

15.247(b)(1) Maximum output power

Power output at the antenna port **does not** exceed 0.250 watt (24 dBm).

15.247(b)(3) Peak power reduction vs antenna gain.

The **WaveACCESS NET 2400 CU232** meets the requirement in the following manner:

The system is designed to work with a number of optional (**professionally installed**) antennas. The highest gain antenna is 12 dBi, (See Table 2). At time of installation, the antenna and country parameters are keyed into the operating software which then adjusts the output power to meet the specific requirements. (The power, relative to 1.0 watt, is reduced by 1 dB for every 1 dB that the directional gain of the antenna exceeds 6 dBi.)

Using the FCC maximum allowed output power of 1 watt peak (30 dBm), the expression for adjusted output power (P) becomes: $P = 30 - (12 - 6)$. Based on the highest gain antenna and since the self imposed maximum power output is 24 dBm no power adjustment is necessary.

CU232 Antenna type	Gain (dBi)
Internal Sector (embedded panel antenna)	12
External Omni	8

Table 2

15.247(b)(4) Radiofrequency exposure.

The WaveAccess NET CU232 operation ensures compliance with the FCC MPE guidelines for an uncontrolled environment , Table 1B in section 1.1310 of the rules in the following manner:

1. The CU232 is required to be installed by a professional installer familiar with the RF exposure guidelines. (installation manual page 7-2, 7-4)
2. The CU232 unit is designed for outdoor installation, typically mounted at a remote location such as a rooftop, building side¹, or a raised tower, thus limiting exposure to users and general population.
3. Users are warned that they are not permitted to make changes or modify the system installation. (manual page iii, v, 7-8, 7-9)
4. The CU232 operates at = 4 watts EIRP. As a result of the installation environment nearby persons are most likely to be further than 20 cm away from the antenna.
5. The manual includes cautionary RF exposure statements prescribing the minimum distance between any persons and the antenna. (manual page iv, vi, 7-9)

¹ Typically as a single sector antenna

Determination of the minimum distance boundary required between a person and the antenna in order to achieve the FCC MPE guidelines for an uncontrolled operating environment has been calculated as follows:

$$R = (PG/S4\pi)^{1/2}$$

Where: S = 1.0 mW/cm²

P = power input to the antenna (0.250 watts)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator (see Table 1)

R = distance to the center of radiation of the antenna.

Based on a maximum antenna input power of 0.250 watts the resulting minimum distances for the various antenna available for use becomes:

CU232 Antenna type	Numeric gain over isotropic	MPE distance (cm)
Internal Sector (embedded panel antenna)	16	18cm
External Omni	6.3	11.2

Calculated field power density based on the CU232 EIRP predicts less than 1.0 mW/cm² at 20 cm distance from any antenna.

15.247(c) Spurious emission requirements, conducted and radiated.

Antenna port conducted results.

Spectrum analyzer measurement scans at the antenna port (from 0 MHz to 25.000 GHz, tenth harmonic) were made at the antenna port for 3 fixed (low, middle, and high) non-hopping frequencies. Both 16QAM and QPSK modulation modes were tested. Test results show all out of band emissions as measured using a 100 kHz RSB² were much greater than 20 dB down from the in-band. Table 3 summarizes test results.

Test Frequency (MHz)	Modulation scheme	Test frequency range (MHz)	Test results Out of band emissions	Compliance statement
2402.0	QPSK 16QAM	0 – 25000	>> 20 dB below n-band	Pass
2440.0	QPSK 16QAM	0 – 25000	>> 20 dB below in-band	Pass
2480.0	QPSK 16QAM	0 - 25000	>> 20 dB below in-band	Pass

Table 3

The reference in-band spectrum plot for combined 16QAM and QPSK modulation schemes are shown in Figure 2. F1 and F2 mark the ISM band frequency edges.

² Because the results exceeded 20 dB the actual plots are maintained on file at GPCL and available for inspection.