TYPE OF EXHIBIT: RF EXPOSURE EVALUATION

FCC PART: 1.1310

IC PART: RSS-102

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-254-0BX6

TYPE OF UNIT: 220 MHz Modem Transceiver

FCC ID: AIERIT25-250

IC ID: 1084A-25250

DATE: June 4, 2007

PROCEDURE:

Because this product is used as a mobile device, an RF evaluation was done. The RF evaluation entailed testing the unit on RITRON'S 3-meter range to determine EIRP and then calculating the minimum safe distance from the antenna necessary to ensure compliance with the appropriate RF exposure limits.

1. The measurement for effective radiated power was taken at the RITRON, Inc. 3-meter test site, details of which are on file with the FCC and Industry Canada.

2. The DUT was aligned for transmitter operation on lower and upper band edge frequenices at the 6 watt maximum output power rating of the DTXM-254-0BX6 per the tune-up procedure outlined in the Maintenance Manual. The unit was then terminated at the antenna port in a quarterwave magnetic mount antenna which is typical of what might be used with this product. (The user may connect other antennas, however.)

3. All field strength measurements were made with the Hewlett-Packard Model 8560E Spectrum Analyzer and an Electro-Metrics EM-6924 adjustable dipole antenna tuned to the carrier frequency.

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PROCEDURE (Continued):

4. The quarterwave antenna was connected to the DUT via its cable and tested above a 0.5m x 0.5 m ground plane. The height of the field strength measurement antenna and the azimuth orientation of the antenna were varied to provide maximum field strength. The maximum levels were noted.

5. A substitution antenna, an Electro-Metrics EM-6924 adjustable dipole, was substituted for the quarterwave antenna at the DTXM-254-0BX6's previous location. An RF signal generator was set for the frequency of the DUT with the level at the substitution antenna noted.

6. The height of the receiving antenna was adjusted for maximum signal strength. The level at the receiving antenna was noted.

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EQUATIONS FOR EIRP:

The substitution antenna is specified from the manufacturer in terms of antenna factor rather than antenna gain. The conversion is:

Ga(dbd) = 20 log f (MHz) – AF(dB) – 31.9

The effective radiated power (ERP) is then:

ERP(dBm) = Pr(dBm) + Pgen(dBm) – Ps(dBm) – Ga(dBd)

Where:

Pr is the power level of the radio's emission at the receiving antenna output.

Pgen is the RF signal generator level at the substitution antenna input.

Ps is the power level of the substitution antenna emission at the receiving antenna output.

Ga is the gain of the substitution antenna.

The ERP is converted to watts from dBm by:

ERP(watts) = $\text{antilog}_{10}((\text{ERP(dBm)} - 30)/10)$

And finally, ERP is converted to EIRP (isotropic radiator) by: EIRP = 1.64 ERP

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RESULTS FOR EIRP:

Frequency (MHz)	Pr (dBm)	Pgen (dBm)	Ps (dBm)	Ga (dBd)	ERP (dBm)	EIRP (watts)
217.500	10.2	-1.0	-25.5	0.0	34.7	4.84
221.500	10.5	-1.0	-26.7	0.0	36.2	6.84

DETERMINING MPE DISTANCE:

Power density is related to EIRP:

$S(W/m^2) = EIRP(W)/4\pi r^2$ where r is the distance from the source in meters. Rearranging for distance:

$r = \sqrt{(EIRP/4\pi S)}$

The MPE (maximum permissible exposure) for a device operating in a General Population/Uncontrolled exposure environment is 0.2 mW/cm^2 . Converting to W/m^2, the limit becomes 2.0 W/m^2. The MPE limit is substituted for S and EIRP is entered in the above equation.

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FCC PART: 1.1310

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RESULTS FOR MPE:

Frequency (MHz)	EIRP (watts)	Duty Cycle %	S limit W/m^2	Distance cm	Distance in
217.500	4.84	50	2.0	31.0	12.2
221.500	6.84	50	2.0	36.9	14.5

RF WARNING STATEMENT:

The following statement appears in the Users Manual regarding RF safety:

> The FCC, with its action in General Docket 79-144, March 13, 1985, adopted a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment.
>
> The DTXM product family has been evaluated for compliance with the maximum exposure limits for RF energy at the maximum power rating of the unit and with the only antenna sold for use with this product by RITRON. To ensure compliance with the General Population/Uncontrolled maximum exposure limits, please observe the following:
>
> When the Ritron RAM-1545 remote magnetic mount antenna is used, mount the antenna in a location that will ensure that all persons will be located away from the antenna by the following minimum distances:

Model	Minimum Distance
DTXM-154-GBX6	
DTXM-154-0BX6	
DTXM-254-0BX6	14.5 in. (36.9 cm)
DTXM-454-0BX3	
DTXM-454-0BX6	8.0 in. (20.2 cm)
DTXM-454-0BX9	

Antennas other than the Ritron RAM-1545 must be tested with the DTXM for RF exposure compliance in the environment in which it is to be used per the FCC's OET Bulletin 65, Edition 97-01 or Industry Canada RSS-102.

Note: The Ritron RAM-1545 cannot be used at 220 MHz. The DTXM-254 was tested with a quarterwave whip antenna tuned to 219 MHz.