



1250 Peterson Dr., Wheeling, IL 60090

Company: Intermatic Incorporated  
Model Tested: HA20  
Report Number: 13384

FCC Rules and Regulations / Intentional Radiators

Operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands

Part 15, Subpart C, Section 15.249

THE FOLLOWING "**MEETS**" THE ABOVE TEST SPECIFICATION

Formal Name: In-Wall Dimmer Switch  
Kind of Equipment: Dimmable Wall Switch  
Test Configuration: Wall Switch Dimmer wired directly to 120VAC 50/60 Hz  
(Tested at 120 vac, 60 Hz)  
Model Number(s): HA20  
Model(s) Tested: HA20  
Serial Number(s): N/A  
Date of Tests: July 26, 27 & 30, 2007  
Test Conducted For: Intermatic Incorporated  
7777 Winn Road  
Spring Grove, Illinois 60081

**NOTICE:** "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

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Model Tested: HA20  
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SIGNATURE PAGE

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Intermatic Incorporated



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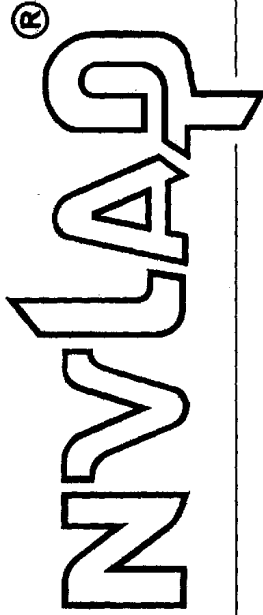
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United States Department of Commerce  
National Institute of Standards and Technology



# Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

**D.L.S. Electronic Systems, Inc.**  
Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

## ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

2006-10-01 through 2007-09-30  
Effective dates



*Dolly S. Buser*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-09-13)



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## 1.0 SUMMARY OF TEST REPORT

It was found that the In-Wall Dimmer Switch, Model Number(s) HA20, "meets" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.249 for operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands.

## 2.0 INTRODUCTION

On July 26, 27 & 30, 2007, a series of radio frequency interference measurements was performed on In-Wall Dimmer Switch, Model Number(s) HA20, Serial Number: N/A. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2003. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

## 3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.35(b), 15.37(d), 15.209 & 15.249 for Intentional Radiators operating in the Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24-24.25 GHz.



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#### 4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2003, Section 8, (Figures 11a and 11b). The conducted tests were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003, Section 4, (Figure 2).

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2003, Sections 6 and 8.



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## 5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2003, Section 4.2.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



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## 6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in MP-5 or ANSI C63.4-2003, as appropriate.





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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

The HA20 is an electronically-controlled in-wall dimmer module intended to be used to control the ON, OFF, and dimming of a lighting load directly connected to the device. The end-user may turn ON, OFF, or dim a light by actuating the toggle switch, or by means of a wireless RF controller sold separately. This product is rated for indoor use.

2 special software programs were loaded onto 2 separate test samples to be tested separately: TXMOD.hex, will constantly transmit the modulated carrier mode for the duration of the test. RX.hex, will place the device into constant receive mode for the duration of the test.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 35mm x Width: 44mm x Height: 105mm

7.3 LINE FILTER USED:

N/A

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

N/A

Clock Frequencies:

32 MHz & 16 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. Main Power PCB           | PN: 900-INT220-102570 REV:5 |
| 2. Key PCB                  | PN: 900-INT220-101570 REV:5 |
| 3. Z-Wave 300 Series Module | PN: ZM3102N                 |



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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:  
(See also Paragraph 7.0)

1: There were no additional descriptions noted at the time of test.

NOTE:

The test was run in continuous transmit mode and receive mode.

Transmit at 908.40 MHz with 40 kps data rate (fastest available).

Two special software programs were loaded onto 2 separate test samples to be tested separately:  
TXMOD.hex, will constantly transmit the modulated carrier mode for the duration of the test.  
RX.hex, will place the device into constant receive mode for the duration of the test.

I certify that the above, combined with paragraph 8.0, describes the equipment tested and that the equipment will be manufactured as stated.

By: \_\_\_\_\_  
Signature Title

For: \_\_\_\_\_  
Company Date



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## 9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 In-Wall Dimmer Switch

Model Number: HA20; Serial Number: N/A

Item 1 Light Bulb (40 watts) load with one meter non-shielded core.

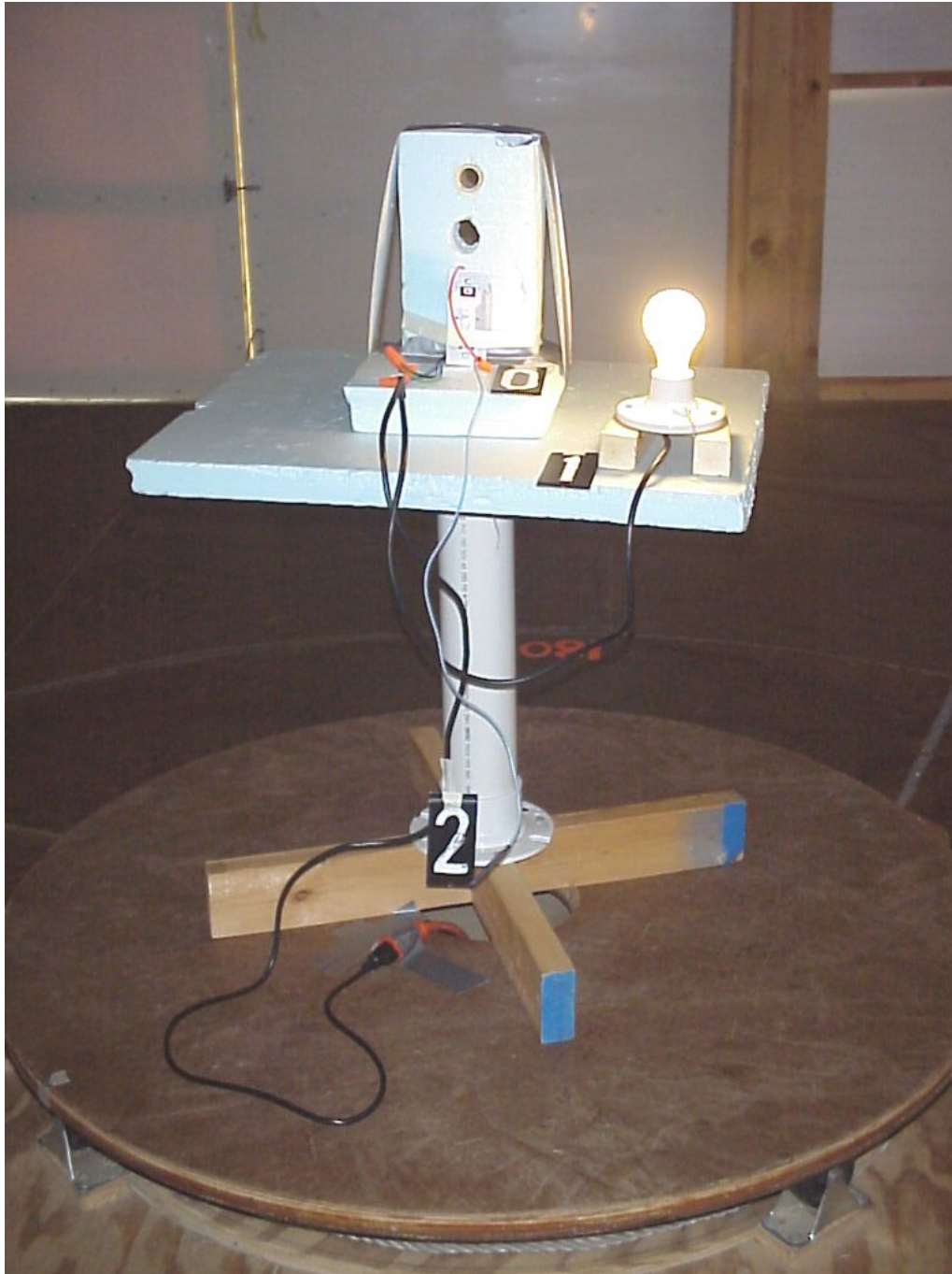
Item 2 Non-shielded AC Power Line Cord. 1.5m



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## 10.0 RADIATED PHOTOS TAKEN DURING TESTING





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## 10.0 CONDUCTED PHOTOS TAKEN DURING TESTING





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## 11.0 RESULTS OF TESTS

The radio interference emission charts can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

## 12.0 CONCLUSION

It was found that the In-Wall Dimmer Switch, Model Number(s) HA20 "meets" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.249 for operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands.





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TABLE 1 – EQUIPMENT LIST

<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Frequency Range</b>	<b>Cal Due Dates</b>
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/07
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/07
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/07
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/08
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/08
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/08
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/08
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/08
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/08
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/08
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/07
Horn Antenna	EMCO	3115	4451	1 GHz – 18 GHz	5/08
Horn Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	6/08
Horn Antenna	EMCO	3115	6204	1 GHz – 18 GHz	5/08
Horn Antenna	COM POWER	AH 118	071127	1 GHz – 18 GHz	5/08

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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TABLE 1 – EQUIPMENT LIST

<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Frequency Range</b>	<b>Cal Due Dates</b>
Horn Antenna	EMCO	3116	2549	18 GHz – 40 GHz	5/08
Horn Antenna	ETS Lindgren	3116	00062917	18 GHz – 40 GHz	10/07
Horn Antenna	A.H. Systems	SAS-574	221	18 GHz – 40 GHz	4/08
Horn Antenna	A.H. Systems	SAS-574	222	18 GHz – 40 GHz	4/08
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/07
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/07
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/07
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/07
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/08

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.





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# APPENDIX A

## TEST PROCEDURE

Part 15, Subpart C, Section 15.249a-e

Operation within the Bands 902-928 MHz,

2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz



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## APPENDIX A

### 1.0 CONDUCTED EMISSION MEASUREMENTS

Conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements as specified in FCC Part 15, Subpart C, Section 15.207 & ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high (hot) and low (neutral) sides, were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. During the test, the cables were placed and items moved (when appropriate) to maximize emissions. All signals were then recorded. The allowed levels for Intentional Radiators which is designed to be connected to the public utility (AC) power line cannot exceed the following:

Frequency of Emissions (MHz)	Conducted Limits (dBuV)	
	Quasi Peak	Average
.15 to .5	66 to 56	56 to 46
.5 to 5	56	46
5 to 30	60	50

#### **NOTE:**

All test measurements were made at a screen room temperature of **75°F** at **50%** relative humidity.



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CONDUCTED DATA AND GRAPH(S)  
TAKEN DURING TESTING

PART 15.207

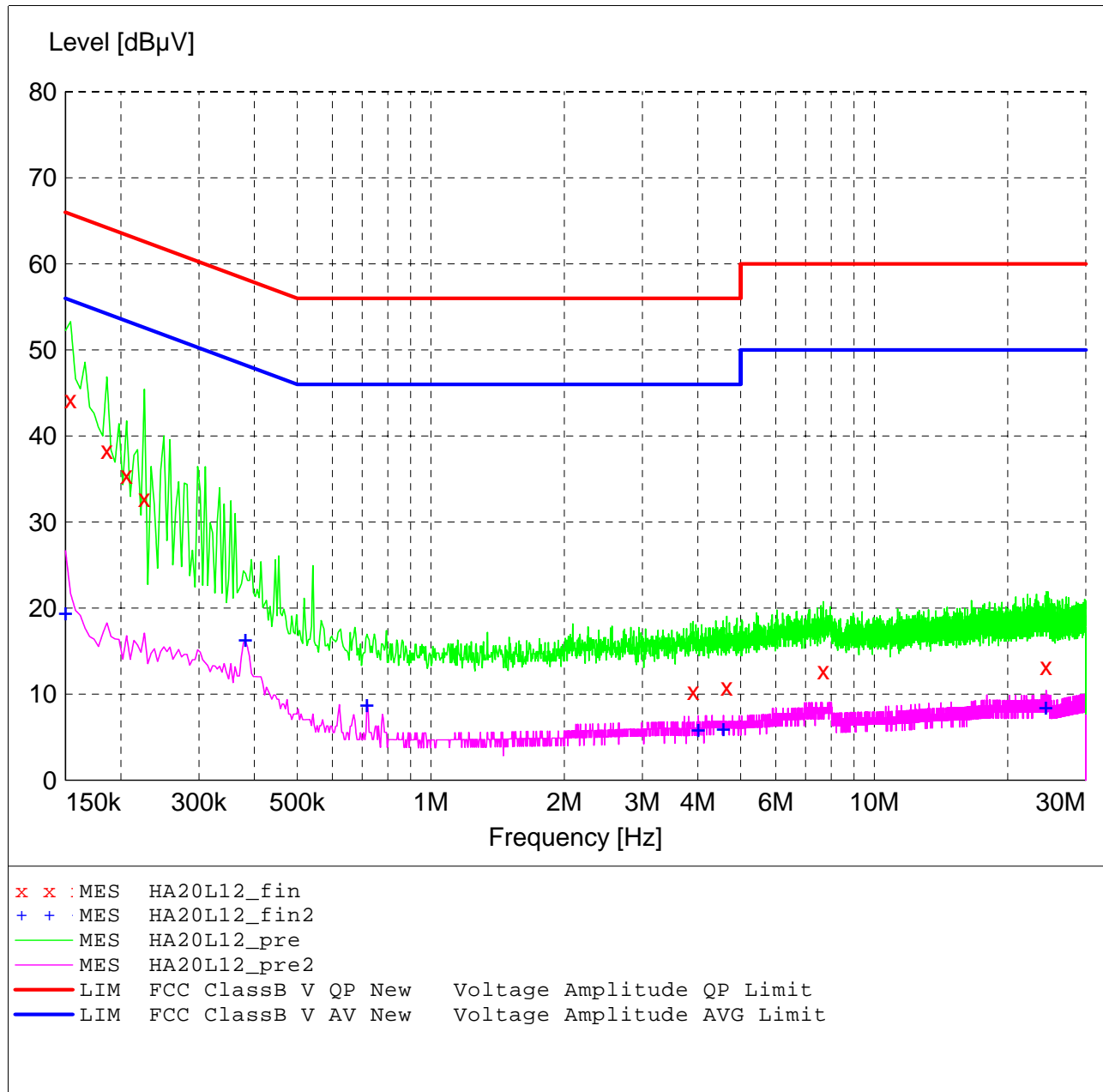
**FCC Part 15 Class B**

**Voltage Mains Test**

EUT: HA20  
 Manufacturer: Intermatic Inc.  
 Operating Condition: 75 deg. F, 50% R.H.  
 Test Site: DLS O.F. Site 1 (Screenroom)  
 Operator: Craig B  
 Test Specification: 120 V 60 Hz  
 Comment: Line 1  
 Date: 07-30-2007

**SCAN TABLE: "Line Cond Scrn RmFin"**

Short Description:		Line Conducted Emissions					Transducer
Start	Stop	Step	Detector	Meas. Time	IF Bandw.		
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	2.0 s	9 kHz	LISN DLS#128	
CISPR AV							



**MEASUREMENT RESULT: "HA20L12\_fin"**

7/30/2007 8:48AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154000	44.20	11.5	66	21.6	QP	---	---
0.186000	38.30	11.2	64	25.9	QP	---	---
0.206000	35.50	11.0	63	27.9	QP	---	---
0.226000	32.80	10.8	63	29.8	QP	---	---
3.906000	10.30	10.8	56	45.7	QP	---	---
4.650000	10.80	10.8	56	45.2	QP	---	---
7.674000	12.70	11.1	60	47.3	QP	---	---
24.426000	13.20	11.9	60	46.8	QP	---	---

**MEASUREMENT RESULT: "HA20L12\_fin2"**

7/30/2007 8:48AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	19.50	11.6	56	36.5	CAV	---	---
0.382000	16.40	10.4	48	31.8	CAV	---	---
0.718000	8.80	10.3	46	37.2	CAV	---	---
4.010000	6.00	10.8	46	40.0	CAV	---	---
4.570000	6.10	10.8	46	39.9	CAV	---	---
24.418000	8.60	11.9	50	41.4	CAV	---	---

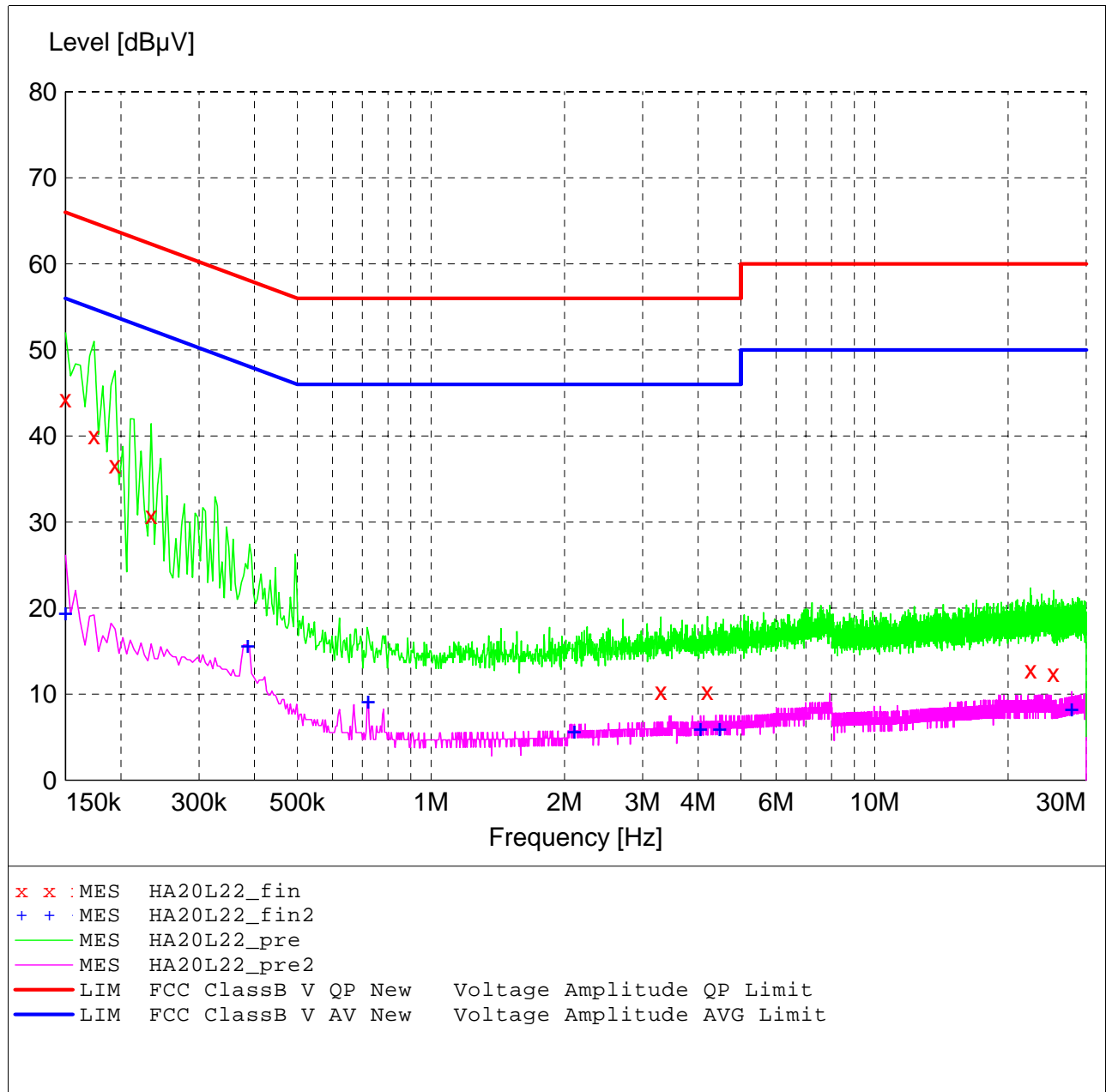
**FCC Part 15 Class B**

**Voltage Mains Test**

EUT: HA20  
 Manufacturer: Intermatic Inc.  
 Operating Condition: 75 deg. F, 50% R.H.  
 Test Site: DLS O.F. Site 1 (Screenroom)  
 Operator: Craig B  
 Test Specification: 120 V 60 Hz  
 Comment: Line 2  
 Date: 07-30-2007

**SCAN TABLE: "Line Cond Scrn RmFin"**

Short Description:			Line Conducted Emissions				Transducer
Start	Stop	Step	Detector	Meas. Time	IF Bandw.		
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	2.0 s	9 kHz	LISN DLS#128	
CISPR AV							



**MEASUREMENT RESULT: "HA20L22\_fin"**

7/30/2007 8:52AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	44.30	11.6	66	21.7	QP	---	---
0.174000	40.10	11.3	65	24.7	QP	---	---
0.194000	36.70	11.1	64	27.2	QP	---	---
0.234000	30.80	10.8	62	31.5	QP	---	---
3.298000	10.30	10.7	56	45.7	QP	---	---
4.198000	10.30	10.8	56	45.7	QP	---	---
22.478000	12.80	11.9	60	47.2	QP	---	---
25.318000	12.40	11.9	60	47.6	QP	---	---

**MEASUREMENT RESULT: "HA20L22\_fin2"**

7/30/2007 8:52AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	19.50	11.6	56	36.5	CAV	---	---
0.386000	15.70	10.4	48	32.4	CAV	---	---
0.722000	9.30	10.3	46	36.7	CAV	---	---
2.106000	5.80	10.5	46	40.2	CAV	---	---
4.054000	6.10	10.8	46	39.9	CAV	---	---
4.478000	6.10	10.8	46	39.9	CAV	---	---
27.842000	8.40	12.4	50	41.6	CAV	---	---



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APPENDIX A

2.0 BAND EDGE AND RESTRICTED BAND COMPLIANCE

The field strength of any emissions appearing outside the 902 to 928 MHz band shall not exceed the general radiated emissions limits as stated Section 15.209. The fundamental from the In-Wall Dimmer Switch transmitter shall not be inside the restricted band 960 to 1240 MHz.

As stated in Section 15.205a, the fundamental emission from the In-Wall Dimmer Switch shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

**NOTE:**

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

See the following page (s) for the graph (s) made showing compliance for Band Edge and Restricted Band: Also see the table of measurements made for the Fundamental and Spurious emissions in paragraph 3 of this section.





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APPENDIX A

DATA AND GRAPH(S) TAKEN SHOWING THE  
RESTRICTED BAND COMPLIANCE

PART 15.249



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APPENDIX A

**Radiated Fundamental and Spurious Emissions – 30 MHz to 10 GHz  
 Tested at a 3 Meter Distance**

**EUT:** Model: HA20  
**Manufacturer:** Intermatic, Inc.  
**Operating Condition:** 73 deg F; 68% R.H.  
**Test Site:** Site 3  
**Operator:** Craig Brandt  
**Test Specification:** FCC Part 15.249  
**Comment:** Continuous transmit – 908.40 MHz; 40 kbps data rate  
**Date:** 07/27/2007

**Note:** All other emissions at least 20 dB under the limit.

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
908.4	Quasi-Peak	Vert	70.93	22.07	-18.3	74.7	94	19.3	1.00	330	Fundamental
908.4	Quasi-Peak	Horz	71.50	22.07	-18.3	75.3	94	18.7	1.30	20	Fundamental
1816.8	Max Peak	Vert	55.00	26.49	-37.9	43.6	74	30.4	1.00	0	Harmonic & Restricted Bands
1816.8	Max Peak	Horz	61.54	26.49	-37.9	50.1	74	23.9	1.00	0	Harmonic & Restricted Bands
1816.8	Average	Vert	48.68	26.49	-37.9	37.3	54	16.7	1.00	0	Harmonic & Restricted Bands
1816.8	Average	Horz	58.68	26.49	-37.9	47.3	54	6.7	1.00	0	Harmonic & Restricted Bands
3633.6	Max Peak	Vert	51.05	31.62	-36.5	46.2	74	27.8	1.10	200	Harmonic & Restricted Bands
3633.6	Max Peak	Horz	50.44	31.62	-36.5	45.6	74	28.4	1.00	200	Harmonic & Restricted Bands
3633.6	Average	Vert	43.57	31.62	-36.5	38.7	54	15.3	1.10	200	Harmonic & Restricted Bands
3633.6	Average	Horz	42.51	31.62	-36.5	37.6	54	16.4	1.00	200	Harmonic & Restricted Bands



1250 Peterson Dr., Wheeling, IL 60090

Company: Intermatic Incorporated  
Model Tested: HA20  
Report Number: 13384

APPENDIX A

20 dB BANDWIDTH BAND EDGE

DATA AND GRAPH(S)

PART 15.249



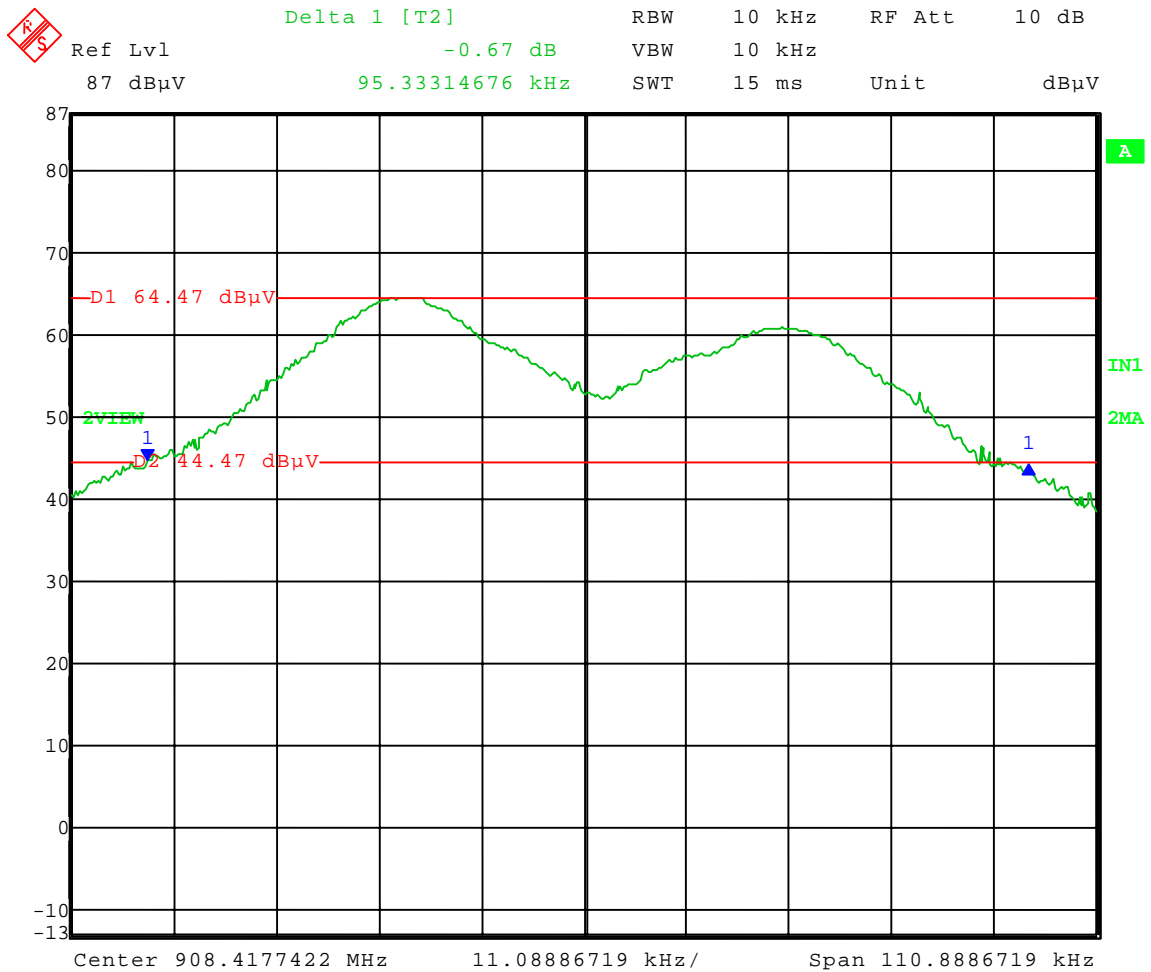
Company: Intermatic Incorporated  
Model Tested: HA20  
Report Number: 13384

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 07-26-2007  
Company: Intermatic Inc.  
EUT: HA20  
Test: 20 dB Bandwidth - Radiated  
Operator: Craig Brandt  
Comment: 40 kbps data rate

20 dB Bandwidth = 95.33 kHz



Date: 26.JUL.2007 13:06:39



1250 Peterson Dr., Wheeling, IL 60090

Company: Intermatic Incorporated  
Model Tested: HA20  
Report Number: 13384

## APPENDIX A

### 3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (SECTION 15.249a-d)

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the In-Wall Dimmer Switch, Model Number: HA20, are shown in tabulated and graph form. Preliminary radiation measurements were performed at a 3 meter test distance with the limits adjusted linearly when required. The frequency range from 30 MHz to over 960 MHz, depending upon the fundamental frequency as stated in Part 15.33a, was automatically scanned and plotted at various angles.

Measurements for the In-Wall Dimmer Switch were made up to 10000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 908.42 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 30 MHz, up to at least the tenth harmonic of the highest fundamental frequency or 10 GHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made over the entire frequency range specified in FCC Part 15, Subpart C, Section 15.249 at the open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**. When required, levels were extrapolated from 10 meters to 3 meters using a linear extrapolation.

All signals in the frequency range of 30 MHz to 2000 MHz were measured with a Biconical Antenna or tuned dipoles and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. From 1000 MHz to 10 GHz Horn Antennas were used. During the test the equipment was rotated and the antenna was raised and lowered from 1 meter to 4 meters to find the maximum level of emissions. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. The EUT, peripheral equipment and cables were configured to meet the conditions in ANSI C63.4-2003, Clauses 6 & 8. Tests were made with the receive antenna(s) in both the horizontal and vertical planes of polarization. In each case, the table was rotated to find the maximum emissions.



Company: Intermatic Incorporated  
 Model Tested: HA20  
 Report Number: 13384

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APPENDIX A

3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T)

For operation in the bands 902 to 928 MHz, 2400 to 2483.5 MHz, 5725 to 5875 MHz, and 24.0 to 24.25 GHz the field strength of any emissions within this band shall not exceed the field strength levels specified in the following table as stated in FCC, Part 15, Section 15.249(a).

Frequency range in MHz	Field Strength of Fundamental millivolts/meter	Field Strength of Fundamental dBuV/meter	Field Strength of Harmonics microvolts/meter	Field Strength of Harmonics dBuV/meter
902 to 928	50	93.98	500	53.98
2400 to 2483.5	50	93.98	500	53.98
5725 to 5875	50	93.98	500	53.98
24000 to 24250	250	107.96	2500	67.96

Field strength limits are at a distance of 3 meters. The emission limits shown are based on measurement instrumentation employing an average detector.

Emissions radiated outside of the specified frequency bands, except for harmonics are attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Preliminary radiated emission measurements were performed at a 3 meter test distance. The frequency range from 30 MHz to 1000 MHz was automatically scanned and plotted at various angles.

**NOTE:**

All radiated emissions measurements were made at a test room temperature of **73°F** at **67%** relative humidity.



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Company: Intermatic Incorporated  
Model Tested: HA20  
Report Number: 13384

APPENDIX A

RADIATED DATA AND GRAPH(S) TAKEN FOR

FUNDAMENTAL & HARMONIC

EMISSION MEASUREMENTS

PART 15.249



Company: Intermatic Incorporated  
 Model Tested: HA20  
 Report Number: 13384

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

**Radiated Fundamental and Spurious Emissions – 30 MHz to 10 GHz  
 Tested at a 3 Meter Distance**

**EUT:** Model: HA20  
**Manufacturer:** Intermatic, Inc.  
**Operating Condition:** 73 deg F; 68% R.H.  
**Test Site:** Site 3  
**Operator:** Craig Brandt  
**Test Specification:** FCC Part 15.249  
**Comment:** Continuous transmit – 908.40 MHz; 40 kbps data rate  
**Date:** 07/27/2007

**Note:** All other emissions at least 20 dB under the limit.

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
908.4	Quasi-Peak	Vert	70.93	22.07	-18.3	74.7	94	19.3	1.00	330	Fundamental
908.4	Quasi-Peak	Horz	71.50	22.07	-18.3	75.3	94	18.7	1.30	20	Fundamental
1816.8	Max Peak	Vert	55.00	26.49	-37.9	43.6	74	30.4	1.00	0	Harmonic
1816.8	Max Peak	Horz	61.54	26.49	-37.9	50.1	74	23.9	1.00	0	Harmonic
1816.8	Average	Vert	48.68	26.49	-37.9	37.3	54	16.7	1.00	0	Harmonic
1816.8	Average	Horz	58.68	26.49	-37.9	47.3	54	6.7	1.00	0	Harmonic
3633.6	Max Peak	Vert	51.05	31.62	-36.5	46.2	74	27.8	1.10	200	Harmonic
3633.6	Max Peak	Horz	50.44	31.62	-36.5	45.6	74	28.4	1.00	200	Harmonic
3633.6	Average	Vert	43.57	31.62	-36.5	38.7	54	15.3	1.10	200	Harmonic
3633.6	Average	Horz	42.51	31.62	-36.5	37.6	54	16.4	1.00	200	Harmonic