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**FCC PT 90 AMPLIFIER  
AND IC RSS-131, RSS-GEN  
TEST REPORT**

<b>APPLICANT</b>	CRESCEND TECHNOLOGIES, LLC
<b>ADDRESS</b>	140 E. State Parkway SCHAUMBURG IL 60173 USA
<b>FCC ID</b>	CWWP25XXFF1
<b>IC LABEL</b>	7291A-P25XXFF1
<b>MODEL NUMBER</b>	P25 Series VHF
<b>PRODUCT DESCRIPTION</b>	250W RF VHF AMPLIFIER
<b>DATE SAMPLE RECEIVED</b>	5/1/2013
<b>DATE TESTED</b>	5/10/2113
<b>TESTED BY</b>	John A. Day
<b>APPROVED BY</b>	John A. Day
<b>TIMCO REPORT NO.</b>	754AUT13TestReport.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.**



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## ATTESTATION STATEMENT

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.



Test Certificate #0955-01

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

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.

**Signature:**



**Function:** ENGINEERING PROJECT MANAGER

**Date:** May 14<sup>th</sup>, 2013

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MODEL #: P25 Series VHF  
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## REPORT SUMMARY

Disclaimer	The test results relate only to the items tested.
Purpose of Test	To show the DUT in compliance with FCC CFR 47, Part 90 and IC RSS-131 requirements for amplifiers
Test Procedures	ANSI/TIA 603-C: 2004 FCC CFR 47 Part 90 IC RSS-131 ANSI C63.4: 2003
Related Approval	N/A

## TEST ENVIRONMENT AND TEST SETUP

Test Facility	All tests were conducted by Timco Engineering Inc. located at 849 NW State Road 45, Newberry, FL 32669 USA
Laboratory Test Condition	Temperature: 26°C Relative humidity: 50%.
Deviation from the standards	No deviation
Modification to the DUT	No modification was made.
Test Exercise (software etc.)	The DUT was placed in continuous transmitting mode of operation.
System Setup	Stand alone device.

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## DUT DESCRIPTION

<b>Manufactured by</b>	CRESCEND TECHNOLOGIES, LLC
<b>Product Description</b>	250W AMPLIFIER
<b>FCC ID</b>	CWWP25XXFF1
<b>IC Label</b>	7291A-P25XXFF1
<b>M/N</b>	P25 Series VHF
<b>Operating Freq</b>	136 – 174
<b>Max. Output Pwr</b>	+54 dBm (250W)
<b>Modulation</b>	N/A Amplifier
<b>Power Source</b>	13.8 VDC
<b>Test Item</b>	Preproduction
<b>Type of DUT</b>	Fixed/Mobile Amplifier

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## TEST EQUIPMENT

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	12/31/11	12/31/13
3-Meter OATS	TEI	N/A	N/A	12/31/11	12/31/13
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/11	12/31/13
Antenna: Active Loop	ETS-Lindgren	6502	00062529	09/23/10	09/23/13
Antenna: Biconnical	Eaton	94455-1	1057	05/31/11	05/31/13
Antenna: Biconnical	Eaton	94455-1	1096	05/04/11	05/04/13
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	06/13/12	06/13/14
AC/DC Clamp Meter	Electronic Specialties	ES-687	07065852	2/25/2013	2/25/2015
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	10/05/12	10/05/14
Antenna: Log-Periodic	Eaton	96005	1243	05/31/11	05/31/13
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/04/11	05/04/13
Audio Generator	B&K Precision	3010	8739686	09/11/12	09/11/14
BandReject Filter	Lorch Microwave	5BR4-10525/900-S	Z1	01/17/13	01/17/15
BandReject Filter	Lorch Microwave	5BR4-2400/60-N	Z1	12/11/12	12/11/14
BandReject Filter	Lorch Microwave	6BR6-2442/300-N	Z1	12/07/12	12/07/14
Broadband Preamplifier	A.H. Systems Inc.	PAM-0126	128	03/14/11	03/14/13
Coaxial Cable - Chamber 3 cable set	Semiflex	Unknown		01/26/12	01/26/14

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Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Coaxial Cable #174	Semiflex	Unknown	30288-0332	08/09/11	08/09/13
Coaxial Cable #175	Semiflex	Unknown	102280-0333	08/09/11	08/09/13
Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	06/24/11	06/24/13
Digital Multimeter	Fluke	77	43850817	02/22/12	02/22/14
Digital Multimeter	Fluke	FLUKE-77-3	79510405	06/13/11	06/13/13
EMI RECEIVER SYSTEM	AGILENT TECHNOLOGIES	8572A	2627A03154	09/15/11	09/15/13
EMI Test Receiver	Rhode & Schwarz	ESIB 40	100274	03/13/12	03/16/14
Frequency Counter	HP	5352B	2632A00165	06/22/11	06/22/13
Frequency Counter	HP	5385A	2730A03025	08/17/11	08/17/13
Frequency Counter	HP	5385A	3242A07460	06/22/11	06/22/13
Function Generator	SRS	DS340	25200	08/17/11	08/17/13
Function Generator	SRS	DS345/12	38435	06/29/11	06/29/13
High Pass Filter	Microlab	HA-10N		03/14/11	03/14/13
High Pass Filter	Microlab	HA-20N		03/14/11	03/14/13
High Pass Filter	Unk	3768(5)-400	041	02/26/13	02/26/15
High Power Attenuator	Bird	8329-300	4980	02/26/13	02/26/15
HP-IB Power Supply Programmer	HP	59501A	1652400102	03/21/11	03/21/13
Hygro-Thermometer	Extech	445703	0602	06/15/11	06/15/13
LISN	Electro-Metrics	ANS-25/2	2604	10/28/11	10/28/13
LISN	Electro-Metrics	EM-7820	2682	02/01/11	02/01/13
LISN	Electro-Metrics	FCC-25/2	2512	02/01/11	02/01/13
Measuring Tape-20M	Kraftixx	0631-20		06/13/11	06/13/13

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Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		06/13/11	06/13/13
Modulation Analyzer	HP	8901A	3050A05856	09/26/12	09/26/14
Notch Filter	Lorch Microwave	5BRX-850/X100-N	AD-1	12/07/12	12/07/14
Oscilloscope	Lecroy	LC584AM	10605	01/19/13	01/19/15
Oscilloscope	LeCroy	LT364	00414	09/08/11	09/08/13
Power Meter and Sensor	Bird	4421-107 & 4022	0166 & 0218	12/15/11	12/15/13
RF Power Meter	Boonton	4531		01/19/13	01/19/15
Sensor	Boonton	51072A	34647	01/19/13	01/19/15
Service Monitor	IFR	FM/AM 500A	5182	06/14/11	06/14/13
Signal Generator	HP	8648C	3623A02898	09/09/11	09/09/13
Signal Generator	HP	8648C	3847A04696	06/12/11	06/12/13
Temperature Chamber	Tenney Engineering	TTRC	11717-7	07/03/12	07/03/14
Temperature Chamber	Thermotron Corp.	S1.2 Mini Max	25-1420-09	07/03/12	07/03/14
Termaline Wattmeter	Bird	6154	12290	01/21/13	01/21/15
Waverunner Digital Scope	Lecroy	LT364L	00543	06/15/11	06/15/13
Attenuator	Narda	766-30	Z1	12/31/2011	12/31/2013

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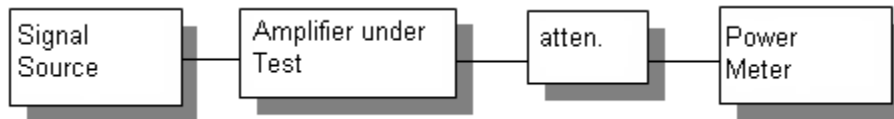
## TEST PROCEDURES

### Power Line Conducted Interference

The procedure used was ANSI 63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

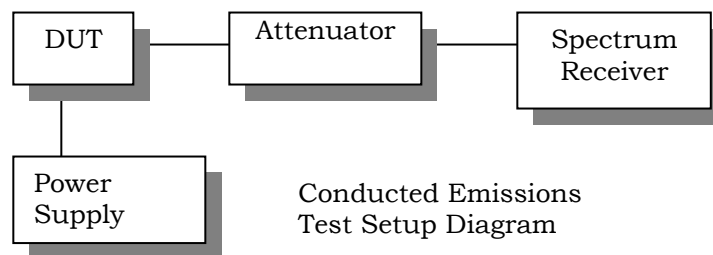
### RF Power Output

The RF power output was measured at the antenna feed point using a peak power meter. A 50-ohm, resistive wattmeter was connected to the RF output connector. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:



### Spurious Emissions At Antenna Terminals (Conducted)

The carrier was modulated 100%. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz. The measurements were made in accordance with standard ANSI/TIA-603-C: 2004



### Radiation Interference

The test procedure used was ANSI/TIA-603-C: 2004 and ANSI C63.4-2003 using 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.

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**Modulation Characteristic**

**Audio frequency response**

The audio frequency response was measured in accordance with ANSI/TIA 603-C: 2004.

**Audio Low Pass Filter**

The audio low pass filter for voice-modulated equipment was measured in accordance with ANSI/TIA 603-C: 2004.

**Audio Input versus modulation**

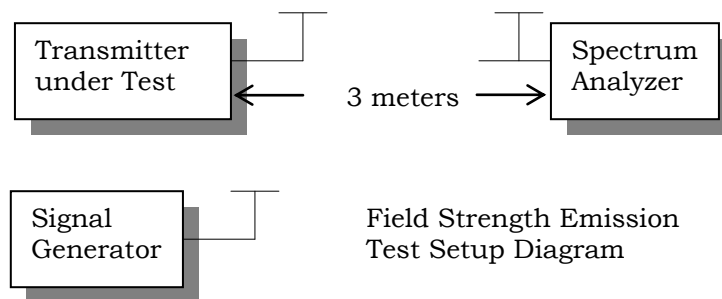
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

**Frequency Stability**

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

**Field Strength of Spurious Emissions**

The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C: 2004 using the substitution method.



**TEST RESULTS**

**RF POWER OUTPUT**

**Rule Part No.:** Pt 2.1046(a), Pt 90, Pt 90.210, RSS-131

**Requirements:** Pt 2.1046(a), Pt 90, Pt 90.210, RSS-131

**Test Data:** Power = 662 Watts

DC Power Consumption

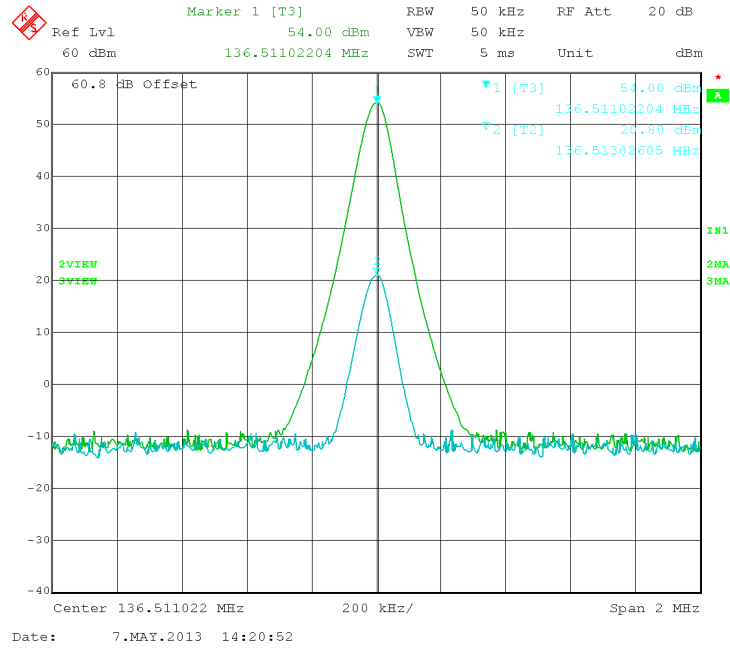
Vdc = 13.8

Ic = 48A

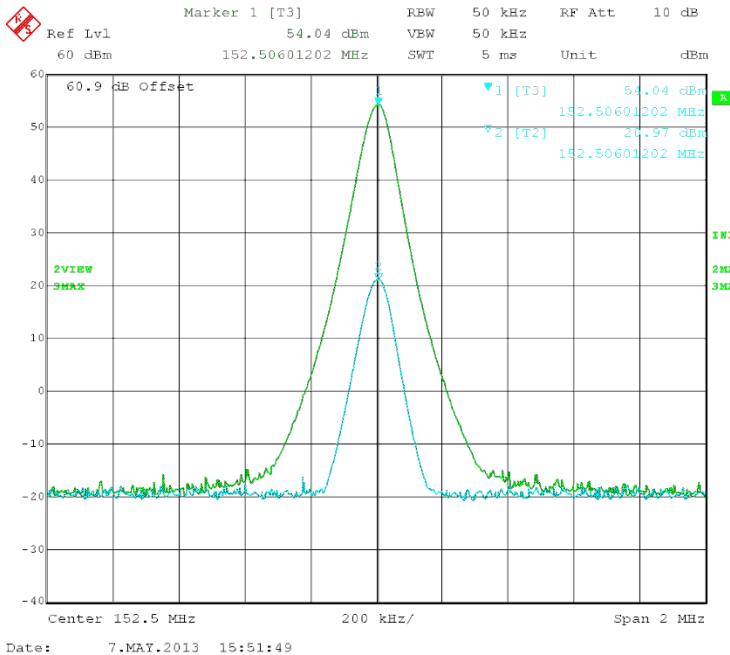
Test Frequency (MHz)	Input (dBm)	Output (dBm)	Output (W)
136.5	20.8	54.0	250
152.5	20.9	54.0	250
159.0	20.6	54.0	250
168.0	20.2	54.0	250

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INPUT/OUTPUT COMPARISON:

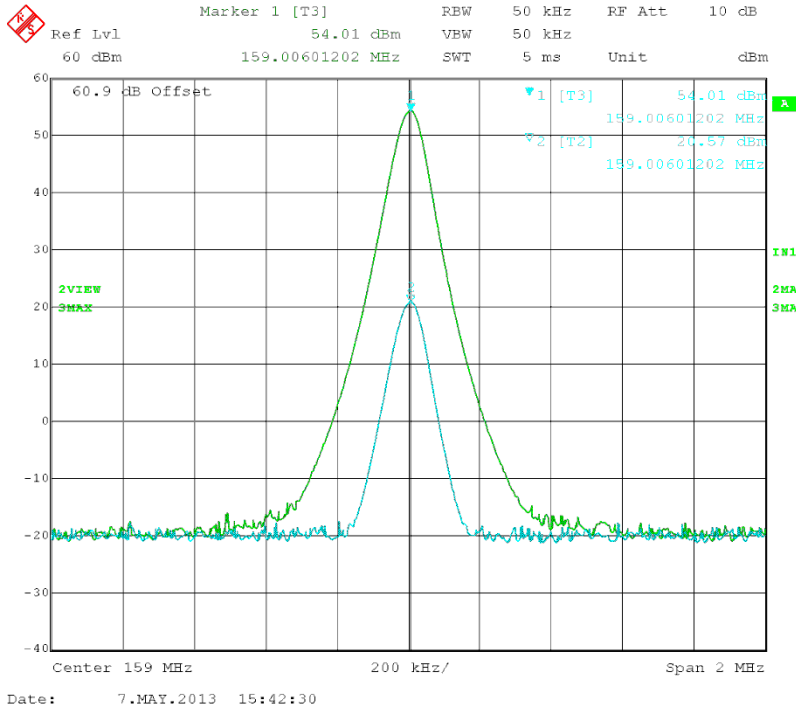


**136.5 MHz**

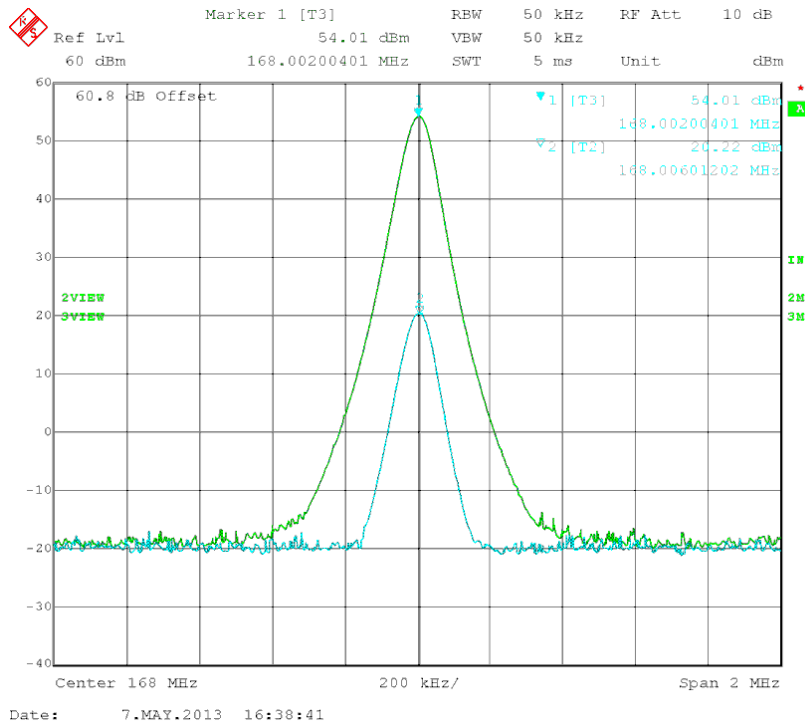


**152.5 MHz**

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**159.0 MHz**



**168.0 MHz**

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## OCCUPIED BANDWIDTH

**Rule Parts No:** Pt 2.1049, Pt 90.210(b), RSS-119

### **Test Requirement:**

#### 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) 12.5kHz Channel Spacing Not Equipped with a Low Pass Filter

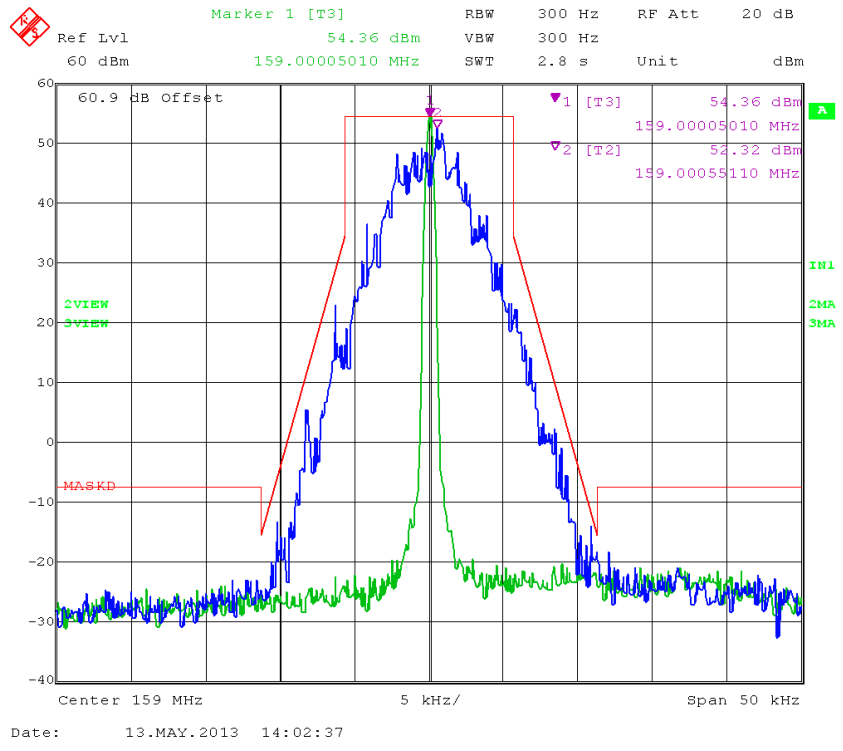
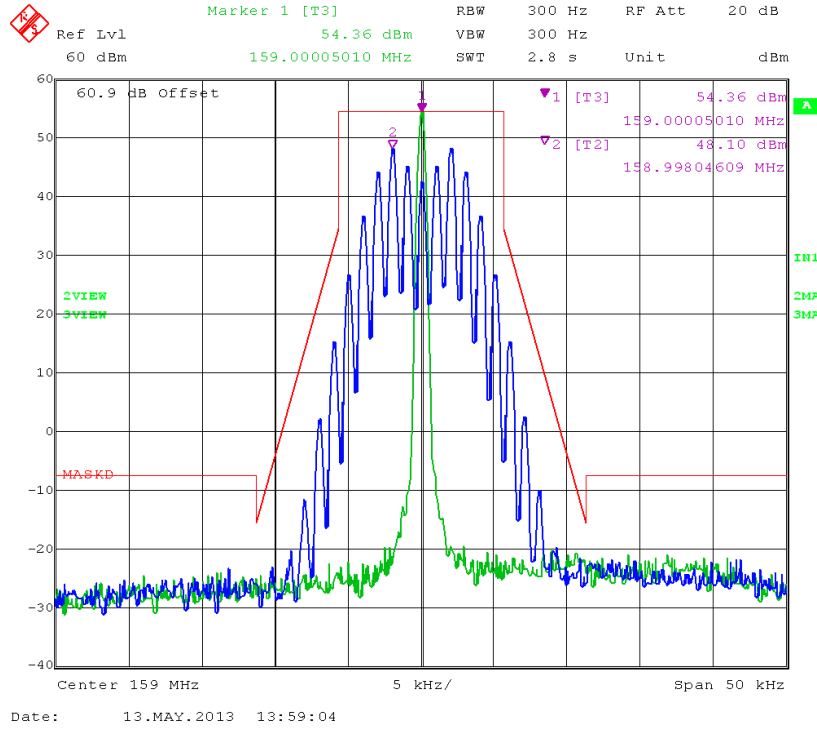
For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  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  $29 \log(f_d/11)$ 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(i) Emission Mask I - 15 kHz channel BW equipment.

For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) of the transmitter as follows:

- (1) On any frequency from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but less than 9.0 kHz: At least 25 dB;
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 9.0 kHz but no more than 15 kHz: At least 35 dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 15 kHz: At least  $43 + 10\log(P)$  dB or 70 dB, whichever is the lesser attenuation.

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## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

**Rule Part No.:** FCC Pt 2.1051(a), IC RSS-119

**Requirements:**  $43+10\log(P_o)=43+10\log(150)= 67$  dB  
 $50+10\log(P_o)=50+10\log(250)= 74$  or  $70$  dB whichever is the lesser

**Test Data:**

Frequency (MHz)	dBc
136.5	0
273.0	71.0
409.5	77.3
546.0	76.6
682.5	76.1
819.0	76.6
955.5	75.6
1092.0	*
1228.5	*
1365.0	*

Frequency (MHz)	dBc
152.5	0
305.0	75.4
457.5	75.6
610.0	75.7
762.5	75.3
915.0	73.8
1067.5	*
1220.0	*
1372.5	*
1525.0	*

Frequency (MHz)	dBc
159.0	0
318.0	74.9
477.0	75.4
636.0	76.0
795.0	75.2
954.0	73.9
1113.0	*
1272.0	*
1431.0	*
1590.0	*

Frequency (MHz)	dBc
168.0	0
336.0	73.9
504.0	76.8
672.0	75.9
840.0	77.0
1008.0	*
1176.0	*
1344.0	*
1512.0	*
1680.0	*

\* Emissions are in the noise level and not reported.

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**FIELD STRENGTH OF SPURIOUS EMISSIONS (RADIATED)**

**Rule Parts. No.:** FCC Pt 2.1053, IC RSS-119

**Requirements:** Same as conducted emissions

**Test Data:**

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
136.50	V	0
273.00	H	121.6
409.50	V	122.7
546.00	H	119.2
682.50	V	106.9
819.00	V	109.4
995.50	H	118.2
1092.00	V	110.9
1228.50	V	109.4
1365.00	V	110.1

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
152.50	V	0
305.00	V	129.5
457.50	V	119.3
610.00	V	121.3
762.50	V	115.0
915.00	V	119.2
1067.50	V	110.8
1220.00	H	111.5
1372.50	V	109.5
1525.00	V	110.3

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
159.00	V	0
318.00	H	126.8
477.00	V	113.8
636.00	H	121.7
795.00	V	116.1
954.00	V	115.1
1113.00	V	110.9
1272.00	V	110.9
1431.00	V	108.6
1590.00	V	110.3

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
168.00	V	0
336.00	H	120.7
504.00	V	118.8
672.00	H	117.3
840.00	V	114.5
1008.00	V	112.7
1176.00	V	109.4
1344.00	V	111.4
1512.00	H	107.4
1680.00	H	107.7

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**POWER LINE CONDUCTED INTERFERENCE**

**Rules Part No.:** FCC Pt 15.207, IC RSS-GEN

**Requirements:**

Frequency (MHz)	Quasi Peak Limits (dB $\mu$ V)	Average Limits (dB $\mu$ V)
0.15 – 0.5	66 – 56 *	56 – 46 *
0.5 – 5.0	56	46
5.0 – 30	60	50
* Decreases with logarithm of frequency		

**Test Data:** Not applicable, DUT is DC or battery operated exclusively.

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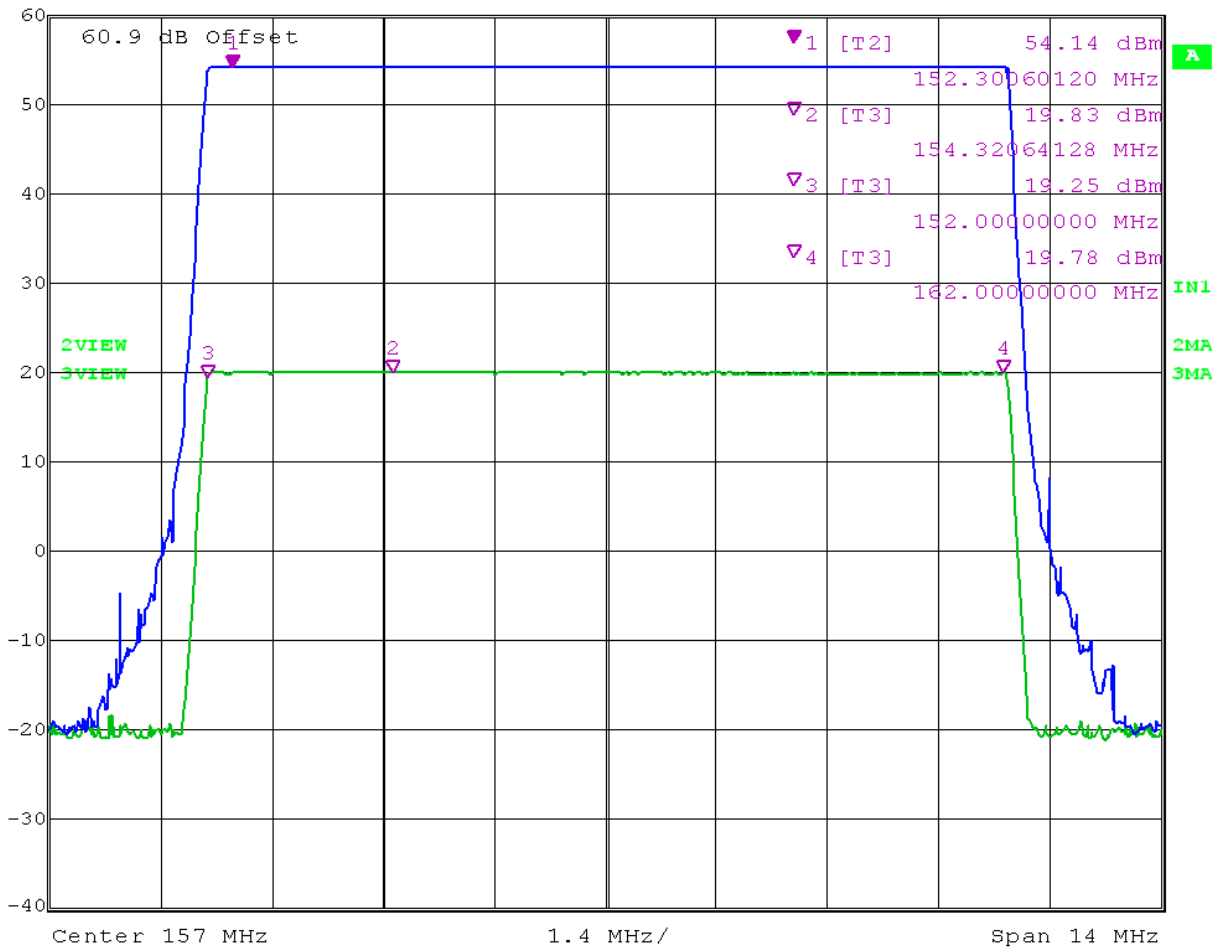
### PASSBAND GAIN AND 20 dB BANDWIDTH

**Rule Part No.:** RSS-131 Issue 2 Para 4.2 (Canada only)

**Requirements:** RSS-131 Issue 2 Para 4.2

**Test Data:** See plots

Marker 1 [T2]      RBW    100 kHz    RF Att    10 dB  
 Ref Lvl                    54.14 dBm    VBW    100 kHz  
 60 dBm                    152.30060120 MHz    SWT    5 ms    Unit            dBm



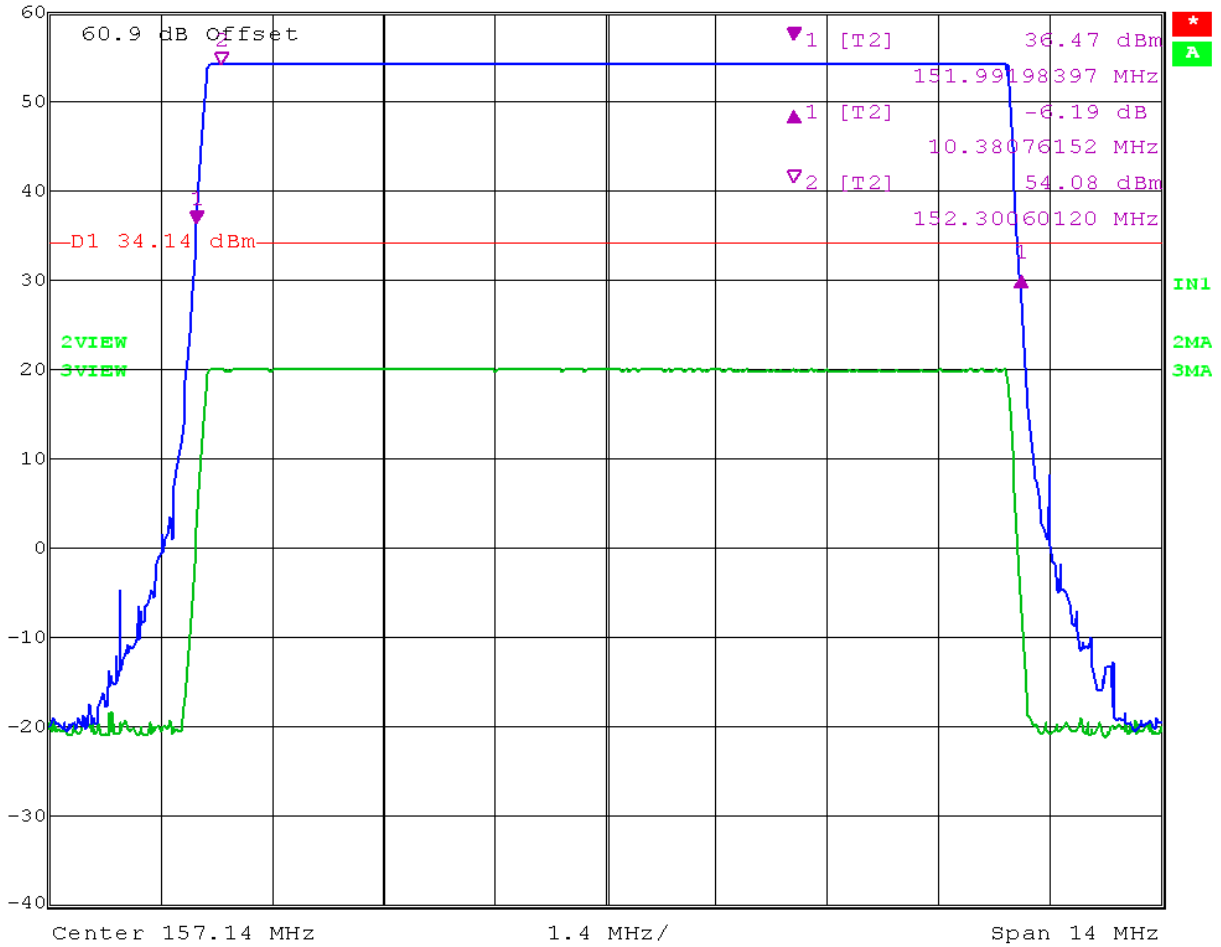
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Input	19.83 dBm
Output	54.14 dBm
Pass Band Gain	34.31 dB

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Delta 1 [T2]      RBW    100 kHz    RF Att    10 dB  
 Ref Lvl            -6.19 dB    VBW    100 kHz  
 60 dBm            10.38076152 MHz    SWT    5 ms    Unit        dBm



Date: 13.MAY.2013 09:18:42

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP25XXFF1  
 IC: 7291A-P25XXFF1  
 MODEL #: P25 Series VHF  
 Report: C\CRESCEND\_CWW\754AUT13\754AUT13TestReport.doc