TYPE OF EXHIBIT: TABLE OF CONTENTS

FCC PART: 2.1033(c)(14)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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TYPE OF EXHIBIT: LIST OF TEST EQUIPMENT USED

FCC PART: 2.947(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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	10/02/2013	10/02/2014
Spectrum Analyzer	Advantest R3265A	75060189	10/02/2013	10/02/2014
Spectrum Analyzer	HP 8560E	3720A02980	10/02/2013	10/02/2014
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	Electo-Metrics LPA-25	8-102	05/17/2011	04/08/2015
Adjustable Dipoles	Electo-Metrics EM-6924	291	04/08/2014	04/08/2015
Gain Horn	Emco #3105	3105	10/21/2013	10/21/2015

TYPE OF EXHIBIT: MEASUREMENT METHODS

FCC PART: 2.947

MANUFACTURER: RITRON, Inc.

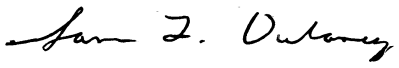
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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



Sam L. Dulaney
Chief Engineer
RITRON, Inc.

TYPE OF EXHIBIT: DESCRIPTION OF MEASUREMENT FACILITY

FCC PART: 2.948

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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.

Sam L. Dulaney
Chief Engineer
RITRON, Inc.

TYPE OF EXHIBIT: RADIO FREQUENCY OUTPUT POWER

FCC PART: 2.1046(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 was aligned for transmitter operation at six power levels per the tune-up procedure outlined in the Maintenance manual for frequencies at the lower, middle and upper band edges.

2. Power was supplied to the DTXM-160 by an Astron VS 20M Power Supply. The DTXM-160 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 a fluke 45 Digital Multimeter to measure current (Id). A Fluke 45 Digital Multimeter 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: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:

150.830 MHz Carrier Frequency

Po (watts)	Vcon (V)	Vd (V)	Id (A)
1.0	2.09	7.53	0.793
2.0	2.19	7.43	1.000
3.0	2.32	7.32	1.273
4.0	2.47	7.21	1.522
5.0	2.65	7.09	1.782
6.0	2.88	6.99	2.010

161.950 MHz Carrier Frequency

Po (watts)	Vcon (V)	Vd (V)	Id (A)
1.0	2.03	7.57	0.654
2.0	2.20	7.39	1.037
3.0	2.34	7.27	1.299
4.0	2.47	7.17	1.531
5.0	2.66	7.08	1.798
6.0	2.86	7.04	2.040

TYPE OF EXHIBIT: RADIO FREQUENCY OUTPUT POWER

FCC PART: 2.1046(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Cont.

173.390 MHz Carrier Frequency

Po (watts)	Vcon (V)	Vd (V)	Id (A)
1.0	2.42	7.71	0.659
2.0	2.58	7.62	0.952
3.0	2.69	7.52	1.201
4.0	2.82	7.38	1.482
5.0	3.15	7.18	1.769
6.0	3.30	6.99	2.114

TYPE OF EXHIBIT: MODULATOR RESPONSE

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 was aligned for transmitter operation at 161.950 MHz at full rated power per the tune-up procedure outlined in the Maintenance manual.

2. The response was measured from the audio input to the modulator input.

3. The test set was swept in frequency from 100 Hz to 10 kHz and the results noted. Plots are shown for both flat and pre-emphasized audio. The frequency response is independent of carrier frequency, therefore, only the center operating frequency is shown.

TYPE OF EXHIBIT: MODULATOR RESPONSE

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

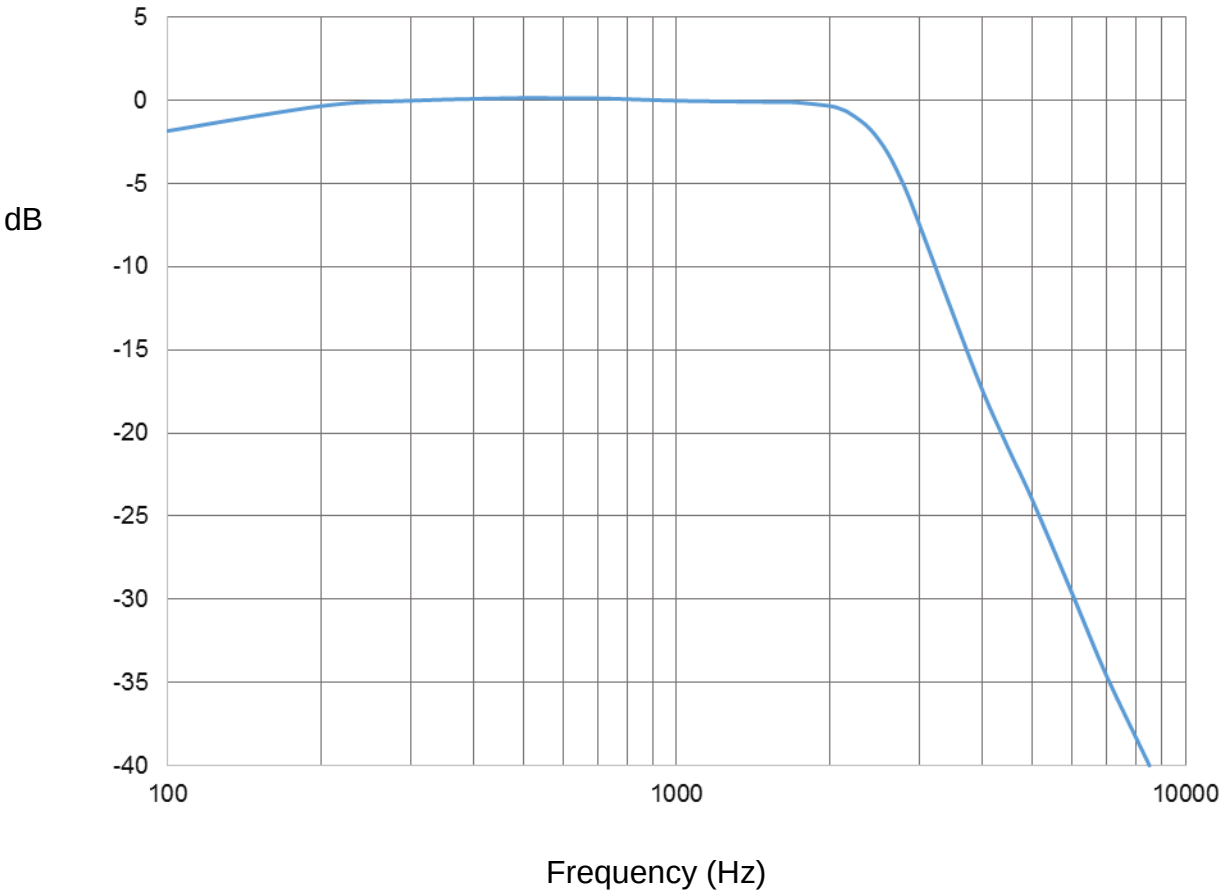
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Flat audio input



TYPE OF EXHIBIT: MODULATOR RESPONSE

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

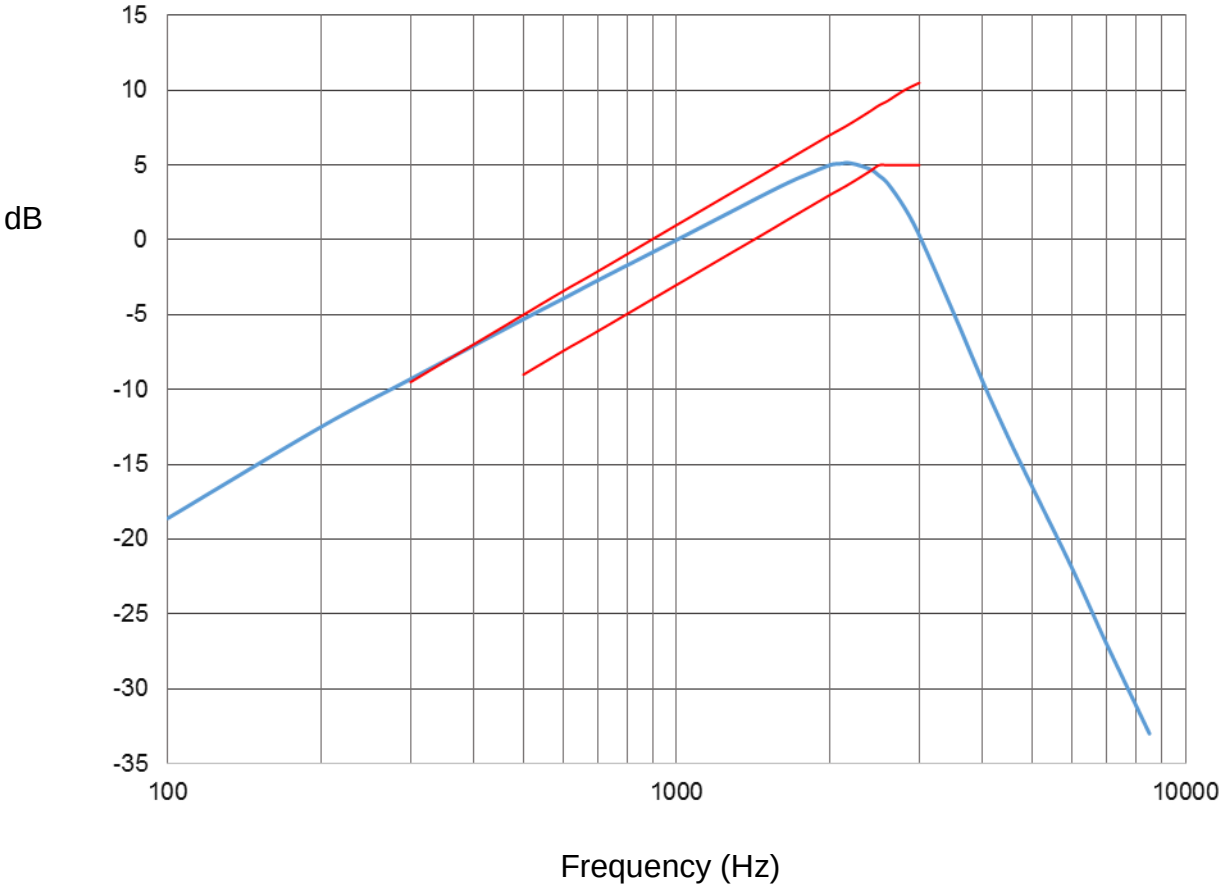
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Pre-emphasized audio input



TYPE OF EXHIBIT: CLIPPER FILTER RESPONSE

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The audio output of the test set was coupled into the clipper filter input of the DTXM-160. 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 20 kHz and the response was plotted. The frequency response is independent of carrier frequency.

TYPE OF EXHIBIT: CLIPPER FILTER RESPONSE

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

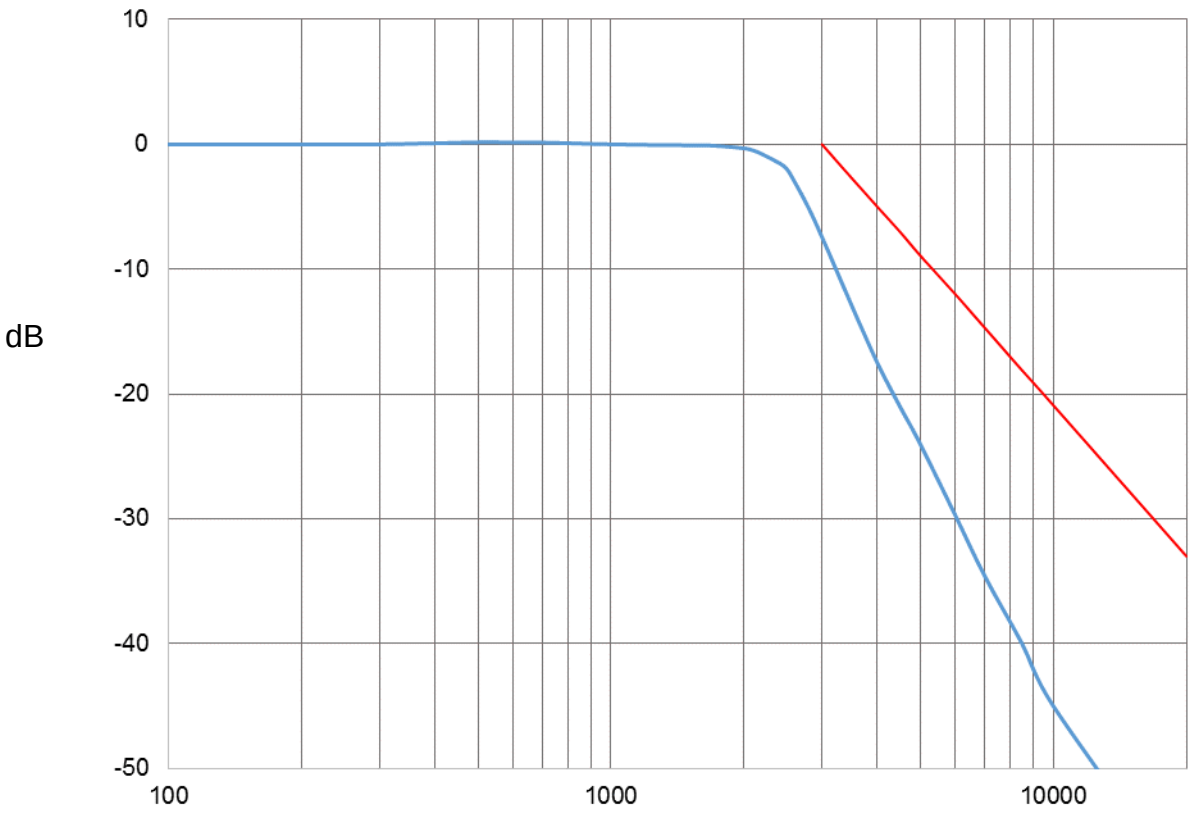
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:



TYPE OF EXHIBIT: MODULATION LIMITING CURVES

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 was aligned for transmitter operation on 161.950 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 test set was routed to the audio input of the DTXM-160.

3. The frequency of the audio generator was adjusted to find the frequency of maximum response. As outlined in the Maintenance manual the DTXM-160, transmit deviation was adjusted for 2.4 kHz maximum deviation. The audio generator level was reduced to produce 50% of maximum deviation and the level noted.

4. The audio frequency was set to 300 Hz and the output level was varied from zero to a level at least 16 dB above that required to produce 50% maximum deviation noted in step 3 above.

5. Step 4 was repeated for audio frequencies of 1000 and 3000 Hz.

TYPE OF EXHIBIT: MODULATION LIMITING CURVES

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

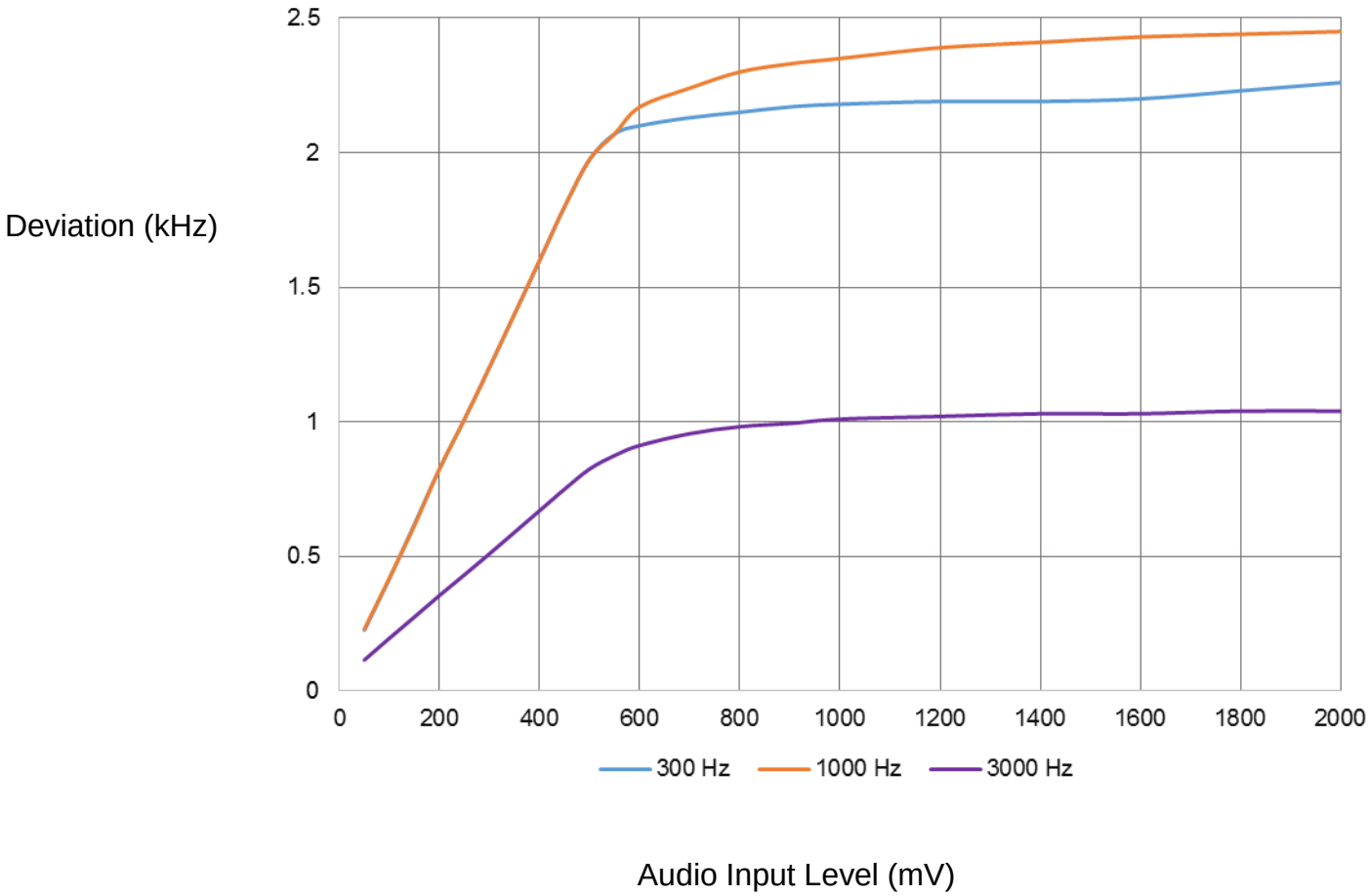
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Flat audio input



TYPE OF EXHIBIT: MODULATION LIMITING CURVES

FCC PART: 2.1047(b)

MANUFACTURER: RITRON, Inc.

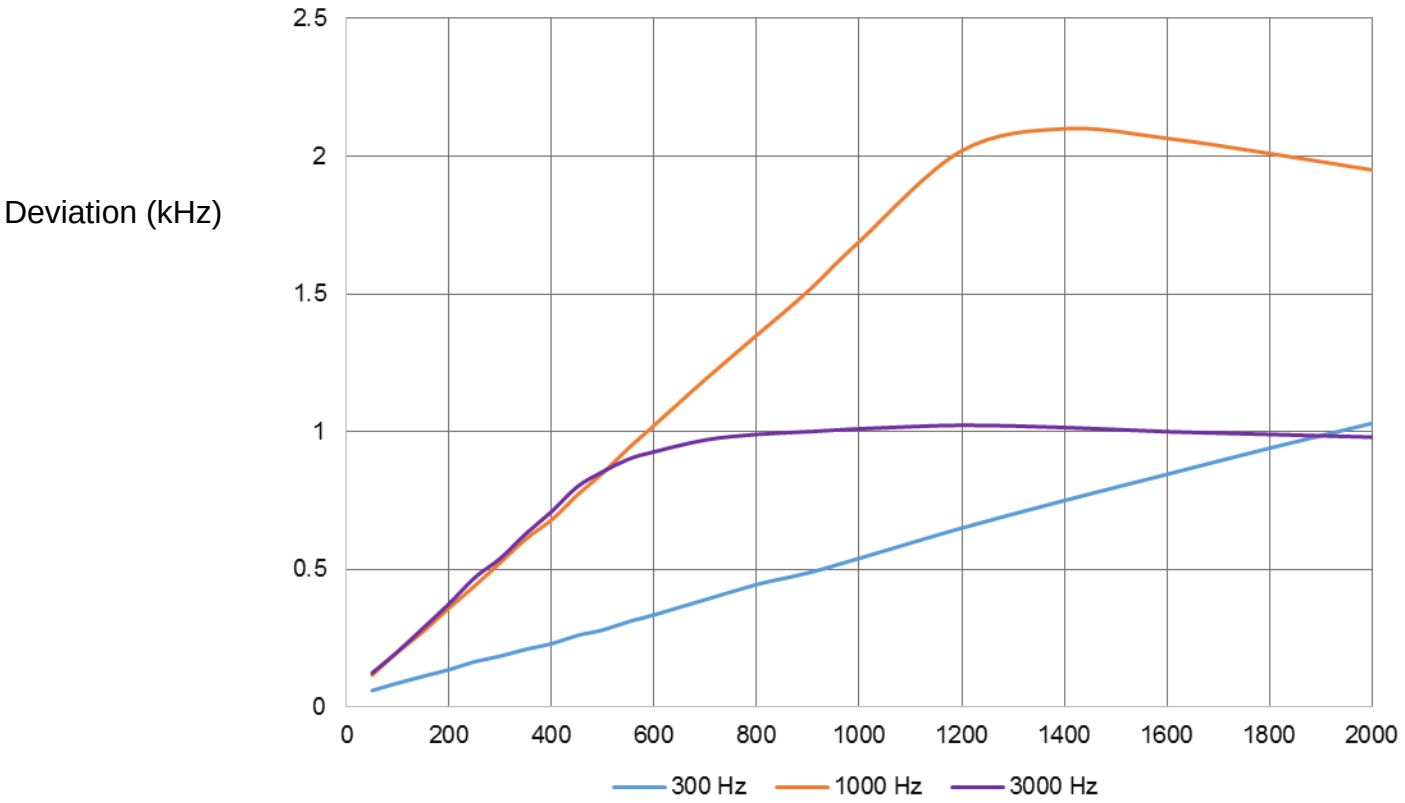
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Pre-emphasized audio input



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH

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

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. For 12.5 kHz 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 for 12.5 kHz channel operation and a spectrum analyzer was connected to the RF output through an RF power attenuator. The analyzer was set to sweep +/-25 kHz of carrier with a reference level set to that observed when the resolution bandwidth and video bandwidth were set to 1 MHz.

2. For 12.5 kHz digital voice operation, an external digital voice (NXDN) circuit board was connected and the maximum output deviation of the C4FM signal was set to +/-2.4 kHz when a special test modulation input was applied. The analyzer was set to sweep +/-25 kHz of carrier with a reference level set to that observed when the resolution bandwidth and video bandwidth were set to 1 MHz. The internal modem also was set to create a pn data sequence for data operation. Digital voice and data are indistinguishable when viewed on a spectrum analyzer and therefore, will be shown as one plot. In addition, an external audio frequency shift keying (AFSK) generator was set to generate a 2400 bps data stream. The level was set for 2.4 kHz deviation and the spectrum plotted.

3. For 6.25 kHz digital voice operation, the deviation was decreased to +/-1.3 kHz and the analyzer set to sweep +/-10 kHz either side of the carrier. Digital voice and data are indistinguishable when viewed on a spectrum analyzer and therefore, will be shown as one plot. Also, digital and voice and data can also be combined as a common signal with the plot appearing the same as

data or digitized voice. Only the internal modem is capable of generating the 6.25 kHz digital signal, the external audio input is disabled in 6.25 kHz mode.

4. The occupied bandwidth plots are independent of carrier frequency, therefore, only the plots for 161.950 MHz are shown.

TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-12.5 kHz CHANNELS

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

MANUFACTURER: RITRON, Inc.

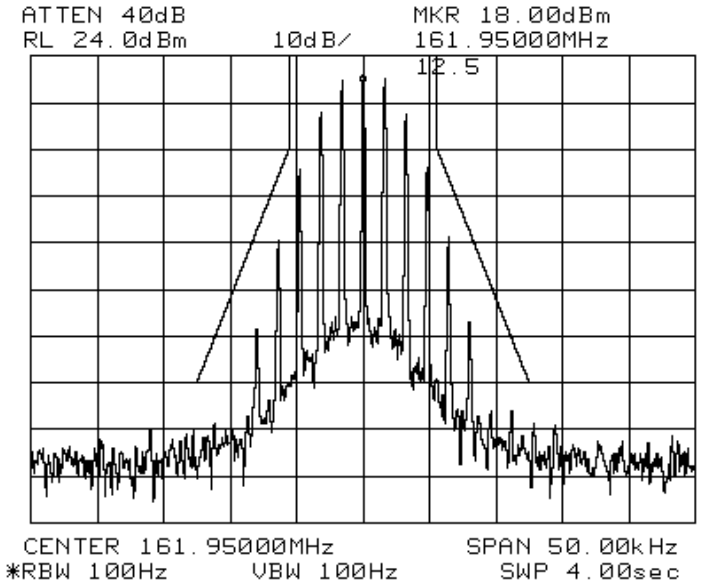
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Analog voice modulation



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-12.5 kHz CHANNELS

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

MANUFACTURER: RITRON, Inc.

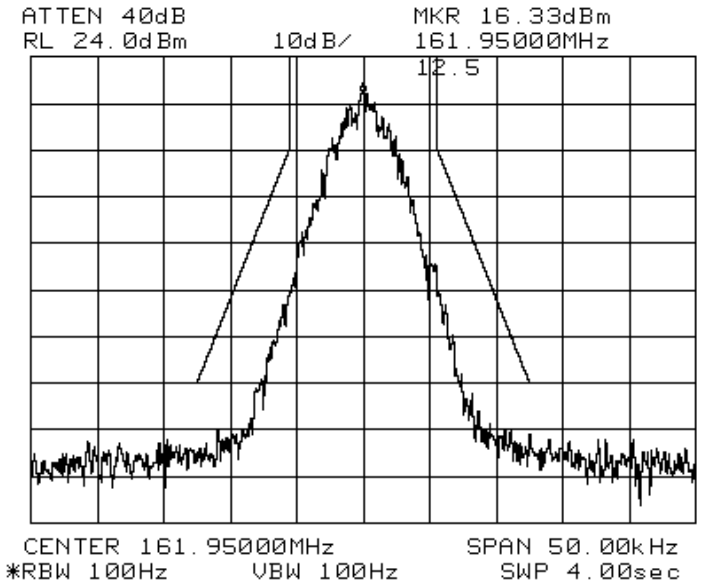
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Digital voice/data modulation



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-12.5 kHz CHANNELS

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

MANUFACTURER: RITRON, Inc.

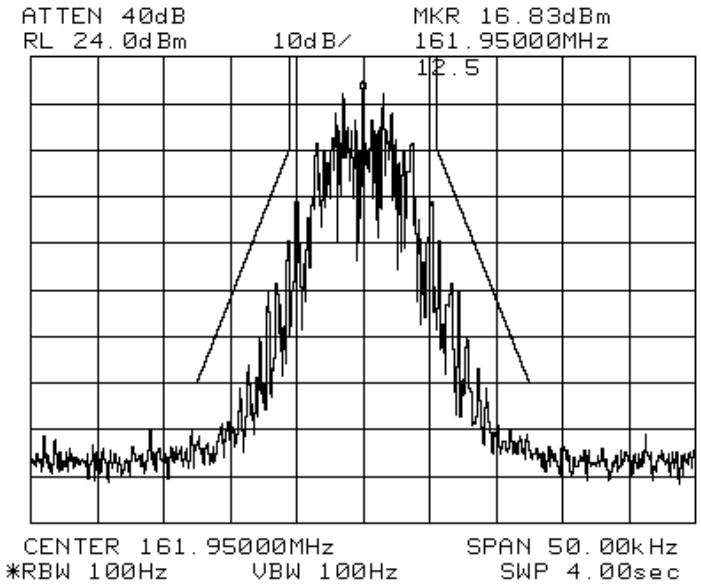
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: AFSK data modulation



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-6.25 kHz CHANNELS

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

MANUFACTURER: RITRON, Inc.

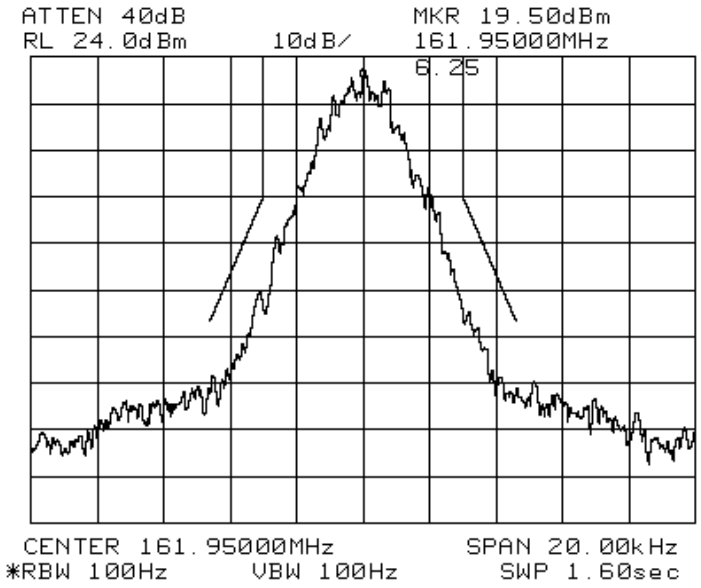
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Digital voice/data modulation



TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE

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

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:

Modulation:

Voice

Externally generated analog voice signals directly modulate the transmitter carrier with a maximum peak deviation of 2.4 kHz for 12.5 kHz channel spacing.

Data-4FSK

Data for 12.5 kHz channel spacing can be accepted by the audio input or may be generated internally when operated as a modem. 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. Data for 6.25 kHz channel spacing is only generated internally. The maximum deviation is dependent upon the channel spacing.

Data-AFSK

An externally generated AFSK data stream can be used to modulate the carrier for 12.5 kHz channel spacing.

TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE

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

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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 (External Input)				
12.5 kHz	2.5	2.5	10.0	10K0F3E
4FSK Digital Voice (External Input)				
12.5 kHz	2.10	1.90	8.0	8K00F1E
4FSK Data (Internally Generated Only)				
6.25 kHz	1.05	0.95	4.0	4K00F1D
4FSK Data (External Input or Internally Generated)				
12.5 kHz	2.10	2.05	8.0	8K30F1D
Digital Voice/Data Combination (External Input)				
12.5 kHz	2.10	2.05	8.0	8K30F7W

TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE

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

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Cont.

AFSK Data (Externally generated)

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: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 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 10 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 high-pass 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 the lowest frequency generated within the device to 10 times the operating frequency, except within 100 kHz of the operating frequency. The attenuation of the high-pass filter at the transmitter harmonic frequencies was measured and factored into the absolute dBm results.

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS

FCC PART: 2.1051, 90.210(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:

150.830 MHz Carrier Frequency

Spur Frequency (MHz)	Notes	Rel. Spur (dBc)	Limit (dBc)	Margin (dB)
136.830	Spurious Output	-80.0	-62.8	17.2
150.755	Spurious Output	-78.0	-62.8	15.2
150.905	Spurious Output	-78.0	-62.8	15.2
164.830	Spurious Output	-80.0	-62.8	17.2
452.490	3rd harmonic	-88.0	-62.8	25.2

Note: Spurious levels more than 20 dB below the limit may not be reported.

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS

FCC PART: 2.1051, 90.210(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Cont.

161.950 MHz Carrier Frequency

Spur Frequency (MHz)	Notes	Rel. Spur (dBc)	Limit (dBc)	Margin (dB)
143.950	Spurious Output	-80.0	-62.8	17.2
158.450	Spurious Output	-82.0	-62.8	19.2
161.875	Spurious Output	-78.0	-62.8	15.2
161.900	Spurious Output	-70.0	-62.8	7.2
162.000	Spurious Output	-70.0	-62.8	7.2
162.025	Spurious Output	-78.0	-62.8	15.2
165.450	Spurious Output	-82.0	-62.8	19.2
179.950	Spurious Output	-80.0	-62.8	17.2
485.850	3rd harmonic	-85.0	-62.8	22.2

Note: Spurious levels more than 20 dB below the limit may not be reported.

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS

FCC PART: 2.1051, 90.210(d)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Cont.

173.390 MHz Carrier Frequency

Spur Frequency (MHz)	Notes	Rel. Spur (dBc)	Limit (dBc)	Margin (dB)
173.240	Spurious Output	-80.0	-62.8	17.2
173.315	Spurious Output	-75.0	-62.8	12.2
173.465	Spurious Output	-75.0	-62.8	12.2
173.540	Spurious Output	-80.0	-62.8	17.2
520.170	3rd harmonic	-80.0	-62.8	17.2

Note: Spurious levels more than 20 dB below the limit may not be reported.

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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 DTXM-160 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.

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 and Advantest R3265A Spectrum Analyzers and either a log periodic antenna, dipoles, or a microwave horn antenna depending upon frequency.

5. The transmitter was keyed and the spectrum searched from the lowest frequency generated within the device 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 DTXM-160 were varied to provide maximum field strength.

6. A substitution antenna, a calibrated dipole, was substituted for the DTXM-160 at the DTXM-160's location. An RF signal generator was set for the frequency of the DTXM-160 with the level at the substitution antenna noted.

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE (continued)**:**

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: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

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: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: September 9, 2014

RESULTS: Horizontal Polarization

150.830 MHz Carrier Frequency

Spur Freq. (MHz)	Notes	Pspur (dBm)	Pgen (dBm)	Lcab (dB)	Pref (dBm)	Spur Level (dBm)	Spur Level (dBc)	Limit (dBc)
301.660	2nd harmonic	-64.0	0	2.0	-24.6	-41.4	-79.4	-62.8
452.490	3rd harmonic	-80.0	0	2.0	-25.5	-56.5	-94.5	-62.8
603.320	4th harmonic	-75.0	0	2.0	-27.2	-49.8	-87.8	-62.8

161.950 MHz Carrier Frequency

Spur Freq. (MHz)	Notes	Pspur (dBm)	Pgen (dBm)	Lcab (dB)	Pref (dBm)	Spur Level (dBm)	Spur Level (dBc)	Limit (dBc)
323.900	2nd harmonic	-74.0	0	2.0	-24.1	-51.9	-89.9	-62.8
485.850	3rd harmonic	-79.0	0	2.0	-25.8	-55.2	-93.2	-62.8

173.390 MHz Carrier Frequency

Spur Freq. (MHz)	Notes	Pspur (dBm)	Pgen (dBm)	Lcab (dB)	Pref (dBm)	Spur Level (dBm)	Spur Level (dBc)	Limit (dBc)
346.780	2nd harmonic	-79.0	0	2.1	-26.1	-55.0	-93.0	-62.8
520.570	3rd harmonic	-77.0	0	2.1	-26.8	-52.3	-90.3	-62.8
693.560	4th harmonic	-83.0	0	2.1	-30.5	-56.4	-92.6	-62.8

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER

FCC PART: 2.1053(a), (b)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: September 9, 2014

RESULTS: Vertical Polarization

150.830 MHz Carrier Frequency

Spur Freq. (MHz)	Notes	Pspur (dBm)	Pgen (dBm)	Lcab (dB)	Pref (dBm)	Spur Level (dBm)	Spur Level (dBc)	Limit (dBc)
301.660	2nd harmonic	-73.0	0	2.0	-26.3	-42.0	-80.0	-62.8

161.950 MHz Carrier Frequency

Spur Freq. (MHz)	Notes	Pspur (dBm)	Pgen (dBm)	Lcab (dB)	Pref (dBm)	Spur Level (dBm)	Spur Level (dBc)	Limit (dBc)
323.900	2nd harmonic	-75.0	0	2.0	-26.8	-50.2	-88.2	-62.8
485.850	3rd harmonic	-81.0	0	2.0	-27.7	-55.3	-93.3	-62.8

173.390 MHz Carrier Frequency

Spur Freq. (MHz)	Notes	Pspur (dBm)	Pgen (dBm)	Lcab (dB)	Pref (dBm)	Spur Level (dBm)	Spur Level (dBc)	Limit (dBc)
346.780	2nd harmonic	-80.0	0	2.0	-25.3	-56.7	-94.7	-62.8
520.170	3rd harmonic	-79.0	0	2.1	-29.8	-51.3	-89.3	-62.8

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE

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

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 was aligned for transmitter operation at 161.950 MHz at full rated power per the tune-up procedure outlined in the Maintenance manual.

2. The DTXM-160 was placed in a Delta Design Model 3900 CL Temperature Chamber. The RF output of the DTXM-160 was connected to an HP 8920 Test Set to monitor the transmitter frequency. An Astron VS 20M Power Supply was adjusted for a nominal voltage of 12.6 VDC and connected to the DC power supply input of the DTX-460. A Triplett Model 320-G/P Thermocouple was used to monitor the temperature inside the chamber.

3. The chamber and the DTXM-160 were heated to +50 degrees C and allowed to stabilize for 30 minutes for the first measurement and 30 minutes for each 10 degree decrement in temperature until the unit reached a temperature of –30 degrees C.

4. The RF frequency at each temperature was recorded and compared with the frequency at 25 degrees C, the tune-up temperature in the Maintenance manual.

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE

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

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:

T (°C)	Δf (Hz)	Δf (ppm)	Limit (ppm)
-30	151	0.53	+/-2.0
-20	167	0.56	+/-2.0
-10	91	0.40	+/-2.0
0	72	0.36	+/-2.0
10	60	0.33	+/-2.0
20	33	0.13	+/-2.0
25	0	0	+/-2.0
30	-140	-0.10	+/-2.0
40	-190	-0.21	+/-2.0
50	-181	-0.19	+/-2.0

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE

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

MANUFACTURER: RITRON, Inc.

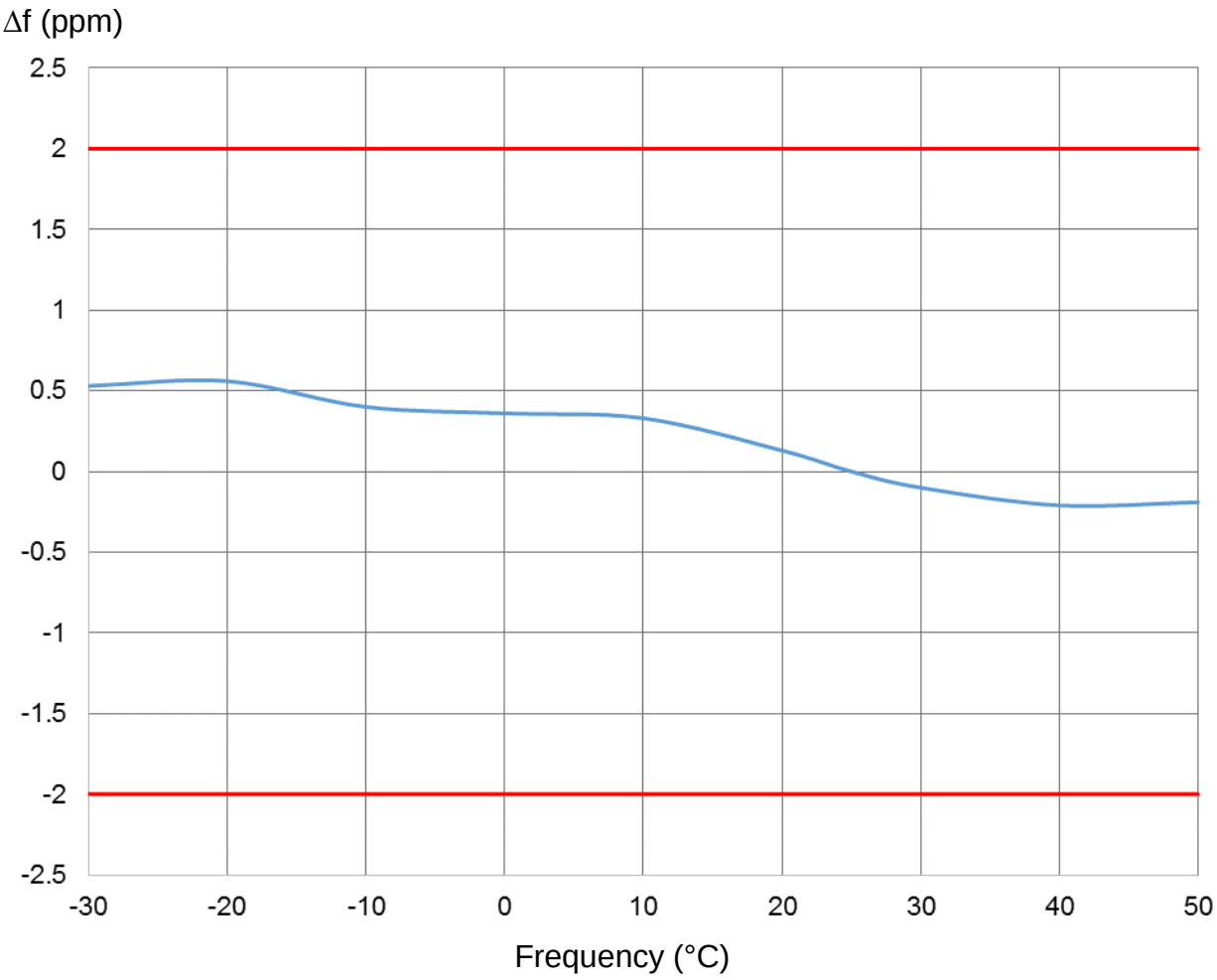
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:



Frequency Stability vs Temperature

TYPE OF EXHIBIT: FREQUENCY STABILITY VS SUPPLY VOLTAGE

FCC PART: 2.1055(d)(1)

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 was aligned for transmitter operation at 161.950 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 11 VDC to 16 VDC (12.6 VDC nominal) to 7.5 VDC for use by the DTXM-160.

2. The RF output of the DTXM-160 was connected to an HP 8920B radio test set to monitor the transmitter frequency. An Astron VS 20M Power Supply was adjusted for a nominal voltage of 12.6 VDC and connected to the DC power supply input of the DTXM-160. The output frequency of the DTXM-160 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: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS:

Regulated Configuration

% Nominal	Voltage VDC	ΔF Hz	ΔF ppm
85	10.7	0	0
100	12.6	0	0
115	14.5	0	0

Unregulated Configuration

% Nominal	Voltage VDC	ΔF Hz	ΔF ppm
85	6.4	2	0.01
100	7.5	0	0
115	8.6	-2	-0.01

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

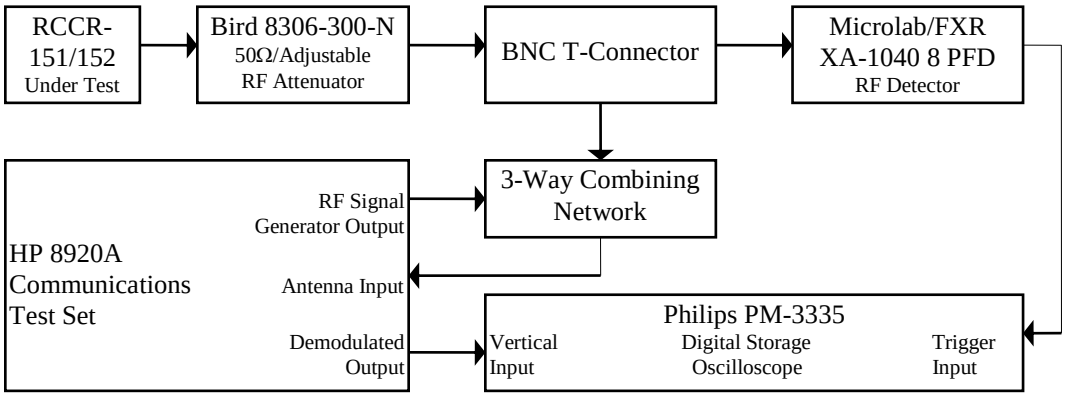
FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE:

1. The DTXM-160 was aligned for transmitter operation on 161.950 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 161.950 MHz. The attenuator was set for 10 dB.

4. The DTXM-160 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: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

PROCEDURE (continued):

5. The DTXM-160 transmitter was turned off. The HP 8920A RF Signal Generator was set to 461.750 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 DTXM-160 transmitter.

8. The DTXM-160 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-460 transmitter.

10. The DTXM-160 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.

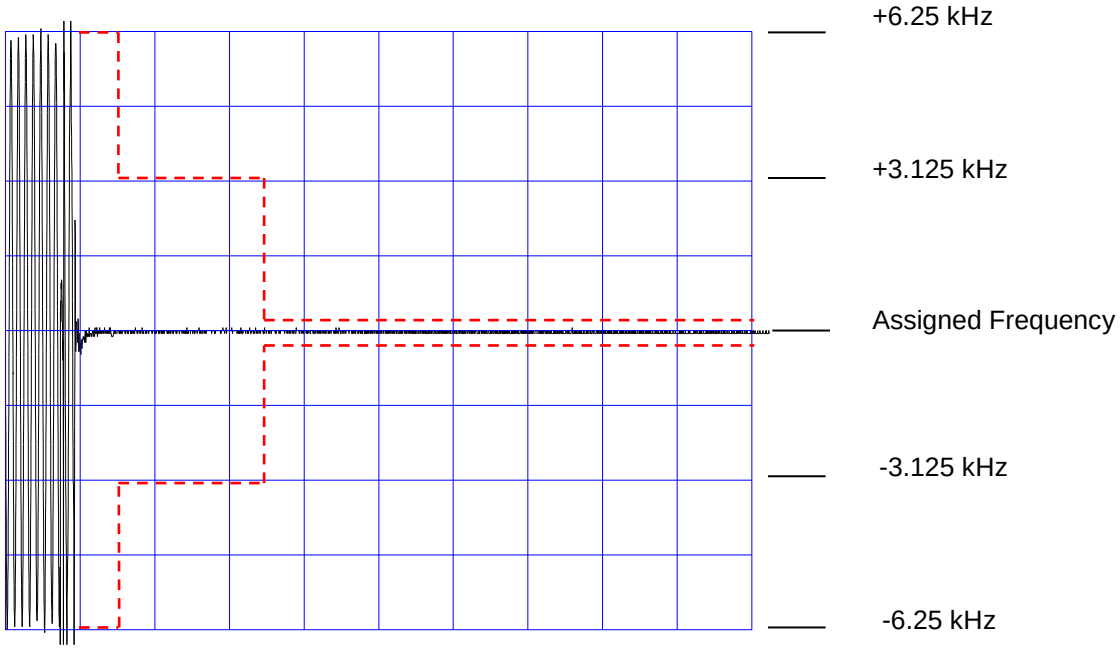
MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Switch-On Condition



10 ms/div

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, Inc.

MODEL: DTXM-160

TYPE OF UNIT: VHF Modem Module

FCC ID: AIERIT39-16006

DATE: July 24, 2014

RESULTS: Switch-Off Condition