the ESP32-WROOM_32U BT/WiFi module [FCC ID: 2AC7Z-ESP32WROOM32U] provided by client.
3. Data extracted from product manual "nighthawk-controller-manual.pdf" provided by client.

EN 62311:2008 Maximum Permissible Exposure (MPE) Assessment

An advisory statement is to be included in the installation and user manual clearly indicating that adequate access restriction is necessary for the protection of the general public by ensuring that members of the public are kept at a minimum safety distance from the transmission point (generally referring to the transmit antenna or structure).

EN 62311:2008 Maximum Permissible Exposure Limits

(values specified in Table 2 in Council Recommendation 1999/519/EC)

Frequency range (MHz)	Power density (W/m ²)
400 – 2000	f/200
2000 - 300000	10

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Calculations – BT (2400 MHz to 2483.5 MHz band)

Maximum RMS output power at antenna input terminal:3.0 dBm
Maximum permissible antenna gain:3.0 dBi
Prediction distance:20 cm
Prediction frequency:2400 MHz
MPE limit:10 W/m²

$$\text{Equation } S = P * G / (4 * \pi R^2) = \mathbf{0.008 \text{ W/m}^2}$$

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 centre of radiation of the antenna

Prediction

The maximum allowed MPE value of 10 W/m² will not be reached at a distance of **20 cm** in the case of an antenna with a gain of 3.0 dBi being used. This means that the power density level at a distance of **20 cm** is in accordance with EN 62311:2008 requirements for a maximum 3.0 dBi gain antenna.

Calculations - WiFi (2400 MHz to 2483.5 MHz band)

Maximum RMS output power at antenna input terminal:16.0 dBm
Maximum permissible antenna gain:3.0 dBi
Prediction distance:20 cm
Prediction frequency:2400 MHz
MPE limit:10 W/m²

$$\text{Equation } S = P * G / (4 * \pi R^2) = \mathbf{0.158 \text{ W/m}^2}$$

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 centre of radiation of the antenna

Prediction

The maximum allowed MPE value of 10 W/m² will not be reached at a distance of **20 cm** in the case of an antenna with a gain of 3.0 dBi being used. This means that the power density level at a distance of **20 cm** is in accordance with EN 62311:2008 requirements for a maximum 3.0 dBi gain antenna.

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Austest Summary and Recommendations

The equipment complies with EN 62311:2008 requirements when the indicated **safety distance of 20 cm** is adhered to, and shall bear the CE mark, when compliance with all other applicable CE requirements is met.

If compliance is sought for model numbers other than those listed in the test report, then the compliance folder must hold additional documentation, demonstrating the equivalence of the products between the different model numbers.

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