

TEST REPORT

Report Number: 3063068-001

Project Number: 3063068

8/12/2004

**Evaluation of the Lexmark 4050e Print Server Model Number: 4032-2W0 /
DELL 3300 Print Server Model Number 4032-dW0**

FCC ID: IYL4050E

Industry Canada ID: 2376A-4050E

**Tested to the Criteria in
FCC Part 15 Subpart C (15.247)
ICES-003 and RSS-210 Issue 5**

For

Lexmark International

Test Performed by:
Intertek
731 Enterprise Drive
Lexington, KY 40510

Test Authorized by:
Lexmark International
740 West New Circle Road
Lexington, KY 40550

Prepared By: Jason Centers **Date:** 8/12/2004

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Intertek Testing Services NA, Inc.

731 Enterprise Drive, Lexington, KY 40510

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DELL 3300 Print Server Model Number 4032-dW0

1 JOB DESCRIPTION

1.1 Test Sample Information

Company Information	
Manufacturer:	Lexmark International
Address:	740 West New Circle Road Lexington KY 40550
Contact Name:	Paul Ramey
Telephone Number:	(859)-825-4469
Fax Number:	(859)-232-7345
Email Address:	pramey@lexmark.com

Test sample			
Model Number:	4032-2W0		
Serial Number:	Not Labled		
FCC ID:	IYL4050E		
Industry Canada ID:	2376A-4050E		
Device Category:	Mobile		
RF Exposure Category:	General Population/Uncontrolled Environment		
Transmission Modes:	802.11b	802.11g	
Frequency Range, MHz:	2412MHz – 2462MHz	2412MHz – 2462MHz	
Type of Transmission:	QPSK, BSK, CCK	BPSK, QPSK, 16QAM, 64QAM	
Maximum RF Output Power:	19.2dBm	20dBm	
Antenna Type:	PCB Mount Antenna		
Antenna Location:	Internal		
Antenna Gain:	3dBi		
Power Supply	Manufacturer	Model Number	Serial Number
	Delta Electronics Inc.	ADP-10SB	AXW0422017025

Test Signal Mode	
Test Commands:	X
Base Station Simulator:	

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1.2 Test Sample Photographs

Figure 1 – 4032-2W0 (Front)



Figure 2 – 4032-2W0 (Back)



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1.2.1 System Support Equipment

Table 1-1 contains the details of the support equipment associated with the Equipment Under Test during the testing.

Table 1-1: System Support Equipment

Description	Manufacturer	Model Number	Serial Number
Printer	Lexmark	4500-202	89021XR

1.2.2 Cables associated with EUT

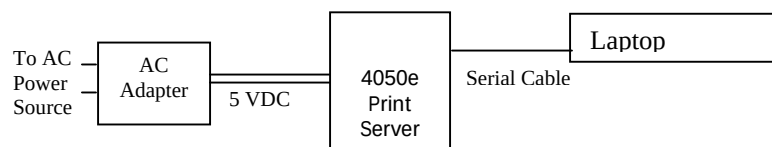
Table 1-2 contains the details of the cables associated with the EUT.

Table 1-2: Interconnecting cables between modules of EUT

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Serial Cable	6 ft	None	None	Programming Port	Comm. 1 on Laptop
AC Power Cable	6 ft	None	None	AC Power Source	AC Input of AC/DC Converter
DC Power Cable	6 ft	None	None	DC Output of AC/DC Converter	DC Input of the 4032-2W0

1.2.3 System Block Diagram

The diagram shown below details the interconnection of the EUT and its accessories during the testing. The Laptop was used to configure force the 4050e Print Server to transmit.



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1.3 Justification

The EUT was operated in the stand-alone configuration.

1.3.1 Mode(s) of operation

The 4050e Print Server was powered by the AC to DC power supply provided with the sample.

1.4 Modifications required for compliance

No modifications were implemented by Intertek. All results in this report pertain to the un-modified sample provided to Intertek.

1.5 Related Submittal(s) Grants

None

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2 EXECUTIVE SUMMARY

Testing performed for: Lexmark International

Equipment Under Test: 4032-2W0

FCC RULE	IC RULE	DESCRIPTION OF TEST	RESULT	PAGE
§15.247(a)(b)(d)	RSS-210 §6.2.2(o)(b)	Conducted RF Power, 6dB Bandwidth, and Power Density	Compliant	11
§15.247(b)	RSS-210 §6.2.2(o)(b)	Radiated RF Power	Compliant	14
§15.247(b)(5)	RSS-102 §4.3	Maximum Permissible Exposure (MPE) Calculations	Compliant	15
§15.247(c)	RSS-210 §6.2.2(o)(e1)	Out of Band Emissions at Antenna Terminals	Compliant	17
c15.247(c) and §15.209(f)	RSS-210 §6.2.2(o)(e1)	Field Strength of Spurious Radiation (General Requirements and Restricted Band Requirements)	Compliant	18
§15.107, §15.207	ICES-003 §5.3	Power Line Conducted Emissions	Compliant	26
§15.109	ICES-003 §5.6	Receiver Spurious Emissions	Compliant	28

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3 TEST FACILITY

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 1992. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.



3.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Environmental Chamber	Thermotron	SM-8C	32692	12/18/2004
Signal Generator	HP	83620B	3614A00199	8/21/2004
Horn Antenna	Antenna Research	DRG-118/A	1086	6/29/2005
Horn Antenna	EMCO	3115	6556	7/21/2005
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	10/2/2004
LISN	FCC	FCC-LISN-50-50-2M	1026	1/12/05
Bilog Antenna	EMCO	3142B	1674	8/2004
Preamplifier	HP	8449B	3008A00775	12/2004

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4 CONDUCTED RF POWER, 6DB BANDWIDTH, AND POWER DENSITY

4.1 Test Procedure (FCC Rule: §15.247(b), RSS-210 Rule §6.2.2(o)(b) Conducted RF Power)

The antenna port of the 4050e Print Server was connected to the input of a peak power meter. The power was read directly from the power meter and corrected for cable loss to obtain the power at the antenna terminals. Conducted power was measured on the high, middle and low channels for all data rates and modulation modes.

4.1.1 Conducted Output Power Criteria

The maximum allowable transmitter power for antennas with gains of 6dBi or less is 1 watt (30dBm).

4.2 Test Procedure (FCC Rule: §15.247(a), RSS-210 Rule §6.2.2(o)(b) 6dB Bandwidth)

The antenna port of the 4050e Print Server was connected to the input of a spectrum analyzer. The analyzer amplitude was offset for the associated cable loss. The analyzer resolution and video bandwidths were set to 100kHz and the max hold function was turned on. A marker peak search was performed on the resultant trace to find the peak amplitude. Markers were then positioned on either side of the peak amplitude such that they were 6dB lower than that amplitude. The 6dB bandwidth was the frequency difference between the marker on the lower side and the marker on the higher side of the peak amplitude. The 6dB bandwidth was measured for the highest data rate for each possible modulation mode on the high, middle, and low channels.

4.2.1 6dB Bandwidth Criteria

The minimum 6dB bandwidth shall be at least 500kHz

4.3 Test Procedure (FCC Rule: §15.247(d), RSS-210 Rule §6.2.2(o)(b) Power Density)

The antenna port of the 4050e Print Server was connected to the input of a spectrum analyzer. The analyzer amplitude was offset for the associated cable loss. The analyzer resolution and video bandwidths were set to 3kHz and the max hold function was turned on. The frequency span was set to 600kHz around the highest amplitude occurring in the peak emission envelope. The total sweep time was calculated as follows:

$$\text{Sweep time (Sec.)} = (F_{\text{stop}} - F_{\text{start}}) / \text{Resolution Bandwidth}$$

$$\text{Sweep time (Sec)} = 600\text{kHz} / 3\text{kHz}$$

$$\text{Sweep time (Sec)} = 200 \text{ Seconds}$$

A peak search was then performed on the resultant trace. The amplitude of that peak was recorded as the maximum power density in dBm. Power density was measured for all data rates and modulation modes on the middle channel. For the high and low channels, power density was measured at the data rate and modulation mode that resulted in the highest and lowest conducted power for that channel.

4.3.1 Power Density Criteria

The peak power spectral density shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

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4.4 Test Results

The 4050e Print Server met the RF power output, 6dB bandwidth, and power density requirements of FCC Part 15 Subpart C (15.247). The test results are located in Table 4-1.

Table 4-1 RF Output Power, 6dB Bandwidth, Power Density Measurements

Frequency (MHz)	Mode	Modulation	Data Rate (Mbps)	Conducted Power (dBm)	Conducted Power (mW)	Power Density (dBm)	6dB Bandwidth (MHz)
2437 Channel 6	802.11b	BPSK	1	19.2	83.176377	-12.61	
		QPSK	2	19.2	83.176377	-6.99	
		QPSK	5.5	19	79.432823	-11.26	12.525
		CCK	11	19	79.432823	-13.4	11.523
	802.11g	BPSK	6	20	100	-18.52	
		BPSK	9	20	100	-11.03	16.33
		QPSK	12	19.67	92.682982	-10.27	
		QPSK	18	19.54	89.949758	-11.44	16.232
		16QAM	24	19.3	85.113804	-12.56	
		16QAM	36	18.96	78.704579	-12.66	16.433
		64QAM	48	17.1	51.286138	-15.62	
		64QAM	54	17.12	51.522864	-15.46	16.533
2412 Channel 1	802.11b	BPSK	1	16.39	43.551187		
		QPSK	2	16.39	43.551187		
		QPSK	5.5	16.05	40.271703	4.63	10.02
		CCK	11	16.1	40.738028		11.52
	802.11g	BPSK	6	18.2	66.069345		
		BPSK	9	18.2	66.069345		16.33
		QPSK	12	18.9	77.624712		
		QPSK	18	18.71	74.301914		16.23
		16QAM	24	19.24	83.945999	-11.89	
		16QAM	36	18.91	77.803655		16.53
		64QAM	48	17.3	53.70318		
		64QAM	54	17.35	54.325033		16.533
2462 Channel 11	802.11b	BPSK	1	14.71	29.580125		
		QPSK	2	14.71	29.580125		
		QPSK	5.5	19.14	82.035154	-11.18	12.324
		CCK	11	14.48	28.054336	-10.6	11.523
	802.11g	BPSK	6	16.85	48.417237		
		BPSK	9	16.86	48.52885		16.132
		QPSK	12	17.75	59.566214		
		QPSK	18	17.5	56.234133		16.432
		16QAM	24	18.18	65.765784		
		16QAM	36	17.74	59.429216		16.53
		64QAM	48	17.28	53.456436		

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		64QAM	54	17.32	53.951062		16.3
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5 RADIATED RF POWER

5.1 Test Procedure (FCC Rule: §15.247(b), RSS-210 Rule §6.2.2(o)(b) Radiated RF Power)

The 4050e Print Server was placed on a non-conductive turntable. It was then set to operate at the maximum output power and data rate that produced the highest conducted output power in both 802.11b and 802.11g modes.

The radiated emission at the fundamental frequency was measured at 3m with a test antenna and EMI receiver. This was performed with the antenna in both vertical and horizontal polarities.

During the measurement of the EUT, the receiver resolution bandwidth was set to 3 MHz and the video bandwidth was set to 3 MHz. The highest emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The receiver reading was recorded (E in dBuV).

The radiated power was measured using a substitution method as described in TIA-603-B Section 2.2.17 (Radiated Power Output). The EUT was replaced with a substitution antenna (tuned dipole below 1 GHz; Horn antenna above 1 GHz) and was fed with an input power from a signal generator set to output 15 dBm. The cable loss between the signal generator and substituting antenna was a known value. The receiver reading was recorded and EIRP was calculated as follows:

$$\text{EIRP} = E_1 - E_2 + V_{\text{sub}} + G$$

where,

E_1 is the receiver reading in dBμV when measuring the field strength of the EUT

E_2 is the receiver reading in dBμV when measured field strength from the generator

V_{sub} is the power delivered to the substitution antenna (generator output in dBm – cable loss between the generator and the substitution antenna)

G is the gain of the transmitting antenna in dBi.

5.1.1 Radiated Output Power Criteria

The maximum allowable transmitter power for antennas with gains of 6dBi or less is 1 watt (30dBm).

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5.2 Test Results

The 4050e Print Server met the radiated power requirements of FCC §15.247(b). The test results are located in Table 5-1. All results are less than the 30dBm limit.

Table 5-1 Radiated RF Power

EUT Mode	TX Channel	Polarity	TX Frequency	Device Reading (dBuV)	Sub. TX Frequency	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
11Mbps (802.11b)	1	V	2.4139 GHz	106.31	2.4138 GHz	115.52	3.994	9.141	15	10.937
11Mbps (802.11b)	6	V	2.437 GHz	107.5	2.4369 GHz	115.247	4.029	9.211	15	12.435
11Mbps (802.11b)	11	V	2.4621 GHz	102.64	2.462 GHz	115.55	4.066	9.286	15	7.31
11Mbps (802.11b)	1	H	2.4121 GHz	108.6	2.4117 GHz	117.574	3.991	9.1	15	11.135
11Mbps (802.11b)	6	H	2.437 GHz	111.05	2.4366 GHz	117.511	4.028	9.184	15	13.695
11Mbps (802.11b)	11	H	2.4621 GHz	106.49	2.4619 GHz	116.962	4.066	9.27	15	9.732
9 Mbps (802.11g)	1	V	2.4139 GHz	106.7	2.4138 GHz	115.52	3.994	9.141	15	11.327
9 Mbps (802.11g)	6	V	2.437 GHz	110.91	2.4369 GHz	115.247	4.029	9.211	15	15.845
9 Mbps (802.11g)	11	V	2.4621 GHz	106.76	2.462 GHz	115.55	4.066	9.286	15	11.43
9 Mbps (802.11g)	1	H	2.4121 GHz	108.01	2.4117 GHz	117.574	3.991	9.1	15	10.545
9 Mbps (802.11g)	6	H	2.437 GHz	113.2	2.4366 GHz	117.511	4.028	9.184	15	15.845
9 Mbps (802.11g)	11	H	2.4621 GHz	106.84	2.4619 GHz	116.962	4.066	9.27	15	10.082

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6 MAXIMUM PERMISSIBLE EXPOSURE (MPE) CALCULATIONS

The § 1.1310 Radiofrequency radiation exposure limits are listed in the table below.

	Frequency Range (MHz)	Power Density Limit (mW/cm²)
Limits for Occupational/Controlled Exposures	0.3-3.0	100
	3.0-30	900/ Frequency ²
	30-300	1.0
	300-1500	Frequency/300
	1500-100,000	5.0
Limits for General Population/Uncontrolled Exposure	0.3-1.34	100
	1.34-30	180/Frequency ²
	30-300	0.2
	300-1500	Frequency/1500
	1500-100,000	1.0

6.1 Test Procedure (FCC Rule: §15.247(b)(5), RSS-102 §4.3)

The ERP and EIRP were measured in section 5, Radiated RF Power. The radiated RF power was used to calculate the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Maximum RF Exposure at 20cm} = (\text{EIRP in mW}) / (4\pi(20\text{cm})^2)$$

Where ERP was measured in section 5, Radiated RF Power, a 2.15dB conversion factor was added to the reading to convert it to EIRP before applying the Maximum RF Exposure formula above. Once the Maximum RF Exposure calculations were complete the results were compared to the MPE limits above.

6.2 Test Results

The following calculations show the Maximum RF Exposure from the 4050e Print Server at 20cm for the worst case measured EIRP. The MPE level is well below the limits for the general population described in the table above.

$$\text{Maximum Measured EIRP} = 15.845\text{dBm} = 38.41\text{mW}$$

$$\text{MPE} = 38.41\text{mW} / (4\pi(20\text{cm})^2) = 0.007 \text{ mW/cm}^2$$

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7 OUT OF BAND EMISSIONS AT ANTENNA TERMINALS

7.1 Test Procedure (FCC Rule §15.247(c), RSS-210 Rule §6.2.2(o)(e1))

The antenna port of the 4050e Print Server was connected to the input of a spectrum analyzer. The analyzer resolution and video bandwidths were set to 3MHz. The 4050e Print Server was set to transmit at its highest output power level and with the modulation scheme that produced the highest conducted output power level. The spectrum analyzer was scanned from 30MHz to 25GHz using the max hold function to detect any out of band spurious emissions. The resulting trace was corrected for the cable loss between the test sample and the spectrum analyzer.

7.1.1 Out of Band Emissions at Antenna Terminals Criteria

In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, the RF power shall be at least 20dB below that of the carrier.

7.2 Test Results

The 4050e Print Server met the out of band emission at antenna terminal requirements. The following plots illustrate the output power of channels 1, 6, and 11 and also show that there are no spurious emissions within 20dB of the peak carrier power.

Figure 7-1: Out of band emissions at antenna terminals – Channel 1, 6, and 11

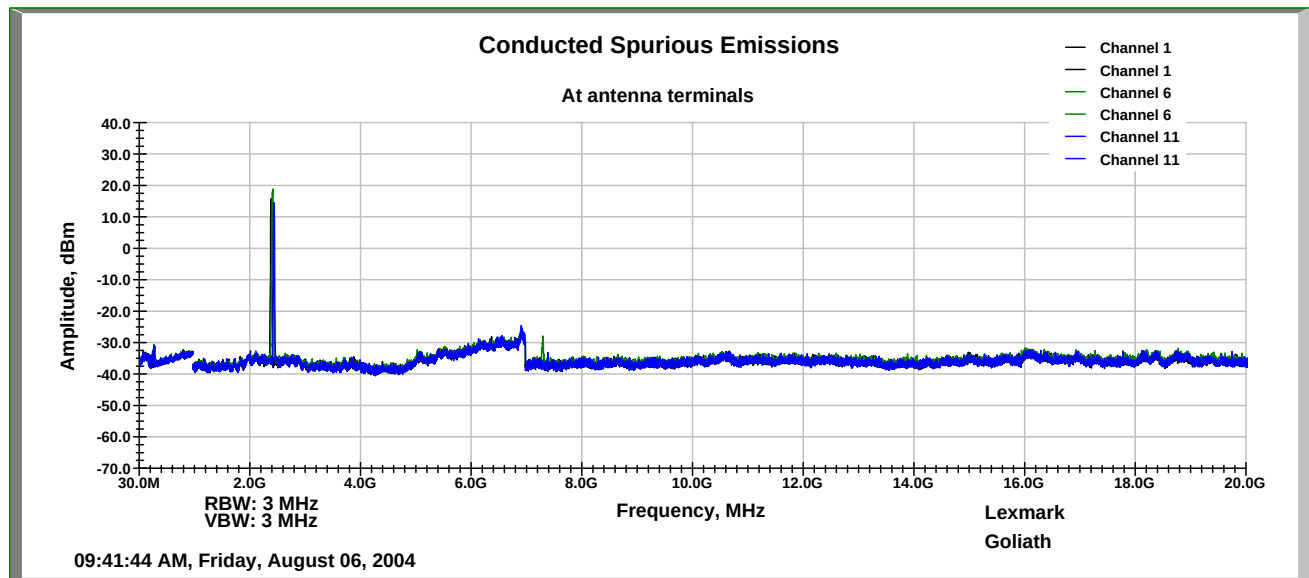
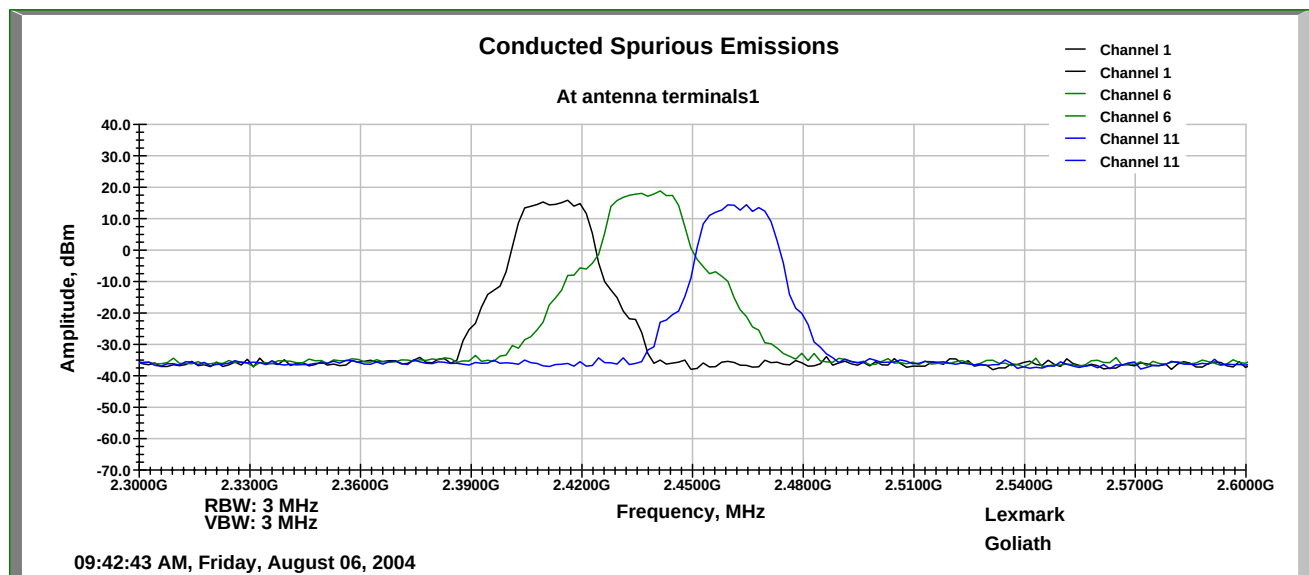


Figure 7-2: Out of band emissions at antenna terminals – Channel 1, 6, and 11 (Zoomed Around Carrier Frequencies)



8 FIELD STRENGTH OF SPURIOUS RADIATION (GENERAL REQUIREMENTS AND RESTRICTED BAND REQUIREMENTS)

8.1 Test Procedure (FCC Rule §15.247(c), RSS-210 §6.2.2(o)(e1) for Radiated Measurements)

The 4050e Print Server was placed on a non-conductive turntable. It was then set to transmit at its highest output power level and with the modulation scheme that produced the highest conducted output power level. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels) in each operating band. Once spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-B section 2.2.12 (Radiated Spurious Emissions).

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

Also, a scan was performed looking specifically at the band edge of channel 11 in order to show that the restricted band ranging from 2483.5MHz to 2500 MHz was not intruded upon. To perform this measurement, the spectrum analyzer was manually set to show the band edge of channel 11 and the entire restricted band. The amplitude was offset to account for cable loss, antenna factor, and preamplifier gain. The turntable and tower were maximized with the analyzer set to max hold.

8.1.1 Field Strength of Spurious Radiation Criteria

In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, the RF power shall be at least 20dB below that of the carrier. In addition, emissions within the restricted bands as specified in §15.205(a), must also comply with the limits specified in §15.209(a). Those Limits are in the table below.

Table 8-1 Radiated Emission Limit for FCC §15.209(a)

Radiated Emission Limits at 3 meters	
Frequency (MHz)	Quasi-Peak limits, dB (µV/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 and up	54.0

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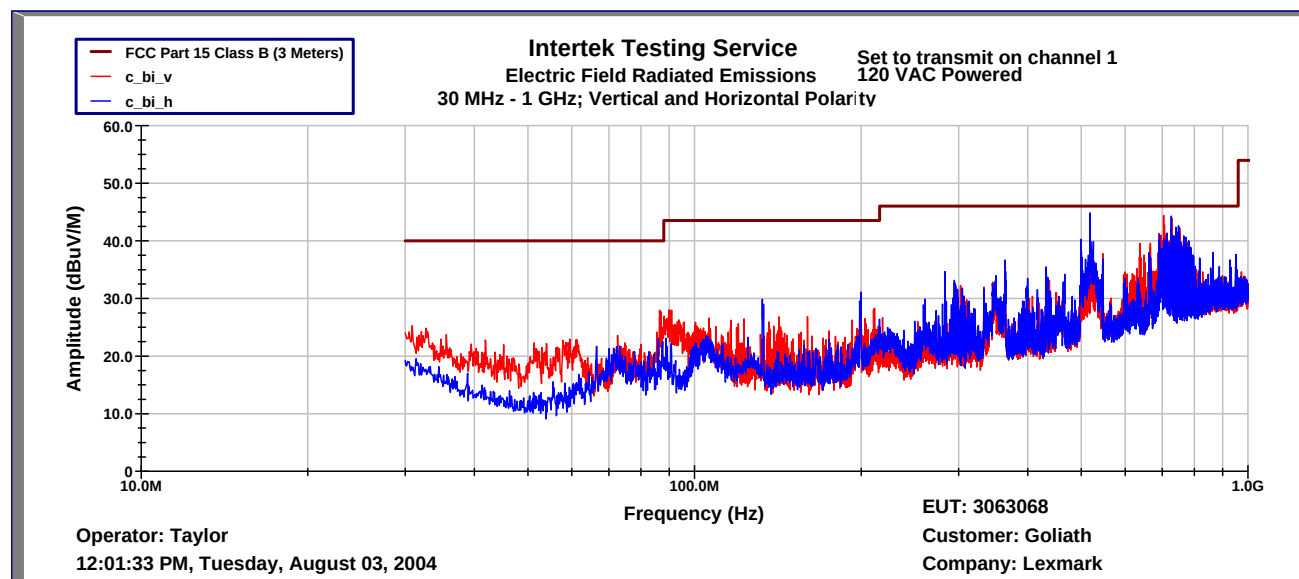
8.2 Test Results

The 4050e Print Server met the field strength of spurious radiation requirements of FCC §15.209 and §15.247(c). See Figure 8-1 through Figure 9-1 for the graphical peak scans. The substitution measurements performed on spurious emissions are shown in Table 8-2.

Table 8-2 Substitution Measurements on Spurious Emissions

EUT Mode	TX Channel	Polarity	TX Frequency (Fundamental)	Device Reading (dBuV)	Harmonic Frequency	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
802.11g (9Mbps)	11	V	2462 MHz	45.9	4923.97 MHz	71.19	5.7	10.8	-30	-50.19
802.11g (9Mbps)	11	H	2462 MHz	43.87	4923.97 MHz	70.37	5.7	10.8	-30	-51.4
802.11b (11Mbps)	11	V	2462 MHz	45.96	4923.97 MHz	71.19	5.7	10.8	-30	-50.13
802.11b (11Mbps)	11	H	2462 MHz	44.03	4923.97 MHz	70.37	5.7	10.8	-30	-51.24

Figure 8-1: Field Strength of Spurious Radiation Channel 1 (30MHz – 1GHz)



Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

Figure 8-2: Field Strength of Spurious Radiation Channel 1 (1GHz – 3GHz Showing the Carrier)

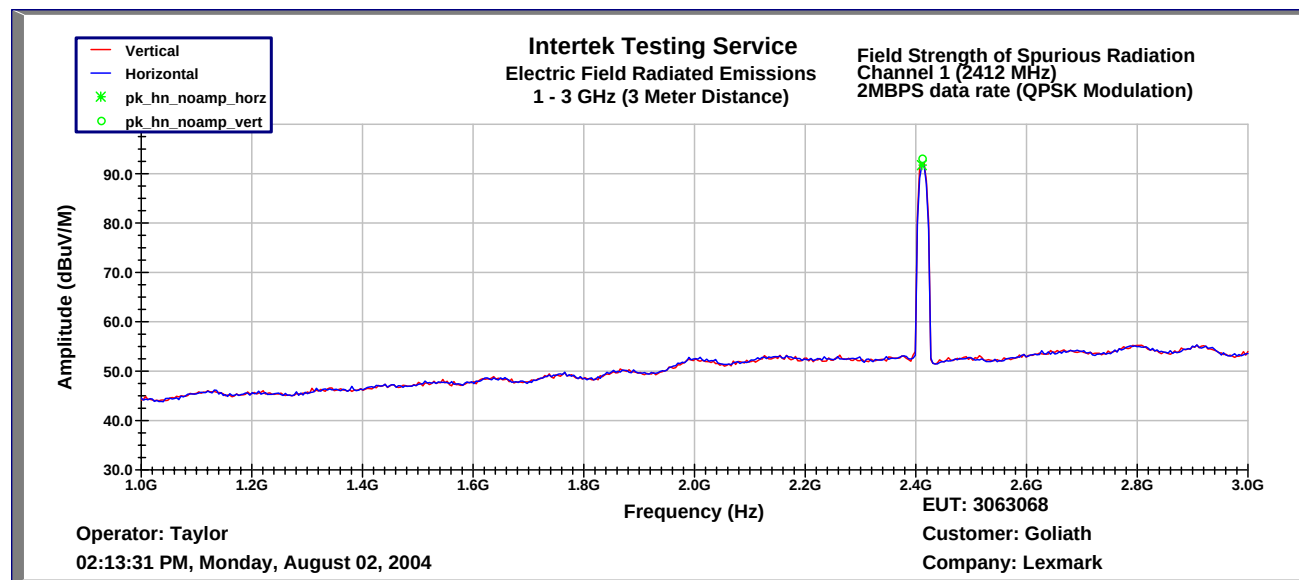
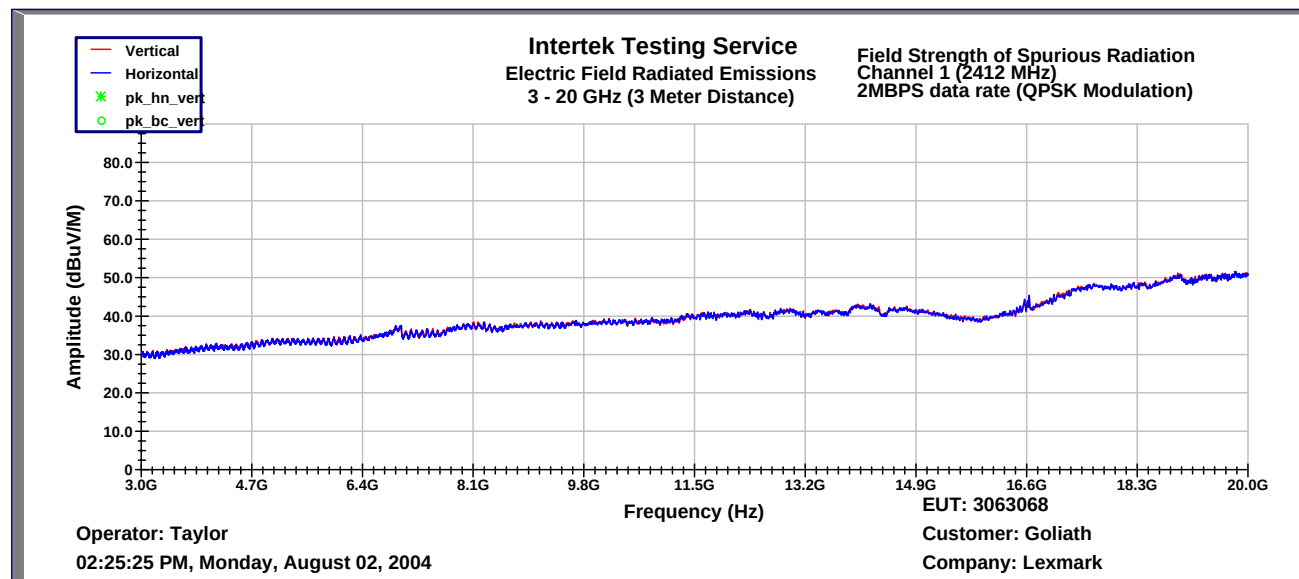


Figure 8-3: Field Strength of Spurious Radiation Channel 1 (3GHz – 20GHz)



Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

Figure 8-4: Field Strength of Spurious Radiation Channel 6 (30MHz – 1GHz)

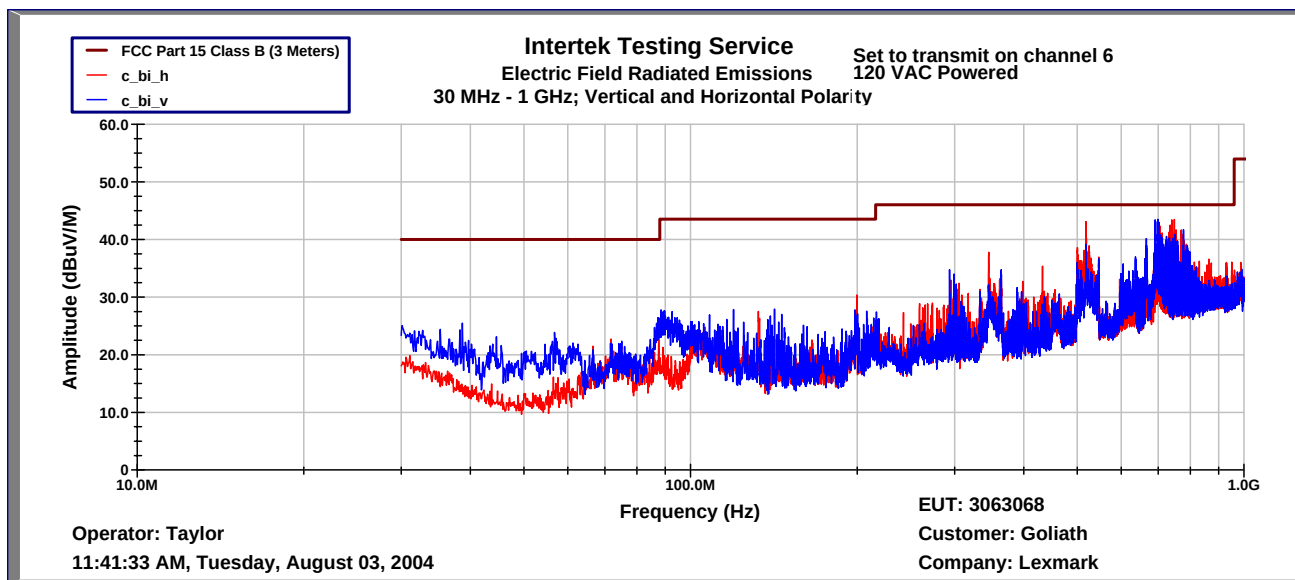
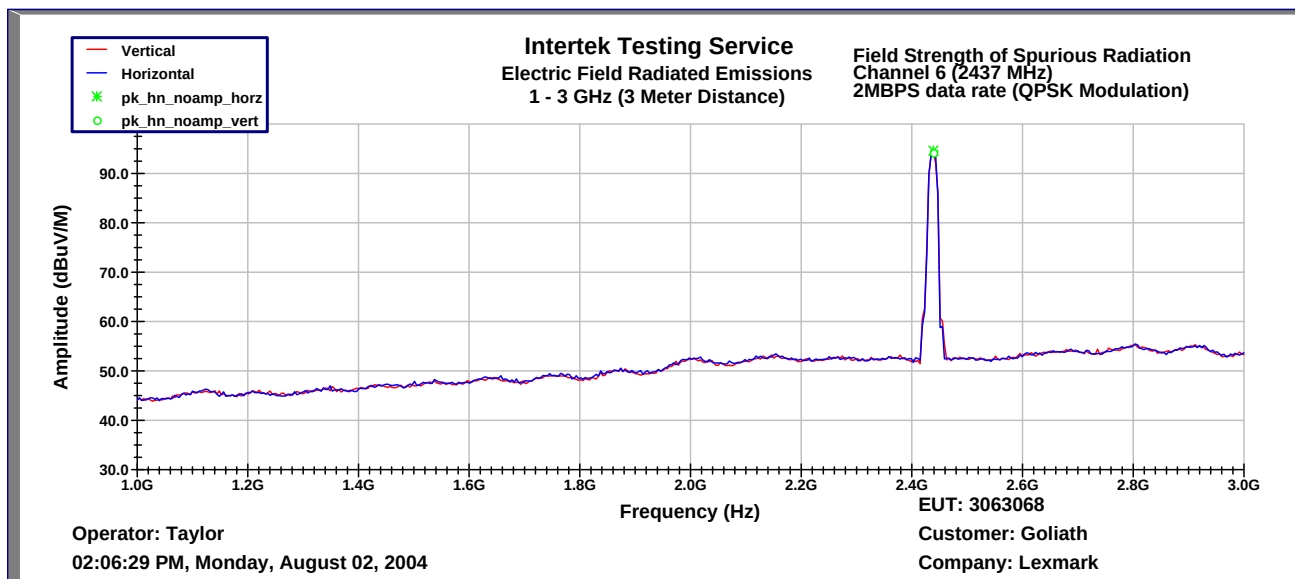


Figure 8-5: Field Strength of Spurious Radiation Channel 6 (1GHz – 3GHz Showing the Carrier)



Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

Figure 8-6: Field Strength of Spurious Radiation Channel 6 (3GHz – 20GHz)

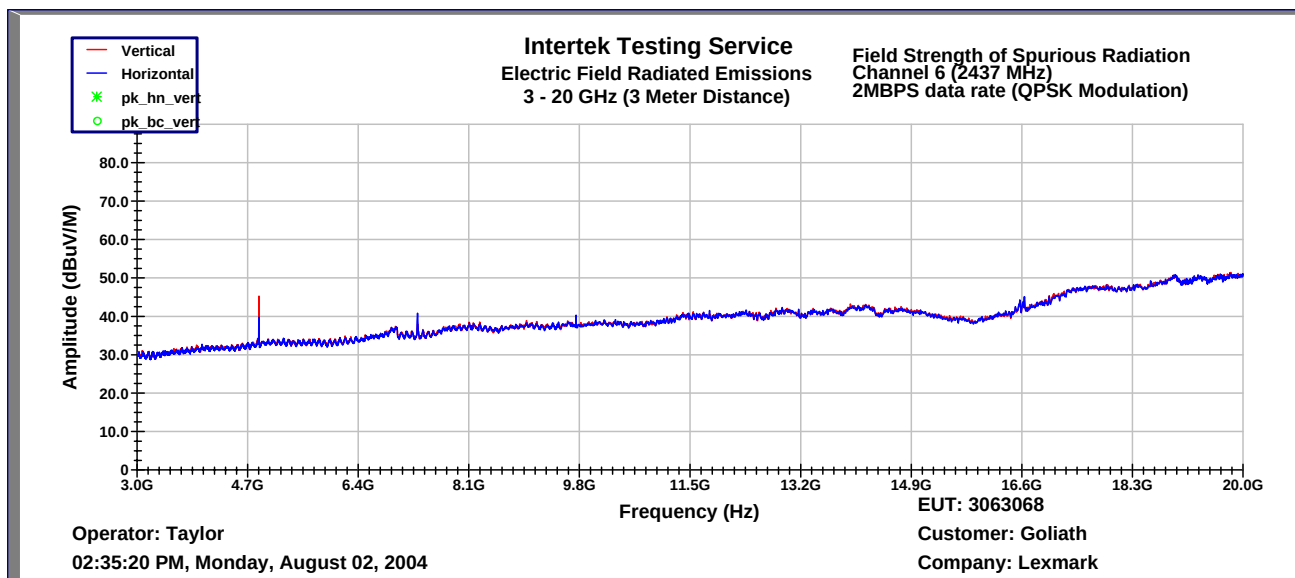
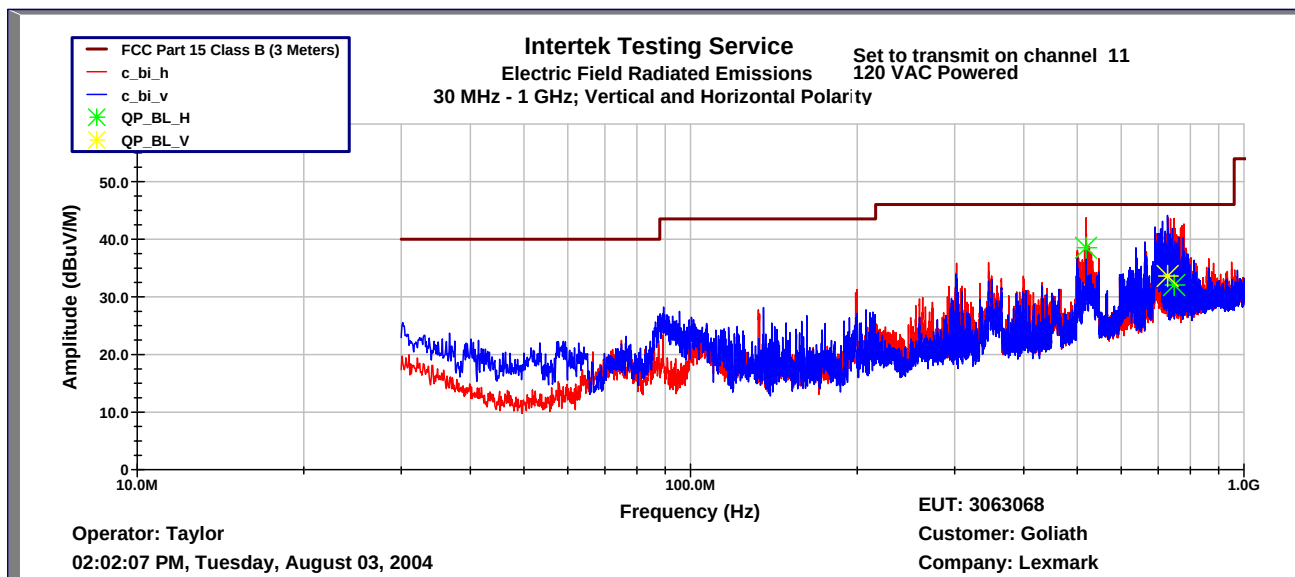


Figure 8-7: Field Strength of Spurious Radiation Channel 11 (30MHz – 1GHz)



Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

Figure 8-8: Field Strength of Spurious Radiation Channel 11 (1GHz – 3GHz Showing the Carrier)

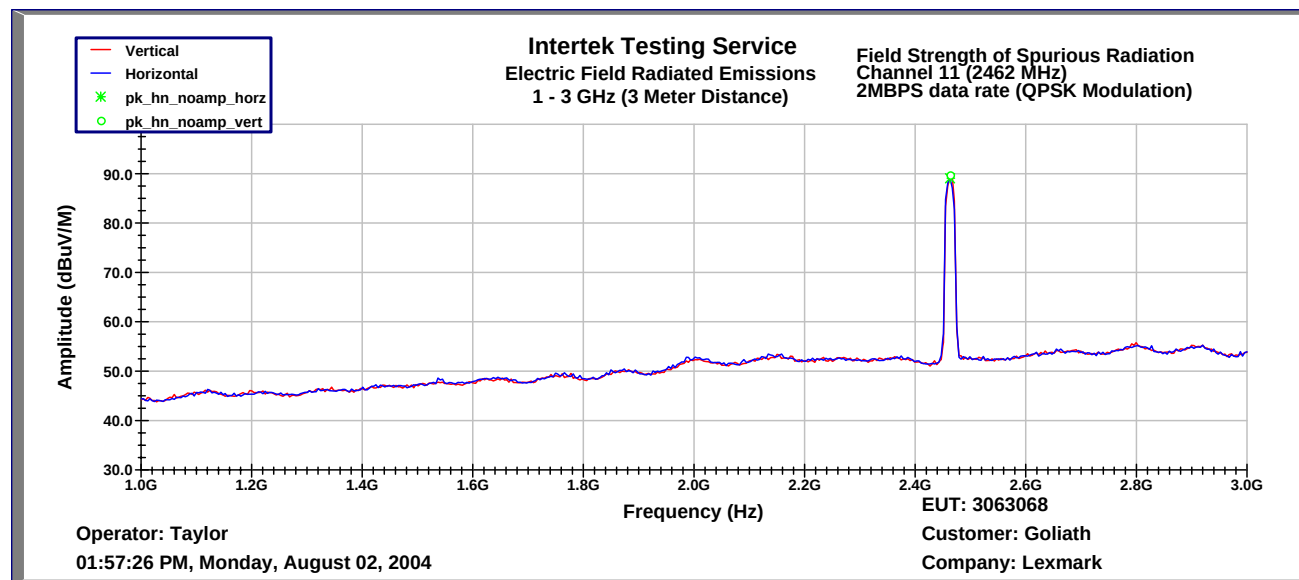
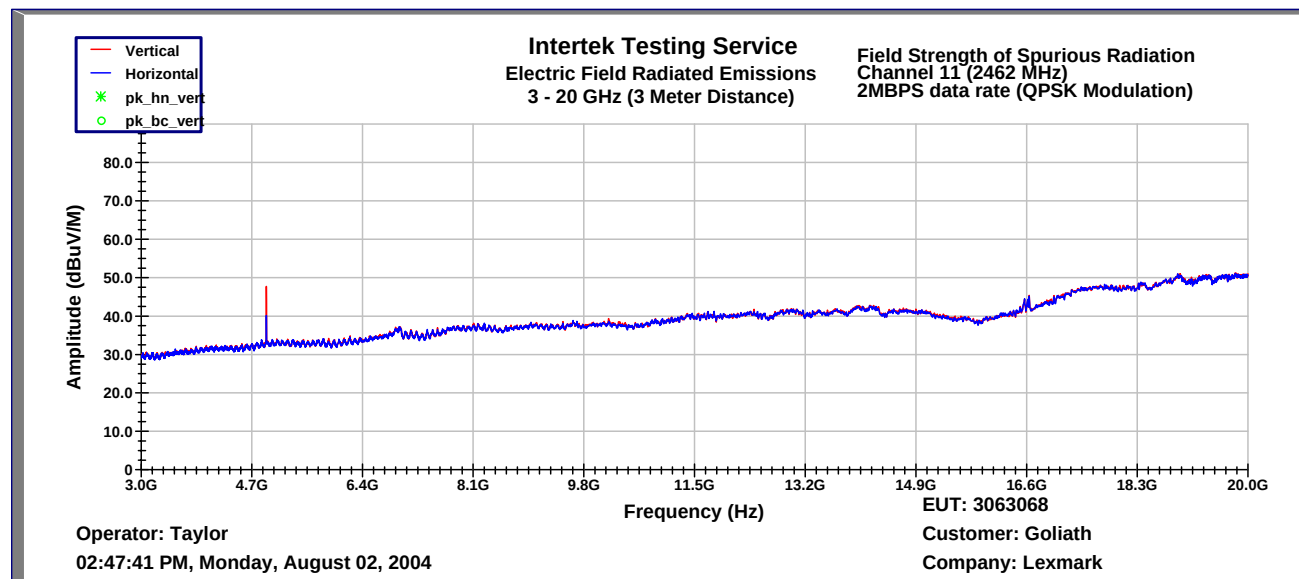


Figure 8-9: Field Strength of Spurious Radiation Channel 11 (3GHz – 20GHz Showing the Carrier)



Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

Figure 8-10: Channel 11 Band Edge Showing the Restricted Band from 2483.5 to 2500 MHz (802.11g)

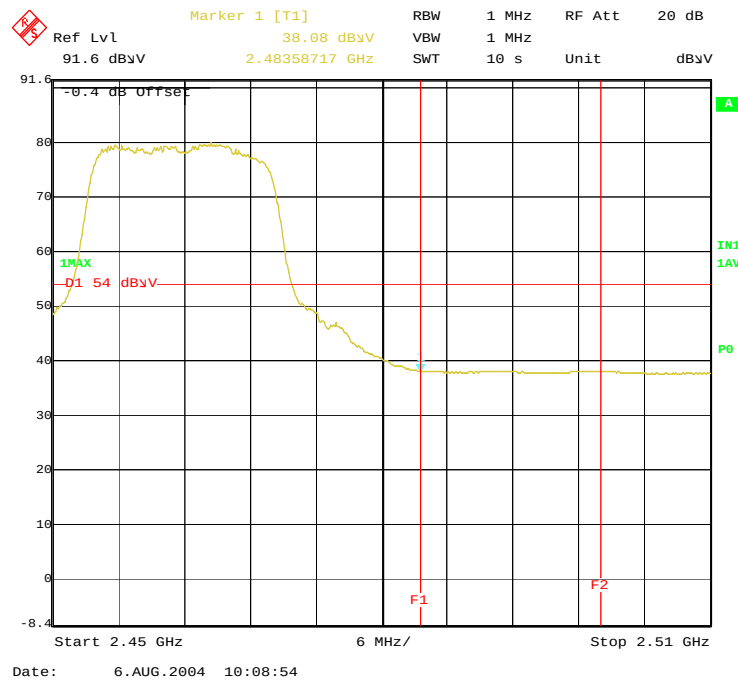
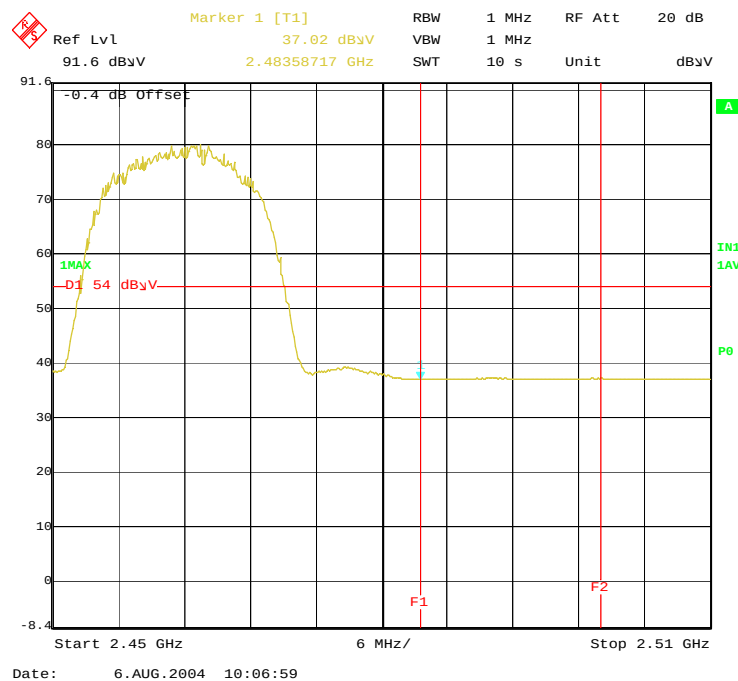


Figure 8-11: Channel 11 Band Edge Showing the Restricted Band from 2483.5 to 2500 MHz (802.11b)



9 POWER LINE CONDUCTED EMISSIONS

9.1 Test Procedure (FCC §15.207, ICES-003 §5.3)

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4: 1992.

9.1.1 Power Line Conducted Emissions Criteria

The RF energy radiated back onto the public utility (AC Power Lines) shall not exceed the values in the following table when measured with the corresponding detector function.

Table 9-1 Conducted Emission Limit for FCC §15.207(a)

Frequency Range (MHz)	FCC Part 15.207(a) Quasi Peak Limit (dBuV)	FCC Part 15.207(a) Average Limit (dBuV)
0.15 – 0.5 MHz	66 to 56	56 to 46
0.5 – 5.0 MHz	56	46
5.0 - 30 MHz	60	50

Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

9.2 Test Results

The 4050e Print Server met the power line conducted emission requirements of FCC §15.107 and §15.207. The test results are located in Figure 9-1 **Error! Reference source not found.** The graphical data, measured with peak detection, was all below the class B quasi-peak and average limits.

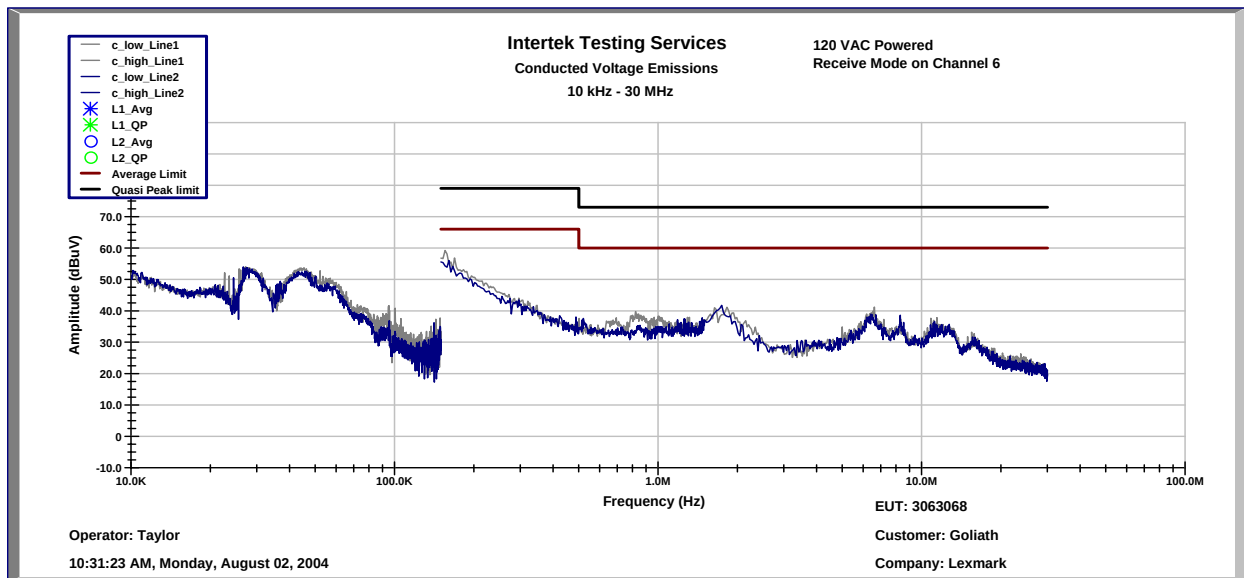


Figure 9-1: FCC §15. Power Line Conducted Emissions Receiver Mode (Lines 1 and 2)

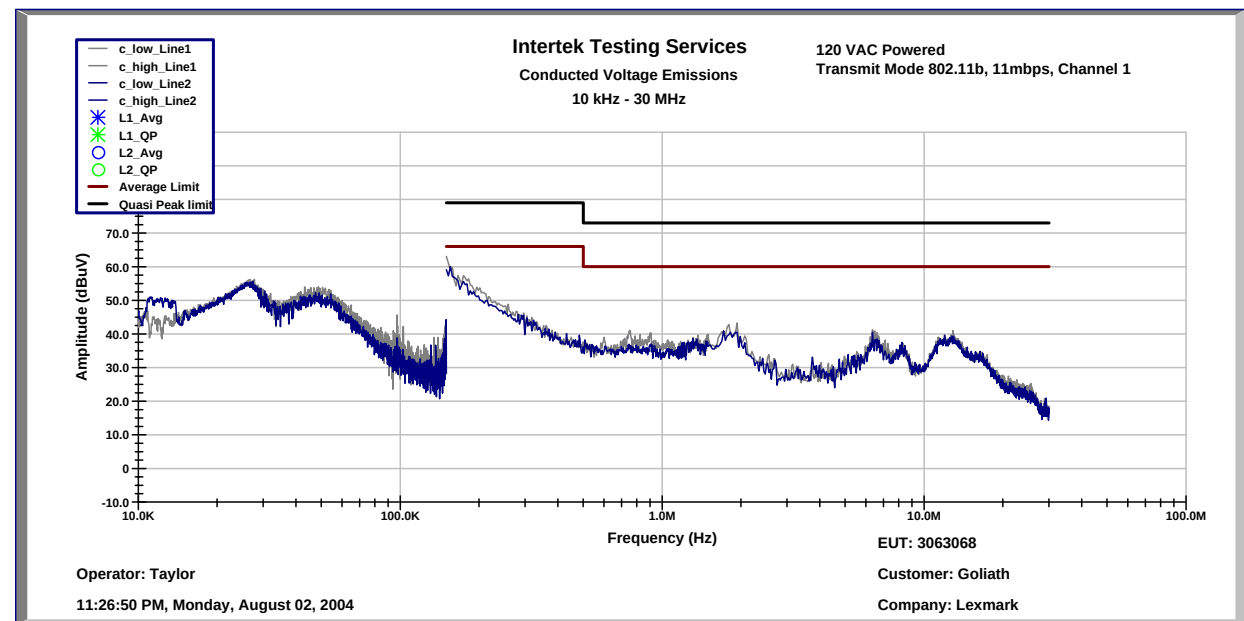


Figure 9-2: FCC §15. Power Line Conducted Emissions TX Channel 1 (Lines 1 and 2)

Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

Figure 9-3: FCC §15. Power Line Conducted Emissions TX Channel 6 (Lines 1 and 2)

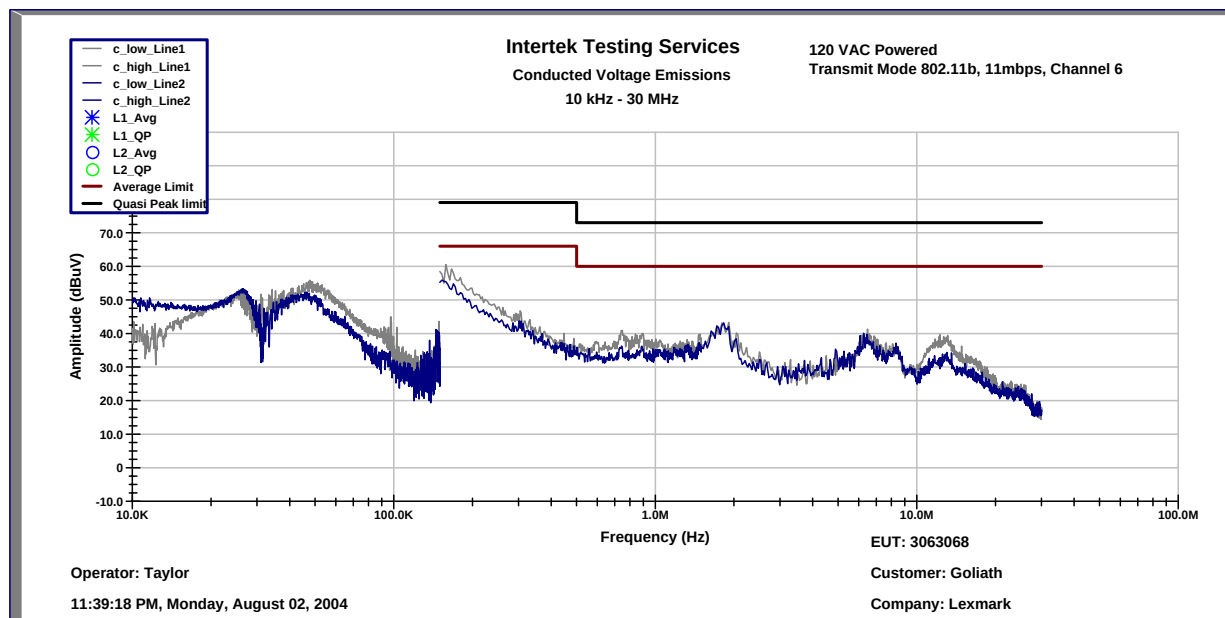
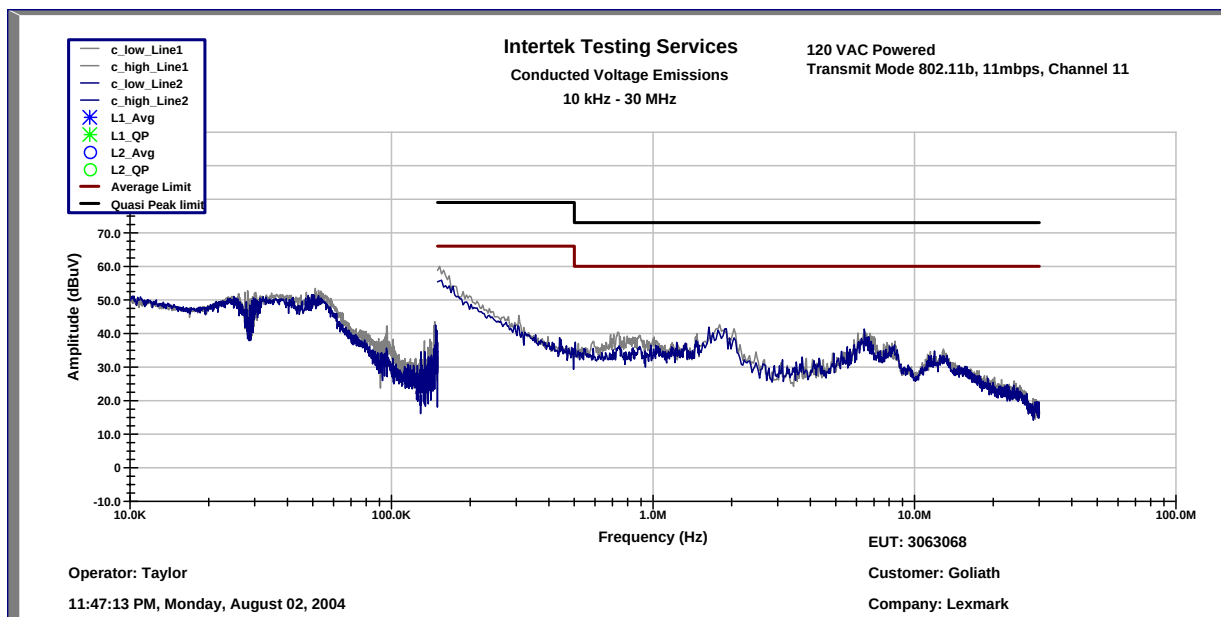


Figure 9-4: FCC §15. Power Line Conducted Emissions TX Channel 11 (Lines 1 and 2)



Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

10 RECEIVER SPURIOUS EMISSIONS**10.1 Test Procedure (FCC §15.109, ICES-003 §5.6)**

Measurements are made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4: 1992.

10.2 Receiver Spurious Emissions Criteria

Table 10-1 Radiated Emission Limit for FCC §15.109

Radiated Emission Limits at 3 meters	
Frequency (MHz)	Quasi-Peak limits, dB (μV/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 and up	54.0

Evaluation For: Lexmark International

FCC ID: IYL4050E; Industry Canada ID: 2376A-4050E

Lexmark 4050e Print Server Model Number: 4032-2W0

DELL 3300 Print Server Model Number 4032-dW0

10.2.1 Test Results

The 4050e Print Server is **compliant** with the radiated disturbance requirements of FCC §15.109 for a class B device as of 3/26/2004. The maximized quasi peak data can be found in Figure 10-3.

Figure 10-1 FCC §15.109Worse Case Receiver Spurious Emission (Horizontal)

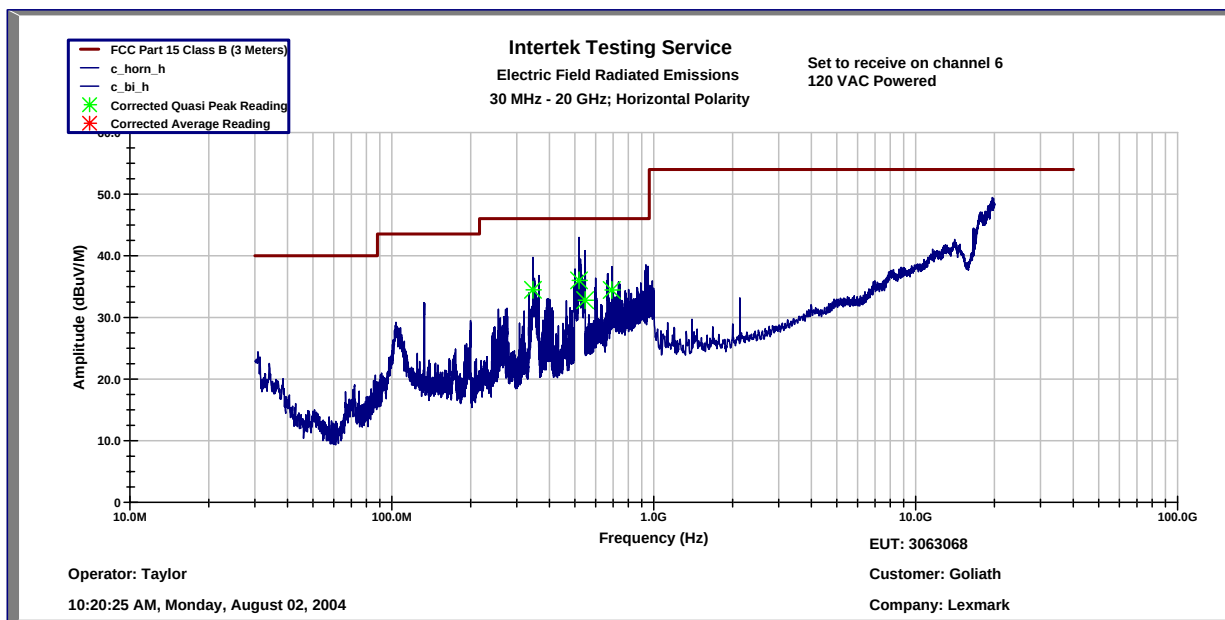
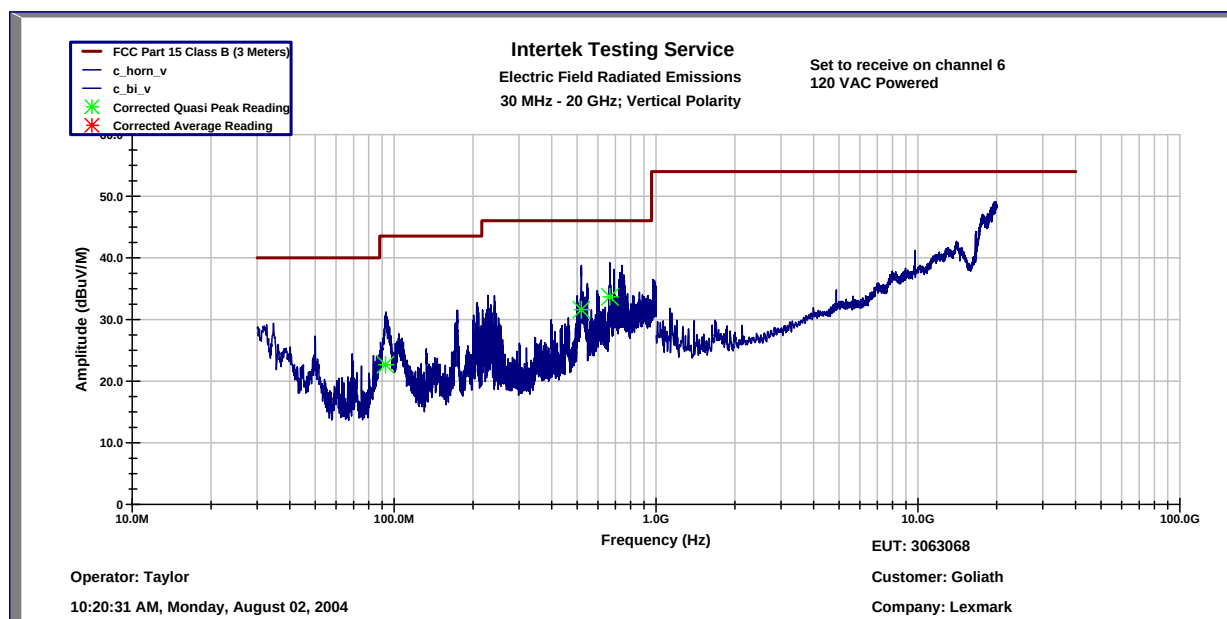


Figure 10-2 FCC §15.109Worse Case Receiver Spurious Emission (Vertical)



Evaluation For: Lexmark International
 Lexmark 4050e Print Server Model Number: 4032-2W0
 DELL 3300 Print Server Model Number 4032-dW0

Figure 10-3 FCC §15.109 Maximized Quasi Peak and Average Emissions (Sorted by Delta)

Frequency (MHz)	Polarity (H/V)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (deg)	Tower (cm)	Results
518.38 MHz	H	2.12	19.43	36	46.02	-10.02	280	116	Compliant
345.59 MHz	H	1.77	16	34.48	46.02	-11.54	87	100	Compliant
691.24 MHz	H	2.39	22.2	34.44	46.02	-11.58	339	268	Compliant
666.36 MHz	V	2.36	21.3	33.66	46.02	-12.36	35	172	Compliant
546.8 MHz	H	2.17	19.51	32.79	46.02	-13.23	287	124	Compliant
518.5 MHz	V	2.12	19.42	31.57	46.02	-14.45	271	195	Compliant
92.591 MHz	V	0.8	8.54	22.65	43.52	-20.87	305	124	Compliant