



849 NW STATE ROAD 45  
NEWBERRY, FL 32669 USA  
PH: 888.472.2424 OR 352.472.5500  
FAX: 352.472.2030  
EMAIL: [INFO@TIMCOENGR.COM](mailto:INFO@TIMCOENGR.COM)  
[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

---

**FCC PT 90 AMPLIFIER  
AND IC RSS-131 (issue 2), RSS-GEN (issue 3)  
TEST REPORT**

<b>APPLICANT</b>	CRESCEND TECHNOLOGIES, LLC
<b>ADDRESS</b>	140 E. State Parkway SCHAUMBURG IL 60173 USA
<b>FCC ID</b>	CWWP5XXUL1
<b>IC LABEL</b>	7291A-P5XXUL1
<b>MODEL NUMBER</b>	P5 Series UHF-L
<b>PRODUCT DESCRIPTION</b>	AMPLIFIER
<b>DATE SAMPLE RECEIVED</b>	3/8/2013
<b>DATE TESTED</b>	4/10/2013
<b>TESTED BY</b>	JOE SCOGGIO
<b>APPROVED BY</b>	MARIO R. DE ARANZETA
<b>TIMCO REPORT NO.</b>	421AUT13TestReport.doc
<b>TEST RESULTS</b>	<input 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

## TABLE OF CONTENTS

ATTESTATION STATEMENT.....	3
REPORT SUMMARY.....	4
TEST ENVIRONMENT AND TEST SETUP.....	4
DUT DESCRIPTION.....	5
TEST EQUIPMENT.....	6
TEST PROCEDURES.....	9
TEST RESULTS.....	11
RF POWER OUTPUT.....	11
OCCUPIED BANDWIDTH.....	12
SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED).....	15
FIELD STRENGTH OF SPURIOUS EMISSIONS (RADIATED).....	16
POWER LINE CONDUCTED INTERFERENCE.....	17
PASSBAND GAIN AND 20 dB BANDWIDTH.....	18

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## 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 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.

**Authorized by:**



**Signature:**

**Function:** Test Lab Supervisor / Engineer

**Date:** 4/10/2013

Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## 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.

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## DUT DESCRIPTION

Manufactured by	CRESCEND TECHNOLOGIES, LLC
Product Description	AMPLIFIER
FCC ID	CWWP5XXUL1
IC Label	7291A-P5XXUL1
M/N	P5 Series UHF-L
Operating Freq	406.1 to 450 MHz
Max. Output Pwr	50 watts
Modulation	N/A Amplifier
Power Source	13.8 volts DC
Test Item	Preproduction
Type of DUT	Fixed/Mobile Amplifier

Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## 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
Analyzer Open-Frame Tower Preamplifier	HP	8449B	3008A01075	07/22/09	09/15/13
Analyzer Open-Frame Tower Quasi-Peak Adapter	HP	85650A	2043A00305	10/26/09	09/15/13
Analyzer Open-Frame Tower RF Preselector	HP	85685A	3107A01282	07/22/09	09/15/13
Analyzer Open-Frame Tower Spectrum Analyzer	HP	8566B/85662A	2627A03154/ 2648A14276	07/22/09	09/15/13
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
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	12/07/11	12/07/13
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

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

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
Coaxial Cable - Chamber 3 cable set	Semiflex	Unknown		01/26/12	01/26/14
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	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	Unk	3768(5)-400	041	02/26/13	02/26/15
High Power Attenuator	Bird	8329-300	4980	02/26/13	02/26/15
Hygro- Thermometer	Extech	445703	0602	06/15/11	06/15/13
LISN	Electro-Metrics	ANS-25/2	2604	10/28/11	10/28/13
Measuring Tape-20M	Kraftixx	0631-20		06/13/11	06/13/13
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

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc



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
Waverunner Digital Scope	Lecroy	LT364L	00543	06/15/11	06/15/13

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc



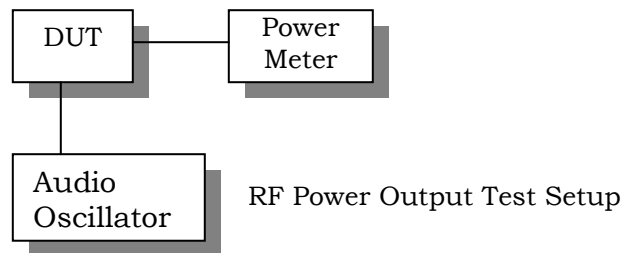
## TEST PROCEDURES

### 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.

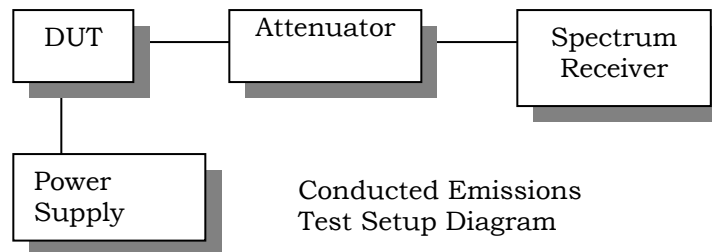
### RF Power Output

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.

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## **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**

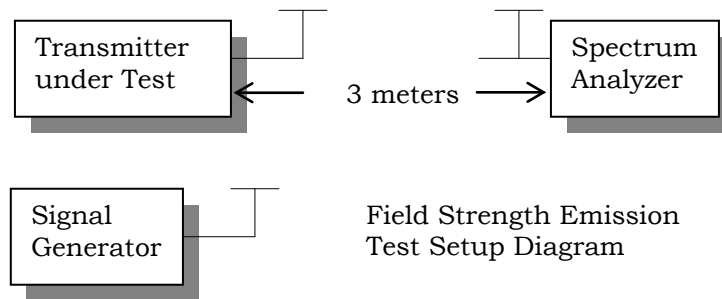
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

### **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 =

DC Power Consumption

Vdc = 13.8

Ic = 11.2 amps

Test Frequency (MHz)	Input (dBm)	Output (dBm)	Output (W)
407	21	46.9	49.7
420	21	46.4	43.6
449.9	21	46.3	42.6

Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## OCCUPIED BANDWIDTH

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

**Test Requirement:** 90.210 (d)

**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.**

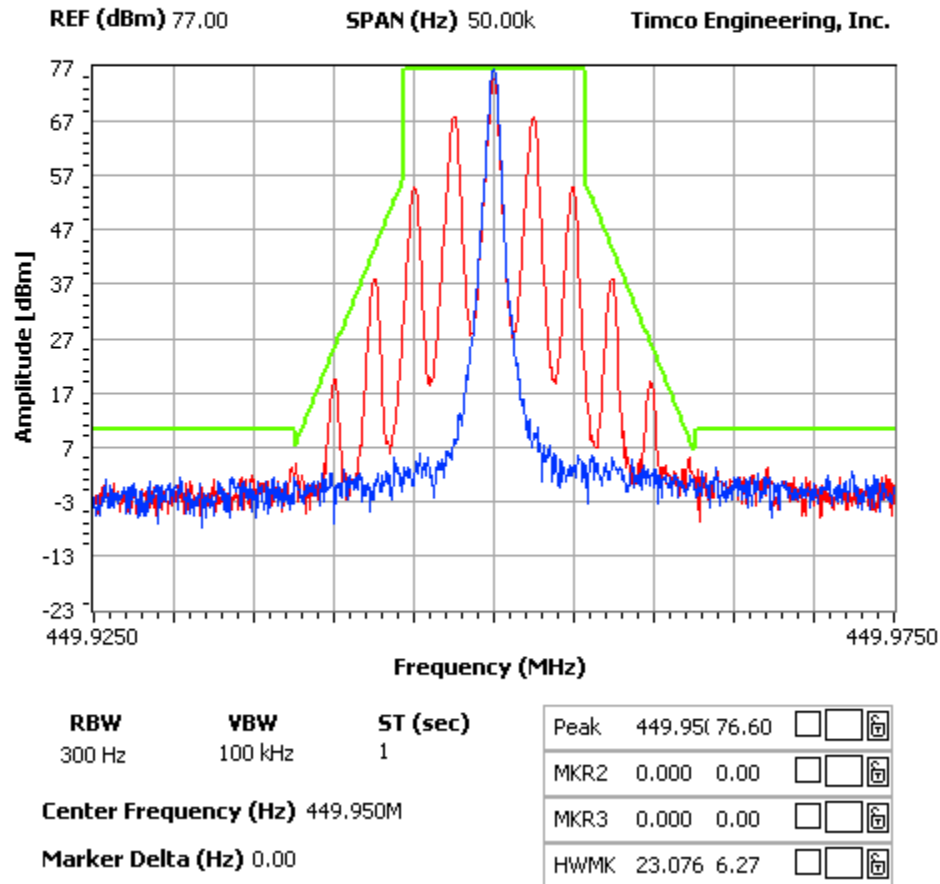
For transmitters designed to operate with a 6.25 kHz bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (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 is the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least  $55 + 10\log(P)$  dB or 65 dB, whichever is the lesser attenuation.

Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

# NOTES:

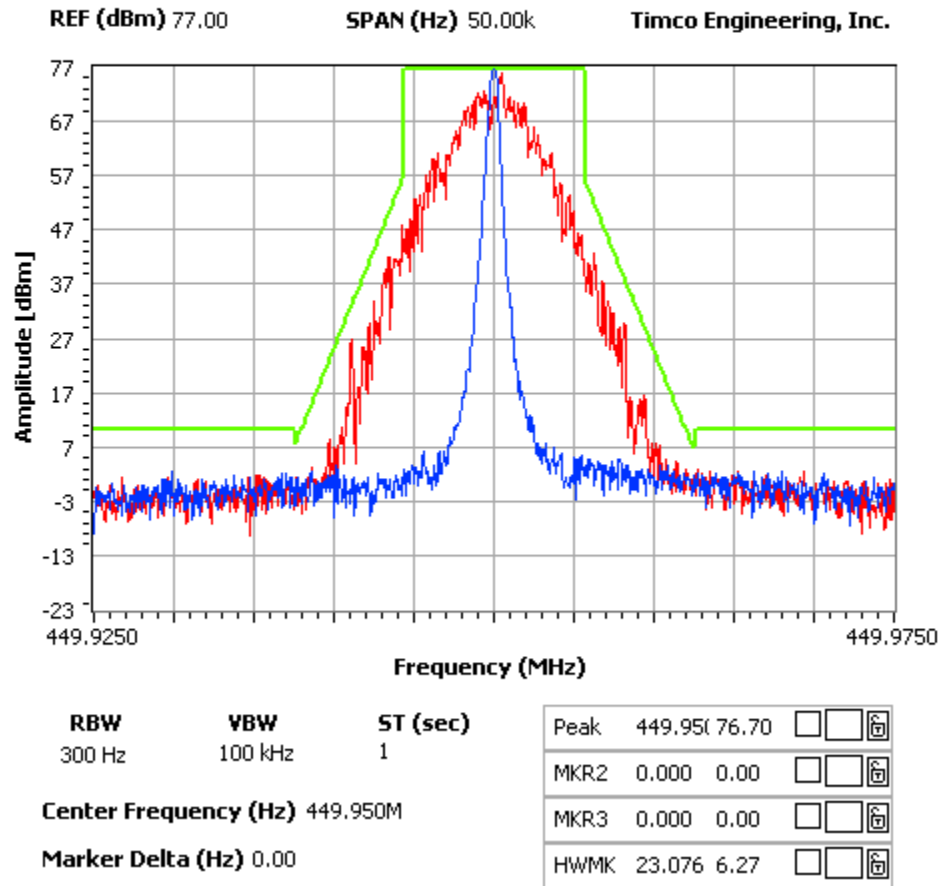
## FCC 90.210 Mask D



Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

# NOTES:

## FCC 90.210 Mask D



Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

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

**Requirements:**  $43+10\log(P_o)=43+10\log(50)= 60 \text{ dB}$   
 $50+10\log(P_o)=50+10\log(50)= 67 \text{ dB}$

**Test Data:**

Emission MHz	dBc
407	0
814	87.1
1221	82.4
1628	114.3
2035	98.8
2442	107.4
2849	114.9
3256	102.8
3663	122.7
4070	111

Emission MHz	dBc
420	0
840	96.8
1260	88.2
1680	115.1
2100	99.5
2520	107
2940	106.4
3360	113.6
3780	125.4
4200	113.2

Emission MHz	dBc
449.9	0
899.9	106.1
1349.8	87.2
1799.8	117.1
2249.7	102.6
2699.7	110.1
3149.6	113
3599.6	125.7
4049.5	109.7
4499.5	110.6

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

Emissions were measured from the lowest frequency generated to the 10th harmonic.

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## FIELD STRENGTH OF SPURIOUS EMISSIONS (RADIATED)

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

**Requirements:** Same as conducted emissions

**Test Data:** measured at 3m. Emissions were measured to the 10<sup>th</sup> harmonic.

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
407.00	V	0
814.00	H	103.6
1221.00	H	103.6
1628.00	H	99.8
2035.00	H	96.6
2442.00	V	101.1
2849.00	H	104.9
3256.00	V	100.4
3663.00	V	103.0
4070.00	V	100.4

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
420.00	V	0
840.00	V	103.3
1260.00	H	104.5
1680.00	H	98.9
2100.00	H	98.5
2520.00	H	102.3
2940.00	V	100.5
3360.00	H	102.0
3780.00	H	99.1
4200.00	H	101.4

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
449.90	V	0
899.90	H	105.2
1349.80	H	100.3
1799.80	H	92.3
2249.70	H	98.1
2699.70	V	100.9
3149.60	V	95.0
3599.60	H	101.2
4049.50	V	96.7
4499.50	V	99.0

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

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc



## POWER LINE CONDUCTED INTERFERENCE

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

**Requirements:**

Frequency (MHz)	Quasi Peak Limits (dBμV)	Average Limits (dBμV)
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 battery operated

Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

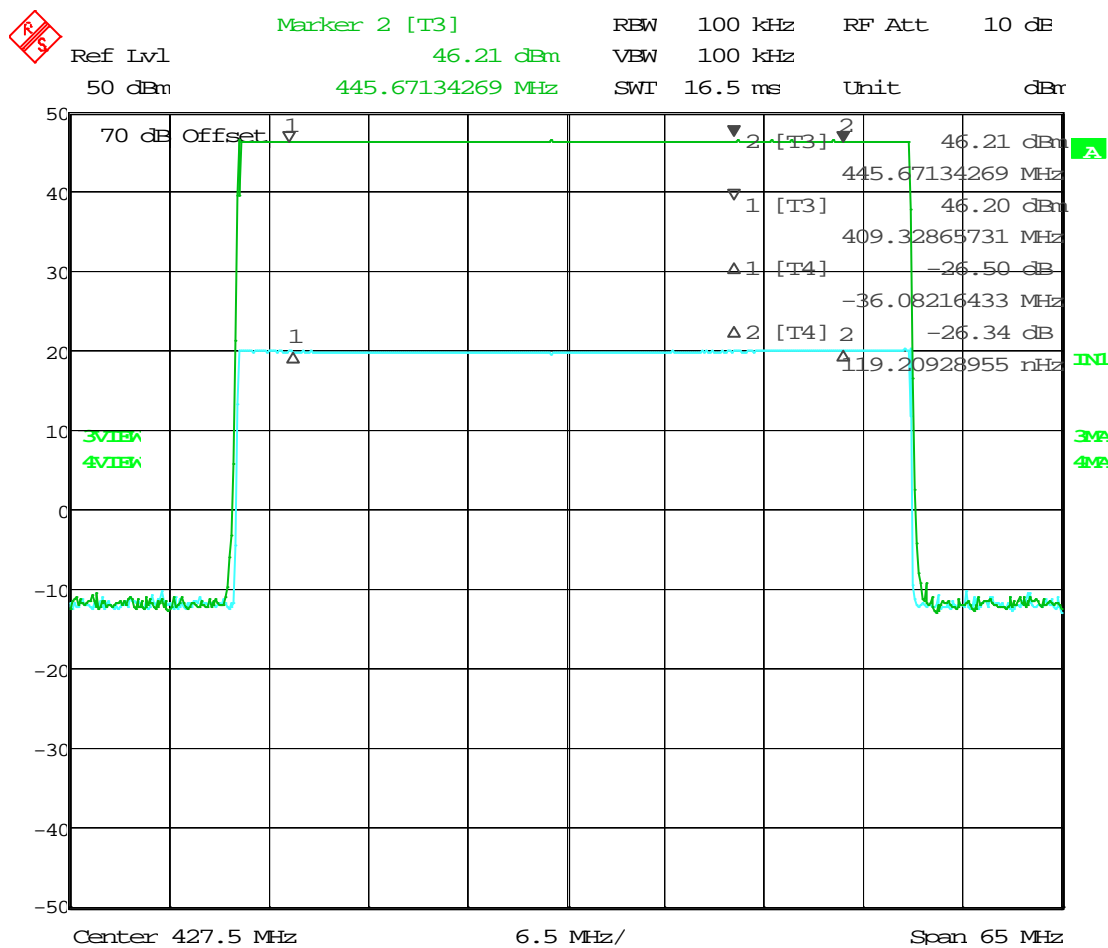
## PASSBAND GAIN AND 20 dB BANDWIDTH

**Rule Part No.:** RSS-131 Issue 2 Para 4.2

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

**Test Data:** See Plots

### Pass Band Gain Plot

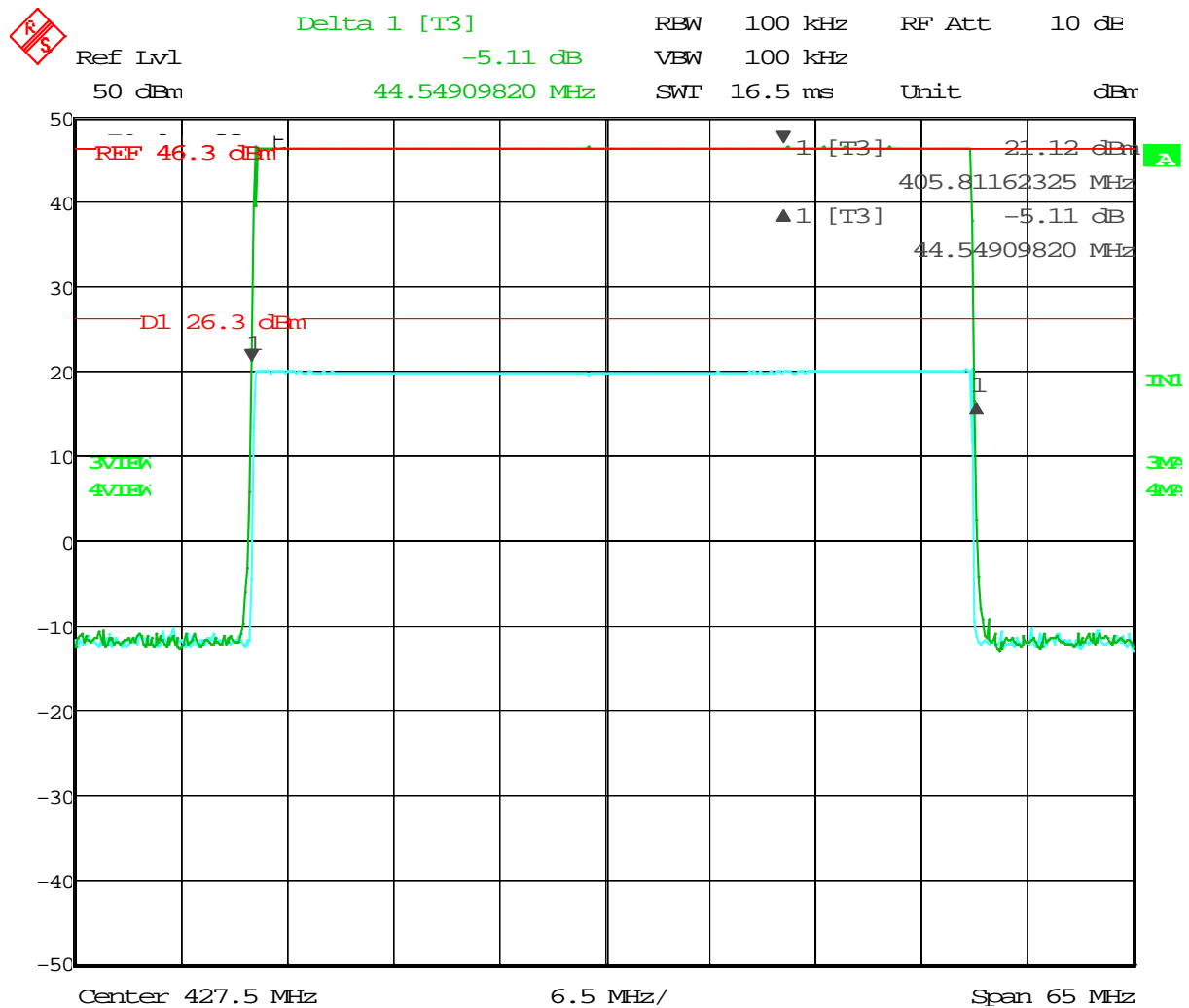


Date: 10.APR.2013 10:14:06

Input	19.7
Output	46.2
Pass Band Gain	26.5

Applicant: CRESCEND TECHNOLOGIES, LLC  
FCC ID: CWWP5XXUL1  
IC: 7291A-P5XXUL1  
MODEL #: P5 Series UHF-L  
Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc

## 20 dB Bandwidth Plot



Date: 10.APR.2013 10:30:56

20 dB Bandwidth: 44.55 MHz

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWP5XXUL1  
 IC: 7291A-P5XXUL1  
 MODEL #: P5 Series UHF-L  
 Report: C:\CRESCEND\_CWW\421AUT13\421AUT13TestReport.doc