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## FCC PART 90 CLASS II PERMISSIVE CHANGE TEST REPORT

<b>APPLICANT</b>	DANIELS ELECTRONICS LTD.
	43 ERIE STREET
	VICTORIA BC V8V 1P8 CANADA
<b>FCC ID</b>	H4JVT-4E150
<b>MODEL NUMBER</b>	VT-4E150-00-800
<b>PRODUCT DESCRIPTION</b>	TRANSMITTER
<b>DATE SAMPLE RECEIVED</b>	9/3/2012
<b>DATE TESTED</b>	9/4/2012
<b>TESTED BY</b>	Nam Nguyen
<b>APPROVED BY</b>	Mario de Aranzeta
<b>TIMCO REPORT NO.</b>	2258UT12TestReport.doc
<b>TEST RESULTS</b>	<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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**GENERAL REMARKS**

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

**Summary**

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

**Attestations**

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.  
849 NW State Road 45  
Newberry, Fl 32669



**Authorized Signatory Name:**

Mario de Aranzeta C.E.T.  
Compliance Engineer/ Lab. Supervisor

**Date:** 9/6/2012

**GENERAL INFORMATION**

**DUT Specification**

<b>DUT Description</b>	TRANSMITTER
<b>FCC ID</b>	H4JVT-4E150
<b>Model Number</b>	VT-4E150-00-800
<b>Type of Emission</b>	6K00F3E,4K00F1D, 4K00F1E, 4K00F1W, 4K00F2D, 8K30F1E, 8K30F1D, 8K30F1W
<b>Modulation</b>	FM, APCO 25 phase I and II
<b>DUT Power Source</b>	<input type="checkbox"/> 110-120Vac/50- 60Hz
	<input checked="" type="checkbox"/> DC Power 12V
	<input type="checkbox"/> Battery Operated Exclusively
<b>Test Item</b>	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
<b>Type of Equipment</b>	<input checked="" type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
<b>Test Conditions</b>	Temperature was 26°C Relative humidity of 50%.
<b>Modification to the DUT</b>	None
<b>Test Exercise</b>	The DUT was placed in continuous transmit mode.
<b>Applicable Standards</b>	ANSI/TIA 603-C:2004, FCC CFR 47 Part 90
<b>Test Facility</b>	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.

## EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 12/31/11	12/31/13
AC Voltmeter	HP	400FL	2213A14499	CAL 6/12/11	6/12/13
Antenna: Active Loop	ETS-Lindgren	6502	00062529	CAL 9/23/10	9/23/12
Frequency Counter	HP	5385A	2730A03025	CAL 8/17/11	8/17/13
Hygro-Thermometer	Extech	445703	0602	CAL 6/15/11	6/15/13
Modulation Analyzer	HP	8901A	3435A06868	CAL 7/18/11	7/18/13
Digital Multimeter	Fluke	FLUKE-77	35053830	CAL 9/9/11	9/9/13
Power Meter	Boonton Electronics	4531	11793	CAL 11/12/2010	11/12/2012
EMI Receiver	Rohde & Schwarz	ESIB40	100274	CAL 3/16/2012	3/16/2014
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 10/28/11	10/28/13
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 10/28/11	10/28/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 10/28/11	10/28/13
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 10/28/11	10/28/13
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 2/22/12	2/22/13
Antenna	ETS	3117	35923	12/7/2011	12/7/2013
Antenna	Electro metrics	LPA-25	1122	5/04/2011	5/04/2013
Antenna	Electro metrics	BIA-25	1096	5/04/2011	5/04/2013

## **TEST PROCEDURE**

**Power Line Conducted Interference:** The procedure used was ANSI/TIA 603-C:2004, using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

**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.

**Power Output:** The RF power output was measured at the antenna feed point using a peak power meter.

**Antenna Conducted Emissions:** 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 was ANSI/TIA 603-C: 2004, using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum ANSI/TIA 603-C:2004, 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.

**MODULATION CHARACTERISTICS**

**Rule Part No.:** Part 2.1047(a)(b)

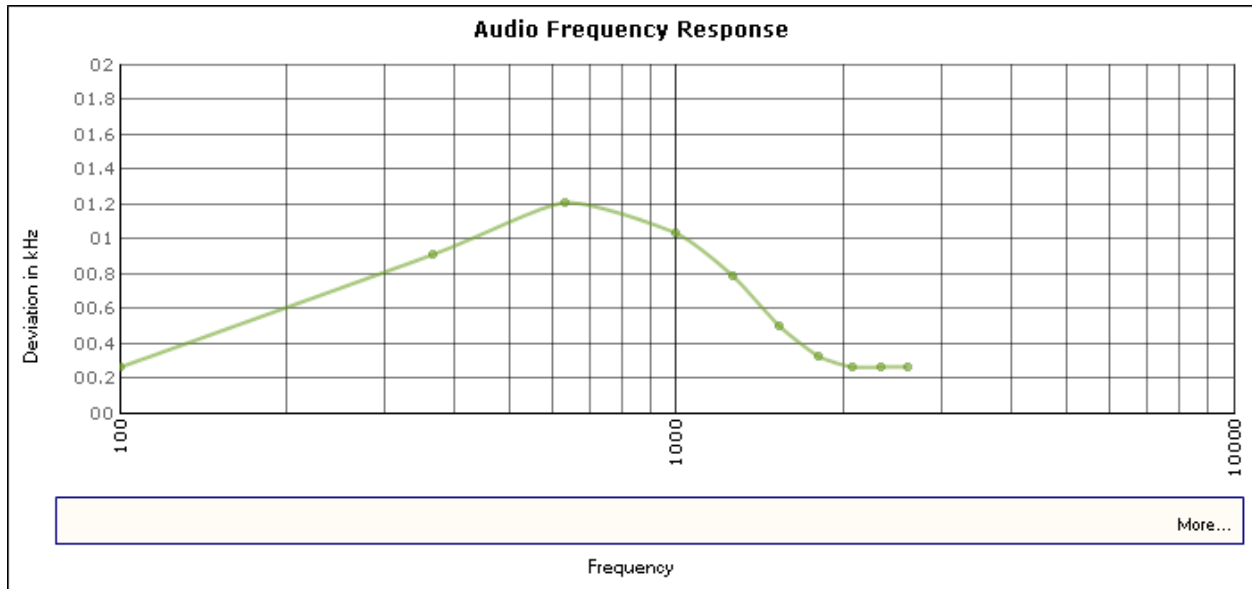
**Test Requirements:**

**Method of Measurement:**

*Audio frequency response*

The audio frequency response was measured in accordance with ANSI/TIA 603-C: 2004 with no exception. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

**AUDIO FREQUENCY RESPONSE PLOT**





## **VOICE MODULATED COMMUNICATION EQUIPMENT**

**Part 2.1047(a):** For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.

### **AUDIO LOW PASS FILTER**

**NOT APPLICABLE.**



## AUDIO INPUT VERSUS MODULATION

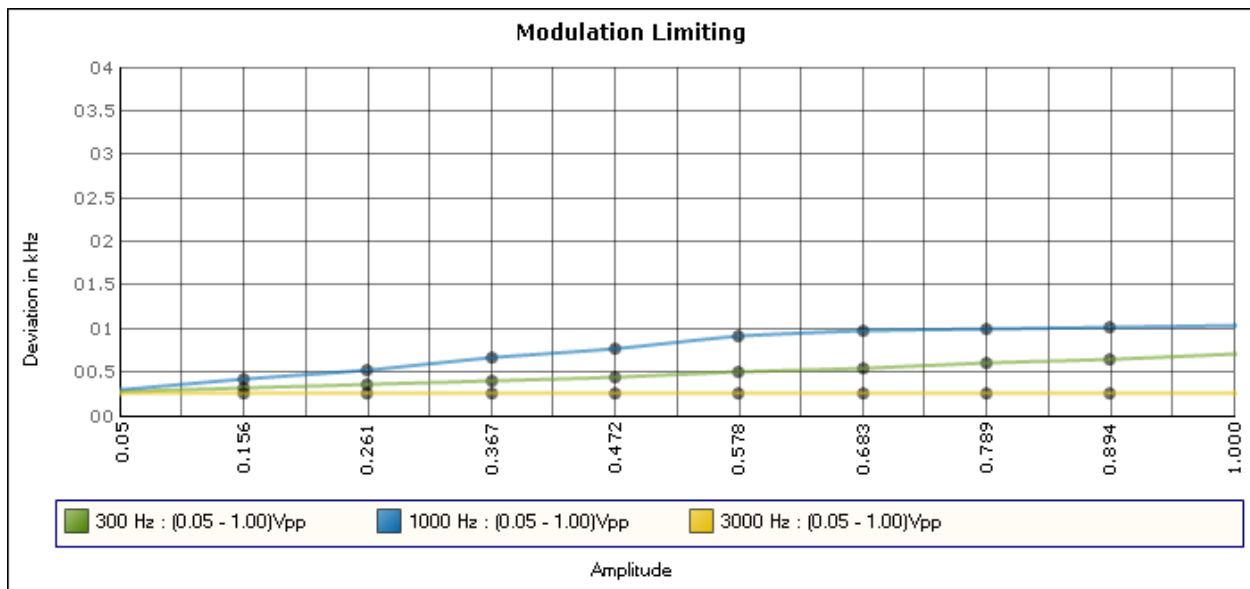
**Rule Part No.:** Part 2.1047(b) & 90

### Test Requirements:

**Method of Measurement:** Modulation cannot exceed 100%, The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

### Test data:

Modulation Limiting Plot



## **OTHER MODULATION CHARACTERISTICS**

### **Part 2.1033(c)**

**Part 2.1033(c) (4)** Type of Emission:

### **Part 90.209**

**Part 2.1033(c) (4)** Type of Emission: 6K00F3E

### **Part 90.209**

**Part 90.207**  $B_n = 2M + 2DK$

$$M = 1000$$

$$D = 1000$$

$$K=1$$

$$B_n = 2(1500)+2(1200) = 5.4k$$

**Part 2.1033(c) (4)** Type of Emission: 6K00F1D

### **Part 90.209**

$$B_n = 2M + 2DK$$

$$M = 2(4800/2)$$

$$D = 600$$

$$B_n = 2(2400) + 2(600)$$

$$B_n = 6000$$

Data emissions include C4FM as used in APCO 25 (phase 1) and consisting of the emission types: 8K30F1D, 8K30F1E, and 8K30F1W.

Data emissions include APCO25 phase 2 and consist of the emission designators 4K00F1E, 4K00F1W, 4K00F1D, and 4K00F2D.

## OCCUPIED BANDWIDTH

### **Part 2.1049(c)**      EMISSION BANDWIDTH:

### **Part 90.210(b) 25kHz Channel Spacing**

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least  $43 + 10\log(P)$ dB.

### **Part 90.210(c) 25 kHz Channel Spacing Not Equipped with a Low Pass Filter**

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz but not more than 10 kHz: At least  $83 \log(f_d/5)$  dB; (2) ON any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least  $29 \log(f_d^2/11)$ dB or 50 dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least  $43+10 \log(P_o)$ dB.

### **Part 90.210(d)      Emission Mask D - 12.5 kHz channel BW equipment.**

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10\log(P)$  dB or 70 dB, whichever is the lesser attenuation.

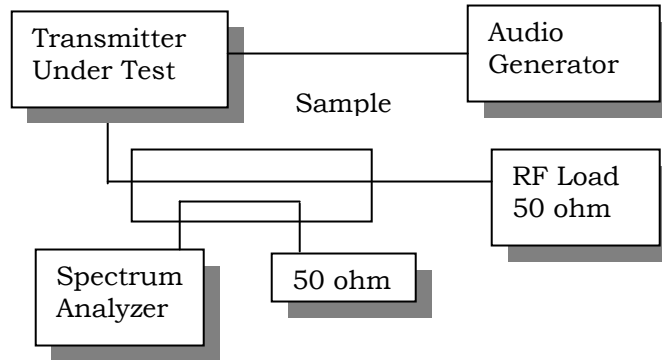
### **Part 90.210(e)      Emission Mask E – 6.25 kHz channel BW equipment.**

For transmitters designed to operate with a 6.25 kHz bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 3.0 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(f_d - 3.0 \text{ kHz})$  or  $55 + 10 \log(P)$  or 65, whichever us the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6kHz: At least  $55 + 10\log(P)$  dB or 65 dB, whichever is the lesser attenuation.

**Method of Measurement: ANSI/TIA 603-C: 2004**

**Test Setup Diagram:**



**Test Data:** See the plots below

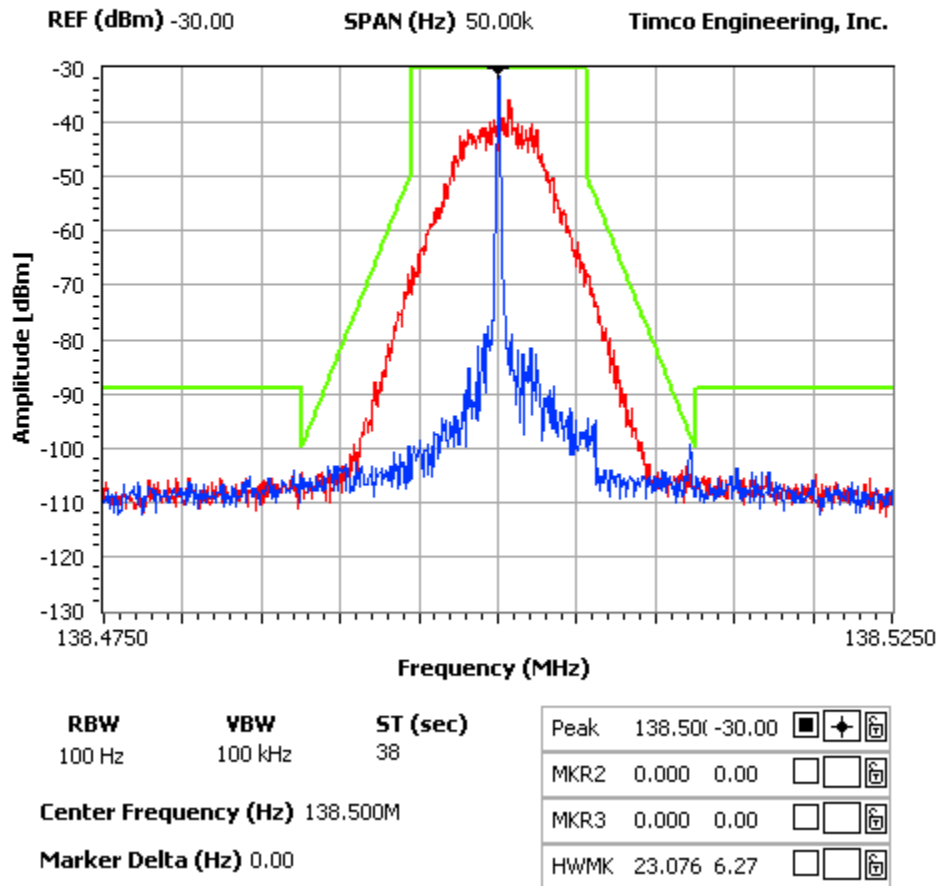
### OCCUPIED BANDWIDTH PLOTS

**Part 90.210(d) Emission Mask D - 12.5 kHz channel**  
**Digital:**

**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 12.5 kHz NB Digital

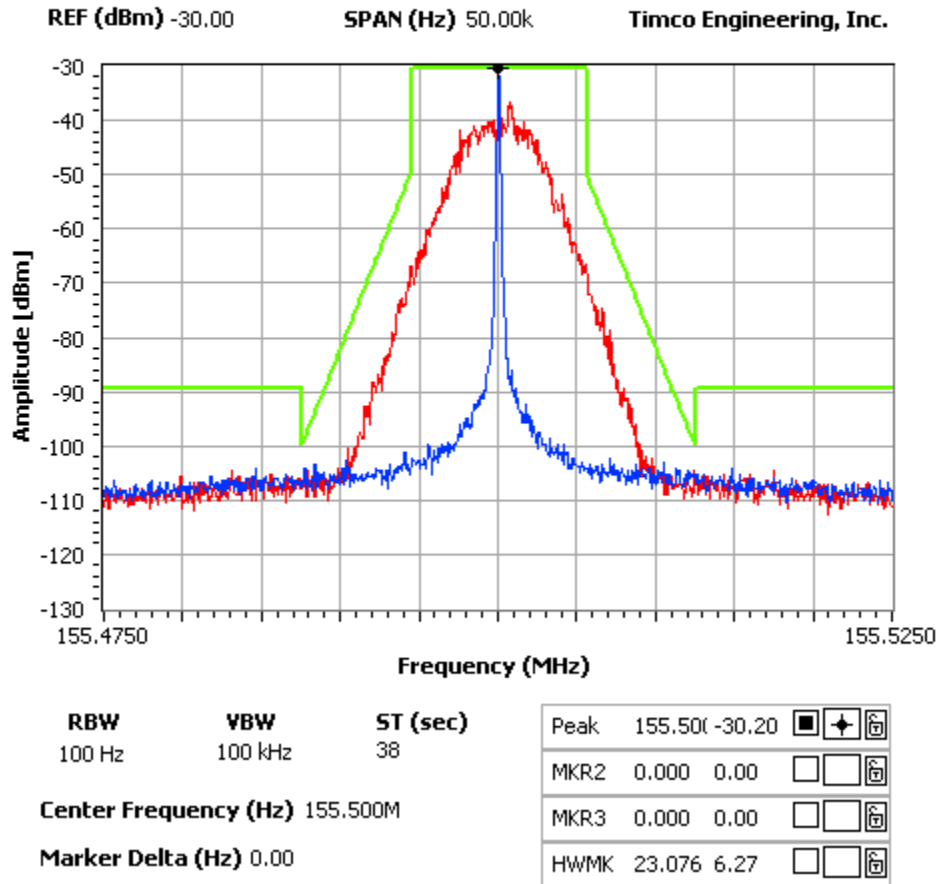
**FCC 90.210 Mask D**



**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 12.5 kHz NB Digital

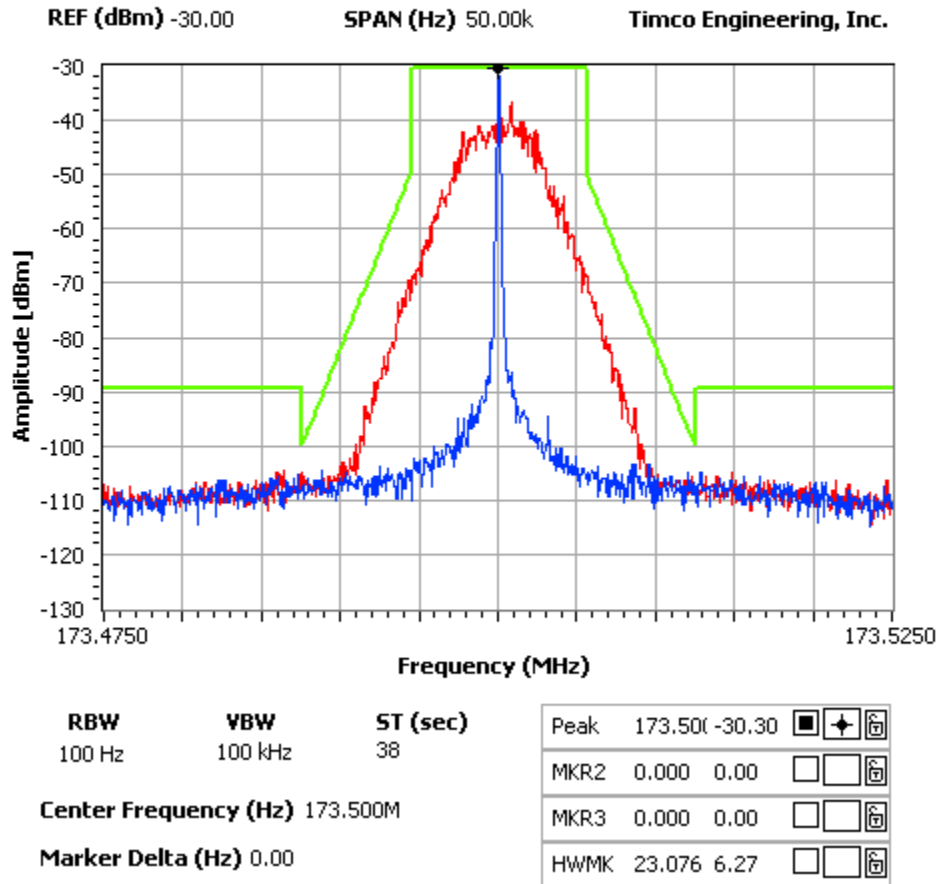
**FCC 90.210 Mask D**



**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 12.5 kHz NB Digital

**FCC 90.210 Mask D**

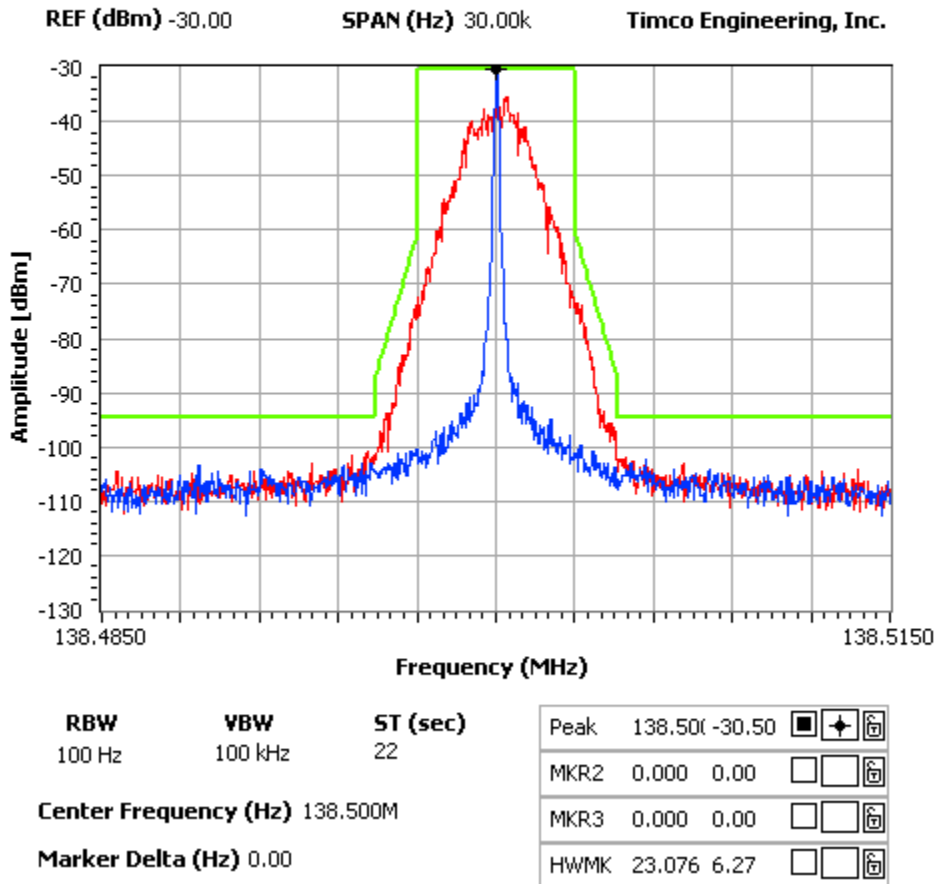


**Part 90.210(e) Emission Mask E – 6.25 kHz channel**  
**Digital:**

**NOTES:**

DANIELS ELECTRONICS LTD, - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz Digital

**FCC 90.210 Mask E**

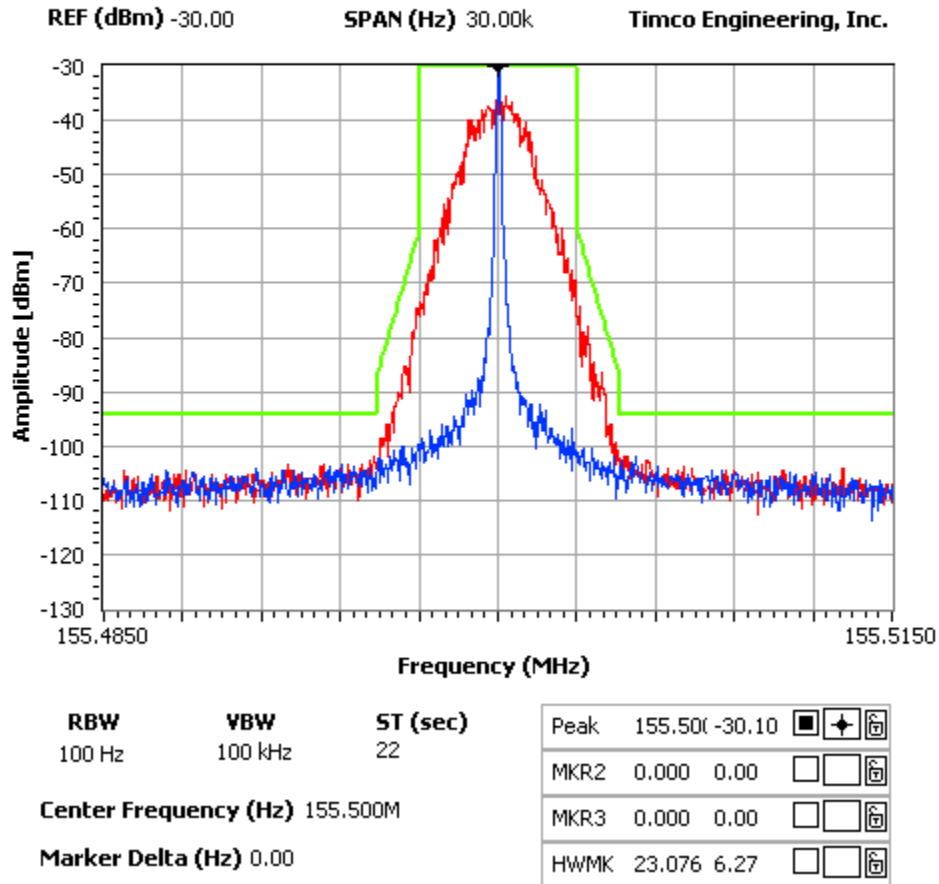




**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz Digital

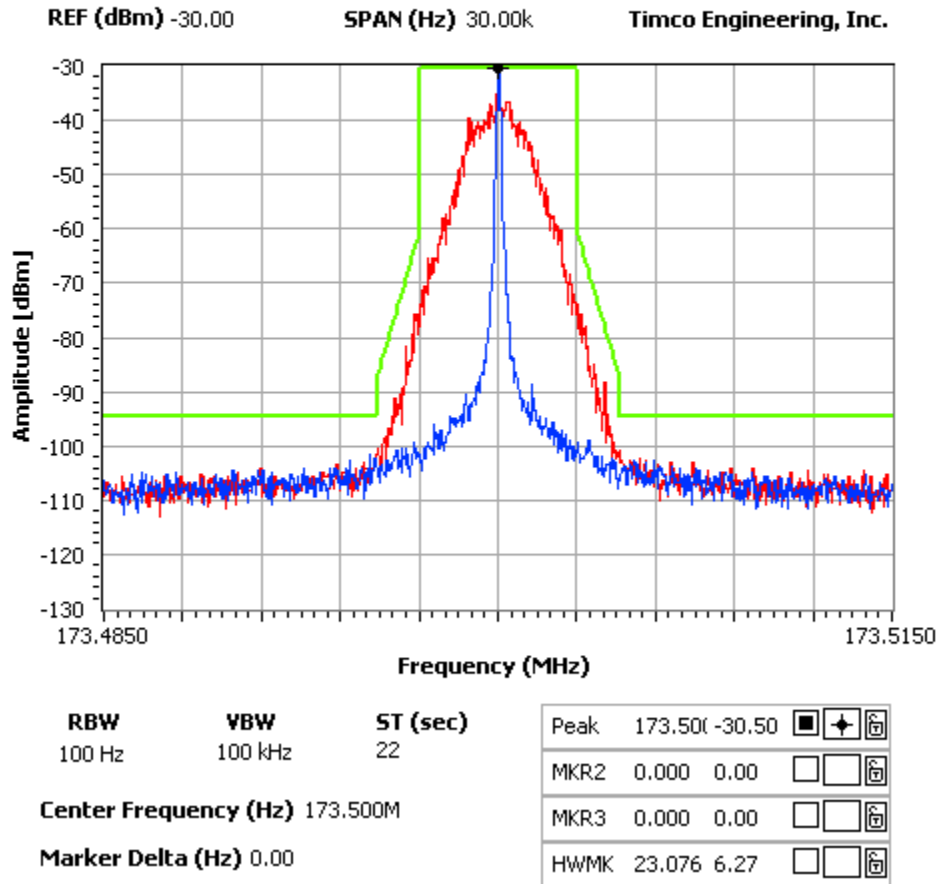
**FCC 90.210 Mask E**



**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz Digital

**FCC 90.210 Mask E**

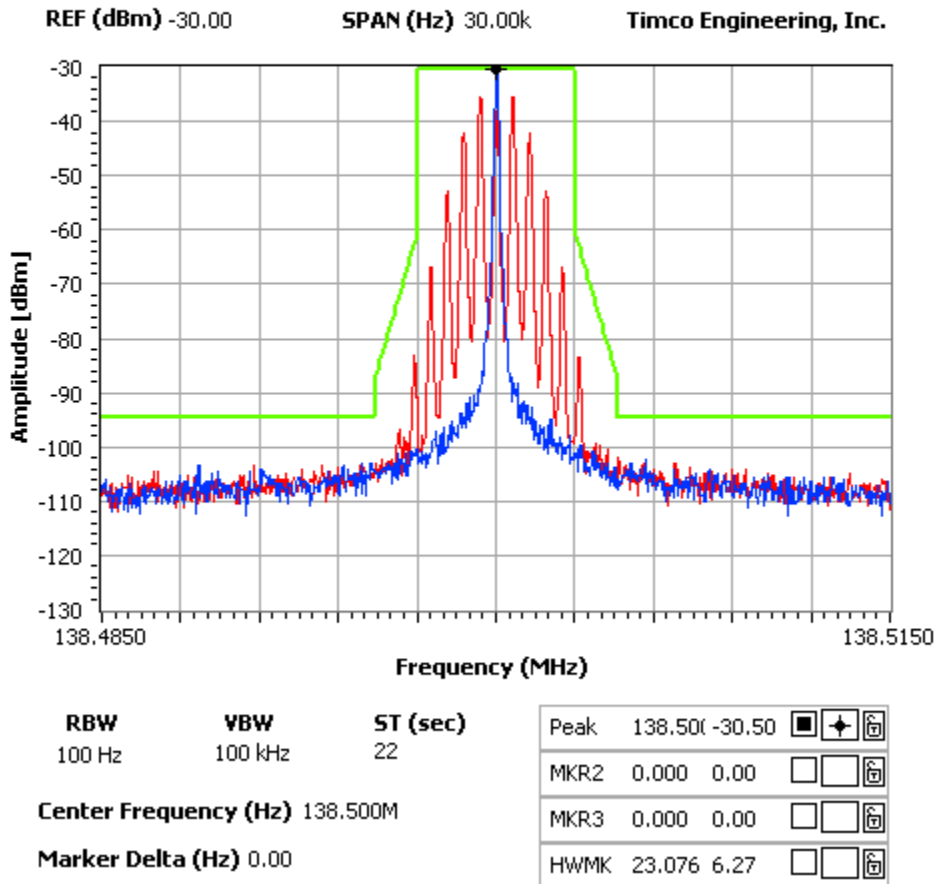


Analog:

**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz Analog

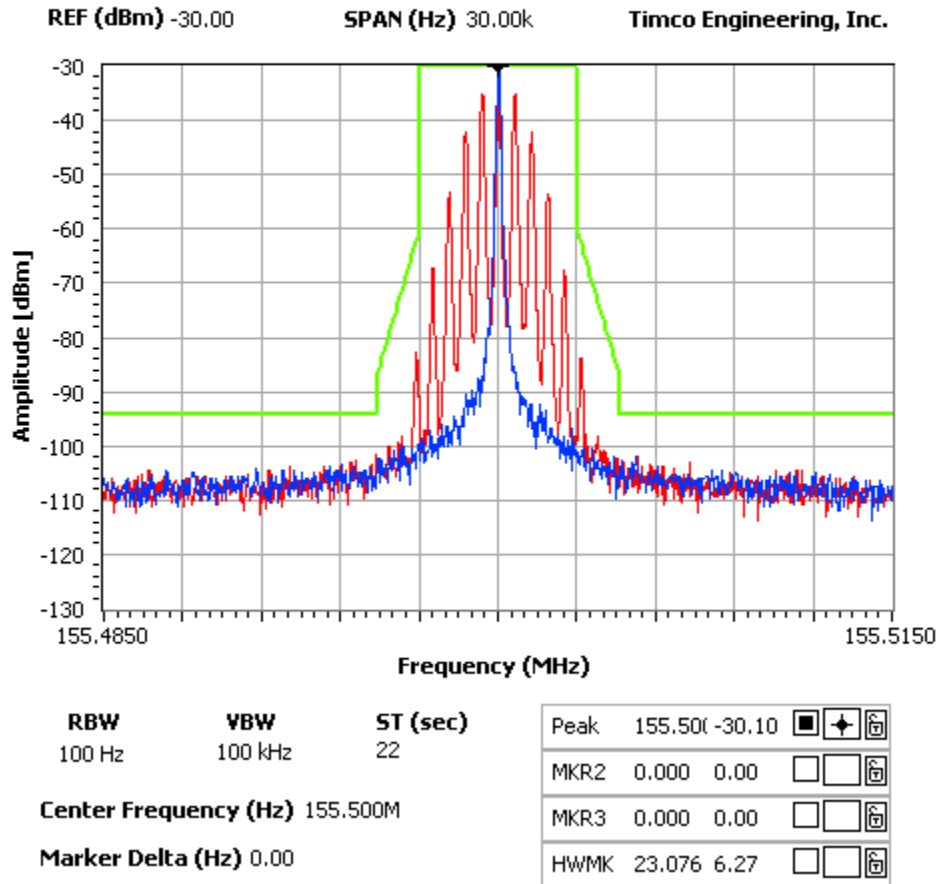
**FCC 90.210 Mask E**



**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz Analog

**FCC 90.210 Mask E**



**NOTES:**

DANIELS ELECTRONICS LTD. - FCC ID: H4JVT-4E150  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz Analog

**FCC 90.210 Mask E**

