TYPE OF EXHIBIT: TABLE OF CONTENTS

FCC PART: 2.1033(c)(14)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

TYPE OF EXHIBIT: LIST OF TEST EQUIPMENT USED

FCC PART: 2.947(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

ITEM	MAKE/MODEL	SERIAL NO.	CAL.	NEXT CAL.
DC Power Supply	HQ PS3010U	N/A	N/A	
Multimeter	HP3466A	N/A	N/A	
RF Test Set	HP 8920A	3352A03633	10/31/2012	10/31/2013
Spectrum Analyzer	Advantest R3265A	75060189	6/22/2012	6/22/2013
Spectrum Analyzer	HP 8560E	3720A02980	6/22/2012	6/22/2013
Storage Scope	Fluke PM3335	DM630034	N/A	N/A
Temp. Chamber	Delta Design 3900	0-52-R	N/A	N/A
Thermocouple	Triplett 320-G/P		N/A	N/A
Log Periodic Ant.	Electo-Metrics LPA-25	8-102	5/20/2011	5/20/2013
Dipole Ant. Set	Ritron Inc.	N/A	5/20/2011	5/20/2013
Microwave Horn	EMCO 3105		5/20/2011	5/20/2013

TYPE OF EXHIBIT: MEASUREMENT METHODS

FCC PART: 2.947

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

All of the measurements made on this device and included in this report were made per ANSI/TIA-603-C-2004.

Dennis Zimmerman
Project Engineer
RITRON, Inc.

TYPE OF EXHIBIT: DESCRIPTION OF MEASUREMENT FACILITY

FCC PART: 2.948

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

The Field Strength measurements filed with this application were made on a site certified by RITRON, Inc. Data pertaining to this side are on file with the FCC and Industry Canada and are current.

This site is used on a continuing basis exclusively by RITRON, Inc. and is utilized only for RF Field Strength measurements of equipment designed and manufactured by RITRON, Inc. It is not used for measurements by, or for, any other party on a contract basis or otherwise.

All other measurements were taken at RITRON's Engineering Laboratory in Carmel, IN.

Dennis Zimmerman
Project Engineer
RITRON, Inc.

TYPE OF EXHIBIT: RADIO FREQUENCY OUTPUT POWER

FCC PART: 2.1046(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 14, 2012

PROCEDURE:

1. The DTX-260 was aligned for transmitter operation at six power levels per the tune-up procedure outlined in the Maintenance manual for frequencies at the lower and upper band edges.

2. Power was supplied to the DTX-260 by a PS3010U Power Supply. The DTX-260 was connected to a HP8920B Test Set used to measure the RF carrier power. The input to the Test Set provides a resistive 50-ohm termination at the frequencies and power levels used for this test.

3. The voltage across an internal shunt in series with the power supply lead of the RF Power Module was used with an HP3466A Digital Multimeter to measure current (Id). A Protek 506 was used to measure the RF Power Module output stage power control voltage (Vcon) and drain voltage (Vd).

4. Measurements were taken at various power levels between 1 watt and 6 watts.

TYPE OF EXHIBIT: RADIO FREQUENCY OUTPUT POWER

FCC PART: 2.1046(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: August 24, 2012

RESULTS:

216 MHz:

Pout(W)	Con(V)	Vd(V)	Id(A)	Eff (%)
1	58	7.7	0.62	21
2	84	7.65	0.91	29
3	105	7.61	1.14	35
4	124	7.58	1.35	39
5	141	7.54	1.54	43
6	159	7.5	1.75	46

222 MHz:

Pout(W)	Con(V)	Vd(V)	Id(A)	Eff (%)
1	60	7.71	0.67	19
2	87	7.65	0.987	26
3	109	7.61	1.24	32
4	129	7.56	1.48	36
5	146	7.52	1.67	40
6	161	7.5	1.86	43

TYPE OF EXHIBIT: MODULATOR RESPONSE-12.5 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

PROCEDURE:

1. The DTX-260 modulator response was measured from the audio input to the modulator input.

2. The unit was swept in frequency from 100 Hz to 10 kHz and the results noted. Plots are shown for 12.5 kHz and 25 kHz channel spacing operation for both flat and pre-emphasized modes and for 6.25 kHz channel spacing for flat mode. The frequency response is independent of carrier frequency.

TYPE OF EXHIBIT: MODULATOR RESPONSE-12.5 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

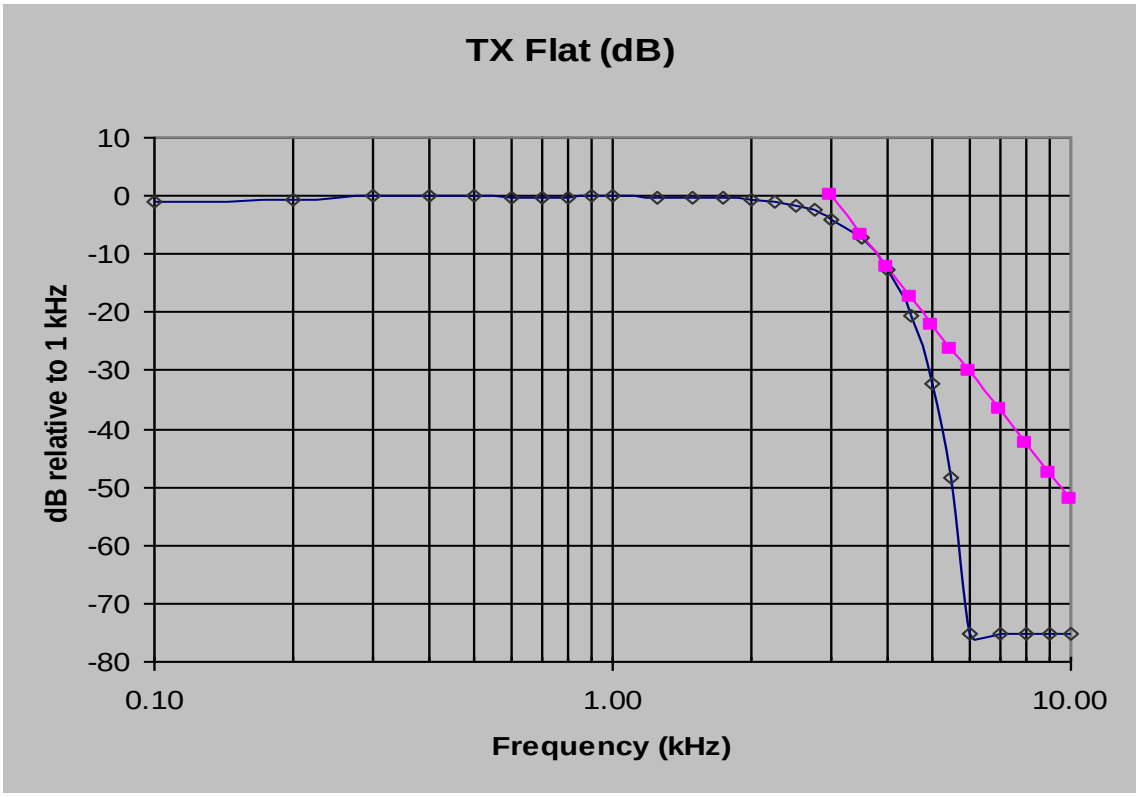
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS: Flat audio input



TYPE OF EXHIBIT: MODULATOR RESPONSE-12.5 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

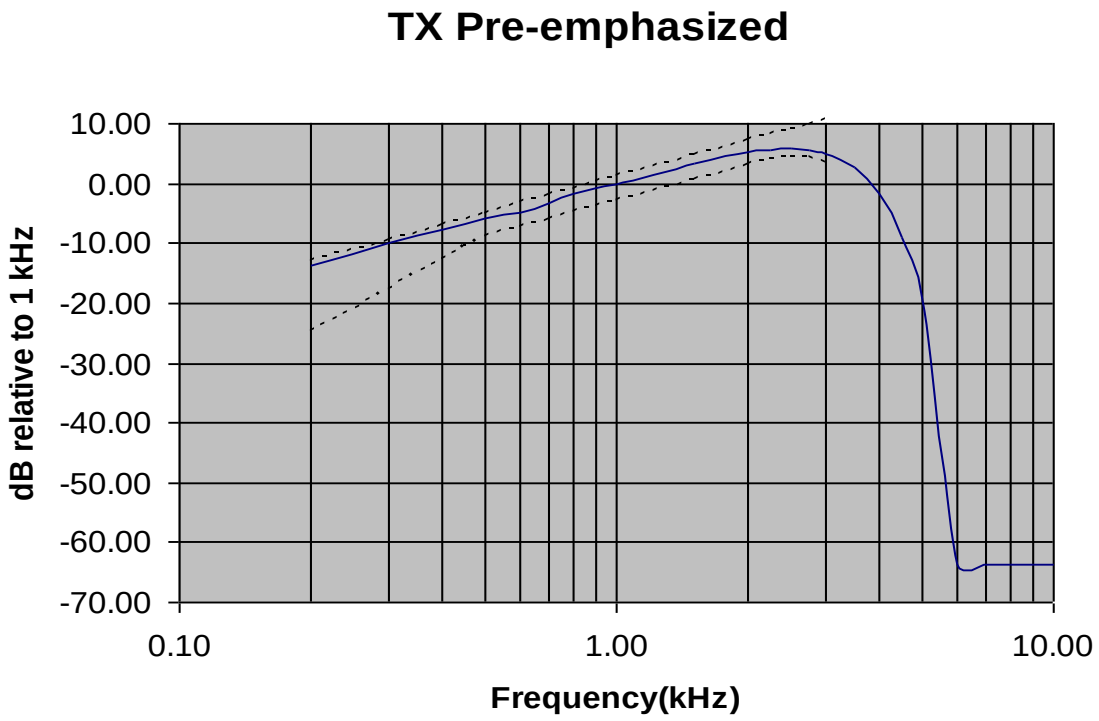
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS: Pre-emphasized audio



TYPE OF EXHIBIT: MODULATOR RESPONSE-6.25 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

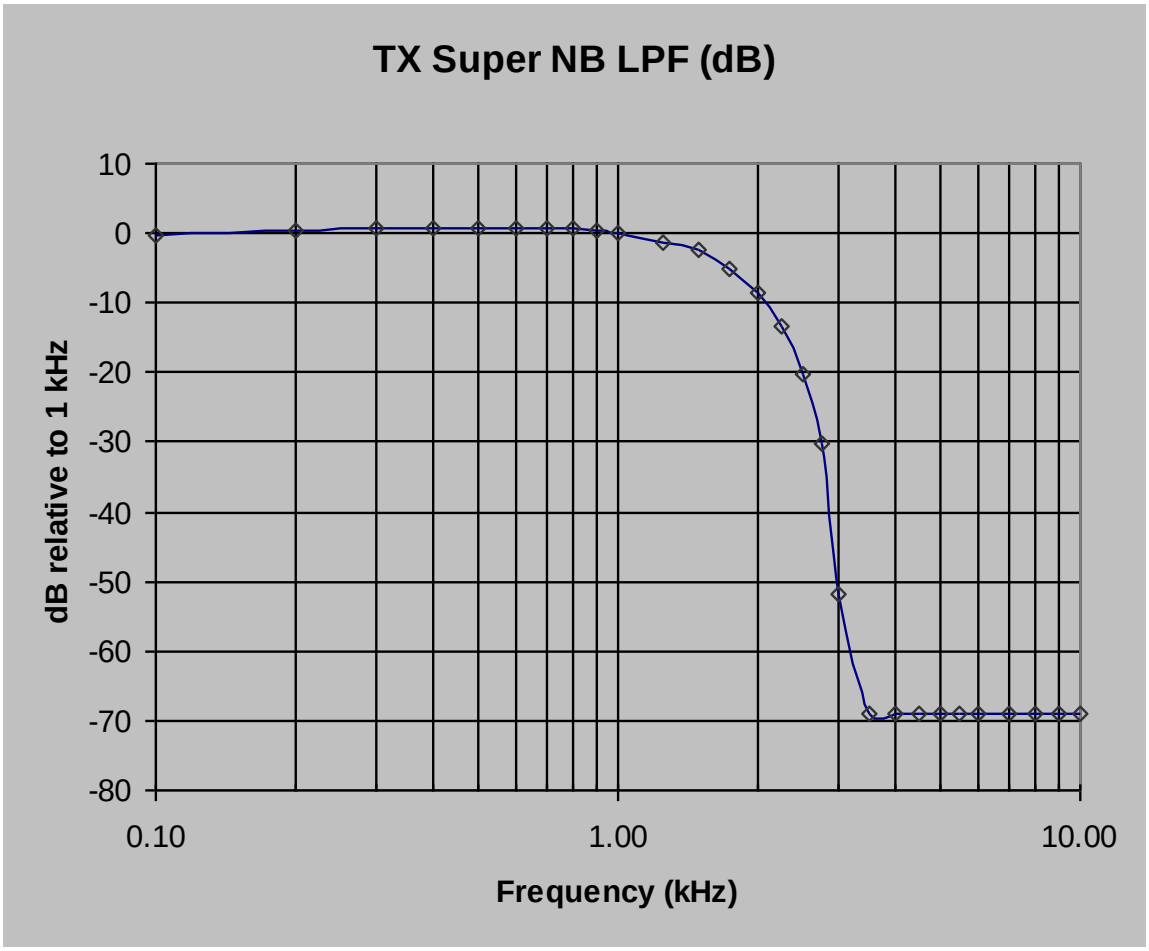
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS: Flat audio



TYPE OF EXHIBIT: MODULATOR RESPONSE- 25 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

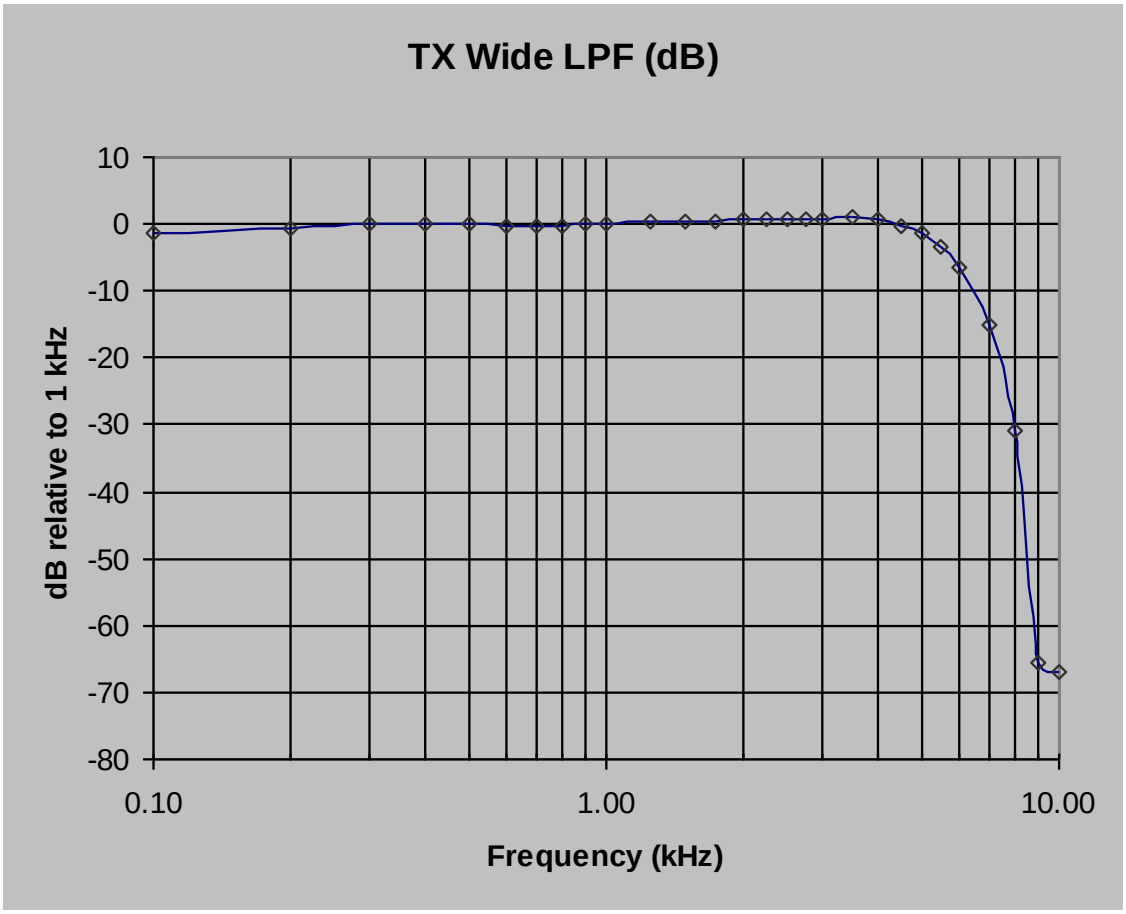
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

RESULTS: Flat audio



TYPE OF EXHIBIT: MODULATOR RESPONSE- 25 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

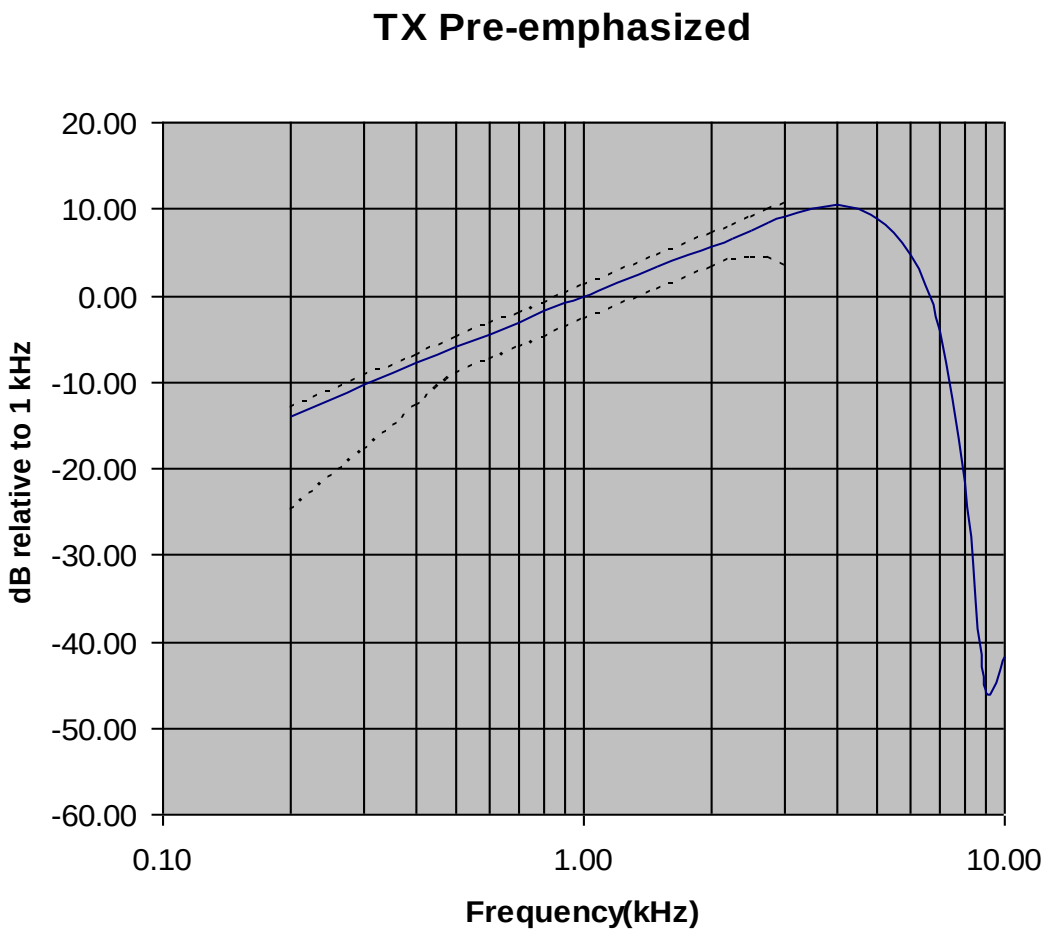
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

RESULTS: Per-emphasized audio



TYPE OF EXHIBIT: CLIPPER FILTER RESPONSE

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

PROCEDURE:

1. The audio output of the audio test set was coupled into the audio input of the DTX-260. The flat input mode was selected. The audio input of the test set was connected to the input of the modulator.

2. The audio generator frequency was swept from 100 Hz to 10 kHz and the response for 12.5 kHz, 6.25 kHz and 25 kHz channel spacing operation noted and plotted. The frequency response is independent of carrier frequency.

TYPE OF EXHIBIT: CLIPPER FILTER RESPONSE-12.5 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

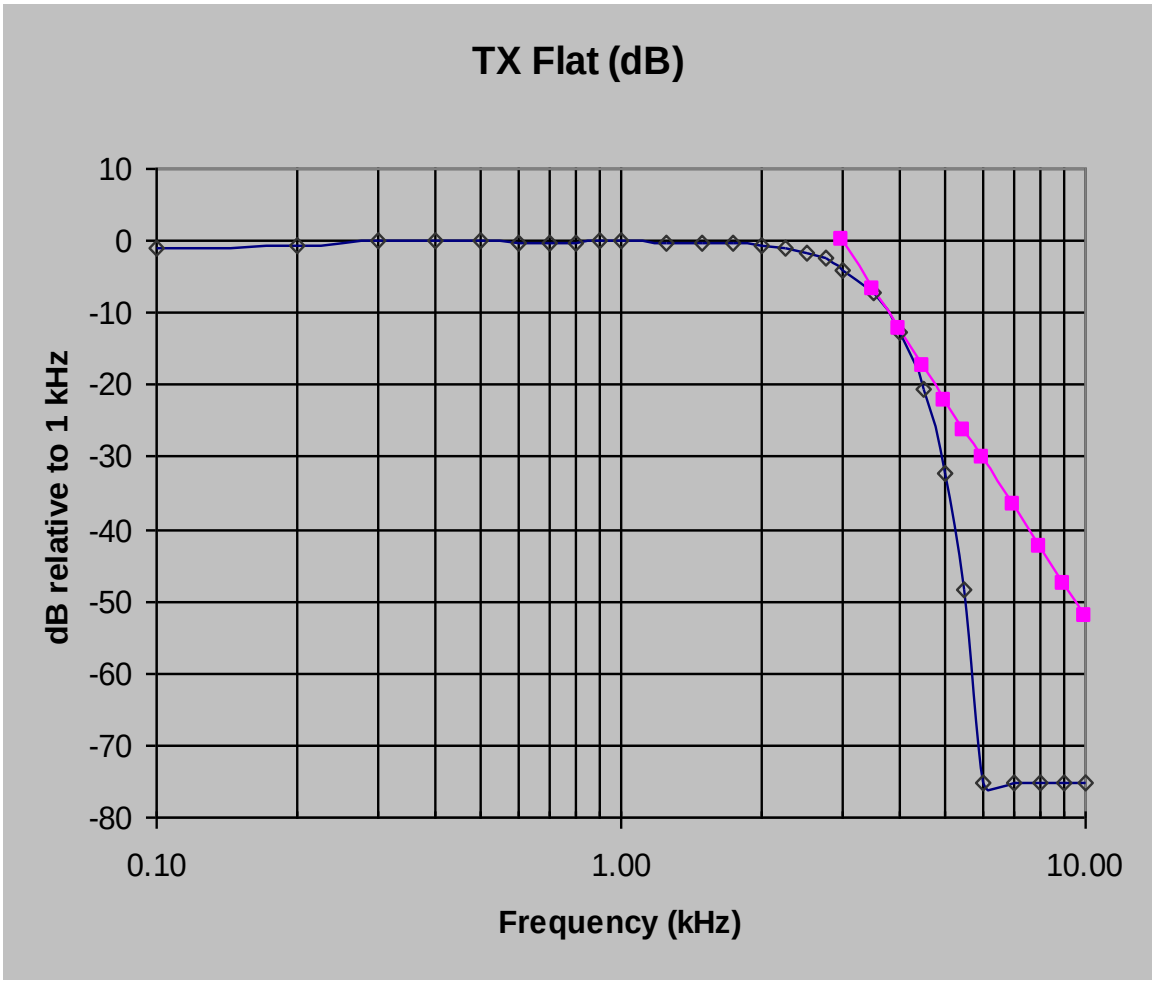
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS:



TYPE OF EXHIBIT: CLIPPER FILTER RESPONSE-6.25 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

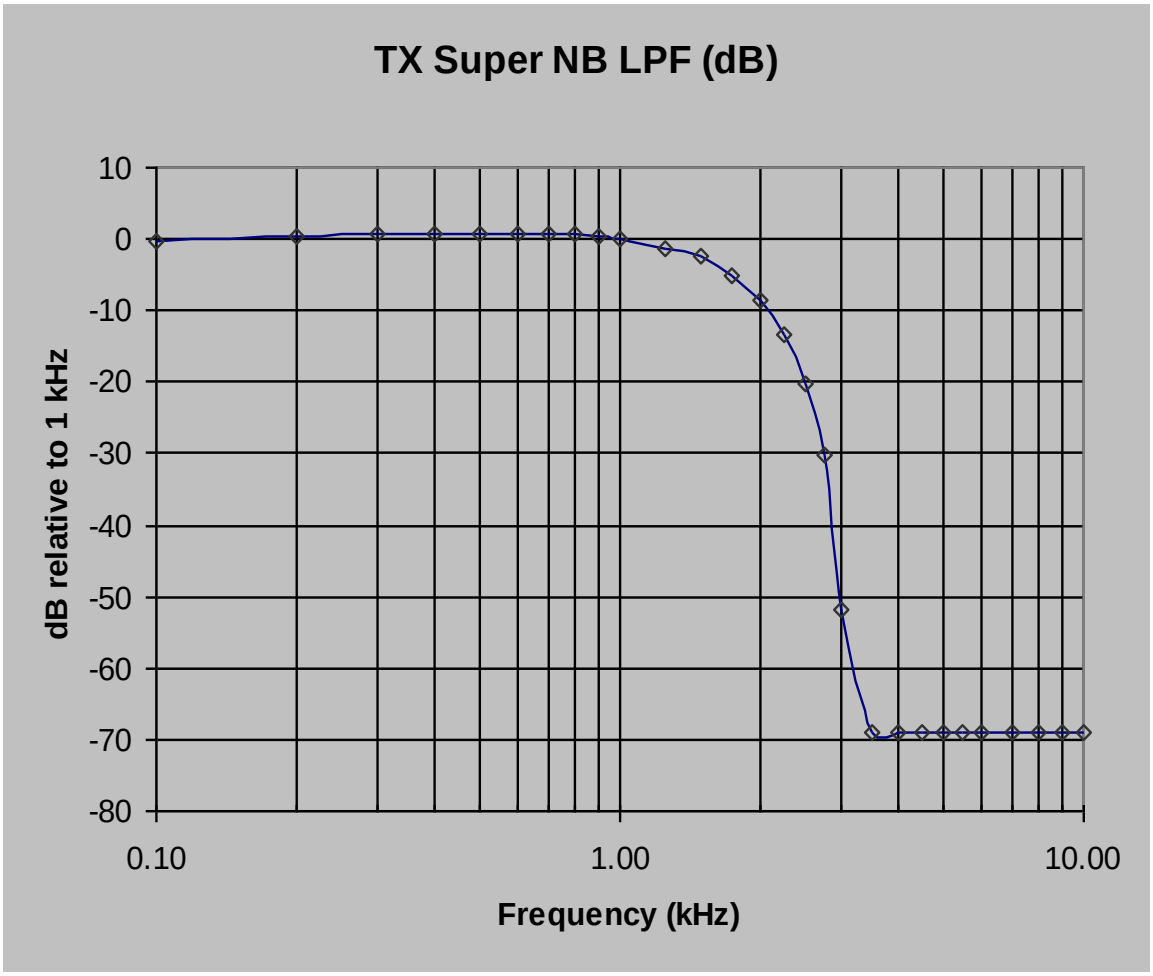
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS:



TYPE OF EXHIBIT: CLIPPER FILTER RESPONSE-12.5 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

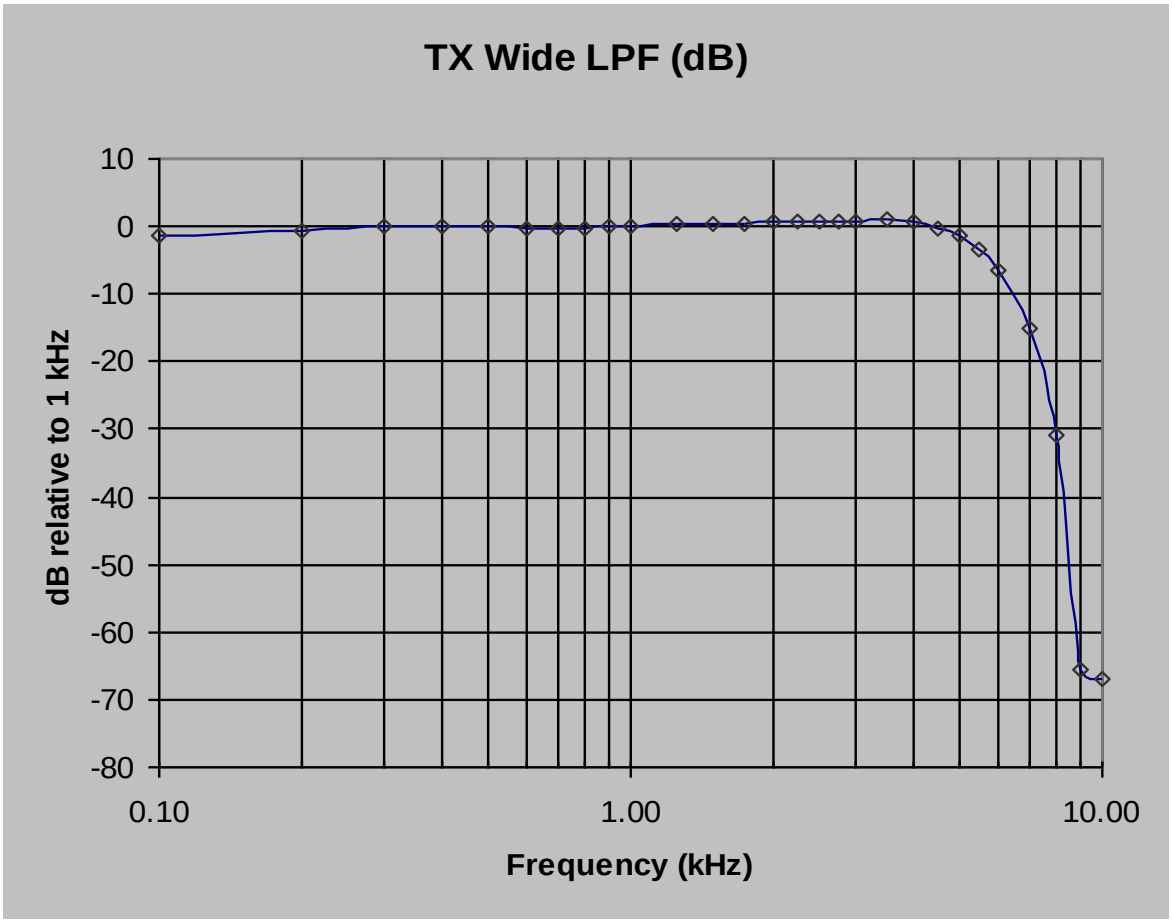
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS:



TYPE OF EXHIBIT: MODULATION LIMITING CURVES

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

PROCEDURE:

1. The DTX-260 was aligned for transmitter operation on 216 MHz per the tune-up procedure outlined in the Maintenance manual.

2. The RF output was connected to the RF input of a radio Test Set configured to measure FM deviation. The audio output of the audio test set was routed to the audio input of the DTX-260.

3. The frequency of the audio generator was adjusted on each transmit filter to find the frequency of maximum response and percentage modulated deviation was calculated relative to this. The DTX-260 transmit deviation was adjusted for 2.4 kHz maximum deviation for 12.5 kHz channel spacing, 1.1 kHz for 6.25 kHz channel spacing and 5 kHz maximum deviation for 25 kHz.

4. Percentage modulation plots are given for the narrowband, super narrowband and wideband transmitter filters for both flat and pre-emphasized input for all but the super narrowband. Here, only flat was show since super narrowband cannot support analog voice.

5. Three varying audio frequencies with increasing input level were used in each plot to show the limiting characteristics.

TYPE OF EXHIBIT: MODULATION LIMITING CURVES-12.5 kHz CHANNELS

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

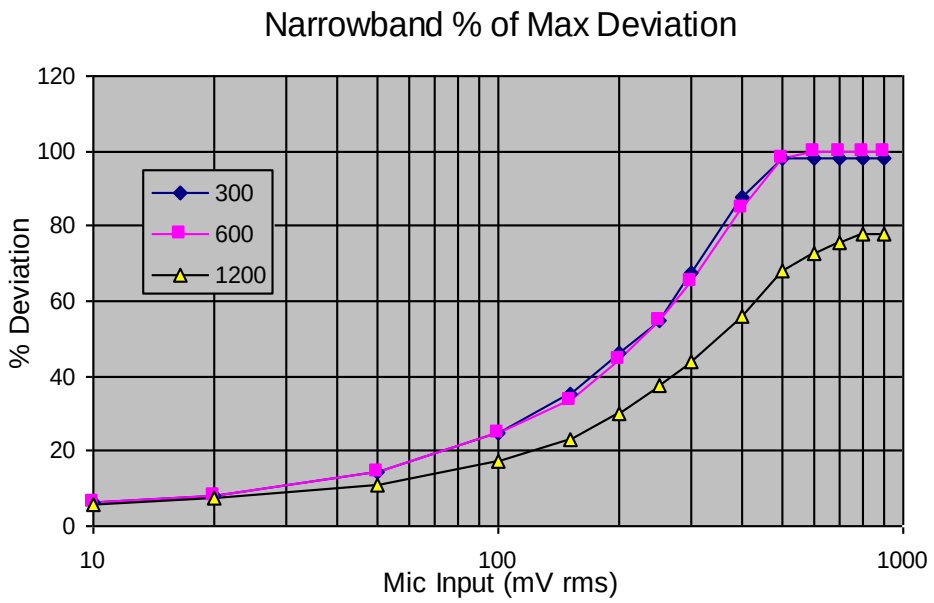
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS: Flat audio input



TYPE OF EXHIBIT: MODULATION LIMITING CURVES-12.5 kHz CHANNELS

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

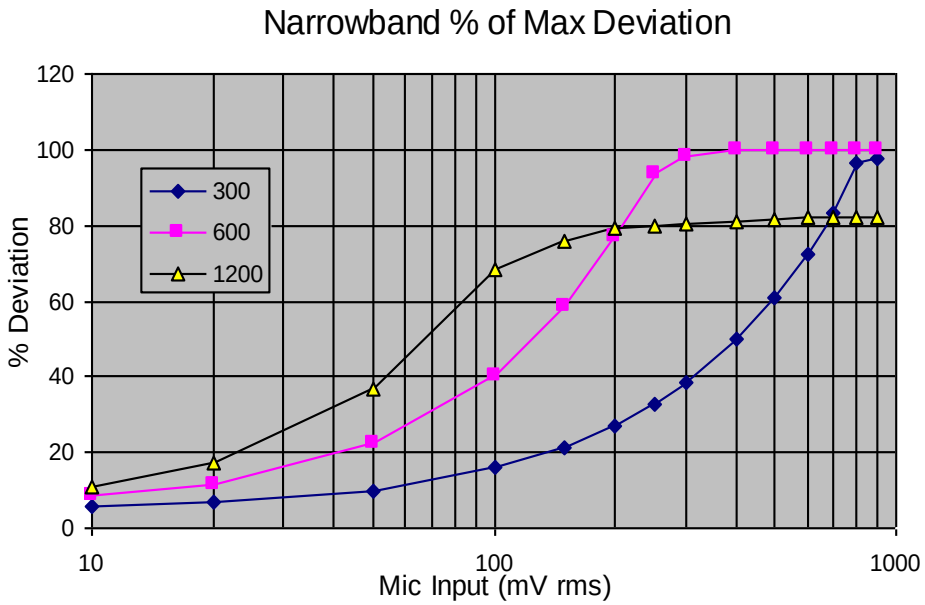
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS: Pre-emphasized audio input



TYPE OF EXHIBIT: MODULATION LIMITING CURVES-6.25 kHz CHANNELS

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

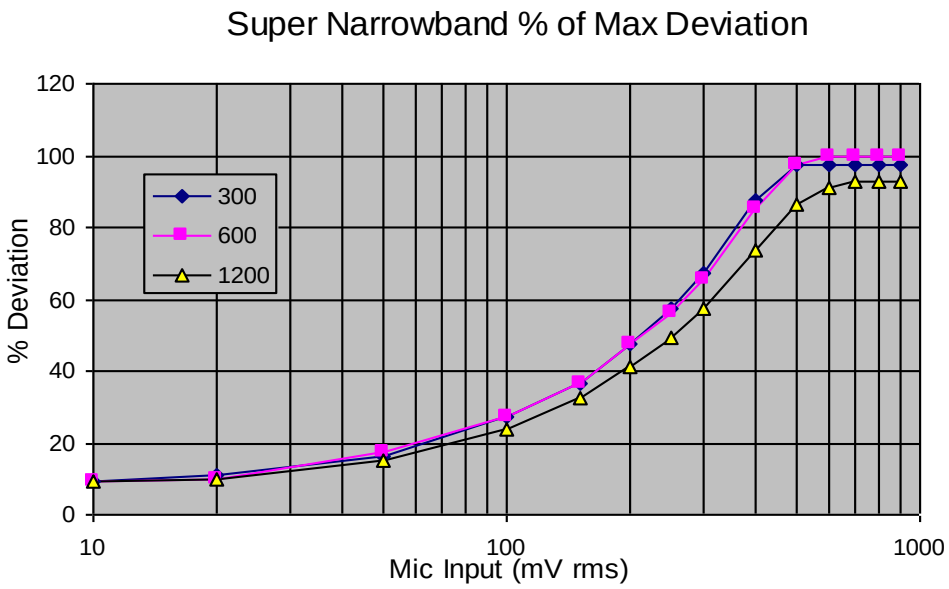
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: March 21, 2012

RESULTS:



TYPE OF EXHIBIT: MODULATION LIMITING CURVES- 25 kHz CHANNELS

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

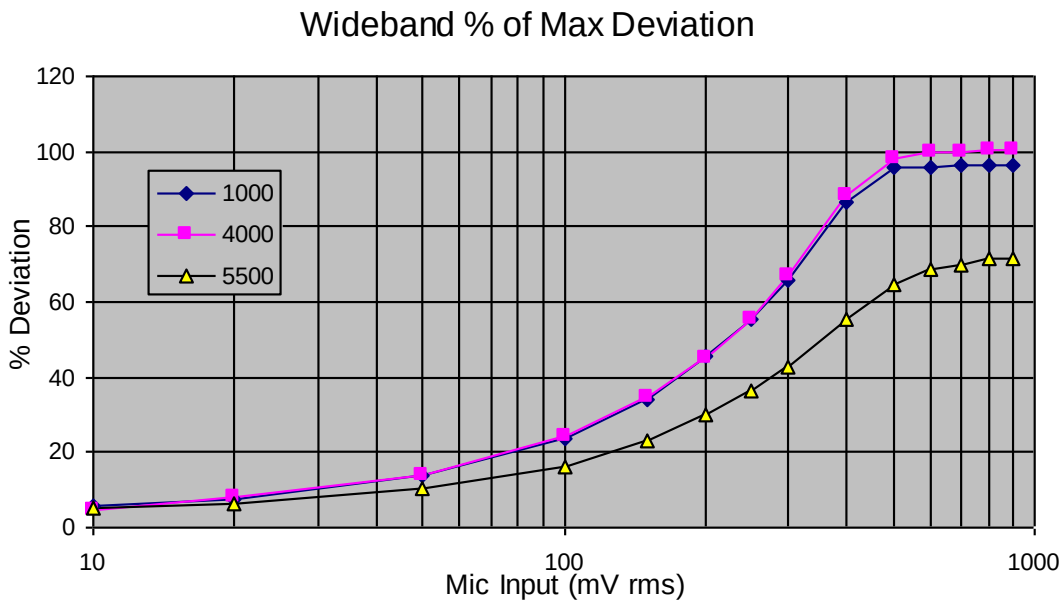
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

RESULTS: Flat audio input



TYPE OF EXHIBIT: MODULATION LIMITING CURVES- 25 kHz CHANNELS

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

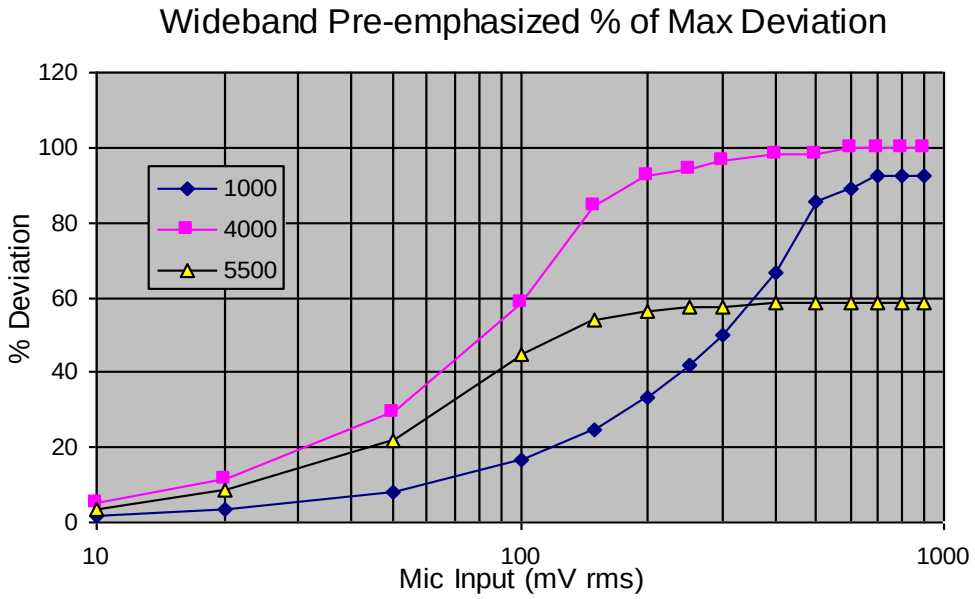
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

RESULTS: Pre-emphasized audio input



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH – D & E Masks

FCC PART: 2.1049(c)(1), 90.210(d), 90.210(e)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 21, 2012

PROCEDURE:

1. Part 90 allows for operation from 216 to 222 MHz. The follow table reflects the channel spacing and authorized bandwidth from 90.209 (b)(5):

Frequency	Channel spacing (kHz)	Autorized bandwidth (kHz)	Mask
216–220	6.25	20/11.25/6	B/D/E
220–222	5	4	F

2. The following plots are for the 216 to 220 MHz band for the wide (20), narrow (11.25) and super narrow (6.25) authorized bandwidths.

3. The first three plots are for wideband (25 kHz):
   Wideband voice- For wideband channel voice operation, a 2.5 kHz audio signal was applied to the microphone input of the unit. Its level was adjusted to be 16 dB above that required to produce 50% of peak deviation at the frequency of maximum deviation. The deviation adjustment was set for 2.4 kHz maximum deviation and a spectrum analyzer was connected to the RF output through a 20dB power attenuator.
   Wideband 4FSK digital voice/data- A four level FSK PN generator producing 9600 symbols/sec or 19200 bps modulate the carrier.
   Wideband AFSK data- Audio tones of 2400 and 4800 Hz modulate the carrier.

4. The next three plots are for narrowband (12.5 kHz):
   Narrowband voice- For wideband channel voice operation, a 2.5 kHz audio signal was applied to the microphone input of the unit. Its level was adjusted to be 16 dB above that required to produce 50% of peak deviation at the frequency of maximum deviation. The deviation adjustment was set for 2.4 kHz maximum deviation and a spectrum analyzer was connected to the RF output through a 20dB power attenuator.
   Narrowband 4FSK digital voice/data- A four level FSK PN generator producing 4800 symbols/sec or 9600 bps modulate the carrier.

Narrowband AFSK data- Audio tones of 1200 and 2400 Hz modulate the carrier.

5. The last plot shows super narrowband (6.25) digital voice or data at 4800 bps generated from a 4-level FSK PN code.

TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-25 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(b)

MANUFACTURER: RITRON, Inc.

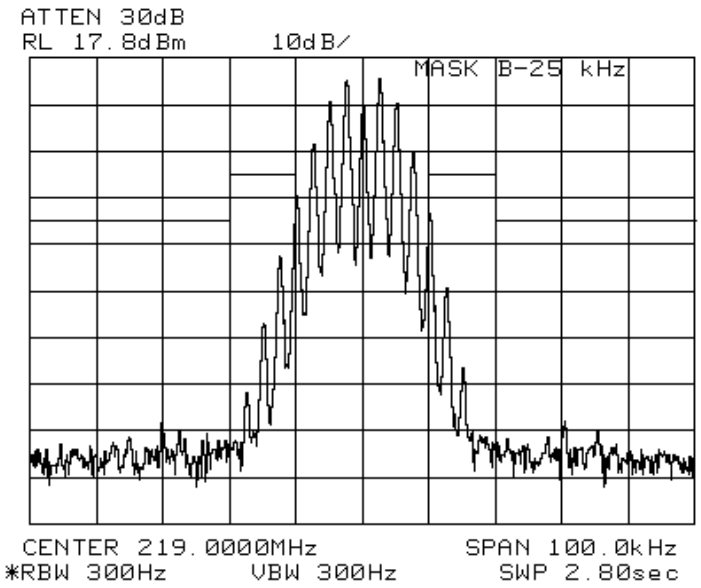
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: Analog voice modulation



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-25 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(b)

MANUFACTURER: RITRON, Inc.

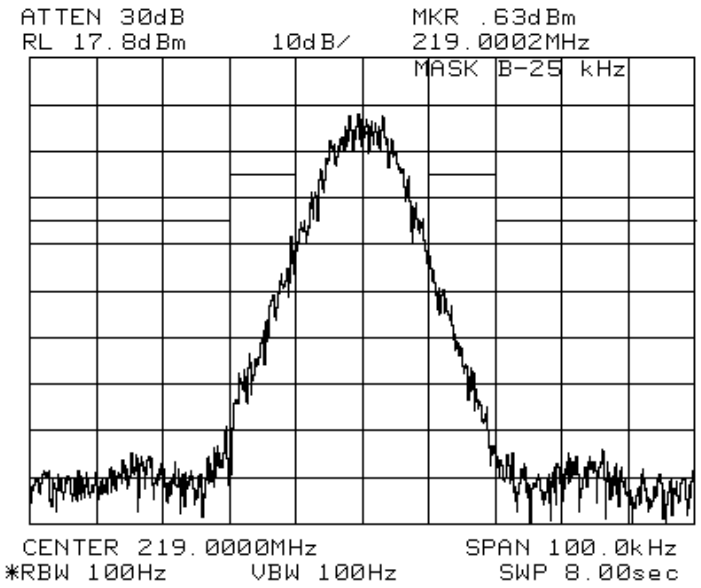
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: data modulation (19.2 kbps)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-25 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(b)

MANUFACTURER: RITRON, Inc.

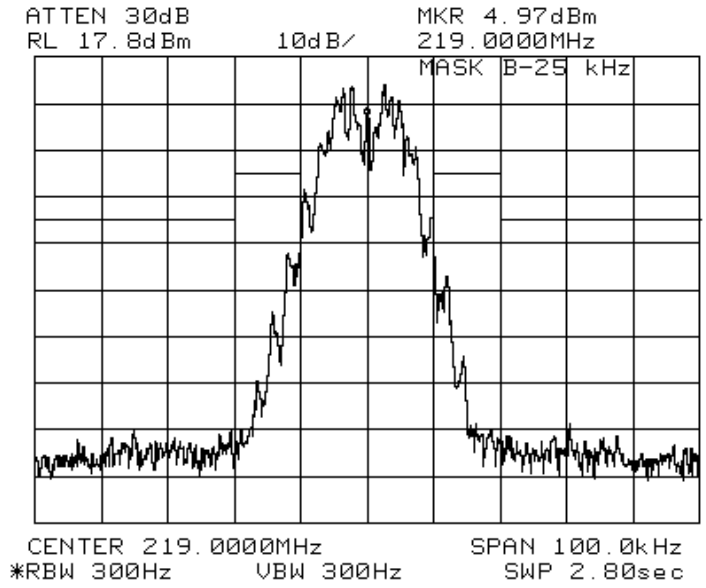
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: AFSK data modulation (4800 bps)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-12.5 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(d)

MANUFACTURER: RITRON, Inc.

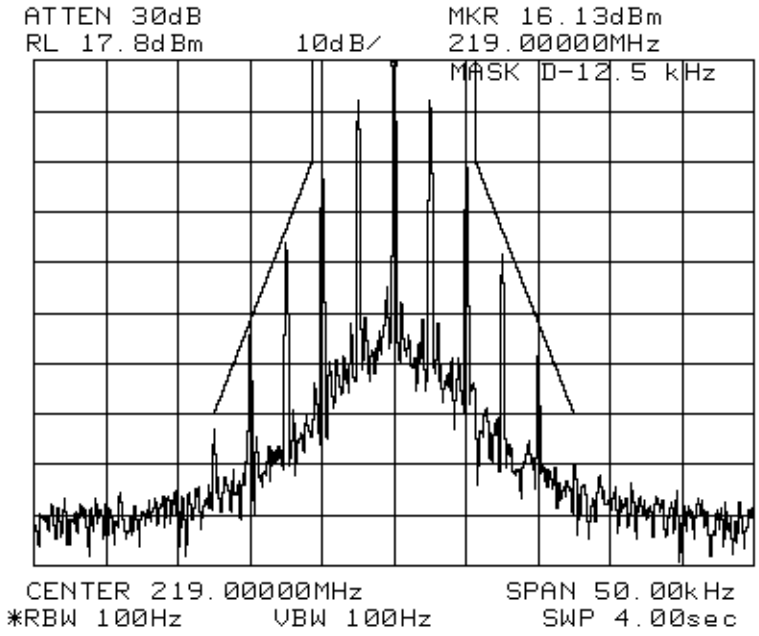
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: Analog voice modulation (2.5 kHz)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-12.5 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(d)

MANUFACTURER: RITRON, Inc.

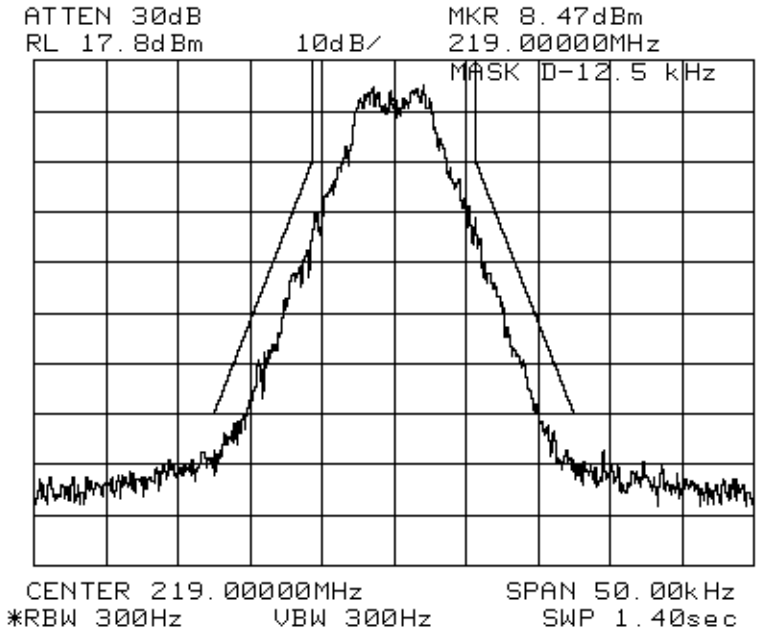
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: Digital voice/data modulation (9600 bps)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-12.5 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(d)

MANUFACTURER: RITRON, Inc.

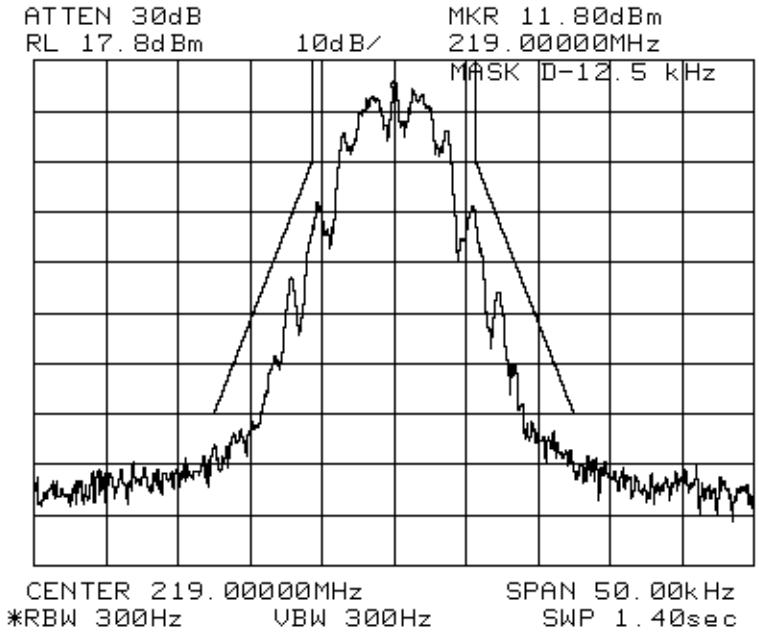
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: AFSK data modulation (2400bps)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-6.25 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(e)

MANUFACTURER: RITRON, Inc.

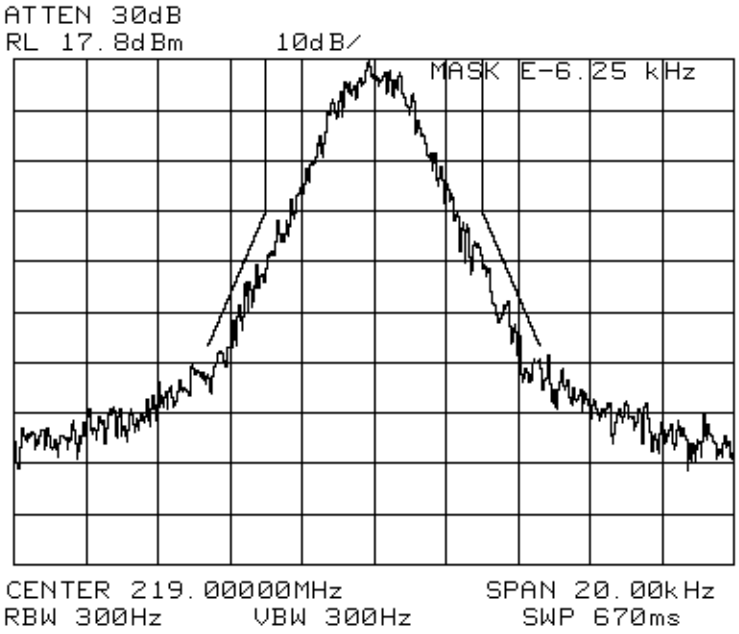
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 22, 2012

RESULTS: Digital voice/data modulation (4800 bps)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH - F Masks

FCC PART: 2.1049(c)(1), 90.210(f), 90.203(k)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 21, 2012

PROCEDURE:

Part 90 allows for operation from 216 to 222 MHz. The follow table reflects the channel spacing and authorized bandwidth from 90.209 (b)(5):

Frequency	Channel spacing (kHz)	Autorized bandwidth (kHz)	Mask
216–220	6.25	20/11.25/6	B/D/ E
220–222	5	4	F

The following plots are for the 220 to 222 MHz band for the F mask and aggregates thereof.
Part 90.203(k) allows for bandwidth greater than 5 kHz in sub-bands within the 220 to 222 MHz range:

> (k) For transmitters operating on frequencies in the 220-222 MHz band, certification will only be granted for equipment with channel bandwidths up to 5 kHz, except that certification will be granted for equipment operating on 220-222 MHz band Channels 1 through 160 (220.0025 through 220.7975/221.0025 through 221.7975), 171 through 180 (220.8525 through 220.8975/221.8525 through 221.8975), and 186 through 200 (220.9275 through 220.9975/221.9275 through 221.9975) with channel bandwidths greater than 5 kHz.

The first plot is contained in a single F mask and supports 4800 bps 4-level FSK digital voice/data.

The second plot is an aggregate of five F masks and supports 9600 bps 4-level FSK digital voice/data.

The third plot is an aggregate of seven F masks and supports 19200 bps 4-level FSK digital voice/data

TYPE OF EXHIBIT: OCCUPIED BANDWIDTH- 5 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(f), 90.203(k)

MANUFACTURER: RITRON, Inc.

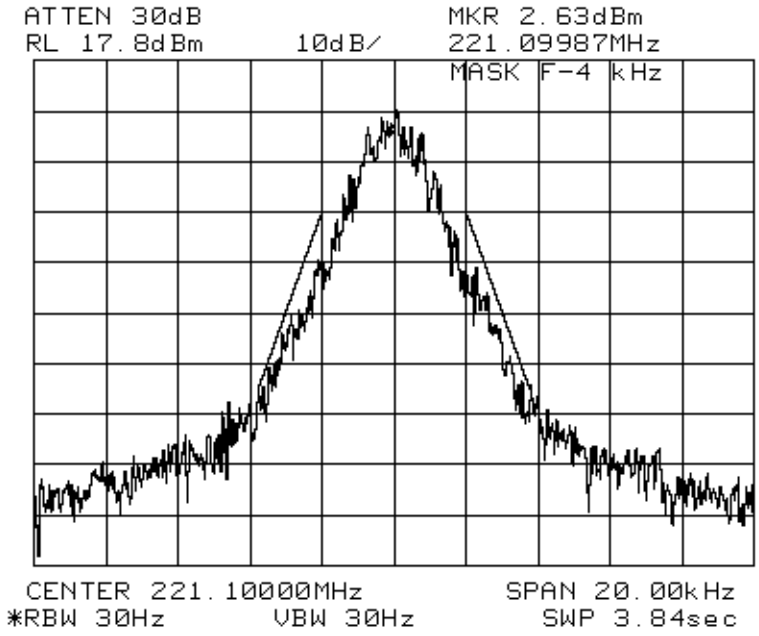
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 24, 2012

RESULTS: Digital data modulation (4800 bps 4FSK, 1 kHz dev, mask F x 1)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH- 5 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(f), 90.203(k)

MANUFACTURER: RITRON, Inc.

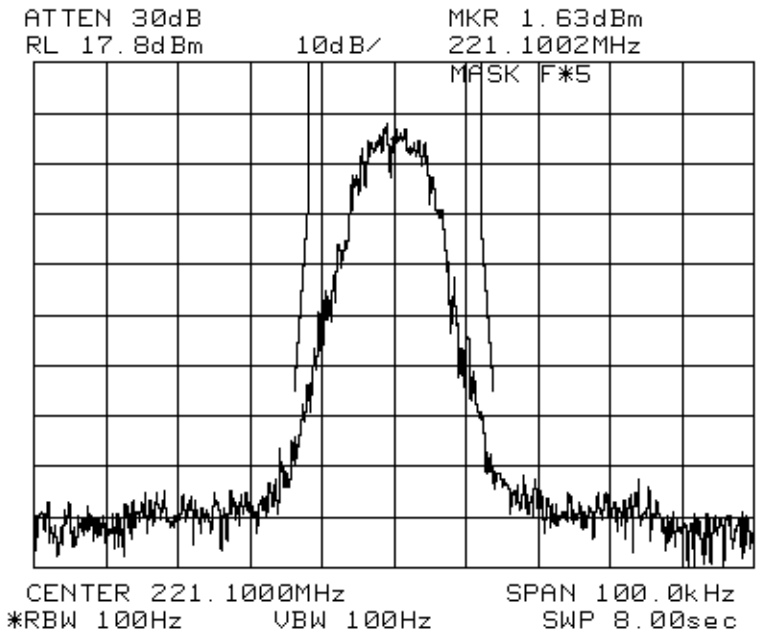
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 25, 2012

RESULTS: Digital voice/data (9600 bps 4FSK, 5 kHz dev, mask F x 5)



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH- 5 kHz CHANNELS

FCC PART: 2.1049(c)(1), 90.210(f), 90.203(k)

MANUFACTURER: RITRON, Inc.

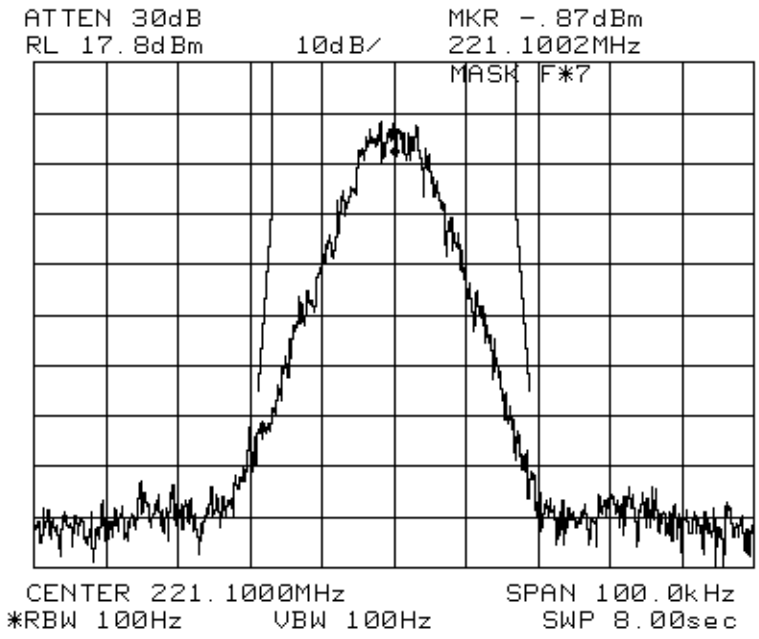
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 25, 2012

RESULTS: Digital data modulation (19200 bps 4FSK, 5 kHz dev, mask F x 7)



TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE

FCC PART: 2.1049(c)(1), 90.210(d), 90.210(e), 90.210(f)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 31, 2012

RESULTS:

Modulation:

Voice

Analog voice signals directly modulate the transmitter carrier with a maximum peak deviation which is dependant upon the channel spacing. Voice signals are pre-emphasized, limited, and filtered prior to being sent to the modulator. Digital voice signals represent the 4-level (4FSK) output of a digital voice encoder and directly modulate the transmitter carrier. The maximum deviation is dependant upon the channel spacing.

Data-4FSK

The 4FSK data stream is encoded into dibits at half the original data rate and used to create a 4-level audio signal which passes through a root-raised cosine filter and is then used to directly modulate the transmitter carrier. The maximum deviation is dependent upon the channel spacing.

CW ID Tone

The on-off (OOK) CW sequence modulates an audio subcarrier, which then frequency modulates the radio. The maximum deviation is dependent upon the channel spacing.

Data-AFSK

The AFSK data stream is used to frequency an audio subcarrier at 1800 Hz. The peak audio deviation is +/-600 Hz. This signal is in turn filtered and used to directly frequency modulate the transmitter carrier with a peak deviation dependent upon the channel spacing.

TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE

FCC PART: 2.1049(c)(1), 90.210(d), 90.210(e), 90.210(f)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 31, 2012

RESULTS:

By Carson's rule, the occupied bandwidth for an FM signal may be calculated by:

$BW = 2(f_\Delta + f_m)$ where f_Δ is the frequency deviation and f_m is the modulating frequency.

Modulation	f_Δ	f_m	BW	Emissions Designator
Analog Voice				
12.5 kHz	2.5	2.5	10.0	10K0F3E
25 kHz	5	3.0	16.0	16K0F3E
Digital Voice				
5 kHz	1.0	0.95	3.9	3K90F1E
6.25 kHz	1.05	0.95	4.0	4K00F1E
12.5 kHz	2.10	1.90	8.0	8K00F1E
25 kHz	4.20	3.80	16.0	16K0F1E
4FSK Data				
5 kHz	1.0	0.95	3.9	3K90F1D
6.25 kHz	1.05	0.95	4.0	4K00F1D
12.5 kHz	2.10	1.90	8.0	8K00F1D
25 kHz	4.20	3.80	16.0	16K0F1D

Digital Voice/Data Combination

5 kHz	1.0	0.95	3.9	3K90F7W
6.25 kHz	1.05	0.95	4.0	4K00F7W
12.5 kHz	2.10	1.90	8.0	8K00F7W
25 kHz	4.20	3.80	16.0	16K0F7W

CW ID Tone

6.25 kHz	1.0	1.0	4.0	4K00F2D

AFSK Data

12.5 kHz	2.5	1.8	8.6	8K60F2D

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS

FCC PART: 2.1051, 90.210(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: 12 October, 2012

PROCEDURE:

1. The DTX-260 was aligned for transmitter operation at the band edges and the band center at power levels ranging from 1 watt to 6 watts per the tune-up procedure outlined in the Maintenance manual. The transmitter was modulated in a manner consistent with the type of signal to be transmitted.

2. The RF output was connected to an HP 8560E spectrum analyzer through a 20 dB, 10 watt, 50-ohm RF attenuator. The center frequency of the spectrum analyzer was set to the transmitter frequency. The frequency span and resolution and video bandwidths were set to show spurious emissions at least 80 dB below the unmodulated carrier level. The transmitter was keyed and the reference level on the analyzer noted.

3. For the transmitter harmonics, an RF highpass filter was inserted into the path from the attenuator to the spectrum analyzer.

4. The transmitter was keyed and the output spectrum was examined from 30 MHz to 10 times the operating frequency, except within 100 kHz of the operating frequency. The attenuation of the highpass filter at the transmitter harmonic frequencies was measured and factored into the absolute dBm results.

5. All spurious above 20 dB below the FCC specification of 55 + 10log(P) dB, -62.8 dBc for this product, were reported.

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS

FCC PART: 2.1051, 90.210(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: 12 October, 2012

RESULTS:

216 MHz Carrier Frequency

Spur Frequency (MHz)	Notes	Spur level (dBm)	Rel. Spur (dBc)	Limit (dBc)
432	2nd harmonic	-37	-74.8	-62.8
648	3rd harmonic	-44	-81.8	-62.8

222 MHz Carrier Frequency

Spur Frequency (MHz)	Notes	Spur level (dBm)	Rel. Spur (dBc)	Limit (dBc)
666	3rd harmonic	-45	-82.8	-62.8

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: 11 October, 2012

PROCEDURE:

1. The measurements for field strength of spurious emissions were taken at the RITRON, Inc. 3-meter test site, details of which are on file with the FCC and Industry Canada.

2. The DTX-260 was aligned and programmed for transmitter operation at the band edges of 216 MHz and 222 MHz at a 6 watt power level per the tune-up procedure outlined in the Maintenance manual.

3. The unit was then terminated at the antenna port with a non-radiating 50-ohm load.

4. All field strength measurements were made with the Hewlett-Packard Model 8560E Spectrum Analyzers and a log periodic antenna.

5. The transmitter was keyed and the spectrum searched from 30 MHz to the 10^{th} harmonic of the transmit carrier. When a spurious emission was found, the height and polarization of the field strength measurement antenna and orientation of the DTX-260 were varied to provide maximum field strength.

6. A substitution antenna, a calibrated dipole, was substituted for the DTX-260 at the DTX-260's location. An RF signal generator was set for the frequency of the DTX-260 with the level at the substitution antenna noted.

7. The polarization of the substitution antenna was adjusted for maximum signal strength at the field strength measuring antenna. The level at the field strength antenna was noted.

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: 11 October, 2012

EQUATIONS:

The spurious level is referenced to the carrier level of the transmitter, which is 6 watts (37.8 dBm), maximum. The equation for spurious levels relative to carrier level is:

Pspur (dBc) = Pcarr (dBm) – Pspur (dBm)

For radiated emissions testing, Pspur (dBm) is the spurious emissions level as measured at the range receiving antenna. The reference level at the range receiving antenna for a 6-watt transmitter is:

Pcarr (dBm) = 37.8 dBm – Pgen (dBm) + Lcab (dB) + Pref (dBm)

Where:

Pcarr is the calculated level of a 6-watt transmitter into the substitution antenna.

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

Lcab is the cable loss from the substitution signal generator to the substitution antenna.

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

The overall equation thus becomes:

Pspur (dBc) = -37.8 dBm + Pgen (dBm) - Lcab (dB) - Pref (dBm)+ Pspur (dBm)

For an absolute level of the spur, the equation is:

Spur Level(dBm) = Pspur (dBm) - Pref (dBm) + Pgen (dBm) - Lcab (dB)

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: 11 October, 2012

RESULTS:

For the two frequencies tested of 216 and 222 MHz the spurious response within 20 dB of the absolute FCC limit of 55 + 10log(P) or -62.8 dBc in this product are shown below:

Transmitting on 216 MHz:

DTX-260 vertical

freq(MHz)	Max Spur ERP(dBm)	Max Spur ERP(dBc)	FCC limit(dBc)	FCC margin(dB)
432	-39	-76.8	-62.8	14
648	-31.8	-69.8	-62.8	7
1296	-32	-69.8	-62.8	7

DTX-260 horizontal

freq(MHz)	Max Spur ERP(dBm)	Max Spur ERP(dBc)	FCC limit(dBc)	FCC margin(dB)
432	-28.3	-65.8	-62.8	3
648	-27	-64.8	-62.8	2
1296	-30	-67.8	-62.8	5

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: 11 October, 2012

RESULTS:

Transmitting at 222 MHz:

DTX-260 vertical

freq(MHz)	Max Spur ERP(dBm)	Max Spur ERP(dBc)	FCC limit(dBm)	FCC margin(dB)
444	-42.7	-80.0	-62.8	18
666	-28.7	-66.8	-62.8	4
1332	-28	-65.8	-62.8	3
1554	-41.2	-78.8	-62.8	16
1776	-38	-75.8	-62.8	13

DTX-260 horizontal

freq(MHz)	Max Spur ERP(dBm)	Max Spur ERP(dBc)	FCC limit(dBm)	FCC margin(dB)
444	-31.7	-69.8	-62.8	7
666	-26	-63.8	-62.8	1
888	-36.2	-73.8	-62.8	11
1332	-26.5	-64.8	-62.8	2
1554	-39.7	-77.8	-62.8	15

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE

FCC PART: 2.1055(a)(1), 90.213

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 5, 2012

PROCEDURE:

1. The DTX-260 was aligned for transmitter operation at 221 MHz at full rated power per the tune-up procedure outlined in the Maintenance manual.

2. The DTX-260 was placed in a Delta Design Model 3900 CL Temperature Chamber. The RF output of the DTX-260 was connected to an HP 8920 Test Set to monitor the transmitter frequency. A PS3010U Power Supply was adjusted for a nominal voltage of 12.6 VDC and connected to the DC power supply input of the DTX-260. A Triplett Model 320-G/P Thermocouple was used to monitor the temperature inside the chamber.

3. The chamber and the DTX-260 were cooled to -30 degrees C and allowed to stabilize for 30 minutes for the first measurement and 15 minutes for each 10 degree increment in temperature until the unit reached a temperature of 60 degrees C.

4. The RF frequency at each temperature was recorded and compared with the frequency at 20 degrees C.

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE

FCC PART: 2.1055(a)(1), 90.213

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

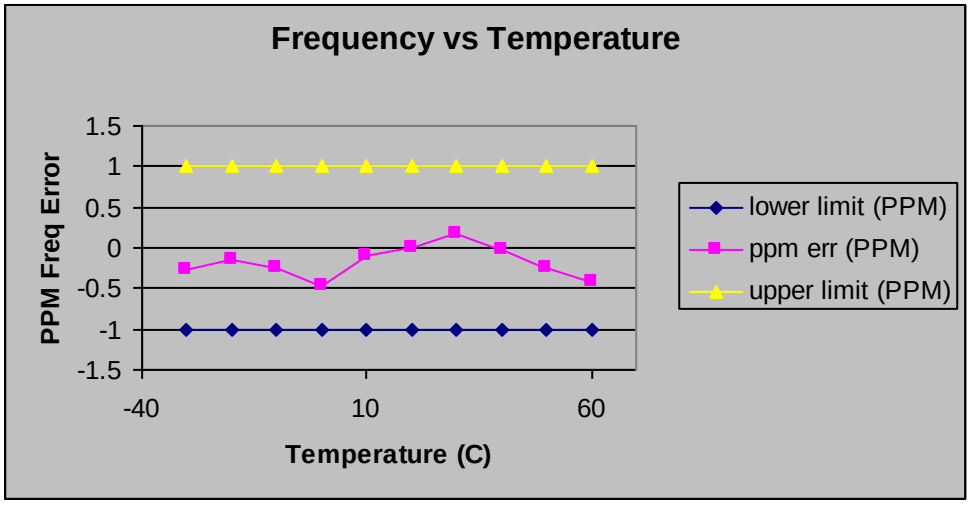
TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 5, 2012

RESULTS:

Temp (deg C)	lower limit (PPM)	ppm err (PPM)	upper limit (PPM)
-30	-1	-0.27	1
-20	-1	-0.16	1
-10	-1	-0.24	1
0	-1	-0.46	1
10	-1	-0.10	1
20	-1	0.00	1
30	-1	0.18	1
40	-1	-0.03	1
50	-1	-0.25	1
60	-1	-0.42	1



TYPE OF EXHIBIT: FREQUENCY STABILITY VS SUPPLY VOLTAGE

FCC PART: 2.1055(d)(1)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

PROCEDURE:

1. The DTX-260 was aligned for transmitter operation at 216 MHz at full rated power per the tune-up procedure outlined in the Maintenance manual. The unit was setup with the internal regulator option which regulates the nominal input voltage of 10 VDC to 16 VDC (12.6 VDC nominal) to 7.5 VDC for use by the DTX-260.

2. The RF output of the DTX-260 was connected to an HP 8920B Test Set to monitor the transmitter frequency. A PS3010U Supply was adjusted for a nominal voltage of 12.6 VDC and connected to the DC power supply input of the DTX-260. The output frequency of the DTX-260 was noted and used as the reference for the results in paragraph 3 below.

3. The power supply voltage was set to 85% nominal and 115% nominal and the frequency noted.

4. The above was repeated for the unit setup in the unregulated configuration and the power supply set for a nominal voltage of 7.5 VDC.

TYPE OF EXHIBIT: FREQUENCY STABILITY VS SUPPLY VOLTAGE

FCC PART: 2.1055(d)(1)

MANUFACTURER: RITRON, Inc.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Nov 2, 2012

RESULTS:

Regulated Configuration

% Nominal	Voltage VDC	ΔF Hz	ΔF ppm
85	10.7	1	0
100	12.6	0	0
115	14.5	-4	-0.02

Unregulated Configuration

% Nominal	Voltage VDC	ΔF Hz	ΔF ppm
85	6.4	0	0
100	7.5	0	0
115	8.6	-5	- 0.02

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

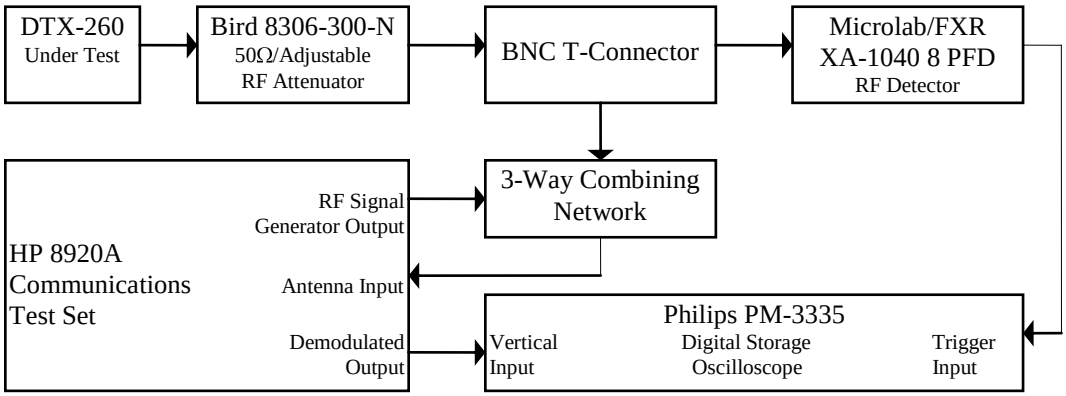
FCC ID: AIERIT33-2600

DATE: Oct 30, 2012

PROCEDURE:

1. The DTX-260 was aligned for transmitter operation on 216 MHz at full rated power per the tune-up procedure outlined in the Maintenance Manual.

2. The test equipment was connected per the following diagram:



3. The HP 8920A Receiver was set to measure FM deviation with the audio bandwidth set at <50 Hz to greater than 15 kHz with the RF frequency set to 216 MHz. The attenuator was set for 10 dB.

4. The DTX-260 transmitter under test was activated and the HP 8920A Spectrum Analyzer was used to measure the RF power level through the test network.

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 30, 2012

PROCEDURE (continued):

5. The DTX-260 transmitter was turned off. The HP 8920A RF Signal Generator was set to 216 MHz at an RF level at the HP 8920A which was 30 dB below that measured in step 3 and modulated with a 1 kHz tone at +/-6.25 kHz deviation.

6. The Philips PM-3335 Digital Oscilloscope Horizontal Sweep Rate was set to 10 msec/div. The Vertical Amplitude Control was adjusted to display the 1000 Hz demodulated audio from the Signal Generator at +/-4 divisions, vertically centered on the screen.

7. The Philips PM-3335 Digital Oscilloscope was set to trigger at 1 division from the left side of the display when the RF Detector sensed RF power from the DTX-260 transmitter.

8. The DTX-260 transmitter was activated and the resulting waveform on the oscilloscope display was stored and plotted. The FCC limits per Part 90.214 were added to the plot. The resulting plot is labeled “Switch On Condition” and shows compliance with FCC Part 90.214/IC RSS-119, section 6.5.

9. The Philips PM-3335 Digital Oscilloscope was set to trigger at 1 division from the right side of the display when the RF Detector senses loss of RF power from the DTX-260 transmitter.

10. The DTX-260 transmitter was turned off and the resulting waveform on the oscilloscope display was stored and plotted. The limits per FCC Part 90.214/RSS-119, section 6.5 were added to the plot in the same manner illustrated in EIA-603 Part 3.2.19.2. The resulting plot is labeled “Switch Off Condition” and shows compliance.

11. Since this product supports 6.25 kHz and 12.5 kHz channel operation, the more stringent 6.25 kHz limits are shown.

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

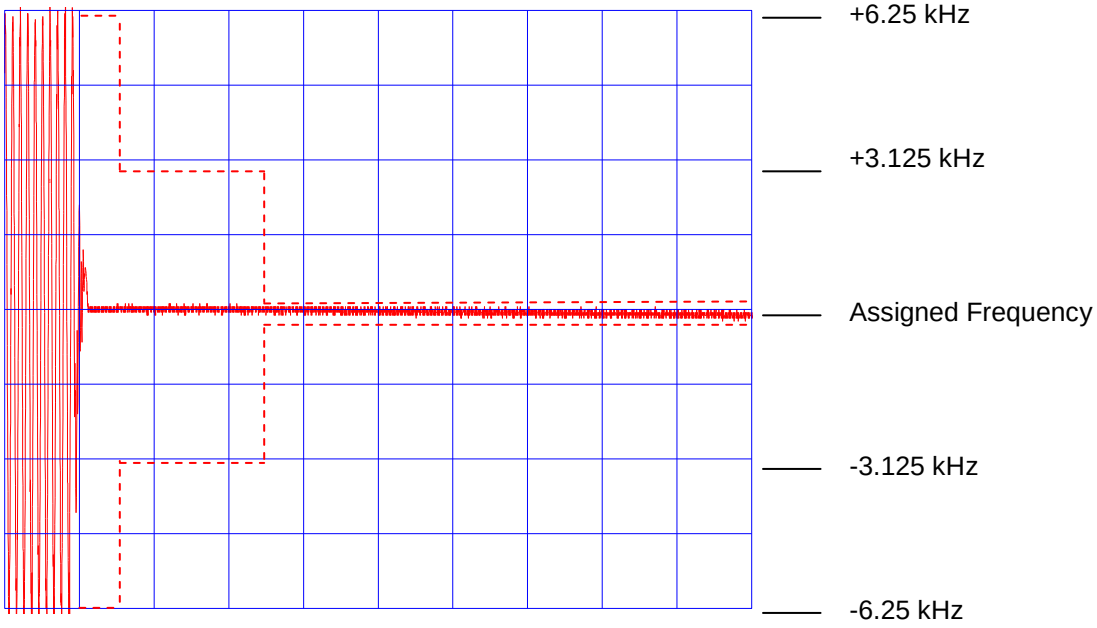
MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 30, 2012

RESULTS: Switch-On Condition



TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

MODEL: DTX-260-0__6

TYPE OF UNIT: VHF Transceiver Module

FCC ID: AIERIT33-2600

DATE: Oct 30, 2012

RESULTS: Switch-Off Condition