TYPE OF EXHIBIT: RF EXPOSURE EVALUATION
FCC PART: 1.1310
MANUFACTURER: RITRON, Inc.
MODEL: RQX-417NX
TYPE OF UNIT: UHF FM Callbox 2-Way Radio
FCC ID: AIERIT41-417
DATE: Nov 30, 2015

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, middle and upper band edge frequencies at the 2.5 Watt output power rating of the RQX-417NX. The unit's internal antenna radiation will be measured.

3. The RQX-417NX was placed on a turntable and rotated to the maximum radiation point as picked up by the log periodic antenna. The height of the measurement log periodic antenna's height was varied to find maximum field strength.

4. In performing the substitution method of measurement an adjustable dipole, was substituted for the DUT at the RQX-417NX previous location. An RF signal generator was set for the frequency of the DUT with the level at the substitution antenna noted. The height of the receiving antenna was adjusted for maximum signal strength. All field strength measurements were made with the Advantest R3265A Spectrum Analyzer and log periodic antenna.

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EQUATIONS FOR EIRP:

The effective radiated power (ERP) is:

ERP(dBm) = Prad(dBm) + Pgen(dBm) – Psub(dBm) + Ga(dBd)

Where:

Prad 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.

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

Ga(dBd) is the gain of the substitution antenna over a dipole (0 dB).

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:

DETERMINING MPE DISTANCE:

EIRP = 1.64 (ERP/2)

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/uncontrolled exposure environment is f/1500 mW/cm^2 . Converting to W/m^2, the limit becomes f/150 W/m^2 (450/150 = 3). The MPE limit is substituted for S and EIRP is entered in the above equation. A 50% transmitter duty cycle is used for the two-way radio.

Freq (MHz)	Substitution power(dBm)	Sub Vert ref(dBm)	Max Vert (dBm)	Max Spur ERP(dBm)	Max Spur EIRP(dBm)	Max Spur EIRP(W)	Duty cyc (%)	Distance (m)	Distance (in)
451.025	-1.59	-27.5	1.4	27.3	29.46	0.88	50	0.11	4.3
460.025	-2	-27.41	3.2	28.6	30.76	1.19	50	0.12	4.9
469.975	-1.78	-27.3	5.1	30.6	32.77	1.89	50	0.15	6.1

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WARNING STATEMENT:

The following statement appears in the Users Manual:

PLEASE NOTE THE FOLLOWING WITH REGARD TO RF EXPOSURE FOR THIS PRODUCT,

EXPOSURE TO RADIO FREQUENCY ENERGY:

This product generates radio frequency (RF) energy when the PTT button on the front of the unit is depressed. This product has been evaluated for compliance with the maximum permissible exposure limits for RF energy at the maximum power rating of the unit. At the 20 cm (8 inches) minimum expected separation distance and greater, the maximum RF exposure is at or below the General Population/Uncontrolled limits. Operator should stay at least 20 cm (8 inches) from call box. External antennas have not been tested for compliance and may or may not meet the exposure limits at the distances given. Higher gain antennas are capable of generating higher fields in the strongest part of their field and would, therefore, require a greater separation from the antenna. They can be mounted higher than the call box which will increase the operator's separation from the antenna. This product is not to be used by the general public in an uncontrolled environment unless compliance with the Uncontrolled/General Population limits for RF exposure can be assured.

To limit exposure to RF energy to levels below the limit, please observe the following:

- **DO NOT** activate the transmitter when not actually wishing to transmit.
- When transmitting, make certain that the distance limits for the particular model in use are observed.
- **DO NOT** allow children to operate the radio.

When used as directed, this series of radios is designed to comply with the FCC's RF exposure limits for "Uncontrolled/General Population". In addition, they are designed to comply with the following Standards and Guidelines:

- United States Federal Communications Commission, Code of Federal Regulations; 47 CFR §§ 2 sub-part J.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992.
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition.