

TYPE OF EXHIBIT:	OPERATIONAL DESCRIPTION
FCC PART:	2.1033 (c)(4), (5), (7), (8), (10)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	DTX-442
TYPE OF UNIT:	UHF-FM Two Way Radio Transceiver Module
FCC ID:	AIERIT17-442
DATE:	Dec 11, 2003

DESCRIPTION:

The DTX-442 is a board level UHF FM RF transceiver module which operates at a maximum output power of five watts. It covers the frequency band of 450 to 470 MHz. The unit will support either 12.5 kHz or 25 kHz channel bandwidth operation for voice operation and/or 12.5 kHz channel bandwidth operation for data. The unit is designed to be operated in mobile service with an external source of DC power and an external antenna.

TYPES OF EMISSIONS:

For voice: 10K6F3E and 15K2F3E

For data: 9K4F1D

FREQUENCY RANGE:

450 to 470 MHz

RANGE OF OPERATING POWER:

1.0 to 5.0 watts

MAXIMUM POWER RATING:

5.0 watts

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FINAL AMPLIFYING STAGE VOLTAGES AND CURRENTS:

The following currents and voltage exist in the final RF power transistor with 13.8 VDC applied to the radio. The power is set by adjusting R222.

Transmit Power (watts)	Gate Voltage (volts)	Drain Voltage (volts)	Transmit Current (Amps)	Q208 Efficiency (%)
1	1.0	13.6	0.28	26.3
2	1.2	13.5	0.40	37.1
3	1.4	13.4	0.52	43.1
4	1.5	13.3	0.64	47.1
5	1.8	13.2	0.76	50.0

CIRCUIT DESCRIPTION-STABILIZING FREQUENCY:

The basic frequency stability of the unit is determined by the stability of the VCTCXO (voltage-controlled temperature compensated crystal oscillator), Y301, and the voltage which drives the modulation port of the VCTCXO.

The VCTCXO is a monolithic device purchased by RITRON and specified to have a frequency stability in excess of that required by the Commission. Sampling of units by RITRON has confirmed that the devices do indeed meet the required stability. The voltage to the modulation port of the VCTCXO is maintained by a high stability voltage regulator. The variation in frequency caused by modulation port voltage variations is at least an order of magnitude below that of the basic VCTCXO.

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CIRCUIT DESCRIPTION-SPURIOUS RADIATION SUPPRESSION:

Spurious radiation caused by modulation components is limited by the modulation limiter filter. The modulation limiter filter is an active lowpass filter formed around two operational amplifier sections. This active filter has five poles with no transmission zeros.

Harmonics of the transmitter carrier are suppressed by a 5-pole filter which follows the final transmitter stage matching network. This filter has less than 0.7 dB insertion loss and greater than 35 dB of ultimate rejection in the stopband.

CIRCUIT DESCRIPTION-MODULATION LIMITING:

Modulation limiting occurs by allowing the audio signal to be amplified enough to clip against an operational amplifier's power supply rails and ground. The clipped signal is then sent to the limiter filter described above. In this product, IC305A and IC308A act as the modulation limiters.

CIRCUIT DESCRIPTION-POWER LIMITING:

The RF output power is limited by a closed loop power control which measures the current drawn by the final RF power device and adjust the drive level as appropriate to maintain a set current. The set point can be adjusted during alignment for output power levels between one and five watts.