

TEST REPORT  
AMC MODEL No: SWN-RRA-3DT-LSI-1575M-TL-HERM  
MARCH 17, 2005



T50-SW-PW-0305

**TEST REPORT**  
**FOR**  
**ENVIRONMENTAL TESTING OF**  
**AMC MODEL No: SWN-RRA-2DT-LSI-1575M-TL-HERM**

**AMERICAN MICROWAVE CORPORATION**  
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Qualtest, Inc.

Report: 04634

Report Date: 29 November 2004

Customer P.O.: 41100658

Test Period: 24 November 2004

Security Classification: NA

## TEST REPORT

FOR

ENVIRONMENTAL TESTING OF THE P/N SWN-RRA-2DT-LSI SWITCH MODULE

TESTING PERFORMED BY:

FOR:

**QUALTEST, INC.**

5325 Old Winter Garden Road  
Orlando, Florida 32811-1520

Website: [www.qualtest.com](http://www.qualtest.com)

**AMERICAN MICROWAVE CORPORATION**

7310 Grove Road, Suite 206  
Frederick, MD 21704

TEST REPORT PREPARED BY:

  
Mary Webb, Technical Documentation Manager

QUALITY ASSURANCE:

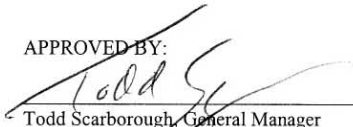
Mike McCord, Quality Assurance Manager

"CQA Performed IAW One Book"

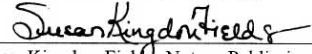
Not Required

Bill Kennedy, DCM Orlando QAS, S1002A

APPROVED BY:

  
Todd Scarborough, General Manager

being duly sworn, deposes and says that the information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects. Subscribed and sworn to before me,

  
Susan Kingdon Fields, Notary Public in and for the State of Florida at large, this

1<sup>st</sup> day of December, 2004.

State of Florida, County of Orange  
NOTARY PUBLIC  
SUSAN KINGDON FIELDS  
MY COMMISSION # DD 231223  
EXPIRES: August 24, 2007  
Expires Thru Budget Notary Services

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Qualtest, Inc.

Report: 04634

REPORT REVISION RECORD

REVISION	DESCRIPTION OF CHANGE
	INITIAL RELEASE



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*Qualtest operates under the relevant quality system requirements of ISO-9001:2000 for providing environmental simulation services as recognized by TRC Registration Certificate #00018. This laboratory also maintains A2LA accreditation to ISO/IEC 17025 for the specific tests listed in A2LA Certificate #1805.01. However, the test results included in this report are not covered by the accreditation.*



### FOREWORD

The objective of this test program was to subject customer provided test hardware to environmental simulation in compliance with customer stated specifications, including any authorized modifications, deviations or concessions to the original requirements. Test hardware consisted of items identified in the appropriate sections of this report. In addition to test hardware identification, each section contains information that describes the associated test setup and performance, and the resulting data. Qualtest measuring instruments used in testing were calibrated according to the requirements of ANSI/NC SL Z540-1-1994 and are NIST traceable. Calibration records are on file and available for inspection by request. Because the test methods are well established and are qualitative or semi-quantitative in nature, Qualtest does not apply measurement uncertainty unless obligated by contract. Measured value related to the corresponding tolerance requirement is used to decide whether a test meets the requirements of the specification. Any test hardware operational setups and resulting evaluations or inspections performed by the customer are not included in this report, unless they were explicitly requested. While observations and/or specification compliance statements may be reported, no interpretations or opinions regarding customer product performance are intended. Unless otherwise indicated in the appropriate report section, all contract obligations were met and the test objective achieved.



**SECTION 1**

**BULKHEAD MOUNTED LEVEL MPE RANDOM VIBRATION TEST SUMMARY**

Test Start-Finish Dates: 24 November 2004

Responsible Test Technician: Ross Blanco

**1-1 TEST HARDWARE**

Six (6) P/N SWN-RRA-2DT-LSI Switch Modules, S/N 635, 636, 637, 638, 639 and 640

**1-2 TEST REQUIREMENTS WITH TOLERANCES**

Perform forty-five (45) seconds of random vibration in each of the three (3) orthogonal axes as follows:

- 0.00225G<sup>2</sup>/Hz from 15 to 64Hz
  - 0.03375G<sup>2</sup>/Hz from 64 to 72Hz
  - 0.00225G<sup>2</sup>/Hz from 72 to 129Hz
  - 0.00844G<sup>2</sup>/Hz from 129 to 143Hz
  - 0.00225G<sup>2</sup>/Hz from 143 to 260Hz
  - 0.06400G<sup>2</sup>/Hz from 514 to 2,000Hz
- GRMS: 10.07

Tolerance:

Standard Ambient: 25±10°C, laboratory ambient Relative Humidity and Pressure  
Random Amplitude: 100% within ±3dB, except ≤ 5% should not exceed -6dB above 500Hz  
GRMS: ≥90% of nominal

**1-2.1 Test Specification:**

Coleman SCD 46090002 Rev. A, Section 3.3.1.1.1 Missile MPE Bulkhead Mounted

**1-3 TEST SETUP**

**QUALTEST FURNISHED MEASUREMENT & TEST EQUIPMENT (including any rentals)**

QTI #	Item	Manufacturer	Model Number	Calibration Due
100002	Thermo/Hygrometer	Amprobe	TH-2	5/5/2005
100032	Accelerometer	Endevco	7703A-50	11/30/2004
100076	Torque Wrench	Proto	6369A	6/24/2005
100126	Charge Amplifier	Endevco/ CH 16	104	10/14/2005
100127	Power Supply	Endevco	109	10/14/2005
100208	Vibration Control System	Data Physics/ CH 1	DP550	2/4/2005
100920	Power Amplifier	Ling Electronics	8096-44 SSPA	NA
100941	Power Amplifier(vert only)	Ling Electronics	DMA5/A395-5	NA



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QTI #	Item	Manufacturer	Model Number	Calibration Due
100942	Vibration Exciter(vert only)	Ling Electronics	A395	NA
101000	Vibration Exciter	Ling Electronics	D335	NA

#### 1-4 TEST DESCRIPTION

##### 1-4.1 Non-Qualtest Personnel, Including Organization, Present for All or Part of the Test:

None

##### 1-4.2 Powered/Operational State of the Hardware and by Whom:

The test items were not operating during the vibration test.

##### 1-4.3 Test Activities and Resulting Measurements from Observed/Recorded Data:

Atmospheric Conditions: Temp (°C): 22 Relative Humidity (%): 51 Pressure: Site Ambient

Run #	Axis	End Time	Duration
1	Vertical	1110	45-seconds
2	Longitudinal	1254	45-seconds
3	Lateral	1327	45-seconds

##### 1-4.4 Limitations or Departures from the Test Requirements and Authorizing Source:

None

#### 1-5 ENVIRONMENTAL TEST DATA

Vibration plots are located after Figure 1-5.



Figure 2-1. Test setup for vertical-axis bulkhead mounted level MPE random vibration.



Figure 2-2. Test setup for longitudinal-axis bulkhead mounted level MPE random vibration.





Figure 2-3. Test setup for longitudinal-axis bulkhead mounted level MPE random vibration.



Figure 2-4. Test setup for lateral-axis bulkhead mounted level MPE random vibration.

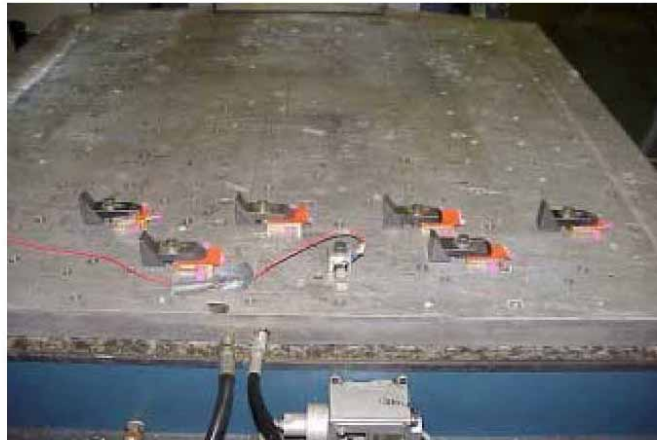


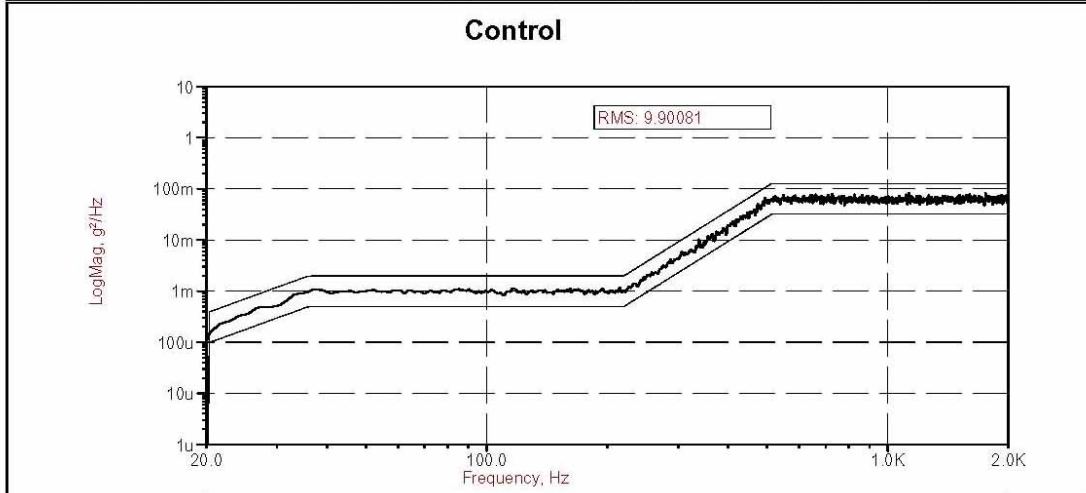
Figure 1-5. Test setup for lateral-axis bulkhead mounted level MPE random vibration.



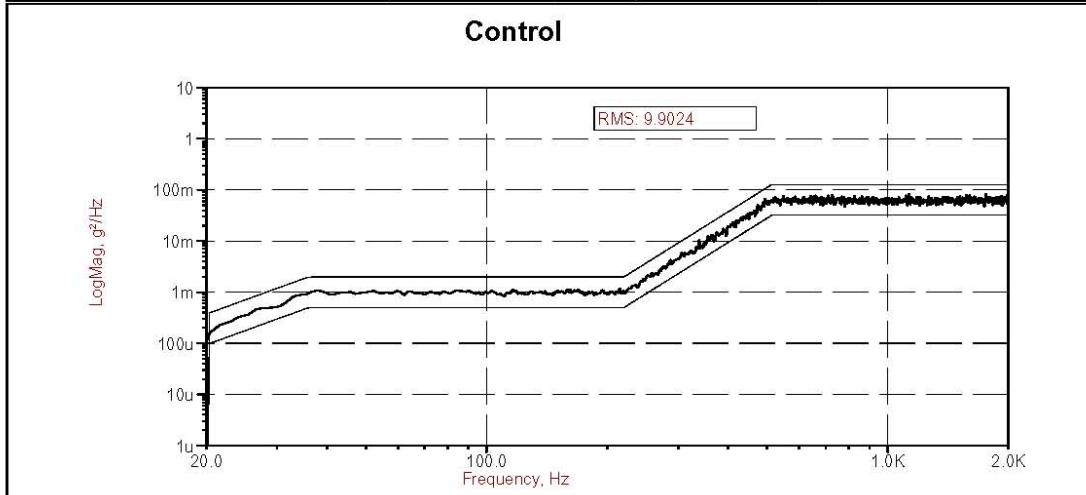
Qualtest, Inc.

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Qualtest, Inc. 5325 Old Winter Garden Road Orlando, Florida 32811 Tel. (407) 293-5844 Fax (407) 297-7376	Customer:		American Microwave Corporation		
	Test Hardware:	Switch Module (6 ea.)	Job #:	04634	
	P/N:	SWN-RRA-2DT-LSI	Run #:	1	
	S/N:	635, 636, 637, 638, 639 and 640	Axis:	Vertical	
	Date:	11/24/04	Time:	1110	Duration:



Qualtest, Inc. 5325 Old Winter Garden Road Orlando, Florida 32811 Tel. (407) 293-5844 Fax (407) 297-7376	Customer:		American Microwave Corporation		
	Test Hardware:	Switch Module (6 ea.)	Job #:	04634	
	P/N:	SWN-RRA-2DT-LSI	Run #:	2	
	S/N:	635, 636, 637, 638, 639 and 640	Axis:	Longitudinal	
	Date:	11/24/04	Time:	1254	Duration:

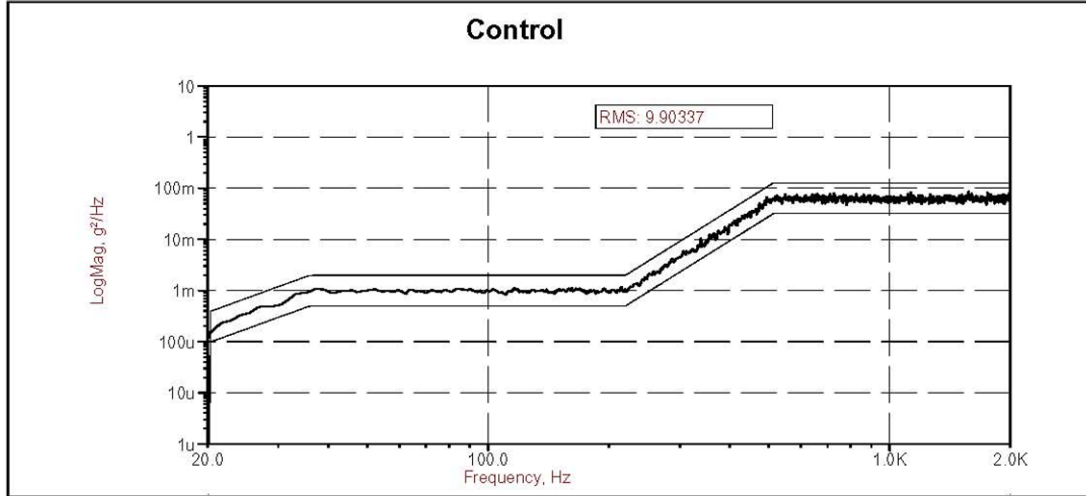




Qualtest, Inc.

Report: 04634

Qualtest, Inc. 5325 Old Winter Garden Road Orlando, Florida 32811 Tel. (407) 293-5844 Fax (407) 297-7376	Customer:		American Microwave Corporation		
	Test Hardware:	Switch Module (6 ea.)	Job #:	04634	
	P/N:	SWN-RRA-2DT-LSI	Run #:	3	
	S/N:	635, 636, 637, 638, 639 and 640	Axis:	Lateral	
	Date:	11/24/04	Time:	1327	Duration:





**SECTION 2**

**WILLOUGHBY RANDOM VIBRATION TEST SUMMARY**

Test Start-Finish Dates: 24 November 2004

Responsible Test Technician: Ross Blanco

**2-1 TEST HARDWARE**

Six (6) P/N SWN-RRA-2DT-LSI Switch Modules, S/N 635, 636, 637, 638, 639 and 640

**2-2 TEST REQUIREMENTS WITH TOLERANCES**

Perform five (5) minutes of random vibration in each of the three (3) orthogonal axes as follows:

0.01000G<sup>2</sup>/Hz at 20Hz

0.04000G<sup>2</sup>/Hz from 80 to 350Hz

0.00700G<sup>2</sup>/Hz at 2,000Hz GRMS: 6.1

Tolerance:

Standard Ambient: 25±10°C, laboratory ambient Relative Humidity and Pressure

Random Amplitude: 100% within ±3dB, except ≤ 5% should not exceed -6dB above 500Hz

GRMS: ≥90% of nominal

**2-2.1 Test Specification:**

Coleman SCD 46090002 Rev. A, Section 3.3.1.1.2 Missile Willoughby Spectrum

**2-3 TEST SETUP**

**QUALTEST FURNISHED MEASUREMENT & TEST EQUIPMENT (including any rentals)**

QTI #	Item	Manufacturer	Model Number	Calibration Due
100002	Thermo/Hygrometer	Amprobe	TH-2	5/5/2005
100032	Accelerometer	Endevco	7703A-50	11/30/2004
100076	Torque Wrench	Proto	6369A	6/24/2005
100126	Charge Amplifier	Endevco/ CH 16	104	10/14/2005
100127	Power Supply	Endevco	109	10/14/2005
100208	Vibration Control System	Data Physics/ CH 1	DP550	2/4/2005
100920	Power Amplifier	Ling Electronics	8096-44 SSPA	NA
100941	Power Amplifier (vert only)	Ling Electronics	DMA5/A395-5	NA
100942	Vibration Exciter (vert only)	Ling Electronics	A395	NA
101000	Vibration Exciter	Ling Electronics	D335	NA



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## 2-4 TEST DESCRIPTION

### 2-4.1 Non-Qualtest Personnel, Including Organization, Present for All or Part of the Test:

None

### 2-4.2 Powered/Operational State of the Hardware and by Whom:

The test items were not operating during the vibration test.

### 2-4.3 Test Activities and Resulting Measurements from Observed/Recorded Data:

Atmospheric Conditions: Temp (°C): 22 Relative Humidity (%): 51 Pressure: Site Ambient

Run #	Axis	End Time	Duration
1	Vertical	1119	5-minutes
2	Longitudinal	1301	5-minutes
3	Lateral	1334	5-minutes

### 2-4.4 Limitations or Departures from the Test Requirements and Authorizing Source:

None

## 2-5 ENVIRONMENTAL TEST DATA

Vibration plots are located after Figure 2-5. The test items were returned to the customer following the completion of the test.



Figure 2-1. Test setup for vertical-axis Willoughby random vibration.



Figure 2-2. Test setup for longitudinal-axis Willoughby random vibration.



Figure 2-3. Test setup for longitudinal-axis Willoughby random vibration.



Figure 2-4. Test setup for lateral-axis Willoughby random vibration.





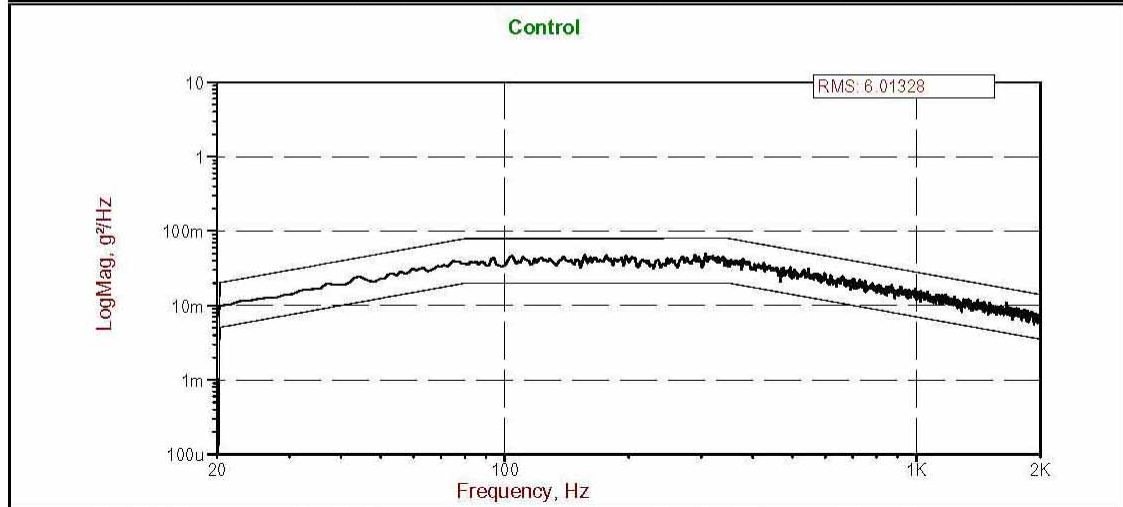
Figure 2-5. Test setup for lateral-axis Willoughby random vibration.



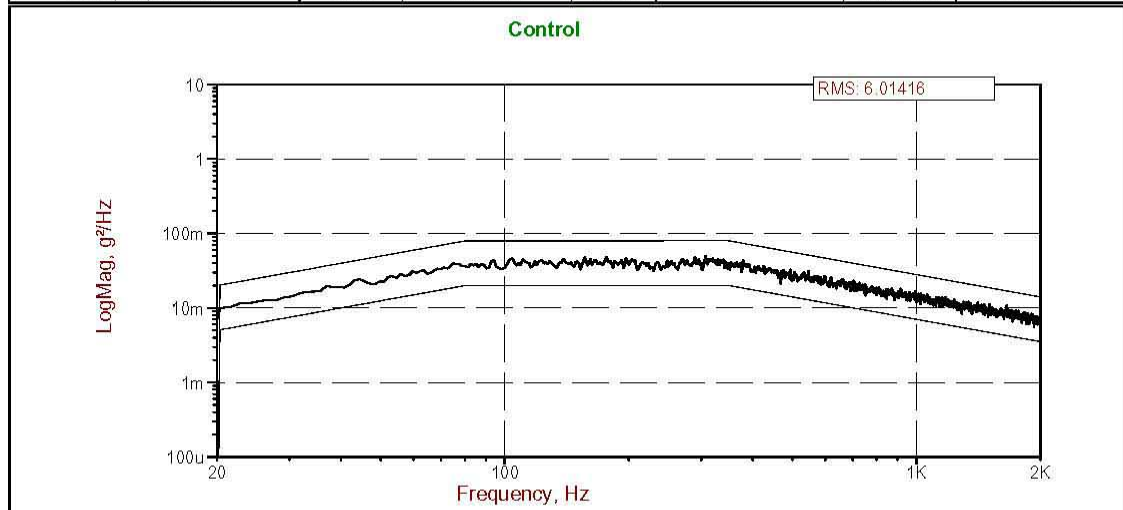
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Qualtest, Inc. 5325 Old Winter Garden Road Orlando, Florida 32811 Tel. (407) 293-5844 Fax (407) 297-7376	Customer:	American Microwave Corporation			
	Test Hardware:	Switch Module (6 ea.)	Job #:	4634	
	P/N:	SWN-RRA-2DT-LSI	Run #:	1	
	S/N:	635, 636, 637, 638, 639 and 640	Axis:	Vertical	
	Date:	11/24/04	Time:	1119	Duration:



Qualtest, Inc. 5325 Old Winter Garden Road Orlando, Florida 32811 Tel. (407) 293-5844 Fax (407) 297-7376	Customer:	American Microwave Corporation			
	Test Hardware:	Switch Module (6 ea.)	Job #:	04634	
	P/N:	SWN-RRA-2DT-LSI	Run #:	2	
	S/N:	635, 636, 637, 638, 639 and 640	Axis:	Longitudinal	
	Date:	11/24/04	Time:	1301	Duration:





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Qualtest, Inc. 5325 Old Winter Garden Road Orlando, Florida 32811 Tel. (407) 293-5844 Fax (407) 297-7376	Customer:		American Microwave Corporation		
	Test Hardware:	Switch Module (6 ea.)	Job #:	04634	
	P/N:	SWN-RRA-2DT-LSI	Run #:	3	
	S/N:	635, 636, 637, 638, 639 and 640	Axis:	Lateral	
	Date:	11/24/04	Time:	1334	Duration:

