EMC Testing Laboratories, Inc.

# Test Report
# To Determine Compliance With:
# FCC, Part 15.239

**Model number:** TuneLink

**Date:** November 30, 2010

**Manufacturer:** New Potato Technologies
5508 Business Dr
Wilmington, NC, 28405

## Contents Section



# Section 1

## *GENERAL INFORMATION*

| | |
|---|---|
| **Manufacturer:** | New Potato Technologies<br>5508 Business Dr<br>Wilmington, NC, 28405 |
| **Manufacturer representative:** | **Mr. Yuli Starodubtsev** |
| **Equipment covered by this report:** | Model no. TuneLink |
| **Options covered by this report:** | For use with iPhone, 3G |
| **Equipment serial no.** | Prototype |
| **Test specifications:** | FCC, 15.239 and RSS-210 |
| **Product ratings:** | 12Vdc |
| **Test report number:** | 10-181-FM |
| **Test commenced:** | November 10, 2010 |
| **Test completed:** | November 30, 2010 |
| **Test engineer:** | **Gene Bailey** |
| **Test Facility:** | The test facility used to perform these tests is on file with the FCC under registration number 637500 and located at:<br><br>**EMC Testing Laboratories, Inc.**<br>2100 Brandon Trail<br>Suite 101<br>Alpharetta, GA 30004 |

# Section 2

## *PRODUCT DESCRIPTION and TESTS SUMMARY*

**Product Description:**
TuneLink is designed for use in a car, and is a combination of mobile phone charger, Bluetooth solution, FM Transmitter, and direct audio connection. In a typical setup, a Bluetooth connection is made, streaming audio is received via Bluetooth, and then the audio is either re-transmitted to the car audio system via FM or a cabled connection. The charging feature provides 5VDC via the USB connection. The USB connector is for charging only; TuneLink does not use the USB connection for data communication. Product is intended to be used with iPhone, model no. 3G.

**Operating Temperature Range:** 15°C to 35°C

**Frequency range:** 88 -107.9 MHz

**Transmit Power:** 5dBm

**Modulation Technique:** FM Transmitter

**Antenna Type:** PCB Plane antenna

**Critical Components:**

Printed wiring boards – The following printed wiring boards are utilized:

| **Name** | **Part. no.** |
|---|---|
| TuneLink | 1001-01002-110, Rev. 0.32 |

**Test Operation:**
For all measurements, the equipment under test was and caused to function in a continuous mode of operation for maximum electrical activity as specified by the manufacturer. Specifically, the product was caused to continuously communicate with an iPod and caused to transmit by a cable connected to a radio or a wireless link as indicated in the various tests.

**Test Configuration:**
The equipment under test (EUT) was set-up and configured as specified by the manufacturer as follows:

**1-** The EUT was connected to the following support peripherals:

**A-** An iPhone, model no. G3.

**B-** A radio manufactured by Bose, model no. AWRCC1.

**C-** A power supply manufactured by HP, model no.E3012A.

**2-** The EUT utilized the following cables.

**A-** A 30.5 cm long shielded cable for connection to radio.

**B-** Two 24AWG unshielded conductors for connection to power supply.

**C-** A 103 cm long USB cable for charging phones.

**D-** A 5ft. long type RG214 cable connected from antenna to preamp.

**E-** A 2ft. long type RG214 cable connected from spectrum analyzer to preamp.

**Modifications:**
The following modifications were required to comply with the requirements.

**1-** None.

**Tests summary**

**Table 1**

| **Clause** | **Test** | **Result** |
|---|---|---|
| 15.239 | Output power | Pass |
| 15.239 | Radiated Emission Test | Pass |
| 15.239 | Harmonic Emissions | Pass |

**Engineering Statement:**
All measurement data of this test report was taken in accordance with the FCC, part 15.239, and RS-210 by EMC Testing Laboratories, Inc. located in Alpharetta, Georgia. Although this data is taken under stringent laboratory conditions and to the best of our knowledge represents accurate data, it must be recognized that emissions from or immunity to this type equipment may be greatly affected by the final installation of the equipment. Therefore, EMC Testing Laboratories, Inc., while supporting the accuracy of the data in this report, takes no responsibility for use of equipment based on these tests. The manufacturer of this equipment must take full responsibility for any field problems which may arise, and agrees that EMC Testing Laboratories, Inc., in performing its functions in accordance with its objectives and purposes, does not assume or undertake to discharge any responsibility of the manufacturer to any other party or parties.

**Conclusion:**
With the above-indicated modifications, the product covered by this report has been tested and found to comply with the requirements of the above-indicated standards.

Tested by:**, Gene Bailey, Engineer** *Gene Bailey*

Approved by: ***Ed Barnes***
**Edward Barnes, RF Engineer,**
**EMC Testing Laboratories, Inc.**

# Section 4

# TEST REPORT

**Results FCC Part 15 – Subpart C**

**4.1.1. Test limits**

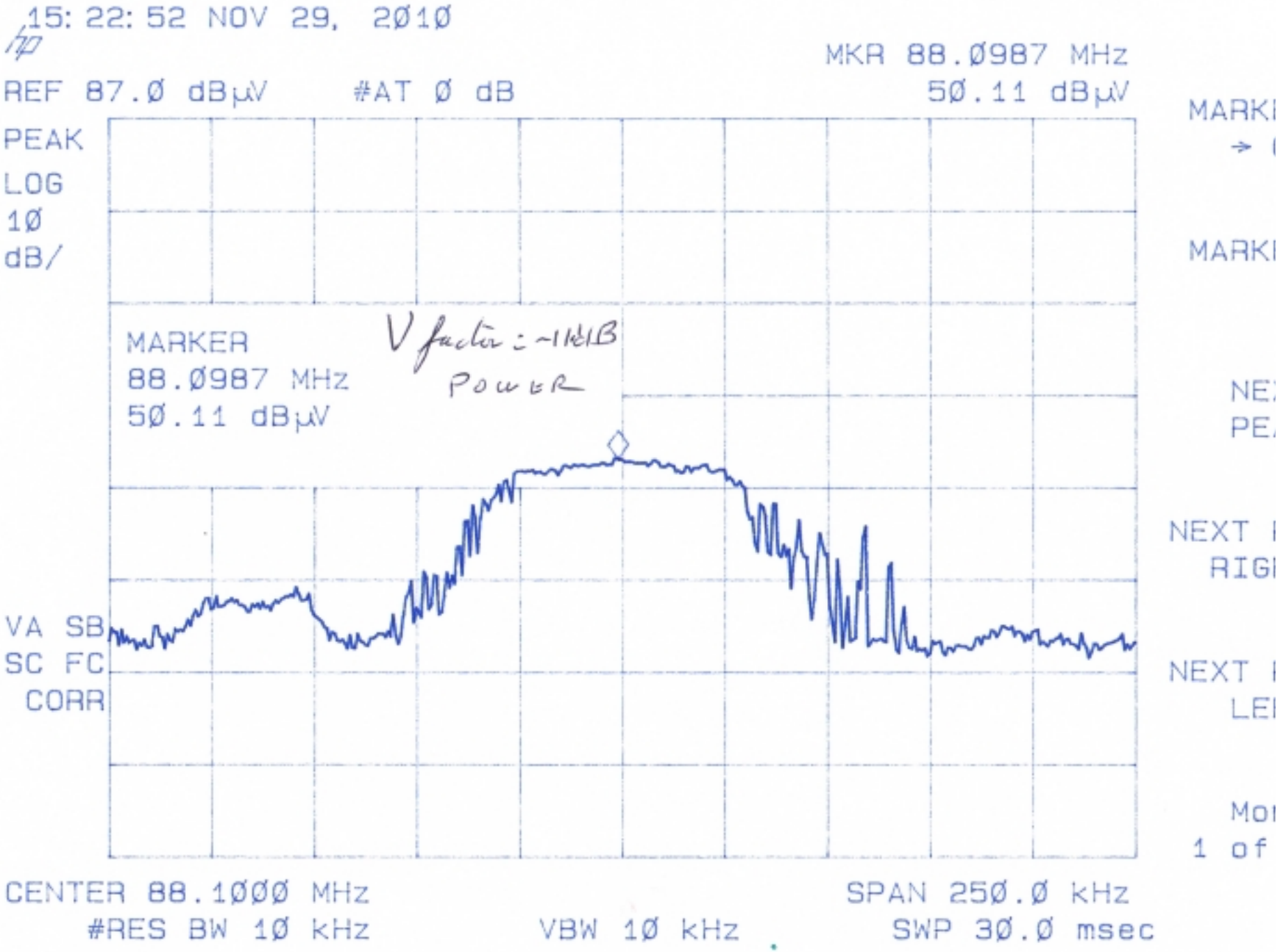
1) FCC part 15C section 15.209
2) FCC part 15C section 15.239(a)

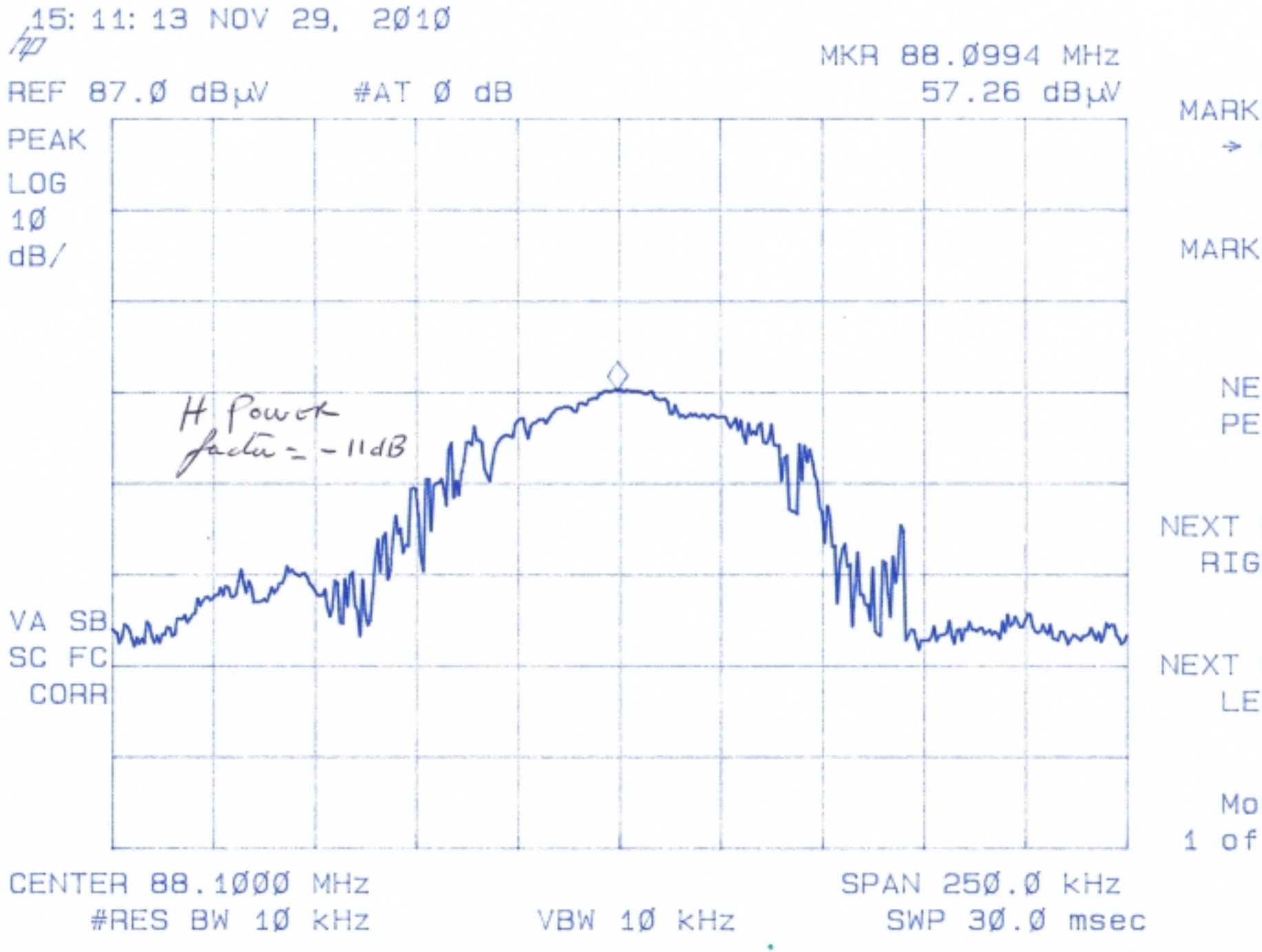
**Subclause 15.209– Peak Output Power** **Pass**

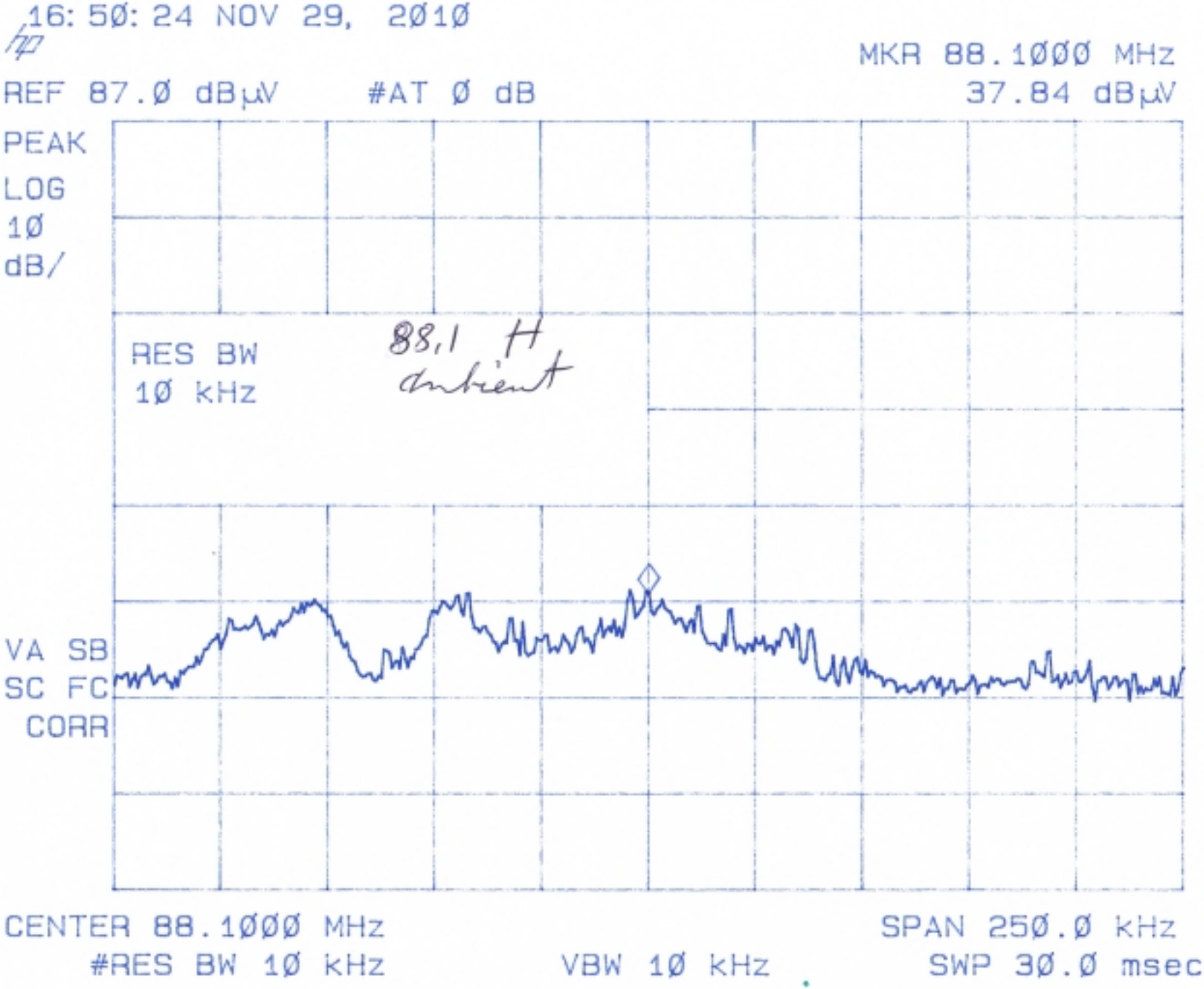
**Test Specification:** FCC Part 15.239
**Mode of operation:** Tx mode (88 – 107.9MHz)
**Port of testing:** Radiated
**Detector:** Peak
**RBW/VBW:** 120KHz / 300KHz
**Supply voltage:** 12VDC from DC power supply
**Temperature:** 23ºC
**Humidity:** 50%

**Results:** See plots the next three pages.

| **Frequency (MHz)** | **Measurement Reading output power (dBµV/m)** | **Corrected Output power (dBµV/m)** | **Limit (dBµV/m)** | **Minimum Margin dBµV/m** |
|---|---|---|---|---|
| 88.1, Vertical | 50.11 | 39.01 | 47.9 | -8.89 |
| 88.1, Horizontal | 57.26 | 46.26 | 47.9 | -1.64 |
| 98.1, Vertical | 52.19 | 41.79 | 47.9 | -6.11 |
| 98.1, Horizontal | 50.47 | 40.37 | 47.9 | -7.53 |
| 107.1, Vertical | 56.22 | 46.52 | 47.9 | -1.38 |
| 107.1, Horizontal | 49.54 | 39.54 | 47.9 | -8.36 |


15: 22: 52 NOV 29, 2010
MKR 88.0987 MHz
REF 87.0 dBµV
#AT 0 dB
50.11 dBµV
PEAK
LOG
10
dB/
MARKER
88.0987 MHz
50.11 dBµV
V factor: -11dB
Power
VA SB
SC FC
CORR
CENTER 88.1000 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec


15: 11: 13 NOV 29, 2010
MKR 88.0994 MHz
REF 87.0 dBµV
#AT 0 dB
57.26 dBµV
PEAK
LOG
10
dB/
H Power
factor = -11dB
VA SB
SC FC
CORR
CENTER 88.1000 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec


16: 50: 24 NOV 29, 2010
MKR 88.1000 MHz
REF 87.0 dBµV
#AT 0 dB
37.84 dBµV
PEAK
LOG
10
dB/
88.1 H
ambient
RES BW
10 kHz
VA SB
SC FC
CORR
CENTER 88.1000 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec
CLEA
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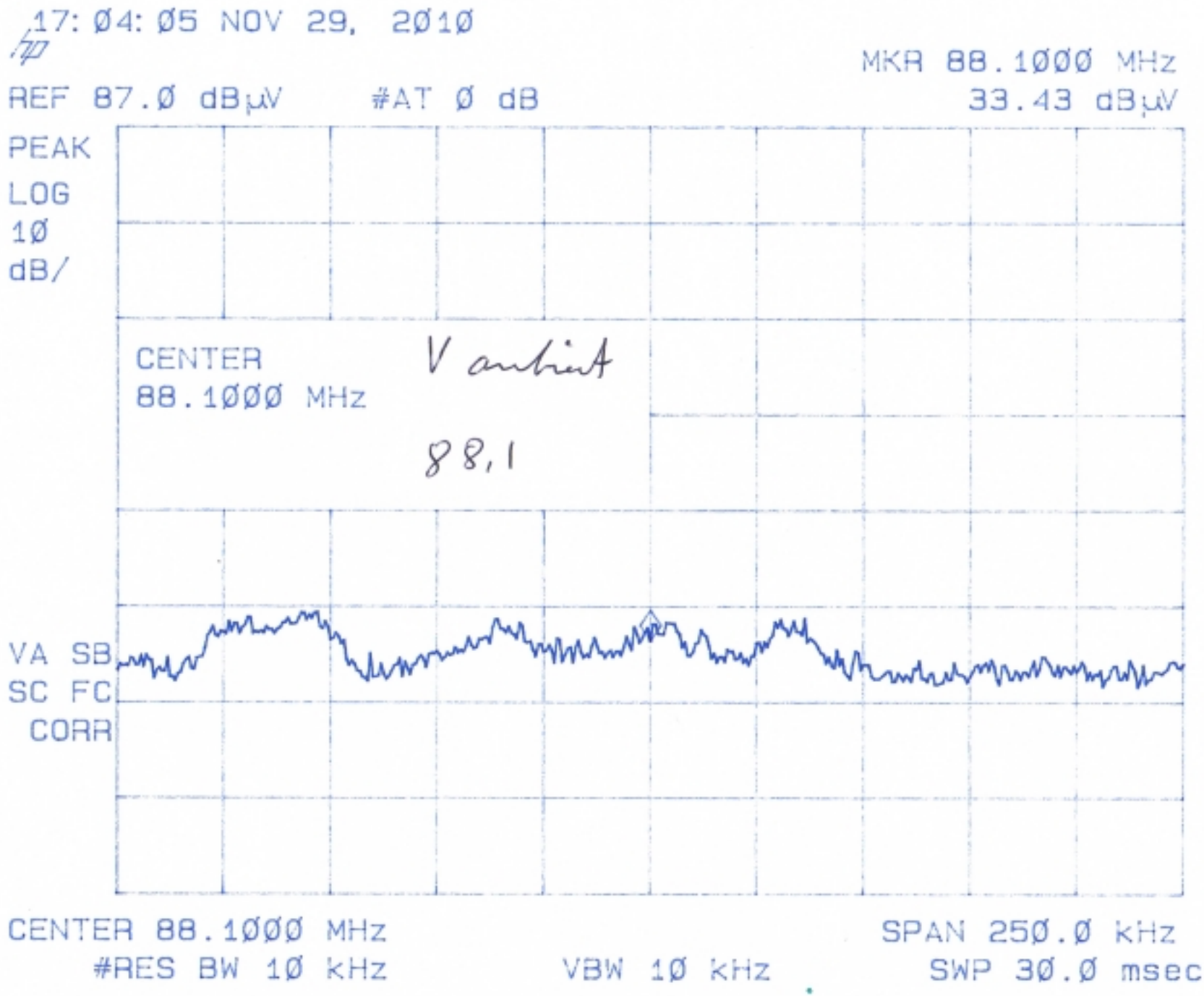
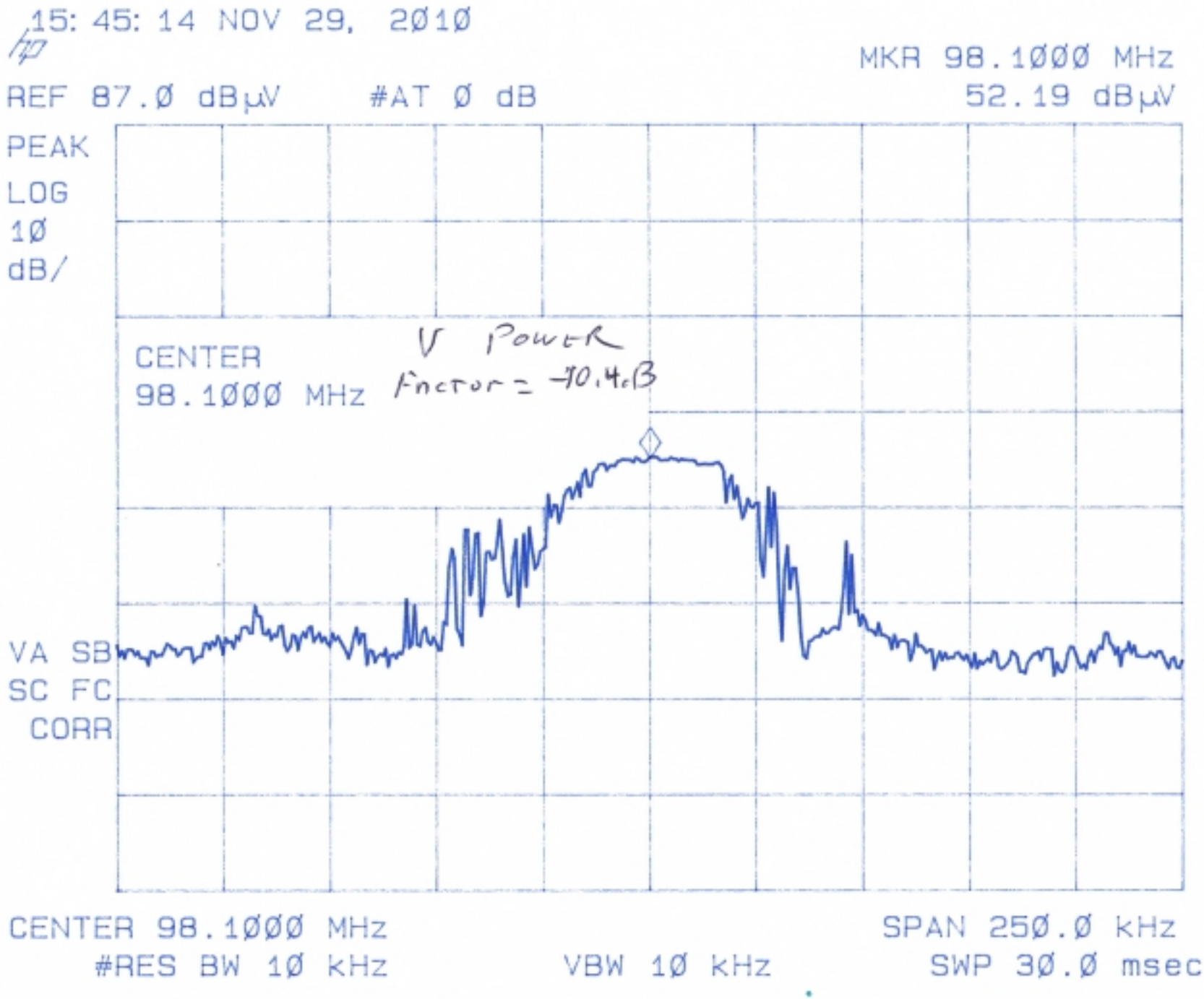

17: Ø4: Ø5 NOV 29, 2Ø1Ø
MKR 88.1ØØØ MHz
REF 87.Ø dBµV
#AT Ø dB
33.43 dBµV
PEAK
LOG
1Ø
dB/
CENTER
88.1ØØØ MHz
Vanbiat
88,1
VA SB
SC FC
CORR
CENTER 88.1ØØØ MHz
#RES BW 1Ø kHz
VBW 1Ø kHz
SPAN 25Ø.Ø kHz
SWP 3Ø.Ø msec


15: 45: 14 NOV 29, 2010
MKR 98.1000 MHz
REF 87.0 dBµV
#AT 0 dB
52.19 dBµV
PEAK
LOG
10
dB/
CENTER
98.1000 MHz
V Power
Factor = -10.4dB
VA SB
SC FC
CORR
CENTER 98.1000 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec
CLEA
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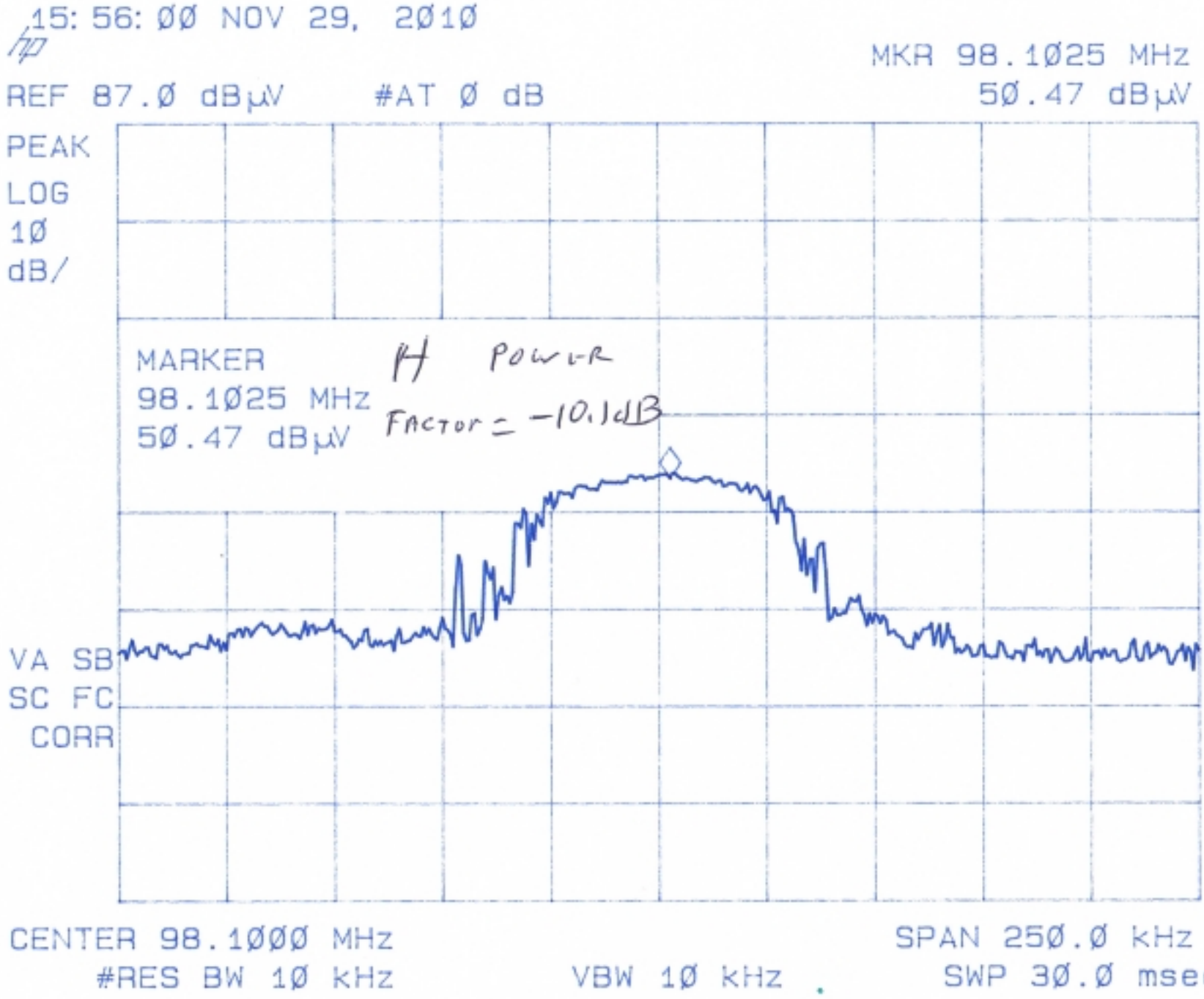
15: 56: ØØ NOV 29, 2Ø1Ø
MKR 98.1Ø25 MHz
REF 87.Ø dBµV
#AT Ø dB
5Ø.47 dBµV
PEAK
LOG
1Ø
dB/
MARKER
98.1Ø25 MHz
5Ø.47 dBµV
H Power
Factor = -10.1dB
VA SB
SC FC
CORR
CENTER 98.1ØØØ MHz
#RES BW 1Ø kHz
VBW 1Ø kHz
SPAN 25Ø.Ø kHz
SWP 3Ø.Ø msec
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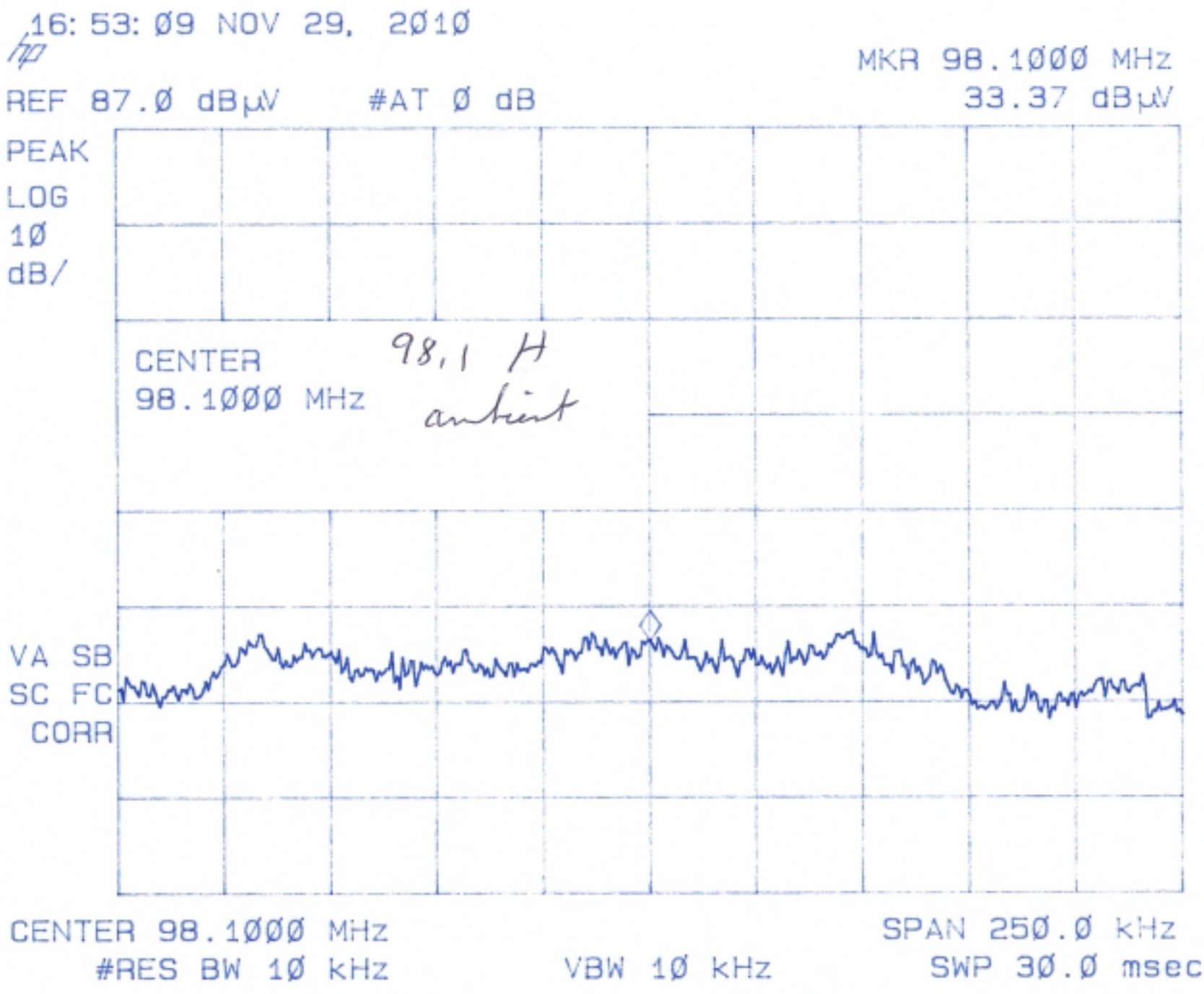
16: 53: Ø9 NOV 29, 2Ø1Ø
MKR 98.1ØØØ MHz
REF 87.Ø dBµV
#AT Ø dB
33.37 dBµV
PEAK
LOG
1Ø
dB/
CENTER
98.1ØØØ MHz
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antint
VA SB
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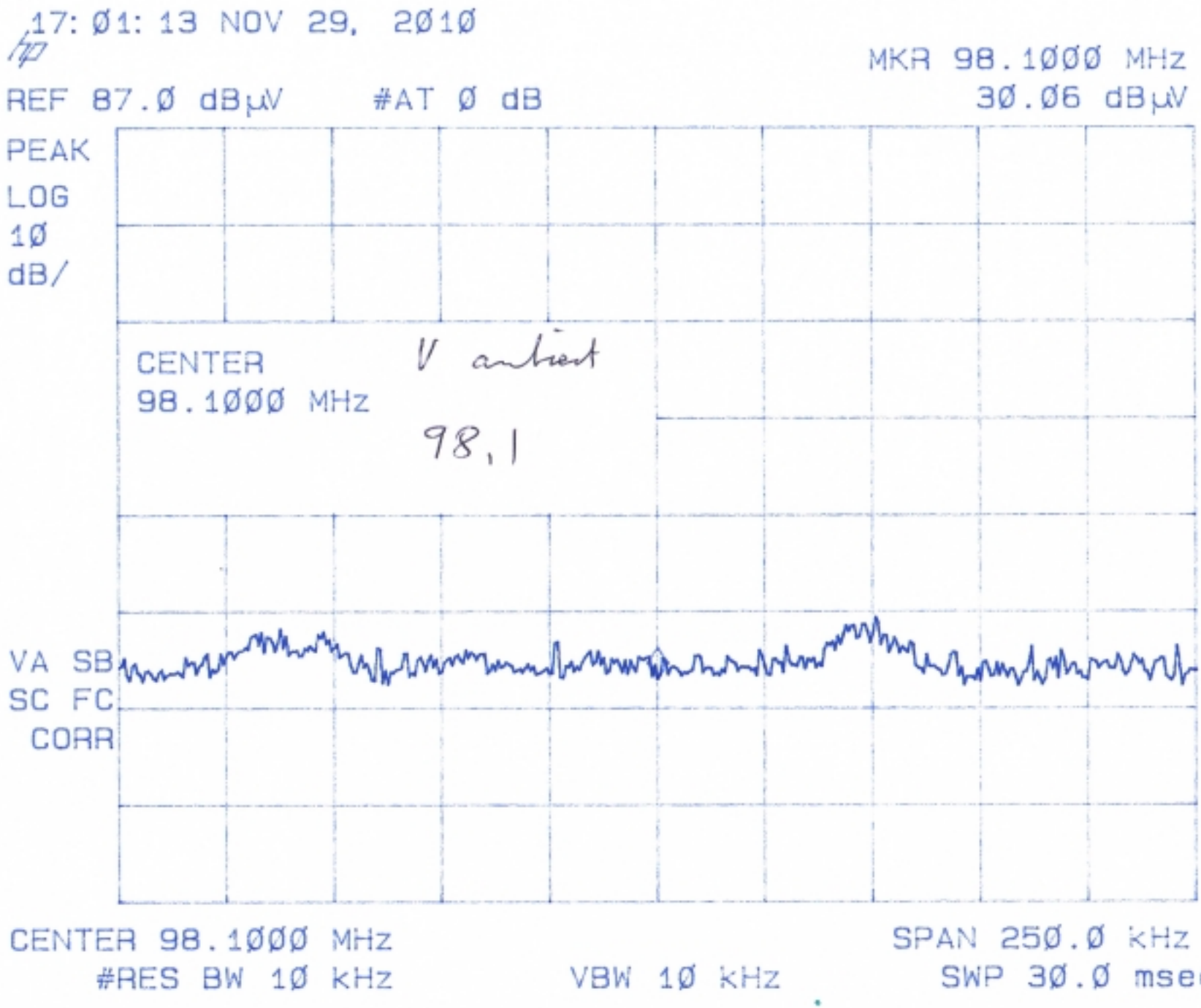
CORR
CENTER 98.1ØØØ MHz
#RES BW 1Ø kHz
VBW 1Ø kHz
SPAN 25Ø.Ø kHz
SWP 3Ø.Ø msec


17: Ø1: 13 NOV 29, 2Ø1Ø
MKR 98.1ØØØ MHz
REF 87.Ø dBµV
#AT Ø dB
3Ø.Ø6 dBµV
PEAK
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CENTER
98.1ØØØ MHz
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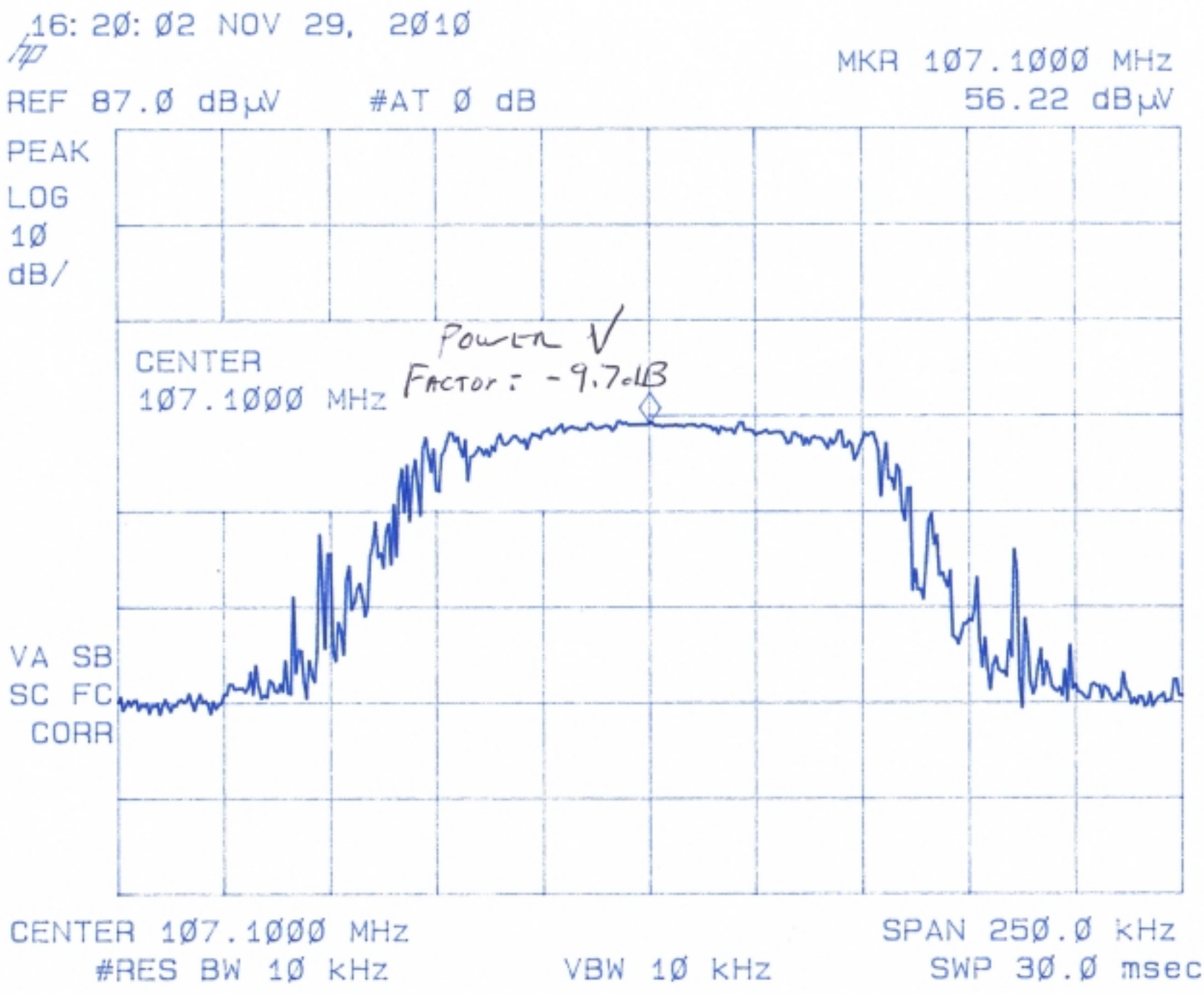
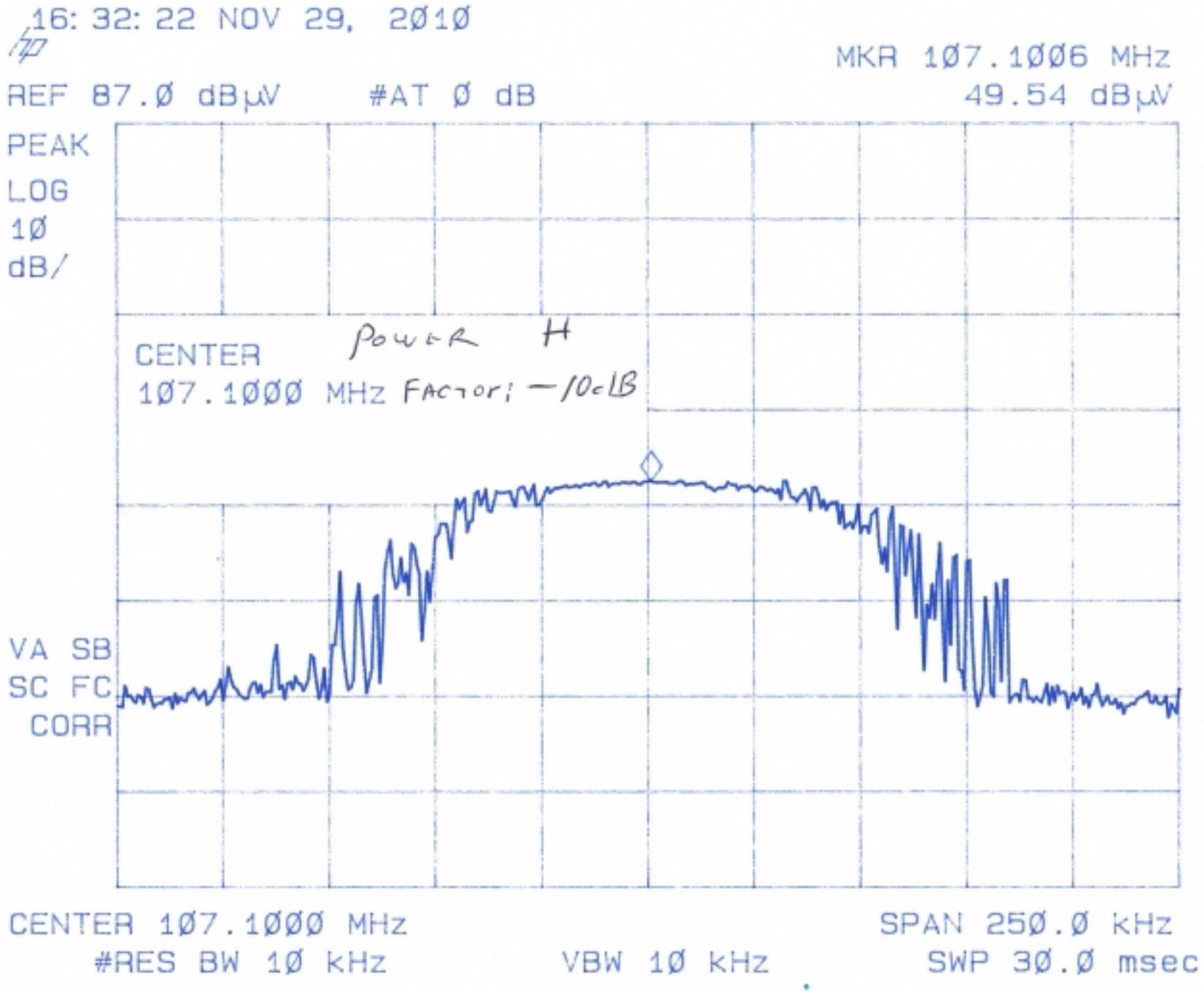
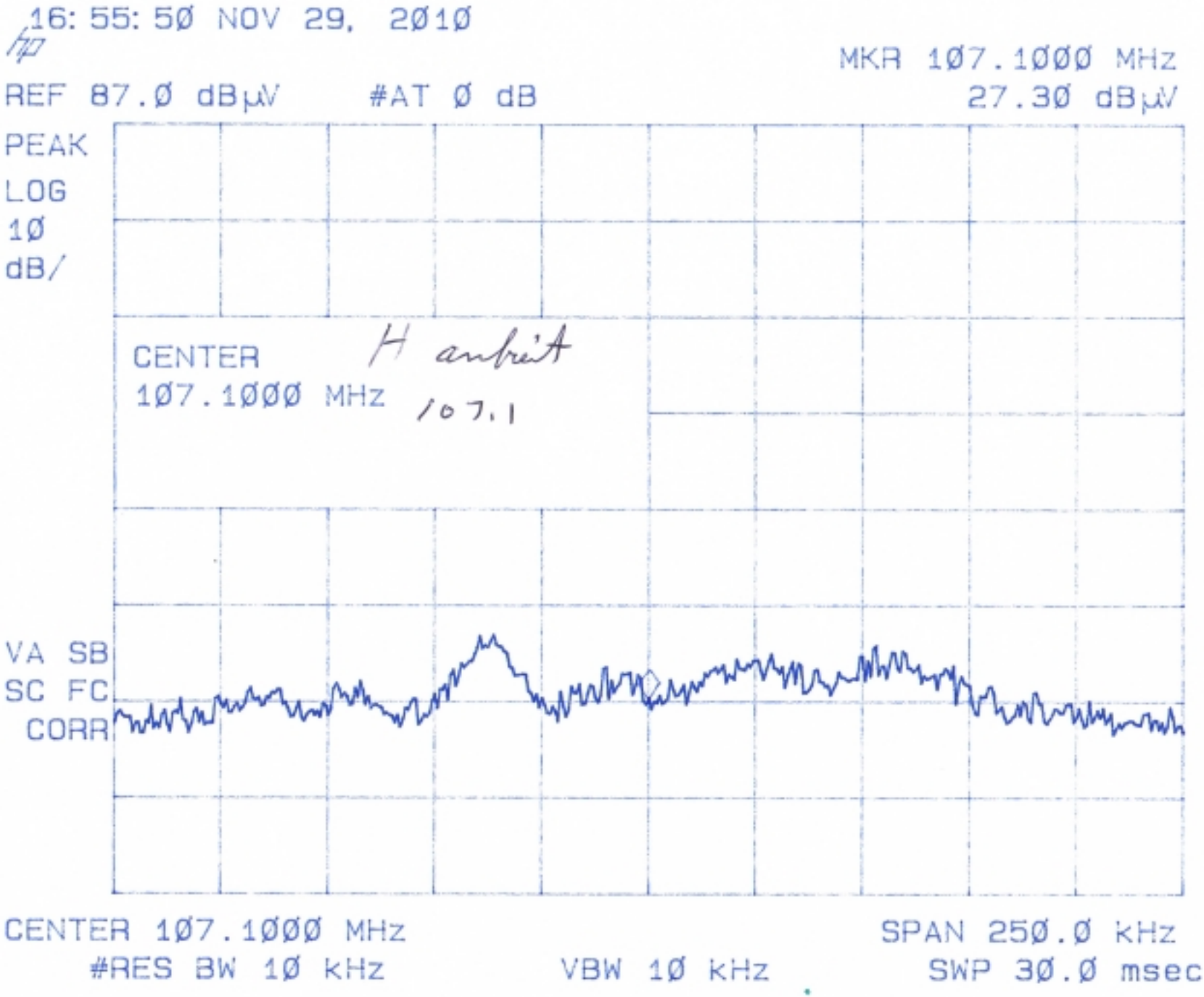
98,1
VA SB
SC FC
CORR
CENTER 98.1ØØØ MHz
#RES BW 1Ø kHz
VBW 1Ø kHz
SPAN 25Ø.Ø kHz
SWP 3Ø.Ø msec


16: 20: 02 NOV 29, 2010
MKR 107.100 MHz
56.22 dBµV
REF 87.0 dBµV
#AT 0 dB
PEAK
LOG
10
dB/
CENTER
107.100 MHz
Power V
Factor: -9.70dB
VA SB
SC FC
CORR
CENTER 107.100 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec


16: 32: 22 NOV 29, 2010
MKR 107.1006 MHz
REF 87.0 dBµV
#AT 0 dB
49.54 dBµV
PEAK
LOG
10
dB/
Power H
CENTER
107.1000 MHz Factor: -10dB
VA SB
SC FC
CORR
CENTER 107.1000 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec


16: 55: 5Ø NOV 29, 2Ø1Ø
MKR 1Ø7.1ØØØ MHz
REF 87.Ø dBµV
#AT Ø dB
27.3Ø dBµV
PEAK
LOG
1Ø
dB/
CENTER
1Ø7.1ØØØ MHz
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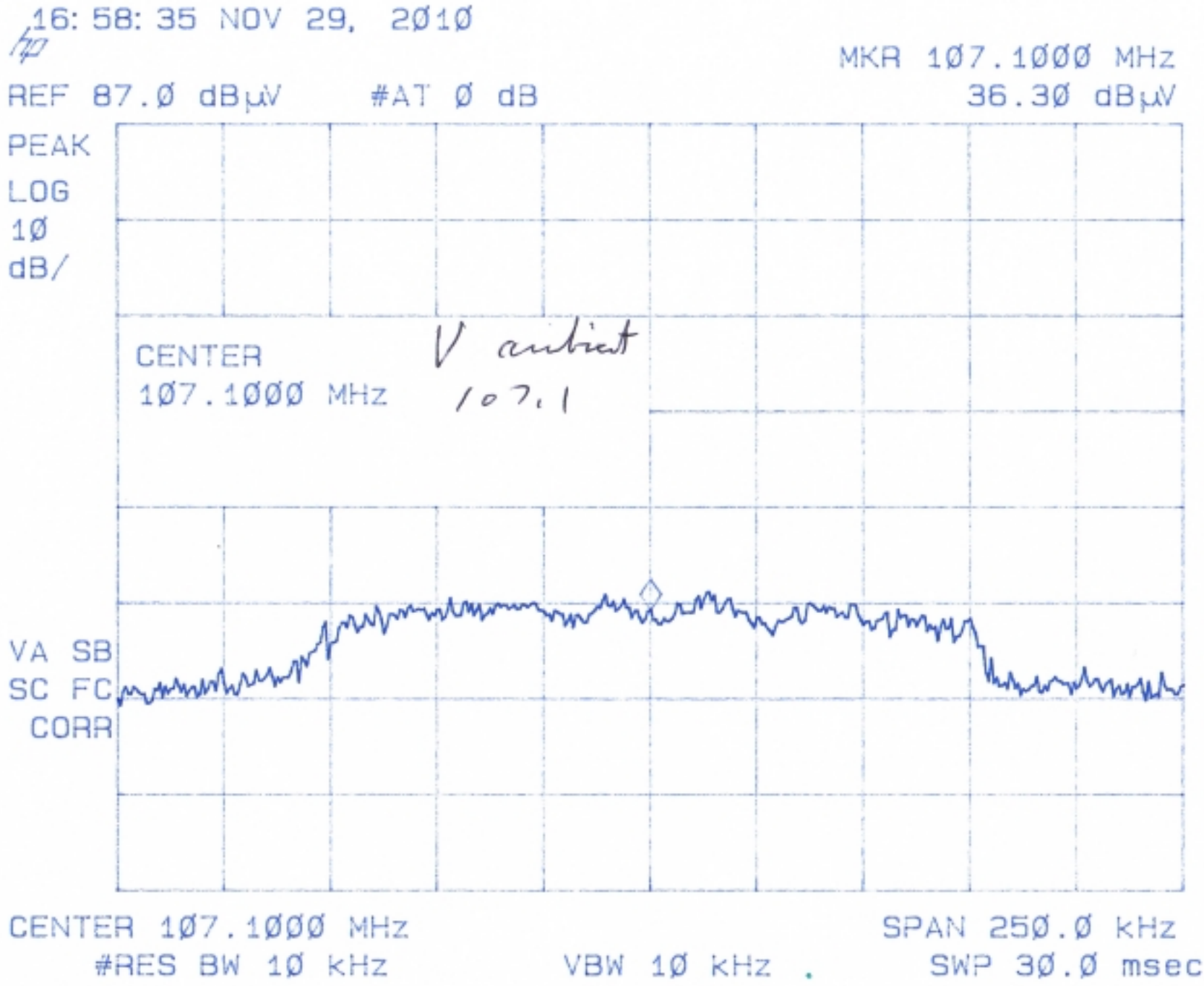
107.1
VA SB
SC FC
CORR
CENTER 1Ø7.1ØØØ MHz
#RES BW 1Ø kHz
VBW 1Ø kHz
SPAN 25Ø.Ø kHz
SWP 3Ø.Ø msec


16: 58: 35 NOV 29, 2010
MKR 107.1000 MHz
REF 87.0 dBµV
#AT 0 dB
36.30 dBµV
PEAK
LOG
10
dB/
CENTER
107.1000 MHz
V ambient
107.1
VA SB
SC FC
CORR
CENTER 107.1000 MHz
#RES BW 10 kHz
VBW 10 kHz
SPAN 250.0 kHz
SWP 30.0 msec
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# *Radiated Emissions*

## INTRODUCTION:

The product covered by this report was subjected to electromagnetic interference emissions measurements to determine compliance with the FCC, Parts 15.239 requirements.

Radiated and conducted emissions were measured in accordance with the Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz, ANSI C63.4-2003.

During this test, the product was charging an iPhone.

## MEASUREMENT CALCULATIONS:

### Radiated Emissions:

For radiated emissions measurements, the signal attenuation due to impedance losses in the antenna and signal cable were significant and was added to the spectrum analyzer reading to give corrected signal strength reading. If a preamplifier was used, the signal gain was subtracted from the signal strength reading. Radiated emissions data was specified as decibels above 1 microvolt per meter (dBμV/m) of radiated field strength.

Radiated emissions (dBμV) = Analyzer reading (dBμV) plus antenna factor (dB) plus cable factor (dB) minus Amplifier gain (dB)

### Conducted Emissions:

For conducted emissions, the signal attenuation due to impedance losses in the LISN and signal cables was negligible and assumed to be 0dB. The conducted emissions were directly equal to the spectrum analyzer reading. Conducted emissions data was specified as decibels above 1 microvolt (dBμV) of conducted line voltage.

Conducted emissions (dBμV) = Analyzer reading (dBμV)

## RADIATED EMISSIONS MEASUREMENT:

Radiated emissions measurements were performed at an open field test site. The receiving antenna was positioned 1 meter from the equipment under test along the center axis of the test site. Measurements were made with broadband antennas and if necessary, detected emissions were verified with dipole antennas. The dipole antenna was manually tuned to the signal frequency by adjusting the length of the antenna elements.

The radiated emissions were measured for both the horizontal and vertical signal planes by rotating the antennas. Additionally, the EUT was rotated by the turntable and the antenna height was raised and lowered 1 to 4 meters to locate the maximum emission strength at each frequency.

The radiated emissions were measured over the frequency span of 30 MHz to 1000 MHz. The following antennas were used to measure the radiated emissions within the specified frequency spans.

**CONDUCTED EMISSIONS MEASUREMENT:**

Conducted emissions measurements were performed on a ground plane that was electrically bonded to earth ground. The equipment under test was positioned 0.8 meter above the ground plane and 0.8 meter minimum from the LISN that was positioned on the ground plane. The LISN housings were electrically bonded to the ground plane. The conducted emissions for both the ungrounded supply conductor (L1) and the grounded conductor (L2) of the power supply cord were measured. The conducted emissions were measured over the frequency span of 0.15 to 30 MHz. The measurements were conducted in the quasi-peak and average detector modes.

**INSTRUMENTATION:**

Radiated and conducted signal strength measurements were taken with a spectrum analyzer. Radiated emissions were measured with broadband and tuned dipole antennas. Conducted emissions were measured with a 50 UH line impedance stabilization network (LISN).

**DETECTOR FUNCTION:**

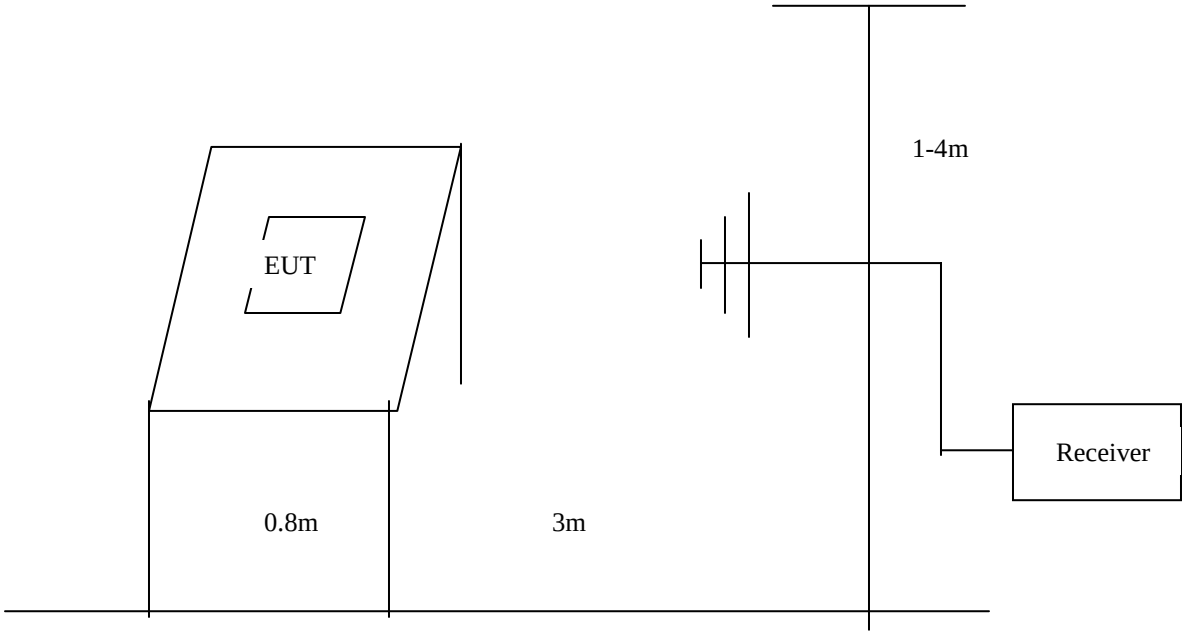
Unless otherwise indicated in this report, all measurements were taken using a peak hold signal detector function. In this mode, the spectrum analyzer makes continuous scans across the frequency band and stores the highest emission value detected at each frequency for all scans. The peak hold integration will detect transient or low duty cycle emissions peak, which might be missed on single scan measurement. The emission value at each frequency was a true value.

**SPECTRUM ANALYZER SETTING:**

For all measurements, the spectrum analyzer was set for 10 dB input attenuation, 10 dB/Division vertical scale and 90 or 100 dBμV reference level. The resolution bandwidth was set at 9 KHz for the 0.15 - 30 MHz span and at 120 KHz for 30 - 1000 MHz span. The video bandwidth and sweep rate were automatically coupled by the analyzer.

*Test Report cont…*

**Test Setup Diagram**
Frequency range: 30MHz-1000MHz




| Frequency MHz | Measurement Reading, dBμV/m | Corrected Reading, dBμV/m | EN55022 Limit, dBμV/m | Minimum Margin, dBμV/m |
|---|---|---|---|---|
| **Horizontal and Vertical** | | | | |
| | | | | |
| There were no measurable radiated emissions within 20 dB from the limits | | | | |
| | | | | |

See below for harmonics measurements

*Test Report cont…*