



Engineering and Testing for EMC and Safety Compliance



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Certification Report FCC Part 18

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FCC ID	WSK-EMR50	Test Report Date	October 27, 2008
Platform	N/A	RTL Work Order Number	2008175
Model #	EMR50	RTL Quote Number	QRTL08-374
FCC Classification	8CC – Part 18 Consumer Device		
FCC Rule Part(s)	Part 18: Industrial, Scientific, and Medical Equipment (10-01-07)		
FCC Procedure Reference(s)	FCC/OST MP-5 (1986) FCC Methods of Measurements of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
2450	4.7	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Furthermore, there was no deviation from, additions to, or exclusions from the applicable parts of FCC Part 2 and FCC Part 18.

Signature: 

Date: October 27, 2008

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 General Information

1.1 Scope

FCC Part 18: Industrial, Scientific, and Medical Equipment (10-01-07)

1.2 Modifications

The manufacturer lowered the RF power in order to comply with the out-of-band field strength limits of Part 18.305.

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories, Inc. (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittal(s)/Grant(s)

This is an original certification report for Protective Systems Inc. Model EMR50, FCC ID: WSK-EMR50.

2 Test Information

2.1 Test Justification

The purpose of this test report is to show compliance of the EMR50 (the EUT) to FCC Part 18 requirements. As the EUT can potentially be used in any environment (including residential), it is being classified as a consumer ISM device subject to the FCC certification procedure as defined by FCC Part 18.203(a) and 2.907.

The EUT operates at the ISM frequency of 2,450 MHz as defined by Part 18.301.

2.2 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Procedure/Standard	Test	Pass/Fail or N/A
MP-5 3.2	Frequency Measurements	Pass
MP-5 5.0, Part 18.305	Radiated Emissions	Pass
MP-5 7.0, Part 18.307	Conducted Powerline Measurements	Pass

2.3 Test System Details

The test sample was received by RTL on October 1, 2008. The FCC Identifier for the equipment is shown in the following table.

Table 2-2: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description
Time Domain Reduction System	Protective Systems	EMR50	N/A	WSK-EMR50	N/A

2.4 Configuration of Tested System



Photograph 1: Configuration of System under Test

3 Frequency Measurements (MP-5 3.2, Part 18.301)

The frequency measurement procedure in MP-5 3.2 was used to determine the minimum and maximum frequency of operation. The EUT was found to stay within the allowed frequency band of 2,400 – 2,500 MHz specified by Part 18.301.

Table 3-1: Frequency Measurement Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

Test Personnel:

Daniel Baltzell		October 15, 2008
EMC Test Engineer	Signature	Date of Test

4 Radiated Emissions (MP-5 5.0, FCC Part 18.305)

Radiated emissions were tested per the procedure in MP-5 5.0 against the limits specified in FCC Part 18.305. Since the EUT operates on an ISM frequency of 2,450 MHz, the limits in the first line of the first table in 18.305 apply for the out of band emissions. Additionally, since the EUT is operating on an ISM frequency as specified in Part 18.301, there is no limit to the in-band emissions.

Radiated emissions were measured at a distance of 10 m, and the emission was converted to an equivalent level to compare to the limit at 300 m using an attenuation factor of 1/d as specified in the second paragraph of MP-5 2.2.6 and 18.305 Note 2.

Only data within 20 dB of the limit is being reported as specified in MP-5 5.6.

4.1 Radiated Emissions Test Data

Table 4-1: Power – In Band

Frequency (MHz)	Analyzer Level (dBuV)	Site Correction Factor (dB/m)	Corrected (dBuV/m)	Power (W)**
2486.2	91.4	30.1	121.5	4.7

measurement distance = 10 m, RBW = 1 MHz, VBW = 10 Hz

** power calculated using $P = (\text{Field Strength} \cdot d)^2 / 30$

Table 4-2: Radiated Emissions Test Data – Out of Band

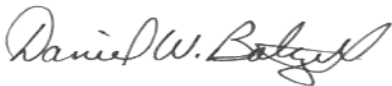
Frequency (MHz)	Analyzer Level (dBuV)	Site Correction Factor (dB/m)	Corrected to 300 meter (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4861.8	44.3	8.4	23.1	28.0	-4.9
7292.7	39.7	10.6	20.8	28.0	-7.2
9007.7	33.2	16.5	20.1	28.0	-7.9
16024.4	28.2	20.0	18.7	28.0	-9.3
20886.2	22.4	29.4	22.3	28.0	-5.7
23317.1	24.2	29.4	24.1	28.0	-3.9

measurement distance = 10 m, RBW = 1 MHz, VBW = 10 Hz

Table 4-3: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	10/8/09
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
901425	Insulated Wire Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/08/09
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/08/09
900772	EMCO	3161-02	Horn Antenna (2-4 GHz)	9804-1044	6/14/10
900321	EMCO	3161-03	Horn Antenna (4.0-8.2 GHz)	9508-1020	6/14/10
900323	EMCO	3160-07	Horn Antenna (8.2-12.4 GHz)	9605-1054	6/14/10
900356	EMCO	3160-08	Horn Antenna (12.4-18 GHz)	9607-1044	6/14/10
900325	EMCO	3160-9	Horn Antennas (18-26.5 GHz)	9605-1051	6/14/10
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz-2 GHz)	2648	12/20/08

Test Personnel:

Daniel Baltzell EMC Test Engineer	 Signature	October 15, 2008 Date of Test
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5 Conducted Powerline Measurements/Conduction Limits (MP-5 7.0, Part 18.307)

5.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable).

The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

5.2 Test Limits

Line-Conducted Emissions		
Limit (dB μ V)		
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

5.3 Conducted Emissions Test Data

Table 5-1: Conducted Emissions; Neutral Side, Line 1

Temperature: 74°F Humidity: 34%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC A QP Limit (dBuV)	FCC A QP Margin (dBuV)	FCC A AV Limit (dBuV)	FCC A AV Margin (dBuV)	Pass/Fail
0.158	Qp	59.6	0.2	59.8	79.0	-19.2	66.0	-6.2	Pass
0.237	Qp	51.0	0.1	51.1	79.0	-27.9	66.0	-14.9	Pass
1.750	Pk	49.2	0.6	49.8	73.0	-23.2	60.0	-10.2	Pass
1.750	Pk	49.4	0.6	50.0	73.0	-23.0	60.0	-10.0	Pass
12.450	Pk	39.3	1.9	41.2	73.0	-31.8	60.0	-18.8	Pass
19.010	Pk	44.7	2.4	47.1	73.0	-25.9	60.0	-12.9	Pass

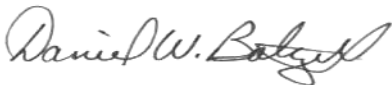
Table 5-2: Conducted Emissions; Hot Side, Line 2

Temperature: 74°F Humidity: 34%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC A QP Limit (dBuV)	FCC A QP Margin (dBuV)	FCC A AV Limit (dBuV)	FCC A AV Margin (dBuV)	Pass/Fail
0.157	Qp	59.8	0.2	60.0	79.0	-19.0	66.0	-6.0	Pass
0.237	Qp	51.0	0.1	51.1	79.0	-27.9	66.0	-14.9	Pass
0.318	Qp	46.7	0.3	47.0	79.0	-32.0	66.0	-19.0	Pass
1.460	Pk	46.8	0.5	47.3	73.0	-25.7	60.0	-12.7	Pass
16.870	Pk	38.3	2.2	40.5	73.0	-32.5	60.0	-19.5	Pass
18.940	Pk	41.3	2.4	43.7	73.0	-29.3	60.0	-16.3	Pass

Table 5-3: Conducted AC Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901083	AFJ International	LS16	16A LISN (110 V)	16010020080	3/28/09
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz–6.5 GHz)	3325A00159	4/15/09

Test Personnel:

Daniel Baltzell EMC Test Engineer	 Signature	October 15, 2008 Date of Test
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6 Conclusion

The data in this measurement report shows that Protective Systems Inc. Model EMR50; FCC ID: WSK-EMR50, complies with all the applicable requirements of Parts 2 and 18 of the FCC Rules.