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Materials Technology

ENVIRONMENTAL TEST REPORT FOR

AMPTEC RESEARCH
Low Resistance Bonding Ohmmeter

Model Number: 620LK

Report Number: ENV8655SC Revision: NC

PERFORMED FOR: AMPTEC RESEARCH
14121 Hwy 290 West, Bldg 3A
Austin, TX 78737

PERFORMED By: STORK GARWOOD LABORATORIES, INC.
143 Calle Iglesia
San Clemente, CA 92672

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Stork Garwood Laboratories, Inc., does hereby certify that all inspections and tests have been performed in accordance with the documents referenced herein with exceptions as noted in this report. The results in this report pertain to the specified equipment tested. This report shall not be reproduced, except in full, without the written authorization of Stork Garwood Laboratories, Inc.

Prepared By:


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Date: September 22, 2009

Approved By:


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Date: September 22, 2009



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CLIENT INFORMATION

<i>Purchase Order</i>	28089KC
<i>Quote Number</i>	GLIQ8655
<i>Company Name</i>	Amptec Research
<i>Address</i>	14121 Hwy 290 West, Bldg 3A
<i>City, State Zip</i>	Austin, TX 78737
<i>Contact Name</i>	Kerry Clark
<i>Phone</i>	512-940-6118
<i>Fax</i>	512-301-9303

STORK GARWOOD INFORMATION

<i>EMC Test Laboratory</i>	Stork Garwood Laboratories, Inc.
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<i>City, State, Zip Code</i>	San Clemente, CA 92672
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SUMMARY OF TESTS PERFORMED

<i>Test Name</i>	<i>Test Personnel</i>	<i>Date Tested</i>	<i>Results</i>
Explosive Atmosphere	Michael Bosica	September 4, 2009	Complied

ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH

1.0 PURPOSE

- 1.1 The purpose of this report is to present the procedures employed and results obtained while conducting the Environmental tests on one Low Resistance Bonding Ohmmeter, Model Number: 620LK, which are hereinafter, referred to as the equipment under test (EUT).
- 1.3 The Low Resistance Bonding Ohmmeter was submitted by Amptec Research.
- 1.4 The Environmental tests, as specified in this report were performed in accordance with MIL STD-810F, dated January 1, 2000.
- 1.5 The test result summarizes, test setup photographs, detailed test data sheets and/or plots, and test equipment lists are included in the specific test section as numbered and summarized in the Table of Contents.

ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH

2.0 PRELIMINARY INFORMATION

2.1 REFERENCES

- MIL STD-810F Department of Defense Test Method Standard for Environmental Engineering Consideration and Laboratory Tests, dated January 1, 2000.
- ANSI/NCSL Z540-1-1994 Calibration Laboratories and Measuring and Test Equipment -- General Requirements.

2.2 TEST LOCATION

All testing was performed at the Orange County facility of Garwood Laboratories, Incorporated, located at 143 Calle Iglesia, San Clemente, California, 92672. Tests were performed using the test set-ups of the relevant standards for tests performed in laboratory conditions.

2.3 TEST CONDITIONS AND EQUIPMENT

2.3.1 AMBIENT CONDITIONS:

Unless otherwise specified herein, all tests were performed at an atmospheric pressure of 28 \pm 2.5 inches of mercury absolute, a temperature of 24 \pm 8° C, and a relative Humidity of 50 \pm 30%.

2.3.2 INSTRUMENTATION AND EQUIPMENT:

2.3.2.1 Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with ANSI/NCSL Z540-1-1994, by Stork Garwood Laboratories, Inc., or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data, when such information is essential to achieve the accuracy control required by the procedure.

2.3.2.2 Stork Garwood Laboratories, Inc., attests that the commercial sources providing calibration services on the above referenced equipment, other than the NIST Standards are in fact capable of performing the



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required services to the satisfaction of Stork Garwood Laboratories, Inc., Quality Assurance. Certifications of all calibrations performed are retained on file in the Stork Garwood Laboratories, Inc., Quality Assurance Department, and are available for inspection upon request by customer representatives.

2.3.2.3 The test equipment utilized during this test program is listed following the Detailed Test Results of each applicable section.

2.3.3 TOLERANCES:

Unless otherwise stated, test conditions were maintained within the tolerances specified with the documents in section 2.1.

ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH

3.0 EXPLOSIVE ATMOSPHERE TEST RESULTS

3.1 SUMMARY OF EXPLOSIVE ATMOSPHERE TEST RESULTS

- 3.1.1 The Explosive Atmosphere test was conducted on the Low Resistance Bonding Ohmmeter, model number: 620LK, in accordance with Method 511.4 of MIL STD-810F, dated January 1, 2000.
- 3.1.2 The Low Resistance Bonding Ohmmeter was placed into an Explosive Atmosphere test chamber with all electrical connectors connected to make operational/functional testing possible.
- 3.1.3 Test chamber was sealed and the chamber's air temperature was increased to the recommended high operating temperature of +50° C. The EUT temperature was allowed to rise to within 10° C of the chamber air temperature. Then 125.9 ml of n-Hexane was introduced into test chamber at site level ambient pressure/altitude, and allowed to circulate for a minimum of three minutes to insure a homogenous mixture. A sample of air/fuel mixture was isolated from the main chamber and ignited to verify potential explosiveness of test mixture.
- 3.1.4 Once the mixture was verified explosive, the Low Resistance Bonding Ohmmeter was operated by the customer, by opening and closing contacts 400 times and visualizing proper functioning of the EUT through the chamber's glass vision port.
- 3.1.5 The explosiveness of test mixture was verified periodically throughout the test.
- 3.1.6 Following the 400 operational cycles, the explosiveness of the test mixture was verified once more, then the test chamber was opened and the test specimen was visually examined.
- 3.1.7 This test will be performed at site level pressure.
- 3.1.8 The Low Resistance Bonding Ohmmeter rear cover has been removed to allow penetration of the explosive mixture.
- 3.1.9 No EUT anomalies were observed during this test. The Low Resistance Bonding Ohmmeter was heated to its normal high operating temperature the EUT was then operated in a verified explosive atmosphere with no occurrence of an explosion.



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- 3.1.10 The Low Resistance Bonding Ohmmeter, Model Number: 620LK, met the requirements of the Explosive Atmosphere test in accordance with Method 511.4 of MIL STD-810F. Final disposition will be determined by the customer.

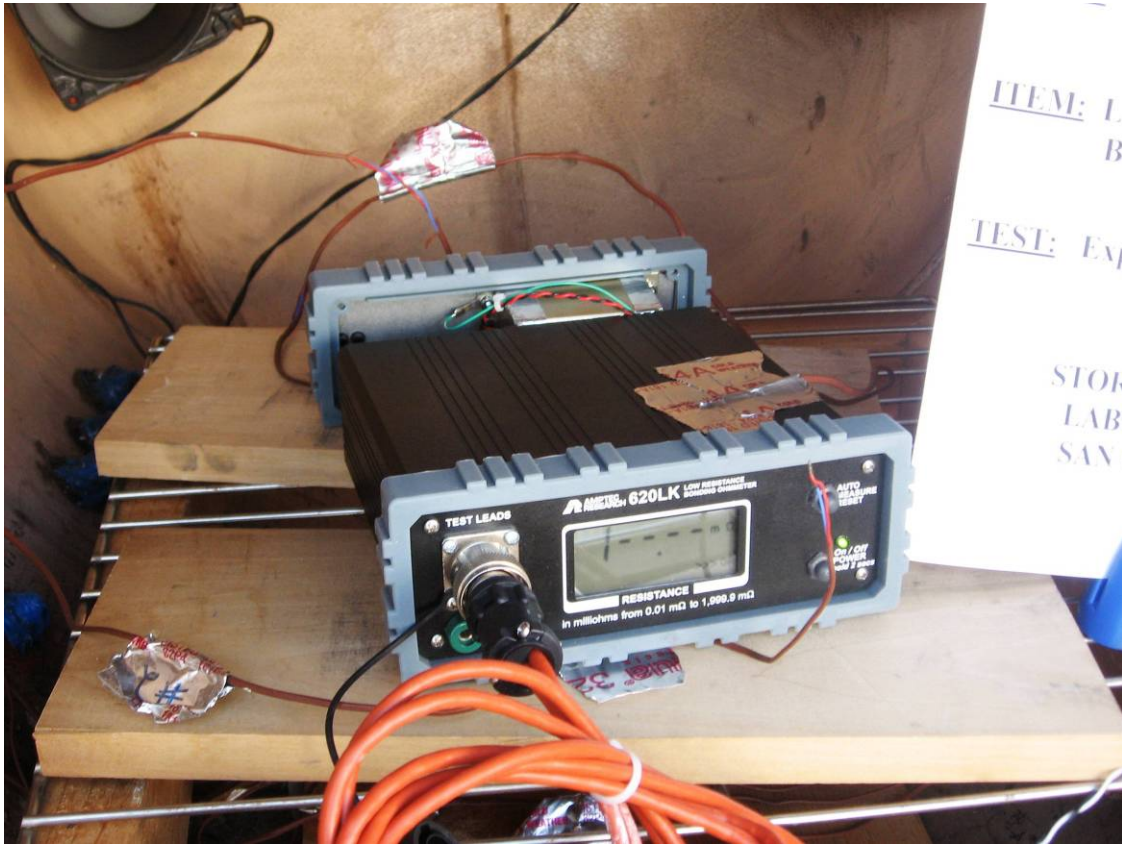
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3.2 TEST PHOTOGRAPHS



Explosive Atmosphere Test Setup

ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH



Explosive Atmosphere Test Setup

ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH



Explosive Atmosphere Test Setup

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Explosive Atmosphere Test Setup

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Explosive Atmosphere Test Setup

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3.3 EXPLOSIVE ATMOSPHERE DETAILED TEST RESULTS




JOB NO.: 8655

Page No.: _____

***** GENERAL DATA LOG SHEET *****

Customer: Amptec Research		Date: 9-4-09	
Test Title: Explosive Atmosphere		Witness? Yes Photos: *	
Test Item: Low Resistance Bonding Ohmmeter		Quantity: 1	
Part/Model No.: 620LK	Serial No(s): N/A		
Specification: MIL-STD-810	Rev: F	Method/Para 511.4	
DATE	TIME	LOG ENTRIES	Initials
9-4-09	0900	Setup	MB
	---	The UUT shall be placed into Explosive Atmosphere test chamber with all electrical connectors connected to make operational / functional testing possible.	
	---	Test chamber shall be sealed and chamber air temperature shall be increased to the recommended high operating temperature of +50°C	
	---	The UUT temperature shall be allowed to rise to within 10°C of the chamber air temperature. Then 125.9 ml of n-Hexane shall be introduced into test chamber at site level ambient pressure / altitude then circulated for a minimum of 3 minutes to insure a homogenous mixture. A sample of air / fuel mixture shall be isolated from main chamber and ignited to verify potential explosiveness of test mixture.	
	---	Once the mixture is verified explosive, the UUT shall be operated by the customer, by opening and closing contacts (400) times and visualizing proper functioning of the UUT through the chamber's glass vision port.	
	---	Explosiveness of test mixture shall be verified periodically throughout the test. Following (400) operational cycles, explosiveness of test mixture shall be verified once more, then the test chamber shall be opened and test specimen shall visually examined.	
	---	This test will be performed at site level pressure.	
	---	The UUT rear cover has been removed to allow penetration of the explosive mixture.	
	---	-----	
	0935	Place UUT into the explosive atmosphere test chamber	
	---	Increase test chamber air temperature to a high operating temperature of +50°C and stabilize test specimen within 10°C of air temperature.	

*Test Photos: 1033 - 1037

Sub-Page: <u>1</u> of <u>3</u>	Test Technician: <u>AB</u> 	Test Engineer: <u>DR</u> 
Inspector: 	DCMC:	



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



JOB NO.: 8655

Page No.:

*** GENERAL DATA LOG SHEET ***

Customer: Amptec Research		Date: 9-4-09	
Test Title: Explosive Atmosphere		Witness? Yes Photos: *	
Test Item: Low Resistance Bonding Ohmmeter		Quantity: 1	
Part/Model No.: 620LK	Serial No(s): N/A		
Specification: MIL-STD-810	Rev: F	Method/Para 511.4	
DATE	TIME	LOG ENTRIES	Initials
9-4-09	1108	Chamber air, and UUT temperatures are stabilized	MB
	---	Introduce 125.9 ml. of n-Hexane into test chamber and circulate for a minimum of 3 minutes to ensure a homogeneous air / fuel / vapor mixture.	
	---	The chamber air temperature dropped when the hexane was introduced.	
	1113	Chamber has re-stabilized at +50°C and mixture has had sufficient time to circulate.	
	---	Isolate a sample of the test mixture and ignite to verify the potential explosiveness of the mixture.	
	---	Results: Mixture is Explosive	
	1114	Customer begins operational cycles by opening and closing contacts (400) times and visually verifying test specimen.	
	1119	100 operational cycles completed	
	---	Isolate a sample of the test mixture and ignite to verify the potential explosiveness of the mixture.	
	---	Results: Mixture is Explosive	
	1123	200 operational cycles completed	
	---	Isolate a sample of the test mixture and ignite to verify the potential explosiveness of the mixture.	
	---	Results: Mixture is Explosive	
	1126	300 operational cycles completed	
	---	Isolate a sample of the test mixture and ignite to verify the potential explosiveness of the mixture.	
	---	Results: Mixture is Explosive	
	---	-----	
	---	-----	

*Test Photos: 1033 - 1037

Sub-Page: 2 of 3	Test Technician:  	Test Engineer: 
	Inspector: 	DCMC:



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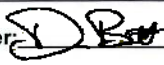

JOB NO.: 8655

Page No.: _____

*** GENERAL DATA LOG SHEET ***

Customer: Amptec Research		Date: 9-4-09	
Test Title: Explosive Atmosphere		Witness? Yes Photos: *	
Test Item: Low Resistance Bonding Ohmmeter		Quantity: 1	
Part/Model No.: 620LK	Serial No(s): N/A		
Specification: MIL-STD-810	Rev: F	Method/Para 511.4	
DATE	TIME	LOG ENTRIES	Initials
9-4-09	1130	400 operational cycles completed	MB
	---	Isolate a sample of the test mixture and ignite to verify the potential explosiveness of the mixture.	
	---	Results: Mixture is Explosive	
	1131	Power down UUT and open chamber	
	---	Test Complete	
	---	-----	
	---	-----	
	---	Summary: No UUT anomalies were observed during this test. The UUT was heated to its normal high operating temperature the UUT was then operated in a verified explosive atmosphere with no occurrence of an explosion.	
	---	Final disposition will be made by the customer.	

*Test Photos: 1033 - 1037

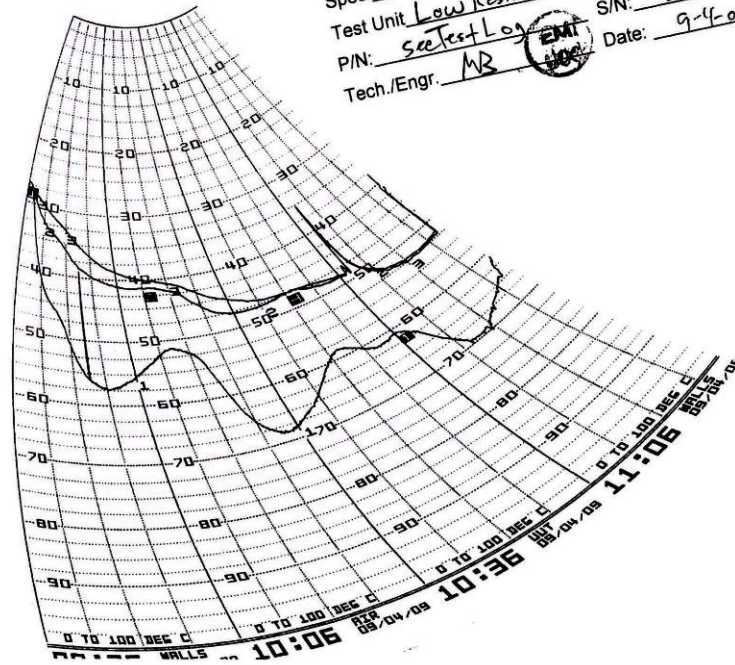
Sub-Page: 3 of 3	Test Technician: MB 	Test Engineer: 
Inspector: 	DCMC: _____	

ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH





GARWOOD LABORATORIES, INC.

Cust. Amptec Research Job # 8655
 Test Explosive Atmosphere
 Spec. MIL-STD-810F
 Test Unit Low Resistance Bonding Ohmmeter
 P/N: see Test Log S/N: see Test Log
 Tech./Engr. MB Date: 9-4-09



ENVIRONMENTAL TEST REPORT FOR AMPTEC RESEARCH

3.4 EXPLOSIVE ATMOSPHERE TEST EQUIPMENT LIST

Asset Number	Description	Manufacturer	Model Number	Calibration Recall Date
1012	Explosive Chamber	Garwood	MG1	UWCE*
1424	Temp Control	Watlow	96	10-28-09
1425	Temp Control	Watlow	96	10-28-09
1211	Chart Recorder	Honeywell	DR4500-AT	8-26-10
0898	Stopwatch	Radio Shack	63-5017	8-6-10
N / A	n-Hexanes	Spectrum	H1011	UWCE*
N / A	Spark Plug	NKG	N / A	UWCE*
Engineer/Technician	Michael Bosica 			
Quality Assurance				

*UWCE = Use With Calibrated Equipment.



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APPENDIX A:

REQUEST FOR CLARIFICATION OF TEST SPECIFICATION



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JOB NO.: 8655 _____

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DATE: 9-4-09

REQUEST FOR CLARIFICATION OF TEST SPECIFICATION

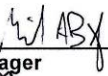
Customer: Amptec Research	
Test Title: Explosive Atmosphere	
Test Item: Low Resistance Bonding Ohmmeter	
Specification: MIL-STD-810	Rev.: F
Paragraph(s): 511.4	


Clarification Requested:

Due to the heater setup of the Explosive Atmosphere chamber, the wall (controlled) temperature reaches the set point quicker than the air and UUT temperatures. Therefore, the customer has given SGLI permission to increase the wall (controlled) temperature over the set point to help bring the air and UUT temperatures to within tolerance of the set point.

Tolerances will be defined by MIL-STD-810F.

Signatures:


 _____ Date: 9-4-09
 GLI Program Manager


 _____ Date: 9/4/09
 Customer Representative