



Project: 04CA52274
File: E133631
Date: 11/20/04
Model: CL4XXE
FCC ID: MMFCL4XXEAW

Test Report

On

Electromagnetic Compatibility Testing

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Underwriters Laboratories Inc.
1285 Walt Whitman Rd.
Melville, NY 11747

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quality service for over 100 years**

Tel: (631) 271-6200 Fax: (631) 439-6095

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

Test Report Details

Tests Performed By:	Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, NY 11747
Tests Performed For:	SATO Corporation TECHNO Center 1-207 OHNARI-CHO SHITAMA-SHI, SAI-TAMA-KEN 330-0852 1-207, Onari-chom, Omiya-ku, Saitama-shi,
Applicant Contact:	Mr. Lince Berchmans
Title:	
Phone:	81-486638118
Fax:	81-486516662
E-mail:	Olay3985@pn.sato.co.jp
Test Report Date:	3/2/2005
Product Type:	RFID Printer
Model Number:	CL4XXE
Sample Serial Number:	45590308
Sample Tag Number:	0630745001
Sample Receive Date:	11/19/2004
EUT Category:	Radio Transmitter
Testing Start Date:	11/22/2004
Date Testing Complete:	1/19/2005

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, A2LA, or any agency of the US government.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA certificates provided at the end of this report.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
-	Original	-	-

1.0 G E N E R A L - Product Description

Printer Description

CL408e is a thermal printer which uses an thermal ink ribbon or a heat transfer system. It is suitable for the printing of a text, bar codes, and graphics with the high resolution (203 dpi). It can respond to many kinds of papers, such as a labels with adhesive applied to the back of a paper, and ticket paper without adhesive. CL412e has a higher resolution of 305 dpi.

Difference between CL408e and CL412e

The difference between the CL408e and CL412e is the thermal head. The different heads provide different resolutions, CL408e – 203 dpi and CL412e – 305dpi. The printer control board recognizes the different thermal heads. The printout data sent from the host computer is changed into each resolution by the processor inside the printer. The processor performs all of these controls and the structure is identical except for the thermal head.

Part List

Product	Description	Part Number	Manufacturer
CL408e	Thermal Head	KPA-112-8MTA2-SKB	Kyocera Corporation
CL412e	Thermal Head	KHT-112-12TAJ2-SKB	Kyocera Corporation

RFID Description

The RFID Reader/Writer and the antenna for performing communication with a RFID tag are built in Sato's RFID printer. The inlet (the RFID tag) has an IC chip and antenna incorporated into the printer label. The printout data entered from the host interface is analyzed inside the printer, modified and sent to RFID Reader/Writer module. The RFID Reader/Writer module communicates with the inlet through the antenna. Reading of data, writing, etc. are performed between the IC chips. When writing into the IC chip ends, a label is conveyed and printing is done on the label surface by the thermal head. The label with the RFID data will be used for physical distribution, product management, and so on.

In order to avoid simultaneous occupancy of transmitting channels in a multi-transmitter environment, each frequency table is pseudo random and is in no way synchronous with any other (see Table 1). And, although there is always a possibility that 2 or more transmitters can transmit simultaneously in any instant, the probability of any substantial energy buildup is, practically zero.

Table 1.



APPLICATION NOTE

US Frequency Table

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	903.138	26	915.446
2	903.631	27	915.938
3	904.123	28	916.431
4	904.615	29	916.923
5	905.108	30	917.415
6	905.600	31	917.908
7	906.092	32	918.400
8	906.585	33	918.892
9	907.077	34	919.385
10	907.569	35	919.877
11	908.062	36	920.369
12	908.554	37	920.862
13	909.046	38	921.354
14	909.538	39	921.846
15	910.031	40	922.338
16	910.523	41	922.831
17	911.015	42	923.323
18	911.508	43	923.815
19	912.00	44	924.308
20	912.492	45	924.800
21	912.985	46	925.292
22	913.477	47	925.785
23	913.969	48	926.277
24	914.462	49	926.769
25	914.954	50	927.262

1.1 Device Configuration During Test

1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	RFID Printer	SATO Corporation	CL408E	All Ports Loaded

* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)

1.1.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	-	-	None
1	Mains	AC	No	No	120V/60Hz
2	Parallel Port	I/O	Yes	No	
3	EXT I/F	I/O	Yes	No	

*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
PMC = Process Measurement and Control Port

1.1.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
902.4 – 926.5	FHSS Range of Operation	---	---
902.4	Low Channel Frequency		
915.2	Middle Channel Frequency		
926.5	High Channel Frequency		

1.1.4 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	120	3.15	-	60	1	--

1.2 EUT Operation Modes:

Mode #	Description
1	Transmit Mode – Low Channel, Hopping Disabled
2	Transmit Mode – Middle Channel, Hopping Disabled
3	Transmit Mode – High Channel, Hopping Disabled
4	Transmit Mode –Hopping Enabled
5	Receive Mode – RF Off and Printing

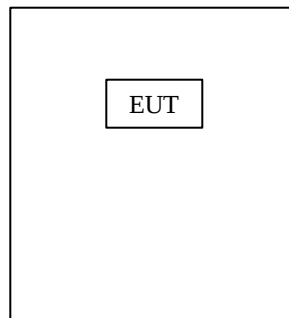
1.3 EUT Configuration Modes:

Mode #	Description
1	Printer utilizing RFID technology. Model: CL408E S/N: 45590308

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.5 Deviations from standard test methods.

Not Applicable

1.6 Device Modifications Necessary for Compliance

As described below:

Modifications to the CL408E were necessary in order to reduce harmonic emissions in the restricted bands. The following modifications were made:

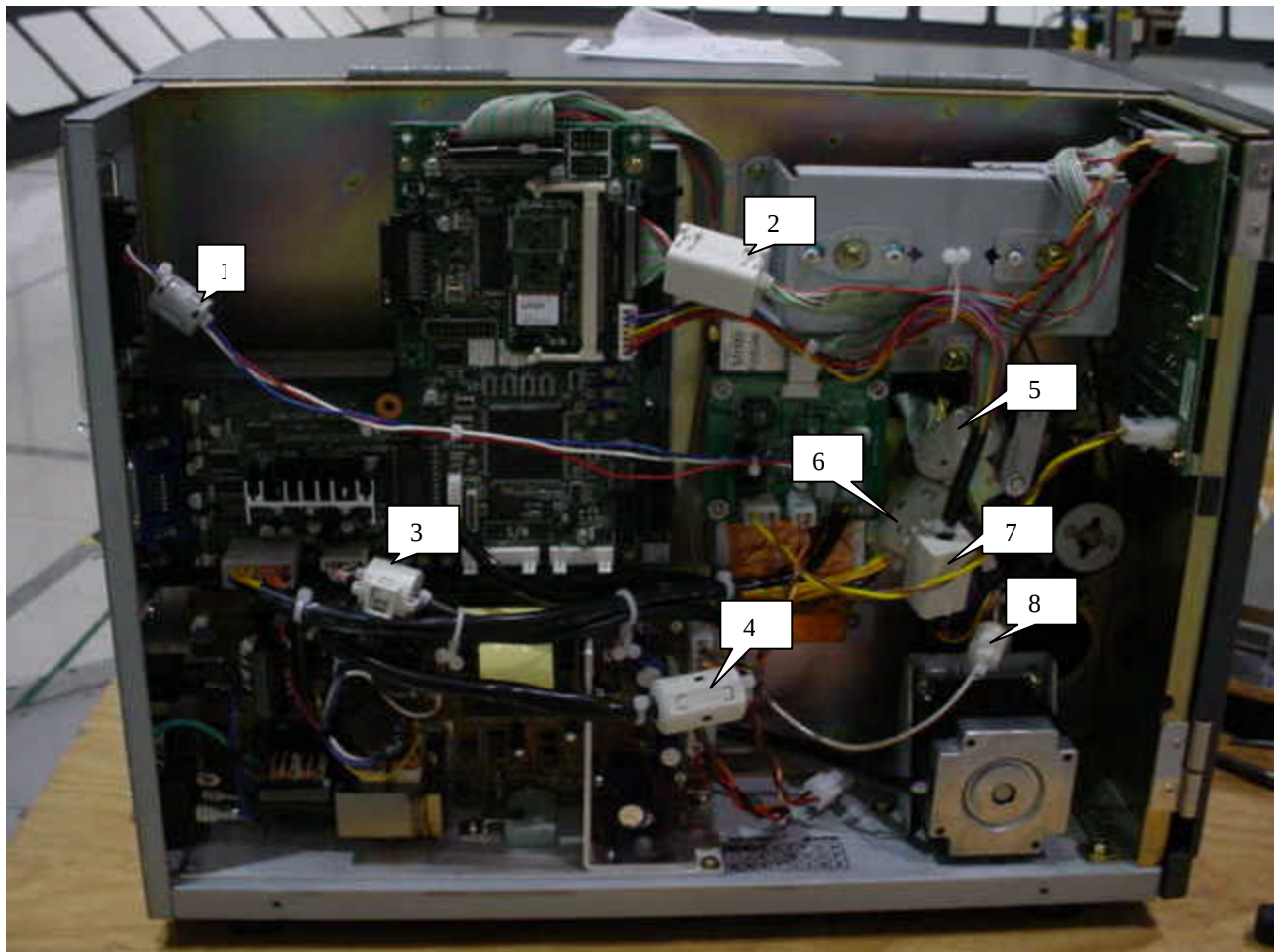
- A. Copper shielding was placed on the bottom portion of the transmitter covering the ribbon cable. **Figure 1.6a**
- B. A Kitagawa SFC-3 ferrite ring was placed on the antenna cable. **Figure 1.6b**
- C. A TDK ZCAT 1518-0730 ferrite ring was placed on the communication cable, internally between the connector and the transmitter interface board. **Figure 1.6b**
- D. A Kitagawa SFC-8 ferrite ring was placed on a cable harness commonly routed with the antenna cable. **Figure 1.6b**
- E. The antenna cable was replaced with a higher quality cable with additional shielding near the antenna and near the connector. **Figure 1.6c**
- F. An additional L- shaped metal plate was placed under the antenna. **Figure 1.6d**

Note:

Additional ferrite rings shown but not discussed are part of the original product configuration. A detailed list of all ferrites employed in the design is included below. **Figure 1.6b**



Figure 1.6a Transmitter Shielding



No.	Part Number	Manufacturer	Remarks
1	ZCAT 1518-0730	TDK Corporation	Added for compliance
2	SFC-8	Kitagawa Industries	Previously added
3	TFC-16-8-16	Kitagawa Industries	Previously added
4	RFC-8	Kitagawa Industries	Previously added
5	RFC-8	Kitagawa Industries	Previously added
6	RFC-8	Kitagawa Industries	Previously added
7	SFC-8	Kitagawa Industries	Added for compliance
8	SFC-3	Kitagawa Industries	Added for compliance
	ZCAT 2035-0930	TDK Corporation	Previously added Not Shown – AC Cable

Figure 1.6b Ferrite Details

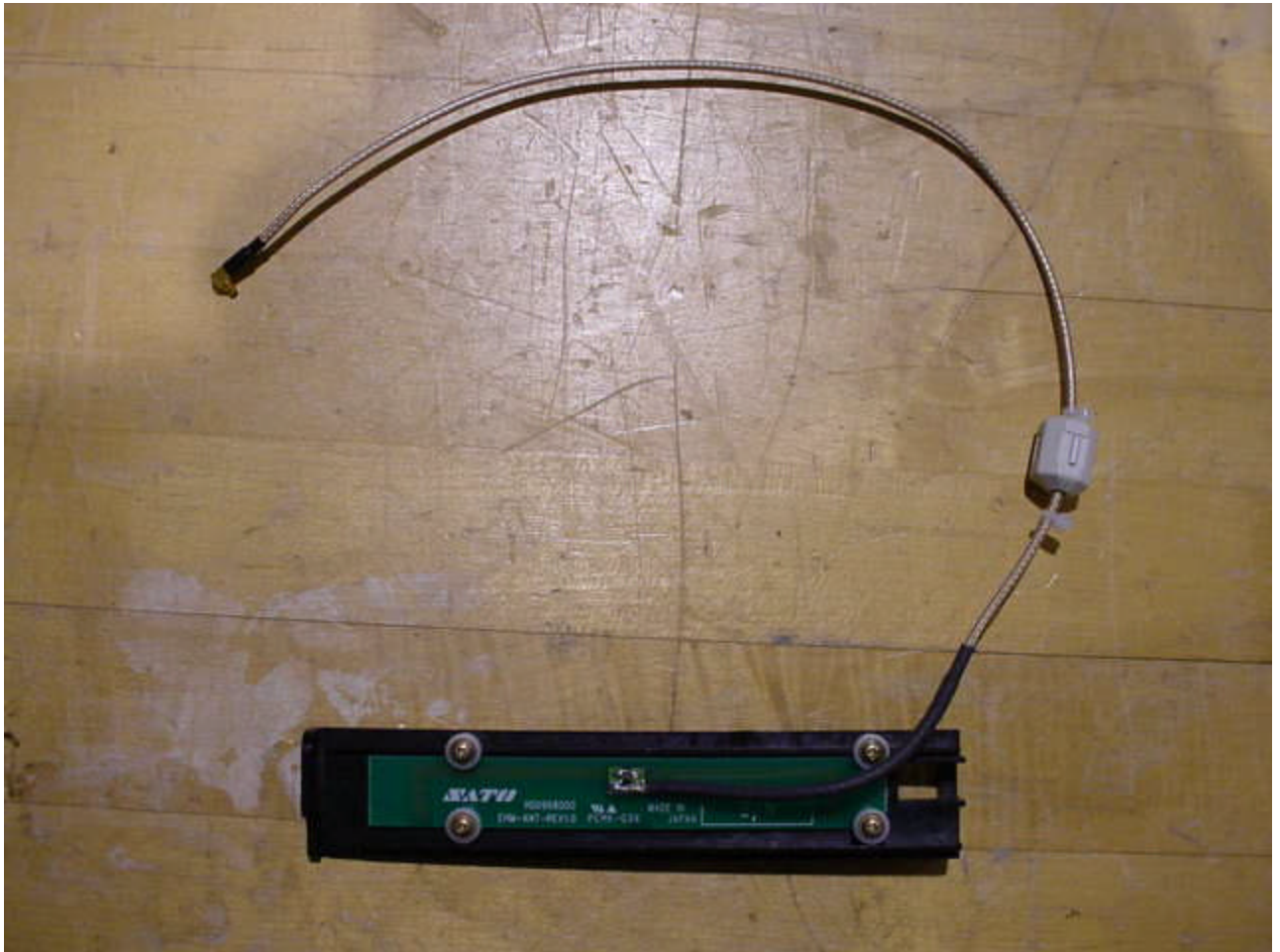


Figure 1.6c Modified Antenna Assembly

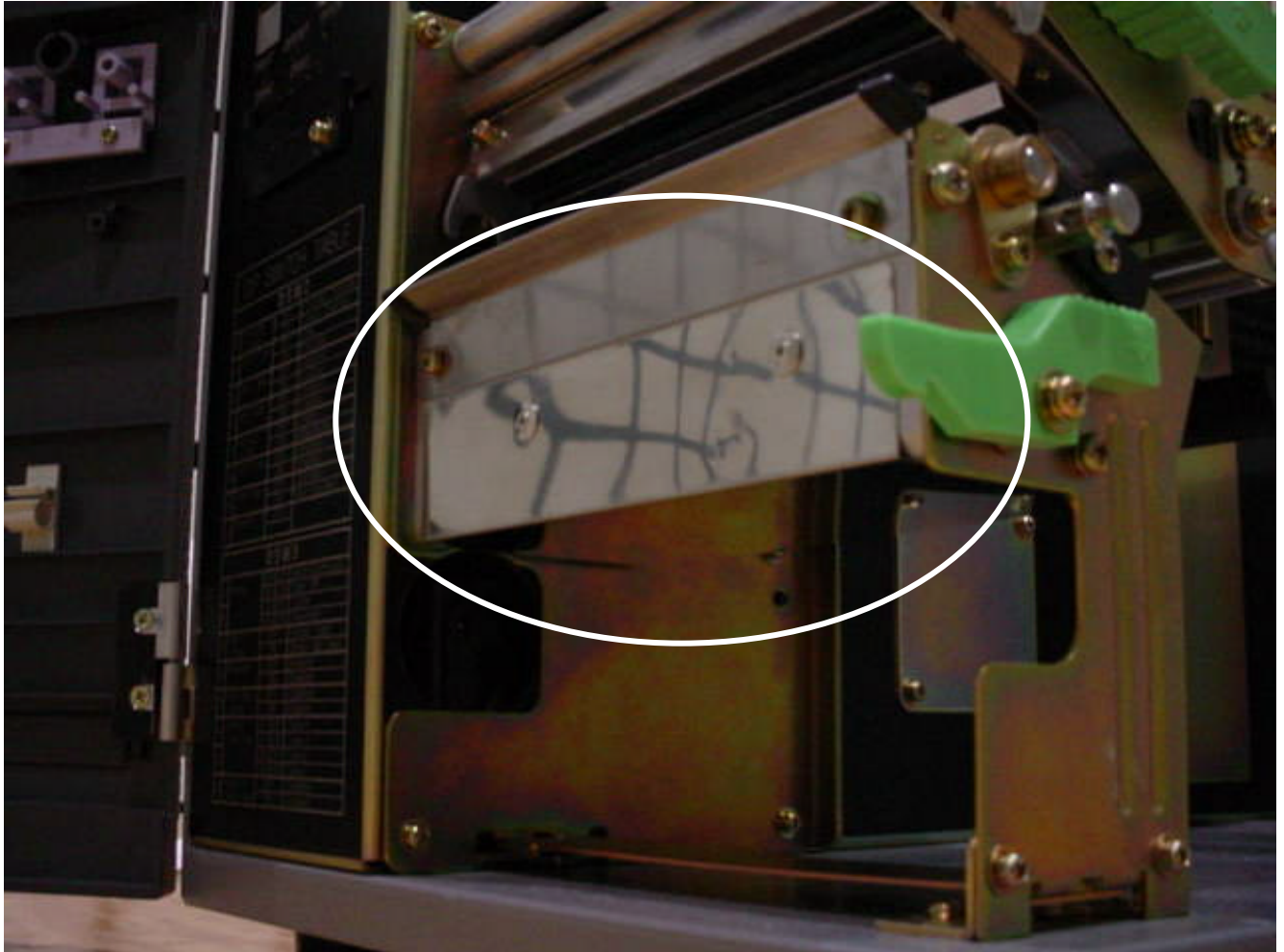


Figure 1.6d Antenna Shielding

1.7 Test Summary

Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
Radiated Disturbance Emissions - 30 to 10000 MHz Electric Field	Y		2
FCC Part 15, Subpart C, Section 15.247		-	
Conducted Disturbance Spurious Emissions -	Y		1
FCC Part 15, Subpart C, Section 15.247		-	
Carrier Frequency Section 15.247	Y		1
Number of Hopping Frequencies Section 15.247 A (i)	Y	-	1
Time of Occupancy (Dwell Time)	Y		1
Occupied Bandwidth	Y	-	1
Peak Output Power Section 15.247(B)	Y		1
RF Exposure Compliance Requirements	Y	-	1
Band-edge Compliance of RF Conducted Emissions: Section 15.247 (C)	Y		1

Remarks:

- 1) No Modifications required for compliance.
- 2) Modifications required to comply as described in Section 1.6

2.0 Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has met the technical requirements as defined under section 5.0.

Test Start Date: 22 November 2004
Test Completion Date: 19 January 2005



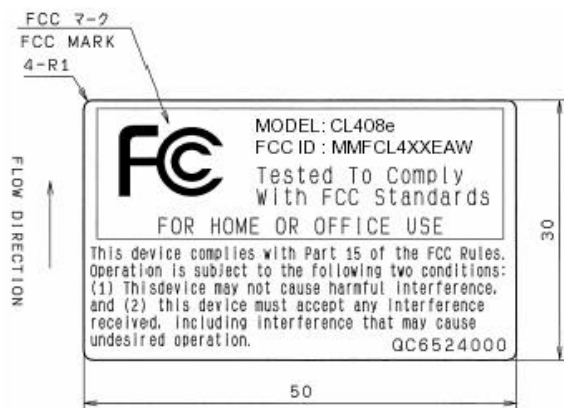
Joshua Thompson (Ext.22218)
Engineer
International EMC Services
Conformity Assessment Services-3027EMEL



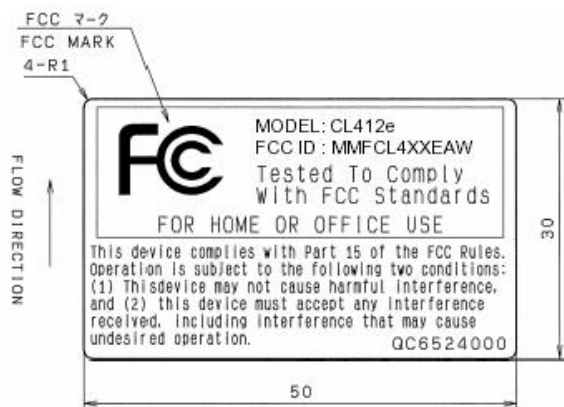
Robert DeLisi (Ext.22452)
Senior Staff Engineer
International EMC Services
Conformity Assessment Services-3027EMEL

3.0 FCC Labeling Information

Label



FCC Label for CL408e



FCC Label for CL412e

Measurements (unit: mm)

Material: Matt Silver Polyester (Thickness: 0.05mm), on Laminate
Adhesive: Hot melt pressure sensitive adhesives, or Synthetic resin emulsion



Label Position (Printer Back View)

4.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

5.0 EMISSIONS TEST REGULATIONS

The emissions tests were performed according to following regulations:

----- United States -----

FCC Part 15, Subpart B, 15.107,
15.109 and Subpart C, 15.207,
15.209 and Section 15.247

Code of Federal Regulations, Part 15, Subpart B and C, Radio
Frequency Devices

Measurement summary:	
Measure ments	Results
Spurious RF Antenna Port Conducted Emissions	>20 dB below Fundamental
Occupied Bandwidth (20 dB BW)	0.324 MHz
Peak Output Power	314.05 mW
Number of Hopping Frequencies	50
Carrier Frequency Separation	0.492 MHz
Band Edge Compliance (lower and Upper Band 902 MHz and 928 MHz)	>20 dB below Fundamental
Time of Occupancy	300 ms
Spurious Radiated Emissions	Meets FCC 15.209 Limit
Harmonic Radiated Emissions (Outside Restricted Bands)	>20 dB below Fundamental
Harmonic Radiated Emissions (Inside Restricted Bands)	Meets FCC 15.209 Limit

5.1.1 AC Mains Conducted Emissions Tests

Measurements were made on a ground plane that extends 1-meter minimum beyond three sides of the system under test with the fourth side positioned 40 cm from a vertical ground plane. The system under test was positioned on a non-conductive table 80 cm above the horizontal ground plane. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN.

Results

The system met the requirements for AC Mains Conducted Emissions. Data Pages follow.

Temperature:	21.0°C
Humidity:	47 %RH
Pressure:	1014 mbar
Date test performed:	14 January 2005

1 fully configured sample was scanned over the following frequency range

Frequency Range	Measurement Point	Mode*	
		Power	Operation
150kHz to 30MHz	AC Mains	<u>1</u>	<u>5</u>

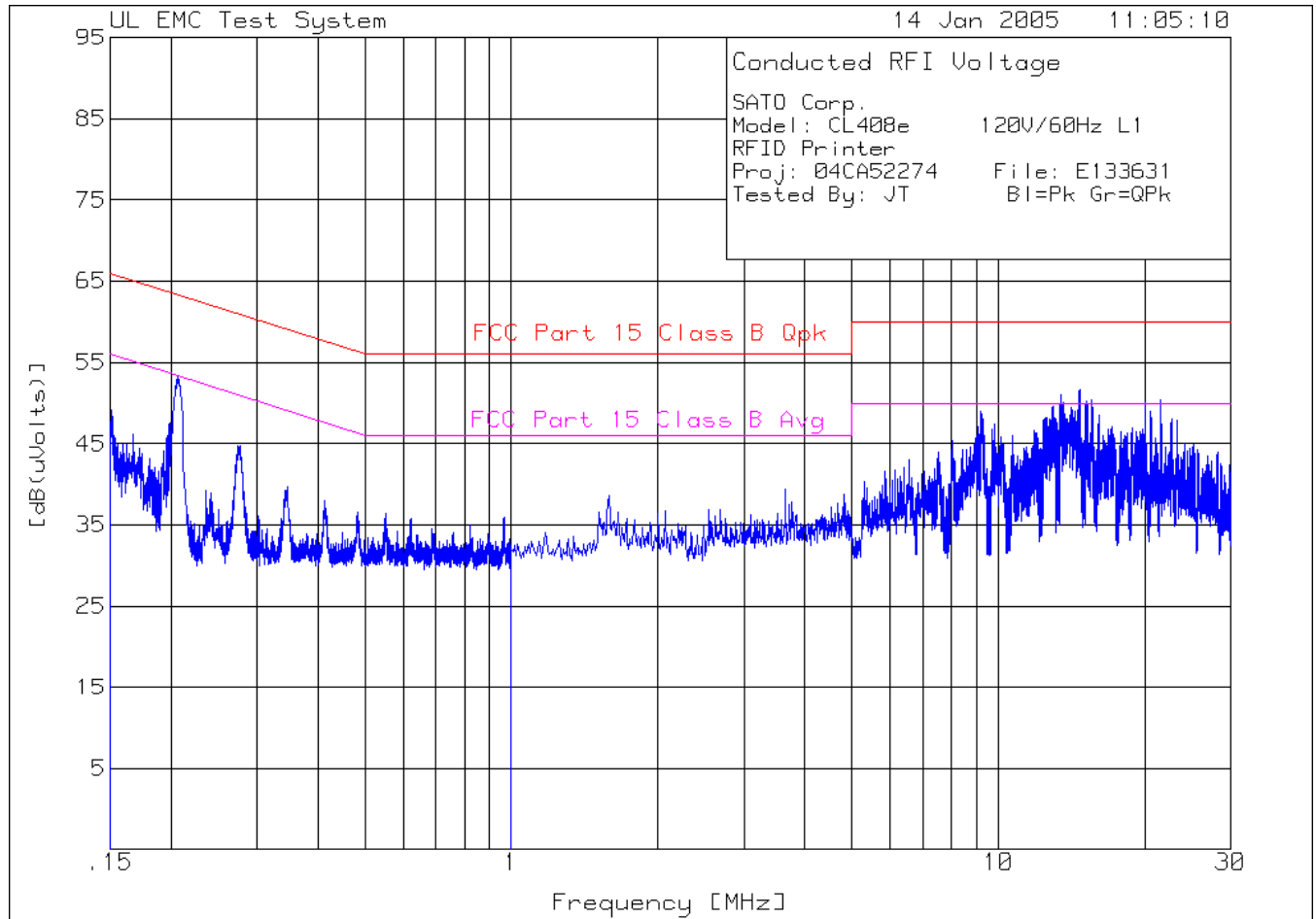
*See Power Interface and EUT Operating Modes for details

Test equipment used for Conducted Emissions

E7402A	Agilent Technologies	EMI Spectrum Analyzer	Equipment No.: ME5B-123
		Quasi Peak BW: 9kHz	150kHz to 30MHz
		RBW 100 KHz	
		Quasi Peak BW: 120 kHz	30 to 1000MHz
		RBW 1.0 MHz	
Range: 0.15 – 30 MHz	Last Calibration Date: 17 August 2004	Calibration Due Date: 17 August 2005	
EMI Software Version	9.1		

Test Accessories for Conducted Emissions

11947A	Hewlett Packard	Transient Limiter	Equipment No.: ME5A-443
Range: 0.15 – 30 MHz	Last Calibration Date: 24 March 2004	Calibration Due Date: 24 March 2005	
9252-50-R-24-BNC	Solar Electronics	50W LISN	Equipment No.: ME5A-637
Range: 0.15 – 30 MHz	Last Calibration Date: 7 July 2004	Calibration Due Date: 7 July 2005	
99760-00	Cole –Parmer	Hygrometer/Temp/Baro meter	Equipment No.: ME4-268
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 June 2004	Calibration Due Date: 18 June 2005	



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e 120V/60Hz L1
 RFID Printer
 Proj: 04CA52274 File: E133631
 Tested By: JT Bl=Pk Gr=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range: 1 .15 - 1MHz -----							
1	.2066	43.33 pk	10.1	0	53.43	63.3	53.3
				Margin [dB]		-9.87	.13
2	.27656	34.7 pk	10.1	0	44.8	60.9	50.9
				Margin [dB]		-16.1	-6.1
Range: 1 1 - 30MHz -----							
3	3.64753	29.03 pk	10.3	0	39.33	56	46
				Margin [dB]		-16.67	-6.67
4	8.06733	34.94 pk	10.4	0	45.34	60	50
				Margin [dB]		-14.66	-4.66
5	9.19578	38.51 pk	10.4	0	48.91	60	50
				Margin [dB]		-11.09	-1.09
6	9.78895	36.95 pk	10.4	0	47.35	60	50
				Margin [dB]		-12.65	-2.65
7	10.68592	35.61 pk	10.4	0	46.01	60	50
				Margin [dB]		-13.99	-3.99
8	11.85778	36.22 pk	10.4	0	46.62	60	50
				Margin [dB]		-13.38	-3.38
9	12.47265	37.86 pk	10.4	0	48.26	60	50
				Margin [dB]		-11.74	-1.74
10	12.92837	39.24 pk	10.4	0	49.64	60	50
				Margin [dB]		-10.36	-.36
11	13.4492	40.7 pk	10.4	0	51.1	60	50
				Margin [dB]		-8.9	1.1
12	14.14363	38.9 pk	10.5	0	49.4	60	50
				Margin [dB]		-10.6	-.6
13	14.67893	41.08 pk	10.5	0	51.58	60	50
				Margin [dB]		-8.42	1.58
14	15.17082	39.74 pk	10.5	0	50.24	60	50
				Margin [dB]		-9.76	.24
15	15.57591	39.93 pk	10.5	0	50.43	60	50
				Margin [dB]		-9.57	.43
16	16.06056	38.01 pk	10.5	0	48.51	60	50
				Margin [dB]		-11.49	-1.49
17	17.08775	36.6 pk	10.5	0	47.1	60	50
				Margin [dB]		-12.9	-2.9
18	18.82384	36.37 pk	10.5	0	46.87	60	50
				Margin [dB]		-13.13	-3.13
19	19.9957	39.62 pk	10.5	0	50.12	60	50
				Margin [dB]		-9.88	.12
20	20.54546	38.45 pk	10.5	0	48.95	60	50
				Margin [dB]		-11.05	-1.05

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FCC ID: MMFCL4XXEAW

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21	21.51477	39.88 pk	10.5	0	50.38	60	50
				Margin [dB]		-9.62	.38
22	22.75174	37.49 pk	10.5	0	47.99	60	50
				Margin [dB]		-12.01	-2.01
23	23.3015	35.74 pk	10.5	0	46.24	60	50
				Margin [dB]		-13.76	-3.76

LIMIT 1: FCC Part 15 Class B Qpk
LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e 120V/60Hz L1
 RFID Printer
 Proj: 04CA52274 File: E133631
 Tested By: JT Bl=Pk Gr=QPk

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
Frequency	Reading	Factor	Factor	[dB(uVolts)]		
[MHz]	[dB(uV)]	[dB]	[dB]			
=====						
Range: 1 .15 - 1MHz						
.2066	40.12 ave	10.1	0	50.22	63.3	53.3
			Margin [dB]:		-13.08	-3.08
Range: 1 1 - 30MHz						
8.06733	25.67 ave	10.4	0	36.07	60	50
			Margin [dB]:		-23.93	-13.93
9.19578	25.37 ave	10.4	0	35.77	60	50
			Margin [dB]:		-24.23	-14.23
9.78895	19.56 ave	10.4	0	29.96	60	50
			Margin [dB]:		-30.04	-20.04
10.68592	25.5 ave	10.4	0	35.9	60	50
			Margin [dB]:		-24.1	-14.1
11.85778	31.2 ave	10.4	0	41.6	60	50
			Margin [dB]:		-18.4	-8.4
12.47265	32.61 ave	10.4	0	43.01	60	50
			Margin [dB]:		-16.99	-6.99
12.92837	32.44 ave	10.4	0	42.84	60	50
			Margin [dB]:		-17.16	-7.16
13.4492	31.85 ave	10.4	0	42.25	60	50
			Margin [dB]:		-17.75	-7.75
14.14363	32.24 ave	10.5	0	42.74	60	50
			Margin [dB]:		-17.26	-7.26
14.67893	29.81 ave	10.5	0	40.31	60	50
			Margin [dB]:		-19.69	-9.69
15.17082	29.84 ave	10.5	0	40.34	60	50
			Margin [dB]:		-19.66	-9.66
15.57591	27.06 ave	10.5	0	37.56	60	50
			Margin [dB]:		-22.44	-12.44
16.06056	28.55 ave	10.5	0	39.05	60	50
			Margin [dB]:		-20.95	-10.95
17.08775	27.69 ave	10.5	0	38.19	60	50
			Margin [dB]:		-21.81	-11.81
18.82384	27.46 ave	10.5	0	37.96	60	50
			Margin [dB]:		-22.04	-12.04
19.9957	27.32 ave	10.5	0	37.82	60	50
			Margin [dB]:		-22.18	-12.18
20.54546	27.29 ave	10.5	0	37.79	60	50
			Margin [dB]:		-22.21	-12.21
21.51477	26.16 ave	10.5	0	36.66	60	50
			Margin [dB]:		-23.34	-13.34
22.75174	24.47 ave	10.5	0	34.97	60	50
			Margin [dB]:		-25.03	-15.03
23.3015	23.17 ave	10.5	0	33.67	60	50

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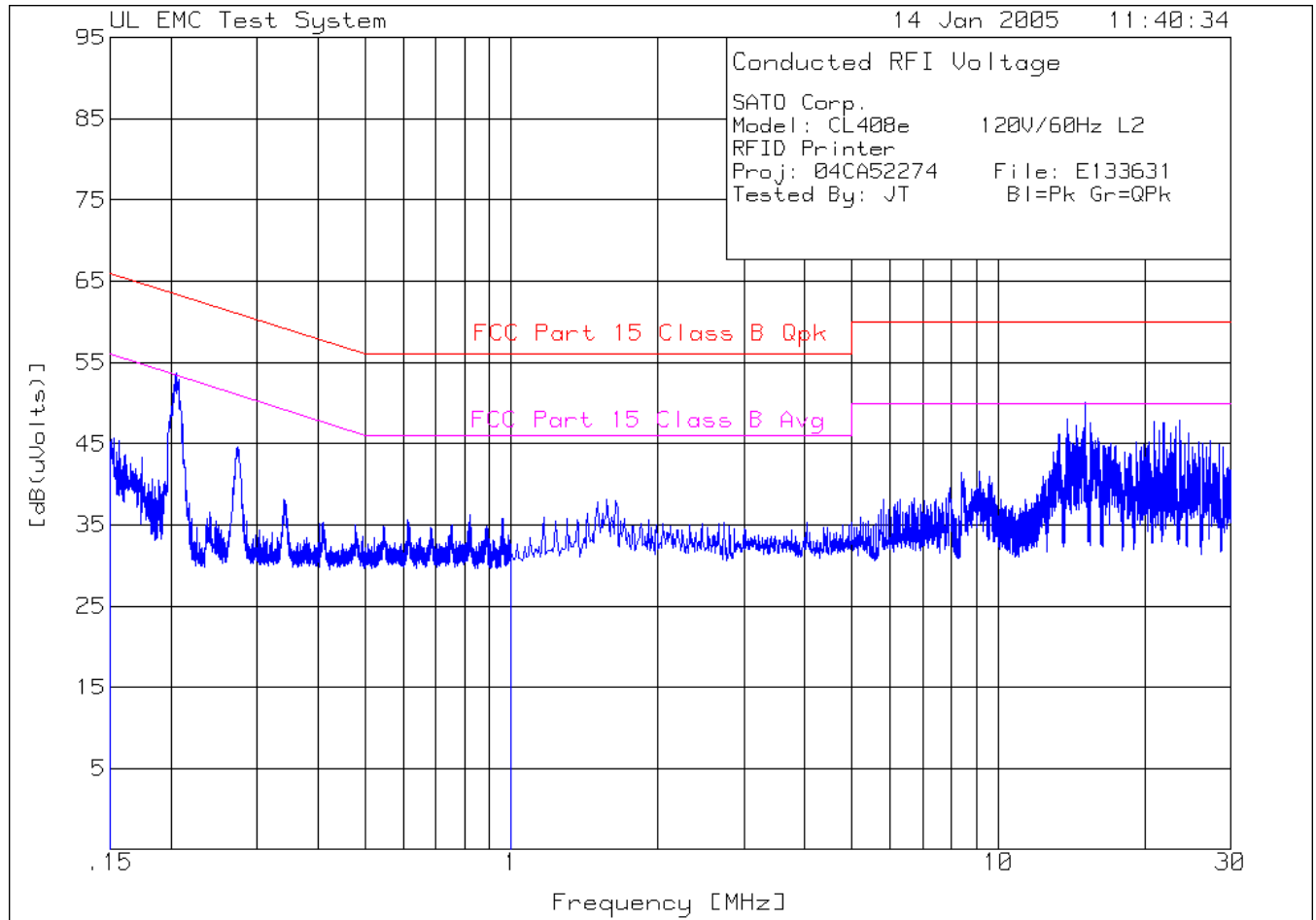
Issued: 3/4/2005

Margin [dB]: -26.33 -16.33

NOTE: "+" - Indicates an emission level in excess of the
applicable limit (s).

pk - Peak detector
qp - Quasi-Peak detector
ave - denotes average detection

LIMIT 1: FCC Part 15 Class B Qpk
LIMIT 2: FCC Part 15 Class B Avg



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e 120V/60Hz L2
 RFID Printer
 Proj: 04CA52274 File: E133631
 Tested By: JT Bl=Pk Gr=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range: 1 .15 - 1MHz -----							
1	.2047	43.57 pk	10.1	0	53.67	63.4	53.4
				Margin [dB]		-9.73	.27
2	.27444	34.53 pk	10.1	0	44.63	61	51
				Margin [dB]		-16.37	-6.37
Range: 1 1 - 30MHz -----							
3	13.27559	35.78 pk	10.4	0	46.18	60	50
				Margin [dB]		-13.82	-3.82
4	13.82535	37.6 pk	10.5	0	48.1	60	50
				Margin [dB]		-11.9	-1.9
5	14.43298	36.81 pk	10.5	0	47.31	60	50
				Margin [dB]		-12.69	-2.69
6	15.04785	39.63 pk	10.5	0	50.13	60	50
				Margin [dB]		-9.87	.13
7	15.48187	37.11 pk	10.5	0	47.61	60	50
				Margin [dB]		-12.39	-2.39
8	15.96653	35.15 pk	10.5	0	45.65	60	50
				Margin [dB]		-14.35	-4.35
9	17.02265	34.49 pk	10.5	0	44.99	60	50
				Margin [dB]		-15.01	-5.01
10	19.17105	34.65 pk	10.5	0	45.15	60	50
				Margin [dB]		-14.85	-4.85
11	19.90889	34.42 pk	10.5	0	44.92	60	50
				Margin [dB]		-15.08	-5.08
12	20.38632	34.77 pk	10.5	0	45.27	60	50
				Margin [dB]		-14.73	-4.73
13	20.87097	37.29 pk	10.5	0	47.79	60	50
				Margin [dB]		-12.21	-2.21
14	21.3484	36.14 pk	10.5	0	46.64	60	50
				Margin [dB]		-13.36	-3.36
15	21.82582	37.09 pk	10.5	0	47.59	60	50
				Margin [dB]		-12.41	-2.41
16	22.57089	35.8 pk	10.5	0	46.3	60	50
				Margin [dB]		-13.7	-3.7
17	23.12789	36.56 pk	10.5	0	47.06	60	50
				Margin [dB]		-12.94	-2.94
18	23.53298	35.54 pk	10.5	0	46.04	60	50
				Margin [dB]		-13.96	-3.96
19	23.60531	37.32 pk	10.5	0	47.82	60	50
				Margin [dB]		-12.18	-2.18
20	24.5674	35.85 pk	10.5	0	46.35	60	50
				Margin [dB]		-13.65	-3.65

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

21	25.72479	34.77 pk	10.5	0	45.27	60	50
				Margin [dB]		-14.73	-4.73
22	26.26008	34.61 pk	10.5	0	45.11	60	50
				Margin [dB]		-14.89	-4.89
23	27.16429	34.89 pk	10.5	0	45.39	60	50
				Margin [dB]		-14.61	-4.61
24	28.37956	34.44 pk	10.5	0	44.94	60	50
				Margin [dB]		-15.06	-5.06
25	28.93655	33.56 pk	10.6	0	44.16	60	50
				Margin [dB]		-15.84	-5.84

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e 120V/60Hz L2
 RFID Printer
 Proj: 04CA52274 File: E133631
 Tested By: JT Bl=Pk Gr=QPk

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
=====						
Range: 1 .15 - 1MHz						
.2047	39.34 ave	10.1	0	49.44	63.4	53.4
			Margin [dB]:		-13.96	-3.96
Range: 1 1 - 30MHz						
13.27559	26.11 ave	10.4	0	36.51	60	50
			Margin [dB]:		-23.49	-13.49
13.82535	28.01 ave	10.5	0	38.51	60	50
			Margin [dB]:		-21.49	-11.49
14.43298	26.67 ave	10.5	0	37.17	60	50
			Margin [dB]:		-22.83	-12.83
15.04785	28.17 ave	10.5	0	38.67	60	50
			Margin [dB]:		-21.33	-11.33
15.48187	26.38 ave	10.5	0	36.88	60	50
			Margin [dB]:		-23.12	-13.12
15.96653	25.7 ave	10.5	0	36.2	60	50
			Margin [dB]:		-23.8	-13.8
17.02265	25.67 ave	10.5	0	36.17	60	50
			Margin [dB]:		-23.83	-13.83
19.17105	24.24 ave	10.5	0	34.74	60	50
			Margin [dB]:		-25.26	-15.26
19.90889	24.65 ave	10.5	0	35.15	60	50
			Margin [dB]:		-24.85	-14.85
20.38632	25.17 ave	10.5	0	35.67	60	50
			Margin [dB]:		-24.33	-14.33
20.87097	25.2 ave	10.5	0	35.7	60	50
			Margin [dB]:		-24.3	-14.3
21.3484	24.48 ave	10.5	0	34.98	60	50
			Margin [dB]:		-25.02	-15.02
21.82582	24.13 ave	10.5	0	34.63	60	50
			Margin [dB]:		-25.37	-15.37
22.57089	22.7 ave	10.5	0	33.2	60	50
			Margin [dB]:		-26.8	-16.8
23.12789	22.82 ave	10.5	0	33.32	60	50
			Margin [dB]:		-26.68	-16.68
23.53298	22.04 ave	10.5	0	32.54	60	50
			Margin [dB]:		-27.46	-17.46
23.60531	21.4 ave	10.5	0	31.9	60	50
			Margin [dB]:		-28.1	-18.1
24.5674	20.9 ave	10.5	0	31.4	60	50
			Margin [dB]:		-28.6	-18.6
25.72479	18.44 ave	10.5	0	28.94	60	50
			Margin [dB]:		-31.06	-21.06
26.26008	18.82 ave	10.5	0	29.32	60	50

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

27.16429	17.69 ave	10.5	Margin [dB]:	-30.68	-20.68
			0	28.19	60 50
28.37956	13.8 ave	10.5	Margin [dB]:	-31.81	-21.81
			0	24.3	60 50
28.93655	16.39 ave	10.6	Margin [dB]:	-35.7	-25.7
			0	26.99	60 50
			Margin [dB]:	-33.01	-23.01

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
qp - Quasi-Peak detector
ave - denotes average detection

LIMIT 1: FCC Part 15 Class B Qpk
LIMIT 2: FCC Part 15 Class B Avg



Conducted Emissions Test Setup

5.1.2 Spurious RF Conducted Emissions Tests

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz bandwidth. Spurious RF conducted emissions are measured with a direct connection between the antenna port of the transmitter and the spectrum analyzer. The spectrum analyzer scans up to the 10th harmonic.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section. Submit these plots.

Results

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	20.0°C
Humidity:	42 %RH
Pressure:	1011 mbar
Date test performed:	30 November 2004

1 fully configured sample was scanned over the following frequency range

Frequency Range

Measurement Point

Mode*

		Power	Operation
30MHz to 10GHz	Antenna Port Spurious Emission	<u>1</u>	<u>1,2,3,4</u>

*See Power Interface and EUT Operating Modes for details

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

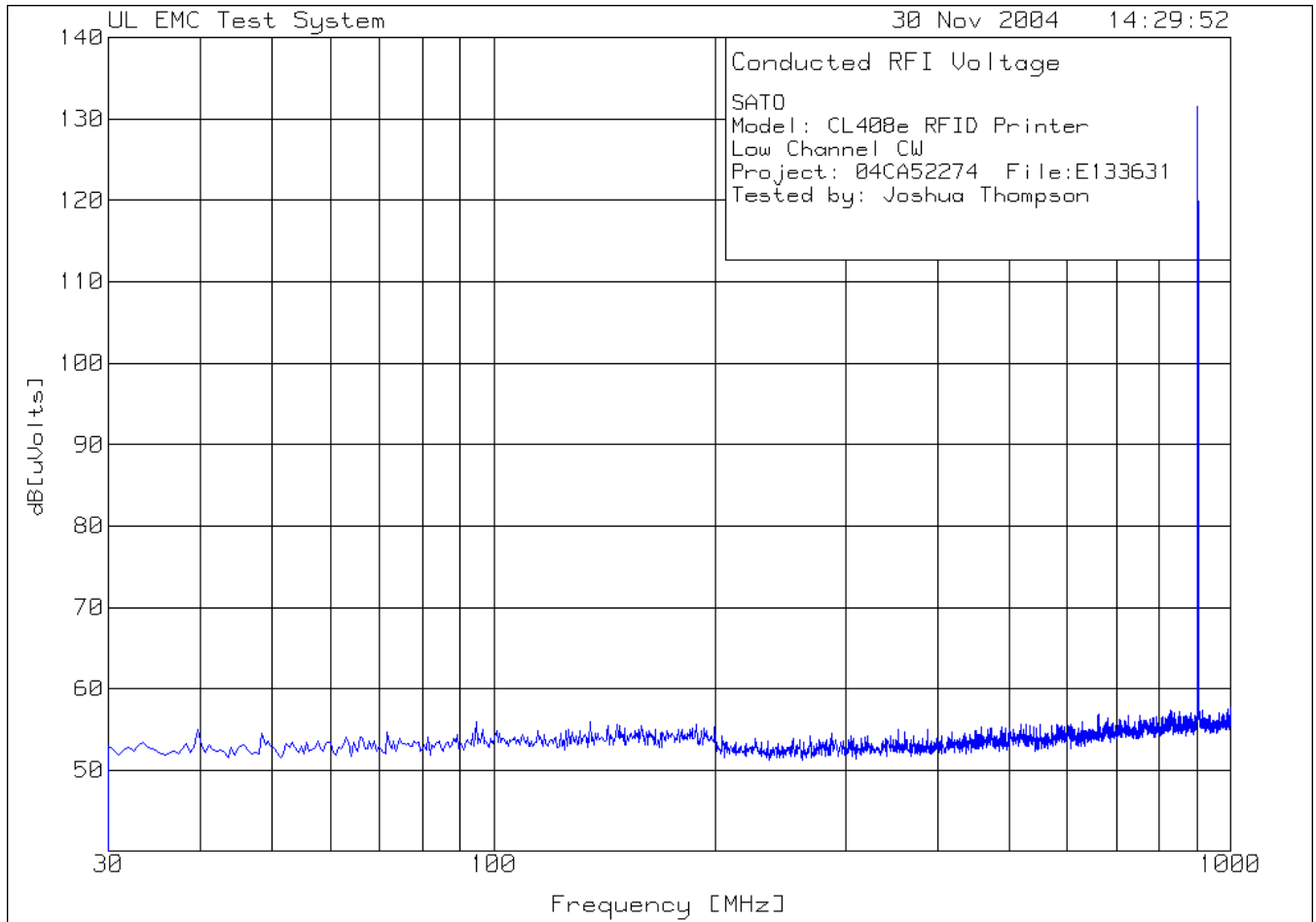
Issued: 3/4/2005

Test equipment used for Conducted Emissions

ESI 26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			RBW 100 kHz
			VBW 300 kHz
Range: 0.03 -10 GHz	Last Calibration Date: 7 September 2004		Calibration Due Date: 7 September 2005
EMI Software Version	9.2		

Test Accessories for Conducted Emissions

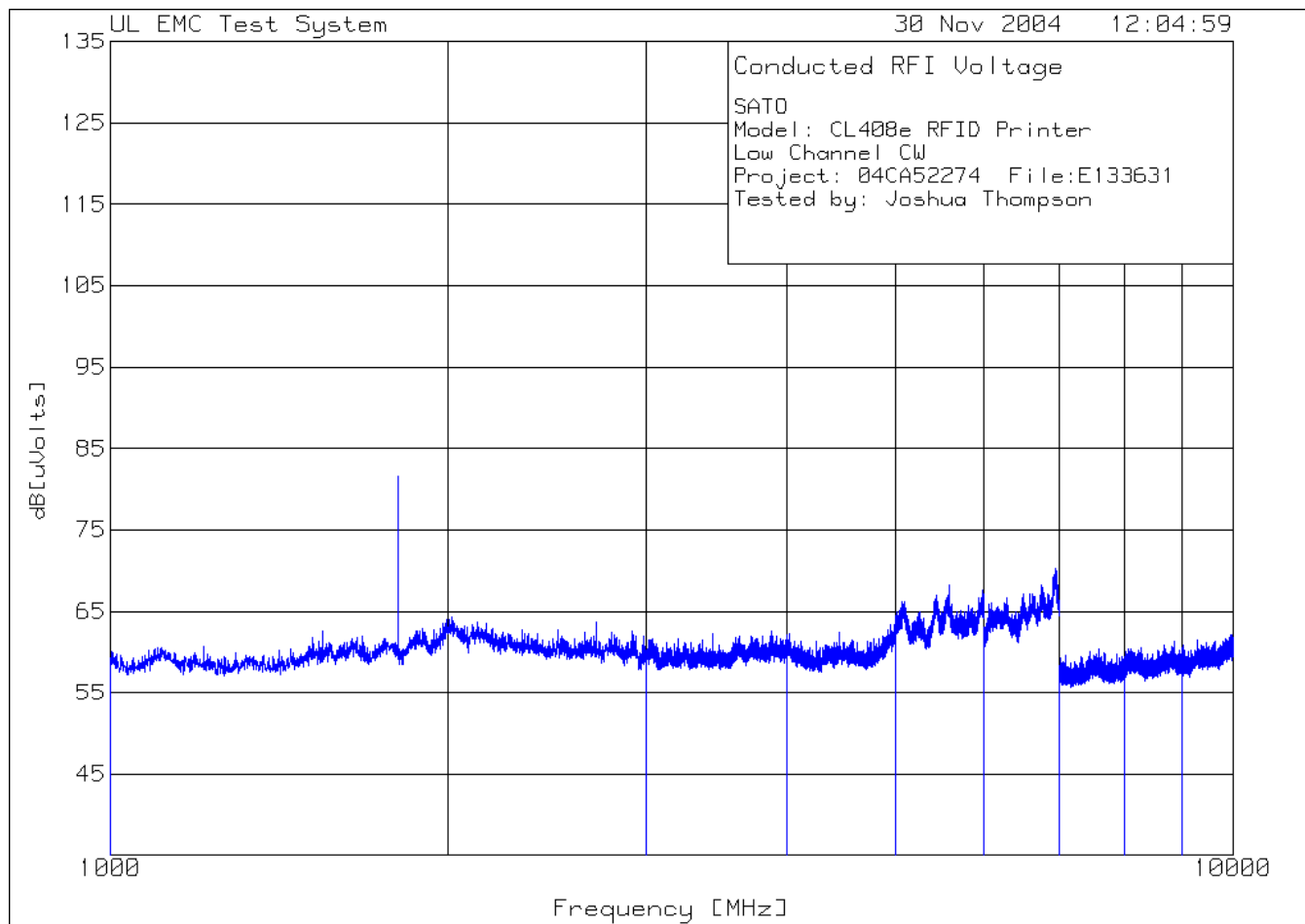
BW-N20W5	Mini-Circuits	20 dB Attenuator	Equipment No.: A01
Range: 0.03 – 10 GHz	Last Calibration Date: 22 November 2004		Calibration Due Date: 22 November 2005
99760-00	Cole –Parmer	Hygrometer/Temp/Baro	Equipment No.: ME4-268
		meter	
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 June 2004		Calibration Due Date: 18 June 2005



SATO
 Model: CL408e RFID Printer
 Low Channel CW
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

Test No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
1	902.4662	110.76 pk	20.8	0	131.56	-	-	-
Margin [dB]						-	-	-

pk - Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model: CL408e RFID Printer

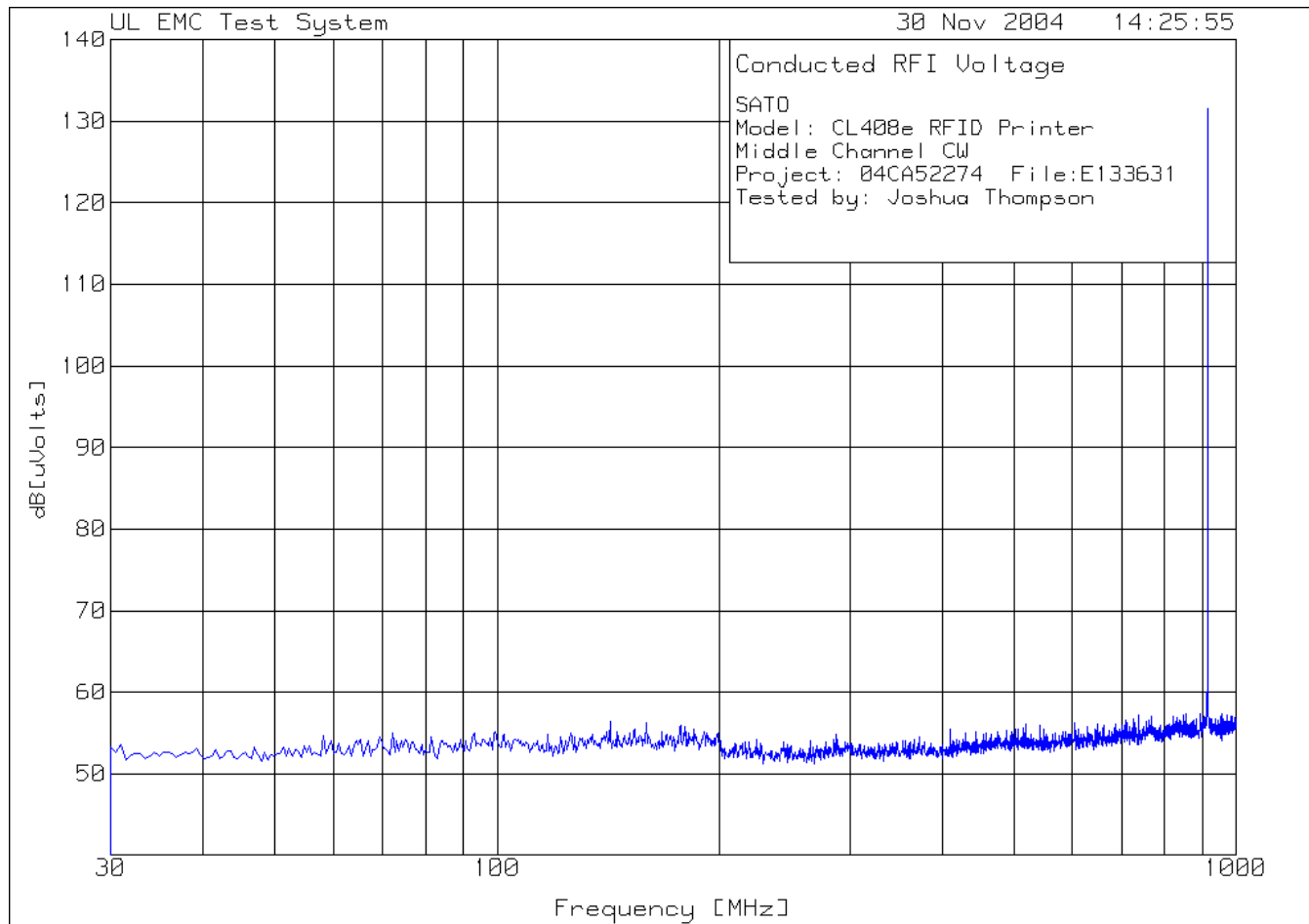
Low Channel CW

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

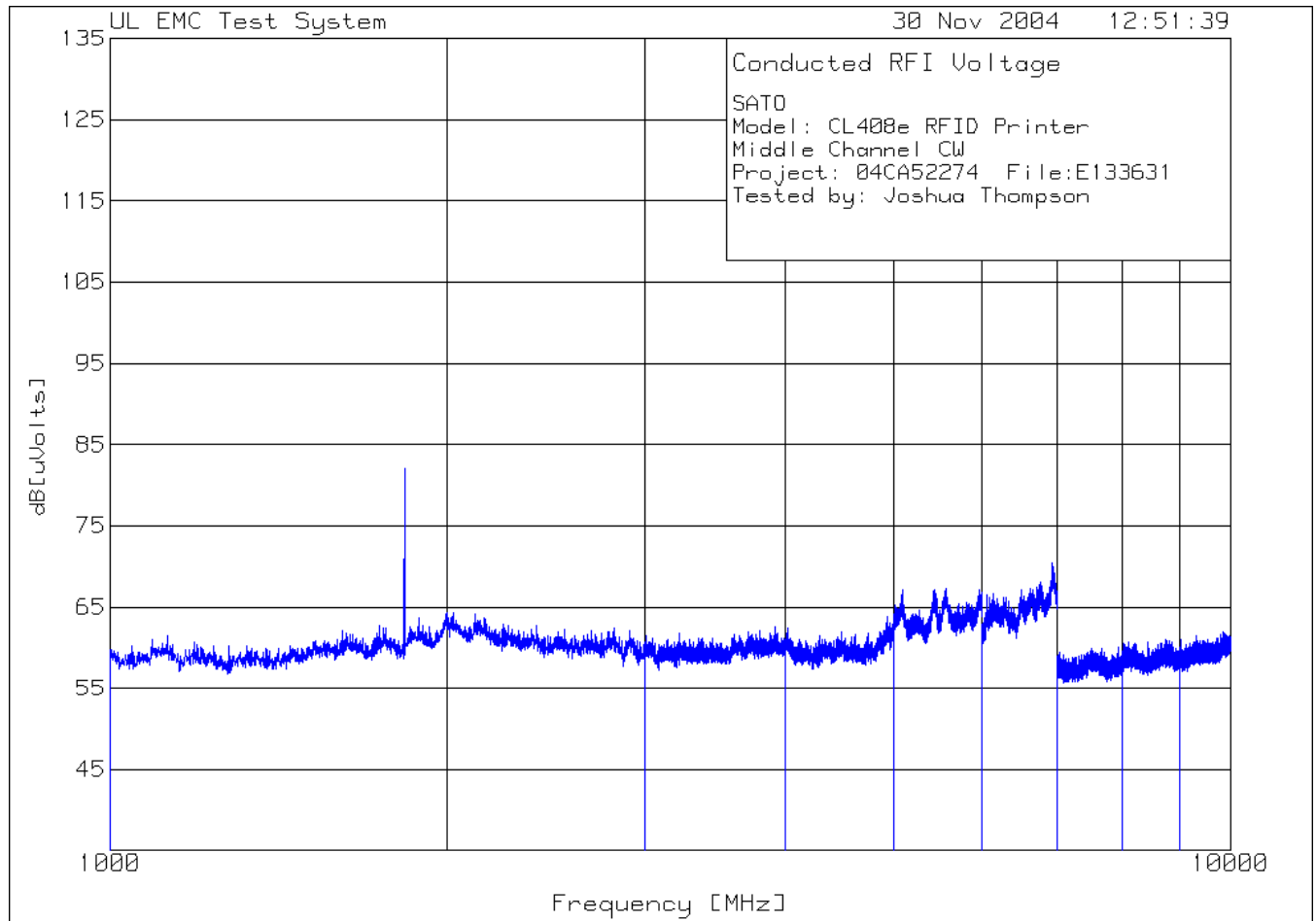
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
=====								
Range: 2 1000 - 3000MHz -----								
1	1804.402	61 pk	20.6	0	81.6	-	-	-
2	2707.854	42.27 pk	21.4	0	63.67	-	-	-
Range:2 3000 - 4000MHz -----								
3	3606.303	39.66 pk	22.2	0	61.86	-	-	-
Range:3 4000 - 5000MHz -----								
4	4509.755	38.92 pk	22.2	0	61.12	-	-	-
Range:4 5000 - 6000MHz -----								
5	5440.72	44.8 pk	22.1	0	66.9	-	-	-
Range:5 6000 - 7000MHz -----								
6	6305.653	43.83 pk	21.6	0	65.43	-	-	-
Range:6 7000 - 8000MHz -----								
7	7217.109	38.1 pk	20.7	0	58.8	-	-	-
Range:7 8000 - 9000MHz -----								
8	8098.549	39.09 pk	21.3	0	60.39	-	-	-
Range:8 9000 - 10000MHz -----								
9	9031.516	38.83 pk	22	0	60.83	-	-	-

pk - Peak detector



SATO
 Model: CL408e RFID Printer
 Middle Channel CW
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
No.	Frequency	Reading	Factor	Factor	dB[uVolts]		
	[MHz]	[dB(uV)]	[dB]	[dB]			
=====							
Range: 2 30 - 1000MHz -----							
1	915.5677	110.82 pk	20.7	0	131.52	-	-
pk - Peak detector							



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model: CL408e RFID Printer

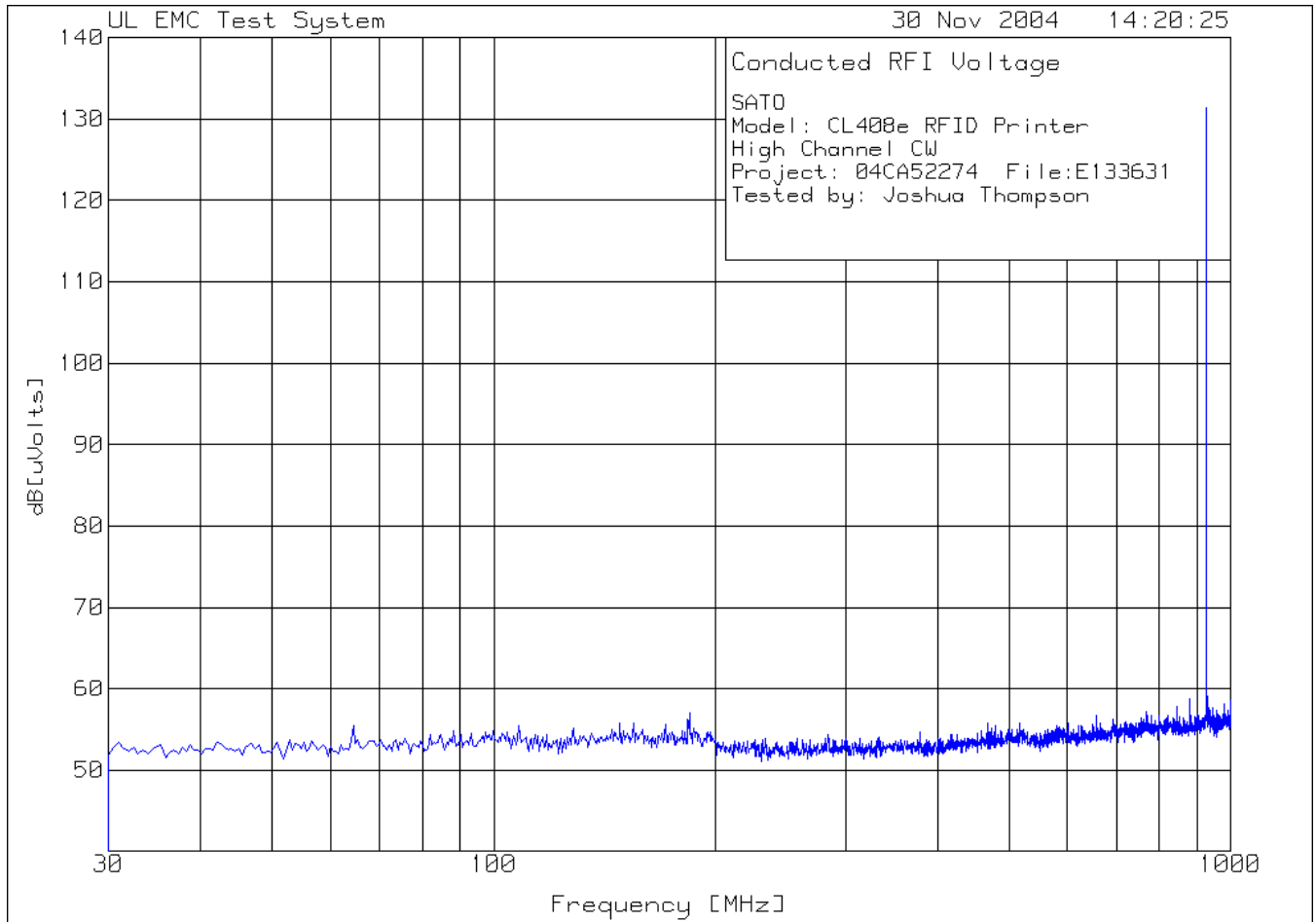
Middle Channel CW

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

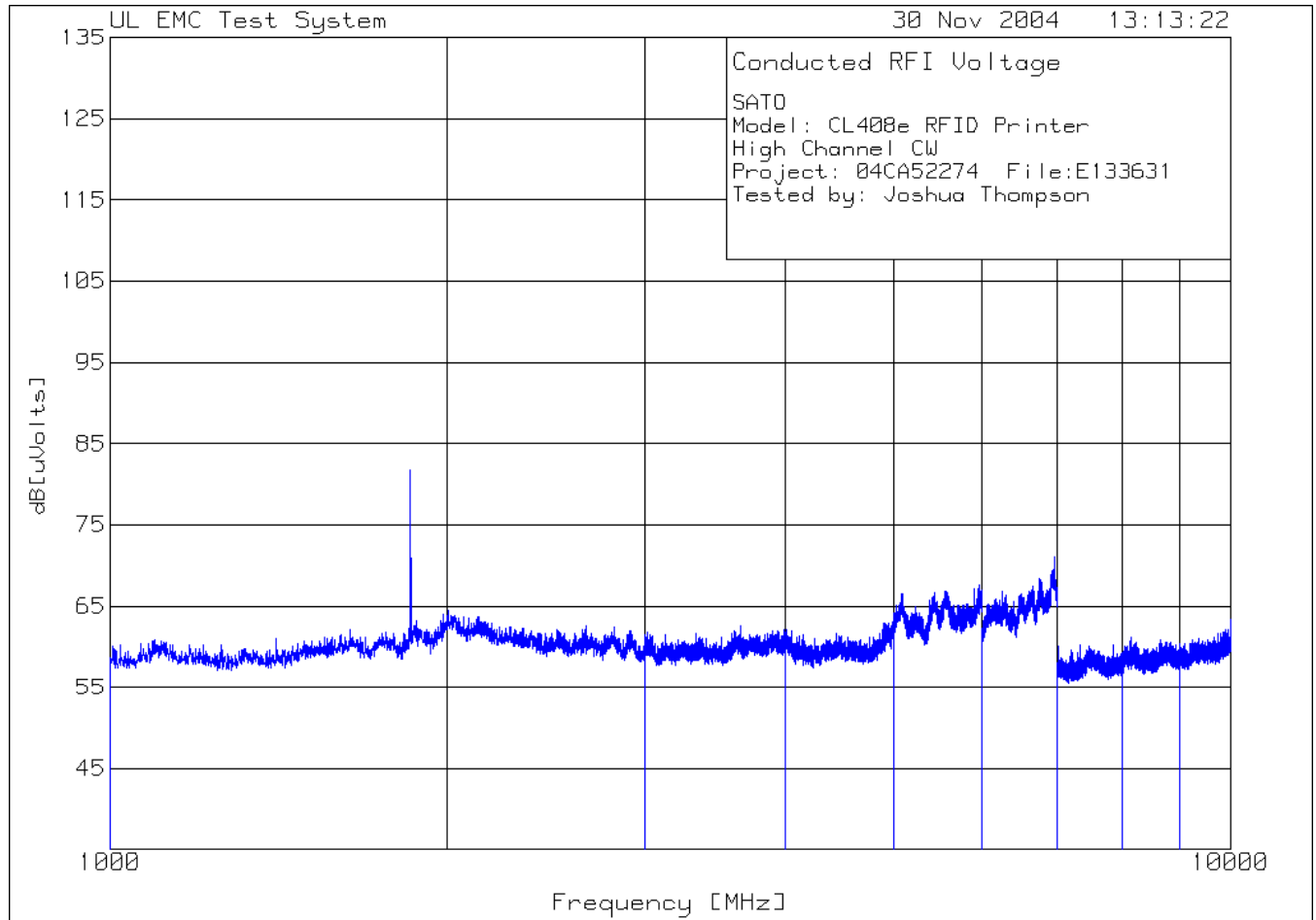
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
=====								
Range: 2 1000 - 3000MHz -----								
1	1830.415	61 pk	21.1	0	82.1	-	-	-
2	2745.873	40.43 pk	21.3	0	61.73	-	-	-
Range:2 3000 - 4000MHz -----								
3	3653.827	39 pk	22.2	0	61.2	-	-	-
Range:3 4000 - 5000MHz -----								
4	4582.791	39.3 pk	22	0	61.3	-	-	-
Range:4 5000 - 6000MHz -----								
5	5491.246	42.68 pk	21.9	0	64.58	-	-	-
Range:5 6000 - 7000MHz -----								
6	6401.201	42.7 pk	22	0	64.7	-	-	-
Range:6 7000 - 8000MHz -----								
7	7324.162	38.13 pk	20.8	0	58.93	-	-	-
Range:7 8000 - 9000MHz -----								
8	8246.623	37.75 pk	21.4	0	59.15	-	-	-
Range:8 9000 - 10000MHz -----								
9	9138.069	37.77 pk	22.1	0	59.87	-	-	-

pk - Peak detector



SATO
 Model: CL408e RFID Printer
 High Channel CW
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
No.	Frequency	Reading	Factor	Factor	dB[uVolts]		
	[MHz]	[dB(uV)]	[dB]	[dB]			
=====							
Range: 2 30 - 1000MHz -----							
1	926.7283	110.64 pk	20.7	0	131.34	-	-
pk - Peak detector							



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model: CL408e RFID Printer

High Channel CW

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------	---------	---	---

=====

Range: 2 1000 - 3000MHz -----

1	1853.427	60.55 pk	21.2	0	81.75	-	-	-
2	2766.884	39.8 pk	21.6	0	61.4	-	-	-

Range:2 3000 - 4000MHz -----

3	3716.358	39.82 pk	21.5	0	61.32	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:3 4000 - 5000MHz -----

4	4631.816	38.61 pk	21.9	0	60.51	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:4 5000 - 6000MHz -----

5	5563.782	45.28 pk	21.6	0	66.88	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:5 6000 - 7000MHz -----

6	6488.744	45.08 pk	21.3	0	66.38	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:6 7000 - 8000MHz -----

7	7421.211	38.09 pk	20.9	0	58.99	-	-	-
---	----------	----------	------	---	-------	---	---	---

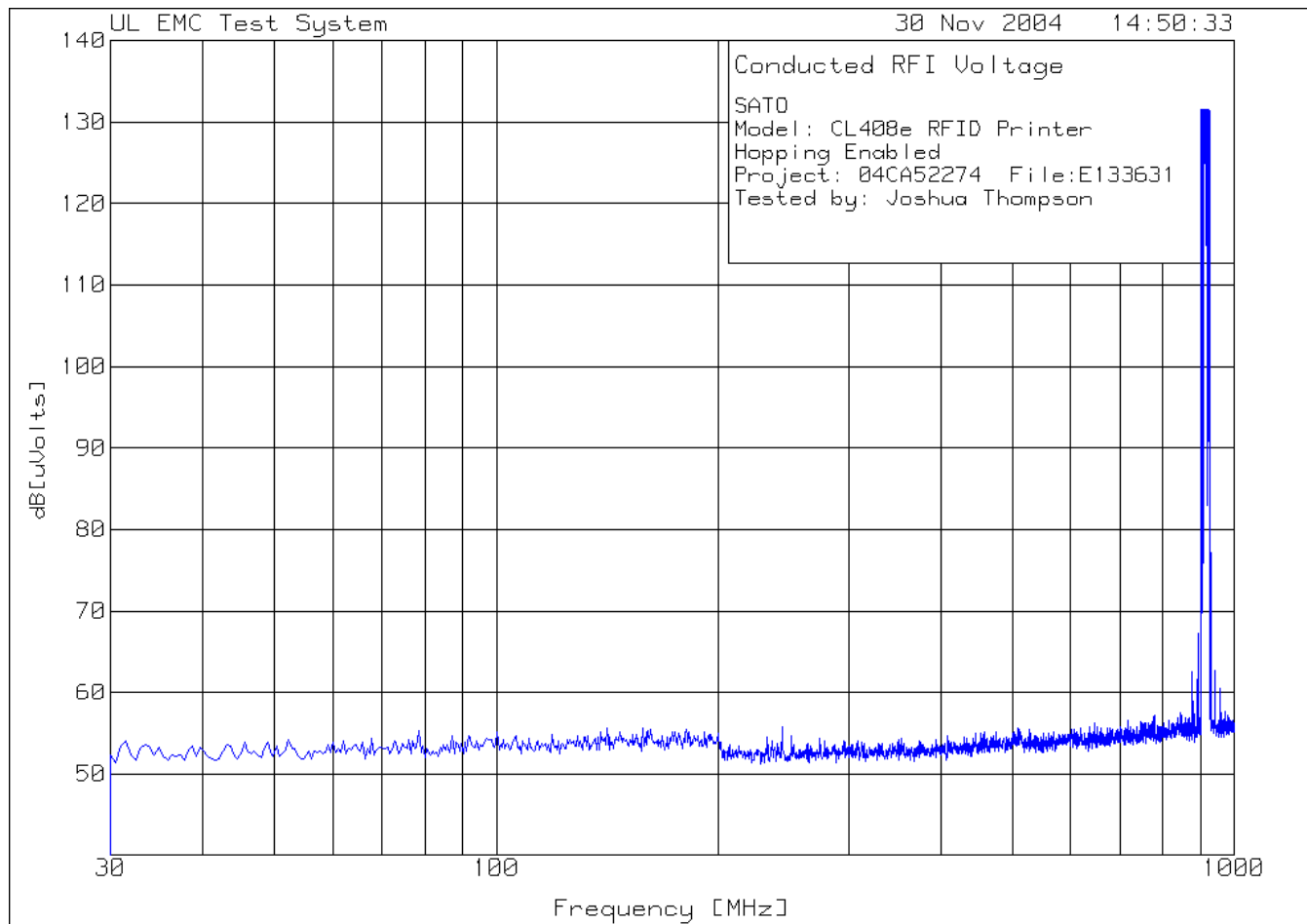
Range:7 8000 - 9000MHz -----

8	8334.667	37.69 pk	21.5	0	59.19	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:8 9000 - 10000MHz -----

9	9267.634	38.25 pk	22.2	0	60.45	-	-	-
---	----------	----------	------	---	-------	---	---	---

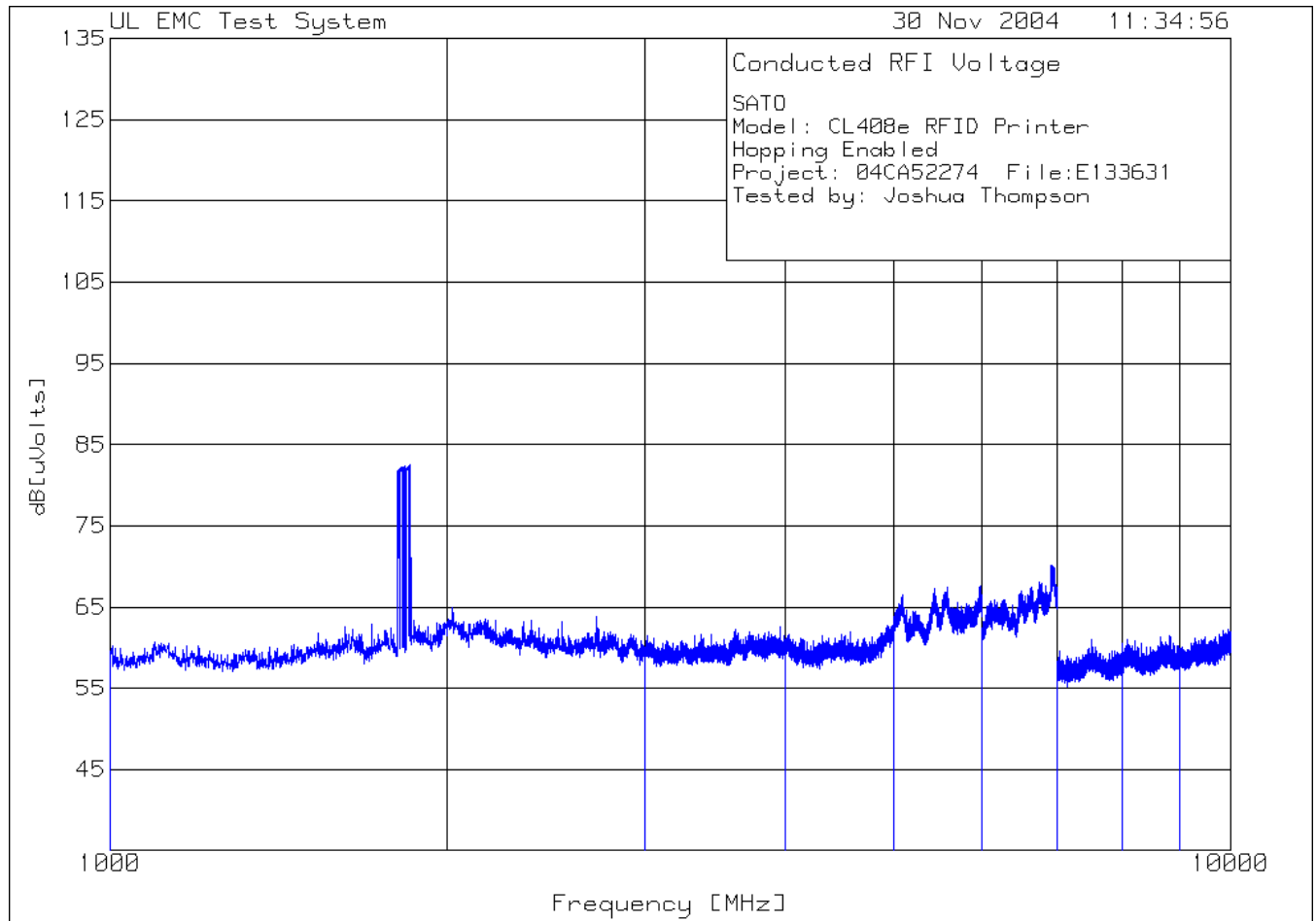
pk - Peak detector



SATO
 Model: CL408e RFID Printer
 Hopping Enabled
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

Test		Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
No.	Frequency	Reading	Factor	Factor	dB[uVolts]			
	[MHz]	[dB(uV)]	[dB]	[dB]				
=====								
Range: 2 30 - 1000MHz -----								
1	903.4367	110.79 pk	20.8	0	131.59	-	-	-
2	925.2726	110.68 pk	20.7	0	131.38	-	-	-

pk - Peak detector



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model: CL408e RFID Printer

Hopping Enabled

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------	---------	---	---

=====

Range: 2 1000 - 3000MHz -----

1	1822.411	61.17 pk	21	0	82.17	-	-	-
2	1850.425	61.07 pk	21.5	0	82.57	-	-	-
3	2713.857	42.27 pk	21.5	0	63.77	-	-	-

Range:2 3000 - 4000MHz -----

4	3617.809	40.03 pk	22.2	0	62.23	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:3 4000 - 5000MHz -----

5	4524.762	39.51 pk	21.9	0	61.41	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:4 5000 - 6000MHz -----

6	5439.72	45.14 pk	22.1	0	67.24	-	-	-
---	---------	----------	------	---	-------	---	---	---

Range:5 6000 - 7000MHz -----

7	6323.662	43.05 pk	21.9	0	64.95	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:6 7000 - 8000MHz -----

8	7270.135	37.99 pk	20.8	0	58.79	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:7 8000 - 9000MHz -----

9	8134.567	38.85 pk	21.4	0	60.25	-	-	-
---	----------	----------	------	---	-------	---	---	---

Range:8 9000 - 10000MHz -----

10	9032.016	37.87 pk	22	0	59.87	-	-	-
----	----------	----------	----	---	-------	---	---	---

pk - Peak detector

5.1.3 Occupied Bandwidth

Frequency hopping systems shall have hopping channel frequencies separated by a minimum of 25 KHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

Occupied bandwidth was measured with a direct connection between the antenna port of the transmitter and the spectrum analyzer. The measurement was made with the spectrum analyzer's resolution bandwidth set to (RBW) = 100 kHz. The VBW > RBW. The frequency difference of two frequencies that are 20 dB from the peak of the fundamental are recorded. The difference of these two frequencies gives the 20 dB occupied bandwidth.

Results

The system met the requirements for Occupied Bandwidth. Data Pages follow.

Temperature:	21.0°C
Humidity:	47 %RH
Pressure:	1014mbar
Date test performed:	23 November 2004

1 fully configured sample was scanned over the following frequency range

Frequency Range	Measurement Point	Mode*	
		Power	Operation
902-928	Antenna Port	<u>1</u>	<u>1,2,3</u>

*See Power Interface and EUT Operating Modes for details

Test Data

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	902.4	0.324
Mid	915.2	0.322
High	926.5	0.323

Note: The graphics presented below contain a misprint. The maximum allowable 20dB bandwidth is 500 kHz not 100 kHz. The 20dB bandwidth measurements shown are correct.

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

Test equipment used for Occupied Bandwidth
E7402A

**Agilent
Technologies**

EMI Spectrum Analyzer

Equipment No.: ME5B-123

**RBW 100 kHz
VBW 300 kHz**

Range: 902-928 MHz

Last Calibration Date: 17 August 2004

Calibration Due Date: 17 August 2005

Test Accessories for Occupied Bandwidth

BW-N20W5

Mini-Circuits

20 dB Attenuator

Equipment No.: A01

Range: 0.03 – 10 GHz

Last Calibration Date: 22 November 2004

Calibration Due Date: 22 November 2005

99760-00

Cole-Parmer

**Hygrometer/Temp/Baro
meter**

Equipment No.: ME4-268

Ranges

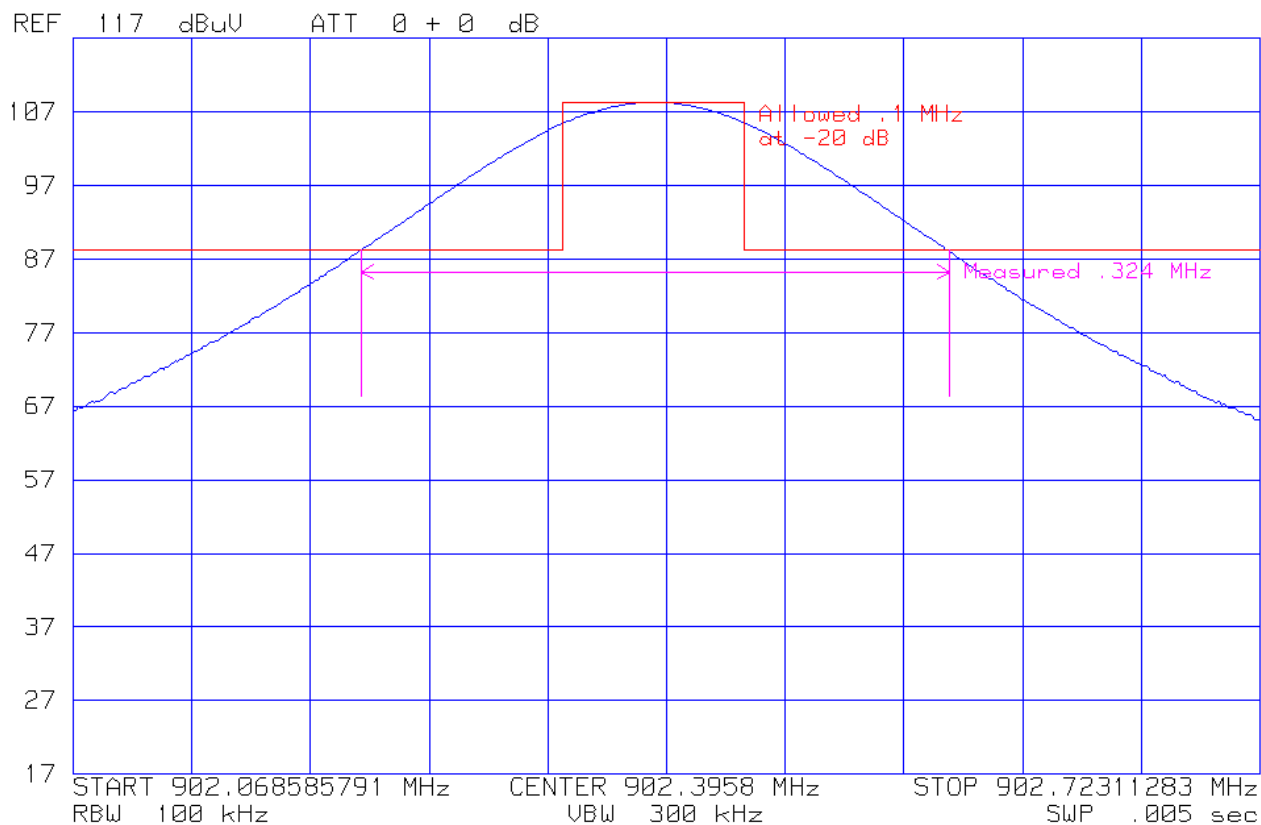
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

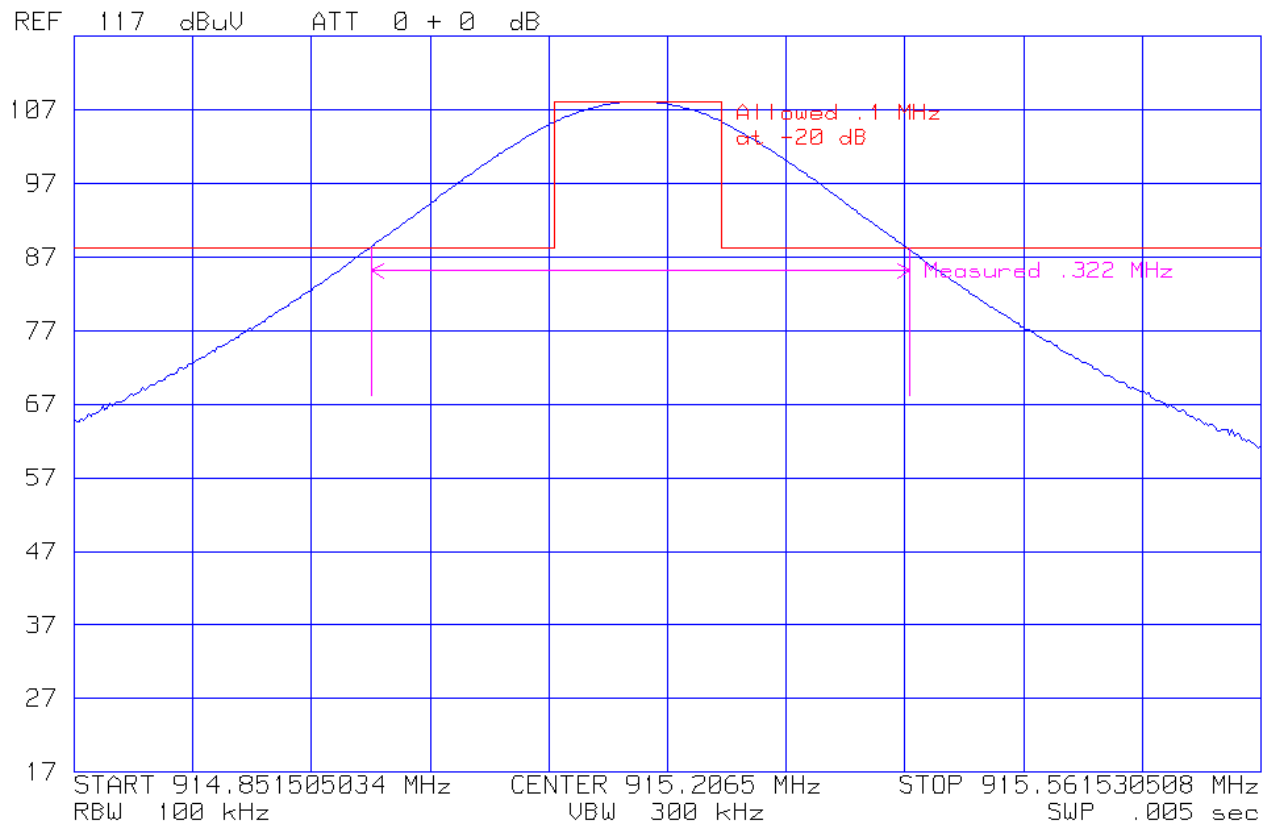
Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

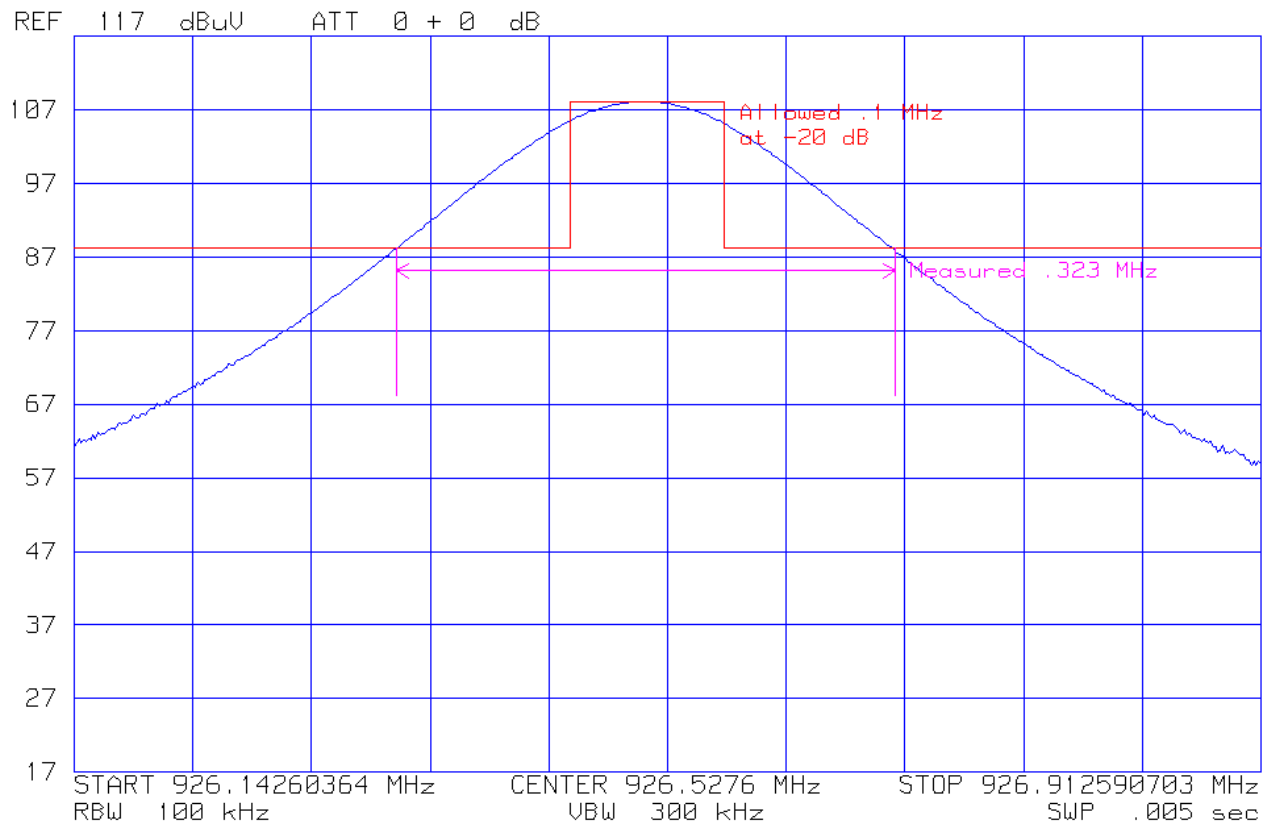
Calibration Due Date: 18 June 2005



20 dB Occupied Bandwidth at 902.4 MHz



20 dB Occupied Bandwidth at 915.2 MHz



20 dB Occupied Bandwidth at 926.5 MHz

5.1.4 Peak Output Power

The maximum peak output power of the intentional radiator shall not exceed 1 Watt. Peak output power was measured with a direct connection between the antenna port of the transmitter and the spectrum analyzer.

Sweep = auto
Detector function = peak
Trace = max hold

Allowed the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Results

The system met the requirements for Peak Output Power. Data Pages follow.

Temperature:	21.0°C
Humidity:	47 %RH
Pressure:	1014mbar
Date test performed:	23 November 2004

External 20dB attenuation was utilized and added to the measurements depicted on the plots below.

Channel	Frequency (MHz)	Measured Output power (dBm)	External Attenuator	Output Power (dBm)	Output Power (mWatt)	Limit (Watt)
Low	902.4	1.23	23.6	24.83	304.09	1
Mid	915.2	1.27	23.7	24.97	314.05	1
High	926.5	1.15	23.8	24.95	312.61	1

Test equipment used for Peak Output Power

ESI 26

Rhode & Schwartz EMI Receiver

Equipment No.: ME5B-081

RBW 500 kHz

VBW 1MHz

Range: 902-928 MHz

Last Calibration Date: 7 September 2004

Calibration Due Date: 7 September 2005

EMI Software Version

9.2

Test Accessories for Peak Output Power

BW-N20W5

Mini-Circuits

20 dB Attenuator

Equipment No.: A01

Range: 0.03 – 10 GHz

Last Calibration Date: 22 November 2004

Calibration Due Date: 22 November 2005

99760-00

Cole-Parmer

Hygrometer/Temp/Barometer Equipment No.: ME4-268

Ranges

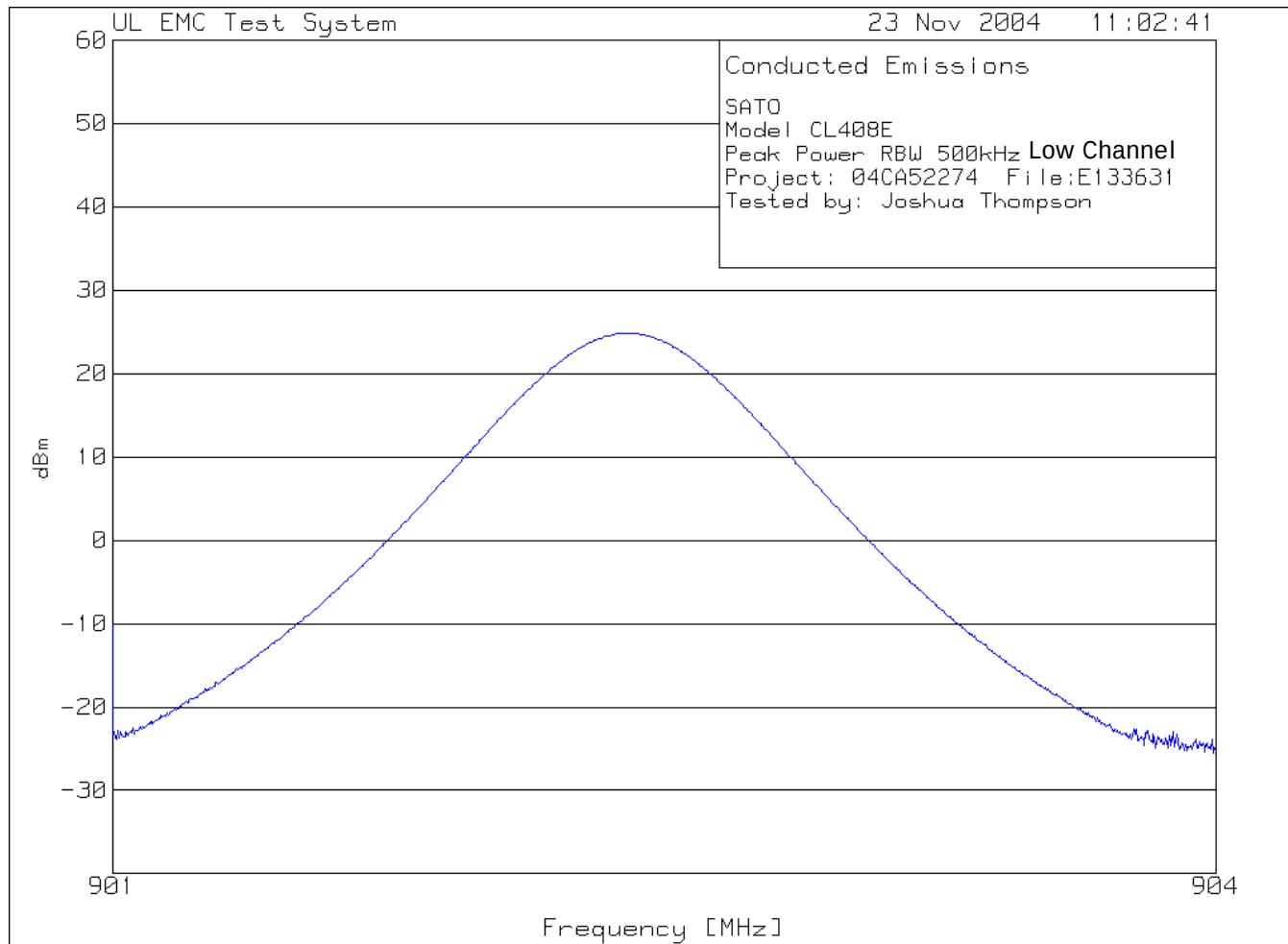
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

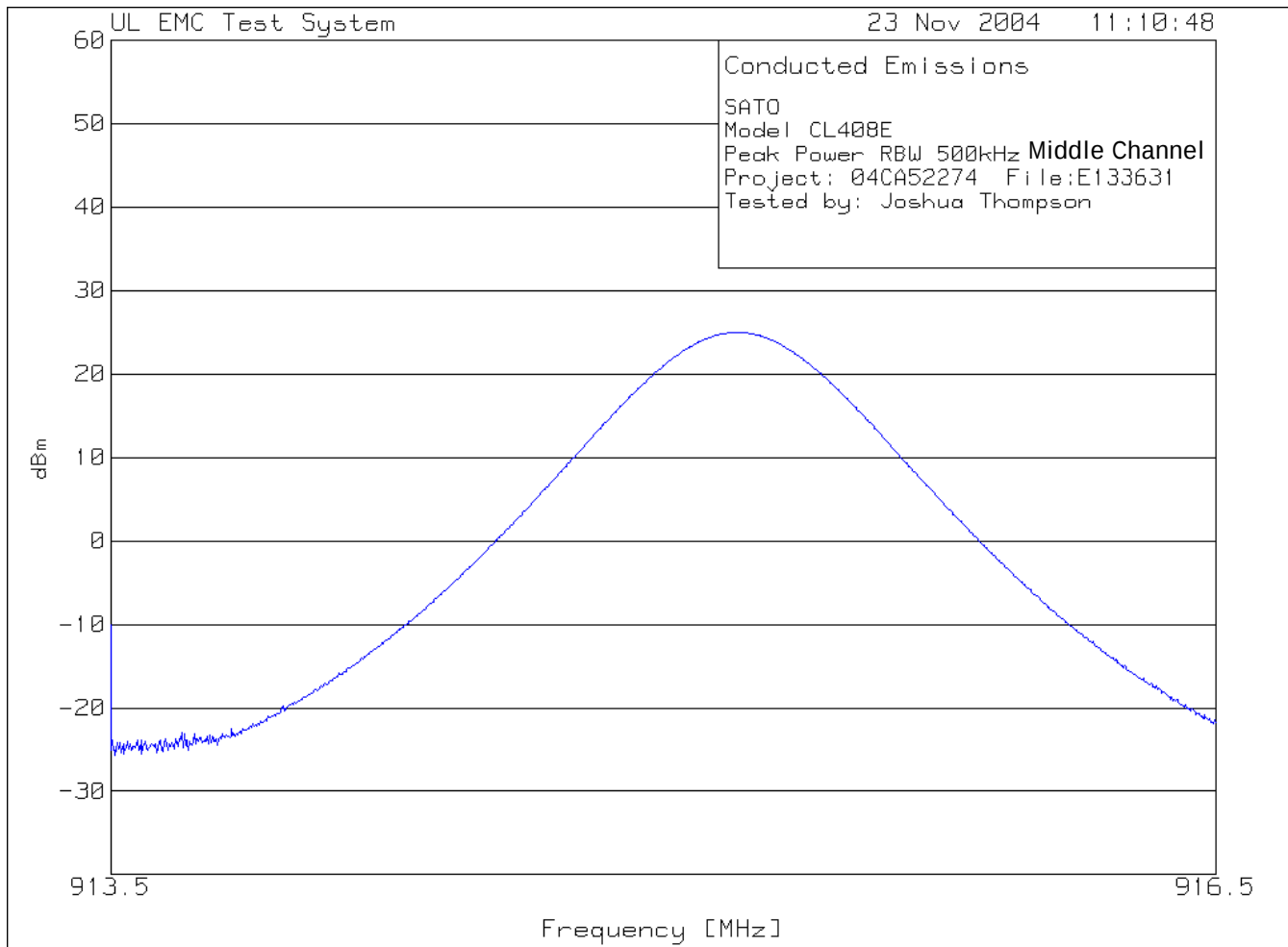
Calibration Due Date: 18 June 2005



SATO
 Model CL408E
 Peak Power RBW 500kHz
 Project: 04CA52274 File: E133631
 Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
1	902.3994	108.23 pk	23.6	-107	24.83	-	-	-

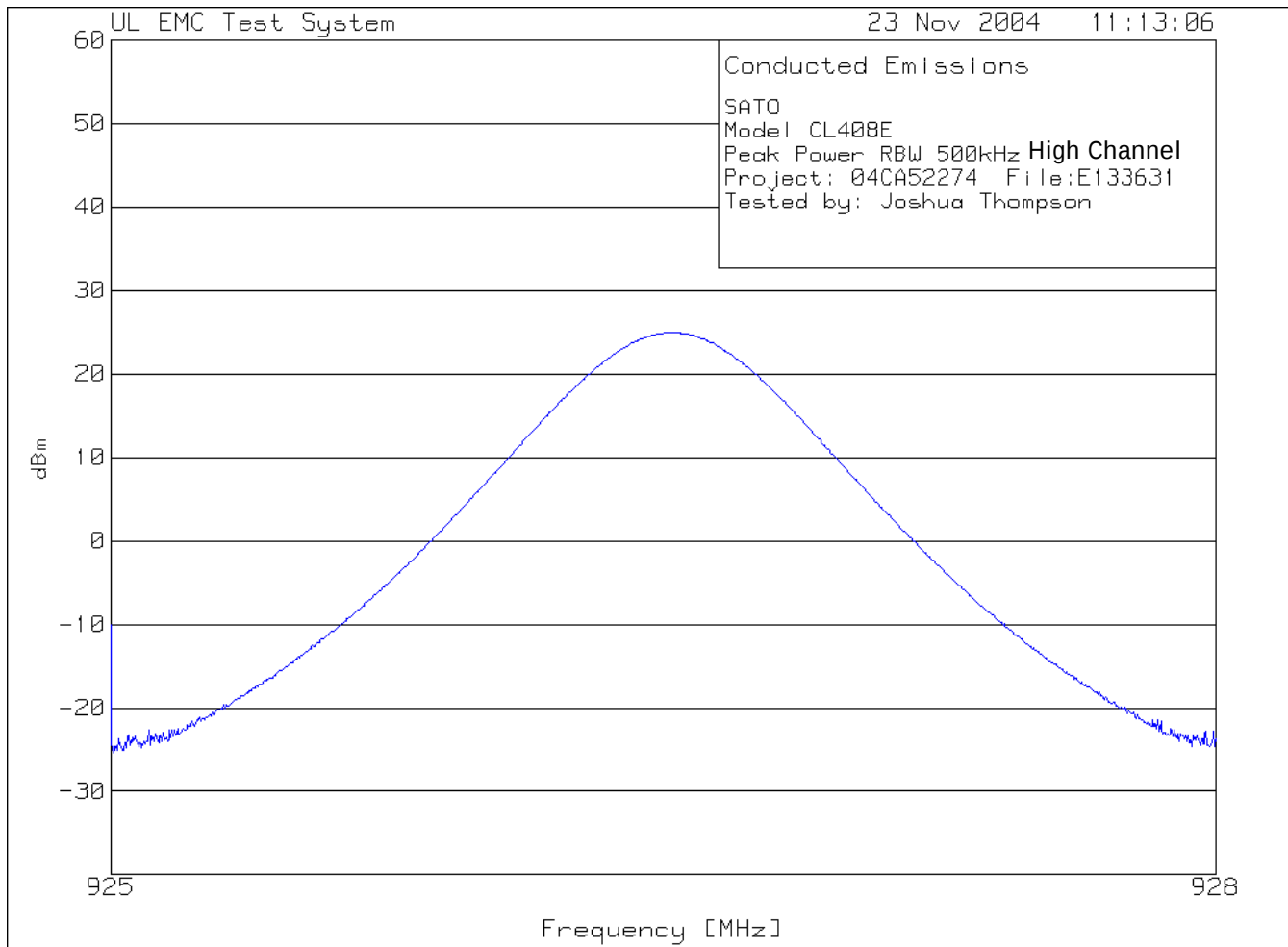
pk - Peak detector



SATO
 Model CL408E
 Peak Power RBW 500kHz
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

Test		Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
No.	Frequency	Reading	Factor	Factor	dBm			
	[MHz]	[dB(uV)]	[dB]	[dB]				
=====								
Range 1 913.5 - 916.5MHz -----								
1	915.2012	108.27 pk	23.7	-107	24.97	-	-	-

pk - Peak detector



SATO
 Model CL408E
 Peak Power RBW 500kHz
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
=====								
Range 1 925 - 928MHz -----								
1	926.5195	108.15 pk	23.8	-107	24.95	-	-	-

pk - Peak detector

5.1.5 Number of Hopping Frequencies

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation
RBW $\geq$ 1% of the span
VBW $\geq$ RBW
Sweep = auto
Detector function = peak
Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

Results

The system met the requirements for Number of Hopping Frequencies. Data Pages follow.

Temperature:	21.0°C
Humidity:	47 %RH
Pressure:	1014mbar
Date test performed:	23 November 2004

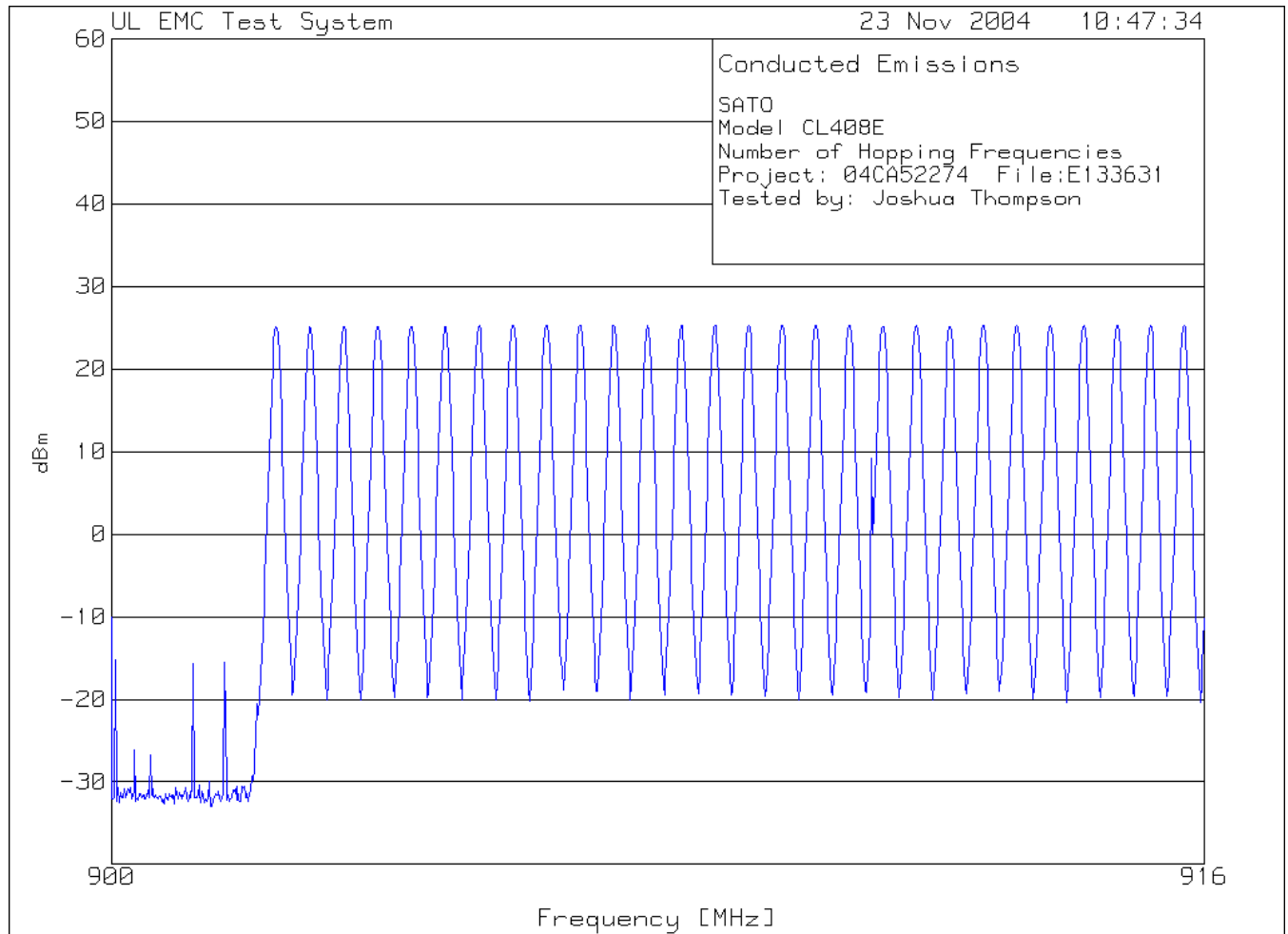
Frequency Range	Measurement Point	Mode*	
		Power	Operation
902-928MHz	Antenna Port	<u>1</u>	<u>4</u>

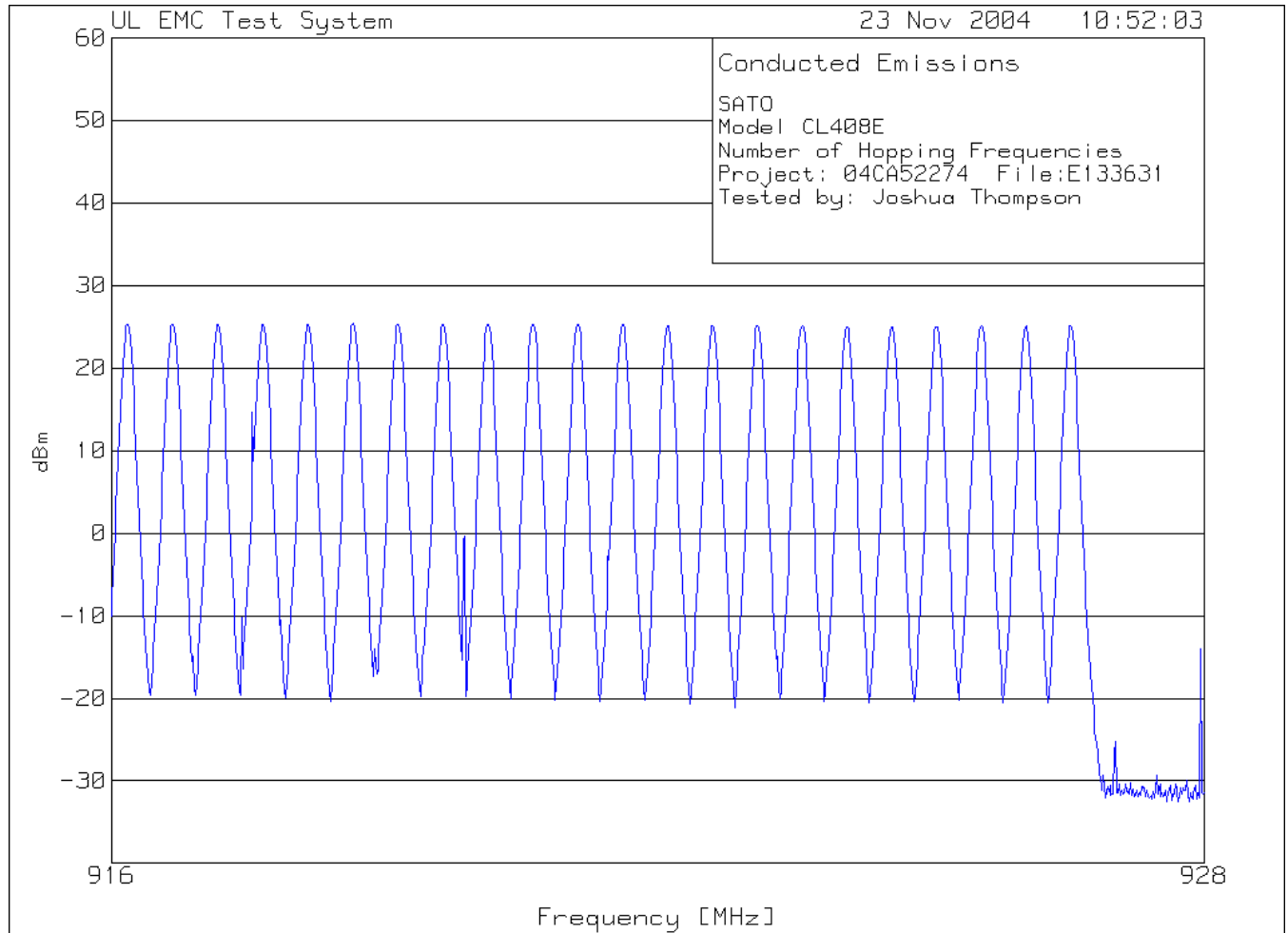
Test equipment used for Number of Hopping Frequencies

ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			RBW 100 kHz
			VBW 300 kHz
Range: 902-928 MHz	Last Calibration Date: 7 September 2004		Calibration Due Date: 7 September 2005
EMI Software Version	9.2		

Test Accessories for Number of Hopping Frequencies

BW-N20W5	Mini-Circuits	20 dB Attenuator	Equipment No.: A01
Range: 0.03 – 10 GHz	Last Calibration Date: 22 November 2004		Calibration Due Date: 22 November 2005
99760-00	Cole –Parmer	Hygrometer/Temp/Baro	Equipment No.: ME4-268
		meter	
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date :18 June 2004		Calibration Due Date: 18 June 2005





Measured Frequency List

1	902.3864	26	914.7107
2	902.8829	27	915.1992
3	903.3794	28	915.6957
4	903.8759	29	916.1742
5	904.3564	30	916.6667
6	904.8528	31	917.1592
7	905.3493	32	917.6517
8	905.8458	33	918.1441
9	906.3423	34	918.6426
10	906.8228	35	919.1351
11	907.3193	36	919.6216
12	907.8158	37	920.1141
13	908.3123	38	920.6126
14	908.7928	39	921.1051
15	909.2893	40	921.5976
16	909.7858	41	922.0901
17	910.2823	42	922.5826
18	910.7628	43	923.0751
19	911.2592	44	923.5676
20	911.7557	45	924.0601
21	912.2522	46	924.5525
22	912.7327	47	925.045
23	913.2292	48	925.5375
24	913.7257	49	926.03
25	914.2222	50	926.5225

5.1.6 Carrier Frequency Separation

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span

Video (or Average) Bandwidth (VBW) $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Results

The system met the requirements for Carrier Frequency Separation. Data Pages follow.

Temperature:	21.0°C
Humidity:	47 %RH
Pressure:	1014mbar
Date test performed:	23 November 2004

Frequency Range	Measurement Point	Mode*	
		Power	Operation
902-928MHz	Antenna Port	<u>1</u>	<u>4</u>

Test equipment used for Carrier Frequency Separation

ESI26

Rhode & Schwartz

EMI Receiver

Equipment No.: ME5B-081

RBW 100 kHz

VBW 300 kHz

Range: 902-928MHz

Last Calibration Date: 7 September 2004

Calibration Due Date: 7 September 2005

EMI Software Version

9.2

Test Accessories for Carrier Frequency Separation

BW-N20W5

Mini-Circuits

20 dB Attenuator

Equipment No.: A01

Range: 0.03 – 10 GHz

Last Calibration Date: 22 November 2004

Calibration Due Date: 22 November 2005

99760-00

Cole –Parmer

Hygrometer/Temp/Baro
meter

Equipment No.: ME4-268

Ranges

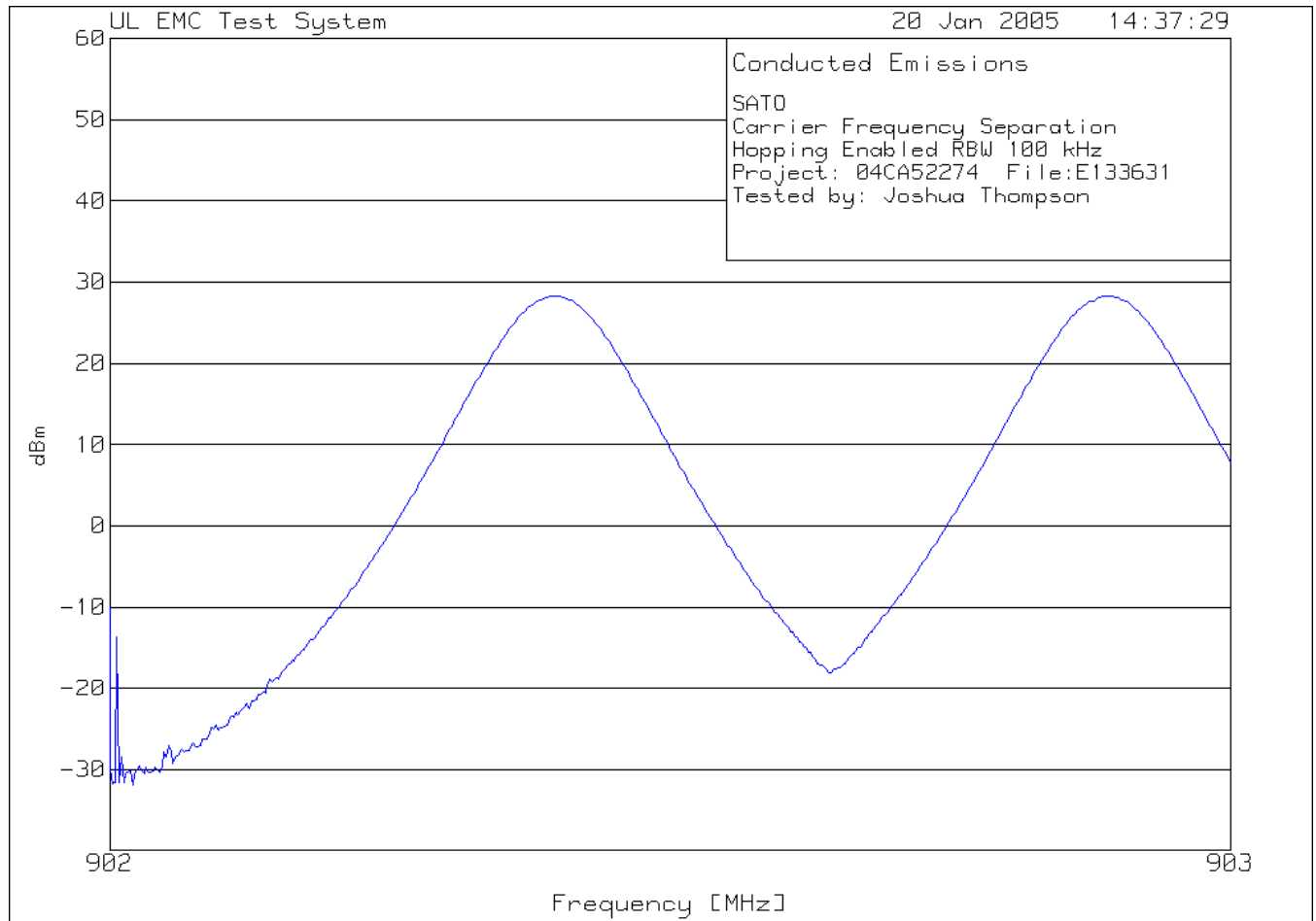
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

Calibration Due Date: 18 June 2005



Frequency Separation: Channels 1 and 2

	Peak 1	Peak 2	Channel Separation
Frequency (MHz)	902.3988	902.8908	0.492

0.492 MHz > 20 dB Bandwidth

5.1.7 Time of Occupancy (Dwell Time)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1 MHz

VBW $\geq$ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

Results

The system met the requirements for Time of Occupancy. Data Pages follow.

Temperature:	21.0°C
Humidity:	47 %RH
Pressure:	1014mbar
Date test performed:	23 November 2004

Frequency Range	Measurement Point	Mode*	
		Power	Operation
902-928MHz	Antenna Port	<u>1</u>	<u>4</u>

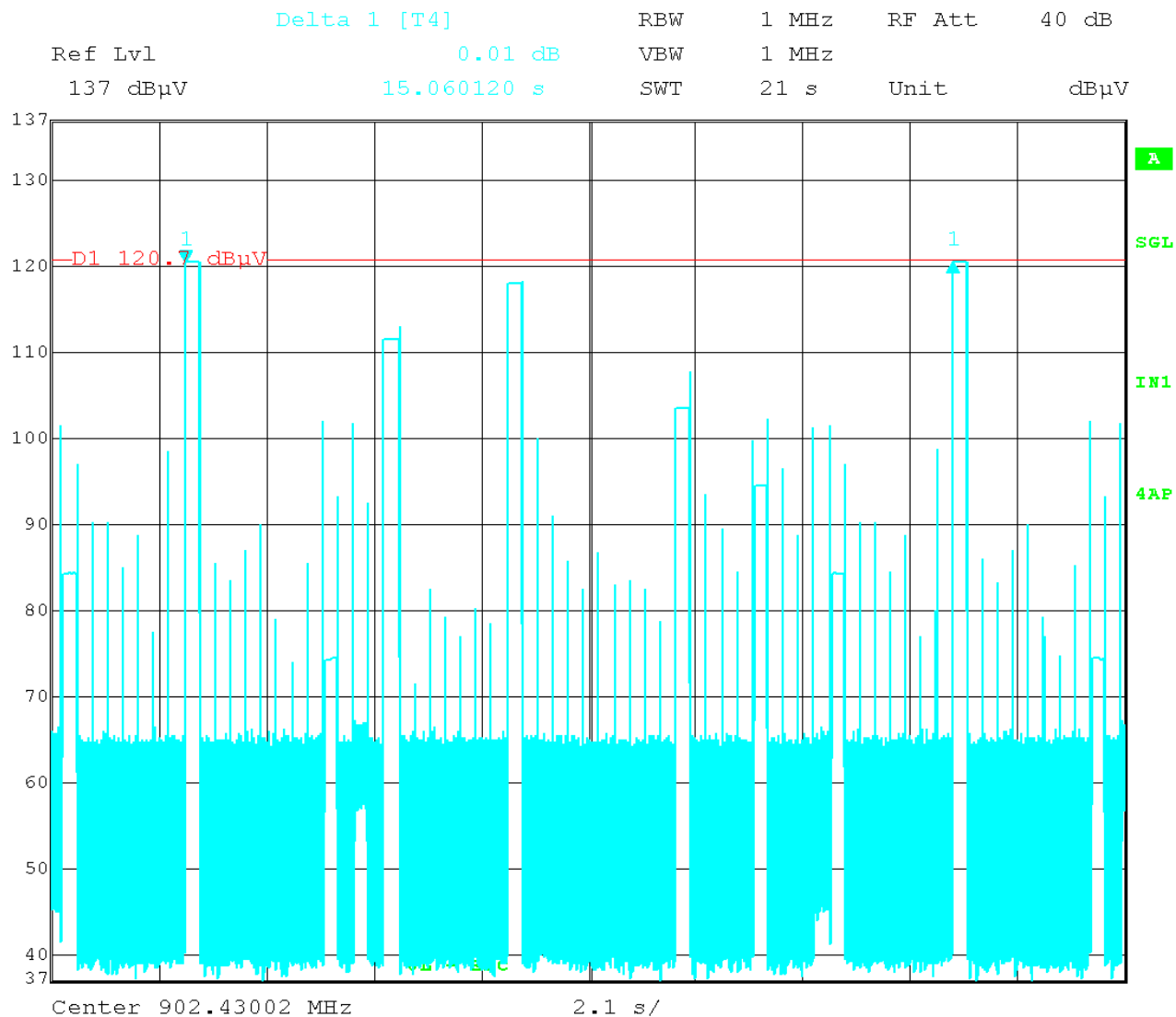
*See Power Interface and EUT Operating Modes for details

Test equipment used for Time of Occupancy

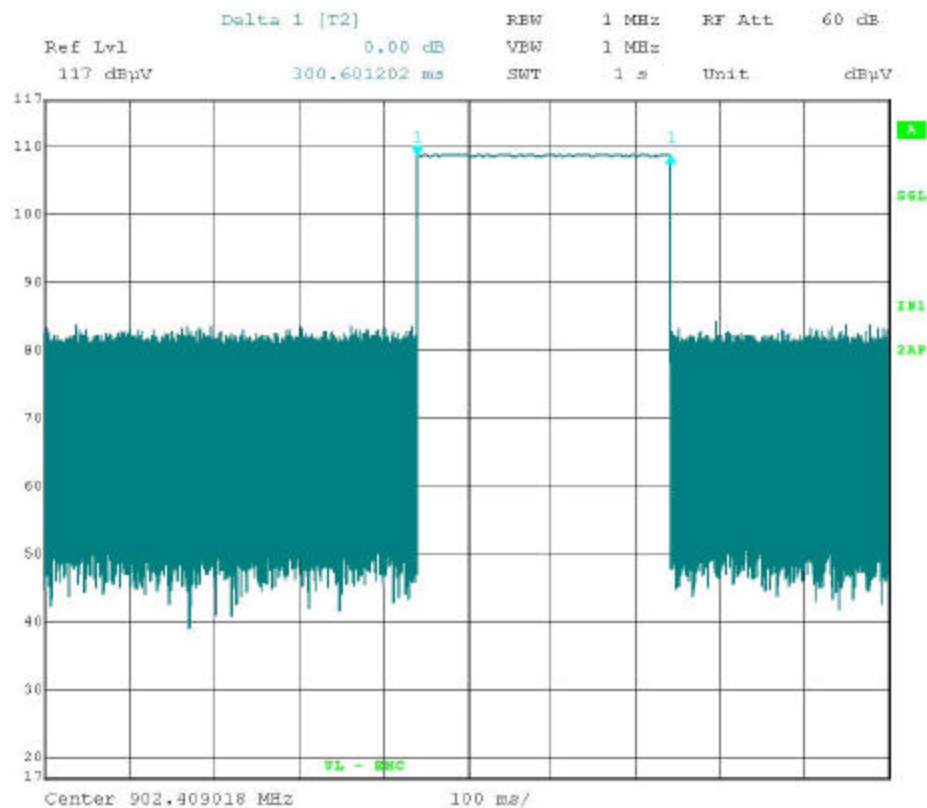
ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			RBW 1.0 MHz
			VBW 1.0 MHz
Range: 902 – 928 MHz	Last Calibration Date: 7 September 2004		Calibration Due Date: 7 September 2005
EMI Software Version	9.2		

Test Accessories for Time of Occupancy

BW-N10W5	Mini-Circuits	10 dB Attenuator	Equipment No.: 31625
Range: 902 – 928 MHz	Last Calibration Date: 22 November 2004		Calibration Due Date: 22 November 2005
99760-00	Cole –Parmer	Hygrometer/Temp/Baro meter	Equipment No.: ME4-268
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 June 2004		Calibration Due Date: 18 June 2005



Time of Occupancy Over Two 10s Periods



Single Hop Dwell Time

Explanation of the Graphs Provided

The first graph shows the hopping activity recorded over two 10 second periods on the 902.4 MHz channel. The scan also shows activity on the adjacent channels at lower amplitude due to the 1 MHz span suggested in DA 00-705 Measurement Guidelines. In this figure the 902.4 MHz channel is activated exactly twice, and those are the marked events.

The second graph is a closer look at a single activation event.

The Time of Occupancy requirement is met based on the following calculations:

Limit: An average of 0.4 s per 10 s period, which yields a ratio of 0.04

Measured: 0.3 s per 15 s period, yields a ratio of $0.02 < 0.04$

5.1.8 Band-edge Compliance of RF Conducted Emissions

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

RBW $\geq$ 1% of the span

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed. Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit. Submit this plot.

Results

The system met the requirements for Band-edge Conducted Emissions. Data Pages follow.

Temperature:	21°C
Humidity:	47%RH
Pressure:	1014mbar
Date test performed:	23 November 2004

Frequency Range	Measure ment Point	Mode*	
		Power	Operation
902-928MHz	Antenna Port	<u>1</u>	<u>4</u>

*See Power Interface and EUT Operating Modes for details

Test equipment used for Conducted Emissions

ESI26

Rhode & Schwartz

EMI Receiver

Equipment No.: ME5B-081

RBW 100 kHz

VBW 300 kHz

Range: 902 – 928 MHz

Last Calibration Date: 7 September 2004

Calibration Due Date: 7 September 2005

EMI Software Version

9.2

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

Test Accessories for Conducted Emissions

BW-N20W5

Range: 0.03 – 10 GHz
99760-00

Mini-Circuits

Last Calibration Date: 22 November 2004
Cole –Parmer

20 dB Attenuator

Hygrometer/Temp/Baro

meter

Ranges

Equipment No.: A01

Calibration Due Date: 22 November 2005

Equipment No.: ME4-268

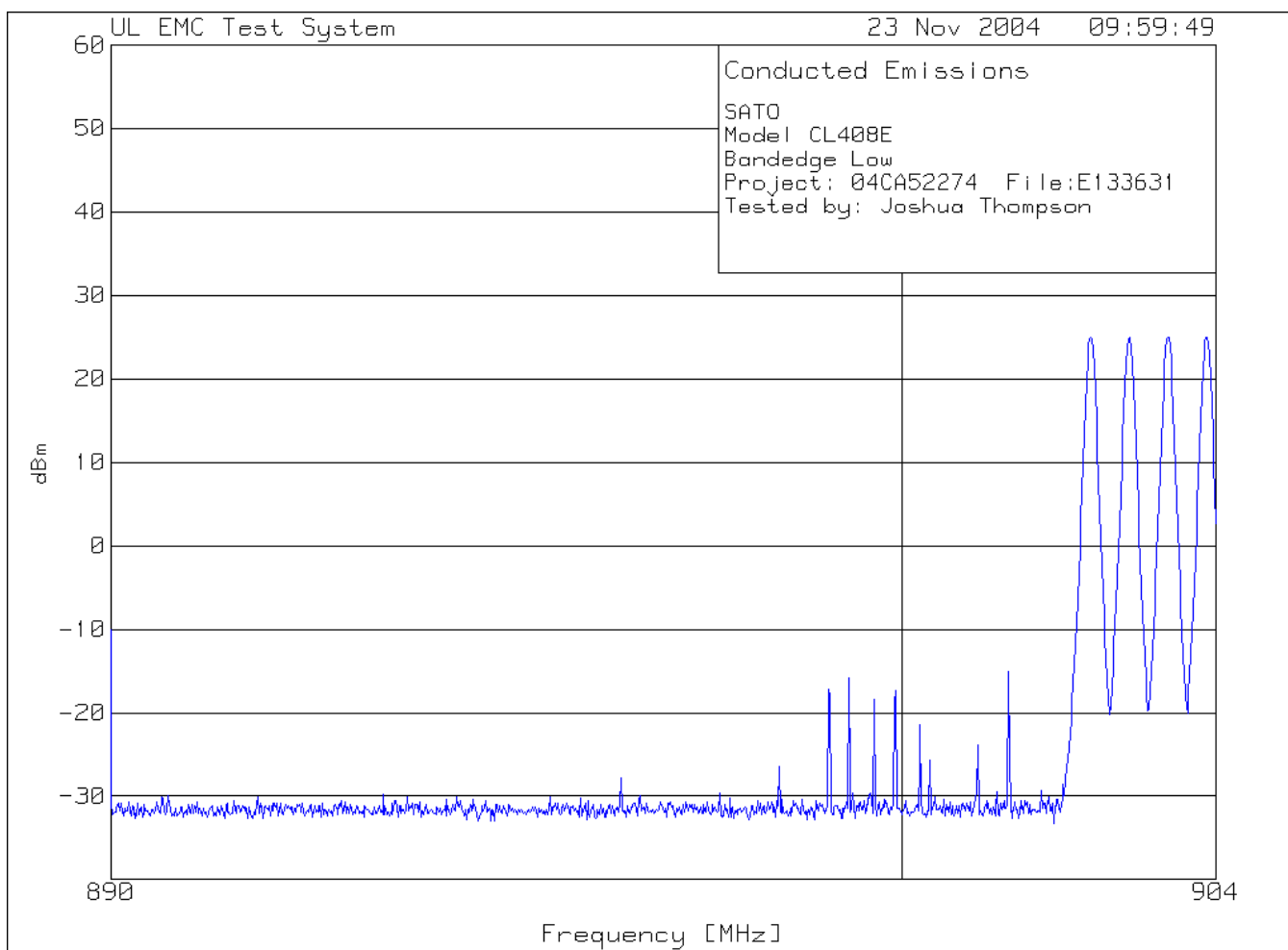
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

Calibration Due Date: 18 June 2005



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408E

Bandedge Low

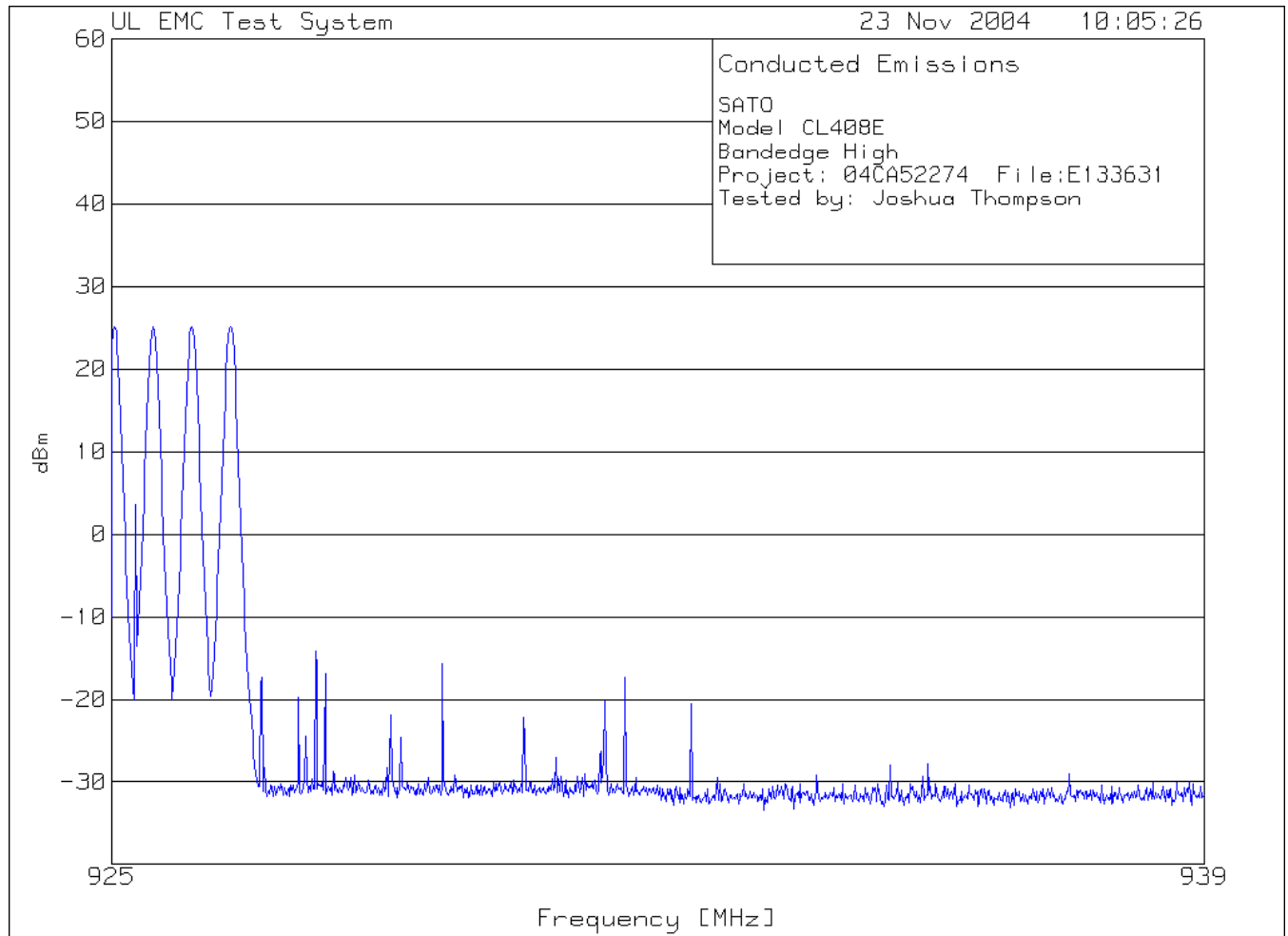
Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
-----	----------------------------	------------------------------	-----------------------------	------------------------------	--------------	---------	---	---

=====								
Range 1 890 - 904MHz -----								
1	902.4024	108.33 pk	23.6	-107	24.93	-	-	-
2	901.3513	68.37 pk	23.6	-107	-15.03	-	-	-
3	899.3193	67.65 pk	23.6	-107	-15.75	-	-	-

pk - Peak detector



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408E

Bandedge High

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
=====								
Range 1 925 - 939MHz -----								
1	926.5135	108.31 pk	23.8	-107	25.11	-	-	-
2	927.5926	68.97 pk	23.8	-107	-14.23	-	-	-
3	929.2182	67.53 pk	23.8	-107	-15.67	-	-	-

pk - Peak detector

5.1.9 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Field Strength Calculation

If a preamplifier was used during the Radiated Emissions testing, it is required that the amplifier gain be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna, cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. These considerations are automatically presented as a part of the print out. This modified specification limit is referred to as the “Actual Level” or simply the level, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

$$\text{Level} = \text{Meter Reading} + \text{Gain/Loss} + \text{Transducer}$$

Where

Meter Reading = Spectrum Analyzer Reading

Transducer = Antenna Factor

Gain/Loss = Cable Loss – Amplifier Gain (if any)

The Margin on the printout will be the actual margin level from the limit

For Example:

At 6835.407MHz we had a meter reading of 28.7 dB/uV, a Gain/Loss of –23.7 dB and a transducer factor of 36.9 dB.

$$\text{Level} = 28.7 = (-23.7) + 36.9$$

$$\text{Level} = 41.9 \text{ dBuV/m}$$

This result is below the FCC Class B limit of 54 dBuV/m at 6835.407 MHz.

Results

The system met the requirements for Radiated Emissions inside and outside of Restricted Bands. Data Pages follow.

Temperature:	21.0°C	19.5°C
Humidity:	47%RH	47%RH
Pressure:	1014mbar	1027mbar
Date test performed:	23 November 2004	19 January 2005

1 fully configured sample was scanned over the following frequency range:

Frequency Range	Measurement Point	Mode*	
		Power	Operation
902-928MHz	Antenna Port	<u>1</u>	<u>1,2,3,4,5</u>

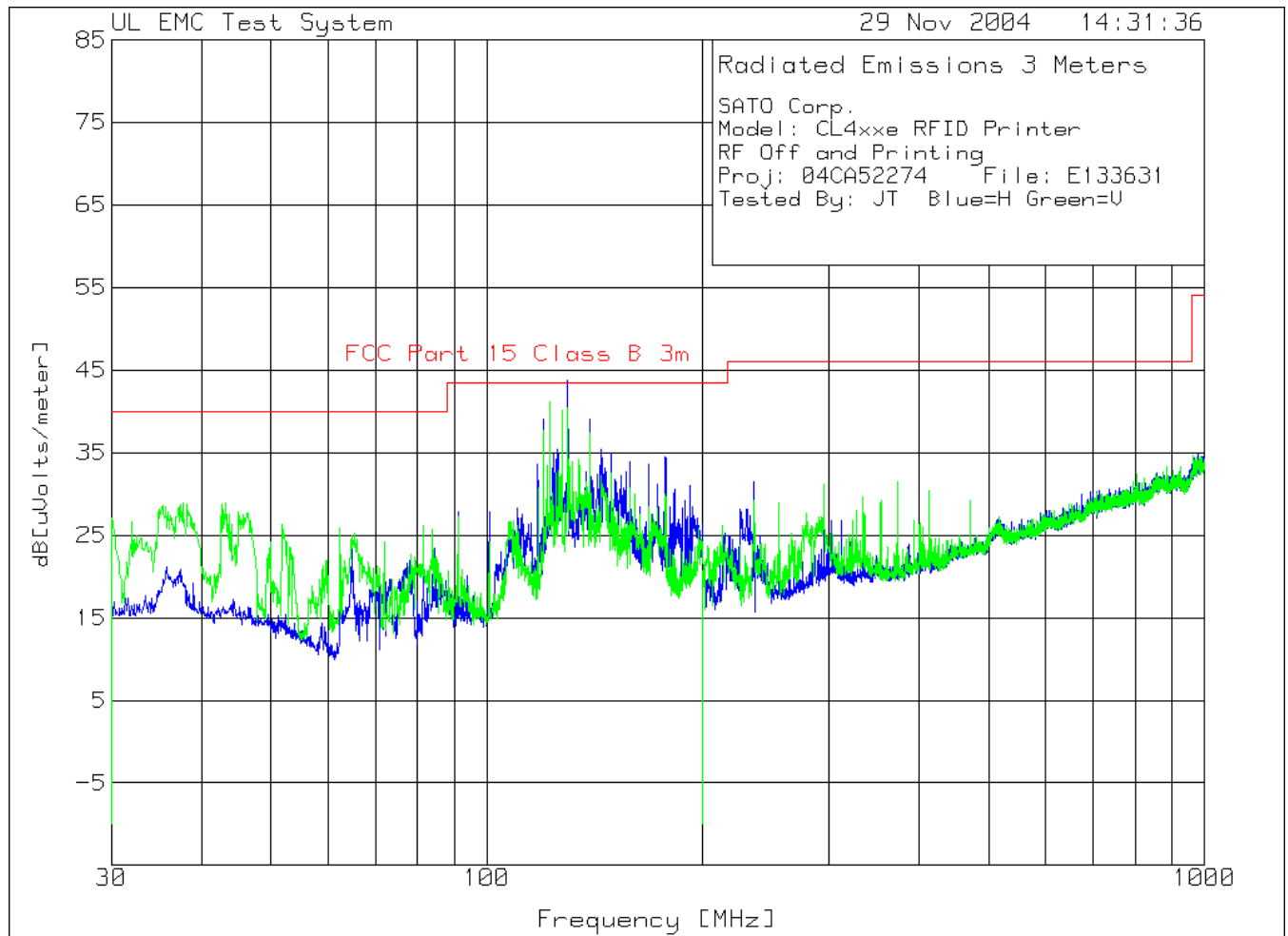
*See Power Interface and EUT Operating Modes for details

Test equipment used for Radiated Emissions

Range:	Last Calibration Date:	Calibration Due Date:
ESI26	Rhode & Schwartz EMI Receiver	Equipment No.: ME5B-081
		Quasi Peak BW: 200Hz 9kHz to 150kHz
		RBW 10 KHz
		Quasi Peak BW: 9kHz 150kHz to 30MHz
		RBW 100 KHz
		Quasi Peak BW: 120 kHz 30 to 1000MHz
		RBW 1.0 MHz
		RBW 1.0 MHz 1000-10000 MHz
Range: 30 – 10000 MHz	Last Calibration Date: 7 September 2004	Calibration Due Date: 7 September 2005

Test Accessories for Radiated Emissions

BW-N10W5	Mini-Circuits	10 dB Attenuator	Equipment No.:31625
Range: 1-2 GHz	Last Calibration Date: 22 November 2004	Calibration Due Date: 22 November 2005	
HA-20N	Microlab	High Pass Filter	Equipment No.: 5B-458
Range: 2-4.6 GHz	Last Calibration Date: 3 December 2004	Calibration Due Date: 3 December 2005	
HD-50N	Microlab	High Pass Filter	Equipment No.: 5B-459
Range: 4.6-10 GHz	Last Calibration Date: 3 December 2004	Calibration Due Date: 3 December 2005	
3104C	EMCO	Biconnical Antenna	Equipment No.: ME5-810
Range: 30-200 MHz	Last Calibration Date: 1 April 2004	Calibration Due Date: 1 April 2005	
94455-1	Ailtech	Biconnical Antenna	Equipment No.: ME5-439
Range: 30 –200 MHz	Last Calibration Date: 2 December 2003	Calibration Due Date: 2 December 2004	
3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-451
Range: 200-1000 MHz	Last Calibration Date: 4 December 2003	Calibration Due Date: 4 December 2004	
3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-811
Range: 200-1000 MHz	Last Calibration Date: 1 April 2004	Calibration Due Date: 1 April 2005	
RGA-180	EMCO	Horn Antenna	Equipment No.: ME5-565
Range: 1-10 GHz	Last Calibration Date: 7 July 2004	Calibration Due Date: 7 July 2005	
8449B	Hewlett Packard	1-26GHz Pre-Amp	Equipment No.: ME5-914
Range: 1-10 GHz	Last Calibration Date: 21 January 2004	Calibration Due Date: 21 January 2005	
99760-00	Cole –Parmer	Hygrometer/Temp/Baro meter	Equipment No.: ME4-268
		Ranges	
		Temp: 0°C-55°C	
		Humidity: 25% to 95 %RH	
		Pressure: 795 to 1050 mbar	
	Last Calibration Date: 18 June 2004	Calibration Due Date: 18 June 2005	



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

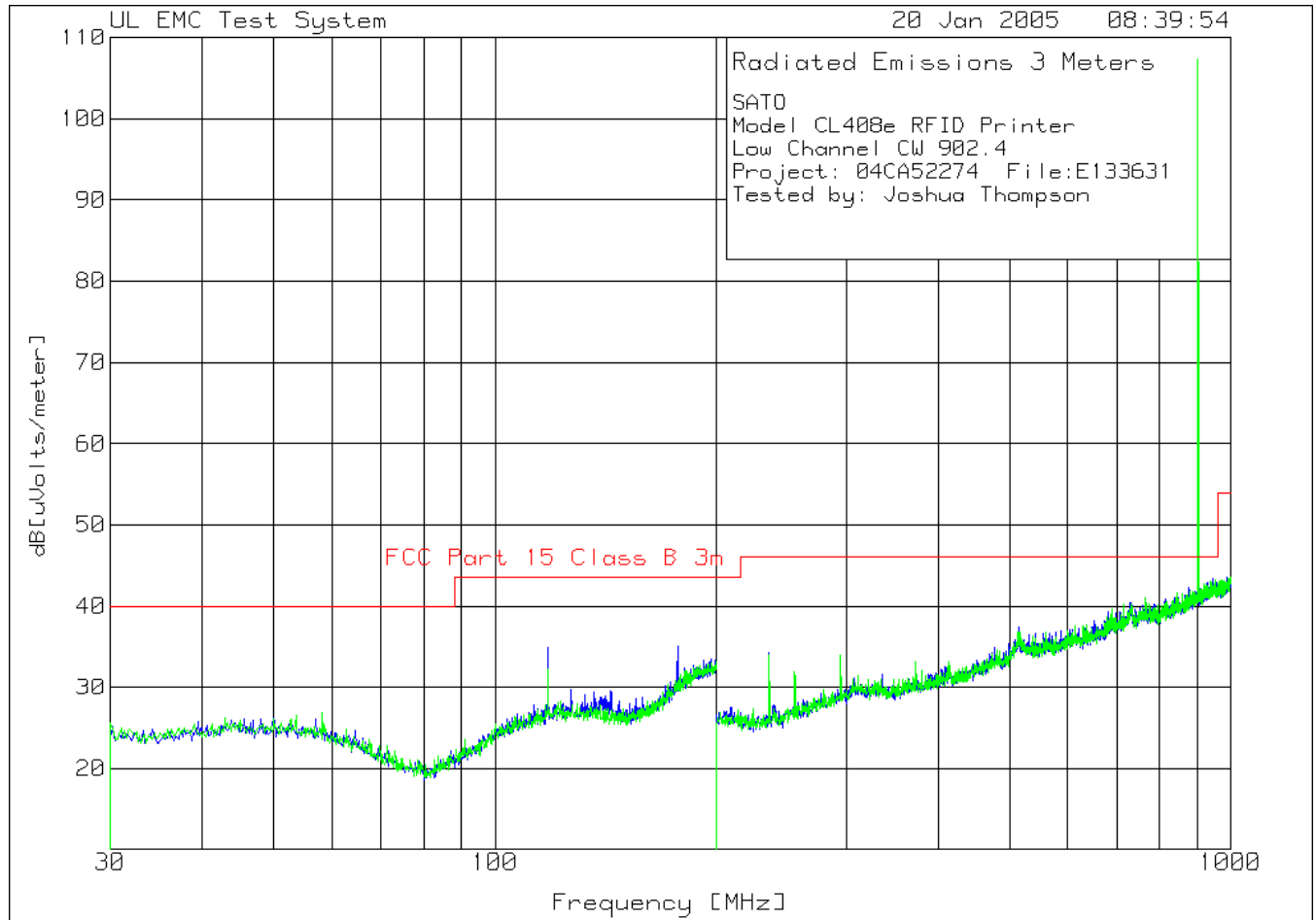
Issued: 3/4/2005

SATO Corp.
 Model: CL4xxe RFID Printer
 RF Off and Printing
 Proj: 04CA52274 File: E133631
 Tested By: JT Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal 30 - 200MHz								
119.975	18.27 qp	1.6	10.3	30.17	43.5	-	-	-
Azimuth: 0	Height:100	Horz	Margin [dB]:	-13.33		-	-	-
139.1247	15.34 qp	1.7	14.6	31.64	43.5	-	-	-
Azimuth: 111	Height:225	Horz	Margin [dB]:	-11.86		-	-	-
129.6	25.41 qp	1.6	12.4	39.41	43.5	-	-	-
Azimuth: 108	Height:148	Horz	Margin [dB]:	-4.09		-	-	-
Vertical 30 - 200MHz								
139.186	18.52 qp	1.7	14.6	34.82	43.5	-	-	-
Azimuth: 0	Height:124	Vert	Margin [dB]:	-8.68		-	-	-
129.6126	27.89 qp	1.6	12.4	41.89	43.5	-	-	-
Azimuth: 216	Height:121	Vert	Margin [dB]:	-1.61		-	-	-
127.2	16.26 qp	1.6	11.9	29.76	43.5	-	-	-
Azimuth: 187	Height:229	Vert	Margin [dB]:	-13.74		-	-	-
122.409	13.32 qp	1.6	10.7	25.62	43.5	-	-	-
Azimuth: 172	Height:278	Vert	Margin [dB]:	-17.88		-	-	-
119.975	19.87 qp	1.6	10.3	31.77	43.5	-	-	-
Azimuth: 172	Height:278	Vert	Margin [dB]:	-11.73		-	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector
 qp - Quasi-Peak detector



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408e RFID Printer

Low Channel CW 902.4

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------	---	---

Horizontal 30 - 200MHz -----

1	117.978	20.74 pk	1.5	12.6	34.84	43.5	-	-
	Azimuth:146	Height:249	Horz	Margin [dB]		-8.66	-	-
2	177.0271	17.7 pk	1.9	15.4	35	43.5	-	-
	Azimuth:358	Height:102	Horz	Margin [dB]		-8.5	-	-

Vertical 30 - 200MHz -----

3	117.978	18.16 pk	1.5	12.6	32.26	43.5	-	-
	Azimuth:252	Height:101	Vert	Margin [dB]		-11.24	-	-

Horizontal 200 - 1000MHz -----

4	902.3512	73.72 pk	4.4	23.3	101.42	46	-	-
	Azimuth:201	Height:101	Horz	Margin [dB]		55.42	-	-
5	957.5788	14.41 pk	4.6	23.9	42.91	46	-	-
	Azimuth:201	Height:249	Horz	Margin [dB]		-3.09	-	-

Vertical 200 - 1000MHz -----

6	902.3512	79.7 pk	4.4	23.3	107.4	46	-	-
	Azimuth:123	Height:101	Vert	Margin [dB]		61.4	-	-
7	953.1766	14.59 pk	4.6	24	43.19	46	-	-
	Azimuth:202	Height:249	Vert	Margin [dB]		-2.81	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408e RFID Printer

Low Channel CW 902.4

Project: 04CA52274 File:E133631

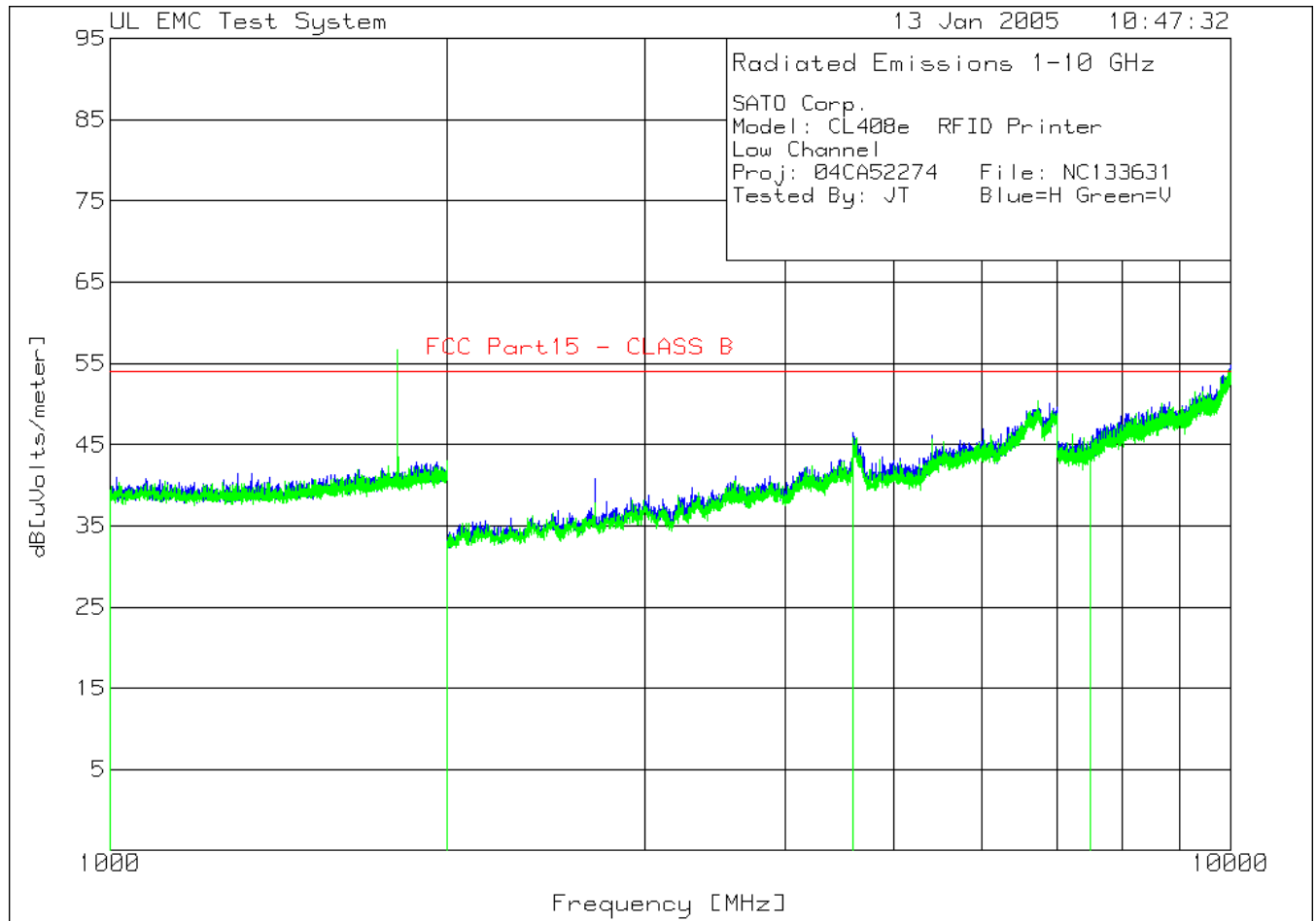
Tested by: Joshua Thompson

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal 200 - 1000MHz								
957.2171	8.62 qp	4.6	23.9	37.12	46	-	-	-
Azimuth: 225 Height:313 Horz			Margin [dB]:		-8.88	-	-	-
Vertical 200 - 1000MHz								
957.9245	8.52 qp	4.6	23.9	37.02	46	-	-	-
Azimuth: 225 Height:132 Vert			Margin [dB]:		-8.98	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e RFID Printer
 Low Channel
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
=====								
Horizontal 1000 - 2000MHz -----								
1	1804.902	40.5 pk	-19.7	26.5	47.3	54	-	-
	Azimuth:101	Height:101	Horz	Margin [dB]		-6.7	-	-
Horizontal 2000 - 4600MHz -----								
2	2706.253	37.02 pk	-25.4	29.2	40.82	54	-	-
	Azimuth:111	Height:101	Horz	Margin [dB]		-13.18	-	-
3	3610.205	32.05 pk	-22.5	31.5	41.05	54	-	-
	Azimuth:16	Height:101	Horz	Margin [dB]		-12.95	-	-
4	4484.242	30.79 pk	-19.9	32.3	43.19	54	-	-
	Azimuth:111	Height:101	Horz	Margin [dB]		-10.81	-	-
Horizontal 4600 - 7500MHz -----								
5	5413.857	31.95 pk	-19.9	34.1	46.15	54	-	-
	Azimuth:97	Height:101	Horz	Margin [dB]		-7.85	-	-
6	6317.659	30.46 pk	-17.9	34.6	47.16	54	-	-
	Azimuth:56	Height:101	Horz	Margin [dB]		-6.84	-	-
7	7228.714	26.8 pk	-17.9	36.2	45.1	54	-	-
	Azimuth:98	Height:101	Horz	Margin [dB]		-8.9	-	-
20	5413.857	31.95 pk	-19.9	34.1	46.15	54	-	-
	Azimuth:97	Height:101	Horz	Margin [dB]		-7.85	-	-
21	6317.659	30.46 pk	-17.9	34.6	47.16	54	-	-
	Azimuth:56	Height:101	Horz	Margin [dB]		-6.84	-	-
22	7228.714	26.8 pk	-17.9	36.2	45.1	54	-	-
	Azimuth:98	Height:101	Horz	Margin [dB]		-8.9	-	-
Horizontal 7500 - 10000MHz -----								
8	8112.806	27.49 pk	-15.7	37	48.79	54	-	-
	Azimuth:177	Height:101	Horz	Margin [dB]		-5.21	-	-
9	9024.512	25.65 pk	-14.6	38	49.05	54	-	-
	Azimuth:355	Height:101	Horz	Margin [dB]		-4.95	-	-
10	9434.717	27.03 pk	-13.2	38.3	52.13	54	-	-
	Azimuth:1	Height:101	Horz	Margin [dB]		-1.87	-	-
11	9588.544	27.38 pk	-13.6	38.5	52.28	54	-	-
	Azimuth:39	Height:101	Horz	Margin [dB]		-1.72	-	-
12	9794.897	26.05 pk	-12.3	38.7	52.45	54	-	-
	Azimuth:223	Height:101	Horz	Margin [dB]		-1.55	-	-
13	9851.176	26.67 pk	-12	38.8	53.47	54	-	-
	Azimuth:223	Height:101	Horz	Margin [dB]		-.53	-	-
14	9962.481	26.65 pk	-11.2	38.9	54.35	54	-	-
	Azimuth:1	Height:101	Horz	Margin [dB]		.35	-	-
15	9988.744	26.95 pk	-11.1	38.9	54.75	54	-	-
	Azimuth:177	Height:101	Horz	Margin [dB]		.75	-	-

Vertical 1000 - 2000MHz -----
16 1804.902 49.83 pk -19.7 26.5 56.63 54 - -
Azimuth:101 Height:101 Vert Margin [dB] 2.63 - -

NOTE: Fundamental Harmonic Limit = Fundamental Signal Level - 20 dB =
107.4 dBuV - 20 dB = 87.4 dBuV, therefore no further investigation of this frequency
was performed.

Vertical 2000 - 4600MHz -----
17 2707.554 33.98 pk -25.3 29.2 37.88 54 - -
Azimuth:332 Height:101 Vert Margin [dB] -16.12 - -
18 3610.205 31.55 pk -22.5 31.5 40.55 54 - -
Azimuth:27 Height:101 Vert Margin [dB] -13.45 - -
19 4488.144 30.49 pk -19.9 32.3 42.89 54 - -
Azimuth:1 Height:101 Vert Margin [dB] -11.11 - -

Vertical 7500 - 10000MHz -----
23 8107.804 26.6 pk -15.7 37 47.9 54 - -
Azimuth:2 Height:101 Vert Margin [dB] -6.1 - -
24 9035.768 25.85 pk -14.6 38 49.25 54 - -
Azimuth:353 Height:101 Vert Margin [dB] -4.75 - -
25 9427.214 26.39 pk -13.2 38.3 51.49 54 - -
Azimuth:88 Height:101 Vert Margin [dB] -2.51 - -
26 9587.294 26.28 pk -13.6 38.5 51.18 54 - -
Azimuth:47 Height:101 Vert Margin [dB] -2.82 - -
27 9797.399 26.82 pk -12.3 38.7 53.22 54 - -
Azimuth:344 Height:101 Vert Margin [dB] -.78 - -
28 9797.399 26.82 pk -12.3 38.7 53.22 54 - -
Azimuth:344 Height:101 Vert Margin [dB] -.78 - -
29 9879.94 26.36 pk -11.8 38.8 53.36 54 - -
Azimuth:272 Height:101 Vert Margin [dB] -.64 - -
30 9953.727 26.62 pk -11.3 38.9 54.22 54 - -
Azimuth:2 Height:101 Vert Margin [dB] .22 - -
31 9953.727 26.62 pk -11.3 38.9 54.22 54 - -
Azimuth:2 Height:101 Vert Margin [dB] .22 - -

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

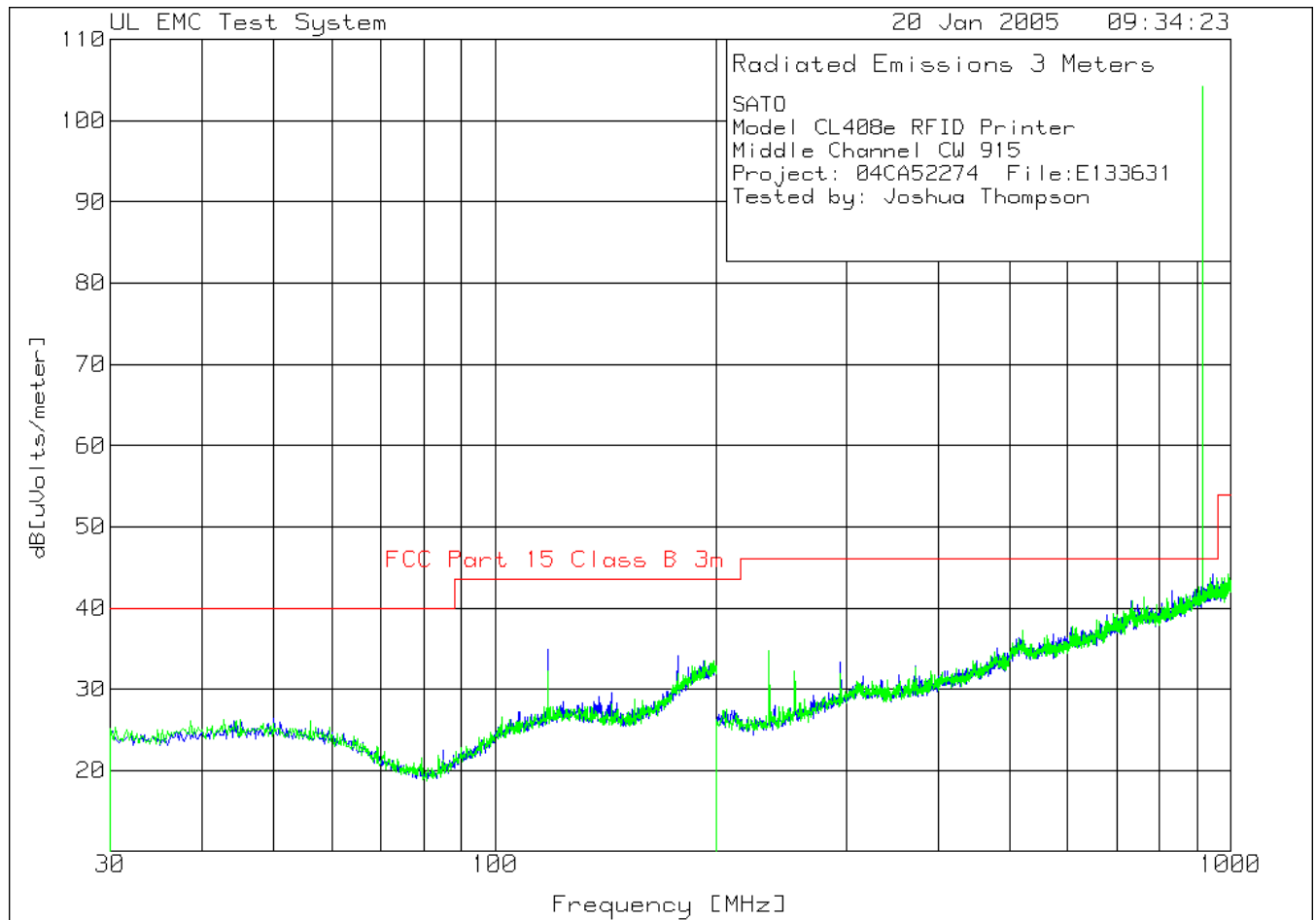
SATO Corp.
 Model: CL408e RFID Printer
 Low Channel
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal	7500 - 10000MHz							
9434.717	22.49 ave	-13.2	38.3	47.59	54	-	-	-
			Margin [dB]:		-6.41	-	-	-
9588.544	22.5 ave	-13.6	38.5	47.4	54	-	-	-
			Margin [dB]:		-6.6	-	-	-
9794.897	23.08 ave	-12.3	38.7	49.48	54	-	-	-
			Margin [dB]:		-4.52	-	-	-
9851.176	23.4 ave	-12	38.8	50.2	54	-	-	-
			Margin [dB]:		-3.8	-	-	-
9962.481	23.6 ave	-11.2	38.9	51.3	54	-	-	-
			Margin [dB]:		-2.7	-	-	-
9988.744	23.65 ave	-11.1	38.9	51.45	54	-	-	-
			Margin [dB]:		-2.55	-	-	-
Vertical	7500 - 10000MHz							
9427.214	22.5 ave	-13.2	38.3	47.6	54	-	-	-
			Margin [dB]:		-6.4	-	-	-
9587.294	22.54 ave	-13.6	38.5	47.44	54	-	-	-
			Margin [dB]:		-6.56	-	-	-
9797.399	23.11 ave	-12.3	38.7	49.51	54	-	-	-
			Margin [dB]:		-4.49	-	-	-
9797.399	23.11 ave	-12.3	38.7	49.51	54	-	-	-
			Margin [dB]:		-4.49	-	-	-
9879.94	23.33 ave	-11.8	38.8	50.33	54	-	-	-
			Margin [dB]:		-3.67	-	-	-
9953.727	23.62 ave	-11.3	38.9	51.22	54	-	-	-
			Margin [dB]:		-2.78	-	-	-
9953.727	23.62 ave	-11.3	38.9	51.22	54	-	-	-
			Margin [dB]:		-2.78	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
 ave - denotes average detection

LIMIT 1: FCC Part15 - CLASS B



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408e RFID Printer

Middle Channel CW 915

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
=====								
Horizontal 30 - 200MHz -----								
1	117.978	20.81 pk	1.5	12.6	34.91	43.5	-	-
	Azimuth:108	Height:249	Horz	Margin [dB]		-8.59	-	-
Vertical 30 - 200MHz -----								
2	117.978	18.21 pk	1.5	12.6	32.31	43.5	-	-
	Azimuth:214	Height:101	Vert	Margin [dB]		-11.19	-	-
Horizontal 200 - 1000MHz -----								
3	833.1166	15.79 pk	4.2	22.2	42.19	46	-	-
	Azimuth:1	Height:399	Horz	Margin [dB]		-3.81	-	-
4	915.1576	71.27 pk	4.4	23.4	99.07	46	-	-
	Azimuth:17	Height:101	Horz	Margin [dB]		53.07	-	-
5	944.7724	15.64 pk	4.5	24	44.14	46	-	-
	Azimuth:343	Height:399	Horz	Margin [dB]		-1.86	-	-
Vertical 200 - 1000MHz -----								
6	915.1576	76.48 pk	4.4	23.4	104.28	46	-	-
	Azimuth:80	Height:101	Vert	Margin [dB]		58.28	-	-
7	957.1786	15.16 pk	4.6	23.9	43.66	46	-	-
	Azimuth:2	Height:250	Vert	Margin [dB]		-2.34	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408e RFID Printer

Middle Channel CW 915

Project: 04CA52274 File:E133631

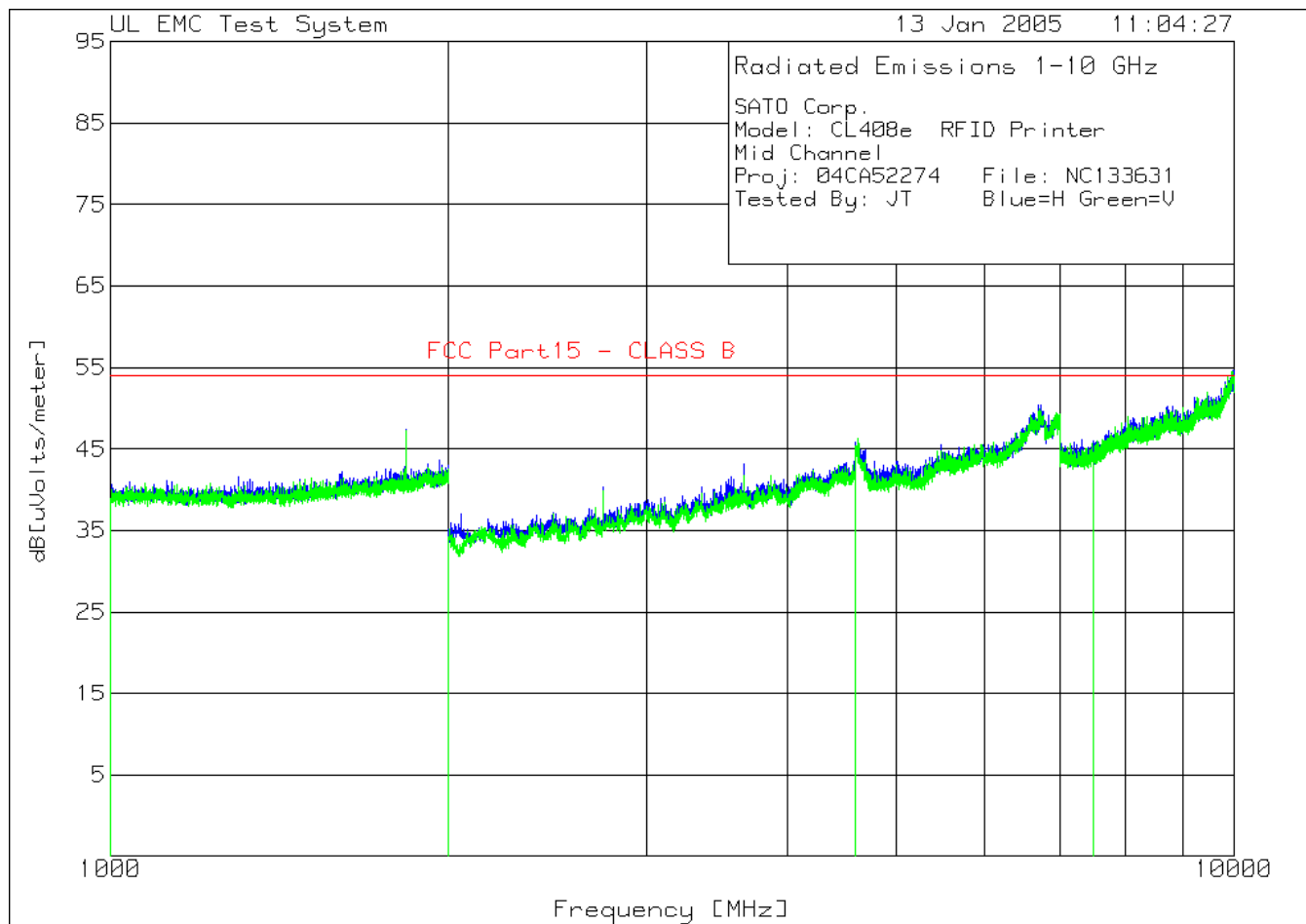
Tested by: Joshua Thompson

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal	200 - 1000MHz							
833.2533	8.24 qp	4.2	22.2	34.64	46	-	-	-
Azimuth: 1	Height:215	Horz		Margin [dB]:	-11.36	-	-	-
944.9534	8.52 qp	4.5	24	37.02	46	-	-	-
Azimuth: 316	Height:261	Horz		Margin [dB]:	-8.98	-	-	-
Vertical	200 - 1000MHz							
957.2488	8.52 qp	4.6	23.9	37.02	46	-	-	-
Azimuth: 196	Height:113	Vert		Margin [dB]:	-8.98	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e RFID Printer
 Mid Channel
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
=====								
Horizontal 1000 - 2000MHz -----								
1	1830.415	40.54 pk	-19.7	26.6	47.44	54	-	-
	Azimuth:358	Height:101	Horz	Margin [dB]		-6.56	-	-
Horizontal 2000 - 4600MHz -----								
2	2745.273	36.18 pk	-25.1	29.3	40.38	54	-	-
	Azimuth:111	Height:101	Horz	Margin [dB]		-13.62	-	-
3	3660.93	33.71 pk	-22.3	31.7	43.11	54	-	-
	Azimuth:138	Height:101	Horz	Margin [dB]		-10.89	-	-
4	4588.294	30.22 pk	-19.3	32.5	43.42	54	-	-
	Azimuth:56	Height:101	Horz	Margin [dB]		-10.58	-	-
Horizontal 4600 - 7500MHz -----								
5	5490.745	31 pk	-19.8	34.3	45.5	54	-	-
	Azimuth:42	Height:101	Horz	Margin [dB]		-8.5	-	-
6	6394.547	29.97 pk	-17.6	34.6	46.97	54	-	-
	Azimuth:106	Height:101	Horz	Margin [dB]		-7.03	-	-
7	7315.758	27.91 pk	-18.1	36.3	46.11	54	-	-
	Azimuth:151	Height:101	Horz	Margin [dB]		-7.89	-	-
Horizontal 7500 - 10000MHz -----								
8	8237.869	26.48 pk	-15.5	37.2	48.18	54	-	-
	Azimuth:184	Height:101	Horz	Margin [dB]		-5.82	-	-
9	9107.054	26.12 pk	-14.4	38.1	49.82	54	-	-
	Azimuth:267	Height:101	Horz	Margin [dB]		-4.18	-	-
10	9209.605	27.2 pk	-14	38.2	51.4	54	-	-
	Azimuth:17	Height:101	Horz	Margin [dB]		-2.6	-	-
11	9468.484	26.24 pk	-13.2	38.4	51.44	54	-	-
	Azimuth:46	Height:101	Horz	Margin [dB]		-2.56	-	-
12	9632.316	26.31 pk	-13.4	38.5	51.41	54	-	-
	Azimuth:17	Height:101	Horz	Margin [dB]		-2.59	-	-
13	9748.624	26.61 pk	-12.8	38.6	52.41	54	-	-
	Azimuth:17	Height:101	Horz	Margin [dB]		-1.59	-	-
14	9816.158	26.76 pk	-12.2	38.7	53.26	54	-	-
	Azimuth:276	Height:101	Horz	Margin [dB]		-.74	-	-
15	9899.95	26.25 pk	-11.6	38.8	53.45	54	-	-
	Azimuth:322	Height:101	Horz	Margin [dB]		-.55	-	-
16	9958.729	27.08 pk	-11.3	38.9	54.68	54	-	-
	Azimuth:1	Height:101	Horz	Margin [dB]		.68	-	-

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

17	9988.744	26.89 pk	-11.1	38.9	54.69	54	-	-
	Azimuth:276	Height:101	Horz	Margin [dB]		.69	-	-
Vertical 1000 - 2000MHz -----								
18	1830.415	40.4 pk	-19.7	26.6	47.3	54	-	-
	Azimuth:102	Height:101	Vert	Margin [dB]		-6.7	-	-
Vertical 2000 - 4600MHz -----								
19	2745.273	35.73 pk	-25.1	29.3	39.93	54	-	-
	Azimuth:16	Height:101	Vert	Margin [dB]		-14.07	-	-
20	3660.93	32.42 pk	-22.3	31.7	41.82	54	-	-
	Azimuth:358	Height:101	Vert	Margin [dB]		-12.18	-	-
21	4598.699	30.37 pk	-19.3	32.5	43.57	54	-	-
	Azimuth:343	Height:101	Vert	Margin [dB]		-10.43	-	-
Vertical 4600 - 7500MHz -----								
22	5489.295	30.19 pk	-19.8	34.3	44.69	54	-	-
	Azimuth:46	Height:101	Vert	Margin [dB]		-9.31	-	-
23	6388.744	30.09 pk	-17.8	34.6	46.89	54	-	-
	Azimuth:212	Height:101	Vert	Margin [dB]		-7.11	-	-
24	7324.462	26.62 pk	-18.1	36.3	44.82	54	-	-
	Azimuth:144	Height:101	Vert	Margin [dB]		-9.18	-	-
Vertical 7500 - 10000MHz -----								
25	8261.631	25.9 pk	-15.4	37.2	47.7	54	-	-
	Azimuth:17	Height:101	Vert	Margin [dB]		-6.3	-	-
26	9118.309	24.99 pk	-14.3	38.1	48.79	54	-	-
	Azimuth:358	Height:101	Vert	Margin [dB]		-5.21	-	-
27	9254.627	26.97 pk	-13.8	38.2	51.37	54	-	-
	Azimuth:221	Height:101	Vert	Margin [dB]		-2.63	-	-
28	9454.727	26.69 pk	-13.2	38.4	51.89	54	-	-
	Azimuth:321	Height:101	Vert	Margin [dB]		-2.11	-	-
29	9781.141	25.79 pk	-12.5	38.7	51.99	54	-	-
	Azimuth:184	Height:101	Vert	Margin [dB]		-2.01	-	-
30	9809.905	26.33 pk	-12.2	38.7	52.83	54	-	-
	Azimuth:6	Height:101	Vert	Margin [dB]		-1.17	-	-
31	9858.679	26.94 pk	-11.9	38.8	53.84	54	-	-
	Azimuth:1	Height:101	Vert	Margin [dB]		-.16	-	-
32	9951.226	26.36 pk	-11.3	38.9	53.96	54	-	-
	Azimuth:184	Height:101	Vert	Margin [dB]		-.04	-	-
33	9966.233	26.8 pk	-11.2	38.9	54.5	54	-	-
	Azimuth:17	Height:101	Vert	Margin [dB]		.5	-	-

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.

Model: CL408e RFID Printer

Mid Channel

Proj: 04CA52274 File: NC133631

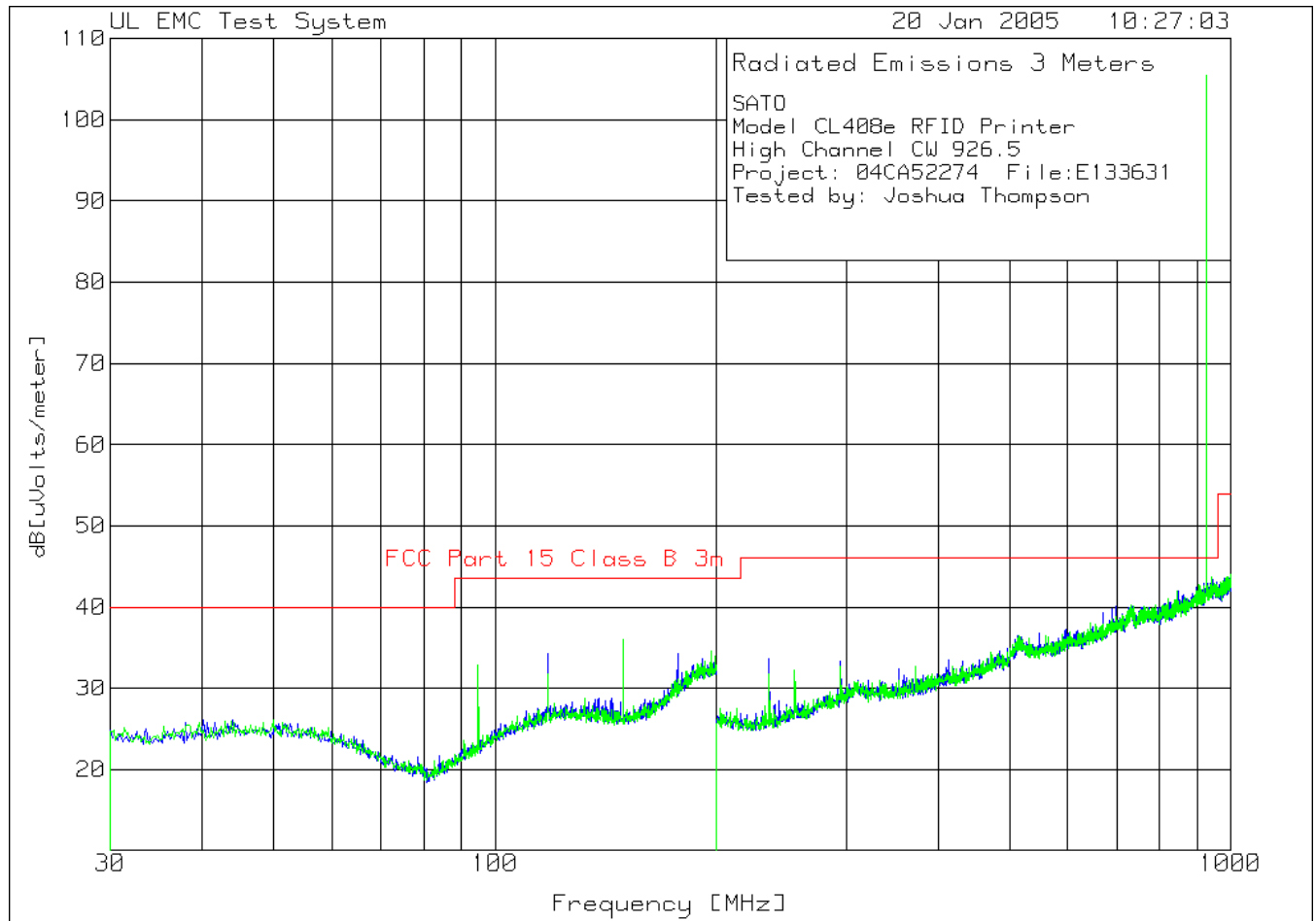
Tested By: JT Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal 7500 - 10000MHz								
9209.605	22.4 ave	-14	38.2	46.6	54	-	-	-
			Margin [dB]:		-7.4	-	-	-
9468.484	22.6 ave	-13.2	38.4	47.8	54	-	-	-
			Margin [dB]:		-6.2	-	-	-
9632.316	22.71 ave	-13.4	38.5	47.81	54	-	-	-
			Margin [dB]:		-6.19	-	-	-
9748.624	22.73 ave	-12.8	38.6	48.53	54	-	-	-
			Margin [dB]:		-5.47	-	-	-
9816.158	23.2 ave	-12.2	38.7	49.7	54	-	-	-
			Margin [dB]:		-4.3	-	-	-
9899.95	23.23 ave	-11.6	38.8	50.43	54	-	-	-
			Margin [dB]:		-3.57	-	-	-
9958.729	23.6 ave	-11.3	38.9	51.2	54	-	-	-
			Margin [dB]:		-2.8	-	-	-
9988.744	23.67 ave	-11.1	38.9	51.47	54	-	-	-
			Margin [dB]:		-2.53	-	-	-
Vertical 7500 - 10000MHz								
9254.627	22.77 ave	-13.8	38.2	47.17	54	-	-	-
			Margin [dB]:		-6.83	-	-	-
9454.727	22.63 ave	-13.2	38.4	47.83	54	-	-	-
			Margin [dB]:		-6.17	-	-	-
9781.141	22.93 ave	-12.5	38.7	49.13	54	-	-	-
			Margin [dB]:		-4.87	-	-	-
9809.905	23.19 ave	-12.2	38.7	49.69	54	-	-	-
			Margin [dB]:		-4.31	-	-	-
9858.679	23.3 ave	-11.9	38.8	50.2	54	-	-	-
			Margin [dB]:		-3.8	-	-	-
9951.226	23.6 ave	-11.3	38.9	51.2	54	-	-	-
			Margin [dB]:		-2.8	-	-	-
9966.233	23.62 ave	-11.2	38.9	51.32	54	-	-	-
			Margin [dB]:		-2.68	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

ave - denotes average detection

LIMIT 1: FCC Part15 - CLASS B



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO								
Model CL408e RFID Printer								
High Channel CW 926.5								
Project: 04CA52274 File:E133631								
Tested by: Joshua Thompson								
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
=====								
Horizontal 30 - 200MHz -----								
1	96.1962	12.94 pk	1.4	9.3	23.64	43.5	-	-
	Azimuth:343	Height:399	Horz	Margin [dB]		-19.86	-	-
2	117.978	20.16 pk	1.5	12.6	34.26	43.5	-	-
	Azimuth:107	Height:250	Horz	Margin [dB]		-9.24	-	-
3	148.0981	14.62 pk	1.7	12	28.32	43.5	-	-
	Azimuth:1	Height:101	Horz	Margin [dB]		-15.18	-	-
Vertical 30 - 200MHz -----								
4	94.8348	22.41 pk	1.4	9	32.81	43.5	-	-
	Azimuth:108	Height:400	Vert	Margin [dB]		-10.69	-	-
5	117.978	17.61 pk	1.5	12.6	31.71	43.5	-	-
	Azimuth:215	Height:101	Vert	Margin [dB]		-11.79	-	-
6	149.4595	22.23 pk	1.7	12	35.93	43.5	-	-
	Azimuth:108	Height:101	Vert	Margin [dB]		-7.57	-	-
Horizontal 200 - 1000MHz -----								
7	850.3252	15.26 pk	4.2	22.5	41.96	46	-	-
	Azimuth:237	Height:250	Horz	Margin [dB]		-4.04	-	-
8	926.7634	68.85 pk	4.5	23.8	97.15	46	-	-
	Azimuth:18	Height:101	Horz	Margin [dB]		51.15	-	-
9	956.7784	14.54 pk	4.6	23.9	43.04	46	-	-
	Azimuth:316	Height:101	Horz	Margin [dB]		-2.96	-	-
Vertical 200 - 1000MHz -----								
10	845.923	15.3 pk	4.2	22.5	42	46	-	-
	Azimuth:315	Height:101	Vert	Margin [dB]		-4	-	-
11	926.7634	77.19 pk	4.5	23.8	105.49	46	-	-
	Azimuth:80	Height:101	Vert	Margin [dB]		59.49	-	-
12	950.3752	14.25 pk	4.6	24	42.85	46	-	-
	Azimuth:18	Height:250	Vert	Margin [dB]		-3.15	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

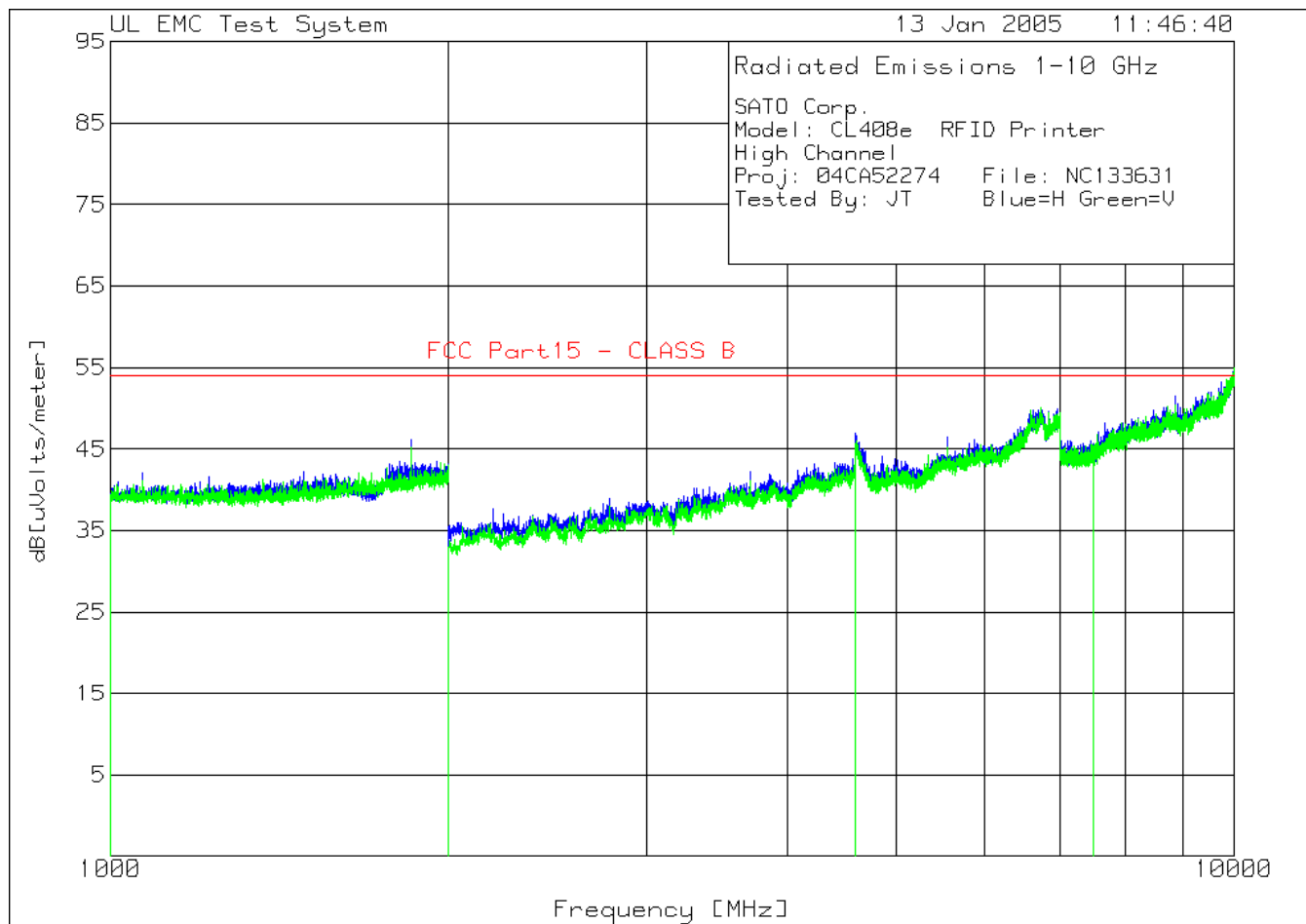
Issued: 3/4/2005

SATO
 Model CL408e RFID Printer
 High Channel CW 926.5
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal 200 - 1000MHz								
850.2781	8.24 qp	4.2	22.5	34.94	46	-	-	-
Azimuth: 133	Height:291	Horz		Margin [dB]:	-11.06	-	-	-
956.7784	8.57 qp	4.6	23.9	37.07	46	-	-	-
Azimuth: 95	Height:201	Horz		Margin [dB]:	-8.93	-	-	-
Vertical 200 - 1000MHz								
846.38	8.35 qp	4.2	22.5	35.05	46	-	-	-
Azimuth: 264	Height:375	Vert		Margin [dB]:	-10.95	-	-	-
950.3752	8.62 qp	4.6	24	37.22	46	-	-	-
Azimuth: 151	Height:103	Vert		Margin [dB]:	-8.78	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e RFID Printer
 High Channel
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
-----	-----------------	------------------------	-----------------------	------------------------	------------------------	---------	---	---

=====

Horizontal 1000 - 2000MHz -----								
1	1852.926	39.12 pk	-19.6	26.7	46.22	54	-	-
	Azimuth:2	Height:101	Horz	Margin [dB]		-7.78	-	-

Horizontal 2000 - 4600MHz -----								
2	2779.09	34.55 pk	-25.1	29.4	38.85	54	-	-
	Azimuth:222	Height:101	Horz	Margin [dB]		-15.15	-	-
3	3706.453	32.58 pk	-22.1	31.8	42.28	54	-	-
	Azimuth:193	Height:101	Horz	Margin [dB]		-11.72	-	-

Horizontal 4600 - 7500MHz -----								
4	4631.916	28.98 pk	-15.8	32.6	45.78	54	-	-
	Azimuth:195	Height:101	Horz	Margin [dB]		-8.22	-	-
5	5558.929	31.84 pk	-19.7	34.3	46.44	54	-	-
	Azimuth:3	Height:101	Horz	Margin [dB]		-7.56	-	-
6	6446.773	30.79 pk	-17.6	34.6	47.79	54	-	-
	Azimuth:355	Height:101	Horz	Margin [dB]		-6.21	-	-
7	7365.083	27.13 pk	-18.2	36.4	45.33	54	-	-
	Azimuth:144	Height:101	Horz	Margin [dB]		-8.67	-	-

Horizontal 7500 - 10000MHz -----								
8	8334.167	26.26 pk	-15.2	37.3	48.36	54	-	-
	Azimuth:6	Height:101	Horz	Margin [dB]		-5.64	-	-
9	8858.179	28.31 pk	-14.7	37.9	51.51	54	-	-
	Azimuth:134	Height:101	Horz	Margin [dB]		-2.49	-	-
10	9285.893	26.42 pk	-13.7	38.2	50.92	54	-	-
	Azimuth:88	Height:101	Horz	Margin [dB]		-3.08	-	-
11	9459.73	26.11 pk	-13.2	38.4	51.31	54	-	-
	Azimuth:92	Height:101	Horz	Margin [dB]		-2.69	-	-
12	9528.514	26.86 pk	-13.3	38.4	51.96	54	-	-
	Azimuth:343	Height:101	Horz	Margin [dB]		-2.04	-	-
13	9697.349	26.93 pk	-13.1	38.6	52.43	54	-	-
	Azimuth:343	Height:101	Horz	Margin [dB]		-1.57	-	-
14	9738.619	27.45 pk	-12.9	38.6	53.15	54	-	-
	Azimuth:7	Height:101	Horz	Margin [dB]		-.85	-	-
15	9844.922	26.62 pk	-12	38.7	53.32	54	-	-
	Azimuth:7	Height:101	Horz	Margin [dB]		-.68	-	-
16	9924.962	26.47 pk	-11.5	38.8	53.77	54	-	-
	Azimuth:343	Height:101	Horz	Margin [dB]		-.23	-	-
17	9964.982	26.76 pk	-11.2	38.9	54.46	54	-	-
	Azimuth:1	Height:101	Horz	Margin [dB]		.46	-	-

Vertical 1000 - 2000MHz -----

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

18	1853.427	38.12 pk	-19.6	26.7	45.22	54	-	-
	Azimuth:355	Height:101 Vert		Margin [dB]		-8.78	-	-
Vertical 2000 - 4600MHz -----								
19	2779.09	33.73 pk	-25.1	29.4	38.03	54	-	-
	Azimuth:332	Height:101 Vert		Margin [dB]		-15.97	-	-
20	3706.453	31.42 pk	-22.1	31.8	41.12	54	-	-
	Azimuth:358	Height:101 Vert		Margin [dB]		-12.88	-	-
Vertical 4600 - 7500MHz -----								
21	4613.057	28.54 pk	-15	32.5	46.04	54	-	-
	Azimuth:1	Height:101 Vert		Margin [dB]		-7.96	-	-
22	5558.929	30.61 pk	-19.7	34.3	45.21	54	-	-
	Azimuth:38	Height:101 Vert		Margin [dB]		-8.79	-	-
23	6471.436	30.18 pk	-17.7	34.6	47.08	54	-	-
	Azimuth:207	Height:101 Vert		Margin [dB]		-6.92	-	-
24	7381.041	27.07 pk	-18.2	36.5	45.37	54	-	-
	Azimuth:148	Height:101 Vert		Margin [dB]		-8.63	-	-
Vertical 7500 - 10000MHz -----								
25	8336.668	26.89 pk	-15.2	37.3	48.99	54	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-5.01	-	-
26	8853.177	27.1 pk	-14.6	37.9	50.4	54	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-3.6	-	-
27	9269.635	25.65 pk	-13.7	38.2	50.15	54	-	-
	Azimuth:17	Height:101 Vert		Margin [dB]		-3.85	-	-
28	9470.985	26.62 pk	-13.2	38.4	51.82	54	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-2.18	-	-
29	9587.294	26.54 pk	-13.6	38.5	51.44	54	-	-
	Azimuth:230	Height:101 Vert		Margin [dB]		-2.56	-	-
30	9631.066	25.91 pk	-13.4	38.5	51.01	54	-	-
	Azimuth:17	Height:101 Vert		Margin [dB]		-2.99	-	-
31	9794.897	26.1 pk	-12.3	38.7	52.5	54	-	-
	Azimuth:138	Height:101 Vert		Margin [dB]		-1.5	-	-
32	9867.434	26.42 pk	-11.8	38.8	53.42	54	-	-
	Azimuth:92	Height:101 Vert		Margin [dB]		-.58	-	-
33	9989.995	27.19 pk	-11.1	38.9	54.99	54	-	-
	Azimuth:230	Height:101 Vert		Margin [dB]		.99	-	-
34	7551.276	27.83 pk	-17.7	36.7	46.83	54	-	-
	Azimuth:1	Height:101 Vert		Margin [dB]		-7.17	-	-

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e RFID Printer
 High Channel
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					

Horizontal 7500 - 10000MHz

8858.179	22.71 ave	-14.7	37.9	45.91	54	-	-	-
			Margin [dB]:		-8.09	-	-	-
9459.73	22.61 ave	-13.2	38.4	47.81	54	-	-	-
			Margin [dB]:		-6.19	-	-	-
9528.514	22.43 ave	-13.3	38.4	47.53	54	-	-	-
			Margin [dB]:		-6.47	-	-	-
9697.349	22.37 ave	-13.1	38.6	47.87	54	-	-	-
			Margin [dB]:		-6.13	-	-	-
9738.619	22.56 ave	-12.9	38.6	48.26	54	-	-	-
			Margin [dB]:		-5.74	-	-	-
9844.922	23.36 ave	-12	38.7	50.06	54	-	-	-
			Margin [dB]:		-3.94	-	-	-
9924.962	23.34 ave	-11.5	38.8	50.64	54	-	-	-
			Margin [dB]:		-3.36	-	-	-
9964.982	23.63 ave	-11.2	38.9	51.33	54	-	-	-
			Margin [dB]:		-2.67	-	-	-

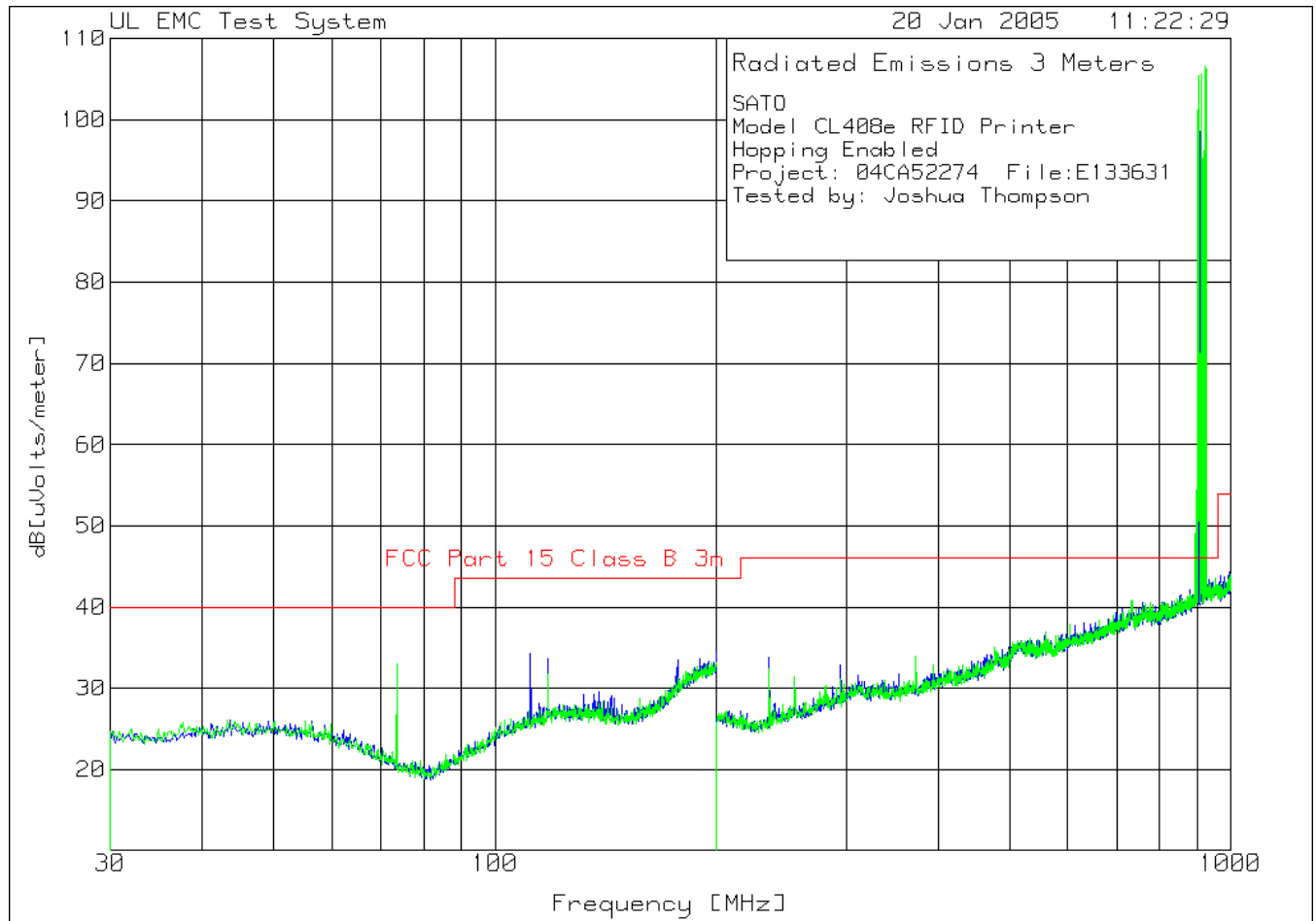
Vertical 7500 - 10000MHz

8853.177	22.71 ave	-14.6	37.9	46.01	54	-	-	-
			Margin [dB]:		-7.99	-	-	-
9470.985	22.59 ave	-13.2	38.4	47.79	54	-	-	-
			Margin [dB]:		-6.21	-	-	-
9587.294	22.64 ave	-13.6	38.5	47.54	54	-	-	-
			Margin [dB]:		-6.46	-	-	-
9631.066	22.73 ave	-13.4	38.5	47.83	54	-	-	-
			Margin [dB]:		-6.17	-	-	-
9794.897	23.12 ave	-12.3	38.7	49.52	54	-	-	-
			Margin [dB]:		-4.48	-	-	-
9867.434	23.35 ave	-11.8	38.8	50.35	54	-	-	-
			Margin [dB]:		-3.65	-	-	-
9989.995	23.68 ave	-11.1	38.9	51.48	54	-	-	-
			Margin [dB]:		-2.52	-	-	-
7551.276	23.07 ave	-17.7	36.7	42.07	54	-	-	-
			Margin [dB]:		-11.93	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

ave - denotes average detection

LIMIT 1: FCC Part15 - CLASS B



File Number: E133631
Project Number: O4CA52274
Model Number: CL4XXE
FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO

Model CL408e RFID Printer

Hopping Enabled

Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------	---	---

Vertical 30 - 200MHz

1	73.5636	24.58 pk	1.2	7.2	32.98	40	-	-
	Azimuth:252	Height:250	Vert	Margin [dB]		-7.02	-	-

Horizontal 200 - 1000MHz

2	855.1276	14.98 pk	4.2	22.4	41.58	46	-	-
	Azimuth:123	Height:249	Horz	Margin [dB]		-4.42	-	-
3	903.952	72.68 pk	4.4	23.3	100.38	46	-	-
	Azimuth:280	Height:101	Horz	Margin [dB]		54.38	-	-
4	919.96	67.35 pk	4.4	23.6	95.35	46	-	-
	Azimuth:43	Height:249	Horz	Margin [dB]		49.35	-	-
5	963.5818	14.66 pk	4.6	23.8	43.06	54	-	-
	Azimuth:123	Height:101	Horz	Margin [dB]		-10.94	-	-

Vertical 200 - 1000MHz

6	733.8669	13.75 pk	3.9	23.2	40.85	46	-	-
	Azimuth:80	Height:249	Vert	Margin [dB]		-5.15	-	-
7	905.1526	77.85 pk	4.4	23.2	105.45	46	-	-
	Azimuth:343	Height:101	Vert	Margin [dB]		59.45	-	-
8	923.5618	78.34 pk	4.5	23.7	106.54	46	-	-
	Azimuth:343	Height:101	Vert	Margin [dB]		60.54	-	-
9	952.3762	14.91 pk	4.6	24	43.51	46	-	-
	Azimuth:343	Height:101	Vert	Margin [dB]		-2.49	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

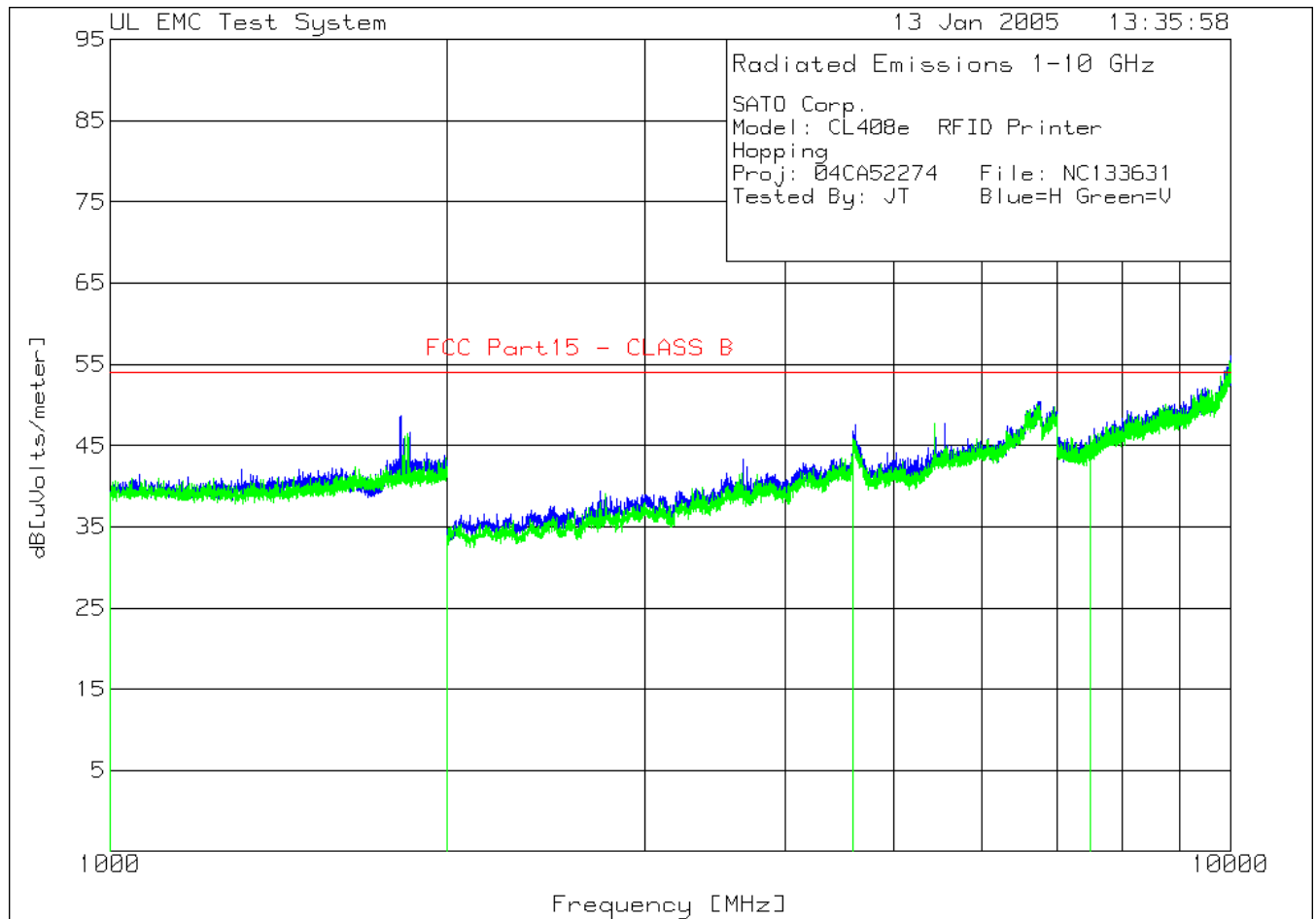
File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO								
Model CL408e RFID Printer								
Hopping Enabled								
Project: 04CA52274 File:E133631								
Tested by: Joshua Thompson								
Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
Horizontal 200 - 1000MHz								
855.6056	8.35 qp	4.2	22.4	34.95	46	-	-	-
Azimuth: 278 Height:329 Horz			Margin [dB]:		-11.05	-	-	-
Vertical 200 - 1000MHz								
733.4602	8.01 qp	3.9	23.1	35.01	46	-	-	-
Azimuth: 167 Height:287 Vert			Margin [dB]:		-10.99	-	-	-
952.3762	8.52 qp	4.6	24	37.12	46	-	-	-
Azimuth: 10 Height:217 Vert			Margin [dB]:		-8.88	-	-	-
952.3762	8.62 qp	4.6	24	37.22	46	-	-	-
Azimuth: 47 Height:212 Horz			Margin [dB]:		-8.78	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.
 Model: CL408e RFID Printer
 Hopping
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
=====								
Horizontal 1000 - 2000MHz -----								
1	1815.908	41.77 pk	-19.7	26.6	48.67	54	-	-
	Azimuth:358	Height:101	Horz	Margin [dB]		-5.33	-	-
Horizontal 2000 - 4600MHz -----								
2	2740.07	35.37 pk	-25.2	29.3	39.47	54	-	-
	Azimuth:111	Height:101	Horz	Margin [dB]		-14.53	-	-
3	3672.636	33.85 pk	-22.3	31.7	43.25	54	-	-
	Azimuth:193	Height:101	Horz	Margin [dB]		-10.75	-	-
Horizontal 4600 - 7500MHz -----								
4	4626.113	30.45 pk	-15.5	32.6	47.55	54	-	-
	Azimuth:1	Height:101	Horz	Margin [dB]		-6.45	-	-
5	5450.125	31.58 pk	-19.8	34.2	45.98	54	-	-
	Azimuth:38	Height:101	Horz	Margin [dB]		-8.02	-	-
6	5556.028	33.2 pk	-19.7	34.3	47.8	54	-	-
	Azimuth:0	Height:101	Horz	Margin [dB]		-6.2	-	-
7	6314.757	30.63 pk	-17.9	34.6	47.33	54	-	-
	Azimuth:358	Height:101	Horz	Margin [dB]		-6.67	-	-
8	7218.559	27.52 pk	-17.9	36.1	45.72	54	-	-
	Azimuth:46	Height:101	Horz	Margin [dB]		-8.28	-	-
Horizontal 7500 - 10000MHz -----								
9	8152.826	27.62 pk	-15.6	37.1	49.12	54	-	-
	Azimuth:138	Height:101	Horz	Margin [dB]		-4.88	-	-
10	9019.51	26.58 pk	-14.6	38	49.98	54	-	-
	Azimuth:358	Height:101	Horz	Margin [dB]		-4.02	-	-
11	9333.417	27.17 pk	-13.5	38.3	51.97	54	-	-
	Azimuth:180	Height:101	Horz	Margin [dB]		-2.03	-	-
12	9438.469	26.79 pk	-13.2	38.4	51.99	54	-	-
	Azimuth:8	Height:101	Horz	Margin [dB]		-2.01	-	-
13	9498.499	26.96 pk	-13.2	38.4	52.16	54	-	-
	Azimuth:231	Height:101	Horz	Margin [dB]		-1.84	-	-
14	9797.399	26.92 pk	-12.3	38.7	53.32	54	-	-
	Azimuth:8	Height:101	Horz	Margin [dB]		-.68	-	-
15	9858.679	27.26 pk	-11.9	38.8	54.16	54	-	-
	Azimuth:8	Height:101	Horz	Margin [dB]		.16	-	-
16	9928.714	27.29 pk	-11.5	38.8	54.59	54	-	-
	Azimuth:2	Height:101	Horz	Margin [dB]		.59	-	-
17	9989.995	28.2 pk	-11.1	38.9	56	54	-	-

Azimuth:231 Height:101 Horz Margin [dB] 2 - -								
Vertical 1000 - 2000MHz -----								
18	1823.912	36.87 pk	-19.7	26.6	43.77	54	-	-
	Azimuth:203	Height:101 Vert		Margin [dB]		-10.23	-	-
Vertical 2000 - 4600MHz -----								
19	2733.567	33.86 pk	-25.2	29.3	37.96	54	-	-
	Azimuth:16	Height:101 Vert		Margin [dB]		-16.04	-	-
20	3657.028	32.34 pk	-22.3	31.6	41.64	54	-	-
	Azimuth:358	Height:101 Vert		Margin [dB]		-12.36	-	-
Vertical 4600 - 7500MHz -----								
21	4605.803	28.14 pk	-14.8	32.5	45.84	54	-	-
	Azimuth:0	Height:101 Vert		Margin [dB]		-8.16	-	-
22	5437.069	33.38 pk	-19.8	34.2	47.78	54	-	-
	Azimuth:15	Height:101 Vert		Margin [dB]		-6.22	-	-
23	6303.152	30.21 pk	-18.1	34.6	46.71	54	-	-
	Azimuth:358	Height:101 Vert		Margin [dB]		-7.29	-	-
24	7202.601	27.65 pk	-17.8	36.1	45.95	54	-	-
	Azimuth:144	Height:101 Vert		Margin [dB]		-8.05	-	-
Vertical 7500 - 10000MHz -----								
25	8176.588	27.03 pk	-15.6	37.1	48.53	54	-	-
	Azimuth:321	Height:101 Vert		Margin [dB]		-5.47	-	-
26	9032.016	26.03 pk	-14.6	38	49.43	54	-	-
	Azimuth:318	Height:101 Vert		Margin [dB]		-4.57	-	-
27	9413.457	26.64 pk	-13.2	38.3	51.74	54	-	-
	Azimuth:92	Height:101 Vert		Margin [dB]		-2.26	-	-
28	9524.762	26.8 pk	-13.3	38.4	51.9	54	-	-
	Azimuth:6	Height:101 Vert		Margin [dB]		-2.1	-	-
29	9622.311	26.82 pk	-13.5	38.5	51.82	54	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-2.18	-	-
30	9784.892	27.21 pk	-12.4	38.7	53.51	54	-	-
	Azimuth:321	Height:101 Vert		Margin [dB]		-.49	-	-
31	9906.203	26.91 pk	-11.6	38.8	54.11	54	-	-
	Azimuth:6	Height:101 Vert		Margin [dB]		.11	-	-
32	9961.231	26.61 pk	-11.2	38.9	54.31	54	-	-
	Azimuth:6	Height:101 Vert		Margin [dB]		.31	-	-
33	9982.491	27.64 pk	-11.1	38.9	55.44	54	-	-
	Azimuth:230	Height:101 Vert		Margin [dB]		1.44	-	-

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: CL4XXE
 FCC ID: MMFCL4XXEAW

Issued: 3/4/2005

SATO Corp.

Model: CL408e RFID Printer

Hopping

Proj: 04CA52274 File: NC133631

Tested By: JT Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					

Horizontal 7500 - 10000MHz

9333.417	22.57 ave	-13.5	38.3	47.37	54	-	-	-
			Margin [dB]:		-6.63	-	-	-
9438.469	22.57 ave	-13.2	38.4	47.77	54	-	-	-
			Margin [dB]:		-6.23	-	-	-
9498.499	22.45 ave	-13.2	38.4	47.65	54	-	-	-
			Margin [dB]:		-6.35	-	-	-
9797.399	23.13 ave	-12.3	38.7	49.53	54	-	-	-
			Margin [dB]:		-4.47	-	-	-
9858.679	23.29 ave	-11.9	38.8	50.19	54	-	-	-
			Margin [dB]:		-3.81	-	-	-
9928.714	23.35 ave	-11.5	38.8	50.65	54	-	-	-
			Margin [dB]:		-3.35	-	-	-
9989.995	23.67 ave	-11.1	38.9	51.47	54	-	-	-
			Margin [dB]:		-2.53	-	-	-

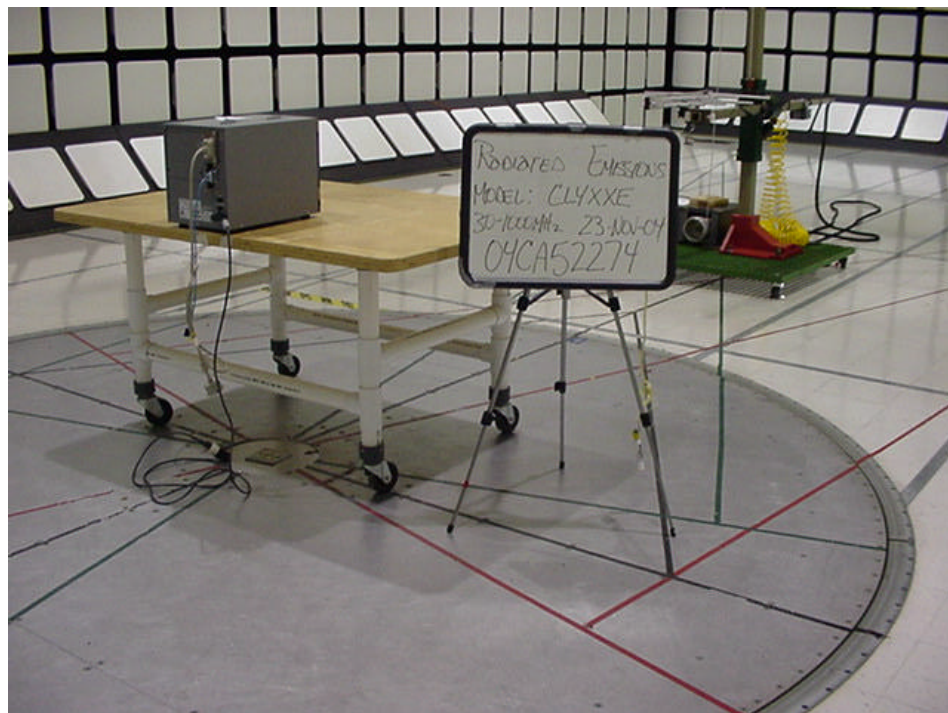
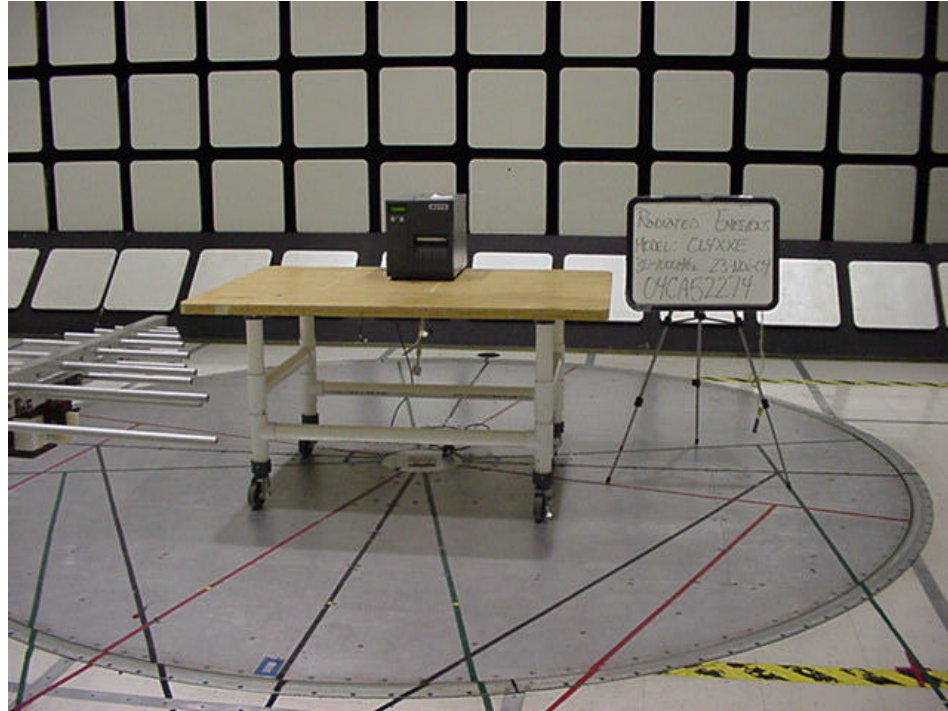
Vertical 7500 - 10000MHz

9413.457	22.52 ave	-13.2	38.3	47.62	54	-	-	-
			Margin [dB]:		-6.38	-	-	-
9524.762	22.43 ave	-13.3	38.4	47.53	54	-	-	-
			Margin [dB]:		-6.47	-	-	-
9622.311	22.72 ave	-13.5	38.5	47.72	54	-	-	-
			Margin [dB]:		-6.28	-	-	-
9784.892	23.01 ave	-12.4	38.7	49.31	54	-	-	-
			Margin [dB]:		-4.69	-	-	-
9906.203	23.3 ave	-11.6	38.8	50.5	54	-	-	-
			Margin [dB]:		-3.5	-	-	-
9961.231	23.6 ave	-11.2	38.9	51.3	54	-	-	-
			Margin [dB]:		-2.7	-	-	-
9982.491	23.63 ave	-11.1	38.9	51.43	54	-	-	-
			Margin [dB]:		-2.57	-	-	-

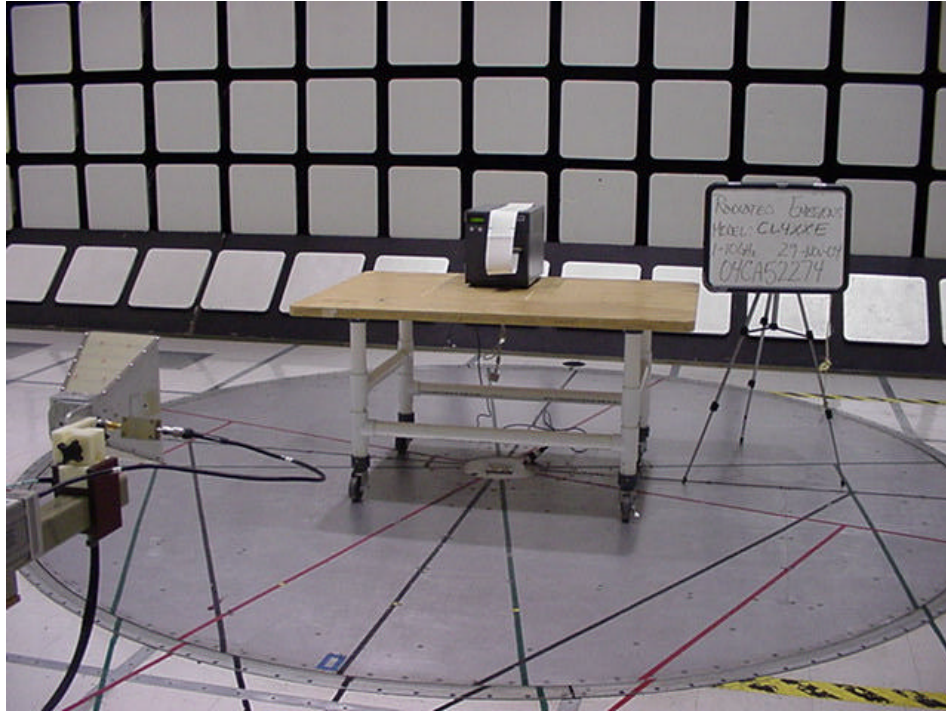
NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

ave - denotes average detection

LIMIT 1: FCC Part15 - CLASS B



Radiated Emissions Test Setup 30-1000 MHz



Radiated Emissions Test Setup 1-10 GHz

5.1.10 Maximum Permissible Exposure

Maximum Permissible Exposure limits are as follows:

FCC Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time $ E^2 , H^2 $, or S (minutes)
0.3 - 1.34	614	1.63	(100)*	30
1.34 - 30	824/f	2.19/f	(180/f ²)*	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f/1500	30
1500 - 100,000	-	-	1.0	30

*Plane-wave equivalent power density

Test Details: This device is considered to possibly be located in either environment. See calculation for assumptions.

Background: Per the following guidance from OET Bulletin 65 Supplement C required minimum spacings are provided to the professional installer.

Transmitter or Device Type ¹⁸	Output ¹⁹	Applicable Methods to Ensure Compliance ²⁰
Transmitters using indoor antennas that operate at 20 cm or more from nearby persons	>2.5 W at 915 MHz	If the MPE distance is greater than that required for normal operation of the device, operating instructions, warning instructions and/or warning labels may be used to ensure compliance by indicating the minimal separation distance to comply with MPE limits. If the antennas are professional installed to ensure compliance, warning instructions and warning labels are not necessary.
	=< 2.5 W at 915 MHz or =< 4 W at 2450 MHz	Transmitters operating at 2.5W EIRP (1.5 ERP) or less at 915 MHz, or at 4 W EIRP (2.4 W ERP) or less at 2450 MHz, generally are not expected to exceed MPE limits when nearby persons are 20 cm or more from most antennas. Therefore, special instructions and warnings are normally not necessary to ensure compliance.

MPE Calculation with highest EIRP:

Assuming the highest gain antenna intended for use (-5 dBi gain) and the CL4XXe is outputting at highest measured power continuously and no cable loss to the antenna, then MPE requirements in an uncontrolled environment are met at a distance of 20cm.

Maximum Permissible Exposure

$\text{Power Density} = \text{EIRP} / (4 * \text{Pi} * \text{R}^2),$ where EIRP = Output Power * Antenna Gain
--

Uncontrolled/Occupational Exposure

Operating Frequency	915MHz		
Output Power (Peak)	0.314Watts		
Antenna Gain	-5dB	or (linear)	0.316228(unitless)
Separation Distance	0.2m	-or-	7.874 inches

Peak Power Density	0.198W/m ²	- or -	0.0198mW/cm ²
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Exposure % (over 6 min timespan for uncontrolled)	100%
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Transmit Duty Cycle (Peak-to-Average Ratio)	100%
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Average Power Density	0.19754 W/m ²	- or -	0.0198 mW/cm ²
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Limit for **Uncontrolled**
 Exposure at Operating
 Frequency

6.1 W/m ²	- or -	0.61 mW/cm ²
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Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. The specific scope includes IEC/CISPR 22:1997, Amendment 1:1995, Amendment 2:1997, EN 55022:1998, AS/NZS 1044, CNS 13438:1997, ANSI C63.4, FCC Method - 47 CFR Part 15, FCC Method - 47 CFR Part 68, AS/NZS 3548, IEC 61000-3-2, EN 61000-3-2, CISPR 14-1, EN 55014-1, AS/NZS 1044, CNS 13783-1, CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, and IEC 61000-4-11 testing.



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland and accepted in a letter dated September 24, 1997 (Ref. No. 91040).



Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.



ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 89/336/EEC, Article 10 (2). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6. U.S. Identifier Number: US0113