TYPE OF EXHIBIT: RF EXPOSURE EVALUATION

FCC PART: 1.1310, 2.1091

MANUFACTURER: RITRON, Inc.

MODEL: DTX-965

TYPE OF UNIT: 900MHz Transceiver Module

FCC ID: AIERIT34-9650

DATE: September 14, 2016

We, Ritron, Inc. would like to declare that the device has been evaluated in accordance with 47 CRF Part 2.1091 and meets the requirements.

Attestations

This equipment has been evaluated with the accordance with the standards identified in this report. To the best of my knowledge and belief, these evaluations were performed using the procedures described in this report.

I attest that the necessary evaluations were made, under my supervision, at:

Ritron Inc.
505 West Carmel Dr.
Carmel, IN. 46032

Kevin G. Matson
Senior Project Manager

Date: 09/14/2016

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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 frequencies at the 30 watt maximum output power rating of the DTX-965 per the tune-up procedure outlined in the Maintenance Manual. The unit was then terminated at the antenna port in a quarterwave dipole 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 Agilent E4407B Spectrum Analyzer and a Log Periodic Antenna.

4. A quarter wave vertical antenna (0 dBi gain) 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 tuned dipole, was substituted for the quarter wave antenna at the DTX-965'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) = antilog$_{10}$((ERP(dBm) – 30)/10)

And finally, ERP is converted to EIRP (isotropic radiator) by: EIRP = 1.64 (ERP/2)

RESULTS FOR EIRP:

			@ 30 Watts				
Frequency (MHz)	Pr (dBm)	Pgen (dBm)	Ps (dBm)	Ga (dBd)	ERP (dBm)	ERP (watts)	EIRP (watts)
896.8875	14.0	-2.0	-32.0	0.8	+43.2	20.9	17.1
900.8875	14.0	-2.0	-32.0	1.0	+43.0	20.0	16.4

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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 occupational/controlled exposure environment is 1 mW/cm^2 . Converting to W/m^2, the limit becomes 3 W/m^2. The MPE limit is substituted for S and EIRP is entered in the above equation.

RESULTS FOR MPE:

		@ 30 Watts			
Frequency (MHz)	EIRP (watts)	Duty Cycle (%)	S limit (W/m^2)	Distance (cm)	Distance (in)
896.8875	17.1	50	3.01	67.4	26.5
900.8875	16.4	50	3.07	66.0	26.0

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RF WARNING STATEMENT:

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

SAFETY STANDARDS-RF EXPOSURE

RF ENERGY EXPOSURE AWARENESS AND CONTROL INFORMATION, AND OPERATIONAL INSTRUCTIONS FOR FCC OCCUPATIONAL USE REQUIREMENTS:

BEFORE USING THIS 2-WAY RADIO, READ THIS IMPORTANT RF ENERGY AWARENESS AND CONTROL INFORMATION AND OPERATIONAL INSTRUCTIONS TO ENSURE COMPLIANCE WITH THE FCC'S AND IC'S RF EXPOSURE GUIDELINES.

NOTICE: This radio is intended for use in occupational/controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC/IC limits. This radio device is NOT authorized for general population, consumer, or any other use.

This 2-way radio uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance. It uses radio frequency (RF) energy or radio waves to send and receive calls. RF energy is one form of electromagnetic energy. Other forms include, but are not limited to, electric power, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection. All 2-way radios marketed in North America are designed, manufactured and tested to ensure they meet government established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of 2-way radios. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it. Please refer to the following websites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits.

http://www.fcc.gov/oet/rfsafety/rf-faqs.html
http://www.osha.gov/SLTC/radiofrequencyradiation/index.html

Federal Communications Commission Regulations:

The FCC rules require manufacturers to comply with the FCC RF energy exposure limits for mobile 2-way radios before they can be marketed in the U.S. When 2-way radios are used as a consequence of employment, the FCC requires users to be fully aware of and able to control their exposure to meet occupational requirements. Exposure awareness can be facilitated by the use of a label directing users to specific user awareness information.

The DTX 2-way radio has an RF exposure product label. Also, this DTX manual includes information and operating instructions required to control your RF exposure and to satisfy compliance requirements.

Compliance with RF Exposure Standards:

The DTX two-way radio is designed and tested to comply with a number of national and international standards and guidelines (listed below) regarding human exposure to radio frequency electromagnetic energy. This radio complies with the IEEE and ICNIRP exposure limits for occupational/controlled RF exposure environment at duty factors of up to 50% talk and 50% listen and is authorized by the FCC for occupational use. In terms of measuring RF energy for compliance with the FCC exposure guidelines, your radio antenna radiates measurable RF energy only while it is transmitting (during talking), not when it is receiving (listening) or in standby mode. The DTX two-way radio complies with the following RF energy exposure 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.
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To control exposure to yourself and others and ensure compliance with the occupational/controlled environment exposure limits always adhere to the following procedures:
Guidelines:

• User awareness instructions should accompany device when transferred to other users.

• Do not use this device if the operational requirements described herein are not met.

Instructions:

• Transmit no more than the rated duty factor of 50% of the time. To transmit (talk or send data), assert the PTT input pin. To receive calls, un-assert the PTT input. Transmitting 50% of the time, or less, is important because this radio generates measurable RF energy exposure only when transmitting (in terms of measuring for standards compliance).

• Transmit only when people are at least the recommended minimum lateral distance away, as shown in Table 1, from a properly installed according to installation instructions, externally-mounted antenna.

NOTE - Table 1 lists the recommended minimum lateral distance for bystanders in a controlled environment from transmitting types of antennas (i.e., monopoles over a ground plane, or dipoles) at several different ranges of rated radio power for mobile radios installed on a vehicle. For mobile applications, this transmitter is restricted for use only in a locomotive, and the antenna must be mounted on the metal roof of the locomotive.

Table 1. Rated Power and Recommended Lateral Distance for quarter-wave ground plane antenna:

Rated Power of DTX-965 (896-901MHz)	Recommended Minimum Lateral Distance from Transmitting Antenna
30 watts or less:	26.5 inches (67.4 cm)

Antennas

• Install antennas taking into account the recommended minimum lateral distances in Table 1. These antenna installation guidelines are limited to antennas with appropriate ground planes. The antenna installation should additionally be in accordance with:

a.) The requirements of the antenna manufacturer/supplier.
b.) Instructions in this manual including minimum antenna cable lengths.
c.) Antennas other than those shown in Table 1 must be tested with the DTX module 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.

Use only a unity gain, quarterwave antenna or equivalent antenna per the frequency range for the device as specified in Table 1. Unauthorized antennas, modifications, or attachments could damage the radio and may violate FCC regulations.

Antennas for this transmitter must not be co-located or operated in conjunction with any other antenna or transmitter. All information herein pertains to the antenna not co-located to other antennas or transmitters.

Approved Accessories

• This radio has been tested and meets the FCC RF exposure guidelines when used with the Ritron accessories supplied or designated for this product. Use of other accessories may not ensure compliance with the FCC's RF exposure guidelines, and may violate FCC regulations.

• For a list of Ritron approved accessories see this user manual, or visit the following website which lists approved accessories: www.ritron,com

Contact Information:

For additional information on exposure requirements or other information, contact Ritron at (317) 846-1201 or at www.ritron.com.