Managing Human Exposure to Radiofrequency fields (NZS 2772)

1. Purpose

The purpose of this document is to provide an overview of the evaluation of the EWM 100 with respect to the requirements of the standard NZS 2772 and provide recommendations on installation specific compliance considerations.

2. Introduction

EDMI currently supplies a GPRS modem product the EWM100. This product is supplied individually and based on customer requirements the modem can also be supplied fitted under the terminal cover of an EDMI meter together with a TC-8813 antenna.

3. NZS 2772 Requirements

Section 8 (Verification of Compliance with the Standard)

"Unless indicated otherwise in Section 8, compliance with the requirements in Sections 5" (Limits of Exposure) "and 6" (Reference Levels) "shall be verified by direct measurements or by evaluation."

"Measurements or evaluations of general public exposure shall be made in areas reasonably accessible to the general public to ensure that the reference levels of section 6 or the basic restrictions of section 5, where allowed for in 5.2, are not exceeded."

"The basic restrictions in this Standard are specified through quantities which are often difficult and, in many cases, impractical to measure. Therefore, reference levels of exposure, which are conservatively formulated and simpler to measure, are provided as an alternative means of demonstrating compliance with this Standard. If measured exposures are lower than the reference levels, compliance with the basic restrictions can be assumed. If measured exposures are higher than reference levels, it does not necessarily follow that the basic restrictions have been exceeded, but a more detailed analysis is necessary to show compliance with the basic restrictions."

"It follows that in the far-field of an RF source, the E,H and S reference levels will not be exceeded for frequencies above 10 MHz if any one of the RF power flux density (S), the electric field strength (E), or the magnetic field strength (H) can be shown to be less than the respective reference levels specified in section 6 herein."

Section 6 (Reference Levels)

Exposure Category	Frequency range	E – Field Strength (V/m rms)	H-Field Strength (A/m rms)	Equivalent plane wave power flux density S (W/m^2)
Table 6 – Reference levels for time averaged exposure to RMS electric magnetic fields				
General public	400 MHz – 2 GHz	$1.375*f(MHz)^{0.5}$	$.0037*f(MHz)^{0.5}$	f(MHz)/200
Table 7 – Reference levels for peak exposure to electric magnetic fields				
General public	400 MHz – 2 GHz	$44*f(MHz)^{0.5}$	$.118*f(MHz)^{0.5}$	5*f(MHz)

Section 10 (Protection – General Public Exposure)

"Measures for the protection of members of the general public who may be exposed to RF fields due to their proximity to antennas or other RF sources shall include the following:

(a) Determination of the boundaries of areas where general public exposure limits levels may be exceeded.

(b) Restriction of public access to those areas where the general public exposure limits may be exceeded.

(c) Appropriate provision of signs or notices complying with AS 1319

(d) Minimising, as appropriate RF exposure which is unnecessary or incidental to the achievement of service objectives or process requirements, provided that this can be readily achieved at modest expense.

(e) Demonstration that installations are planned and operated in accordance with appropriate industry best contemporary practice

(f) Notification of the competent authority, as required, in the event of the exposure exceeding the relevant limits"

4. Evaluation of exposure with respect to the NZS 2772 reference levels

The EWM100 modem is a quad band Class 10 GPRS modem with a rated maximum output power of +33 dBm at the antenna connector port under worst case conditions when received signal strength is at a minimum.
The TC-8813 antenna typically supplied with the product has a gain of +3 dBi.

Evaluation inputs –EWM 100 Modem

Freq (Mhz)	Power (dBm)	TX Duty Cycle	Antenna Gain dB	Distance (Meters)	Power (Watts)	Antenna Gain Factor	Effective Power (Watts)
850	33	0.25	3	0.2	0.5	2	1
900	33	0.25	3	0.2	0.5	2	1
1800	33	0.25	3	0.2	0.5	2	1
1900	33	0.25	3	0.2	0.5	2	1

Calculated Far Field Exposure versus Reference Levels – EWM 100 Modem

Freq (Mhz)	Calculated Exposure @ 20cm			Reference Levels Time Averaged			Reference Levels Instantaneous		
	E (V/m)	H (A/m)	S (W/m²)	E (V/m)	H (A/m)	S (W/m²)	E (V/m)	H (A/m)	S (W/m²)
850	27.39	0.07	1.99	40.09	0.11	4.25	1282.81	3.44	4250
900	27.39	0.07	1.99	41.25	0.11	4.5	1320	3.54	4500
1800	27.39	0.07	1.99	58.34	0.15	9	1866.76	5.01	9000
1900	27.39	0.07	1.99	59.93	0.16	9.5	1917.92	5.14	9500

Evaluation Conclusion

The RF radiation generated by the EWM100 when used in conjunction with the TC-8813 antenna is well below the reference levels outlined in the standard NZS 2772 when considering both time averaged exposure and instantaneous levels.

1.99 W/m2 is 1,990,000 uW/m2 which is an outrageously high output. Many cell towers at 50m are only 20,000 uW/m2, which is considered an extremely strong output and recognised as a serious health risk. Building Biology and the BioInitiative report classify output over 1,000 uW/m2 as extreme concern.

5. Recommendations

Through evaluation it has been determined that radiation levels emitted are well below the reference levels at 20cm from the antenna. It is important that installers be made aware of the requirements relating to NZS 2772 Section 10 (Protection) in terms of best practice. The installer should be made aware that the product should not be installed in a location where it is likely that the general public will be closer than 20 cm to the antenna for an extended period. If this installation situation can not be avoided then an appropriate sign or notice complying with AS1319 should be installed in order to provide general public awareness. The installation considerations with respect to the standard should also be noted on the individual installation documentation.