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**FCC PT 90 AMPLIFIER  
AND IC RSS-131 (i2) , RSS-GEN (i3)  
TEST REPORT**

Applicant	CRESCEND TECHNOLOGIES, LLC
Address	140 E. State Parkway SCHAUMBURG IL 60173 USA
FCC ID	CWWDSDTV100XX
IC LABEL	7291A-DSDTV100XX
Model Number	DSDTV SERIES 100XX
Product Description	100W VHF MOBILE AMPLIFIER
Standards Applied	CFR 47 Part 90, Part 22 IC Standard RSS-131, Issue 2, July 2003 IC Standard RSS-GEN, Issue 3, December 2010
Date Sample Received	1/17/2014
Date Tested	1/21/2014
Date Report Issued	1/27/2014
Tested By	NAM NGUYEN
Approved By	NAM NGUYEN
Timco Report No.	94AUT14TestReport
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.**

**TABLE OF CONTENTS**

GENERAL REMARKS ..... 3

FCC PART RULES ..... 4

TEST ENVIRONMENT ..... 4

TEST SETUP SUMMARY ..... 4

EUT DESCRIPTION ..... 5

TEST EQUIPMENT ..... 6

TEST PROCEDURES ..... 7

TEST RESULTS ..... 9

    RF POWER OUTPUT ..... 9

    INPUT/OUTPUT COMPARISON ..... 10

    OCCUPIED BANDWIDTH ..... 15

        ANALOG SIGNAL INPUT .....16

        DIGITAL SIGNAL INPUT.....19

    SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED) ..... 22

    FIELD STRENGTH OF SPURIOUS EMISSIONS (RADIATED)..... 24

    POWER LINE CONDUCTED INTERFERENCE ..... 26

    PASSBAND GAIN AND 20 dB BANDWIDTH ..... 27

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

## 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.

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:



Nam Nguyen  
Engineering Project Manager

**Date: 1/24/2014**

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Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

## FCC PART RULES

Applicable Rule(s)	ANSI/TIA 603-C: 2004 CFR 47 Part 90, Part 22 IC Standard RSS-131, Issue 2, July 2003 IC Standard RSS-GEN, Issue 3, December 2010
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## TEST ENVIRONMENT

Test Facility	Timco Engineering, Inc. 849 NW State Road 45 Newberry, FL 32669 USA.
Test Condition in the laboratory	Temperature: 26°C Relative humidity: 50%

## TEST SETUP SUMMARY

Test Setup Diagram/Description	The DUT was placed on the turntable per setup per ANSI C63.4: 2003. A test set up explanation and photo is provided in each test section of this report for clarification.
Deviation from the standard/procedure	No deviation
Modification to the DUT	No modification was made

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 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

**EUT DESCRIPTION**

EUT Description	This is a 100W mobile VHF power amplifier. The amplifier is a nonlinear AB/C Class unit that is intended for frequency (phase) modulated (manipulated) signals amplifications.
FCC ID	CWWDSDTV100XX
IC	7291A-DSDTV100XX
Model Number	DSDTV SERIES 100XX
Operating Frequency	(136 – 174) MHz
Max. Output Power	50.0 dBm (100W)
Modulation	N/A - Amplifier
EUT Power Source	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input checked="" type="checkbox"/> DC Power 13.8V
	<input type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
Type of Equipment	<input type="checkbox"/> Fixed
	<input checked="" type="checkbox"/> Mobile
	<input type="checkbox"/> Portable

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## TEST EQUIPMENT

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Antenna: Biconnical	Eaton	94455-1	1057	06/14/13	06/14/15
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	10/05/12	10/05/14
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Audio Generator	B&K Precision	3010	8739686	09/11/12	09/11/14
Broadband Preamplifier	A.H. Systems Inc.	PAM-0126	128	05/17/13	05/17/15
Coaxial Cable #174	Semiflex	Unknown	30288-0332	06/25/13	06/25/15
Coaxial Cable #175	Semiflex	Unknown	102280-0333	06/24/13	06/24/15
Digital Multimeter	Fluke	FLUKE-77-3	79510405	06/20/13	06/20/15
EMI Test Receiver	Rhode & Schwarz	ESIB 40	100274	03/13/12	03/16/14
EMI Test Receiver	Rhode & Schwarz	ESU 40			
High Pass Filter	Microlab	HA-10N		05/17/13	05/17/15
High Power Attenuator	Bird	8329-300	4980	02/26/13	02/26/15
HP-IB Power Supply Programmer	HP	59501A	1652400102	05/06/13	05/06/15
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		05/20/13	05/20/15
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
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	06/26/13	06/26/15
Signal Generator	HP	8648C	3847A04696	08/29/13	08/29/15
Vector Signal Generator	Rhode & Schwarz SMU 200A			12/04/13	12/04/15
Signal Generator	Rhode & Schwarz SMIQ 02	SMIQ02	DE24678	2/22/12	2/22/14
Signal Amplifier	Amplifier Research	1W1000B	23117	6/25/13	6/25/15

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 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

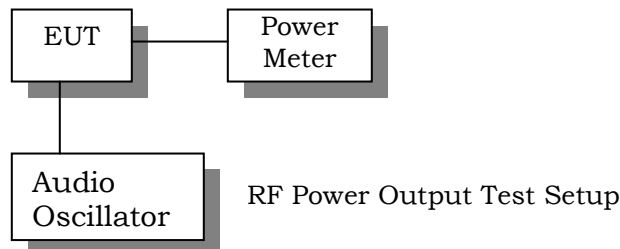
## TEST PROCEDURES

### Power Line Conducted Interference

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

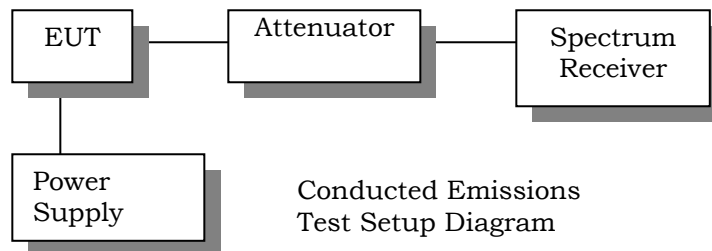
### RF Power Output

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  
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 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

**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**

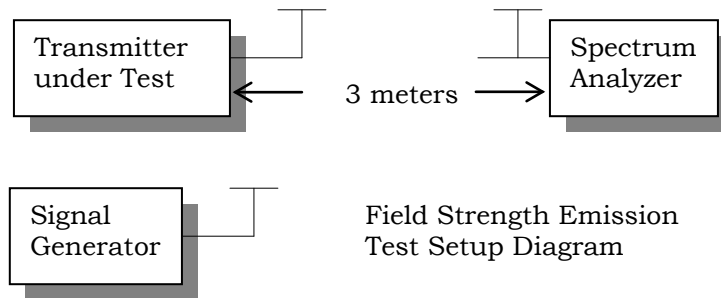
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

**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 = 13.8 \* 17.7 = 244.3 W

DC Power Consumption

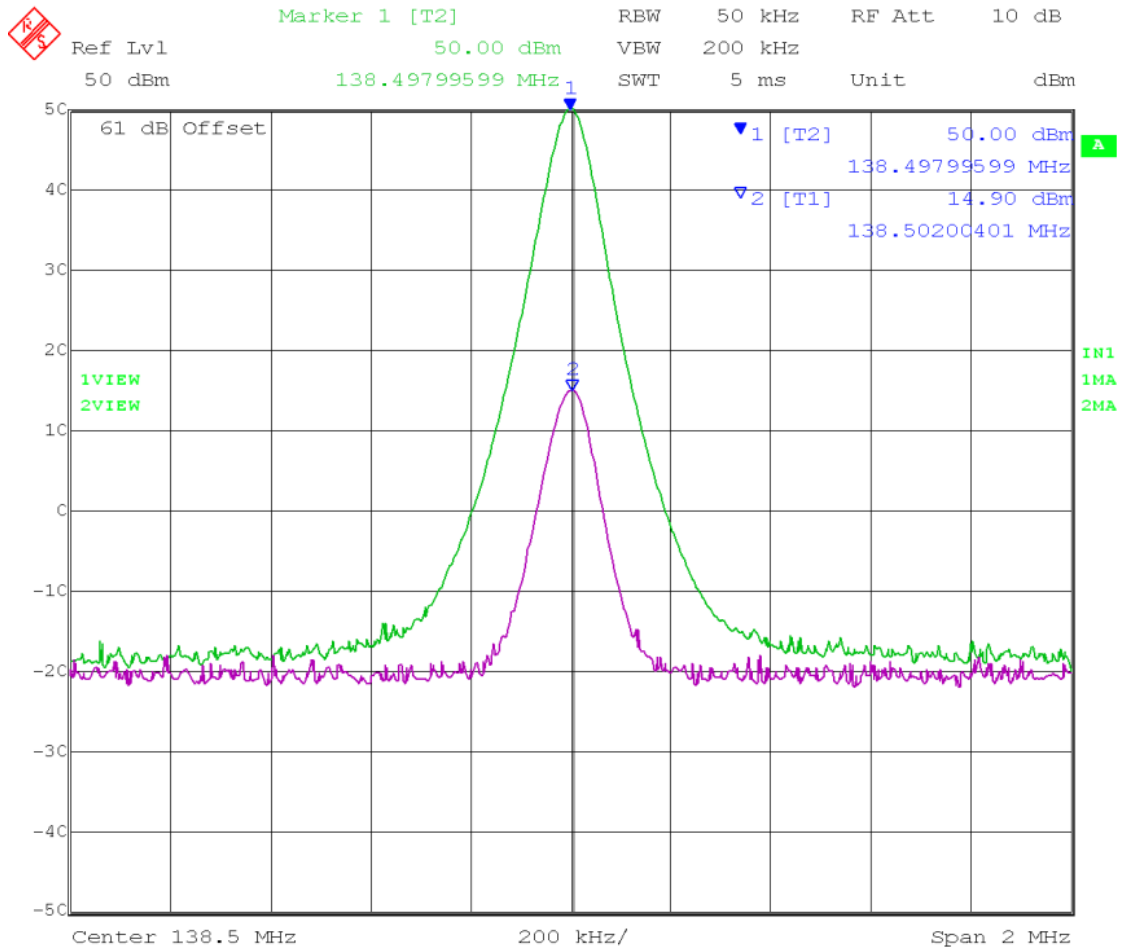
Vdc = 13.8 V

Ic = 17.7 A

Test Frequency (MHz)	Input (dBm)	Output (dBm)	Output (W)
138.5	14.9	50	100
143.5	14.4	50	100
152.5	14.7	50	100
162.5	15	50	100
173.5	15.2	50	100

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 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

**INPUT/OUTPUT COMPARISON**

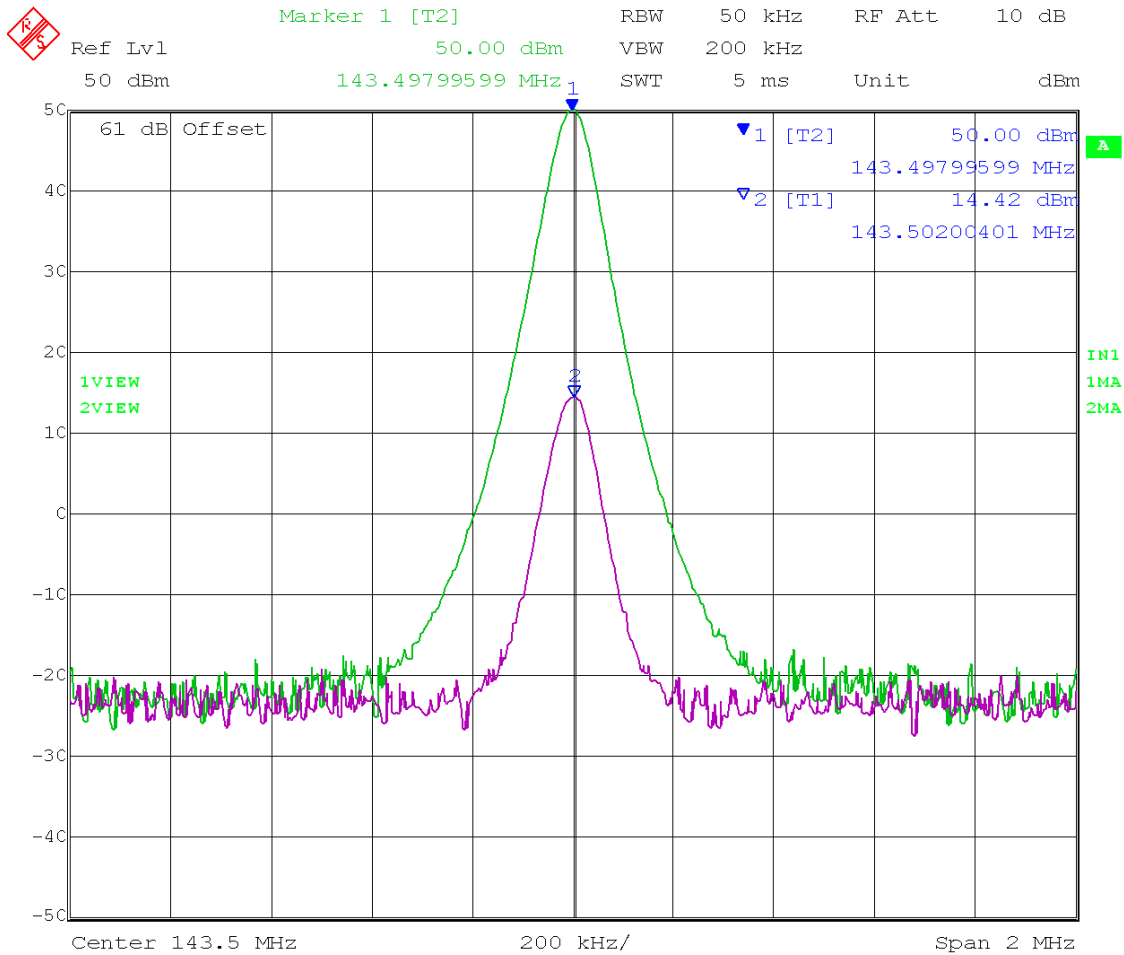


Date: 21.JAN.2014 15:21:58

**138.5 MHz**

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### INPUT/OUTPUT COMPARISON

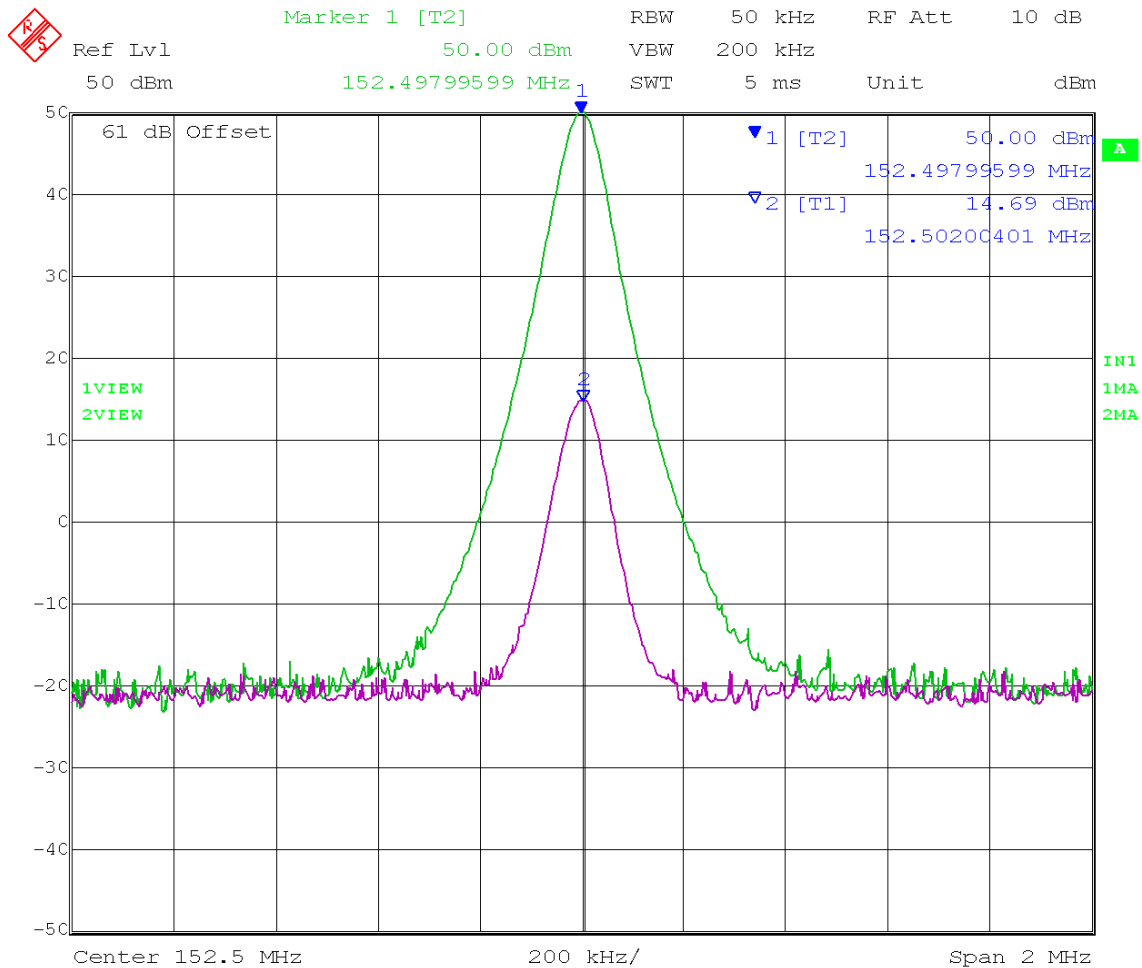


Date: 21.JAN.2014 16:01:39

**143.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

### INPUT/OUTPUT COMPARISON

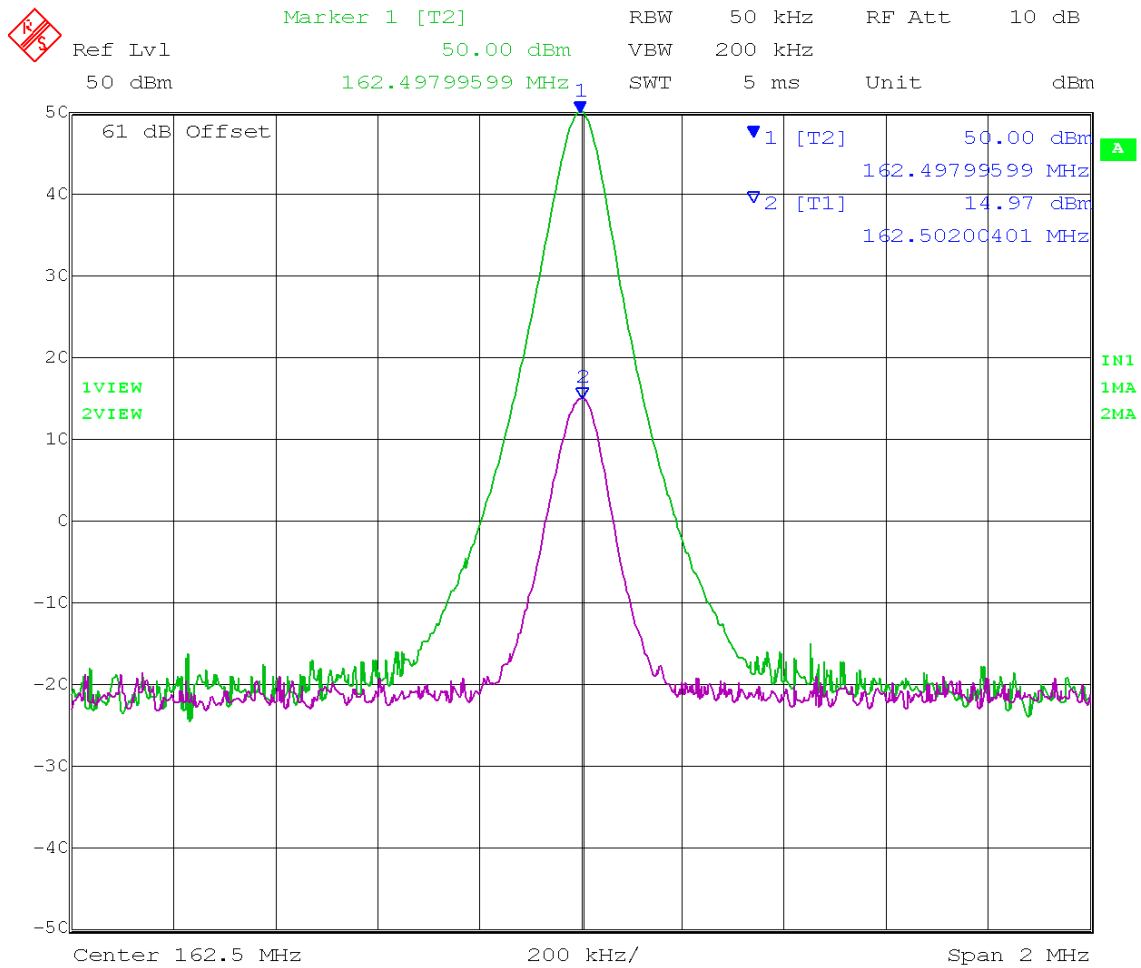


Date: 21.JAN.2014 15:54:21

**152.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

### INPUT/OUTPUT COMPARISON

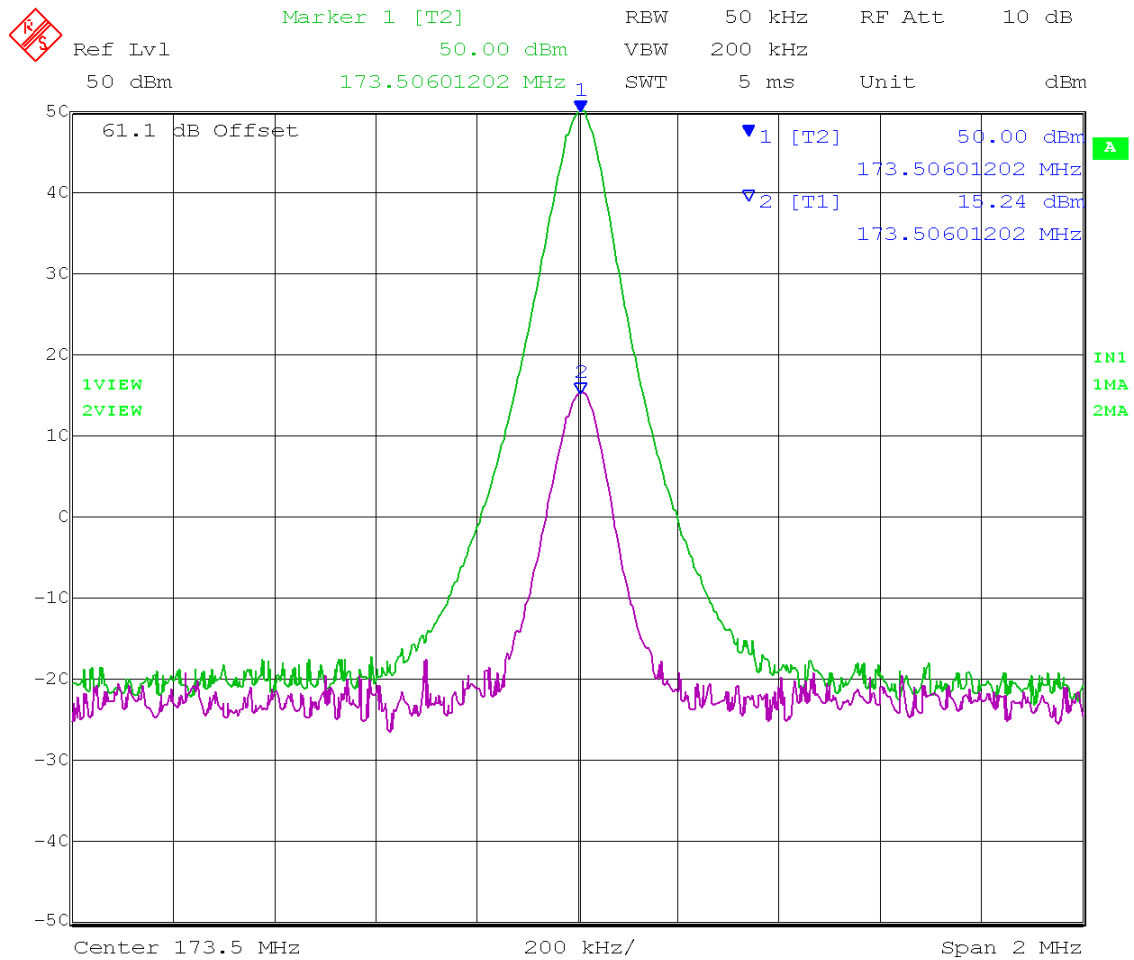


Date: 21.JAN.2014 16:08:30

**162.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

### INPUT/OUTPUT COMPARISON



Date: 22.JAN.2014 09:09:25

**173.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

## 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.

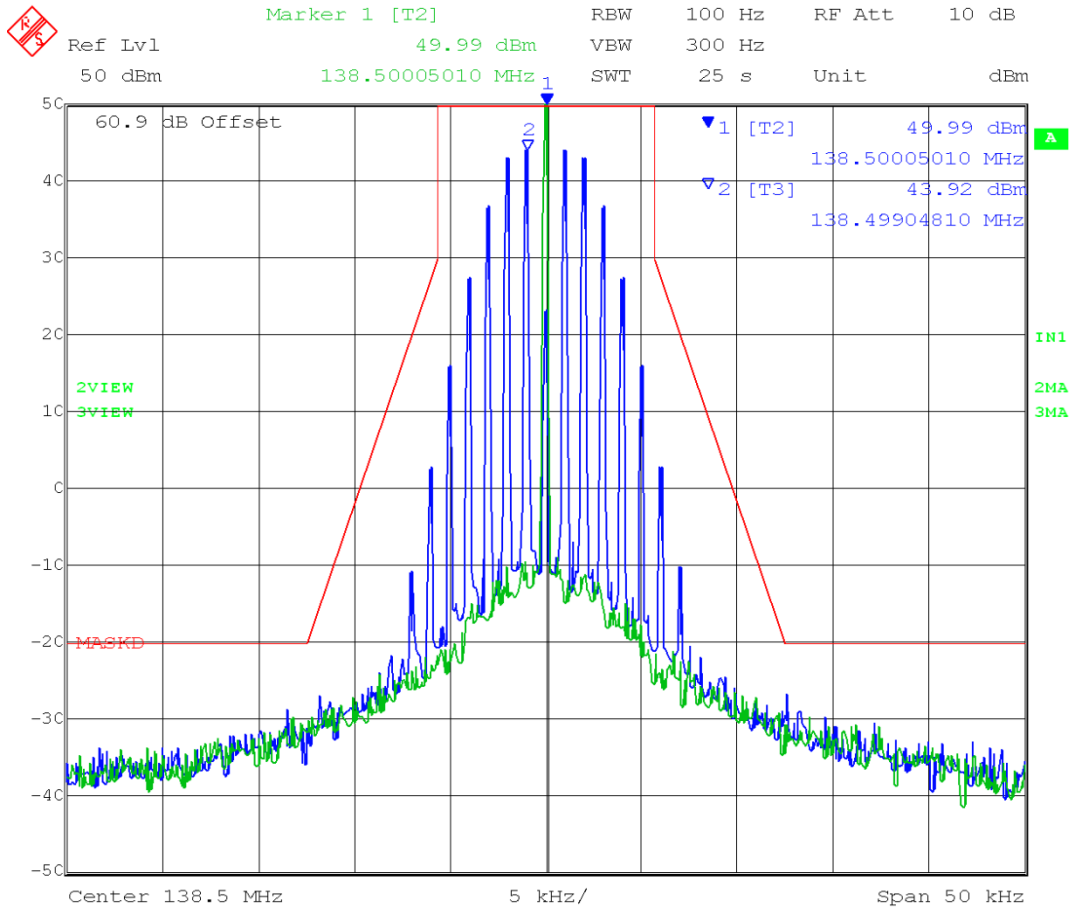
#### Part 90.210(j) Emission Mask I - 15 kHz channel BW equipment.

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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# ANALOG SIGNAL INPUT



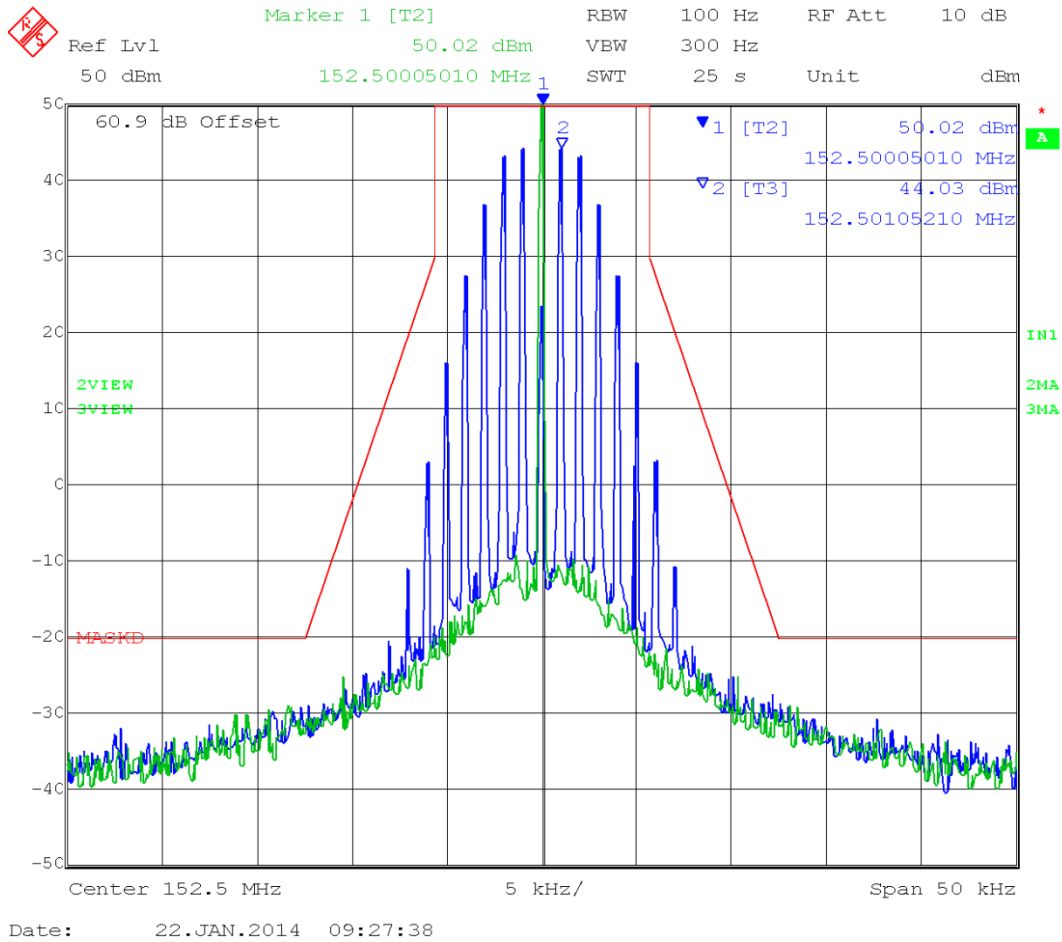
Date: 22.JAN.2014 09:31:05

## 138.5 MHz

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport



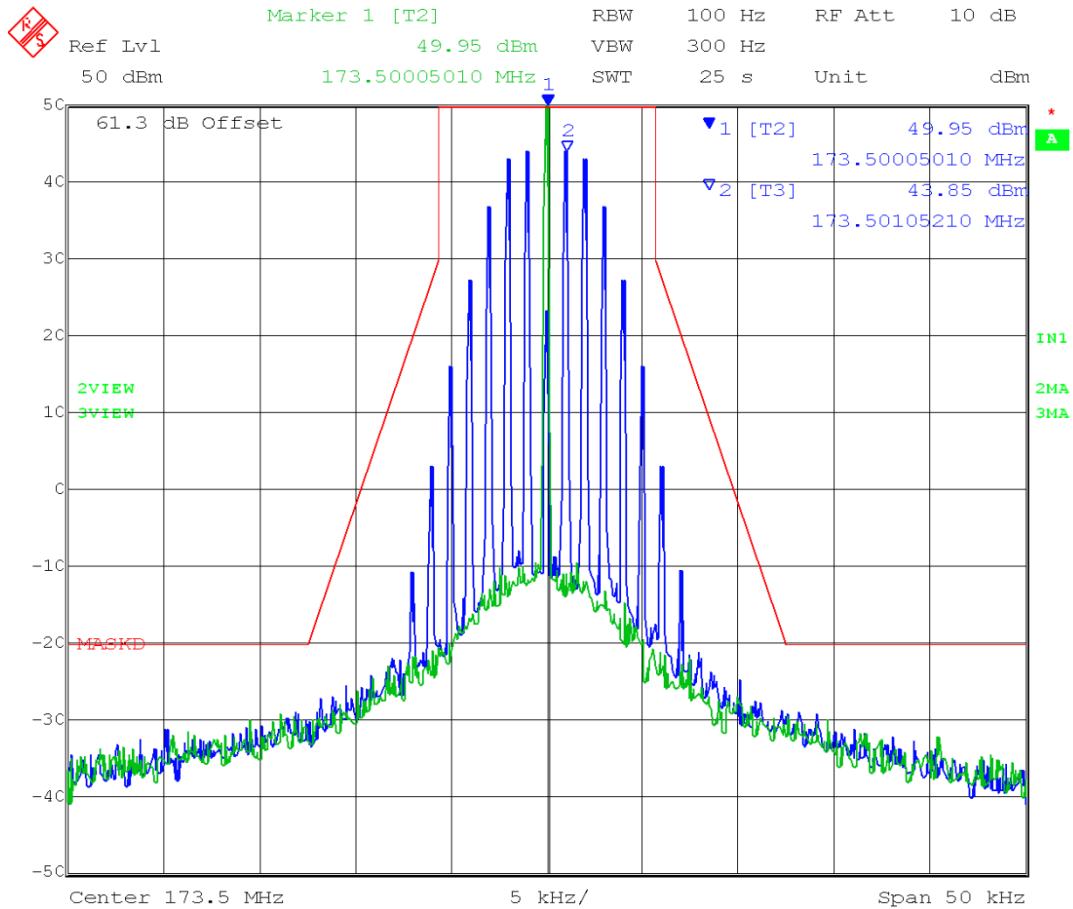
### ANALOG SIGNAL INPUT



**152.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

### ANALOG SIGNAL INPUT

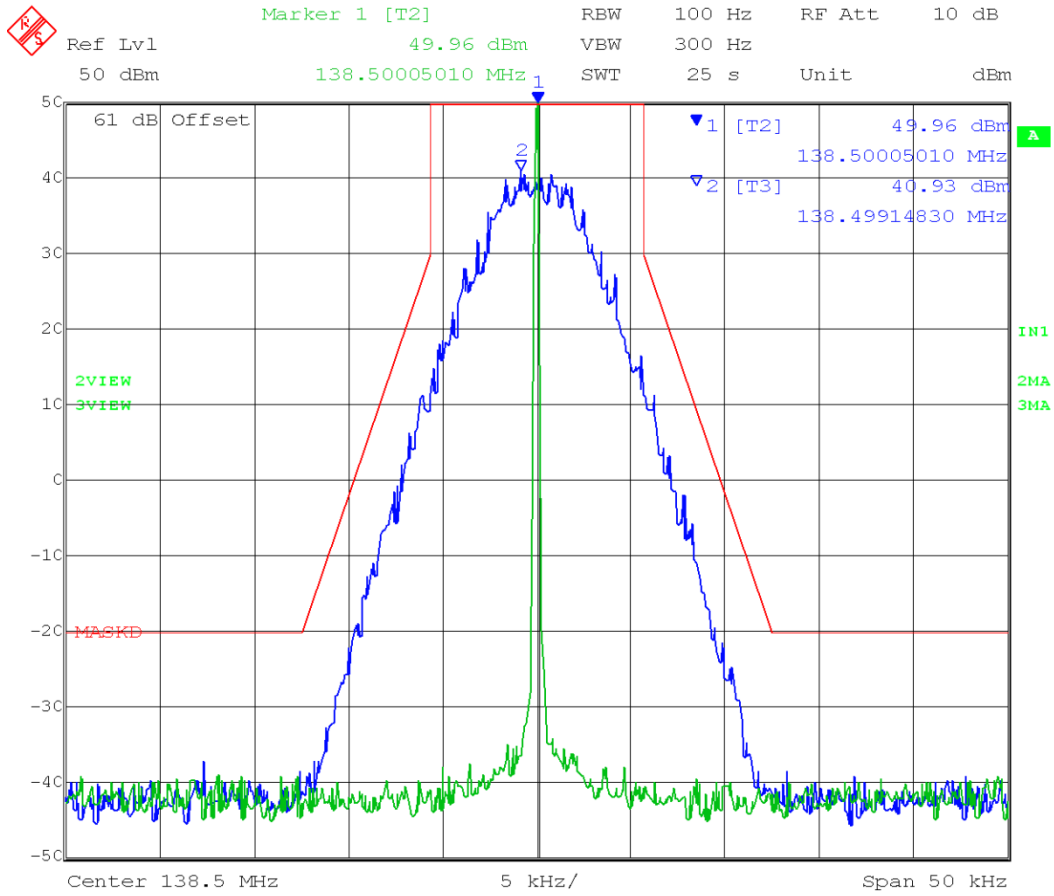


Date: 22.JAN.2014 09:22:57

### 173.5 MHz

Applicant: CRESCEND TECHNOLOGIES, LLC  
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 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

# DIGITAL SIGNAL INPUT

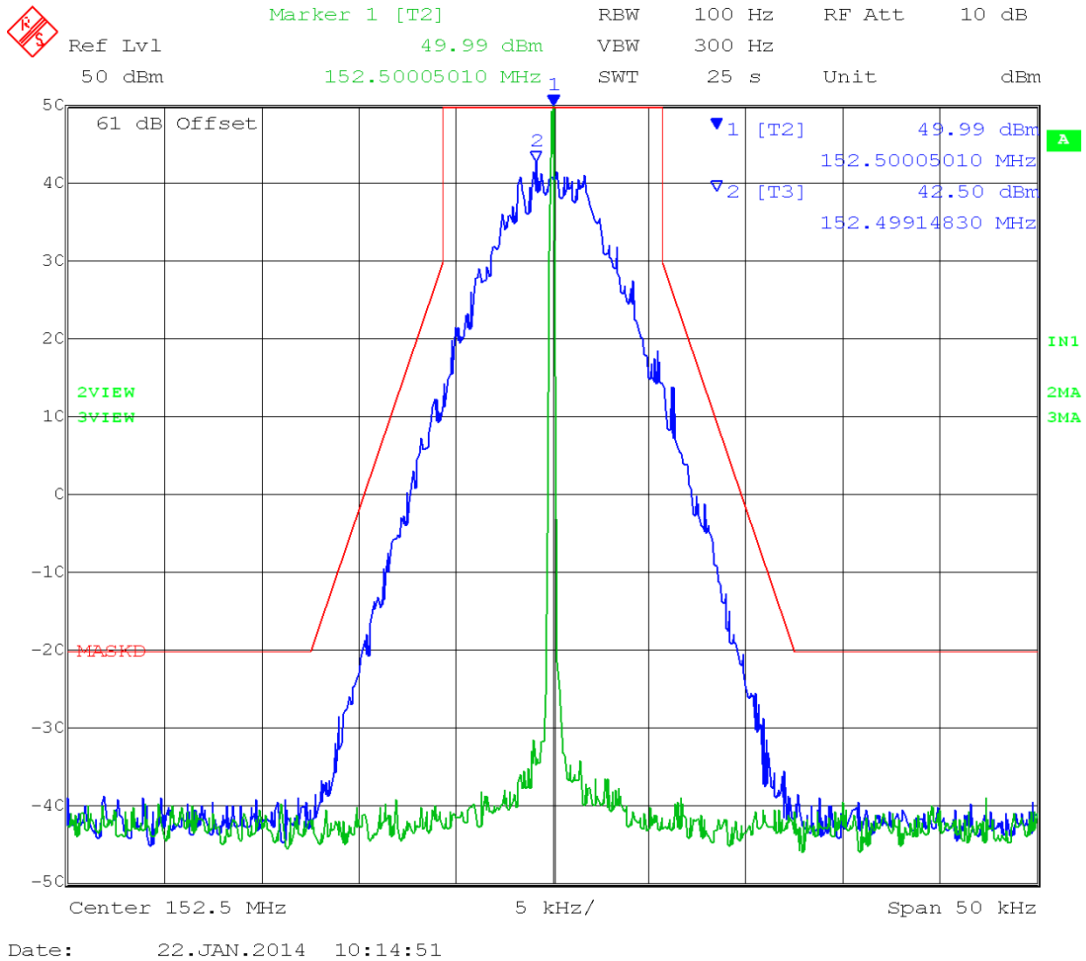


Date: 22.JAN.2014 10:08:11

**138.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

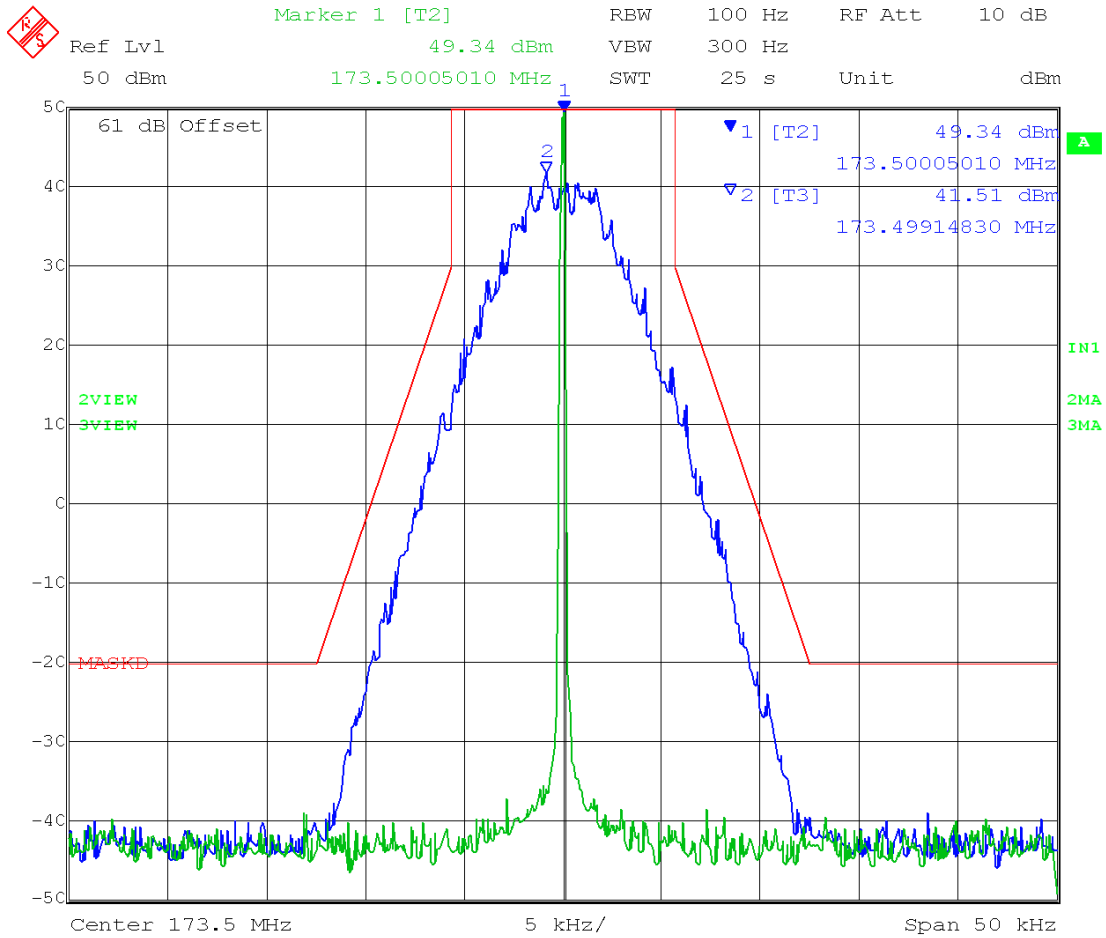
### DIGITAL SIGNAL INPUT



**152.5 MHz**

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
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### DIGITAL SIGNAL INPUT



Date: 22.JAN.2014 10:19:51

### 173.5 MHz

Applicant: CRESCEND TECHNOLOGIES, LLC  
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 MODEL #: DSDTV SERIES 100XX  
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**SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)**

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

**Requirements:**  $43+10\log(P_o)=43+10\log(100.0)= 63.0$  dB

$50+10\log(P_o)=50+10\log(100.0)= 70.0$  dB

**Test Data:**

<b>TF POWER</b>	<b>EF</b>	<b>dB below carrier</b>		<b>TF POWER</b>	<b>EF</b>	<b>dB below carrier</b>
138.50	277.00	70.3		143.50	287.00	70.9
	415.50	77.4			430.50	82.9
	554.00	77.3			574.00	95.5
	692.50	83.5			717.50	92.4
	831.00	92.6			861.00	97.3
	969.50	88.8			1004.50	87.7
	1108.00	90.0			1148.00	90.2
	1246.50	84.1			1291.50	82.9
	1385.00	87.9			1435.00	90.5

<b>TF POWER</b>	<b>EF</b>	<b>dB below carrier</b>		<b>TF POWER</b>	<b>EF</b>	<b>dB below carrier</b>
152.50	305.00	71.0		162.50	325.00	71.6
	457.50	80.4			487.50	84.7
	610.00	80.1			650.00	99.0
	762.50	86.1			812.50	93.2
	915.00	97.9			975.00	97.4
	1067.50	86.0			1137.50	84.6
	1220.00	89.7			1300.00	88.6
	1372.50	78.2			1462.50	80.6
	1525.00	87.5			1625.00	87.7

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

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<b>TF POWER</b>	<b>EF</b>	<b>dB below carrier</b>				
173.50	347.00	71.4				
	520.50	95.4				
	694.00	97.8				
	867.50	90.0				
	1041.00	87.9				
	1214.50	83.9				
	1388.00	86.9				
	1561.50	81.6				
	1735.00	88.0				

\* 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)
138.50	0	0
277.00	V	115.2
415.50	V	115.8
554.00	V	114.0
692.50	V	111.0
831.00	V	108.8
969.50	V	106.6
1108.00	H/V	*
1246.50	H/V	*
1385.00	H/V	*

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
143.50	0	0
287.00	V	117.2
430.50	V	117.6
574.00	V	112.8
717.50	V	111.8
861.00	V	108.2
1004.50	H/V	*
1148.00	H/V	*
1291.50	H/V	*
1435.00	H/V	*

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
152.50	0	0
305.00	V	113.9
457.50	V	113.7
610.00	V	113.9
762.50	V	108.4
915.00	V	108.2
1067.50	H/V	*
1220.00	H/V	*
1372.50	H/V	*
1525.00	H/V	*

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
162.50	0	0
325.00	V	113.8
487.50	V	114.8
650.00	V	113.3
812.50	V	110.4
975.00	V	108.5
1137.50	H/V	*
1300.00	H/V	*
1462.50	H/V	*
1625.00	H/V	*

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

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Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
173.50	0	0
347.00	V	119.3
520.50	V	114.5
694.00	V	111.8
867.50	V	107.8
1041.00	H/V	*
1214.50	H/V	*
1388.00	H/V	*
1561.50	H/V	*
1735.00	H/V	*

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

Applicant: CRESCEND TECHNOLOGIES, LLC  
 FCC ID: CWWDSDTV100XX  
 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport

**POWER LINE CONDUCTED INTERFERENCE**

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

**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
* Decreases with logarithm of frequency		

**Test Data:** Not applicable EUT is battery operated exclusively.

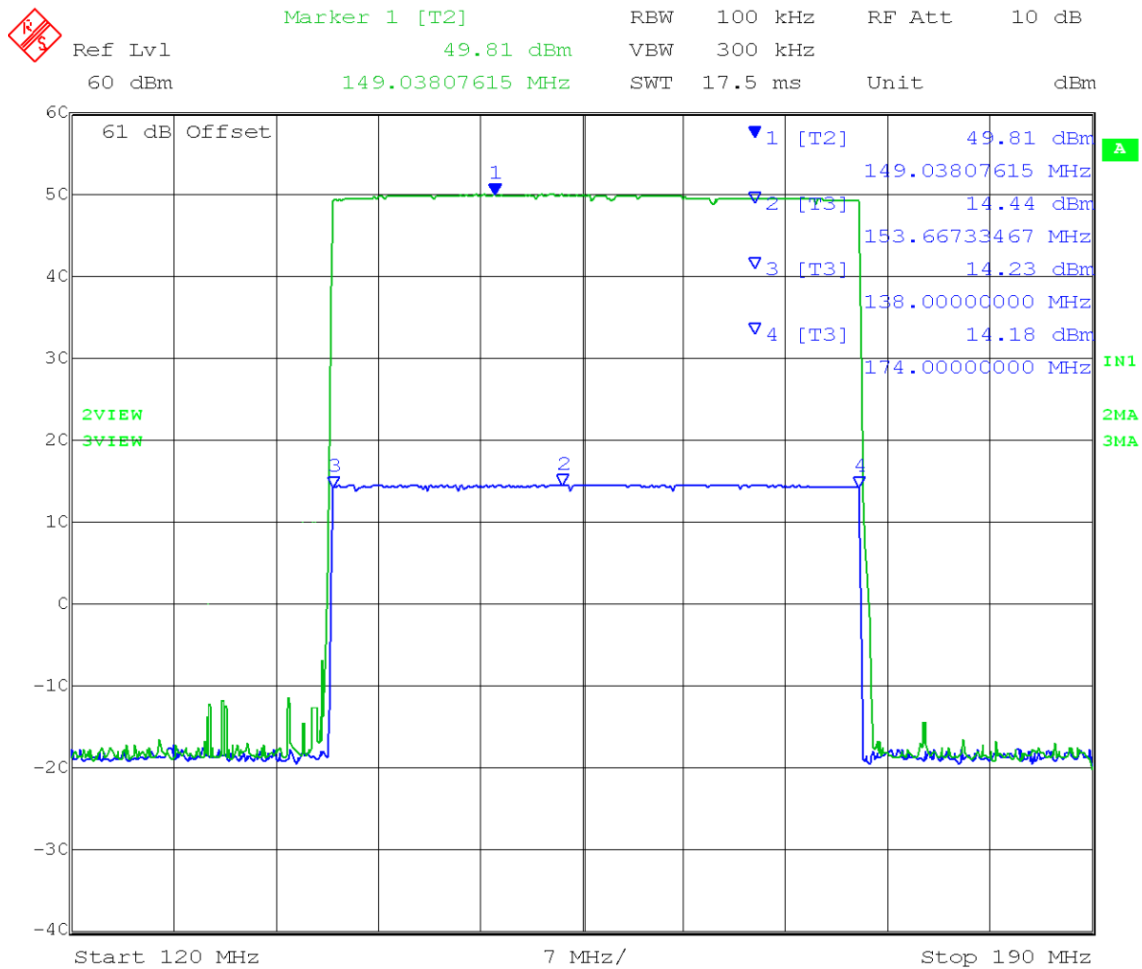
Applicant: CRESCEND TECHNOLOGIES, LLC  
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 IC: 7291A-DSDTV100XX  
 MODEL #: DSDTV SERIES 100XX  
 Report: C\CRESCEND\_CWW\94AUT14\94AUT14TestReport

**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



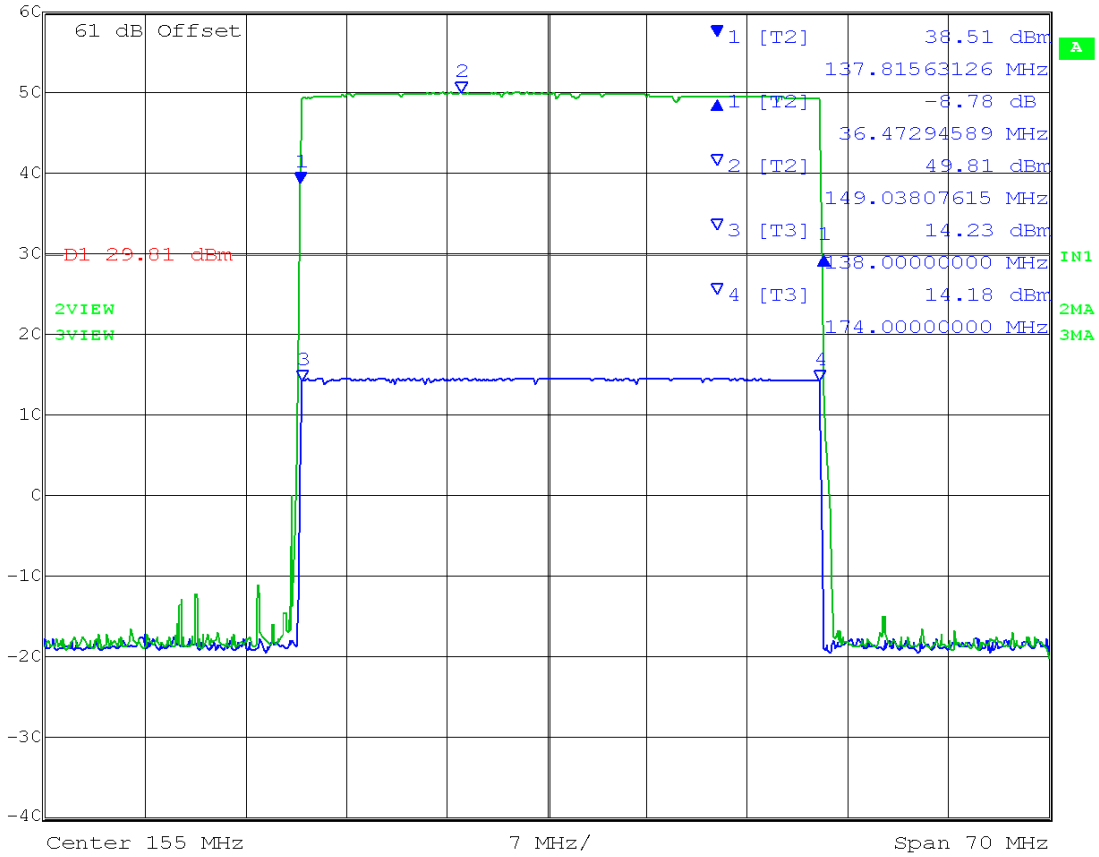
Date: 22.JAN.2014 11:05:15

Input	14.44 dBm
Output	49.81 dBm
Pass Band Gain	35.37 dB

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## 20 dB BANDWIDTH

Delta 1 [T2]
RBW 100 kHz
RF Att 10 dB  
Ref Lvl -8.78 dB
VBW 300 kHz  
60 dBm
36.47294589 MHz
SWT 17.5 ms
Unit dBm



Date: 22.JAN.2014 11:11:37

Applicant: CRESCEND TECHNOLOGIES, LLC  
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 MODEL #: DSDTV SERIES 100XX  
 Report: C:\CRESCEND\_CWW\94AUT14\94AUT14TestReport