



Project: 04CA52274
File: E133631
Date: 11/20/04
Model: M-8485Se
FCC ID: MMF8485SEAW

Test Report

On

Electromagnetic Compatibility Testing

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quality service for over 100 years*

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File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

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
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Test Report Date:	3/4/05
Product Type:	RFID Printer
Model Number:	M-8485Se
Sample Serial Number:	40404116
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

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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

M-8485Se is a thermal printer that uses a 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. 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.

RFID Printer 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.

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	M-8485Se	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

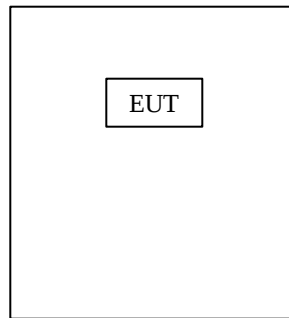
1.3 EUT Configuration Modes:

Mode #	Description
1	Printer utilizing RFID technology. Model: M-8485Se S/N: 40404116

"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 M-8485Se were necessary in order to reduce harmonic emissions in the restricted bands. The following modifications were made:

- A. Copper shielding was placed on the transmitter ribbon cable. **Figure 1.6a**
- B. The antenna cable was replaced with a higher quality cable with additional shielding near the antenna and near the connector. **Figure 1.6b**
- C. A Kitagawa SFC-3 ferrite ring was placed on the antenna cable. **Figure 1.6b**
- D. A TDK ZCAT 1518-0730 ferrite ring was placed on the communication cable, internally between the connector and the transmitter interface board. **Figure 1.6c**

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 1.6c**

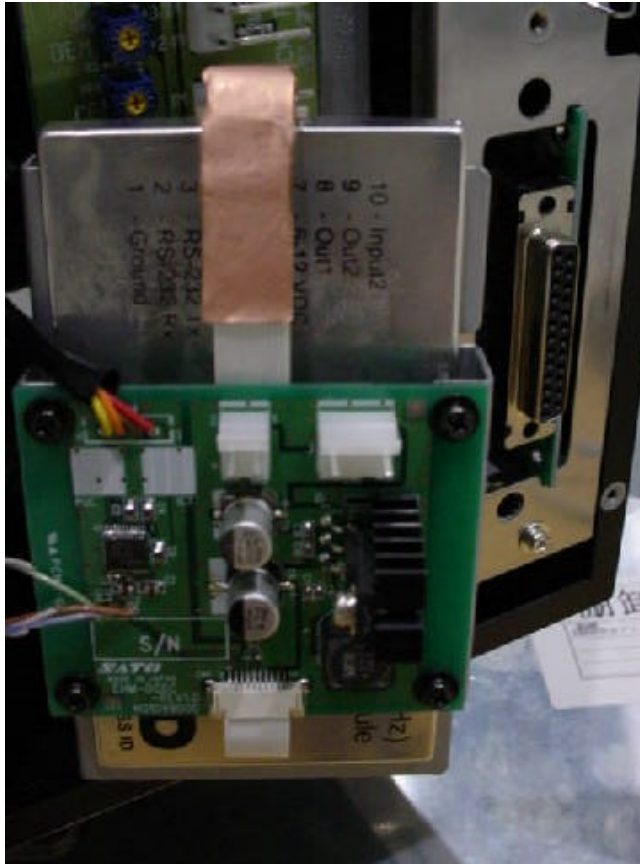


Figure 1.6a Transmitter Ribbon Cable Shielding

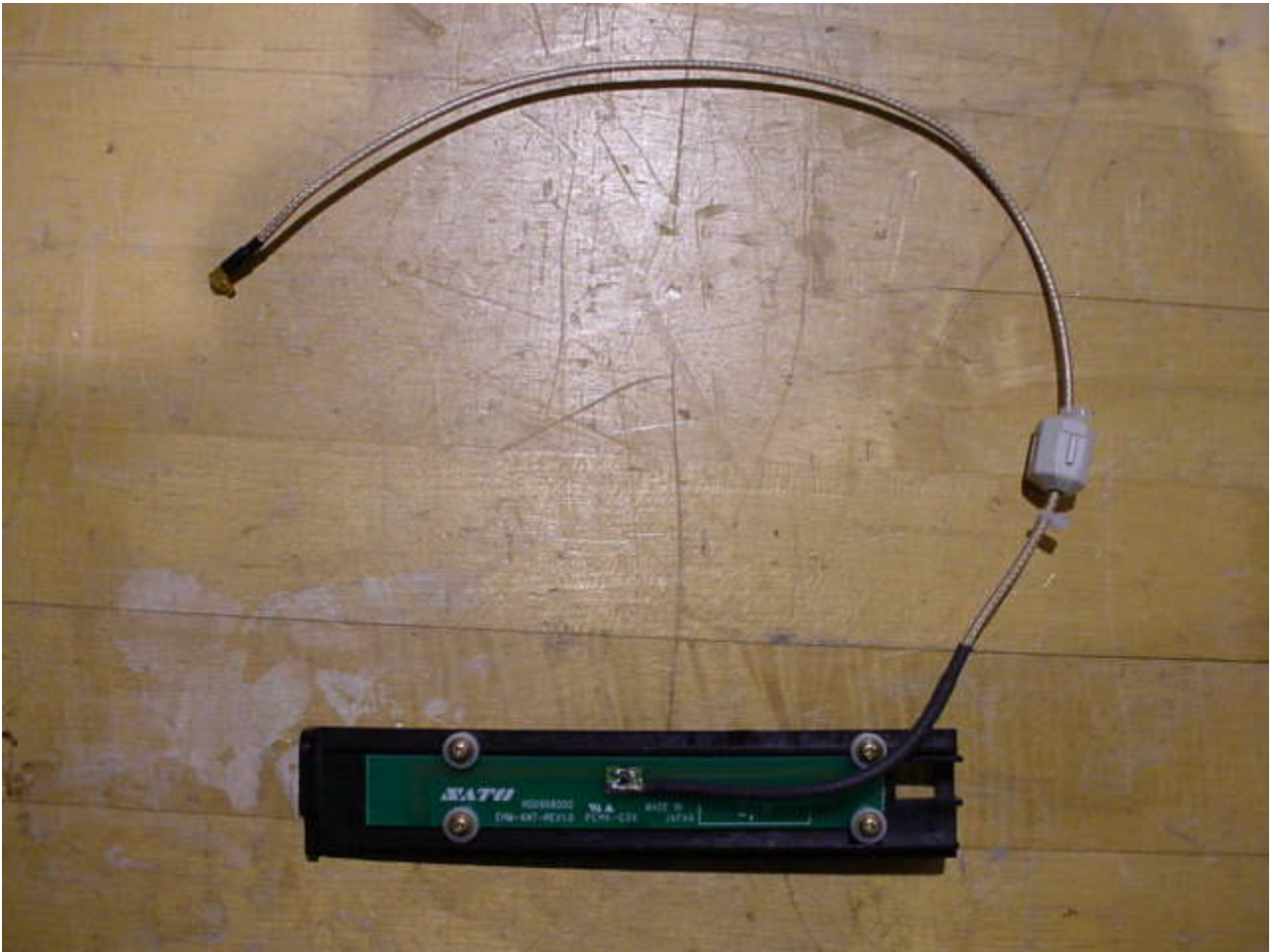


Figure 1.6b Modified Antenna Assembly

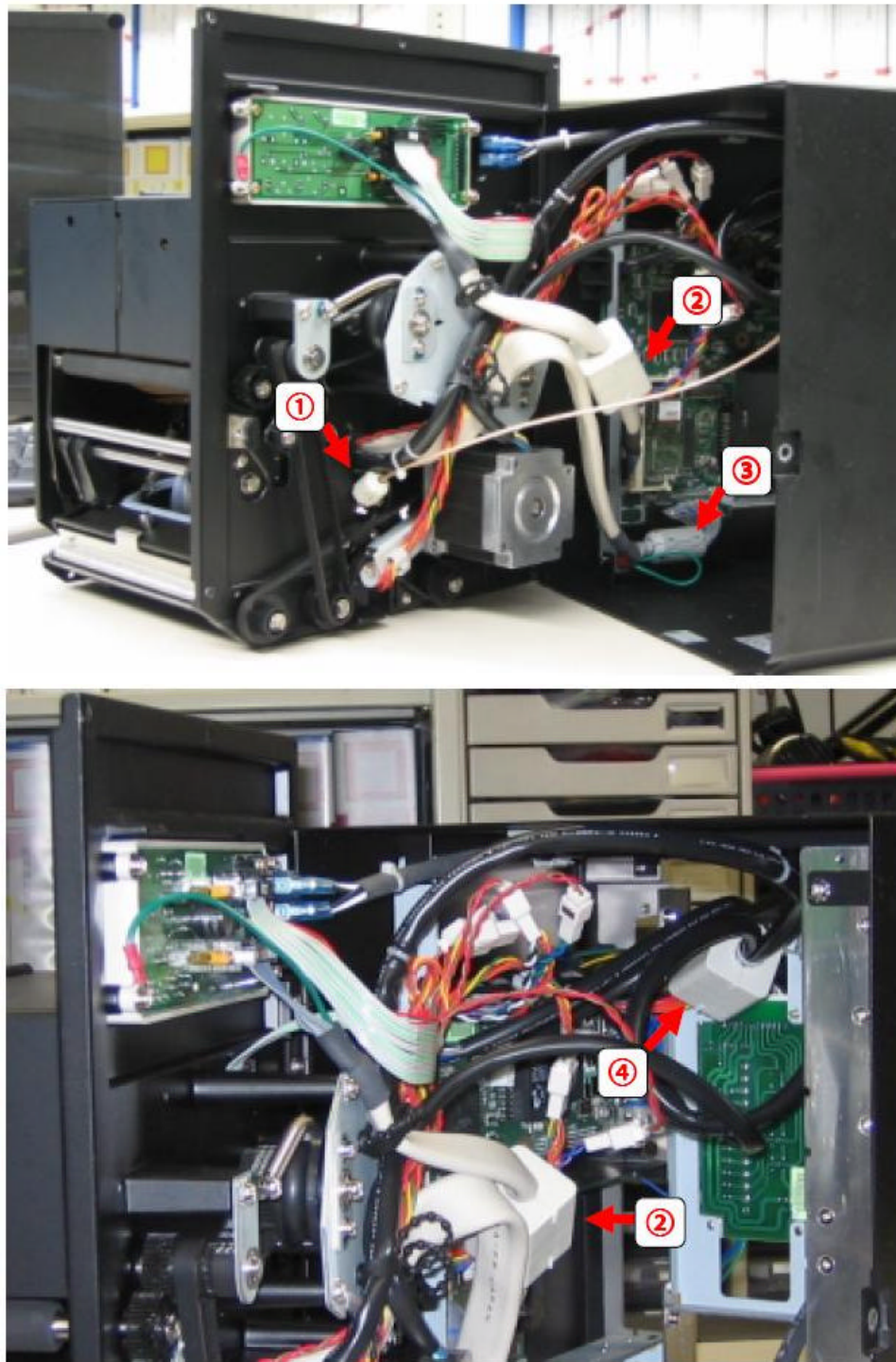


Figure 1.6c Ferrite Details

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
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Issued: 3-4-05

No.	Part Number	Manufacturer	Remarks
1	SFC-3	Kitagawa Industries	Added for compliance
2	SFC-10	Kitagawa Industries	Previously added
3	ZCAT 2035-0930	TDK Corporation	Previously added
4	SFC-10	Kitagawa Industries	Previously added
	ZCAT 1518-0730	TDK Corporation	Added for compliance Not Shown – Reader Communications Cable
	ZCAT 2035-0930	TDK Corporation	Previously added Not Shown – AC Cable

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

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 - FCC Part 15, Subpart C, Section 15.247	Y		1
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



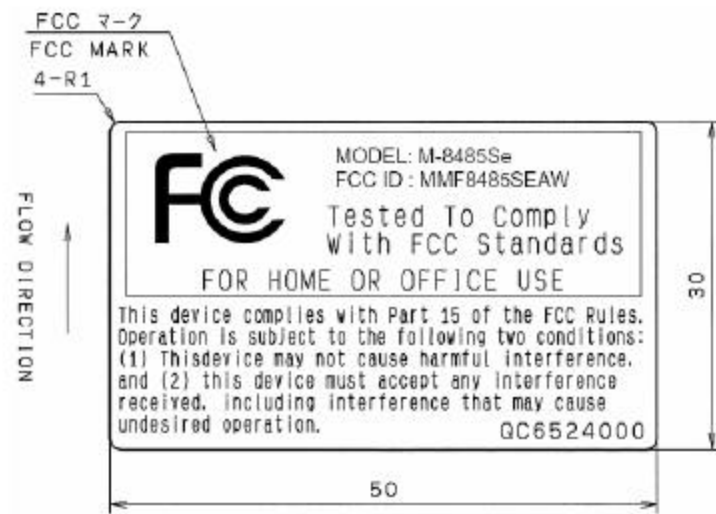
Joshua Thompson (Ext.22218)
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Robert DeLisi (Ext.22452)
Senior Staff Engineer
International EMC Services
Conformity Assessment Services-3027EMEL

3.0 FCC Labeling Information

Label



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

Conducted Emissions Measurement summary:	
Measurements	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:	23 November 2004

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>

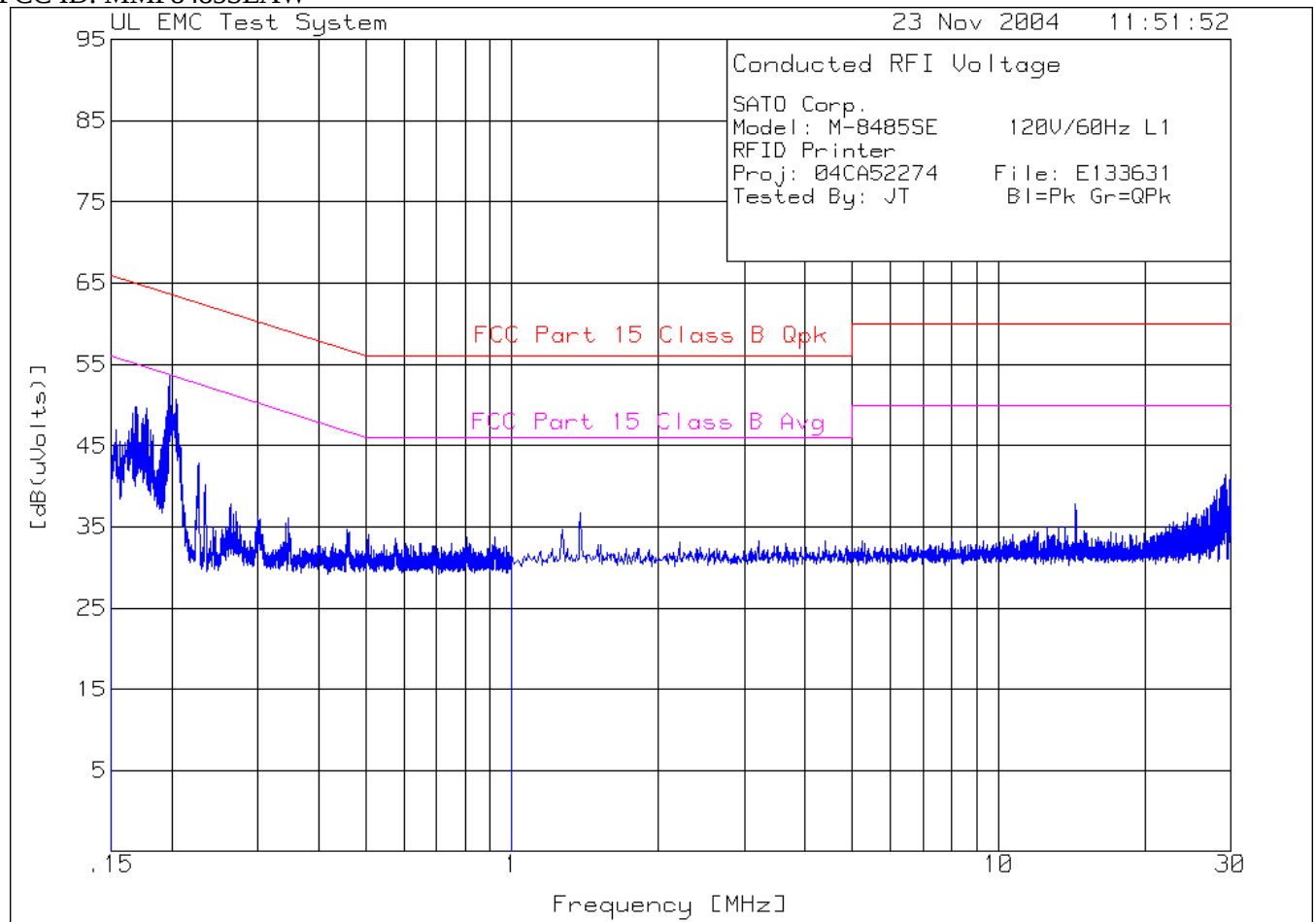
*See Power Interface and EUT Operating Modes for details

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: M-8485Se
 FCC ID: MMF8485SEAW
 SATO Corp.

Issued: 3-4-05

Model: M-8485SE 120V/60Hz L1
 RFID Printer
 Proj: 04CA52274 File: E133631

Tested By: JT Bl=Pk Gr=QPk

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

Range: 1 .15 - 1MHz -----

1	.1695	39.74 pk	10.1	0	49.84	65	55
		Margin [dB]				-15.16	-5.16
2	.17777	39.46 pk	10.1	0	49.56	64.6	54.6
		Margin [dB]				-15.04	-5.04
3	.19834	43.56 pk	10.1	0	53.66	63.7	53.7
		Margin [dB]				-10.04	-.04
4	.20448	40.66 pk	10.1	0	50.76	63.4	53.4
		Margin [dB]				-12.64	-2.64
5	.22674	32.7 pk	10.1	0	42.8	62.6	52.6
		Margin [dB]				-19.8	-9.8
6	.23395	30.02 pk	10.1	0	40.12	62.3	52.3
		Margin [dB]				-22.18	-12.18

Range: 1 1 - 30MHz -----

7	1.38339	26.7 pk	10.1	0	36.8	56	46
		Margin [dB]				-19.2	-9.2
8	14.39681	27.33 pk	10.5	0	37.83	60	50
		Margin [dB]				-22.17	-12.17
9	29.3344	30.89 pk	10.6	0	41.49	60	50
		Margin [dB]				-18.51	-8.51

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
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 SATO Corp.

Issued: 3-4-05

Model: M-8485SE 120V/60Hz L1
 RFID Printer
 Proj: 04CA52274 File: E133631

Tested By: JT Bl=Pk Gr=QPk

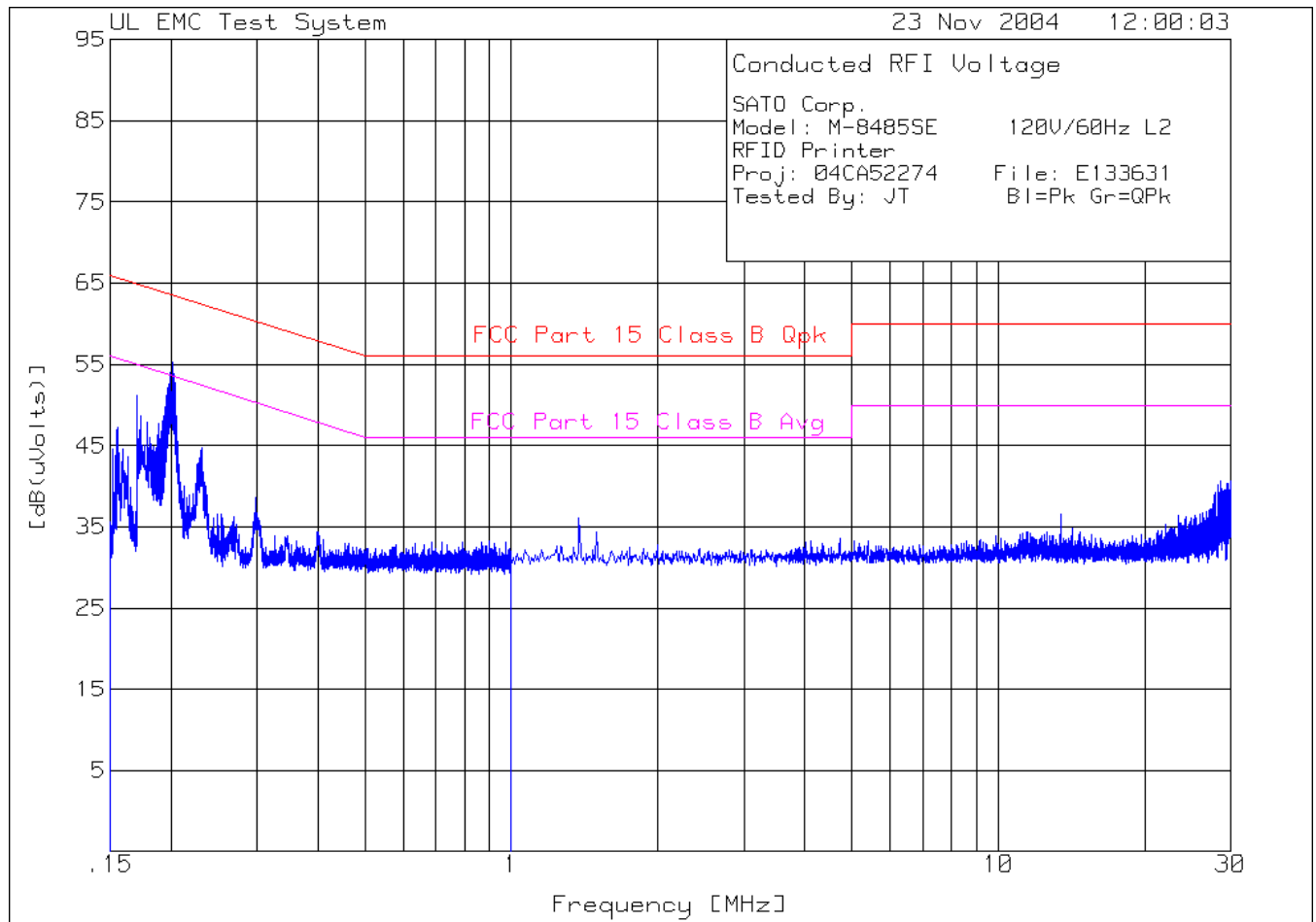
Test	Meter	Gain/Loss	Transducer	Level	Limit:1	Limit: 2
Frequency	Reading	Factor	Factor	[dB(uVolts)]		
[MHz]	[dB(uV)]	[dB]	[dB]			

=====						
Range: 1 .15 - 1MHz						
.1695	28.44 ave	10.1	0	38.54	65	55
	Margin [dB]:				-26.46	-16.46
.17777	21.45 ave	10.1	0	31.55	64.6	54.6
	Margin [dB]:				-33.05	-23.05
.19834	34.92 ave	10.1	0	45.02	63.7	53.7
	Margin [dB]:				-18.68	-8.68
.20448	31.42 ave	10.1	0	41.52	63.4	53.4
	Margin [dB]:				-21.88	-11.88

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

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 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: M-8485Se
 FCC ID: MMF8485SEAW
 SATO Corp.

Issued: 3-4-05

Model: M-8485SE 120V/60Hz L2
 RFID Printer
 Proj: O4CA52274 File: E133631

Tested By: JT Bl=Pk Gr=QPk

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

Range: 1 .15 - 1MHz -----

1 .15572	37.09 pk	10.1	0	47.19	65.7	55.7
	Margin [dB]				-18.51	-8.51
2 .17035	41.08 pk	10.1	0	51.18	64.9	54.9
	Margin [dB]				-13.72	-3.72
3 .20088	45.21 pk	10.1	0	55.31	63.6	53.6
	Margin [dB]				-8.29	1.71
4 .23077	34.69 pk	10.1	0	44.79	62.4	52.4
	Margin [dB]				-17.61	-7.61
5 .29776	27.38 pk	10.1	0	37.48	60.3	50.3
	Margin [dB]				-22.82	-12.82

Range: 1 1 - 30MHz -----

6 1.37615	25.98 pk	10.1	0	36.08	56	46
	Margin [dB]				-19.92	-9.92
7 13.4058	26.15 pk	10.4	0	36.55	60	50
	Margin [dB]				-23.45	-13.45
8 28.89315	28.77 pk	10.6	0	39.37	60	50
	Margin [dB]				-20.63	-10.63

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

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File Number: E133631
 Project Number: O4CA52274
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 SATO Corp.

Issued: 3-4-05

Model: M -8485SE 120V/60Hz L2
 RFID Printer
 Proj: 04CA52274 File: E133631

Tested By: JT Bl=Pk Gr=QPk

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

=====

Range: 1 .15 - 1MHz

.15572	23.26 ave	10.1	0	33.36	65.7	55.7
	Margin [dB]:				-32.34	-22.34
.17035	29.05 ave	10.1	0	39.15	64.9	54.9
	Margin [dB]:				-25.75	-15.75
.20088	36.83 ave	10.1	0	46.93	63.6	53.6
	Margin [dB]:				-16.67	-6.67
.23077	26.22 ave	10.1	0	36.32	62.4	52.4
	Margin [dB]:				-26.08	-16.08

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

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 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 $\geq$ 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 Spurious RF 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
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FCC ID: MMF8485SEAW

Issued: 3-4-05

Test equipment used for Conducted Emissions

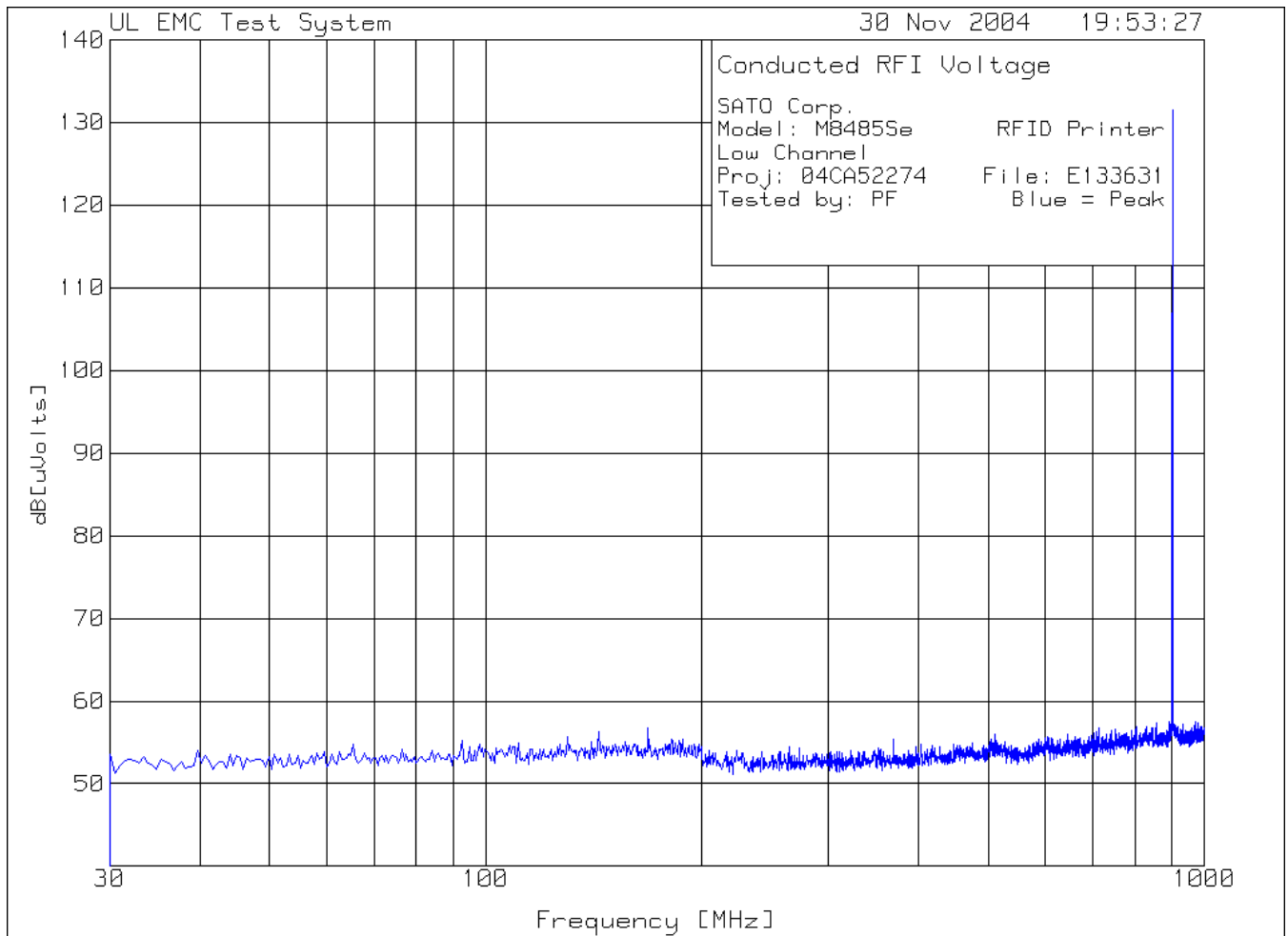
ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			RBW 100 kHz
			VBW 300 kHz
Range: 0.03 -10 GHz	Last Calibration Date: 7 September 2004		Calibration Due Date: 7 September 2005
EMI Software Version	9.2		

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

File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

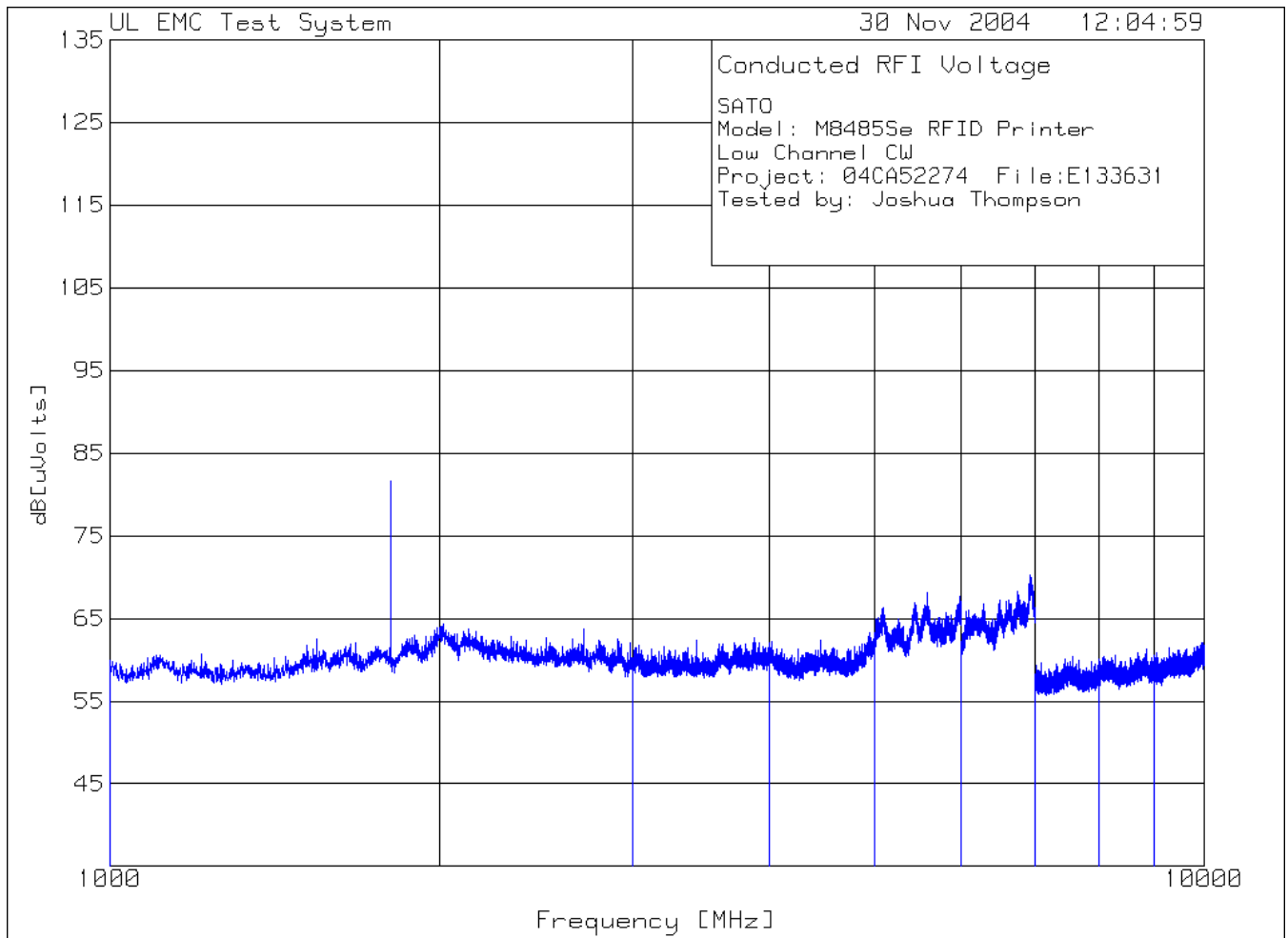
Issued: 3-4-05



SATO Corp.
 Model: M8485Se RFID Printer
 Low Channel
 Proj: 04CA52274 File: E133631
 Tested by: PF Blue = Peak

No.	Test 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: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model: M8485Se 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	-	-	-
---	----------	---------	------	---	------	---	---	---

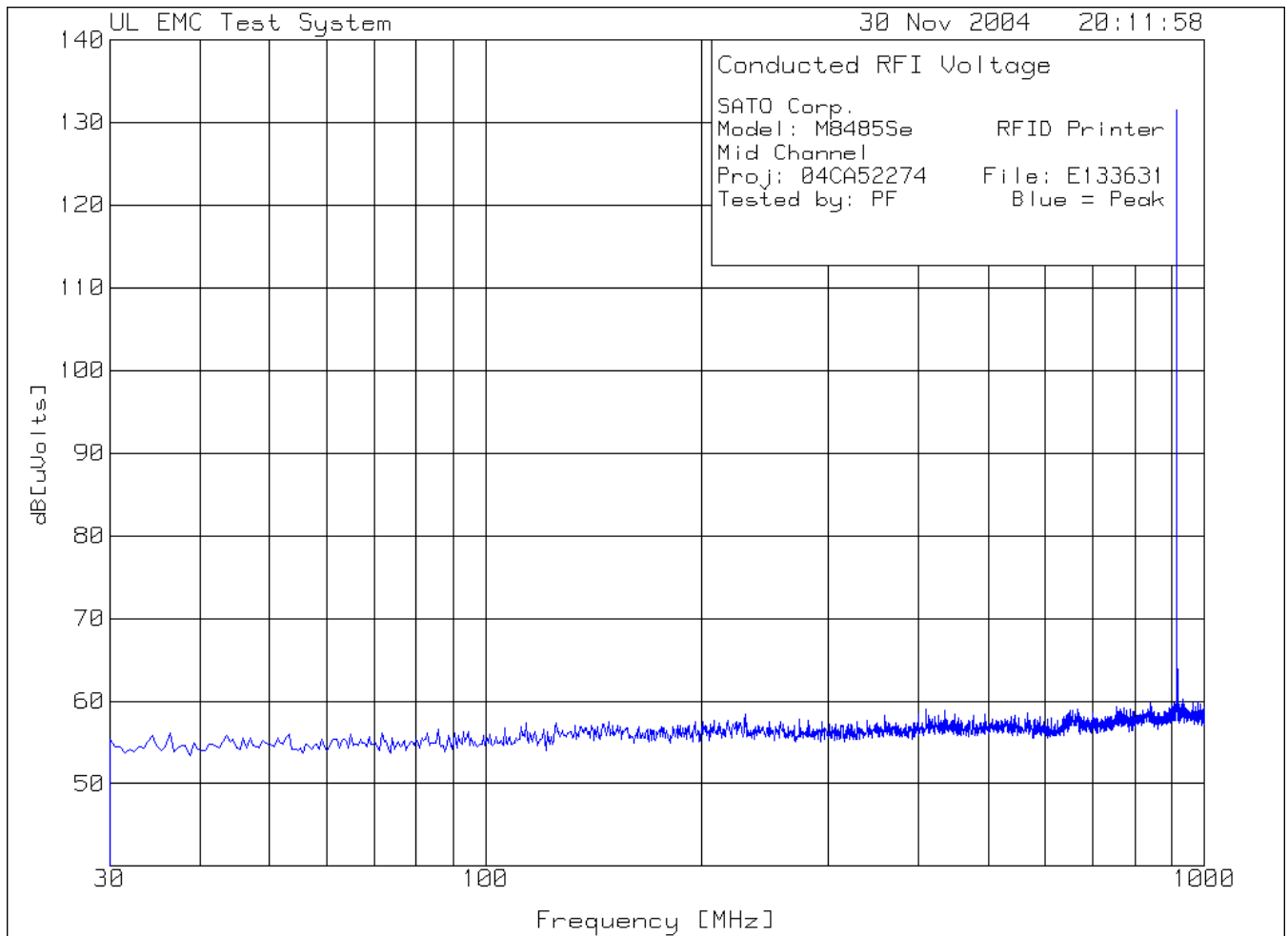
Range:7 8000 - 9000MHz -----

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	-	-	-
---	----------	----------	----	---	-------	---	---	---

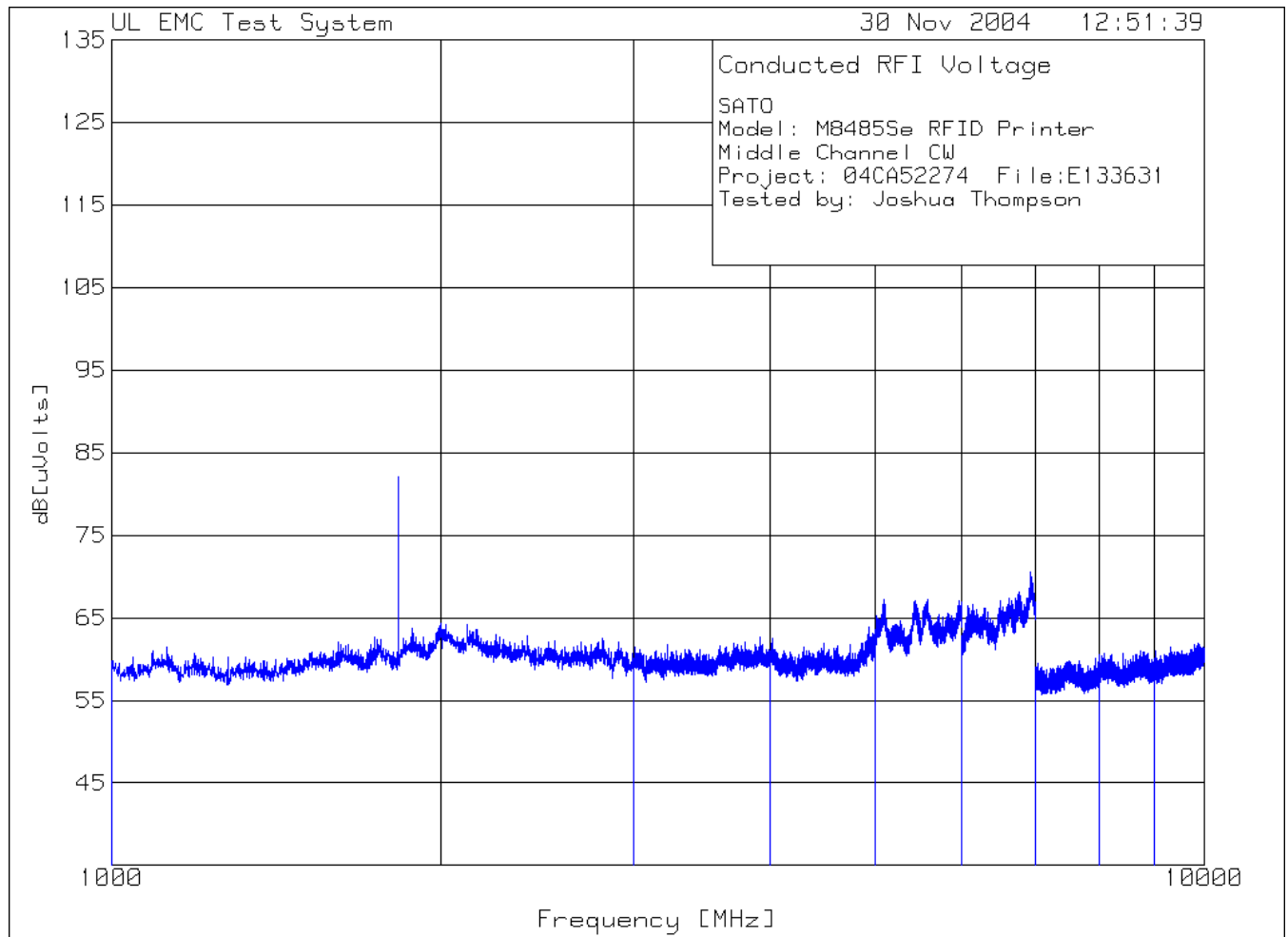
pk - Peak detector



SATO Corp.
 Model: M8485Se RFID Printer
 Mid Channel
 Proj: 04CA52274 File: E133631
 Tested by: PF Blue = Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
1	915.5677	110.83 pk	20.7	0	131.53	-	-	-
				Margin [dB]		-	-	-

pk - Peak detector



File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model: M8485Se 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	-	-	-
---	----------	----------	------	---	-------	---	---	---

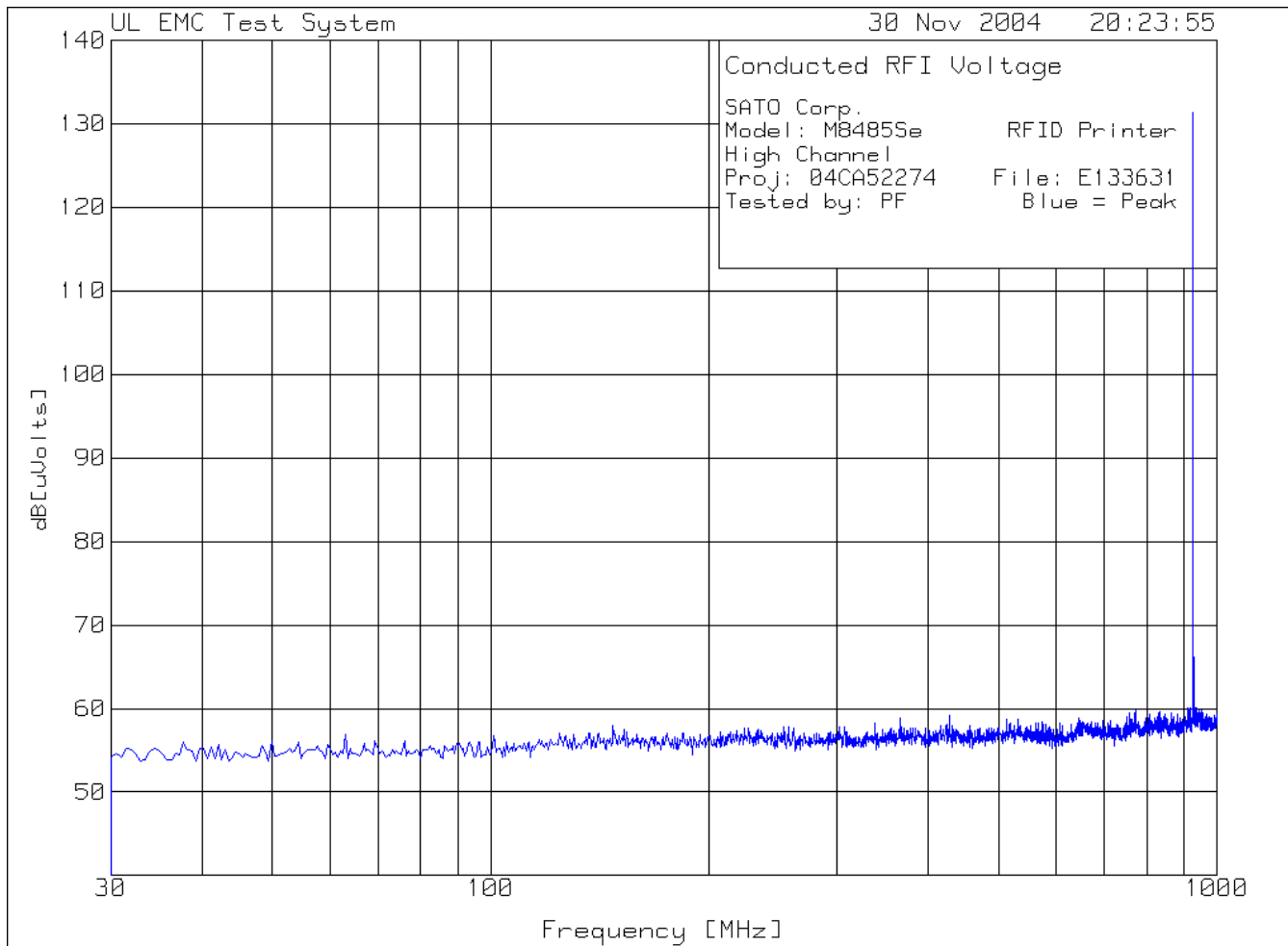
Range:7 8000 - 9000MHz -----

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	-	-	-
---	----------	----------	------	---	-------	---	---	---

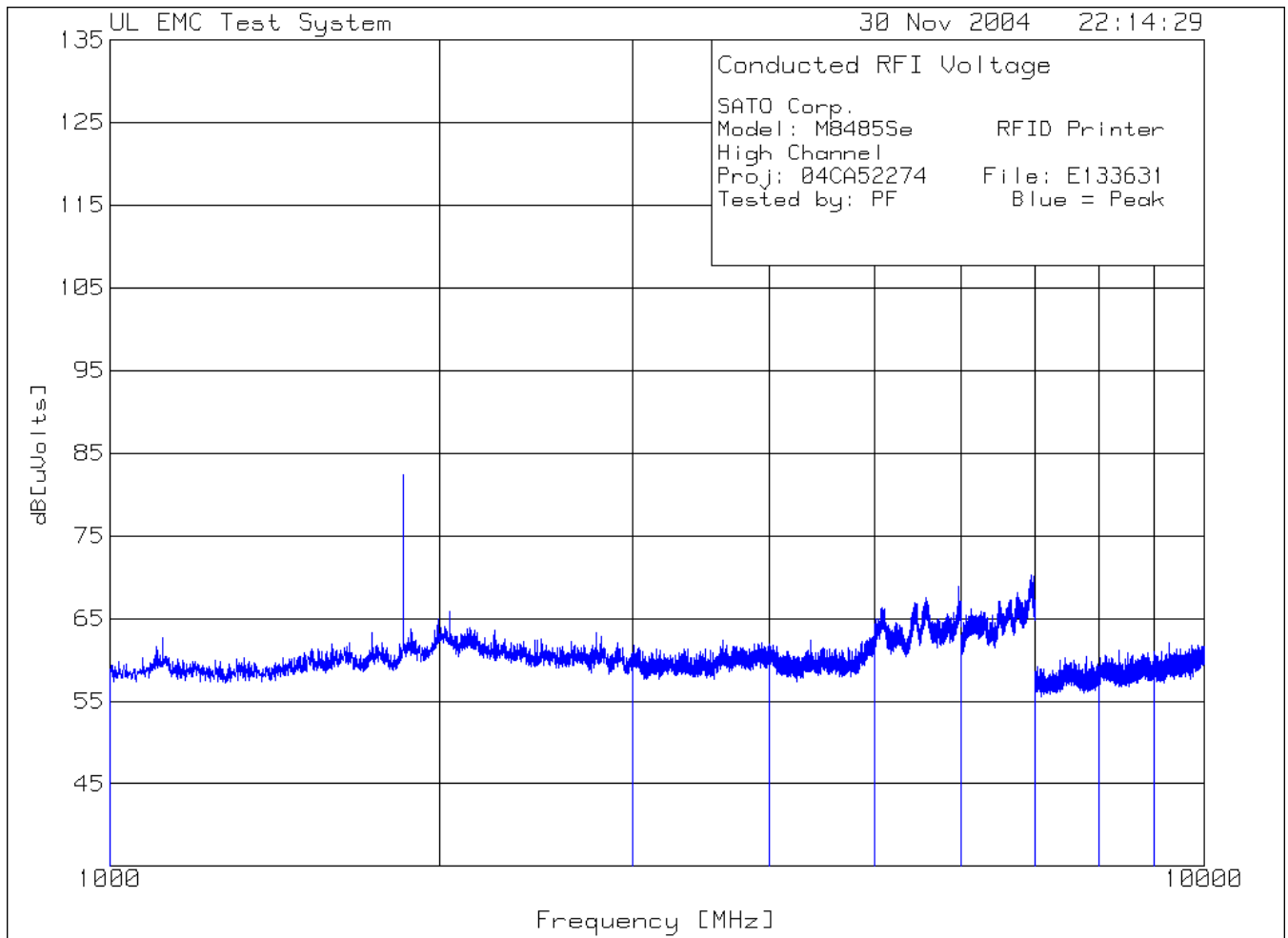
pk - Peak detector



SATO Corp.
 Model: M8485Se RFID Printer
 High Channel
 Proj: 04CA52274 File: E133631
 Tested by: PF Blue = Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
1	926.7283	110.66 pk	20.7	0	131.36	-	-	-
Margin [dB]						-	-	-

pk - Peak detector



SATO Corp.

File Number: E133631

Issued: 3-4-05

Project Number: O4CA52274

Model Number: M-8485Se

FCC ID: MMF8485SEAW

Model: M8485Se RFID Printer

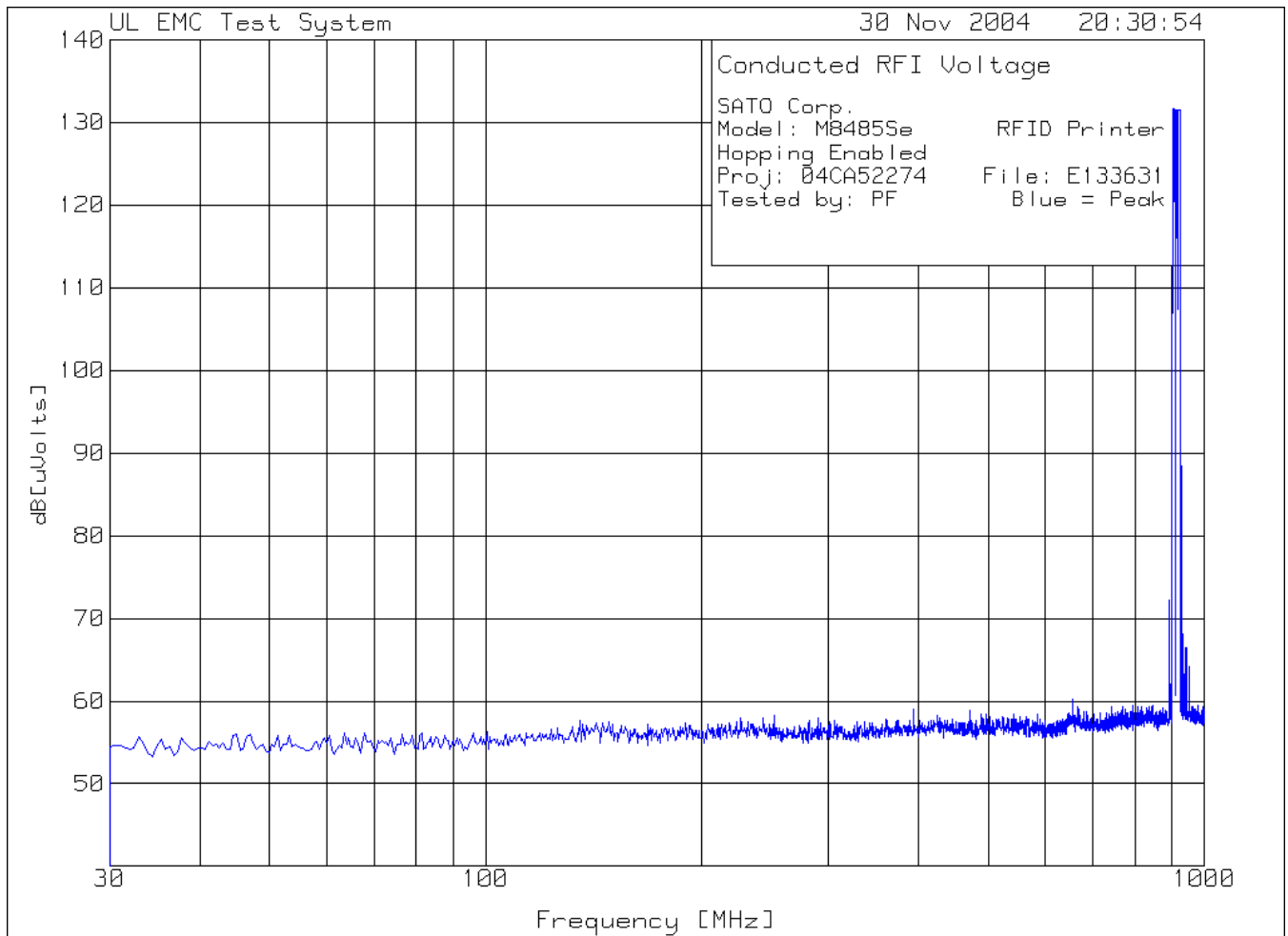
High Channel

Proj: 04CA52274 File: E133631

Tested by: PF Blue = Peak

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
4	5	6					
No. Frequency	Reading	Factor	Factor	dB[uVolts]			
[MHz]	[dB(uV)]	[dB]	[dB]				
=====							
=====							
Range: 2 1000 - 3000MHz -----							
1 1853.427	61.13 pk	21.2	0	82.33	-	-	-
2 2779.89	41.52 pk	21.7	0	63.22	-	-	-
Range: 2 3000 - 4000MHz -----							
3 3706.353	38.76 pk	21.6	0	60.36	-	-	-
Range: 3 4000 - 5000MHz -----							
4 4630.815	37.58 pk	21.9	0	59.48	-	-	-
Range: 4 5000 - 6000MHz -----							
5 5558.279	45.29 pk	21.6	0	66.89	-	-	-
Range: 5 6000 - 7000MHz -----							
6 6486.743	45.06 pk	21.3	0	66.36	-	-	-
Range: 6 7000 - 8000MHz -----							
7 7412.206	37.8 pk	20.9	0	58.7	-	-	-
Range: 7 8000 - 9000MHz -----							
8 8339.17	36.47 pk	21.5	0	57.97	-	-	-
Range: 8 9000 - 10000MHz -----							
9 9263.632	37.91 pk	22.2	0	60.11	-	-	-

pk - Peak detector

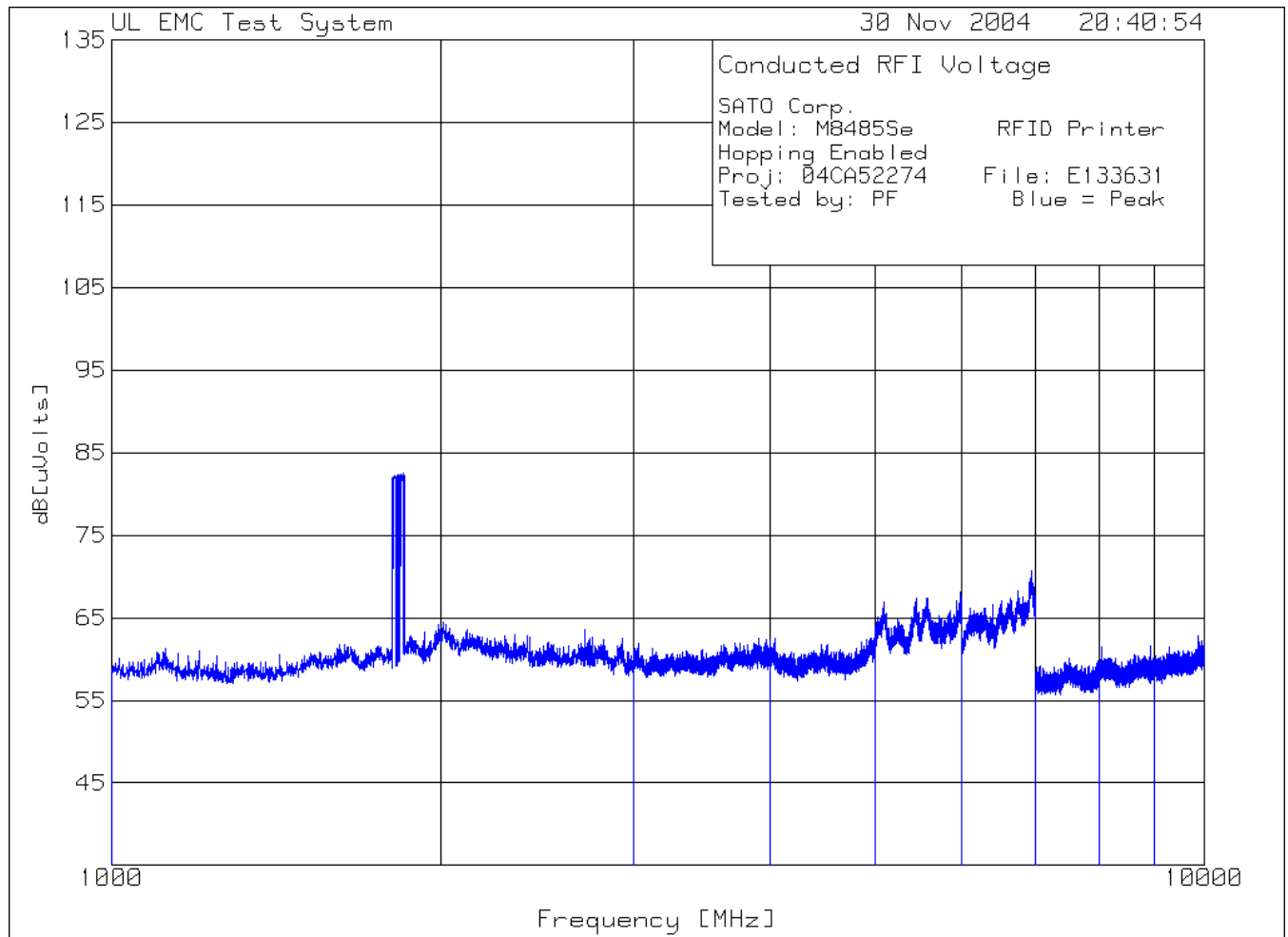


SATO Corp.
 Model: M8485Se
 Hopping Enabled
 Proj: 04CA52274
 Tested by: PF

RFID Printer
 File: E133631
 Blue = Peak

Test No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3
1	917.0235	110.87 pk	20.7	0	131.57	-	-	-
Margin [dB]						-	-	-

pk - Peak detector



File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.

Model: M8485Se RFID Printer

Hopping Enabled

Proj: 04CA52274 File: E133631

Tested by: PF Blue = Peak

4	Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
5	6							
No.	Frequency	Reading	Factor	Factor	dB[uVolts]			
	[MHz]	[dB(uV)]	[dB]	[dB]				
=====								
=====								
Range: 2 1000 - 3000MHz -----								
1	1850.425	60.96 pk	21.5	0	82.46	-	-	-
2	2750.876	41.57 pk	21.1	0	62.67	-	-	-
Range: 2 3000 - 4000MHz -----								
3	3692.846	39.02 pk	21.8	0	60.82	-	-	-
Range: 3 4000 - 5000MHz -----								
4	4624.312	38.88 pk	22	0	60.88	-	-	-
Range: 4 5000 - 6000MHz -----								
5	5559.28	44.82 pk	21.6	0	66.42	-	-	-
Range: 5 6000 - 7000MHz -----								
6	6482.741	44.61 pk	21.3	0	65.91	-	-	-
Range: 6 7000 - 8000MHz -----								
7	7396.198	37.96 pk	20.8	0	58.76	-	-	-
Range: 7 8000 - 9000MHz -----								
8	8325.163	37.75 pk	21.5	0	59.25	-	-	-
Range: 8 9000 - 10000MHz -----								
9	9246.623	38.44 pk	22.2	0	60.64	-	-	-

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 MHz	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: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

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

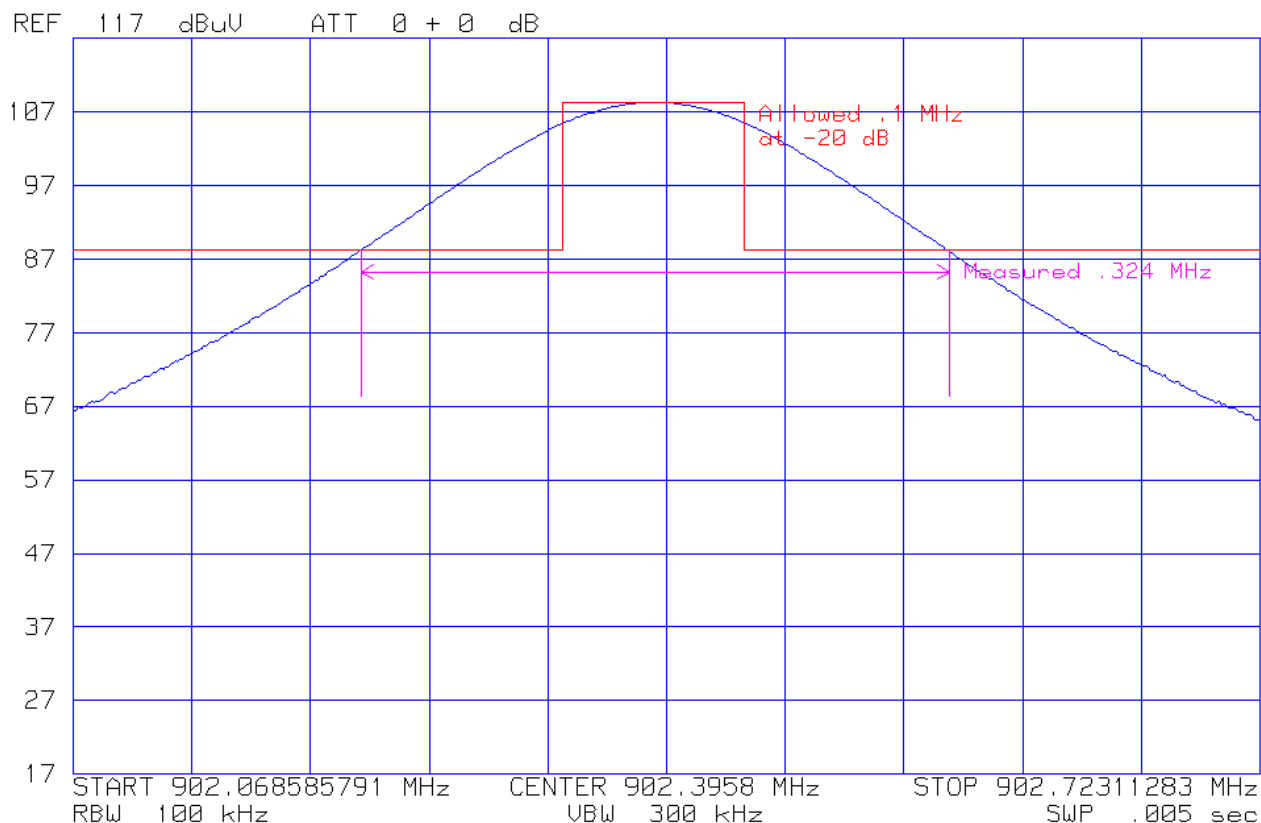
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

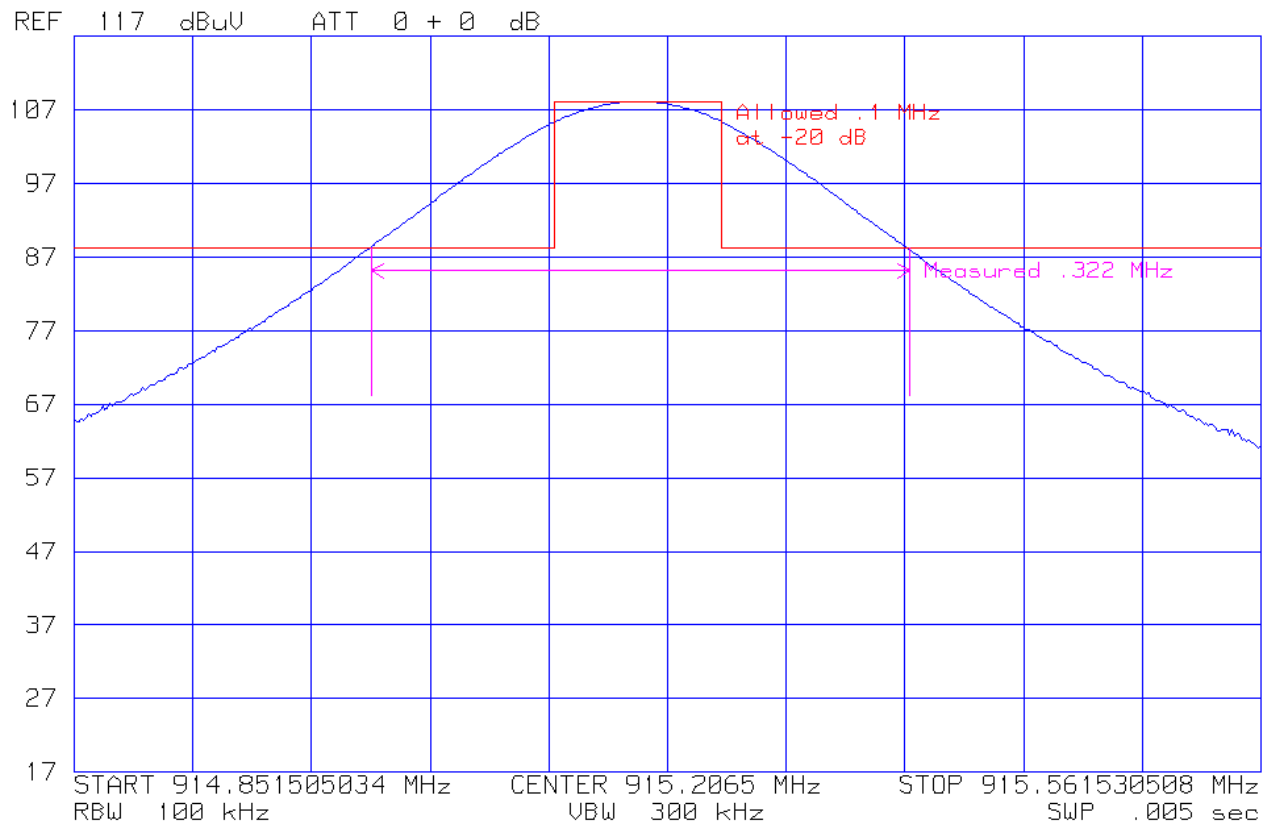
Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

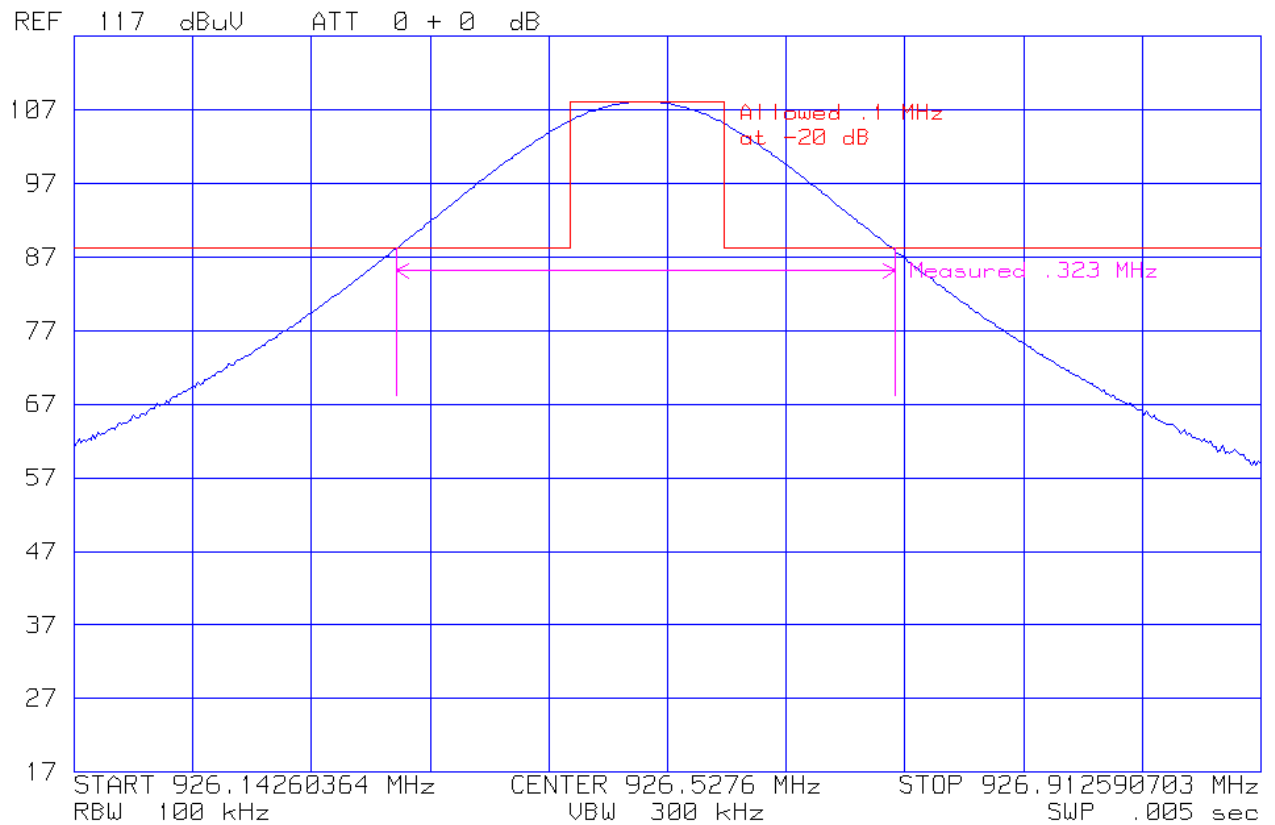
Calibration Due Date: 18 June 2005



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

ESI26

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
Ranges

Equipment No.: ME4-268

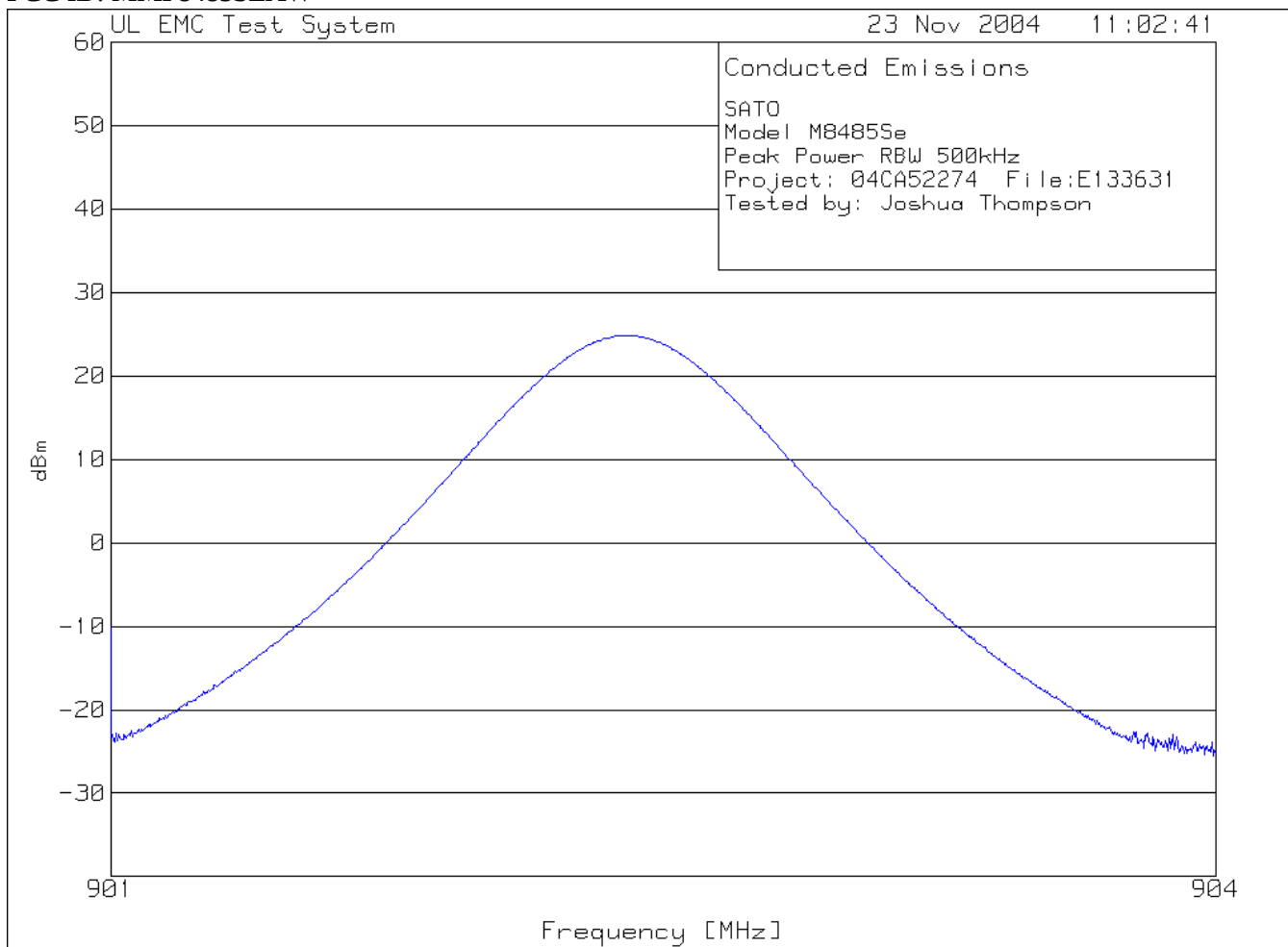
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

Calibration Due Date: 18 June 2005



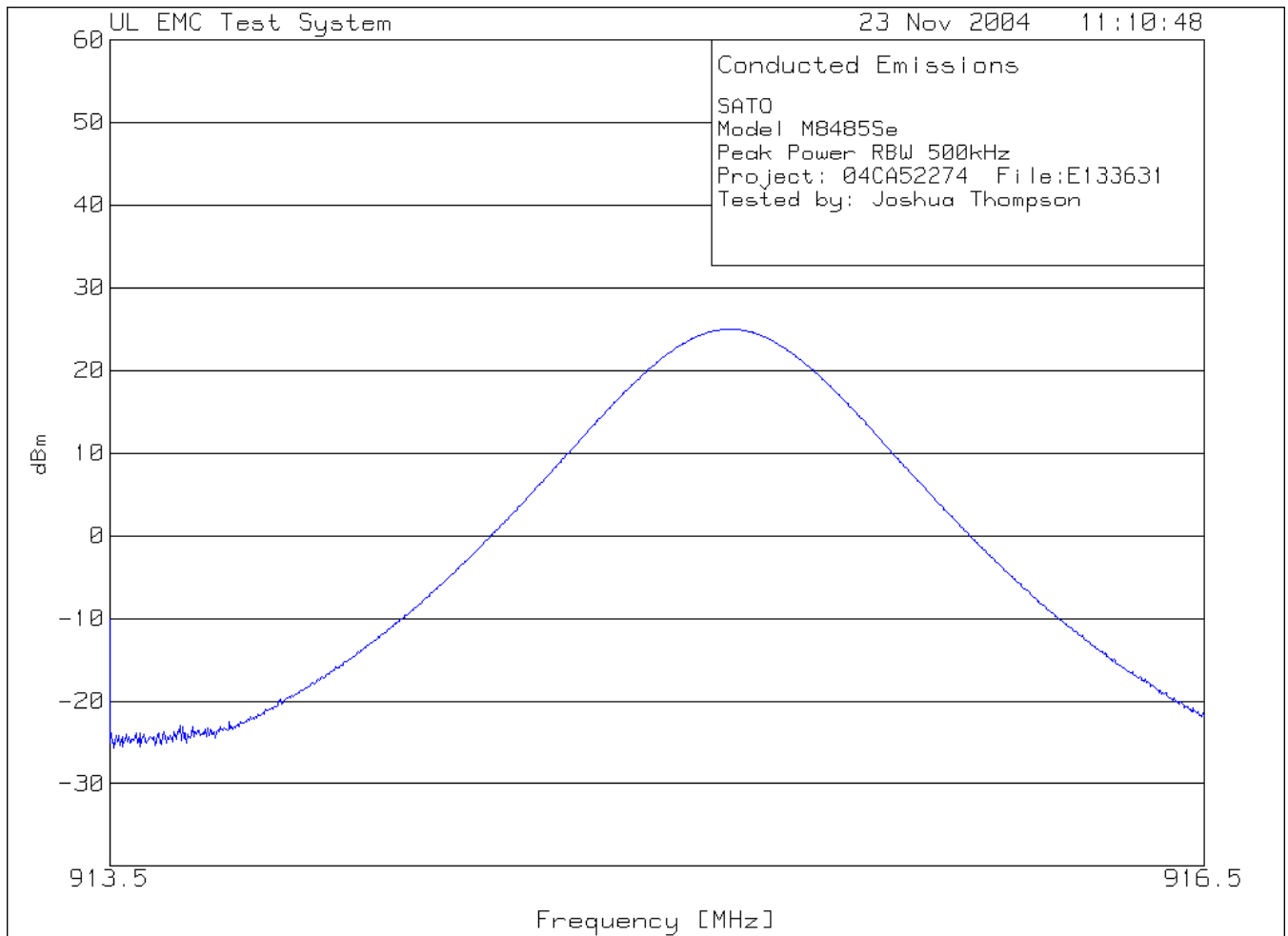
SATO
 Model M8485Se
 Peak Power RBW 500kHz
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
=====								
Range 1 901 - 904MHz -----								
1	902.3994	108.23 pk	23.6	-107	24.83	-	-	-

pk - Peak detector

File Number: E133631
 Project Number: 04CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05



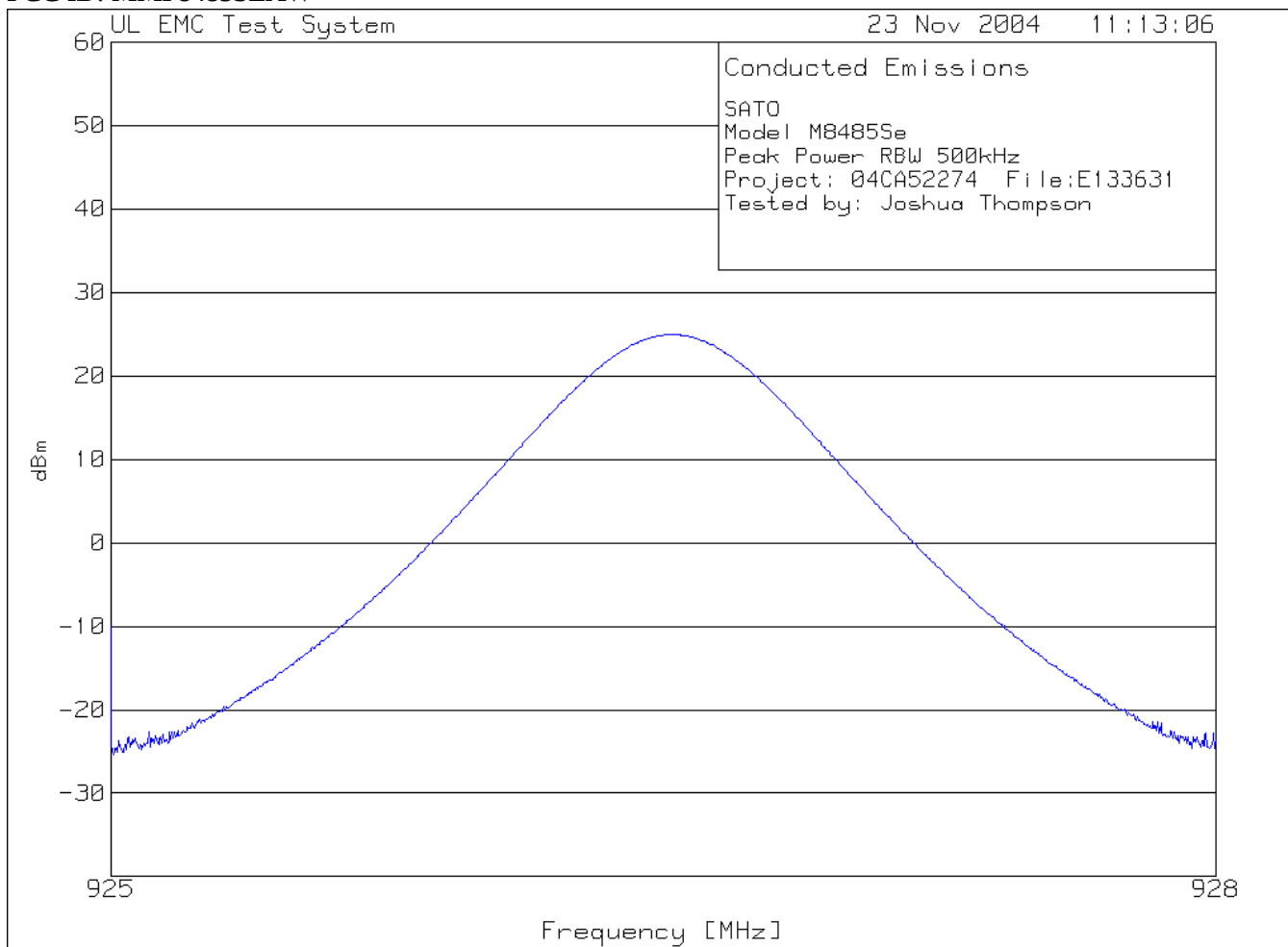
SATO
 Model M8485Se
 Peak Power RBW 500kHz
 Project: 04CA52274 File:E133631
 Tested by: Joshua Thompson

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

pk - Peak detector

File Number: E133631
 Project Number: 04CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05



SATO
 Model M8485Se
 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

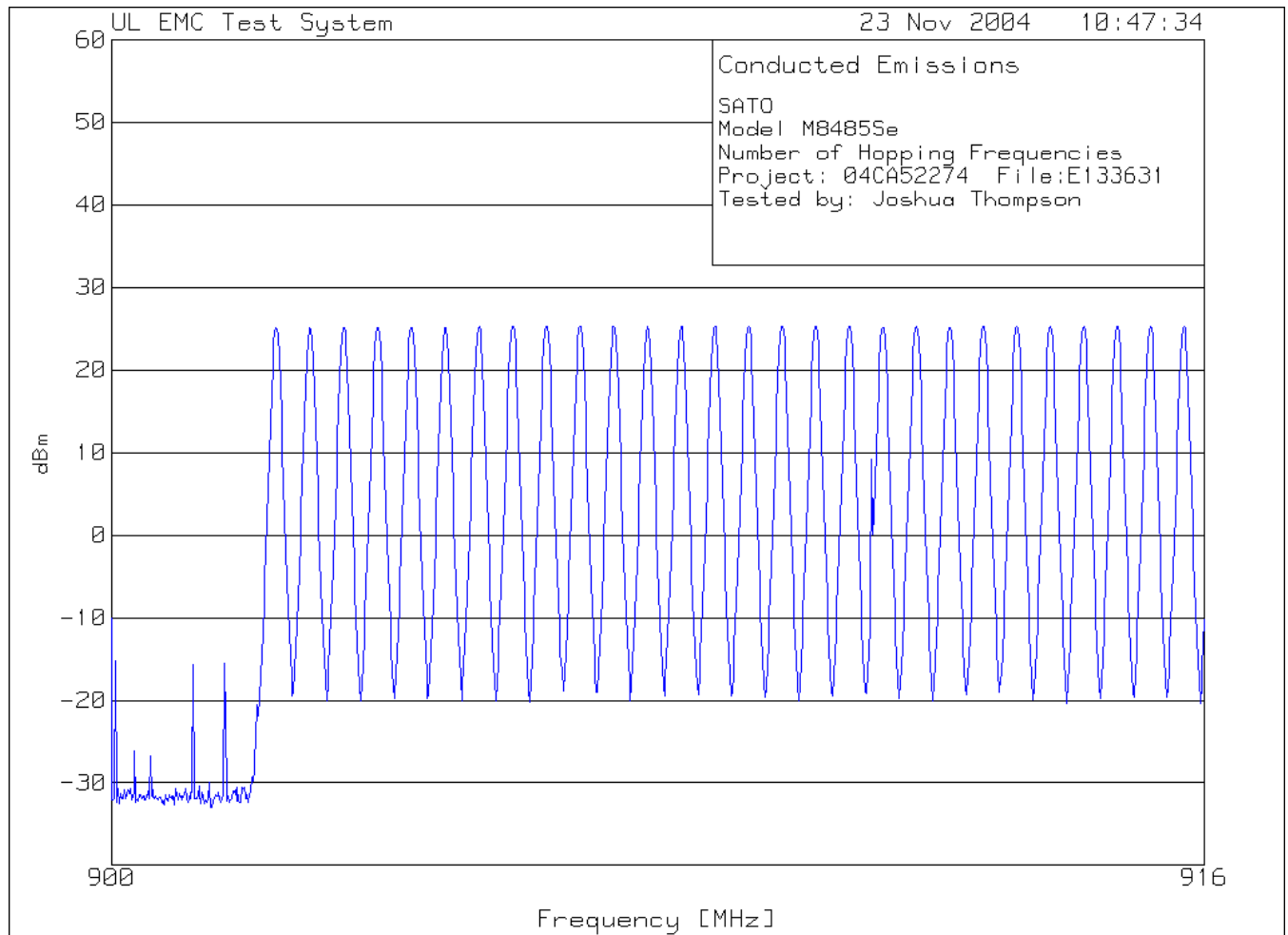
Temp: 0°C-55°C

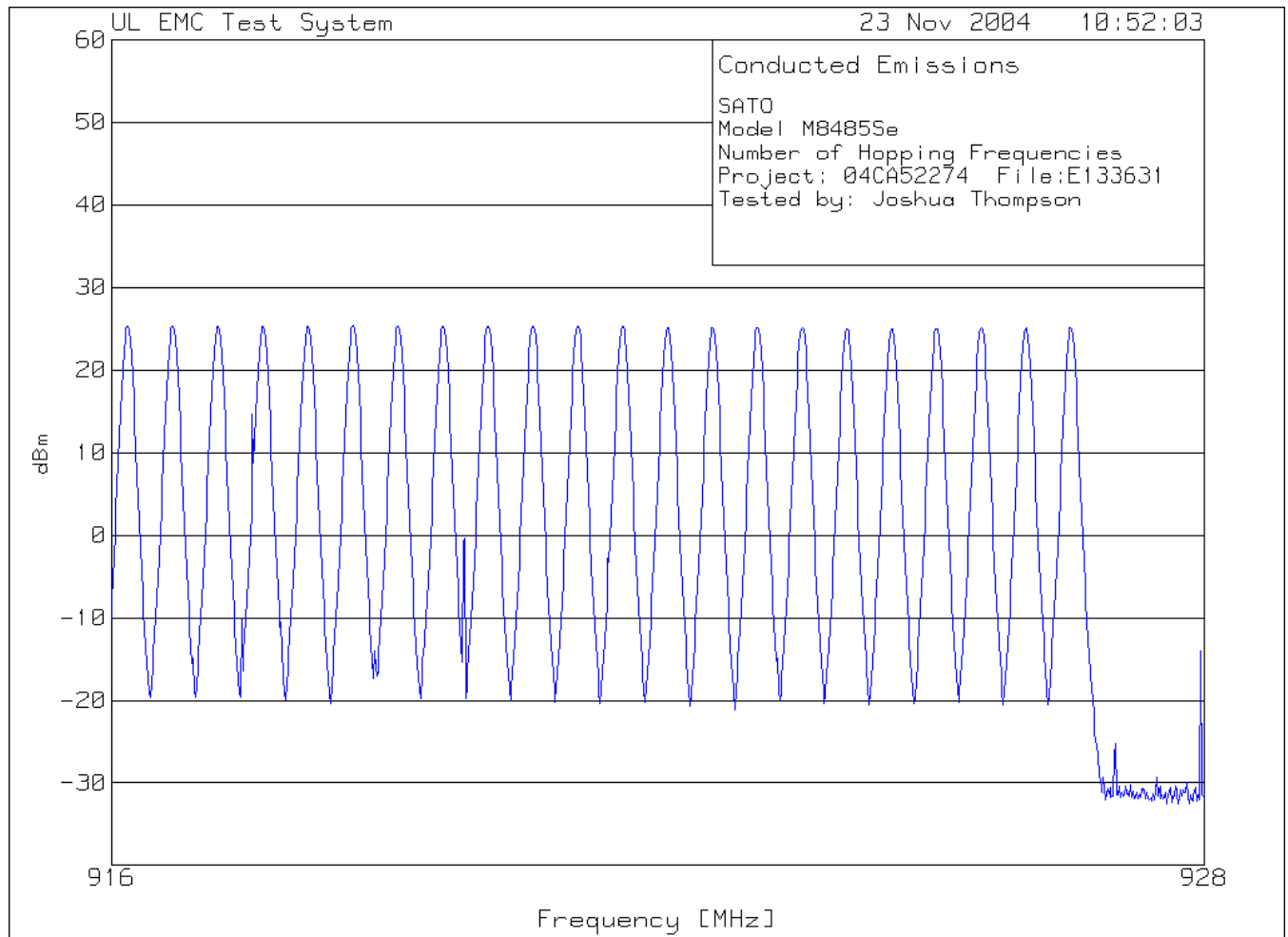
Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date :18 June 2004

Calibration Due Date: 18 June 2005





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

Equipment No.: ME4-268

meter

Ranges

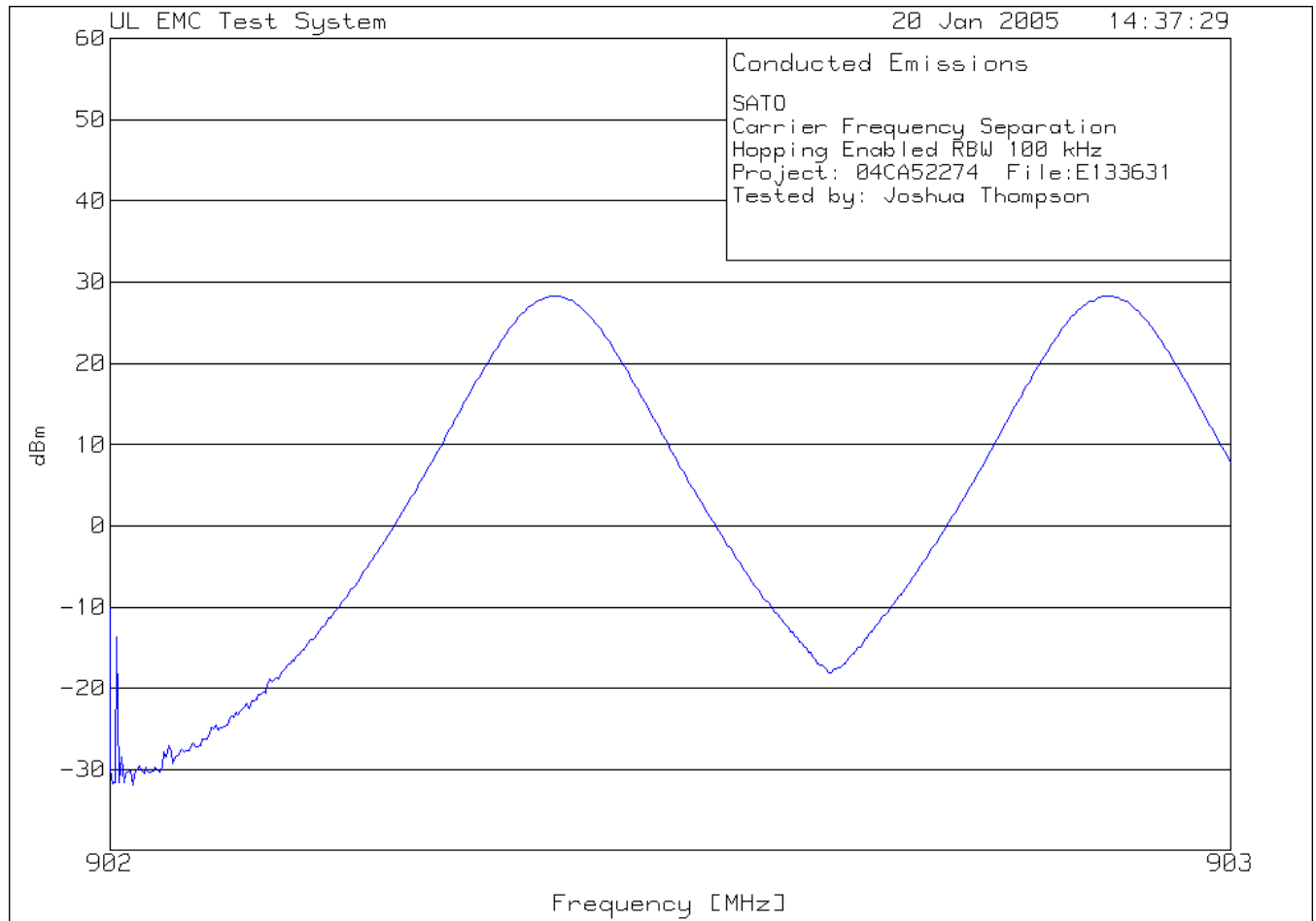
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

Calibration Due Date: 18 June 2005



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

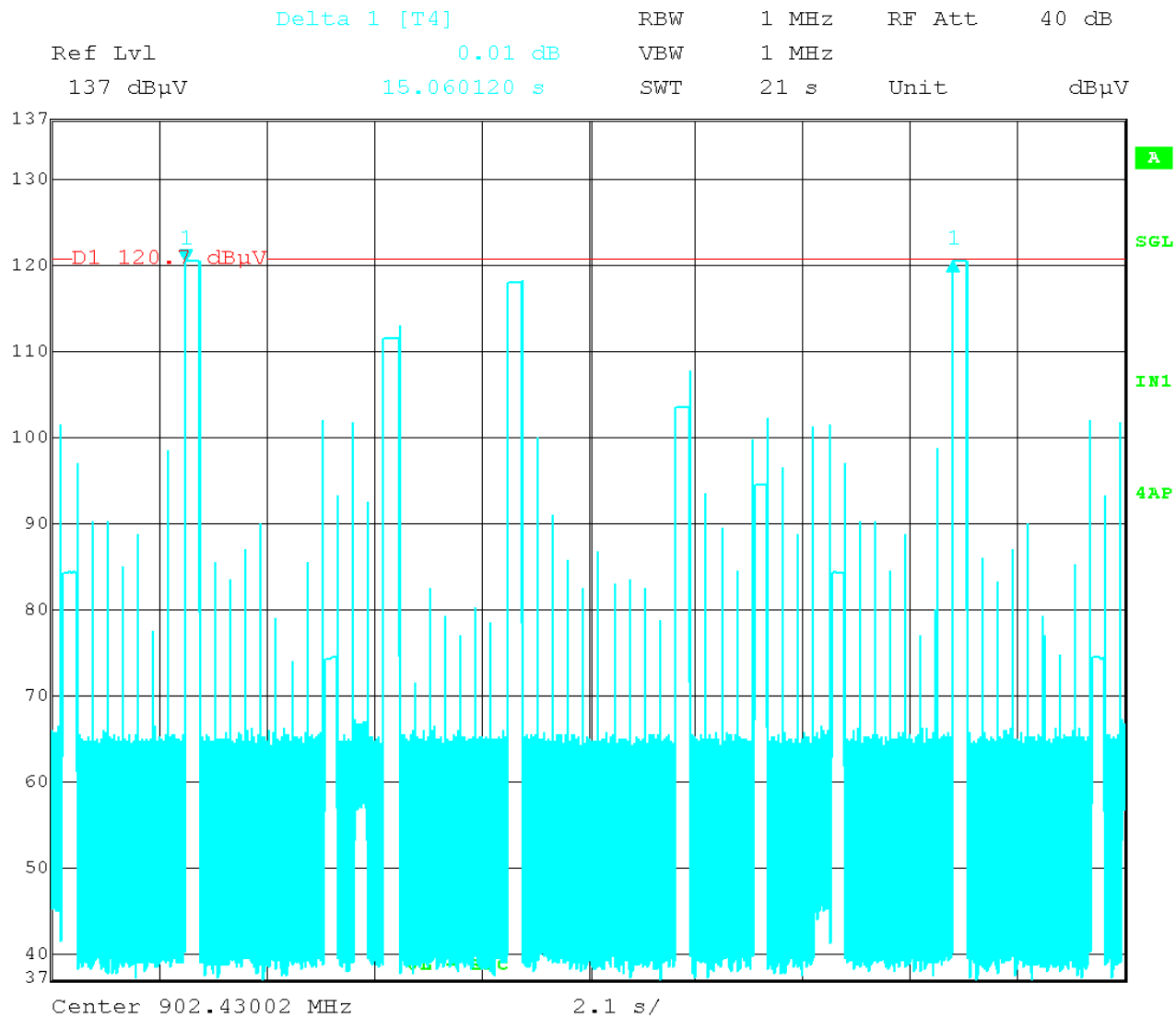
Temp: 0°C-55°C

Humidity: 25% to 95 %RH

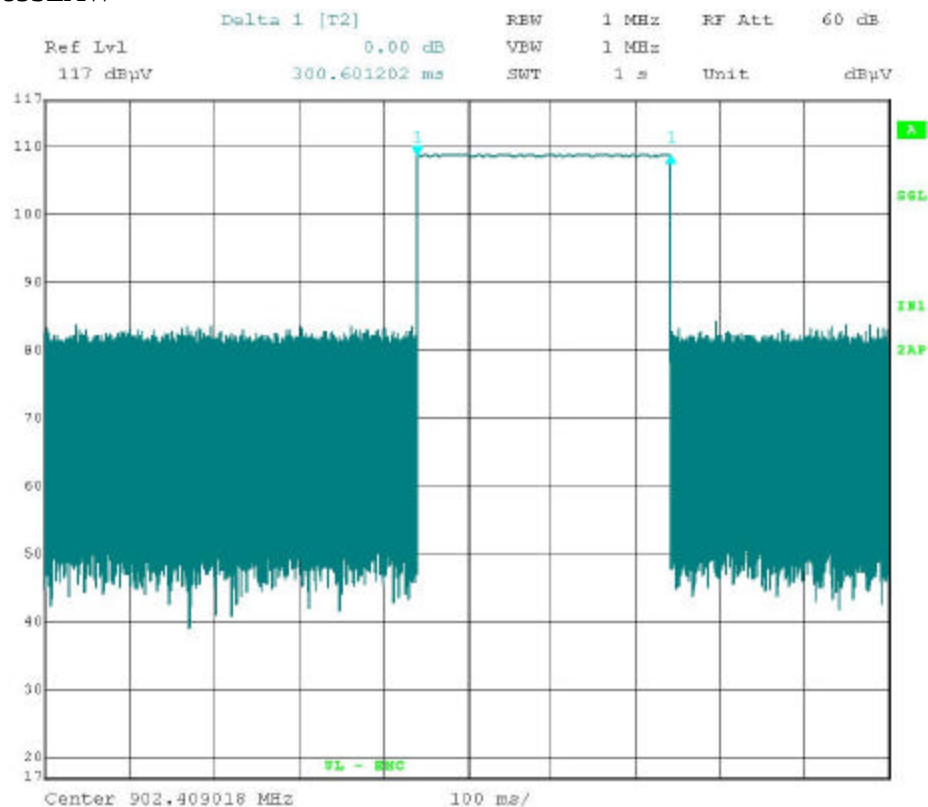
Pressure: 795 to 1050 mbar

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 Compliance. Data Pages follow.

Temperature:	21°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 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: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

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

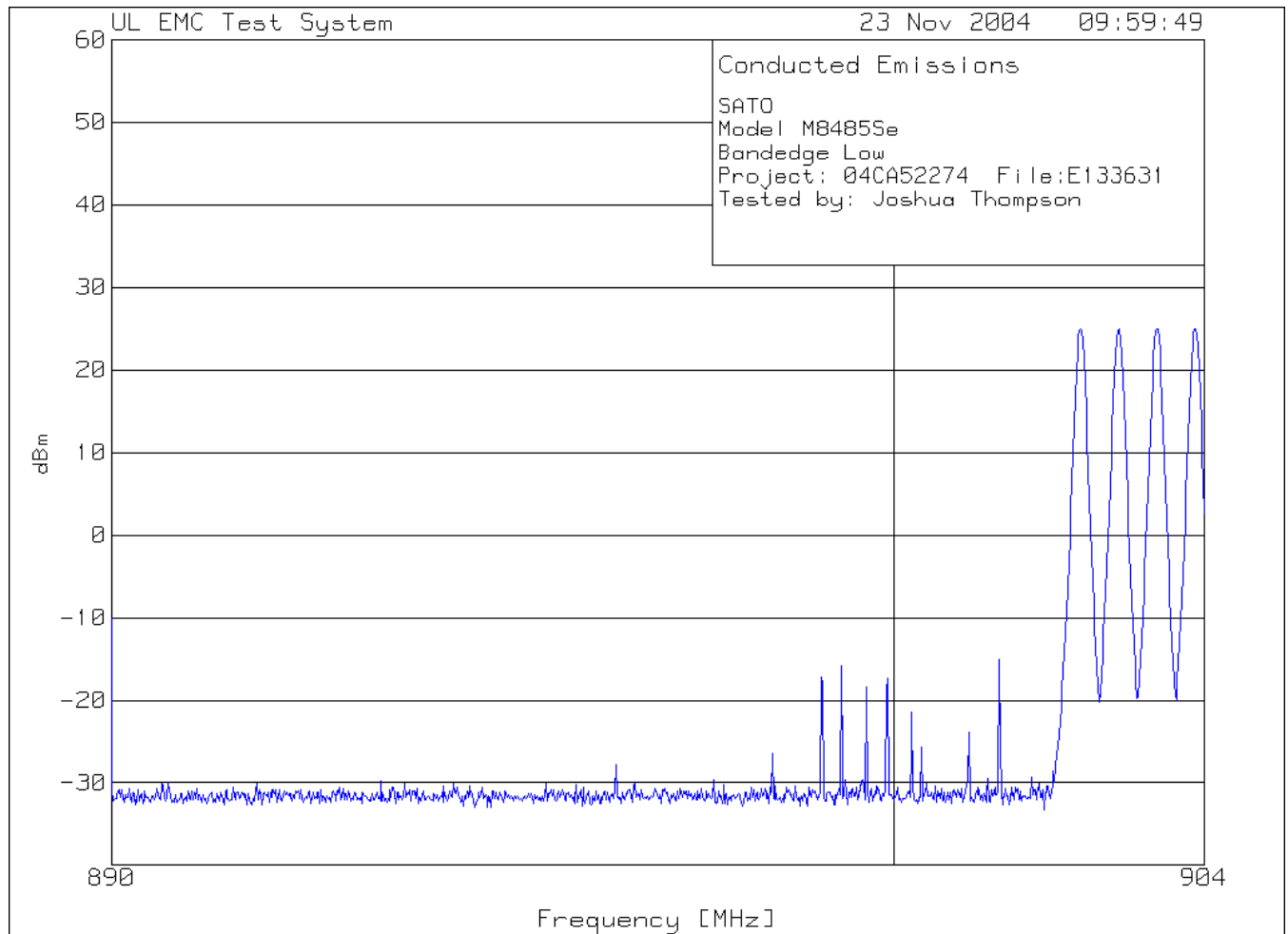
Temp: 0°C-55°C

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: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SAT0

Model M8485Se

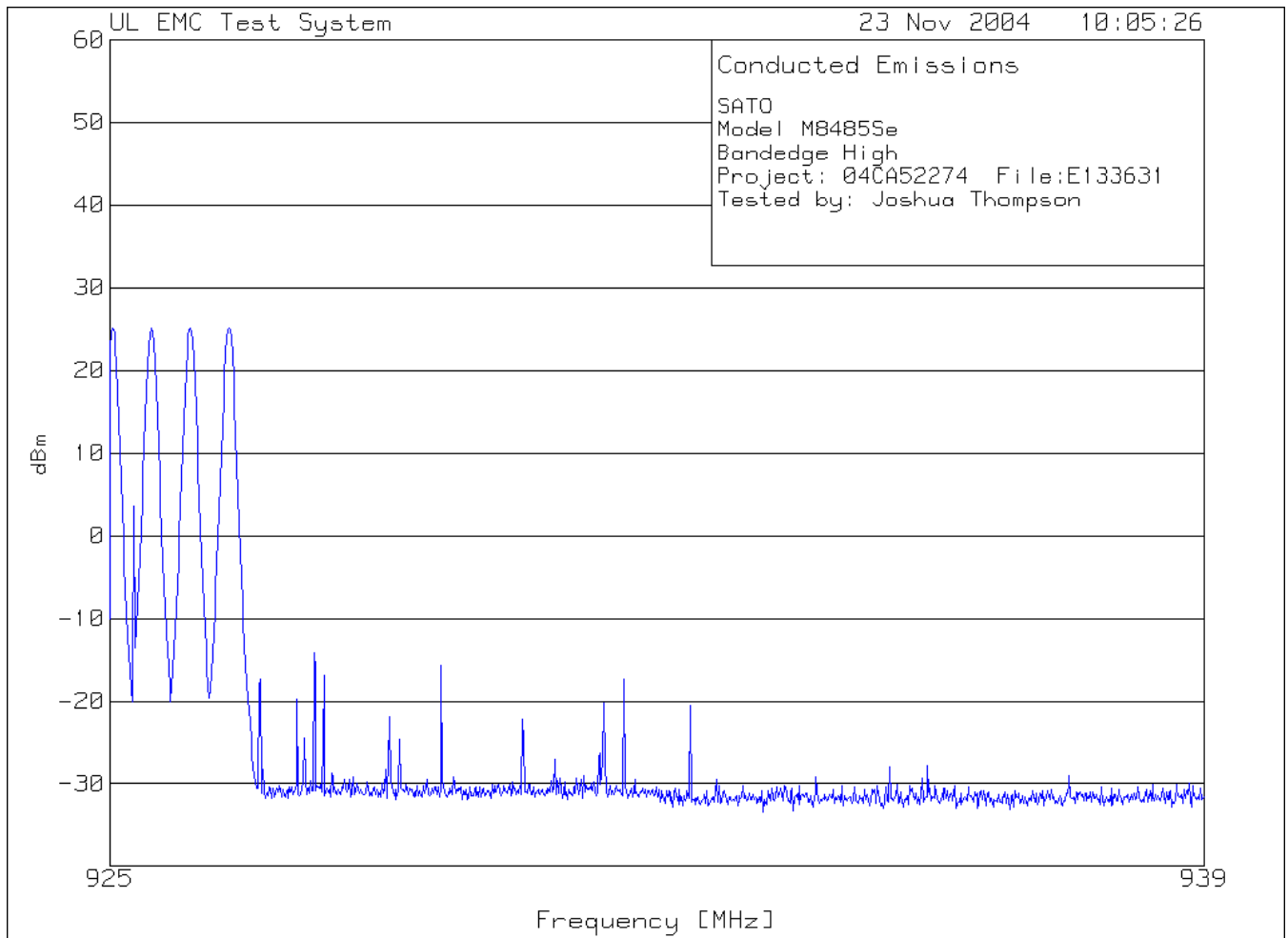
Bandedge Low

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: M-8485Se
 FCC ID: MMF8485SEAW
 SATO

Issued: 3-4-05

Model M8485Se
 Bandedge High
 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 1 925 - 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. 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:

File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

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

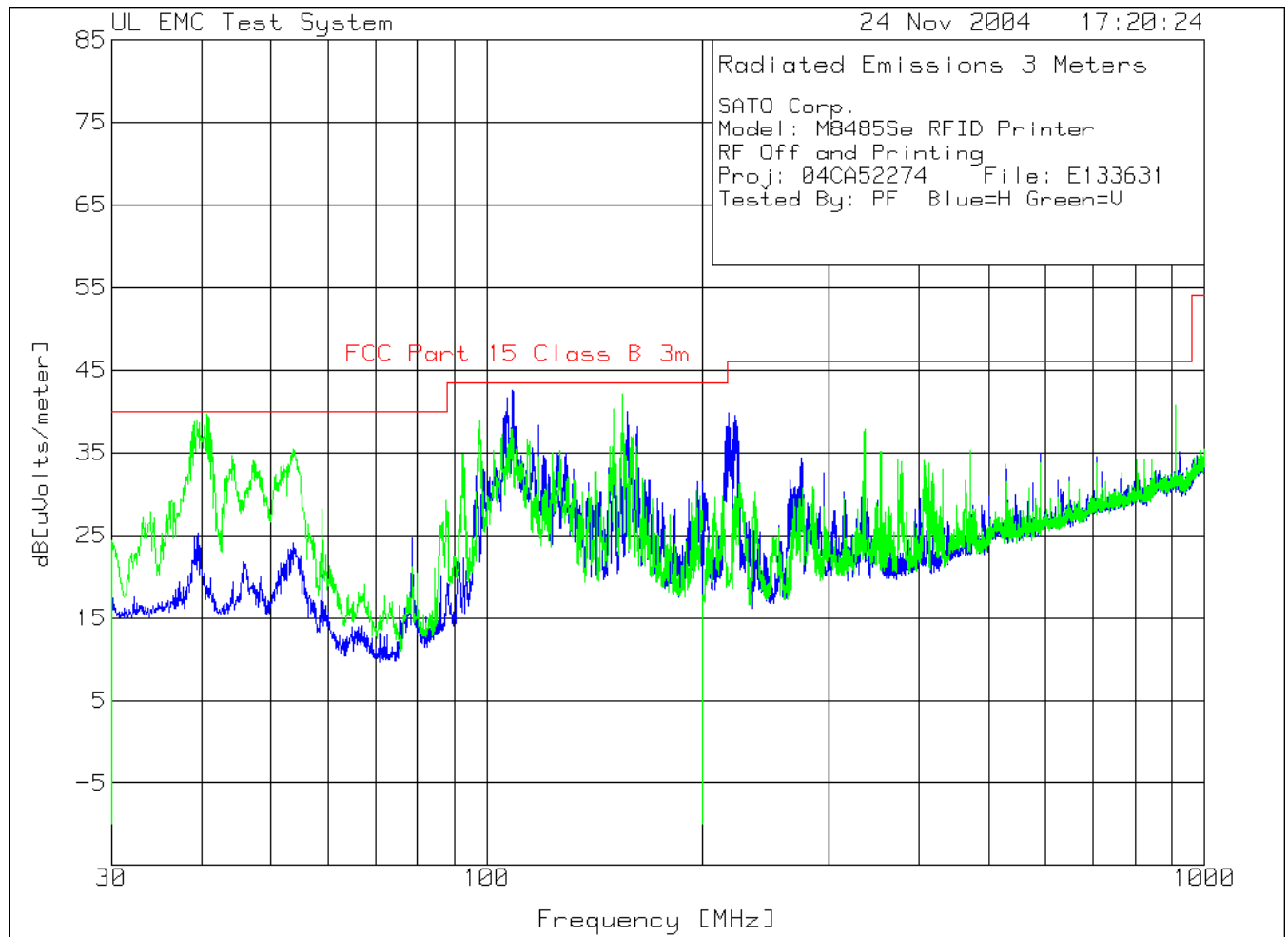
*See Power Interface and EUT Operating Modes for details

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
		30 to 1000MHz
		kHz
		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	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	



File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW
SATO Corp.

Issued: 3-4-05

Model: M8485Se RFID Printer

RF Off and Printing

Proj: 04CA52274 File: E133631

Tested By: PF 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

106.5707	21.7 qp	1.5	10.5	33.7	43.5	-	-	-
Azimuth: 231	Height:182	Horz	Margin	[dB]:	-9.8	-	-	-
108.4429	22.6 qp	1.5	10.4	34.5	43.5	-	-	-
Azimuth: 235	Height:194	Horz	Margin	[dB]:	-9	-	-	-
117.9501	26.03 qp	1.5	10.1	37.63	43.5	-	-	-
Azimuth: 246	Height:144	Horz	Margin	[dB]:	-5.87	-	-	-
157.2739	10.5 qp	1.8	16.4	28.7	43.5	-	-	-
Azimuth: 118	Height:121	Horz	Margin	[dB]:	-14.8	-	-	-
162.0207	8.3 qp	1.8	16.3	26.4	43.5	-	-	-
Azimuth: 281	Height:131	Horz	Margin	[dB]:	-17.1	-	-	-

Vertical 30 - 200MHz

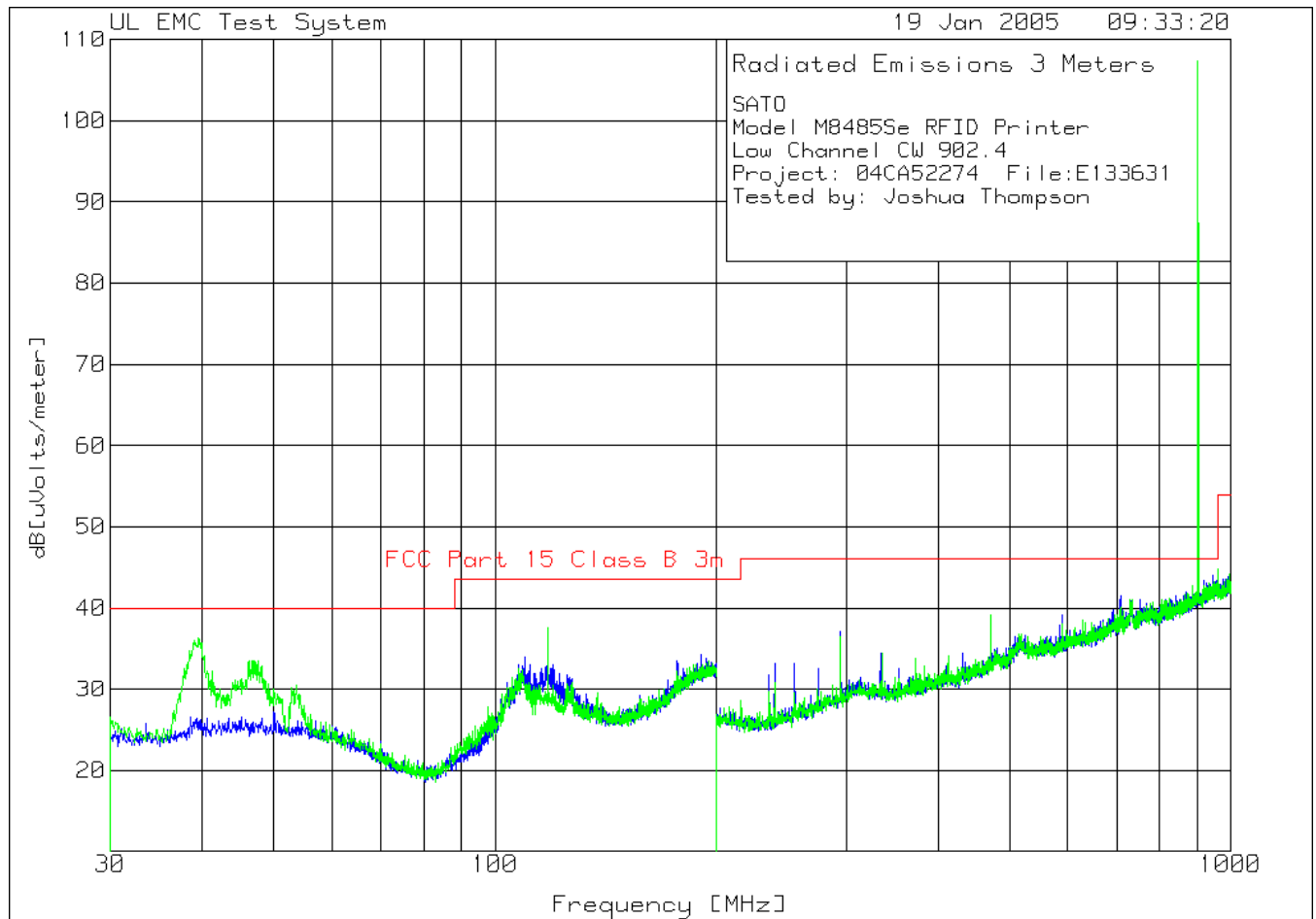
39.6164	19.4 qp	.9	13.6	33.9	40	-	-	-
Azimuth: 261	Height:111	Vert	Margin	[dB]:	-6.1	-	-	-
40.7855	18.29 qp	.9	13.4	32.59	40	-	-	-
Azimuth: 307	Height:117	Vert	Margin	[dB]:	-7.41	-	-	-
44.1571	14.37 qp	1	12.9	28.27	40	-	-	-
Azimuth: 196	Height:109	Vert	Margin	[dB]:	-11.73	-	-	-
47.1886	13.35 qp	1	12.2	26.55	40	-	-	-
Azimuth: 233	Height:111	Vert	Margin	[dB]:	-13.45	-	-	-
53.6902	19.58 qp	1	10.3	30.88	40	-	-	-
Azimuth: 186	Height:111	Vert	Margin	[dB]:	-9.12	-	-	-
97.5113	14.4 qp	1.4	10.7	26.5	43.5	-	-	-
Azimuth: 174	Height:155	Vert	Margin	[dB]:	-17	-	-	-
108.1042	19.03 qp	1.5	10.4	30.93	43.5	-	-	-
Azimuth: 181	Height:120	Vert	Margin	[dB]:	-12.57	-	-	-
150.0233	8.62 qp	1.8	15.9	26.32	43.5	-	-	-
Azimuth: 30	Height:116	Vert	Margin	[dB]:	-17.18	-	-	-
154.6701	10.28 qp	1.8	16.3	28.38	43.5	-	-	-
Azimuth: 295	Height:114	Vert	Margin	[dB]:	-15.12	-	-	-

Vertical 200 - 1000MHz

909.791	15.44 qp	4.4	23.5	43.34	46	-	-	-
Azimuth: 20	Height:103	Vert	Margin	[dB]:	-2.66	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO
 Model M8485Se RFID Printer
 Low Channel CW 902.4
 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/meter]	Limit:1	2	3
Horizontal 30 - 200MHz -----								
1	109.6848	20.76 pk	1.5	11.7	33.96 43.5	-	-	-
Azimuth:109		Height:250	Horz	Margin [dB]	-9.54	-	-	-
Vertical 30 - 200MHz -----								
2	39.5248	23.05 pk	.9	12.4	36.35 40	-	-	-
Azimuth:358		Height:101	Vert	Margin [dB]	-3.65	-	-	-
3	117.9339	23.5 pk	1.5	12.6	37.6 43.5	-	-	-
Azimuth:343		Height:101	Vert	Margin [dB]	-5.9	-	-	-
Horizontal 200 - 1000MHz -----								
4	294.6982	20.23 pk	2.5	14.3	37.03 46	-	-	-
Azimuth:355		Height:101	Horz	Margin [dB]	-8.97	-	-	-
8	902.5009	77.02 pk	4.4	23.3	104.72 46	-	-	-
Azimuth:292		Height:101	Horz	Margin [dB]	58.72	-	-	-
9	958.3862	14.9 pk	4.6	23.9	43.4 46	-	-	-
Azimuth:358		Height:249	Horz	Margin [dB]	-2.6	-	-	-
Vertical 200 - 1000MHz -----								
5	294.6982	19.65 pk	2.5	14.3	36.45 46	-	-	-
Azimuth:220		Height:101	Vert	Margin [dB]	-9.55	-	-	-
6	471.824	18.59 pk	3.1	17.5	39.19 46	-	-	-
Azimuth:340		Height:101	Vert	Margin [dB]	-6.81	-	-	-
7	902.3675	79.59 pk	4.4	23.3	107.29 46	-	-	-
Azimuth:12		Height:101	Vert	Margin [dB]	61.29	-	-	-
10	960.5202	16.4 pk	4.6	23.8	44.8 54	-	-	-
Azimuth:82		Height:250	Vert	Margin [dB]	-9.2	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model M8485Se RFID Printer

Low Channel CW 902.4

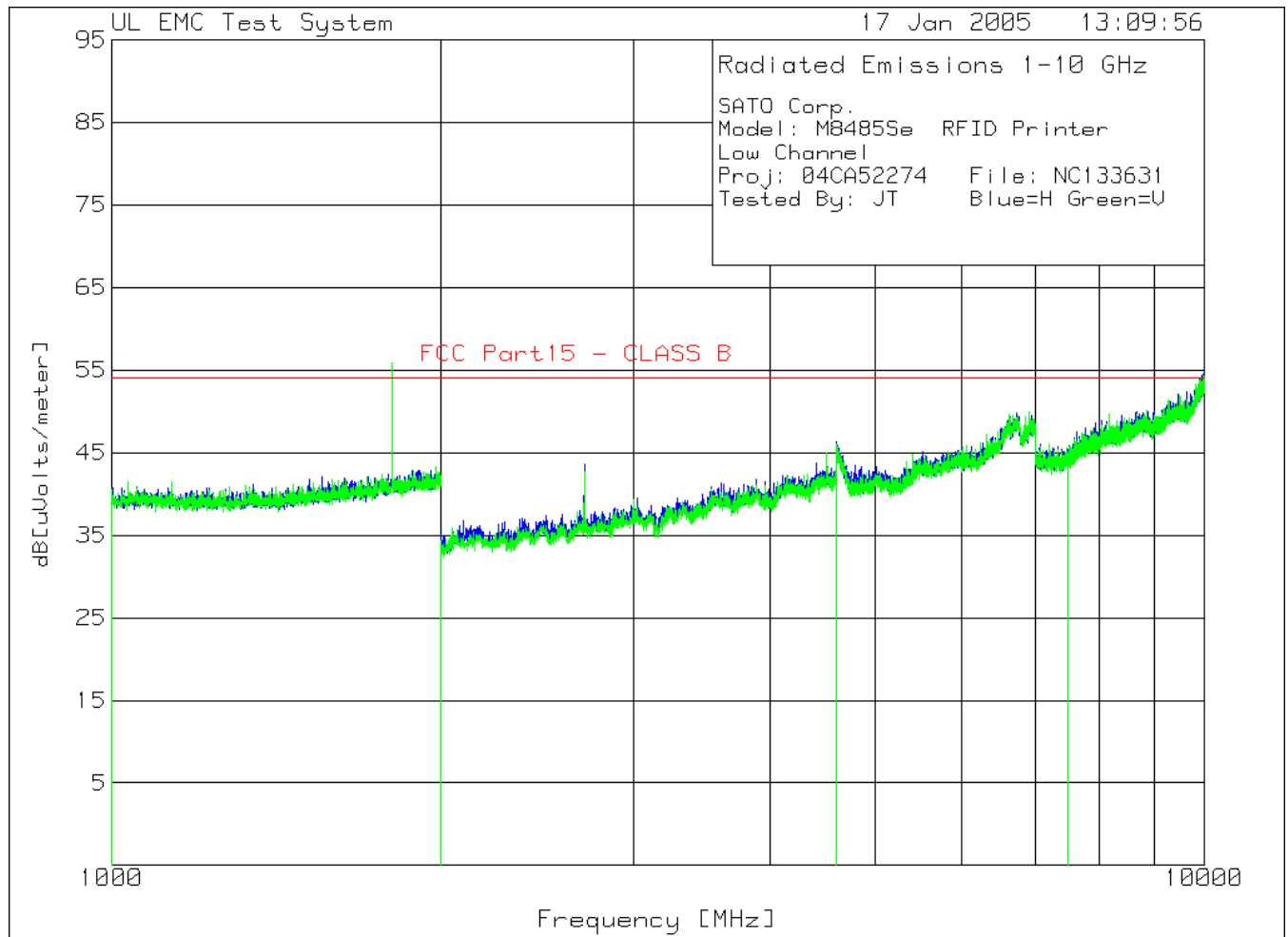
Project: 04CA52274 File:E133631

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]					
=====								
Vertical 30 - 200MHz								
39.9086	17.67 qp	.9	12.4	30.97	40	-	-	-
Azimuth: 267	Height:148	Vert		Margin [dB]:	-9.03	-	-	-
117.9303	20.64 qp	1.5	12.6	34.74	43.5	-	-	-
Azimuth: 223	Height:106	Vert		Margin [dB]:	-8.76	-	-	-
Horizontal 200 - 1000MHz								
958.3502	8.78 qp	4.6	23.9	37.28	46	-	-	-
Azimuth: 263	Height:215	Horz		Margin [dB]:	-8.72	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.

Model: M8485Se RFID Printer

Low Channel

Proj: 04CA52274 File: NC133631

Tested By: JT Blue=H Green=V

Test		Meter	Gain/Loss	Transducer	Level	Limit:1		
No.	Frequency	Reading	Factor	Factor	dB[uVolts/meter]			
	[MHz]	[dB(uV)]	[dB]	[dB]				
=====								
Horizontal 1000 - 2000MHz -----								
1	1804.902	46.89 pk	-19.7	26.5	53.69	54	-	-
	Azimuth:253	Height:101	Horz	Margin [dB]		-.31	-	-
Horizontal 2000 - 4600MHz -----								
2	2706.253	39.82 pk	-25.4	29.2	43.62	54	-	-
	Azimuth:193	Height:101	Horz	Margin [dB]		-10.38	-	-
3	3610.205	32.34 pk	-22.5	31.5	41.34	54	-	-
	Azimuth:331	Height:101	Horz	Margin [dB]		-12.66	-	-
4	4512.856	32.26 pk	-19.8	32.3	44.76	54	-	-
	Azimuth:249	Height:101	Horz	Margin [dB]		-9.24	-	-
Horizontal 4600 - 7500MHz -----								
5	5413.857	30.25 pk	-19.9	34.1	44.45	54	-	-
	Azimuth:167	Height:101	Horz	Margin [dB]		-9.55	-	-
6	6317.659	30.55 pk	-17.9	34.6	47.25	54	-	-
	Azimuth:55	Height:101	Horz	Margin [dB]		-6.75	-	-
7	7257.729	27.34 pk	-18	36.2	45.54	54	-	-
	Azimuth:212	Height:101	Horz	Margin [dB]		-8.46	-	-
Horizontal 7500 - 10000MHz -----								
8	8140.32	27.28 pk	-15.7	37.1	48.68	54	-	-
	Azimuth:85	Height:101	Horz	Margin [dB]		-5.32	-	-
9	9008.254	25.91 pk	-14.7	38	49.21	54	-	-
	Azimuth:276	Height:101	Horz	Margin [dB]		-4.79	-	-
10	9267.134	26.78 pk	-13.7	38.2	51.28	54	-	-
	Azimuth:93	Height:101	Horz	Margin [dB]		-2.72	-	-
11	9452.226	26.88 pk	-13.2	38.4	52.08	54	-	-
	Azimuth:176	Height:101	Horz	Margin [dB]		-1.92	-	-
12	9633.567	27.24 pk	-13.4	38.5	52.34	54	-	-
	Azimuth:268	Height:101	Horz	Margin [dB]		-1.66	-	-
13	9721.111	26.5 pk	-13	38.6	52.1	54	-	-
	Azimuth:354	Height:101	Horz	Margin [dB]		-1.9	-	-
14	9786.143	26.24 pk	-12.4	38.7	52.54	54	-	-
	Azimuth:131	Height:101	Horz	Margin [dB]		-1.46	-	-
15	9897.449	26.8 pk	-11.7	38.8	53.9	54	-	-
	Azimuth:222	Height:101	Horz	Margin [dB]		-.1	-	-
16	9949.975	26.85 pk	-11.3	38.8	54.35	54	-	-
	Azimuth:85	Height:101	Horz	Margin [dB]		.35	-	-
17	9978.739	26.76 pk	-11.1	38.9	54.56	54	-	-
	Azimuth:313	Height:101	Horz	Margin [dB]		.56	-	-

Project Number: O4CA52274

Model Number: M-8485Se

FCC ID: MMF8485SEAW

Vertical 1000 - 2000MHz -----

18	1804.902	49.03 pk	-19.7	26.5	55.83	54	-	-
	Azimuth:47	Height:101 Vert		Margin [dB]		1.83	-	-

NOTE: Fundamental Harmonic Limit = Fundamental Signal Level - 20 dB =
 107.29 dBuV - 20 dB = 87.29 dBuV, therefore no further investigation of this frequency was performed.

Vertical 2000 - 4600MHz -----

19	2707.554	38.71 pk	-25.3	29.2	42.61	54	-	-
	Azimuth:344	Height:101 Vert		Margin [dB]		-11.39	-	-
20	3611.506	31.14 pk	-22.5	31.5	40.14	54	-	-
	Azimuth:1	Height:101 Vert		Margin [dB]		-13.86	-	-
21	4512.856	32.48 pk	-19.8	32.3	44.98	54	-	-
	Azimuth:84	Height:101 Vert		Margin [dB]		-9.02	-	-

Vertical 4600 - 7500MHz -----

22	5413.857	30.58 pk	-19.9	34.1	44.78	54	-	-
	Azimuth:66	Height:101 Vert		Margin [dB]		-9.22	-	-
23	6317.659	30.54 pk	-17.9	34.6	47.24	54	-	-
	Azimuth:359	Height:101 Vert		Margin [dB]		-6.76	-	-
24	7282.391	26.95 pk	-18	36.3	45.25	54	-	-
	Azimuth:162	Height:101 Vert		Margin [dB]		-8.75	-	-

Vertical 7500 - 10000MHz -----

25	8131.566	27.06 pk	-15.7	37.1	48.46	54	-	-
	Azimuth:85	Height:101 Vert		Margin [dB]		-5.54	-	-
26	8999.5	26.21 pk	-14.7	38	49.51	54	-	-
	Azimuth:138	Height:101 Vert		Margin [dB]		-4.49	-	-
27	9282.141	26.87 pk	-13.7	38.2	51.37	54	-	-
	Azimuth:6	Height:101 Vert		Margin [dB]		-2.63	-	-
28	9487.244	26.8 pk	-13.2	38.4	52	54	-	-
	Azimuth:353	Height:101 Vert		Margin [dB]		-2	-	-
29	9582.291	26.12 pk	-13.5	38.5	51.12	54	-	-
	Azimuth:312	Height:101 Vert		Margin [dB]		-2.88	-	-
30	9816.158	26.85 pk	-12.2	38.7	53.35	54	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-.65	-	-
31	9889.945	26.72 pk	-11.7	38.8	53.82	54	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-.18	-	-
32	9976.238	26.61 pk	-11.1	38.9	54.41	54	-	-
	Azimuth:175	Height:101 Vert		Margin [dB]		.41	-	-

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.

Model: M8485Se RFID Printer

Low Channel

Proj: 04CA52274 File: NC133631

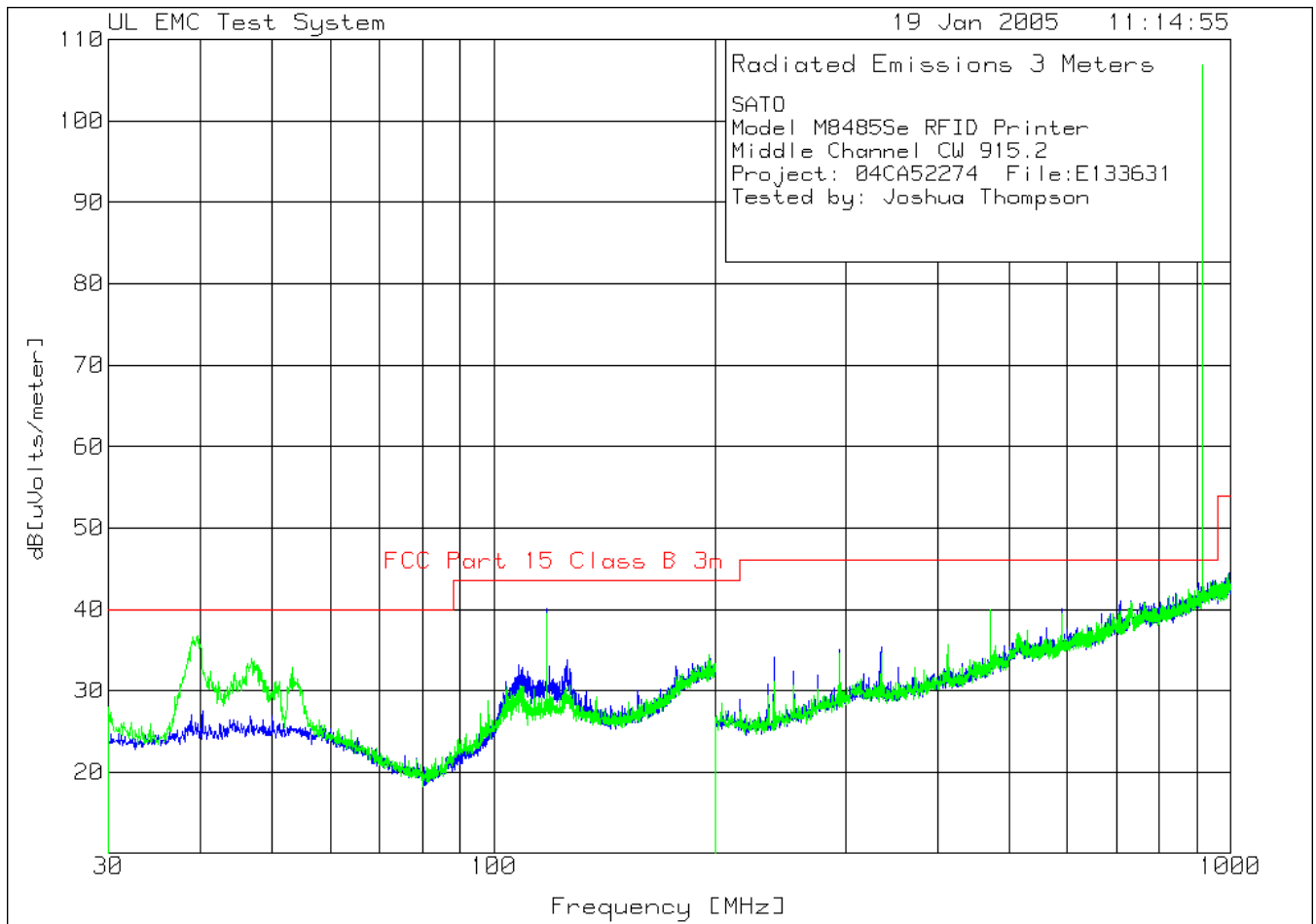
Tested By: JT Blue=H Green=V

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								
9008.254	22.44 ave	-14.7	38	45.74	54	-	-	-
			Margin [dB]:		-8.26	-	-	-
9267.134	22.69 ave	-13.7	38.2	47.19	54	-	-	-
			Margin [dB]:		-6.81	-	-	-
9452.226	22.45 ave	-13.2	38.4	47.65	54	-	-	-
			Margin [dB]:		-6.35	-	-	-
9633.567	22.51 ave	-13.4	38.5	47.61	54	-	-	-
			Margin [dB]:		-6.39	-	-	-
9721.111	22.2 ave	-13	38.6	47.8	54	-	-	-
			Margin [dB]:		-6.2	-	-	-
9786.143	22.85 ave	-12.4	38.7	49.15	54	-	-	-
			Margin [dB]:		-4.85	-	-	-
9897.449	23.11 ave	-11.7	38.8	50.21	54	-	-	-
			Margin [dB]:		-3.79	-	-	-
9949.975	23.46 ave	-11.3	38.8	50.96	54	-	-	-
			Margin [dB]:		-3.04	-	-	-
9978.739	23.46 ave	-11.1	38.9	51.26	54	-	-	-
			Margin [dB]:		-2.74	-	-	-
Vertical 7500 - 10000MHz								
8999.5	22.4 ave	-14.7	38	45.7	54	-	-	-
			Margin [dB]:		-8.3	-	-	-
9282.141	22.66 ave	-13.7	38.2	47.16	54	-	-	-
			Margin [dB]:		-6.84	-	-	-
9487.244	22.41 ave	-13.2	38.4	47.61	54	-	-	-
			Margin [dB]:		-6.39	-	-	-
9582.291	22.43 ave	-13.5	38.5	47.43	54	-	-	-
			Margin [dB]:		-6.57	-	-	-
9816.158	23.07 ave	-12.2	38.7	49.57	54	-	-	-
			Margin [dB]:		-4.43	-	-	-
9889.945	23.13 ave	-11.7	38.8	50.23	54	-	-	-
			Margin [dB]:		-3.77	-	-	-
9976.238	23.45 ave	-11.1	38.9	51.25	54	-	-	-
			Margin [dB]:		-2.75	-	-	-

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: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model M8485Se RFID Printer

Middle Channel CW 915.2

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/meter]		
	[MHz]	[dB(uV)]	[dB]	[dB]			
=====							
Horizontal 30 - 200MHz -----							
3	117.9339	25.98 pk	1.5	12.6	40.08 43.5	-	-
Azimuth:17		Height:249	Horz	Margin [dB]	-3.42	-	-
Vertical 30 - 200MHz -----							
1	39.6098	23.52 pk	.9	12.4	36.82 40	-	-
Azimuth:343		Height:101	Vert	Margin [dB]	-3.18	-	-
2	117.9339	25.4 pk	1.5	12.6	39.5 43.5	-	-
Azimuth:343		Height:101	Vert	Margin [dB]	-4	-	-
Horizontal 200 - 1000MHz -----							
4	915.1718	77.94 pk	4.4	23.4	105.74 46	-	-
Azimuth:274		Height:101	Horz	Margin [dB]	59.74	-	-
5	962.921	14.6 pk	4.6	23.8	43 54	-	-
Azimuth:343		Height:101	Horz	Margin [dB]	-11	-	-
Vertical 200 - 1000MHz -----							
6	955.1851	14.73 pk	4.6	23.9	43.23 46	-	-
Azimuth:234		Height:101	Vert	Margin [dB]	-2.77	-	-
7	915.1718	79.12 pk	4.4	23.4	106.92 46	-	-
Azimuth:352		Height:101	Vert	Margin [dB]	60.92	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

File Number: E133631
Project Number: 04CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model M8485Se RFID Printer

Middle Channel CW 915.2

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 30 - 200MHz

117.9519	25.31 qp	1.5	12.6	39.41	43.5	-	-	-
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Azimuth: 159	Height:105	Horz	Margin [dB]:	-4.09		-	-	-
--------------	------------	------	--------------	-------	--	---	---	---

Vertical 30 - 200MHz

117.9299	25.51 qp	1.5	12.6	39.61	43.5	-	-	-
----------	----------	-----	------	-------	------	---	---	---

Azimuth: 246	Height:132	Vert	Margin [dB]:	-3.89		-	-	-
--------------	------------	------	--------------	-------	--	---	---	---

39.1408	18.26 qp	.9	12.4	31.56	40	-	-	-
---------	----------	----	------	-------	----	---	---	---

Azimuth: 19	Height:122	Vert	Margin [dB]:	-8.44		-	-	-
-------------	------------	------	--------------	-------	--	---	---	---

Horizontal 200 - 1000MHz

955.1851	8.62 qp	4.6	23.9	37.12	46	-	-	-
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Azimuth: 360	Height:101	Horz	Margin [dB]:	-8.88		-	-	-
--------------	------------	------	--------------	-------	--	---	---	---

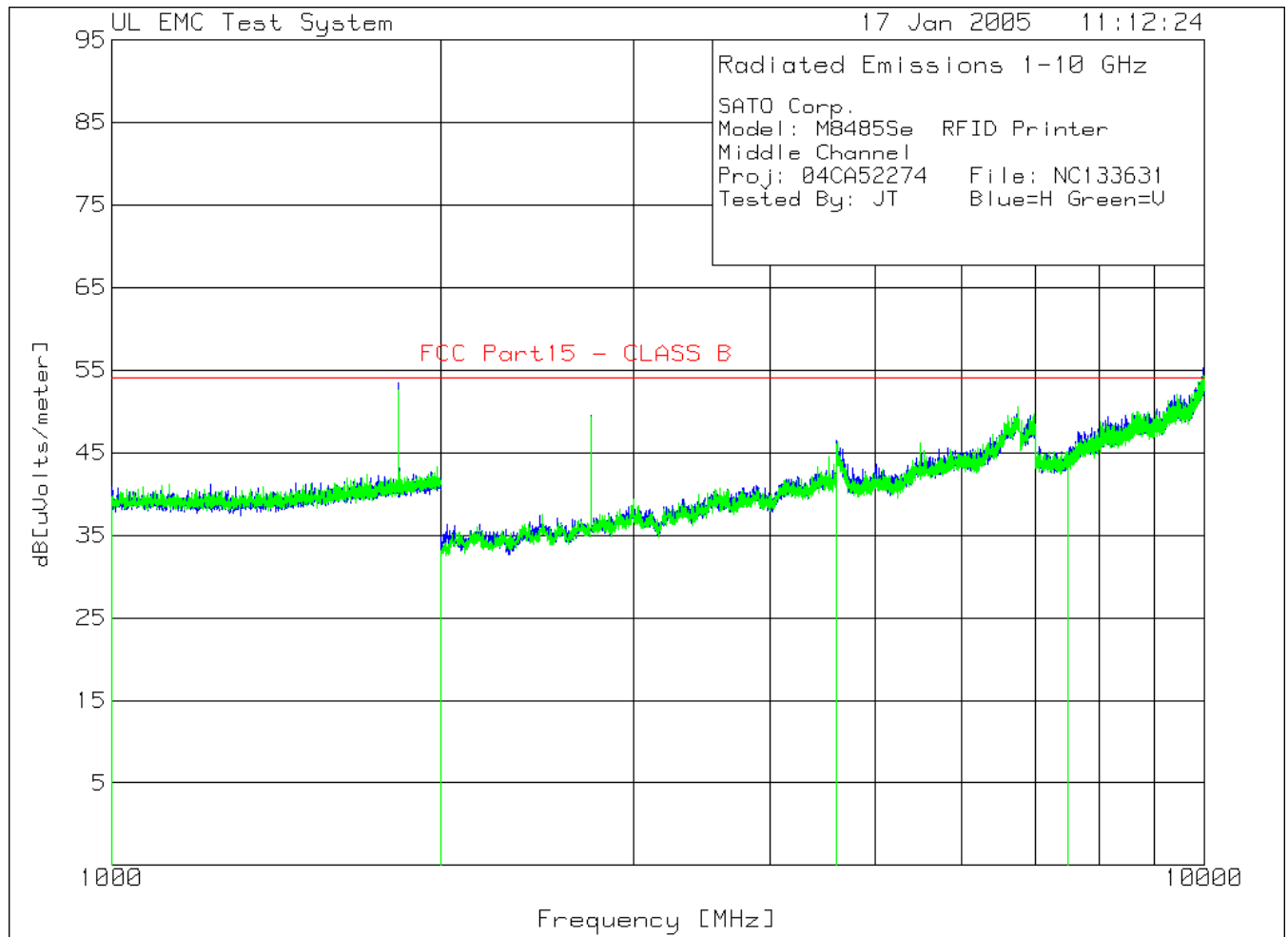
Vertical 200 - 1000MHz

955.1851	8.73 qp	4.6	23.9	37.23	46	-	-	-
----------	---------	-----	------	-------	----	---	---	---

Azimuth: 360	Height:101	Vert	Margin [dB]:	-8.77		-	-	-
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LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.
 Model: M8485Se RFID Printer
 Middle Channel
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

No.	Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]	[dB]				
=====								
Horizontal 1000 - 2000MHz -----								
1	1830.415	46.59 pk	-19.7	26.6	53.49	54	-	-
	Azimuth:103	Height:101	Horz	Margin [dB]		-.51	-	-
Horizontal 2000 - 4600MHz -----								
2	2745.273	45.35 pk	-25.1	29.3	49.55	54	-	-
	Azimuth:193	Height:101	Horz	Margin [dB]		-4.45	-	-
3	3660.93	31.16 pk	-22.3	31.7	40.56	54	-	-
	Azimuth:56	Height:101	Horz	Margin [dB]		-13.44	-	-
4	4576.588	29.82 pk	-19.4	32.5	42.92	54	-	-
	Azimuth:193	Height:101	Horz	Margin [dB]		-11.08	-	-
Horizontal 4600 - 7500MHz -----								
5	5490.745	30.98 pk	-19.8	34.3	45.48	54	-	-
	Azimuth:116	Height:101	Horz	Margin [dB]		-8.52	-	-
6	6416.308	29.15 pk	-17.5	34.6	46.25	54	-	-
	Azimuth:355	Height:101	Horz	Margin [dB]		-7.75	-	-
7	7324.462	26.81 pk	-18.1	36.3	45.01	54	-	-
	Azimuth:43	Height:101	Horz	Margin [dB]		-8.99	-	-
Horizontal 7500 - 10000MHz -----								
8	8212.856	26.92 pk	-15.5	37.2	48.62	54	-	-
	Azimuth:354	Height:101	Horz	Margin [dB]		-5.38	-	-
9	9167.084	25.73 pk	-14.2	38.1	49.63	54	-	-
	Azimuth:138	Height:101	Horz	Margin [dB]		-4.37	-	-
10	9387.194	26.84 pk	-13.2	38.3	51.94	54	-	-
	Azimuth:39	Height:101	Horz	Margin [dB]		-2.06	-	-
11	9442.221	26.35 pk	-13.2	38.4	51.55	54	-	-
	Azimuth:343	Height:101	Horz	Margin [dB]		-2.45	-	-
12	9513.507	26.89 pk	-13.3	38.4	51.99	54	-	-
	Azimuth:268	Height:101	Horz	Margin [dB]		-2.01	-	-
13	9588.544	26.65 pk	-13.6	38.5	51.55	54	-	-
	Azimuth:85	Height:101	Horz	Margin [dB]		-2.45	-	-
14	9682.341	26.49 pk	-13.2	38.6	51.89	54	-	-
	Azimuth:85	Height:101	Horz	Margin [dB]		-2.11	-	-
15	9802.401	26.43 pk	-12.3	38.7	52.83	54	-	-
	Azimuth:39	Height:101	Horz	Margin [dB]		-1.17	-	-
16	9888.694	26.08 pk	-11.7	38.8	53.18	54	-	-
	Azimuth:39	Height:101	Horz	Margin [dB]		-.82	-	-
17	9958.729	26.69 pk	-11.3	38.9	54.29	54	-	-
	Azimuth:39	Height:101	Horz	Margin [dB]		.29	-	-
18	9982.491	27.43 pk	-11.1	38.9	55.23	54	-	-
	Azimuth:85	Height:101	Horz	Margin [dB]		1.23	-	-

File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

Vertical 1000 - 2000MHz -----
 19 1830.415 45.61 pk -19.7 26.6 52.51 54 - -
 Azimuth:358 Height:101 Vert Margin [dB] -1.49 - - -

Vertical 2000 - 4600MHz -----
 20 2745.273 45.13 pk -25.1 29.3 49.33 54 - -
 Azimuth:344 Height:101 Vert Margin [dB] -4.67 - -
 21 3660.93 31.08 pk -22.3 31.7 40.48 54 - -
 Azimuth:343 Height:101 Vert Margin [dB] -13.52 - -
 22 4576.588 30.5 pk -19.4 32.5 43.6 54 - -
 Azimuth:28 Height:101 Vert Margin [dB] -10.4 - -

Vertical 4600 - 7500MHz -----
 23 5490.745 31.7 pk -19.8 34.3 46.2 54 - -
 Azimuth:358 Height:101 Vert Margin [dB] -7.8 - -
 24 6406.153 30.17 pk -17.6 34.6 47.17 54 - -
 Azimuth:349 Height:101 Vert Margin [dB] -6.83 - -
 25 7286.743 26.77 pk -18 36.3 45.07 54 - -
 Azimuth:163 Height:101 Vert Margin [dB] -8.93 - -

Vertical 7500 - 10000MHz -----
 26 8240.37 26.51 pk -15.5 37.2 48.21 54 - -
 Azimuth:343 Height:101 Vert Margin [dB] -5.79 - -
 27 9152.076 26.13 pk -14.2 38.1 50.03 54 - -
 Azimuth:18 Height:101 Vert Margin [dB] -3.97 - -
 28 9443.472 26.85 pk -13.2 38.4 52.05 54 - -
 Azimuth:343 Height:101 Vert Margin [dB] -1.95 - -
 29 9470.985 26.33 pk -13.2 38.4 51.53 54 - -
 Azimuth:343 Height:101 Vert Margin [dB] -2.47 - -
 30 9562.281 26.33 pk -13.5 38.5 51.33 54 - -
 Azimuth:268 Height:101 Vert Margin [dB] -2.67 - -
 31 9706.103 26.2 pk -13.1 38.6 51.7 54 - -
 Azimuth:131 Height:101 Vert Margin [dB] -2.3 - -
 32 9732.366 26.33 pk -12.9 38.6 52.03 54 - -
 Azimuth:343 Height:101 Vert Margin [dB] -1.97 - -
 33 9868.684 26.66 pk -11.8 38.8 53.66 54 - -
 Azimuth:358 Height:101 Vert Margin [dB] -.34 - -
 34 9941.221 26.45 pk -11.4 38.8 53.85 54 - -
 Azimuth:131 Height:101 Vert Margin [dB] -.15 - -
 35 9972.486 26.61 pk -11.2 38.9 54.31 54 - -
 Azimuth:131 Height:101 Vert Margin [dB] .31 - -

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.
Model: M8485Se RFID Printer
Middle 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 2000 - 4600MHz								
2745.6713	48.37 pk	-25.1	29.3	52.57	54	-	-	-
				Margin [dB]:	-1.43	-	-	-
Azimuth: 197 Height:102 Horz								
Vertical 2000 - 4600MHz								
2745.0902	37.54 ave	-25.1	29.3	41.74	54	-	-	-
				Margin [dB]:	-12.26	-	-	-
Azimuth: 35 Height:104 Vert								
LIMIT 1: FCC Part15 - CLASS B								
ave - Average detector								

SATO Corp.
Model: M8485Se RFID Printer
Middle 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								
9167.084	22.01 ave	-14.2	38.1	45.91	54	-	-	-
				Margin [dB]:	-8.09	-	-	-
9387.194	22.39 ave	-13.2	38.3	47.49	54	-	-	-
				Margin [dB]:	-6.51	-	-	-
9442.221	22.48 ave	-13.2	38.4	47.68	54	-	-	-
				Margin [dB]:	-6.32	-	-	-
9513.507	22.36 ave	-13.3	38.4	47.46	54	-	-	-
				Margin [dB]:	-6.54	-	-	-
9588.544	22.44 ave	-13.6	38.5	47.34	54	-	-	-
				Margin [dB]:	-6.66	-	-	-
9682.341	22.25 ave	-13.2	38.6	47.65	54	-	-	-
				Margin [dB]:	-6.35	-	-	-
9802.401	23.05 ave	-12.3	38.7	49.45	54	-	-	-
				Margin [dB]:	-4.55	-	-	-
9888.694	23.11 ave	-11.7	38.8	50.21	54	-	-	-
				Margin [dB]:	-3.79	-	-	-
9958.729	23.46 ave	-11.3	38.9	51.06	54	-	-	-
				Margin [dB]:	-2.94	-	-	-

File Number: E133631

Issued: 3-4-05

Project Number: O4CA52274

Model Number: M-8485Se

FCC ID: MMF8485SEAW

9982.491	23.49	ave	-11.1	38.9	51.29	54	-	-	-
				Margin [dB]:		-2.71	-	-	-

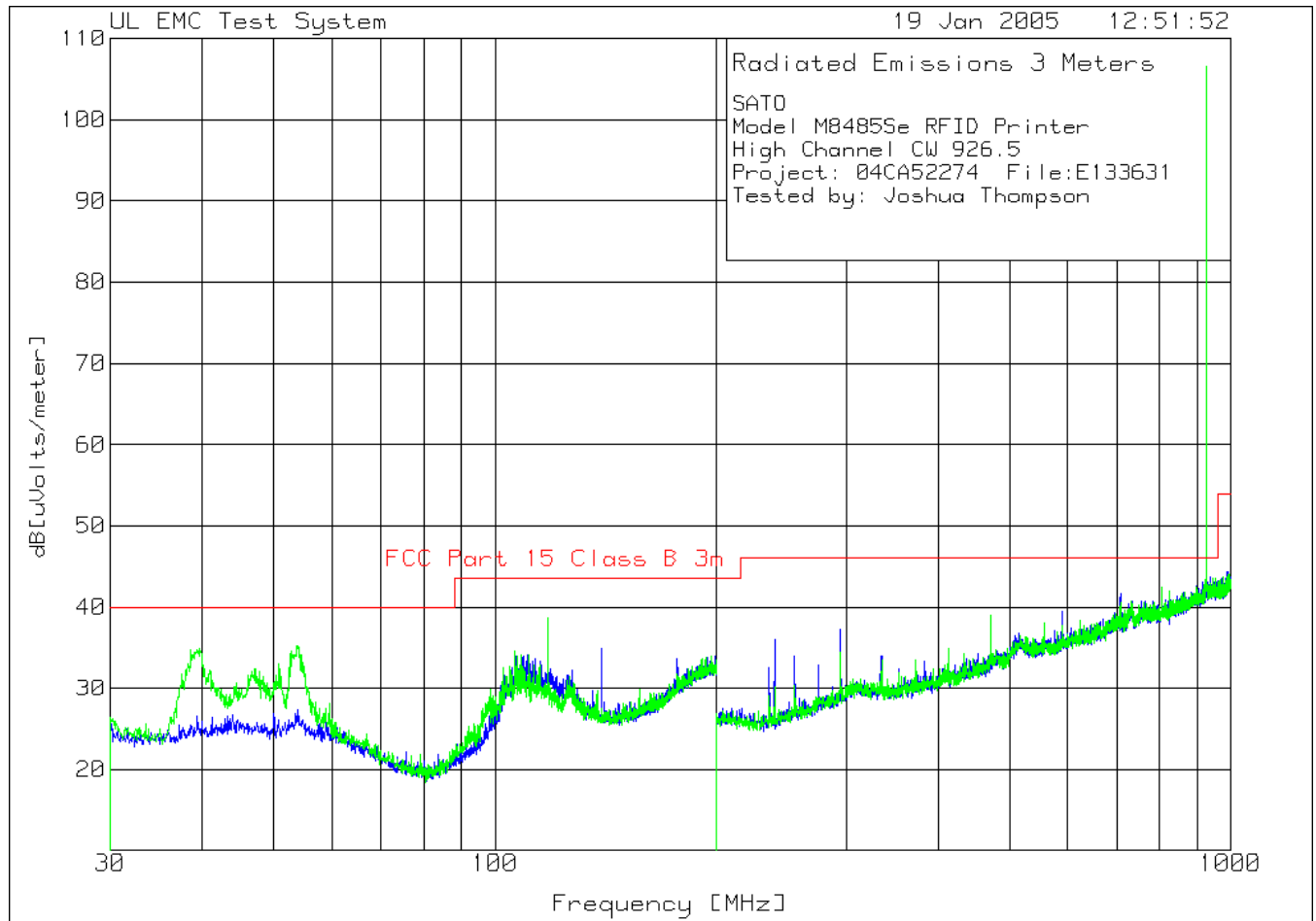
Vertical 7500 - 10000MHz

9152.076	22.13	ave	-14.2	38.1	46.03	54	-	-	-
				Margin [dB]:		-7.97	-	-	-
9443.472	22.45	ave	-13.2	38.4	47.65	54	-	-	-
				Margin [dB]:		-6.35	-	-	-
9470.985	22.45	ave	-13.2	38.4	47.65	54	-	-	-
				Margin [dB]:		-6.35	-	-	-
9562.281	22.44	ave	-13.5	38.5	47.44	54	-	-	-
				Margin [dB]:		-6.56	-	-	-
9706.103	22.18	ave	-13.1	38.6	47.68	54	-	-	-
				Margin [dB]:		-6.32	-	-	-
9732.366	22.36	ave	-12.9	38.6	48.06	54	-	-	-
				Margin [dB]:		-5.94	-	-	-
9868.684	23.18	ave	-11.8	38.8	50.18	54	-	-	-
				Margin [dB]:		-3.82	-	-	-
9941.221	23.38	ave	-11.4	38.8	50.78	54	-	-	-
				Margin [dB]:		-3.22	-	-	-
9972.486	23.48	ave	-11.2	38.9	51.18	54	-	-	-
				Margin [dB]:		-2.82	-	-	-

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: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model M8485Se 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 -----

4	117.9339	23.05 pk	1.5	12.6	37.15	43.5	-	-		
Azimuth:19					Height:249	Horz	Margin [dB]	-6.35	-	-

Vertical 30 - 200MHz -----

1	39.6948	21.61 pk	.9	12.4	34.91	40	-	-		
Azimuth:358					Height:101	Vert	Margin [dB]	-5.09	-	-
2	53.7269	22.23 pk	1	12	35.23	40	-	-		
Azimuth:192					Height:101	Vert	Margin [dB]	-4.77	-	-
3	117.9339	24.5 pk	1.5	12.6	38.6	43.5	-	-		
Azimuth:250					Height:101	Vert	Margin [dB]	-4.9	-	-

Horizontal 200 - 1000MHz -----

5	707.9027	16.56 pk	3.9	21.2	41.66	46	-	-		
Azimuth:13					Height:101	Horz	Margin [dB]	-4.34	-	-
6	926.6423	76.52 pk	4.5	23.8	104.82	46	-	-		
Azimuth:292					Height:101	Horz	Margin [dB]	58.82	-	-
7	958.6529	14.78 pk	4.6	23.9	43.28	46	-	-		
Azimuth:223					Height:250	Horz	Margin [dB]	-2.72	-	-

Vertical 200 - 1000MHz -----

8	707.9027	15.47 pk	3.9	21.2	40.57	46	-	-		
Azimuth:220					Height:249	Vert	Margin [dB]	-5.43	-	-
9	926.6423	78.34 pk	4.5	23.8	106.64	46	-	-		
Azimuth:358					Height:249	Vert	Margin [dB]	60.64	-	-
10	953.0511	15 pk	4.6	24	43.6	46	-	-		
Azimuth:289					Height:249	Vert	Margin [dB]	-2.4	-	-

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

File Number: E133631
Project Number: 04CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model M8485Se 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
Frequency	Reading	Factor	Factor	dB[uVolts/meter]			
[MHz]	[dB(uV)]	[dB]	[dB]				

Vertical 30 - 200MHz

117.9691	18.92 qp	1.5	12.6	33.02	43.5	-	-	-
Azimuth: 360	Height:117	Vert	Margin	[dB]:	-10.48	-	-	-
53.8545	15.87 qp	1	12	28.87	40	-	-	-
Azimuth: 10	Height:137	Vert	Margin	[dB]:	-11.13	-	-	-
39.6429	16.67 qp	.9	12.4	29.97	40	-	-	-
Azimuth: 79	Height:140	Vert	Margin	[dB]:	-10.03	-	-	-

Horizontal 200 - 1000MHz

707.7521	15.58 qp	3.9	21.2	40.68	46	-	-	-
Azimuth: 178	Height:146	Horz	Margin	[dB]:	-5.32	-	-	-
958.7071	8.68 qp	4.6	23.9	37.18	46	-	-	-
Azimuth: 267	Height:262	Horz	Margin	[dB]:	-8.82	-	-	-

Vertical 200 - 1000MHz

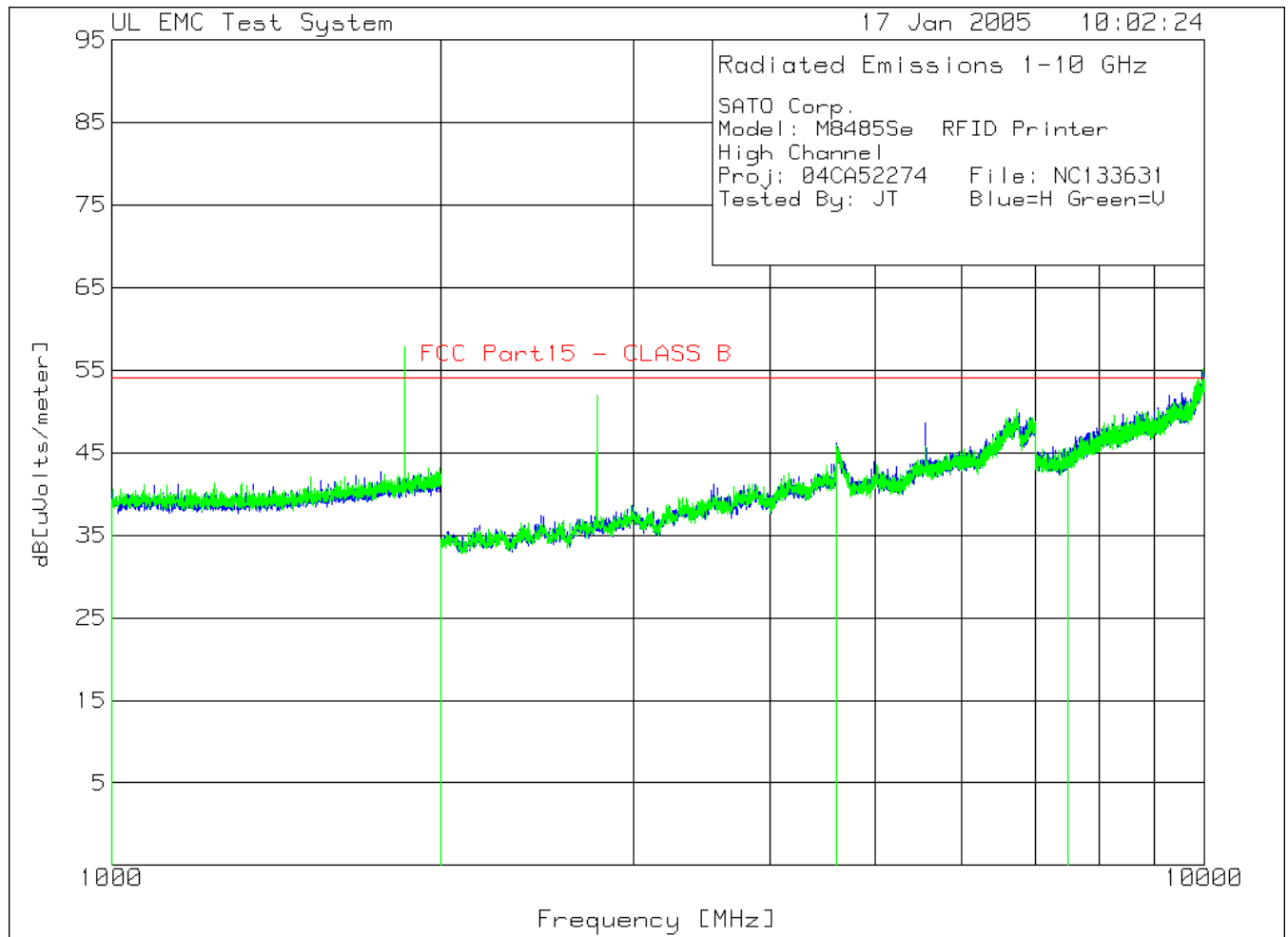
952.9688	8.78 qp	4.6	24	37.38	46	-	-	-
Azimuth: 358	Height:359	Vert	Margin	[dB]:	-8.62	-	-	-
707.7449	14.86 qp	3.9	21.2	39.96	46	-	-	-
Azimuth: 33	Height:123	Vert	Margin	[dB]:	-6.04	-	-	-

LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05



SATO Corp.

File Number: E133631

Issued: 3-4-05

Project Number: O4CA52274

Model Number: M-8485Se

FCC ID: MMF8485SEAW

Model: M8485Se RFID Printer

High 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	1852.926	45.36 pk	-19.6	26.7	52.46	54	-	-
	Azimuth:312	Height:103	Horz	Margin [dB]		-1.54	-	-
Horizontal 2000 - 4600MHz -----								
2	2779.09	42.72 pk	-25.1	29.4	47.02	54	-	-
	Azimuth:166	Height:103	Horz	Margin [dB]		-6.98	-	-
3	3706.453	30.22 pk	-22.1	31.8	39.92	54	-	-
	Azimuth:28	Height:103	Horz	Margin [dB]		-14.08	-	-
Horizontal 4600 - 7500MHz -----								
4	4634.817	27.78 pk	-15.9	32.6	44.48	54	-	-
	Azimuth:333	Height:103	Horz	Margin [dB]		-9.52	-	-
5	5558.929	33.98 pk	-19.7	34.3	48.58	54	-	-
	Azimuth:15	Height:103	Horz	Margin [dB]		-5.42	-	-
6	6513.507	30.46 pk	-17.4	34.6	47.66	54	-	-
	Azimuth:258	Height:103	Horz	Margin [dB]		-6.34	-	-
7	7455.028	27.14 pk	-18.2	36.6	45.54	54	-	-
	Azimuth:283	Height:103	Horz	Margin [dB]		-8.46	-	-
Horizontal 7500 - 10000MHz -----								
8	8335.418	25.71 pk	-15.2	37.3	47.81	54	-	-
	Azimuth:183	Height:103	Horz	Margin [dB]		-6.19	-	-
9	9280.89	27.41 pk	-13.7	38.2	51.91	54	-	-
	Azimuth:318	Height:103	Horz	Margin [dB]		-2.09	-	-
10	9533.517	27.25 pk	-13.4	38.4	52.25	54	-	-
	Azimuth:344	Height:103	Horz	Margin [dB]		-1.75	-	-
11	9609.805	26.73 pk	-13.6	38.5	51.63	54	-	-
	Azimuth:344	Height:103	Horz	Margin [dB]		-2.37	-	-
12	9706.103	25.92 pk	-13.1	38.6	51.42	54	-	-
	Azimuth:275	Height:103	Horz	Margin [dB]		-2.58	-	-
13	9774.887	26.93 pk	-12.6	38.7	53.03	54	-	-
	Azimuth:138	Height:103	Horz	Margin [dB]		-.97	-	-
14	9868.684	26.4 pk	-11.8	38.8	53.4	54	-	-
	Azimuth:2	Height:103	Horz	Margin [dB]		-.6	-	-
15	9944.972	27.37 pk	-11.3	38.8	54.87	54	-	-
	Azimuth:92	Height:103	Horz	Margin [dB]		.87	-	-
16	9996.248	26.4 pk	-11	38.9	54.3	54	-	-
	Azimuth:184	Height:103	Horz	Margin [dB]		.3	-	-

Project Number: O4CA52274

Model Number: M-8485Se

FCC ID: MMF8485SEAW

Vertical 1000 - 2000MHz -----

17	1853.427	50.78 pk	-19.6	26.7	57.88	54	-	-
	Azimuth:308	Height:103 Vert		Margin [dB]		3.88	-	-

NOTE: Fundamental Harmonic Limit = Fundamental Signal Level - 20 dB =
 106.64 dBuV - 20 dB = 86.64 dBuV, therefore no further investigation of this
 frequency was performed.

Vertical 2000 - 4600MHz -----

18	2779.09	47.57 pk	-25.1	29.4	51.87	54	-	-
	Azimuth:15	Height:103 Vert		Margin [dB]		-2.13	-	-
19	3706.453	31.15 pk	-22.1	31.8	40.85	54	-	-
	Azimuth:139	Height:103 Vert		Margin [dB]		-13.15	-	-

Vertical 4600 - 7500MHz -----

20	4631.916	28.61 pk	-15.8	32.6	45.41	54	-	-
	Azimuth:359	Height:103 Vert		Margin [dB]		-8.59	-	-
21	5558.929	31.19 pk	-19.7	34.3	45.79	54	-	-
	Azimuth:15	Height:103 Vert		Margin [dB]		-8.21	-	-
22	6485.943	30.72 pk	-17.6	34.6	47.72	54	-	-
	Azimuth:65	Height:103 Vert		Margin [dB]		-6.28	-	-
23	7463.732	27.2 pk	-18.2	36.6	45.6	54	-	-
	Azimuth:262	Height:103 Vert		Margin [dB]		-8.4	-	-

Vertical 7500 - 10000MHz -----

24	8336.668	26.19 pk	-15.2	37.3	48.29	54	-	-
	Azimuth:92	Height:103 Vert		Margin [dB]		-5.71	-	-
25	9260.88	26.1 pk	-13.8	38.2	50.5	54	-	-
	Azimuth:17	Height:103 Vert		Margin [dB]		-3.5	-	-
26	9523.512	25.58 pk	-13.3	38.4	50.68	54	-	-
	Azimuth:5	Height:103 Vert		Margin [dB]		-3.32	-	-
27	9611.056	26.03 pk	-13.6	38.5	50.93	54	-	-
	Azimuth:275	Height:103 Vert		Margin [dB]		-3.07	-	-
28	9662.331	25.77 pk	-13.3	38.6	51.07	54	-	-
	Azimuth:275	Height:103 Vert		Margin [dB]		-2.93	-	-
29	9757.379	26.19 pk	-12.7	38.7	52.19	54	-	-
	Azimuth:92	Height:103 Vert		Margin [dB]		-1.81	-	-
30	9816.158	26.58 pk	-12.2	38.7	53.08	54	-	-
	Azimuth:46	Height:103 Vert		Margin [dB]		-.92	-	-
31	9857.429	27.05 pk	-11.9	38.8	53.95	54	-	-
	Azimuth:46	Height:103 Vert		Margin [dB]		-.05	-	-
32	9969.985	27.48 pk	-11.2	38.9	55.18	54	-	-
	Azimuth:229	Height:103 Vert		Margin [dB]		1.18	-	-

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.
Model: M8485Se 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
Frequency	Reading	Factor	Factor	dB[uVolts/meter]			
[MHz]	[dB(uV)]	[dB]	[dB]				
=====							
Vertical 2000 - 4600MHz							
2779.5611	48.6 ave	-25.1	29.4	52.9	54	-	-
Azimuth: 27 Height:116 Vert				Margin [dB]:	-1.1	-	-

LIMIT 1: FCC Part15 - CLASS B

ave - Average detector

SATO Corp.
Model: M8485Se 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
Frequency	Reading	Factor	Factor	dB[uVolts/meter]			
[MHz]	[dB(uV)]	[dB]	[dB]				
=====							
Horizontal 7500 - 10000MHz							
9280.89	22.63 ave	-13.7	38.2	47.13	54	-	-
				Margin [dB]:	-6.87	-	-
9533.517	22.34 ave	-13.4	38.4	47.34	54	-	-
				Margin [dB]:	-6.66	-	-
9609.805	22.48 ave	-13.6	38.5	47.38	54	-	-
				Margin [dB]:	-6.62	-	-
9706.103	22.13 ave	-13.1	38.6	47.63	54	-	-
				Margin [dB]:	-6.37	-	-
9774.887	22.69 ave	-12.6	38.7	48.79	54	-	-
				Margin [dB]:	-5.21	-	-
9868.684	23.15 ave	-11.8	38.8	50.15	54	-	-
				Margin [dB]:	-3.85	-	-
9944.972	23.39 ave	-11.3	38.8	50.89	54	-	-
				Margin [dB]:	-3.11	-	-
9996.248	23.57 ave	-11	38.9	51.47	54	-	-
				Margin [dB]:	-2.53	-	-
Vertical 7500 - 10000MHz							
9260.88	22.69 ave	-13.8	38.2	47.09	54	-	-
				Margin [dB]:	-6.91	-	-
9523.512	22.31 ave	-13.3	38.4	47.41	54	-	-
				Margin [dB]:	-6.59	-	-
9611.056	22.49 ave	-13.6	38.5	47.39	54	-	-
				Margin [dB]:	-6.61	-	-

File Number: E133631

Issued: 3-4-05

Project Number: O4CA52274

Model Number: M-8485Se

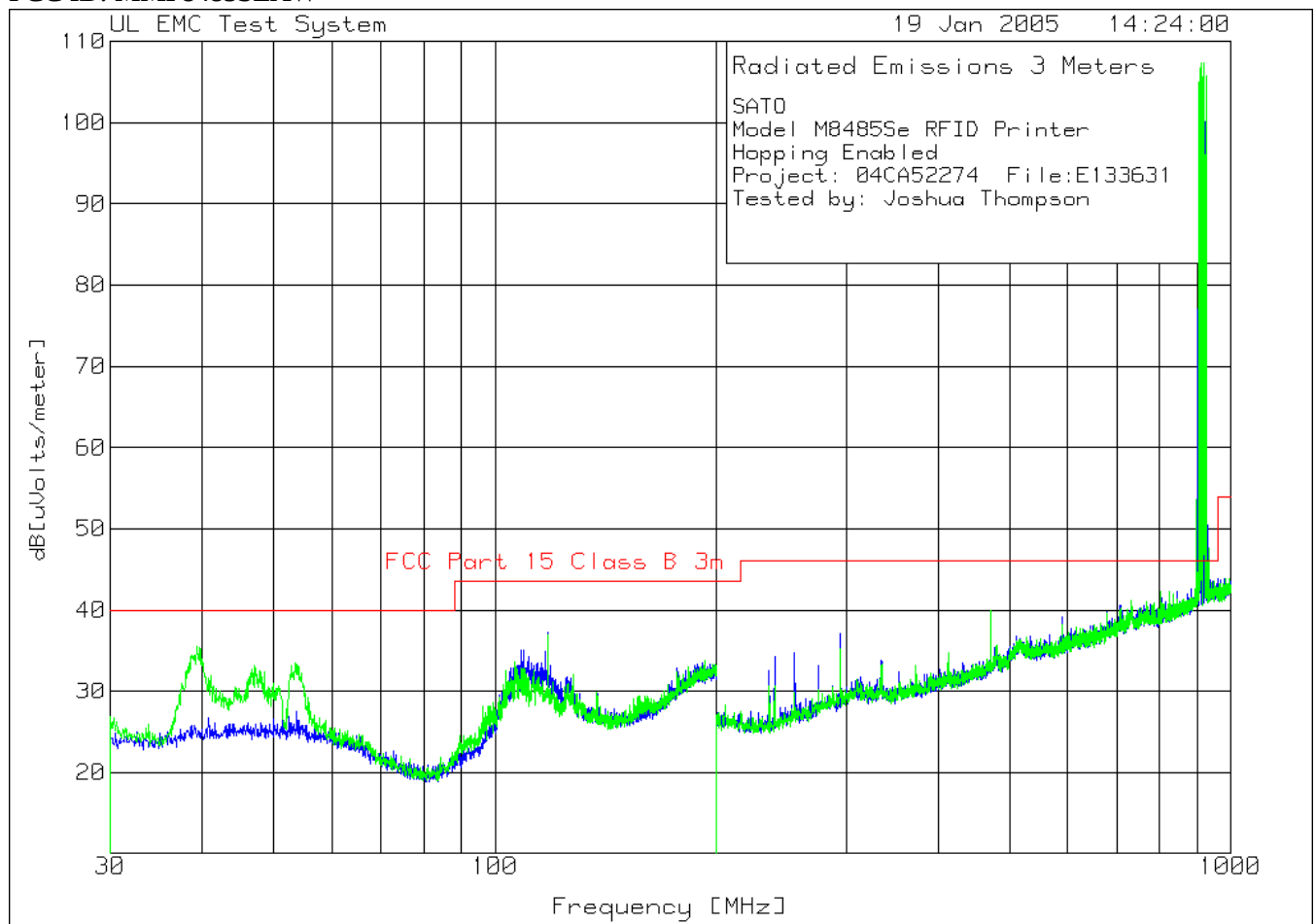
FCC ID: MMF8485SEAW

9662.331	22.34	ave	-13.3	38.6	47.64	54	-	-	-
				Margin [dB]:		-6.36	-	-	-
9757.379	22.61	ave	-12.7	38.7	48.61	54	-	-	-
				Margin [dB]:		-5.39	-	-	-
9816.158	23.06	ave	-12.2	38.7	49.56	54	-	-	-
				Margin [dB]:		-4.44	-	-	-
9857.429	23.3	ave	-11.9	38.8	50.2	54	-	-	-
				Margin [dB]:		-3.8	-	-	-
9969.985	23.45	ave	-11.2	38.9	51.15	54	-	-	-
				Margin [dB]:		-2.85	-	-	-

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

ave - denotes average detection

LIMIT 1: FCC Part15 - CLASS B



SATO

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

Model M8485Se 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
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------	---	---

Horizontal 30 - 200MHz -----
4 117.9339 23.11 pk 1.5 12.6 37.21 43.5 - -
Azimuth:18 Height:249 Horz Margin [dB] -6.29 - -

Vertical 30 - 200MHz -----
1 39.2696 22.28 pk .9 12.4 35.58 40 - - -
Azimuth:276 Height:101 Vert Margin [dB] -4.42 - - -
2 53.4717 20.35 pk 1 12.1 33.45 40 - - -
Azimuth:18 Height:101 Vert Margin [dB] -6.55 - - -
3 117.9339 22.87 pk 1.5 12.6 36.97 43.5 - - -
Azimuth:250 Height:101 Vert Margin [dB] -6.53 - - -

Horizontal 200 - 1000MHz -----
5 903.4345 75.35 pk 4.4 23.3 103.05 46 - - -
Azimuth:359 Height:101 Horz Margin [dB] 57.05 - - -
6 923.7079 71.95 pk 4.5 23.7 100.15 46 - - -
Azimuth:356 Height:101 Horz Margin [dB] 54.15 - - -
7 962.1207 15.49 pk 4.6 23.8 43.89 54 - - -
Azimuth:86 Height:400 Horz Margin [dB] -10.11 - - -

Vertical 200 - 1000MHz -----
8 471.824 19.39 pk 3.1 17.5 39.99 46 - - -
Azimuth:3 Height:101 Vert Margin [dB] -6.01 - - -
9 903.968 77.26 pk 4.4 23.3 104.96 46 - - -
Azimuth:355 Height:399 Vert Margin [dB] 58.96 - - -
10 920.7736 79.18 pk 4.5 23.6 107.28 46 - - -
Azimuth:154 Height:250 Vert Margin [dB] 61.28 - - -
11 953.8513 14.26 pk 4.6 24 42.86 46 - - -
Azimuth:293 Height:250 Vert Margin [dB] -3.14 - - -

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

File Number: E133631
Project Number: O4CA52274
Model Number: M-8485Se
FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO

Model M8485Se RFID Printer

Hopping Enabled

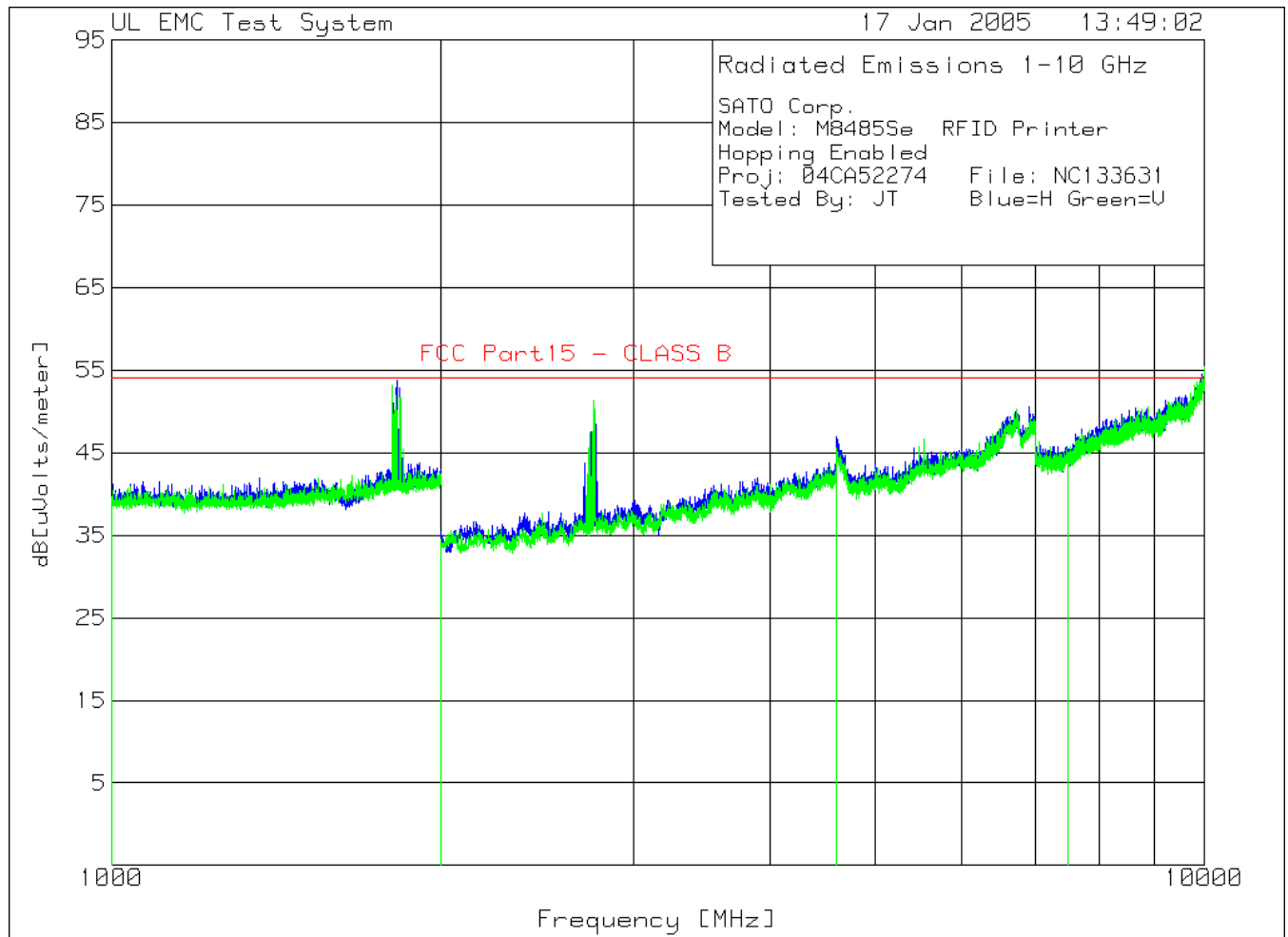
Project: 04CA52274 File:E133631

Tested by: Joshua Thompson

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3
Frequency	Reading	Factor	Factor	dB[uVolts/meter]			
[MHz]	[dB(uV)]	[dB]	[dB]				
=====							
Vertical 30 - 200MHz							
38.9816	16.94 qp	.9	12.4	30.24	40	-	-
Azimuth: 238 Height:133 Vert			Margin [dB]:		-9.76	-	-
Vertical 200 - 1000MHz							
953.7849	8.73 qp	4.6	24	37.33	46	-	-
Azimuth: 129 Height:243 Vert			Margin [dB]:		-8.67	-	-
471.8324	16.12 qp	3.1	17.5	36.72	46	-	-
Azimuth: 355 Height:113 Vert			Margin [dB]:		-9.28	-	-

LIMIT 1: FCC Part 15 Class B 3m

qp - Quasi-Peak detector



File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW

Issued: 3-4-05

SATO Corp.
 Model: M8485Se RFID Printer
 Hopping Enabled
 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	1824.912	46.82 pk	-19.7	26.6	53.72	54	-	-
	Azimuth:253	Height:101	Horz	Margin [dB]		-.28	-	-
Horizontal 2000 - 4600MHz -----								
2	2769.985	45.09 pk	-25.1	29.4	49.39	54	-	-
	Azimuth:193	Height:101	Horz	Margin [dB]		-4.61	-	-
3	3670.035	31.7 pk	-22.4	31.7	41	54	-	-
	Azimuth:16	Height:101	Horz	Margin [dB]		-13	-	-
4	4575.288	29.7 pk	-19.4	32.5	42.8	54	-	-
	Azimuth:194	Height:101	Horz	Margin [dB]		-11.2	-	-
Horizontal 4600 - 7500MHz -----								
5	5482.041	30.71 pk	-19.8	34.3	45.21	54	-	-
	Azimuth:358	Height:101	Horz	Margin [dB]		-8.79	-	-
6	6377.139	30.18 pk	-17.8	34.6	46.98	54	-	-
	Azimuth:38	Height:101	Horz	Margin [dB]		-7.02	-	-
7	7334.617	27.42 pk	-18.1	36.4	45.72	54	-	-
	Azimuth:358	Height:101	Horz	Margin [dB]		-8.28	-	-
Horizontal 7500 - 10000MHz -----								
8	8234.117	27.27 pk	-15.5	37.2	48.97	54	-	-
	Azimuth:312	Height:101	Horz	Margin [dB]		-5.03	-	-
9	9184.592	26.09 pk	-14.1	38.1	50.09	54	-	-
	Azimuth:138	Height:101	Horz	Margin [dB]		-3.91	-	-
10	9472.236	26.58 pk	-13.2	38.4	51.78	54	-	-
	Azimuth:354	Height:101	Horz	Margin [dB]		-2.22	-	-
11	9603.552	27.11 pk	-13.6	38.5	52.01	54	-	-
	Azimuth:176	Height:101	Horz	Margin [dB]		-1.99	-	-
12	9849.925	26.88 pk	-12	38.7	53.58	54	-	-
	Azimuth:267	Height:101	Horz	Margin [dB]		-.42	-	-
13	9936.218	27.04 pk	-11.4	38.8	54.44	54	-	-
	Azimuth:84	Height:101	Horz	Margin [dB]		.44	-	-
14	9986.243	27.15 pk	-11.1	38.9	54.95	54	-	-
	Azimuth:38	Height:101	Horz	Margin [dB]		.95	-	-
Vertical 1000 - 2000MHz -----								
15	1819.91	45.04 pk	-19.7	26.6	51.94	54	-	-
	Azimuth:17	Height:101	Vert	Margin [dB]		-2.06	-	-

Vertical 2000 - 4600MHz

16	2763.482	47.04 pk	-25.1	29.4	51.34	54	-	-
	Azimuth:28	Height:101 Vert		Margin [dB]		-2.66	-	-
17	3640.12	31.18 pk	-22.3	31.6	40.48	54	-	-
	Azimuth:276	Height:101 Vert		Margin [dB]		-13.52	-	-
18	4537.569	30.52 pk	-19.7	32.4	43.22	54	-	-
	Azimuth:83	Height:101 Vert		Margin [dB]		-10.78	-	-

Vertical 4600 - 7500MHz

19	5532.816	32.03 pk	-19.7	34.3	46.63	54	-	-
	Azimuth:358	Height:101 Vert		Margin [dB]		-7.37	-	-
20	6388.744	29.92 pk	-17.8	34.6	46.72	54	-	-
	Azimuth:9	Height:101 Vert		Margin [dB]		-7.28	-	-
21	7314.307	26.82 pk	-18.1	36.3	45.02	54	-	-
	Azimuth:10	Height:101 Vert		Margin [dB]		-8.98	-	-

Vertical 7500 - 10000MHz

22	8219.11	26.35 pk	-15.5	37.2	48.05	54	-	-
	Azimuth:222	Height:101 Vert		Margin [dB]		-5.95	-	-
23	9193.347	25.58 pk	-14.1	38.2	49.68	54	-	-
	Azimuth:321	Height:101 Vert		Margin [dB]		-4.32	-	-
24	9462.231	26.03 pk	-13.2	38.4	51.23	54	-	-
	Azimuth:131	Height:101 Vert		Margin [dB]		-2.77	-	-
25	9609.805	26.03 pk	-13.6	38.5	50.93	54	-	-
	Azimuth:358	Height:101 Vert		Margin [dB]		-3.07	-	-
26	9703.602	26.73 pk	-13.1	38.6	52.23	54	-	-
	Azimuth:18	Height:101 Vert		Margin [dB]		-1.77	-	-
27	9796.148	26.82 pk	-12.3	38.7	53.22	54	-	-
	Azimuth:268	Height:101 Vert		Margin [dB]		-.78	-	-
28	9848.674	26.88 pk	-12	38.7	53.58	54	-	-
	Azimuth:39	Height:101 Vert		Margin [dB]		-.42	-	-
29	9956.228	26.65 pk	-11.3	38.9	54.25	54	-	-
	Azimuth:268	Height:101 Vert		Margin [dB]		.25	-	-
30	10000	27.52 pk	-11	38.9	55.42	54	-	-
	Azimuth:358	Height:101 Vert		Margin [dB]		1.42	-	-

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

File Number: E133631
 Project Number: O4CA52274
 Model Number: M-8485Se
 FCC ID: MMF8485SEAW
 SATO Corp.

Issued: 3-4-05

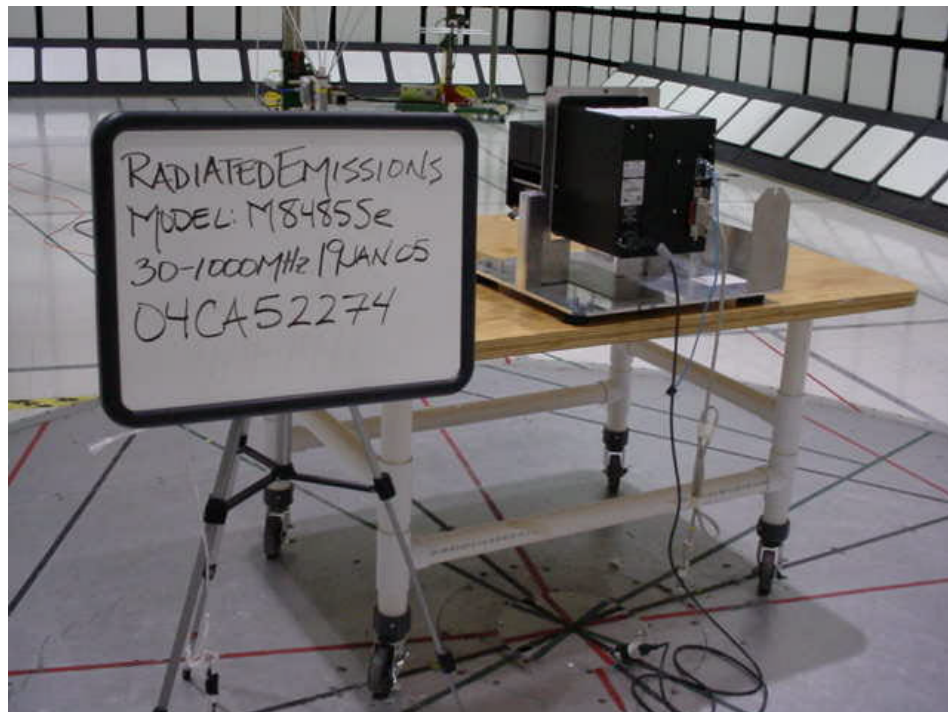
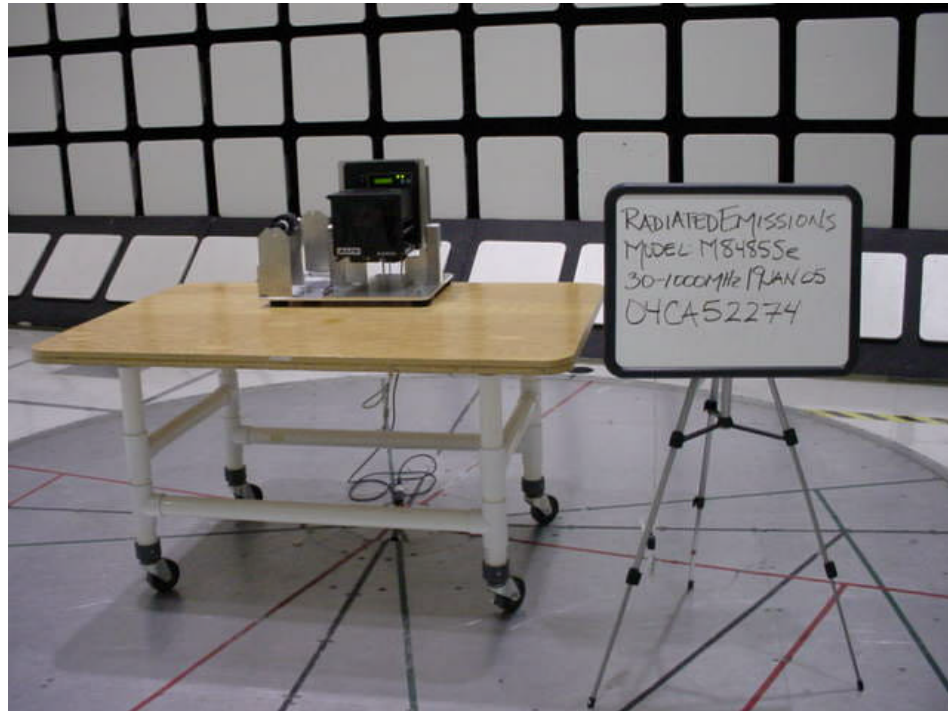
Model: M8485Se RFID Printer
 Hopping Enabled
 Proj: 04CA52274 File: NC133631
 Tested By: JT Blue=H Green=V

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								
9184.592	22.05 ave	-14.1	38.1	46.05	54	-	-	-
			Margin [dB]:		-7.95	-	-	-
9472.236	22.44 ave	-13.2	38.4	47.64	54	-	-	-
			Margin [dB]:		-6.36	-	-	-
9603.552	22.46 ave	-13.6	38.5	47.36	54	-	-	-
			Margin [dB]:		-6.64	-	-	-
9849.925	23.26 ave	-12	38.7	49.96	54	-	-	-
			Margin [dB]:		-4.04	-	-	-
9936.218	23.31 ave	-11.4	38.8	50.71	54	-	-	-
			Margin [dB]:		-3.29	-	-	-
9986.243	23.51 ave	-11.1	38.9	51.31	54	-	-	-
			Margin [dB]:		-2.69	-	-	-
Vertical 7500 - 10000MHz								
9193.347	22.14 ave	-14.1	38.2	46.24	54	-	-	-
			Margin [dB]:		-7.76	-	-	-
9462.231	22.48 ave	-13.2	38.4	47.68	54	-	-	-
			Margin [dB]:		-6.32	-	-	-
9609.805	22.5 ave	-13.6	38.5	47.4	54	-	-	-
			Margin [dB]:		-6.6	-	-	-
9703.602	22.16 ave	-13.1	38.6	47.66	54	-	-	-
			Margin [dB]:		-6.34	-	-	-
9796.148	23.02 ave	-12.3	38.7	49.42	54	-	-	-
			Margin [dB]:		-4.58	-	-	-
9848.674	23.25 ave	-12	38.7	49.95	54	-	-	-
			Margin [dB]:		-4.05	-	-	-
9956.228	23.45 ave	-11.3	38.9	51.05	54	-	-	-
			Margin [dB]:		-2.95	-	-	-
10000	23.59 ave	-11	38.9	51.49	54	-	-	-
			Margin [dB]:		-2.51	-	-	-

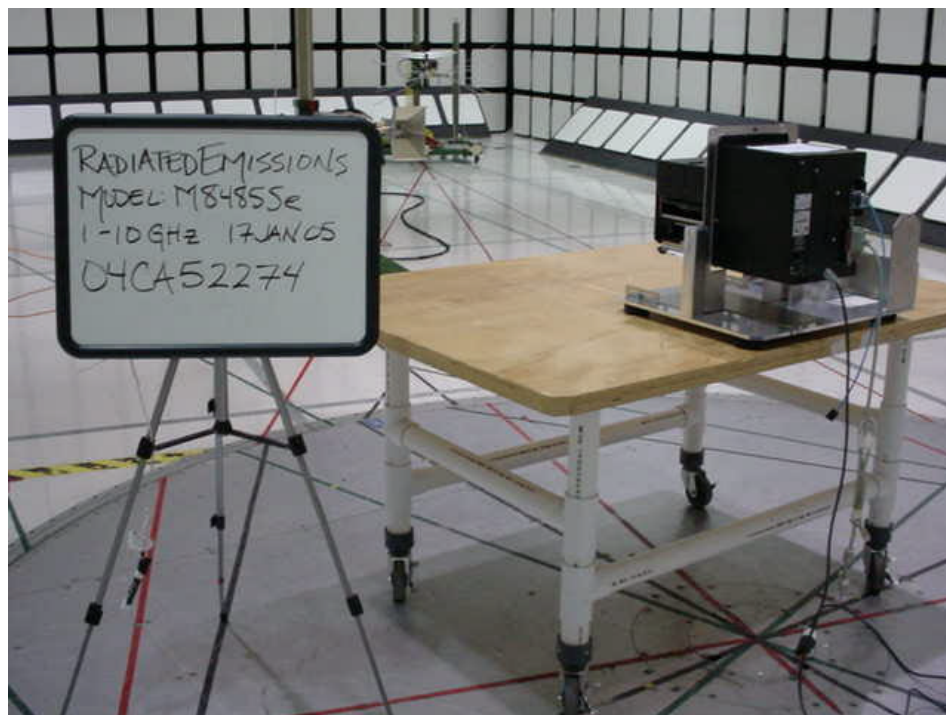
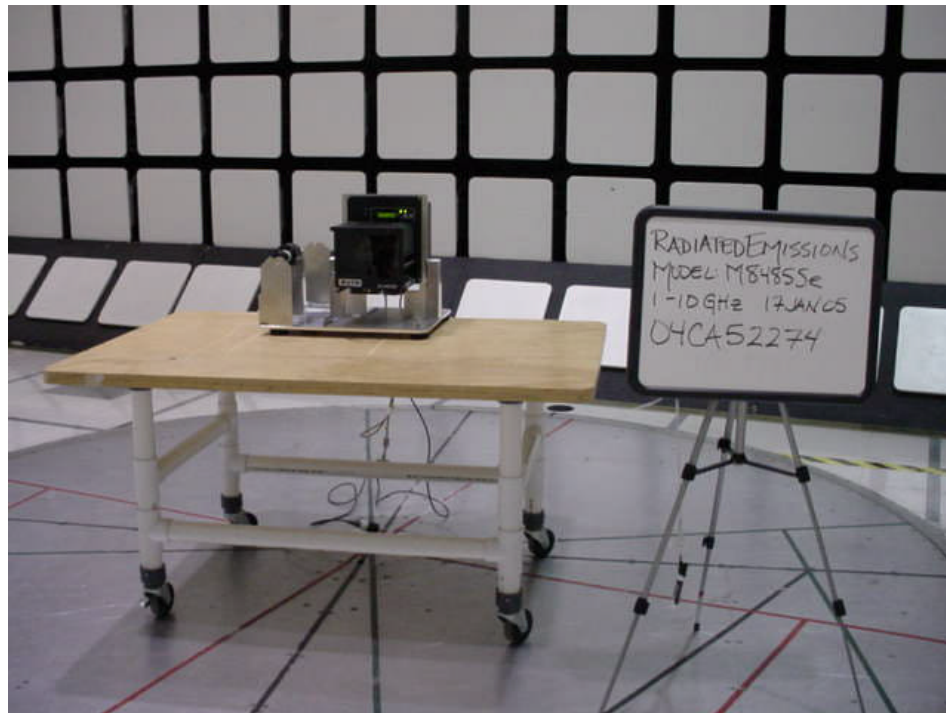
NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

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.

<u>Transmitter or Device Type</u> ¹⁸	<u>Output</u> ¹⁹	<u>Applicable Methods to Ensure Compliance</u> 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 professionally 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 M8485Se 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

Power Density = $EIRP / (4 * \pi * R^2)$,
 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/m² - or - 0.0198mW/cm²

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 **0.19754W/m²** - or - **0.0198mW/cm²**

Limit for **Uncontrolled**
 Exposure at Operating
 Frequency **6.1W/m²** - or - **0.61mW/cm²**

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