



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION REPORT

FCC PART 90

vARC Systems, Inc.
280 N. 8th Street, Suite 30
Boise, Idaho 83702

MODEL: 1WTX-2470

FCC ID: ROE1WTX-2470

December 8, 2003

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2001	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2003	RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS
PART 90: 2001	PRIVATE LAND MOBILE RADIO SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 2002	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS

Frequency Range	Output Power Conducted (W)	Frequency Tolerance (ppm)	Emission Designator
2470 MHz	0.646	3.4	15M7F8W

REPORT PREPARED BY TEST ENGINEER: DAN BALTZELL

Document Number: 2003213 / QRTL03-173

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1 GENERAL INFORMATION

The following Type Certification Report is prepared on behalf of vArc Systems, Inc. in accordance with the Federal Communications Commission's Rules and Regulations. The Equipment Under Test (EUT) was Model: 1WTX-2470, FCC ID: ROE1WTX-2470. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 2000, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application report.

2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2001	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2003	RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS
PART 90: 2001	PRIVATE LAND MOBILE RADIO SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 2002	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS

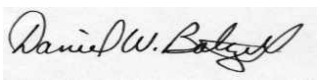
Frequency Range	Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
2470 MHz	0.646	3.4	15M7F8W

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to, or exclusions from, the above standards for Certification methodology.

Signature: 
Typed/Printed Name: Desmond Fraser

Date: December 8, 2003
Position: President

Signature: 
Typed/Printed Name: Daniel Baltzell

Date: December 8, 2003
Position: Test Engineer



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

3 TESTED SYSTEM DETAILS

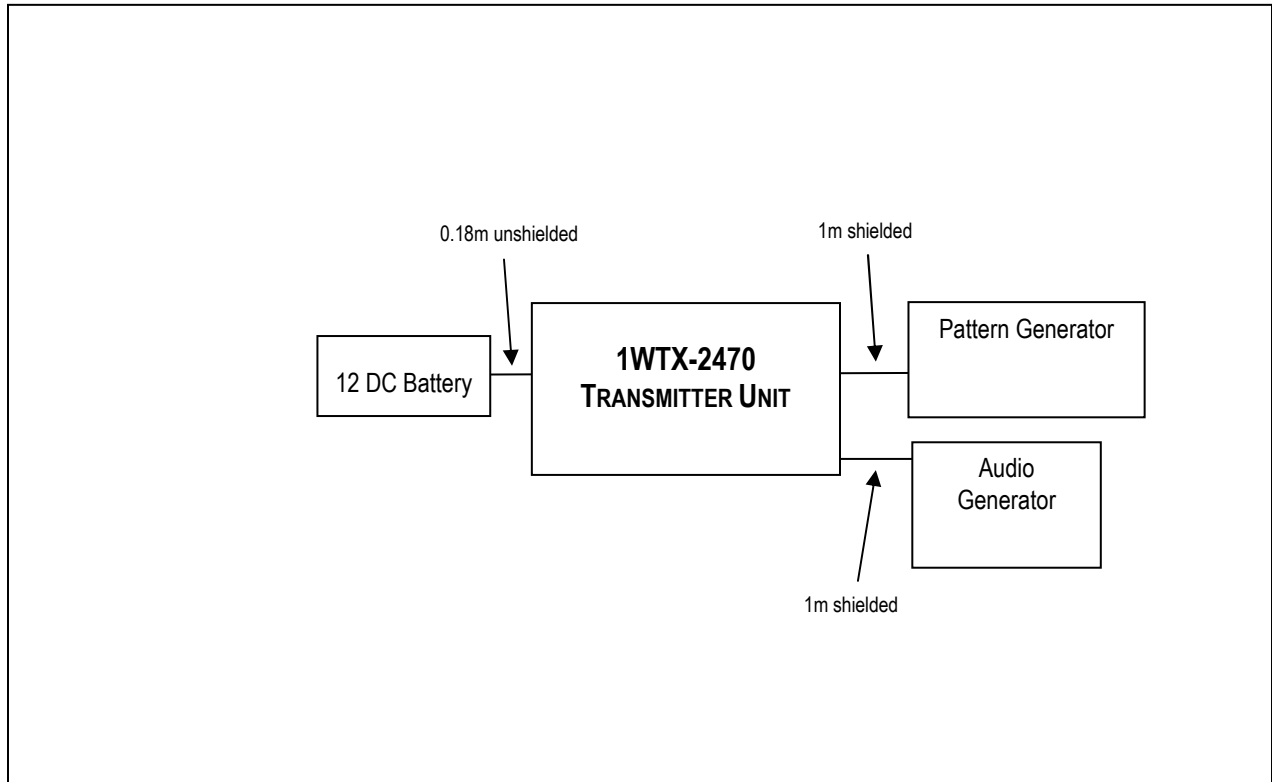
The EUT is a 2.47 GHz analog audio/video transmitter used in conjunction with an off-the-shelf digital camcorder. The EUT can be battery-operated or operated from an AC to DC adapter, and is intended for use in mobile configurations with NTSC inputs only.

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	FCC ID	CABLE DESCRIPTIONS	RTL BAR CODE
Transmitter Module (EUT)	vArc Systems, Inc.	1WTX-2470	N/A	ROE1WTX-2470	0.18 m unshielded Power, 1 m shielded I/O	15571
Transmitter Module (EUT)	vArc Systems, Inc.	1WTX-2470	N/A	ROE1WTX-2470	0.18 m unshielded Power, 1 m shielded I/O	15570
Antenna	vArc Systems, Inc.	Dipole SMA	N/A	N/A	N/A	15569
Antenna	vArc Systems, Inc.	Dipole SMA	N/A	N/A	N/A	15568
Battery Charger	vArc Systems, Inc.	PPI-1220-ADU	N/A	N/A	1.9m unshielded power	15589
Battery	Batteries Plus	BV13E	N/A	N/A	0.18m unshielded power	15590
Audio Generator	TEKTRONIX	ASG 100	B03274 V2.3	N/A	1 m shielded I/O	900927
Pattern Generator	Phillips	PM5418TDSI	LR81436C	N/A	1 m shielded I/O	900369
AC to DC Power Supply	N/A	UD-1205C	N/A	N/A	unshielded	15566

FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM



4 FCC PART 2.1033(C)(8); DC VOLTAGES AND CURRENTS

The DC voltages applied to, and dc currents into, the several elements of the final radio frequency amplifying device for normal operation over the power range where:

12 volts @ 0.5A

5 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

5.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.1

The EUT was connected to a coaxial attenuator having a 50Ω load impedance.

5.2 TEST DATA

The carrier (in MHz) was tested: 2470

TABLE 5-1: RF POWER OUTPUT: CARRIER OUTPUT POWER (UNMODULATED)

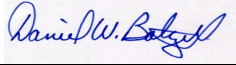
Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	2470	0.646

* Measurement accuracy: +/- .02 dB (logarithmic mode)

TABLE 5-2: TEST EQUIPMENT USED FOR TESTING (RF POWER OUTPUT - CONDUCTED)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184/901186	Agilent	E4416A/E9323A	Power Meter / Sensor	GB41050573/US40410380	07/30/04

TEST PERSONNEL:

DANIEL W. BALTZELL		DECEMBER 4, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

6 FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

6.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, Section 2.2.13: The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

TRANSMITTER INPUT MODULATION: The test signal modulating the main carrier consists of a standard NTSC video signal and a 5.5 MHz audio sub-carrier at 1 Vp-p respectively. The video processing circuit of the transmitter consists of a pre-emphasis network that conforms to the NTSC standard CCIR 405 525 line plot. The transmitter is designed for pre-emphasis audio and video NTSC standard signals only. The content of the video signal in conjunction with the pre-emphasis network ensures that the occupied bandwidth will not exceed the limit as defined by the calculated necessary bandwidth and §90.210(b). The test signal used for measuring occupied bandwidth was a color bar (75% color bars from a video pattern generator) which contains high frequency content at amplitudes that far exceed that which would be received from an NTSC video camera. Under conditions of extreme brightness, a video camera is incapable of generating a signal that would cause the transmitter's occupied bandwidth to exceed that measured using the 75% color bar signal. Therefore, the 75% color bar signal represents a worse case modulation condition.

6.2 TEST DATA

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc

Limits: Mask B (dBm): $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

The carrier was investigated at 2470 MHz. The worse case (unwanted emissions) data are shown below. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

TABLE 6-1: CONDUCTED SPURIOUS EMISSIONS CARRIER – 2470 MHZ

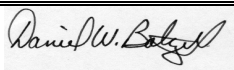
(2470 MHz); 99% BW = 11.6 MHz; Conducted power = 0.646 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin (dB)
4929.000	86.7	41.1	-45.6
4934.450	67.0	41.1	-25.9
4940.000	50.6	41.1	-9.5
4945.800	66.5	41.1	-25.4
4951.400	86.4	41.1	-45.3
7404.900	71.7	41.1	-30.6
7410.000	58.8	41.1	-17.7
7415.950	71.0	41.1	-29.9
9875.000	69.0	41.1	-27.9
9880.000	59.2	41.1	-18.1
9886.050	69.5	41.1	-28.4
12345.100	67.0	41.1	-25.9
12350.000	58.1	41.1	-17.0
12356.300	64.5	41.1	-23.4
14815.300	69.4	41.1	-28.3
14820.000	62.9	41.1	-21.8
14826.300	68.5	41.1	-27.4
17285.100	77.8	41.1	-36.7
17290.000	74.8	41.1	-33.7
17296.400	77.3	41.1	-36.2
19755.300	71.7	41.1	-30.6
19760.000	69.8	41.1	-28.7
19766.400	71.9	41.1	-30.8
22225.450	74.0	41.1	-32.9
22230.000	74.8	41.1	-33.7
22236.500	74.3	41.1	-33.2
24700.000	84.2	41.1	-43.1

TABLE 6-2: TEST EQUIPMENT USED FOR TESTING (CONDUCTED SPURIOUS EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	8/6/04
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901137	Par Electronics	2.4-2.4850 GHz	Notch Filter	N/A	5/13/04
900819	Weinschel Corporation	BF0830	Attenuator 10dB	N/A	5/13/04

TEST PERSONNEL:

DANIEL W. BALTZELL		DECEMBER 4, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

7 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.12; the transmitter is terminated with a 50 Ω load. The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. The signal generator level was then corrected by subtracting the cable loss between the substitution antenna and the signal generator. The gain of the antenna was further corrected to a half wave dipole.

TRANSMITTER INPUT MODULATION: The test signal modulating the main carrier consists of a standard NTSC video signal with audio sub-carriers at 5.5 MHz and at a 1 Vp-p level respectively. The video processing circuit of the transmitter consists of a pre-emphasis network that conforms to the NTSC standard CCIR 405 525 line plot. The transmitter is designed for pre-emphasis audio and video NTSC standard signals only. The content of the video signal in conjunction with the pre-emphasis network ensures that the occupied bandwidth will not exceed the limit as defined by the calculated necessary bandwidth and §90.210(b). The test signal used for measuring occupied bandwidth was a color bar (75% color bars from a video pattern generator) which contains high frequency content at amplitudes that far exceed that which would be received from an NTSC video camera. Under conditions of extreme brightness, a video camera is incapable of generating a signal that would cause the transmitter's occupied bandwidth to exceed that measured using the 75% color bar signal. Therefore, the 75% color bar signal represents a worse case modulation condition.

7.2 TEST DATA

7.2.1 CFR 47 PART 90.210 REQUIREMENTS

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

TABLE 7-1: FIELD STRENGTH OF SPURIOUS HARMONIC-CARRIER AT 2470 MHZ

Radiated Spurious Emissions; Carrier 2470 MHz; Limit = $43 + 10 \log P = 41.1$ dBc; Conducted Power = 28.1 dBm = 0.646 W

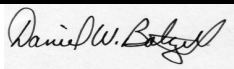
Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Limit (dBc)	Margin (dB)
4941.330	61.0	-26.5	7.7	7.8	54.6	41.1	-13.5
7408.200	35.7	-52.1	9.9	8.8	81.3	41.1	-40.2
7409.500	36.2	-51.6	10.0	8.8	81.0	41.1	-39.9
7412.210	35.9	-51.9	10.0	8.8	81.2	41.1	-40.1
9877.700	33.0	-47.7	10.8	8.9	77.7	41.1	-36.6
9879.300	32.6	-48.1	10.8	8.9	78.1	41.1	-37.0
9882.400	33.9	-46.8	10.8	8.9	76.9	41.1	-35.8
12353.050	33.0	-48.5	11.9	10.4	78.2	41.1	-37.1
14816.050	29.1	-38.8	11.9	10.0	68.8	41.1	-27.7
14819.220	30.5	-37.4	11.9	10.0	67.5	41.1	-26.4
14824.320	29.5	-38.4	11.9	10.0	68.5	41.1	-27.4
19754.560	30.3	-34.7	15.5	12.1	66.2	41.1	-25.1
19757.850	19.7	-45.3	15.4	12.1	76.7	41.1	-35.6
19758.030	22.5	-42.5	15.5	12.1	74.1	41.1	-33.0

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the $\frac{1}{2}$ wave dipole antenna.

TABLE 7-2: TEST EQUIPMENT USED FOR TESTING (FIELD STRENGTH OF SPURIOUS RADIATION)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	7/3/04
900811	Rhein Tech Labs	PR-1040	Amplifier	1003	2/13/04
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	4/22/04
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 - 20 GHz)	3610A00866	8/5/04
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	3/15/04
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/10/04
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	6/10/04
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	6/10/04
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna (1 - 18 GHz)	2310	2/17/04
900392	Hewlett Packard	1197OK	Harmonic Mixer (18 - 26 GHz)	3525A00159	7/30/04
901218	EMCO	3301B	Horn Antenna (18 - 26 GHz)	960281-003	7/30/04
900886	EMI Shop	WRT000-0003	Turntable OATS	N/A	Not Required
901231	IW Microwave Products	KPW-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
901232	IW Microwave Products	KPW-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	1/30/04

TEST PERSONNEL:

DANIEL W. BALTZELL		DECEMBER 5, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

8 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH

OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

8.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.11

Device with audio modulation: Transmitter was modulated with a 2,500 Hz sine wave at an input level of 16 dB greater than that required to produce 50% of rated system deviation at 1,000 Hz.

TRANSMITTER INPUT MODULATION: The test signal modulating the main carrier consists of a standard NTSC video signal with audio sub-carriers at 5.5 MHz and at a 1 Vp-p level respectively. The video processing circuit of the transmitter consists of a pre-emphasis network that conforms to the NTSC standard CCIR 405 525 line plot. The Transmitter is designed for pre-emphasis audio and video NTSC standard signals only. The content of the video signal in conjunction with the pre-emphasis network ensures that the occupied bandwidth will not exceed the limit as defined by the calculated necessary bandwidth and §90.210(b). The test signal used for measuring occupied bandwidth was a color bar (75% color bars from a video pattern generator) which contains high frequency content at amplitudes that far exceed that which would be received from an NTSC video camera. Under conditions of extreme brightness, a video camera is incapable of generating a signal that would cause the transmitter's occupied bandwidth to exceed that measured using the 75% color bar signal. Therefore, the 75% color bar signal represents a worse case modulation condition.

8.2 EMISSION MASK B CALCULATION

Rated power output: 0.646 Watt

Authorized bandwidth: 11.6 MHz (measured at -26 dBc, unmodulated)

FCC Part 90.210 (b) 1

On any frequency removed from the assigned frequency by more than 50%, but not more than 100% of the authorized bandwidth: At least 25dB

FCC Part 90.210 (b) 2

On any frequency removed from the assigned frequency by more than 100%, but not more than 250% of the authorized bandwidth: At least 35dB

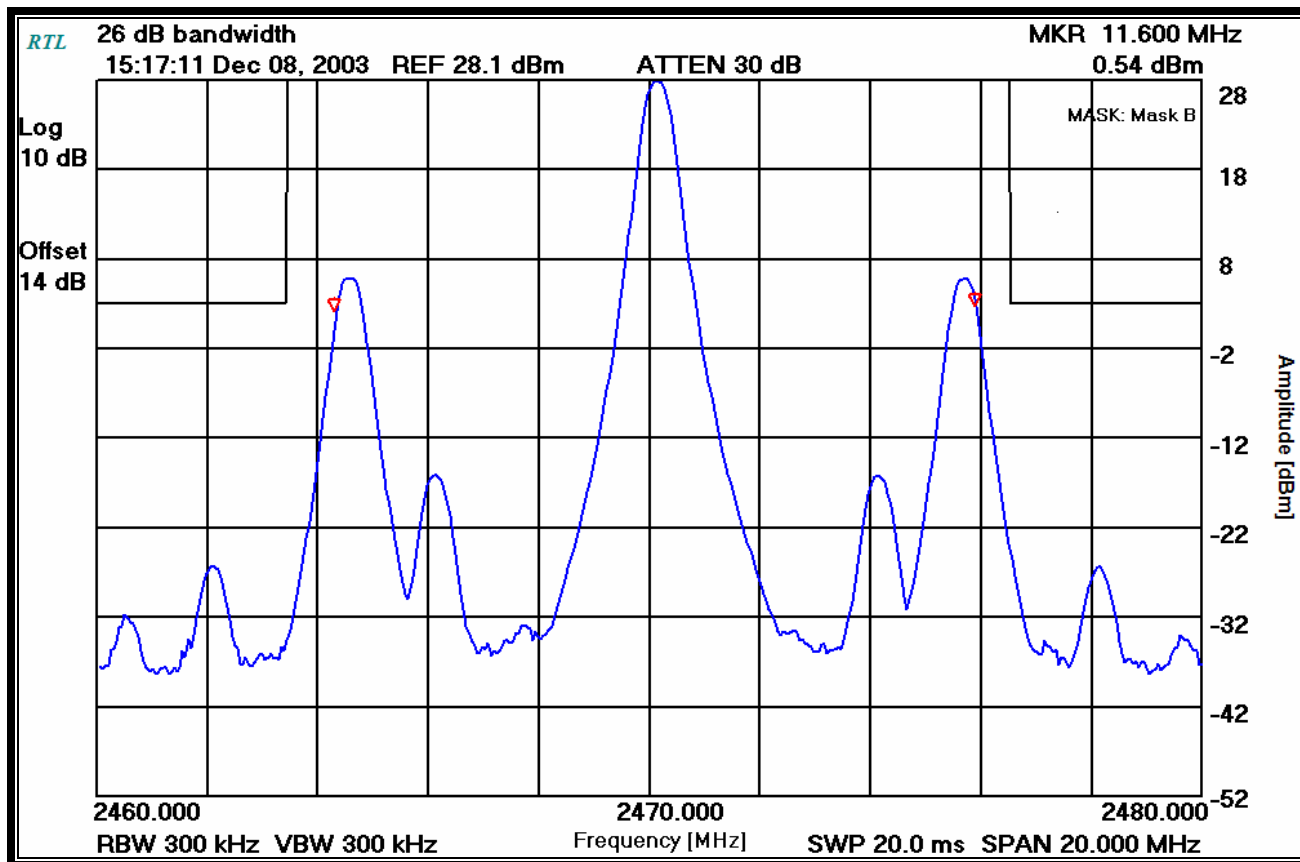
FCC Part 90.210 (c) 3

On any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth: At least $43 + 10 \log(P)$ dB

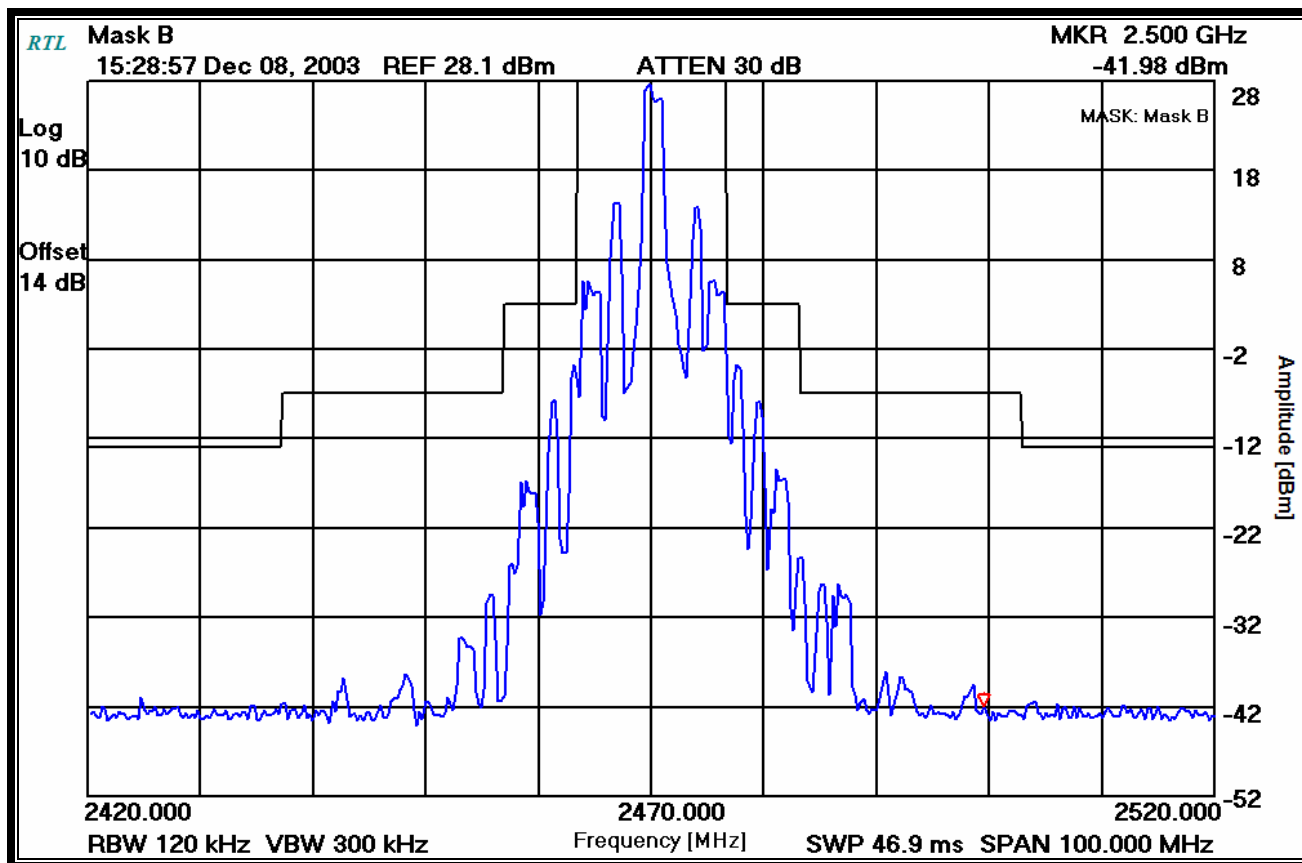
50% of the authorized BW = $0.5 \times 11.6 \text{ MHz} = 5.8 \text{ MHz}$
 100% of the authorized BW = $1.0 \times 11.6 \text{ MHz} = 11.6 \text{ MHz}$
 250% of the authorized BW = $2.5 \times 11.6 \text{ MHz} = 29.0 \text{ MHz}$

Frequency band	Required attenuation
Fc -5.8 MHz to Fc + 5.8 MHz	0 dB
Fc -11.6 MHz to Fc + 11.6 MHz	25 dB
Fc -29 MHz to Fc + 29 MHz	35 dB
More than 250% $43 + 10 \log(P)$ dB	43 dB

8.3 TEST DATA



PLOT 8-1: OCCUPIED BANDWIDTH; CW



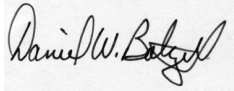
PLOT 8-2: OCCUPIED BANDWIDTH; AUDIO AND VIDEO MODULATION-PRE-EMPHASIS NTSC

8.4 TEST EQUIPMENT USED FOR TESTING

TABLE 8-1: TEST EQUIPMENT USED FOR TESTING (OCCUPIED BANDWIDTH)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04

TEST PERSONNEL:

DANIEL W. BALTZELL		DECEMBER 8, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

9 FCC RULES AND REGULATIONS PART 2 §2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

The modulating signal consists of a video carrier and an audio sub-carrier. The mean radiated power from each of the sub-carriers is less than 0.5 percent of the total mean radiated power, therefore, only the characteristics video component of the modulating signal are considered when calculating the necessary bandwidth.

Type of Emission: F8W

Necessary Bandwidth and Emission Bandwidth:

Modulation: 1Vpp CCIR 405 NTSC Pre-emphasis audio and Video.

Calculation:

Max modulation(M) in MHz: 4.25MHz for CCIR 405 525 lines NTSC Video

Max deviation (D) in MHz: 3.58

Constant factor (K): 1 (assumed)

$B_n = 2 \times M + 2 \times DK = 15.7 \text{ MHz}$

Emission designator: 15M7F8W

Measurement: 99.75% Occupied Bandwidth

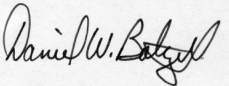
$B_n = 11.6 \text{ MHz}$

Emission designator: 15M7F8W

TABLE 9-1: TEST EQUIPMENT USED FOR NECESSARY AND EMISSION BANDWIDTH MEASUREMENTS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04

TEST PERSONNEL:

DANIEL W. BALTZELL		DECEMBER 5, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

10 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY

10.1 TEST PROCEDURE

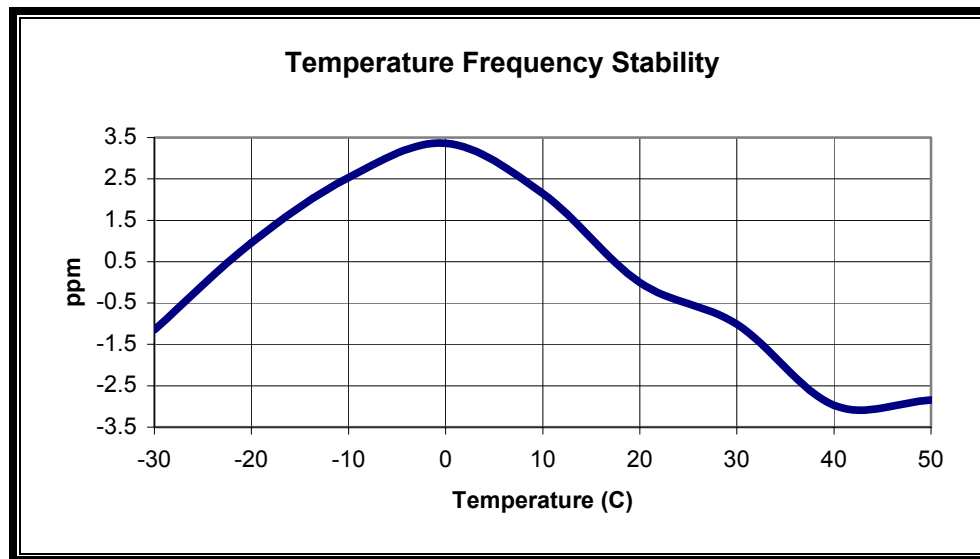
ANSI/TIA/EIA-603-2002, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency. The EUT was evaluated over the temperature range -30°C to +50°C. The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A half hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied from the battery end point to maximum voltage. The worst-case test data are shown in Table 10-2.

10.2 TEST DATA

10.2.1 FREQUENCY STABILITY/TEMPERATURE VARIATION

Worst-case deviation was found to be 3.4 ppm at 0°C.



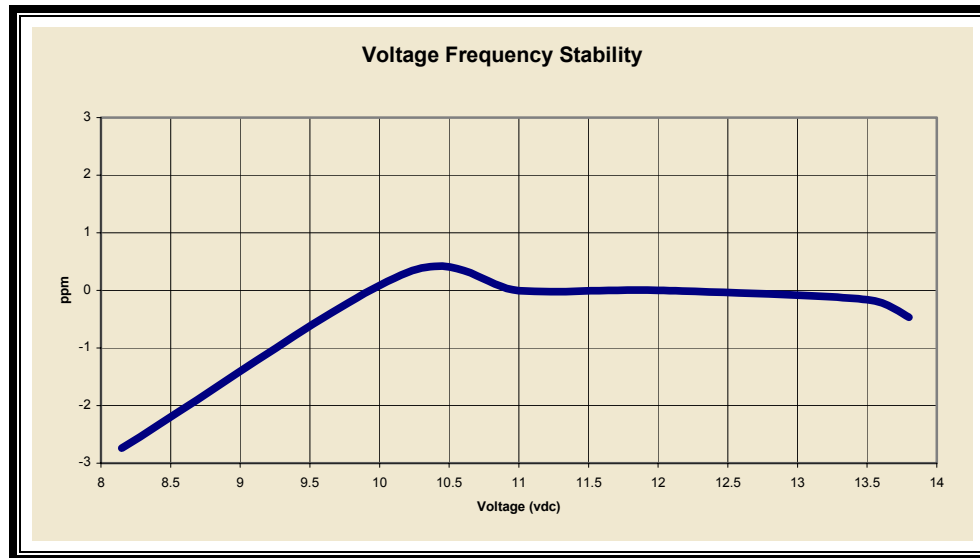
PLOT 10-1: TEMPERATURE FREQUENCY STABILITY

TABLE 10-1: TEMPERATURE FREQUENCY STABILITY CARRIER AT 2463 MHZ

Temperature C	Measured Frequency (MHz)	ppm
-30°C	2469.997168	-1.1
-20°C	2470.002366	1.0
-10°C	2470.006257	2.5
0°C	2470.008307	3.4
10°C	2470.005307	2.1
20°C (Ref)	2470.000000	0.0
30°C	2469.997500	-1.0
40°C	2469.992648	-3.0
50°C	2469.992986	-2.8

10.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

Worst-case variation is -0.06 ppm at the 8.625 VDC.



PLOT 10-2: VOLTAGE FREQUENCY STABILITY

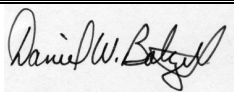
TABLE 10-2: FREQUENCY STABILITY/VOLTAGE VARIATION CARRIER AT 2470 MHZ

Voltage (Vdc)	Measured Frequency (MHz)	Ppm
8.15	2469.993238	-2.7
10.20	2470.000772	0.3
11.00	2469.999987	0.0
12.0 (Ref)	2470.000000	0.0
13.50	2469.999600	-0.2
13.80	2469.998850	-0.5

TABLE 10-3: TEST EQUIPMENT USED FOR TESTING (FREQUENCY STABILITY/TEMPERATURE)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	2/4/04
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901247	Wavetek	DM25XT	Multimeter	40804098	2/14/04

TEST PERSONNEL:

DANIEL W. BALTZELL		DECEMBER 5, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

11 FCC PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

11.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.6

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref. The audio signal generator was varied from 100 Hz to 5 kHz with the input level held constant. The deviation in kHz was recorded using a modulation analyzer as DEVfreq. The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

11.2 TEST DATA

Not applicable; the EUT does not contain an audio low pass filter. The EUT is designed to use pre-emphasis NTSC audio.

12 FCC PART 2 §2.1047 (A): MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER

12.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

12.2 TEST DATA

Not applicable; the EUT does not contain an audio low pass filter. The EUT is designed to use pre-emphasis NTSC audio.

13 FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING

13.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.3

The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0dB) the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

13.2 TEST DATA

Not applicable; the EUT does not contain modulation limiting circuitry. The EUT is designed to use pre-emphasis NTSC Video.

14 FCC RULES AND REGULATIONS PART 90 §90.214: TRANSIENT FREQUENCY BEHAVIOR

14.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.3

14.2 TEST DATA

Since the device is not a transmitter in the 150–174 MHz and 421–512 MHz frequency bands, the transient frequency behavior test does not apply.

15 CONCLUSION

The data in this measurement report shows that the vArc Systems, Inc., Model: 1WTX-2470, FCC ID: ROE1WTX-2470, complies with all the requirements of Parts 90, 15 and 2 of the FCC Rules and Regulations.