Product Safety Engineering, Inc
12955 Bellamy Brothers Blvd.
Dade City, FL 33525
352-588-2209

TEST REPORT

08F429C
11/13/08

Applicant:

The Nielsen Company
501 Brooker Creek Blvd.
Oldsmar, FL 34677

Product:

Models -501-2226
Mailable Meter II

Test dates:

10/27/2008

Receive Date:

10/15/2008

Prepared by: Steven E. Hoke - EMC Site Manager

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Test Results Summary

Test	Requirement	Measured	Pass/Fail
Minimum 6 dB Bandwidth	> 500 kHz	1.6 MHz	Pass
Power Spectral Density	< 8 dBm / 3 kHz	-16.6 dBm	Pass
Output Power	< 1 watt	0.00073 watts	Pass
Spurious Emissions	=>20 dB down	> 20 down	Pass
Powerline Conducted	Limit Table	6.3 dB margin	Pass
RF Exposure	1.0 mW / cm^2	0.000145 mW / cm^2	Pass

Test Procedures

Product description: The system under test contains an internal direct sequence spread spectrum transceiver operating in the 2.4 GHz frequency band.

Powerline conducted interference: 15.207 (a) The AC powerline conducted emissions measurements were made in accordance with ANSI C64.3 2003.

Power Output: 15.247 (b)(3) The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at its maximum output power. The measurements were made using the alternate field strength method described in FCC publication “Measurements of Digital Transmissions Systems Operating Under Section 15.247, issued March 23, 2005".

If antenna conducted tests cannot be performed on this device, radiated tests to show compliance with the various conducted requirements of Section 15.247 are acceptable. As stated previously, a pre-amp must be used in making the following measurements.

1. Calculate the transmitter's peak power using the following equation:
Where: E = the measured maximum field strength in V/m.

Set the RBW > 6dB bandwidth of the emission or use a peak power meter.

P = (E x d) squared / (30 x G)
G = the numeric gain of the transmitting antenna over an isotropic radiator.
d = the distance in meters from which the field strength was measured.
P = the power in watts for which you are solving:
.
Power Spectral Density: 15.247 (e) The peak power spectral density measurements were measured with the EUT set to low, medium and high transmit frequencies. The data rate of the radio was varied to determine the level that produced the worst case. The measurements were made using the alternate field strength method described in FCC publication “Measurements of Digital Transmissions Systems Operating Under Section 15.247, issued March 23, 2005".

The power spectral density was measured as follows:

A. Tune the analyzer to the highest point of the maximized fundamental emission. Reset the analyzer to a RBW = 3 kHz, VBW > RBW, span = 300 kHz, sweep =

B. From the peak level obtained in (A), derive the field strength, E, by applying the appropriate antenna factor, cable loss, pre-amp gain, etc. Using the equation listed in (1), calculate a power level for comparison to the + 8 dBm limit.

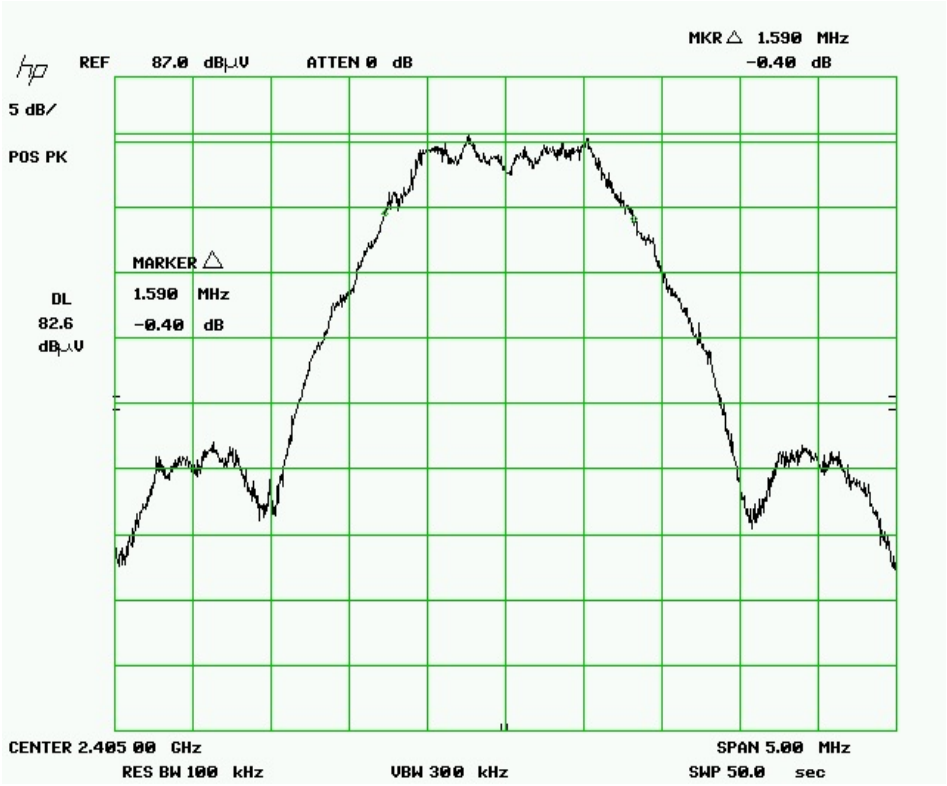
Minimum Bandwidth: 15.247 (a)(2) The minimum 6 dB bandwidth shall be at least 500 kHz. The RBW was set to (100) kHz and the VBW was set to (300) kHz. The (6) dB down points were then measured.

Radiated Spurious Emissions: 15.247 (d) The radiated spurious emissions measurements were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using our open area test site. All emissions up to 25 Ghz were investigated and those falling into restricted bands were measured for compliance.

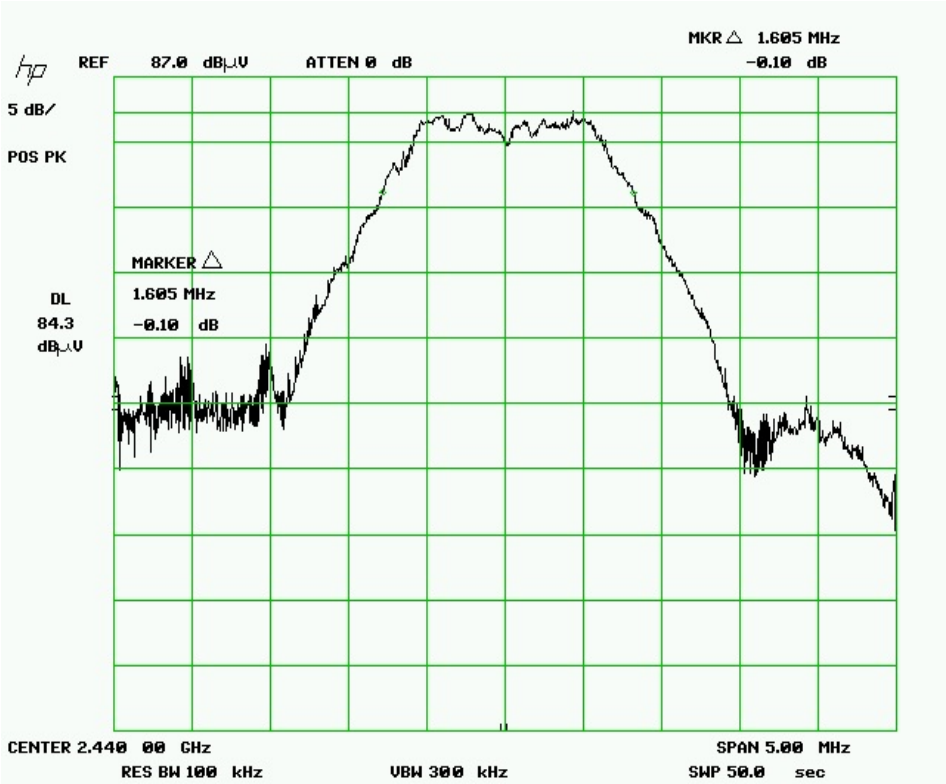
TEST EQUIPMENT CALIBRATION INFORMATION

Manufacturer	Model	Description	Serial Number	Cal Due
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	07/25/09
Hewlett Packard	85662A	Display	2403A07352	07/25/09
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00209	07/31/09
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06832	12/18/08
Hewlett Packard	8568B	Spectrum Analyzer	2407A03213	
Hewlett Packard	85662A	Display	2340A05806	
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00358	
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06901	
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	1937A03247	
Hewlett Packard	8449B	Preamp 1 - 26.5 GHz	3008A00320	08/03/09
Hewlett Packard	8648B	Signal Generator	3443U00312	
Hewlett Packard	8672A	Signal Generator	2211A02426	
Eaton	96005	Log Periodic Antenna	1099	
Electro-Metrics	LPA 30	Log Periodic Antenna	2280	01/10/09
Electro-Metrics	BIA 30	Biconical Antenna	3852	01/15/09
Electro-Metrics	BIA 25	Biconical Antenna	4283	
Electro-Mechanics	3115	Double Ridge Guide Ant.	3810	01/16/10
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824	
Solar	8012	LISN	924840	
Solar	8028	LISN	829012/809022	05/02/09
Solar	8028	LISN	903725/903726	
Agilent	E7402A	Absorbing Clamp	US39150137	
Leader		Function Generator	8060233	
Electro-Metrics	EMC-30	EMI Receiver	191	06/01/09
Antenna Research	ALA-130/A	Loop Antenna	106	
Radio Shack	63-867	Temp/Hygrometer	N/A	
Radio Shack	63-867A	Temp/Hygrometer	N/A	

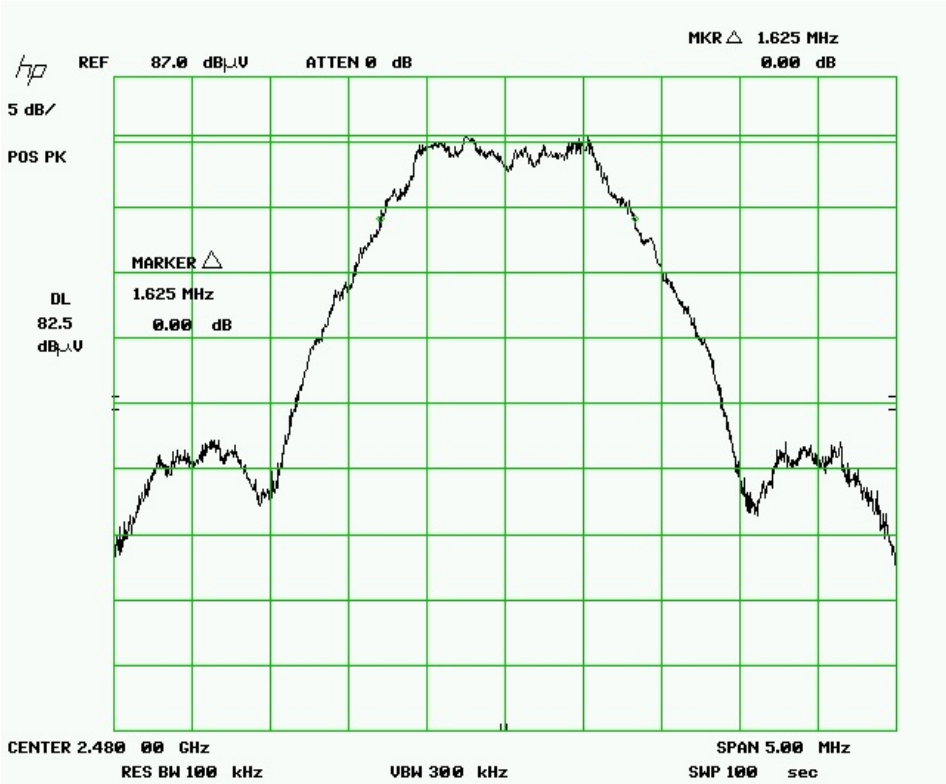
Test: Minimum Bandwidth per 15.247(a)(2)
Date: 10/27/08
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 1



Test: Minimum Bandwidth per 15.247(a)(2)
Date: 10/27/08
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 6



Test: Minimum Bandwidth per 15.247(a)(2)
Date: 10/27/08
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 11



1

Test: Power Spectral Density per 15.247(e)

Date: 10/27/08

Requirement: The peak power spectral density conducted from the antenna port of a direct sequence transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

VBW: (10) kHz

Channel: 1

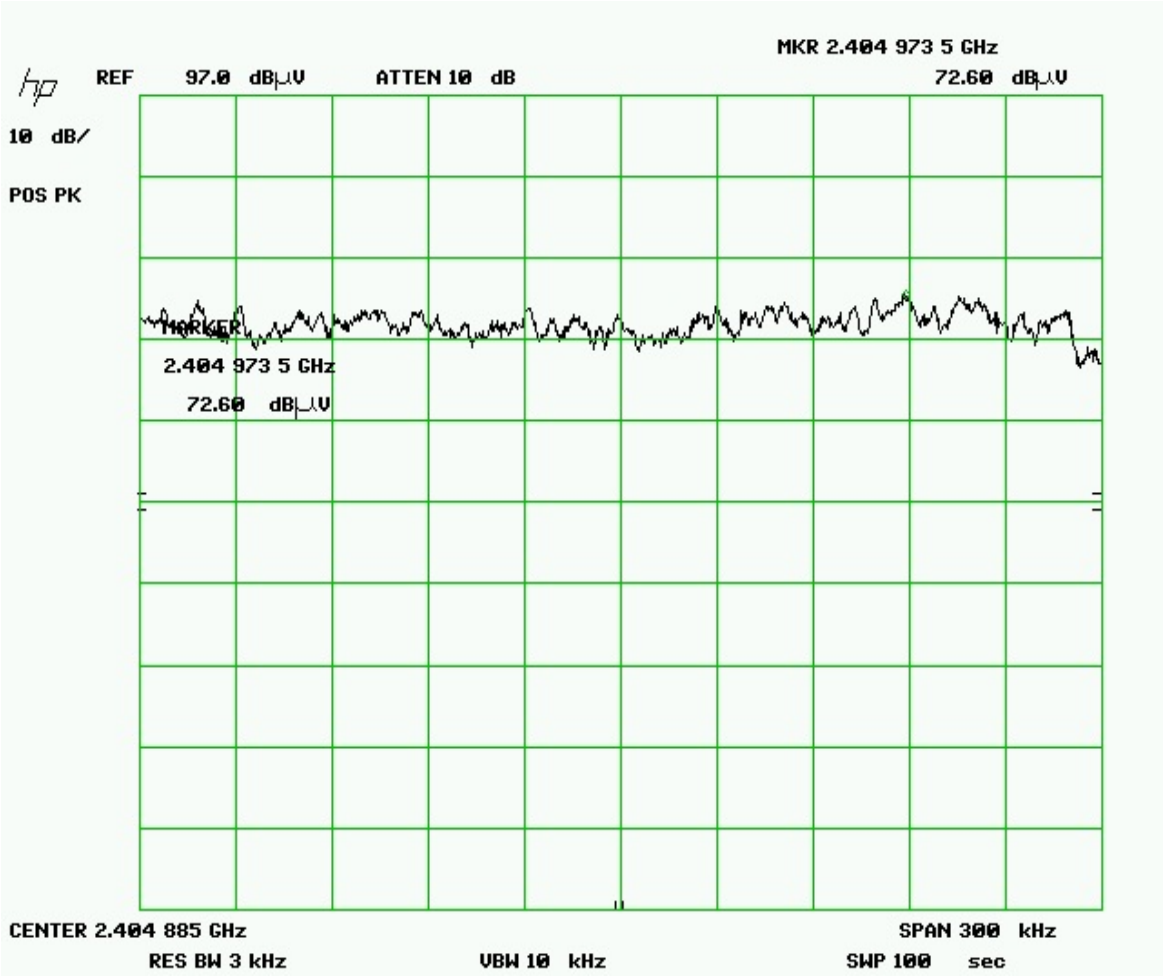
Peak Power Spectral Density = (72.6 dBuV = 76.1 dBuV/m) = 6,383 uV/m = 0.0064 E/m

P=(E*d)^2 / (30 *G)

P = (0.0064 *3)^2 / (30)

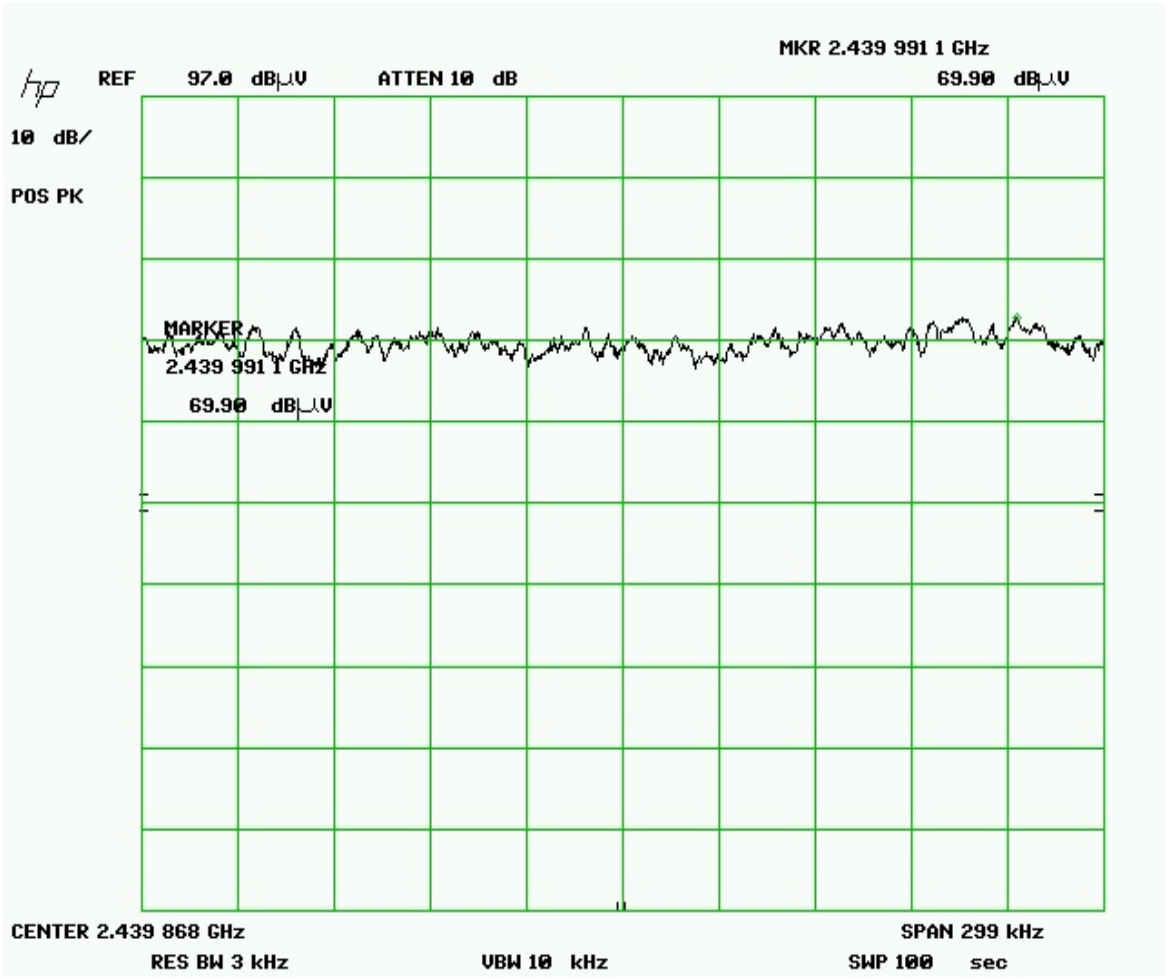
P = 0.0123 mW

P = 0.0123 mW = -19.1 dBm / 3 kHz



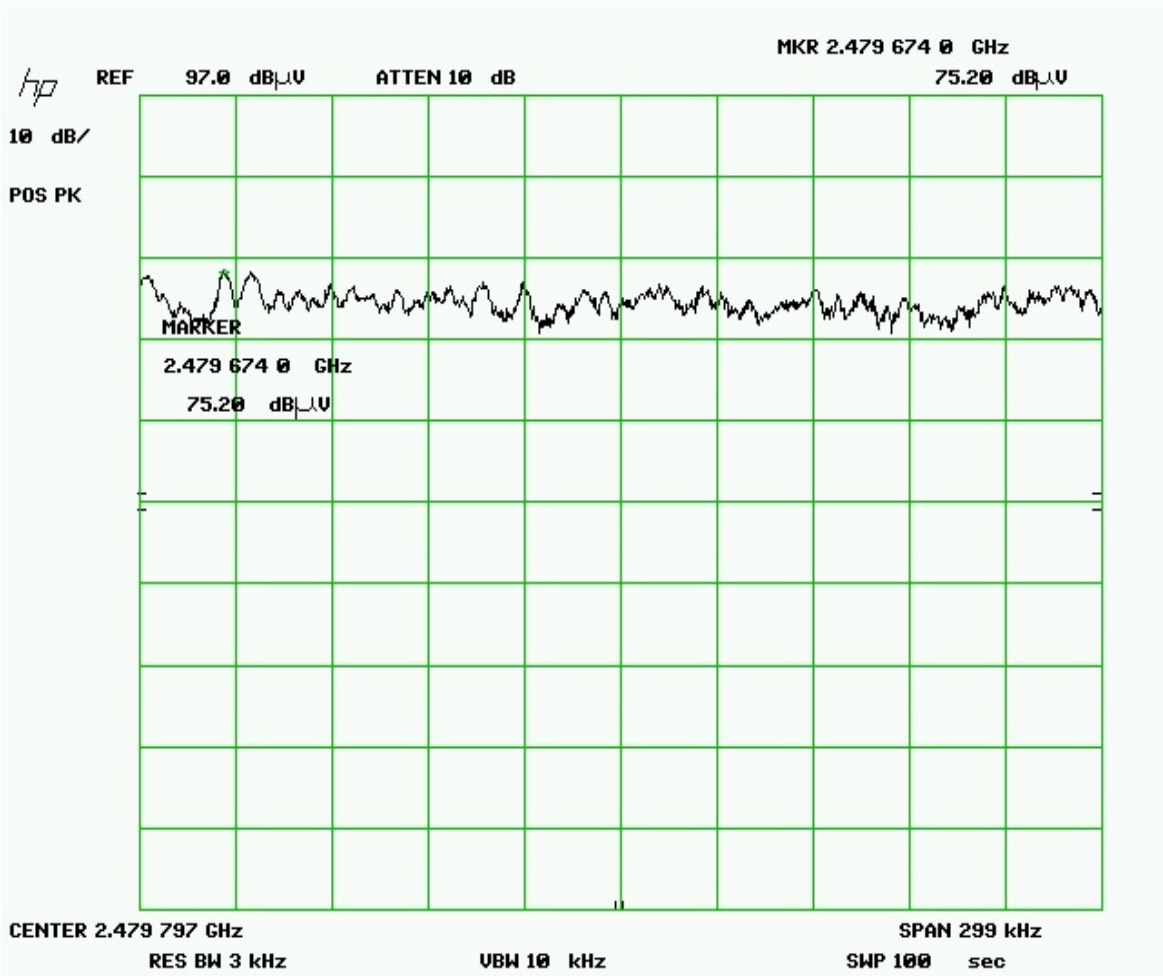
Test: Power Spectral Density per 15.247(e)
Date: 06/25/08
Requirement: The peak power spectral density conducted from the antenna port of a direct sequencr transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.
RBW: (3) kHz
VBW: (10) kHz
Channel: 6

Peak Power Spectral Density = (69.9 dBuV = 73.4 dBuV/m) = 4,677 uV/m = 0.0047 E/m
P=(E*d)^2 / (30 *G)
P = (0.0047 *3)^2 / (30)
P = 0.0067 mW
P = 0.0067 mW = -21.7 dBm / 3 kHz



Test: Power Spectral Density per 15.247(e)
Date: 06/25/08
Requirement: The peak power spectral density conducted from the antenna port of a direct sequencr transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.
RBW: (3) kHz
VBW: (10) kHz
Channel: 11

Peak Power Spectral Density = (75.2 dBuV = 78.7 dBuV/m) = 8,610 uV/m = 0.0086 E/m
P=(E*d)^2 / (30 *G)
P = (0.0086 *3)^2 / (30)
P = 0.022 mW
P = 0.022 mW = -16.6 dBm / 3 kHz



Test: Output Power per 15.247(b)(3)
Date: 06/24/08
Requirement: The maximum peak output power must not exceed 1 watt.
RBW: (1) MHz
VBW: (3) MHz
Channel: See Table
Peak Output Power = (0.73) mW

Channel	Level dBuV	ACF	Cable Loss	Preamp Gain	Adj. Level dBuV/m	E/m	Watts mW
1	90.3	28.6	2.1	27.2	93.8	0.049	0.73
6	89.1	28.6	2.1	27.2	92.6	0.043	0.55
11	87.5	28.6	2.1	27.2	91.0	0.036	0.39

P=(E*D)^2 / (30 * G)

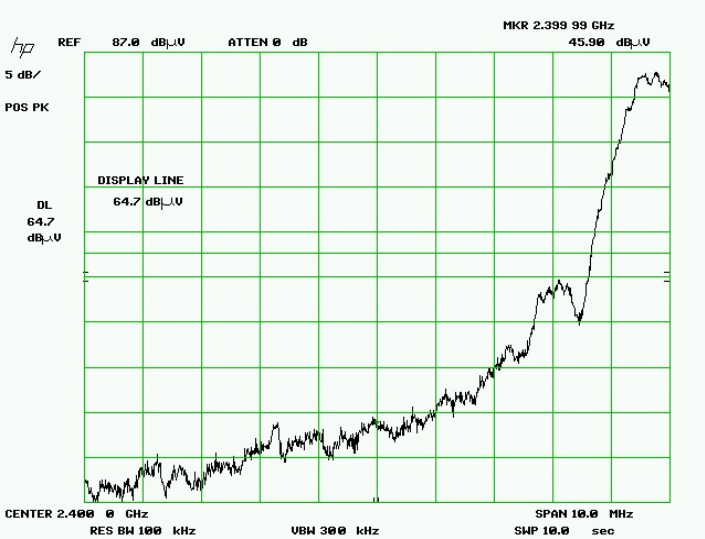
P = watts
E = volts per meter
D = distance in meters
G = transmit antenna numeric gain

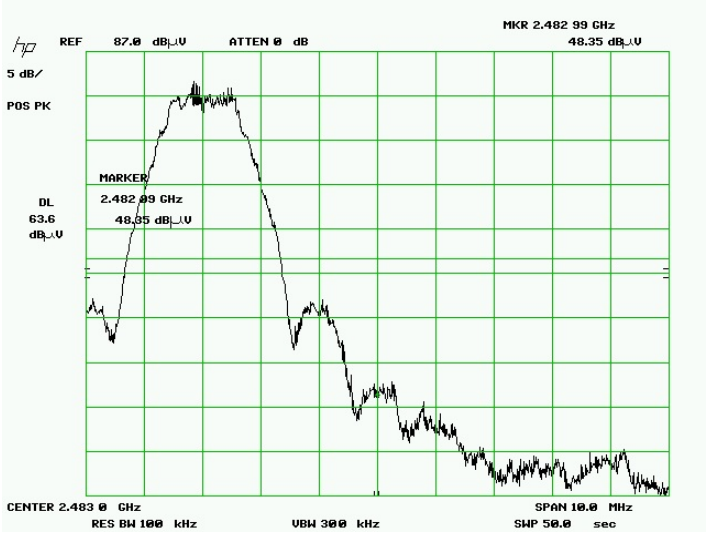
P=(0.049 * 3)^2 / (30 *1)
P=(0.147)^2 / 30
P=(0.022) / 30
P= 0.00073 watts

Test: Radiated Spurious Emissions per 15.247(d)
Date: 06/24/08
Requirement: In any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20 dB down from the highest emissions level within the authorized band.

RBW: (100) kHz
VBW: (300) kHz
Channel: 1, 6, & 11

Maximum Conducted Spurious Emissions = Greater than (20) dB down





Test: AC powerline Conducted Emissions per15.207
Date: 10/19/2005
Requirement: If the EUT is connected to the AC power, it must meet the limits set forth from (150) kHz to (30) MHz.
RBW: (9) kHz
VBW: (10) kHz
Channel: 1,6,11 (worst case shown below)
Detector: Quasi-Peak
Line Side: QP Margin = (6.3) dB
Line Side: AVG Margin = (17.0) dB
Neutral Side: QP Margin = (3.5) dB

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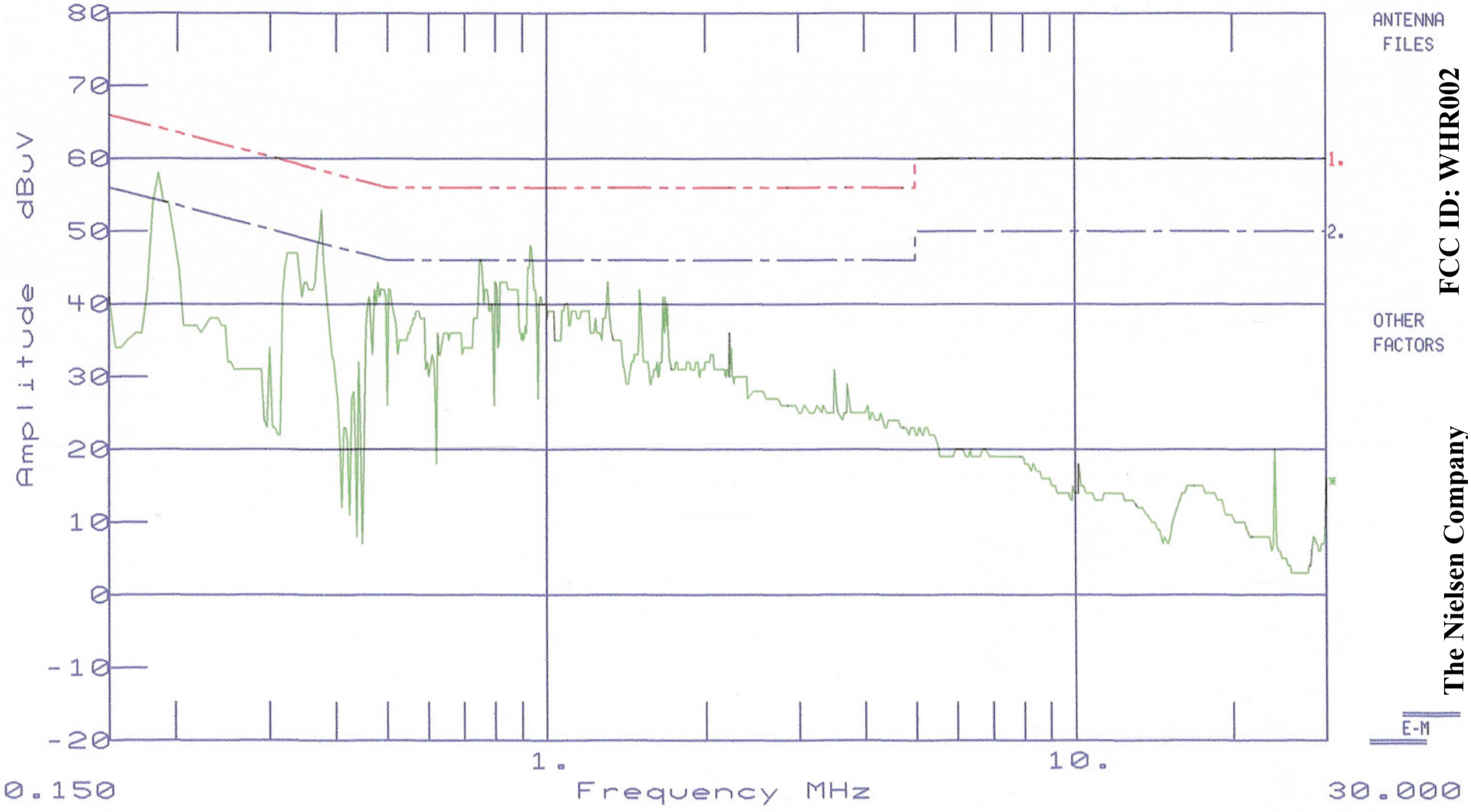
NIELSEN MEDIA RESEARCH

Date : 10/28/08	Time : 15:25:16.60	EMC-30 SETTINGS	SPECS
Technician : JACK GARNER	Test Equip. :EMC-30	Detector QuasiPeak	1) CISPR 22 Quasi Peak
Test Method :EN55022 CLASS B	Test Number :1	Bandwidth CISPR	2) CISPR 22 AVG
Equipment : 501-2226	Sensor Loc. :LINE	Dump/Dwell IN/A	3)
Mode of Op. :NORMAL	Sensor Pol. :	RF Atten. 10 dB	4)
Serial No. : 5012226000@00000013	Ext. Atten. :0 dB	IF Atten. 10 dB	

Comment : 120 VAC / 60 HZ



TEST TITLE:NIELSEN MEDIA RESEARCH | PAGE 1
DATA FILE :429_L.D30 | Freq.(MHz) 0.1500
Amplitude Units : dBuV | Threshold -2 dB

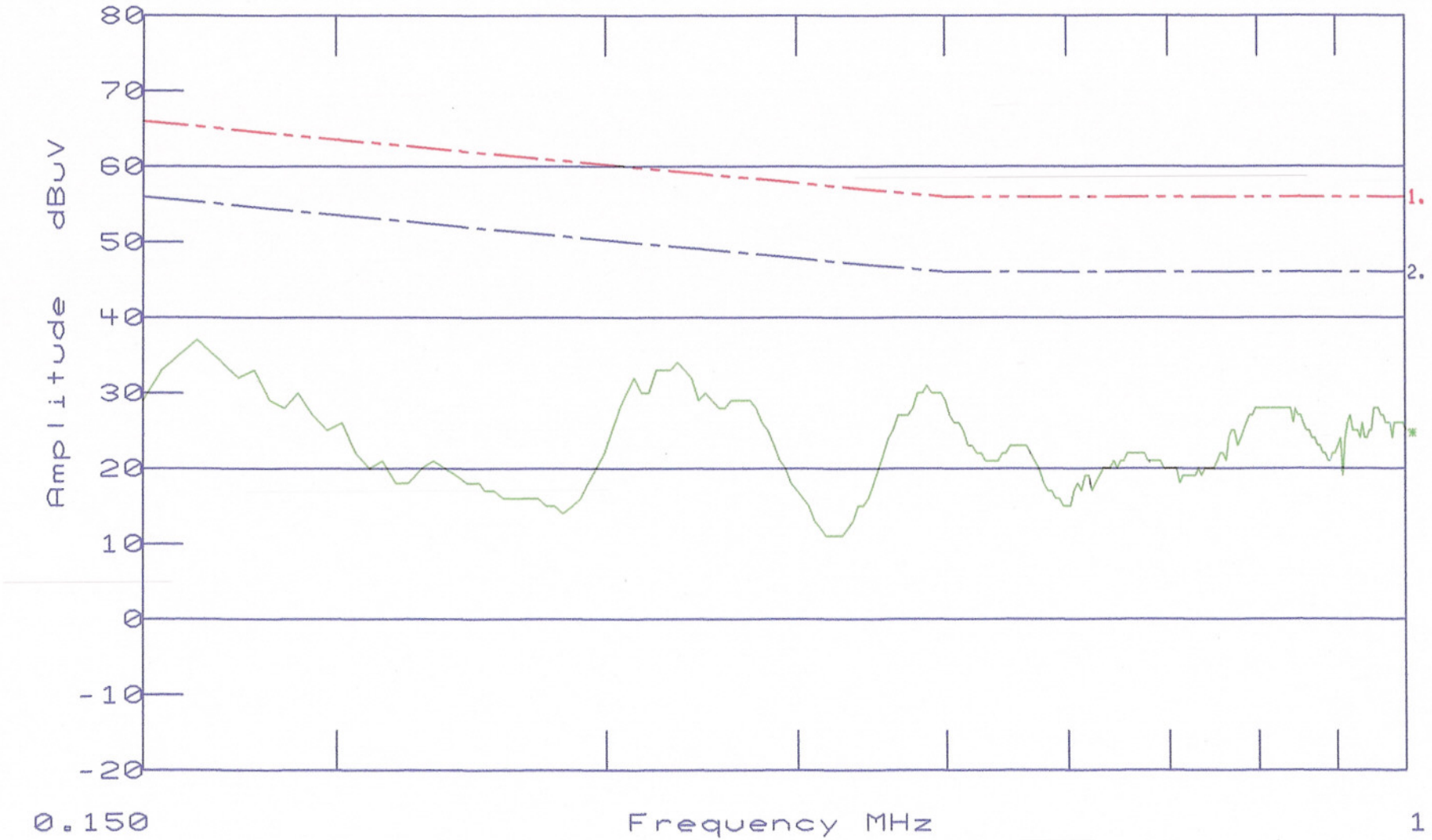
Freq(MHz)	Amp	C22BQP.S30 vs Spec(dB)	C22BAVG.S30 vs Spec(dB)
0.1811	54.0		-0.435 *
0.1852	58.0		3.751 *
0.1890	54.0		-0.080 *
0.1932	54.0		0.102 *
0.3689	48.0		-0.526 *
0.3723	49.0		0.551 *
0.3756	53.0		4.624 *
0.7493	46.0		0.000 *
0.7527	46.0		0.000 *
0.7561	45.0		-1.000 *
0.9228	45.0		-1.000 *
0.9262	45.0		-1.000 *
0.9296	45.0		-1.000 *
0.9330	48.0		2.000 *
0.9364	48.0		2.000 *
0.9398	47.0		1.000 *
0.9432	45.0		-1.000 *

Product Safety Engineering

NIELSEN MEDIA RESEARCH

Date :	10/28/08	Time :	15:47:33.81	EMC-30 SETTINGS	SPECS
Technician :	JACK GARNER	Test Equip. :	EMC-30	Detector Average	1) CISPR 22 Quasi Peak
Test Method :	EN55022 CLASS B	Test Number :	1	Bandwidth CISPR	2) CISPR 22 AVG
Equipment :	501-2226	Sensor Loc. :	LINE	Dump/Dwell N/A	3)
Mode of Op. :	NORMAL	Sensor Pol. :		RF Atten. 10 dB	4)
Serial No. :	5012226000@00000013	Ext. Atten. :	0 dB	IF Atten. 10 dB	

Comment : 120 VAC / 60 HZ



TEST TITLE:NIELSEN MEDIA RESEARCH			PAGE 1
DATA FILE :429_LA.D30			Freq.(MHz)
Amplitude Units : dBuV		Threshold -17 dB	0.1500

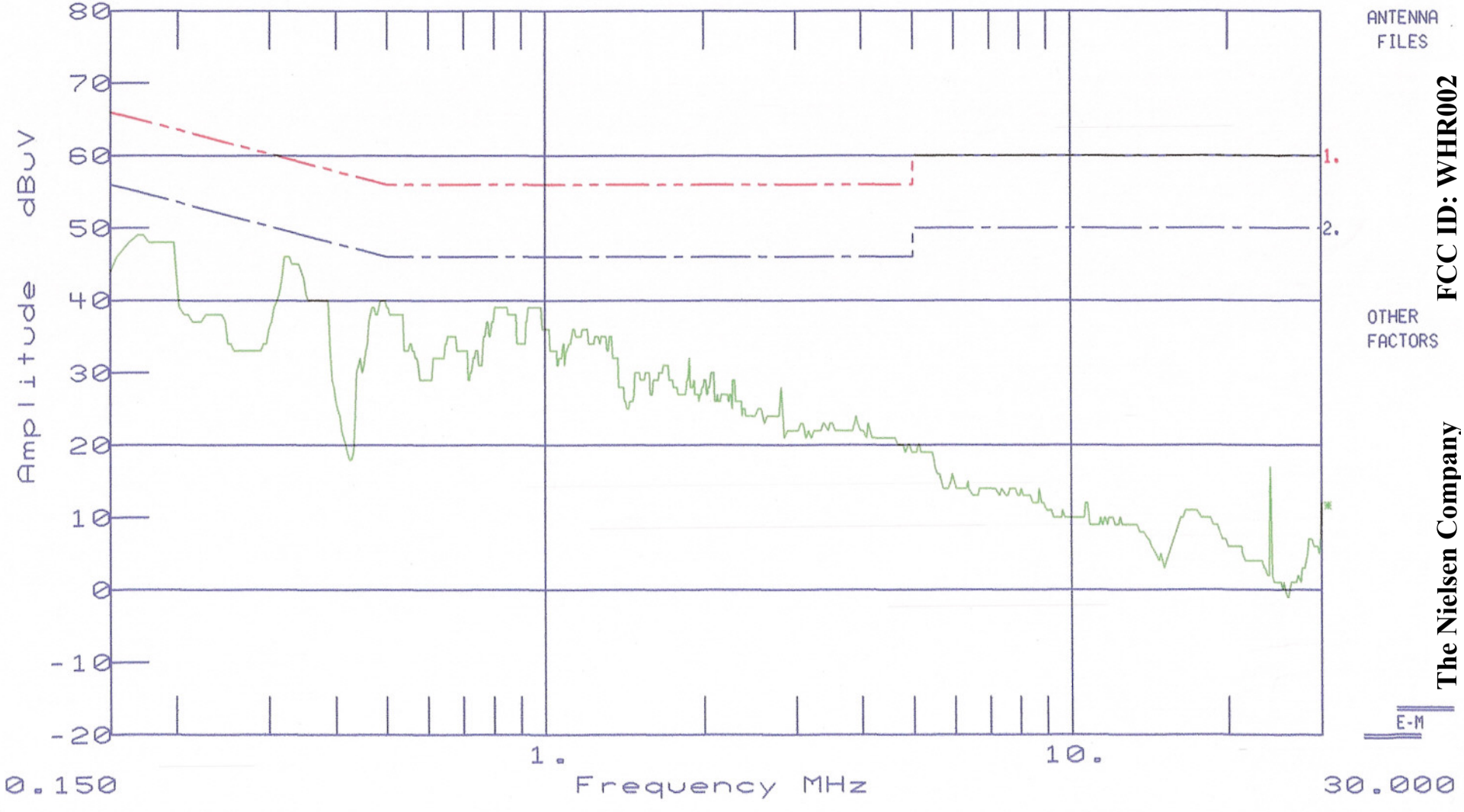
Freq(MHz)	Amp	C22BQP.S30 vs Spec(dB)	C22BAVG.S30 vs Spec(dB)
0.3235	33.0		-16.616 *
0.3270	33.0		-16.527 *
0.3305	33.0		-16.439 *
0.3340	34.0		-15.351 *
0.3374	33.0		-16.267 *
0.4796	30.0		-16.346 *
0.4831	30.0		-16.286 *
0.4866	31.0		-15.226 *
0.4900	30.0		-16.168 *
0.4935	30.0		-16.109 *
0.4970	30.0		-16.050 *
0.5000	29.0		-17.000 *

Product Safety Engineering

NIELSEN MEDIA RESEARCH

Date : 10/28/08	Time : 16:43:19.76	EMC-30 SETTINGS	SPECS
Technician : JACK GARNER	Test Equip. :EMC-30	Detector QuasiPeak	1) CISPR 22 Quasi Peak
Test Method :EN55022 CLASS B	Test Number :1	Bandwidth CISPR	2) CISPR 22 AVG
Equipment : 501-2226	Sensor Loc. :NEUTRAL	Dump/DwelIN/A	3)
Mode of Op. :NORMAL	Sensor Pol. :	RF Atten. 10 dB	4)
Serial No. : 5012226000@00000013	Ext. Atten. :0 dB	IF Atten. 10 dB	

Comment : 120 VAC / 60 HZ



TEST TITLE:NIELSEN MEDIA RESEARCH
DATA FILE :429_N.D30
Amplitude Units : dBuV Threshold -6 dB

PAGE 1
Freq.(MHz)
0.1500

Freq(MHz)	Amp	C22BQP.S30 vs Spec(dB)	C22BAVG.S30 vs Spec(dB)
0.1728	49.0		-5.825 *
0.1932	48.0		-5.898 *
0.1973	48.0		-5.723 *
0.3201	46.0		-3.704 *
0.3235	46.0		-3.616 *
0.3270	46.0		-3.527 *
0.3305	45.0		-4.439 *
0.3340	45.0		-4.351 *
0.3374	45.0		-4.267 *
0.3409	45.0		-4.181 *
0.3446	44.0		-5.092 *

RF Exposure - Power Density Compliance Calculation

15.247(I) - Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Compliance is based upon section CFR 47 section 1.1310, Table (1) Limits for Maximum Permissible Exposure (MPE), (b) Limits for General Population/Uncontrolled Exposure. The stated limit is (1.0) mW/cm2 and compliance was calculated using the following formula:

$$S=(P\ G) / (4\ \pi\ r^2)$$

Where:

S = Power density in mW/cm2
P = Power in mW
G = Numerical antenna gain
r = Distance in cm

Maximum output power = (2.7) mW
Antenna gain (numeric) = 1.0 dB
Distance = 20 cm

S = (0.73 * 1.0) / (12.57 * 400)
S= (0.73) / (5,028)

S= (0.000145) mW / cm^2

Limit = (1.0) mW / cm^2