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To Whom It May Concern:

To investigate the RF exposure of the Tantalus Systems Corp. TRUConnect™ module (FCC ID: OZFSTIM, IC ID: 3669A-STIM) incorporated inside the TRUConnect™ meter series the FCC KDB publication 447498 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 TRUConnect™ module contains 2 different transmitters, the first transmitter operates in the 902 to 928MHz band and the second transmitter operates in the 2400-2483 band.

The following analysis uses the following worst case operating conditions:

- Transmitter 1 operating at 902-928MHz has a maximum duty cycle of 20.9%
- Transmitter 2 operating at 2.4-2.483GHz operating in half duplex and the duty cycle is 50%

This results in the following:

Transmitter #	Operating Frequency (MHz)	EIRP (W)	EIRP over time (W)
1	902-928	0.925	0.193
2	2400-2483	0.056*	0.028

* At 2.4GHZ maximum output power is 17.5dBm with 0dBi antenna gain.

Analysis per Health Canada Safety Code 6 guidelines:

As per 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:

$$S = f/150$$

Where S is the Power Density in W/cm².

F is the frequency of operation in MHz.

For transmitter 1 that 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:

$$S = 902 / 150 = 6.01 \text{ W/m}^2 = 0.601 \text{ mW/cm}^2$$

For transmitter 2 that operates in the 2.4GHz band, the exposure limit is 10W/m or 1mW/ cm².

The power density for each transmitter when averaged spatially and over time at a distance of 20cm is given in the table below.

Transmitter #	Operating Frequency (MHz)	EIRP over time (W)	Power Density at 20cm (mW/cm ²)
1	902-928	0.193	0.038
2	2400-2483	0.028	0.0056

Therefore the total time averaged power and power density at 20cm is 0.221 W and 0.044mW/cm² respectively.

To determine whether the EUT meets the requirements that maximum exposure limits are not exceeded when exposed to multiple RF sources, Safety Code 6 requires that the sum of all ratios obtained for all frequencies shall not exceed unity when averaged spatially and over time.

The limit, as applied to multiple frequencies, can be expressed as:

$$\sum_{f = 3 \text{ kHz}}^{300 \text{ GHz}} R_f \leq 1$$

where f is the frequency for which measurements were taken and where the power density is measured,

$$R_f = \frac{\text{Measured Value of Power Density at } f}{\text{Exposure Limit of Power Density at } f}$$

Therefore, using the table shown below, the sum of the ratio's when both transmitters are operating simultaneously is 0.0679.

Transmitter #	Time Averaged EIRP (W)	Power Density at 20cm (mW/cm ²)	MPE (mW/cm ²)	Ratio
1	0.193	0.038	0.601	0.0632
2	0.028	0.0056	1.0	0.0056

Since the sum of the ratio for all transmitters is less than unity, the EUT meets the MPE requirements for a mobile device.

Analysis as per the FCC KDB publication 447498:

As per the FCC KDB publication 447498 D06 General RF Exposure Guidance, 4.3.1(b) states that SAR tests are not required if the RF power does not exceed the following formula:-

The maximum time averaged power (mW) must not exceed:-

$$\text{Max. Power (mW) Allowed at 50mm}^* + (\text{test separation distance} - 50 \text{ mm}) \times F_{(\text{MHz})}/150$$

$$*\text{Where Max. Power (mW) Allowed at 50mm} = 3 \times 50 / \sqrt{F_{(\text{GHz})}} = 155\text{mW}$$

FCC KDB publication 447498 D06 General RF Exposure Guidance, 4.3.2 states that in the case of co-located transmitters the SAR test exclusion is allowed if the sum of all transmissions meets the requirement. For transmitter 1 using the internal antenna the time averaged power is 193mW and the time averaged power for transmitter 2 is 28mW. The total power of these 2 transmitters is 221mW. The distance at which the power does not exceed 221mW is 6.8cm.

Result:

SAR tests are not required for this product. The RF power emitted by the module, when operating at its maximum rate of possible transmission, is considered not to be dangerous for the general public as long as a distance of at least 6.8cm is maintained during normal operation.

This transmitter is installed inside a host device that is professionally installed by the end user to measure energy and report this consumption back to the home office in a remote manner. Due to the extremely low data rate that is required to report back the consumption reading to the home office, the RF emissions is several orders below the level that is permitted. However, since this product is for fixed applications a minimum distance of 20cm from the general public must be observed during normal operation.

20cm Compliance Requirements

It is required that the transmitter inside the host device maintains at least 20cm distance from the general public at all times.

The electric meter base is permanently installed on the outside of house to measure energy before it enters in the customer premises. Under most situation, the remote location of the meter base (required for either esthetic reasons or protection against the elements) inherently provides a 20cm distance between the uncontrolled public, however if this distance cannot be guaranteed then Tantalus Systems Corp. suggests that some form of public awareness is made by the utility to protects its customers from any unintentional exposure to RF radiation.

A handwritten signature in black ink, appearing to read 'M. Fairburn', with a horizontal line extending to the right.

Mark Fairburn
Sr. RF Design Engineer
Tantalus Systems Corp.