Declaration on radiation safety standard conformance

To whom it may concern:

NuTune
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declares that the following product

Description	:	Dual band 802.11n wireless interface module
FCC ID	:	WOPMRX2010C2
Manufacturer	:	NuTune
Brand	:	NuTune
Model	:	MRX2010

has a maximum e.i.r.p. of 24.3 dBm (269.2 mW, maximum conducted output power of 21.8 dBm plus antenna gain of 2.5 dBi) in the frequency range of 2412 – 2462 MHz, which means that the worst case prediction of power density (with 100% reflection) at 20 cm distance (worst case) can be calculated as follows :

$$S = \frac{EIRP}{4*\pi * R^2} \quad \text{(power density without reflection)}$$

$$S = \frac{2^{2*}EIRP}{4*\pi * R^2} \quad \text{(power density with 100\% reflection)}$$

$$S = \frac{2^2 *EIRP}{4*\pi * R^2} = \frac{269.2\ mW}{\pi*(20cm)^2} = 0.214\ mW/cm^2 \quad (\text{limit} = 1.0\ mW/cm^2)$$

and has a maximum e.i.r.p. of 24.4 dBm (275.4 mW, maximum conducted output power of 18.9 dBm plus antenna gain of 5.5 dBi) in the frequency range of 5745 – 5825 MHz, which means that the worst case prediction of power density (with 100% reflection) at 20 cm distance (worst case) can be calculated as follows :

$$S = \frac{EIRP}{4*\pi * R^2} \quad \text{(power density without reflection)}$$

$$S = \frac{2^{2*}EIRP}{4*\pi * R^2} \quad \text{(power density with 100\% reflection)}$$

$$S = \frac{2^2 *EIRP}{4*\pi * R^2} = \frac{275.4\ mW}{\pi*(20cm)^2} = 0.219\ mW/cm^2 \quad (\text{limit} = 1.0\ mW/cm^2)$$

This means that according to OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), the equipment fulfills the requirements on power density for general population/uncontrolled exposure and therefore fulfills the requirements of 47 CFR Part 15.247 (i). See table below on this page for all relevant measured/calculated values.

Modulation	MHz	Separation distance (cm)	Conducted power (dBm)	Antenna gain (dBi)	Radiated power (EIRP, dBm)	Radiated power (EIRP, mW)	Radiated power density (mW/cm2)
802.11b	2412 - 2462	20	19.00	2.50	21.50	141.25	0.112
802.11g	2412 - 2462	20	21.70	2.50	24.20	263.03	0.209
802.11n 20 MHz	2412 - 2462	20	21.80	2.50	24.30	269.15	0.214
802.11n 40 MHz	2412 - 2462	20	18.70	2.50	21.20	131.83	0.105
802.11a	5745 - 5825	20	17.50	5.50	23.00	199.53	0.159
802.11n 20 MHz	5745 - 5825	20	17.70	5.50	23.20	208.93	0.166
802.11n 40 MHz	5745 - 5825	20	18.90	5.50	24.40	275.42	0.219

The power level used for MPE calculations is the sum of the power of all transmitter chains.

Since the antennas are identical for each transmitter this is equivalent to summing the power density of all transmitters. The two antennas are assumed to be at the same location to give a worst-case estimate of the total power density at a distance of 20 cm from this point.

For 802.11 ag transmissions the effective antenna gain is used (this assumes that the separate signals are coherent and thus add in voltage). For 802.11n transmissions the signals are not coherent, therefore they add in power and the normal antenna gain is applicable.

The product also has a maximum e.i.r.p. of 25.1 dBm (323.6 mW, maximum conducted output power of 19.6 dBm plus antenna gain of 5.5 dBi) in the frequency range of 5180 – 5320 MHz, which means that the worst case prediction of power density (with 100% reflection) at 20 cm distance (worst case) can be calculated as follows :

$$S = \frac{EIRP}{4*\pi * R^2} \quad \text{(power density without reflection)}$$

$$S = \frac{2^{2*}EIRP}{4*\pi * R^2} \quad \text{(power density with 100\% reflection)}$$

$$S = \frac{2^2 *EIRP}{4*\pi * R^2} = \frac{323.6 \text{ mW}}{\pi*(20\text{cm})^2} = 0.258 \text{ mW/cm}^2 \quad (\text{limit} = 1.0 \text{ mW/cm}^2)$$

and has a maximum e.i.r.p. of 25.6 dBm (363.1 mW, maximum conducted output power of 20.1 dBm plus antenna gain of 5.5 dBi) in the frequency range of 5500 – 5700 MHz, which means that the worst case prediction of power density (with 100% reflection) at 20 cm distance (worst case) can be calculated as follows :

$$S = \frac{EIRP}{4*\pi * R^2} \quad \text{(power density without reflection)}$$

$$S = \frac{2^{2*}EIRP}{4*\pi * R^2} \quad \text{(power density with 100\% reflection)}$$

$$S = \frac{2^2 *EIRP}{4*\pi * R^2} = \frac{363.1 \text{ mW}}{\pi*(20\text{cm})^2} = 0.289 \text{ mW/cm}^2 \quad (\text{limit} = 1.0 \text{ mW/cm}^2)$$

This means that according to OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), the equipment fulfills the requirements on power density for general population/uncontrolled exposure and therefore fulfills the requirements of 47 CFR Part 15.407 (f). See table below on this page for all relevant measured/calculated values.

Modulation	**MHz**	**Separation distance (cm)**	**Conducted power (dBm)**	**Antenna gain (dBi)**	**Radiated power (EIRP, dBm)**	**Radiated power (EIRP, mW)**	**Radiated power density (mW/cm2)**
802.11a	5180 - 5320	20	18.70	5.50	24.20	263.03	0.209
802.11n 20 MHz	5180 - 5320	20	18.80	5.50	24.30	269.15	0.214
802.11n 40 MHz	5180 - 5320	20	19.60	5.50	25.10	323.59	0.258
802.11a	5500 - 5700	20	17.60	5.50	23.10	204.17	0.162
802.11n 20 MHz	5500 - 5700	20	17.80	5.50	23.30	213.80	0.170
802.11n 40 MHz	5500 - 5700	20	20.10	5.50	25.60	363.08	0.289

The power level used for MPE calculations is the sum of the power of all transmitter chains.

Since the antennas are identical for each transmitter this is equivalent to summing the power density of all transmitters. The two antennas are assumed to be at the same location to give a worst-case estimate of the total power density at a distance of 20 cm from this point.

For 802.11 a transmissions the effective antenna gain is used (this assumes that the separate signals are coherent and thus add in voltage). For 802.11n transmissions the signals are not coherent, therefore they add in power and the normal antenna gain is applicable.