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## FCC PART 87 TEST REPORT

APPLICANT	Daniel Electronics Ltd.
	43 Erie Street
	Victoria BC V8V 1P8 Canada
FCC ID	H4JVT-3A130-F
MODEL NUMBER	VT-3A130-SYF410
PRODUCT DESCRIPTION	25 kHz AM TRANSMITTER
DATE SAMPLE RECEIVED	8/2/2006
DATE TESTED	8/18/2006
TESTED BY	Nam Nguyen
APPROVED BY	Mario R. de Aranzeta
TIMCO REPORT NO.	D\Danelec\2283AUT6\2283AUT6TestReport.doc
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL  
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Certificate # 0955-01



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## TABLE OF CONTENTS

STATEMENT OF COMPLIANCE..... 3

REPORT SUMMARY..... 4

TEST SYSTEM ..... 4

DUT SPECIFICATION..... 5

EMC EQUIPMENT LIST ..... 6

TEST PROCEDURE ..... 7

RF POWER OUTPUT ..... 9

MODULATION CHARACTERISTICS..... 10

OCCUPIED BANDWIDTH ..... 13

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)..... 14

FIELD STRENGTH OF SPURIOUS EMISSIONS..... 15

FREQUENCY STABILITY..... 16

POWER LINE CONDUCTED INTERFERENCE..... 17



Certificate # 0955-01

## **STATEMENT OF COMPLIANCE**

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

**Authorized by:** Mario R. de Aranzeta

**Function:** Engineer

**Date:** 8/29/2006

**Tested by:** Nam Nguyen



Certificate # 0955-01

### REPORT SUMMARY

Purpose of Report:	To demonstrate the DUT in compliance with FCC CDR 47 Part 80 requirements.
Disclaimer:	The test results relate only to the items tested.
Applicable Standards:	TIA 603, FCC CFR 47 Part 87

### TEST SYSTEM

Test Facility:	The test sites used by Timco Engineering Inc. for collecting radiated and conducted emission data are located at 849 NW State Road 45 Newberry, FL 32669 USA.
Test Condition of Laboratory:	Temperature: 26°C Relative humidity: 50%
Test Exercise (e.g software description, test signal, etc.):	The DUT was placed in continuous transmit mode of operation.
Modification to the DUT:	No modification was made to the DUT during testing.
Test Accessories:	NA



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### DUT SPECIFICATION

Manufacturer:	Daniel Electronicis Ltd.		
DUT Description:	Non-Broadcast Station VHF Transmitter		
FCC ID:	H4JVT-3A130-F		
Model Number:	VT-3A130-SYF410		
Operating Frequency:	118.00 MHz – 137.00 MHz		
No. of Channels:	16		
Modulation:	AM		
Type of Emission:	6K00A3E		
Authorized Bandwidth:	25 kHz		
Power Source:	DC Power 13.8 Vdc		
DC Voltages and Current into Final Amplifier	High Power – High: (13.8Vdc)(1.0A) = 13.8 Watts		
Test Item:	<input type="checkbox"/> Prototype	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Production
Type of Equipment:	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Mobile	<input type="checkbox"/> Portable
Antenna:	NA		
Antenna Connector:	N-Female		



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### EMC EQUIPMENT LIST

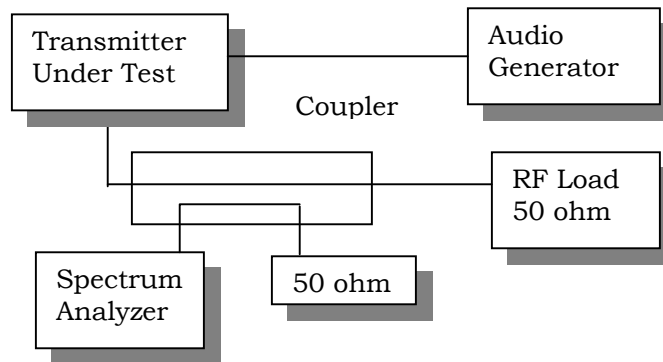
Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	CAL 8/26/04	8/26/06
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	CAL 12/29/04	12/29/06
LISN	Electro-Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 7/16/04	7/16/06

## TEST PROCEDURE

**Power Line Conducted Interference:** The procedure used was TIA 603 using a 50uH LISN. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

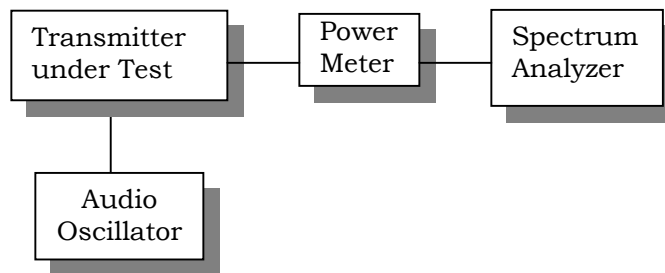
**Bandwidth 20 dB:** The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Bandwidth Test Setup Diagram



**Power Output:** RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

RF Power Output Test Setup Diagram



**Modulation Characteristics**

Audio frequency response

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with the exception that for an AM modulated transmitter the input was varied for a constant modulation of 20%.

Audio Low Pass Filter

The audio low pass filter for voice-modulated equipment was measured in accordance with TIA/EIA Specification 603. This rule part is only applicable for FM transmitter. The DUT is Am transmitter.

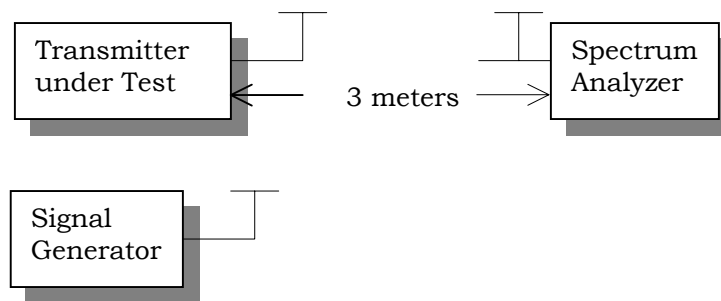
Audio Input versus modulation

This is requirement for Voice Modulated Communication Equipment. The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

**Antenna Conducted Emissions:** The measurements were made in accordance with standard TIA/EIA-603. The carrier was modulated 100% using a 2500 Hz tone. The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10<sup>th</sup> Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**Radiation Interference:** The test procedure used is from TIA/EIA STANDARD 603-C. The test uses an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

Substitution Method Test Setup Diagram



**Frequency Stability**

The frequency stability was measured per TIA/EIA 603-C-2004.





Certificate # 0955-01

## **RF POWER OUTPUT**

**Rule Part No.:** Part 2.1046(a), Part 87.131

**Test Requirements:** Part 2.1046

### **Test Data:**

High Output Power – 3.0 Watts



Certificate # 0955-01

## **MODULATION CHARACTERISTICS**

**Rule Part No.:** Part 2.1047(a), (b) & 87.141, 87.141 (F)

### **Requirements:**

Audio Frequency Response: A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted.

Audio Input Versus Modulation: For voice modulated communication equipment, modulation cannot exceed 100%. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

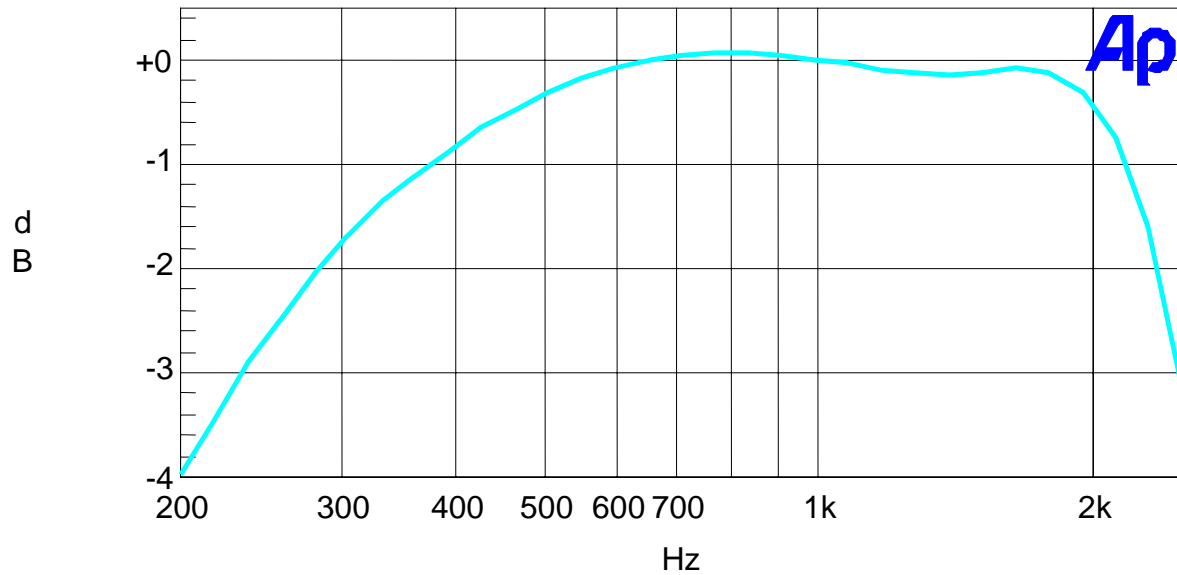
Audio Low Pass Filter: Not applicable. This rule part is only required for FM modulation.



Certificate # 0955-01

### Plot - Audio Frequency Response

## Audio Frequency Response Plot

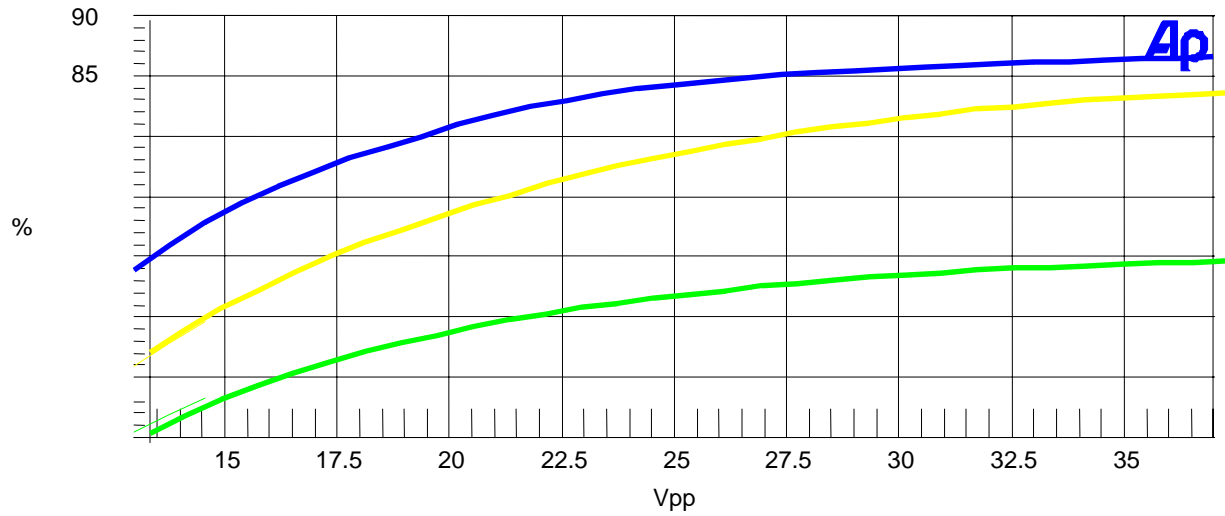




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### Plot - The Audio Input Curves Versus Modulation

Modulation Limiting Plots:  
2.5 KHz (Green), 1.0 KHz (Blue), and 300 Hz (Yellow)





Certificate # 0955-01

### OCCUPIED BANDWIDTH

**Rule Part No.:** Part 2.1049, Part 87.139

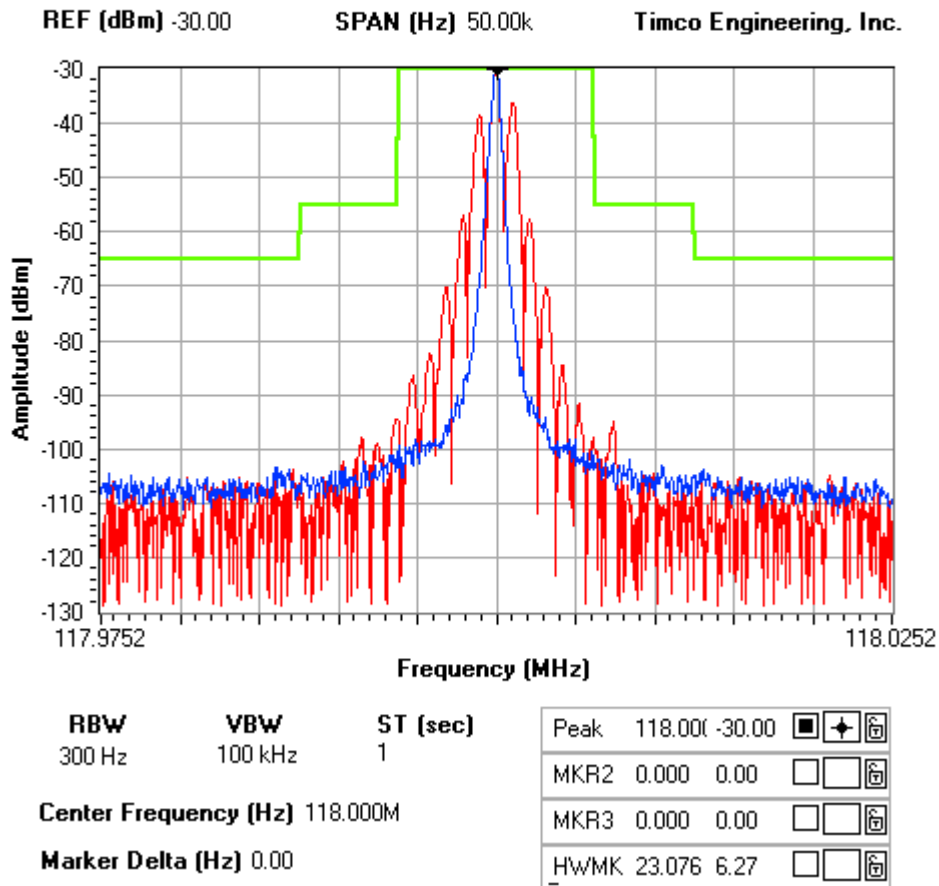
**Requirements:** Data in the plots show that on any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth: At least 43 + 10log(P)dB.

**Test Data:** See the plots below

The authorized BW is 25 kHz.

**NOTES:**

Daniel Electronics Ltd. - FCC ID: H4JVT-3A130-SYF410  
OCCUPIED BANDWIDTH PLOT





Certificate # 0955-01

### SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

**Rule Part No.:** Part 2.1051(a)

**Requirements:**  $43+10\log(3W)= 47.8 \text{ dB}$

**Test Data:**

CH1  
118MHz

CH8  
128MHz

CH16  
137MHz

EF (MHz)	dBc
236.00	85.8
354.00	95.6
472.00	104.7
590.00	104.8
708.00	105.5
826.00	105.1
944.00	96.7
1062.00	93.5
1180.00	93.5

EF (MHz)	dBc
256.00	89.2
384.00	98.3
512.00	104.3
640.00	103.6
768.00	97.3
896.00	103.5
1024.00	92.5
1152.00	92.9
1280.00	93

EF (MHz)	dBc
276.00	102
414.00	94.9
552.00	104.5
690.00	103.4
828.00	103.1
966.00	100.8
1104.00	92.2
1242.00	91.8
1370.00	92.5



Certificate # 0955-01

### FIELD STRENGTH OF SPURIOUS EMISSIONS

**Rule Parts. No.:** Part 2.1053

**Test Requirements:** The FCC limits for radiated emissions are the same as previously stated for the conducted emissions.

**Test Data:**

CH1  
118.00MHz

CH8  
128.00MHz

CH16  
137.00MHz

Emission Frequency MHz	Ant. Polarity V/H	dB Below Carrier (dBc)
236.00	H	119.80
354.00	V	113.68
472.00	V	108.91
590.00	V	109.28
708.00	H	107.28
826.00	H	106.71
944.00	H	103.65
1062.00	H	91.24
1180.00	H	92.69

Emission Frequency MHz	Ant. Polarity V/H	dB Below Carrier (dBc)
256.00	H	118.58
384.00	H	110.80
512.00	V	108.62
640.00	H	110.76
768.00	V	103.95
896.00	V	102.65
1024.00	H	91.39
1152.00	V	92.40
1280.00	H	90.51

Emission Frequency MHz	Ant. Polarity V/H	dB Below Carrier (dBc)
276.00	V	114.48
414.00	V	111.06
552.00	H	109.12
690.00	H	107.56
828.00	H	106.50
966.00	H	103.45
1104.00	H	92.09
1242.00	H	91.14
1370.00	H	89.79



Certificate # 0955-01

## FREQUENCY STABILITY

**Rule Parts. No.:** Part 2.1055, Part 87.133

**Requirements:** Temperature range requirements: -30 to +50° C.  
Voltage Variation +, -15% ±20 PPM

**Test Data:**

TEMPERATURE °C	FREQUENCY MHz	PPM
-30°C	118.000020	-0.02
-20°C	117.999988	-0.29
-10°C	117.999990	-0.27
-0°C	118.000017	-0.04
10°C	118.000033	0.09
20°C	117.999997	-0.21
30°C	117.999976	-0.39
40°C	117.999969	-0.45
50°C	117.999966	-0.47

Assigned Frequency (Ref. Frequency) (MHz)		
Battery %	Frequency (MHz)	Frequency Stability (PPM)
-15%	118.000018	-0.03
+15%	118.000025	0.03





Certificate # 0955-01

## POWER LINE CONDUCTED INTERFERENCE

**Rules Part No.:** Part 15.207

**Requirements:**

Frequency (MHz)	Quasi Peak Limits (dBuV)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

**Test Data:** The attached graphs represent the emissions read for power line conducted for this device. Not Applicable because of battery operated exclusively.