ELECTROMAGNETIC COMPATIBILITY (EMC)
Test Report

EMISSIONS & IMMUNITY

Won-Door Corp.

Model CTRL2K

September 8, 2004

Project No.: 03CA38530

Test Report No.: NC5824-090804

Underwriters Laboratories Inc.
1655 Scott Blvd
Santa Clara, CA 95050

EMC Services Department Tel: (408) 876-2905 Fax: (408)556-6071

REPORT DIRECTORY

1.0 General Information

1.1 Scope

Underwriters Laboratories Inc., authorizes the above named company to reproduce this Report, provided it is reproduced in it's entirety. The data in this Report reflects only the items tested in the configurations and mode of operations described. All data recorded and photographs represents testing under the worst case conditions permitted by the requirements applied to the product. It is the manufacturer's responsibility to assure that additional production units are manufactured with identical electrical and mechanical components. Any modifications necessary for compliance made during testing must be implemented in all production units for compliance to be maintained.

Underwriters Laboratories Inc., shall have no liability for any deductions, inferences or generalizations drawn from this report. This report shall not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the United States government.

1.2 Purpose

Testing was performed to the following regulations:

Emissions Standards used: EMC - Directive 89/336/EEC, EN 55022:1998

Immunity Standards used: EMC - Directive 89/336/EEC, EN 50130-4, EN 61000-4-2, EN 61000-4-3:1998, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11

Test methods and data contained in the following sections are not covered by NVLAP accreditation: None.

1.3 Test Results

In Compliance

1.4 Documentation Review/Approval

Project Management:

Bill Barry
Staff Engineer
International EMC Services
Department 3014A

Technical Review By:

Tim Lee
Staff Engineer
International EMC Services
Department 3014A

2.0 General Product Description

Applicant	:	Won-Door Corp.
Manufactured By	:	Same as Applicant
License Holder	:	Not Applicable
Applicant Address	:	1865 South 3480 West Salt Lake City, UT 84104
Applicant Contact	:	Mr. Carl Goodman
Model/Type No.	:	CTRL2K
Date of Issue	:	September 8, 2004
File No.	:	NC5824
Test Report No.	:	NC5824-090804
Project No.	:	03CA38530

Product Description

The product tested is a controller for a fire door.

Equipment Size, Mobility, and Identification

Dimensions: 13 1/2 by 5 5/8 by 16 1/4 in.
Mobility: Wall Mount

Electrical Ratings

	Voltage [Volts]	Current or Power	Frequency [Hz]	Phase
EUT	120/220 V	130 VA	50/60	Single

Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage	Frequency
230 V	50 Hz

Clocks/Oscillators

4.91 MHz

Equipment Type

Pre-Production

Model Differences

Testing was conducted to represent both the 12 and 24 V dc versions of the controller.

Any other model(s) represented by the models tested in this investigation will be documented by the manufacturer.

Device Modifications

The following modifications were necessary for compliance: None

EUT and Peripherals

Description	Manufacturer	Model/Part #	Serial Number
Controller (EUT)	Won-Door Corp.	CTRL2K with 12 V Charger	018612-KM
Controller (EUT)	Won-Door Corp.	CTRL2K with 24V Charger	018579T
MUX Controller	Won-Door Corp.	MUX Test Box	018143T
Motor/Controller	Won-Door Corp.	MTR2K	017500
Programmer	Won-Door Corp.	Programmer Emulator Tester	None

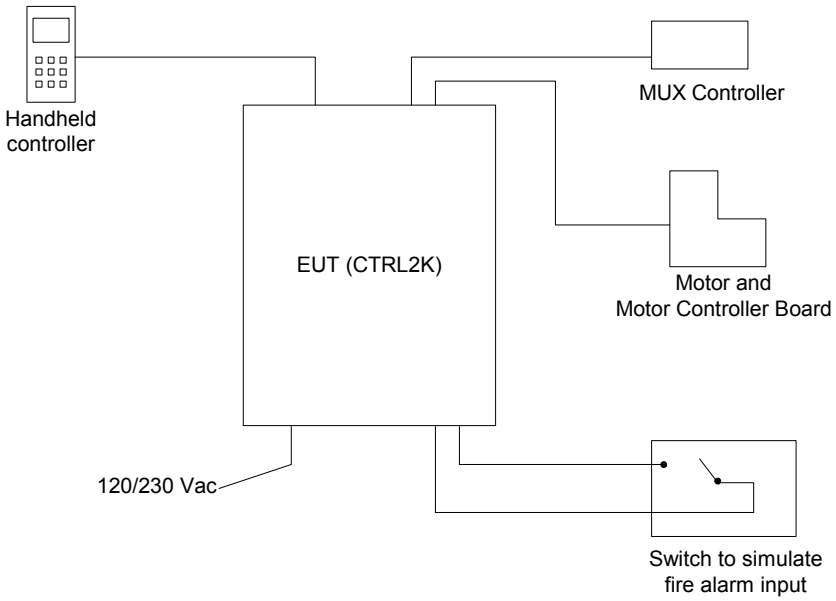
Cables

Cable Type	Shield	Length (meters)	Ferrite	Connector	Connection Point 1	Connection Point 2
I/O	No	1.3	No	RJ11	EUT com port	RJ11 port of programmer
I/O	No	1.55	No	RJ11	EUT MUX port	RJ11 port of MUX Controller
I/O	No	2.05	No	RJ45	EUT motor port	Motor controller, RJ45 port
Power Cable	No	1.4	No	Power	EUT VDC port	Motor controller, power supply port

Note: The controller is intended to be mounted in the “pocket” area where the folded fire door is installed. The wiring to the MUX controller and motor controller will always be contained within the immediate pocket area. The handheld controller wiring is a temporary connection used during the initial set-up and maintenance. The power and signal wiring that is run from outside the pocket will be installed in conduit.

2.1 Justification of Configuration

The controller is provided in one operational configuration. The peripheral equipment was interconnected with the EUT as noted in the diagram below.



2.2 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

Standby
Alarm

3.0 Environmental Conditions in Test Lab

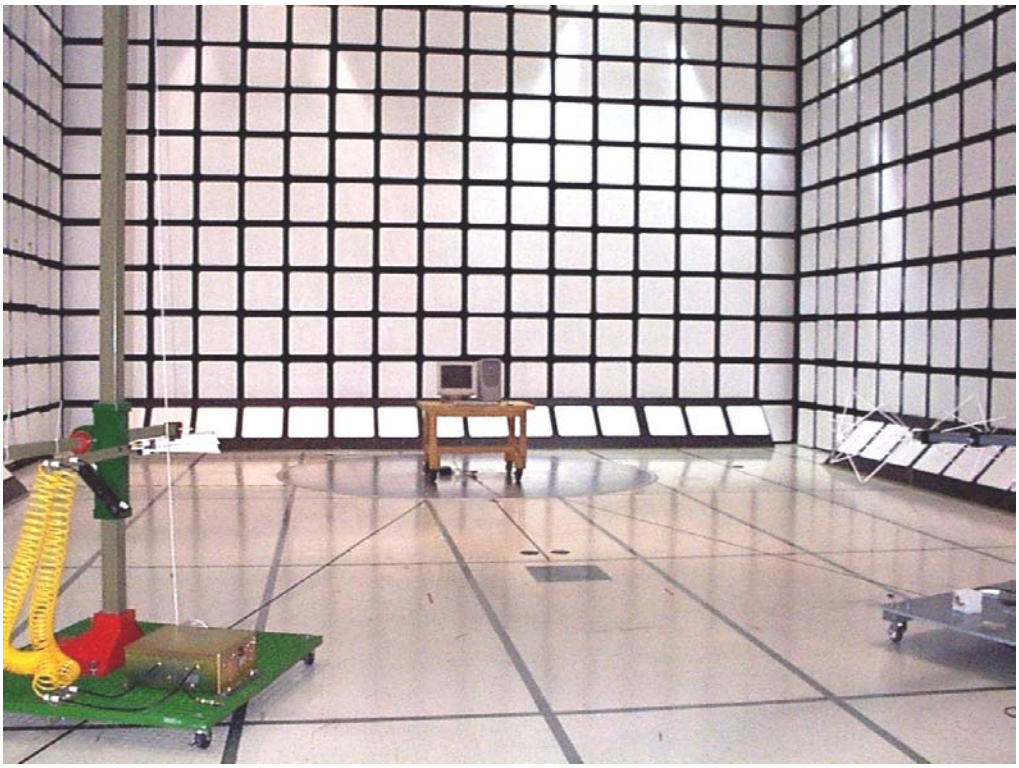
Temperature:	20-25 °C	Atmospheric Pressure:	680-1060 mbar
Relative Humidity:	30-60%		20.1-31.3 in. Hga

4.0 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on 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 Test Facility

Underwriters Laboratories Inc.
1655 Scott Blvd.
Santa Clara, CA 95050
Phone: (408) 876-2905 Fax: (408) 556-6071



6.0 Accreditations and Authorizations

NVLAP Lab code: 200252-0

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 Guide 25 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, AS/NZS 3548, IEC 61000-3-2, EN 61000-3-2, CISPR 14-1, EN 55014-1, 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. 31040/SIT 1300F2).

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 2704

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-672, (Conducted Emissions) C-689.

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: US0114

7.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

---------- Europe ----------

EMC - Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC

EN 55022 : 1998 Limits and methods of measurement of radio disturbance characteristics of information technology equipment including A1:2001
Class A

EN 61000-3-2 : 1995 Electromagnetic compatibility (EMC), Part 3: Limits, Section 2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) including A1:1998, A2:1998, and A14:2000

EN 61000-3-3 : 1995 Electromagnetic compatibility (EMC), Part 3: Limits, Section 2: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A

7.1 Equipment Classifications

Class A Digital Device: *A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.*

7.2 Field Strength Calculations

The field strength is calculated by adding the Transducer Factor (Antenna Factor) and Gain/Loss (Cable Loss, Preamp Gain) Factor to the Meter Reading. The basic equation with a sample calculation is as follows:

Field Strength = Meter Reading + Transducer Factor + Gain/Loss

Assume a receiver reading of 53.2 dBuV is obtained. The Transducer Factor of 5.1 dB and a Gain/Loss of –31 dB is added, giving a field strength of 27.3 dBuV.

FS = 53.2 + 5.1 + (-31) = 27.3 dBuV

Use the following formula to convert dBμV to μV: $x = 10^{(y/20)}$, where x is the value in μV and y is the value in dBμV.

Level in uV = 10^(27.3/20) = 23.2 uV

7.3 Measurement Uncertainty

When a measurement is made the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value.

Uncertainty (dB)

		Biconical Antenna			Log Periodic Antenna		
Test Distance	Probability Distribution	10m +18 deg	10m -14 deg	3m	10m +18 deg	10m -14 deg	3m
Combined Standard Uncertainty $\mathbf{u_c(y)}$	Normal	±1.24	±1.25	±1.29	±1.14	±1.13	±1.9
Expanded uncertainty **U** (level of confidence = 95%)	Normal (k = 2)	±2.47	±2.49	±2.59	±2.28	±2.27	±2.76

Conducted Voltage Emissions	Probability Distribution	
Combined Standard Uncertainty $\mathbf{u_c(y)}$	Normal	±1.08
Expanded uncertainty **U** (level of confidence = 95%)	Normal (k = 2)	±2.16

$\mathbf{u_c(y)}$ = square root of the sum of squares of the individual standard deviation uncertainties.

U = combined standard uncertainty multiplied by the coverage factor: k. This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required then k=3 (CL=97%) can be used.

"ISO Guide to the Expression of Uncertainty in Measurements" and 'NIS81: The Treatment of Uncertainty in EMC Measurements" were the basis for determining the uncertainty levels of our measurements. Details of those calculations are available upon request.

7.4 Measurement Bandwidths

Frequency Range (MHz)	Peak Data BW (kHz)	Quasi-Peak Data BW (kHz)	Average Data BW (kHz)
0.01 - 0.15	**1**	**3**	**0.2**
0.15 - 30	**10**	**9**	**100**
30 - 1000	**100**	**120**	**120**
Above 1000	**1000**	**N/A**	**1000**

7.5 Conducted Voltage Emissions

Test Location
Ground Plane #1 (Test Station 5)

Date Tested: 12/16/03

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Spectrum Analyzer	Hewlett-Packard	8546A	8098	10/24/2003	10/24/2004

Test Accessories

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
LISN	Electro-Metrics	EM-7820-1	8007	6/9/2003	6/9/2004
LISN	Electro-Metrics	EM-7820-1	8010	6/9/2003	6/9/2004
Transient Limiter	Com-Power	HZ-560	8137	3/12/2003	3/12/2004

UL Procedure
3314-LPG-004

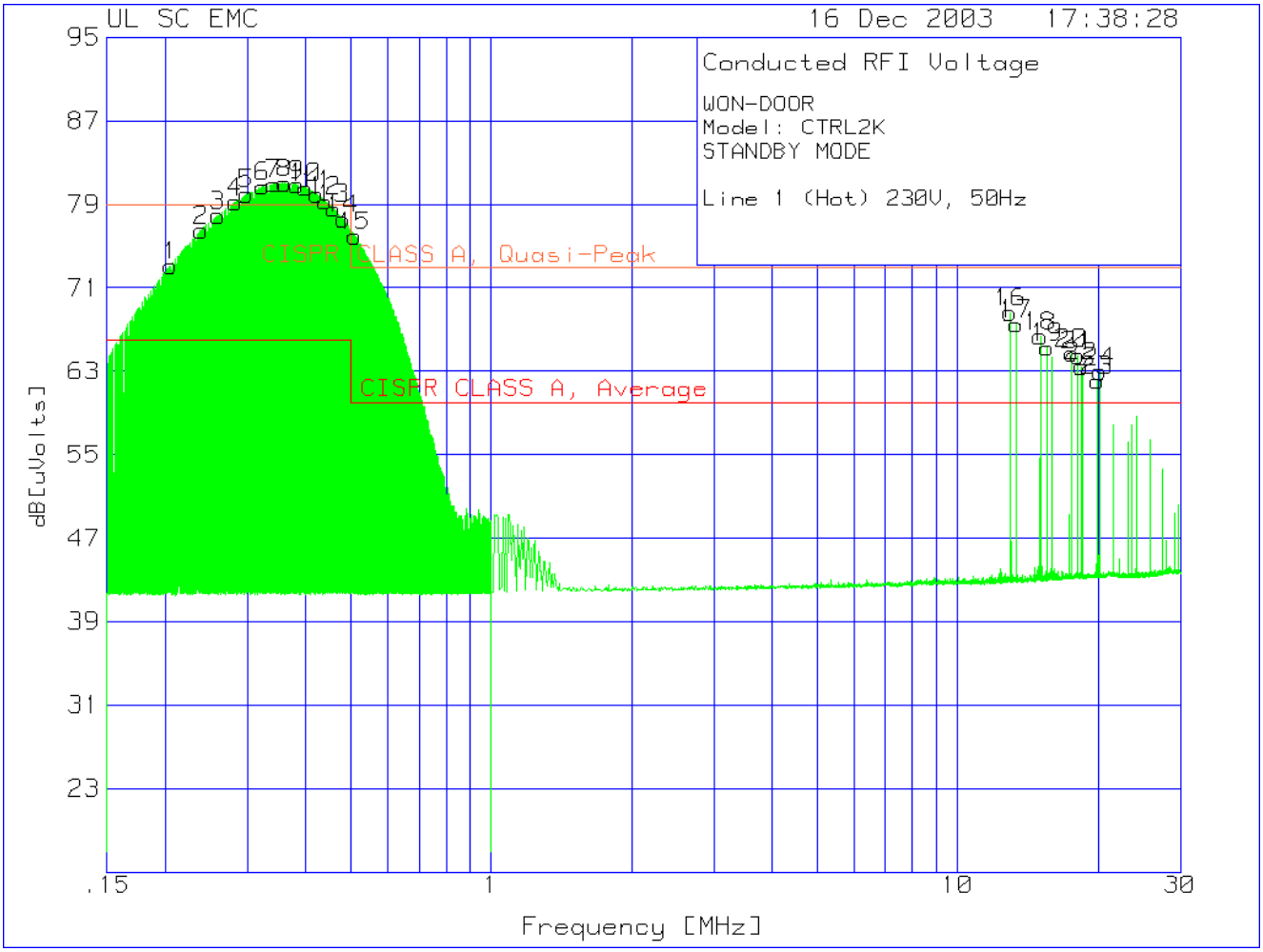
Frequency Range of Measurement
150 kHz to 30 MHz

Test Results
The Requirements are:

MET minimum margin is 1.22 dBµV at 0.505 MHz. Line 2, Alarm Mode.

Remarks
Testing was performed in both the standby and alarm modes.

Test Data


UL SC EMC
16 Dec 2003 17:38:28
Conducted RFI Voltage
WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz
CISPR CLASS A, Quasi-Peak
CISPR CLASS A, Average
dB[uVolts]
95
87
79
71
63
55
47
39
31
23
.15
1
10
30
Frequency [MHz]

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz							
1	.20537	62.79 pk	.08	10.24	73.11	79	66
				Margin [dB]		-5.89	7.11
2	.23904	66.17 pk	.1	10.22	76.49	79	66
				Margin [dB]		-2.51	10.49
3	.25962	67.57 pk	.1	10.23	77.9	79	66
				Margin [dB]		-1.1	11.9
4	.28231	68.9 pk	.1	10.2	79.2	79	66
				Margin [dB]		.2	13.2
5	.29878	69.63 pk	.1	10.24	79.97	79	66
				Margin [dB]		.97	13.97
6	.32372	70.34 pk	.11	10.23	80.68	79	66
				Margin [dB]		1.68	14.68
7	.3423	70.58 pk	.12	10.24	80.94	79	66
				Margin [dB]		1.94	14.94
8	.36051	70.65 pk	.12	10.25	81.02	79	66
				Margin [dB]		2.02	15.02
9	.3837	70.48 pk	.12	10.25	80.85	79	66
				Margin [dB]		1.85	14.85
10	.40054	70.2 pk	.12	10.25	80.57	79	66
				Margin [dB]		1.57	14.57
11	.42236	69.56 pk	.13	10.25	79.94	79	66
				Margin [dB]		.94	13.94
12	.44057	68.92 pk	.14	10.23	79.29	79	66
				Margin [dB]		.29	13.29
13	.46015	68.17 pk	.15	10.25	78.57	79	66
				Margin [dB]		-.43	12.57
14	.4811	67.19 pk	.15	10.25	77.59	79	66
				Margin [dB]		-1.41	11.59
15	.50978	65.56 pk	.14	10.25	75.95	73	60
				Margin [dB]		2.95	15.95
Range: 2 1 - 30MHz							
16	12.95011	57.28 pk	.95	10.4	68.63	73	60
				Margin [dB]		-4.37	8.63
17	13.3335	56.08 pk	.97	10.43	67.48	73	60
				Margin [dB]		-5.52	7.48
18	15.03343	54.85 pk	1.02	10.48	66.35	73	60
				Margin [dB]		-6.65	6.35
19	15.56149	53.71 pk	1.05	10.49	65.25	73	60
				Margin [dB]		-7.75	5.25
20	17.558	53.05 pk	1.13	10.53	64.71	73	60
				Margin [dB]		-8.29	4.71
21	18.11499	52.84 pk	1.15	10.52	64.51	73	60
				Margin [dB]		-8.49	4.51
22	18.41881	51.73 pk	1.16	10.55	63.44	73	60
				Margin [dB]		-9.56	3.44
23	19.88002	50.3 pk	1.2	10.57	62.07	73	60
				Margin [dB]		-10.93	2.07

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
24	20.16937	51.17 pk	1.21	10.56	62.94	73	60
				Margin [dB]		-10.06	2.94

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.21523	57.29qp	.1	10.2	67.59	79	66
			Margin [dB]:		-11.41	1.59
.23934	59.48qp	.1	10.2	69.78	79	66
			Margin [dB]:		-9.22	3.78
.25992	60.6qp	.1	10.2	70.9	79	66
			Margin [dB]:		-8.1	4.9
.28187	61.81qp	.1	10.2	72.11	79	66
			Margin [dB]:		-6.89	6.11
.29886	63.12qp	.1	10.2	73.42	79	66
			Margin [dB]:		-5.58	7.42
.3236	63.36qp	.1	10.2	73.66	79	66
			Margin [dB]:		-5.34	7.66
.34206	63.5qp	.1	10.2	73.8	79	66
			Margin [dB]:		-5.2	7.8
.3605	63.55qp	.1	10.3	73.95	79	66
			Margin [dB]:		-5.05	7.95
.38403	63.37qp	.1	10.3	73.77	79	66
			Margin [dB]:		-5.23	7.77
.40093	63.12qp	.1	10.3	73.52	79	66
			Margin [dB]:		-5.48	7.52
.42239	62.57qp	.1	10.3	72.97	79	66
			Margin [dB]:		-6.03	6.97
.44065	62qp	.1	10.2	72.3	79	66
			Margin [dB]:		-6.7	6.3
.46043	61.24qp	.2	10.3	71.74	79	66
			Margin [dB]:		-7.26	5.74
.48085	60.39qp	.2	10.2	70.79	79	66
			Margin [dB]:		-8.21	4.79
.50976	59.4qp	.1	10.2	69.7	73	60
			Margin [dB]:		-3.3	9.7

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
12.9766	19.83qp	.9		10.4	31.13	73	60
			Margin [dB]:			-41.87	-28.87
13.3258	19.37qp	1		10.4	30.77	73	60
			Margin [dB]:			-42.23	-29.23
15.0437	17.08qp	1		10.5	28.58	73	60
			Margin [dB]:			-44.42	-31.42
15.5502	18.4qp	1.1		10.5	30	73	60
			Margin [dB]:			-43	-30
17.5354	18.63qp	1.1		10.5	30.23	73	60
			Margin [dB]:			-42.77	-29.77

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average

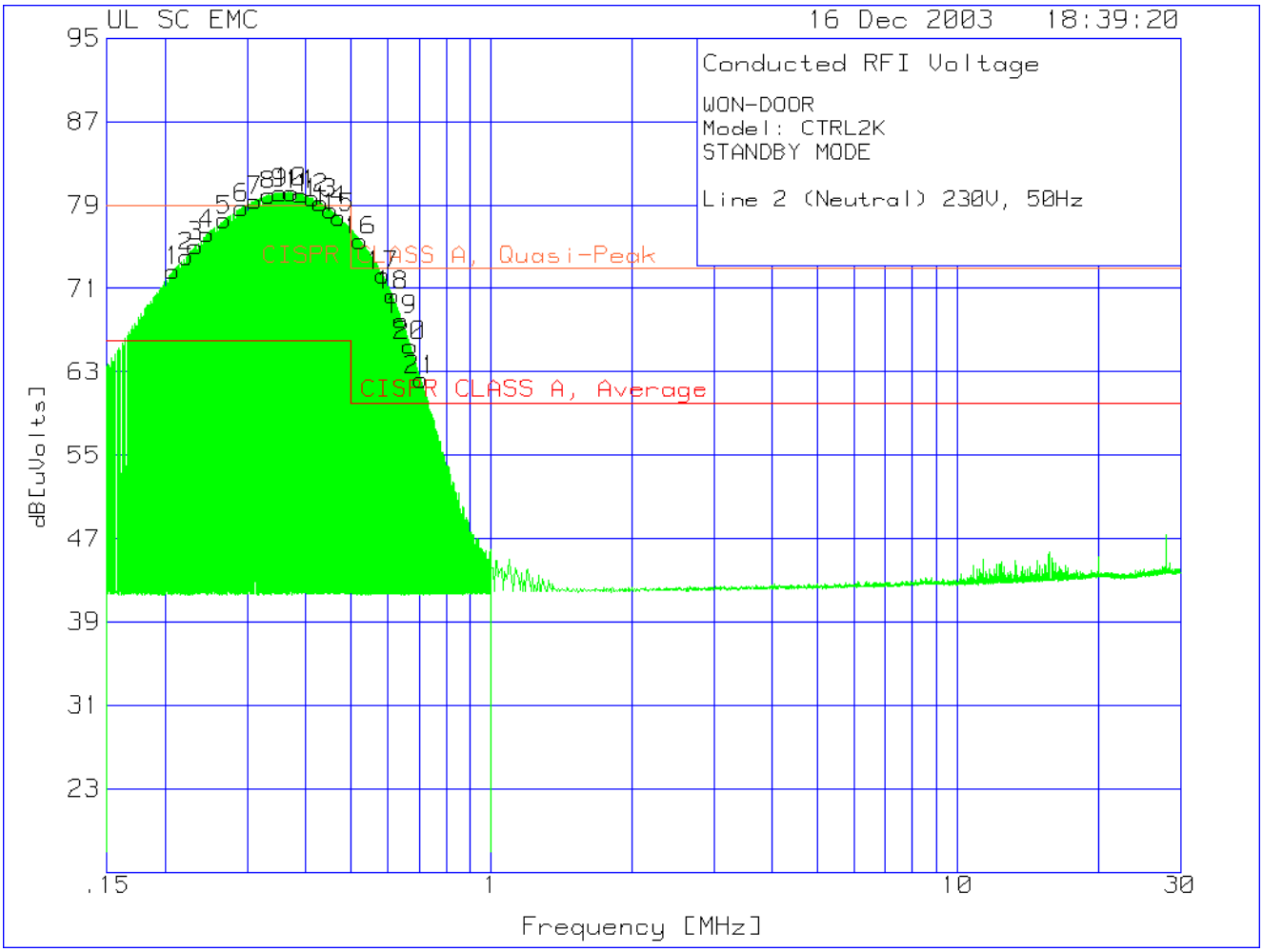
WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.20537	23.27av	.1	10.2	33.57	79	66
			Margin [dB]:		-45.43	-32.43
.23904	25.6av	.1	10.2	35.9	79	66
			Margin [dB]:		-43.1	-30.1
.25962	26.64av	.1	10.2	36.94	79	66
			Margin [dB]:		-42.06	-29.06
.28231	28av	.1	10.2	38.3	79	66
			Margin [dB]:		-40.7	-27.7
.29878	28.51av	.1	10.2	38.81	79	66
			Margin [dB]:		-40.19	-27.19
.32372	28.93av	.1	10.2	39.23	79	66
			Margin [dB]:		-39.77	-26.77
.3423	29.44av	.1	10.2	39.74	79	66
			Margin [dB]:		-39.26	-26.26
.36051	29.43av	.1	10.3	39.83	79	66
			Margin [dB]:		-39.17	-26.17
.3837	29.46av	.1	10.3	39.86	79	66
			Margin [dB]:		-39.14	-26.14
.40054	28.95av	.1	10.3	39.35	79	66
			Margin [dB]:		-39.65	-26.65
.42236	28.51av	.1	10.3	38.91	79	66
			Margin [dB]:		-40.09	-27.09
.44057	27.98av	.1	10.2	38.28	79	66
			Margin [dB]:		-40.72	-27.72
.46015	27.86av	.2	10.3	38.36	79	66
			Margin [dB]:		-40.64	-27.64
.4811	26.8av	.2	10.2	37.2	79	66
			Margin [dB]:		-41.8	-28.8
.50978	25.59av	.1	10.2	35.89	73	60
			Margin [dB]:		-37.11	-24.11
Range: 2 1 - 30MHz						
12.95011	10.52av	.9	10.4	21.82	73	60
			Margin [dB]:		-51.18	-38.18
13.3335	10.26av	1	10.4	21.66	73	60
			Margin [dB]:		-51.34	-38.34
15.03343	10.26av	1	10.5	21.76	73	60
			Margin [dB]:		-51.24	-38.24
15.56149	10.42av	1.1	10.5	22.02	73	60
			Margin [dB]:		-50.98	-37.98
17.558	13.77av	1.1	10.5	25.37	73	60
			Margin [dB]:		-47.63	-34.63
18.11499	11.8av	1.2	10.5	23.5	73	60
			Margin [dB]:		-49.5	-36.5
18.41881	11.83av	1.2	10.6	23.63	73	60
			Margin [dB]:		-49.37	-36.37

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 1 (Hot) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
19.88002	10.43av	1.2	10.6	22.23	73	60	
			Margin [dB]:		-50.77	-37.77	
20.16937	10.15av	1.2	10.6	21.95	73	60	
			Margin [dB]:		-51.05	-38.05	

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average


UL SC EMC
16 Dec 2003 18:39:20
Conducted RFI Voltage
WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz
CISPR CLASS A, Quasi-Peak
CISPR CLASS A, Average
dB[uVolts]
95
87
79
71
63
55
47
39
31
23
.15
1
10
30
Frequency [MHz]

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz							
1	.20786	62.39 pk	.08	10.22	72.69	79	66
				Margin [dB]		-6.31	6.69
2	.22246	63.75 pk	.09	10.22	74.06	79	66
				Margin [dB]		-4.94	8.06
3	.23218	64.73 pk	.09	10.22	75.04	79	66
				Margin [dB]		-3.96	9.04
4	.24565	65.88 pk	.1	10.22	76.2	79	66
				Margin [dB]		-2.8	10.2
5	.26772	67.26 pk	.1	10.2	77.56	79	66
				Margin [dB]		-1.44	11.56
6	.29192	68.4 pk	.1	10.22	78.72	79	66
				Margin [dB]		-.28	12.72
7	.31125	69.09 pk	.1	10.22	79.41	79	66
				Margin [dB]		.41	13.41
8	.33344	69.63 pk	.11	10.22	79.96	79	66
				Margin [dB]		.96	13.96
9	.35302	69.79 pk	.12	10.23	80.14	79	66
				Margin [dB]		1.14	14.14
10	.37248	69.83 pk	.12	10.25	80.2	79	66
				Margin [dB]		1.2	14.2
11	.39118	69.65 pk	.12	10.24	80.01	79	66
				Margin [dB]		1.01	14.01
12	.41369	69.28 pk	.13	10.25	79.66	79	66
				Margin [dB]		.66	13.66
13	.43109	68.81 pk	.14	10.25	79.2	79	66
				Margin [dB]		.2	13.2
14	.45241	68.14 pk	.15	10.23	78.52	79	66
				Margin [dB]		-.48	12.52
15	.471	67.43 pk	.15	10.23	77.81	79	66
				Margin [dB]		-1.19	11.81
16	.52337	65.22 pk	.14	10.22	75.58	73	60
				Margin [dB]		2.58	15.58
17	.58573	61.88 pk	.16	10.22	72.26	73	60
				Margin [dB]		-.74	12.26
18	.61441	59.92 pk	.18	10.22	70.32	73	60
				Margin [dB]		-2.68	10.32
19	.64209	57.58 pk	.18	10.2	67.96	73	60
				Margin [dB]		-5.04	7.96

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
20	.67053	55.12 pk	.17	10.2	65.49	73	60
				Margin [dB]		-7.51	5.49
21	.70669	51.89 pk	.15	10.2	62.24	73	60
				Margin [dB]		-10.76	2.24

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.21784	57.03qp	.1	10.2	67.33	79	66
			Margin [dB]:		-11.67	1.33
.22205	57.46qp	.1	10.2	67.76	79	66
			Margin [dB]:		-11.24	1.76
.23179	58.34qp	.1	10.2	68.64	79	66
			Margin [dB]:		-10.36	2.64
.24597	59.46qp	.1	10.2	69.76	79	66
			Margin [dB]:		-9.24	3.76
.26733	60.51qp	.1	10.2	70.81	79	66
			Margin [dB]:		-8.19	4.81
.29169	61.7qp	.1	10.2	72	79	66
			Margin [dB]:		-7	6
.31081	65.01qp	.1	10.2	75.31	79	66
			Margin [dB]:		-3.69	9.31
.33372	63.07qp	.1	10.2	73.37	79	66
			Margin [dB]:		-5.63	7.37
.35291	63.17qp	.1	10.2	73.47	79	66
			Margin [dB]:		-5.53	7.47
.37205	63.08qp	.1	10.2	73.38	79	66
			Margin [dB]:		-5.62	7.38
.39164	62.83qp	.1	10.2	73.13	79	66
			Margin [dB]:		-5.87	7.13
.41409	62.37qp	.1	10.2	72.67	79	66
			Margin [dB]:		-6.33	6.67
.43076	61.94qp	.1	10.2	72.24	79	66
			Margin [dB]:		-6.76	6.24
.45277	61.25qp	.2	10.2	71.65	79	66
			Margin [dB]:		-7.35	5.65
.4705	60.56qp	.2	10.2	70.96	79	66
			Margin [dB]:		-8.04	4.96
.52326	58.61qp	.1	10.2	68.91	73	60
			Margin [dB]:		-4.09	8.91
.58596	55.24qp	.2	10.2	65.64	73	60
			Margin [dB]:		-7.36	5.64
.61403	53.3qp	.2	10.2	63.7	73	60
			Margin [dB]:		-9.3	3.7
.64219	51.01qp	.2	10.2	61.41	73	60
			Margin [dB]:		-11.59	1.41
.67042	48.55qp	.2	10.2	58.95	73	60
			Margin [dB]:		-14.05	-1.05

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
.70628	45.32	qp	.2	10.2	55.72	73	60
				Margin [dB]:		-17.28	-4.28

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

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average

WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.20786	23.11av	.1	10.2	33.41	79	66
			Margin [dB]:		-45.59	-32.59
.22246	23.65av	.1	10.2	33.95	79	66
			Margin [dB]:		-45.05	-32.05
.23218	24.64av	.1	10.2	34.94	79	66
			Margin [dB]:		-44.06	-31.06
.24565	25.58av	.1	10.2	35.88	79	66
			Margin [dB]:		-43.12	-30.12
.26772	27.02av	.1	10.2	37.32	79	66
			Margin [dB]:		-41.68	-28.68
.29192	27.89av	.1	10.2	38.19	79	66
			Margin [dB]:		-40.81	-27.81
.31125	28.56av	.1	10.2	38.86	79	66
			Margin [dB]:		-40.14	-27.14
.33344	29.41av	.1	10.2	39.71	79	66
			Margin [dB]:		-39.29	-26.29
.35302	28.98av	.1	10.2	39.28	79	66
			Margin [dB]:		-39.72	-26.72
.37248	28.91av	.1	10.2	39.21	79	66
			Margin [dB]:		-39.79	-26.79
.39118	28.88av	.1	10.2	39.18	79	66
			Margin [dB]:		-39.82	-26.82
.41369	28.63av	.1	10.3	39.03	79	66
			Margin [dB]:		-39.97	-26.97
.43109	27.96av	.1	10.2	38.26	79	66
			Margin [dB]:		-40.74	-27.74
.45241	27.53av	.2	10.2	37.93	79	66
			Margin [dB]:		-41.07	-28.07
.471	27.23av	.2	10.2	37.63	79	66
			Margin [dB]:		-41.37	-28.37
.52337	24.78av	.1	10.2	35.08	73	60
			Margin [dB]:		-37.92	-24.92
.58573	21.68av	.2	10.2	32.08	73	60
			Margin [dB]:		-40.92	-27.92
.61441	19.65av	.2	10.2	30.05	73	60
			Margin [dB]:		-42.95	-29.95
.64209	18.15av	.2	10.2	28.55	73	60
			Margin [dB]:		-44.45	-31.45

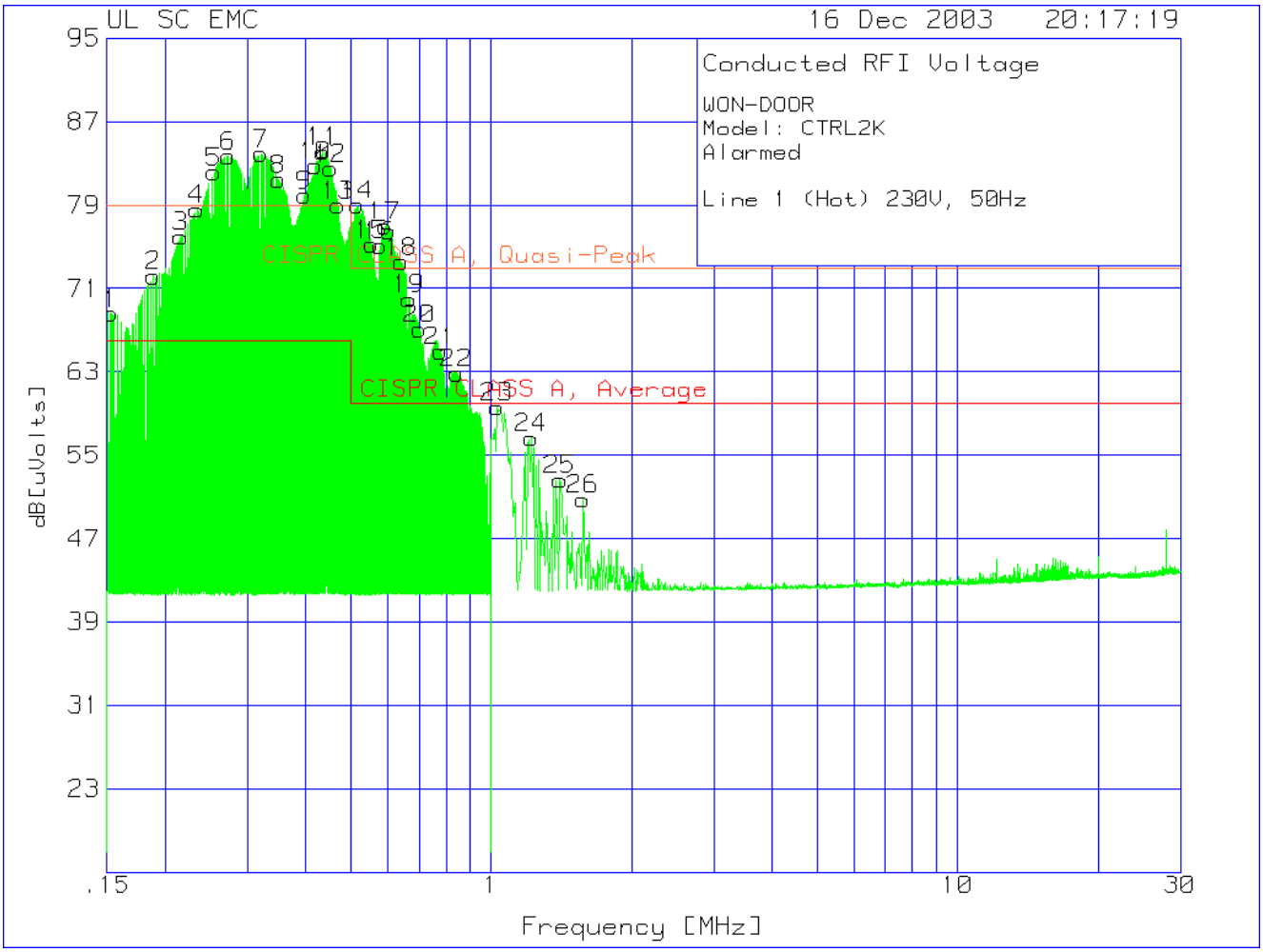
WON-DOOR
Model: CTRL2K
STANDBY MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
.67053	16.11av	.2	10.2	26.51	73	60	
			Margin [dB]:		-46.49	-33.49	
.70669	13.04av	.2	10.2	23.44	73	60	
			Margin [dB]:		-49.56	-36.56	

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

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average


UL SC EMC
16 Dec 2003 20:17:19
Conducted RFI Voltage
WON-DOOR
Model: CTRL2K
Alarmed
Line 1 (Hot) 230V, 50Hz
CISPR CLASS A, Quasi-Peak
CISPR CLASS A, Average
dB[uVolts]
95
87
79
71
63
55
47
39
31
23
.15
1
10
30
Frequency [MHz]

WON-DOOR
Model: CTRL2K
Alarmed
Line 1 (Hot) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz							
1	.15299	58.24 pk	.08	10.28	68.6	79	66
				Margin [dB]		-10.4	2.6
2	.18891	61.88 pk	.08	10.23	72.19	79	66
				Margin [dB]		-6.81	6.19
3	.21597	65.65 pk	.09	10.23	75.97	79	66
				Margin [dB]		-3.03	9.97
4	.2338	68.25 pk	.09	10.23	78.57	79	66
				Margin [dB]		-.43	12.57
5	.25438	71.82 pk	.1	10.23	82.15	79	66
				Margin [dB]		3.15	16.15
6	.27309	73.31 pk	.1	10.26	83.67	79	66
				Margin [dB]		4.67	17.67
7	.3206	73.59 pk	.11	10.23	83.93	79	66
				Margin [dB]		4.93	17.93
8	.34991	71.1 pk	.12	10.22	81.44	79	66
				Margin [dB]		2.44	15.44
9	.39804	69.56 pk	.12	10.25	79.93	79	66
				Margin [dB]		.93	13.93
10	.41949	72.4 pk	.13	10.24	82.77	79	66
				Margin [dB]		3.77	16.77
11	.43545	73.76 pk	.14	10.23	84.13	79	66
				Margin [dB]		5.13	18.13
12	.45241	72.15 pk	.15	10.23	82.53	79	66
				Margin [dB]		3.53	16.53
13	.46925	68.58 pk	.15	10.24	78.97	79	66
				Margin [dB]		-.03	12.97
14	.51576	68.62 pk	.14	10.25	79.01	73	60
				Margin [dB]		6.01	19.01
15	.55311	64.87 pk	.12	10.22	75.21	73	60
				Margin [dB]		2.21	15.21
16	.57799	64.72 pk	.15	10.23	75.1	73	60
				Margin [dB]		2.1	15.1
17	.59121	66.61 pk	.17	10.22	77	73	60
				Margin [dB]		4	17
18	.64134	63.16 pk	.18	10.2	73.54	73	60
				Margin [dB]		.54	13.54
19	.66678	59.62 pk	.17	10.2	69.99	73	60
				Margin [dB]		-3.01	9.99
20	.7017	56.73 pk	.15	10.22	67.1	73	60
				Margin [dB]		-5.9	7.1
21	.77852	54.59 pk	.17	10.22	64.98	73	60
				Margin [dB]		-8.02	4.98
22	.84349	52.49 pk	.17	10.21	62.87	73	60
				Margin [dB]		-10.13	2.87

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
23	1.02894	49.17 pk	.22	10.21	59.6	73	60
				Margin [dB]		-13.4	-.4
24	1.21701	46.2 pk	.24	10.21	56.65	73	60
				Margin [dB]		-16.35	-3.35
25	1.40509	42.17 pk	.26	10.2	52.63	73	60
				Margin [dB]		-20.37	-7.37
26	1.57146	40.25 pk	.28	10.23	50.76	73	60
				Margin [dB]		-22.24	-9.24

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 1 (Hot) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.15292	50.77qp	.1	10.3	61.17	79	66
			Margin [dB]:		-17.83	-4.83
.18849	53.81qp	.1	10.2	64.11	79	66
			Margin [dB]:		-14.89	-1.89
.21554	58.07qp	.1	10.2	68.37	79	66
			Margin [dB]:		-10.63	2.37
.23366	60.98qp	.1	10.2	71.28	79	66
			Margin [dB]:		-7.72	5.28
.25414	64.01qp	.1	10.2	74.31	79	66
			Margin [dB]:		-4.69	8.31
.27284	64.96qp	.1	10.3	75.36	79	66
			Margin [dB]:		-3.64	9.36
.32024	64.84qp	.1	10.2	75.14	79	66
			Margin [dB]:		-3.86	9.14
.35039	64.72qp	.1	10.2	75.02	79	66
			Margin [dB]:		-3.98	9.02
.39823	60.6qp	.1	10.3	71	79	66
			Margin [dB]:		-8	5
.41977	65.37qp	.1	10.2	75.67	79	66
			Margin [dB]:		-3.33	9.67
.43544	66.26qp	.1	10.2	76.56	79	66
			Margin [dB]:		-2.44	10.56
.45196	65.09qp	.2	10.2	75.49	79	66
			Margin [dB]:		-3.51	9.49
.46919	61.59qp	.2	10.2	71.99	79	66
			Margin [dB]:		-7.01	5.99
.51563	60.11qp	.1	10.2	70.41	73	60
			Margin [dB]:		-2.59	10.41
.55332	56.49qp	.1	10.2	66.79	73	60
			Margin [dB]:		-6.21	6.79
.57824	54.89qp	.2	10.2	65.29	73	60
			Margin [dB]:		-7.71	5.29
.5912	57.47qp	.2	10.2	67.87	73	60
			Margin [dB]:		-5.13	7.87
.64176	55.53qp	.2	10.2	65.93	73	60
			Margin [dB]:		-7.07	5.93
.66681	52.62qp	.2	10.2	63.02	73	60
			Margin [dB]:		-9.98	3.02
.70212	48.43qp	.2	10.2	58.83	73	60
			Margin [dB]:		-14.17	-1.17
.77818	46.38qp	.2	10.2	56.78	73	60
			Margin [dB]:		-16.22	-3.22
.84304	43.84qp	.2	10.2	54.24	73	60
			Margin [dB]:		-18.76	-5.76

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
1.03078	40.19qp	.2	10.2	50.59	73	60	
			Margin [dB]:		-22.41	-9.41	
1.2347	38.91qp	.2	10.2	49.31	73	60	
			Margin [dB]:		-23.69	-10.69	
1.39842	34.31qp	.3	10.2	44.81	73	60	
			Margin [dB]:		-28.19	-15.19	
1.58741	29.57qp	.3	10.2	40.07	73	60	
			Margin [dB]:		-32.93	-19.93	

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

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 1 (Hot) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.15299	16.41av	.1	10.3	26.81	79	66
			Margin [dB]:		-52.19	-39.19
.18891	20.37av	.1	10.2	30.67	79	66
			Margin [dB]:		-48.33	-35.33
.21597	24.89av	.1	10.2	35.19	79	66
			Margin [dB]:		-43.81	-30.81
.2338	27.21av	.1	10.2	37.51	79	66
			Margin [dB]:		-41.49	-28.49
.25438	30.2av	.1	10.2	40.5	79	66
			Margin [dB]:		-38.5	-25.5
.27309	31.78av	.1	10.3	42.18	79	66
			Margin [dB]:		-36.82	-23.82
.3206	30.47av	.1	10.2	40.77	79	66
			Margin [dB]:		-38.23	-25.23
.34991	31.08av	.1	10.2	41.38	79	66
			Margin [dB]:		-37.62	-24.62
.39804	26.92av	.1	10.3	37.32	79	66
			Margin [dB]:		-41.68	-28.68
.41949	31.51av	.1	10.2	41.81	79	66
			Margin [dB]:		-37.19	-24.19
.43545	32.55av	.1	10.2	42.85	79	66
			Margin [dB]:		-36.15	-23.15
.45241	32.15av	.2	10.2	42.55	79	66
			Margin [dB]:		-36.45	-23.45
.46925	28.75av	.2	10.2	39.15	79	66
			Margin [dB]:		-39.85	-26.85
.51576	27.5av	.1	10.2	37.8	73	60
			Margin [dB]:		-35.2	-22.2
.55311	24.55av	.1	10.2	34.85	73	60
			Margin [dB]:		-38.15	-25.15
.57799	21.94av	.2	10.2	32.34	73	60
			Margin [dB]:		-40.66	-27.66
.59121	23.22av	.2	10.2	33.62	73	60
			Margin [dB]:		-39.38	-26.38
.64134	22.05av	.2	10.2	32.45	73	60
			Margin [dB]:		-40.55	-27.55
.66678	19.4av	.2	10.2	29.8	73	60
			Margin [dB]:		-43.2	-30.2
.7017	16.79av	.2	10.2	27.19	73	60
			Margin [dB]:		-45.81	-32.81
.77852	13.72av	.2	10.2	24.12	73	60
			Margin [dB]:		-48.88	-35.88
.84349	12.5av	.2	10.2	22.9	73	60
			Margin [dB]:		-50.1	-37.1

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
1.029	10.8av	.2	10.2	21.2	73	60	
			Margin [dB]:		-51.8	-38.8	
1.21701	9.77av	.2	10.2	20.17	73	60	
			Margin [dB]:		-52.83	-39.83	
1.40509	9.07av	.3	10.2	19.57	73	60	
			Margin [dB]:		-53.43	-40.43	
1.57146	9.31av	.3	10.2	19.81	73	60	
			Margin [dB]:		-53.19	-40.19	

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
LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average


UL SC EMC
16 Dec 2003 19:36:37
Conducted RFI Voltage
WON-DOOR
Model: CTRL2K
Alarmed
Line 2 (Neutral) 230V, 50Hz
CISPR CLASS A, Quasi-Peak
CISPR CLASS A, Average
dB[uVolts]
95
87
79
71
63
55
47
39
31
23
.15
1
10
30
Frequency [MHz]

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz							
1	.19776	62.57 pk	.08	10.25	72.9	79	66
				Margin [dB]		-6.1	6.9
2	.2146	63.68 pk	.09	10.23	74	79	66
				Margin [dB]		-5	8
3	.23106	65.58 pk	.09	10.22	75.89	79	66
				Margin [dB]		-3.11	9.89
4	.24515	67.87 pk	.1	10.22	78.19	79	66
				Margin [dB]		-.81	12.19
5	.26211	71.66 pk	.1	10.2	81.96	79	66
				Margin [dB]		2.96	15.96
6	.27807	72.89 pk	.1	10.21	83.2	79	66
				Margin [dB]		4.2	17.2
7	.29666	71.23 pk	.1	10.24	81.57	79	66
				Margin [dB]		2.57	15.57
8	.30962	72.5 pk	.1	10.21	82.81	79	66
				Margin [dB]		3.81	16.81
9	.31761	72.96 pk	.11	10.23	83.3	79	66
				Margin [dB]		4.3	17.3
10	.32746	73.1 pk	.11	10.23	83.44	79	66
				Margin [dB]		4.44	17.44
11	.35976	71.87 pk	.12	10.25	82.24	79	66
				Margin [dB]		3.24	16.24
12	.39704	69.94 pk	.12	10.25	80.31	79	66
				Margin [dB]		1.31	14.31
13	.41276	71.73 pk	.13	10.25	82.11	79	66
				Margin [dB]		3.11	16.11
14	.44044	72.42 pk	.14	10.23	82.79	79	66
				Margin [dB]		3.79	16.79
15	.46002	71.96 pk	.15	10.25	82.36	79	66
				Margin [dB]		3.36	16.36
16	.50492	69.25 pk	.15	10.23	79.63	73	60
				Margin [dB]		6.63	19.63
17	.51826	69.32 pk	.14	10.24	79.7	73	60
				Margin [dB]		6.7	19.7
18	.53609	69.06 pk	.13	10.22	79.41	73	60
				Margin [dB]		6.41	19.41
19	.61042	65.56 pk	.18	10.22	75.96	73	60
				Margin [dB]		2.96	15.96
20	.69048	60.5 pk	.16	10.21	70.87	73	60
				Margin [dB]		-2.13	10.87
21	.81244	54.77 pk	.17	10.23	65.17	73	60
				Margin [dB]		-7.83	5.17
22	.87854	52.81 pk	.19	10.21	63.21	73	60
				Margin [dB]		-9.79	3.21

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
23	1.0217	49.89 pk	.22	10.2	60.31	73	60
				Margin [dB]		-12.69	.31
24	1.23871	47.68 pk	.25	10.23	58.16	73	60
				Margin [dB]		-14.84	-1.84

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.19846	55.53qp	.1	10.3	65.93	79	66
			Margin [dB]:		-13.07	-.07
.21488	57.98qp	.1	10.2	68.28	79	66
			Margin [dB]:		-10.72	2.28
.23141	60.72qp	.1	10.2	71.02	79	66
			Margin [dB]:		-7.98	5.02
.24524	62.58qp	.1	10.2	72.88	79	66
			Margin [dB]:		-6.12	6.88
.26257	64.46qp	.1	10.2	74.76	79	66
			Margin [dB]:		-4.24	8.76
.27819	64.88qp	.1	10.2	75.18	79	66
			Margin [dB]:		-3.82	9.18
.2963	64.61qp	.1	10.2	74.91	79	66
			Margin [dB]:		-4.09	8.91
.30944	64.36qp	.1	10.2	74.66	79	66
			Margin [dB]:		-4.34	8.66
.31746	64.54qp	.1	10.2	74.84	79	66
			Margin [dB]:		-4.16	8.84
.32717	64.72qp	.1	10.2	75.02	79	66
			Margin [dB]:		-3.98	9.02
.36022	63.62qp	.1	10.3	74.02	79	66
			Margin [dB]:		-4.98	8.02
.39733	61.36qp	.1	10.2	71.66	79	66
			Margin [dB]:		-7.34	5.66
.41325	65.01qp	.1	10.3	75.41	79	66
			Margin [dB]:		-3.59	9.41
.4403	65.76qp	.1	10.2	76.06	79	66
			Margin [dB]:		-2.94	10.06
.45997	62.88qp	.2	10.3	73.38	79	66
			Margin [dB]:		-5.62	7.38
.50531	61.48qp	.1	10.2	71.78	73	60
			Margin [dB]:		-1.22	11.78
.51866	61.57qp	.1	10.2	71.87	73	60
			Margin [dB]:		-1.13	11.87
.53626	59.91qp	.1	10.2	70.21	73	60
			Margin [dB]:		-2.79	10.21
.61076	58.9qp	.2	10.2	69.3	73	60
			Margin [dB]:		-3.7	9.3
.69045	50.22qp	.2	10.2	60.62	73	60
			Margin [dB]:		-12.38	.62
.81229	43.27qp	.2	10.2	53.67	73	60
			Margin [dB]:		-19.33	-6.33
.87828	44.47qp	.2	10.2	54.87	73	60
			Margin [dB]:		-18.13	-5.13

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
	1.03062	42.57qp	.2	10.2	52.97	73	60
				Margin [dB]:		-20.03	-7.03
	1.21885	39.14qp	.2	10.2	49.54	73	60
				Margin [dB]:		-23.46	-10.46

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 1 .15 - 1MHz						
.19776	21.74av	.1	10.3	32.14	79	66
			Margin [dB]:		-46.86	-33.86
.2146	23.94av	.1	10.2	34.24	79	66
			Margin [dB]:		-44.76	-31.76
.23106	26.38av	.1	10.2	36.68	79	66
			Margin [dB]:		-42.32	-29.32
.24515	28.21av	.1	10.2	38.51	79	66
			Margin [dB]:		-40.49	-27.49
.26211	30.79av	.1	10.2	41.09	79	66
			Margin [dB]:		-37.91	-24.91
.27807	31.45av	.1	10.2	41.75	79	66
			Margin [dB]:		-37.25	-24.25
.29666	31.53av	.1	10.2	41.83	79	66
			Margin [dB]:		-37.17	-24.17
.30962	31.45av	.1	10.2	41.75	79	66
			Margin [dB]:		-37.25	-24.25
.31761	31.5av	.1	10.2	41.8	79	66
			Margin [dB]:		-37.2	-24.2
.32746	31.38av	.1	10.2	41.68	79	66
			Margin [dB]:		-37.32	-24.32
.35976	29.12av	.1	10.3	39.52	79	66
			Margin [dB]:		-39.48	-26.48
.39704	28.6av	.1	10.2	38.9	79	66
			Margin [dB]:		-40.1	-27.1
.41276	31.67av	.1	10.3	42.07	79	66
			Margin [dB]:		-36.93	-23.93
.44044	32.16av	.1	10.2	42.46	79	66
			Margin [dB]:		-36.54	-23.54
.46002	28.36av	.2	10.3	38.86	79	66
			Margin [dB]:		-40.14	-27.14
.50492	28.89av	.1	10.2	39.19	73	60
			Margin [dB]:		-33.81	-20.81
.51826	29.03av	.1	10.2	39.33	73	60
			Margin [dB]:		-33.67	-20.67
.53609	26.77av	.1	10.2	37.07	73	60
			Margin [dB]:		-35.93	-22.93
.61042	25.48av	.2	10.2	35.88	73	60
			Margin [dB]:		-37.12	-24.12
.69048	18.45av	.2	10.2	28.85	73	60
			Margin [dB]:		-44.15	-31.15
.81244	13.56av	.2	10.2	23.96	73	60
			Margin [dB]:		-49.04	-36.04
.87854	11.53av	.2	10.2	21.93	73	60
			Margin [dB]:		-51.07	-38.07

WON-DOOR
Model: CTRL2K
ALARM MODE
Line 2 (Neutral) 230V, 50Hz

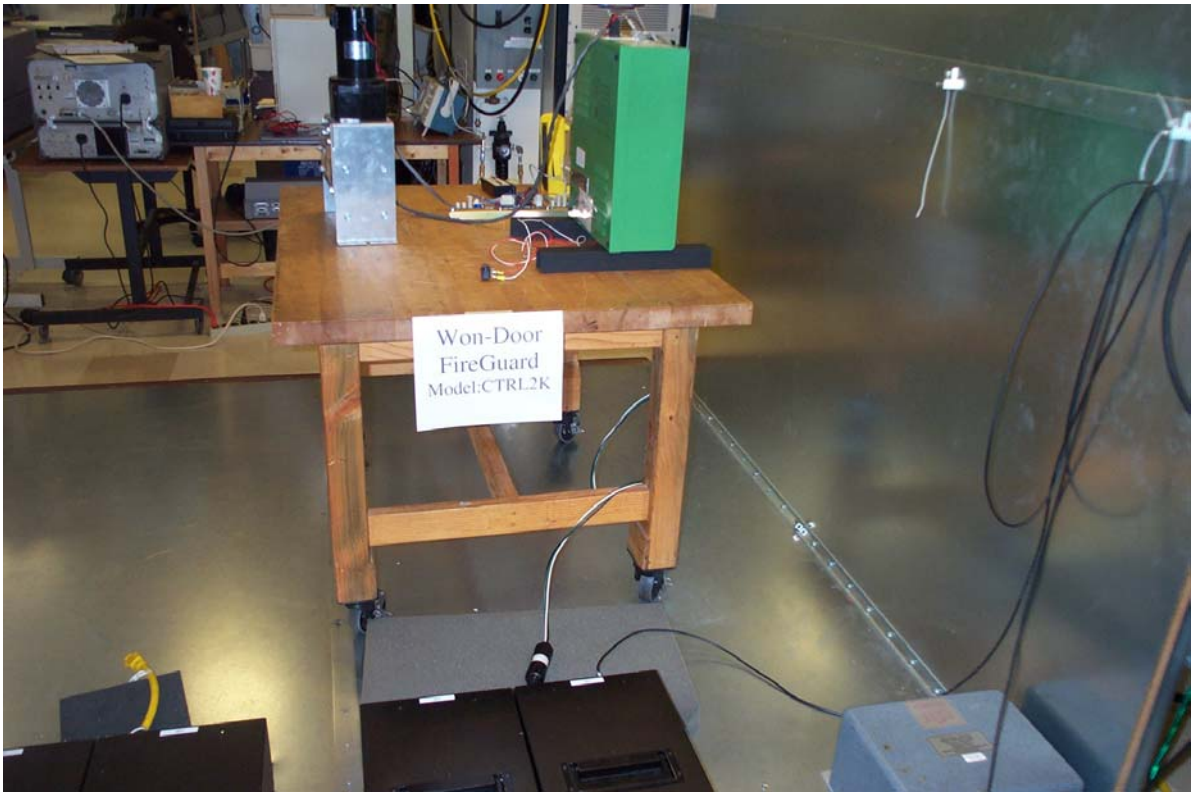
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2
Range: 2 1 - 30MHz							
	1.029	12.26av	.2	10.2	22.66	73	60
				Margin [dB]:		-50.34	-37.34
	1.23871	10.56av	.2	10.2	20.96	73	60
				Margin [dB]:		-52.04	-39.04

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

LIMIT 1: CISPR CLASS A, Quasi-Peak
LIMIT 2: CISPR CLASS A, Average

Photograph



7.6 Radiated Electric Field Emissions

Test Location Date Tested: 12/15/03

10 Meter Semi-Anechoic Chamber (Test Station 2) (Last NSA: 2/28/03; Next NSA 2/28/04)

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Spectrum Analyzer	Hewlett-Packard	8566B	8034	5/6/2003	5/6/2004

Test Accessories

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Biconical Antenna	Electro-Metrics	EM-6912A	8082	7/8/2003	7/8/2004
Log Periodic Antenna	Electro-Metrics	EM-6950	8083	7/10/2003	7/10/2004
6dB Res Band Display	Hewlett-Packard	85662A	8031	5/6/2003	5/6/2004
Quasi-Peak Detector	Hewlett-Packard	85650A	8030	5/6/2003	5/6/2004
Switch Driver	Hewlett-Packard	11713A	8036	5/6/2003	5/6/2004
Preselector	Hewlett-Packard	85685A	8037	5/6/2003	5/6/2004
Pre-amplifier	Sonoma Instruments	310N	8085	11/27/2002	12/30/2003

UL Procedure
3314-LPG-013

Frequency Range of Measurement
30 MHz to 1 GHz

Measurement Distance
10 meters

Test Results
The requirements are:

MET minimum margin is >10 dB (μV/m) at all frequencies.

Remarks
None

Test Data

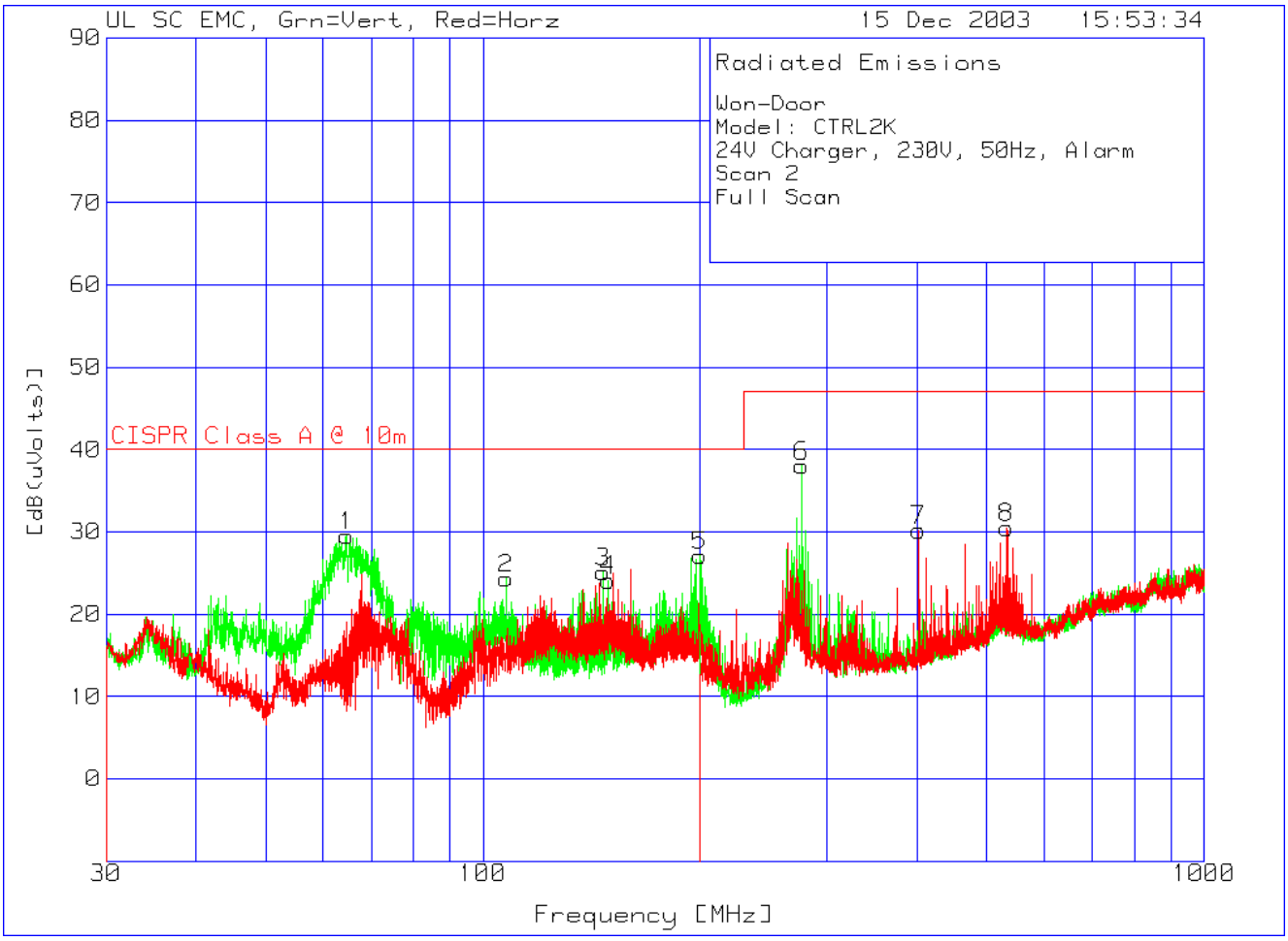

UL SC EMC, Grn=Vert, Red=Horz
15 Dec 2003 14:52:50
Radiated Emissions
Won-Door
Model: CTRL2K
24V Charger, 230V, 50Hz, Standby
Scan 1
Full Scan
CISPR Class A @ 10m
dB(uVolts)
Frequency [MHz]
90
80
70
60
50
40
30
20
10
0
30
100
1000
1
2
3
4
5
6
7

Won-Door
Model: CTRL2K
24V Charger, 230V, 50Hz, Standby
Scan 1
Full Scan

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 1 30 - 205MHz						
1	33.7597	39 pk	-28.4	15.9	26.5	40
	Azimuth:327	Height:400 Vert		Margin [dB]		-13.5
3	51.9023	41.8 pk	-28.2	8.9	22.5	40
	Azimuth:224	Height:99 Vert		Margin [dB]		-17.5
4	70.1324	50.4 pk	-28	5.9	28.3	40
	Azimuth:104	Height:400 Vert		Margin [dB]		-11.7
5	96.4502	41.2 pk	-27.8	11	24.4	40
	Azimuth:305	Height:99 Vert		Margin [dB]		-15.6
6	177.4582	33.2 pk	-27.1	16.5	22.6	40
	Azimuth:122	Height:99 Vert		Margin [dB]		-17.4
Range:2 30 - 205MHz						
2	36.2953	40.5 pk	-28.4	15.5	27.6	40
	Azimuth:328	Height:301 Horz		Margin [dB]		-12.4
Range:4 200 - 1000MHz						
7	513.9645	30.9 pk	-26.5	18.9	23.3	47
	Azimuth:241	Height:400 Horz		Margin [dB]		-23.7

LIMIT 1: CISPR Class A @ 10m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
avem - denotes EMI average detection
tm - Trace Math Result


UL SC EMC, Grn=Vert, Red=Horz
15 Dec 2003 15:53:34
Radiated Emissions
Won-Door
Model: CTRL2K
24V Charger, 230V, 50Hz, Alarm
Scan 2
Full Scan
CISPR Class A @ 10m
dB(uVolts)
Frequency [MHz]
90
80
70
60
50
40
30
20
10
0
30
100
1000

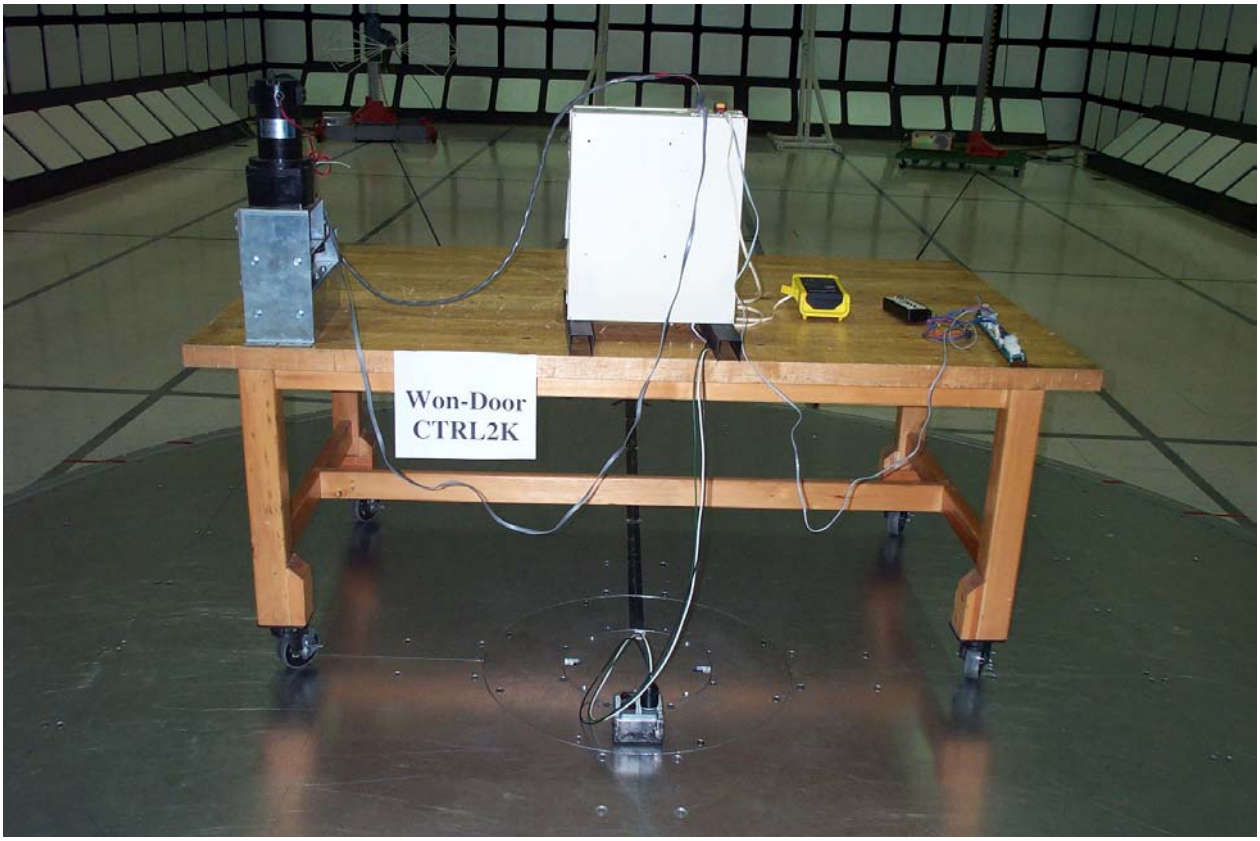
Won-Door
Model: CTRL2K
24V Charger, 230V, 50Hz, Alarm
Scan 2
Full Scan

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1 [dB(uVolts)]	
Range: 1 30 - 205MHz							
1	64.7552	51.8 pk	-28.1	5.8	29.5	40	
	Azimuth:312	Height:200 Vert		Margin [dB]		-10.5	
2	107.5106	38.6 pk	-27.5	13.2	24.3	40	
	Azimuth:359	Height:99 Vert		Margin [dB]		-15.7	
3	146.8124	38.1 pk	-27.3	14.3	25.1	40	
	Azimuth:239	Height:99 Vert		Margin [dB]		-14.9	
4	149.2168	37.1 pk	-27.3	14.3	24.1	40	
	Azimuth:179	Height:99 Vert		Margin [dB]		-15.9	
5	199.8414	37.6 pk	-27	16.5	27.1	40	
	Azimuth:260	Height:99 Vert		Margin [dB]		-12.9	
Range:3 200 - 1000MHz							
6	276.9423	50.8 pk	-27.1	14.3	38	47	
	Azimuth:335	Height:400 Vert		Margin [dB]		-9	
Range:4 200 - 1000MHz							
7	402.4482	41.8 pk	-26.5	14.9	30.2	47	
	Azimuth:241	Height:400 Horz		Margin [dB]		-16.8	
8	532.3507	39.1 pk	-26.5	17.9	30.5	47	
	Azimuth:217	Height:400 Horz		Margin [dB]		-16.5	

LIMIT 1: CISPR Class A @ 10m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
avem - denotes EMI average detection
tm - Trace Math Result

Photograph



7.7 Harmonic Current Emissions

Date Tested: 12/16/03

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Power Analyzer	Voltech	PM3000A	8065	2/11/2003	2/11/2004

UL Procedure
3314-LPG-010

Test Results
The requirements are:

MET

Remarks
None

Test Data

Product:	Won-Door	Dec 16 2003 10:00pm
Serial no:		Page 1 of 1
Description:	FireGuard Model: CTRL2K	
Test Date:	Dec 16 2003 9:53pm	
Result Name:	Alarmed	
Type of Test:	EN61000:2001 Harmonics	
Limits:	Class A	
Power Analyzer:	Voltech PM3000A v2.16 s/n 0000	
AC Source:	Mains / Manual Source	

Overall Result:	**Notes:**
PASS	

Test Parameter Details	**User Entered**	**Measured**
Operating Frequency:	50	49.9922
Operating Voltage:	230	229.6000
Specified Power:	0.0000	133.1133
Fundamental Current:	0.0000	0.6439
Power Factor:	0.0000	0.8000
Average Input Current:		0.1138
Maximum POHC:		0.0024
POHC Limit:		0.0779
Maximum THC:		0.0524
Minimum Power:	75	
Class Multiplier:	1.0000	
Test Duration:	00:02:30	

Won-Door

Product:	Won-Door	Dec 16 2003 10:00pm Page 1 of 1
Serial no:		
Description:	FireGuard Model: CTRL2K	
Result Name:	Alarmed	
Voltech IEC1000-3 Windows Software 3.07.04	Test Date:	Dec 16 2003 9:53pm
Type of Test:	Fluctuating Harmonics Test - Worst Case Table (2001)	
Power Analyzer:	Voltech PM3000A v2.16 s/n 0000	
AC Source:	Mains / Manual Source	
Overall Result: **PASS**		

Class	Class A
Class Multiplier	1

Harm	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL	Harm	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL
2	1.080mA	1.620mA	1.042mA	✓ ✓	1.614mA	✓	N/A	3	2.300mA	3.450mA	294.4mA	✓ ✓	296.6mA	✓	Pass
4	430.0mA	645.0mA	0.722mA	✓ ✓	1.003mA	✓	N/A	5	1.140mA	1.710mA	120.2mA	✓ ✓	126.6mA	✓	Pass
6	330.0mA	450.0mA	0.379mA	✓ ✓	0.558mA	✓	N/A	7	770.0mA	1.155mA	34.38mA	✓ ✓	34.79mA	✓	Pass
8	230.0mA	345.0mA	0.371mA	✓ ✓	0.544mA	✓	N/A	9	400.0mA	600.0mA	27.37mA	✓ ✓	27.41mA	✓	Pass
10	184.0mA	276.0mA	0.367mA	✓ ✓	0.499mA	✓	N/A	11	330.0mA	495.0mA	13.72mA	✓ ✓	13.89mA	✓	Pass
12	153.3mA	230.0mA	0.368mA	✓ ✓	0.509mA	✓	N/A	13	210.0mA	315.0mA	11.28mA	✓ ✓	11.41mA	✓	Pass
14	131.4mA	197.1mA	0.352mA	✓ ✓	0.469mA	✓	N/A	15	150.0mA	225.0mA	7.718mA	✓ ✓	7.863mA	✓	Pass
16	115.0mA	172.5mA	0.381mA	✓ ✓	0.470mA	✓	N/A	17	132.3mA	198.5mA	6.703mA	✓ ✓	6.729mA	✓	Pass
18	102.2mA	153.3mA	0.347mA	✓ ✓	0.454mA	✓	N/A	19	118.4mA	177.6mA	4.984mA	✓ ✓	5.049mA	✓	N/A
20	92.00mA	138.0mA	0.363mA	✓ ✓	0.496mA	✓	N/A	21	107.1mA	160.7mA	3.738mA	✓ ✓	3.892mA	✓	N/A
22	83.63mA	125.4mA	0.347mA	✓ ✓	0.446mA	✓	N/A	23	97.82mA	146.7mA	3.324mA	✓ ✓	3.432mA	✓	N/A
24	76.67mA	115.0mA	0.325mA	✓ ✓	0.422mA	✓	N/A	25	90.00mA	135.0mA	3.119mA	✓ ✓	3.146mA	✓	N/A
26	70.78mA	106.1mA	0.346mA	✓ ✓	0.454mA	✓	N/A	27	83.33mA	125.0mA	2.696mA	✓ ✓	2.730mA	✓	N/A
28	65.71mA	98.57mA	0.350mA	✓ ✓	0.453mA	✓	N/A	29	77.58mA	116.3mA	1.899mA	✓ ✓	1.952mA	✓	N/A
30	61.33mA	92.00mA	0.328mA	✓ ✓	0.417mA	✓	N/A	31	72.58mA	108.8mA	1.676mA	✓ ✓	1.746mA	✓	N/A
32	57.50mA	86.25mA	0.350mA	✓ ✓	0.434mA	✓	N/A	33	68.18mA	102.2mA	1.783mA	✓ ✓	1.808mA	✓	N/A
34	54.11mA	81.17mA	0.338mA	✓ ✓	0.423mA	✓	N/A	35	64.28mA	96.42mA	1.700mA	✓ ✓	1.728mA	✓	N/A
36	51.11mA	76.66mA	0.354mA	✓ ✓	0.444mA	✓	N/A	37	60.81mA	91.21mA	1.010mA	✓ ✓	1.153mA	✓	N/A
38	48.42mA	72.63mA	0.339mA	✓ ✓	0.422mA	✓	N/A	39	57.69mA	86.53mA	0.860mA	✓ ✓	0.932mA	✓	N/A
40	46.00mA	69.00mA	0.335mA	✓ ✓	0.411mA	✓	N/A								

<L1 : Reading is below limit 1.
<L2 : Reading is below limit 2.
N/A : Harmonic current below 0.6% of rated current or 5mA, whichever is greater, are disregarded.

7.8 Voltage Fluctuations and Flicker

Date Tested: 12/16/03

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Power Analyzer	Voltech	PM3000A	8065	2/11/2003	2/11/2004
Power Supply	Pacific Power	360AMX7	8050	No Cal	No Cal

2.6.2 UL Procedure

3314-LPG-010

Test Results

The requirements are:

MET

Remarks

None

Test Data

Won-Door

Product:	Won-Door	Dec 17 2003 12:08am Page 1 of 1
Serial no:		
Description:	FireGuard Model: CTRL2K	
Result Name:	FLICKER	
Voltech IEC1000-3 Windows Software 3.07.04		Test Date: Dec 16 2003 10:05pm
Type of Test:	Flickermeter Test - Table	
Power Analyzer:	Voltech PM3000A v2.16 s/n 0000	
AC Source:	Mains / Manual Source	
Overall Result: **PASS**	Notes: Plt test duration 120 minutes Measurement method - Voltage	

	Plt
Limit	0.650
Reading	0.071

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.071	0.017	0.040	0
Reading 2	0.071	0.017	0.040	0
Reading 3	0.071	0.017	0.040	0
Reading 4	0.071	0.017	0.040	0
Reading 5	0.071	0.017	0.040	0
Reading 6	0.071	0.017	0.040	0
Reading 7	0.071	0.017	0.047	0
Reading 8	0.071	0.017	0.047	0
Reading 9	0.071	0.017	0.040	0
Reading 10	0.071	0.017	0.040	0
Reading 11	0.071	0.017	0.040	0
Reading 12	0.071	0.017	0.040	0

8.0 Immunity Test Regulations :

The immunity tests were performed according to following regulations:

---------- Europe ----------

EMC - Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC

EN 50130-4 : 1995 Alarm systems, Part 4. Electromagnetic compatibility, Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

The test set-up and measurement technique was in accordance with the following test procedure standards:

EN 61000-4-2 : 1995 (Electrostatic Discharge) including A1:1998 and A2:2001
IEC 61000-4-2 : 1995 (Electrostatic Discharge) including A1:1998 and A2:2000
EN 61000-4-3 : 1996 (Radiated) including A1:1998 and A2:2000)
IEC 61000-4-3 : 1995 (Radiated) including A1:1998 and A2:2000)
EN 61000-4-4 : 1995 (Electrical Fast Transient/Burst) including A1:2001 and A2:2001
IEC 61000-4-4 : A1:2000 and A2:2001
EN 61000-4-5 : 1995 (Surge) including A1:2001
IEC 61000-4-5 : 1995 (Surge) including A1:2000
EN 61000-4-6 : 1996 (Conducted) including A1:2001
IEC 61000-4-6 : 1996 (Conducted) including A1:2000
EN 61000-4-11 : 1994 (Voltage Dips and Interrupts) including A1:2001
IEC 61000-4-11 : 1994 (Voltage Dips and Interrupts) including A1:2002

8.1 Performance Criteria (PC)

The performance criteria was based on the following guidelines:

During testing, the EUT was placed in the normal supervisory condition (NSC). While the test condition was being applied, no door activation was to have occurred. After the test condition was applied, a functional test was performed as noted below:

Functional Test:

1. With the unit in NSC, toggle the alarm switch to activate the motor.
2. Verify the motor turns on, the sounders activate, and the programmer indicates “Alarm – Door Closing”.
3. Activate the “Door Block” button on the MUX controller switchbox.
4. Verify the motor stops running.
5. Press the “Reset” key on the programmer.
6. Verify the sounders deactivate and the unit resets to NSC.

8.2 Electrostatic Discharge

Test Location

Date Tested: 9/2/04

Ground Plane #1 (Test Station 5)

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
ESD Simulator	Schaffner	NSG 435	8195	4/8/2004	4/8/2005

UL Procedure

3314-LPG-007

Test Specifications

Discharge Factor:	≥ 1 second
Discharge Impedance:	330 Ω / 150 pF
Kind of discharge:	air, contact (direct and indirect)
Location of Discharge:	see Test Data below
Polarity:	positive and negative
# of discharges:	≥ 10 at all locations

Discharge Voltage:	Contact	Air
	2 kV	2 kV
	4 kV	4 kV
	6 kV	8 kV

Test Data

Test Conditions:

Temperature:	20.0	ºC
Relative Humidity:	52.0	%
Atmospheric Pressure:	29.83	in . Hga

Test Data

24 V Controller

Contact Discharge Location	Positive Polarity (kV)				Negative Polarity (kV)			
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	2	4	6	-	2	4	6	-
Indirect Mode								
Vertical Coupling Plane								
Front	1	1	1	-	1	1	1	-
Left	1	1	1	-	1	1	1	-
Rear	1	1	1	-	1	1	1	-
Right	1	1	1	-	1	1	1	-
Horizontal Coupling Plane								
Front	-	-	-	-	-	-	-	-
Direct Mode								
Front Panel	1	1	1	-	1	1	1	-
Left	1	1	1		1	1	1	
Right	1	1	1	-	1	1	1	-
Top	1	1	1	-	1	1	1	-

Air Discharge Location	Positive Polarity (kV)				Negative Polarity (kV)			
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	2	4	8	15	2	4	8	15
Switch; Red	2	2	2	-	2	2	2	-
Switch; Power	2	2	2	-	2	2	2	-
DC Cable Connector	2	2	2	-	2	2	2	-

Observation:

1 - Discharge observed, no response observed from EUT.
2 - No perceived discharge, no response observed from EUT.

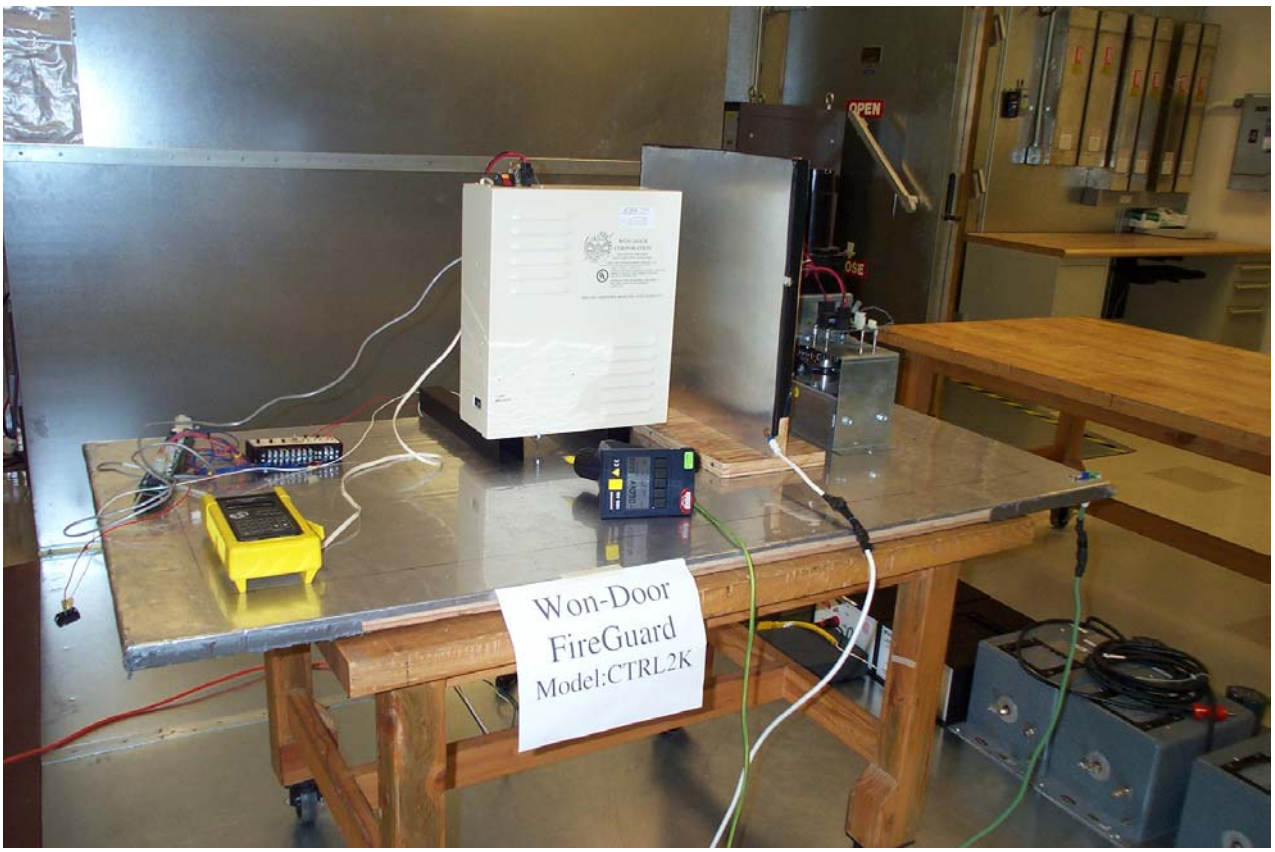
Test results

Required Performance Criteria MET

Remarks

Testing considered representative of the 12 V controller

Photograph



8.3 Radiated Electric Field Immunity

Test location

Date Tested: 12/19/03

3 Meter Anechoic Chamber (Test Station 6)

UL Procedure

3314-LPG-014

Test Accessories

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Signal Generator	Anritsu	68347C	8196	11/3/2003	11/3/2004
Amplifier 0.08-1 GHz	Amplifier Research	250W1000A	8145	No Cal	No Cal
Biconilog Antenna	EMCO	3141	8021	No Cal	No Cal
Horn Antenna	Antenna Research	DRG-118/A	8133	No Cal	No Cal
Field Probe	Holaday	HI4450	8039	11/30/2002	12/30/2003
Field Probe	Holaday (0.08-40 GHz)	HI4422	8194	6/10/2003	6/10/2004

Test Specifications

Antenna Polarization: horizontal & vertical unless indicated otherwise

Antenna Distance: 3 meters

Field Strength: 10 V/m

Frequency Range: 80 MHz to 2 GHz

Modulation: AM, 80%, 1 kHz sine wave
Pulse, 1 Hz Modulation, 0.5 sec on, 0.5 sec off

Step: 1 % step

# of Sides Radiated: 4

Performance Criteria: A

Test Data

12 V controller powered from 120 Vac

80 MHz - 1 GHz

AM: 80% modulation , 1 kHz sine wave
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 GHz –2 GHz

AM: 80% modulation , 1 kHz sine wave
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 - No response observed from EUT.

80 MHz - 1 GHz

Pulse, 1 Hz Modulation, 0.5 sec on, 0.5 sec off
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 GHz –2 GHz

Pulse, 1 Hz Modulation, 0.5 sec on, 0.5 sec off
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 - No response observed from EUT.

24 V controller

80 MHz - 1 GHz

AM: 80% modulation , 1 kHz sine wave
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 GHz –2 GHz

AM: 80% modulation , 1 kHz sine wave
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 - No response observed from EUT.

80 MHz - 1 GHz

Pulse, 1 Hz Modulation, 0.5 sec on, 0.5 sec off
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 GHz –2 GHz

Pulse, 1 Hz Modulation, 0.5 sec on, 0.5 sec off
Dwell Time: 2.7 seconds

	Observation	
Side Exposed	**Horizontal**	**Vertical**
Front	1	1
Right	1	1
Back	1	1
Left	1	1

1 - No response observed from EUT.

Note: Right and Left side are determined as facing towards the front of the EUT.

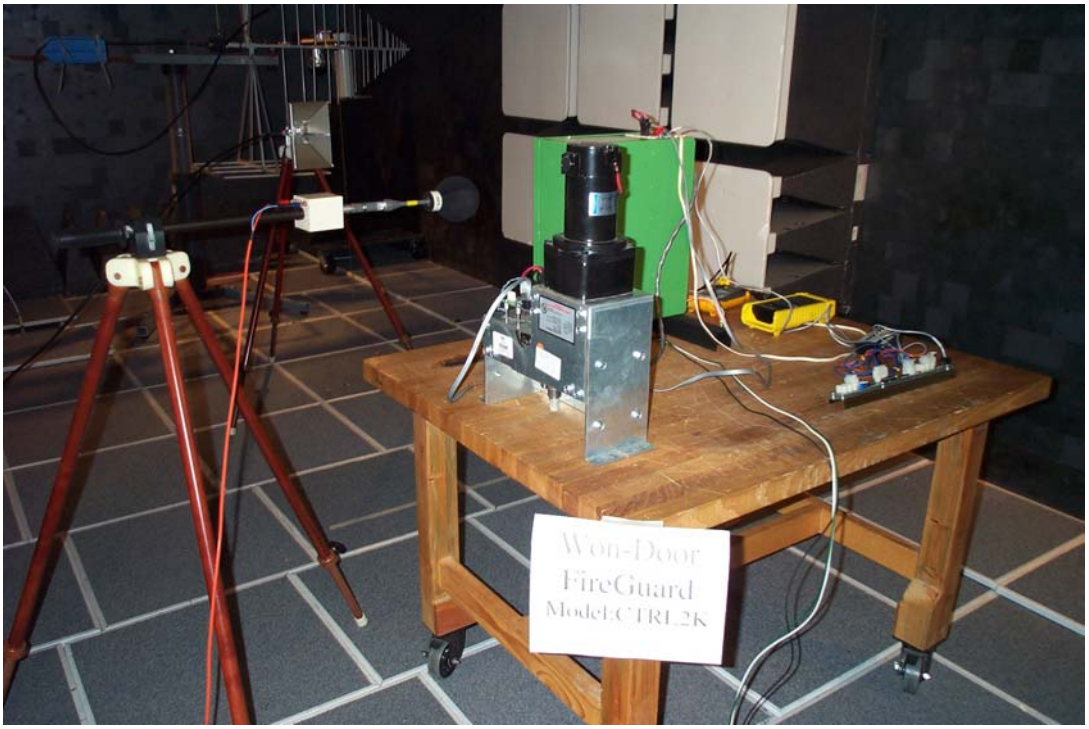
Test Results

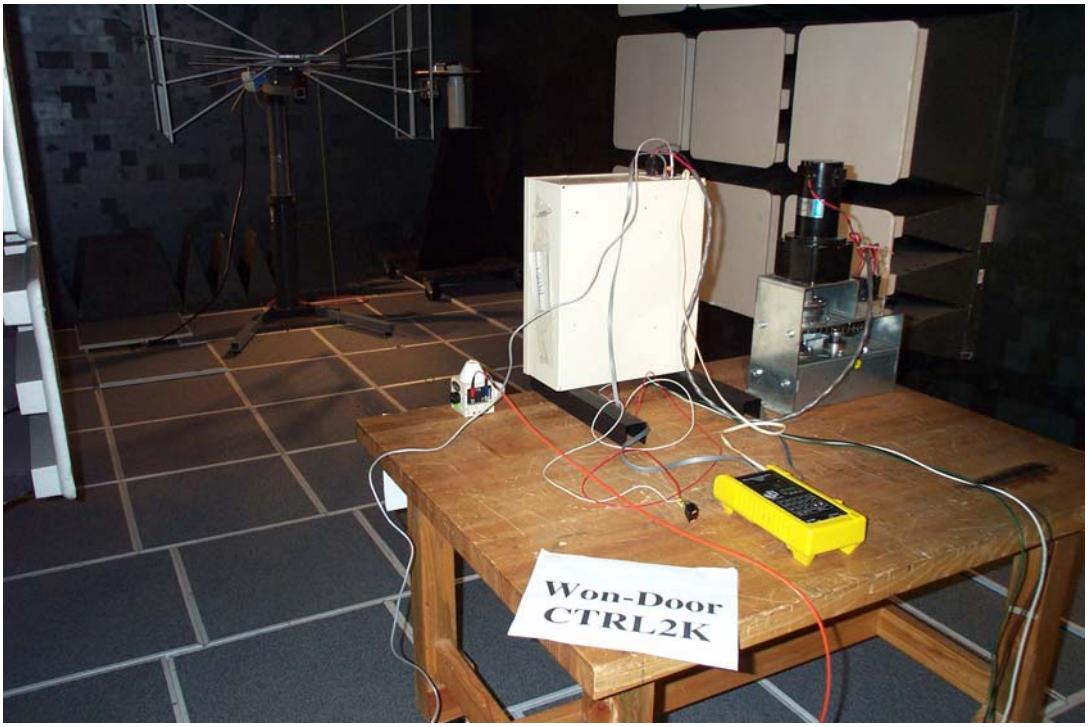
Required Performance Criteria MET

Remarks

Any clock frequencies that were utilized, see Section 2.0, and their harmonics (up to the 10th) which fall into the test frequency range were also investigated.

Photographs





8.4 Electrical Fast Transients/Bursts

Test Location

Date Tested: 7/6/04

Ground Plane # 2 (Test Station 3)

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
EFT Generator	Keytek	ECAT E-103	8042	4/29/2004	4/29/2005

UL Procedure

3314-LPG-006

Test Accessories

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Coupling Clamp	Keytek	CCL-4/5	8046		No Cal

Test Specifications

Pulse Amplitude & Polarity:
(Power Lines) ± 2.0 kV

Pulse Amplitude & Polarity:
(Data Lines & DC Lines) ± 1.0 kV

Burst Period: 300 ms

Repetition Rate: 5 kHz

Duration of Test Voltage: ≥ 1 minute

Location of Coupling: See Test Data

Required Performance Criteria: B

Test Data

24 V controller:

AC Mains - coupling network used

	OBSERVATIONS					
Mode of Application	**(+) Burst (kV)**			**(-) Burst (kV)**		
	0.5	**1.0**	**2.0**	**0.5**	**1.0**	**2.0**
Line 1 with respect to RGP	-	-	1	-	-	1
Neutral with respect to RGP	-	-	1	-	-	1
PE with respect to RGP	-	-	1	-	-	1

I/O and Communication Cables - coupling clamp used

	OBSERVATIONS					
Cable Under Test	**(+) Burst (kV)**			**(-) Burst (kV)**		
	0.25	**0.5**	**1.0**	**0.25**	**0.5**	**1.0**
Switch	-	1	1	-	1	1

Notes: RPG = Reference Ground Plane, PE = Protective Earth, "blank" = not performed

Observations:
1 - No response observed from EUT.

Test Results

Required Performance Criteria MET

Remarks

None

Photograph

8.5 Surge Voltage

Test Location

Date Tested: 9/4/04

Ground Plane # 2 (Test Station 3)

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
I/O Line Coupling Device	Keytek	CM-TELCD	8126	No Cal	No Cal

UL Procedure

3314-LPG-015

Test Specifications – AC Power Lines

Source Impedance: 2 Ω for differential mode and 12 Ω for common mode

Surge Amplitude: Common Mode: 0.5, 1.0 & 2 kV; Differential Mode: 0.5 & 1 kV

Number of Surges: 5 surges per angle

Angle: 90°, 180°, 270°

Polarity: positive & negative

Repetition Rate: 1 surge per minute

Location of Coupling: See Test Data

Test Specifications – Signal Lines

Impedance: 40 ohms

Surge Amplitude: Common Mode: 0.5, 1.0

Number of Surges: 5 surges

Polarity: positive & negative

Repetition Rate: 1 surge per minute

Location of Coupling: See Test Data

Test Data

24 V Controller

Line to Earth / Common Mode

Mode of Application	OBSERVATIONS					
	(+) Surge (kV)			(-) Surge (kV)		
	0.5	1.0	2.0	0.5	1.0	2.0
Line 1 with respect to PE	1	1	1	1	1	1
Neutral with respect to PE	1	1	1	1	1	1

Line to Line / Differential Mode

Mode of Application	OBSERVATIONS					
	(+) Surge (kV)			(-) Surge (kV)		
	0.5	1.0	-	0.5	1.0	-
Line 1 with respect to Neutral	1	1	-	1	1	-

I/O Lines

Mode of Application	OBSERVATIONS					
	(+) Surge (kV)			(-) Surge (kV)		
	0.5	1.0	-	0.5	1.0	-
Fire Alarm Input	1	1	-	1	1	-

Observations:
1 - No response observed from EUT.

Test Results

Required Performance Criteria MET

Remarks

Results are considered representative of the 12 V controller.

Photograph

8.6 Conducted Disturbance

Test Location

Date Tested: 9/2/04

RF Chamber (Test Station 4)

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Signal Generator	Rohde & Schwarz	SMT03	8057	9/25/2003	9/25/2004

UL Procedure

3314-LPG-005

Test Accessories

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
CDN	Fischer	FCC-801-M3-50	8025	1/2/2004	1/2/2005
Injection Current	Antenna Research	ICP-1230	8004	8/22/2004	8/22/2005

Test Specifications

Frequency range: 150 kHz to 100 MHz

Voltage Level: 10 V_{rms}

Modulation: AM, 80%, 1 kHz sine wave
Pulse, 0.5 sec on, 0.5 sec off

Step: 1 % step

Location of Coupling (names of lines): See Test Data

Required Performance Criteria: A

Test Data

24 V controller

Dwell Time: 2.7 Seconds

Coupling Location (Line Stressed)	Coupling Method	AM Observation	PM Observation
AC Main Input	CDN	1	1
Contact Switch	ICC	1	1

Notes: CDN = Coupling Decoupling Network, ICC = Injection Current Clamp
"blank" = not performed

Observations:
1 - No response observed from EUT.

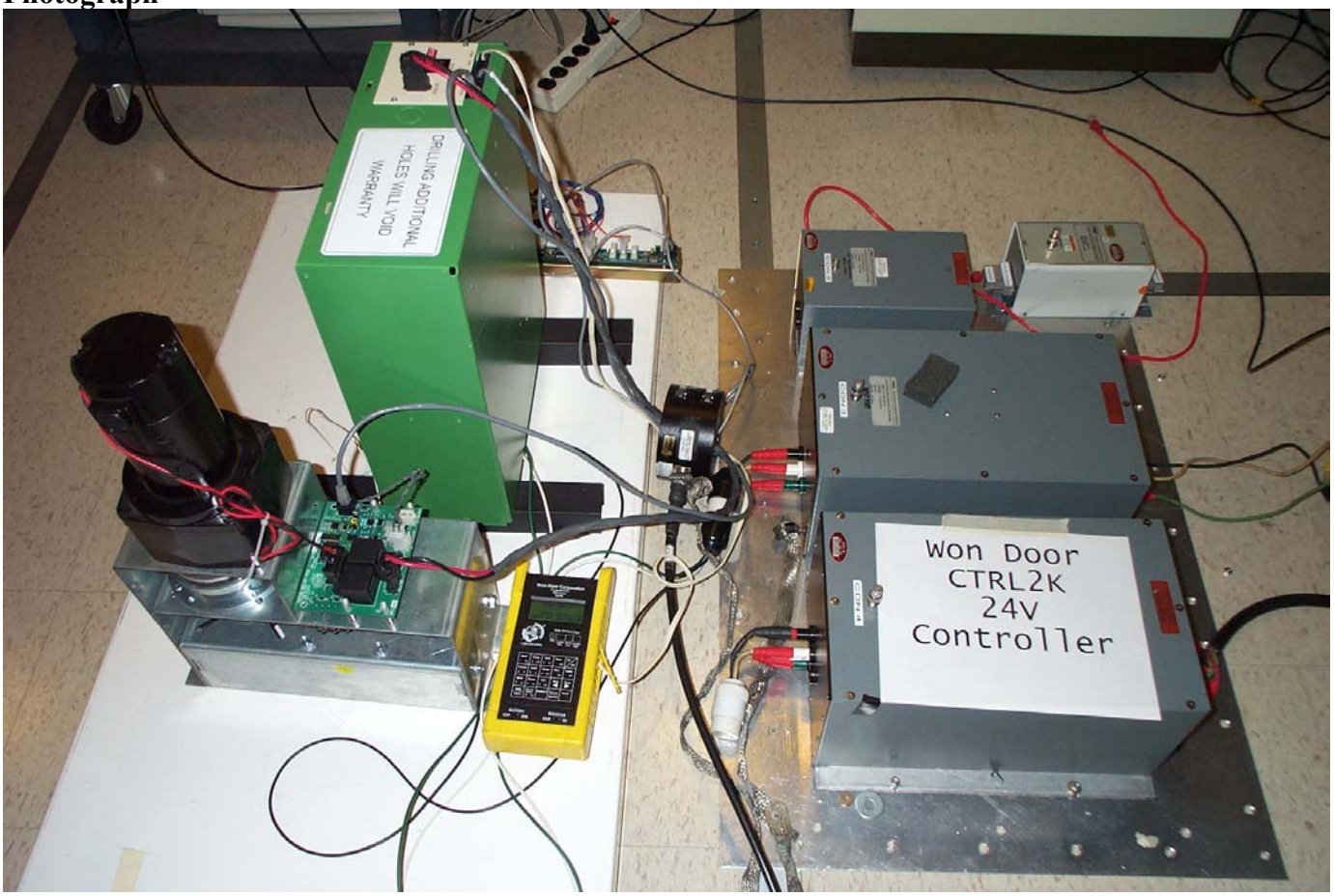
Test Results

Required Performance Criteria MET for both pulsed and AM modulations.

Remarks

Results considered representative of the 12 V controller.

Photograph


DRILLING ADDITIONAL
HOLES WILL VOID
WARRANTY
Won Door
CTRL2K
24V
Controller

8.7 Voltage Dips, Short Interrupts & Voltage Variations

Test Location

Date Tested: 12/16/03

Open Lab Area (Test Station 3)

Test Instruments

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Power Supply	Pacific Power	360AMX7	8050	No Cal	No Cal

Test Accessories

Instrument	Manufacturer	Model	ID#	Cal Last	Cal Next
Oscilloscope	Tektronix	TDS3052	8197	11/26/2002	11/26/2003

UL Procedure

3314-LPG-011

24 V controller:

Test Specifications & Observations/Remarks

Voltage Dips and Short Interruptions

Test Level	Duration [in period/ms (50 Hz)]	Observation (3 Trials)		
0 %U_T	0.5* / 10	1	1	1
(100 % dip)	1.0 / 20	1	1	1
	5.0 / 100	1	1	1
40 %U_T	0.5* / 10	1	1	1
(60 % dip)	1.0 / 20	1	1	1
	5.0 / 100	1	1	1
	10 / 200	1	1	1
70 %U_T	0.5* / 10	1	1	1
(30 % dip)	1.0 / 20	1	1	1
	5.0 / 100	1	1	1
	10 / 200	1	1	1

NOTE - * indicates for 0.5 period, the test made in positive and negative polarity, i.e. starting at 0 and 180.

Observations:
1 - No response observed from EUT.
2 - Unit shuts down then automatically restarts when full voltage is restored.

Voltage Variations

Test Level	Observation (3 trials)		
110 %U_T	1	1	1
85 %U_T	3	3	3

Observations:
1 - No response observed from EUT.
2 - Unit shuts down then automatically restarts when full voltage is restored.
3 – AC low alert, No other fault

Test Results

Required Performance Criteria MET

Remarks

None