Tantalus Systems Corp.
301–3480 Gilmore Way, Burnaby, BC Canada V5G 4Y1
Tel. 604.299.0458 · Fax 604.451.4111
www.tantalus.com

December 6, 2012

To Whom It May Concern:

To investigate the RF exposure of the XR-3100 cross-band repeater the FCC OET Bulletin 65 and the Health Canada Safety Code 6 (as specified in RSS-102) have been used as guidelines to determine compliance with the FCC and IC RF exposure limit. The maximum duty factor of the Part 90 transceiver (FCC ID: OZFXR3001) is 6.3% with a typical duty factor of 0.3%. The maximum duty cycle of the Part 15 device is 14.4%.

Analysis:

As per OET Bulletin 65 and Health Canada Safety Code 6 guidelines:

The EUT is classed to meet the RF exposure that it subjects to the "General Population/Uncontrolled Environment". Under this class the limit is calculated by:

$$S = f/1500$$

Where S is the Power Density in mW/cm^2.
F is the frequency of operation in MHz.

The Part 15 device operates in the 902 to 928 MHz band, the lower exposure limit would be obtained by using a frequency at the lower edge of the band, therefore:

$$S = 902 /1500 = 0.601\ mW/cm^2$$

The maximum EIRP was measured to be 3.311W

However, under normal operation the transmitter is not on continuously and therefore its power must be time averaged. The maximum total transmit cycle that the device will operate at is 10.7%.

The average EIRP is therefore:

$$EIRP_{(average)} = EIRP_{(continuous)} * \text{duty cycle}$$

$$EIRP_{(average)} = 3.311\ W * 0.144 = 0.477\ W$$

The minimum distance to meet the maximum exposure limit would be 8cm.

The Part 90 device operates in the 200 to 220 MHz band, the lower exposure limit would be obtained by using a frequency at the lower edge of the band, therefore:

$$S = 200 /1500 = 0.133 \text{ mW/cm}^2$$

The maximum rated output power is 5W and the maximum duty cycle for this device is 6.3%. The maximum average EIRP will depend on what antenna has been connected to the Part 90 device:-

The average EIRP of the Part 90 device is therefore:

	Antenna Gain (dBi)	Average EIRP (W)
Average EIRP=P*DF*Gain	2.1 (internal)	0.512
	5.2	1.046
	9.1	2.566

The minimum distance for the Part 90 device at which the maximum exposure limit is reached is:-

	Antenna Gain (dBi)	Distance (cm)
Required Minimum Distance	2.1 (internal)	17.5
	5.2	25
	9.1	39.2

Since both transmitters could be transmitting simultaneously then the affect of the Part 15 device must added to the distance required for the Part 90 device. This is done by calculating the added power density of the Part 15 device at the Part 90 distances and then solving iteratively.

The minimum distance for the product at which the maximum exposure limit is reached is:-

	Antenna Gain (dBi)	Distance (cm)
Required Minimum Distance	2.1 (internal)	18.2
	5.2	25.5
	9.1	39.5

Mark Fairburn
RF Design Engineer
Tantalus Systems Corp.