

*FCC PART 15, SUBPART C  
TEST REPORT*

*for*

**TUNECAST**

**MODEL: F8V3080**

Prepared for

**BELKIN INTERNATIONAL, INC.  
501 W. WALNUT STREET  
COMPTON, CA 90220-5221**

Prepared by: \_\_\_\_\_

**JOSH HANSEN**

Approved by: \_\_\_\_\_

**JEFF KLINGER**

**COMPATIBLE ELECTRONICS INC.  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400**

**DATE: December 6, 2008**

	REPORT BODY	APPENDICES					TOTAL
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## GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Device Tested: TUNECAST  
Model: F8V3080  
S/N: N/A

Product Description: See Expository Statement

Modifications: The EUT was not modified in order to meet the specifications.

Manufacturer: Belkin International, inc.  
501 W. Walnut Street  
Compton, CA 90220-5221

Test Dates: November 4 and 5, 2008

Test Specifications: CFR Title 47, Part 15 Subpart C, Sections 15.205, 15.209 and 15.239

Test Procedure: ANSI C63.4: 2003

Test Deviations: The test procedure was not deviated from during the testing.

## SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Radiated RF Emissions, 10 kHz – 1080 MHz	Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209, 15.239 (b), and 15.239 (c).
2	-20 dB Bandwidth of the Fundamental	Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.239 (a).

**1. PURPOSE**

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the TUNECAST Model: F8V3080. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.239.



## 2. ADMINISTRATIVE DATA

### 2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way, Lake Forest, California 92630.

### 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

### 2.3 Cognizant Personnel

Belkin International, inc.

Daniel Wesey Compliance Engineer

Compatible Electronics, Inc.

Josh Hansen Test Technician  
Joey Madlangbayan Test Engineer  
Jeff Klinger Director of Engineering

### 2.4 Date Test Sample was Received

The test sample was received on November 4, 2008.

### 2.5 Disposition of the Test Sample

The sample has not yet been returned to Belkin International, Inc. as of December 6, 2008.

### 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
CLA	Cigar Lighter Adaptor
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
RBW	Resolution Bandwidth
VBW	Video Bandwidth

**3. APPLICABLE DOCUMENTS**

The following documents are referenced or used in the preparation of this EMI Test Report.

<b>SPEC</b>	<b>TITLE</b>
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz



#### **4. DESCRIPTION OF TEST CONFIGURATION**

##### **4.1 Description Of Test Configuration - EMI**

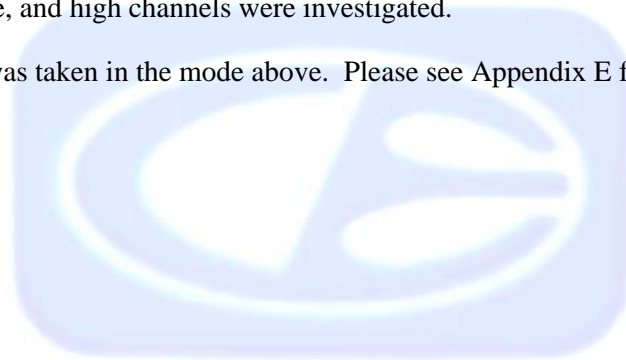
Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The TUNECAST Model: F8V3080 (EUT) was connected to an MP3 player via the stereo phone plug connector. 12V DC was supplied via the EUT integral CLA (Cigar Lighter Adaptor), which was connected to a CLA socket receptacle, which in turn was connected to a 12 volt battery. The EUT was receiving audio from the MP3 player and transmitting the audio in the FM band, the MP3 player and the music being played was provided by the customer, the song was Linkin Park "Don't say" 0dB encoded (Max analog level was set). The EUT's transmit antenna was directly connected to the PCB of the EUT, and is mounted in the top cover.

The low, middle, and high channels were investigated.

The final data was taken in the mode above. Please see Appendix E for the data sheets.





#### **4.1.1 Cable Construction and Termination**

Cable 1 This is a 1.2 meter cable connecting the Cigarette Lighter Adapter (CLA) (Battery receptacle) to the EUT. The cable has a CLA at the cigar lighter receptacle end and has a mini barrel type DC connector at the EUT end.

Cable 2 This is a 25 centimeter cable connecting the MP3 player to the EUT. The cable has a 1/8 inch stereo phone connector at the MP3 player end, and is hard wired into the EUT.



**5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT****5.1 EUT and Accessory List**

<b>EQUIPMENT</b>	<b>MANUFACTURER</b>	<b>MODEL NUMBER</b>	<b>SERIALNUMBER</b>	<b>FCC ID</b>
TUNECAST (EUT)	BELKIN INTERNATIONAL, INC.	F8V3080	N/A	<b>K7SF8V3080-B</b>
MP3 PLAYER	Apple	iPod A1136	JQ542XTQSZ9	N/A
12V BATTERY	GENERIC	N/A	N/A	N/A



**5.2 EMI Test Equipment**

<b>EQUIPMENT TYPE</b>	<b>MANUFACTURER</b>	<b>MODEL NUMBER</b>	<b>SERIAL NUMBER</b>	<b>CAL. DATE</b>	<b>CAL. DUE DATE</b>
Computer	Compatible Electronics	NONE	NONE	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100219	4/11/2008	4/11/2010
Antenna, Active Loop	Com Power	AL-130	17085	8/1/08	8/1/09
Antenna, CombiLog	Com Power	AC-220	001	9/03/08	9/03/09
Mast, Antenna Positioner	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Antenna Mast	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Turntable	Sunol Science Corporation	FM 2001	N/A	N/A	N/A
Mast and Turntable Controller	Sunol Science Corporation	SC104V	020808-1	N/A	N/A

**6. TEST SITE DESCRIPTION****6.1 Test Facility Description**

Please refer to section 2.1 and 7.1 of this report for EMI test location.

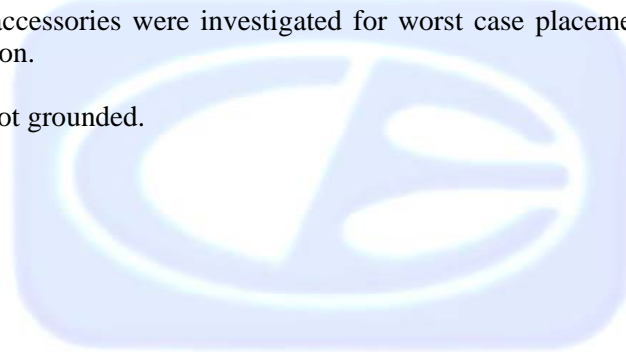
**6.2 EUT Mounting, Bonding and Grounding**

The EUT, MP3 Player, and cigarette lighter receptacle were mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was placed in the center, and on the back edge of the table, in accordance with ANSI C63.4: 2003. The test site receive antenna distance was measured from the closest periphery of the EUT setup. Each accessory was placed 10cm to either side of the EUT. The 12 volt battery was placed on the ground, using an 80cm length of wire to connect to the cigarette lighter receptacle, which was mounted on the table.

The EUT and accessories were investigated for worst case placement; the above yielded the worst case configuration.

The EUT was not grounded.



**7. TEST PROCEDURES**

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

**7.1 RF Emissions****7.1.1 Conducted Emissions Test**

EUT is DC powered; therefore this test was not performed.



### 7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The EMI receiver was used as a measuring meter. The EMI receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps.

The frequencies above 1 GHz, below 30 MHz, and the fundamental for the low, middle, and high channels were investigated with the built in average detector. For spurious emissions below 1GHz and above 30MHz, a quasi-peak detector was used.

The measurement bandwidths and transducers used for the radiated emissions (Spurious) tests were:

<b>FREQUENCY RANGE</b>	<b>EFFECTIVE MEASUREMENT BANDWIDTH</b>	<b>TRANSDUCER</b>
9 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 1000 MHz	120 kHz	CombiLog Antenna
1000-1080MHz	1 MHz	CombiLog Antenna

The Semi-Anechoic test site of Compatible Electronics, Inc, Lab P, was used for radiated emission testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.

### 7.1.3 Radiated Emissions (Spurious and Harmonics) Test (Continued)

The EUT was tested at a 3-meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E.

#### **Test Results:**

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.239.

### 7.1.4 Peak radiated EMI

The EUT was tested at a 3-meter test distance to obtain the final test data. The EUT was maximized for cable placement as well as EUT position. The EUT was receiving a 0dB encoded file from the audio source. This file represents maximum audio input level. The resolution bandwidth was 100 kHz and video bandwidth 300 KHz. The final qualification data sheets are located in Appendix E. This data also shows compliance at the band edges.

#### **Test Results:**

The EUT complies with Part 15, Subpart C, section 15.239.

## 7.2 Bandwidth of the Fundamental

The -20 dB bandwidth was checked using the EMI Receiver to see that it was wholly within the 200 kHz band centered on the operating frequency. The RBW was set to 10 kHz and the VBW was set to 30 kHz, but no less than 3kHz RBW and 10kHz VBW. The low, middle, and high channels were investigated. Plots of the -20 dB bandwidth are located in Appendix E.

### Test Results:

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.239 (a) for the -20 dB bandwidth of the fundamental. The EUT has a -20 dB bandwidth that is wholly within the 200 kHz band centered on the operating frequency.





**8. CONCLUSIONS**

The TUNECAST Model: F8V3080 meets all of the specification limits defined in CFR Title 47, Part 15, Subpart B for the digital portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.239 for the transmitter portion.





**APPENDIX A**

***LABORATORY RECOGNITIONS***

---

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

## ***LABORATORY RECOGNITIONS***

### **Compatible Electronics has the following agency accreditations:**

National Voluntary Laboratory Accreditation Program - Lab Code: 200527-00

Voluntary Control Council for Interference - Registration Numbers: R-2848, C-3142, T-1450

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

### **Compatible Electronics is recognized or on file with the following agencies:**

Industry Canada: Site # 2154C-1



**APPENDIX B**

***MODIFICATIONS TO THE EUT***

## **MODIFICATIONS TO THE EUT**

No modifications were made to the EUT.



  
**APPENDIX C*****ADDITIONAL MODELS COVERED  
UNDER THIS REPORT***

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**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

## **ADDITIONAL MODELS COVERED UNDER THIS REPORT**

USED FOR THE PRIMARY TEST

TUNECAST  
Model: F8V3080

There were no additional models covered under this report.





**APPENDIX D**

***DIAGRAMS, CHARTS, AND PHOTOS***



**FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED TEST SITE**

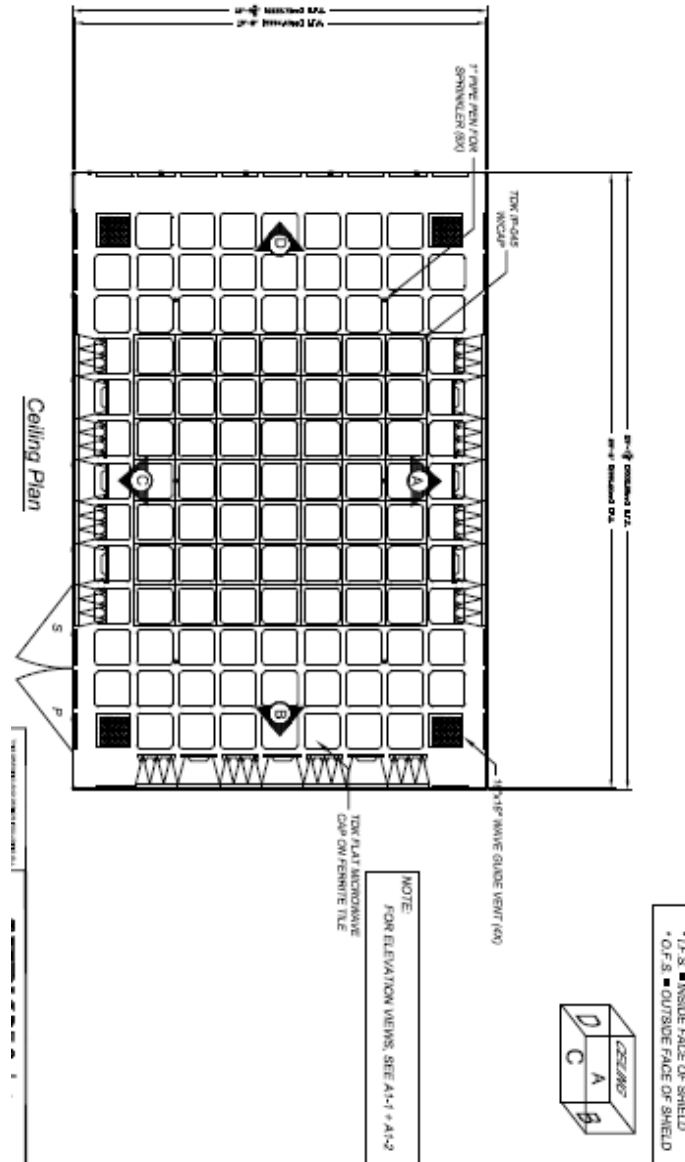


Figure 1ITDK FAC-3 test chamber

**COM-POWER AC-220****LAB P - COMBYLOG ANTENNA**

S/N: 001

CALIBRATION DATE: SEPTEMBER 03, 2008

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
30.0	20.6	300.0	14.9
40.0	19.8	400.0	16.5
50.0	19.0	500.0	18.5
60.0	13.8	700.0	21.1
70.0	9.6	1000.0	24.6
80.0	8.7	1300.0	24.9
100.0	11.6	1500.0	27.2
150.0	9.4	1700.0	27.2
200.0	10.8	2000.0	29.0
250.0	14.9		

**COM-POWER AL-130****LOOP ANTENNA**

S/N: 17085

CALIBRATION DATE: 8/1/08

<b>FREQUENCY (MHz)</b>	<b>MAGNETIC (dB/m)</b>	<b>ELECTRIC (dB/m)</b>	<b>FREQUENCY (MHz)</b>	<b>MAGNETIC (dB/m)</b>	<b>ELECTRIC (dB/m)</b>
0.009	-43	8.5	0.8	-41.53	9.97
0.01	-41.93	9.57	0.9	-41.46	10.04
0.02	-41.29	10.21	1	-41.29	10.21
0.03	-40.73	10.77	2	-40.97	10.53
0.04	-41.03	10.47	3	-41.1	10.4
0.05	-42.37	9.13	4	-41.36	10.14
0.06	-41.6	9.9	5	-40.93	10.57
0.07	-41.96	9.54	6	-40.67	10.83
0.08	-42.1	9.4	7	-41.07	10.43
0.09	-41.83	9.67	8	-40.9	10.6
0.1	-41.83	9.67	9	-40.1	11.4
0.2	-44.46	7.04	10	-41.16	10.34
0.3	-41.73	9.77	15	-47.97	3.53
0.4	-41.8	9.7	20	-40.77	10.73
0.5	-41.8	9.7	25	-44.37	7.13
0.6	-41.33	10.17	30	-43.1	8.4
0.7	-41.36	10.14			



**FRONT VIEW**

BELKIN INTERNATIONAL, INC.  
TUNECAST  
MODEL: F8V3080  
FCC SUBPART B AND C – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**

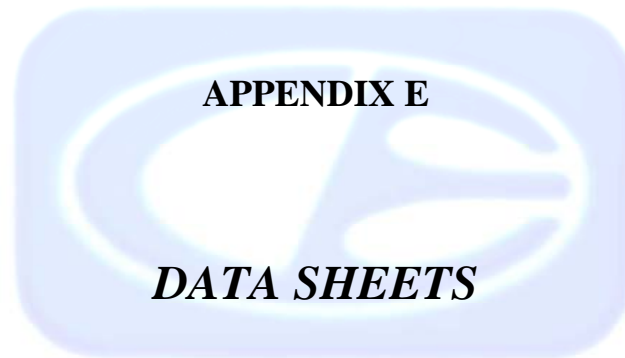


**REAR VIEW**

BELKIN INTERNATIONAL, INC.  
TUNECAST  
MODEL: F8V3080  
FCC SUBPART B AND C – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**







***RADIATED EMISSIONS***

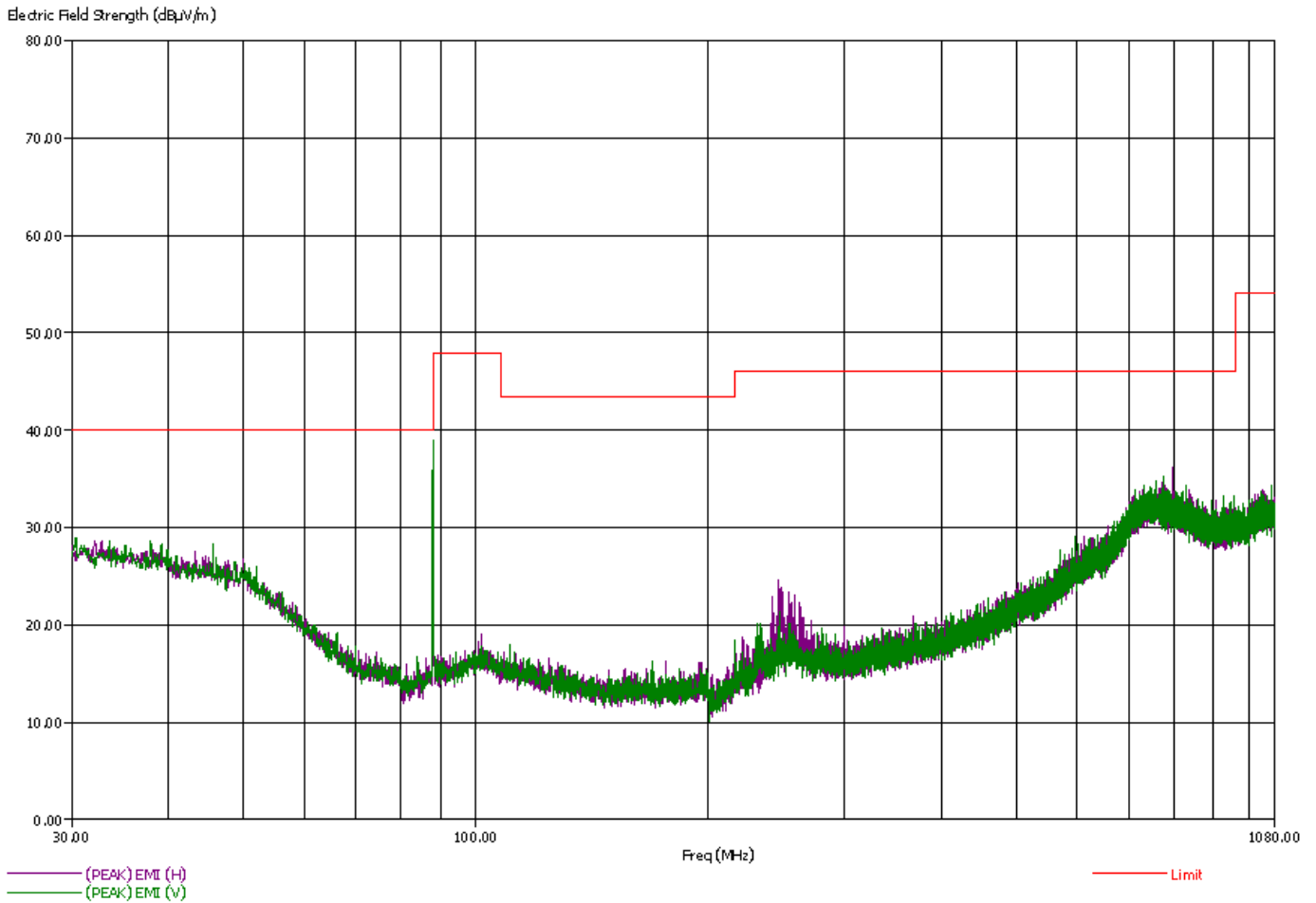
SPURIOUS AND HARMONICS

***DATA SHEETS***

Title: FCC 15.239  
File: Radiated Pre-scan 30-1000Mhz.set  
Operator: Josh Hansen  
EUT Type: Tunecast F8VZ3080  
EUT Condition: 88.1  
Comments:  
Temp: 70f  
Hum: 33%

11/4/2008 5:13:48 PM  
Sequence: Preliminary Scan

Compatible Electronics, Inc

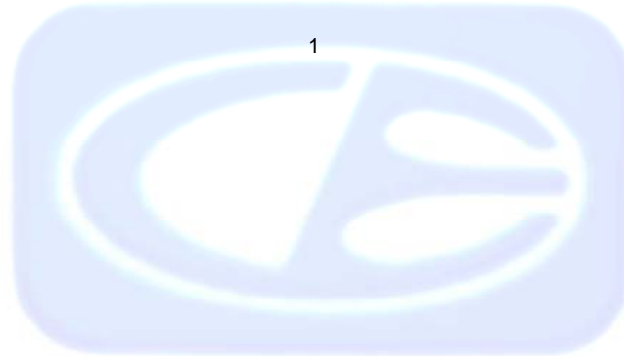




Title: FCC 15.239 11/5/2008 5:00:00 PM  
 File: Radiated Final 30-2000Mhz.set Sequence: Final Measurements  
 Operator: Josh Hansen  
 EUT Type: Tunecast F8V3080  
 EUT Condition: 88.1  
 Comments:  
 Temp: 70f  
 Hum: 33%

Compatible Electronics, Inc

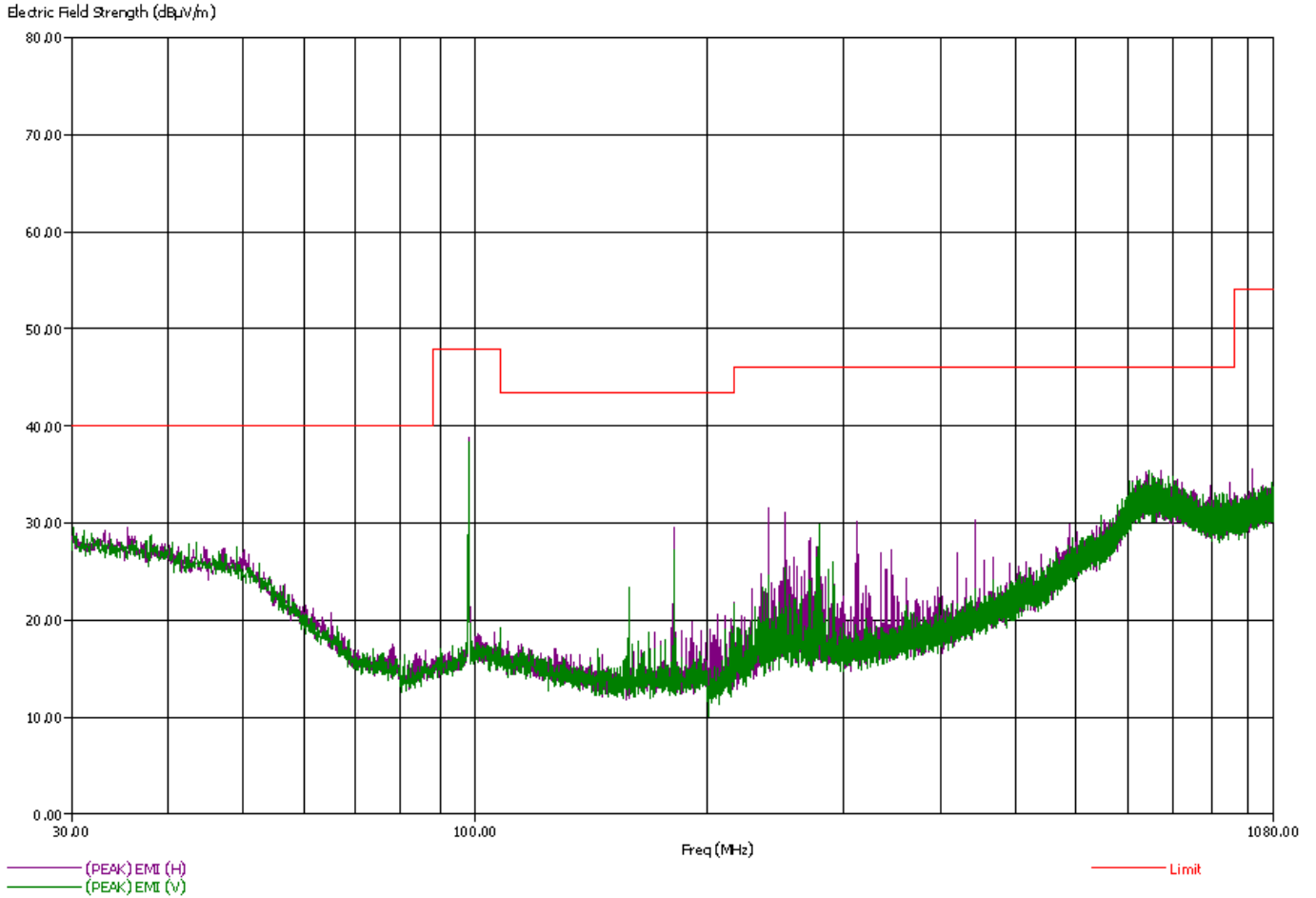
Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dBµV/m)	(PEAK) EMI (dBµV/m)	Limit (dBµV/m)	Pol	Twr Ht (cm)	Ttbl Agl (deg)
32.20	-26.35	24.10	28.87	50.45	H	11.00	270.76
45.70	-27.71	22.74	28.30	50.45	V	137.75	206.52
246.80	-41.75	15.70	27.14	57.45	H	359.75	244.70
254.20	-41.65	15.80	23.41	57.45	H	328.75	174.64
774.80	-27.43	30.02	35.19	57.45	V	109.75	231.94



Title: FCC 15.239  
File: Radiated Pre-scan 30-1000Mhz.set  
Operator: Josh Hansen  
EUT Type: Tunecast F8V3080  
EUT Condition: 98.1  
Comments:  
Temp: 70f  
Hum: 33%

11/5/2008 8:05:09 AM  
Sequence: Preliminary Scan

Compatible Electronics, Inc



Title: FCC 15.239  
File: Radiated Final 30-2000Mhz.set  
Operator: Josh Hansen  
EUT Type: Tunecast F8V3080  
EUT Condition: 98.1  
Comments:  
Temp: 70f  
Hum: 33%

11/5/2008 11:56:43 AM  
Sequence: Final Measurements

Compatible Electronics, Inc

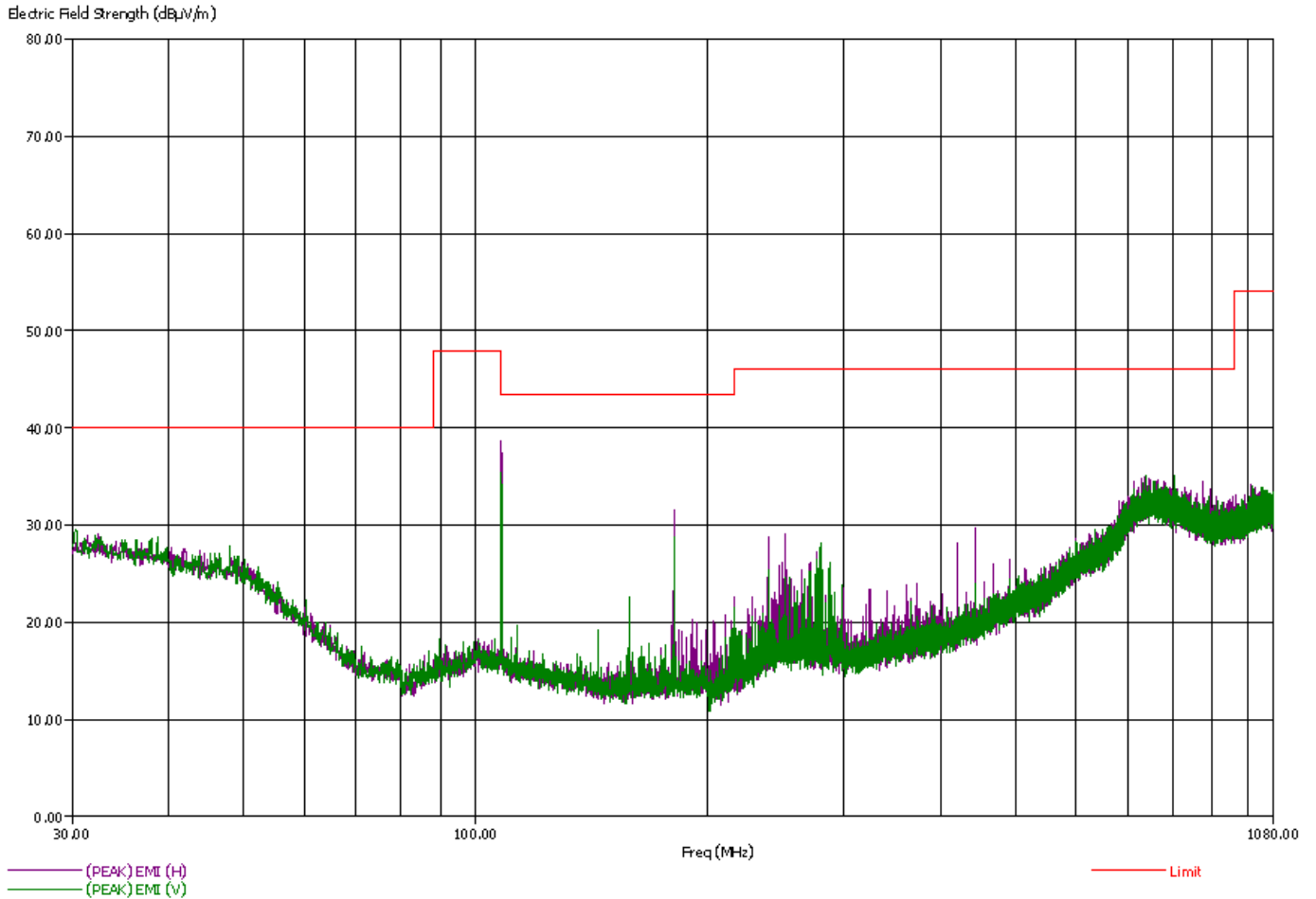
Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dB $\mu$ V/m)	(PEAK) EMI (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Pol	Twr Ht (cm)	Ttbl Agl (deg)
158.10	-28.40	22.05	24.98	50.45	V	286.75	166.52
180.70	-17.07	33.38	34.46	50.45	H	352.25	160.52
180.70	-23.22	27.23	29.15	50.45	V	347.25	156.88
240.10	-30.75	26.70	29.86	57.45	H	354.00	162.76
252.00	-30.36	27.09	36.33	57.45	H	6.50	151.05



Title: FCC 15.239  
File: Radiated Pre-scan 30-1000Mhz.set  
Operator: Josh Hansen  
EUT Type: Tunecast F8V3080  
EUT Condition: 107.9  
Comments:  
Temp: 70f  
Hum: 33%

11/5/2008 8:27:54 AM  
Sequence: Preliminary Scan

Compatible Electronics, Inc



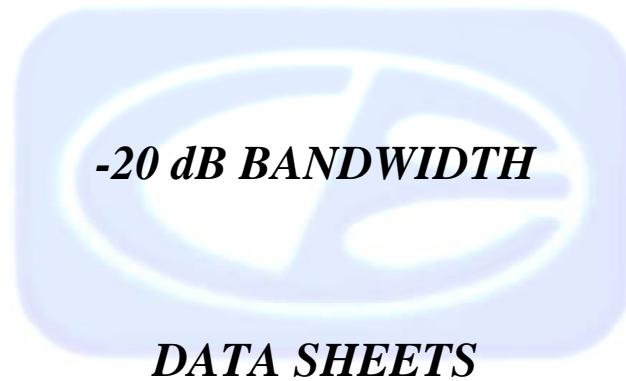
Title: FCC 15.239  
File: Radiated Final 30-2000Mhz.set  
Operator: Josh Hansen  
EUT Type: Tunecast F8V3080  
EUT Condition: 107.9  
Comments:  
Temp: 70f  
Hum: 33%

11/5/2008 12:30:38 PM  
Sequence: Final Measurements

Compatible Electronics, Inc

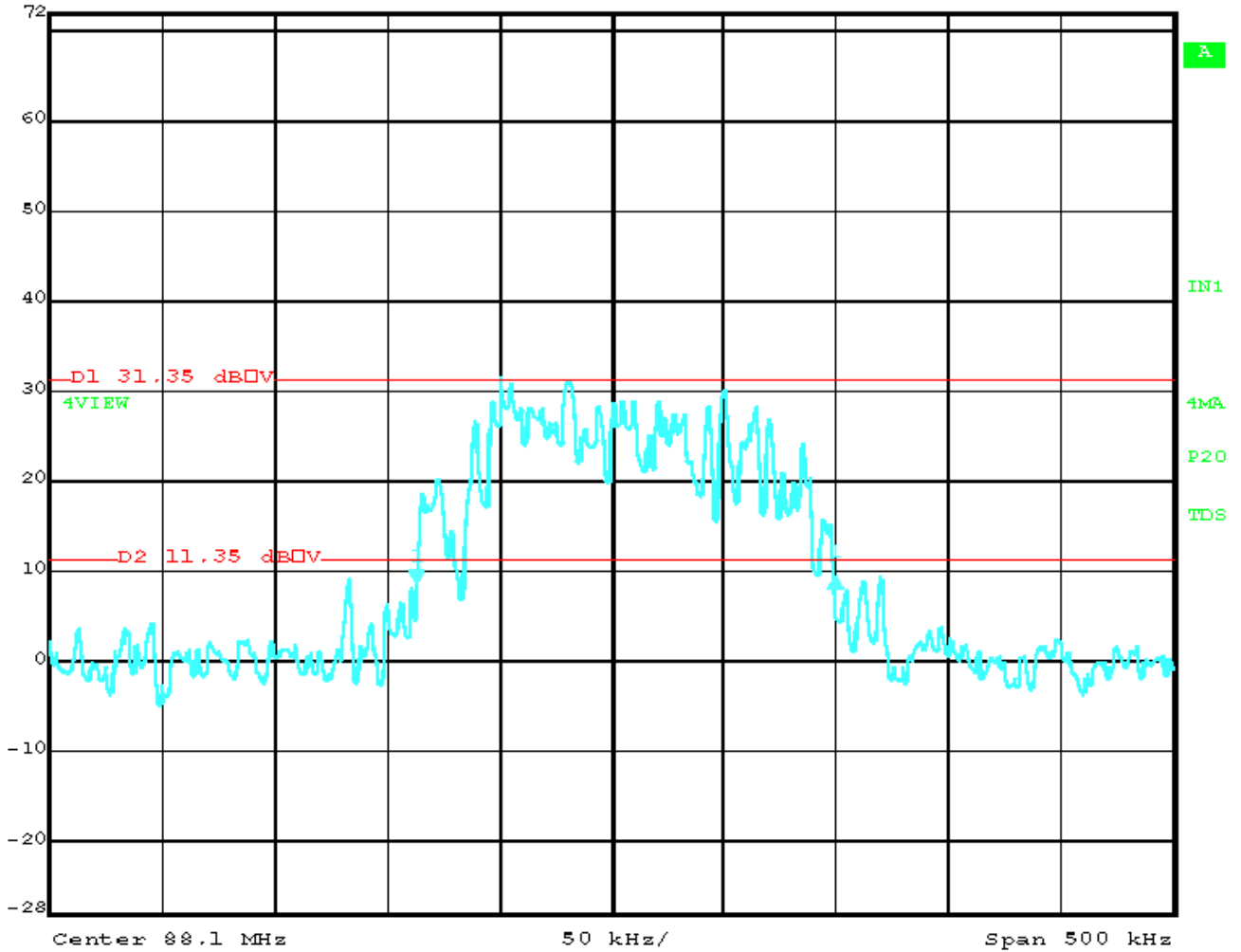
Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dB $\mu$ V/m)	(PEAK) EMI (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Pol	Twr Ht (cm)	Ttbl Agl (deg)
180.60	-22.17	28.28	29.91	50.45	V	346.25	160.17
180.70	-18.16	32.29	33.30	50.45	H	0.00	183.23
240.10	-27.98	29.47	30.99	57.45	H	203.00	186.41
252.00	-35.99	21.46	27.36	57.45	H	12.50	157.64
280.80	-38.61	18.84	21.40	57.45	V	157.25	227.94







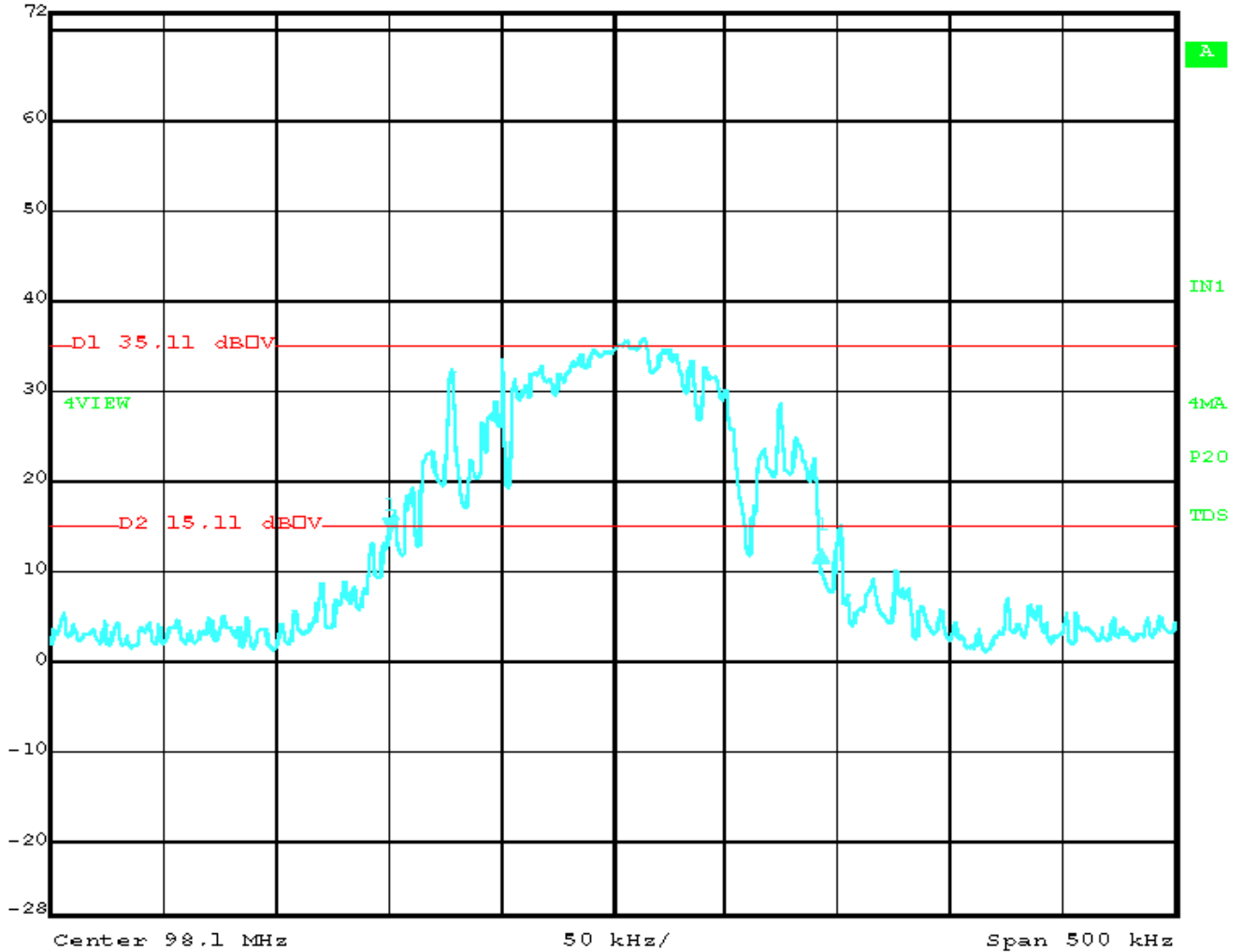
Delta 1 [T4] RBW 10 kHz RF Att 0 dB  
 Ref Lvl 0.58 dB VEW 30 kHz  
 72 dB $\mu$ V 186.37274549 kHz SWT 15 ms Unit dB $\mu$ V



Date: 4.NOV.2008 17:13:26



Delta 1 [T4]      RBW 10 kHz      RF Att 0 dB  
 Ref Lvl      -2.27 dB      VBW 30 kHz  
 72 dBov      191.38276553 kHz      SWT 15 ms      Unit dBov

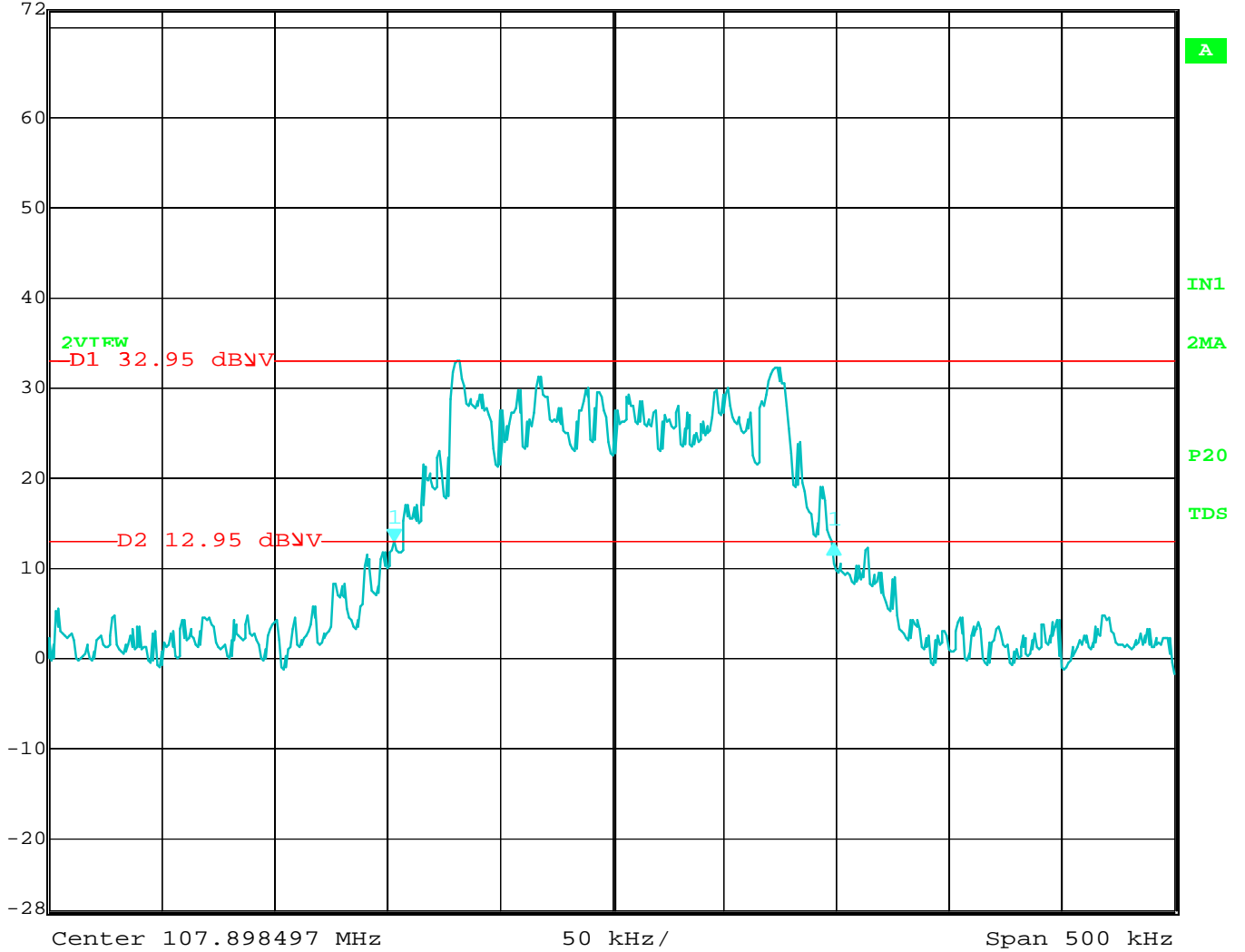


Date: 4.NOV.2008 16:54:31





Delta 1 [T2] RBW 10 kHz RF Att 0 dB  
 Ref Lvl -0.21 dB VBW 30 kHz  
 72 dBV 195.39078156 kHz SWT 15 ms Unit dBV



Date: 19.JAN.2009 10:16:03



***PEAK TRANSMIT EMI and BAND EDGE***

***DATA SHEETS***

Title: FCC 15.109  
 File: Final FCC 239 ERP.set  
 Operator: Josh Hansen  
 EUT Type: TuneCast F8V3080  
 EUT Condition:  
 Comments:  
 Temp: 70f  
 Hum: 35%

1/19/2009 10:12:09 AM  
 Sequence: Final Measurements

Compatible Electronics, Inc. FAC-3

Freq (MHz)	(AVG) Margin (dB)	(AVG) EMI (dBµV/m)	(PEAK) EMI (dBµV/m)	Limit (dBµV/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)
88.10	-16.24	31.72	33.63	47.96	H	331.25	372.52
88.10	-14.73	33.23	42.00	47.96	V	270.50	119.64
98.10	-12.04	35.92	39.57	47.96	H	171.75	343.29
98.10	-13.46	34.50	38.75	47.96	V	96.75	113.64
107.90	-12.30	35.66	38.94	47.96	H	179.00	190.64
107.90	-23.05	24.91	34.73	47.96	V	93.50	131.35

