



REPORT NO: 9628B-1002

END ITEM DATA PACKAGE

IDENTIFICATION SHEET

MESSENGER PROJECT

- 1. Part Name: 5 MHz Oscillator 9628B |
- 2. Datum Part Number: 14751-101 |
- 3. Serial Number: 1002
- 4. Lot Date Code: | 0306 |

Prepared By: Tommy Rogers  
Datum Product Assurance Representative



Datum  
34 Tozer Rd.  
Beverly, MA 01915

## CERTIFICATE OF CONFORMANCE

**CUSTOMER:**        **Johns Hopkins University**  
                         **Applied Physics Laboratory**  
                         **11100 Johns Hopkins Road**  
                         **Laurel, MD 20723-6099**

**Product Description:** 5 MHz Oscillator 9628B  
**Datum Part Number:** 14751-101  
**Serial Number:** 1002  
**Lot Date Code:** 0306

**Datum hereby certifies that articles supplied under the stated purchase order were produced from materials and processes for which there are available tests reports or other evidence of conformance to material specifications.**

**Datum also certifies that the deliverable end item has been controlled and tested utilizing calibrated equipment to all applicable specifications and purchase order requirements, that quality control has been performed and the that inspection and test records applicable to this certification are maintained on file.**

  
Quality Assurance

2/24/03  
DATE

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	RELEASED FROM A3, with changes		SIGNATURES ON FILE
B	REV'D PER ECO 1086 (BMC) 1/17/03		SIGNATURES ON FILE

SN 1002

**SIGNATURES ON FILE**

Originator:	Brenda McHale (12/10/02)
Check	Steven P. DiMare (1/7/03)
Designer	Peter E. Cash (1/6/03)
Project:	Peter E. Cash (12/23/02)
Manufacturing/Test	Doug W. Harvey (12/27/02)
QA	Tony Raposo (1/6/03)



**TITLE: ATP, OSC, 5 MHz, OCXO (9628B)**

SIZE	CAGE NO.	DRAWING NUMBER	REVISION
A	56219	14753-301	B
SCALE	NONE		SHEET 1 OF 23

**TABLE 1. TEST EQUIPMENT LIST**

<u>Item No</u>	<u>Description</u>	<u>Control #</u>	<u>Verify (✓)</u>
1.	Power Supply; Tektronics, 0-20 VDC, 3 A	<u>7146</u>	<u>✓</u>
2.	DVM - Fluke 8804A or Equivalent	<u>3071</u>	<u>10/31/03</u>
3.	CAMS Test System, version 2.0.7 or Equivalent	<u>✓</u>	<u>✓</u>
4.	Frequency Counter; HP53132A or equivalent	<u>7165</u>	<u>2/28/03</u>
5.	Spectrum Analyzer; HP8590L or equivalent	<u>3060</u>	<u>1/30/03</u>
6.	RF Millivoltmeter; BOONTON Model 70-L or equivalent	<u>252</u>	<u>10/31/03</u>
7.	Phase Noise Measurement System; HP-3048A or equivalent	<u>✓</u>	<u>✓</u>
8.	Synthesizer; FLUKE 6160B or equivalent	<u>N/A</u>	<u>N/A - BWH 2/3/05</u>
9.	TSC 5110C Frequency Stability System or equivalent	<u>✓</u>	<u>✓</u>
10.	5 MHz, FTS 1000B Phase Noise Reference	<u>✓</u>	<u>✓</u>
11.	Vibration Test Fixture, SK0340 or SK0407-001 and -002	<u>✓</u>	<u>✓</u>
12.	HP34401A Multimeter with Intuilink program	<u>3068</u>	<u>3/31/03</u>
13.	Variable load (45Ω vs 55Ω), SKO-389 or equivalent	<u>✓</u>	<u>✓</u>
14.	Buffer Amplifier, SK0204	<u>✓</u>	<u>✓</u>

Test Data Sheet 1

Paragraph 6.0 Examination of Product

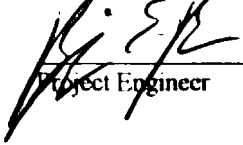
SYMMETRICOM 9628 OCXO

Symmetricom Part Number: 14751-10 L

Serial Number: 1002

Test Para.	Test Description	Specification Limits	Recorded Measurement	Pass /Fail	Tested by	Date
6.0	Examination of Product					
6.1	Dimensions	Pass/Fail (ref. ICD 14752-201)		PASS	MJB	1/7/03
6.2	Mass	≤175 grams	<u>169</u> gms	PASS	MJB	1/7/03
6.3	Marking	Pass/Fail		PASS	MJB	2/11/03
6.4	Finish	Pass/Fail		PASS	MJB	2/11/03

Test Verification

  
Project Engineer

2/12/03  
Date

  
Product Assurance

2/12/03  
Date

Test Data Sheet 2  
Paragraph 7.0 Baseline Measurements (25°C Atmosphere)


SYMMETRICOM 9628 OCXO

Symmetricom Part Number: 14751-10 1

Serial Number: 1002

Test Para.	Test Description	Specification Limits	Recorded Measurement	Tested by	Pass/Fail	Date
7.0	Baseline Performance					
7.1	Warm-Up Power	< 4.5 W	<u>4.2</u> W	DWH	PASS	11/10/03
7.2	Steady State Power	< 3.0 W	<u>2.3</u> W			
7.3	Output Power (RF)	7.0 ± 0.5 dBm	<u>7.1</u> dBm	↓	↓	↓
7.4	Output Frequency	5.000000 MHz ± 1 × 10 <sup>-7</sup>	<u>5.2</u> × 10 <sup>-9</sup>			
7.5	Harmonic Distortion	<-25 dBc	<u>-28</u> dBc			
7.6	Phase Noise 1 Hz Bandwidth	1 Hz offset no limit	<u>-108</u> dBc/Hz			
		10 Hz offset no limit	<u>-135</u> dBc/Hz			
		100 Hz offset no limit	<u>-155</u> dBc/Hz			
		1 kHz offset <-51 dBc/Hz	<u>-160</u> dBc/Hz			
		10 kHz offset <-71 dBc/Hz	<u>-162</u> dBc/Hz			
		100 kHz offset <-91 dBc/Hz	<u>-164</u> dBc/Hz			
7.6	Spurious Output	<-70 dBc, 1kHz to 100 kHz	<u>-119</u> dBc @ <u>4</u> kHz	↓	↓	↓
7.7	Allan Deviation	T=0.1 seconds, σ ≤ 1 × 10 <sup>-9</sup>	<u>4.6</u> × 10 <sup>-12</sup>	DWH	PASS	11/13/03
		T=1 seconds, σ ≤ 1 × 10 <sup>-10</sup>	<u>2.5</u> × 10 <sup>-12</sup>			
		T=180 minutes, σ ≤ 1 × 10 <sup>-9</sup>	<u>15</u> × 10 <sup>-11</sup>			
7.8	Power Supply Sensitivity	±2 × 10 <sup>-10</sup>	<u>-0.5</u> × 10 <sup>-10</sup>	DWH	PASS	11/19/03
7.9	Load Sensitivity	±2 × 10 <sup>-9</sup>	<u>-0.4</u> × 10 <sup>-10</sup>	DWH	PASS	11/13/03

Test Verification

  
Project Engineer

2/5/03  
Date

  
Product Assurance

2/11/03  
Date

Test Data Sheet 3A  
Paragraph 8.0 Environmental Testing

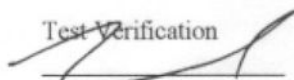
SYMMETRICOM 9628 OCXO

Symmetricon Part Number: 14751-10\_1

Serial Number: 1802

Test/Ref. Para	Test Description	Specification Limits	Recorded Measurement	Tested by	Date
8.0	Environmental Testing				
8.1	Vibration Testing	Change in oscillator appearance or structure	<u>PASS</u> (Pass/Fail)	<u>SNP</u>	<u>1/15/03</u>
8.1.1	X-axis Vibration				
	Pre-Vibration X-axis Input Power	< 3.0 W	<u>2.6</u> W		
	Pre-Vibration X-axis RF Power	7.0 ± 0.5 dBm	<u>7.2</u> dBm		
	Pre-Vibration X-axis Frequency	5.000 000 MHz ±1 x 10 <sup>-7</sup>	<u>0.19</u> x 10 <sup>-8</sup>		
	X-axis Sine survey	Change in response Yes=fail, No=pass	<u>NO</u>		
	X-axis Sine Vibration	Note any anomalies( P/F)	<u>PASS</u>		
	X-axis Random vibration test	Note any anomalies( P/F)	<u>PASS</u>		
	X-axis Sine survey	Change in response Yes=fail, No=pass *	<u>NO</u>		
	Post-Vibration X-axis Input Power	< 3.0 W	<u>2.6</u> W		
	Post-Vibration X-axis RF Power	7.0 ± 0.5 dBm	<u>7.2</u> dBm		
	Post-Vibration X-axis Frequency	5.000 000 MHz ±1 x 10 <sup>-7</sup>	<u>0.2</u> x 10 <sup>-8</sup>		
8.1.2	Y-axis Vibration				
	Pre-Vibration Y-axis Input Power	< 3.0 W	<u>2.6</u> W		
	Pre-Vibration Y-axis RF Power	7.0 ± 0.5 dBm	<u>7.2</u> dBm		
	Pre-Vibration Y-axis Frequency	5.000 000 MHz ±1 x 10 <sup>-7</sup>	<u>0.2</u> x 10 <sup>-8</sup>		
	Y-axis Sine survey	Change in response Yes=fail, No=pass	<u>NO</u>		
	Y-axis Sine Vibration	Note any anomalies( P/F)	<u>PASS</u>		
	Y-axis Random vibration test	Note any anomalies( P/F)	<u>PASS</u>		
	Y-axis Sine survey	Change in response Yes=fail, No=pass	<u>NO</u>		
	Post-Vibration Y-axis Input Power	< 3.0 W	<u>2.6</u> W		
	Post-Vibration Y-axis RF Power	7.0 ± 0.5 dBm	<u>7.2</u> dBm		
	Post-Vibration Y-axis Frequency	5.000 000 MHz ±1 x 10 <sup>-7</sup>	<u>0.2</u> x 10 <sup>-8</sup>		

\* See FR1815 T

Test Verification  
  
Project Engineer

2/6/03  
Date

  
Product Assurance

2/11/03  
Date

Test Data Sheet 3B  
Paragraph 8.0 Environmental Testing

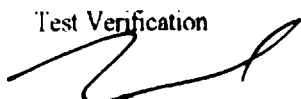
SYMMETRICOM 9628 OCXO

Symmetricon Part Number: 14751-10 1

Serial Number: 1002

Test/Ref. Para	Test Description	Specification Limits	Recorded Measurement	Tested by	Date
8.0	Environmental Testing				
8.1.2	Z-axis Vibration				
	Pre-Vibration Z-axis Input Power	< 3.0 W	<u>2.6</u> W	SNP	1/15/03
	Pre-Vibration Z-axis RF Power	7.0 ± 0.5 dBm	<u>7.2</u> dBm		
	Pre-Vibration Z-axis Frequency	5.000 000 MHz ±1 x 10 <sup>-7</sup>	<u>0.2</u> x 10 <sup>-8</sup>		
	Z-axis Sine survey	Change in response Yes=fail, No=pass	<u>NO</u>		
	Z-axis Sine Vibration	Note any anomalies( P/F)	<u>PASS</u>		
	Z-axis Random vibration test	Note any anomalies( P/F)	<u>PASS</u>		
	Z-axis Sine survey	Change in response Yes=fail, No=pass	<u>NO</u>		
	Post-Vibration Z-axis Input Power	< 3.0 W	<u>2.6</u> W		
	Post-Vibration Z-axis RF Power	7.0 ± 0.5 dBm	<u>7.2</u> dBm		
	Post-Vibration Z-axis Frequency	5.000 000 MHz ±1 x 10 <sup>-7</sup>	<u>0.2</u> x 10 <sup>-8</sup>	↓	↓
8.2	Thermal Cycling/ Thermal Shock	10 cycles -55°C to 85°C, * 1 hour dwell times	<u>19</u> Cycles	SNP	1/17/03
	Post-Thermal Cycle Input Power	< 3.0 W	<u>2.2</u> W		
	Post-Thermal Cycle RF Power	7.0 ± 0.5 dBm	<u>7.1</u> dBm		
	Post-Thermal Cycle Frequency	5.000000 MHz ±1 x 10 <sup>-7</sup>	<u>0.6</u> x 10 <sup>-8</sup>	↓	↓

\* See Incident Report: 9628 -001

Test Verification  
  
Project Engineer

2/4/03  
Date


  
Product Assurance

2/11/03  
Date



### FIGURE 3 INCIDENT REPORT

PROGRAM: 9628B	DATE: 1/17/03	IR No. 9628-001
Item Description: APL	Part No. 14753 101	Serial No. 1002, 1004
Unit Type: <input type="checkbox"/> Eng. Model <input type="checkbox"/> Protoflight <input checked="" type="checkbox"/> Flight Model <input type="checkbox"/> Pre-Production <input type="checkbox"/> Qualification Model		
Incident Occurred During: <input type="checkbox"/> Burn-In Test <input type="checkbox"/> Final System Test <input checked="" type="checkbox"/> AIP <input type="checkbox"/> QTP <input type="checkbox"/> Other		
Incident Environment: <input type="checkbox"/> Vibration <input type="checkbox"/> Thermal Vacuum <input type="checkbox"/> Room Ambient Thermal <input checked="" type="checkbox"/> Shock <input type="checkbox"/> Temperature °C <input type="checkbox"/> Other		
Description of Incident: Test Procedure: 14753-501 Paragraph No. 8.2		
The units were cycled 19 times instead of 10. The temperature units were -85°C to -55°C with 1 hour dwells.		
Test Engineer:	Date: 1/17/03	
Engineering Statement: No overstress occurred due to the additional thermal cycles. Technology has demonstrated reliable operation for > 5000 cycles from 25°C → 85°C during ongoing testing.		
Engineer:	Date: 1/17/03	
Retest Instructions (if applicable): None		

 <b>datum inc</b> FAILURE REPORT	DATE 1/15/03	PROGRAM 9628B	FAILURE REPORT # 1815T
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<b>UNIT AFFECTED</b> <input type="checkbox"/> ENG MODEL <input checked="" type="checkbox"/> FLIGHT/PRODUCTION  <input type="checkbox"/> QUAL <input type="checkbox"/> PROTOTYPE <input type="checkbox"/> OTHER
---

IDENTIFICATION OF HARDWARE	CUSTOMER P/N: 7384-9049
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	NAME/MODEL#	DRAWING NO.	REV.	SERIAL NO.
SYSTEM	5 MHz OCXO / 9628	14751-101	A	1002 & 1004 (Flight Model)
ASSEMBLY				
SUB-ASSEMBLY				

NAME OF PART	PART NO.	LOT NO.	SER. NO.	REF. DES.	MANUFACTURER

**FAILURE OCCURRED DURING:**  
 ACCEPTANCE TEST    QUALIFICATION TEST    INTEGRATION TEST    OTHER  
 OPERATING TIME AT FAILURE:   FAILED T   T PROCEDURE: ATP 14753-301, Paragraph 8.1.1.1, X Axis Sine Survey

**FAILURE ENVIRONMENT:**  
 VIBRATION    THERMAL VACUUM    EMI    LAB AMBIENT    SHOCK  
 X-AXIS   
 Y-AXIS     TEMPERATURE:    OTHER  
 Z-AXIS

**DESCRIPTION OF FAILURE:**  
 During the X Axis Sine survey vibration test, the vibration profile was below the allowable -2 dB tolerance for the 0.1G Sine vibration level. The shaker controller could not compensate for a resonance in the 1820-1890 Hz region with the 4 Octaves/min sweep rate utilized.

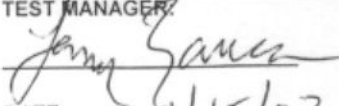
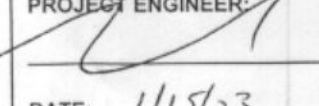
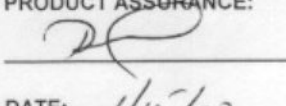
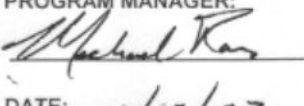
**CAUSE OF FAILURE:**  
 Due to the very low level vibration profile required during the sine sweep testing (0.1G from 10 to 2000 Hz), the electrodynamic shaker was unable to be controlled by the Dactron controller due to the very low signal levels, and the speed of the sweep. By reducing the sweep rate to 1.25 Octaves/min, the Dactron controller can control the shaker to keep the vibration level within the ± 2 dB tolerance zone required by the ATP.

**REWORK/RETEST INSTRUCTIONS:**  
 Use as is and continue with ATP. Set the low-level sine vibration sweep at a 1.25 Octave/min sweep rate in the Dactron project file for this ATP paragraph.

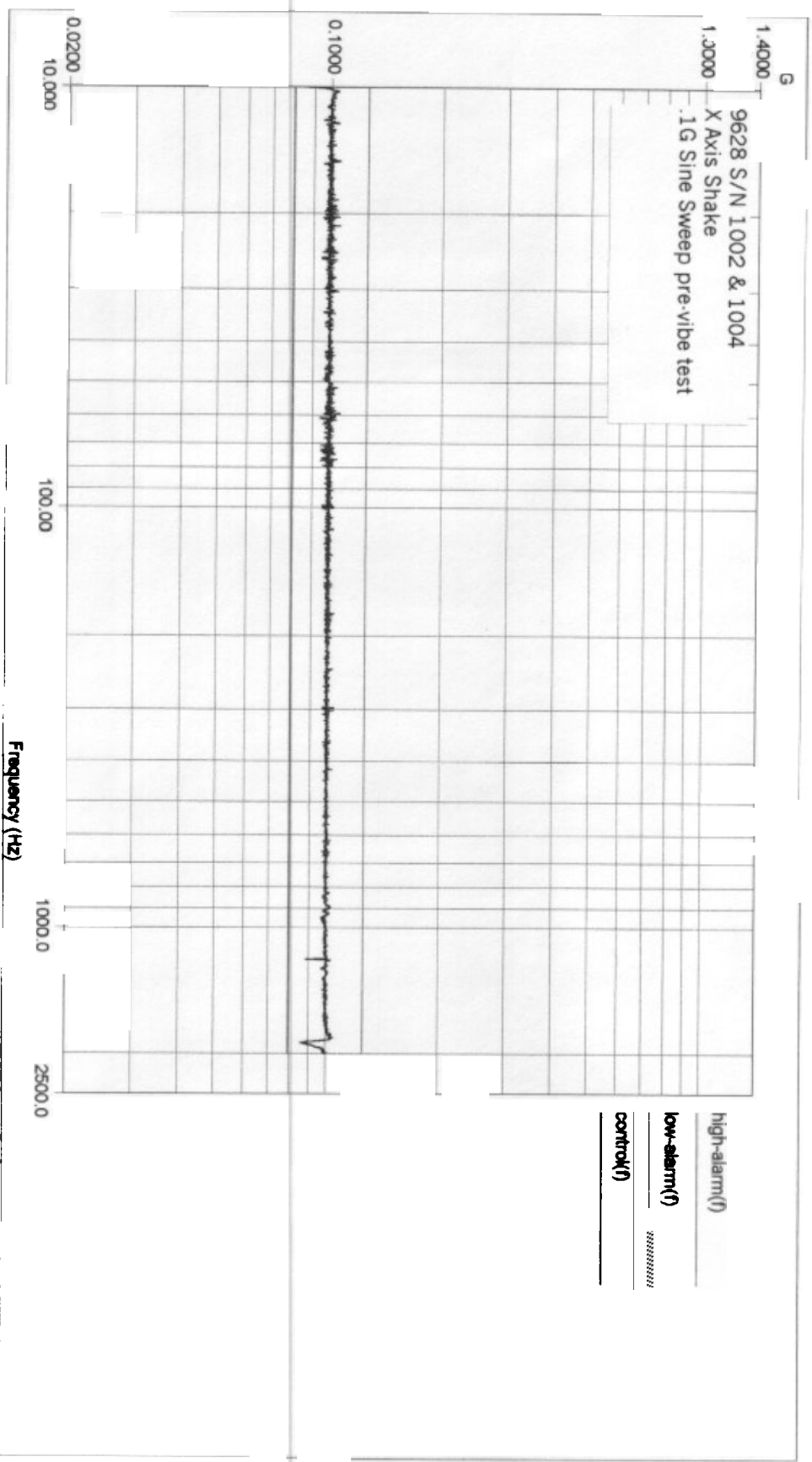
**DISPOSITION OF FAILED PART:**  RELIABILITY ENG    SCRAP    QA RETENTION  
 HIGH-REL MANUFACTURING   NA

<b>OVERSTRESS ANALYSIS</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO  <b>FAILURE ANALYSIS</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<b>ORGANIZATION RESPONSIBLE FOR ANALYSIS:</b> Engineering No overstress occurred on UUT during test, since vibration energy into the unit was below the tolerance level.
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**CORRECTIVE ACTION:**  
 Run the low level sine vibration sweep at a 1.25 Octave/min sweep rate. Discuss with the customer (APL), the possibility of changing the ATP (14753-301) to allow the vibration level to increase to .5 G to allow for the low level sine sweep survey to be conducted

<b>TEST MANAGER:</b>  DATE: 1/15/03	<b>PROJECT ENGINEER:</b>  DATE: 1/15/03	<b>PRODUCT ASSURANCE:</b>  DATE: 1/15/03	<b>PROGRAM MANAGER:</b>  DATE: 1/15/03
---	--	--	---

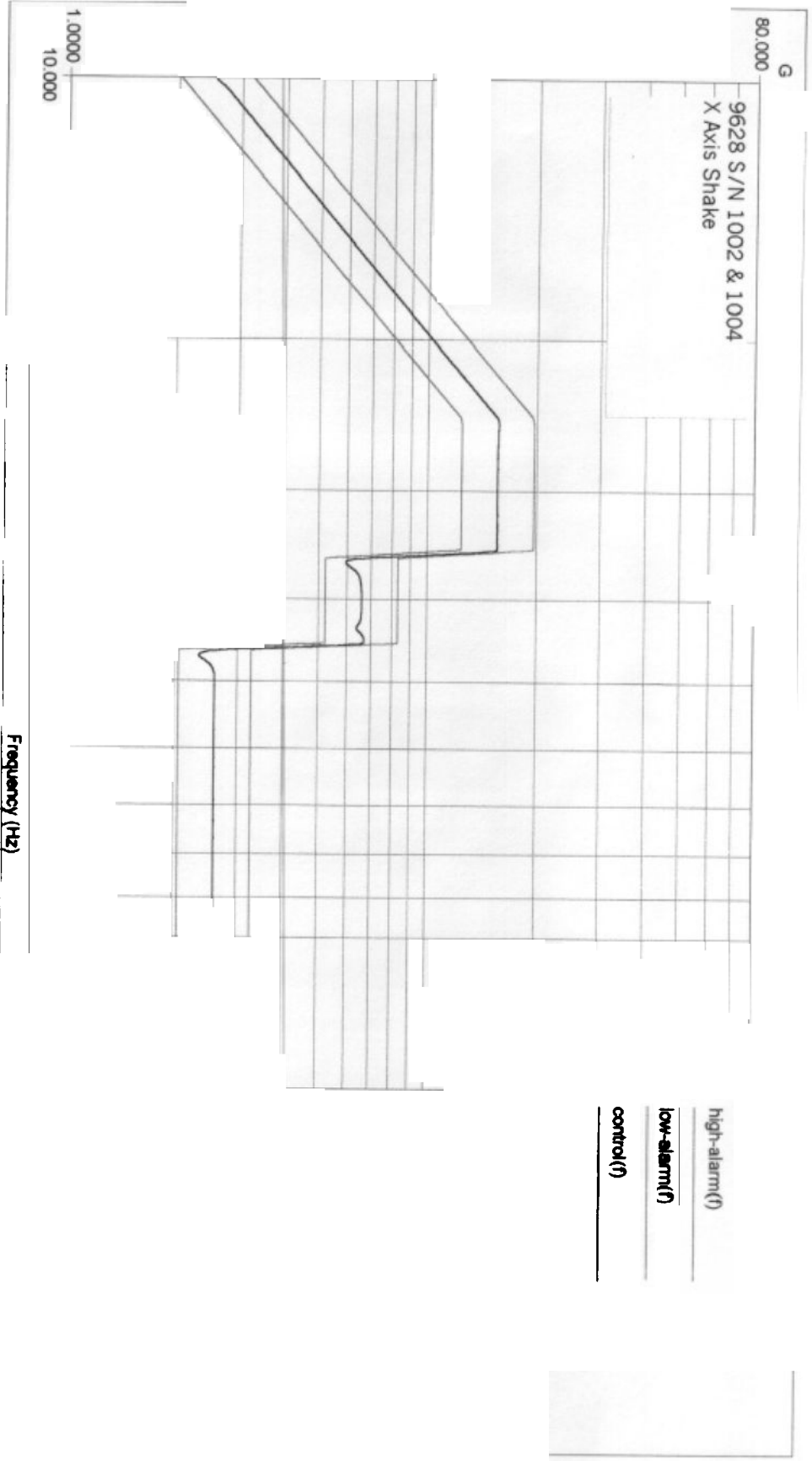
**Plot Header 1:** 9628 Swept Sine Survey  
**Plot Header 2:** Test Technician Initials:SNP  
**Project File Name:** 14753\_1G Sine Survey.prj  
**Profile Name:** 9628\_1G Swept Sine Vibration  
**Test Type:** Swept Sine  
**Run Folder:** .\Run Jan 15,2003 12-03-49



**Level:** 100 %      **Control Peak:** 0.100134 G      **Full Level Time:** 00:06:06      **Sweep Type:** Logarithmic  
**Frequency:** 1997.014160 Hz      **Demand Peak:** 0.100000 G      **Time Remaining:** 00:00:00      **Sweep Rate:** 1.25 Oct/Min

Data saved at 12:10:15 PM, Wednesday, January 15, 2003      Report created at 12:10:24 PM, Wednesday, January 15, 2003

Plot Header 1: 9628 Swept Sine Vibration Test  
 Plot Header 2: Test Technician Initials:SNP  
 Project File Name: 14753 ATP.prj  
 Profile Name: 9628 Swept Sine Vibration  
 Test Type: Swept Sine  
 Run Folder: \Run Jan 15,2003 12-22-02



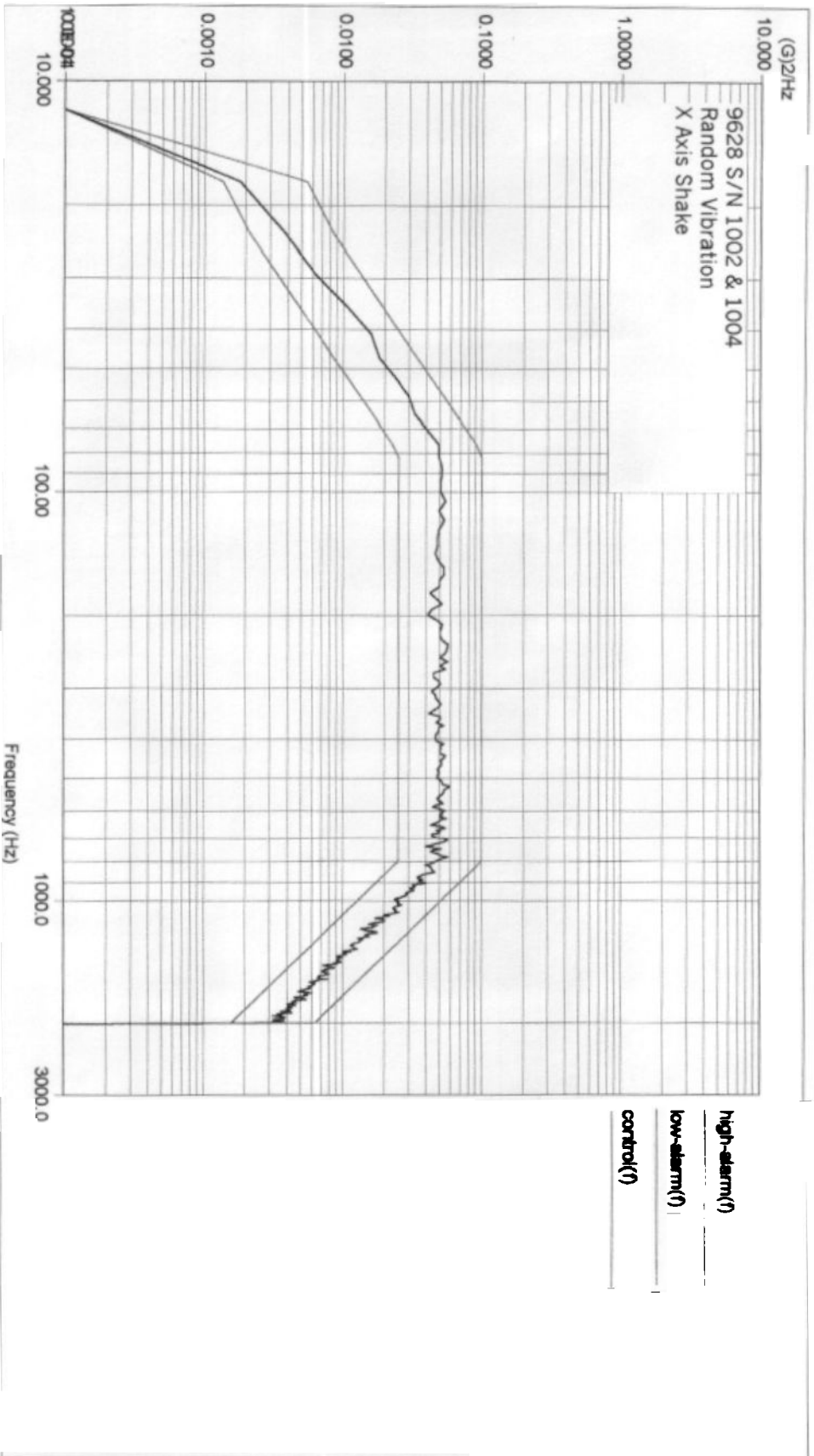
Level: 100 %  
 Control Peak: 2.602662 G  
 Full Level Time: 00:00:49  
 Sweep Type: Logarithmic  
 Frequency: 99.715729 Hz  
 Demand Peak: 2.600000 G  
 Time Remaining: 00:00:00  
 Sweep Rate: 4 Oct/Min

Data saved at 12:23:05 PM, Wednesday, January 15, 2003  
 Report created at 12:23:07 PM, Wednesday, January 15, 2003

Plot Header 1: 9628 Random Vibration Test In Plane  
 Plot Header 2: Test Technician Initials:SNP  
 Project File Name: 14753 ATP X&Y Axes.prf  
 Profile Name: Acceptance Level Random Vibration X & Y Axes  
 02

Test Type: Random

Run Folder: .Run Jan 15,2003 12-25-



Level: 100 %  
 Control RMS: 7.365346 G  
 Demand RMS: 7.356525 G

Full Level Elapsed Time: 00:01:00  
 Remaining Time: 00:00:00

Lines: 450  
 DOF: 154  
 Frame Time: 0.170667 Seconds  
 dF: 5.859375 Hz

Data saved at 12:27:12 PM, Wednesday, January 15, 2003 Report created at 12:27:14 PM, Wednesday, January 15, 2003

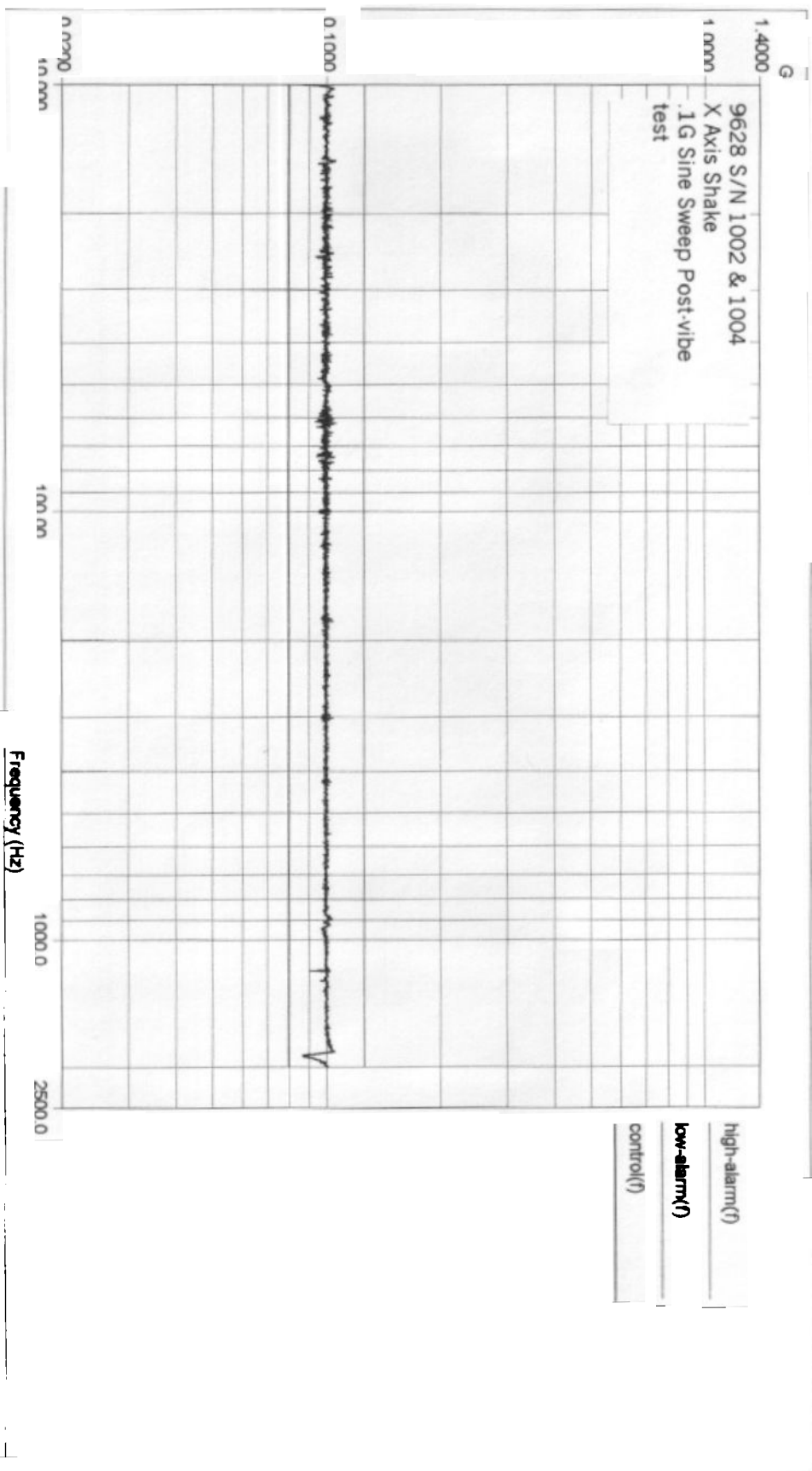
Pilot Header 1: 9628 Swept Sine Survey  
Pilot Header 2: Test Technician Initials:snp  
Project File Name: 14753 .1G Sine Survey.prj  
Profile Name: 9628 .1G Swept Sine Vibration

Test Type:

Swept Sine

Run Folder:

.Run Jan 15,2003 12-30-32



Level: 100 % Control Peak: 0.100891 G Full Level Time: 00:06:07 Sweep Type: Logarithmic  
Frequency: 1998.552246 Hz Demand Peak: 0.100000 G Time Remaining: 00:00:00 Sweep Rate: 1.25 Oct/Min

Data saved at 12:37:00 PM, Wednesday, January 15, 2003 Report created at 12:37:01 PM, Wednesday, January 15, 2003

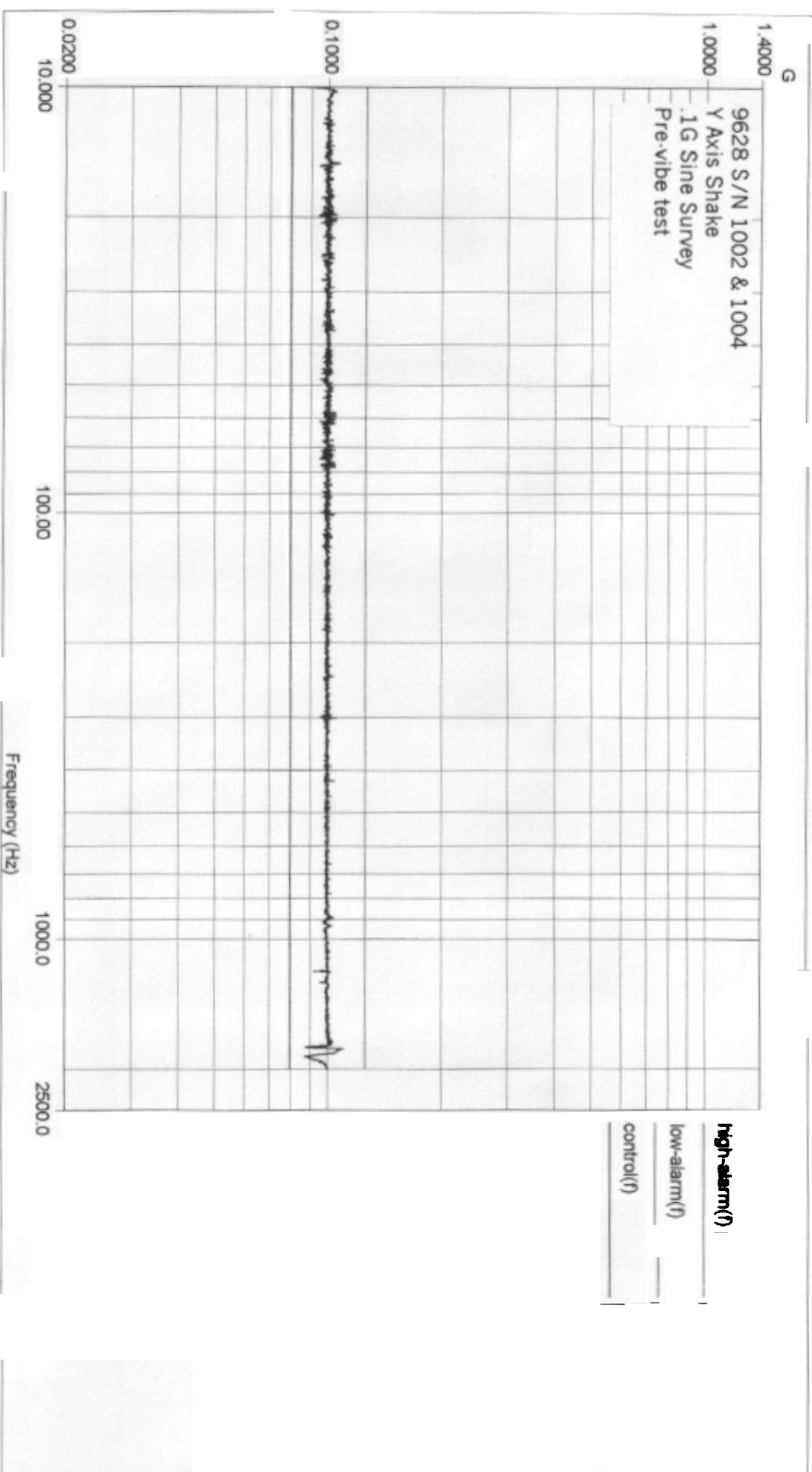
Plot Header 1: 9628 Swept Sine Survey  
Plot Header 2: Test Technician Initials:snp  
Project File Name: 14753 -1G Sine Survey.prj  
Profile Name: 9628 -1G Swept Sine Vibration

Test Type:

Swept Sine

Run Folder:

.Run Jan 15,2003 13-39-29



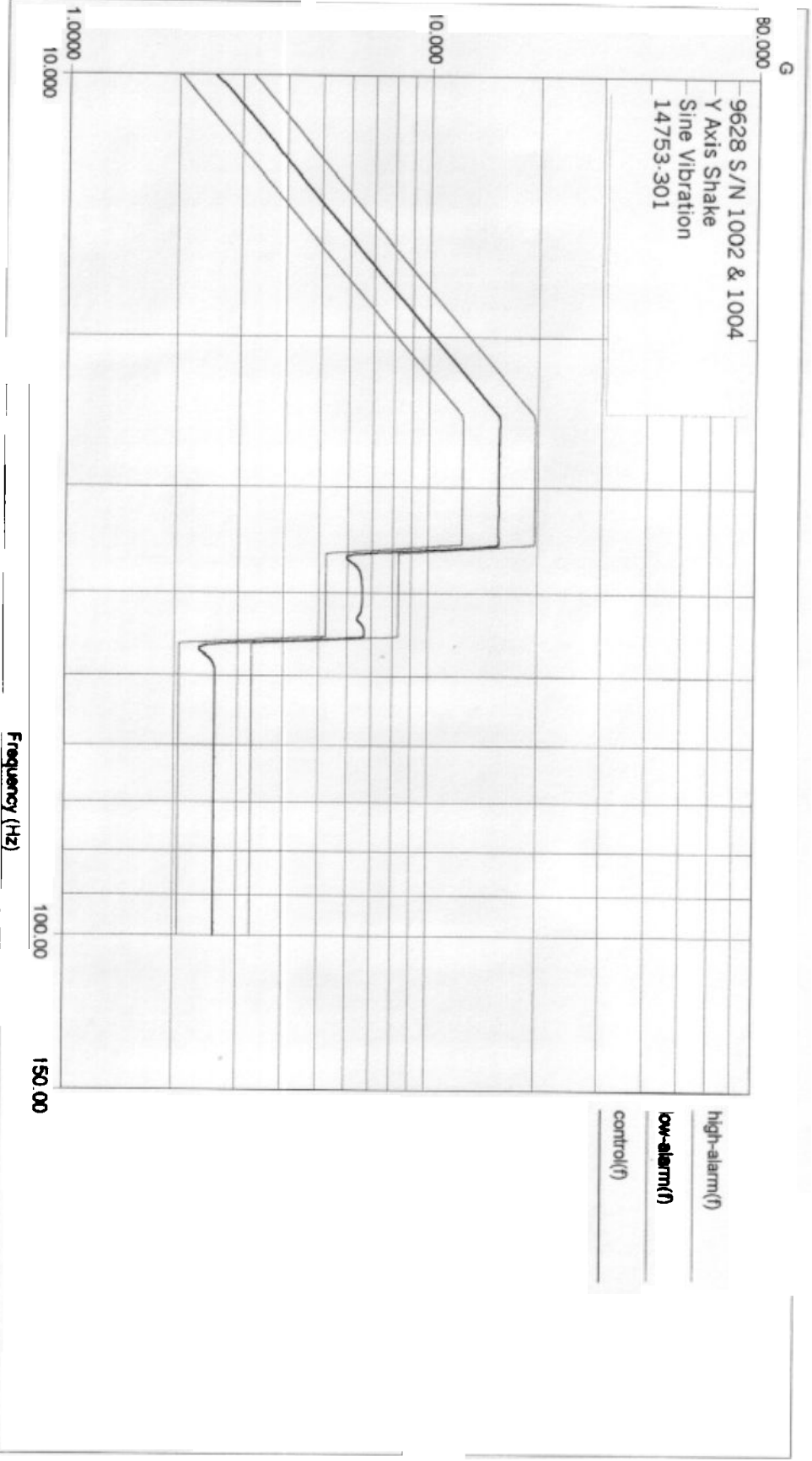
Level: 100 % Control Peak: 0.099775 G Full Level Time: 00:06:07 Sweep Type: Logarithmic  
Frequency: 1997.936890 Hz Demand Peak: 0.100000 G Time Remaining: 00:00:00 Sweep Rate: 1.25 Oct/Min

Data saved at 01:46:08 PM, Wednesday, January 15, 2003 Report created at 01:46:23 PM, Wednesday, January 15, 2003

Plot Header1: 9628 Swept Sine Vibration Test  
Plot Header2: Test Technician Initials:snp  
Project File Name: 14753 ATP.prj  
Profile Name: 9628 Swept Sine Vibration

Test Type: Swept Sine

Run Folder: .\Run Jan 15,2003 13-54-25



Level: 100 % Control Peak: 2.598371 G Full Level Time: 00:00:49 Sweep Type: Logarithmic  
Frequency: 99.863243 Hz Demand Peak: 2.600000 G Time Remaining: 00:00:00 Sweep Rate: 4 Oct/Min

Data saved at 01:55:29 PM, Wednesday, January 15, 2003 Report created at 01:55:31 PM, Wednesday, January 15, 2003

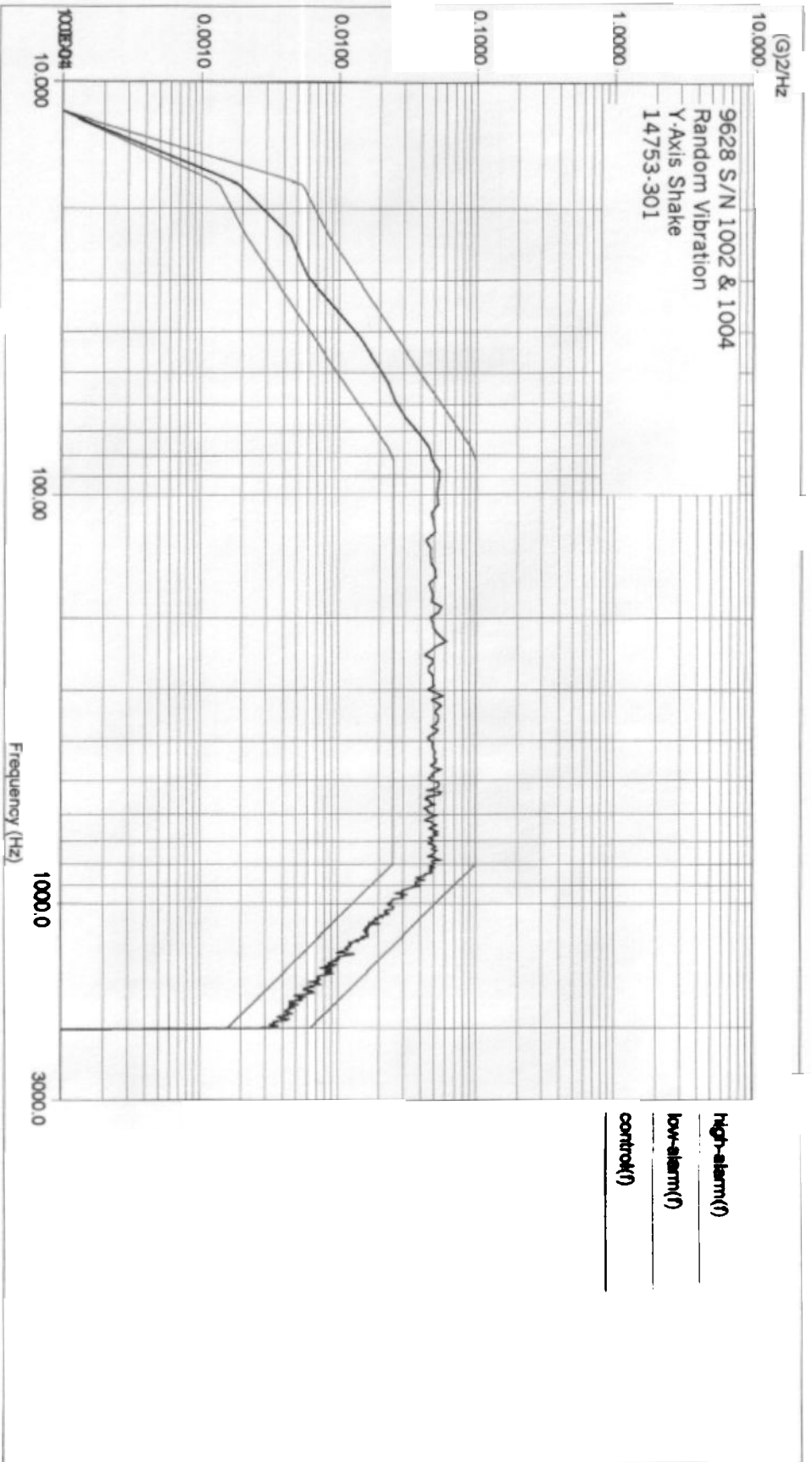
Plot Header 1: 9628 Random Vibration Test In Plane  
 Plot Header 2: Test Technician Initials:snp  
 Project File Name: 14753 X&Y Axes random vibration.pri  
 Profile Name: Acceptance Level Random Vibration X & Y Axes  
 42

Test Type:

Random

Run Folder:

.Run Jan 15,2003 14-00-



Level: 100 %  
 Control RMS: 7.344132 G  
 Demand RMS: 7.356525 G

Full Level Elapsed Time: 00:01:00  
 Remaining Time: 00:00:00

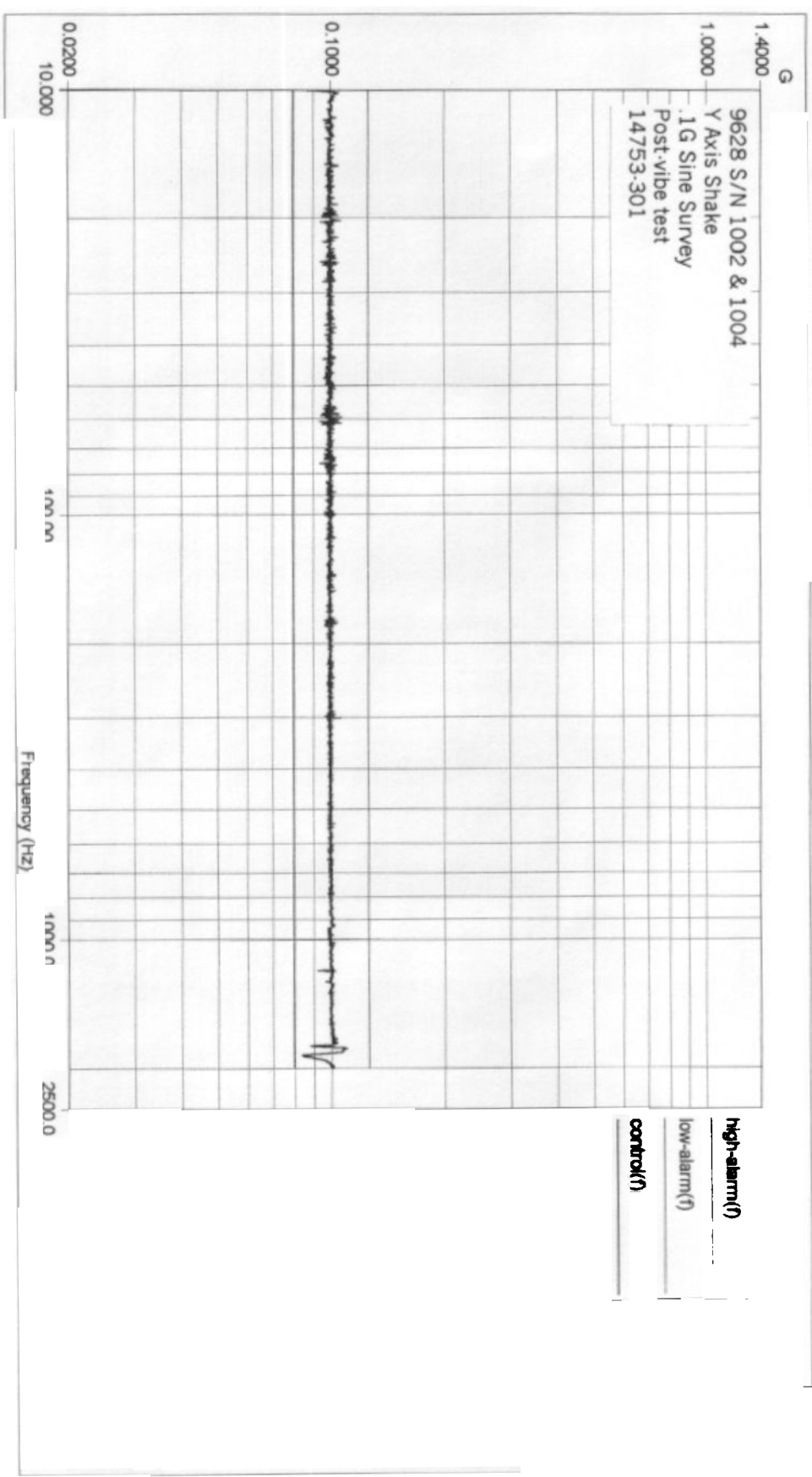
Lines: 450  
 Frame Time: 0.170667 Seconds  
 DOF: 154  
 df: 5.859375 Hz

Data saved at 02:02:17 PM, Wednesday, January 15, 2003  
 Report created at 02:02:19 PM, Wednesday, January 15, 2003

Pilot Header 1: 9628 Swept Sine Survey  
Pilot Header 2: Test Technician Initials:smj  
Project File Name: 14753 .1G Sine Survey.prj  
Profile Name: 9628 .1G Swept Sine Vibration

Test Type: Swept Sine

Run Folder: .\Run Jan 15,2003 14-04-43



Level: 100 % Control Peak: 0.100992 G Full Level Time: 00:06:07 Sweep Type: Logarithmic  
Frequency: 1998.859985 Hz Demand Peak: 0.100000 G Time Remaining: 00:00:00 Sweep Rate: 1.25 Oct/Min

Data saved at 02:16:08 PM, Wednesday, January 15, 2003 Report created at 02:16:10 PM, Wednesday, January 15, 2003

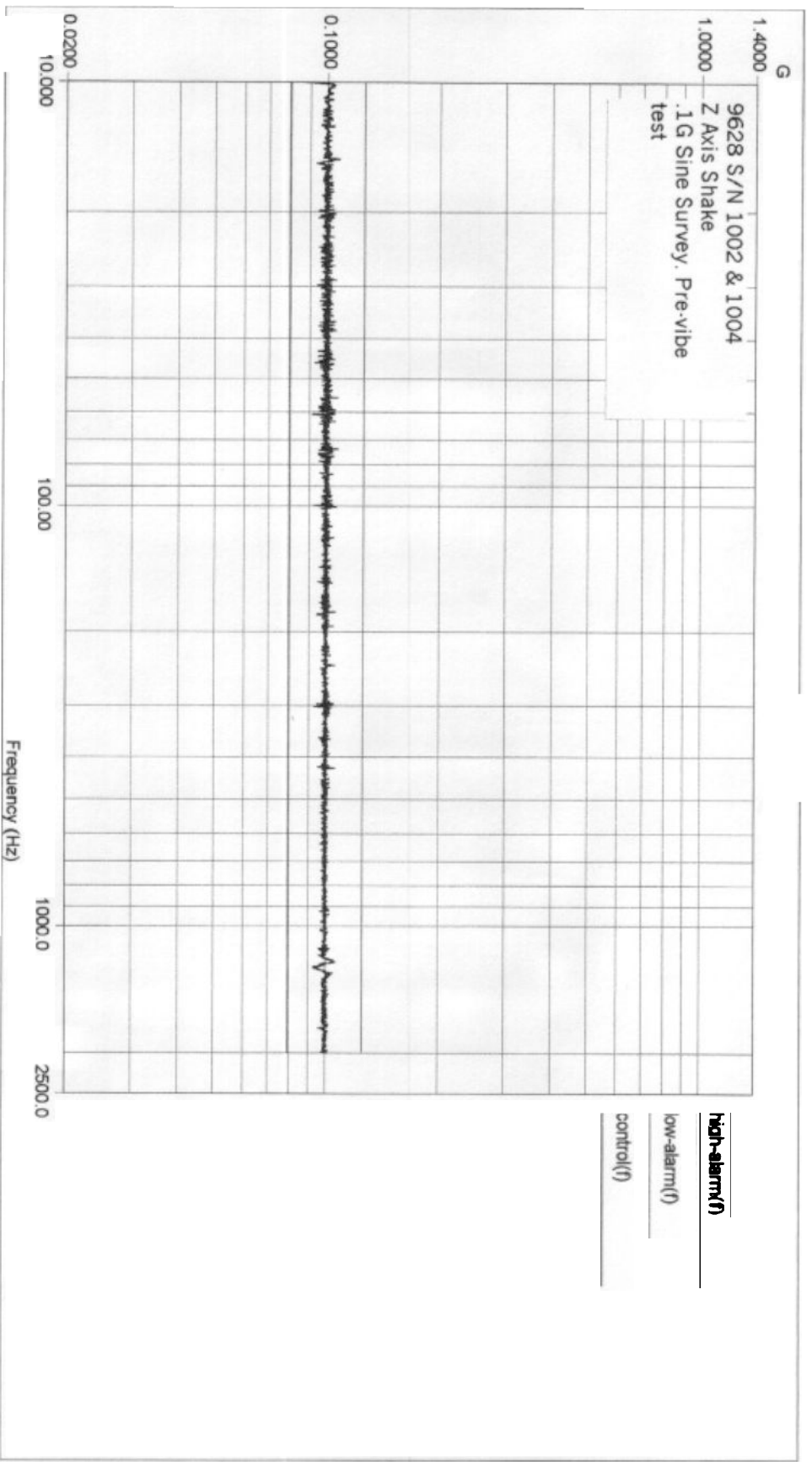
Plot Header 1: 9628 Swept Sine Survey  
Plot Header 2: Test Technician Initials: snp  
Project File Name: 14753 .1G Sine Survey.pri  
Profile Name: 9628 .1G Swept Sine Vibration

Test Type:

Swept Sine

Run Folder:

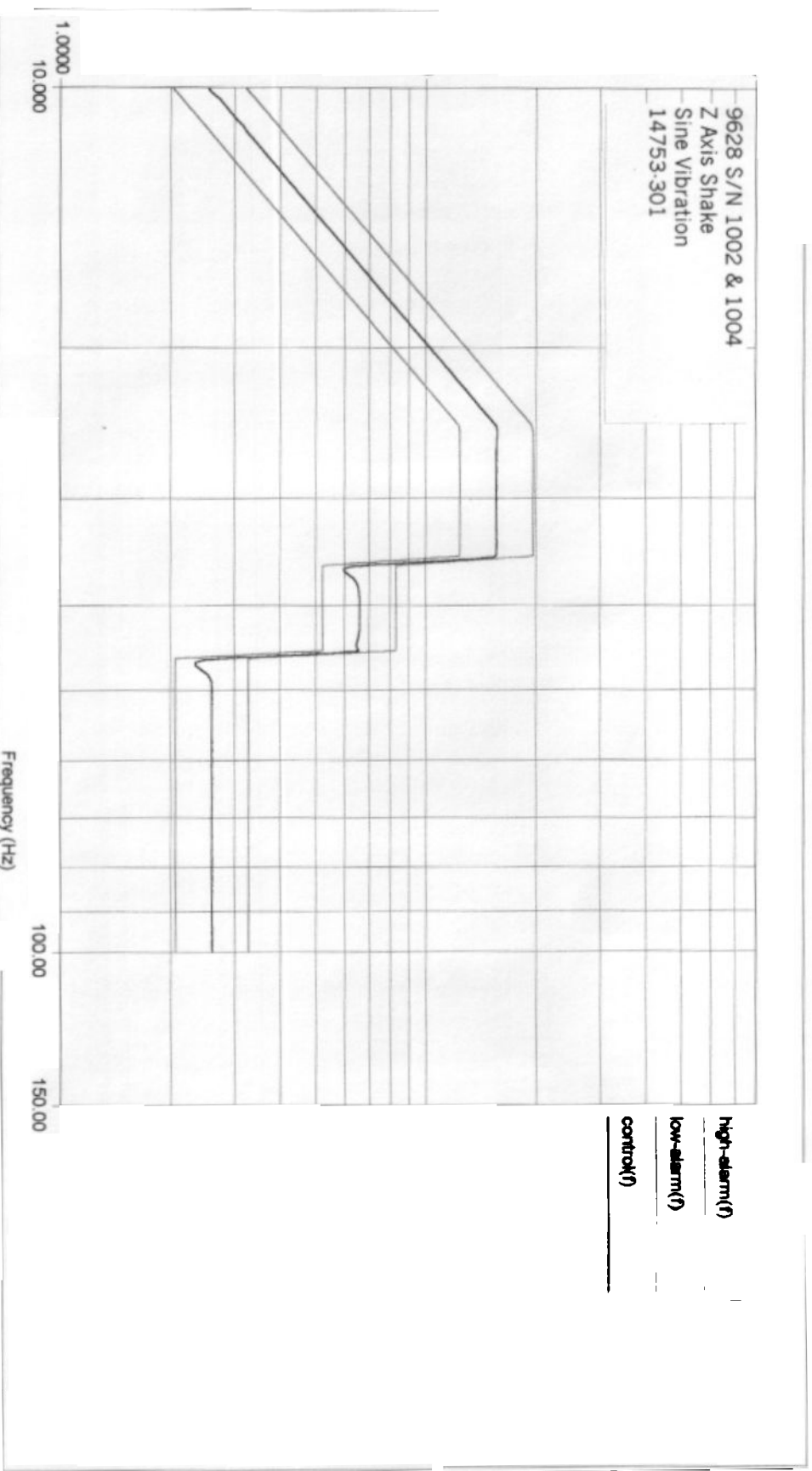
.Run Jan 15, 2003 14-55-07



Level: 100 % Control Peak: 0.101563 G Full Level Time: 00:06:07 Sweep Type: Logarithmic  
Frequency: 1997.936890 Hz Demand Peak: 0.100000 G Time Remaining: 00:00:00 Sweep Rate: 1.25 Oct/Min

Data saved at 03:03:16 PM, Wednesday, January 15, 2003 Report created at 03:03:21 PM, Wednesday, January 15, 2003

Plot Header1: 9628 Swept Sine Vibration Test  
 Plot Header2: Test Technician Initials:smp  
 Project File Name: 14753 ATP.prj  
 Profile Name: 9628 Swept Sine Vibration | Test Type: Swept Sine | Run Folder: Run Jan 15, 2003 15-22-49



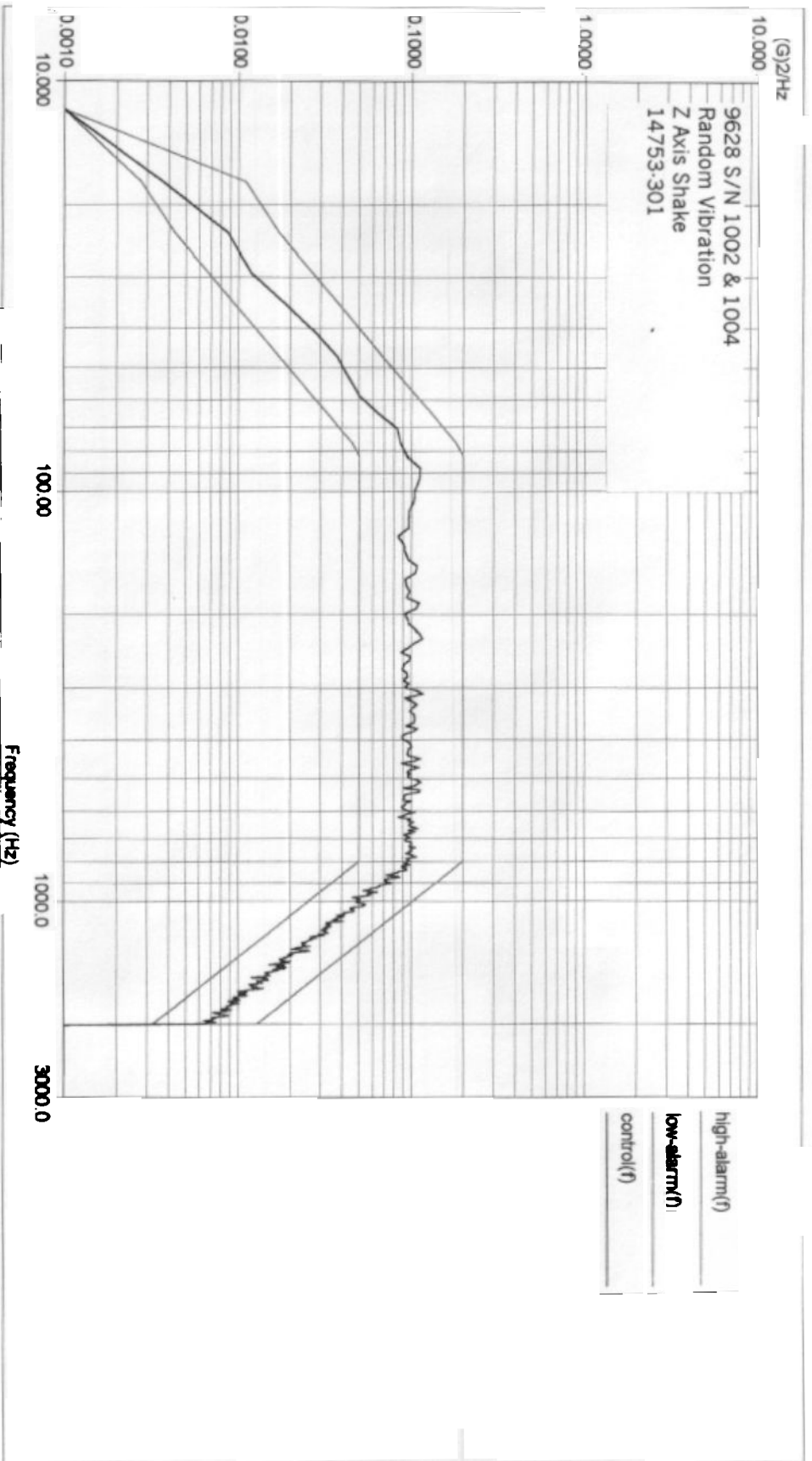
Level: 100 %  
 Frequency: 99.814049 Hz  
 Control Peak: 2.603353 G  
 Demand Peak: 2.600000 G  
 Full Level Time: 00:00:49  
 Time Remaining: 00:00:00  
 Sweep Type: Logarithmic  
 Sweep Rate: 4 Oct/Min  
 Data saved at 03:23:55 PM, Wednesday, January 15, 2003 | Report created at 03:24:01 PM, Wednesday, January 15, 2003

Plot Header1: 9628 Random Vibration Test Normal  
 Plot Header2: Test Technician Initials:snp  
 Project File Name: 14753 ATP Z Axis.pfj  
 Profile Name: Acceptance Level Random Vibration Z Axis

Test Type: Random

Run Folder:

.Run Jan 15,2003 15-26-39



Level: 100 %  
 Control RMS: 10.397657 G Full Level Elapsed Time: 00:01:00 Lines: 450 Frame Time: 0.170667 Seconds  
 Demand RMS: 10.413095 G Remaining Time: 00:00:00 DOF: 154 df: 5.859375 Hz

Data saved at 03:28:12 PM, Wednesday, January 15, 2003 Report created at 03:28:14 PM, Wednesday, January 15, 2003

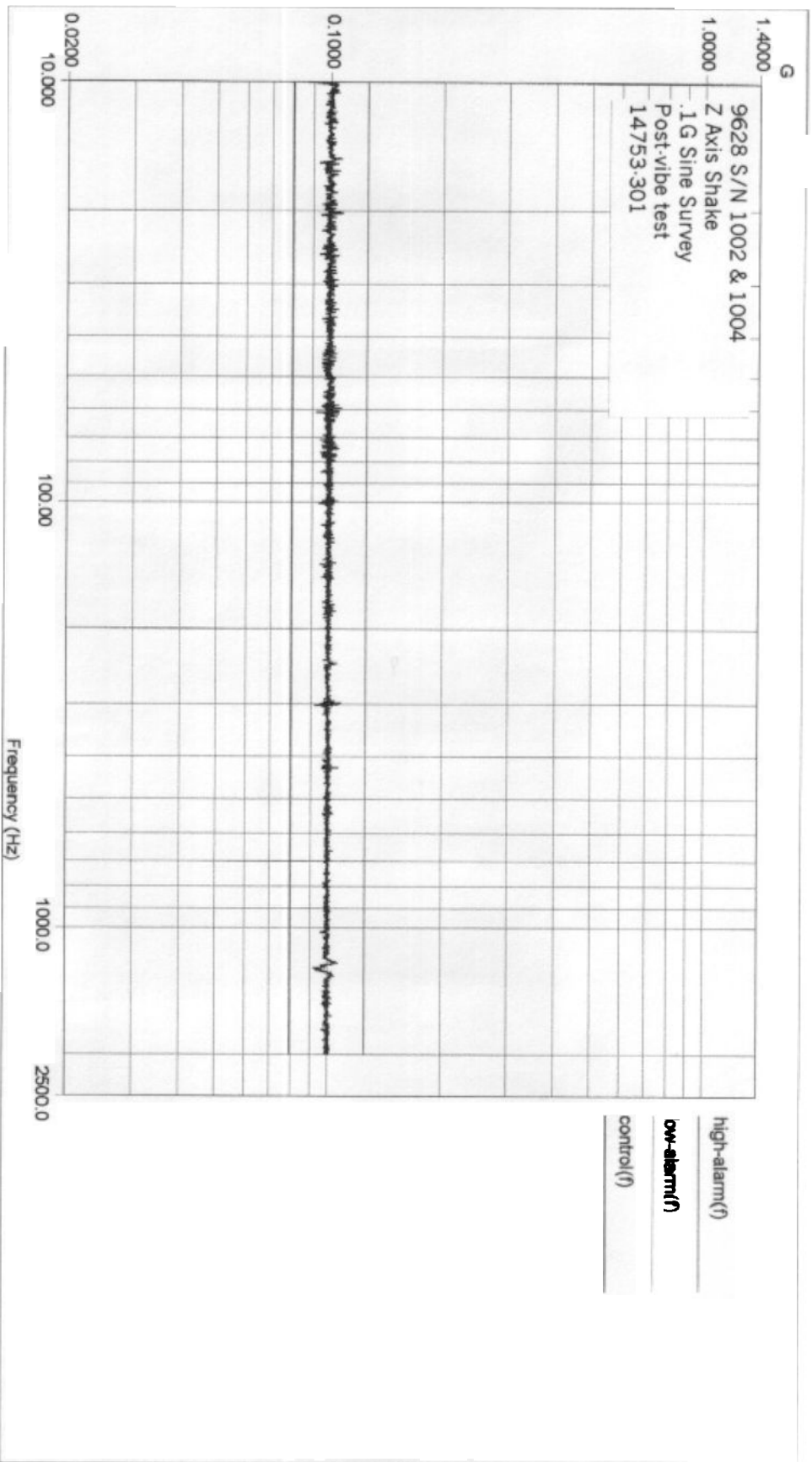
Plot Header 1: 9628 Swept Sine Survey  
Plot Header 2: Test Technician Initials: snp  
Project File Name: 14753.1G Sine Survey.prj  
Profile Name: 9628.1G Swept Sine Vibration

Test Type:

Swept Sine

Run Folder:

.Run Jan 15,2003 15-32-06



Level: 100 % Control Peak: 0.099879 G Full Level Time: 00:06:06 Sweep Type: Logarithmic  
Frequency: 1997.014160 Hz Demand Peak: 0.100000 G Time Remaining: 00:00:00 Sweep Rate: 1.25 Oct/Min

Data saved at 03:39:09 PM, Wednesday, January 15, 2003 Report created at 03:39:10 PM, Wednesday, January 15, 2003

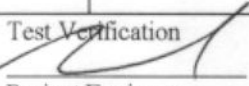
Test Data Sheet 4A  
Paragraph 9.0 Thermal Vacuum Test

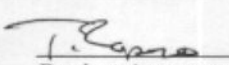
SYMMETRICOM 9628 OCXO

Pressure: **Vacuum unless noted**  
Symmetricom Part Number: 14751-10 1

Serial Number: 1002

Test Para.	Test Description	Specification Limits	Temp	Recorded Measurement	Tested by	Pass/Fail	Date
9.0	Thermal Vacuum Test						
9.1	Warm-Up Power Steady State Power	< 4.5 W (Ambient Pressure) < 3 W(Ambient Pressure)	25°C	<u>4.2 W</u> <u>2.6 W</u>	SNP	PASS	1/20/03
9.1	Output Power( RF)	7.0 ± 0.5 dBm ( Ambient Pressure)	25°C	<u>7.2 dBm</u>	↓	↓	↓
9.1	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-7</sup> (Ambient Pressure)	25° C	<u>0.2 x 10<sup>-8</sup></u>	↓	↓	↓
	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-7</sup> (Vacuum Pressure)	25° C	<u>1.4 x 10<sup>-8</sup></u>	SNP	PASS	1/21/03
9.2	Vacuum Steady State Power	<1.5 W	25° C	<u>0.74 W</u>	BNP	PASS	1/21/03
9.2	Harmonic Distortion	<-25 dBc	25°C	<u>-29 dBc</u>	DWTH	PASS	1/21/03
9.2	Phase Noise	1 kHz offset <-51 dBc/Hz 10 kHz offset <-71 dBc/Hz 100 kHz offset <-91 dBc/Hz	25°C	<u>-160 dBc/Hz</u> <u>-162 dBc/Hz</u> <u>-164 dBc/Hz</u>	DWTH	PASS	1/21/03
9.2	Spurious Output	<-70 dBc, 1kHz to 100 kHz	25°C	<u>-112 dBc</u> <u>@ 2 KHz</u>	↓	↓	↓
	Power Supply Sensitivity	<±2 x 10 <sup>-10</sup>	25°C	<u>x 10<sup>-10</sup></u> <u>0.3</u>	↓	↓	↓
	Load Sensitivity	<±2 x 10 <sup>-9</sup>	25°C	<u>x 10<sup>-10</sup></u> <u>0.08</u>	↓	↓	↓
9.2	Allan Deviation	T=0.1 seconds, σ ≤ 1 x 10 <sup>-9</sup> T=1 seconds, σ ≤ 1 x 10 <sup>-10</sup>	25°C	<u>4.1 x 10<sup>-12</sup></u> <u>2.2 x 10<sup>-12</sup></u>	↓	↓	↓
9.3	Un-powered Survival Cycle	25° to 60°C, pass/fail		<u>PASS</u>	↓	↓	↓
	Steady State Power	< 1 W	60°C.	<u>0.33 W</u>	↓	↓	↓
	Output Power( RF)	7.0 ± 0.5 dBm	60°C.	<u>7.0 dBm</u>	↓	↓	↓
	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-6</sup>	60°C.	<u>1.8 x 10<sup>-8</sup></u>	↓	↓	↓
	Un-powered Survival Cycle	60°C to -25°C, pass/fail		<u>PASS</u>	DWTH	PASS	1/21/03
9.4	Warm-Up Power Steady State Power	< 4 .5W <2.5 W	-25°C	<u>4.4 W</u> <u>1.1 W</u>	DWTH	PASS	1/22/03
9.4	Output Power( RF)	7.0 ± 0.5 dBm	-25°C	<u>6.9 dBm</u>	↓	↓	↓
9.4	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-7</sup>	-25°C	<u>+1.4 x 10<sup>-8</sup></u>	↓	↓	↓
9.5	Steady State Power	< 2.5 W	5°C	<u>0.8 W</u>	DWTH	PASS	1/23/03
9.5	Harmonic Distortion	<-25 dBc	5°C	<u>-28 dBc</u>	DWTH	PASS	1/23/03
9.5	Phase Noise	1 kHz offset <-51 dBc/Hz 10 kHz offset <-71 dBc/Hz 100 kHz offset <-91 dBc/Hz	5°C	<u>-162 dBc/Hz</u> <u>-162 dBc/Hz</u> <u>-164 dBc/Hz</u>	↓	↓	↓
9.5	Spurious Output	<-70 dBc/Hz, 1kHz to 100 kHz	5°C	<u>-115 dBc/Hz</u> <u>@ 2 KHz</u>	↓	↓	↓
9.5	Allan Deviation	T=0.1 seconds, σ ≤ 1 x 10 <sup>-9</sup> T=1 seconds, σ ≤ 1 x 10 <sup>-10</sup>	5°C	<u>4.4 x 10<sup>-12</sup></u> <u>2.8 x 10<sup>-12</sup></u>	↓	↓	↓

Test Verification  
  
Project Engineer      2/6/03  
Date

  
Product Assurance      2/11/03  
Date

Test Data Sheet 4B  
Paragraph 9.0 Thermal Vacuum Test

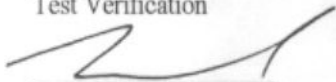
SYMMETRICOM 9628 OCXO

Symmetricom Part Number: 14751-10 1

Serial Number: 1002

Test Para.	Test Description	Specification Limits	Temp.	Recorded Measurement	Tested by	Pass/Fail	Date
9.6	Warm-Up Power Steady State Power	< 4.5 W < 1.0 W	45°C	4.4 W 0.5 W	DWH	PASS	1/23/03
9.6.3	Output Power( RF)	7.0 ± 0.5 dBm	45°C	6.9 dBm			
9.6.4	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-7</sup>	45°C	+1.7 x 10 <sup>-8</sup>			
9.6.5	Harmonic Distortion	<-25 dBc	45°C	-29 dBc			
9.6.6	Phase Noise	1 kHz offset <-51 dBc/Hz 10 kHz offset <-71 dBc/Hz 100 kHz offset <-91 dBc/Hz	45°C	-161 dBc/Hz -162 dBc/Hz -163 dBc/Hz			
9.6	Spurious Output	<-70 dBc/Hz, 1kHz to 100 kHz	45°C	-115 dBc/Hz @ 2 KHz			
9.6	Allan Deviation	T=0.1 seconds, σ ≤ 1 x 10 <sup>-9</sup> T=1 seconds, σ ≤ 1 x 10 <sup>-10</sup>	45°C	4.2 x 10 <sup>-12</sup> 2.9 x 10 <sup>-12</sup>			
9.7.1	Thermal Vacuum Cycling and Temperature Coefficient	4. cycles from 45°C to 5° with 4 hour dwells. < 4 x 10 <sup>-9</sup> . Turn Off Power for 4 hours		4 cycles 3.2 x 10 <sup>-9</sup>	DWH	1/25/03 PASS	1/25/03
9.7.2	High to Low Temperature Frequency Stability	Temperature profile per figure 3 < 1 x 10 <sup>-9</sup> per 10 °C. **		0.9 x 10 <sup>-9</sup>	DWH	PASS	1/27/03
	Frequency @ 45°C			1.70 x 10 <sup>-8</sup>			
	Frequency @ 40°C			1.65 x 10 <sup>-8</sup>			
	Frequency @ 35°C			1.61 x 10 <sup>-8</sup>			
	Frequency @ 30°C			1.57 x 10 <sup>-8</sup>			
	Frequency @ 25°C			1.52 x 10 <sup>-8</sup>			
	Frequency @ 20°C			1.50 x 10 <sup>-8</sup>			
	Frequency @ 15°C			1.45 x 10 <sup>-8</sup>			
	Frequency @ 10°C			1.42 x 10 <sup>-8</sup>			
	Frequency @ 5°C			1.38 x 10 <sup>-8</sup>			

Test Verification

  
Project Engineer

2/6/03  
Date

  
Product Assurance

2/11/03  
Date

\*\* -record power consumption using Intuilink

Test Data Sheet 4C  
Paragraph 9.0 Thermal Vacuum Test

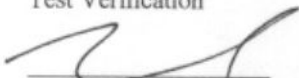
SYMMETRICOM 9628 OCXO

Symmetricom Part Number: 14751-10 1

Serial Number: 1002

Test Para.	Test Description	Specification Limits	Temp.	Recorded Measurement	Tested by	Pass/Fail	Date
9.7.3	Cold Temperature Turn on						
	Warm-Up Power	< 4.5 W	-25°C.	<u>4.4 W</u>	DWH	PASS	1/27/03
	Steady State Power	< 2 W		<u>1.0 W</u>			
	Output Power (RF)	7.0 ± 0.5 dBm	-25°C.	<u>7.0 DBm</u>	DWH	PASS	1/27/03
	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-7</sup>	-25°C.	<u>1.51 x 10<sup>-8</sup></u>	DWH	PASS	1/27/03
9.7.4	Low to High Temperature Frequency Stability	Temperature profile per figure 3 < 1 x 10 <sup>-9</sup> per 10°C. **		<u>0.5 x 10<sup>-9</sup></u>	DWH	PASS	1/28/03
	Frequency @ 5°C			<u>1.64 x 10<sup>-8</sup></u>			
	Frequency @ 10°C			<u>1.66 x 10<sup>-8</sup></u>			
	Frequency @ 15°C			<u>1.68 x 10<sup>-8</sup></u>			
	Frequency @ 20°C			<u>1.69 x 10<sup>-8</sup></u>			
	Frequency @ 25°C			<u>1.72 x 10<sup>-8</sup></u>			
	Frequency @ 30°C			<u>1.74 x 10<sup>-8</sup></u>			
	Frequency @ 35°C			<u>1.76 x 10<sup>-8</sup></u>			
	Frequency @ 40°C			<u>1.78 x 10<sup>-8</sup></u>			
	Frequency @ 45°C			<u>1.79 x 10<sup>-8</sup></u>			
9.8	Hot Temperature Turn-On						
	Warm-Up Power	< 4.5 W	60°C.	<u>4.4 W</u>	DWH	PASS	1/29/03
	Steady State Power	< 1 W		<u>0.33 W</u>			
	Output Power (RF)	7.0 ± 0.5 dBm	60°C.	<u>6.8 dBm</u>			
	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-6</sup>	60°C.	<u>2.0 x 10<sup>-8</sup></u>			

Test Verification

  
Project Engineer

2/4/03  
Date

  
Product Assurance

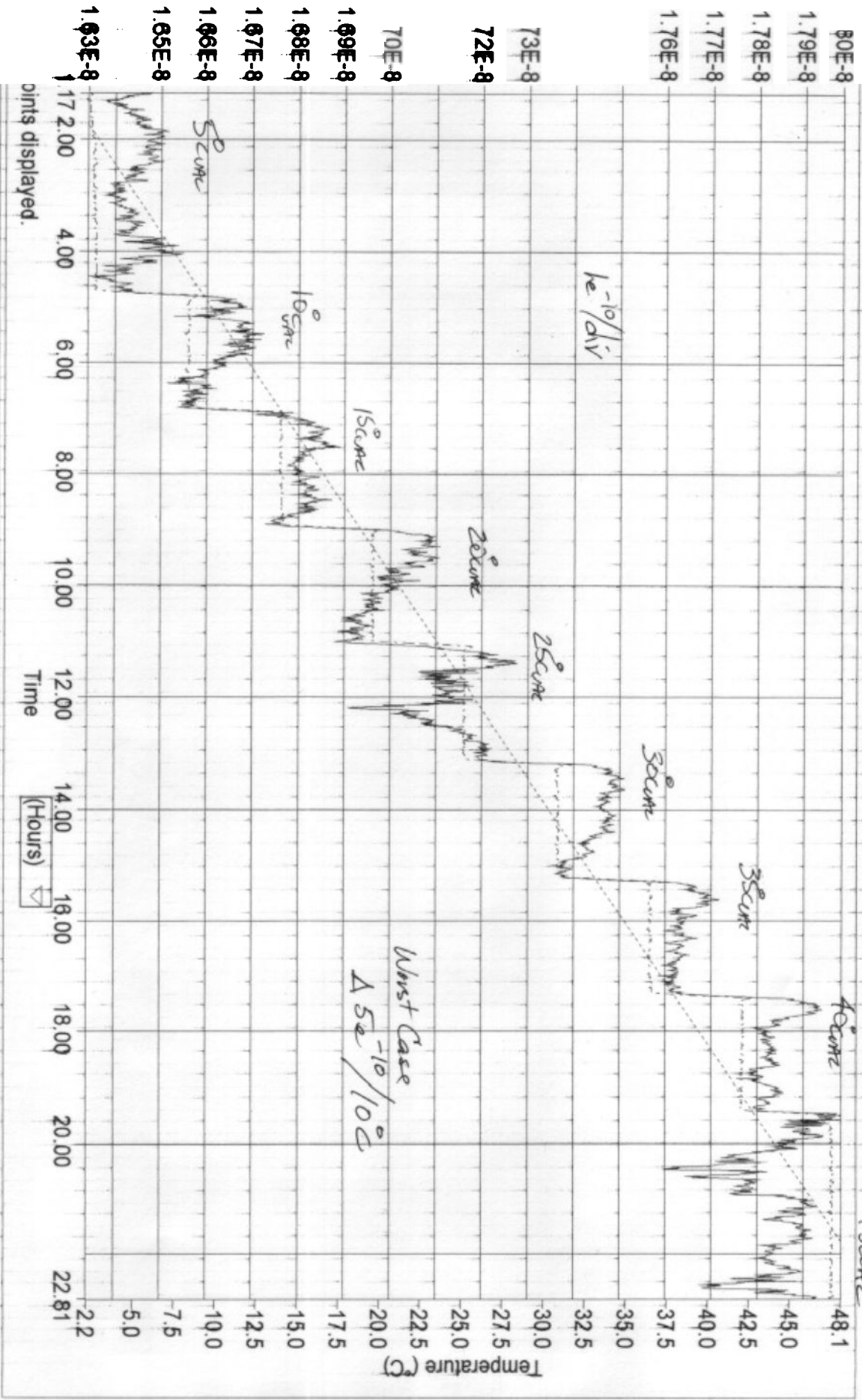
2/11/03  
Date

\*\* -record power consumption using Intuilink

Print  
1/28/03

9628B APL 1002  
Low to High Temp

Frequency & Time Systems of Datum, Inc. - Model# 9628B, Serial# 0123031002, Data starts at 01/27/2003 20:29:36



Raw aging per hour

Standard deviation filter coefficient

Filtered aging per hour

Number of outliers

Nominal frequency (Hz)

Time between gates (secs)

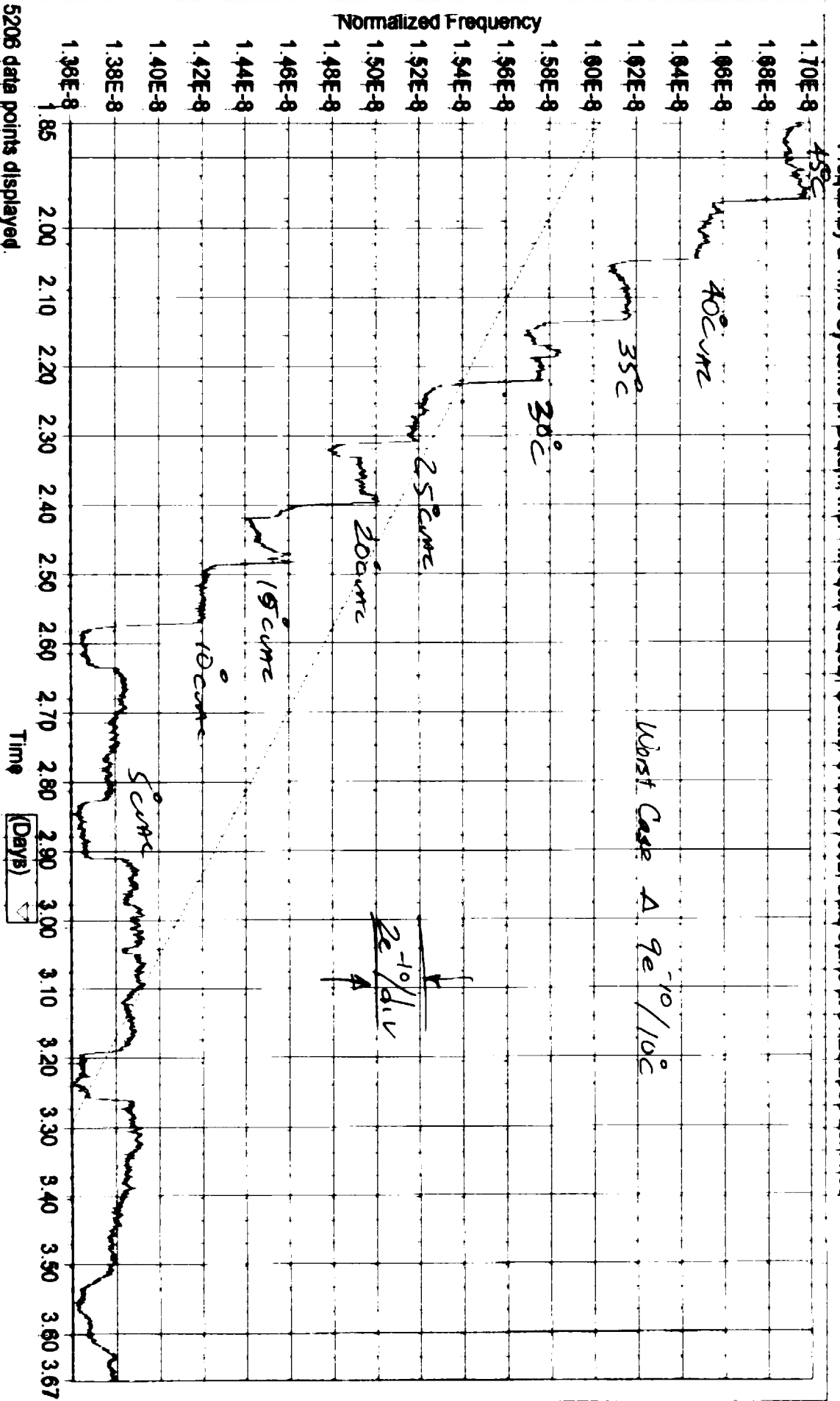
Gate time (secs)

Amount of gaps in data

APL 1002  
High to Low Temp Stability

DWH  
1/27/03

Frequency & Time Systems of Datum, Inc. - Model# 9628B, Serial# 0123031002. Data starts at 01/23/2008 20:44:35



5206 data points displayed.

Raw aging per day

Standard deviation filter coefficient

Filtered aging per day

Number of outliers

Nominal frequency (Hz)

Time between gates (secs)

Gate time (secs)

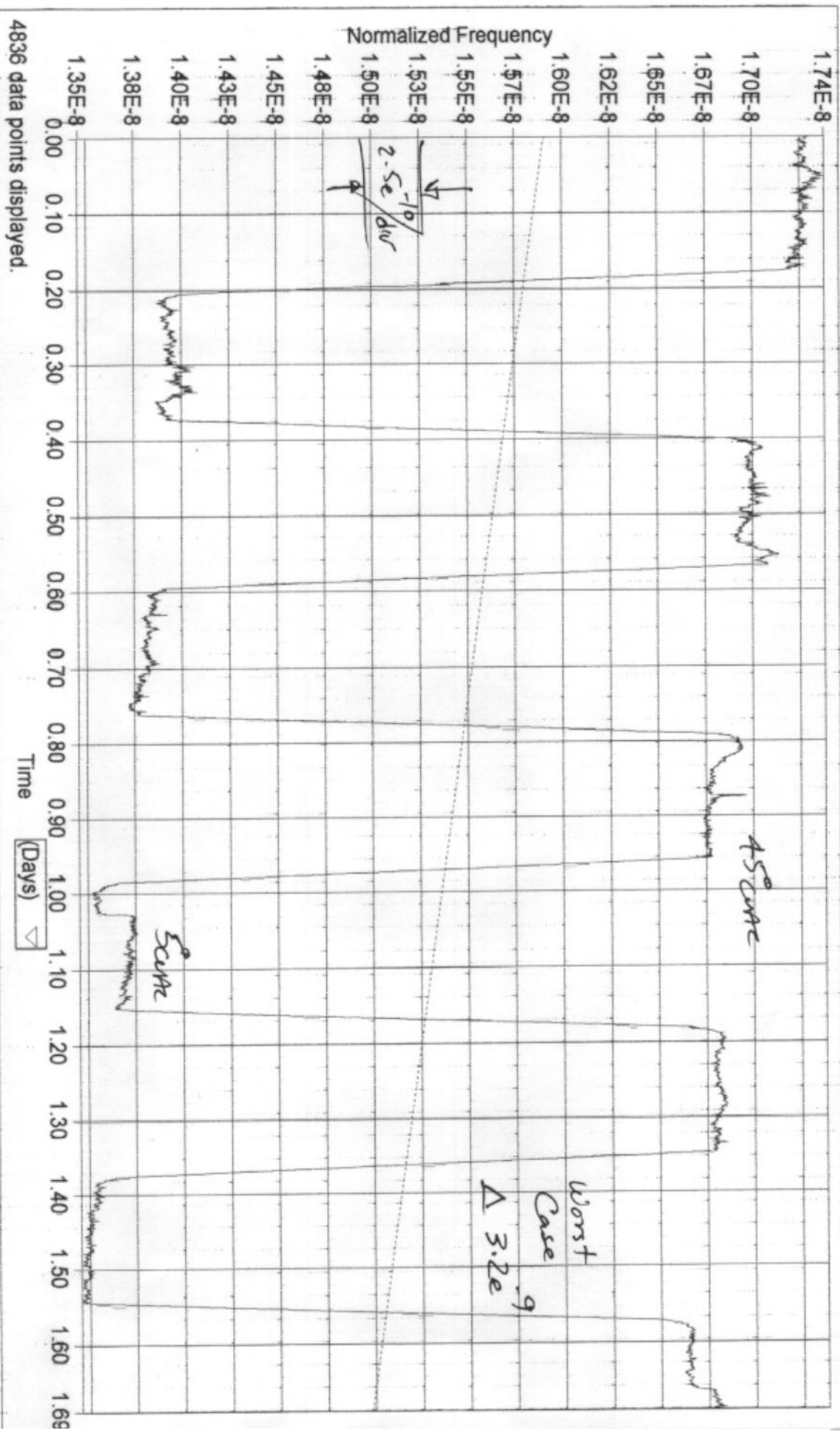
Amount of gaps in data

- Print
- Snap to Graph
- Set Ranges
- Help
- Done

SN 1002  
Thermal cycling TVC

1/25/03

Frequency & Time Systems of Datum, Inc. - Model# 9628B, Serial# 0123031002, Data starts at 01/23/2003 20:44:35



Raw aging per day

Standard deviation filter coefficient

Filtered aging per day

Number of outliers

Nominal frequency (Hz)

Time between gates (secs)

Gate time (secs)

Amount of gaps in data

Test Data Sheet 5

Paragraph 10 Final Electrical Testing (Ambient Pressure)

SYMMETRICOM 9628 OCXO

Symmetricon Part Number: 14751-10

Serial Number: 1002

Test Para.	Test Description	Specification Limits	Temp.	Recorded Measurement	Tested by	Pass/Fail	Date
10.0	Final Electrical Testing		25°C				
10.1	Warm-Up Power	< 4.5 W	25°C	4.4 W			
10.2	Steady State Power	< 3 W		2.98 W	DWH	PASS	2/03/03
10.3	Output Power (RF)	7.0 ± 0.5 dBm	25°C	7.0 DBm	SNP	PASS	1/31/03
10.4	Harmonic Distortion	< -25 dBc	25°C	-27 DBc	SNP	PASS	1/31/03
10.5	Phase Noise 1 Hz Bandwidth	1 Hz offset no limit 10 Hz offset no limit 100 Hz offset no limit 1 kHz offset < -51 dBc/Hz 10 kHz offset < -71 dBc/Hz 100 kHz offset < -91 dBc/Hz	25°C	-105 dBc/Hz -141 dBc/Hz -151 dBc/Hz -155 dBc/Hz -157 dBc/Hz -161 dBc/Hz	SNP	PASS	1/31/03
10.5	Spurious Output	< -70 dBc, 1kHz to 100 kHz	25°C	-124 dBc @ 1.7KHz	SNP	PASS	1/31/03
10.6	Allan Deviation	T=0.1 seconds, $\sigma \leq 1 \times 10^{-9}$ T=1 seconds, $\sigma \leq 1 \times 10^{-10}$ T=180 minutes $\sigma \leq 1 \times 10^{-9}$	25°C	$4.5 \times 10^{-12}$ $3.1 \times 10^{-12}$ $5.0 \times 10^{-11}$	DWH	PASS	1/31/03
10.7	Power Supply Sensitivity	< ±2 x 10 <sup>-10</sup>	25°C	±2.0 x 10 <sup>-10</sup>	DWH	PASS	2/3/03
10.8	Load Sensitivity	< ±2 x 10 <sup>-9</sup>	25°C	-0.3 x 10 <sup>-10</sup>	SNP	PASS	1/31/03
10.9	Aging **	Days to reach ±1 x 10 <sup>-9</sup> per day ±5 x 10 <sup>-11</sup> per day for 2 days	25°C	1 days -0.16 x 10 <sup>-11</sup> after 2 days	DWH	PASS	2/03/03
10.10	Output Frequency	5.000000 MHz ± 1 x 10 <sup>-7</sup>	25°C	0.09 x 10 <sup>-8</sup>	DWH	PASS	1/31/03
10.13	J1-4,6 Chassis Connection	Electrical Short to Chassis Pass/Fail	25°C	PASS	DWH	PASS	2/3/03

Test Verification

  
Project Engineer

Date

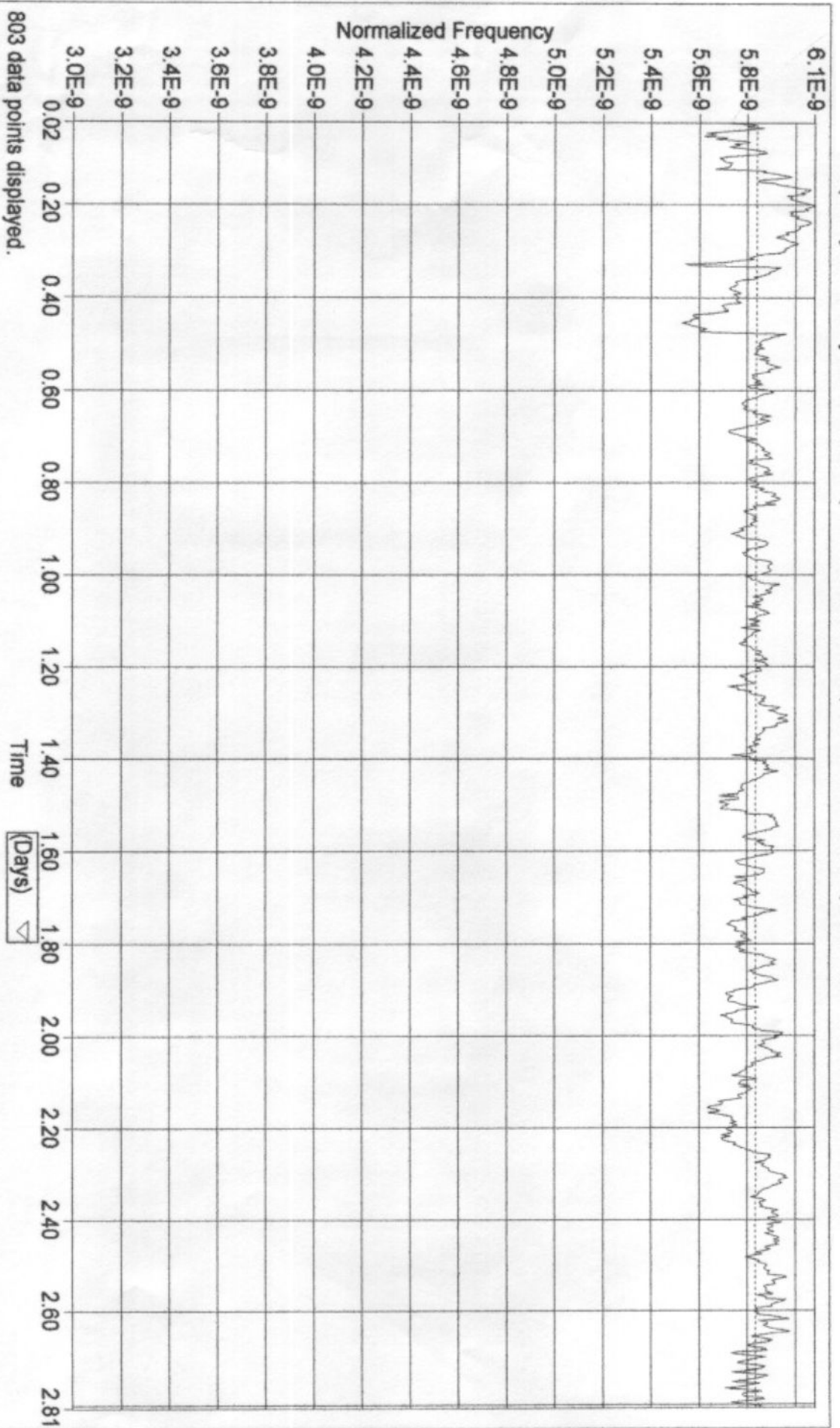
  
Product Assurance

2/12/03  
Date

\*\* - Include plot in EIDP

# AGING FINAL MEASURE

Frequency & Time Systems of Datum, Inc. - Model# 9628B, Serial# 0131031002, Data starts at 01/31/2003 20:58:44



Raw aging per day

Standard deviation filter coefficient

Filtered aging per day

Number of outliers

Nominal frequency (Hz)

Time between gates (secs)

Gate time (secs)

Amount of gaps in data

