Technical Information

Applicant		Manufacturer	
Name:	Greenwald Industries	Name:	Greenwald Industries
Address:	212 Middlesex Avenue	Address:	212 Middlesex Avenue
City, State, Zip:	Chester, CT 06412	City, State, Zip:	Chester, CT 06412

Test Specification: FCC Rules and Regulations Part 15, Subpart C, Para. 15.225

Test Procedure: ANSI C63.4:2003

Test Sample Description

Date of Report: December 22, 2010

Test Sample: Flash Card Reader

Brandname: Flash Cash

FCC ID: YHMA001211CR

Type: RFID Transmitter

Power Requirements: 12-24 VDC derived from 120 VAC,60 Hz transformer

Frequency of Operation: 13.56 MHz

Applicable Rule Section: Part 15, Subpart C, Section 15.225

Tests Performed

Testing Date(s)	FCC Part 15, Subpart C	Test Method
November 12, 2010	15.225(a)	Radiated Emissions, Fundamental Frequency
May 27, 2010	15.225(d)	Radiated Emissions, Spurious and Harmonics, 9 kHz to 150 MHz
September 1, 2010	15.225(e)	Frequency Tolerance, Temperature Variation
October 4, 2010	15.209(a)	Conducted Emissions

Test Results

15.207(a): The radio frequency voltage that was conducted back on to the AC power line on any frequency/frequencies within the bandwidth of 150 kHz to 30 MHz did not exceed Class B limits as specified in CISPR 22.

15.225 (a): The fundamental field strength did not exceed 15,848 microvolts/meter at 30 meters within the band of 13.5537 – 13.567 MHZ.

15.225 (d): The field strength of emissions appearing outside of the 13.110 – 14.010 MHz band did not exceed the general radiated emissions limit in 15.209.

15.225 (e): The frequency tolerance was maintained with +/-0.01% of the operating frequency over a temperature variation of -20ºC to +50º Cat normal supply voltage and for variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20ºC.

General Notes

1. All readings were taken utilizing a peak detector function at a test distance of 3 meters.
2. The frequency range was scanned from 30 MHz to report were more than 20 dB below the specified limit.
3. The test sample was mounted in a representative host device.

Conducted Emissions Modification:
October 4, 2010
Flash Cash Cable description:

- The cable is constructed of individual seven (7) 22AWG wires. The wires are wound around several ferrite cores.
- All seven wires are wound to pass 5 times through the core (Fair-Rite 2631102002) near the reader end connector.
- This is repeated with two additional cores.
- Each individual wire is then wound to pass 3 times through a core (Fair-Rite 2631250202) using one core for each conductor.
- This is repeated three additional times.
- Finally, all seven wires are wound to pass 5 times through an additional core (Fair-Rite 2531102002)

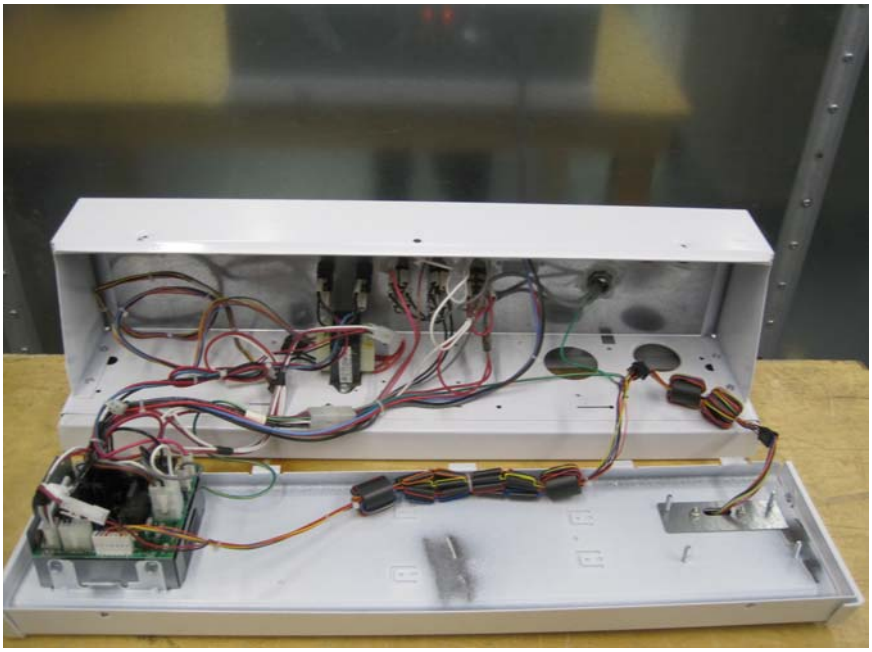
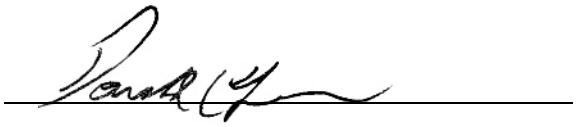


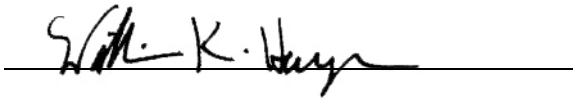
Photo of modification

Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Donald Lerner
EMC Engineer
NVLAP Approved Signatory



William K. Hayes
Executive Vice President
NARTE Certified Engineer EMC-000157-NE
NVLAP Approved Signatory

Non-Warranty Provision
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

Equipment List

Fundamental Frequency

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
012	Emco	Active Loop		6502	6/24/2010	6/24/2011
067	Retlif	Open Area Test Site	3/10 Meter	RNY	Inspect Before Use	
141	Agilent / HP	Spectrum Analyzer	100 HZ - 22 GHZ	8566B	6/21/2010	6/21/2011
141B	Agilent / HP	Quasi-Peak Adaptor	100 HZ - 22 GHZ	85650A	6/21/2010	6/21/2011

Spurious Emissions

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
012	Loop Antenna, Active	EMCO	9 kHz - 30 MHz	6502	7/21/2009	7/21/2010
067	Open Area Test Site	Retlif	3/10 Meter	RNY	6/1/2009	6/1/2010
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	5/6/2009	6/6/2010
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	5/5/2009	6/5/2010
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	5/5/2009	6/5/2010
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	5/6/2009	6/6/2010
512	Graphics Plotter	Hewlett Packard	N/A	7470A	10/1/2009	10/1/2010
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	10/13/2009	10/13/2010

Temperature Variation

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
507	STACO	AC POWER SUPPLY	0 - 140 Vac	E1010VA	Calibrate Before Use	
520F	WAVETEK-	DIGITAL MULTIMETER	True RMS Multimeter	25XT	8/4/2010	8/4/2011
544	AGILENT / HP	EMC ANALYZER	9.0 kHz - 1.8 GHz	8591EM	1/19/2010	1/19/2011
612	THERMOTRON CORP.	TEMPERATURE CHAMBER		SE-1000L	3/31/2010	3/31/2011

Conducted Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
078	SOLAR ELECTRONICS	LINE IMPEDANCE STABILIZATION NETWORK	10 kHz - 30 MHz	8028-50-TS24BNC	6/24/2010	6/24/2011
079	SOLAR ELECTRONICS	LINE IMPEDANCE STABILIZATION NETWORK	10 kHz - 30 MHz	8028-50-TS24BNC	6/24/2010	6/24/2011
1375	NARDA	10DB ATTENUATOR / 20W	DC - 11 GHz	768-10	8/5/2010	8/5/2011
712	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 26.5 GHz	ESIB26	6/29/2010	6/29/2011

Test Photograph(s)
Radiated Emissions - Fundamental Frequency

Test Photograph(s)
Radiated Emissions - Fundamental Frequency

EUT Configuration Front View

EUT Configuration Rear View

Test Photograph(s)
Radiated Emissions - Fundamental Frequency

Loop Antenna, Parallel Orientation to the EUT

Loop Antenna, Perpendicular Orientation to the EUT

Test Data
Radiated Emissions - Fundamental Frequency

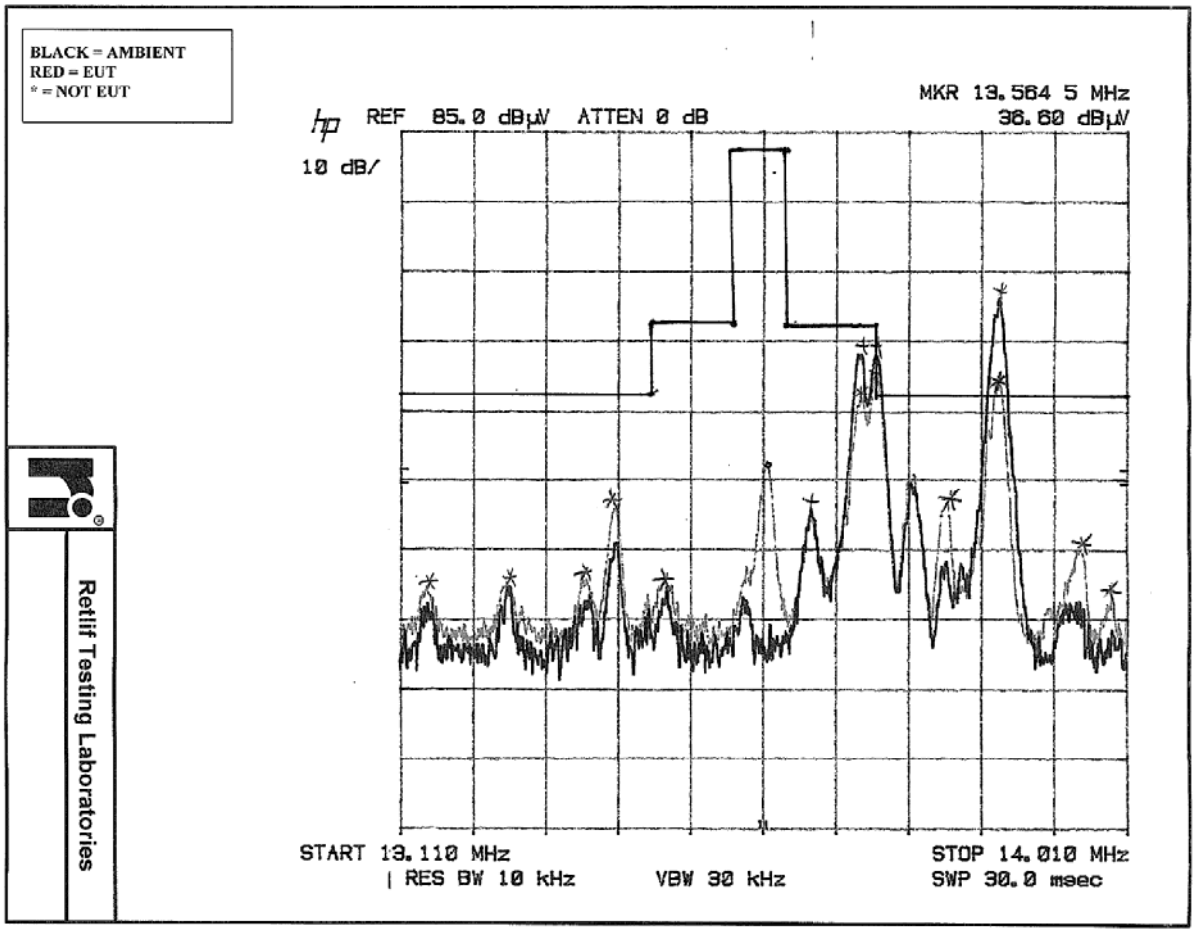
FCC Part 15, Subpart C Fundamental Frequency,
Paragraph 15.225(a)
Test Data

Test Method:	FCC Part 15 Subpart C Radiated Emissions, Fundamental Frequency Paragraph 15.225(a)		
Customer:	Greenwald Industries	**Job No.**	R-13463-3
Test Sample:	Flash Card Reader		
Model No.:	N/A	**FCC ID:**	YMHA001211CR
Operating Mode:	EUT continuously transmitting a 13.56 MHz signal.		
Technician:	R. Soodoo	**Date:**	November 12, 2010

Notes: Test Distance: 3 Meters
Detector: Peak, Unless otherwise specified

Test Freq.	Raw Amplitude @ 3m	Antenna Factor	Cable loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30 m	Margin	Detector
MHz	dBµV/m	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	PK / QP / AVG
13.56	36.6	8.5	3.6	40.0	8.7	84.0	75.3	PK

Note: Plot taken in OATS for spurious emission operating within the band 13.11 MHz to 14.01 MHz.

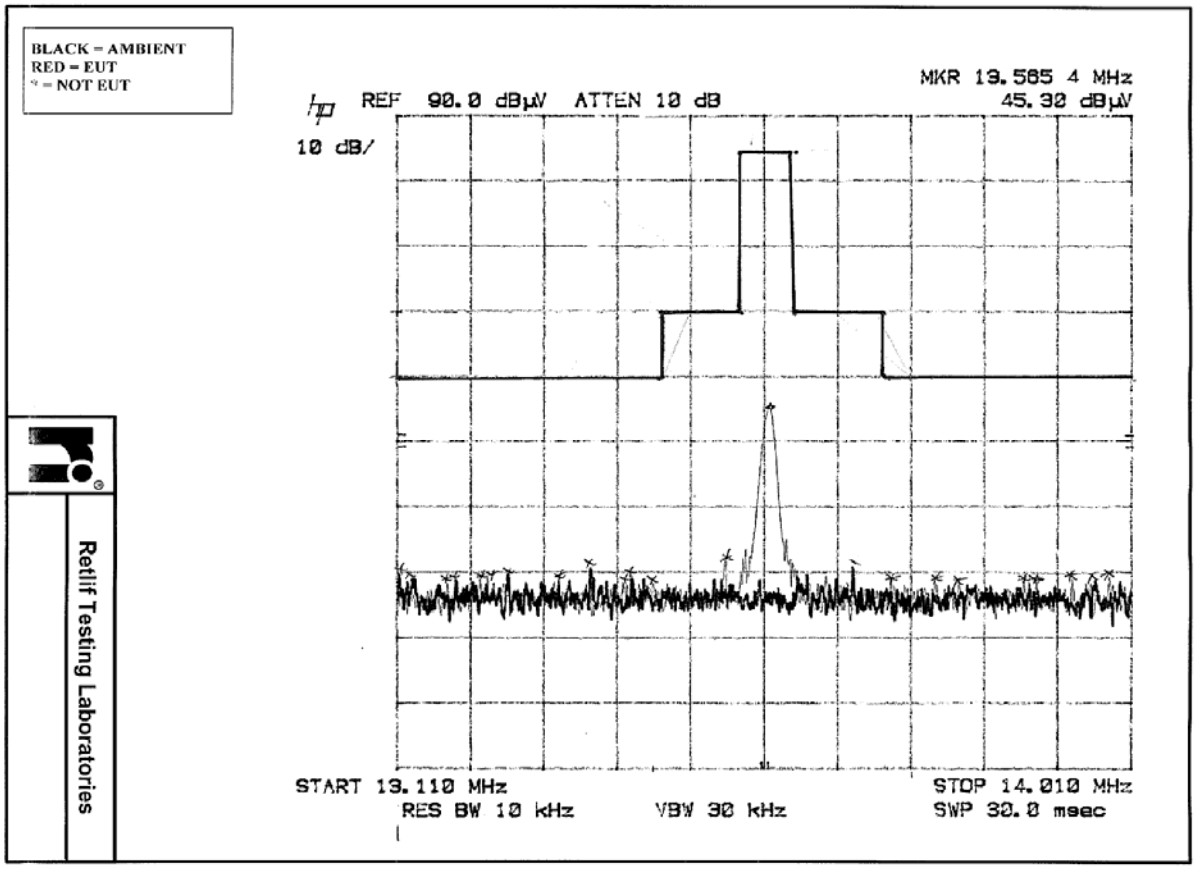


Test Method:	FCC Part 15 Subpart C Radiated Emissions, Fundamental Frequency Paragraph 15.225(a)		
Customer:	Greenwald Industries	**Job No.**	R-13463-3
Test Sample:	Flash Card Reader		
Model No.:	N/A	**FCC ID:**	YMHA001211CR
Operating Mode:	EUT continuously transmitting a 13.56 MHz signal.		
Technician:	R. Soodoo	**Date:**	November 12, 2010

Notes: Test Distance: 3 Meters
Detector: Peak, Unless otherwise specified

Test Freq.	Raw Amplitude @ 3m	Antenna Factor	Cable loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30 m	Margin	Detector
MHz	dBµV/m	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	PK / QP / AVG
13.56	36.6	8.5	3.6	40.0	8.7	84.0	75.3	PK

Note: Plot taken in a shielded enclosure showing no spurious emission operating within the band 13.11 MHz to 14.01 MHz.



Test Photograph(s)
Radiated Emissions, Spurious and Harmonics,
9 kHz to 150 MHz

Test Photograph(s)
Radiated Emissions, Spurious and Harmonics,

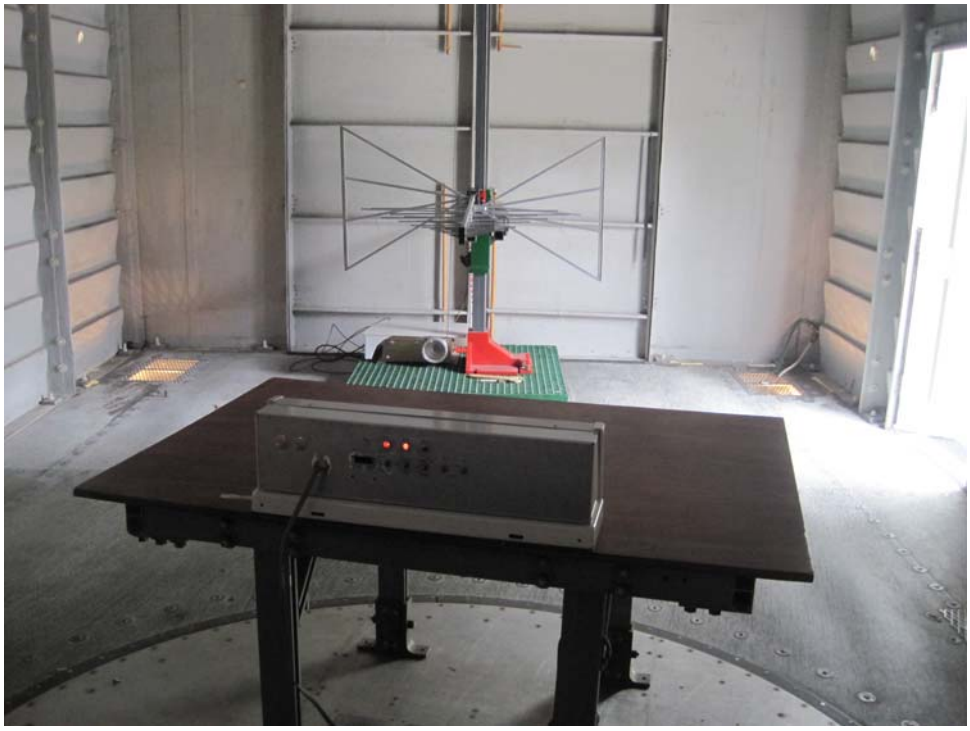
EUT Configuration Front View

EUT Configuration Rear View

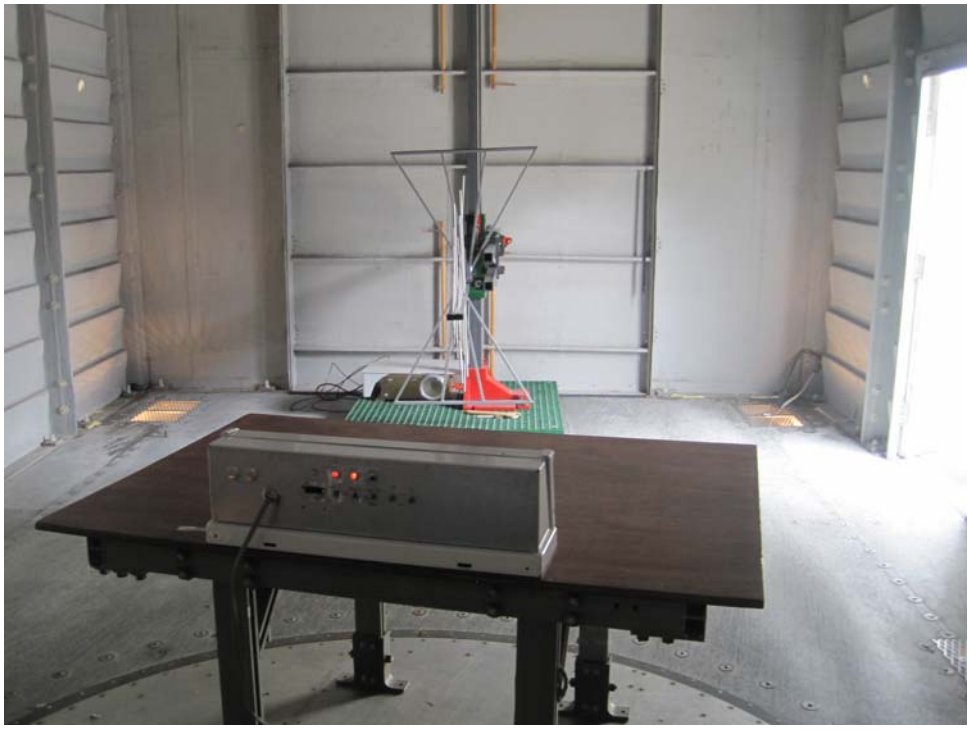
Test Photograph(s)
Radiated Emissions, Spurious and Harmonics,

Loop Antenna, Perpendicular Orientation to the EUT

Loop Antenna, Parallel Orientation to the EUT



Biconilog Antenna, Horizontal Orientation to the EUT



Biconilog Antenna, Vertical Orientation to the EUT

FCC Part 15, Subpart C Harmonics and Spurious Emissions,
Paragraph 15.225(d)
Test Data

Test Method:	FCC Part 15 Subpart C Harmonic and Spurious Emissions, Paragraph 15.225(d)		
Customer:	Greenwald Industries	**Job No.**	R-13463-3
Test Sample:	Flash Card Reader		
Model No.:	N/A	**FCC ID:**	YMHA001211CR
Operating Mode:	EUT continuously transmitting a 13.56 MHz signal.		
Technician:	R. Soodoo	**Date:**	May 27, 2010

Notes: Test Distance: 3 Meters
Detector: Quasi-Peak

Test Freq.	Antenna Pol./Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H)/Meters	Degree	dBµV	dB	dBµV/m	uV/m	uV/m
0.009							0.177
|							|
|							|
0.490							0.177
0.490							1.77
|							|
|							|
1.705							1.77
1.705							30.0
|							|
|							|
30.0							30.0
30.0							100.0
|							|
|							|
54.1	V / 1.0	68.0	39.0	-10.7	28.3	26.0	|
67.7	V / 1.0	150.0	31.5	-12.3	19.2	9.1	|
|							|
|							|
88.0							100.0
88.0							150.0
|							|
|							|
108.4	V / 1.0	197.0	32.2	-10.7	21.5	11.9	|
122.0	V / 1.0	20.0	31.2	-11.5	19.7	9.7	|
127.9	H / 1.4	164.0	39.1	-11.5	27.6	24.0	|
135.6	H / 1.0	200.0	30.5	-11.1	19.4	9.3	|
149.1	H / 1.0	153.0	34.3	-9.5	24.8	17.4	|
|							|
|							|
150.0							150.0
	The frequency range was scanned from 9.0 kHz to 150 MHz. All emissions not recorded were more						
	than 20 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.						

Test Photograph(s)
Frequency Tolerance

External Test Setup

Internal Test Setup

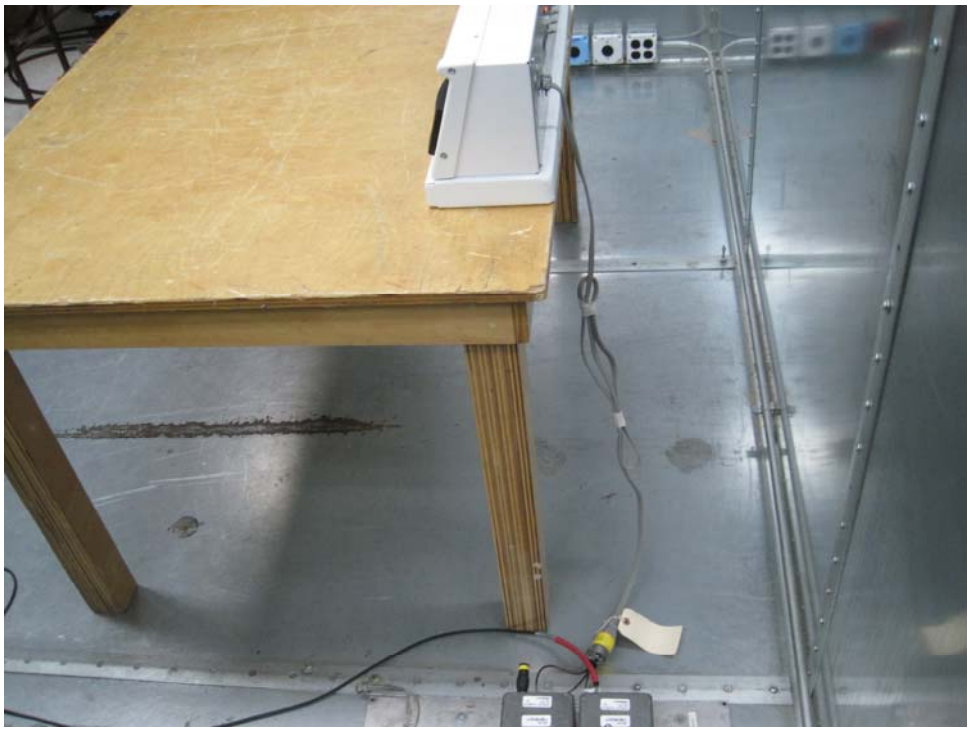
FCC Part 15, Subpart C Frequency Tolerance,
Temperature Variation
Paragraph 15.225(e)
Test Data

TEST DATA SHEET			
Test Method	FCC Part 15 Subpart C Frequency Tolerance, Temperature Variation Paragraph 15.225(e)		
Customer	Greenwald Industries		
Job Number	R-13463-3		
Test Sample	Flash Card Reader		
Model Number:	N/A	FCC ID:	YMHA001211CR
Operating Mode	EUT continuously transmitting a 13.56 MHz signal.		
Technician	A. Escobar, D. Lerner		
Date	September 1, 2010		
Notes: Frequency tolerance shall be maintained ±0.01 % of the fundamental frequency			

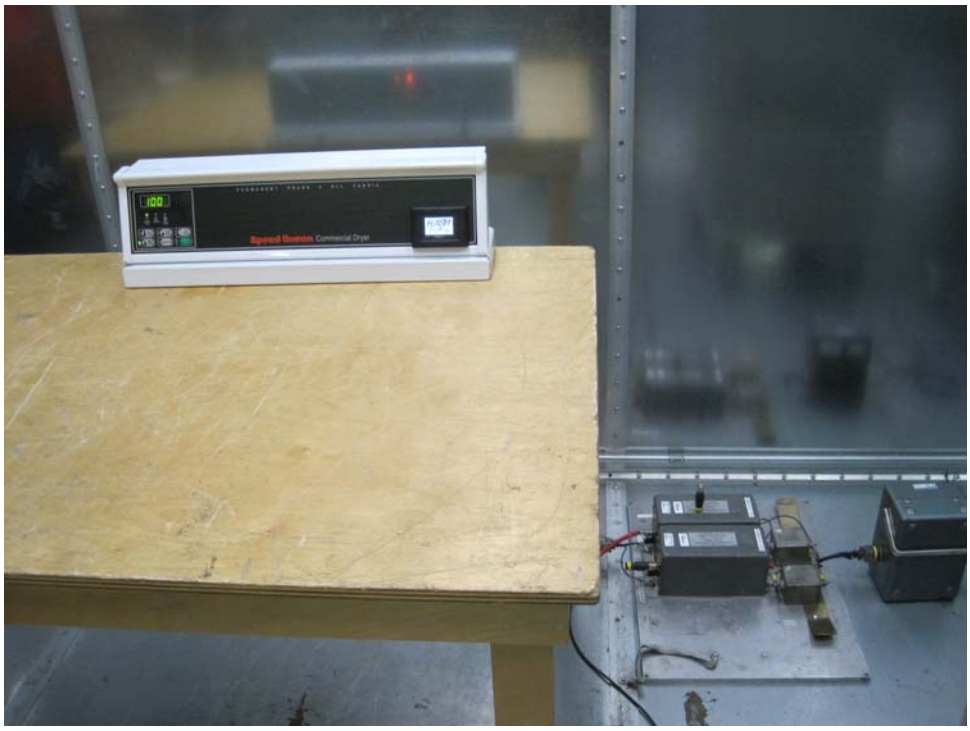
Temperature	Supply Voltage	Frequency	Results
°C	VAC	MHz	
20.0	115	13.56033	PASSED
20.0	97.7	13.56033	PASSED
20.0	132.3	13.56033	PASSED
-20.0	115	13.56015	PASSED
50.0	115	13.56023	PASSED

Sheet 1 of 1

Test Photograph(s)
Conducted Emissions



Cable Setup



Configuration

Test Photograph(s)
Conducted Emissions

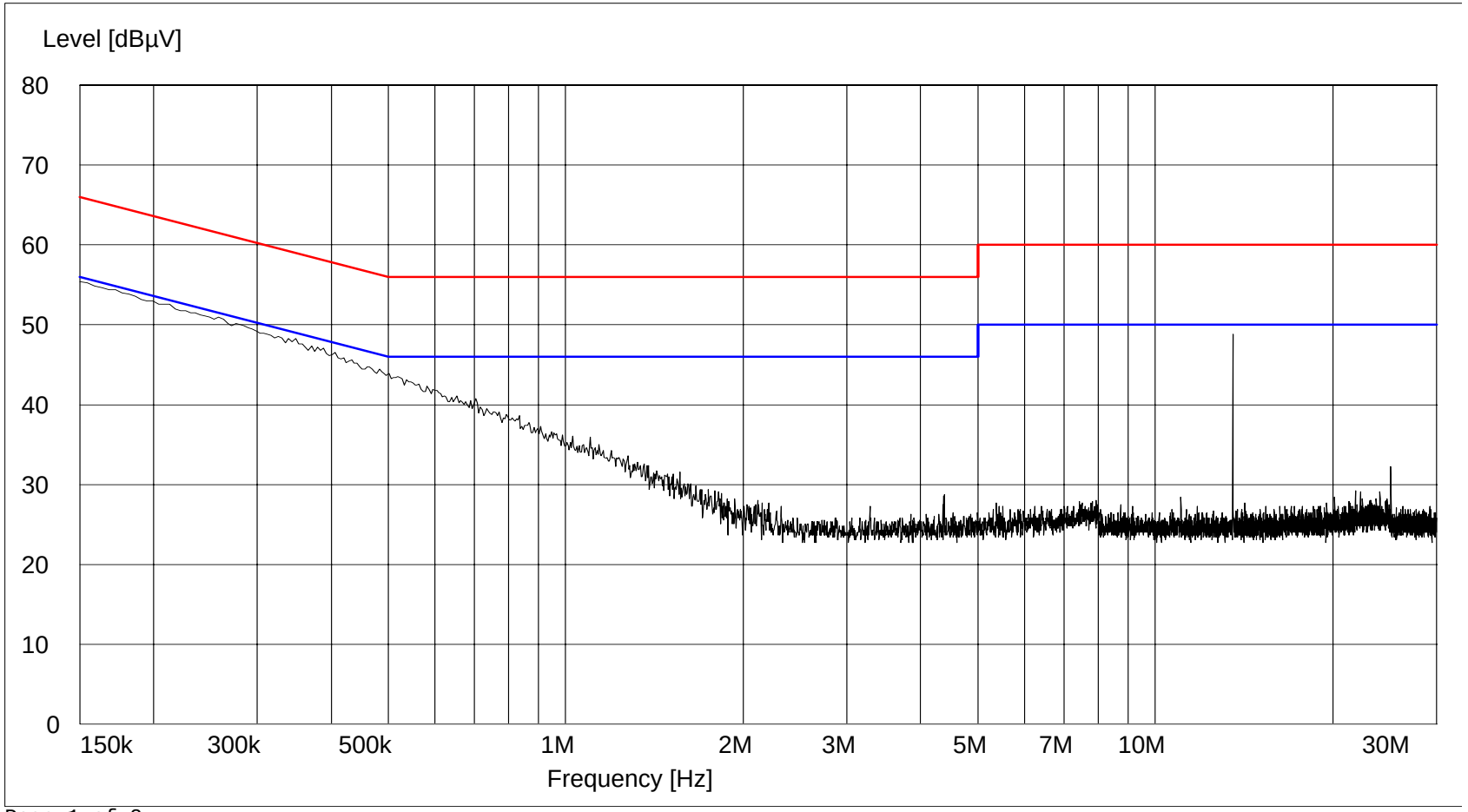
Test Setup

FCC Part 15, Subpart C, Section 15.207(a), Conducted Emissions, Power Leads, 150 kHz to 30 MHz
EUT Flash Card Reader
Test Data

RETLIF Testing Laboratories, Job Number R-13463-1 Retest

FCC Part 15, Subpart C, Conducted Emissions, 150 kHz to 30 MHz

```
Customer:           Greenwald Industries
Test Sample:        Flash Card Reader
Model Number:       N/A
FCC ID.:            YMHA001211CR
Test Specification: FCC Part 15 Subpart C Section 15.207(a)
Mode of Operation:  EUT continuously transmitting a 13.56 MHz signal.
Lead Tested:        120 VAC/60 Hz hot input to EUT
Technician / Date:  R. Soodoo / October 4, 2010
Detector / Note:    Peak / Peak emissions passed average limit.
```



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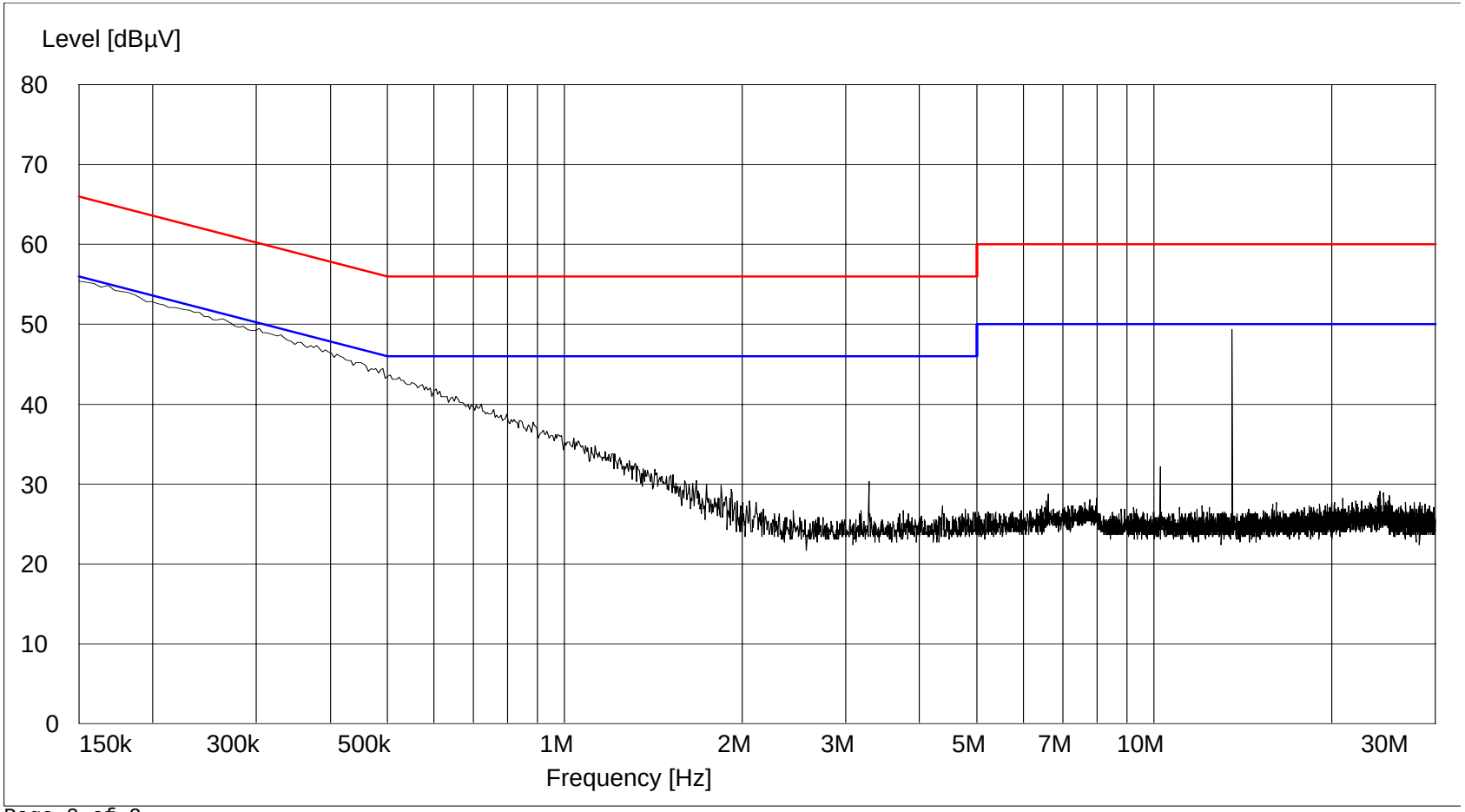
RETLIF Testing Laboratories, Job Number R-13463-1 Retest

FCC Part 15, Subpart C, Conducted Emissions, 150 kHz to 30 MHz

```
Customer:           Greenwald Industries
Test Sample:        Flash Card Reader
Model Number:       N/A
FCC ID.:            YMHA001211CR
Test Specification: FCC Part 15 Subpart C Section 15.207(a)
Mode of Operation:  EUT continuously transmitting a 13.56 MHz signal.
Lead Tested:        120 VAC/60 Hz neutral input to EUT
Technician / Date:  R. Soodoo / October 4, 2010
Detector / Note:    Peak / Peak emissions passed average limit.
```



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