EMC EVALUATION OF THE BELKIN CORPORATION TUNECAST 3 - MODEL F8M010

Date: NOVEMBER 29, 2006
Test Report Number: TRR0361.06 REVISION 2

IN ACCORDANCE WITH
FCC PART 15 SUBPART A 15.33
FCC PART 15 SUBPART C 15.209
FCC PART 15 SUBPART C 15.239
AS/NZS 4268:2003

Prepared For: BELKIN CORPORATION
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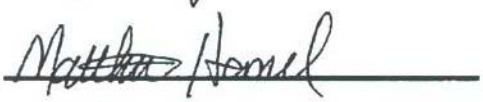
Test Technician or Engineer: 

Rochester Manager: 

CTS Approved Signatory: 

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LIST OF DEFINITIONS/ABBREVIATIONS

AC	Alternating Current
BB	Broadband
BW	Bandwidth
cm	Centimeter
CPU	Calibrate Prior to Use
dB	Decibel
DC	Direct Current
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ER	Electric Radiation
EUT	Equipment Under Test
GHz	GigaHertz
Hz	Hertz
I-face	Interface
kHz	KiloHertz
m	Meter
MHz	MegaHertz
mm	Millimeter
mS	Millisecond
mV	MilliVolt
MR	Magnetic Radiation
NB	Narrowband
NCR	No Calibration Required
PLC	Power Line Conduction
PPS	Pulses Per Second
uF	MicroFarad
uH	MicroHenry
uS	Microsecond
uV	MicroVolt
UWC	Use With Calibrated Equipment

1.0 GENERAL

1.1 Introduction

1.1.1 Purpose

The purpose of this report is to document the performance of the Belkin Corporation TuneCast 3 - Model F8M010 during an electromagnetic interference (EMI) test and record the test requirements and procedures used. At the request of Belkin Corporation, the tests were performed by Chomerics Test Services (CTS) of Woburn, Massachusetts at Chomerics' test facility located in Rochester, New York. The assessment will determine the compliance or non-compliance with the requirements set up by the FCC Part 15 Subpart C 15.239 and AS/NZS 4268:2003 Radio Equipment and Systems – Short Range Devices- Limits and Methods measurement.

Jeff Meyers from the Belkin Corporation was present during testing. Testing was performed during the period of October 26-30, 2006 under Chomerics' order number 953555.

1.1.2 Requirements

The requirements for the sequence of tests performed on the TuneCast 3 - Model F8M010 are as follows:

FCC Part 15 Subpart C 15.239 – Section 2.0

FCC Part 15 Subpart C 15.239, Emission requirements:

Sec. 15.239: Operation in the band 88-108 MHz. - Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz. The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microVolts/meter (47.95 dBuV) at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions for limiting Peak emissions in 15.35 apply The field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in Sec. 15.209.

AS/NZS 4268:2003 – Section 2.4

Table 1
Maximum EIRP = 10uW
Maximum Transmitter Spurious Emissions EIRP = 0.1uW
Maximum -26 dB Bandwidth 180 kHz

FCC Part 15 Subpart C 15.33 – Section 2.5

FCC Part 15 Subpart C 15.33, Radio Frequency Devices:

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in paragraph (1).

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental or to 40 GHz, whichever is lower.

FCC Part 15 Subpart A 15.35

FCC Part 15 Subpart C 15.35, Measurement Detector Functions and Bandwidths:

(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument used were in accordance with CISPR 16. Peak detector measured data may be substituted for the appropriate detector data to show compliance if the peak level obtained does not exceed the limit. The bandwidth used shall be greater than or equal to 100 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz and 100 kHz from 30 MHz to 1000 MHz.

Actual Bandwidths used;
1 – 30 MHz; 9 kHz
30 – 1000 MHz; 120 kHz

1.2 TEST SUMMARY

The terms "Passed" or "Failed" in this section are intended to guide the reader as to whether or not the EUT met the minimum requirements that can be interpreted from the FCC Part 15 Subpart C 15.239 Emissions Standard as defined in Section 1.5. The "Results" paragraph in each test section to follow and the test data sheets will outline specifically how the EUT performed during each test.

FCC Part 15.239 -26 dB Bandwidth	Passed
FCC Part 15.239 Field Strength	Passed
FCC Radiated Emissions (FCC 47 CFR 15.209)	Passed
AS/NZS 4268: 2003 EIRP of Fundamental	Passed
AS/NZS 4268:2003 EIRP Spurious	Passed
AS/NZS 4268:2003 -26 dB Bandwidth	Passed
FCC Radiated Emissions (FCC 47 CFR 15.33)	Passed

1.2.1 Summary of Recommendations

The Belkin Corporation TuneCast 3 - Model F8M010 will require no modifications in order to ensure compliance with the Electromagnetic Interference Standard FCC Part 15 Subpart C 15.239, Subpart A 15.33, Subpart C 15.209 or AS/NZS 4268:2003.

Please note that if any modifications and or fixes were implemented to the EUT to achieve compliance, other approaches to solving the problem may exist. In addition, any EMI/EMC shielding products listed in this report may be substituted with an equivalent.

1.3 Administrative Data

1.3.1 Test Facility

Chomerics Test Services in Rochester, New York is an American Association for Laboratory Accreditation (A2LA) accredited facility as defined on Certification Number 1980-02. The Scope of Accreditation is limited to the following tests:

Emissions

Radiated (up to 2 GHz) + Conducted	Code of Federal Regulation (CFR) 47, FCC Part 15 (Subpart B, ITE devices) using ANSI C63.4 (2001, 2003); CISPR 11; EN 55011; CISPR 14; EN 55014-1; CISPR 22; EN 55022; AS/NZS CISPR 14; AS/NZS CISPR 11; AS/NZS CISPR 22; VCCI; CNS 13738-1; CAN/CSA CISPR 22; KN 22; RRL Notice 2005-82 (September 29, 2005)
Current Harmonics	EN 61000-3-2
Voltage Fluctuations + Flicker	EN 61000-3-3
Generic Standards	EN 61000-6-3; EN 61000-6-4

Immunity

Electrostatic Discharge (ESD)	EN 61000-4-2:1995+A1:1998+A2:2000; IEC 61000-4-2:1995+A1:1998+A2:2000; KN 61000-4-2
Radiated Immunity	EN 61000-4-3:1996+A1:2002; IEC 61000-4-3:1995+A1:2002; KN 61000-4-3
Electrical Fast Transient/Burst	EN 61000-4-4:1995+A1:2000+A2:2001; EN 61000-4-4: 2004; IEC 61000-4-4:1995+A1:2000+A2:2001; IEC 61000-4-4:2004; KN 61000-4-4
Surge Immunity	EN 61000-4-5:1995+A1:2001 IEC 61000-4-5:1995+A1:2000; KN 61000-4-5
Conducted Immunity	EN 61000-4-6:1996+A1:2001; IEC 61000-4-6:1996+A1:2000; IEC 61000-4-6: 2003 + A1;2004; KN 61000-4-6
Power Frequency Magnetic Field Immunity	EN 61000-4-8:1993+A1:2001; IEC 61000-4-8:1993+A1:2001; KN 61000-4-8
Voltage Dips, Short Interruptions, and Line Voltage Variations	EN 61000-4-11:1994+A1:2000; IEC 61000-4-11:1994+A1:2000; EN 61000-4-11:2004; IEC 61000-4-11: 2004; KN 61000-4-11

Product Standards	IEC/EN 60601-1-2, EN 300 386, EN 61326; CISPR 24; EN 55024; CISPR 14; EN 55014-2; RRL Notice No.2005-130 (December 27, 2005)

Any tests in this report that are not listed above are not covered by the A2LA Accreditation.

ALL test(s) included within this report are covered under Chomerics' A2LA Scope of Accreditation.

Chomerics' Semi-anechoic Test Chamber is listed by the Federal Communications Commission (FCC) for Radiated and Conducted Emissions testing under file number 102772.

Chomerics' Semi-anechoic Test Chamber is accredited for Radiated and Conducted Emissions tests through Industry Canada (IC) under file numbers IC4154.

Chomerics test facility operates under the current revision of Chomerics Quality Assurance (QA) Manual Document Number QA002.

The QA Manual has been constructed to reflect a quality program in accordance with the requirements of the National Institute of Standards and Technology (NIST), ISO 9002, ISO 17025, ISO Guide 25, NIST Handbook 150, EN 45001, MIL-I-45208A, MIL-STD-461D, 462D and Chomerics Quality Assurance Program (QAP).

The QA Manual outlines and describes the procedures for establishing and maintaining the quality of analysis, research, inspection, and testing within Chomerics Test Service (CTS).

This test report does not represent an endorsement by the U.S. Government.

The results and/or conclusions within this test report refer and/or apply only to the unit(s) tested as defined by this report.

Measurements performed for this test are traceable to the National Institute of Standards and Technology (NIST) based on the fact that all test equipment used for the measurements were previously calibrated using standards traceable to NIST.

Additions to, or exclusions from the test specification(s) were made. AS/NZS 4268:2003 tests were performed as well as the FCC Part 15 Subpart C 15.239 measurements.

Chomerics Test Services measurement uncertainty calculations are available for review upon request.

Sample Calculation:

Radiated Emissions

The tabular data listed in the report is the highest signal detected during the scan. At a minimum six of the highest signals will be selected and maximized. The tabular data sheet shall contain the measured value "QP-Value", field level, limit, margin to the limit, antenna height, antenna polarity and turn table azimuth.

The field level is the final value that will be compared to the limit in order to determine if the EUT is in compliance. The field level will be calculated by the following for each of the signals maximized:

Field Level dBuV = Measured Value dBuV + Antenna Factor dB + Cable Loss dB

37dBuV = 30dBuV + 5dB + 2dB

The margin to the limit shall be calculated by subtracting the field level to the limit. The margin to the limit shall be calculated by the following for each of the signal maximized.

Margin to Limit dB = Field Level dBuV – Limit dBuV
-3dB = 37dBuV - 40dBuV

Conducted Emissions

The tabular data listed in the report is the highest signal detected during the scan. At a minimum six of the highest signals will be selected and maximized. The tabular data sheet shall contain the measured value, final level, limit, margin to the limit, LISN factor

The final value will be compared to the limit in order to determine if the EUT is in compliance. The final value will be calculated by the following for each of the maximized signals.

Final Value dBuV = measured value dBuV + LISN Factor dB
50dBuV = 49dBuV + 1dB

The margin to the limit shall be calculated by subtracting the final value to the limit. The margin to the limit shall be calculated by the following for each signal maximized.

Margin to Limit dB = Field Level dBuV – Limit dBuV
-3dB = 37dBuV - 40dBuV

1.3.2 Equipment Calibration

The calibration of Chomerics test facility equipment is controlled under the current edition of Chomerics Laboratory Test Equipment Calibration Manual Document Number QA001.

The test equipment used throughout this test sequence conforms to laboratory calibration standards, MIL-STD-45662, traceable to the National Institute of Standards and Technology (NIST). The date of the next due scheduled calibration is listed in each test section for the applicable equipment.

All test equipment is calibrated in one year intervals.

1.3.3 Test Personnel

The test personnel performing or supervising the tests are accredited by the National Association of Radio and Telecommunications Engineers, Inc. (NARTE) as Certified Electromagnetic Compatibility Engineers (N.C.E.) and Technicians (N.C.T.).

1.4 Test Set-up

1.4.1 Test Site Matrix

The specific test locations used for the emissions testing of the Belkin Corporation TuneCast 3 - Model F8M010 are as follows: (Refer to Section 1.4.2 for test site descriptions).

Emissions Test	Test Site
FCC Part 15.239 -26 dB Bandwidth	Semi-Anechoic Chamber
FCC Part 15.239 Field Strength	Semi-Anechoic Chamber
FCC Radiated Emissions (FCC 47 CFR 15.209)	Semi-Anechoic Chamber
AS/NZS 4268:2003 EIRP of Fundamental	Semi-Anechoic Chamber
AS/NZS 4268:2003 EIRP Spurious	Semi-Anechoic Chamber
AS/NZS 4268:2003 -26 dB Bandwidth	Semi-Anechoic Chamber
FCC Radiated Emissions (FCC 47 CFR 15.33)	Semi-Anechoic Chamber

1.4.2 Test Site Descriptions

The following is a list of test sites and descriptions of each. Refer to Section 1.4.1 for specific test sites used for testing.

Semi-anechoic Chamber: Chomerics' Semi-anechoic Test Chamber is located at 100 Indigo Creek Drive, Rochester, NY 14626 (see Figure 1). The shielded enclosures were manufactured and installed by EMC Test Systems of Texas. The normal exterior dimensions of the shielded indoor semi-anechoic chamber are approximately 28 feet long by 20 feet wide by 18 feet high and consist of rigid, steel-clad, wood core modular panels with steel framing.

The shielding performance is as follows:

Field	Attenuation
Magnetic	20dB at 1kHz, increasing to 56dB at 10kHz and increasing to 100dB at 200kHz
Electric	100dB from 200kHz to 18GHz

The anechoic absorber treatment is broadband hybrid EMC absorbers, FerroSorb model number FS-400. All interior surfaces of the chamber with the exception of the ground plane are covered with FS-400 absorber. The FS-400 absorber material is a combination of dielectric foam absorber and magnetic ferrite title, which is 16 inches thick.

Two swing type shielded doors are provided for personal access into the control room and chamber. The doors are 4 feet wide by 7 feet high. The doors are a single unit containing a brass door leaf and frame and a single leaf of spring finger gaskets. The doors provide 100dB of attenuation from 30MHz to 18 GHz.

The quiet zone for the Chomerics semi-anechoic test chamber is a cylinder two meters in diameter.

Air conditioning is provided by honeycomb wave-guide to supply and return air in the main chamber. Four (4) incandescent light fixtures provide lighting of the chamber.

The turntable is an electrically driven EMCO metal top turntable with a 2-meter diameter. The turntable is grounded around its circumference with continuous metallic brush to the semi-anechoic chamber floor by a ground ring. The electrically driven turntable doesn't introduce conducted or radiated noise above the ambient levels existing within the chamber. An EMCO 2090 Controller controls the turntable with an IEEE-488 data/controller for automation. Interconnecting cables are routed along an access area through the center bearing.

The ground plane consists of raised standard steel floor panels. RF and fiber optic cables are routes under the raised steel floor of the chamber.

Power is supplied on separate circuits to the chamber and the control room. Separate filters are provided for signal distribution as well in the semi-anechoic chamber. All filters provided a minimum of 100dB attenuation from 10kHz to 10GHz per MIL-STD 220A.

See Figure 1 for the overall dimensional drawing of the semi-anechoic chamber.

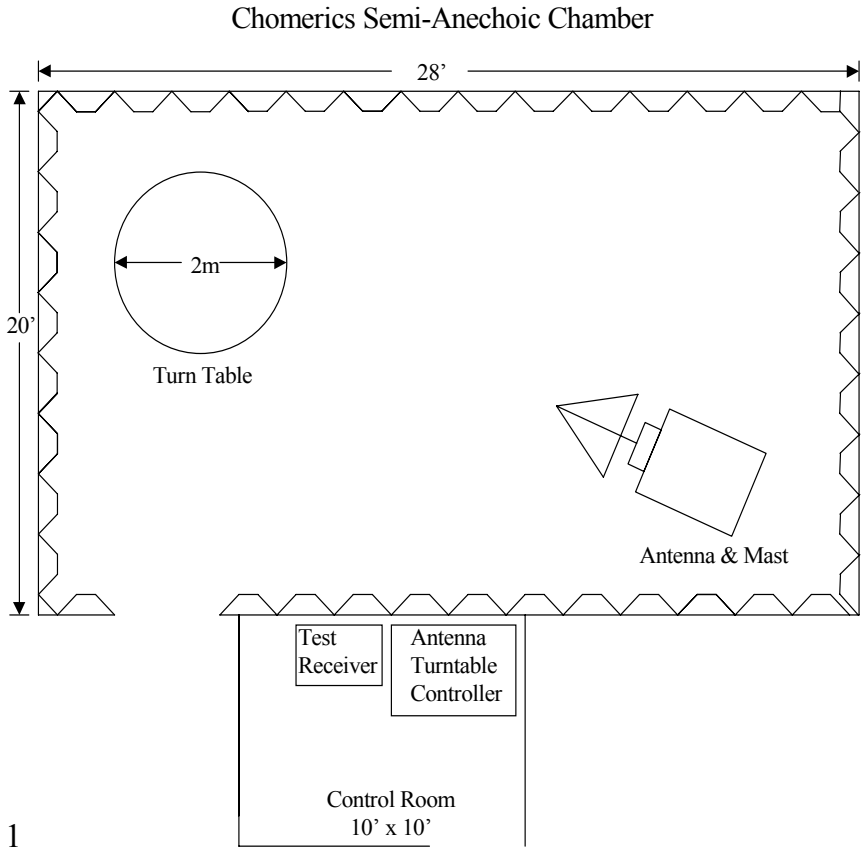


Figure 1

1.4.3 Equipment Under Test

The Belkin Corporation TuneCast 3 - Model F8M010 is a device that wirelessly transmits audio signals to an FM receiver. It is designed to allow the user to set the transmission frequency in the band of 88.1 MHz – 107.9 MHz in 0.1 MHz intervals. The device was manually adjusted and it was verified that it is not possible for the user to adjust the device to frequencies outside of this range.

The support equipment needed to run the Belkin Corporation TuneCast 3 - Model F8M010 in the normal mode of operation consisted of the following:

	Manufactory	Device	Serial #	Model #
a.	Apple	iPod Nano	YM6367ZBV8W	A1199

The TuneCast 3 - Model F8M010 is a DC powered device that operates on 3.0 VDC power. For the purpose of the radiated emission tests, power was supplied by two fully charged AAA batteries. The internal transmitter of the device runs off of 3.75VDC regardless of the input supply voltage.

There are no I/O connections.

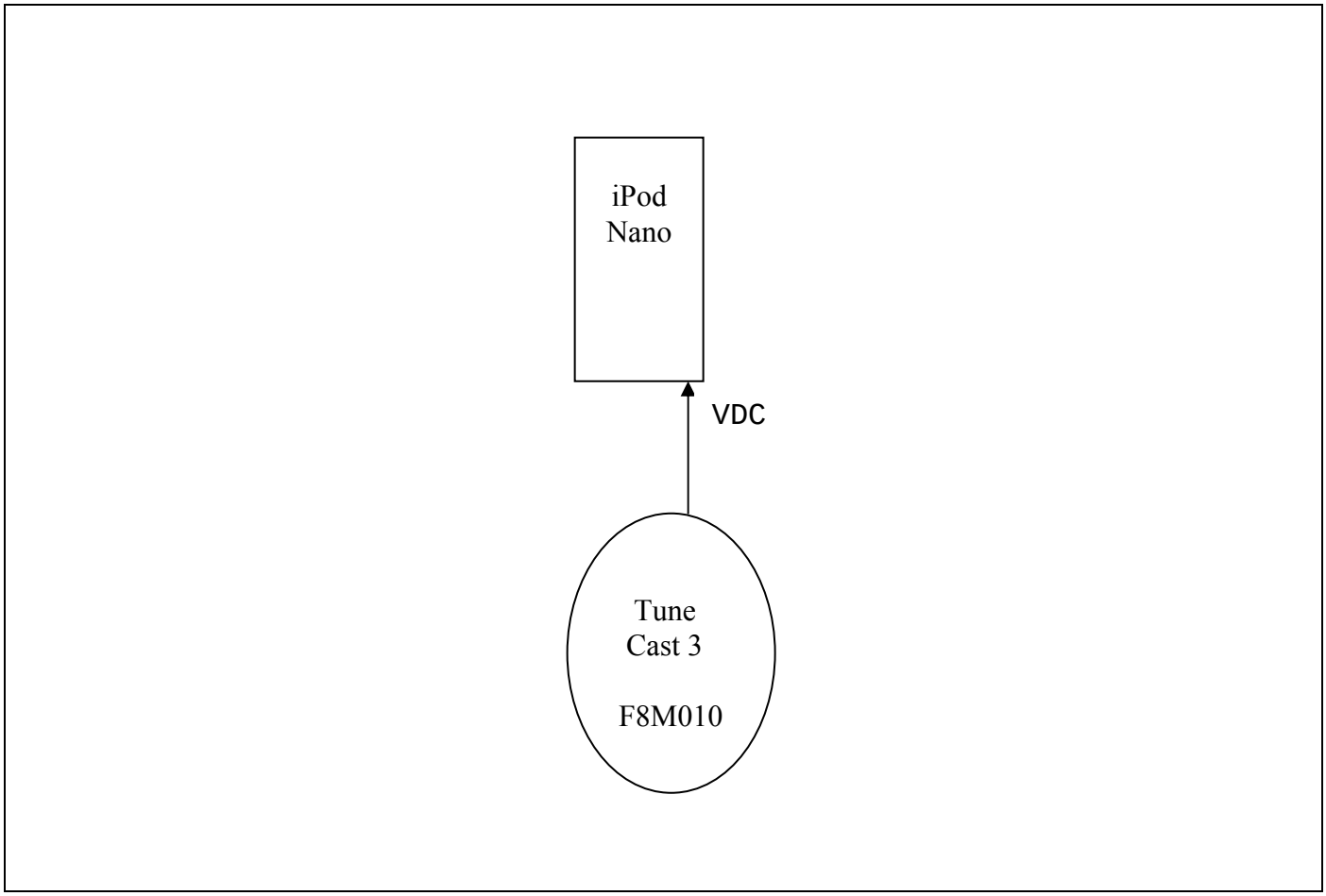
The normal mode of operation was used for emissions tests. The TuneCast 3 - Model F8M010 was monitored during the tests by Jeff Meyers of the Belkin Corporation.

The equipment under test was setup as illustrated on CTS-Form-014.

1.4.4 Block Diagram

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010

DATE: OCTOBER 26, 2006
TESTED BY: DWIGHT SIMPSON/MATTHEW HANEL



System Configuration Block Diagram – Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside the testing field.

FORM CTS-014

2.0 EMISSIONS TESTS PERFORMED

2.1 -26 dB BANDWIDTH OF FUNDAMENTAL EMISSION

2.1.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	EMC Test Systems Semi-anechoic Chamber	667	N/A	10/07
X	Rohde and Schwarz ESCS30 Test Receiver	638	826547/024	12/06
X	EMCO 3142B Biconilog Antenna	668	9903-1357	12/06
X	Hewlett Packard Vectra VL	N/A	US71656121	NCR
X	EMCO Multi Device Controller Model 2090	639	9808-1343	NCR
X	EMCO Antenna Mast Model 3801/2NM	666	N/A	NCR
X	EMCO Video Camera Controller Model VCC-01	653	N/A	NCR
X	EMCO Video Camera Model 2075	680	00183858	NCR
X	Quantum Change Tile Software	N/A	Version 3.2	NCR

2.1.2 Test Conditions

The -26 dB Bandwidth measurement testing was performed with the TuneCast 3 - Model F8M010 set up on a wooden table above the turntable at a distance of 3 meters from Biconilog antenna within the semi-anechoic chamber. The TuneCast 3 - Model F8M010 was configured to operate at the low, mid and then high transmit frequencies. The device was also configured to operate at its maximum audio input using a typical audio file from an iPod Nano MP3 player.

2.1.3 Test Method

The bandwidth of the TuneCast 3 - Model F8M010 was measured through an air interface. The TuneCast 3 - Model F8M010 was placed on top of a wooden turntable 3 meters from a receiving antenna. The bandwidths of the TuneCast 3 - Model F8M010 were measured at the low, mid, and high transmit frequencies. During this test, the antenna, turntable and the EUT were manipulated to maximize the emission level. In accordance with ANSI C63.4, the device was positioned to maximize radiation in all three orthogonal planes during preliminary testing.

2.1.4 Results

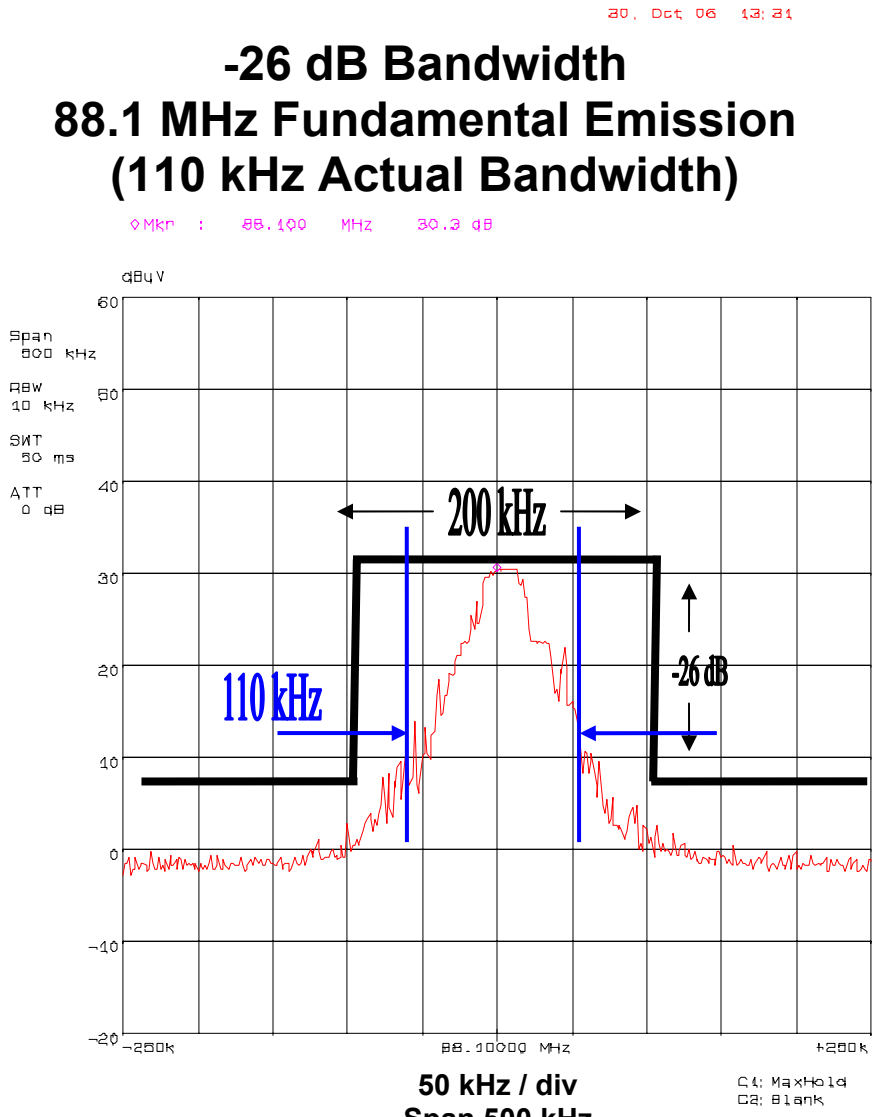
The Belkin Corporation TuneCast 3 - Model F8M010 meets the maximum 200 kHz bandwidth requirements of FCC Part15.239 and 180 kHz requirement of AS/NZS 4268:2033 at the frequencies tested. As shown on the plots, the radiated fundamental signal lies wholly within the authorized frequency band at the -26 dB bandwidth measurement as required by 15.239 (a) within the frequency range of 88.1 MHz to 107.9 MHz.

2.1.5 Test Data

-26 dB BANDWIDTH MEASUREMENTS

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL

DATE: OCTOBER 30, 2006
TEST NUMBER: 4
OPERATING MODE: CONTINUOUS TRANSMISSION LOW FREQ.



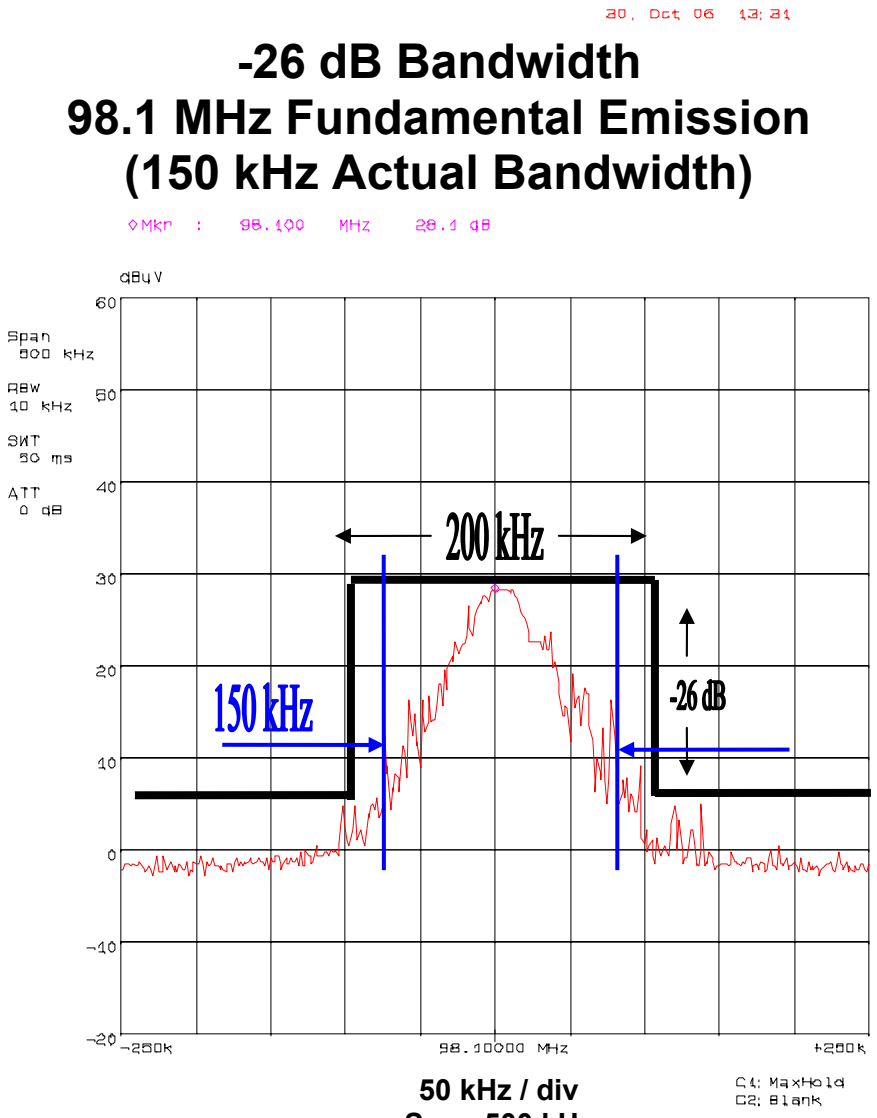
50 kHz / div
Span 500 kHz
RBW 10 kHz
Sweep 50 ms
Attn 0 dB

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL

DATE: OCTOBER 30, 2006
TEST NUMBER: 4
OPERATING MODE: CONTINUOUS TRANSMISSION MID FREQ.

-26 dB Bandwidth
98.1 MHz Fundamental Emission
(150 kHz Actual Bandwidth)



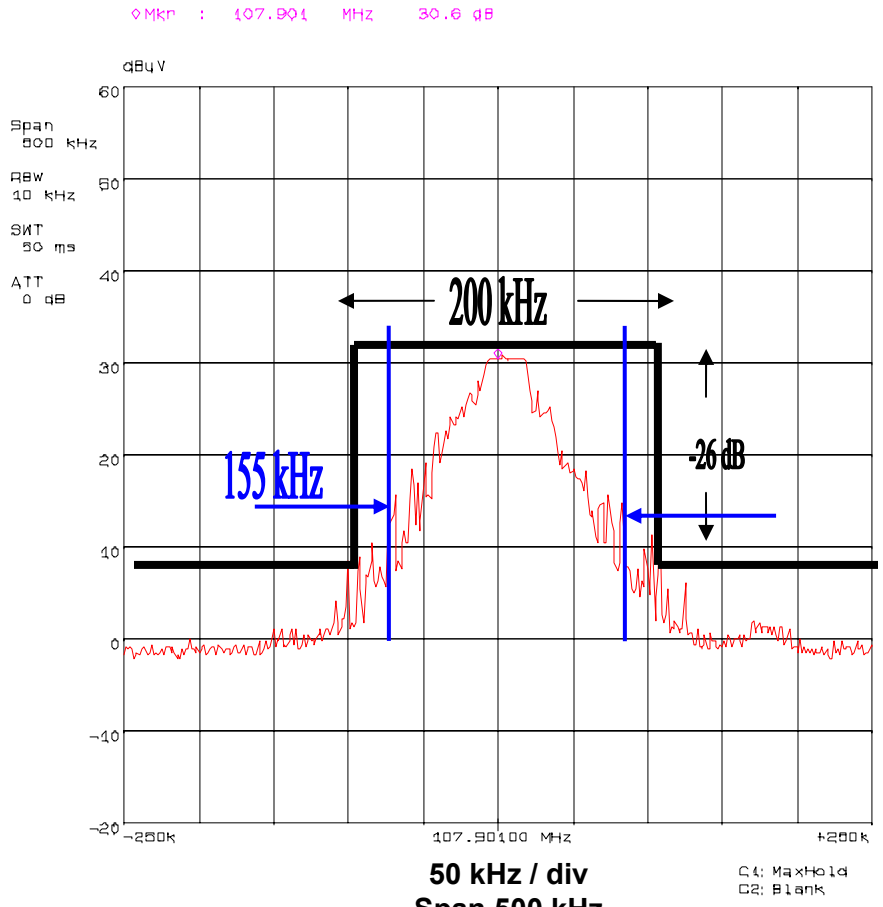
50 kHz / div
Span 500 kHz
RBW 10 kHz
Sweep 50 ms
Attn 0 dB

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: DWIGHT SIMPSON

DATE: OCTOBER 30, 2006
TEST NUMBER: 4
OPERATING MODE: CONTINUOUS TRANSMISSION HIGH FREQ.

-26 dB Bandwidth
107.9 MHz Fundamental Emission
(155 kHz Actual Bandwidth)



50 kHz / div
Span 500 kHz
RBW 10 kHz
Sweep 50 ms
Attn 0 dB

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

2.1.6 Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL
DATE: OCTOBER 30, 2006
TEST NUMBER: 4
OPERATING MODE: CONTINUOUS TRANSMISSION

Photograph Description: Test set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL

DATE: OCTOBER 30, 2006
TEST NUMBER: 4
OPERATING MODE: CONTINUOUS TRANSMISSION

Photograph Description: Test set-up

FORM CTS-PHOTO

2.2 FCC Part 15 Subpart C Field Strength (FCC 47 CFR 15.239)

2.2.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	EMC Test Systems Semi-anechoic Chamber	667	N/A	10/07
X	Rohde and Schwarz ESCS30 Test Receiver	638	826547/024	12/06
X	EMCO 3142B Biconilog Antenna	668	9903-1357	12/06
X	IBM Personal Computer Model 300XL	N/A	23TMP08	NCR
	Electro Metrics ALR-25M Loop Antenna	17	4706	1/07
	EMCO 3115 Microwave Horn Antenna	376	2796	1/07
	Luthi EM101 Absorbing Clamp	654	35543	11/06
X	EMCO Multi Device Controller Model 2090	639	9808-1343	NCR
X	EMCO Antenna Mast Model 3801/2NM	666	N/A	NCR
X	EMCO Video Camera Controller Model VCC-01	653	N/A	NCR
X	EMCO Video Camera Model 2075	680	00183858	NCR
X	Quantum Change Tile Software	N/A	Version 3.2	NCR

2.2.2 Test Conditions

Output Power tests were performed on the Belkin Corporation TuneCast 3 - Model F8M010 while it was set up on a wooden table above the turntable at a distance of 3 meters from Biconilog antenna within the semi-anechoic chamber. The TuneCast 3 - Model F8M010 was configured to operate in the normal mode of operation at the lowest possible, the midpoint and then high possible transmit frequencies allowed by the device. In accordance with ANSI C63.4, the device was positioned to maximize radiation in all three orthogonal planes during preliminary testing.

2.2.3 Test Method

The field strength of the Belkin Corporation TuneCast 3 - Model F8M010 was measured with the Rohde and Schwarz ESCS30 Test Receiver.

2.2.4 Results

The Belkin Corporation TuneCast 3 - Model F8M010 meets the field strength requirement of FCC Part 15 Subpart C 15.239, for the frequencies tested.

2.2.5 Test Data

OUTPUT POWER MEASUREMENTS

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: DWIGHT SIMPSON

DATE: OCTOBER 26, 2006
TEST NUMBER: 1
OPERATING MODE: CONTINUOUS TRANSMISSION

TuneCast 3
Field Strength of Fundamental Emission - High Frequency 88.1 MHz

Peak

Frequency	Measured PK	Antenna	Cable	Corrected QP	FCC 15.239	Pass / Fail	Angle	Height	Polarity
MHz	dBuV	Factor	Factor	dBuV	Limit	Margin	Deg.	cm	H / V
88.13	35.10	8.06	0.92	44.08	67.95	-23.87	261	209	H

Avg

Frequency	Measured Avg	Antenna	Cable	Corrected QP	FCC 15.239	Pass / Fail	Angle	Height	Polarity
MHz	dBuV	Factor	Factor	dBuV	Limit	Margin	Deg.	cm	H / V
88.13	34.48	8.06	0.92	43.46	47.95	-4.49	261	209	H

Field Strength of Fundamental Emission - High Frequency 98.1 MHz

Peak

Frequency	Measured PK	Antenna	Cable	Corrected QP	FCC 15.239	Pass / Fail	Angle	Height	Polarity
MHz	dBuV	Factor	Factor	dBuV	Limit	Margin	Deg.	cm	H / V
98.09	32.70	9.38	1.00	43.07	67.95	-24.88	261	245	H

Avg

Frequency	Measured Avg	Antenna	Cable	Corrected QP	FCC 15.239	Pass / Fail	Angle	Height	Polarity
MHz	dBuV	Factor	Factor	dBuV	Limit	Margin	Deg.	cm	H / V
98.09	31.68	9.38	1.00	42.05	47.95	-5.90	261	245	H

Field Strength of Fundamental Emission - High Frequency 107.9 MHz

Peak

Frequency	Measured Pk	Antenna	Cable	Corrected QP	FCC 15.239	Pass / Fail	Angle	Height	Polarity
MHz	dBuV	Factor	Factor	dBuV	Limit	Margin	Deg.	cm	H / V
107.89	35.18	9.10	1.04	45.32	67.95	-22.63	248	277	H

Avg

Frequency	Measured Avg	Antenna	Cable	Corrected QP	FCC 15.239	Pass / Fail	Angle	Height	Polarity
MHz	dBuV	Factor	Factor	dBuV	Limit	Margin	Deg.	cm	H / V
107.89	34.14	9.10	1.04	44.28	47.95	-3.67	248	277	H

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

2.2.6 Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: DWIGHT SIMPSON
OPERATING MODE: NORMAL

DATE: OCTOBER 26, 2006
TEST NUMBER: 1
COUPLING DEVICE: EMCO BICONILOG

Photograph Description: Test set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: DWIGHT SIMPSON
OPERATING MODE: NORMAL

DATE: OCTOBER 26, 2006
TEST NUMBER: 1
COUPLING DEVICE: EMCO BICONILOG

Photograph Description: Test set-up

FORM CTS-PHOTO

2.3 FCC Part 15 Subpart C Radiated Emissions (FCC 47 CFR 15.209)

2.3.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	EMC Test Systems Semi-anechoic Chamber	667	N/A	10/07
X	Rohde and Schwarz ESCS30 Test Receiver	638	826547/024	12/06
X	EMCO 3142B Biconilog Antenna	668	9903-1357	12/06
X	IBM Personal Computer Model 300XL	N/A	23TMP08	NCR
X	EMCO Multi Device Controller Model 2090	639	9808-1343	NCR
X	EMCO Antenna Mast Model 3801/2NM	666	N/A	NCR
X	EMCO Video Camera Controller Model VCC-01	653	N/A	NCR
X	EMCO Video Camera Model 2075	680	00183858	NCR
X	Quantum Change Tile Software	N/A	Version 3.2	NCR

2.3.2 Test Conditions

Radiated emissions testing was performed with the EUT set up on a wooden table above the turntable at a distance of 3 meters from the Biconilog antenna within the Semi-anechoic Chamber.

The Belkin Corporation TuneCast 3 - Model F8M010 was configured to operate in the normal mode of operation to maximize the emissions. The TuneCast 3 - Model F8M010 was set up and powered by 3.0 VDC for radiated emission tests. The worst case signals detected were recorded.

2.3.3 Test Method

The test method of FCC Part 15.209 Radiated Emissions was followed for Intentional Radiators. For the radiated emission measurements, a manual scan was performed from 30 MHz – 1080 MHz. In accordance with ANSI C63.4, the antenna, turntable and the EUT's cable positions were manipulated to maximize the emission levels in a given frequency band displayed on the receiver.

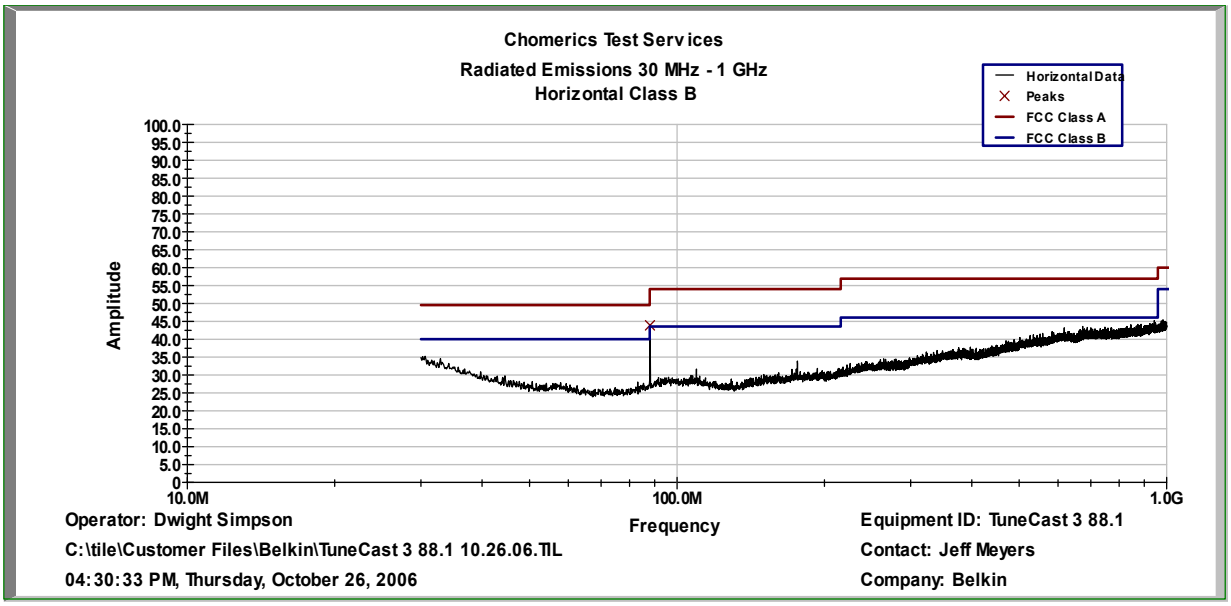
Subsequently, an automated scan was performed in first the peak and then the quasi-peak detection modes using the Quantum Change Tile Software.

2.3.4 Results

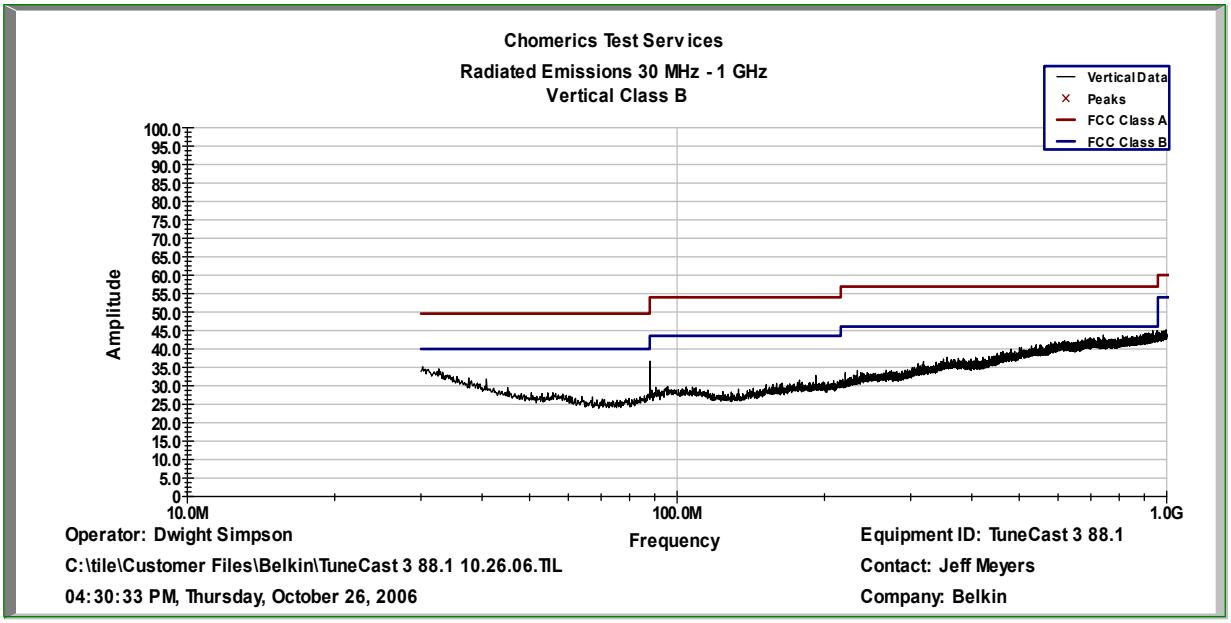
The Belkin Corporation TuneCast 3 - Model F8M010 meets the requirements for radiated emissions as required by FCC Part 15.209.

2.3.5 Test Data

Low Frequency 88.1 MHz
Graph Horizontal



Graph Vertical



Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Tabular Data – 88.1 MHz

Chomerics Test Services
Radiated Emissions 30 MHz - 1080 MHz

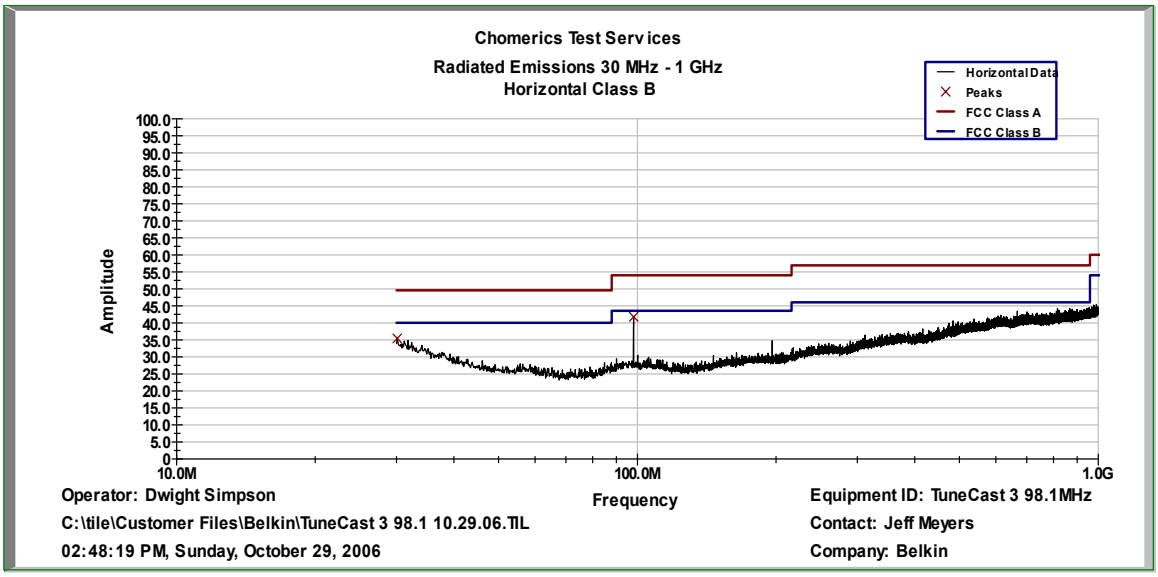
Operator: Dwight Simpson
C:\tile\Customer Files\Belkin\TuneCast 3 88.1 10.26.06.TIL
04:46:10 PM, Thursday, October 26, 2006
Equipment ID: TuneCast 3 88.1
Contact: Jeff Meyers
Company: Belkin

Final Quasi-Peak Values

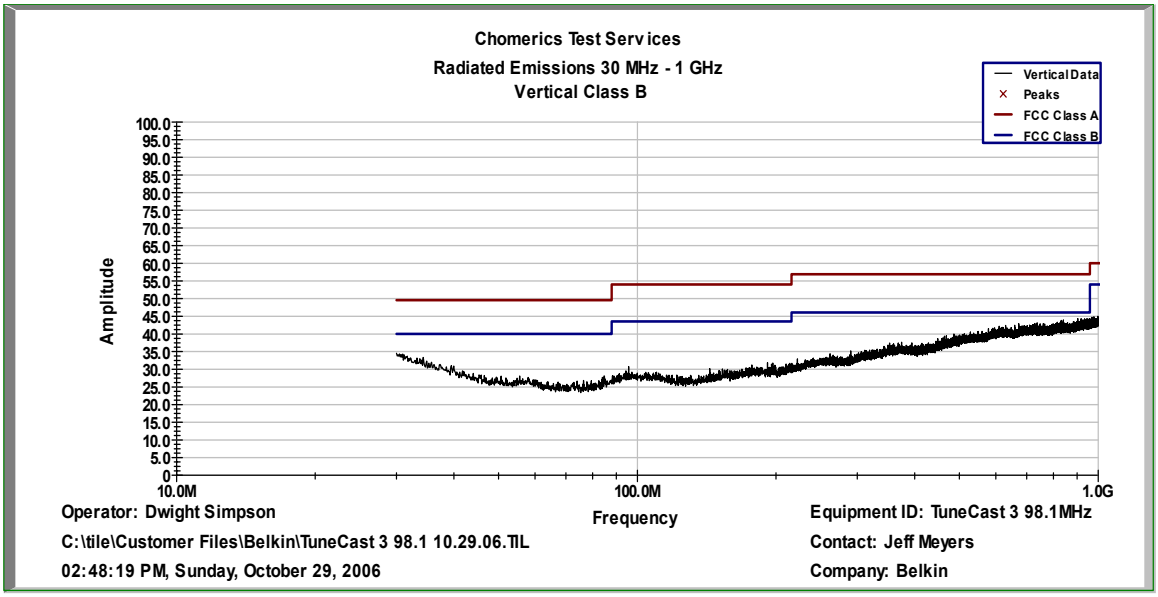
Frequency MHz	Measured QP dBuV	Antenna Factor	Cable Factor	Corrected QP dBuV	FCC 15.209 Limit	Pass / Fail Margin	Angle Deg.	Height cm	Polarity H / V
30.340	2.75	16.26	0.55	19.56	40.00	-20.44	236	199	V
30.652	3.23	16.08	0.56	19.87	40.00	-20.13	96	180	H
140.946	3.40	8.32	1.24	13.02	43.52	-30.50	326	108	H
176.150	11.21	10.30	1.38	22.86	43.52	-20.66	202	202	V
176.190	22.12	10.30	1.38	33.80	43.52	-9.72	76	174	H
192.110	3.30	10.30	1.44	15.04	43.52	-28.48	63	248	V
742.700	2.22	20.90	2.91	26.03	46.02	-19.99	285	352	V

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Mid Frequency 98.1 MHz
Graph Horizontal



Graph Vertical



Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Tabular Data – 98.1 MHz

Chomerics Test Services
Radiated Emissions 30 MHz - 1080 MHz

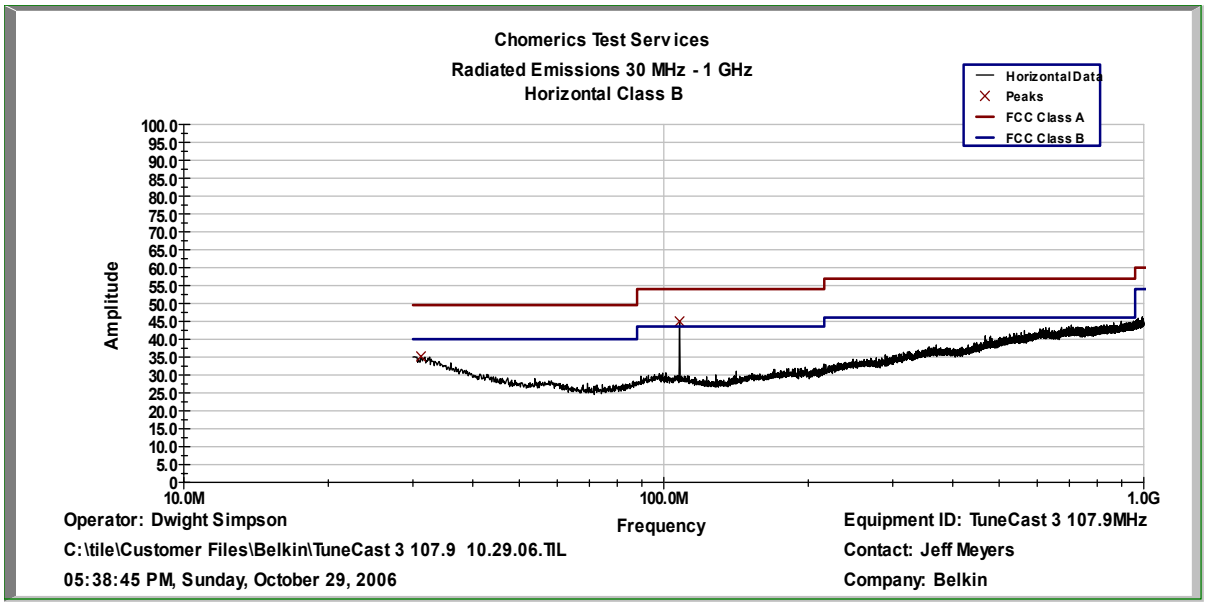
Operator: Dwight Simpson
C:\tile\Customer Files\Belkin\TuneCast 3 98.1 10.29.06.TIL
03:00:08 PM, Sunday, October 29, 2006
Equipment ID: TuneCast 3 98.1MHz
Contact: Jeff Meyers
Company: Belkin

Final Quasi-Peak Values

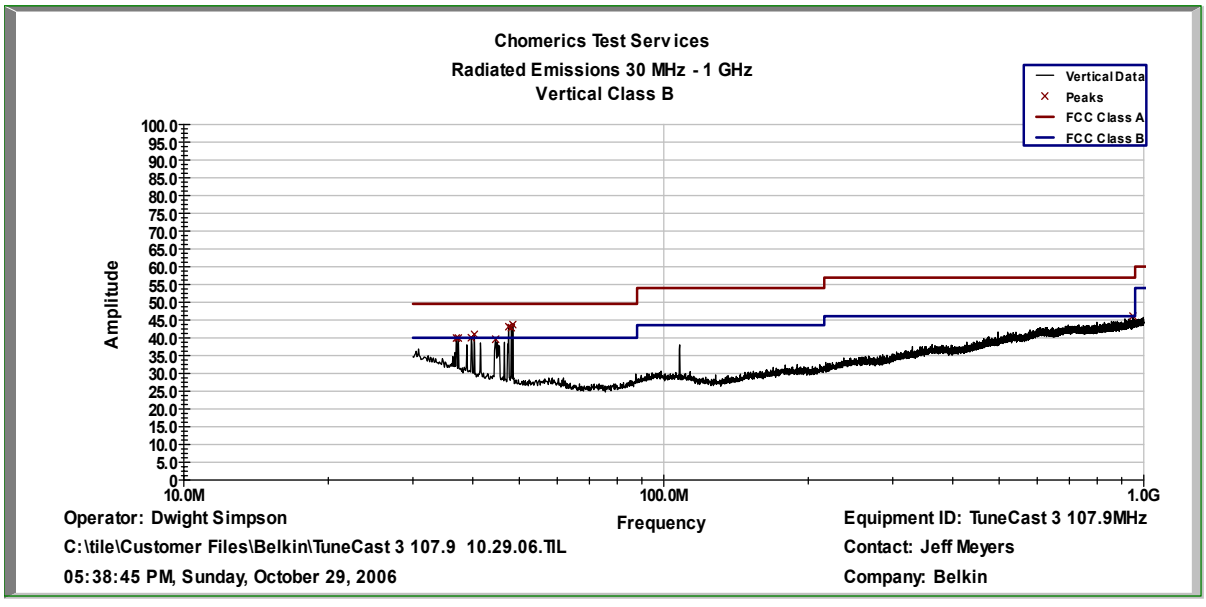
Frequency MHz	Measured QP dBuV	Antenna Factor	Cable Factor	Corrected QP dBuV	FCC 15.209 Limit	Pass / Fail Margin	Angle Deg.	Height cm	Polarity H / V
30.522	2.92	16.16	0.56	19.63	40.00	-20.37	81	198	H
31.020	3.00	15.88	0.57	19.45	40.00	-20.56	357	363	V
95.660	3.61	9.39	0.98	13.97	43.52	-29.55	193	321	V
100.020	3.52	9.20	1.01	13.73	43.52	-29.79	117	288	H
196.160	3.13	10.20	1.50	14.83	43.52	-28.69	70	380	H
683.780	2.28	20.46	2.82	25.55	46.02	-20.47	3	286	V

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

High Frequency 107.9 MHz
Graph Horizontal



Graph Vertical



Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Tabular Data – 107.9 MHz

Chomerics Test Services
Radiated Emissions 30 MHz - 1080 MHz

Operator: Dwight Simpson
C:\tile\Customer Files\Belkin\TuneCast 3 107.9 10.29.06.TIL
06:03:05 PM, Sunday, October 29, 2006
Equipment ID: TuneCast 3 107.9MHz
Contact: Jeff Meyers
Company: Belkin

Final Quasi-Peak Values

Frequency MHz	Measured QP dBuV	Antenna Factor	Cable Factor	Corrected QP dBuV	FCC 15.209 Limit	Pass / Fail Margin	Angle Deg.	Height cm	Polarity H / V
31.190	3.22	15.78	0.57	19.57	40.00	-20.43	338	367	H
37.039	3.57	12.40	0.68	16.65	40.00	-23.36	315	286	V
37.309	3.42	12.27	0.68	16.39	40.00	-23.57	272	294	V
39.709	3.37	11.09	0.68	15.14	40.00	-24.86	326	128	V
40.369	3.40	10.70	0.68	14.78	40.00	-25.22	258	205	V
44.629	3.58	9.36	0.70	13.63	40.00	-26.37	248	313	V
47.509	3.52	8.60	0.74	12.85	40.00	-27.15	116	177	V
48.219	3.44	8.41	0.75	12.60	40.00	-27.40	275	344	V
48.469	3.44	8.40	0.75	12.59	40.00	-27.41	270	159	V
949.694	1.62	22.66	3.33	27.61	46.02	-18.41	125	287	V

Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

2.3.6 Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: DWIGHT SIMPSON
OPERATING MODE: NORMAL

DATE: OCTOBER 29, 2006
TEST NUMBER: 2
COUPLING DEVICE: EMCO BICONILOG

Photograph Description: Test set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: DWIGHT SIMPSON
OPERATING MODE: NORMAL

DATE: OCTOBER 29, 2006
TEST NUMBER: 2
COUPLING DEVICE: EMCO BICONILOG

Photograph Description: Test set-up

FORM CTS-PHOTO

2.4 Effective Isotropic Radiated Power Fundamental and Spurious Emissions

2.4.1 Equipment Used

	Equipment Used	Asset #	Serial #	Cal Date
X	EMC Test Systems Semi-anechoic Chamber	667	N/A	10/07
X	Rohde and Schwarz ESCS30 Test Receiver	638	826547/024	12/06
X	EMCO 3142B Biconilog Antenna	668	9903-1357	12/06
X	EMCO Biconical Antenna	679	9106-2444	11/06
X	Rohde and Schwarz SML01 Signal Generator	689	33216	10/06
X	EMCO Multi Device Controller Model 2090	639	9808-1343	NCR
X	EMCO Antenna Mast Model 3801/2NM	666	N/A	NCR
X	EMCO Video Camera Controller Model VCC-01	653	N/A	NCR
	EMCO Video Camera Model 2075	680	00183858	NCR

2.4.2 Test Conditions

EIRP measurements were performed with the TuneCast 3 - Model F8M010 set up on a wooden table above the turntable at a distance of 3 meters from Biconilog antenna within the semi-anechoic chamber.

The TuneCast 3 - Model F8M010 was configured to operate in the continuous mode of operation to maximize the emissions. The TuneCast 3 - Model F8M010 was tested at the low mid and high frequencies. The TuneCast 3 - Model F8M010 was set up and powered by 3.0 VDC for this test.

2.4.3 Test Method

The test method of ESTI EN 300 220-1 Clause 8.3 was followed for the EIRP measurement. A manual signal substation test was performed. During this test, the antenna, turntable and the EUT were manipulated to maximize the emission level. In accordance with ANI C63.4, the device was positioned to maximize radiation in all three orthogonal planes during preliminary testing.

2.4.4 Results

The Belkin Corporation TuneCast 3 - Model F8M010 is fully compliant with the EIRP requirement for the Fundamental and Spurious Emissions of AS/NZS 4268:2003.

No Spurious emissions were detected. The maximum EIRP measured was 20.9 nW at 107.9 MHz.

2.4.5 Test Data

EIRP OF THE FUNDAMENTAL

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL
OPERATING MODE: NORMAL

DATE: OCTOBER 30, 2006
TEST NUMBER: 5
PROCEDURE: ESTI EN 300 220-1 CLAUSE 8.3

FREQUENCY MHZ	Signal Generator -dBm	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H / V	CABLE LOSS dB	NUMERIC GAIN dBI	EIRP -dBm	EIRP nW
88.1	**-52.3**	**2.14**	**336**	**H**	**1.2**	**1.3**	**-49.8**	**10.5**
98.1	**-54.9**	**2.23**	**313**	**H**	**1.2**	**1.4**	**-52.3**	**5.9**
107.9	**-49.4**	**2.89**	**330**	**V**	**1.2**	**1.4**	**-46.8**	**20.9**

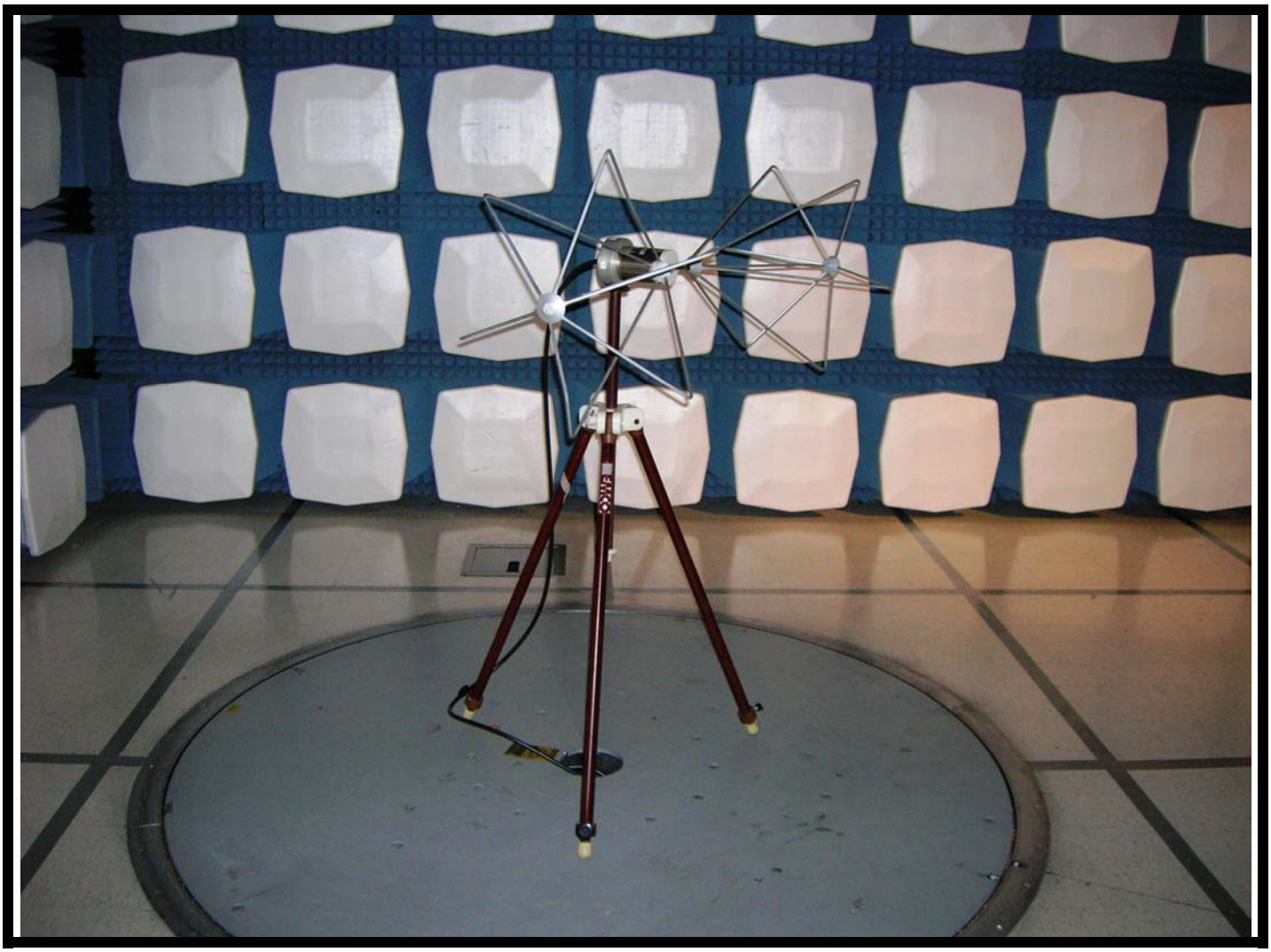
Ambient Temperature: 72°F **Humidity: 43%** **Atmospheric Pressure: 30.1″**

FORM CTS-DS-001R

2.4.6 Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL
OPERATING MODE: NORMAL

DATE: OCTOBER 30, 2006
TEST NUMBER: 5
PROCEDURE: ESTI EN 300 220-1 CLAUSE 8.3



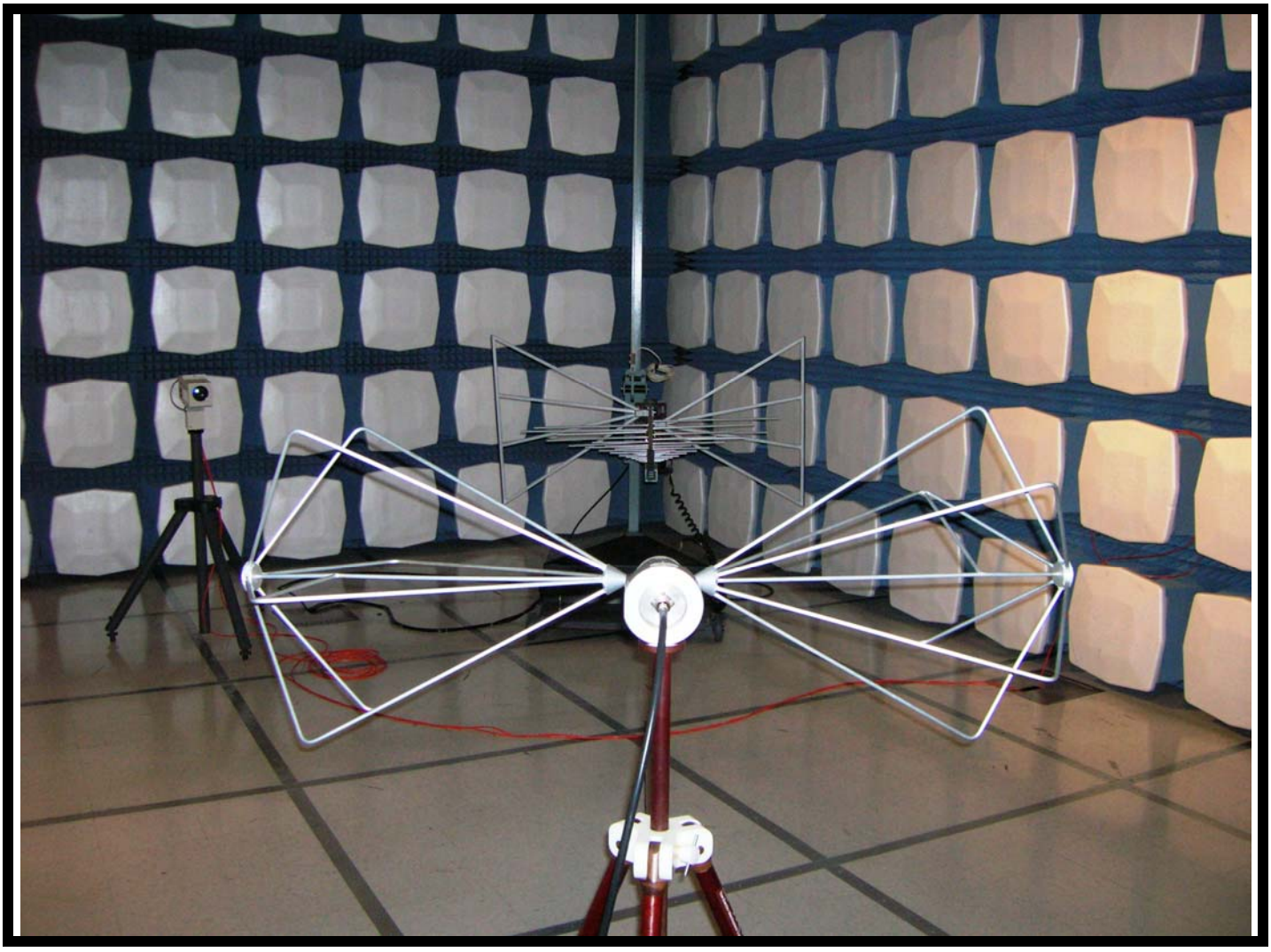
Photograph Description: Test set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL
OPERATING MODE: NORMAL

DATE: OCTOBER 30, 2006
TEST NUMBER: 5
PROCEDURE: ESTI EN 300 220-1 CLAUSE 8.3



Photograph Description: Test set-up

FORM CTS-PHOTO

2.5 FCC Part 15 Subpart A Radiated Emissions (FCC 47 CFR 15.33)

2.5.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	EMC Test Systems Semi-anechoic Chamber	667	N/A	10/07
X	Rohde and Schwarz ESCS30 Test Receiver	638	826547/024	12/06
X	EMC Test Systems 6512 Loop Antenna	787	00051667	11/06
X	IBM Personal Computer Model 300XL	N/A	23TMP08	NCR
X	EMCO Multi Device Controller Model 2090	639	9808-1343	NCR
X	EMCO Antenna Mast Model 3801/2NM	666	N/A	NCR
X	EMCO Video Camera Controller Model VCC-01	653	N/A	NCR
X	EMCO Video Camera Model 2075	680	00183858	NCR
X	Quantum Change Tile Software	N/A	Version 3.2	NCR

2.5.2 Test Conditions

Radiated emissions testing was performed with the EUT set up on a wooden table above the turntable at a distance of 1 meter from the Loop antenna within the Semi-anechoic Chamber.

The Belkin Corporation TuneCast 3 - Model F8M010 was configured to operate in the normal mode of operation to maximize the emissions. The TuneCast 3 - Model F8M010 was set up and powered by 3.0 VDC for radiated emission tests. The worst case signals detected were recorded.

2.5.3 Test Method

The test method of FCC Part 15.33 Radio Frequency Devices was followed. The lowest frequency generated or used on this device was identified to be 1.0 MHz; therefore, a manual scan was performed from 1 MHz – 30 MHz. In accordance with ANSI C63.4, the antenna, turntable and the EUT's position was manipulated to maximize the emission levels in a given frequency band displayed on the receiver. The device was positioned to maximize radiation in all three orthogonal planes during preliminary testing.

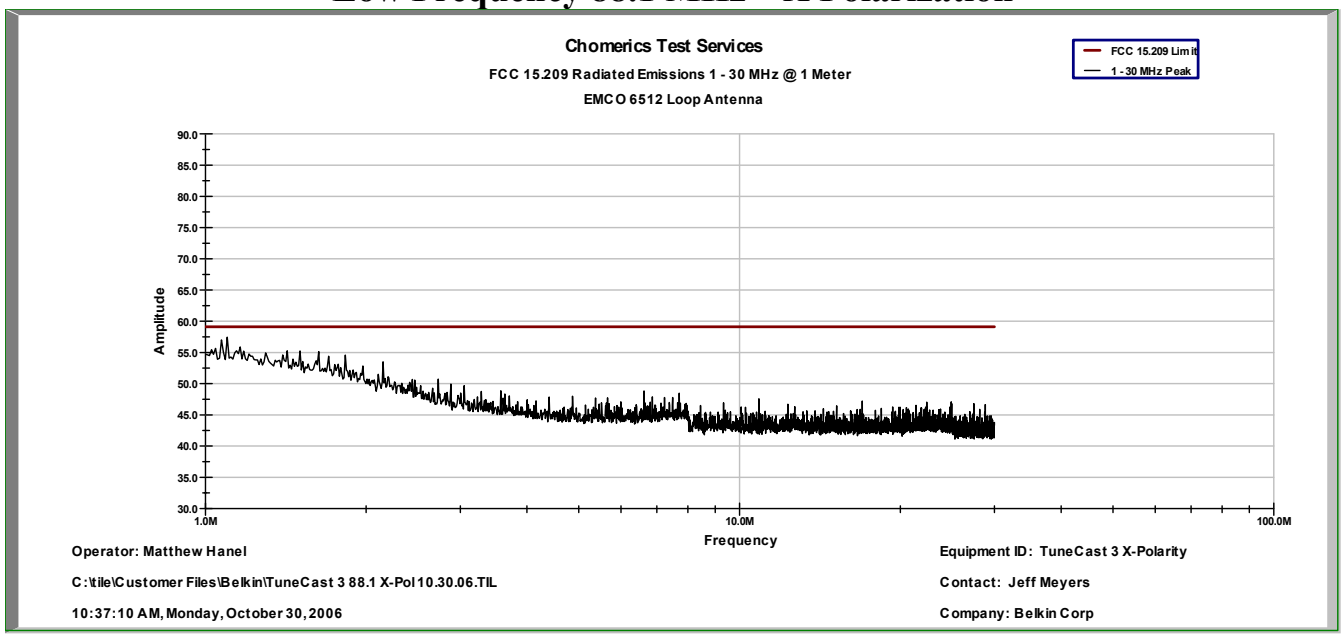
Subsequently, an automated scan was performed in 3 antenna polarizations to maximize the emissions from the EUT using the Quantum Change Tile Software.

2.5.4 Results

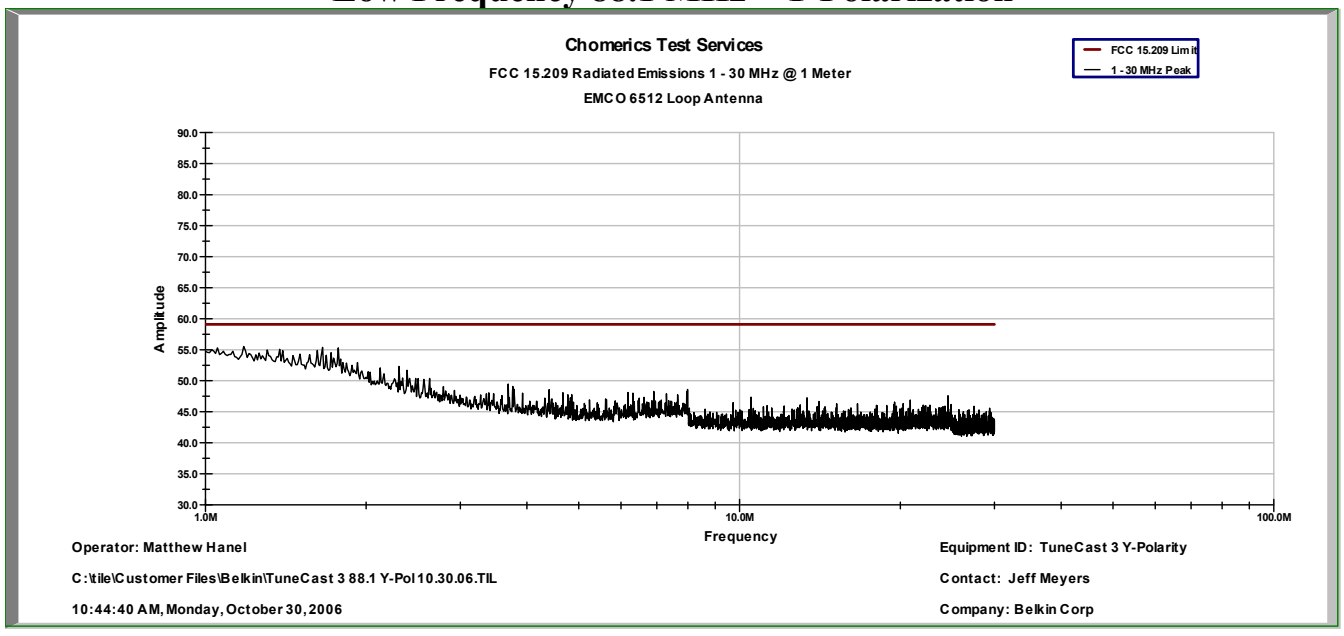
Peak measurements recorded across the frequency range of 1 – 30 MHz revealed no signals that were within 6dB of the limit. The Belkin Corporation TuneCast 3 - Model F8M010 meets the requirements for radiated emissions as required by FCC Part 15.33.

2.5.5 Test Data

Low Frequency 88.1 MHz – X Polarization

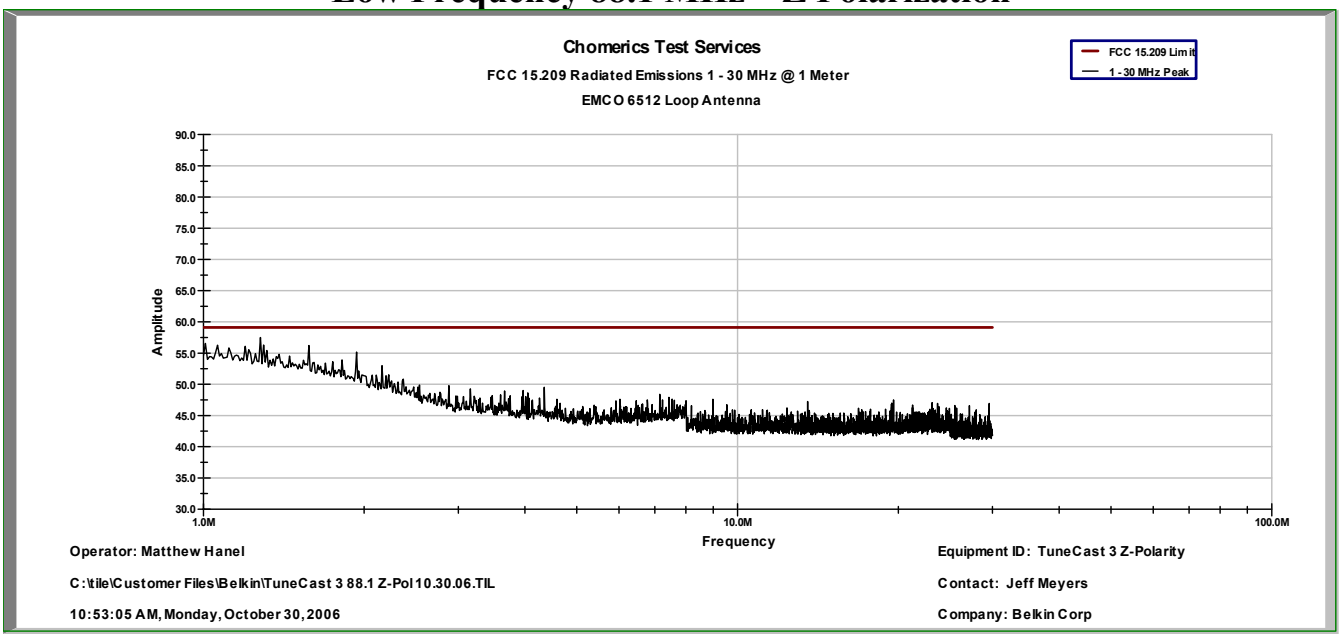


Low Frequency 88.1 MHz – Y Polarization



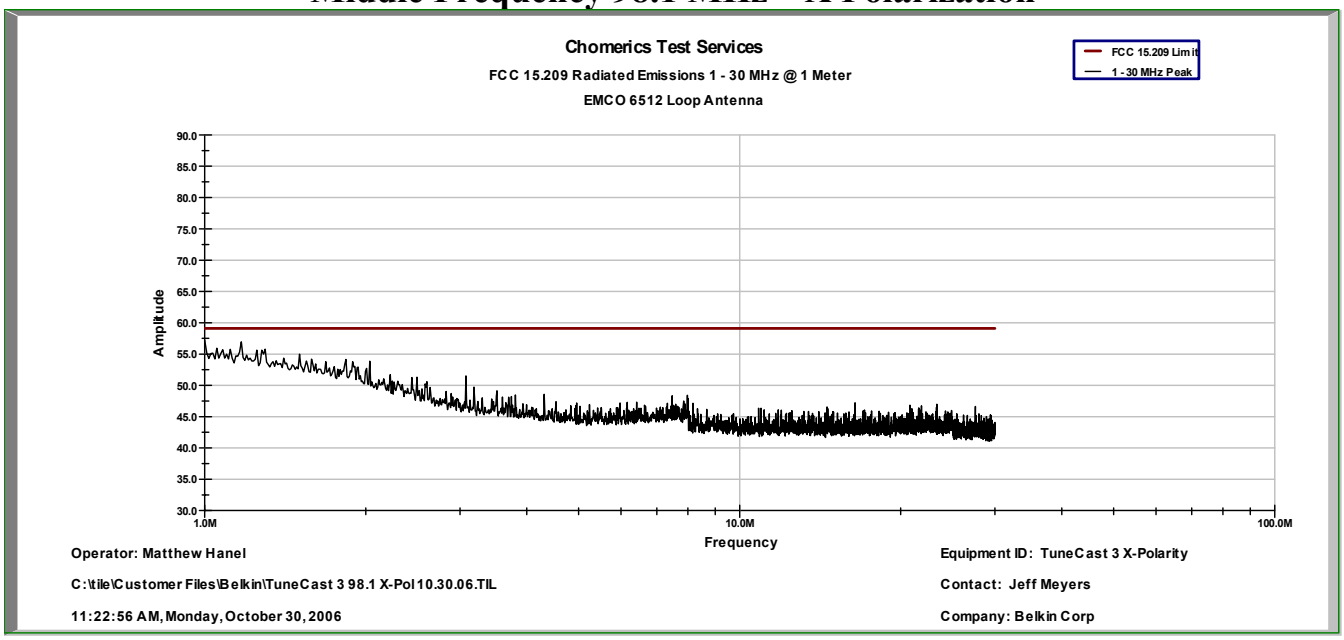
Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Low Frequency 88.1 MHz – Z Polarization

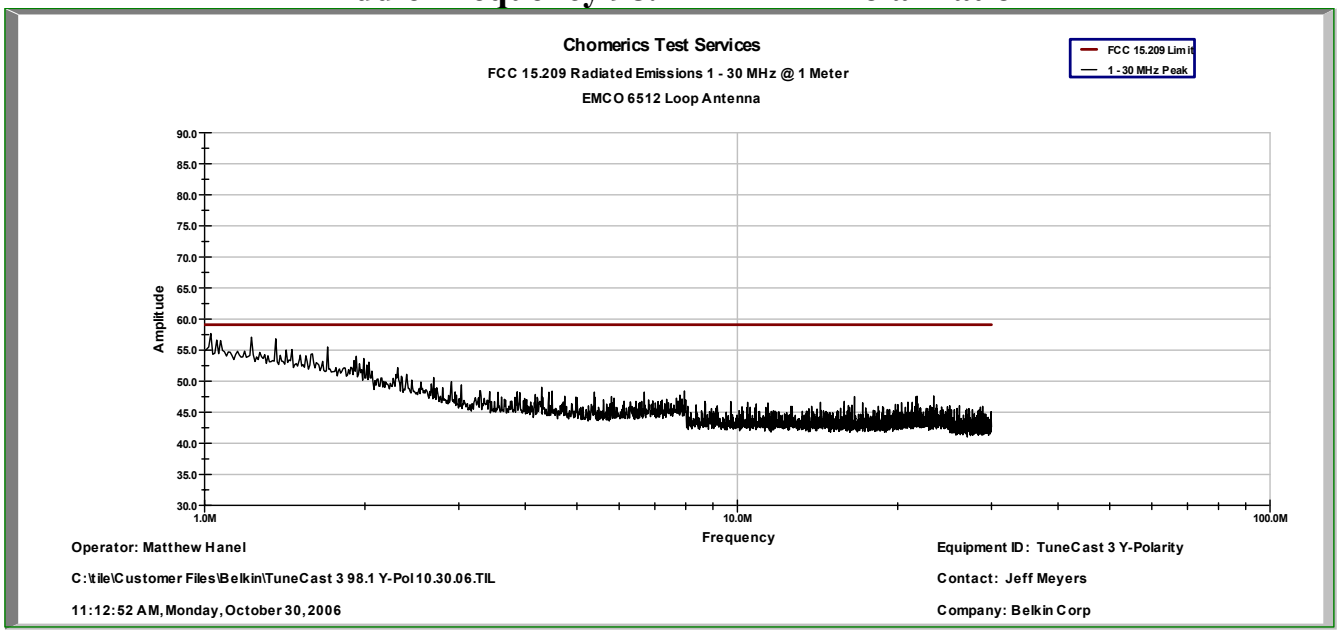


Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Middle Frequency 98.1 MHz – X Polarization

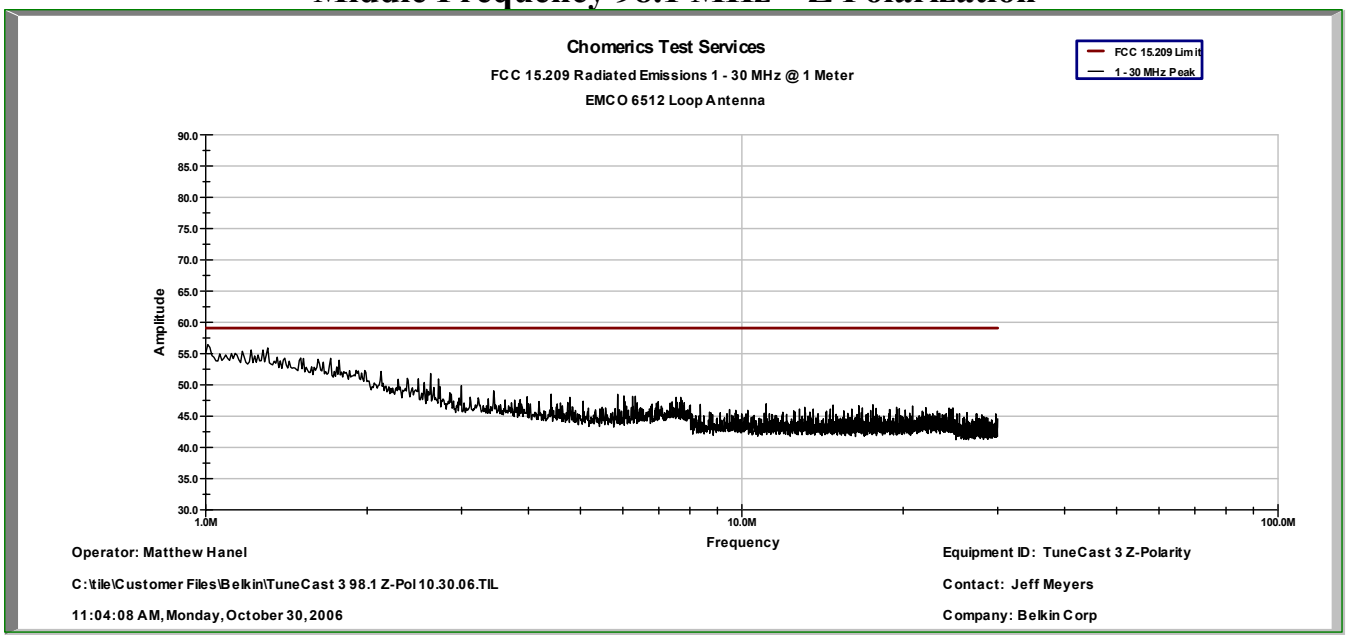


Middle Frequency 98.1 MHz – Y Polarization



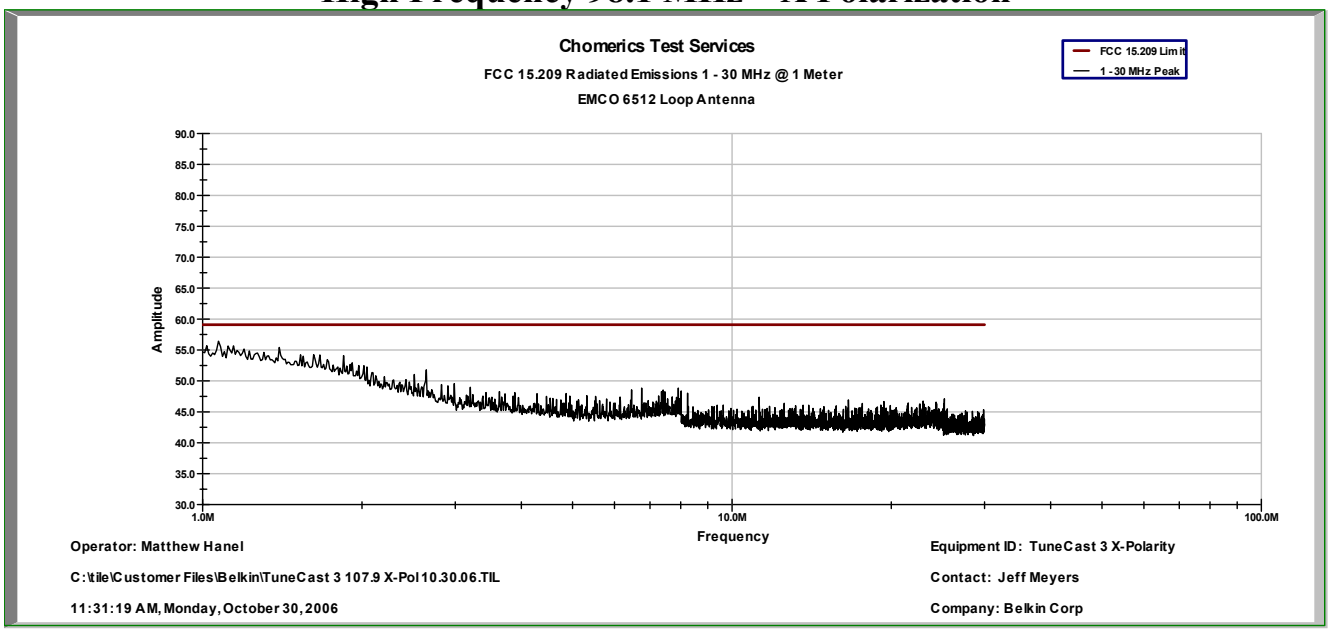
Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

Middle Frequency 98.1 MHz – Z Polarization

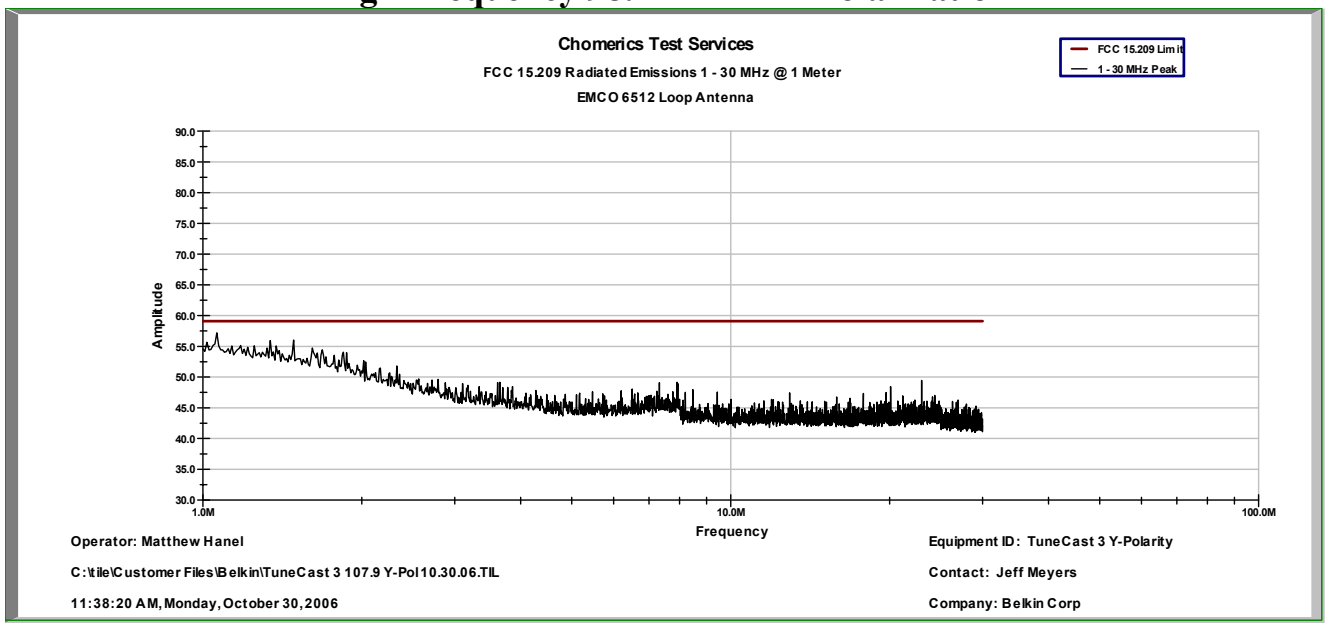


Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

High Frequency 98.1 MHz – X Polarization

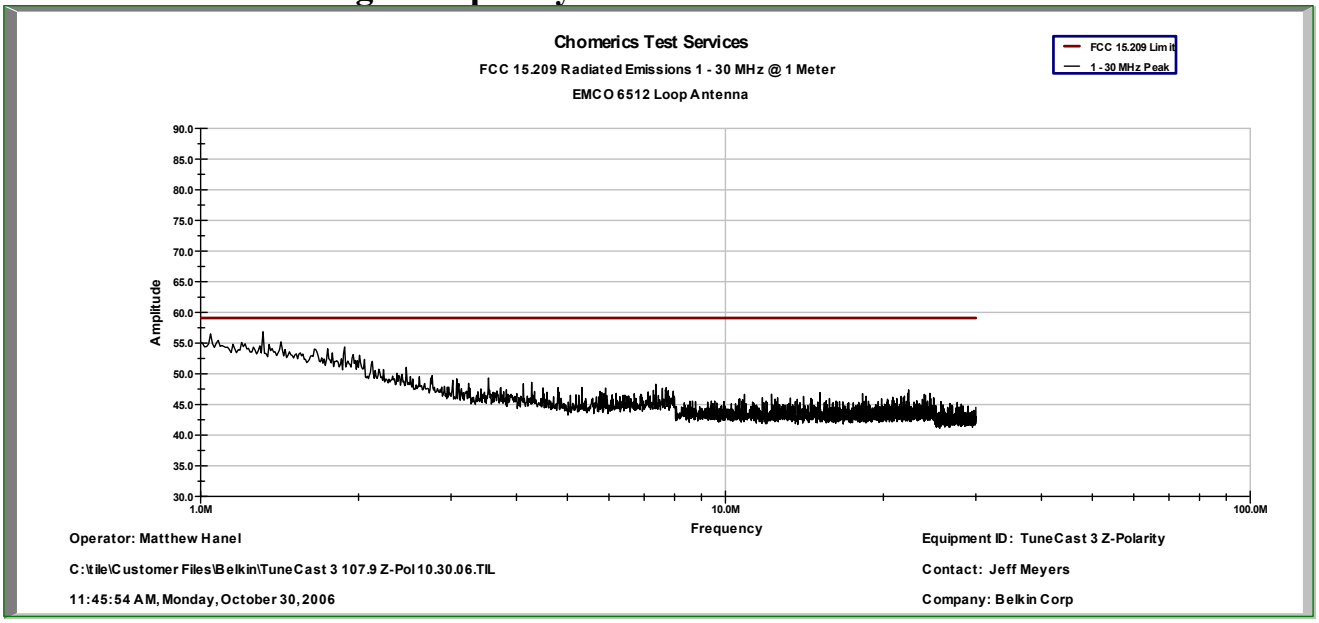


High Frequency 98.1 MHz – Y Polarization



Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

High Frequency 98.1 MHz – Z Polarization



Ambient Temperature: 72°F **Humidity: 46%** **Atmospheric Pressure: 30.3″**

2.5.6 Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL
OPERATING MODE: NORMAL

DATE: OCTOBER 30, 2006
TEST NUMBER: 3
FCC SUBPART C 15.33

Photograph Description: Test set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010
TESTED BY: MATTHEW HANEL
OPERATING MODE: NORMAL

DATE: OCTOBER 30, 2006
TEST NUMBER: 3
FCC SUBPART C 15.33

Photograph Description: Test set-up

FORM CTS-PHOTO

APPENDIX A

TEST LOG

TEST LOG

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010

PROGRAM: EMISSIONS
TESTED BY: DWIGHT SIMPSON

	Date	Comments
Pre-Test Checklist	October 26, 2006	Test Plan/Procedure: ANSI C63.4 & ESTI EN 300 220-1 Clause 8.3 Test Specification: FCC Part 15 Subpart C 15.209 and 15.239 Chomerics Procedure: CHO TPECROC T1, T2 EUT Power Requirement Verified: Voltage 3.0 VDC Frequency N/A Phase N/A EUT Functional Operational Check: [X] Pass [ ] Fail Environmental: Bonding/Grounding: N/A Safety Issues: N/A

	Date	Test #	Test Type	Test Equipment Calibrated	Test Performed Properly – Data Accepted	EUT Set-up Check/ Operational Check	EUT Pass/ Fail
In-Process Test Checklist	10.26.06	1	FCC 15.239 Radiated Emissions	Yes	Yes	Yes	Pass
	10.26.06-10.29.06	2	FCC 15.209 Radiated Emissions	Yes	Yes	Yes	Pass
	10.30.06	4	-26 dB Width Measurements	Yes	Yes	Yes	Pass

Post Test Checklist	Date: October 30, 2006	EUT Functional Operation Check: [X] Pass [ ] Fail	Test Engineer/Tech Approved Signatory

FORM CTS-010

TEST LOG

CUSTOMER: BELKIN CORPORATION
EQUIPMENT: TUNECAST 3 - MODEL F8M010

PROGRAM: EMISSIONS
TESTED BY: MATTHEW HANEL

	Date	Comments
Pre-Test Checklist	October 30, 2006	Test Plan/Procedure: ANSI C63.4 & ESTI EN 300 220-1 Clause 8.3 Test Specification: FCC Part 15 Subpart C 15.33 & AS/NZS 4268:2003 Chomerics Procedure: CHO TPECROC T1, T2 EUT Power Requirement Verified: Voltage 3.0 VDC Frequency Single Phase Single EUT Functional Operational Check: [X] Pass [ ] Fail Environmental: Bonding/Grounding: NA Safety Issues: NA

In-Process Test Checklist	Date	Test #	Test Type	Test Equipment Calibrated	Test Performed Properly – Data Accepted	EUT Set-up Check/ Operational Check	EUT Pass/ Fail
	10.30.06	3	FCC 15.33 Radiated Emissions	Yes	Yes	Yes	Pass
	10.30.06	4	-26 dB Width Measurements (Continued)	Yes	Yes	Yes	Pass
	10.30.06	5	EIRP	Yes	Yes	Yes	Pass

Post Test Checklist	Date: October 30, 2006	EUT Functional Operation Check: [X] Pass [ ] Fail	Test Engineer/Tech / Approved Signatory

FORM CTS-010