TYPE OF EXHIBIT:	TEST REPORT
FCC PART:	2.1033 (c)(14)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

The following is a list of attached exhibits required by the Federal Communications Commission for the application to and grant of FCC Type Acceptance. All tests are per TIA-603-D (2010) where applicable.

TABLE OF CONTENT:

TYPE OF EXHIBIT:	TEST EQUIPMENT LIST
FCC PART:	2.947 (d)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

TEST EQUIPMENT:

The measured data in this report was obtained using one or more of the following pieces of equipment. The particular equipment used in any one test is detailed in the procedure for that test.

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.	Last Cal	EXP Cal
Comms Test Set	Aeroflex	IFR COM-120B	485001757	6 DEC 2013	6 DEC 2014
Signal generator	Agilent	N5181A	MY46240065	04 NOV 2013	04 NOV 2016
Spectrum Analyzer	Advantest	R3265A	75060189	02 OCT 2013	02 OCT 2014
Log Periodic Antenna	Electro-Metrics	LPA-25	8-102	30 APR 2014	30 APR 2017
Dipole Antenna	Electro-Metrics	BDA-25	8-101	30 APR 2014	30 APR 2017
Dipole Antenna	Electro-Metrics	EM-6925	292	8 APR 2014	8 APR 2015
Dipole Antenna	Electro-Metrics	EM-6927	292	8 APR 2014	8 APR 2015
Gain horn	EMCO	3105	2034	22 OCT 2013	22 OCT 2015

SUPPORT EQUIPMENT:

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.		
Power Supply	BK Precision	1630	146-03508		
Digital Oscilloscope	Philips	PM-3335	DM648004		
Digital Multimeter	Fluke	179	82800086		
Temperature Chamber	Associated Laboratories	ELH-0.5-LC	N/A		
Thermocouple	Omega	7035-J-225	8504		
272 MHz high pass filter	Ritron				
30dB Power Attenuator	Bird	8306-300-N	N/A		
10dB Attenuator	ELCOM	AT-51-10	N/A		

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	DESCRIPTION OF MEASUREMENT FACILITY
FCC PART:	2.947 (d)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

DESCRIPTION:

The emission measurements filed with this application were made on a site certified by RITRON, Inc. Data pertaining to this site is on file with the FCC and Industry Canada.

Firm Registration Number: 536261

Firm FRN: 0004-3348-76

FCC Reference: ANSI STD C63.4-2003

Industry Canada Radio Standard: Procedure 212

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 are taken at RITRON's engineering laboratory in Carmel, IN.

PHOTO OF RITRON TEST SITE:

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	RADIO FREQUENCY POWER OUTPUT
FCC PART:	2.1046 (a)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. Power was supplied to the RQX-456 at P603 Battery Connector by a BK Precision 1630 power supply.
2. The RQX-456 was aligned for transmitter operation on 3 frequencies represent the low, middle, and upper range of the desired operating band for each of the three configurations listed below.
   - RQX-456 model installed in the basic enclosure, powered by 3 D-cell batteries for 700mW TX power, operating with the internal antenna etched on the PCB.
   - RQX-456 model installed in the basic enclosure, powered by 6 AA-cell batteries for 2W TX power, operating with the internal antenna etched on the PCB.
   - RQX-456-XT model installed in an XT enclosure, powered by 6 D-cell batteries, limited to 1.5W TX power, terminated at the antenna port with the Ritron AFB-1545 antenna include with the product. (The user can connect other antennas, however.)
3. The RQX-456 was tested in each of the three configurations.
4. The RQX-456 J201 SMB antenna connector was connected to an IFR COM-120A 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. The internal antenna etched on the PCB was disconnected.
5. A Fluke 179 multimeter was used to measure the I_{TX} transmitter current that supplies the final RF amplifier.
6. Measurements were taken using frequencies at the low, middle, and upper range of the desired operating band at supply voltages representing fully charged batteries (number of cells x 1.5V) and EOL batteries (number of cells x 1.1V)
7. Power was supplied to the RQX-456 at P601 External Power Input by a BK Precision 1630 power supply set to 12 volts, the rated external input voltage.
8. Steps 3-5 were repeated.

TYPE OF EXHIBIT:	RADIO FREQUENCY POWER OUTPUT
FCC PART:	2.1046 (a)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

			700mW output with 3 D-cell batteries		**2.0W output with 6 AA-cell batteries**		**1.5W output with 6 D-cell batteries**	
Frequency (MHz)	**Input (VDC)**	**+V_{TX} (VDC)**	**I_{TX} (mA)**	**Power (W)**	**I_{TX} (mA)**	**Power (W)**	**I_{TX} (mA)**	**Power (W)**
451.025	3.3	3.15	345	0.38	333	0.36	-	-
	4.5	4.3	467	0.70	624	0.99	-	-
	6.6	6.4	471	0.80	797	1.79	669	1.40
	9.0	8.8	469	0.77	800	2.00	672	1.50
	12	8.4	468	0.78	803	2.00	670	1.50
460.025	3.3	3.15	349	0.40	352	0.40	-	-
	4.5	4.3	469	0.72	600	0.94	-	-
	6.6	6.4	473	0.84	770	1.75	649	1.37
	9.0	8.8	473	0.82	780	2.00	647	1.50
	12	8.4	471	0.84	780	2.00	654	1.50
469.975	3.3	3.15	347	0.37	361	0.39	-	-
	4.5	4.3	482	0.70	599	0.92	-	-
	6.6	6.4	489	0.83	805	1.75	672	1.36
	9.0	8.8	490	0.80	818	2.00	681	1.50
	12	8.4	487	0.81	818	2.00	675	1.50

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	TRANSMITTER AUDIO OVERALL RESPONSE
FCC PART:	2.1047 (a)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. The RQX-456 was set to transmit narrowband (12.5 kHz) at a frequency in the middle of the desired operating band, with the radio set for pre-emphasis and voice audio lowpass filter.
2. The output of an IFR COM-120B audio function generator was applied to the MIC_AUD input of the RQX-456 at a constant input level of 100 mVP to prevent limiting at any frequency.
3. The audio input frequency was varied from 100-5000 Hz, and the resulting FM deviation was measured using an IFR COM-120B Test Set.
4. The transmitter audio frequency response was calculated as:

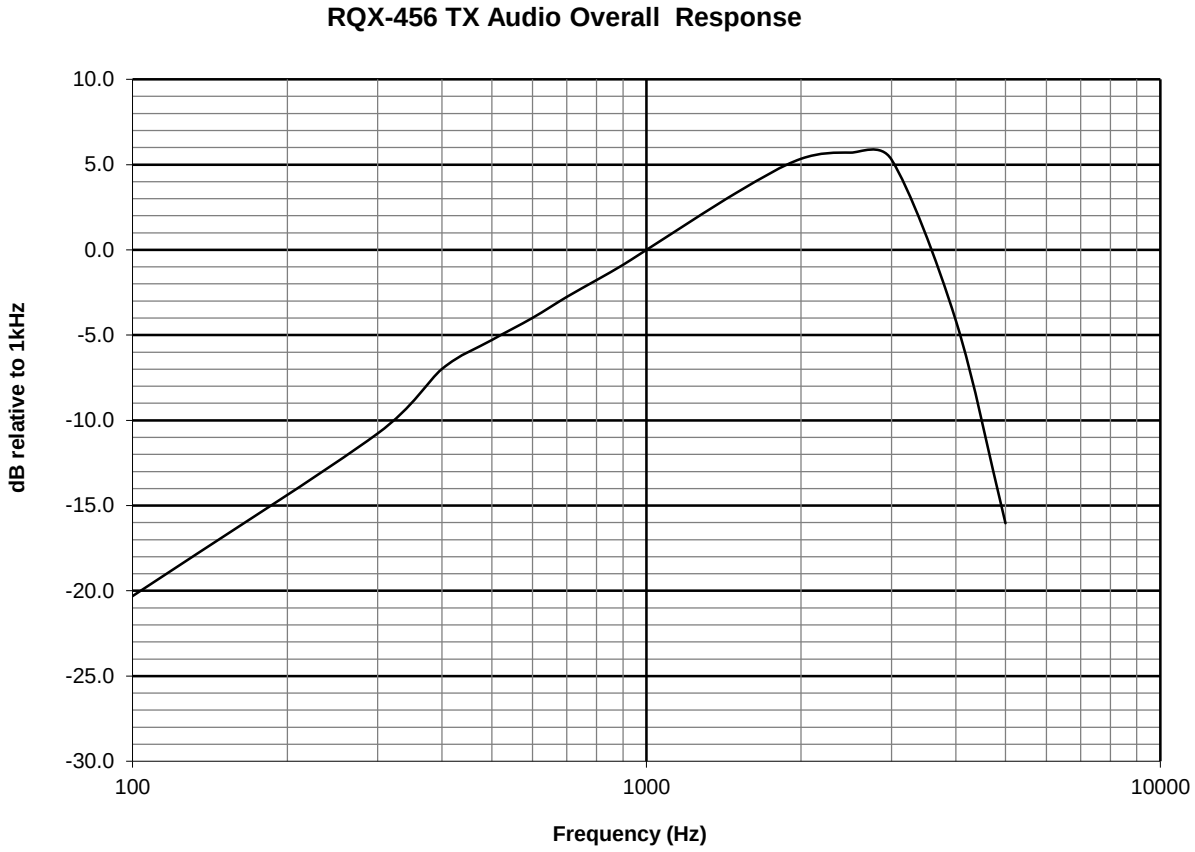
   20 log (Deviation of test frequency/deviation of 1 kHz reference frequency)
5. Results were plotted on the attached chart.

RESULTS:

Frequency	**Audio Response**	
(Hz)	**(dB)**	**Deviation (Hz)**
100	-20.3	110
300	-10.8	330
400	-7.0	510
500	-5.3	620
600	-4.0	720
700	-2.8	830
800	-1.8	930
900	-0.9	1030
1000	0.0	1140
1500	3.4	1680
2000	5.3	2110
2500	5.7	2200
3000	5.3	2100
4000	-4.1	710
5000	-16.0	180

TYPE OF EXHIBIT:	TRANSMITTER AUDIO OVERALL RESPONSE
FCC PART:	2.1047 (a)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PLOT:



SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	TRANSMITTER AUDIO LOWPASS FILTER
FCC PART:	2.1047 (a)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. The RQX-456 was set to transmit narrowband (12.5 kHz) at a frequency in the middle of the desired operating band, with the radio set for no pre-emphasis.
2. The output of an IFR COM-120B audio function generator was applied to the MIC_AUD input of the RQX-456 at a constant input level of 100 mVP to prevent limiting at any frequency.
3. The audio input frequency was varied from 300-5000 Hz, and the resulting FM deviation was measured using an IFR COM-120B Test Set.
4. The transmitter audio frequency response was calculated as:

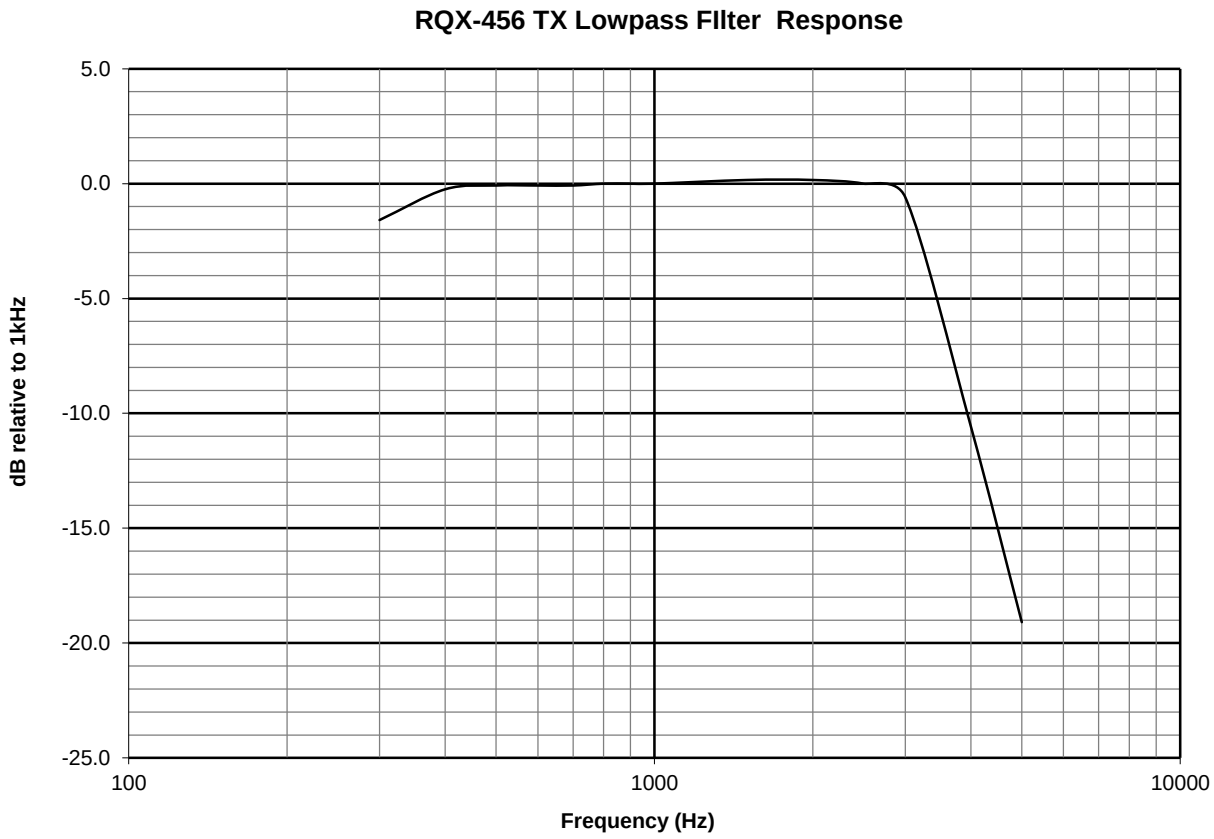
   20 log (Deviation of test frequency/deviation of 1 kHz reference frequency)
5. Results were plotted on the attached chart.

RESULTS:

Frequency	Audio Response	
(Hz)	**(dB)**	**Deviation (kHz)**
300	-1.6	0.9
400	-0.2	1.05
500	-0.1	1.07
600	-0.1	1.07
700	-0.1	1.07
800	0.0	1.08
900	0.0	1.08
1000	0.0	1.08
1500	0.2	1.1
2000	0.2	1.1
2500	0.0	1.08
3000	-0.6	1.01
4000	-10.6	0.32
5000	-19.1	0.12

TYPE OF EXHIBIT:	TRANSMITTER AUDIO LOWPASS FILTER
FCC PART:	2.1047 (a)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PLOT:



SIGNED: Michael A. Pickard

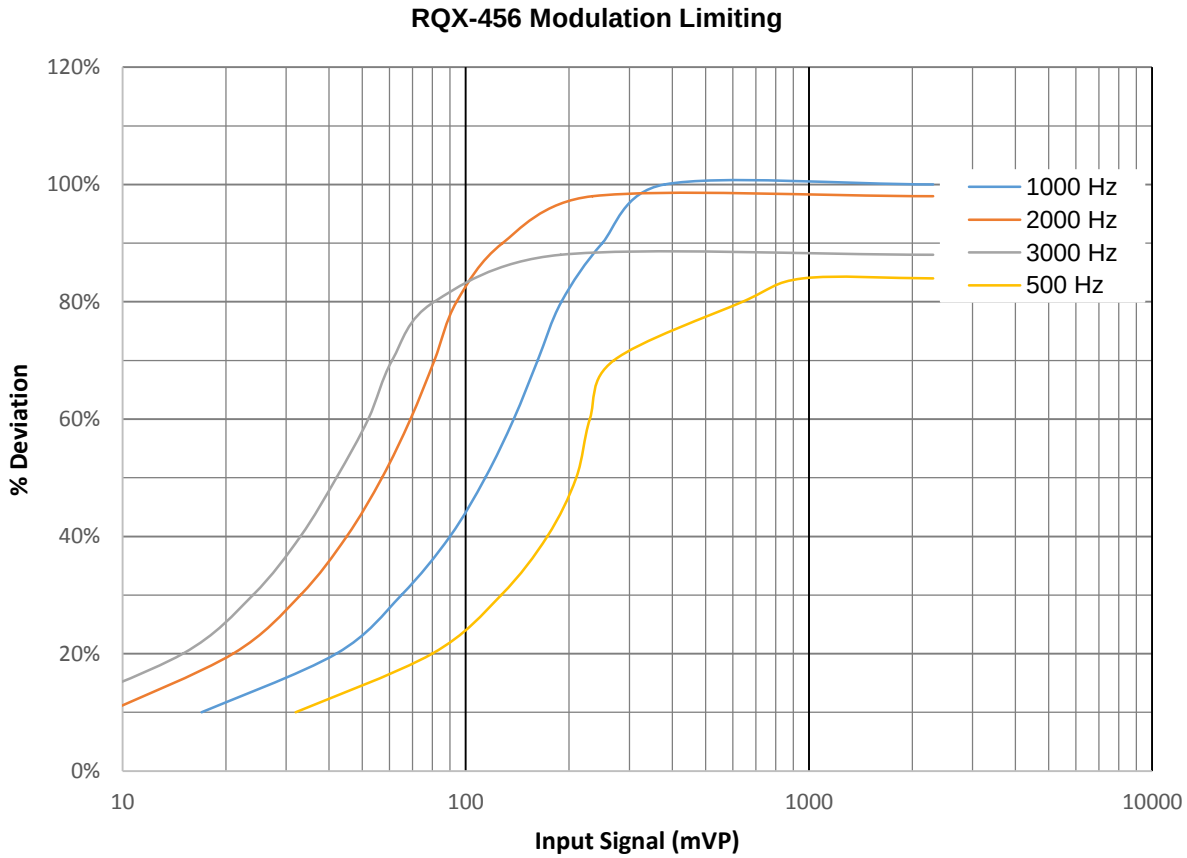
Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	MODULATION LIMITING
FCC PART:	2.1047 (b)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. The RQX-456 was adjusted for a narrowband 100% deviation of +/- 2.5 kHz per the tune-up procedure. The radio was programmed for transmitter operation at a frequency in the middle of the desired operating band.
2. The output of an IFR COM-120B audio generator was applied to the MIC_AUD input of the RQX-456.
3. The output of the generator was adjusted from 6 mVP to 2300 mVP at frequencies from 500 to 3000 Hz. This satisfies required deviation for 60% modulation +/- 20dB at all frequencies.
4. An IFR COM-120B was used to measure FM deviation. The resulting deviations were recorded as a percentage of the rated system deviation of +/- 2.5 kHz for narrowband operation.
5. The test was repeated at frequencies near the lower and upper range of the desired operation band.
6. The attached chart displays the narrowband (12.5 kHz) response.

PLOT:



TYPE OF EXHIBIT:	MODULATION LIMITING
FCC PART:	2.1047 (b)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

mVP	1000 Hz	2000 Hz	3000 Hz	500 Hz
6			10%	
9		10%		
15			20%	
17	10%			
21		20%		
24			30%	
32				10%
33		30%	40%	
42	20%		50%	
45		40%		
52			60%	
57		50%		
61			70%	
65	30%			
69		60%		
80				20%
81		70%	80%	
90	40%			
94		80%		
114	50%			
127				30%
128		90%		
138	60%			
162	70%			
173				40%
189			88%	
190	80%			
210				50%
230				60%
234		98%		
250	90%			
270				70%
380	100%			
640				80%
960				84%
2300	100%	98%	88%	84%

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	EMISSIONS DESIGNATOR
FCC PART:	2.1049 (c)(1)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

CALCULATIONS:

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.

The necessary bandwidth for the narrowband voice channel is:

Maximum modulation frequency (f_m) in kHz = 3

Maximum deviation (f_Δ) in kHz = 2.5

Necessary bandwidth for **narrowband** in kHz = 2(2.5 + 3) = 11

Narrowband emissions designator applied for is 11K0F3E.

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	OCCUPIED BANDWIDTH
FCC PART:	2.1049 (c)(1) per 90.210 (d)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

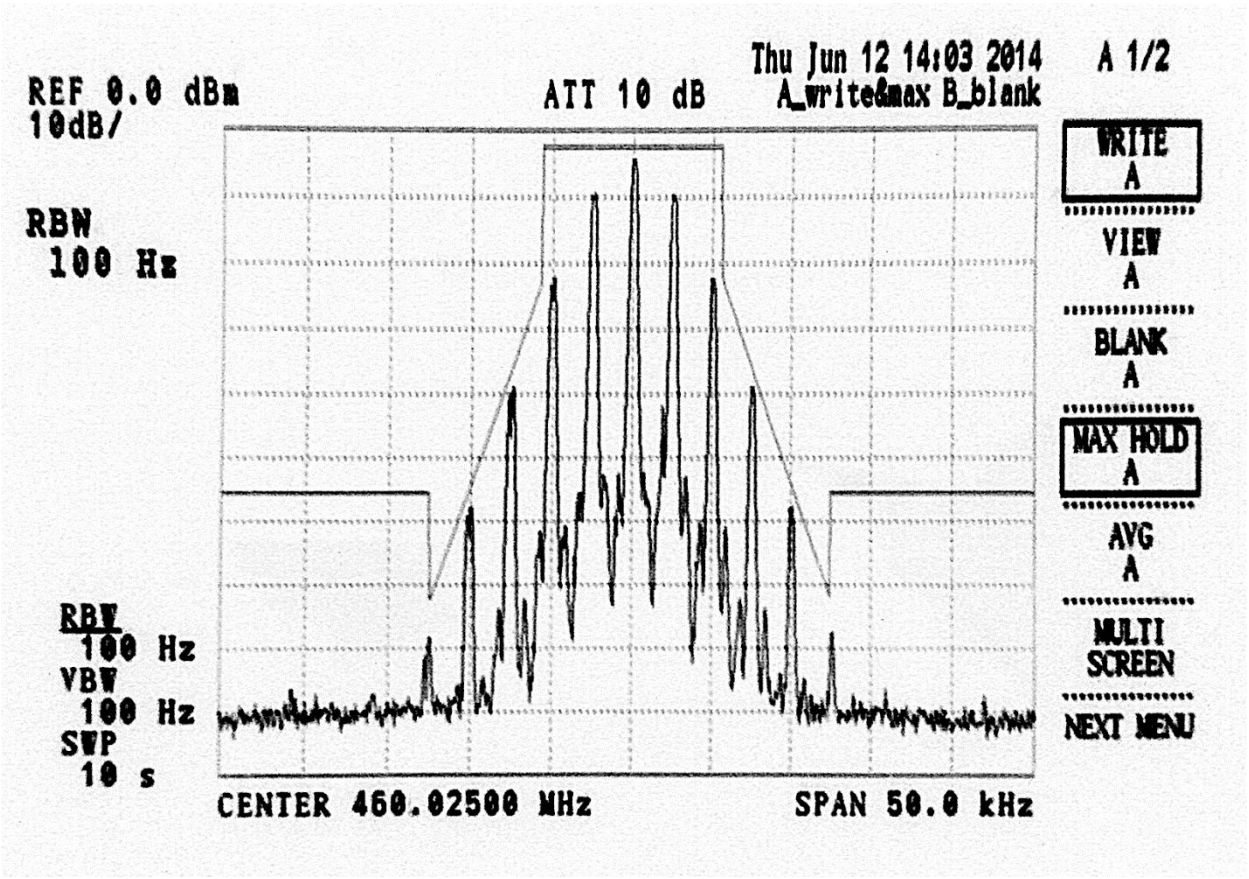
1. The RQX-456 was set for 700mW transmitter operation at a frequency in the middle of the desired operating band. The transmitter was adjusted for a deviation of +/- 2.5 kHz at 1000 Hz for narrowband operation.
2. Power was supplied to the RQX-456 at P603 Battery Connector by a BK Precision 1630 power supply set to 4.5 volts, an input voltage representing 3 fully charged D-cell batteries. The RF output of the RQX-456 was measured with an IFR COM-120B wattmeter at 700 mW.
3. The unit's antenna port was connected to the Advantest R3265A spectrum analyzer through a Bird 8306-300-N 30dB attenuator. The spectrum analyzer reference level was set to the measured level of the unmodulated carrier after attenuation.
4. The output of an IFR COM-120B audio generator was applied to the MIC_AUD input of the RQX-456. The frequency of the audio signal generator was set to 2500 Hz and the output adjusted to a level 16 dB greater than that necessary to produce 50% of the rated system deviation at the frequency of maximum response.

Frequency of maximum response:	2700	Hz
Level for 50% system deviation:	45	mVP
Level for 50% system deviation + 16DB:	284	mVP

5. The spectrum analyzer was centered on 460.025 MHz and the sidebands were capture in max hold mode on the spectrum analyzer. The appropriate narrow band emission mask was also displayed.
6. Steps 2 - 5 were repeated at frequencies representing the lower and upper range of the desired operating band.
7. The captured spectrum analyzer display is included in this exhibit, representing the response with the highest sidebands.
8. The RQX-456 was set for 2W transmitter operation. Power was supplied to the RQX-456 at P603 Battery Connector by a BK Precision 1630 power supply set to 9.0 volts, an input voltage representing 6 fully charged AA-cell batteries. The RF output of the RQX-456 was measured with an IFR COM-120B wattmeter at 2.0 W.
9. Steps 3-7 were repeated with the captured spectrum analyzer display included in this exhibit, representing the response with the highest sidebands.

TYPE OF EXHIBIT:	OCCUPIED BANDWIDTH
FCC PART:	2.1049 (c)(1) per 90.210 (d)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

ANALYZER DISPLAY at 700mW:

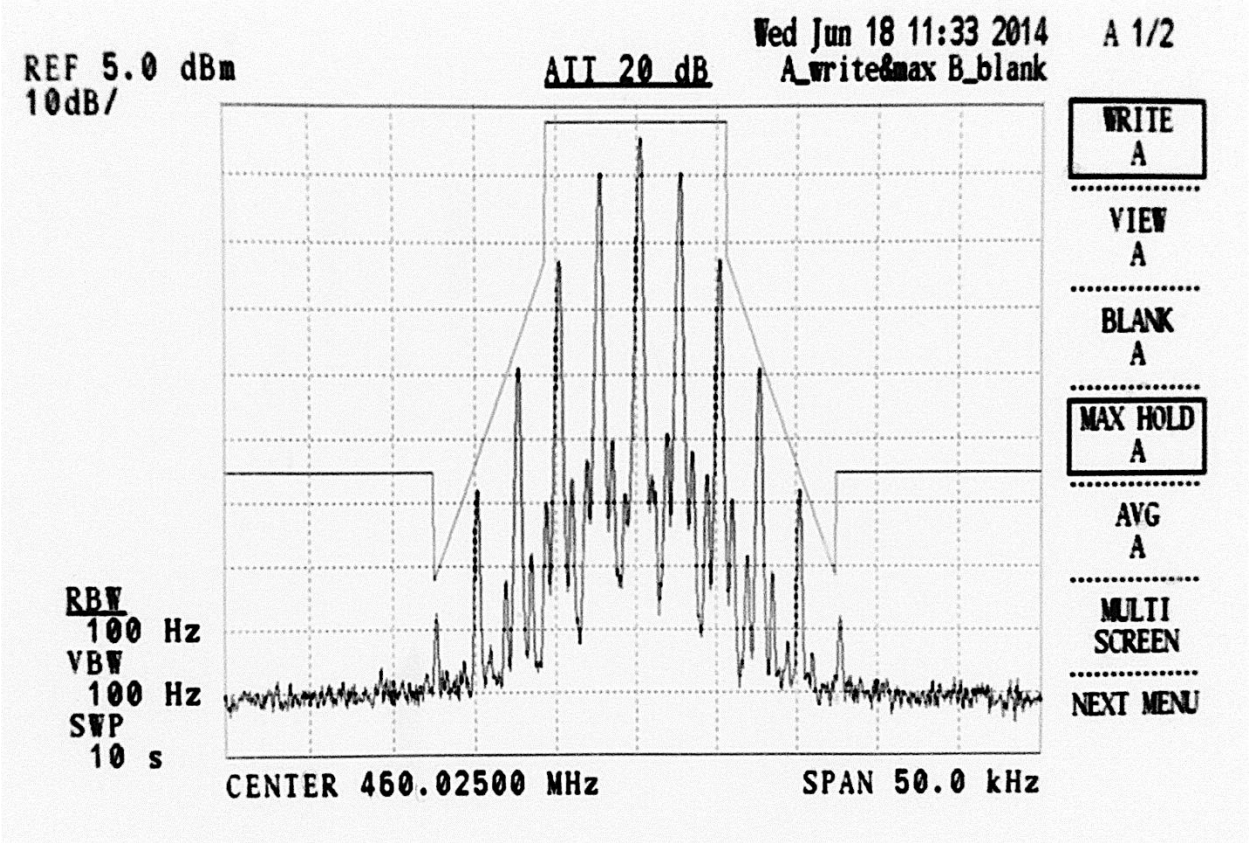


SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	OCCUPIED BANDWIDTH
FCC PART:	2.1049 (c)(1) per 90.210 (d)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

ANALYZER DISPLAY at 2W:



SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	SPURIOUS EMISSIONS AT ANTENNA TERMINALS
FCC PART:	2.1051
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. The RQX-456 was programmed for transmitter operation on frequencies at the low, middle, and upper range of the desired operating band.
2. Power was supplied to the RQX-456 at P603 Battery Connector by a BK Precision 1630 power supply set to 4.5 volts, an input voltage representing 3 fully charged D-cell batteries. The RF output of the RQX-456 was measured with an IFR COM-120B wattmeter at 700 mW.
3. The transmitter was modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation as specified in FCC Part 2.1049 (c)(1).
4. The RQX-456 antenna port was connected to the Advantest R3265A spectrum analyzer through a Bird 8306-300-N 30dB attenuator.
5. The spectrum was searched from 8 MHz to the 10th harmonic of the operating frequency. All unreported emissions are more than 20 dB below the FCC limit.
6. Power was supplied to the RQX-456 at P603 Battery Connector by a BK Precision 1630 power supply set to 9.0 volts, an input voltage representing 6 fully charged AA-cell batteries. The RF output of the RQX-456 was measured with an IFR COM-120B wattmeter at 2.0 W.
7. Steps 3-5 were repeated.

TYPE OF EXHIBIT:	SPURIOUS EMISSIONS AT ANTENNA TERMINALS
FCC PART:	2.1051
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

Output Power: 0.7 W

FCC Attenuation per Part 90.210(d)(3): 48.45 dBc

Multiple of Carrier	Emission Frequency (MHz)	Analyzer Reading (dBm)	Attenuation Correction Factor (dB)	Spurious Power (dBm)	Spurious Power (dBc)	FCC Limit (dBc)	FCC Margin (dB)
Carrier	451.025						
Carrier 6	460.025 2760.150	- 54.00	15.38	-38.62	-67.07	-48.45	18.62
Carrier 2	469.975 939.950	- 51.03	11.34	-39.69	-68.14	-48.45	19.69

Output Power: 2.0 W

FCC Attenuation per Part 90.210(d)(3): 53.00 dBc

Multiple of Carrier	Emission Frequency (MHz)	Analyzer Reading (dBm)	Attenuation Correction Factor (dB)	Spurious Power (dBm)	Spurious Power (dBc)	FCC Limit (dBc)	FCC Margin (dB)
Carrier	451.025						
Carrier	460.025						
Carrier 2	469.975 939.950	- 51.13	11.34	-39.79	-73.01	-53.00	20.01

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS
FCC PART:	2.1053
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. Field strength of spurious radiation of the RQX-456 was taken at the RITRON, Inc. 3-meter test site, details of which are on file with the FCC. The measurements were via the substitution method.
2. The RQX-456 was aligned for transmitter operation on 3 frequencies represent the low, middle, and upper range of the desired operating band for each of the three configurations listed below.
3. The RQX-456 was tested in each of the three configurations:
    - Installed in the basic enclosure, powered by 3 D-cell batteries for 700mW TX power, operating with the internal antenna etched on the PCB.
    - Installed in the basic enclosure, powered by 6 AA-cell batteries for 2W TX power, operating with the internal antenna etched on the PCB.
    - Installed in an XT enclosure, powered by 6 D-cell batteries for 1.5W TX power, terminated at the antenna port with the Ritron AFB-1545 antenna include with the product. (The user can connect other antennas, however.)
4. All field strength measurements were made with the Advantest R3265A Spectrum Analyzer connected to the Electro-Metrics BDA-25 dipole, Electro-Metrics LPA-25 log periodic or EMCO horn receiving antenna. All harmonic measurements were made through a 900 MHz high pass filter.
5. A calibrated ½-wave dipole antenna was substituted at the radio side of the range driven by a known power level from an Agilent N5181A RF signal generator to produce a known ERP at each harmonic. The receiving antenna was oriented both vertically and horizontally and reference measurements were taken at each harmonic. All harmonic measurements were made through a 900 MHz high pass filter. Cable loss from generator to the dipole was taken into account.
6. For each emission, the height and polarization of the field strength measuring antenna and orientation of the RQX-456 was varied to find maximum field strength.
7. The spectrum was searched up to the 10th harmonic of the transmit frequency. All non-harmonics were less than 20 dB below the FCC limits specified in Part 90.210(d)(3). All harmonics with greater than 20 dB margin were not reported.

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS
FCC PART:	2.1053
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

Power Output: 0.7 W **FCC Attenuation per Part 90.210(d)(3):** 48.5 dBc

RQX-456				**Horizontal**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	451.025	16.6	-1.59	-24.13	-6.59		
2	902.050	8.3	-3.22	-35.75	-61.31	-57.23	8.78
7	3157.175	2.4	-10.28	-61.34	-88.41	-65.80	17.35
8	3608.200	2.1	-14.41	-69.41	-93.84	-67.29	18.84
	460.025	16.3	-2.00	-24.69	-10.75		
2	920.050	8.2	-3.19	-37.38	-59.34	-53.60	5.15
7	3220.175	2.3	-10.16	-63.16	-83.53	-58.98	10.53
8	3680.200	2.0	-12.06	-71.50	-88.22	-57.23	8.78
	469.975	16.0	-1.78	-24.19	-8.44		
2	939.950	8.0	-3.53	-37.75	-58.09	-52.32	3.87
3	1409.925	5.3	-4.50	-45.19	-80.44	-68.20	19.75
7	3289.825	2.3	-11.69	-66.69	-94.41	-67.86	19.41

RQX-456				**Vertical**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	451.025	16.6	-1.59	-25.41	2.56		
2	902.050	8.3	-3.22	-41.03	-65.78	-56.42	7.97
	460.050	16.3	-2.00	-25.78	-0.09		
2	920.050	8.2	-3.19	-39.06	-70.06	-62.64	14.19
7	3220.175	2.3	-10.16	-57.66	-85.94	-66.89	18.44
8	3680.200	2.0	-12.06	-67.31	-94.88	-68.08	19.63
	469.975	16.0	-1.78	-25.88	1.06		
2	939.950	8.0	-3.53	-37.69	-70.19	-64.48	16.03
6	2819.850	2.7	-7.22	-51.66	-81.28	-65.29	16.84
7	3289.825	2.3	-11.69	-59.28	-86.66	-67.52	19.07

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS
FCC PART:	2.1053
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

Power Output: 2.0 W **FCC Attenuation per Part 90.210(d)(3):** 53.0 dBc

RQX-456				**Horizontal**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	451.025	16.6	-1.59	-24.13	-2.41		
	460.025	16.3	-2.00	-24.69	1.56		
	469.975	16.0	-1.78	-24.19	1.41		

RQX-456				**Vertical**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	451.025	16.6	-1.59	-25.41	6.09		
2	902.050	8.3	-3.22	-41.03	-71.34	-66.54	13.53
	460.050	16.3	-2.00	-25.78	8.00		
2	920.050	8.2	-3.19	-39.06	-69.41	-66.55	13.54
5	2300.125	3.3	-5.44	-50.69	-83.97	-71.73	18.72
	469.975	16.0	-1.78	-25.88	8.03		
2	939.950	8.0	-3.53	-37.69	-71.88	-70.73	17.72
3	1409.925	5.3	-4.50	-45.50	-75.89	-67.90	14.89
5	2349.875	3.2	-5.56	-51.47	-84.44	-71.54	18.53
7	3289.825	2.3	-11.69	-59.28	-85.44	-70.86	17.85

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS
FCC PART:	2.1053
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

Power Output: 1.5 W **FCC Attenuation per Part 90.210(d)(3):** 51.8 dBc

RQX-456-XT				**Horizontal**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	451.025	16.6	-1.59	-24.13	-5.38		
6	2706.150	2.8	-6.94	-51.09	-83.69	-71.30	19.54
8	3608.200	2.1	-14.41	-69.41	-85.16	-61.92	10.16
	460.025	16.3	-2.00	-24.69	-7.47		
5	2300.125	3.3	-5.44	-48.00	-82.38	-71.58	19.82
6	2760.150	2.7	-6.72	-53.09	-76.65	-62.04	10.28
7	3220.175	2.3	-10.16	-63.16	-83.81	-62.57	10.81
8	3680.200	2.0	-12.06	-71.50	-87.00	-59.32	7.56
	469.975	16.0	-1.78	-24.19	-1.94		
6	2819.850	2.7	-7.22	-54.16	-74.94	-59.76	8.00
7	3289.825	2.3	-11.69	-66.69	-87.78	-64.54	12.78
8	3759.800	2.0	-13.22	-72.84	-99.47	-71.61	18.85

RQX-456-XT				**Vertical**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	451.025	16.6	-1.59	-25.41	7.31		
	460.050	16.3	-2.00	-25.78	8.69		
6	2760.150	2.7	-6.72	-53.56	-81.00	-65.92	14.16
7	3220.175	2.3	-10.16	-57.66	-83.03	-67.29	15.53
8	3680.200	2.0	-12.06	-67.31	-91.19	-67.70	15.94
	469.975	16.0	-1.78	-25.88	8.63		
6	2819.850	2.7	-7.22	-51.66	-79.81	-67.13	15.37

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.1055 (a)(1)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

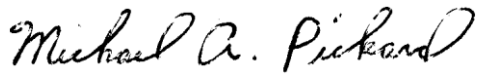
1. The RQX-456 uses two different reference oscillators to determine transmit frequency. A 26.0 MHz reference oscillator is used for transmit frequencies 464.400 MHz and below, and a 25.6 MHz oscillator is used for frequencies above 464.400 MHz.
2. The RQX-456 was programmed for operation at a frequency using the 25.6 MHz reference oscillator.
3. The unit was placed inside a Delta Design Model 3900 CL temperature chamber and power was supplied to the RQX-456 at P603 Battery Connector by a BK Precision 1630 power supply set to 4.5 VDC. The antenna terminal was connected to the input of an IFR COM-120B RF communications test set used to measure frequency of the carrier. A Triplett model 320-G/P thermocouple was placed inside the chamber to measure temperature.
4. Frequency was measured at +25°C and recorded as a reference frequency.
5. The temperature was raise to +30°C for 30 minutes, at which time the transmitter frequency was measured and recorded.
6. Step 4 was repeated in +10°C increments up to +60°C.
7. The unit was allowed to return naturally back to the ambient room temperature of +25°C.
8. The temperature was lowered to +20°C for 30 minutes, at which time the transmitter frequency was measured and recorded.
9. Step 8 was repeated in -10°C increments down to -30°C.
10. The RQX-456 was programmed for operation at a frequency using the 26.0 MHz reference oscillator. Steps 3-9 were repeated.
11. The frequency remained within the 1.5 ppm specified across the full -30°C to +60°C temperature range.

TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.1055 (a)(1)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

RESULTS:

25.6 MHz reference oscillator		
Temp °C	**Frequency (MHz)**	**Error (ppm)**
-30	469.974916	-0.19
-20	469.975129	0.26
-10	469.975205	0.43
0	469.975091	0.18
10	469.975079	0.16
20	469.975021	0.03
30	469.974939	-0.14
40	469.974936	-0.15
50	469.975033	0.06
60	469.974939	-0.14
25	469.975005	0.00

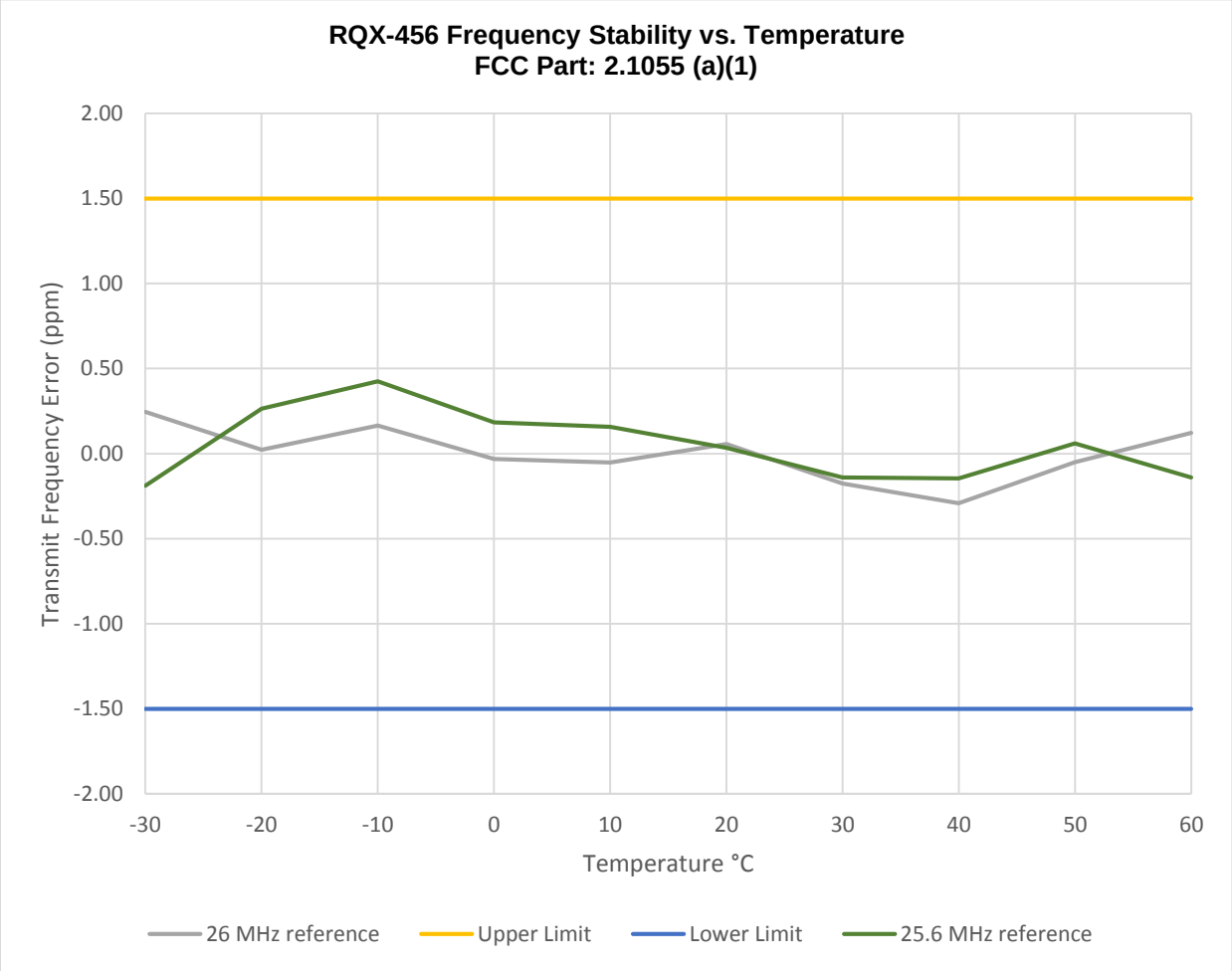
26 MHz reference oscillator		
Temp C	**Frequency (MHz)**	**Error (ppm)**
-30	451.025112	0.25
-20	451.025011	0.02
-10	451.025075	0.16
0	451.024987	-0.03
10	451.024977	-0.05
20	451.025026	0.06
30	451.024922	-0.18
40	451.024869	-0.29
50	451.024978	-0.05
60	451.025056	0.12
25	451.025001	0.00

SIGNED: 

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.1055 (a)(1)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PLOT:



TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. VOLTAGE
FCC PART:	2.1055 (d)(1)
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. The RQX-456 uses two different reference oscillators to determine transmit frequency. A 26.0 MHz reference oscillator is used for transmit frequencies 464.400 MHz and below, and a 25.6 MHz oscillator is used for frequencies above 464.400 MHz.
2. The RQX-456 was programmed for operation at a frequency using the 25.6 MHz reference oscillator.
3. The RQX-456 antenna terminal was connected to the input of an IFR COM-120B communications test set, used to measure frequency of the carrier.
4. A BK Precision Model 1630 power supply was used to apply supply voltage at the battery input.
5. Frequency was checked at voltages representing fully charged and fully discharged condition.

   3 fully discharged D-cell batteries = 3.3 V 3 fully charged D-cell batteries = 4.5 V
   6 fully discharged AA-cell batteries = 6.6 V 6 fully charged AA-cell batteries = 9.0 V
6. The radio was put into transmit mode and frequency measured.
7. A BK Precision Model 1630 power supply was used to apply supply voltage at the external power input.
8. Frequency was checked from 85% to 115% of the specified operating voltage of 12 V.

   Minimum of 12 x 0.85 = 10.2 V Maximum of 12 x 1.15 = 13.8 V
7. The RQX-456 was programmed for operation at a frequency using the 26.0 MHz reference oscillator. Steps 3-8 were repeated.

RESULTS:

		25.6 MHz oscillator		26 MHz oscillator	
VDC	**Condition**	**Frequency (MHz)**	**Error (ppm)**	**Frequency (MHz)**	**Error (ppm)**
10.2	External Power @ 85%	469.975023	0.05	451.025037	0.08
12.0	External Power Nominal	469.975028	0.06	451.025041	0.09
13.8	External Power @ 115%	469.975028	0.06	451.025032	0.07
3.3	3 D-cell batteries fully discharged	469.075036	0.08	451.025082	0.18
4.5	3 D-cell batteries fully charged	469.975043	0.09	451.025077	0.17
6.6	6 AA-cell batteries fully discharged	469.975037	0.08	451.025053	0.12
9.0	6 AA-cell batteries fully charged	469.975034	0.07	451.025042	0.09

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

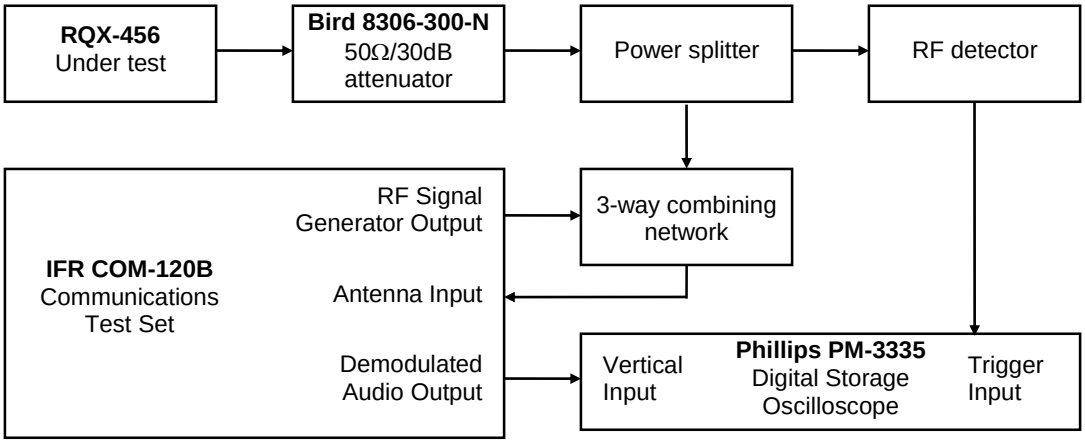
TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

PROCEDURE:

1. The RQX-456 was aligned for transmitter operation at 2 W power level per the tune-up procedure for frequencies representing the low, middle, and upper range of the desired operating band.
2. Power was supplied to the RQX-456 at the BATTERY input by a BK Precision 1630 power supply set to 9.0 VDC.
3. The test equipment was connected per the TEST SETUP diagram.
4. The IFR COM-120B receiver was set to measure FM deviation with the audio bandwidth set at ≤ 20 Hz to 15 kHz at an RF frequency in the middle of the desired operating band.
5. The RQX-456 transmitter under test was turned on and the IFR COM-120B Spectrum Analyzer was used to measure the RF power level through the test network.
6. The RQX-456 transmitter was turned off.
7. The IFR COM-120B RF signal generator was set to the transmit frequency at an RF level 30 dB below that measured in step 5, modulated with a 1 kHz tone at ± 12.5 kHz deviation.
8. The Phillips PM-3335 digital oscilloscope horizontal sweep rate was set to 10 mS per division. The vertical amplitude control was adjusted to display the 1000 Hz demodulated audio from the signal generator at ± 4 divisions (3.125 kHz/div), vertically centered on the screen.
9. The Phillips PM-3335 digital oscilloscope was set to trigger at 1 division from the left side of the display when the RF detector senses RF power from the RQX-456 transmitter.
10. The RQX-456 transmitter is turned on and the resulting waveform on the oscilloscope display was stored and plotted. The FCC limits per Part 90.214 were added to the plot in the same manner illustrated in EIA-603-B Part 2.2.19.3. The resulting plot is labeled “Switch ON” and shows compliance with FCC Part 90.214.
11. The Phillips 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 RQX-456 transmitter.
12. The RQX-456 transmitter is turned off and the resulting waveform on the oscilloscope display was stored and plotted. The FCC limits per Part 90.214 were added to the plot in the same manner illustrated in EIA-603-B Part 2.2.19.3. The resulting plot is labeled “Switch OFF” and shows compliance with FCC Part 90.214.
13. The test procedure was repeated for frequencies at the lower and upper range of the desired operating band. The worst case response occurred at the low end of the specified operating band, with the resulting display included in this exhibit.

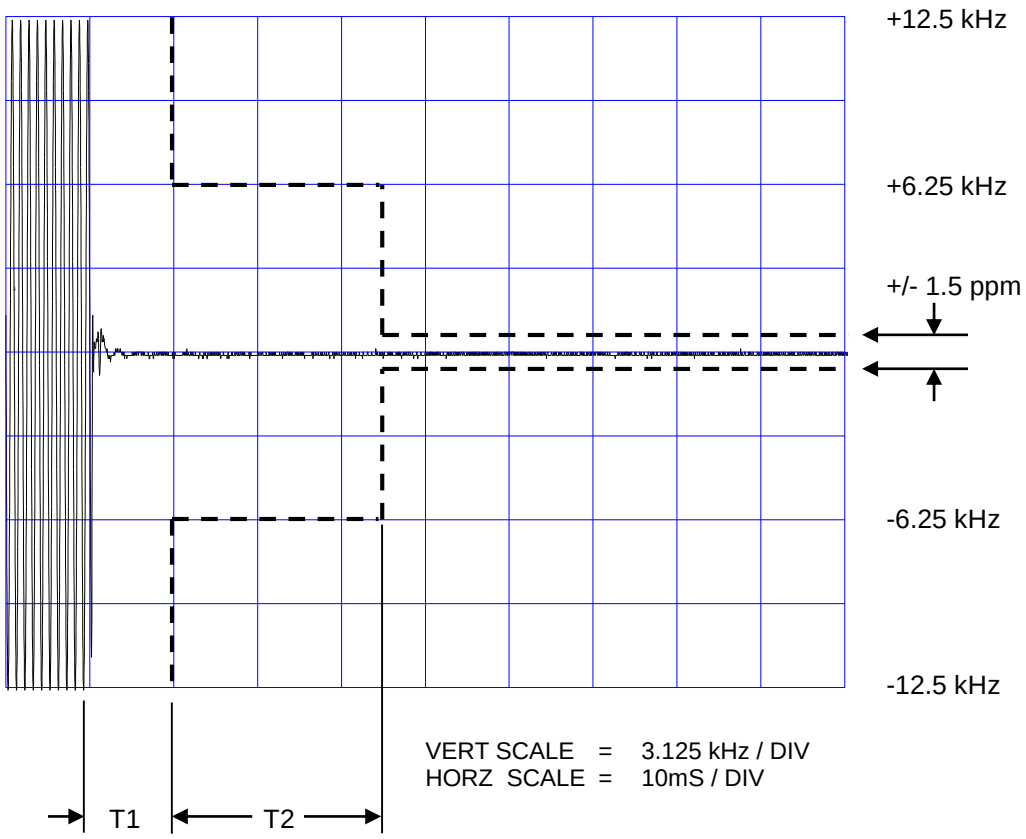
TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

TEST SETUP:



TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

SWITCH ON CONDITION

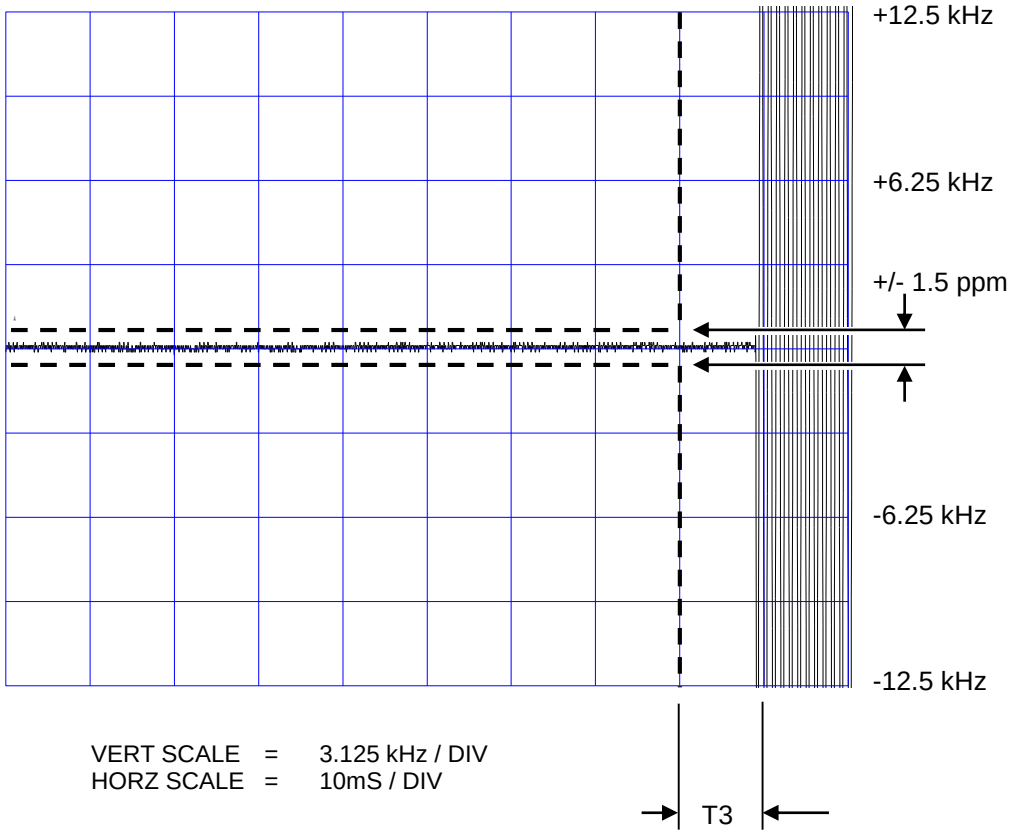


SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	RQX-456, RQX-456-XT
TYPE OF UNIT:	UHF-FM Callbox 2-Way Radio
FCC ID:	AIERIT38-456
DATE:	July 16, 2014

SWITCH OFF CONDITION



SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer