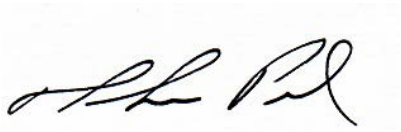
NOVEMBER 14, 2013

TEST REPORT #213041B, REVISION 1.1

VITA 46 VPX CONNECTORS

QUALIFICATION

HYPERTRONICS CORPORATION



APPROVED BY: THOMAS PEEL
PRESIDENT AND
DIRECTOR OF TEST PROGRAM DEVELOPMENT
CONTECH RESEARCH, INC.
ATTLEBORO, MA

ilac-MRA

1478 - 01
ACCREDITED
Test Laboratory
1478 - 02

Contech Research
An Independent Test and Research Laboratory

REVISION HISTORY

DATE	REV. NO.	DESCRIPTION	ENG.
11/14/2013	1.0	Initial Release	TP
2/7/2014	1.1	Removed Subgroup D, Appendix A at the request of the Test Sponsor. Renamed Subgroup F, Appendix B to Appendix A.	TP

CERTIFICATION

This is to certify that the evaluation described herein was designed and executed by personnel of Contech Research, Inc. It was performed with the concurrence of Hypertronics Corporation who was the test sponsor.

All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1 and MIL-STD-45662 as applicable.

All data, raw and summarized, analysis and conclusions presented herein are the property of the test sponsor. No copy of this report, except in full, shall be forwarded to any agency, customer, etc., without the written approval of the test sponsor and Contech Research.

Approved By: Thomas Peel
President and
Director Of Test Program Development
Contech Research, Inc.
Attleboro, MA

TP:cf

SCOPE

To perform Qualification testing on VITA 46 connectors as manufactured and submitted by the test sponsor Hypertronics Corporation.

APPLICABLE DOCUMENTS

1. Unless otherwise specified, the following documents of issue in effect at the time of testing performed form a part of this report to the extent as specified herein. The requirements of sub-tier specifications and/or standards apply only when specifically referenced in this report.

2. VITA 46 Connector/Module Test Plan, Rev. 6 (Jan, 2005)

3. EN-61000-4-2, Electrostatic Discharge Immunity Test

4. Standards:

   a) MIL-STD-1344
   b) EIA Publication 364
   c) ASTM G85

TEST SAMPLES AND PREPARATION

1. The following test samples were submitted by the test sponsor, Hypertronics Corporation, for the evaluation to be performed by Contech Research, Inc.

BACKPLANE		
P.N.	**DESCRIPTION**	**QTY**
KX2HEP01C1TBH	72-Pin Module	1
KX2FCU01C1TAH	144-Pin Module	6

DAUGHTER CARD		
P.N.	**DESCRIPTION**	**QTY**
KX1HCP01C1TBH	Utility/Power Center Module	1
KX1FCD01C1TBH	Differential Center Module	4
KX1FED01C1TBH	Differential End Module	1
KX1FES01C1TBH	Single Ended End Module	1

-continued on next page.

TEST SAMPLES AND PREPARATION –continued

2. The following additional materials were submitted by the test sponsor to assist and perform the testing of items listed in #1 above.

   Description

   a) Vibration Test Fixture (see Figure #1)

3. The test samples as submitted were submitted by the manufacturer as being fabricated and assembled utilizing normal production techniques common for this type of product and inspected in accordance with the quality criteria as established for the product involved.

4. Connectors were supplied assembled and terminated to test boards by the test sponsor.

5. Test boards for mounting test samples were supplied by the test sponsor.

6. All test samples were coded and identified by Contech Research to maintain continuity throughout the test sequences. Upon initiating testing, mated test samples remained with each other throughout the test sequences for which they were designated.

7. Figure #2 illustrates the test sample used for the evaluation.

8. The test samples were tested in their ‘as received’ condition.

9. All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1, as applicable.

10. Unless otherwise specified in the test procedures used, no further preparation was used.

TEST SELECTION

1. See Test Plan Flow Diagram, Figure #3, for test sequences used.

-continued on next page.

TEST SELECTION -continued

2. Test set ups and/or procedures which are standard or common are not detailed or documented herein provided they are certified as being performed in accordance with the applicable (industry or military) test methods, standards and/or drawings as specified in the detail specification.

SAMPLE CODING

1. All samples were coded. Mated test samples remained with each other throughout the test group/sequences for which they were designated. Coding was performed in a manner which remained legible for the test duration.

2. The test samples were coded in the following manner:

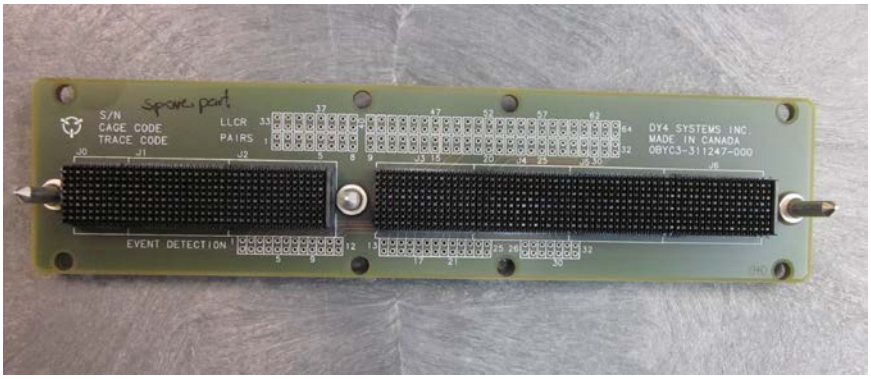
Group A: A1 A2
Group B: B1
Group C: C1
Group D: D1
Group E: E1
Group F: F1
Group G: G1

FIGURE #1

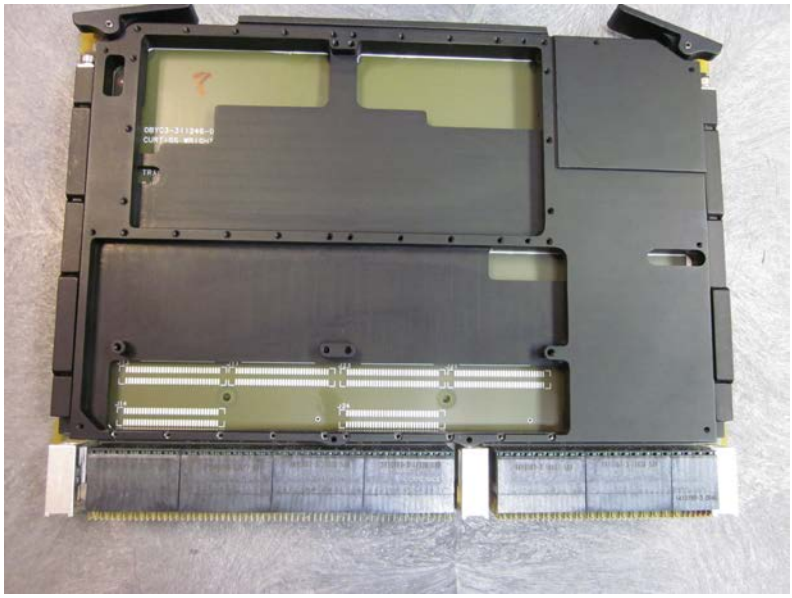
MECHANICAL SHOCK/VIBRATION TEST FIXTURE

FIGURE #2

TYPICAL TEST SAMPLE



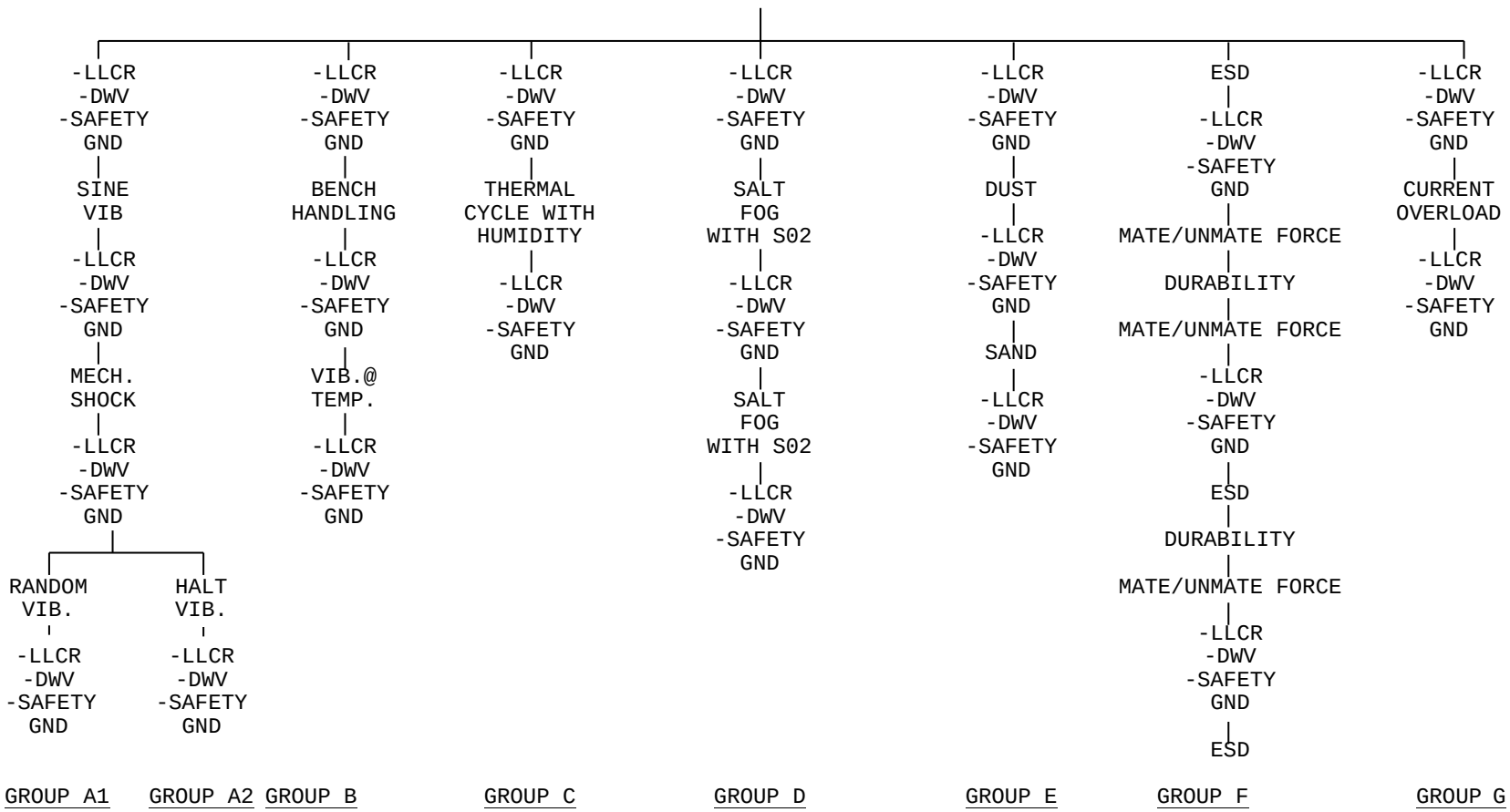
Receptacle side



Plug side

FIGURE #3

TEST PLAN FLOW DIAGRAM



DATA SUMMARY

TEST	REQUIREMENT	RESULTS
GROUP A		
LLCR	RECORD	33.4 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	
SAFETY GND	100.0 mΩ MAX	0.3 mΩ MAX.
RESONANCE	RECORD	
	X-AXIS	7.37G @ 1075.65 Hz
	Y-AXIS	49.818G @ 441.43 Hz
	x-AXIS	5.197G @ 1915.3 Hz
LLCR	+10.0 mΩ MAX.CHG.	+0.8 mΩ MAX.CHG.
	+5.0 mΩ MAX.AVG.CHG	+0.0 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.4 mΩ MAX.
MECHANICAL SHOCK	NO DAMAGE	PASSED
	10.0 NANOSECOND	PASSED
LLCR	+10.0 mΩ MAX.CHG.	+1.2 mΩ MAX.CHG.
	+5.0 mΩ MAX.AVG.CHG	-0.1 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.5 mΩ MAX.
SAMPLE ID# 1A		
RANDOM VIBRATION	NO DAMAGE	PASSED
	10.0 NANOSECOND	PASSED
LLCR	+10.0 mΩ MAX.CHG.	+1.4 mΩ MAX.CHG.
	+5.0 mΩ MAX.AVG.CHG	-0.1 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.5 mΩ MAX.
SAMPLE ID# 1B		
HALT RANDOM VIB.	NO DAMAGE	PASSED
	10.0 NANOSECOND	PASSED
LLCR	+10.0 mΩ MAX.CHG.	+3.0 mΩ MAX.CHG.
	+5.0 mΩ MAX.AVG.CHG	+0.2 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	1.2 mΩ MAX.

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DATA SUMMARY -continued

TEST	REQUIREMENT	RESULTS
GROUP B		
LLCR	RECORD	33.0 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.3 mΩ MAX.
BENCH HANDLING	NO DAMAGE 10.0 NANOSECOND	PASSED
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+6.6 mΩ MAX.CHG. +0.3 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.2 mΩ MAX.
VIBRATION @ TEMP.	NO DAMAGE 10.0 NANOSECOND	PASSED
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+6.2 mΩ MAX.CHG. +0.3 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	4.8 mΩ MAX.
GROUP C		
LLCR	RECORD	33.6 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.4 mΩ MAX.
TEMP./HUMIDITY	NO DAMAGE	PASSED
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+3.4 mΩ MAX.CHG. +0.2 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.4 mΩ MAX.

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DATA SUMMARY -continued

TEST	REQUIREMENT	RESULTS
GROUP D		
LLCR	RECORD	33.4 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	RECORD	0.4 mΩ MAX.
SALT FOG W/ SO2	NO DAMAGE	
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG. CHG.	+2.9 mΩ MAX.CHG. +0.1 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.2 mΩ MAX.
SALT FOG W/ SO2	NO DAMAGE	PASSED
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+3.1 mΩ MAX.CHG. +0.3 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.2 mΩ MAX.
GROUP E		
LLCR	RECORD	34.1 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.3 mΩ MAX.
SAND TEST	NO DAMAGE	PASSED
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+0.6 mΩ MAX.CHG. +0.0 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.3 mΩ MAX.
DUST TEST	NO DAMAGE	
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+0.8 mΩ MAX.CHG. -0.1 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.3 mΩ MAX.

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DATA SUMMARY -continued

TEST	REQUIREMENT	RESULTS
GROUP F		
ESD	<20.0 V DISCHARGE	PASSED
LLCR	RECORD	33.7 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.4 mΩ MAX.
MATING FORCE	RECORD	104.5 LBS.MAX.
UNMATING FORCE	RECORD	74.0 LBS.MAX.
DURABILITY (200X)	NO DAMAGE	PASSED
MATING FORCE	RECORD	121.0 LBS.MAX.
UNMATING FORCE	RECORD	85.5 LBS.MAX.
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+0.6 mΩ MAX.CHG. -0.2 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.5 mΩ MAX.
ESD	<20.0 V DISCHARGE	PASSED
DURABILITY (300X)	NO DAMAGE	PASSED
MATING FORCE	RECORD	LBS.MAX.
UNMATING FORCE	RECORD	LBS.MAX.
LLCR	+10.0 mΩ MAX.CHG. +5.0 mΩ MAX.AVG.CHG	+0.5 mΩ MAX.CHG. -0.2 mΩ MAX.AVG.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.4 mΩ MAX.
ESD	<20.0 V DISCHARGE	PASSED
GROUP G		
LLCR		
SIGNAL CONTACTS	RECORD	33.6 mΩ MAX.
SINGLE/DOUBLE	RECORD	35.6 mΩ MAX.
POWER CONTACTS	RECORD	4.7 mΩ MAX.
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	+0.4 mΩ MAX.
CURRENT OVERLOAD	NO DAMAGE	PASSED
LLCR		
SIGNAL CONTACTS	+10.0 mΩ MAX.CHG.	+2.3 mΩ MAX.CHG
SINGLE/DOUBLE	+10.0 mΩ MAX.CHG.	+1.8 mΩ MAX.CHG
POWER CONTACTS	+10.0 mΩ MAX.CHG.	+0.2 mΩ MAX.CHG
DWV	NO BREAKDOWN, <5.0 mA LEAKAGE	PASSED
SAFETY GND	100.0 mΩ MAX	0.6 mΩ MAX.

EQUIPMENT LIST

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq. Cal
26	11/7/2014	11/7/2013	Dial-a-Gram Scale	Ohaus Co.	2610	26	See Cal Cert	12 mon
46	N/A	N/A	Drill Press	Jet	Jet-13RF	33696	N/A	N/A
321	4/19/2014	4/19/2013	AC-DC Hipot/Megometer	Hipotronics Co.	H300B	DS16-201	See Cal Cert	12 mon
339	N/A	N/A	IBM Dust Chamber	Contech Research	4000	4000 In 3-2	N/A	N/A
398	5/3/2014	5/3/2013	Digital Force Gage 500 Lbs	Chatillon	DFI-500	11792	±1.25 LBS	12 mon
403	N/A	N/A	Sand Chamber	Contech Research	4000	4000 i n 3-1	N/A	Ea Test
553	5/21/2014	5/21/2013	12 channel Power Unit	PCB Piezotronics	483A	1303	See Cal Cert	12 mon
611	10/8/2014	10/8/2013	DC Power Supply 30Amps	Hewlett Packard	6033A	2934-A-04691	See Cal Cert	12 mon
689	7/16/2014	7/16/2013	DC Power Supply 30Amps	Hewlett Packard	6033A	2548A01848	See Cal Cert	12 mon
874	N/A	N/A	Computer	M&P	Vectra	us75203327	N/A	N/A
1028	7/24/2014	7/24/2013	Event Detector	Analysis Tech	32 EHD	981019	See Cal Cert	12 mon
1047	1/9/2014	1/9/2013	Micro-Ohm Meter	Keithley Instr.	580	0705731	See Cal Cert	12 mon
1127	6/26/2014	6/26/2013	Temp/Humid/Chamber	Thermotron	SM-8-C	29503	See Cal Cert	12 mon
1147	5/23/2014	5/23/2013	Digital O-Scope	Tektronix	11801C	B030915	See Cal Cert	12 mon
1166	10/31/2015	10/31/2013	Sine/Rndm Vib Control Digitizer	Hewlett Packard	E1432A	US39342279	See Cal Cert	12 mon
1167	N/A	N/A	Interface	Hewlett Packard	E8491B	US390100753	N/A	N/A
1168	N/A	N/A	Mainframe	Hewlett Packard	E8408A	US39000357	N/A	N/A
1271	N/A	N/A	Amplifier	Unholtz Dickie	SA15	3483	N/A	N/A
1272	N/A	N/A	Shaker Table	Unholtz Dickie	S202PB	263	N/A	N/A
1314	3/29/2014	3/29/2013	Multiplexer card	Keithley Co.	7708	0862544	See Cal Cert	12 mon
1315	1/25/2013	1/25/2012	Data Aquisition Multimeter	Keithley Co.	2700	0862680	See Cal Cert	12 mon

EQUIPMENT LIST -continued

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq. Cal
1348	N/A	N/A	Low&High Temp Oven	Curtin Matheson	Equitherm	108T-11	N/A	Ea Test
1349	N/A	N/A	Positioner	Danials Mfg	TH163	N/A	N/A	N/A
1360	3/28/2014	3/28/2013	Data Aquisition Multimeter	Keithley	2700	0914136	See Cal Cert	12 mon
1361	3/29/2014	3/29/2013	Multiplexer Card	Keithley	7708	0915308	See Cal Cert	12 mon
1366	N/A	N/A	Main Frame	Agilent H.P.	8408A		N/A	N/A
1367	N/A	N/A	Interface	Agilent H.P.	E8491A		N/A	N/A
1368	6/20/2015	6/20/2013	Sine/Rnd Control digitizer	Agilent H.P.	E1432A	US35470169	See Manual	24 mon
1521	5/10/2014	5/10/2013	Accelerometer	PCB Piezotronics	353B04	118492	See Cal Cert	12 mon
1727	N/A	N/A	Computer	Dell	GX620	FYF0T91	N/A	N/A
1790	N/A	N/A	Power Amplier	Unholtz Dickie	SAI30F	4860	N/A	N/A
1791	N/A	N/A	Vibration Shaker Table	Unholtz Dickie	S452-12	314	N/A	N/A
1797			Accelerometer	PCB Piezotronics	353B04	LW167522	See Cal Cert	12 mon
5045	5/24/2014	5/24/2013	TDR -Sampling Head	Tektronix	SD-24	B0221502	See Cal Cert	12 mon

TEST RESULTS

GROUP A

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 2 Samples	TECHNICIAN: MHB
START DATE: 8/20/13	COMPLETE DATE: 9/9/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 45%
EQUIPMENT ID#: 1047, 1727	

LOW LEVEL CIRCUIT RESISTANCE (LLCR) –SIGNAL CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the signal contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

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PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 64 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The signal contact low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

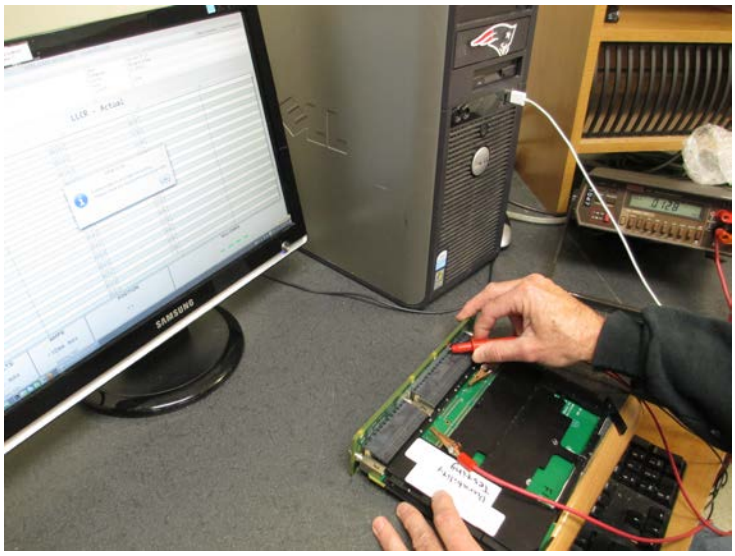
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

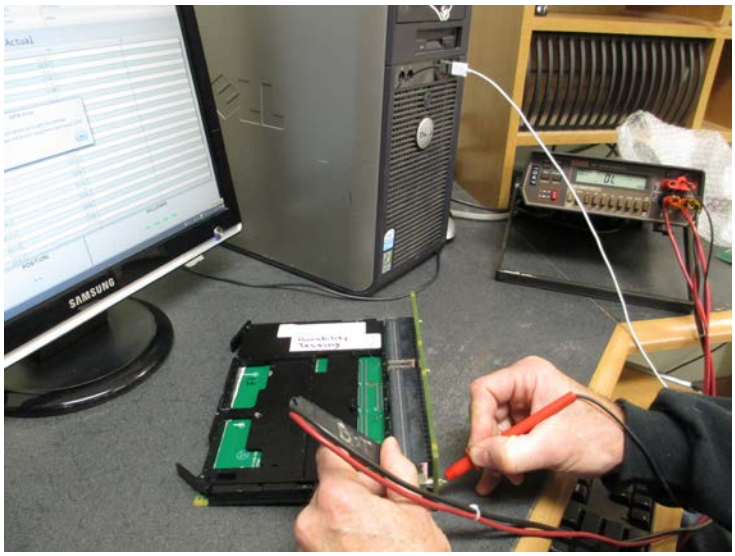
Sample ID#	Avg.	Max.	Min.
A1	22.0	33.4	7.2
A2	21.5	32.9	6.9

2. See data files 213041B01a and 213041B03 for individual data points.

FIGURE #4

TYPICAL LLCR SET-UP





PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 2 Samples	TECHNICIAN: MHB
START DATE: 8/20/13	COMPLETE DATE: 9/9/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 45%
EQUIPMENT ID#: 321	

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

a)	Between Adjacent Contacts	: Yes
b)	Mated Condition	: Mated
c)	Mounting Condition	: Mounted
d)	Test Voltage	: 500 VAC
e)	Holt Time	: 1 Minute
f)	Rate of Application	: 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

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REQUIREMENTS: -continued

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

The samples met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 2 Samples	TECHNICIAN: MHB
START DATE: 8/20/13	COMPLETE DATE: 9/9/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 45%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

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PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 100 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The safety ground low level circuit resistance shall not exceed 100 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
A1	0.3	0.3	0.2
A2	0.3	0.4	0.3

2. See data files 213041B02a and 213041B04 for individual data points.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: DG/KR
START DATE: 8/21/13	COMPLETE DATE: 8/22/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 50%
EQUIPMENT ID#: 1147, 5045	

NANOSECOND CHARACTERIZATION

PROCEDURE:

1. Prior to testing, 1 mated test sample was characterized to assure the desired event to be monitored (10 nanoseconds) was capable of being detected.

2. The characterization was performed in accordance with EIA-364 Test Procedure 87.

3. Test samples were tested with COAX cables (Pasternack # PE3584-**) terminated to the designated test points.

4. A TDR was used to measure the transition time of a fast risetime step (<60 pS) reflected from the sample under test.

REQUIREMENTS:

1. The transition time shall be measured and recorded.

2. The transition time shall be significantly less than 10 nanoseconds to assure the event detection will reliably detect an event.

RESULTS: See Next Page

RESULTS:

1. After characterization, 32 test positions were confirmed for low nanosecond event detection.

2. The following is a summary of the observed data:

	Transition Time (Nanoseconds)		
Sample ID#	Avg.	Max.	Min.
A1	2.32	4.67	1.56

3. The TDR plots are illustrated in Figure #s 5 through 36.

FIGURE #5

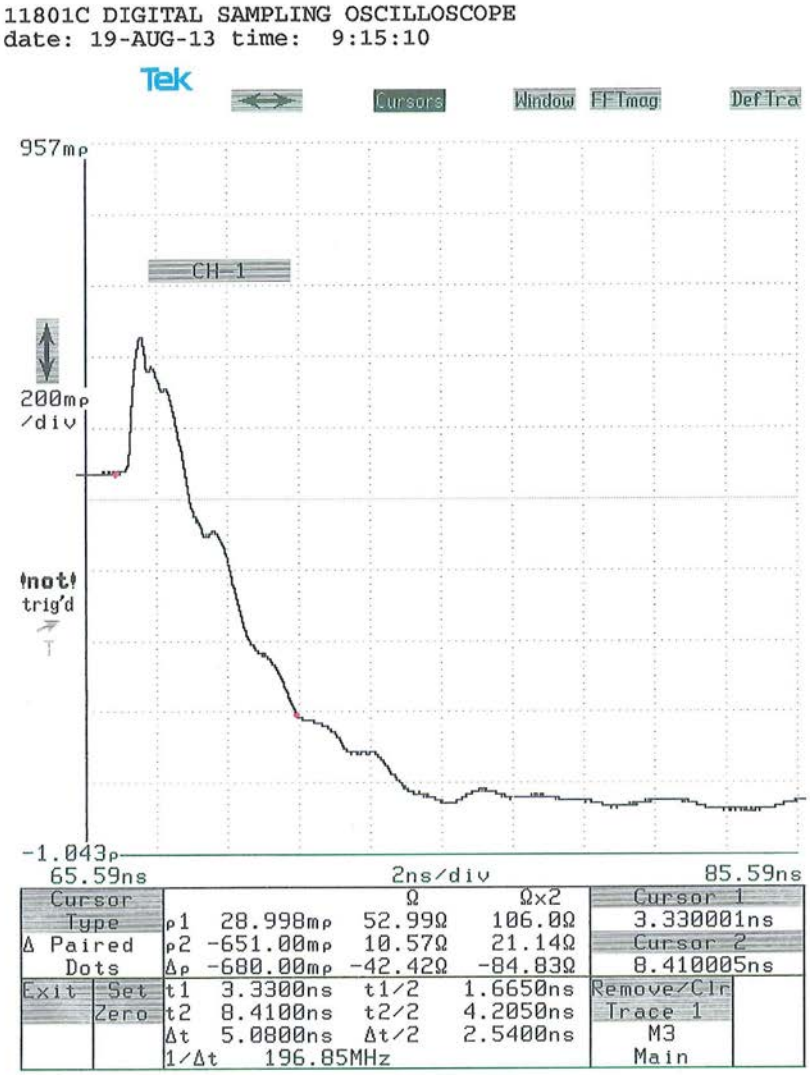


FIGURE #6

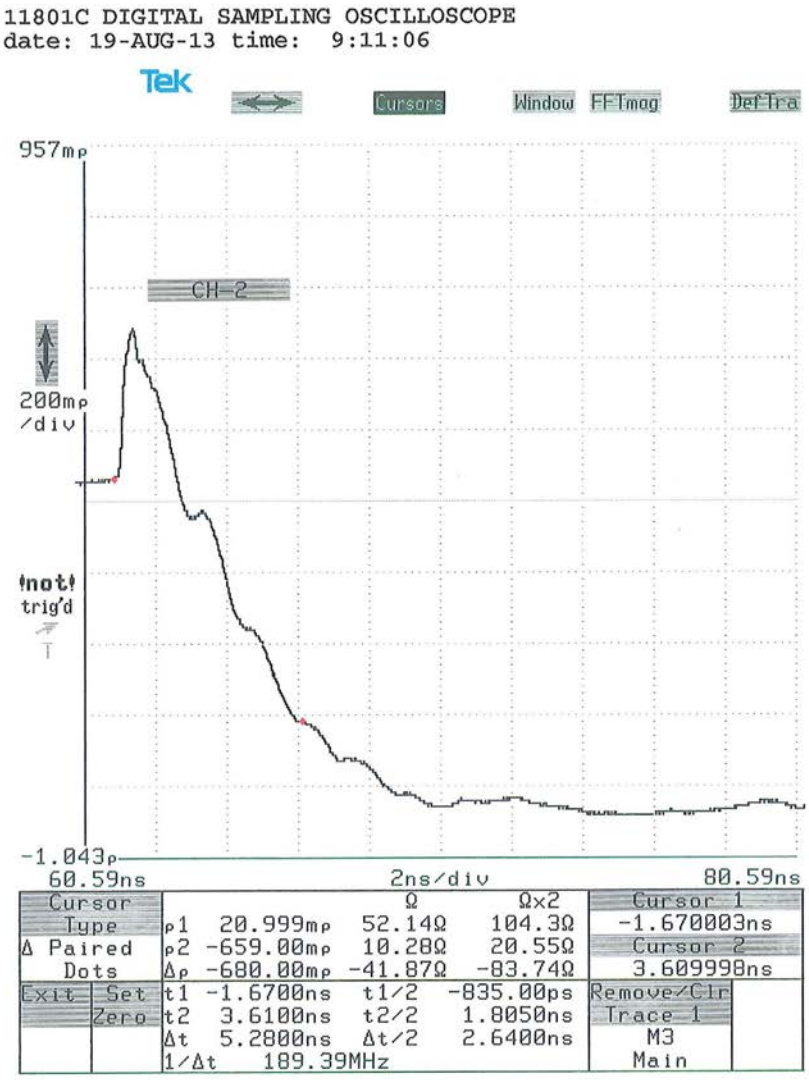

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:11:06
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH 2
200mρ /div
not trig'd
-1.043ρ
60.59ns
2ns/div
80.59ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 20.999mρ 52.14Ω 104.3Ω
ρ2 -659.00mρ 10.28Ω 20.55Ω
Δρ -680.00mρ -41.87Ω -83.74Ω
t1 -1.6700ns t1/2 -835.00ps
t2 3.6100ns t2/2 1.8050ns
Δt 5.2800ns Δt/2 2.6400ns
1/Δt 189.39MHz
Cursor 1
-1.670003ns
Cursor 2
3.609998ns
Remove/Clr
Trace 1
M3
Main

FIGURE #7

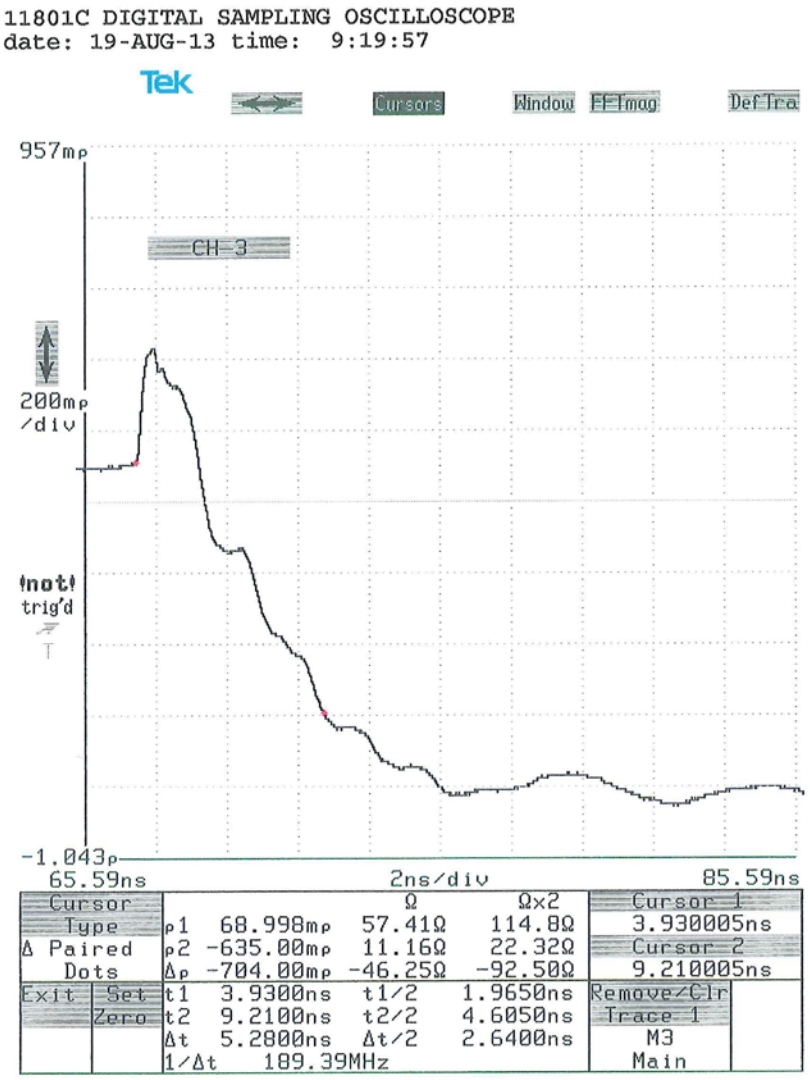

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:19:57
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-3
200mρ /div
not trig'd
-1.043ρ
65.59ns
2ns/div
85.59ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 68.998mρ 57.41Ω 114.8Ω
ρ2 -635.00mρ 11.16Ω 22.32Ω
Δρ -704.00mρ -46.25Ω -92.50Ω
t1 3.9300ns t1/2 1.9650ns
t2 9.2100ns t2/2 4.6050ns
Δt 5.2800ns Δt/2 2.6400ns
1/Δt 189.39MHz
Cursor 1
3.930005ns
Cursor 2
9.210005ns
Remove/Clr Trace 1
M3
Main

FIGURE #8

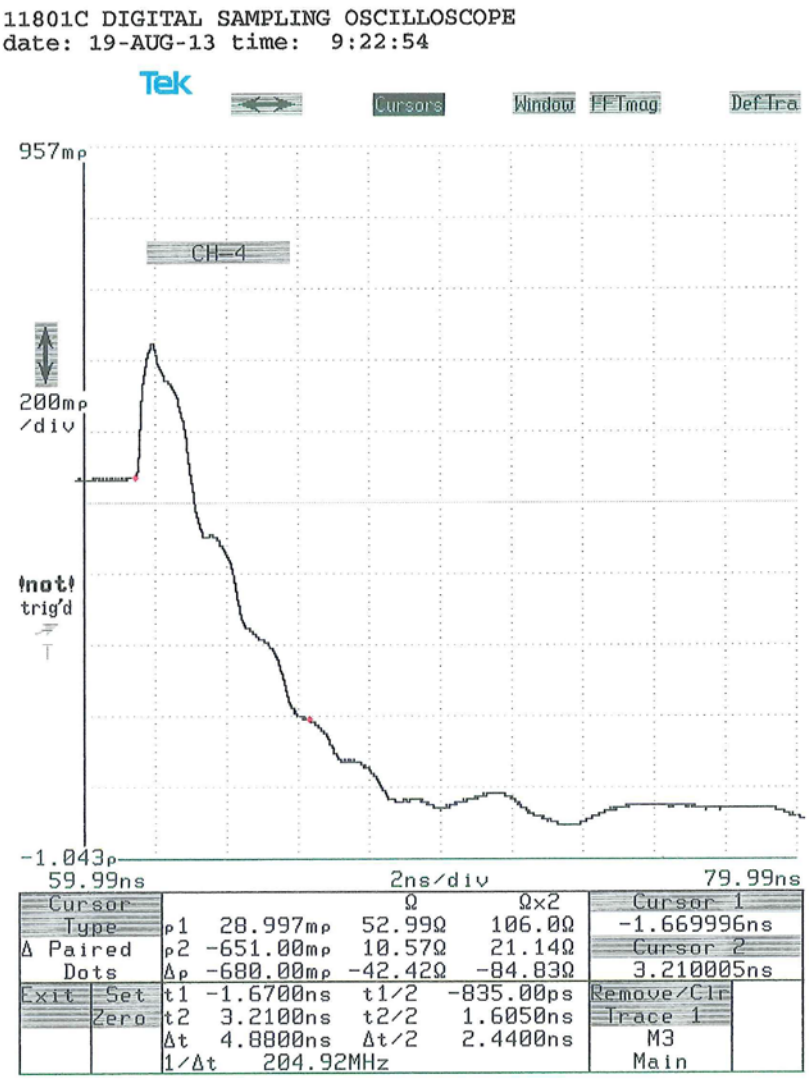

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:22:54
Tek
Cursors
Window
FFTmag
Def Tra
957mρ
CH 4
200mρ /div
not trig'd
-1.043ρ
59.99ns
2ns/div
79.99ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 28.997mρ 52.99Ω 106.0Ω
ρ2 -651.00mρ 10.57Ω 21.14Ω
Δρ -680.00mρ -42.42Ω -84.83Ω
t1 -1.6700ns t1/2 -835.00ps
t2 3.2100ns t2/2 1.6050ns
Δt 4.8800ns Δt/2 2.4400ns
1/Δt 204.92MHz
Cursor 1
-1.669996ns
Cursor 2
3.210005ns
Remove/Clr
Trace 1
M3
Main

FIGURE #9

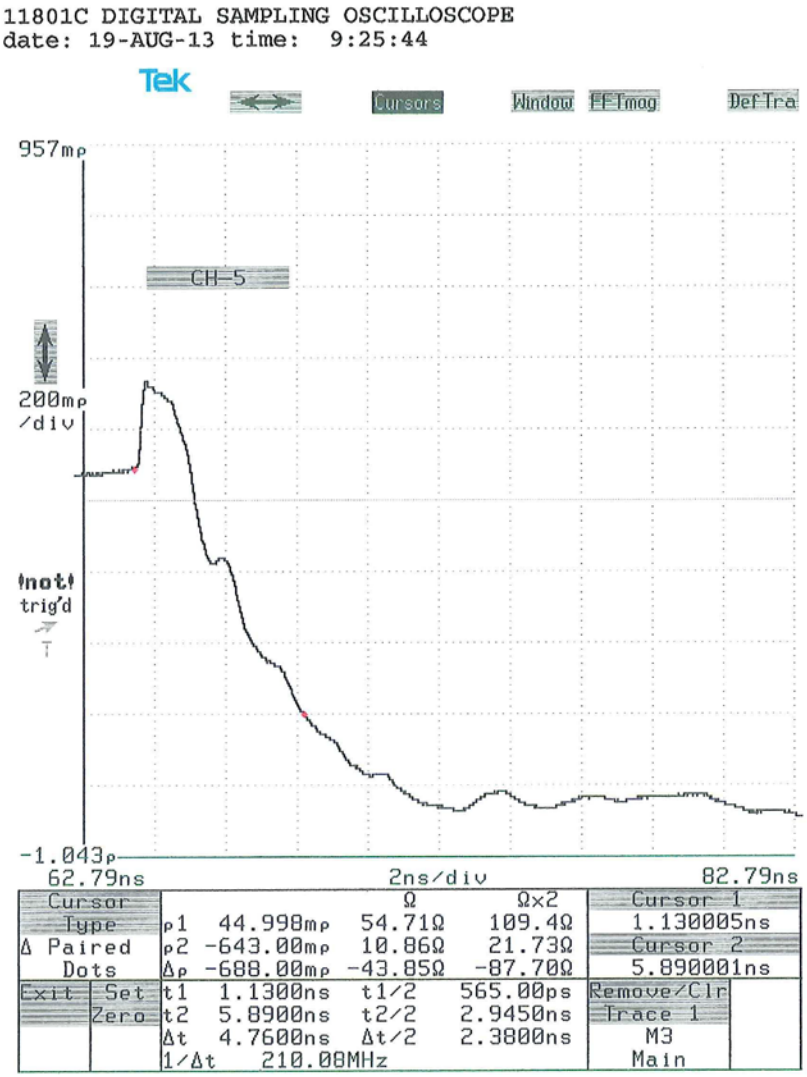

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:25:44
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH 5
200mρ /div
!not! trig'd
-1.043ρ
62.79ns
2ns/div
82.79ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 44.998mρ 54.71Ω 109.4Ω
ρ2 -643.00mρ 10.86Ω 21.73Ω
Δρ -688.00mρ -43.85Ω -87.70Ω
t1 1.1300ns t1/2 565.00ps
t2 5.8900ns t2/2 2.9450ns
Δt 4.7600ns Δt/2 2.3800ns
1/Δt 210.08MHz
Cursor 1
1.130005ns
Cursor 2
5.890001ns
Remove/Clr Trace 1
M3
Main

FIGURE #10

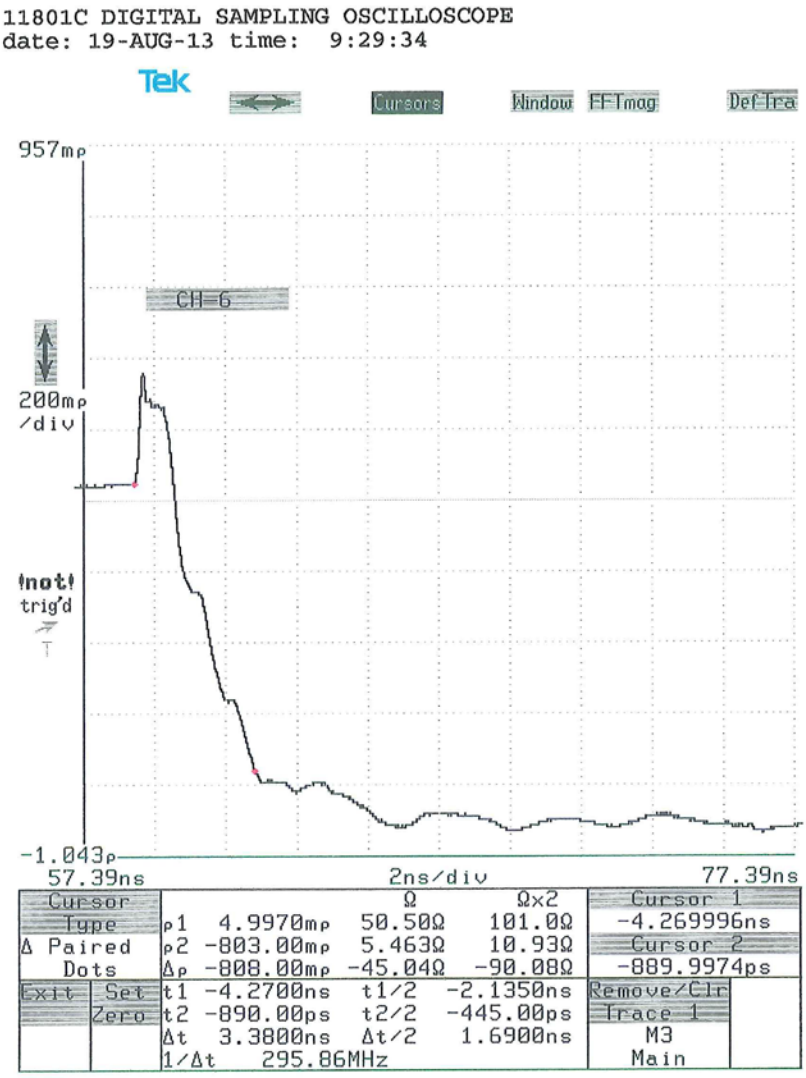

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:29:34
Tek
Cursors
Window
FFTmag
Def Fra
957mρ
CH 6
200mρ /div
!not! trig'd
-1.043ρ
57.39ns
2ns/div
77.39ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 4.9970mρ 50.50Ω 101.0Ω
ρ2 -803.00mρ 5.463Ω 10.93Ω
Δρ -808.00mρ -45.04Ω -90.08Ω
t1 -4.2700ns t1/2 -2.1350ns
t2 -890.00ps t2/2 -445.00ps
Δt 3.3800ns Δt/2 1.6900ns
1/Δt 295.86MHz
Cursor 1
-4.269996ns
Cursor 2
-889.9974ps
Remove/Clr Trace 1
M3
Main

FIGURE #11

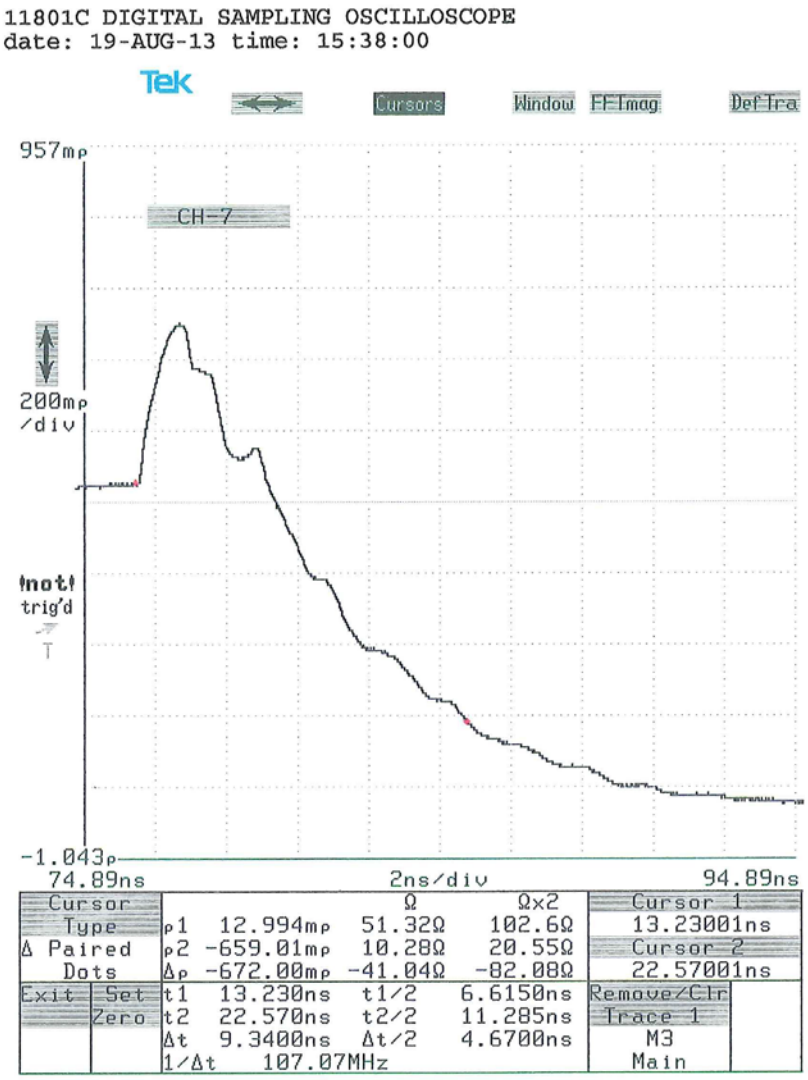

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 15:38:00
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-7
200mρ /div
Not trig'd
-1.043ρ
74.89ns
2ns/div
94.89ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 12.994mρ 51.32Ω 102.6Ω
ρ2 -659.01mρ 10.28Ω 20.55Ω
Δρ -672.00mρ -41.04Ω -82.08Ω
t1 13.230ns t1/2 6.6150ns
t2 22.570ns t2/2 11.285ns
Δt 9.3400ns Δt/2 4.6700ns
1/Δt 107.07MHz
Cursor 1
13.23001ns
Cursor 2
22.57001ns
Remove/Clr Trace 1
M3
Main

FIGURE #12

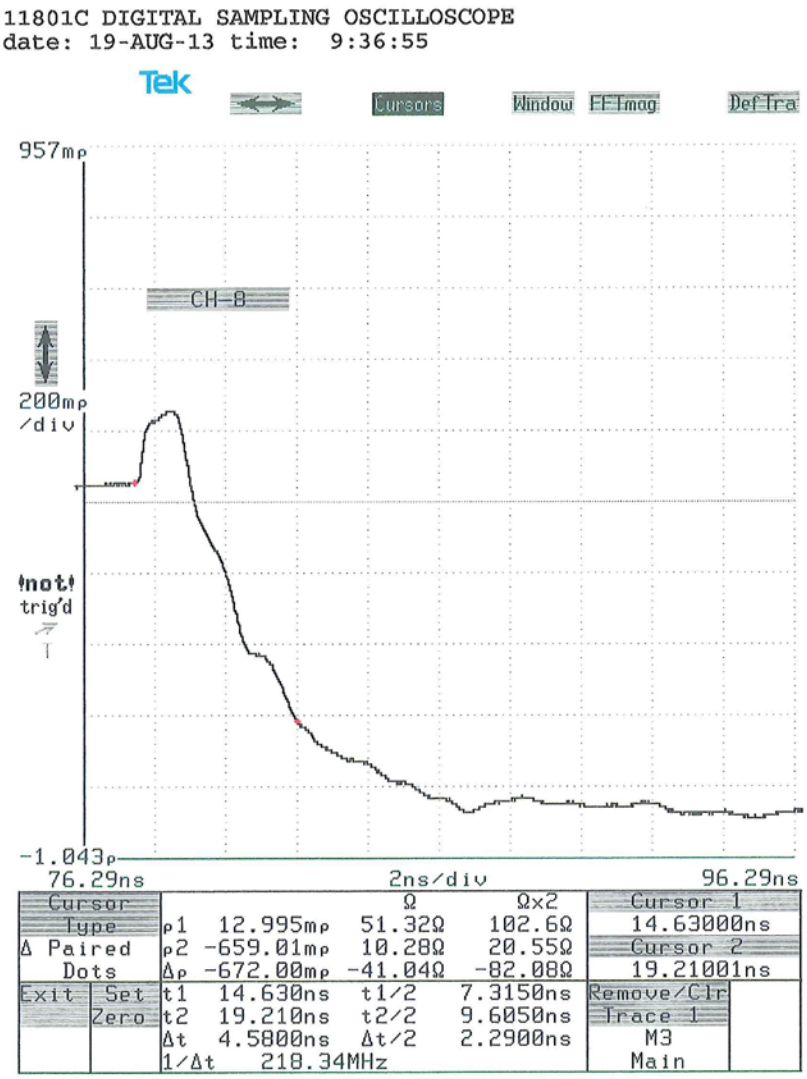

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:36:55
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-8
200mρ /div
!not!
trig'd
-1.043ρ
76.29ns
2ns/div
96.29ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 12.995mρ 51.32Ω 102.6Ω
ρ2 -659.01mρ 10.28Ω 20.55Ω
Δρ -672.00mρ -41.04Ω -82.08Ω
t1 14.630ns t1/2 7.3150ns
t2 19.210ns t2/2 9.6050ns
Δt 4.5800ns Δt/2 2.2900ns
1/Δt 218.34MHz
Cursor 1
14.63000ns
Cursor 2
19.21001ns
Remove/Clr Trace 1
M3
Main

FIGURE #13

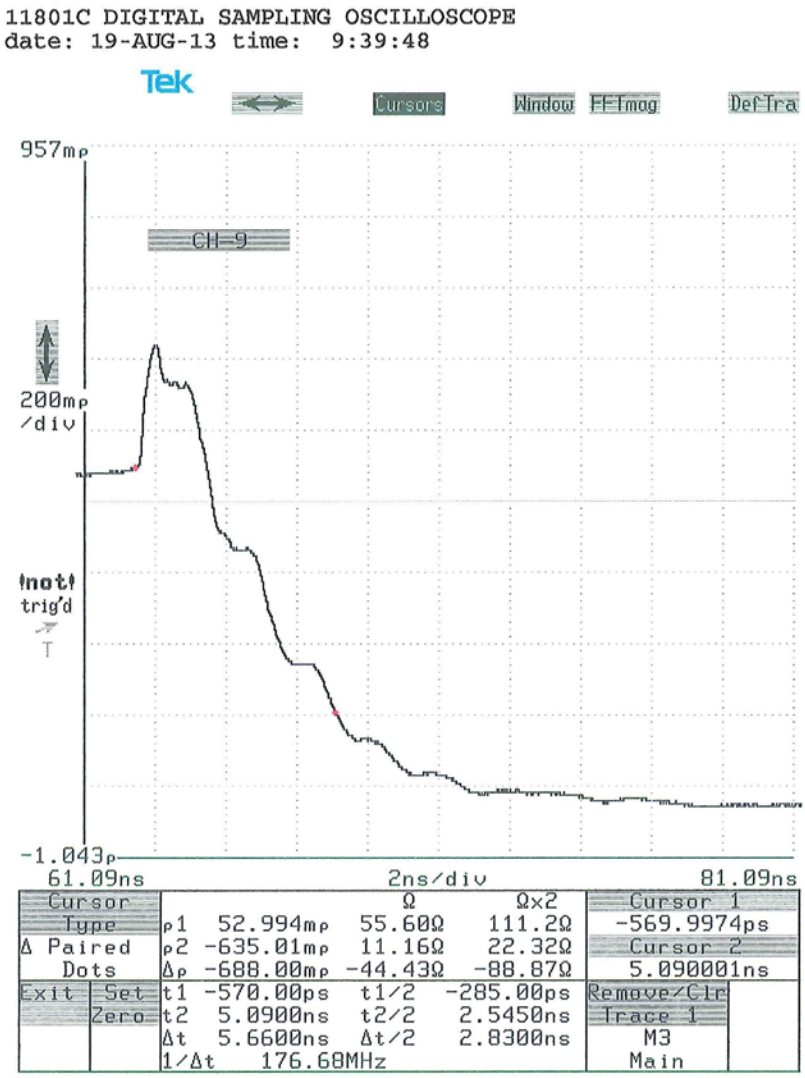

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 9:39:48
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH 9
200mρ /div
!not! trig'd
-1.043ρ
61.09ns
2ns/div
81.09ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 52.994mρ 55.60Ω 111.2Ω
ρ2 -635.01mρ 11.16Ω 22.32Ω
Δρ -688.00mρ -44.43Ω -88.87Ω
t1 -570.00ps t1/2 -285.00ps
t2 5.0900ns t2/2 2.5450ns
Δt 5.6600ns Δt/2 2.8300ns
1/Δt 176.68MHz
Cursor 1
-569.9974ps
Cursor 2
5.090001ns
Remove/Clr Trace 1
M3
Main

FIGURE #14

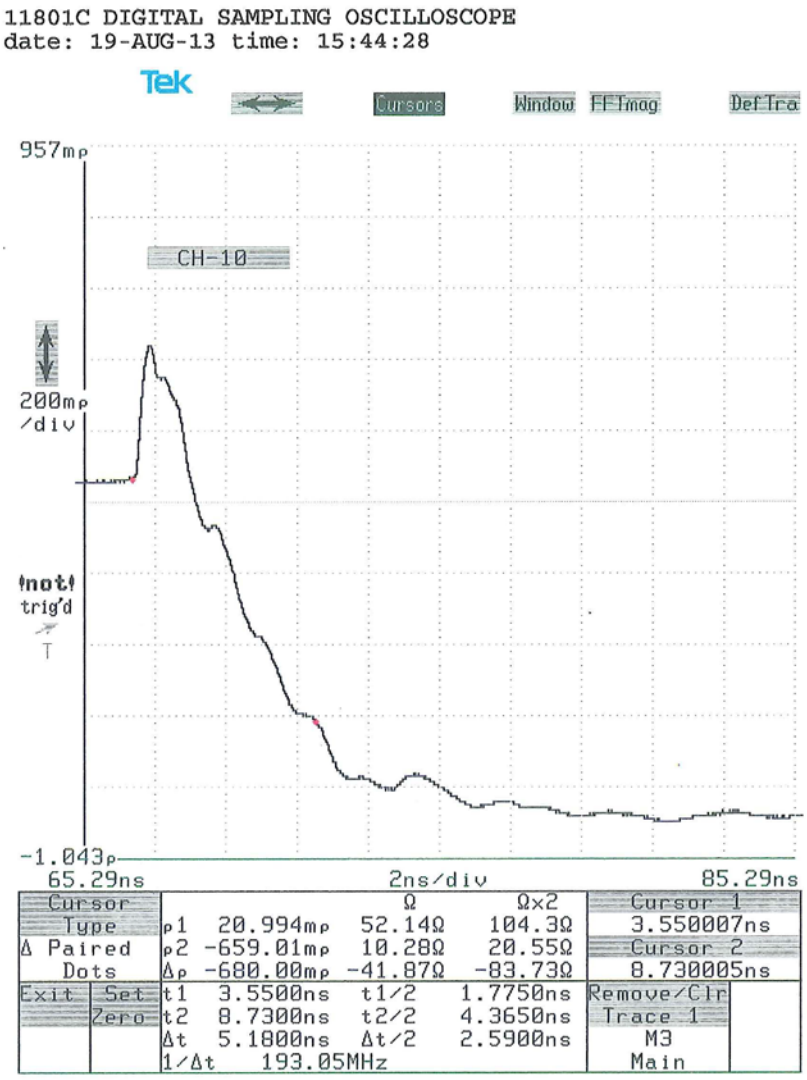

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 15:44:28
Tek
Cursors
Window
FFTmag
DefTrc
957mρ
CH-10
200mρ
/div
!not!
trig'd
T
-1.043ρ
65.29ns
2ns/div
85.29ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 20.994mρ 52.14Ω 104.3Ω
ρ2 -659.01mρ 10.28Ω 20.55Ω
Δρ -680.00mρ -41.87Ω -83.73Ω
t1 3.5500ns t1/2 1.7750ns
t2 8.7300ns t2/2 4.3650ns
Δt 5.1800ns Δt/2 2.5900ns
1/Δt 193.05MHz
Cursor 1
3.550007ns
Cursor 2
8.730005ns
Remove/Clr Trace 1
M3
Main

FIGURE #15

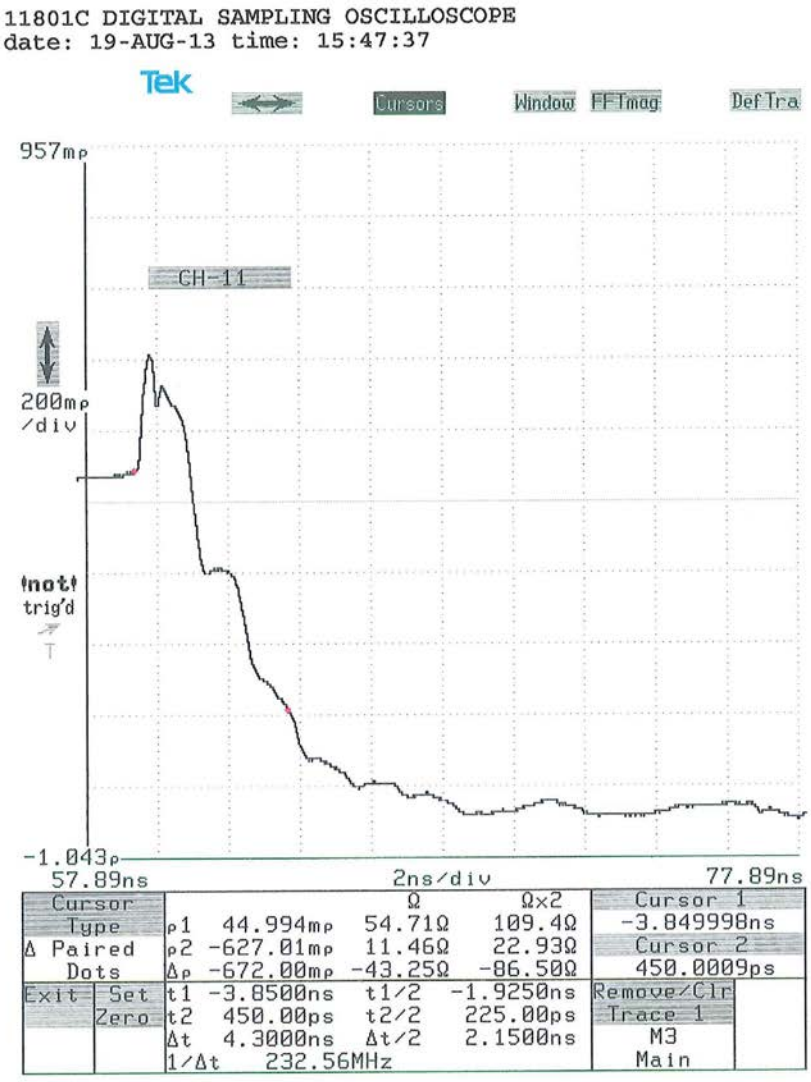

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 15:47:37
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-11
200mρ
/div
not
trig'd
-1.043ρ
57.89ns
2ns/div
77.89ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
ρ1 44.994mρ 54.71Ω 109.4Ω
ρ2 -627.01mρ 11.46Ω 22.93Ω
Δρ -672.00mρ -43.25Ω -86.50Ω
t1 -3.8500ns t1/2 -1.9250ns
t2 450.00ps t2/2 225.00ps
Δt 4.3000ns Δt/2 2.1500ns
1/Δt 232.56MHz
Ω
Ωx2
Cursor 1
-3.849998ns
Cursor 2
450.0009ps
Remove/Clr
Trace 1
M3
Main

FIGURE #16

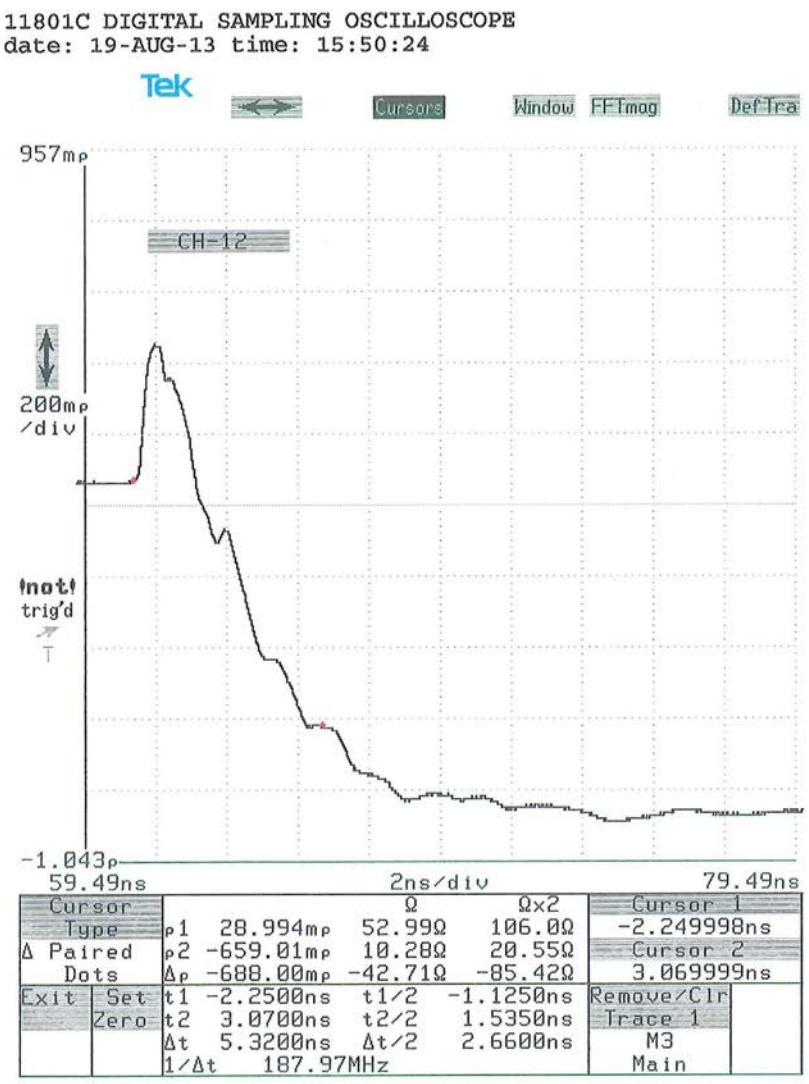

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 15:50:24
Tek
Cursors
Window
FFTmag
Def Tra
957mρ
CH-12
200mρ /div
!not! trig'd
-1.043ρ
59.49ns
2ns/div
79.49ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 28.994mρ 52.99Ω 106.0Ω
ρ2 -659.01mρ 10.28Ω 20.55Ω
Δρ -688.00mρ -42.71Ω -85.42Ω
t1 -2.2500ns t1/2 -1.1250ns
t2 3.0700ns t2/2 1.5350ns
Δt 5.3200ns Δt/2 2.6600ns
1/Δt 187.97MHz
Cursor 1
-2.249998ns
Cursor 2
3.069999ns
Remove/Clr Trace 1
M3
Main

FIGURE #17

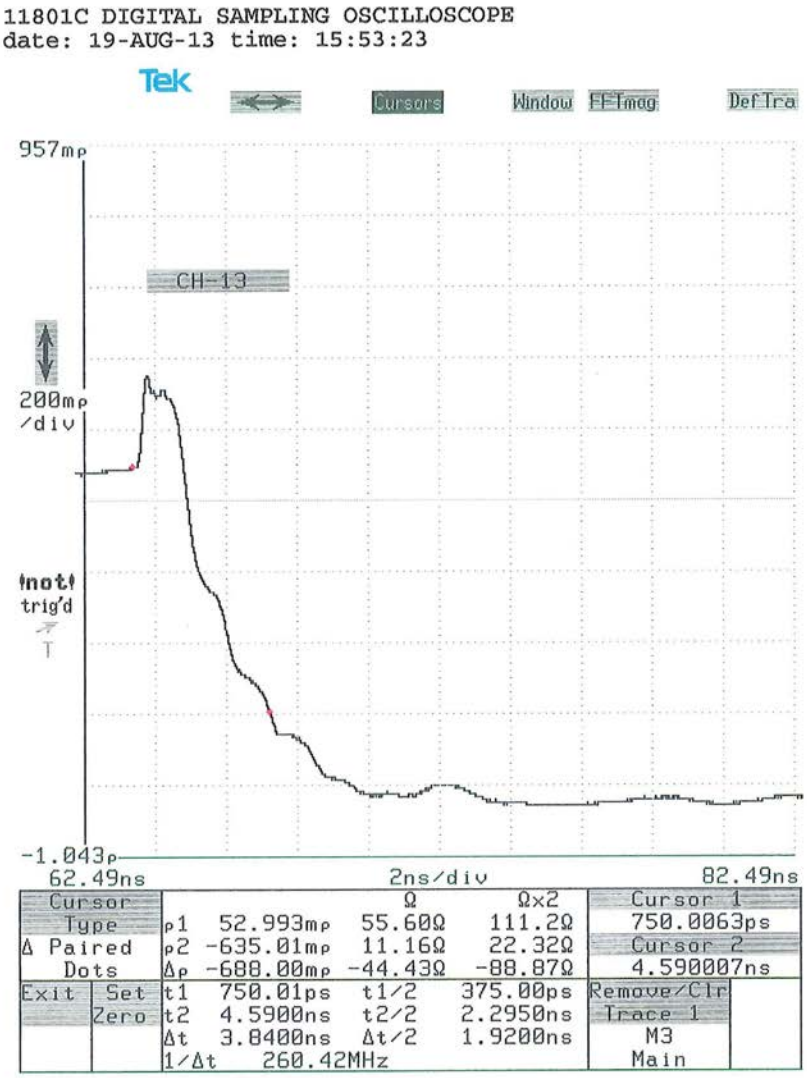


FIGURE #18

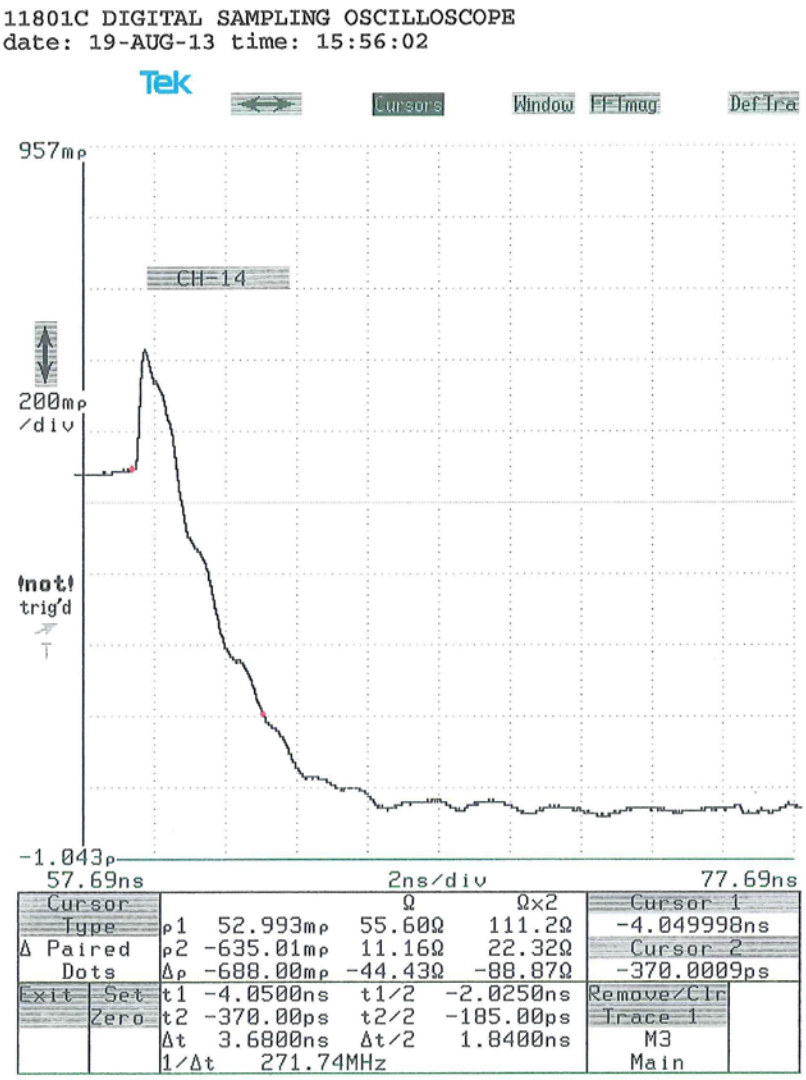

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 15:56:02
Tek
Cursors
Window
FFTmag
DefTrc
957mρ
CH-14
200mρ
/div
!not!
trig'd
-1.043ρ
57.69ns
2ns/div
77.69ns
Cursor
Type
Δ Paired
Dots
Exit
Set
Zero
Ω
Ωx2
ρ1 52.993mρ 55.60Ω 111.2Ω
ρ2 -635.01mρ 11.16Ω 22.32Ω
Δρ -688.00mρ -44.43Ω -88.87Ω
t1 -4.0500ns t1/2 -2.0250ns
t2 -370.00ps t2/2 -185.00ps
Δt 3.6800ns Δt/2 1.8400ns
1/Δt 271.74MHz
Cursor 1
-4.049998ns
Cursor 2
-370.0009ps
Remove/Clr
Trace 1
M3
Main

FIGURE #19

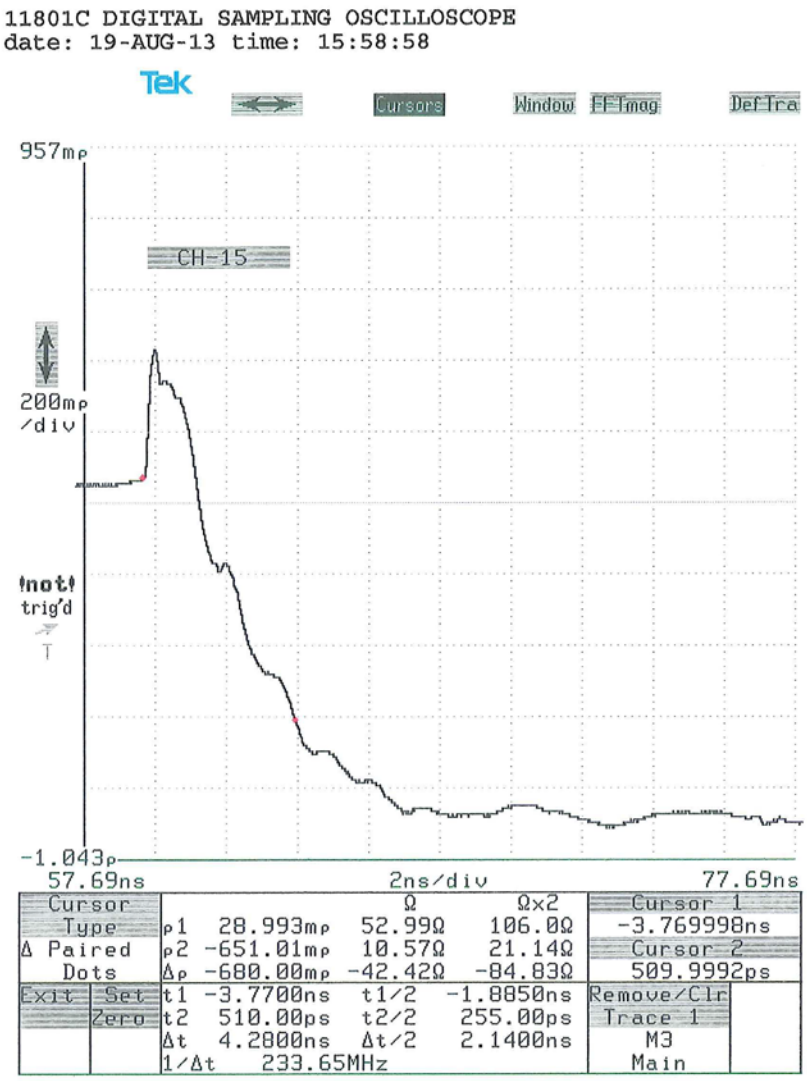


FIGURE #20

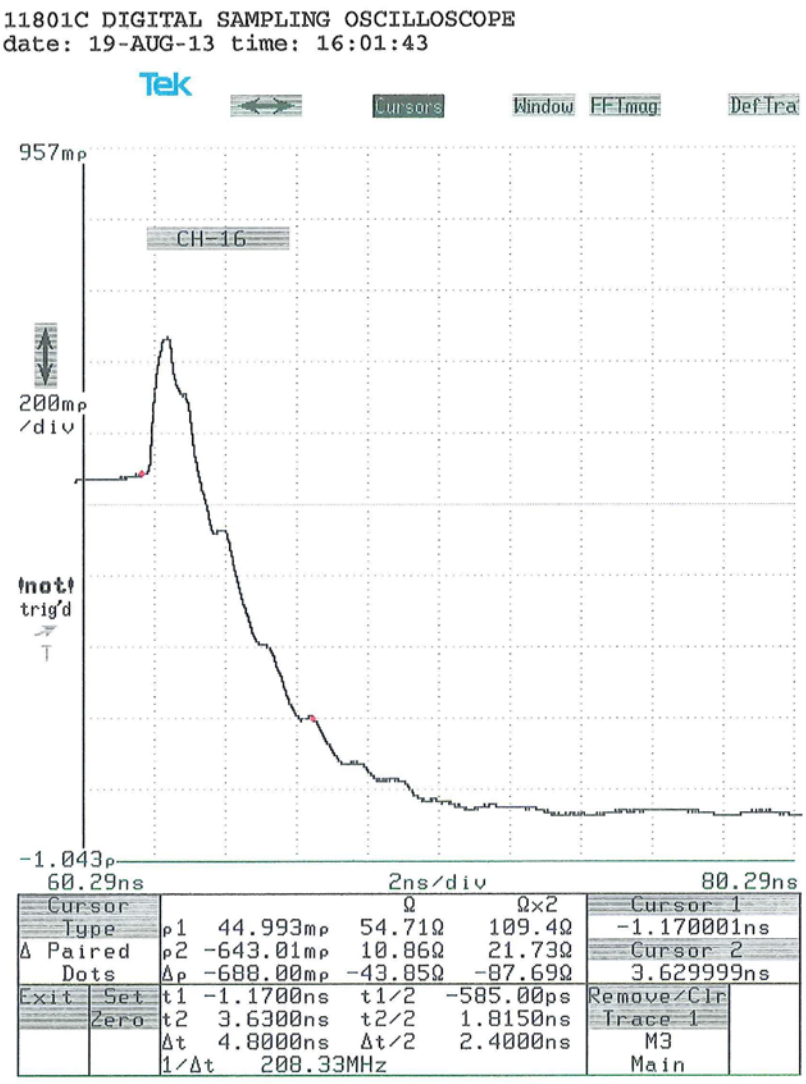

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:01:43
Tek
Cursors
Window
FFTmag
Def Tra
957mρ
CH-16
200mρ /div
Not trig'd
-1.043ρ
60.29ns
2ns/div
80.29ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 44.993mρ 54.71Ω 109.4Ω
ρ2 -643.01mρ 10.86Ω 21.73Ω
Δρ -688.00mρ -43.85Ω -87.69Ω
t1 -1.1700ns t1/2 -585.00ps
t2 3.6300ns t2/2 1.8150ns
Δt 4.8000ns Δt/2 2.4000ns
1/Δt 208.33MHz
Cursor 1
-1.170001ns
Cursor 2
3.629999ns
Remove/Clr Trace 1
M3
Main

FIGURE #21

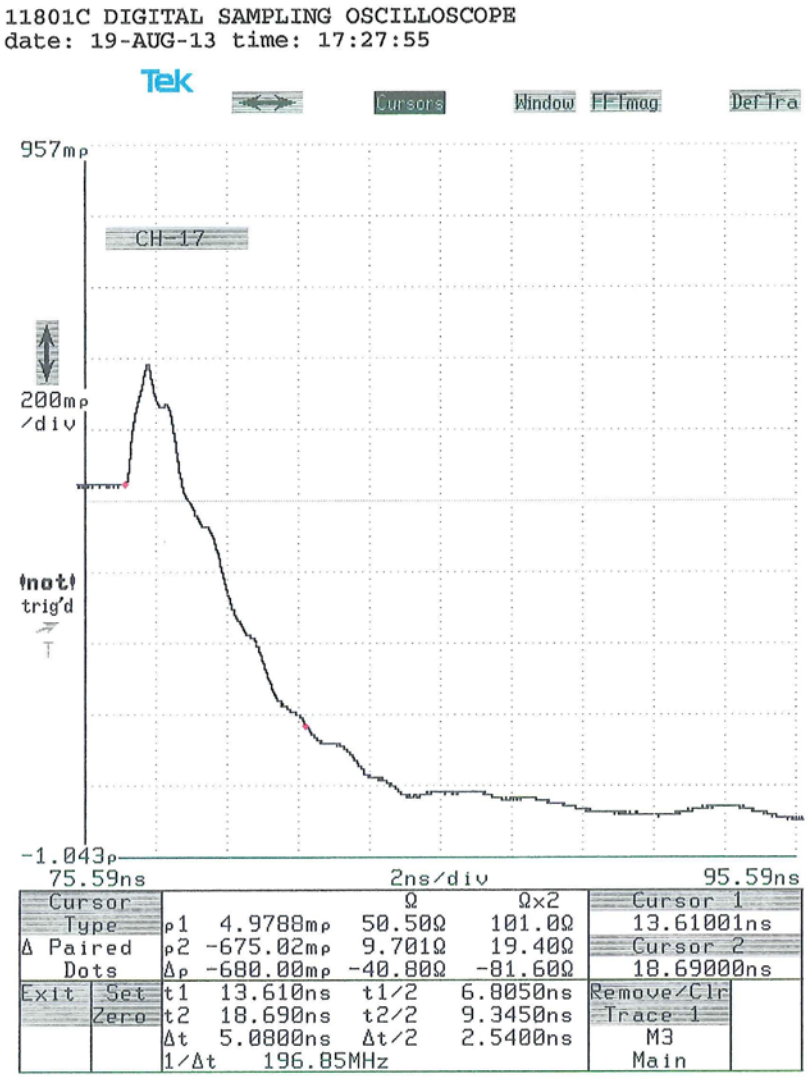

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 17:27:55
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-17
200mρ
/div
not
trig'd
-1.043ρ
75.59ns
2ns/div
95.59ns
Cursor
Type
Δ Paired
Dots
Exit
Set
Zero
Ω
Ωx2
ρ1 4.9788mρ 50.50Ω 101.0Ω
ρ2 -675.02mρ 9.701Ω 19.40Ω
Δρ -680.00mρ -40.80Ω -81.60Ω
t1 13.610ns t1/2 6.8050ns
t2 18.690ns t2/2 9.3450ns
Δt 5.0800ns Δt/2 2.5400ns
1/Δt 196.85MHz
Cursor 1
13.61001ns
Cursor 2
18.69000ns
Remove/Clr
Trace 1
M3
Main

FIGURE #22

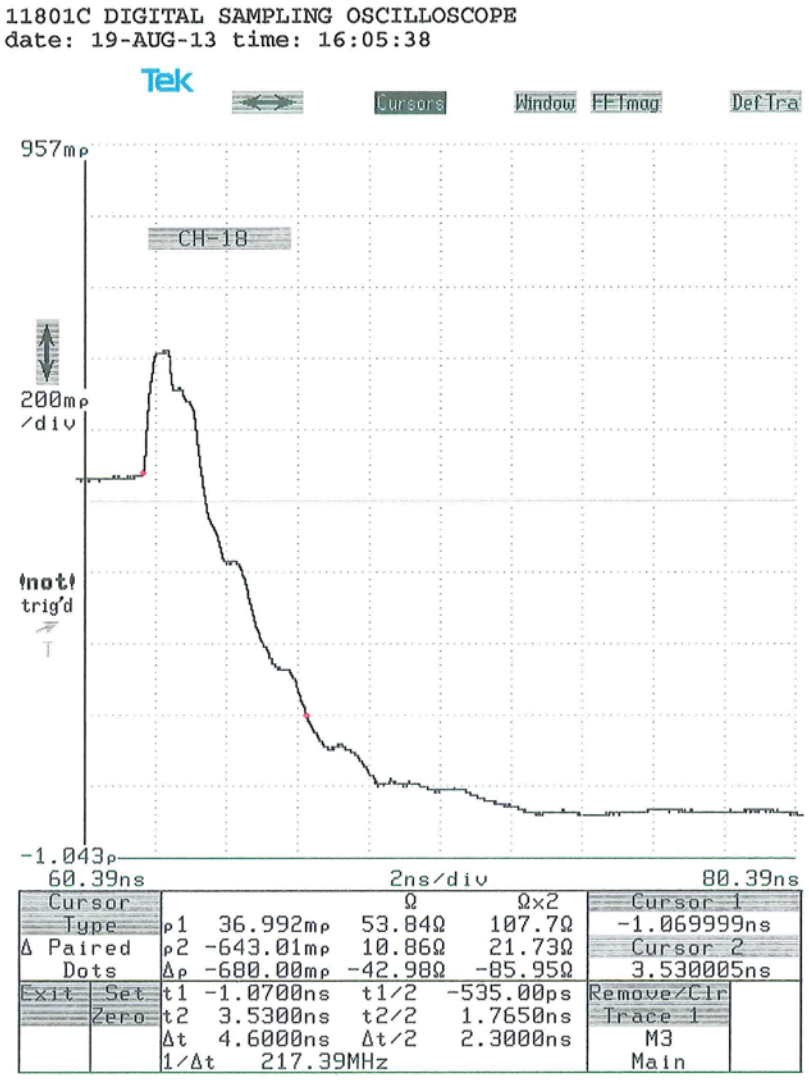

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:05:38
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-18
200mρ /div
not trig'd
-1.043ρ
60.39ns
2ns/div
80.39ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
ΩxΩ
ρ1 36.992mρ 53.84Ω 107.7Ω
ρ2 -643.01mρ 10.86Ω 21.73Ω
Δρ -680.00mρ -42.98Ω -85.95Ω
t1 -1.0700ns t1/2 -535.00ps
t2 3.5300ns t2/2 1.7650ns
Δt 4.6000ns Δt/2 2.3000ns
1/Δt 217.39MHz
Cursor 1
-1.069999ns
Cursor 2
3.530005ns
Remove/Clr Trace 1
M3
Main

FIGURE #23

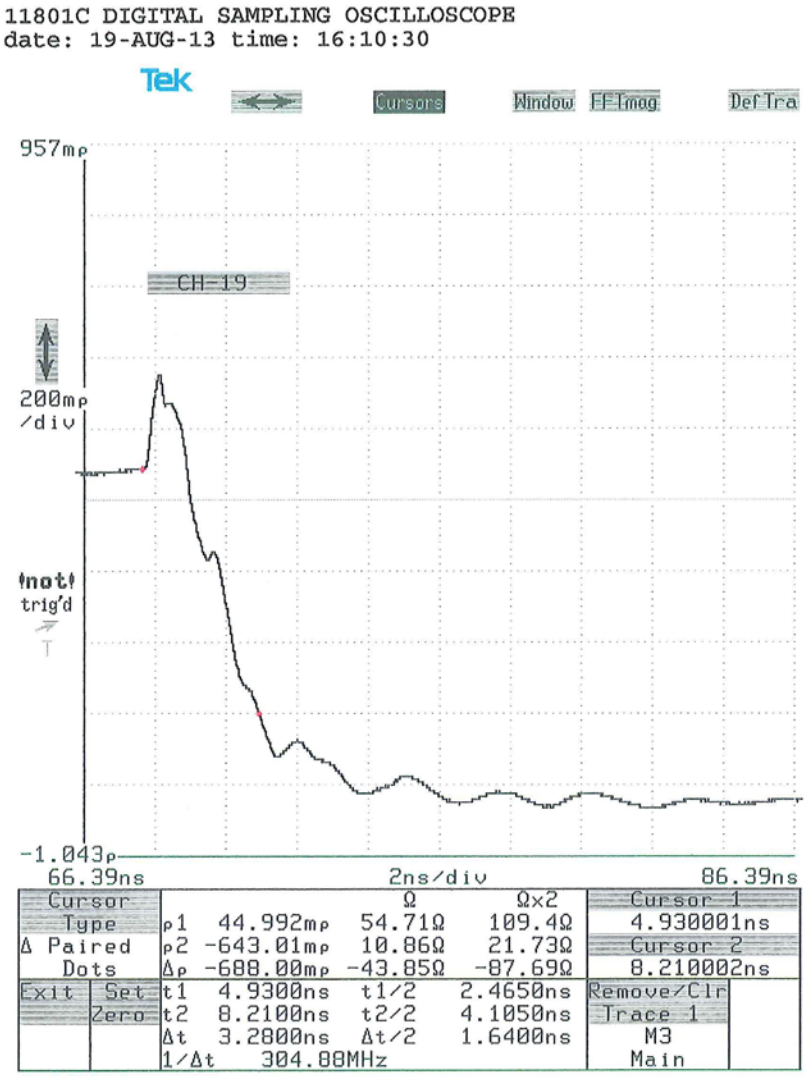


FIGURE #24

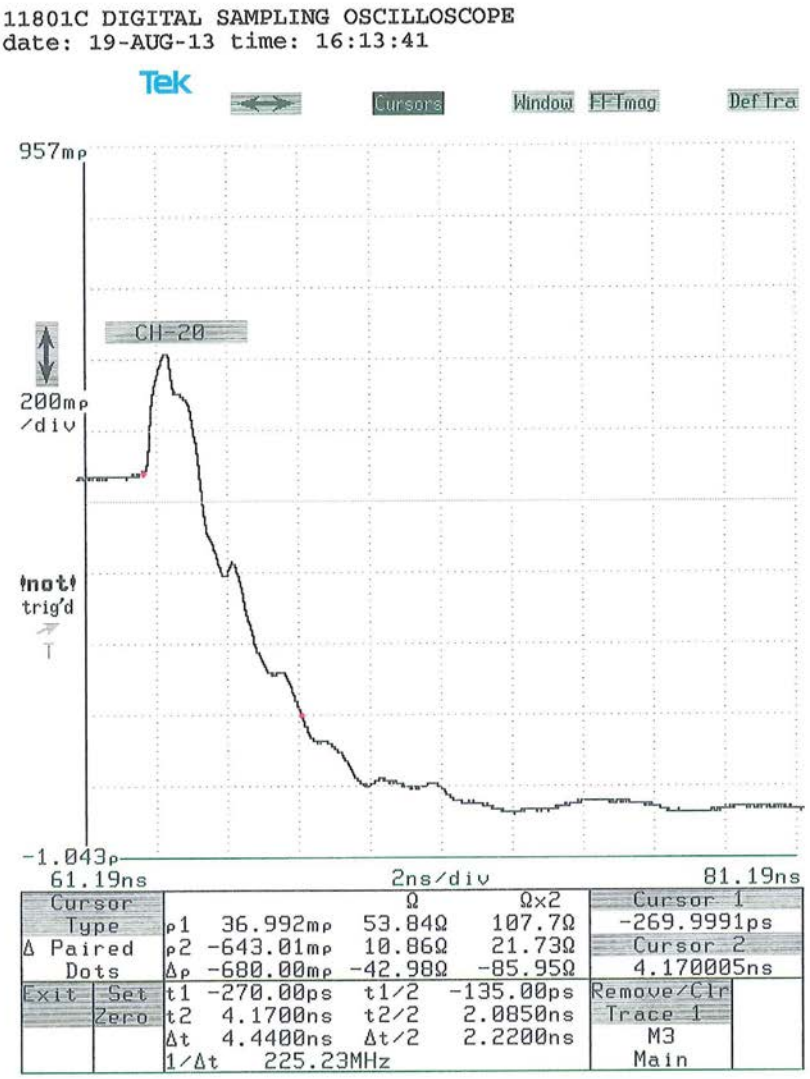

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:13:41
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-20
200mρ
/div
not
trig'd
-1.043ρ
61.19ns
2ns/div
81.19ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 36.992mρ 53.84Ω 107.7Ω
ρ2 -643.01mρ 10.86Ω 21.73Ω
Δρ -680.00mρ -42.98Ω -85.95Ω
t1 -270.00ps t1/2 -135.00ps
t2 4.1700ns t2/2 2.0850ns
Δt 4.4400ns Δt/2 2.2200ns
1/Δt 225.23MHz
Cursor 1
-269.9991ps
Cursor 2
4.170005ns
Remove/Clr Trace 1
M3
Main

FIGURE #25

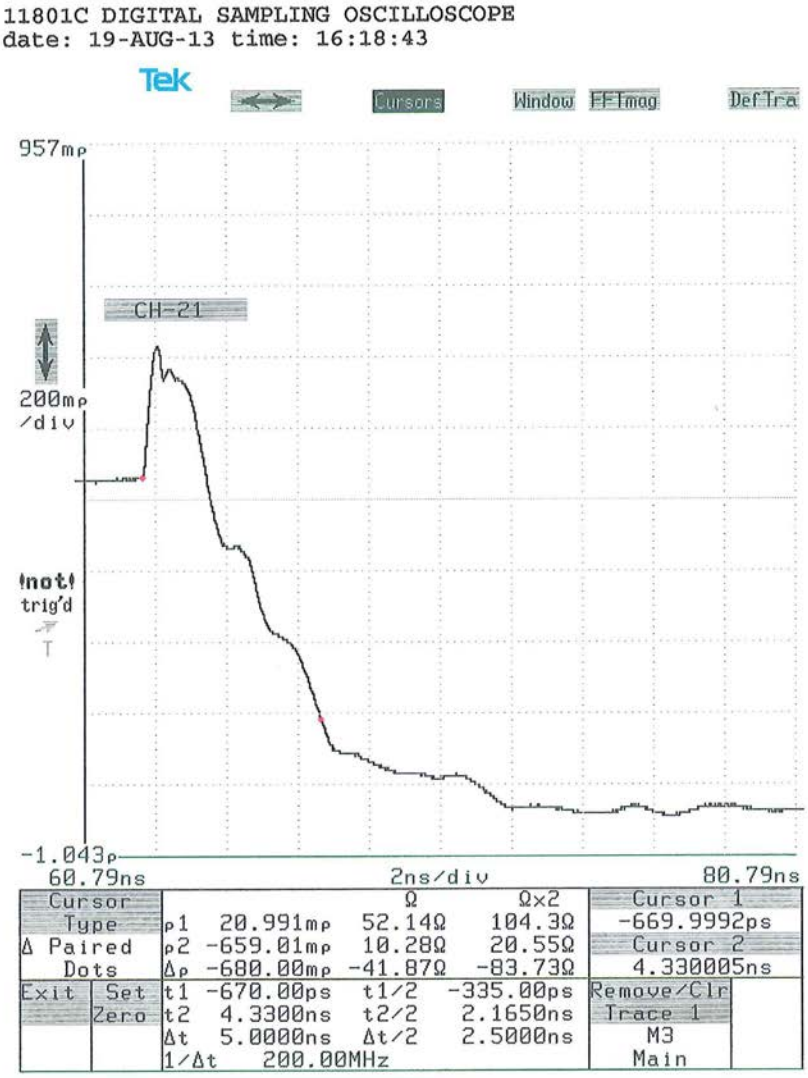


FIGURE #26

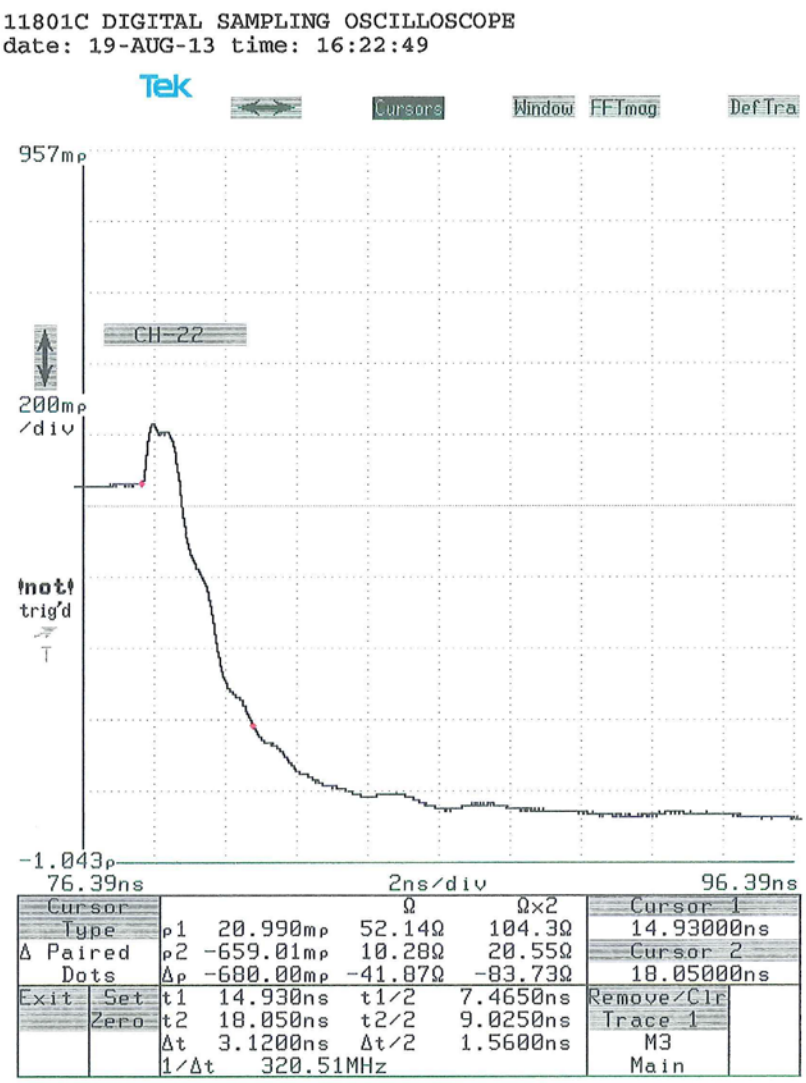

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:22:49
Tek
Cursors
Window
FFTmag
Def Tra
957mρ
CH-22
200mρ /div
!not!
trig'd
-1.043ρ
76.39ns
2ns/div
96.39ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 20.990mρ 52.14Ω 104.3Ω
ρ2 -659.01mρ 10.28Ω 20.55Ω
Δρ -680.00mρ -41.87Ω -83.73Ω
t1 14.930ns t1/2 7.4650ns
t2 18.050ns t2/2 9.0250ns
Δt 3.1200ns Δt/2 1.5600ns
1/Δt 320.51MHz
Cursor 1
14.93000ns
Cursor 2
18.05000ns
Remove/Clr Trace 1
M3
Main

FIGURE #27

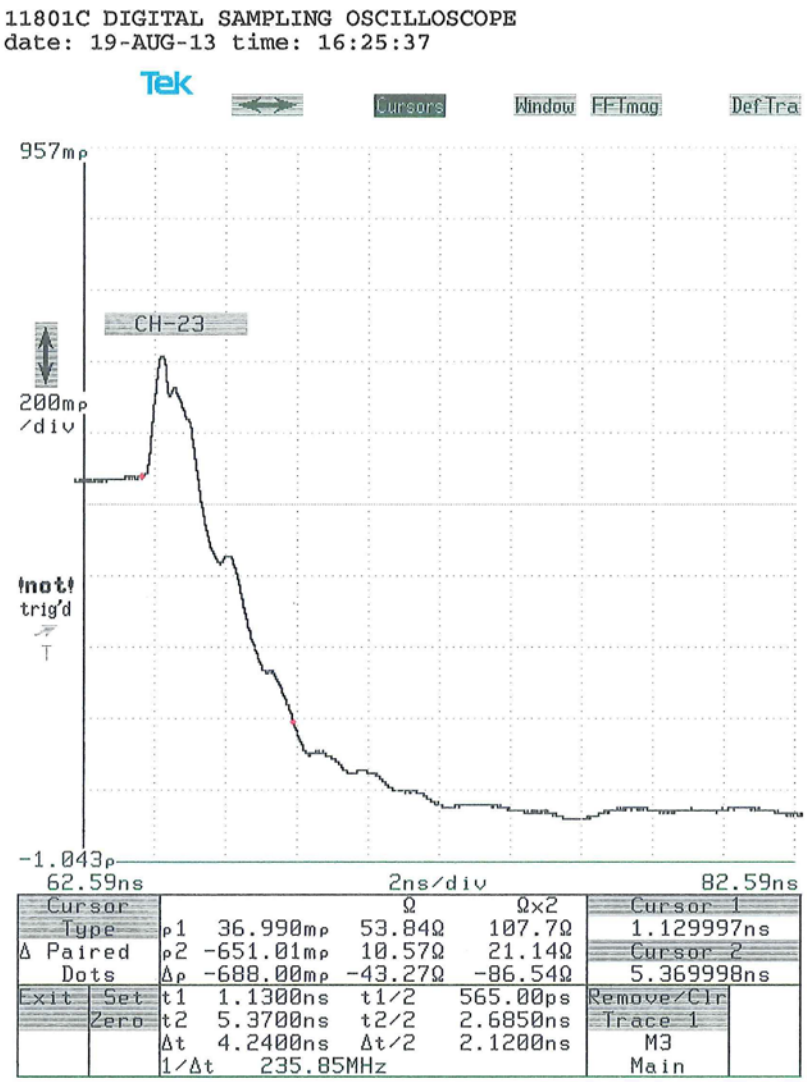

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:25:37
Tek
Cursors
Window
FFTmag
Def Tra
957mρ
CH-23
200mρ /div
not trig'd
-1.043ρ
62.59ns
2ns/div
82.59ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 36.990mρ 53.84Ω 107.7Ω
ρ2 -651.01mρ 10.57Ω 21.14Ω
Δρ -688.00mρ -43.27Ω -86.54Ω
t1 1.1300ns t1/2 565.00ps
t2 5.3700ns t2/2 2.6850ns
Δt 4.2400ns Δt/2 2.1200ns
1/Δt 235.85MHz
Cursor 1
1.129997ns
Cursor 2
5.369998ns
Remove/Clr Trace 1
M3
Main

FIGURE #28

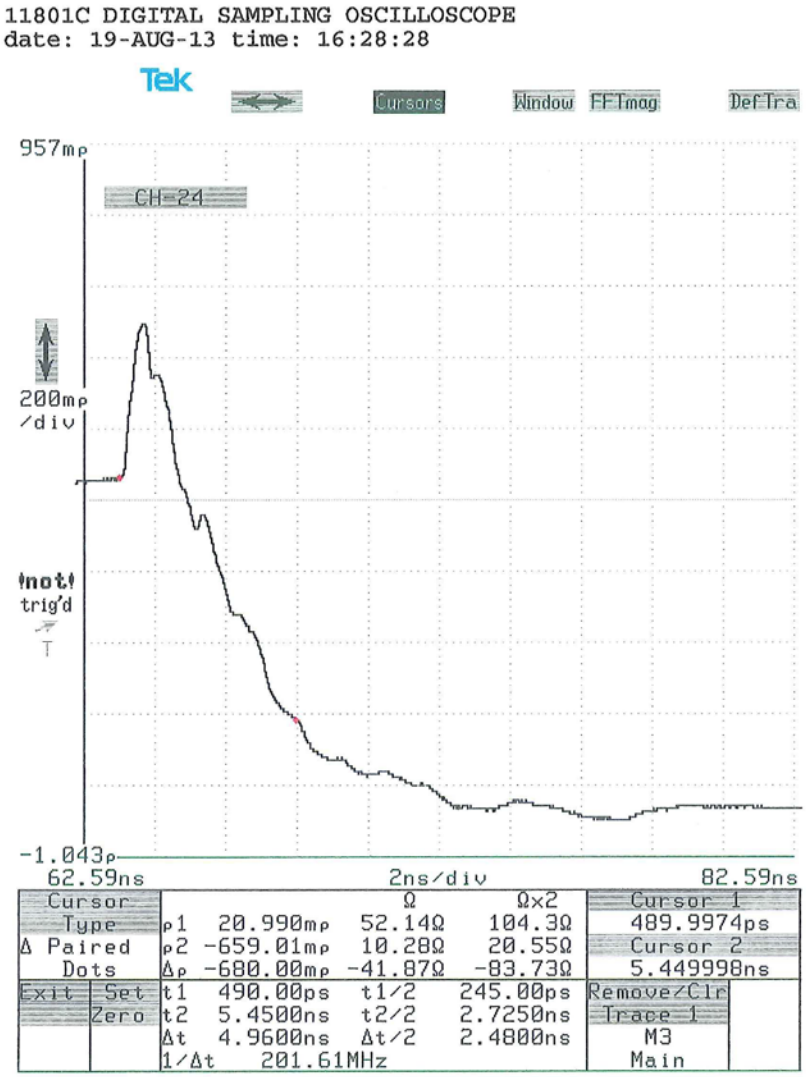


FIGURE #29

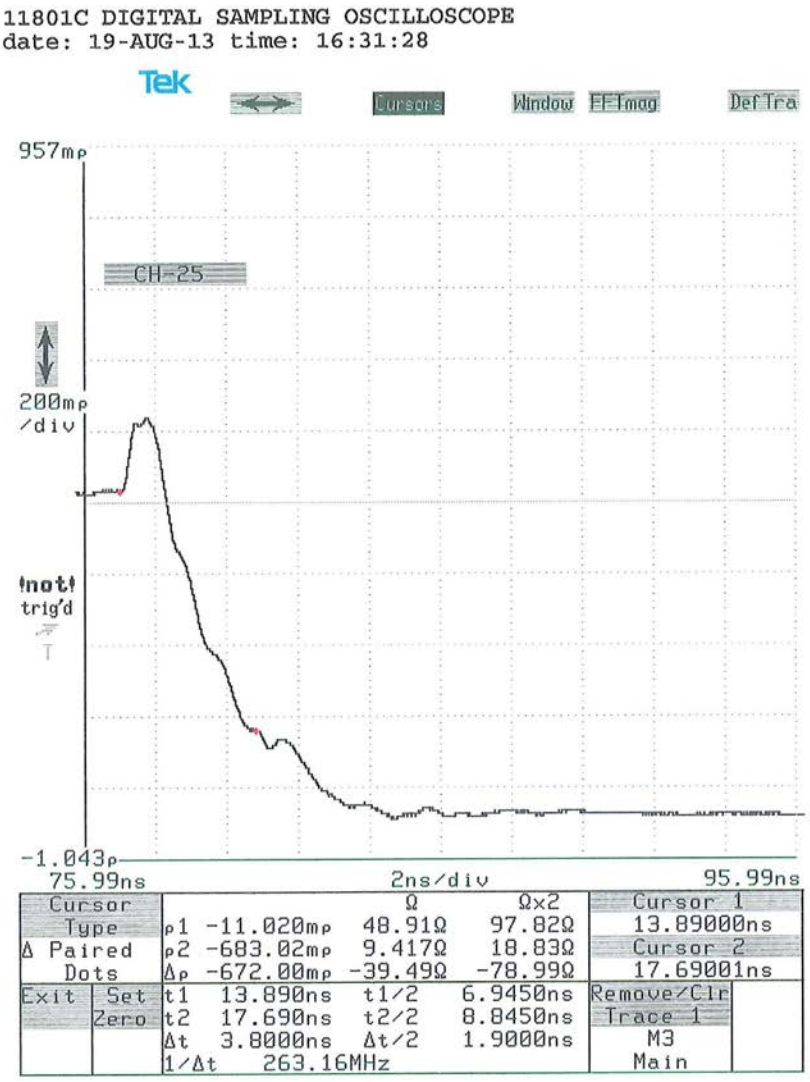

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:31:28
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-25
200mρ /div
!not!
trig'd
-1.043ρ
75.99ns
2ns/div
95.99ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 -11.020mρ 48.91Ω 97.82Ω
ρ2 -683.02mρ 9.417Ω 18.83Ω
Δρ -672.00mρ -39.49Ω -78.99Ω
t1 13.890ns t1/2 6.9450ns
t2 17.690ns t2/2 8.8450ns
Δt 3.8000ns Δt/2 1.9000ns
1/Δt 263.16MHz
Cursor 1
13.89000ns
Cursor 2
17.69001ns
Remove/Clr Trace 1
M3
Main

FIGURE #30

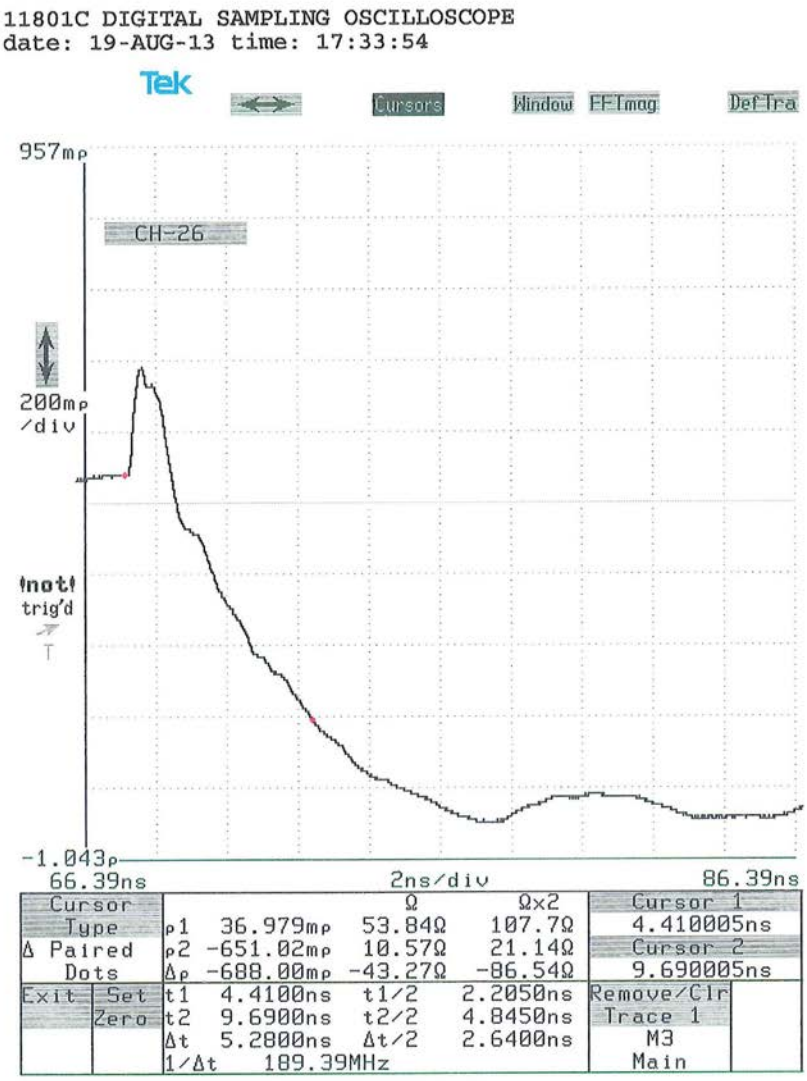


FIGURE #31

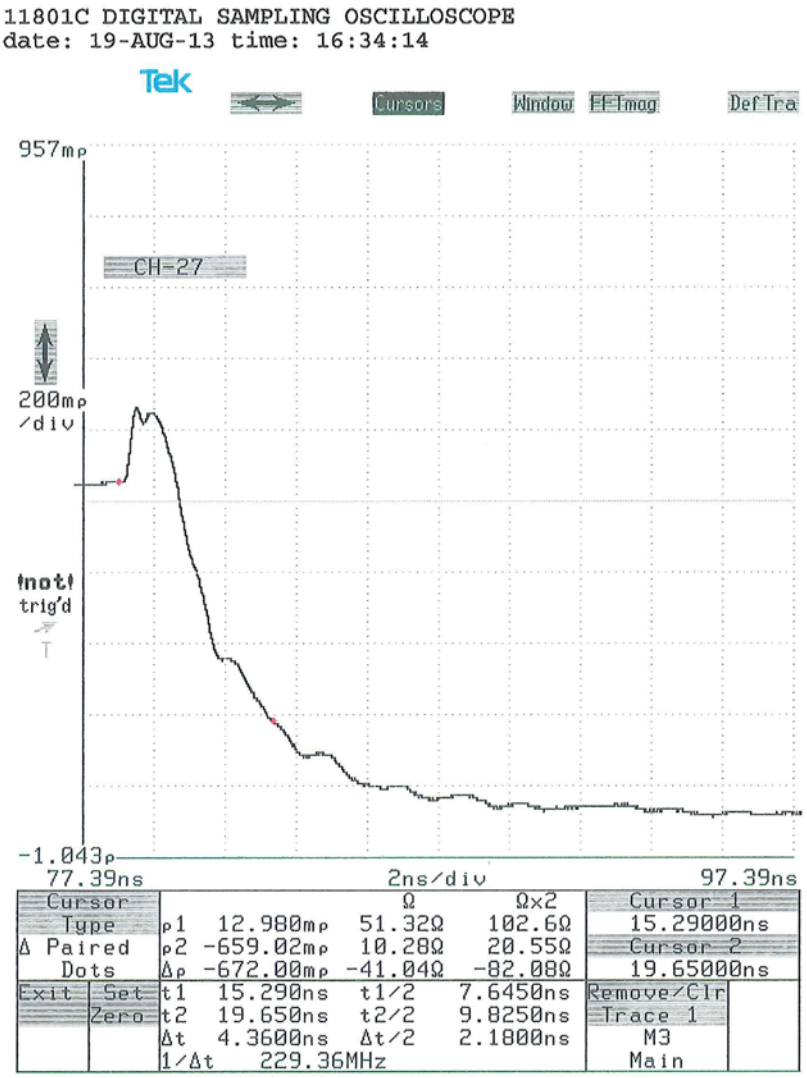

11801C DIGITAL SAMPLING OSCILLOSCOPE
date: 19-AUG-13 time: 16:34:14
Tek
Cursors
Window
FFTmag
DefTra
957mρ
CH-27
200mρ /div
!not!
trig'd
-1.043ρ
77.39ns
2ns/div
97.39ns
Cursor Type
Δ Paired Dots
Exit
Set Zero
Ω
Ωx2
ρ1 12.980mρ 51.32Ω 102.6Ω
ρ2 -659.02mρ 10.28Ω 20.55Ω
Δρ -672.00mρ -41.04Ω -82.08Ω
t1 15.290ns t1/2 7.6450ns
t2 19.650ns t2/2 9.8250ns
Δt 4.3600ns Δt/2 2.1800ns
1/Δt 229.36MHz
Cursor 1
15.29000ns
Cursor 2
19.65000ns
Remove/Clr
Trace 1
M3
Main

FIGURE #32

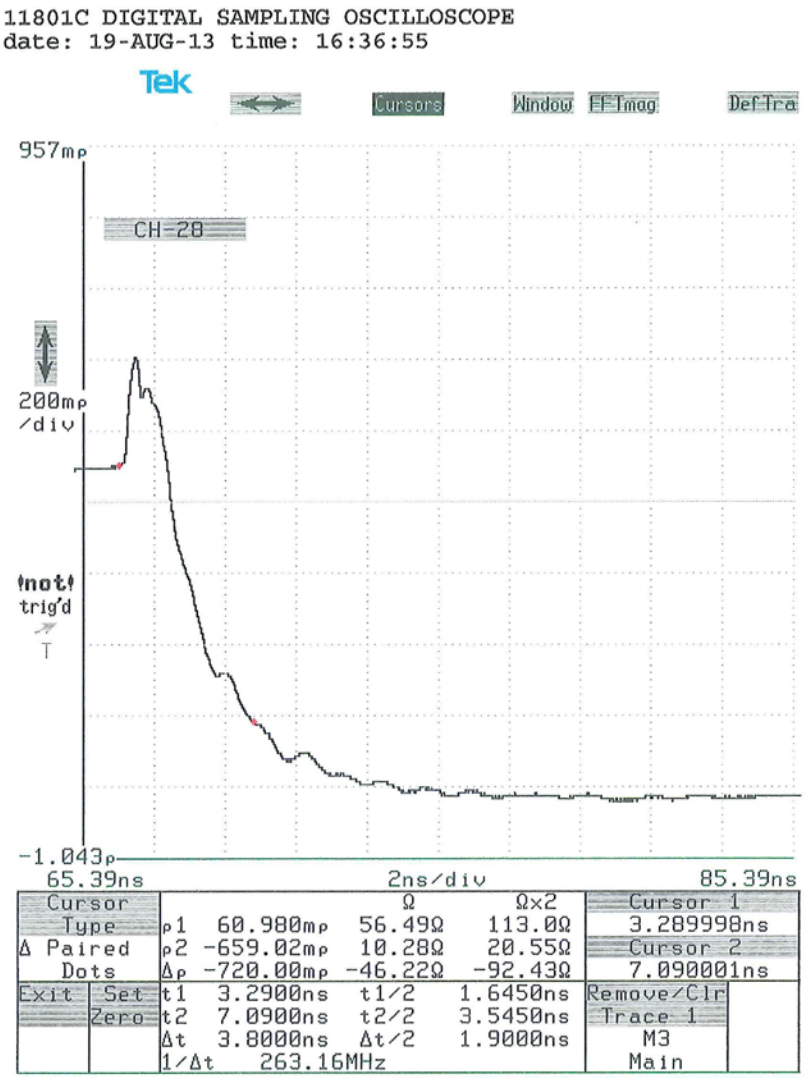


FIGURE #33

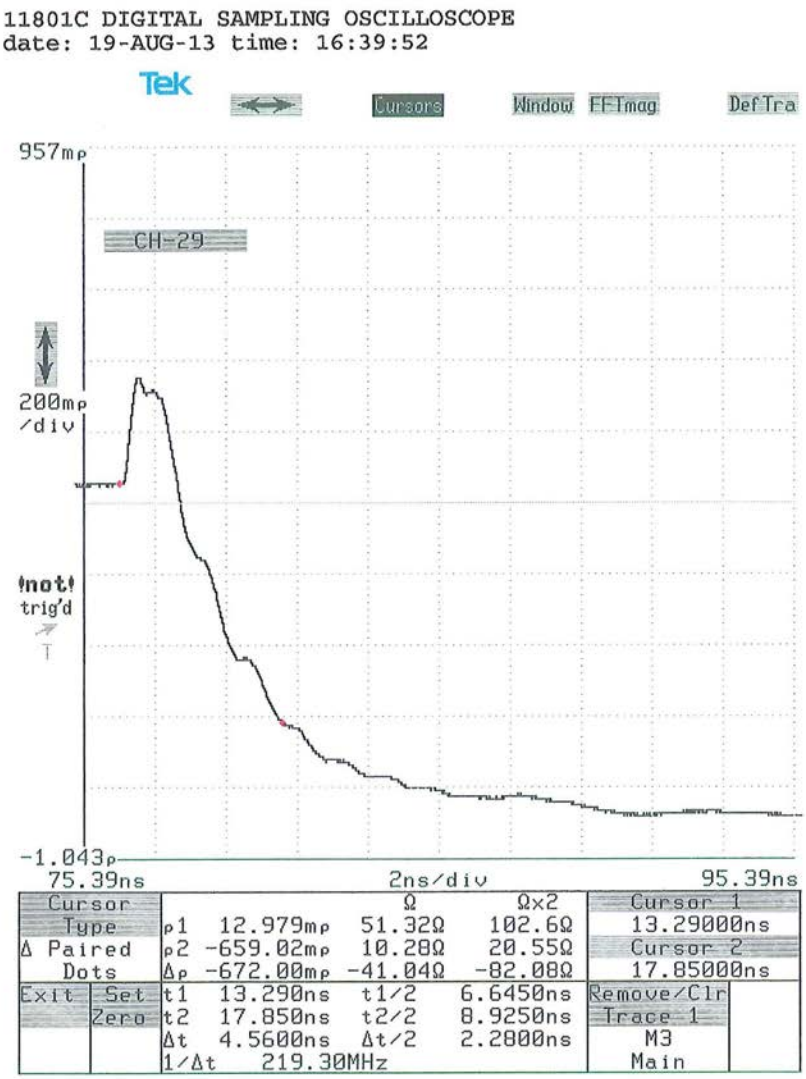


FIGURE #34

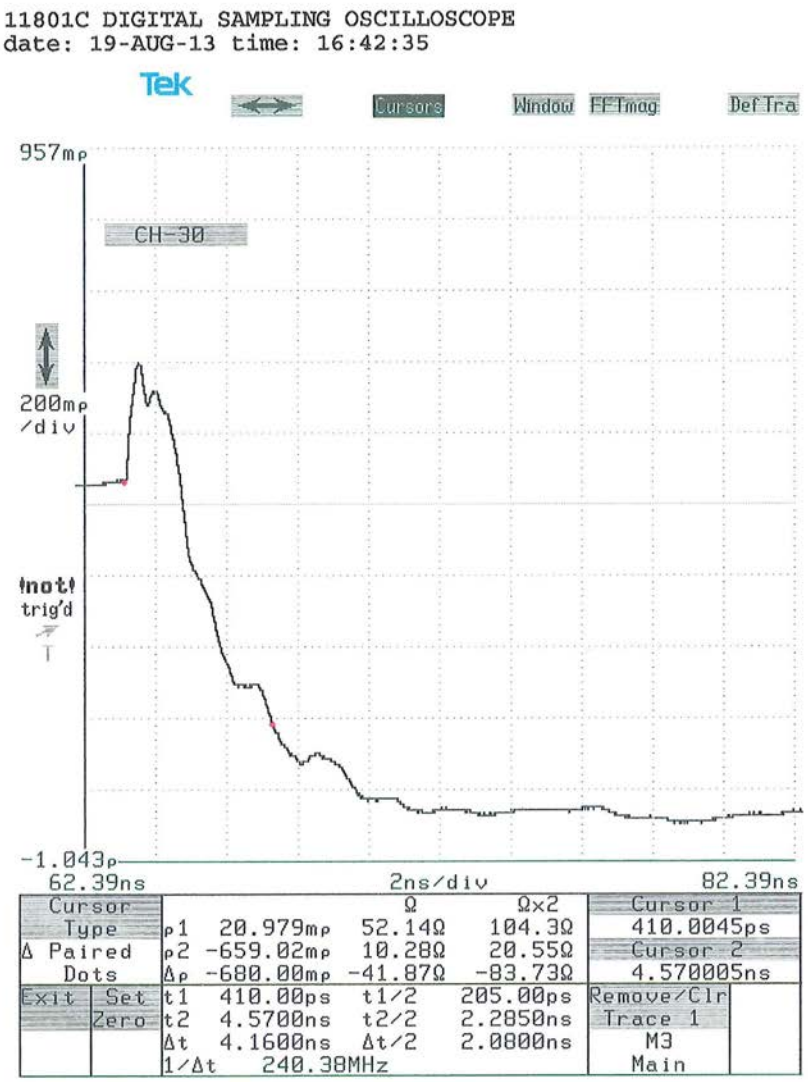


FIGURE #35

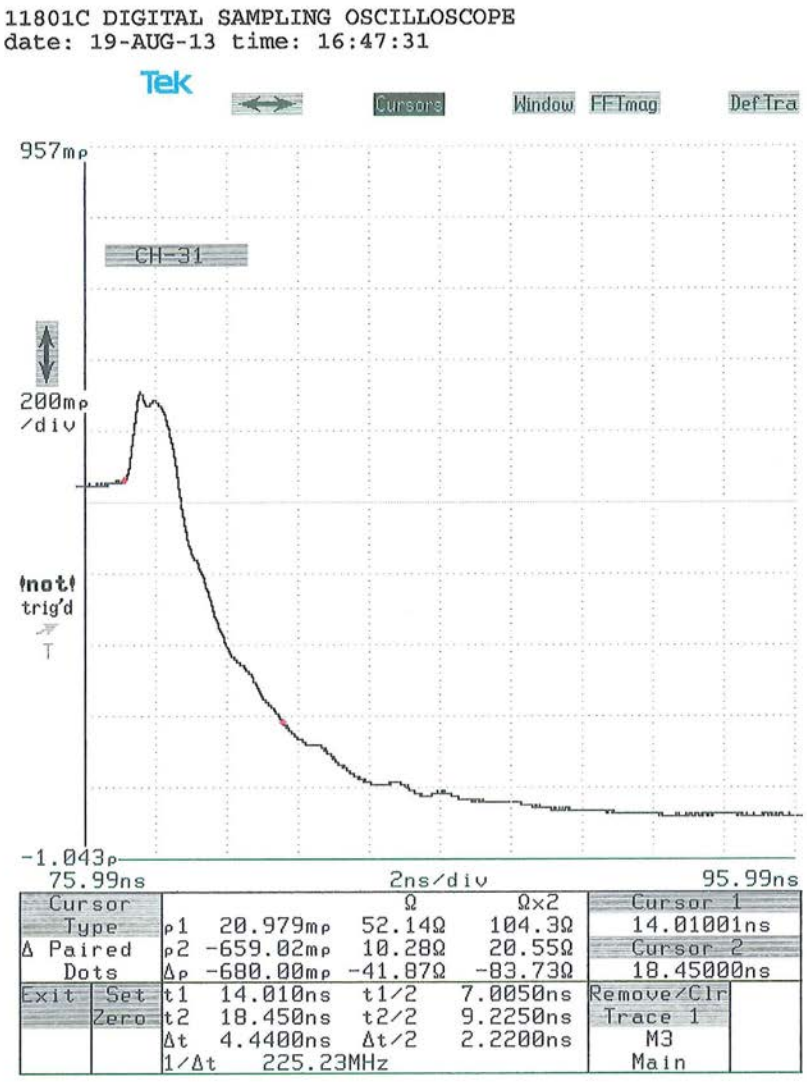
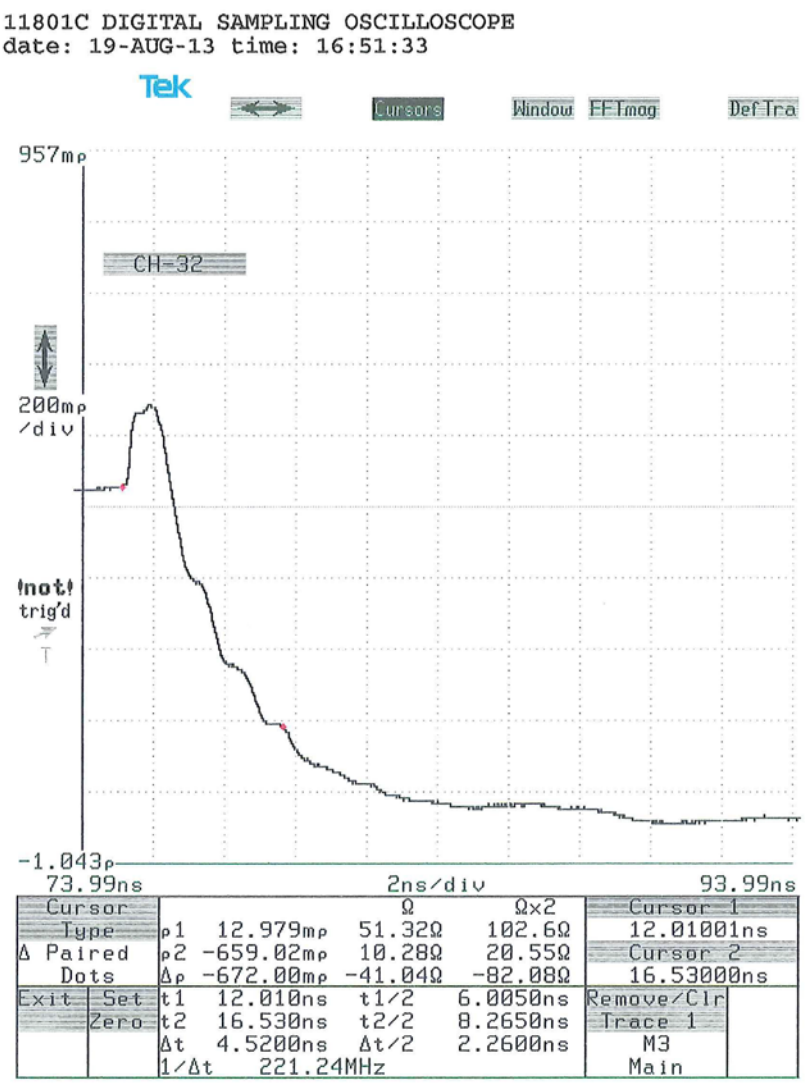


FIGURE #36



PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 2 Samples	TECHNICIAN: RT/MHB
START DATE: 9/6/13	COMPLETE DATE: 9/16/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 50%
EQUIPMENT ID#: 321, 553, 1028, 1047, 1166, 1167, 1168, 1271, 1272, 1556, 1634, 1681, 1727	

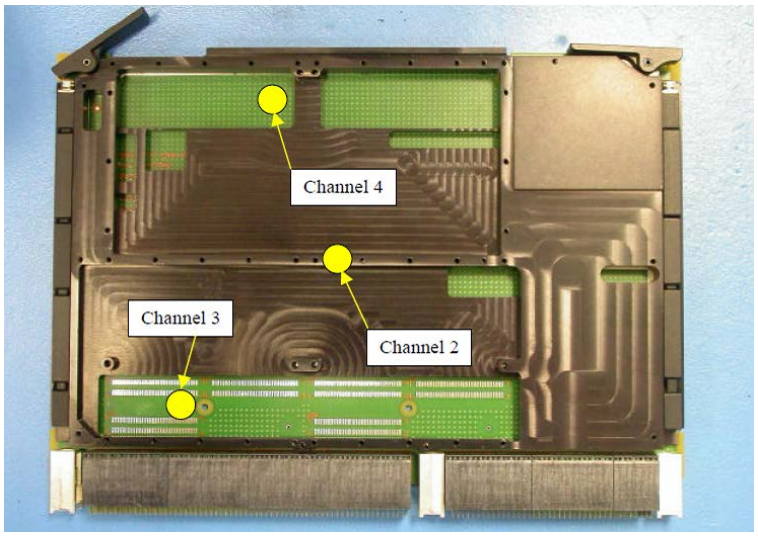
VIBRATION SCANS, SINUSOIDAL

PURPOSE:

To evaluate the (test samples and/or fixture) to determine if resonance occurs due to vibratory motion.

PROCEDURE:

1. The monitoring accelerometers were placed at the locations shown below:



-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Frequency	:	10 to 2000 to 10 Hz
b) Amplitude	:	0.06" da or 1 G
c) No. Of Sweeps	:	1
d) Sweep Time	:	20 minutes

3. The control accelerometer was places on the vibration table.

4. The response from the monitoring accelerometer was compared to the control accelerometer to determine the difference between the vibration equipment output and actual vibration level at the sample.

5. All subsequent variable testing was performed in accordance with procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

2. The results of the resonance sweep shall be recorded.

3. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

4. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

5. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS: See Next Page

RESULTS:

1. The following is a summary of the observed data:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# A1	+0.0	+0.5
ID# A2	-0.1	+0.8

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# A1	0.2	0.2	0.2
ID# A2	0.3	0.4	0.2

2. See data files 213041B01a, 213041B02a, 213041B03, 213041B04 for individual data points.

3. There was no evidence of arcing, breakdown, etc., when the specified test voltage was applied nor did the leakage current exceed 5.0 milliamps.

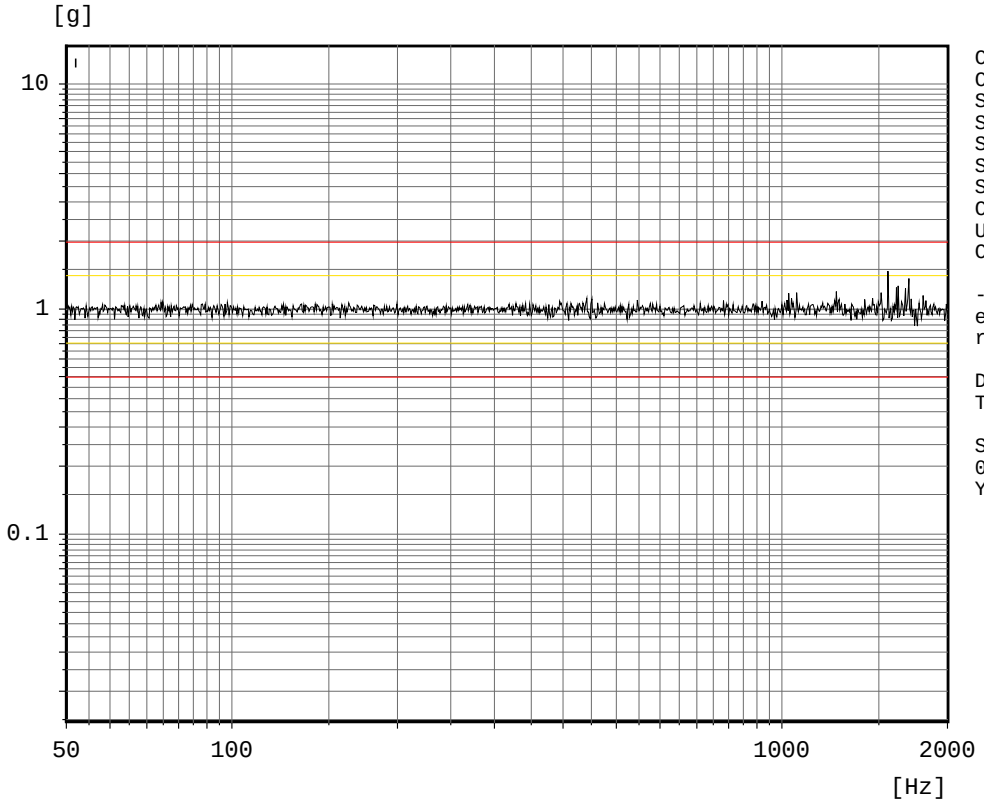
4. The results of the resonance scans are illustrated in the following Figures:

   Sample ID# A1 –Figure #s 37 through 48
   Sample ID# A2 –Figure #s 49 through 60

FIGURE #37

Sine

Channel 1

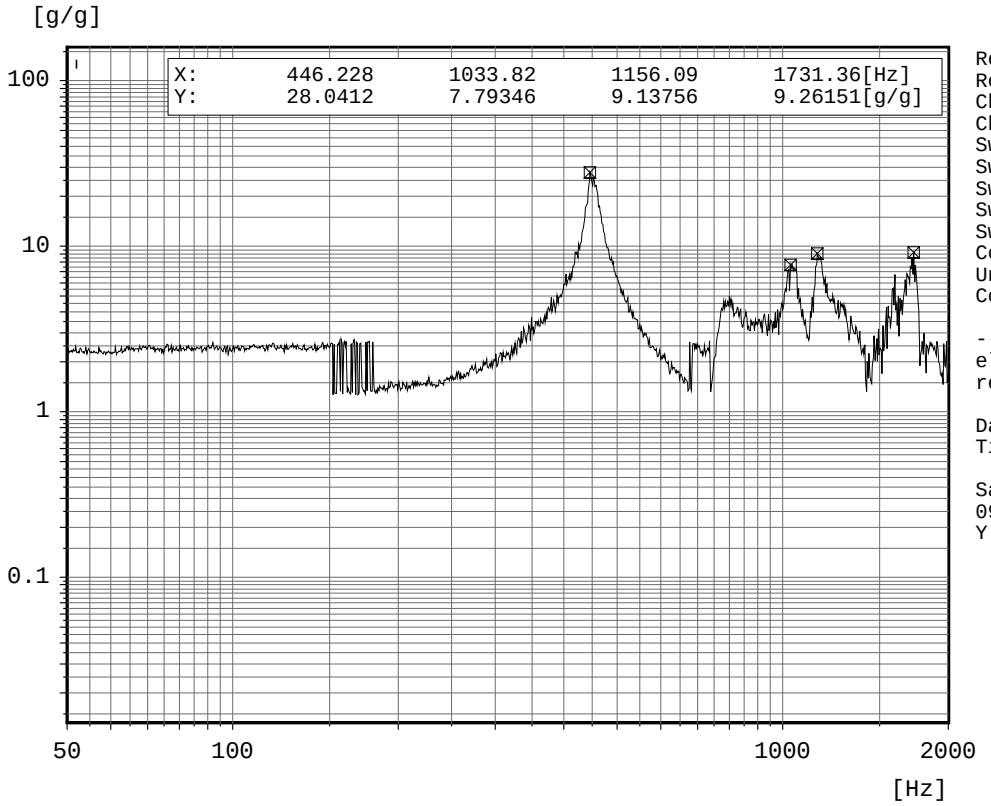



```
Chan.no:        1
Chan.type:      CW   Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.:  up
Sweep rate:       0.27 Oct/min
Contr.strat.:   Average
Unit:           g
Contr.strat.:   Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-06-13
Time:           09:16:57

Sample A1
09-06-13
Y Axis
```

FIGURE #38

Sine

Channel 2 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 2
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

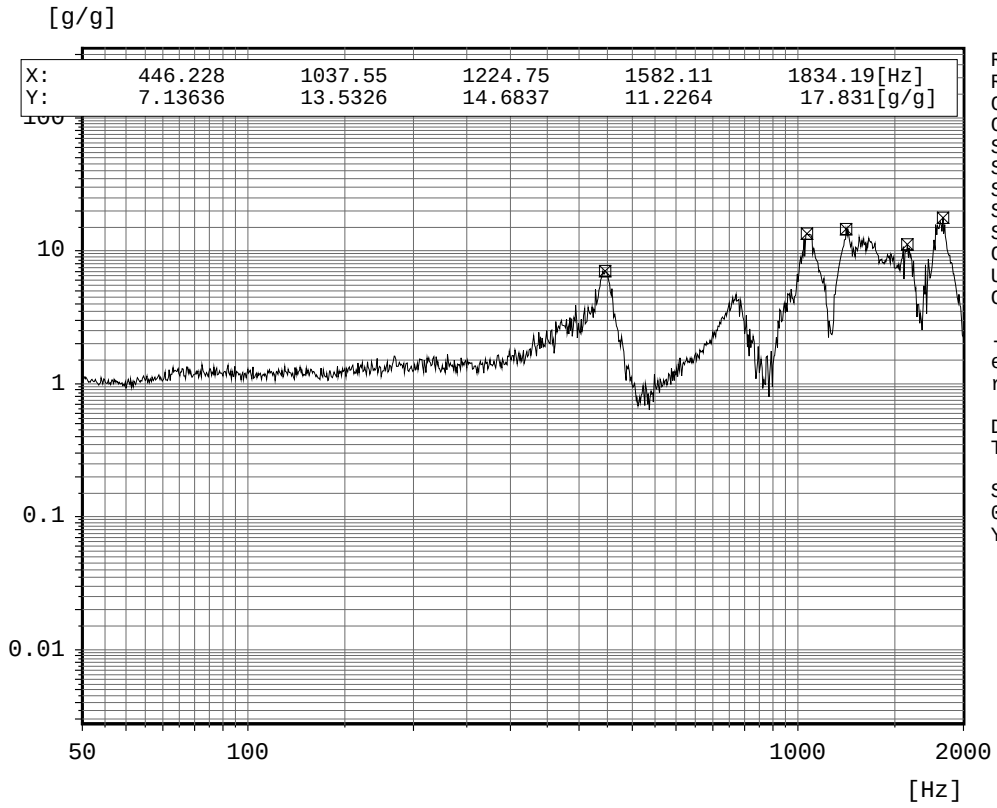
Date: 09-06-13
Time: 09:16:57

Sample A1
09-06-13
Y Axis

FIGURE #39

Sine

Channel 3 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 3
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

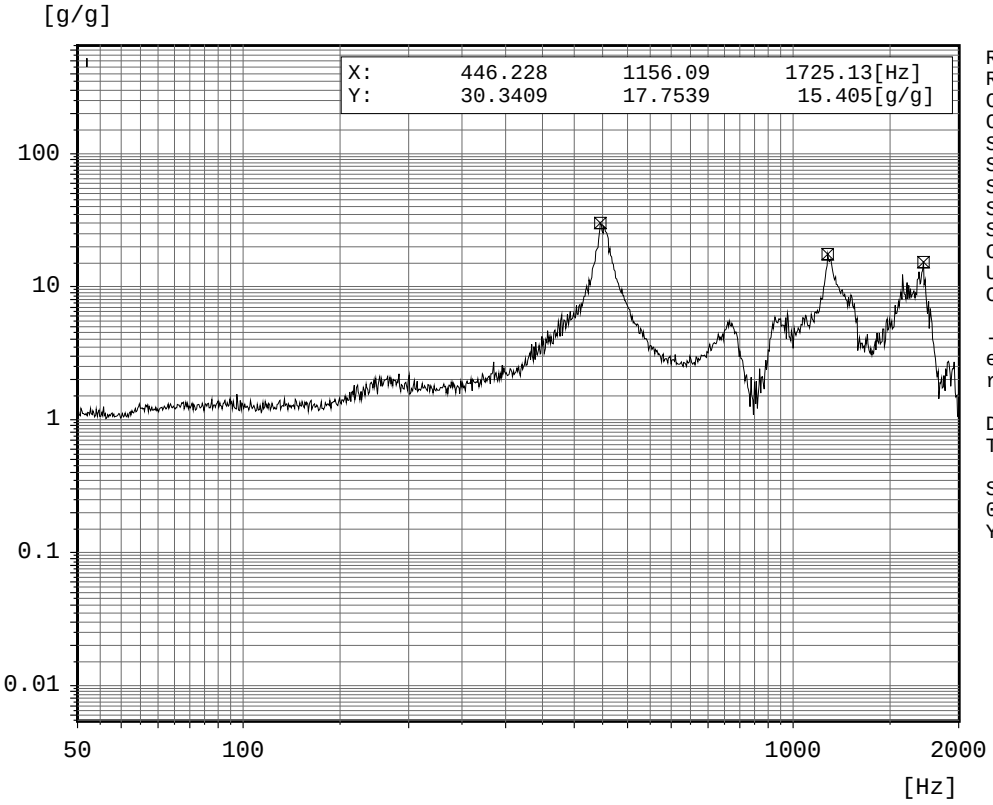
Date: 09-06-13
Time: 09:16:57

Sample A1
09-06-13
Y Axis

FIGURE #40

Sine

Channel 4 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 4
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

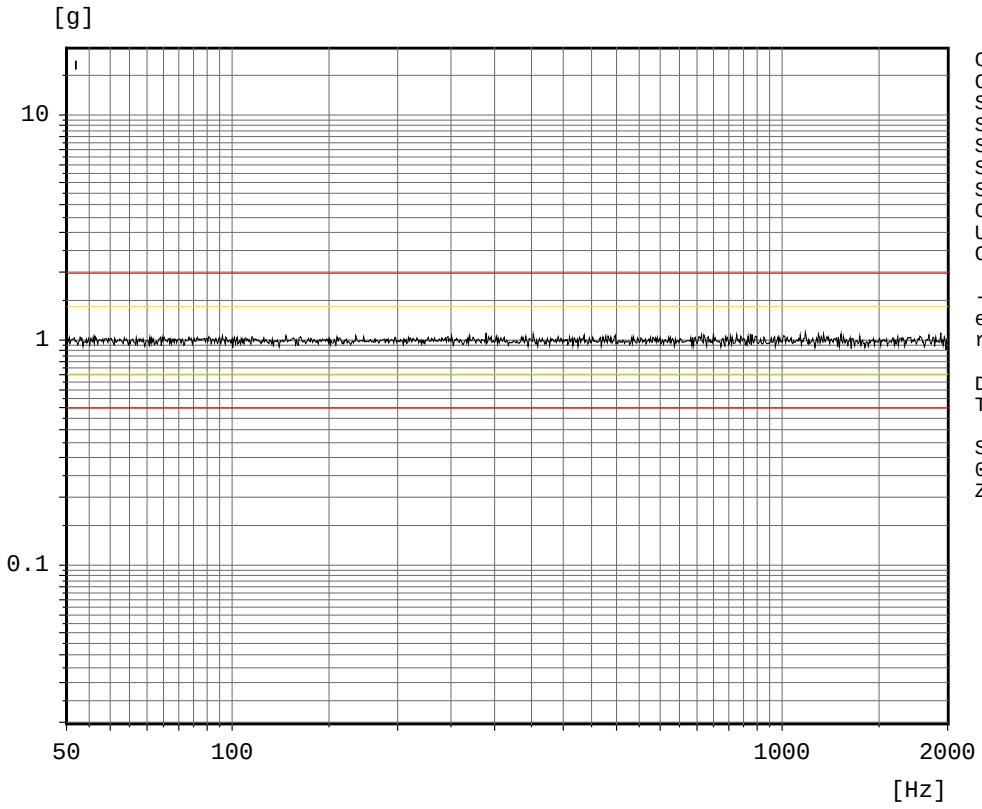
Date: 09-06-13
Time: 09:16:57

Sample A1
09-06-13
Y Axis

FIGURE #41

Sine

Channel 1

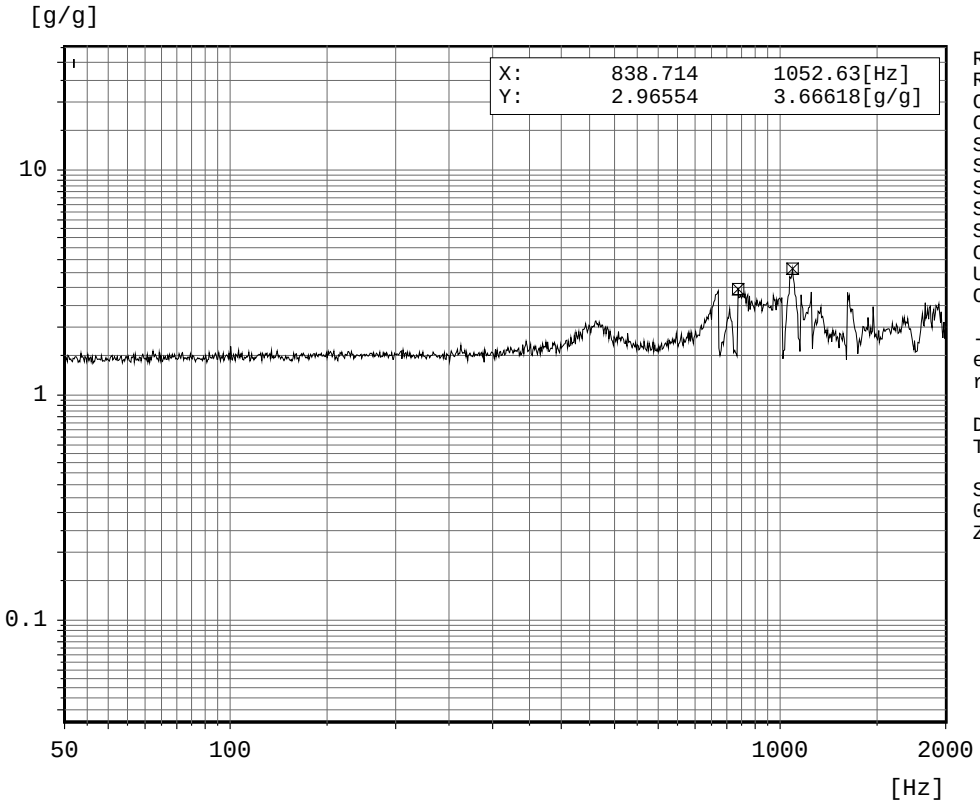



```
Chan.no:       1
Chan.type:     CW   Peak
Sweep type:    logarithmic
Sweeps done:   1
Sweeps req.:   1
Sweep direct.: up
Sweep rate:      0.27 Oct/min
Contr.strat.:  Average
Unit:          g
Contr.strat.:  Closed loop

-- Testing time --
elapsed:       000:19:59
remaining:     000:00:00

Date:          09-09-13
Time:          09:51:01

Sample A1 Run 2
09-09-13
Z Axis
```

FIGURE #42

Sine

Channel 2 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 2
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

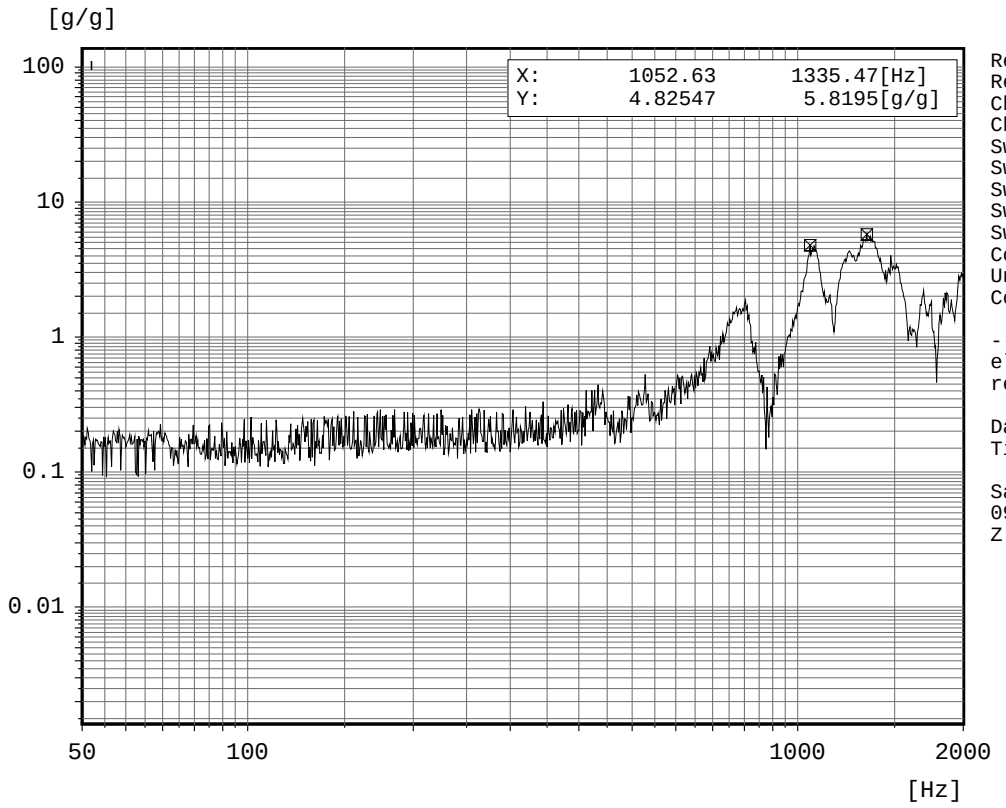
Date: 09-09-13
Time: 09:51:01

Sample A1 Run 2
09-09-13
Z Axis

FIGURE #43

Sine

Channel 3 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 3
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

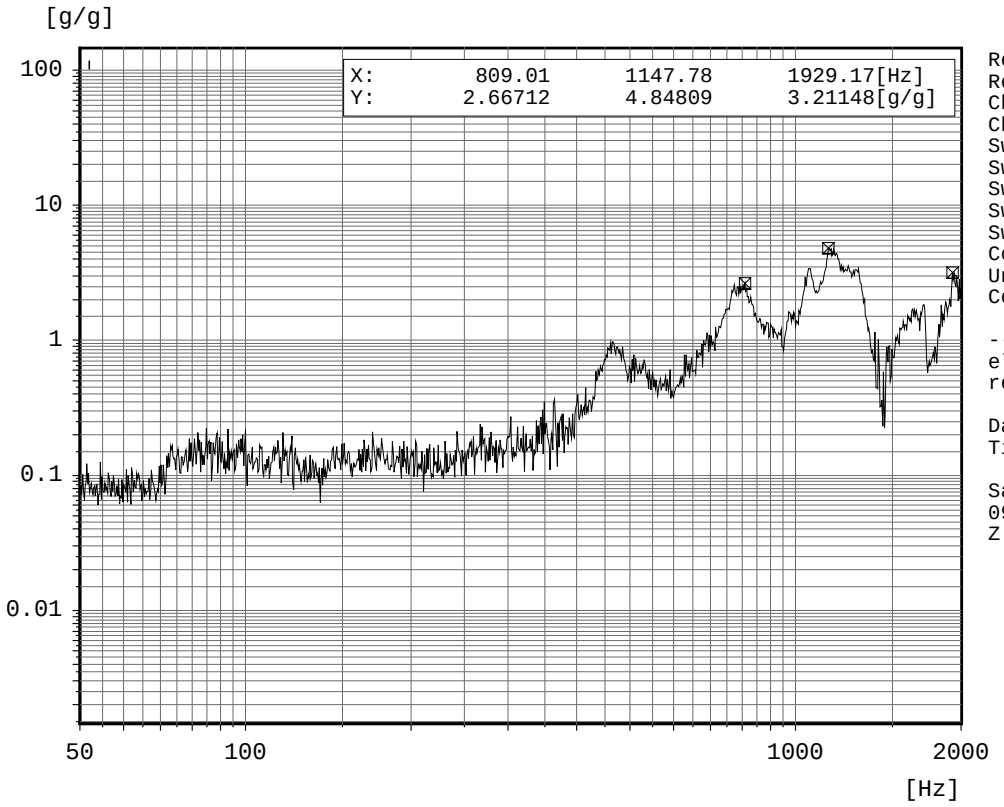
Date: 09-09-13
Time: 09:51:01

Sample A1 Run 2
09-09-13
Z Axis

FIGURE #44

Sine

Channel 4 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 4
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

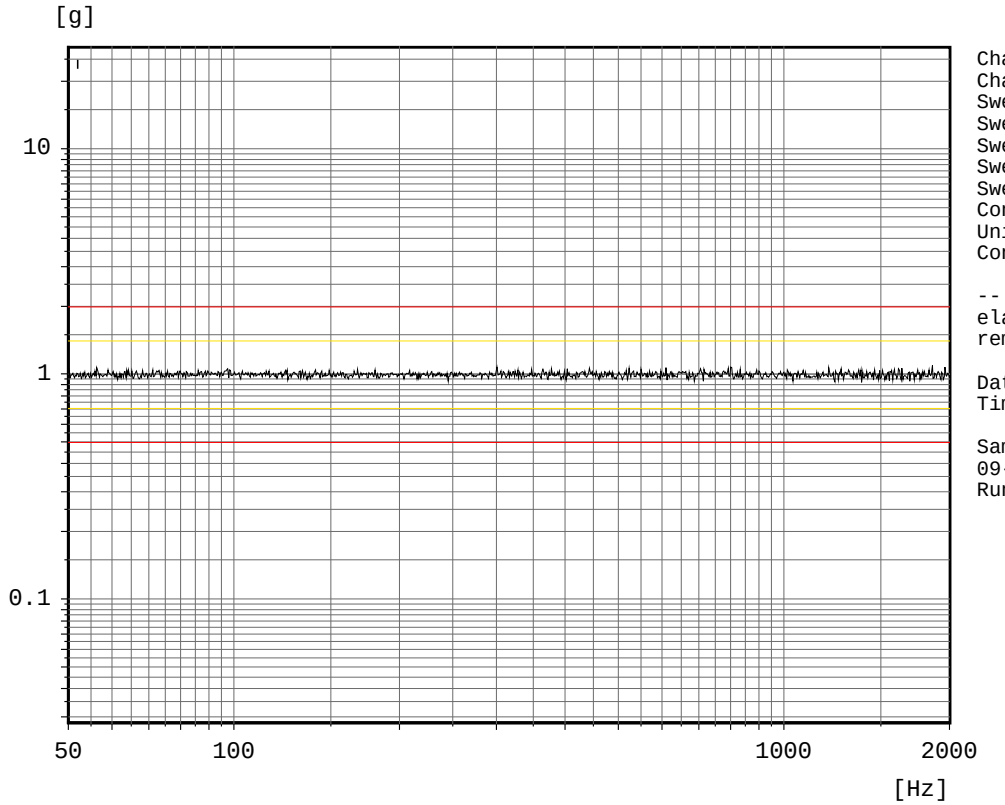
Date: 09-09-13
Time: 09:51:01

Sample A1 Run 2
09-09-13
Z Axis

FIGURE #45

Sine

Channel 1

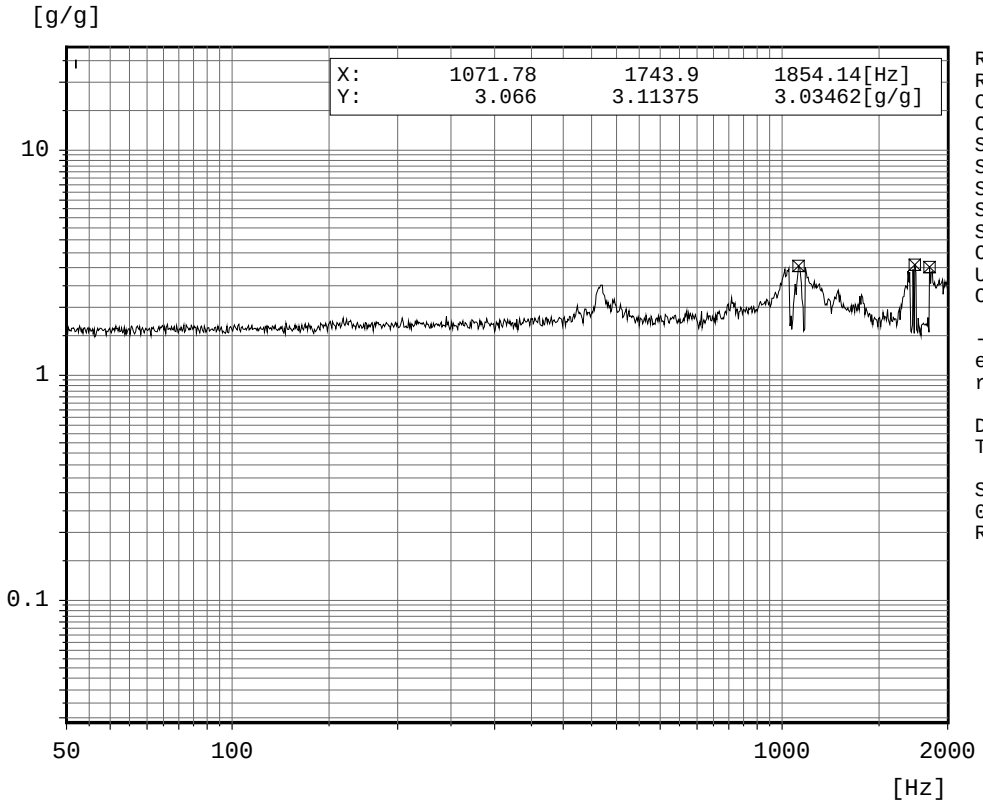



```
Chan.no:        1
Chan.type:      CW   Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.:  up
Sweep rate:       0.27 Oct/min
Contr.strat.:   Average
Unit:           g
Contr.strat.:   Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-09-13
Time:           11:04:34

Sample A1
09-09-13
Run 3 X-Axis
```

FIGURE #46

Sine

Channel 2 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 2
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

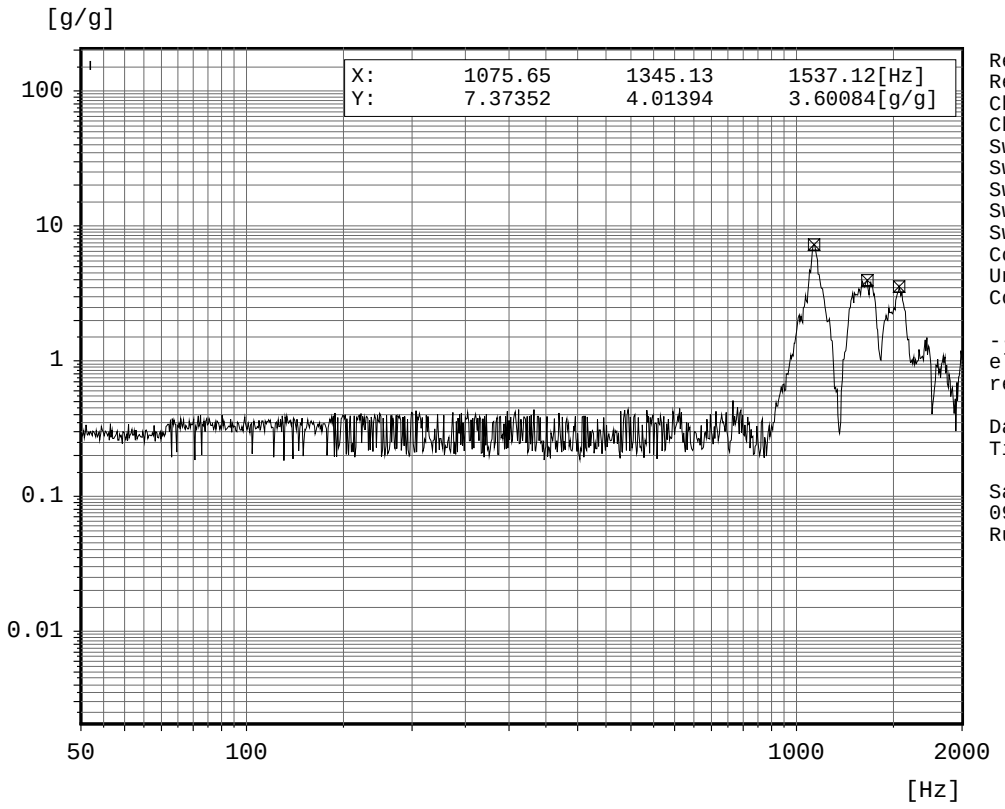
Date: 09-09-13
Time: 11:04:34

Sample A1
09-09-13
Run 3 X-Axis

FIGURE #47

Sine

Channel 3 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 3
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

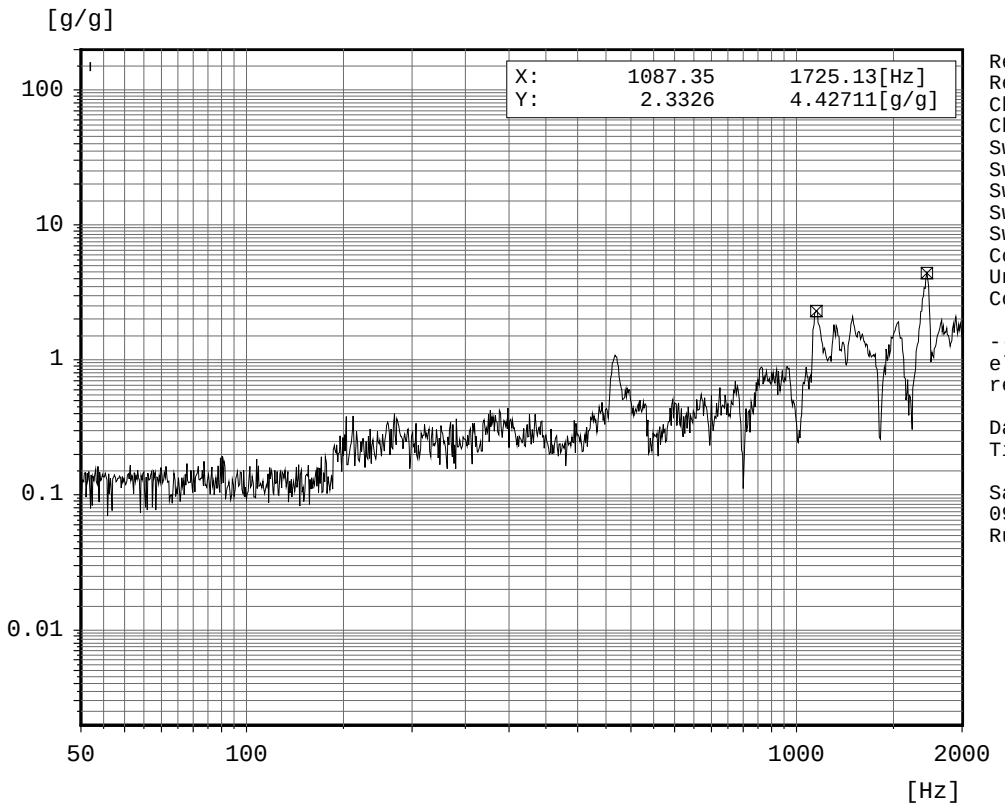
Date: 09-09-13
Time: 11:04:34

Sample A1
09-09-13
Run 3 X-Axis

FIGURE #48

Sine

Channel 4 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 4
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

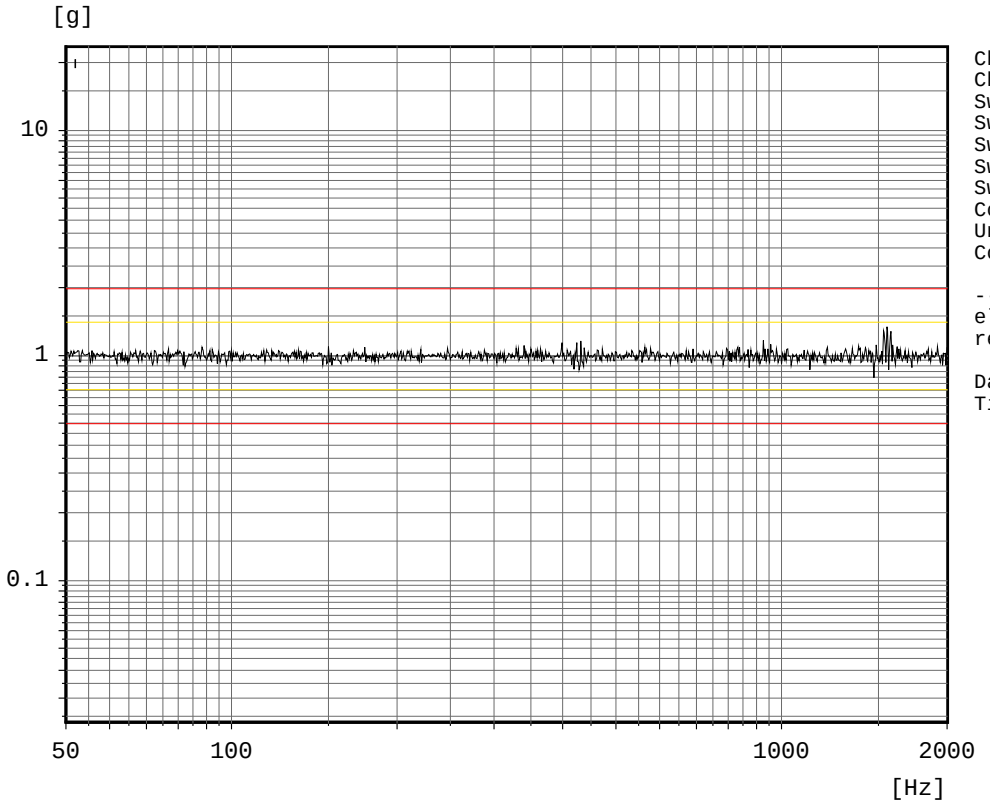
Date: 09-09-13
Time: 11:04:34

Sample A1
09-09-13
Run 3 X-Axis

FIGURE #49

Sine

Channel 1

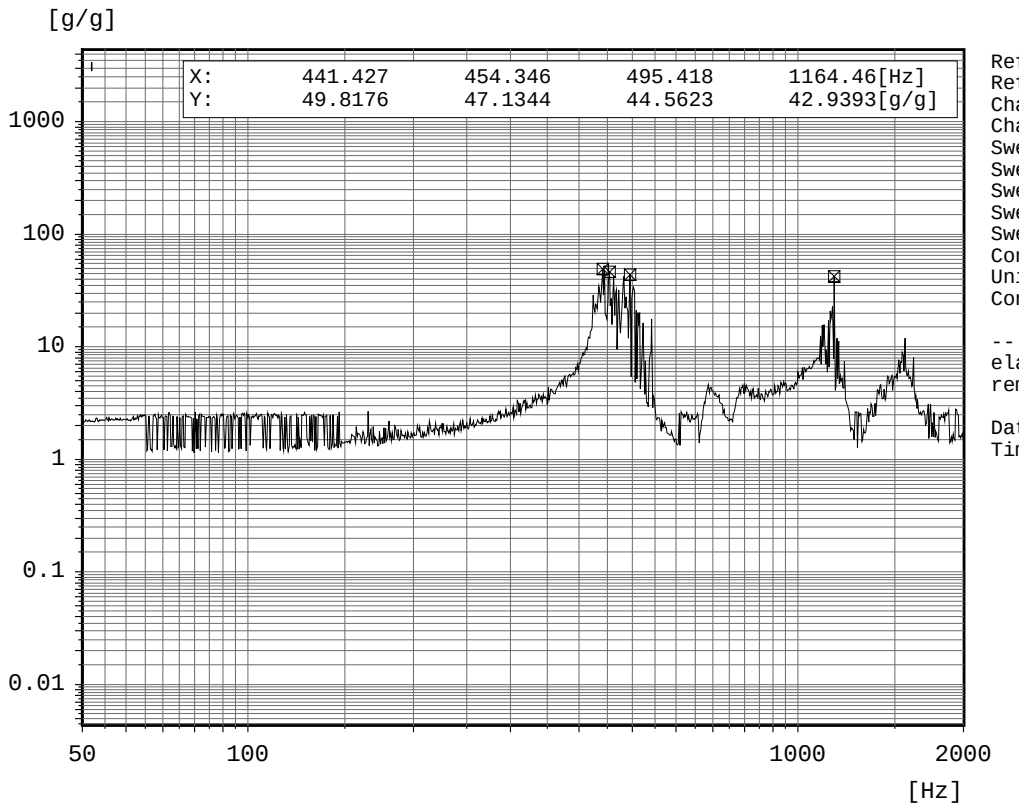



```
Chan.no:        1
Chan.type:      CW   Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.:  up
Sweep rate:       0.27 Oct/min
Contr.strat.:   Average
Unit:           g
Contr.strat.:   Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-13-13
Time:           09:35:27
```

FIGURE #50

Sine

Channel 2 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 2
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

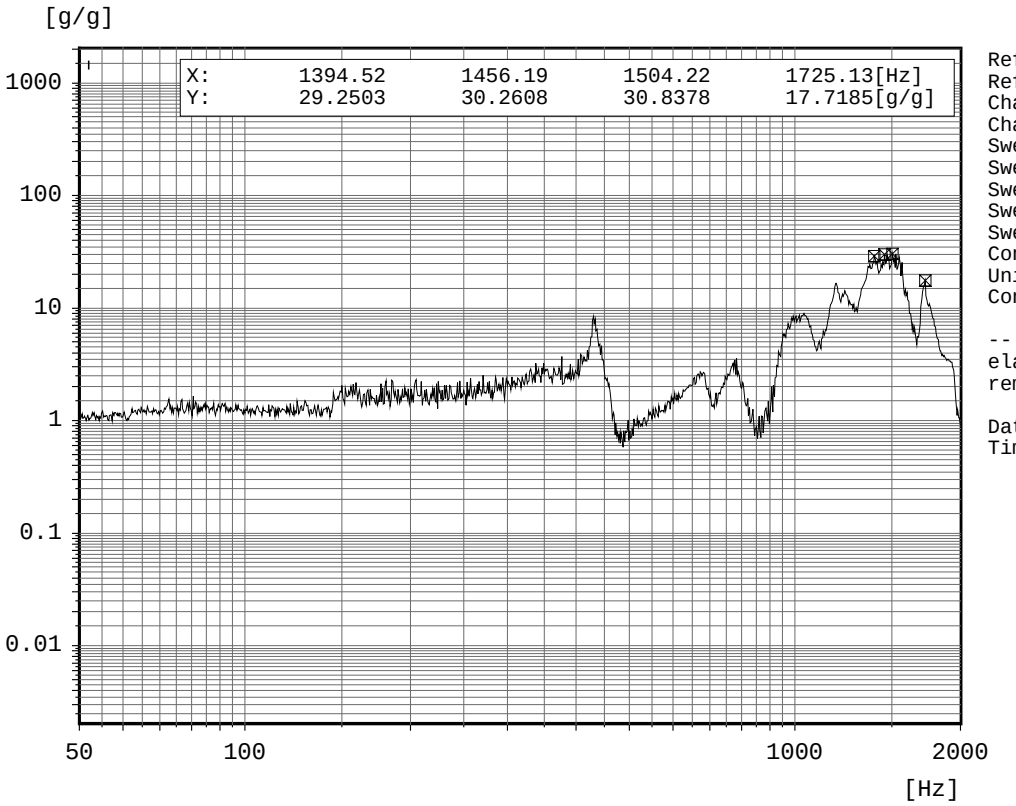
-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

Date: 09-13-13
Time: 09:35:27

FIGURE #51

Sine

Channel 3 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 3
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

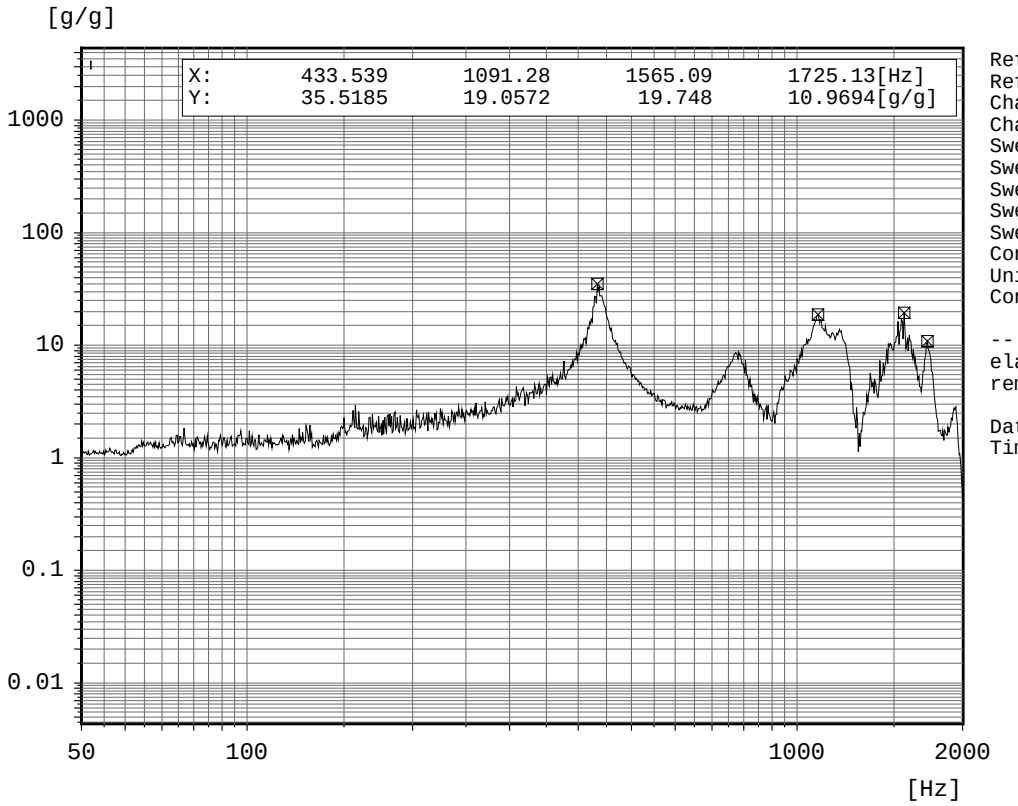
-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

Date: 09-13-13
Time: 09:35:27

FIGURE #52

Sine

Channel 4 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 4
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

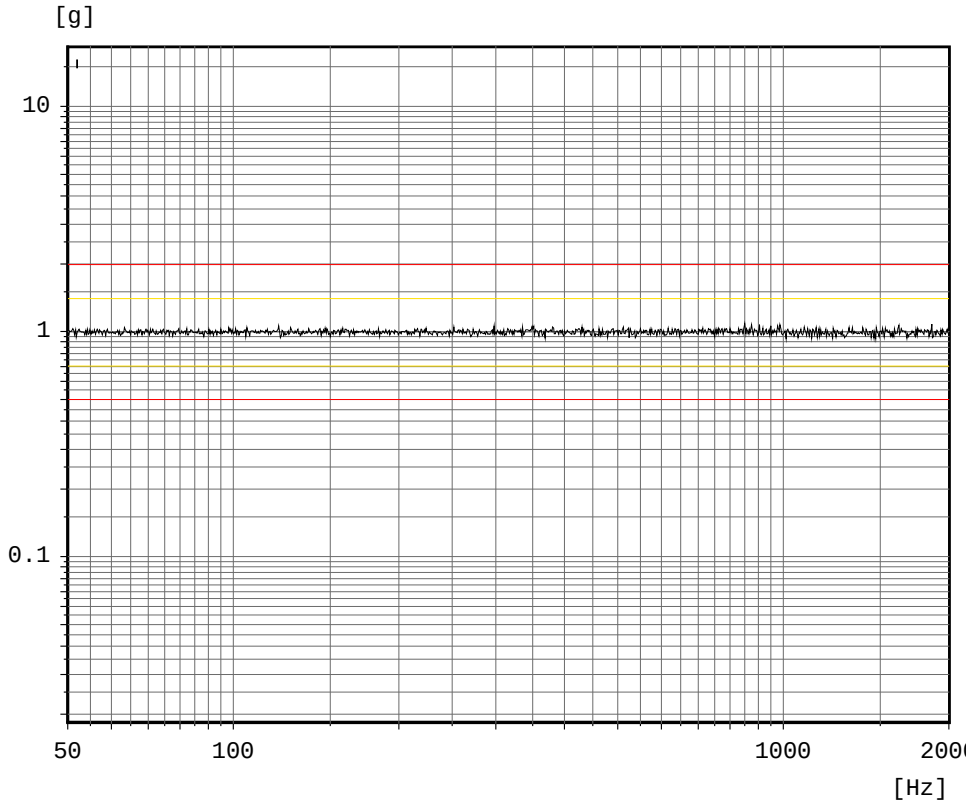
-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

Date: 09-13-13
Time: 09:35:27

FIGURE #53

Sine

Channel 1

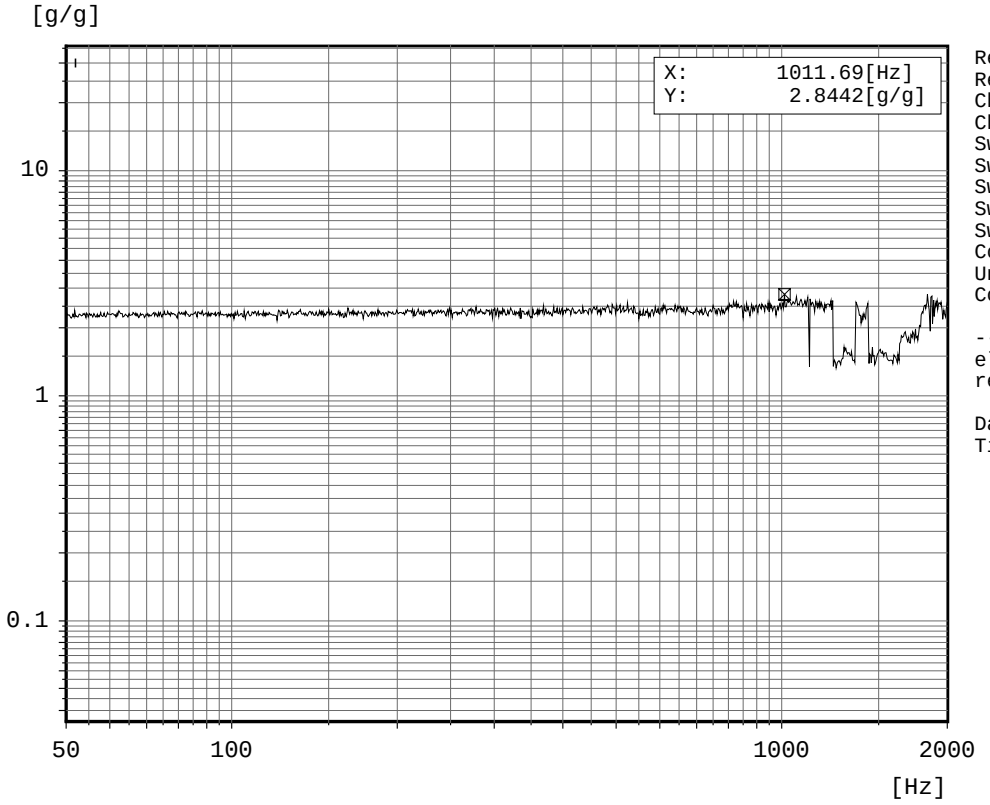



```
Chan.no:        1
Chan.type:      CW   Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.:  up
Sweep rate:       0.27 Oct/min
Contr.strat.:   Average
Unit:           g
Contr.strat.:   Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-13-13
Time:           11:48:59
```

FIGURE #54

Sine

Channel 2 vs. Channel 1

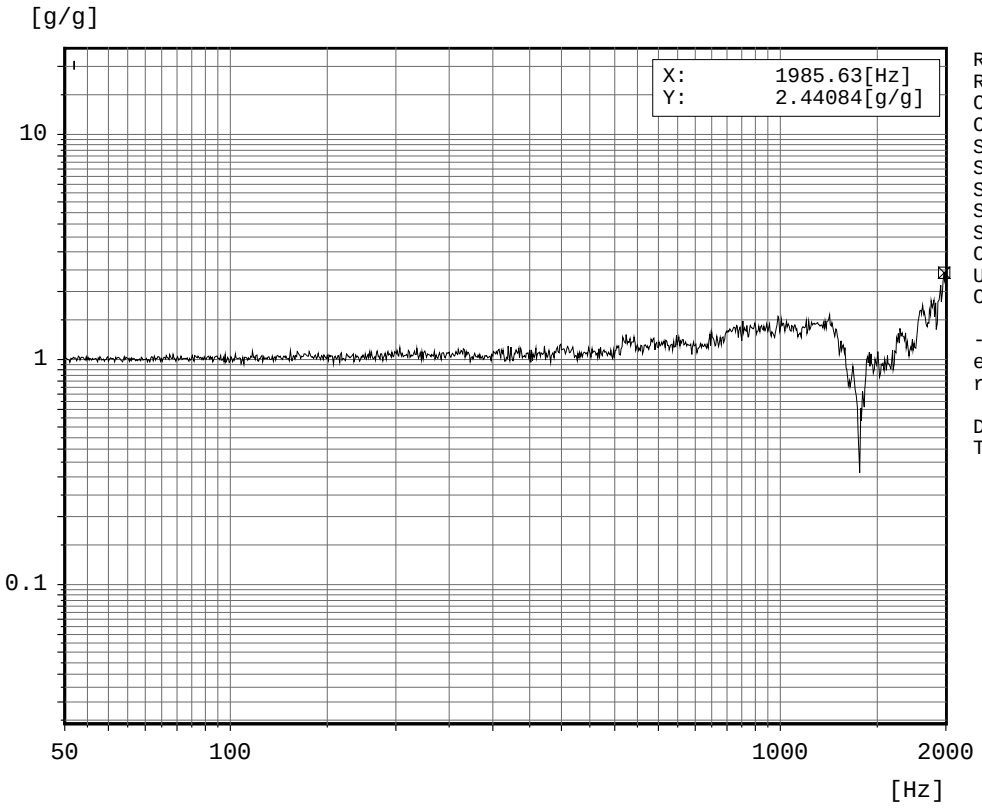



```
Ref.Chan.:      1
Ref.Chan.type: CW
Chan.no:        2
Chan.type:          M Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.: up
Sweep rate:       0.27 Oct/min
Contr.strat.:  Average
Unit:           g/g
Contr.strat.:  Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-13-13
Time:           11:48:59
```

FIGURE #55

Sine

Channel 3 vs. Channel 1

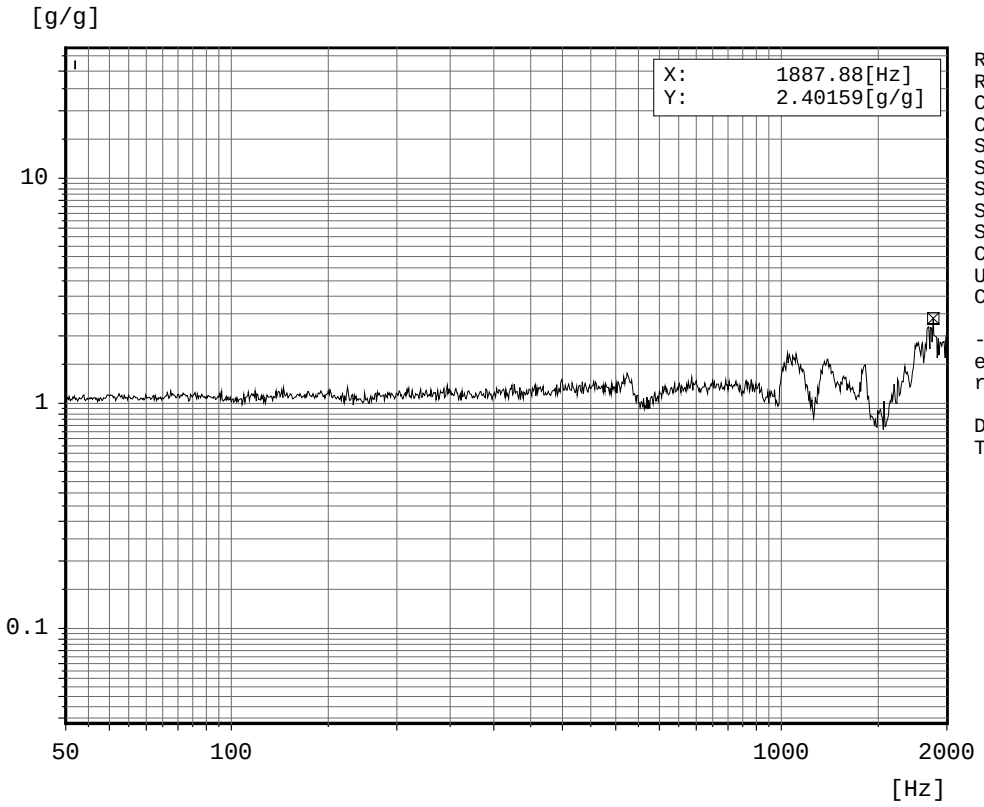



```
Ref.Chan.:      1
Ref.Chan.type: CW
Chan.no:        3
Chan.type:          M Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.: up
Sweep rate:       0.27 Oct/min
Contr.strat.:  Average
Unit:           g/g
Contr.strat.:  Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-13-13
Time:           11:48:59
```

FIGURE #56

Sine

Channel 4 vs. Channel 1

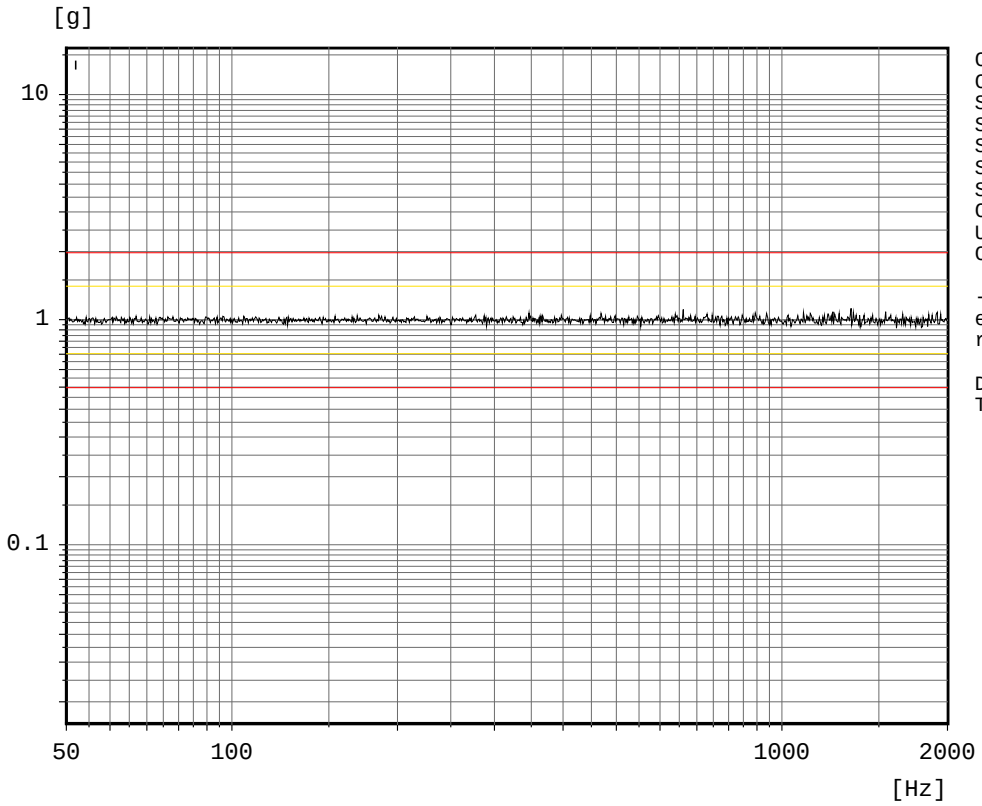



```
Ref.Chan.:     1
Ref.Chan.type: CW
Chan.no:       4
Chan.type:         M Peak
Sweep type:    logarithmic
Sweeps done:   1
Sweeps req.:   1
Sweep direct.: up
Sweep rate:      0.27 Oct/min
Contr.strat.:  Average
Unit:          g/g
Contr.strat.:  Closed loop

-- Testing time --
elapsed:       000:19:59
remaining:     000:00:00

Date:          09-13-13
Time:          11:48:59
```

FIGURE #57

Sine

Channel 1

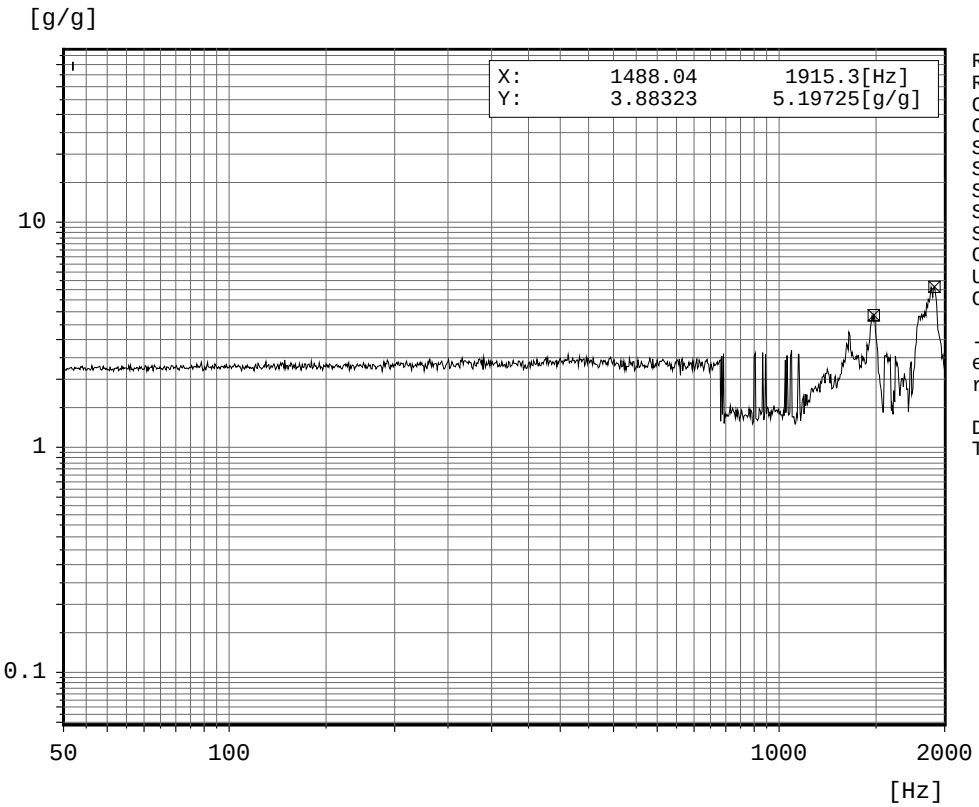



```
Chan.no:        1
Chan.type:      CW   Peak
Sweep type:     logarithmic
Sweeps done:    1
Sweeps req.:    1
Sweep direct.:  up
Sweep rate:       0.27 Oct/min
Contr.strat.:   Average
Unit:           g
Contr.strat.:   Closed loop

-- Testing time --
elapsed:        000:19:59
remaining:      000:00:00

Date:           09-13-13
Time:           13:09:34
```

FIGURE #58

Sine

Channel 2 vs. Channel 1

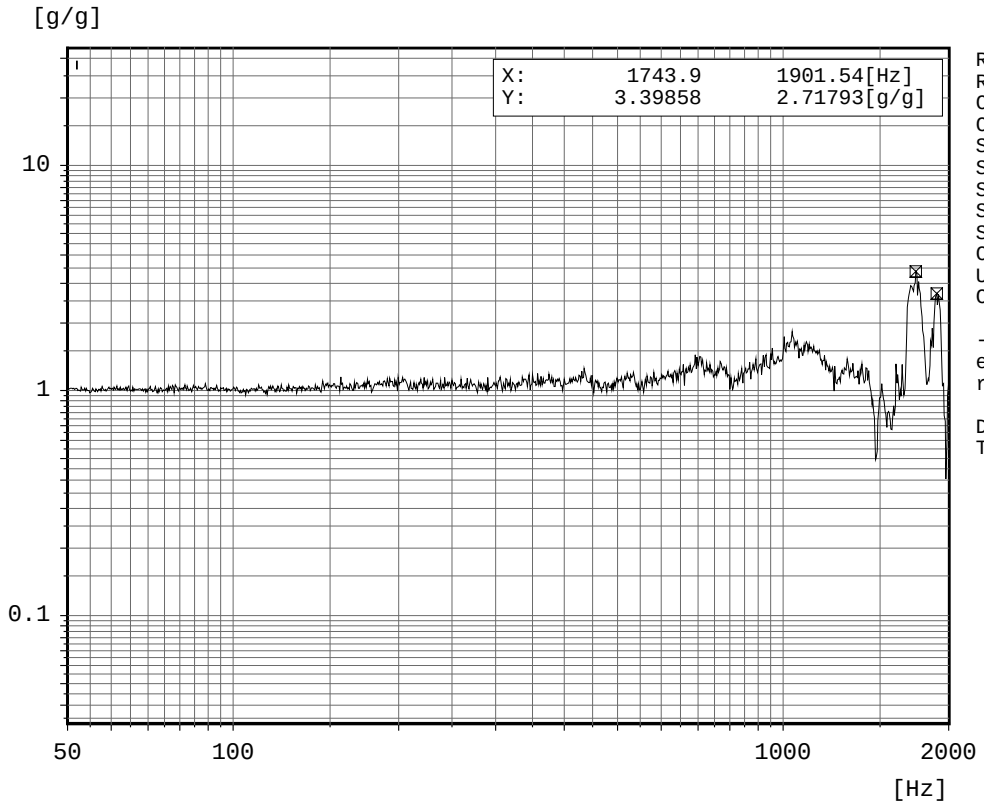



```
Ref.Chan.:      1
Ref.Chan.type: CW
Chan.no:        2
Chan.type:          M Peak
Sweep type:    logarithmic
Sweeps done:   1
Sweeps req.:   1
Sweep direct.: up
Sweep rate:       0.27 Oct/min
Contr.strat.:  Average
Unit:          g/g
Contr.strat.:  Closed loop

-- Testing time --
elapsed:       000:19:59
remaining:     000:00:00

Date:          09-13-13
Time:          13:09:34
```

FIGURE #59

Sine

Channel 3 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 3
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

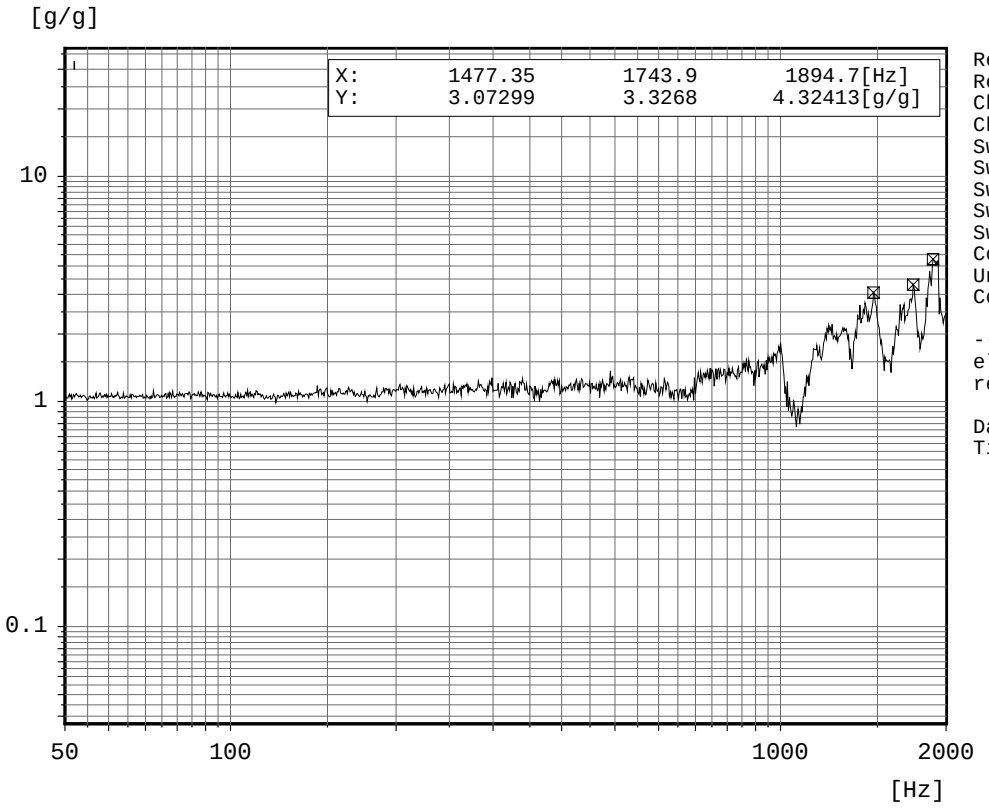
-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

Date: 09-13-13
Time: 13:09:34

FIGURE #60

Sine

Channel 4 vs. Channel 1



Ref.Chan.: 1
Ref.Chan.type: CW
Chan.no: 4
Chan.type: M Peak
Sweep type: logarithmic
Sweeps done: 1
Sweeps req.: 1
Sweep direct.: up
Sweep rate: 0.27 Oct/min
Contr.strat.: Average
Unit: g/g
Contr.strat.: Closed loop

-- Testing time --
elapsed: 000:19:59
remaining: 000:00:00

Date: 09-13-13
Time: 13:09:34

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 2 Samples TECHNICIAN: MHB

START DATE: 9/10/13 COMPLETE DATE: 9/10/13

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 49%

EQUIPMENT ID#: 553, 874, 1028, 1047, 1366, 1367, 1368, 1727, 1790, 1791, 1797

MECHANICAL SHOCK (SPECIFIED PULSE)

PURPOSE:

To determine the mechanical and electrical integrity of connectors for use with electronic equipment subjected to shocks such as those expected from handling, transportation, etc.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 27, Test Condition A.

2. Test Conditions:

   a) Peak Value : 50 G
   b) Duration : 11 Milliseconds
   c) Wave Form : Half-sine
   d) Velocity : 11.3 feet per second
   e) No. of Shocks : 3 Shocks/Direction, 3 Axis (18 Total)

3. Figure #61 illustrates the test sample fixturing utilized during the test.

4. The low nanosecond monitoring was performed in accordance with EIA 364, Test Procedure 87.

5. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS:

1. The following is a summary of the observed data:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# A1	-0.1	+1.2
ID# A2	+0.0	+1.1

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# A1	0.3	0.3	0.2
ID# A2	0.3	0.5	0.2

2. See data files 213041B01a, 213041B02a, 213041B03, 213041B04 for individual data points.

-continued on next page.

RESULTS: -continued

3. There was no evidence of arcing, breakdown, etc., when the specified test voltage was applied nor did the leakage current exceed 5.0 milliamps.

4. The Mechanical Shock characteristics are shown in Figures #62 (Calibration Pulse) and #63 (Test Pulse). Each figure displays the shock pulse contained within the upper and lower limits as defined by the appropriate test specification.

FIGURE #61

MECHANICAL SHOCK

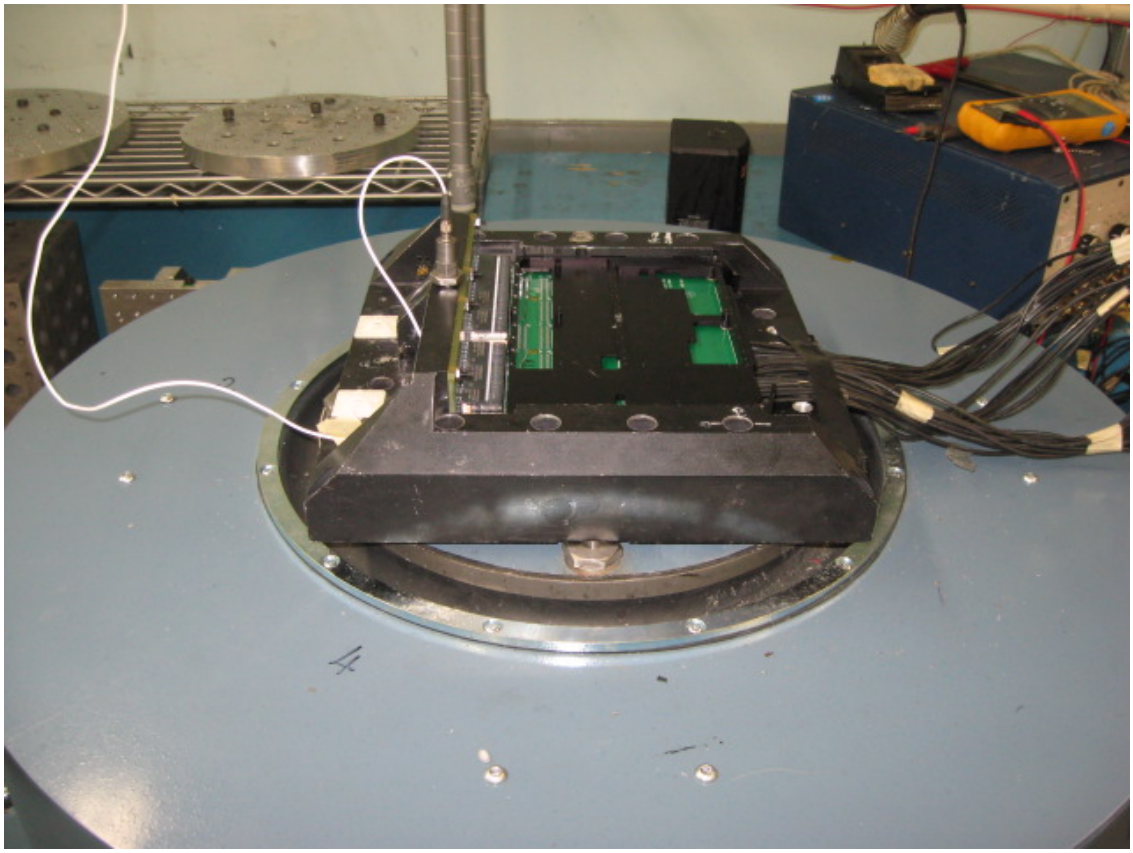
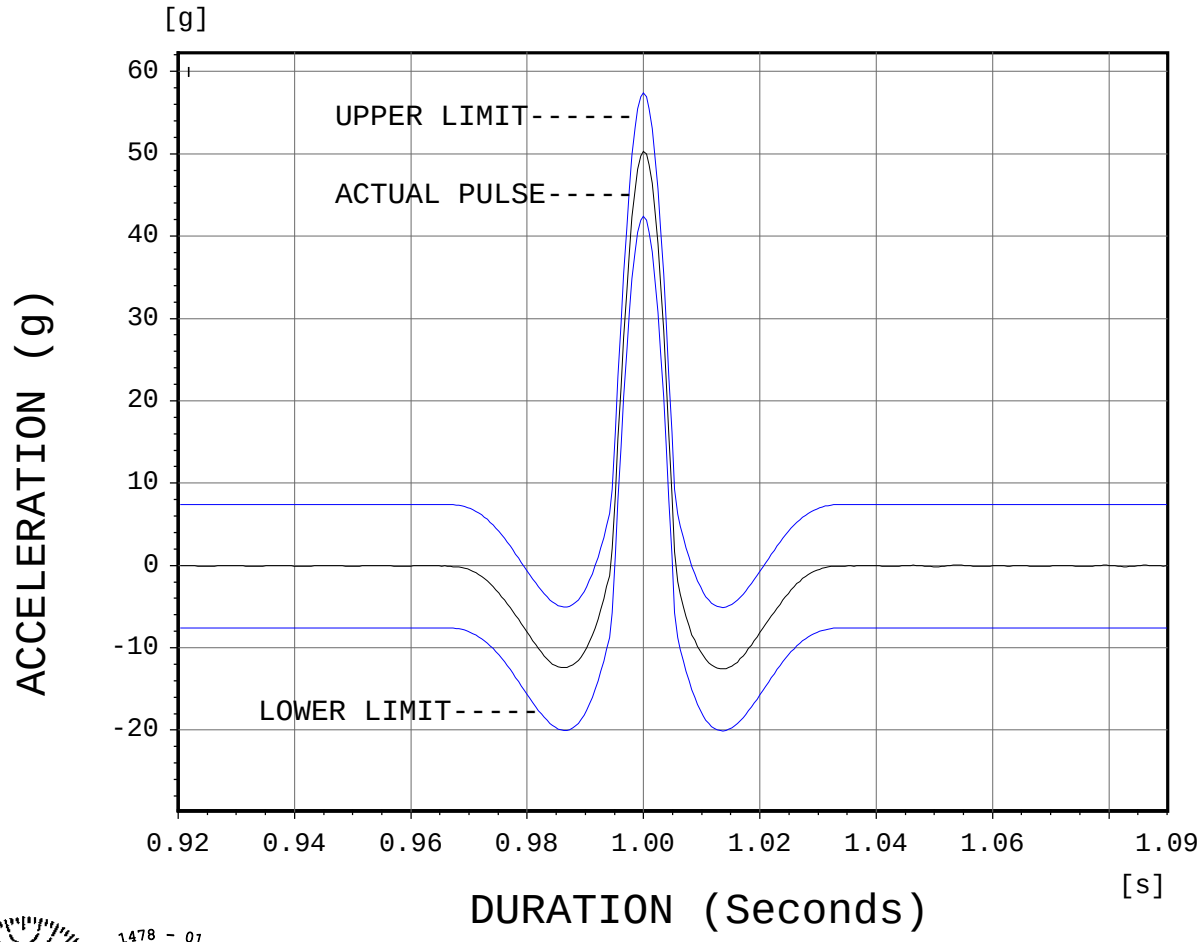


FIGURE #62

Classical Shock **Channel 5**



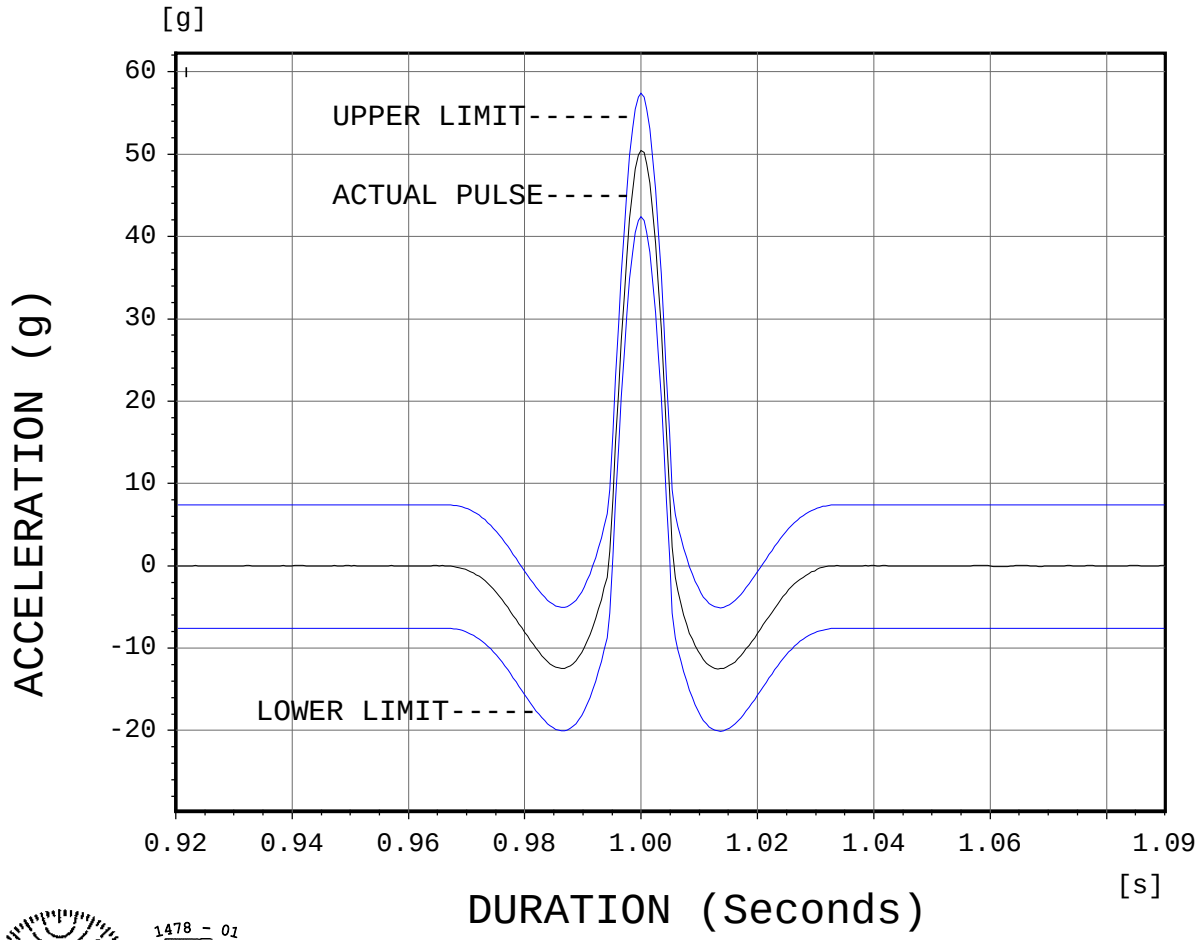
Project 213041
Hypertronics
Cal Wave 1
50G's 11ms
Halfsine
09-10-13
Tech:MHB

ilac-MRA 1478 - 01 ACCREDITED Test Laboratory 1478 - 02

Contech Research
An Independent Test and Research Laboratory

FIGURE #63

Classical Shock **Channel 5**



Project 213041
Hypertronics
Actual Wave 1
50G's 11ms
Halfsine
09-10-13
Tech:MHB

ilac-MRA 1478 - 01 ACCREDITED Test Laboratory 1478 - 02

Contech Research
An Independent Test and Research Laboratory

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 9/11/13	COMPLETE DATE: 9/11/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 46%
EQUIPMENT ID#: 321, 553, 874, 1028, 1047, 1366, 1367, 1368, 1727, 1790, 1791, 1797	

VIBRATION, RANDOM

PURPOSE:

1. To determine if nanosecond events at the level specified exist.

2. To determine if the contact system is susceptible to fretting corrosion.

3. To determine if the electrical stability of the system has degraded when exposed to a vibratory environment.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 28, Test Condition V, Letter D.

2. Test Conditions:

   a) Power Spectral Density : 0.1 g^2/Hz
   b) G 'RMS' : 11.95
   c) Frequency : 50 to 2,000 Hz
   d) Duration : 1.5 Hours/Axis (3 axis total)

3. Figure #64 illustrates the test sample fixturing utilized during the test.

4. The low nanosecond event detection was performed in accordance with EIA 364, Test Procedure 87.

-continued on next page.

PROCEDURE: -continued

5. All subsequent variable testing was performed in accordance with procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

2. There shall be no events detected greater than 10.0 nanoseconds.

3. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

4. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

5. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

6. There shall be no visible wear-through of the connector contact gold plating under 30X to 40X magnification.

RESULTS:

1. There was no evidence of physical damage to the test samples as tested nor was there any visible evidence of wear-through on the gold contacts as tested.

2. There was no evidence of low nanosecond events in excess of 10.0 nanoseconds.

3. There was no evidence of arcing, breakdown, etc. when the test voltage was applied nor did the leakage current exceed 5.0 milliamps.

-continued on next page.

RESULTS: -continued

4. The following is a summary of the observed data:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
A1	-0.1	+1.4

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
A1	0.4	0.5	0.3

5. See data files 213041B1a and 213041B2a for individual data points.

6. The random vibration profiles are shown in Figure #'s 65 (X-axis), 66 (Y-axis) and 67 (Z-axis).

FIGURE #64

RANDOM VIBRATION

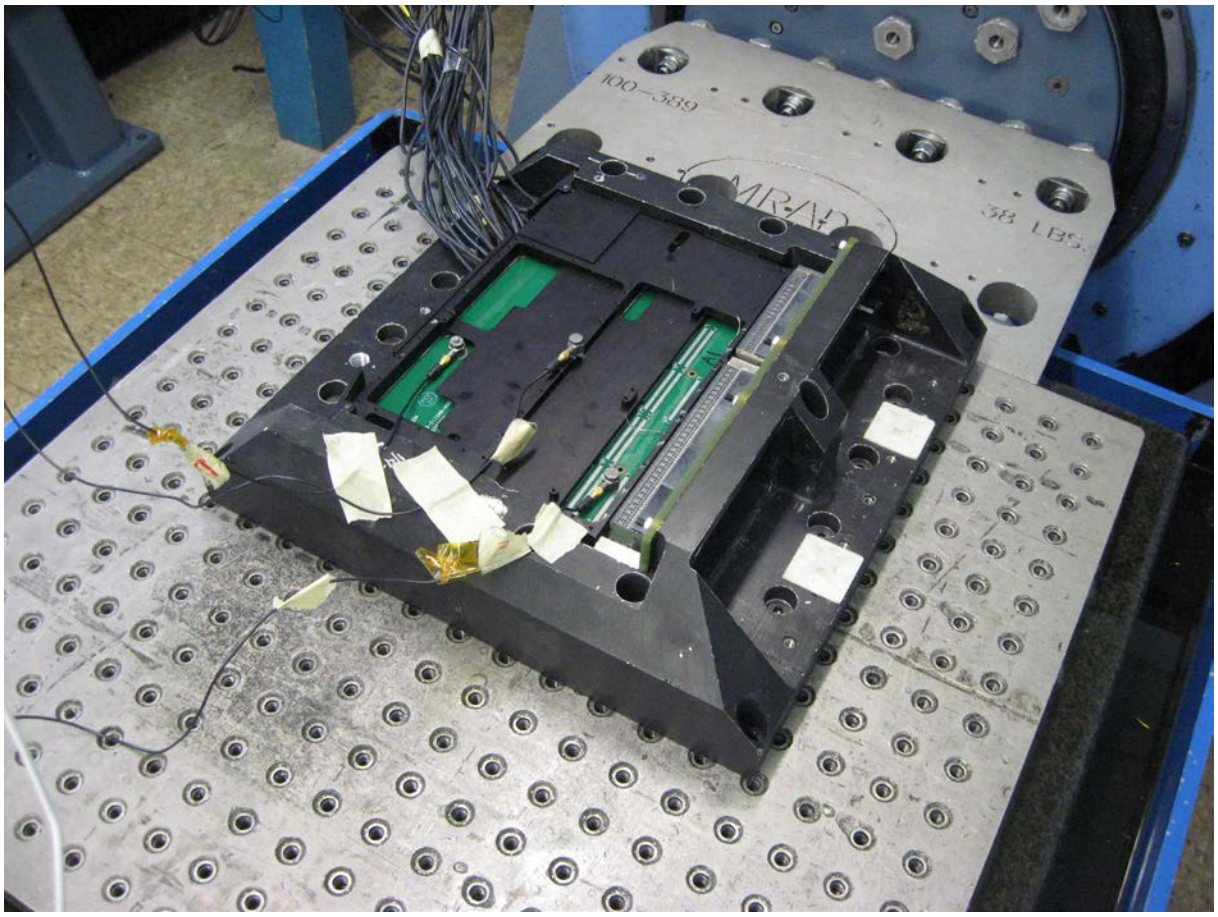
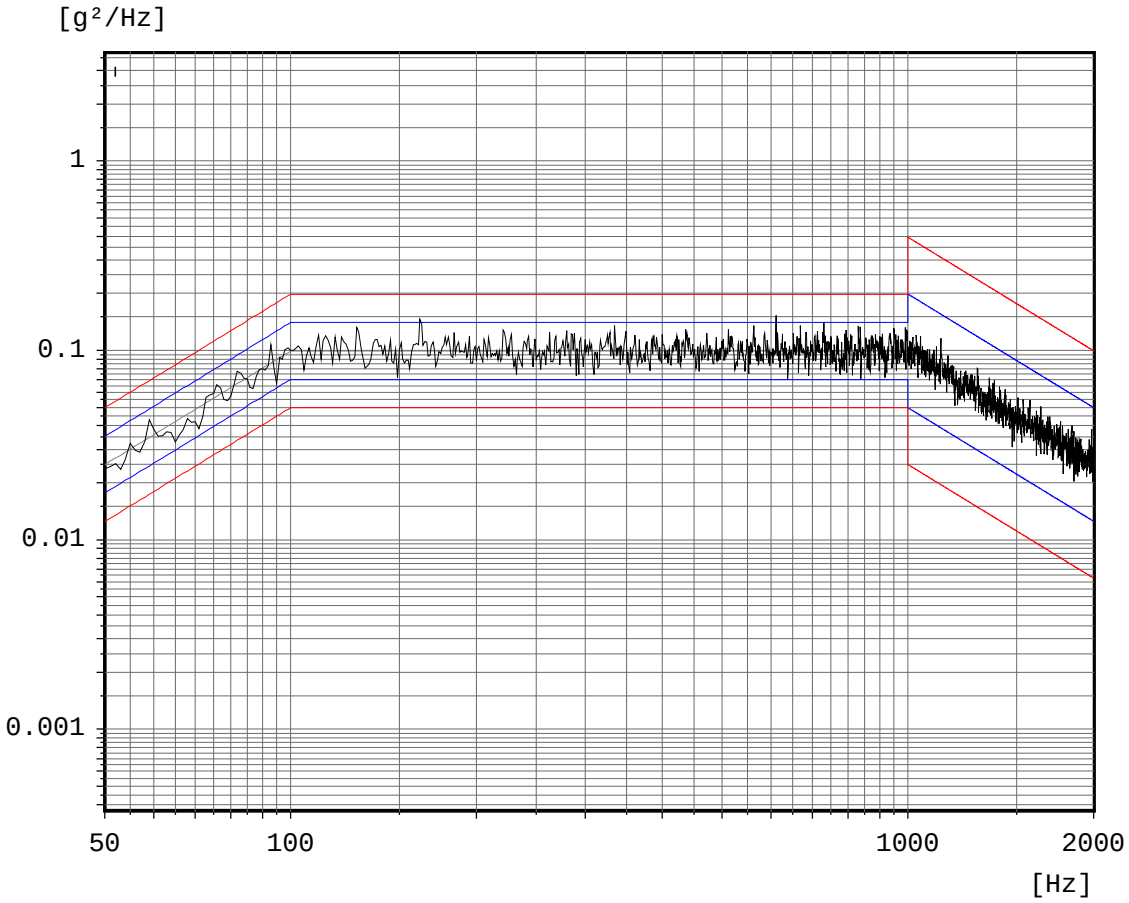


FIGURE #65

Random

Control channel

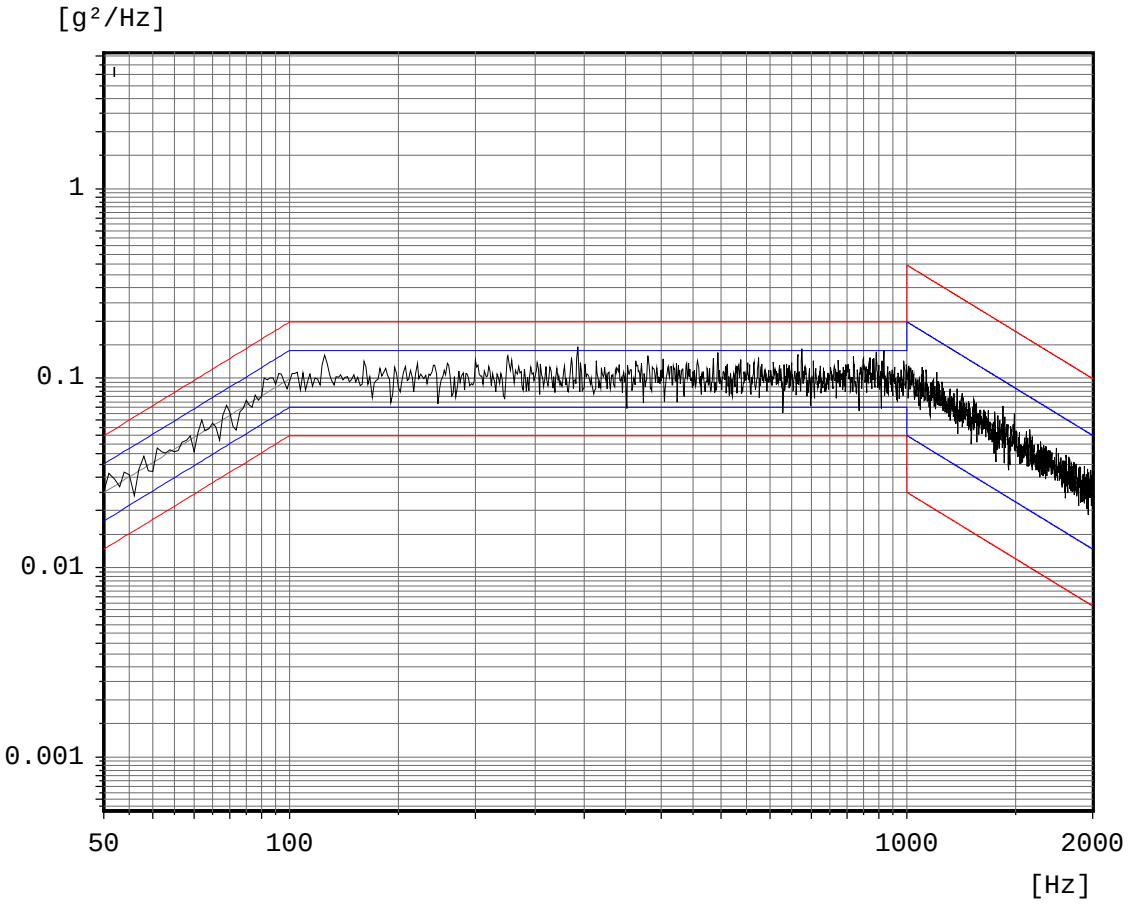


Project# 213041
Hypertronics
Sample A1
Run 1
Z-Axis
Date:11Sep13
Tech:MHB

FIGURE #66

Random

Control channel

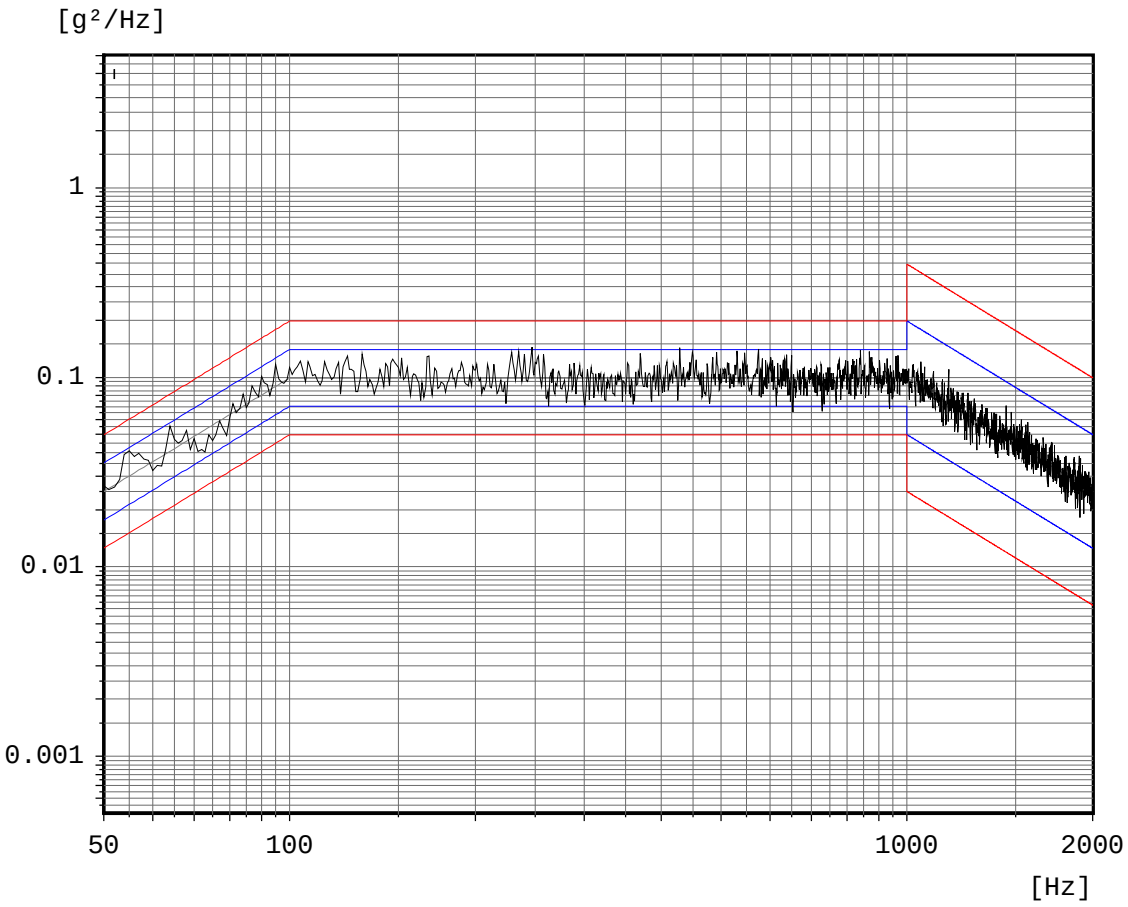


Project# 213041
Hypertronics
Sample A1
Run 2
Y-Axis
Date:11Sep13
Tech:MHB

FIGURE #67

Random

Control channel



Project# 213041
Hypertronics
Sample A1
Run 3
X-Axis
Date:11Sep13
Tech:MHB

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN: MHB

START DATE: 9/30/13 COMPLETE DATE: 9/30/13

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 48%

EQUIPMENT ID#: 321, 553, 874, 1028, 1047, 1366, 1367, 1368, 1727, 1790, 1791, 1797

RANDOM VIBRATION, HALT

PURPOSE:

1. To evaluate the test samples to determine if fretting corrosion occurs due to mechanical motion.

2. To evaluate the integrity of the test samples relative to a severe mechanical environment.

3. To determine if nanosecond events at the level specified exist.

4. To determine if the contact system is susceptible to fretting corrosion.

5. To determine if the electrical stability of the system has degraded when exposed to a vibratory environment.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 28, Test Condition V with the following severity levels:

	Step 1	Step 2	Step 3	Step 4
a) PSD :	0.125	0.150	0.175	0.200
b) Duration :	15/axis	15/axis	15/axis	45/axis

   Test frequency for all steps was 20 to 2,000 Hz

2. Figure #68 illustrates the test sample fixturing utilized during the test.

-continued on next page.

PROCEDURE: -continued

3. The low nanosecond event detection was performed in accordance with EIA 364, Test Procedure 87.

4. All subsequent variable testing was performed in accordance with procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

2. There shall be no events detected greater than 10.0 nanoseconds.

3. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

4. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

5. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

6. There shall be no visible wear-through of the connector contact gold plating under 30X to 40X magnification.

RESULTS:

1. There was no evidence of physical damage to the test samples as tested or visible evidence of wear-through on the gold contacts.

2. There was no evidence of low nanosecond events in excess of 10.0 nanoseconds.

3. There was no evidence of arcing, breakdown, etc. when the test voltage was applied nor did the leakage current exceed 5.0 milliamps.

-continued on next page.

RESULTS: -continued

4. The following is a summary of the observed data:

MAXIMUM CHANGE IN SIGNAL
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Step 1	Step 2	Step 3	Step 4
A2	+1.3	+3.0	+0.7	+0.7

MAXIMUM
SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Step 1	Step 2	Step 3	Step 4
A2	0.5	0.6	0.8	1.2

5. See data files 213041B03 and 213041B04 for individual data points.

6. The vibration profiles are summarized in the following Figures:

   Step 1: Figure #s 69, 70, 71
   Step 2: Figure #s 72, 73, 74
   Step 3: Figure #s 78, 79, 80
   Step 4: Figure #s 75, 76, 87

FIGURE #68

HALT VIBRATION

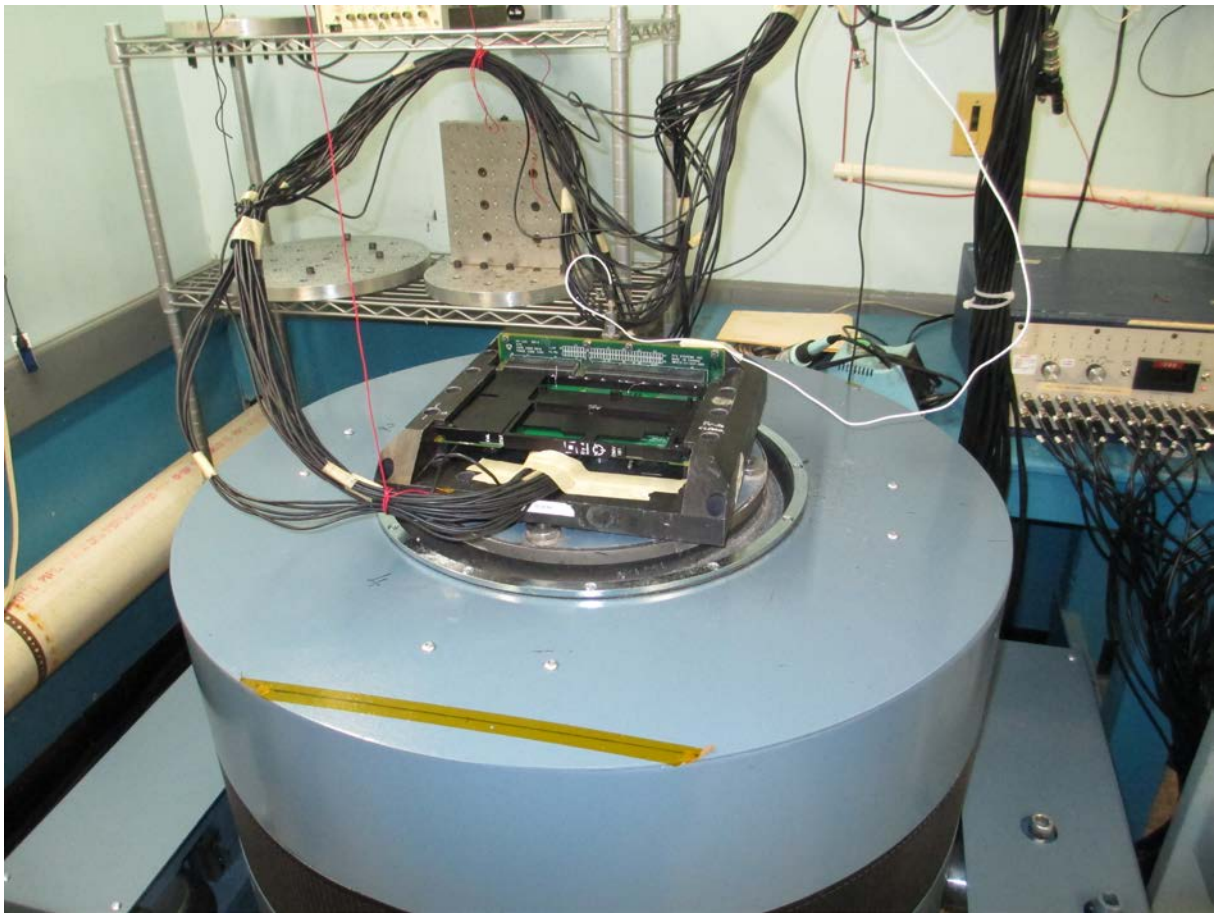
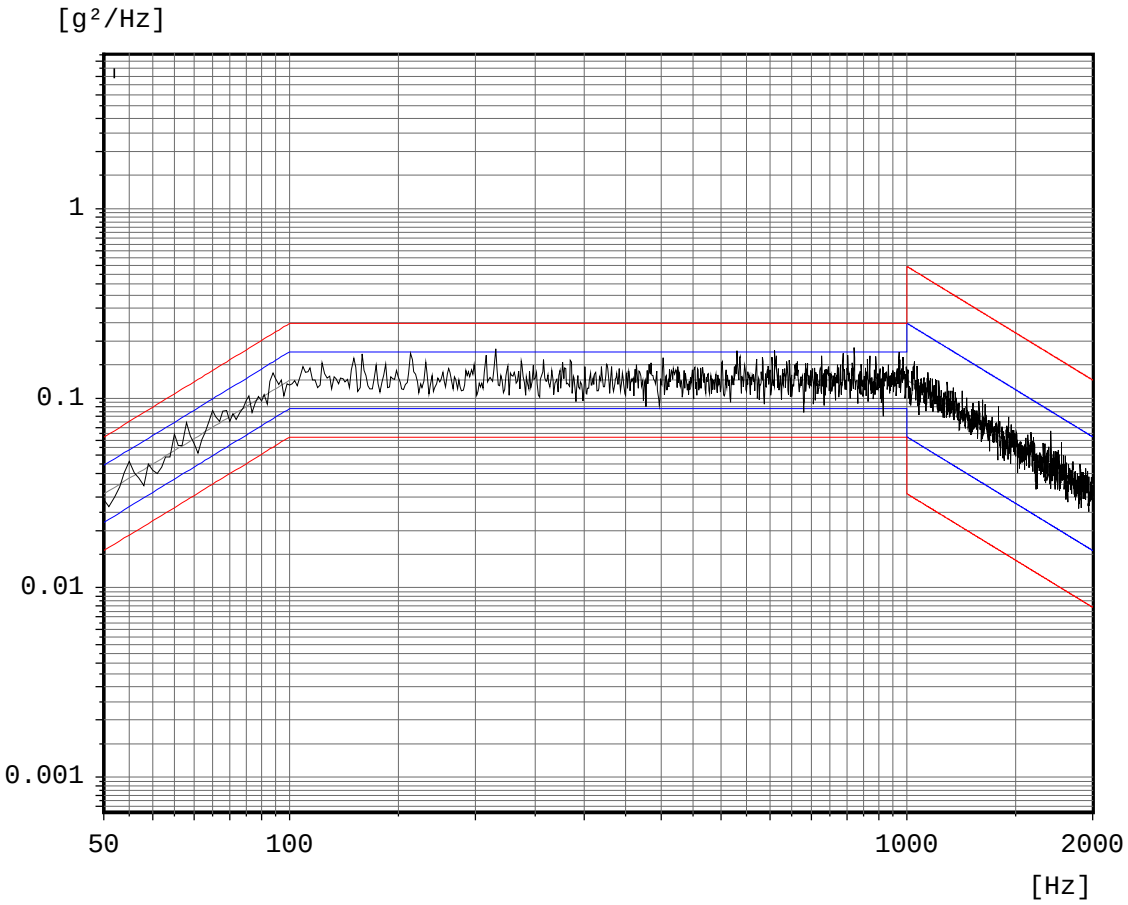


FIGURE #69

Random

Channel 5

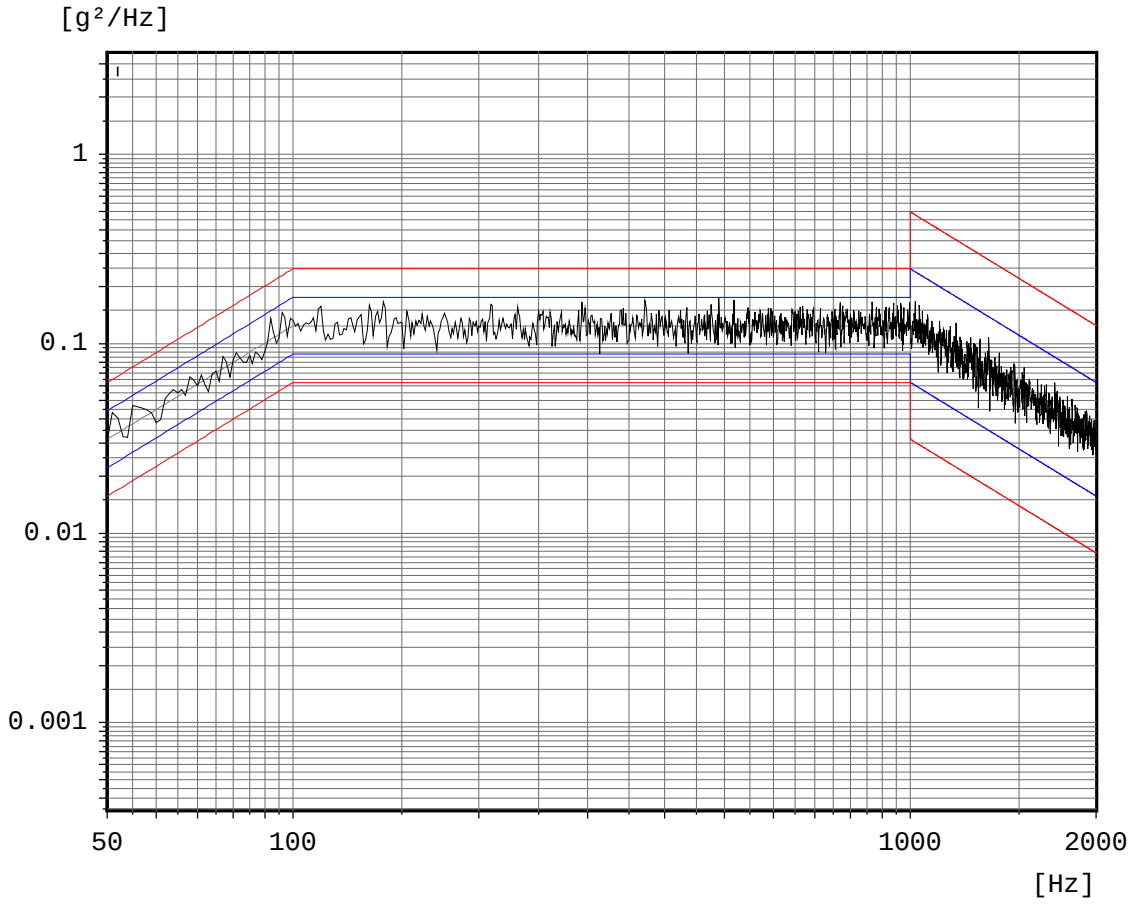


Project# 213041
Run 1
Date:09-27-13
Test Conditions:
50-2000Hz 13.4Grms
PSD 0.125 15Min/Axis
Tech: RT

FIGURE #70

Random

Channel 5

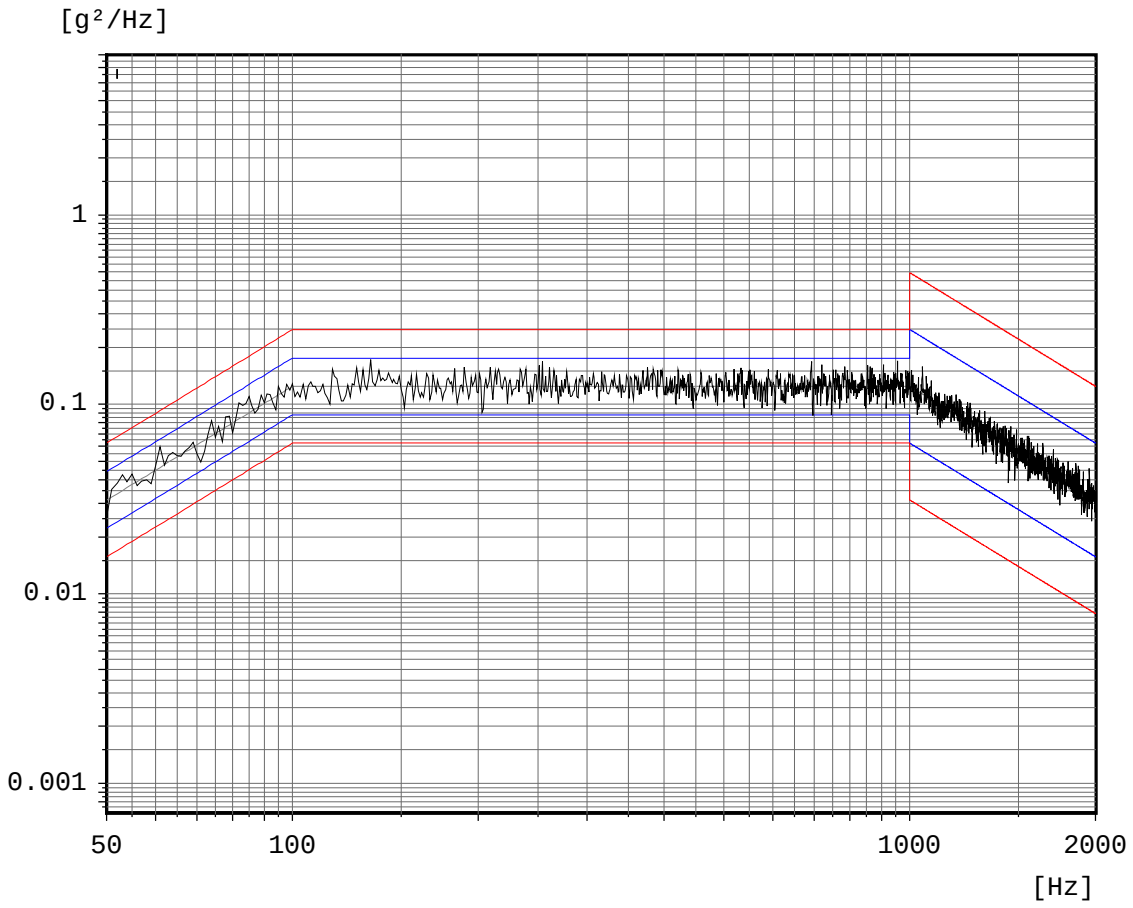


Project# 213041
Run 2
Date:09-27-13
Test Conditions:
50-2000Hz 13.4Grms
PSD 0.125 15Min/Axis
Tech: RT

FIGURE #71

Random

Channel 5

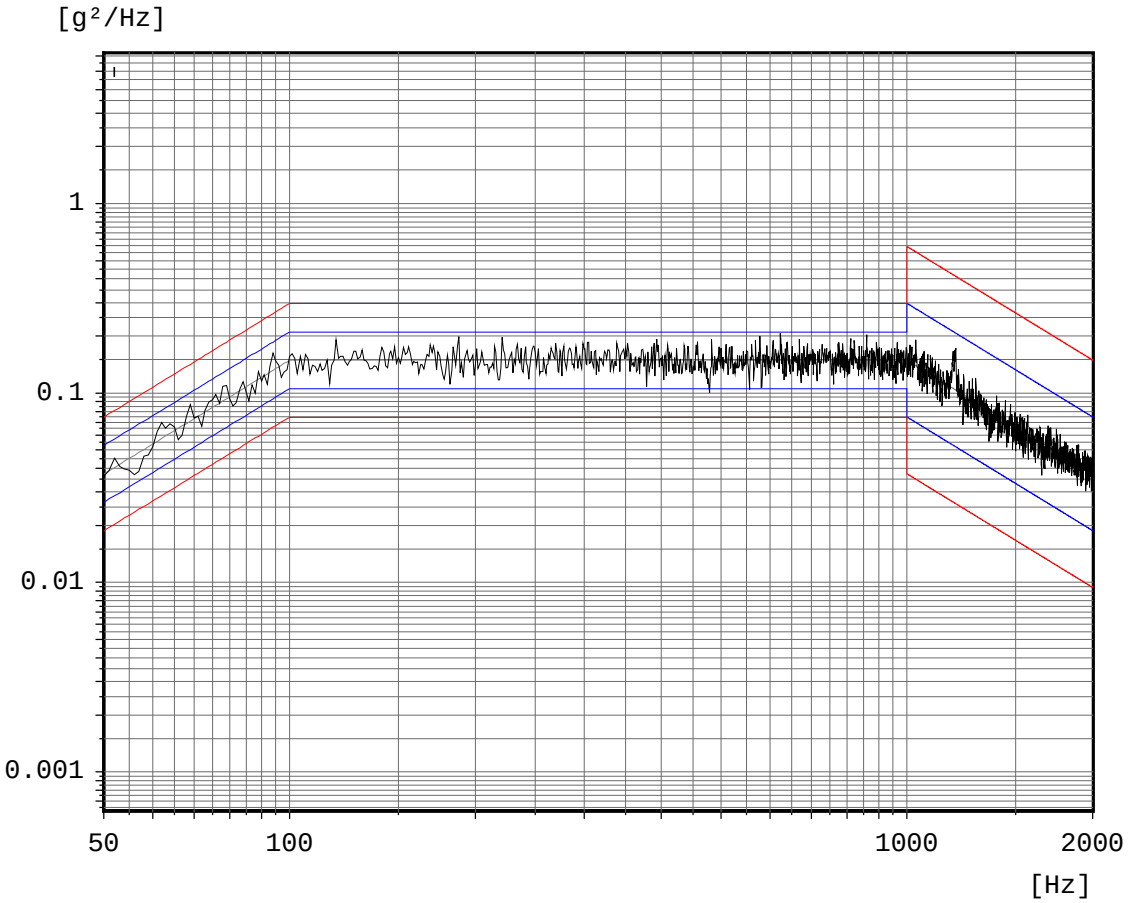


Project# 213041
Run 3
Date:09-27-13
Test Conditions:
50-2000Hz 13.4Grms
PSD 0.125 15Min/Axis
Tech: RT

FIGURE #72

Random

Channel 5

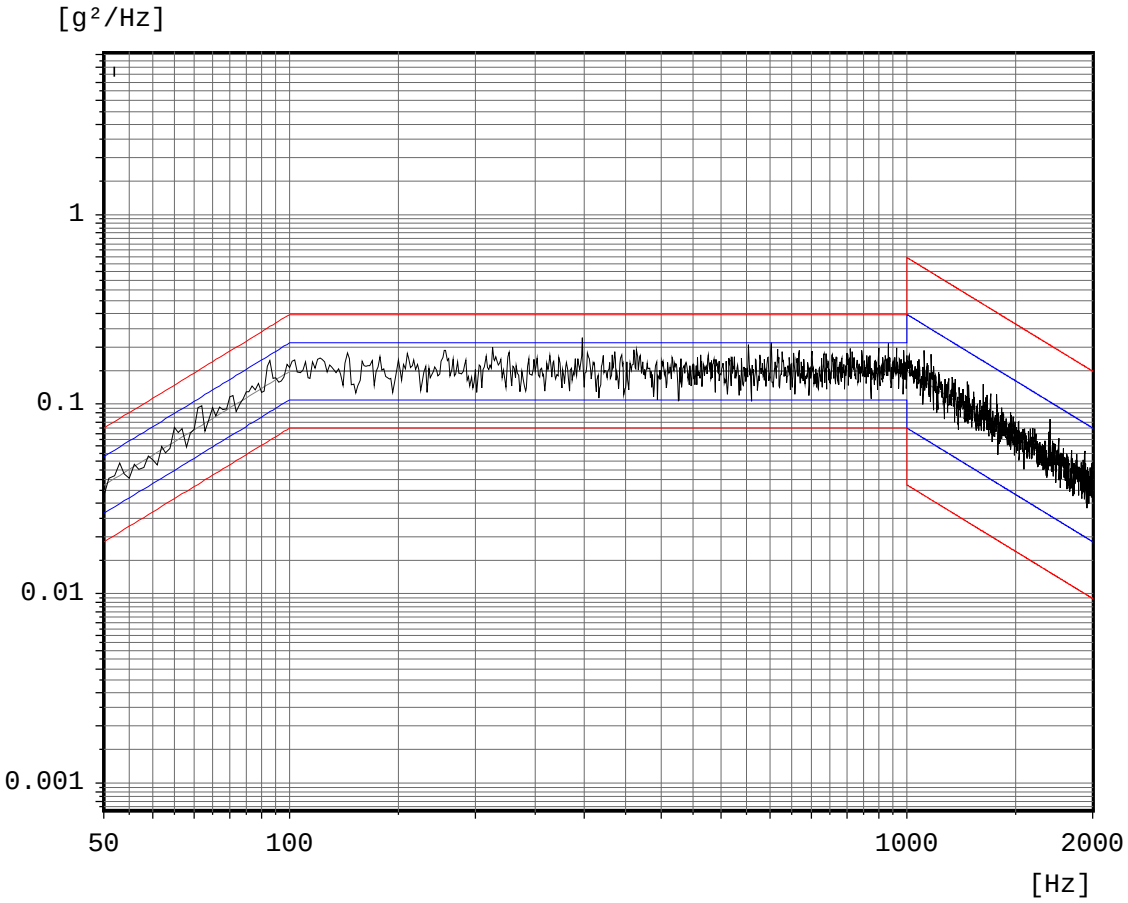


Project# 213041
Run 1
Date:09-30-13
Test Conditions:
50-2000Hz 14.6Grms
PSD 0.150 15Min/Axis
Tech: MHB

FIGURE #73

Random

Channel 5

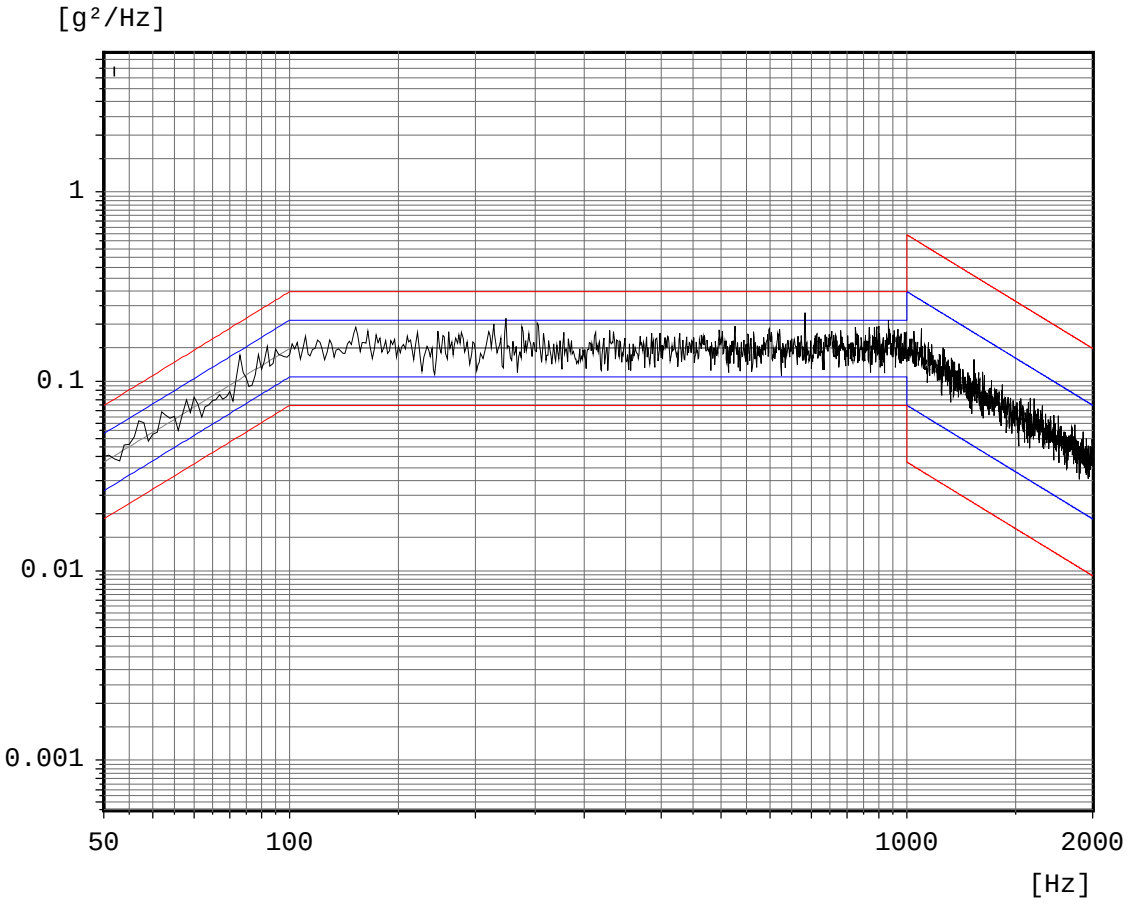


Project# 213041
Run 2
Date:09-30-13
Test Conditions:
50-2000Hz 14.6Grms
PSD 0.150 15Min/Axis
Tech: MHB

FIGURE #74

Random

Channel 5

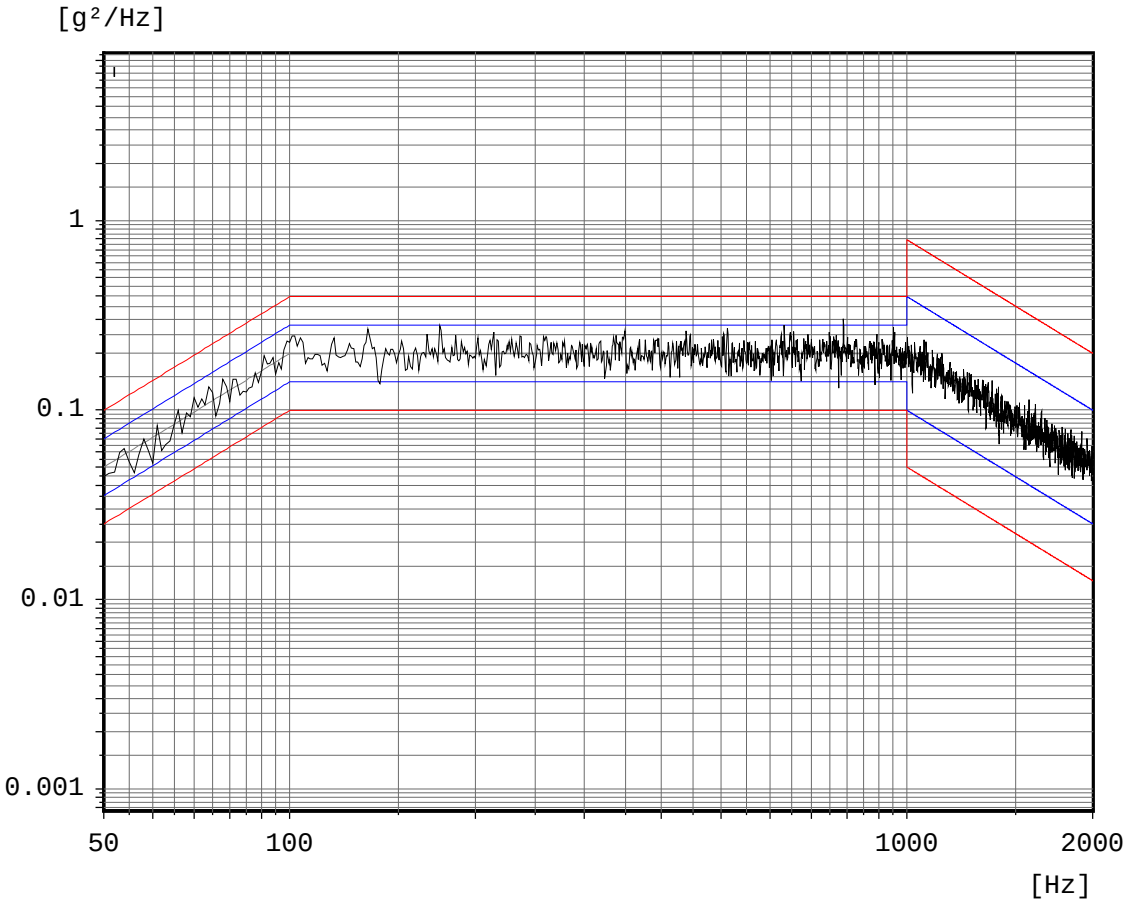


Project# 213041
Run 3
Date:09-30-13
Test Conditions:
50-2000Hz 14.6Grms
PSD 0.150 15Min/Axis
Tech: MHB

FIGURE #75

Random

Channel 5

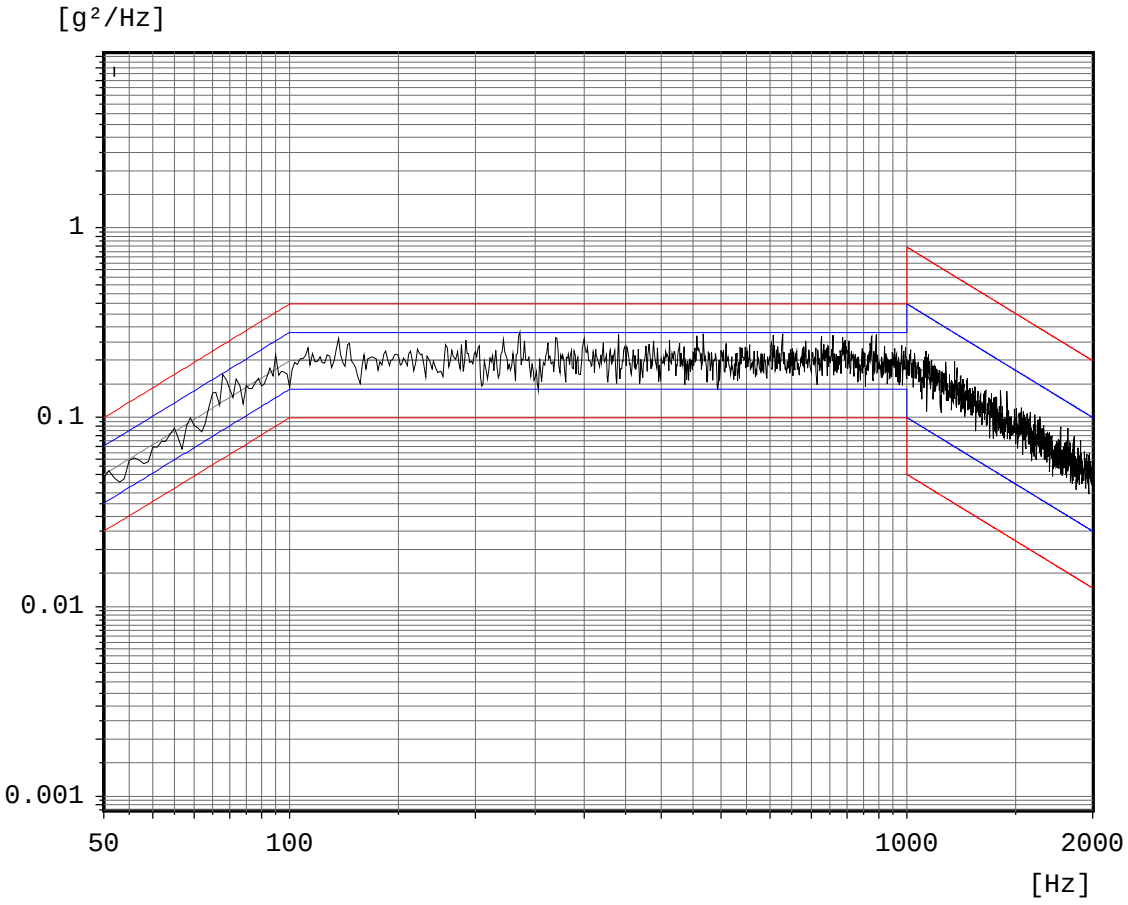


Project# 213041
Run 1
Date:09-30-13
Test Conditions:
50-2000Hz 16.9Grms
PSD 0.200 45Min/Axis
Tech: MHB

FIGURE #76

Random

Channel 5

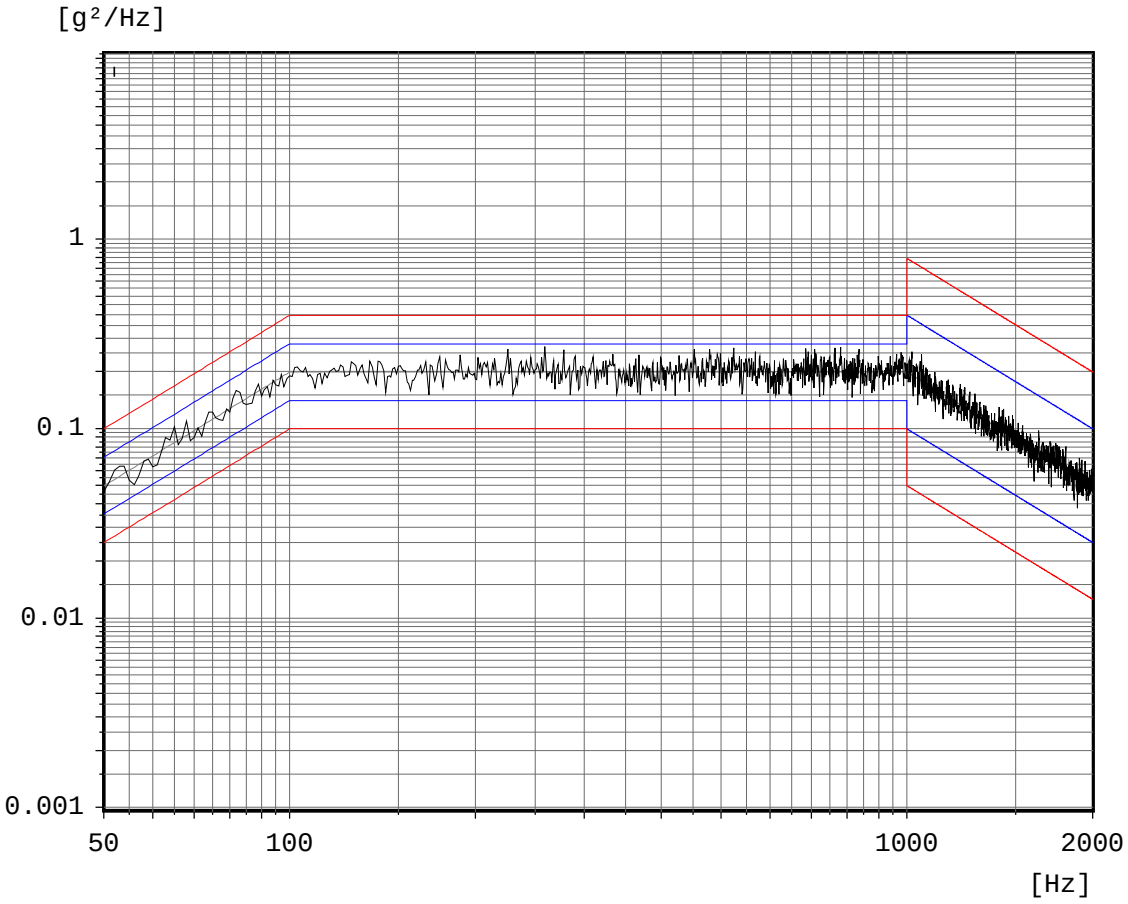


Project# 213041
Run 2
Date:09-30-13
Test Conditions:
50-2000Hz 16.9Grms
PSD 0.200 45Min/Axis
Tech: MHB

FIGURE #77

Random

Channel 5

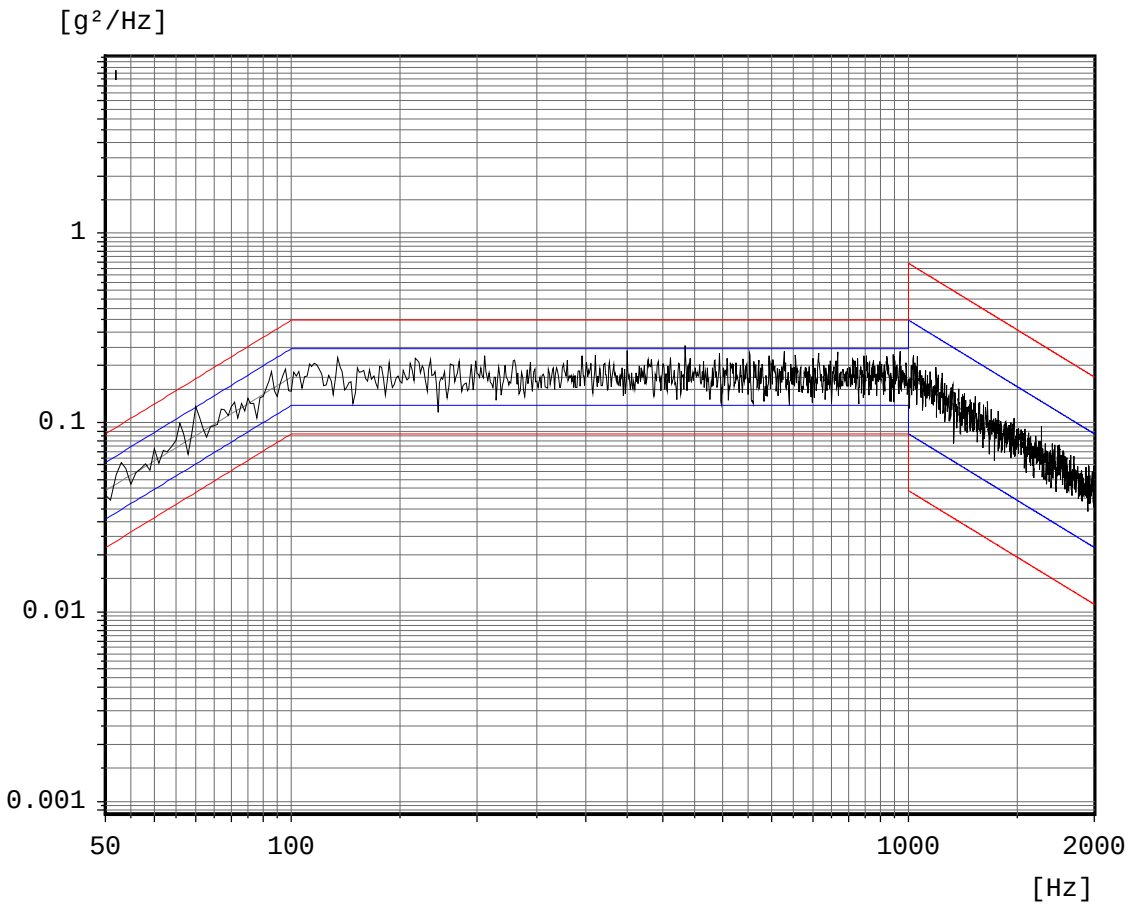


Project# 213041
Run 3
Date:09-30-13
Test Conditions:
50-2000Hz 16.9Grms
PSD 0.200 45Min/Axis
Tech: MHB

FIGURE #78

Random

Channel 5

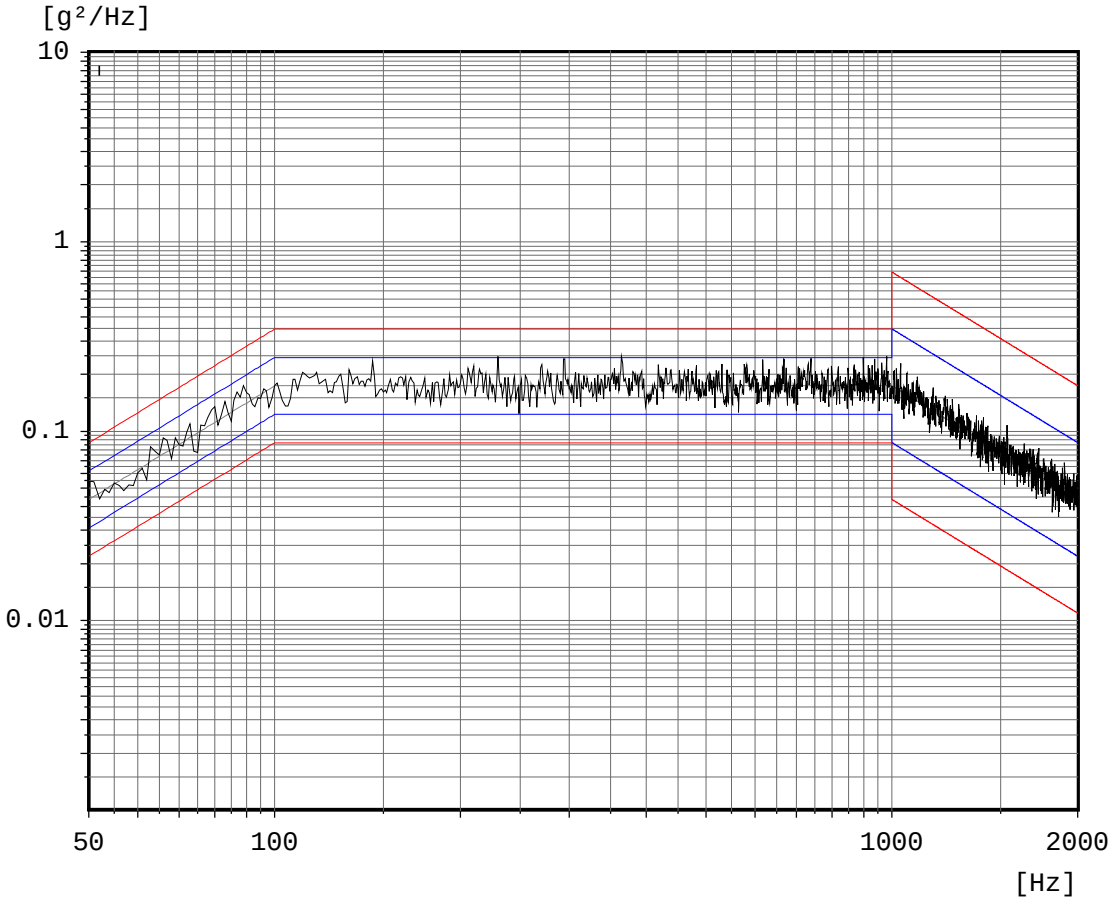


Project# 213041
Run 1
Date:09-30-13
Test Conditions:
50-2000Hz 15.8Grms
PSD 0.175 15Min/Axis
Tech: MHB

FIGURE #79

Random

Channel 5

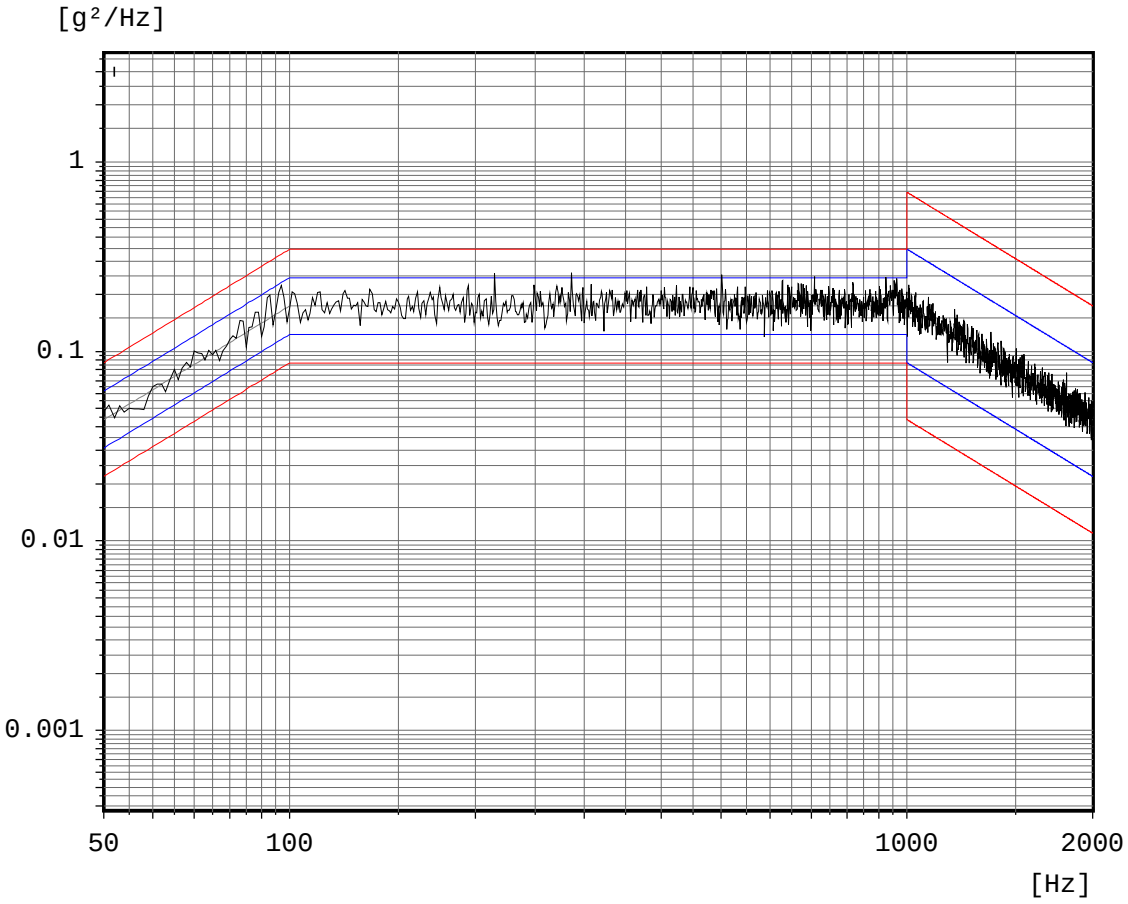


Project# 213041
Run 2
Date:09-30-13
Test Conditions:
50-2000Hz 15.8Grms
PSD 0.175 15Min/Axis
Tech: MHB

FIGURE #80

Random

Channel 5



Project# 213041
Run 3
Date:09-30-13
Test Conditions:
50-2000Hz 15.8Grms
PSD 0.175 15Min/Axis
Tech: MHB

SIGNAL LLCR DATA FILES

FILE NUMBERS

213041B01a
213041B03

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	A/ ID# A1
Product:	VITA46 Connector		File No.:	21304101a
Description:	Signal Contacts			
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	22°C	22°C	22°C	22
R.H. %	62%	45%	53%	60
Date:	04-Sep-2013	09-Sep-2013	10-Sep-2013	11-Sep-2013
Pos. ID	Initial	Sine Vibration	M.Shock	Random Vibration
1	21.2	0.0	0.1	-0.1
2	26.2	-0.1	0.1	-0.1
3	17.5	0.2	0.3	0.3
4	20.8	0.0	0.0	-0.1
5	26.1	0.2	0.1	0.2
6	19.2	0.2	-0.1	0.0
7	25.9	0.0	0.0	0.1
8	17.6	0.0	-0.1	-0.2
9	23.4	0.1	0.0	0.0
10	19.1	-0.1	-0.1	1.4
11	23.5	0.0	-0.2	-0.2
12	19.1	-0.1	0.0	0.0
13	23.5	0.0	-0.1	-0.2
14	19.3	0.1	0.0	0.0
15	27.1	0.0	-0.2	-0.2
16	23.3	0.1	0.1	0.0
17	27.1	0.0	-0.2	-0.5
18	25.5	-0.3	-0.2	-0.2
19	19.8	-0.4	0.0	-0.2
20	25.7	0.1	-0.1	-0.3
21	19.6	0.3	0.1	0.1
22	26.0	-0.7	-0.6	-0.8
23	19.7	0.1	0.0	0.0
24	25.8	-0.1	0.9	-0.3
25	21.0	0.0	-0.8	0.0
26	32.1	0.2	-0.5	-0.1
27	10.0	-0.1	0.0	0.0
28	24.2	-0.1	0.0	-0.2
29	10.1	-0.1	-0.1	-0.1
30	10.3	0.4	-0.1	-0.1
31	23.9	-0.4	-0.2	-0.3
32	7.2	0.0	-0.2	-0.3
33	21.2	-0.1	0.0	-0.1
34	27.2	0.1	0.0	-0.4

			File No.:	21304101a
Temp ºC	22°C	22°C	22°C	22
R.H. %	62%	45%	53%	60
Date:	04-Sep-2013	09-Sep-2013	10-Sep-2013	11-Sep-2013
Pos. ID	Initial	Sine Vibration	M.Shock	Random Vibration
35	19.9	0.0	-0.1	0.0
36	21.3	-0.4	-0.4	0.0
37	27.1	0.2	-0.5	-0.1
38	17.3	0.0	0.1	0.1
39	27.3	-0.2	0.6	0.0
40	19.7	0.2	-0.2	0.3
41	21.1	0.1	0.1	-0.2
42	17.4	0.0	-0.2	-0.1
43	21.2	-0.5	0.0	-0.2
44	17.7	0.0	-0.2	-0.2
45	21.4	-0.5	-0.1	0.0
46	18.0	0.1	0.0	-0.1
47	26.8	0.0	-0.1	-0.1
48	21.4	0.4	0.0	-0.4
49	27.0	0.0	-0.1	-1.1
50	23.4	0.0	-0.7	0.0
51	20.0	0.5	1.2	0.3
52	23.2	0.2	-0.1	-0.2
53	18.2	-0.8	-0.8	-0.7
54	23.3	0.0	-0.2	-0.2
55	17.5	0.1	-0.1	1.2
56	23.5	0.0	-0.2	-0.3
57	10.9	-0.1	0.0	-0.1
58	23.9	0.0	-0.1	-0.1
59	26.7	0.2	0.2	-0.3
60	33.4	-0.2	-2.0	-0.7
61	27.7	0.1	0.3	0.1
62	27.6	0.0	0.0	-0.1
63	31.3	0.0	-0.2	-0.1
64	22.9	0.0	-0.1	-0.2
MAX	33.4	0.5	1.2	1.4
MIN	7.2	-0.8	-2.0	-1.1
AVG	22.0	0.0	-0.1	-0.1
STD	5.2	0.2	0.4	0.3
Open	0	0	0	0
Tech:	MHB	MHB	MHB	MHB
EQUIP. ID	1727	1727	1727	1727
	1047	1047	1047	1047

Low Level Contact Resistance - Delta Values							
Project:	213041					Spec:	EIA 364,TP 23
Customer:	Hypertronics					Subgroup:	A/ ID# A2
Product:	VITA46 Connector					File No.:	21304103
Description:	Signal Contacts						
Open Circuit Voltage:		20mV				Current:	10mA
Temp ºC	22°C	22°C	22°C	22°C	22°C	22°C	22°C
R.H. %	45%	52%	53%	48%	48%	48%	48%
Date:	09-Sep-2013	16-Sep-2013	16-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013
Pos. ID	Initial	Sine	M. Shock	Step 1	Step 2	Step 3	Step 4
		Vibration					
1	20.4	-0.3	0.1	0.4	0.3	0.0	-0.1
2	24.9	-0.1	0.1	0.3	1.9	0.1	-0.1
3	16.9	-0.2	0.2	0.2	-0.1	-0.4	-0.3
4	20.0	-0.2	0.0	0.3	0.3	0.1	-0.2
5	25.1	-0.1	0.0	0.2	2.4	-0.1	-0.2
6	18.8	-0.1	1.1	0.3	0.1	-0.6	-0.3
7	25.2	-0.3	-0.3	0.3	3.0	-0.1	-0.8
8	17.2	-0.1	0.1	0.2	0.1	-0.1	-0.2
9	23.1	-0.1	0.0	-0.9	0.5	-0.1	-0.1
10	18.9	-0.2	0.0	0.2	0.6	-0.5	-0.3
11	23.0	0.0	0.1	0.1	0.3	0.1	0.1
12	19.1	-0.1	0.1	0.4	-0.5	0.0	-0.2
13	23.3	-0.2	0.0	0.1	-0.6	-0.2	-0.2
14	18.6	0.1	0.3	0.5	0.7	0.2	0.2
15	26.7	0.1	0.3	0.6	0.7	0.3	0.2
16	23.6	-0.3	-0.5	0.1	0.0	-0.3	-0.3
17	27.1	-0.1	-0.1	0.1	-0.3	-0.4	-0.1
18	25.0	-0.2	-0.4	0.0	0.3	0.1	-0.1

						File No.:	21304103
Temp ºC	22°C	22°C	22°C	22°C	22°C	22°C	22°C
R.H. %	45%	52%	53%	48%	48%	48%	48%
Date:	09-Sep-2013	16-Sep-2013	16-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013
Pos. ID	Initial	Sine	M. Shock	Step 1	Step 2	Step 3	Step 4
		Vibration					
19	19.2	-0.1	0.1	0.4	-0.1	0.0	-0.2
20	25.1	-0.2	0.0	0.2	-0.9	-0.1	-0.2
21	19.0	-0.1	0.1	0.3	0.0	-0.1	-0.1
22	25.0	-0.1	-0.2	0.1	-0.2	-0.2	-0.4
23	19.5	-0.1	0.0	-0.8	-0.2	-0.4	-0.2
24	24.8	0.8	0.9	1.3	0.7	0.7	0.7
25	20.7	-0.1	0.0	0.1	-0.1	-0.3	-0.2
26	32.4	-0.2	-0.5	-1.3	-0.3	-0.3	-0.2
27	10.1	-0.1	-0.1	0.1	-0.2	-0.5	-0.3
28	23.7	-0.2	-0.1	0.1	-0.2	-0.2	-0.2
29	10.2	-0.2	-0.1	0.3	-0.2	-0.2	-0.3
30	9.9	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2
31	23.6	-0.3	-0.1	0.1	-0.2	-0.3	0.4
32	6.9	-0.2	-0.1	0.2	-0.2	-0.1	0.0
33	20.6	-0.4	-0.1	0.2	-0.1	-0.2	-0.3
34	26.0	-0.1	-0.4	0.5	-0.1	0.0	-0.2
35	18.7	-0.2	0.1	0.4	-0.1	0.0	-0.1
36	20.8	-0.1	-0.2	0.2	-0.2	-0.1	-0.2
37	26.0	-0.1	-0.2	0.3	-0.2	0.0	-0.2
38	16.9	0.3	0.6	0.8	0.2	0.2	-0.5
39	26.2	0.5	0.0	0.3	-0.2	-0.1	-0.2
40	19.0	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2
41	20.6	-0.2	-0.1	0.1	-0.2	-0.1	-0.2
42	16.9	-0.2	-0.2	0.4	-0.2	-0.2	-0.2

						File No.:	21304103
Temp ºC	22°C	22°C	22°C	22°C	22°C	22°C	22°C
R.H. %	45%	52%	53%	48%	48%	48%	48%
Date:	09-Sep-2013	16-Sep-2013	16-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013
Pos. ID	Initial	Sine	M. Shock	Step 1	Step 2	Step 3	Step 4
		Vibration					
43	21.1	-0.2	0.1	-0.4	-0.1	-0.1	-0.1
44	16.9	-0.1	0.0	-0.2	-0.3	-0.2	-0.3
45	21.2	0.0	0.1	0.4	-0.3	-0.2	-0.4
46	17.0	-0.2	0.1	0.1	-0.2	-0.2	-0.2
47	26.8	-0.1	0.0	0.2	-0.2	-0.1	-0.1
48	21.3	-0.4	0.0	0.2	-0.3	-0.3	-0.4
49	26.8	-0.1	-0.3	0.3	-0.4	-0.1	-0.3
50	22.9	-0.6	0.1	0.5	0.1	0.3	0.3
51	16.6	-0.1	0.2	0.3	0.0	-0.1	-0.1
52	22.9	-0.2	-0.1	-0.2	-0.2	-0.1	0.3
53	17.3	-0.1	0.0	0.3	-0.4	-0.2	-0.2
54	22.9	0.0	0.3	0.4	-0.6	0.1	0.1
55	17.2	-0.2	0.0	0.0	-0.4	-0.7	0.0
56	23.3	-0.2	0.0	0.2	-0.2	-0.2	-0.2
57	10.3	-0.2	-0.1	0.3	0.1	-0.1	0.0
58	23.6	-0.3	-0.1	0.3	-0.3	-0.2	-0.2
59	26.7	-0.3	0.1	0.1	-0.1	-0.2	-0.3
60	32.9	0.2	0.3	0.1	-0.1	0.0	0.3
61	27.9	-0.5	-0.2	0.0	-0.1	-0.3	-0.2
62	27.3	-0.1	0.2	0.3	-0.2	0.1	-0.4
63	31.4	-0.4	-0.2	-0.3	-0.9	-0.4	-0.4
64	22.9	-0.2	-0.1	0.1	-0.2	-0.2	-0.2

						File No.:	21304103
Temp ºC	22°C	22°C	22°C	22°C	22°C	22°C	22°C
R.H. %	45%	52%	53%	48%	48%	48%	48%
Date:	09-Sep-2013	16-Sep-2013	16-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013
Pos. ID	Initial	Sine	M. Shock	Step 1	Step 2	Step 3	Step 4
		Vibration					
MAX	32.9	0.8	1.1	1.3	3.0	0.7	0.7
MIN	6.9	-0.6	-0.5	-1.3	-0.9	-0.7	-0.8
AVG	21.5	-0.1	0.0	0.2	0.0	-0.1	-0.2
STD	5.2	0.2	0.3	0.4	0.6	0.2	0.2
Open	0	0	0	0	0	0	0
Tech:	MHB	MHB	MHB	MHB	MHB	MHB	MHB
EQUIP. ID	1727	1727	1727	1727	1727	1727	1727
	1047	1047	1047	1047	1047	1047	1047

SAFETY GROUND DATA FILES

FILE NUMBERS

213041B02a
213041B04

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertontics		Subgroup:	A/ ID#A1
Product:	VITA46 Connector		File No.:	'21304102a
Description:	Safety Ground Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	22°C	22°C	22°C	22°C
R.H. %	62%	45%	53%	60%
Date:	04-Aug-2013	09-Sep-2013	10-Sep-2013	11-Sep-2013
Pos. ID	Initial	Sine Vib	M.Shock	
1	0.3	0.2	0.3	0.5
2	0.3	0.2	0.2	0.3
3	0.2	0.2	0.3	0.3
MAX	0.3	0.2	0.3	0.5
MIN	0.2	0.2	0.2	0.3
AVG	0.3	0.2	0.3	0.4
STD	0.0	0.0	0.0	0.1
Open	0	0	0	0
Tech:	MHB	MHB	MHB	MHB
EQUIP. ID	1727	1727	1727	1727
	1047	1047	1047	1047

		Low Level Contact Resistance - Actual Values					
Project:	213041					Spec:	EIA 364,TP 23
Customer:	Hypertontics					Subgroup:	A/ ID#A2
Product:	VITA46 Connector					File No.:	21304104
Description:	Safety Ground Contacts					Tech:	MHB
Open Circuit Voltage:		20mV				Current:	10mA
Temp ºC	22°C	22°C	22°C	22°C	22°C	22°C	22°C
R.H. %	45%	52%	53%	48%	48%	48%	43%
Date:	09-Sep-2013	16-Sep-2013	16-Sep-2013	30-Sep-2013	30-Sep-2013	30-Sep-2013	01-Oct-2013
Pos. ID	Initial	Sine	M.Shock	Step 1	Step 2	Step 3	Step 4
		Vibration					
1	0.3	0.2	0.2	0.4	0.5	0.5	0.9
2	0.3	0.3	0.3	0.5	0.6	0.8	1.2
3	0.4	0.4	0.5	0.4	0.3	0.5	0.2
MAX	0.4	0.4	0.5	0.5	0.6	0.8	1.2
MIN	0.3	0.2	0.2	0.4	0.3	0.5	0.2
AVG	0.3	0.3	0.3	0.4	0.5	0.6	0.8
STD	0.0	0.1	0.1	0.1	0.2	0.2	0.5
Open	0	0	0	0	0	0	0
Tech:	MHB	MHB	MHB	MHB	MHB	MHB	MHB
EQUIP. ID	1727	1727	1727	1727	1727	1727	1727
	1047	1047	1047	1047	1047	1047	1047

TEST RESULTS

GROUP B

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 9/16/13	COMPLETE DATE: 9/16/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 52%
EQUIPMENT ID#: 1047, 1727	

LOW LEVEL CIRCUIT RESISTANCE (LLCR) –SIGNAL CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the signal contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE:

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 64 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The signal contact low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# B1	21.7	33.0	7.2

2. See data file 213041B10 for individual data points.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 9/16/13 | COMPLETE DATE: 9/16/13

ROOM AMBIENT: 22°C | RELATIVE HUMIDITY: 52%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

    a) Between Adjacent Contacts : Yes
    b) Mated Condition : Mated
    c) Mounting Condition : Mounted
    d) Test Voltage : 500 VAC
    e) Holt Time : 1 Minute
    f) Rate of Application : 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 9/16/13	COMPLETE DATE: 9/16/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 52%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE:

2. Test Conditions:

a) Test Current : 100 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# B1	0.2	0.3	0.2

2. See data file 213041B11 for individual data points.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN:
START DATE: 9/16/13	COMPLETE DATE: 9/16/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 53%

EQUIPMENT ID#: 321, 1047, 1727

BENCH HANDLING

PURPOSE:

To determine the mechanical and electrical integrity of connectors for use with electronic equipment subjected to shocks such as those expected from handling.

PROCEDURE:

1. Sample under test was raised on one edge using the opposite edge as a hinge 4 inches or 45 degrees whichever is less then released to drop on the bench top. The opposite and adjacent edges were repeated in a similar manner giving a total of 4 drops for the bottom plane.

2. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test sample as tested.

2. The change in the signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

-continued on next page.

REQUIREMENTS: -continued

4. There shall be no evidence of arcing, breakdown, etc. when a 500 VAC test voltage is applied nor shall the leakage current exceed 5.0 milliamps.

RESULTS:

1. There was no evidence of physical damage to the test sample.

2. The following is a summary of the data observed:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# B1	+0.3	+6.6

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# B1	0.2	0.2	0.2

3. See data files 213041B10 and 213041B11 for individual data points.

4. There was no evidence of breakdown, arcing, etc. nor did the leakage current exceed 5.0 milliamps when the specified test voltage was applied.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 9/17/13	COMPLETE DATE: 9/19/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 46%

EQUIPMENT ID#: 321, 553, 874, 1028, 1047, 1348, 1349, 1360, 1361, 1366, 1367, 1368, 1521, 1727, 1790, 1791

VIBRATION, RANDOM @ TEMPERATURE CYCLE

PURPOSE:

1. To determine if nanosecond events at the level specified exist.

2. To determine if the contact system is susceptible to fretting corrosion.

3. To determine if the electrical stability of the system has degraded when exposed to a vibratory environment.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 28, Test Condition V, Letter D with Temperature Cycling.

2. Test Conditions:

   a) Power Spectral Density : 0.1 g^2/Hz
   b) G 'RMS' : 11.95
   c) Frequency : 50 to 2,0000 Hz
   d) Temperature Cond. : -40°C to +100°C
      Dwell time : 30 Minutes
      Ramp Time : 3°C to 5°C per minute

3. Figure #81 illustrates the test sample fixturing utilized during the test.

-continued on next page.

PROCEDURE: -continued

4. The low nanosecond event detection was performed in accordance with EIA 364, Test Procedure 87.

5. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

6. All subsequent variable testing was performed in accordance with procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

2. There shall be no events detected greater than 10.0 nanoseconds.

3. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

4. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

5. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

6. There shall be no visible wear-through of the connector contact gold plating under 30X to 40X magnification.

RESULTS:

1. There was no evidence of physical damage to the test samples as tested or visible evidence of wear-through on the gold contacts.

2. There was no evidence of low nanosecond events in excess of 10.0 nanoseconds.

-continued on next page.

RESULTS: -continued

3. There was no evidence of arcing, breakdown, etc. when the test voltage was applied nor did the leakage current exceed 5.0 milliamps.

4. The following is a summary of the observed data:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# B1	+0.3	+6.2

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# B1	2.4	4.8	0.4

5. See data files 213041B10 and 213041B11 for individual data points.

6. The vibration profiles are shown in Figure #'s 82 (X-axis), 83 (Y-axis) and 84 (Z-axis).

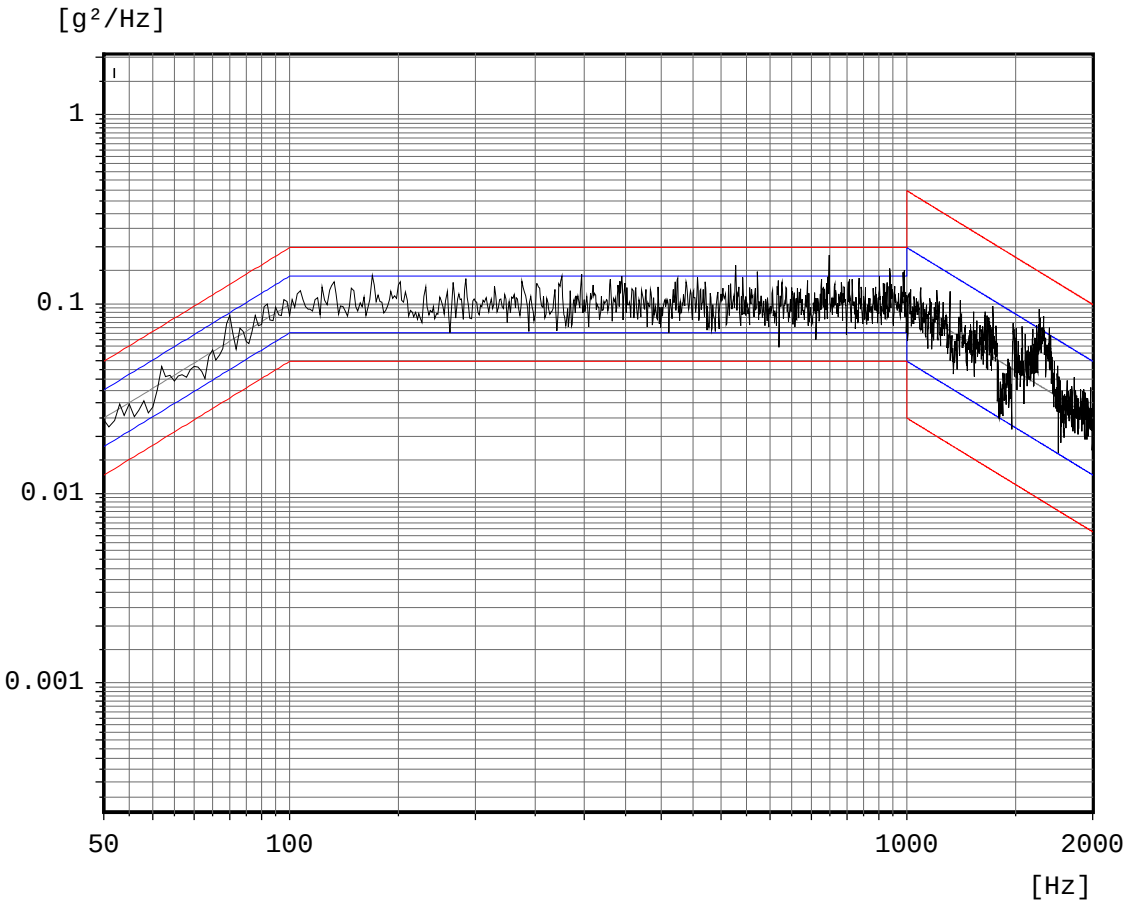
FIGURE #81

RANDOM VIBRATION @ TEMPERATURE CYCLE

FIGURE #82

Random

Control channel

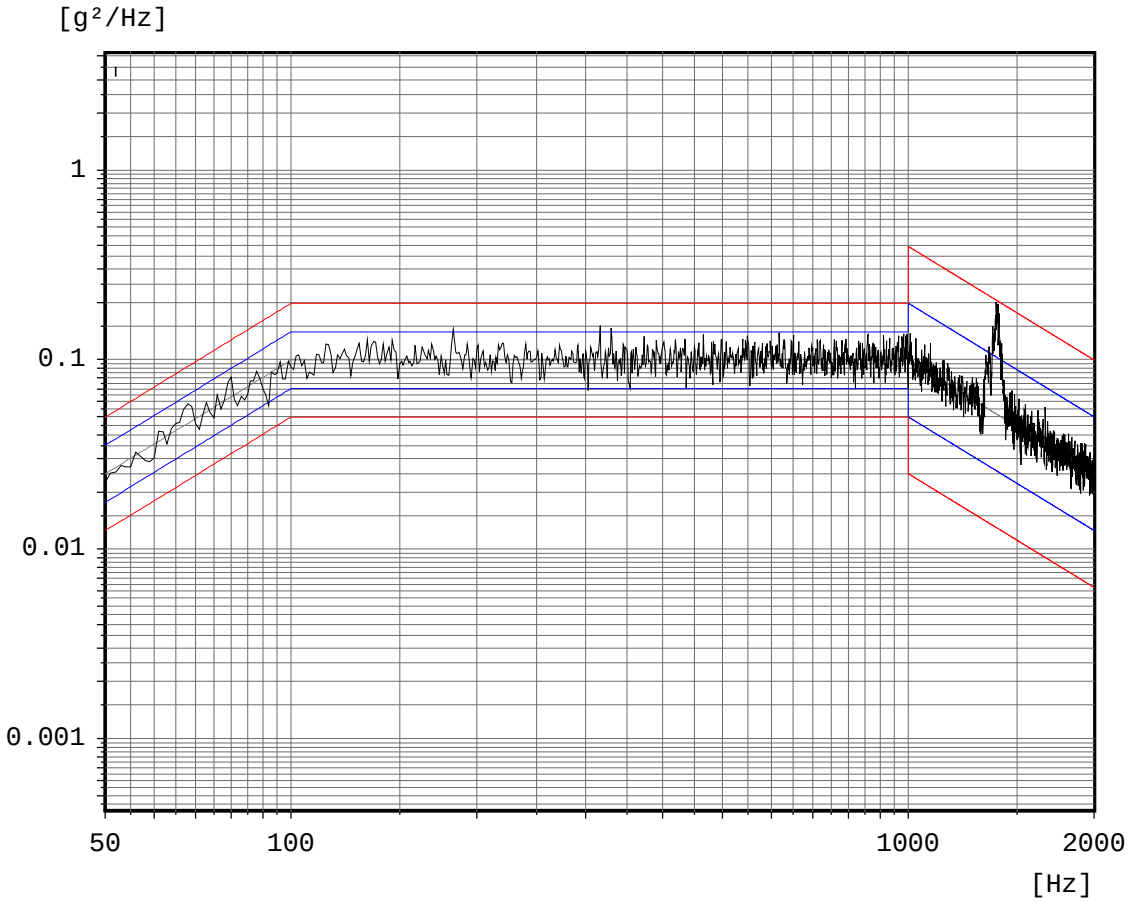


Project# 213041
Hypertronics
Run 1
Z-Axis
Date:17Sep13
Tech:MHB

FIGURE #83

Random

Control channel

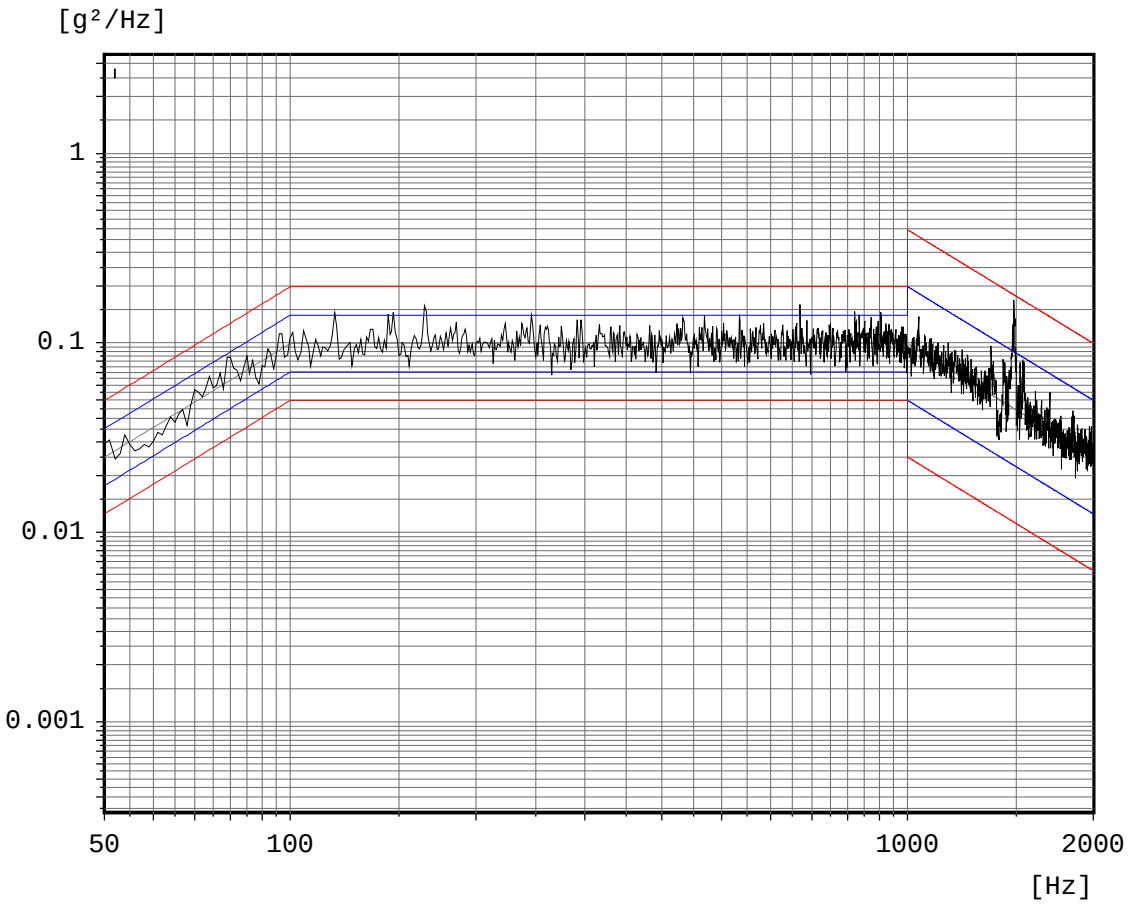


Project# 213041
Hypertronics
Sample B1
Run 2
Y-Axis
Date:17Sep13
Tech:MHB

FIGURE #84

Random

Control channel



Project# 213041
Sample B1
Hypertronics
Run 3
X-Axis
Date:18Sep13
Tech:MHB

SIGNAL LLCR DATA FILES

FILE NUMBERS

213041B10

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec: EIA 364,TP 23	
Customer:	Hypertronics		Subgroup:	B/ ID# B1
Product:	VITA46 Connector		File No.:	213041B10
Description:	Signal Contacts		Current:	10mA
Open Circuit Voltage:		20mV		
Temp ºC	22°C	22°C	22	
R.H. %	52%	52%	46	
Date:	16-Sep-2013	16-Sep-2013	19-Sep-2013	
Pos. ID	Initial	Bench	Vibration	
		Handling	@ Temp	
1	20.7	0.5	-0.2	
2	25.6	-0.2	-0.2	
3	18.0	1.3	2.2	
4	20.5	-0.6	-0.2	
5	25.1	1.0	0.6	
6	19.6	-0.7	-0.3	
7	26.1	1.5	-0.3	
8	17.7	-0.6	0.0	
9	23.4	-0.1	0.3	
10	16.3	0.4	2.2	
11	21.9	0.8	1.6	
12	18.8	0.3	0.2	
13	25.4	-1.2	-2.1	
14	18.8	0.3	0.3	
15	27.2	0.4	0.0	
16	24.2	-0.6	-0.4	
17	27.5	-0.5	-1.0	
18	25.8	0.3	0.0	
19	20.5	-1.6	-0.5	
20	25.1	1.2	-0.6	
21	19.5	-0.3	0.1	
22	25.0	1.0	0.7	
23	18.1	1.6	1.7	
24	26.6	-0.9	-0.6	
25	21.7	-0.7	0.1	
26	31.3	2.0	2.5	
27	10.1	0.5	1.4	
28	23.8	0.1	-0.7	
29	9.9	0.4	-0.1	
30	10.3	0.4	0.4	
31	23.8	0.1	0.0	
32	7.2	0.2	0.1	
33	21.0	0.2	-0.1	

			File No.:	213041B10
Temp ºC	22°C	22°C	22	
R.H. %	52%	52%	46	
Date:	16-Sep-2013	16-Sep-2013	19-Sep-2013	
Pos. ID	Initial	Bench	Vibration	
		Handling	@ Temp	
34	26.6	0.1	0.4	
35	19.8	0.1	-0.3	
36	21.0	0.1	0.2	
37	26.1	0.1	0.1	
38	17.8	-0.1	-0.2	
39	26.8	0.1	-0.4	
40	19.4	-0.2	-0.1	
41	21.4	0.1	-0.1	
42	17.3	0.0	0.1	
43	21.1	0.2	-0.3	
44	17.4	0.1	0.2	
45	21.3	0.0	-0.3	
46	17.3	0.1	0.5	
47	27.2	0.2	0.5	
48	21.5	0.1	0.2	
49	26.7	0.5	0.0	
50	23.5	0.0	0.1	
51	17.2	0.3	0.0	
52	23.6	2.8	0.1	
53	17.2	0.0	0.4	
54	23.3	-0.1	0.2	
55	17.1	0.1	1.0	
56	23.4	0.1	0.3	
57	10.5	0.2	0.6	
58	23.7	-0.2	0.1	
59	23.8	3.7	4.9	
60	27.2	6.6	6.2	
61	33.0	-4.3	-4.9	
62	27.9	0.0	-0.1	
63	31.4	-0.1	0.0	
64	23.1	0.5	0.1	
MAX	33.0	6.6	6.2	
MIN	7.2	-4.3	-4.9	
AVG	21.7	0.3	0.3	
STD	5.2	1.3	1.4	
Open	0	0	0	
Tech:	MHB	MHB	MHB	
EQUIP. ID	1727	1727	1727	
	1047	1047	1047	

SAFETY GROUND RESISTANCE FILES

FILE NUMBERS

213041B11

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertontics		Subgroup:	B/ ID# B1
Product:	VITA46 Connector		File No.:	213041B11
Description:	Safety Ground Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	22°C	22°C		
R.H. %	53%	53%		
Date:	16-Sep-2013	16-Sep-2013	19-Sep-2013	
Pos. ID	Initial	Bench	Vibration	
		Handling	@ Temp	
1	0.2	0.2	2.2	
2	0.3	0.2	4.8	
3	0.2	0.2	0.4	
MAX	0.3	0.2	4.8	
MIN	0.2	0.2	0.4	
AVG	0.2	0.2	2.4	
STD	0.0	0.0	2.2	
Open	0	0	0	
Tech:	MHB	MHB	MHB	
EQUIP. ID	1727	1727	1727	
	1047	1047	1047	

TEST RESULTS

GROUP C

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 8/21/13 | COMPLETE DATE: 8/21/13

ROOM AMBIENT: 21°C | RELATIVE HUMIDITY: 59%

EQUIPMENT ID#: 1047, 1727

LOW LEVEL CIRCUIT RESISTANCE –SIGNAL CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the signal contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 64 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The signal contact low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# C1	21.9	33.6	6.1

2. See data file 213041B05 for individual data points.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 8/21/13 | COMPLETE DATE: 8/21/13

ROOM AMBIENT: 21°C | RELATIVE HUMIDITY: 59%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

   a) Between Adjacent Contacts : Yes
   b) Mated Condition : Mated
   c) Mounting Condition : Mounted
   d) Test Voltage : 500 VAC
   e) Holt Time : 1 Minute
   f) Rate of Application : 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

-continued on next page.

REQUIREMENTS:

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 8/21/13	COMPLETE DATE: 8/21/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 59%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# C1	0.3	0.4	0.2

2. See data file 213041B06 for individual data points.

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN: MHB

START DATE: 8/23/13 COMPLETE DATE: 9/2/13

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 68%

EQUIPMENT ID#: 321, 1047, 1127, 1314, 1315, 1361, 1727

THERMAL CYCLE WITH HUMIDITY

PURPOSE:

To evaluate the impact on electrical stability of the contact system when exposed to any environment which may generate thermal/moisture type failure mechanisms such as:

a) Fretting corrosion due to wear resulting from micromotion, induced by thermal cycling. Humidity accelerates the oxidation process.

b) Oxidation of wear debris or from particulates from the surrounding atmosphere which may have become entrapped between the contacting surfaces.

c) Failure mechanisms resulting from a wet oxidation process.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 31.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Relative Humidity	:	85% to 95%
b) Temperature Conditions	:	28°C to 71°C
c) Number of Cycles	:	10
d) Mating Conditions	:	Mated
e) Mounting Conditions	:	Mounted
f) Cycle Duration	:	24 Hours
g) Duration	:	240 Hours

3. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical deterioration of the test samples as tested.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS:

1. The test samples as tested showed no evidence of physical deterioration.

2. There was no evidence of breakdown, arcing, etc., nor did the leakage current exceed 5.0 milliamps when a 500 VAC test voltage was applied.

-continued on next page.

RESULTS: -continued

3. The following is a summary of the data observed:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# C1	+0.2	+3.1

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# C1	0.3	0.4	0.3

4. See data files 213041B05 and 213041B06 for individual data points.

SIGNAL CONTACT LLCR DATA FILES

FILE NUMBER

213041B05

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertonics		Subgroup:	C/ ID# C1
Product:	VITA46 Connector		File No.:	21304105
Description:	Signal Contacts			
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C		
R.H. %	59%	68%		
Date:	21-Aug-2013	02-Sep-2013		
Pos. ID	Initial	Humidity		
1	21.3	0.2		
2	25.7	0.4		
3	18.0	1.0		
4	18.3	2.0		
5	23.9	1.4		
6	19.0	0.2		
7	25.9	0.0		
8	17.7	0.3		
9	24.2	0.2		
10	19.1	0.1		
11	23.8	0.2		
12	18.8	0.5		
13	23.5	0.1		
14	18.7	0.0		
15	27.2	0.4		
16	24.7	-0.7		
17	26.6	1.0		
18	25.9	0.4		
19	20.0	0.0		
20	25.9	0.3		
21	20.2	-0.5		
22	25.9	0.2		
23	19.4	0.0		
24	26.0	0.0		
25	22.4	-1.1		
26	32.9	0.9		
27	10.2	-0.1		
28	23.2	0.8		
29	10.2	-0.2		
30	10.0	0.0		
31	23.8	0.3		
32	6.4	0.2		
33	20.9	1.0		

			File No.:	21304105
Temp ºC	21°C	22°C		
R.H. %	59%	68%		
Date:	21-Aug-2013	02-Sep-2013		
Pos. ID	Initial	Humidity		
34	26.6	0.4		
35	20.0	0.2		
36	21.0	-0.4		
37	26.5	-1.1		
38	18.3	0.2		
39	26.4	1.0		
40	18.6	0.7		
41	21.3	0.3		
42	17.3	0.1		
43	21.5	-0.2		
44	17.9	0.7		
45	21.7	0.0		
46	17.9	-0.5		
47	26.9	0.1		
48	21.3	-0.1		
49	27.2	0.1		
50	24.4	-0.1		
51	17.8	0.1		
52	23.8	-0.1		
53	17.5	0.1		
54	23.9	-0.5		
55	17.4	0.2		
56	24.0	0.1		
57	14.8	-3.7		
58	20.4	3.4		
59	30.7	1.7		
60	33.6	0.3		
61	30.1	1.5		
62	27.7	0.4		
63	32.2	0.1		
64	25.3	0.1		
MAX	33.6	3.4		
MIN	6.4	-3.7		
AVG	22.1	0.2		
STD	5.3	0.8		
Open	0	0		
Tech:	MHB	MHB		
EQUIP. ID	1727	1727		
	1047	1047		

SAFETY GROUND LLCR DATA FILES

FILE NUMBER

213041B06

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	C/ ID# C1
Product:	VITA46 Connector		File No.:	21304106
Description:	Safety Ground Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C		
R.H. %	59%	68%		
Date:	21-Aug-2013	02-Sep-2013		
Pos. ID	Initial	Humidity		
1	0.3	0.4		
2	0.4	0.3		
3	0.2	0.3		
MAX	0.4	0.4		
MIN	0.2	0.3		
AVG	0.3	0.3		
STD	0.1	0.1		
Open	0	0		
Tech:	MHB	MHB		
EQUIP. ID	1727	1727		
	1047	1047		

TEST RESULTS

GROUP D

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN:

START DATE: 8/15/13 | COMPLETE DATE: 8/15/13

ROOM AMBIENT: 21°C | RELATIVE HUMIDITY: 58%

EQUIPMENT ID#: 1047, 1727

LOW LEVEL CIRCUIT RESISTANCE –SIGNAL CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the signal contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 64 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# D1	22.2	33.4	6.9

2. See data file 213041B07 for individual data points.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 8/15/13 | COMPLETE DATE: 8/15/13

ROOM AMBIENT: 21°C | RELATIVE HUMIDITY: 58%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

   a) Between Adjacent Contacts : Yes
   b) Mated Condition : Mated
   c) Mounting Condition : Mounted
   d) Test Voltage : 500 VAC
   e) Holt Time : 1 Minute
   f) Rate of Application : 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 8/15/13	COMPLETE DATE: 8/15/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 58%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground contacts under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

REQUIREMENTS:

The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# D1	0.3	0.4	0.2

2. See data file 213041B08 for individual data points.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN:

START DATE: 9/22/13 | COMPLETE DATE: 10/3/13

ROOM AMBIENT: 22°C | RELATIVE HUMIDITY: 50%

EQUIPMENT ID#: 321, 1047, 1727

SALT FOG W/SO2

PURPOSE:

To expose test samples to an environment consisting of spraying salt fog with the introduction of SO2.

a) Penetration of the atmosphere to the contact surfaces.
b) Surface finish degradation.
c) Galvanic reaction of dissimilar metals.
d) Imperfections in the finish system due to gross porosity or wear.

PROCEDURE:

1. The test environment was performed in accordance with ASTM G85 (Annex A4, Cycle A4.4.4.1).

2. Test Conditions:

   a) Salt Solution : 5%
   b) Temperature : 35 +1.1°C/-1.7°C
   c) Duration : 2, 48 Hour Tests
   d) Post Cleaning : Yes
   e) Mated Condition : Mated
   f) Mounting Condition : Mounted

3. Testing was subcontracted to Element Material Technologies.

-continued on next page.

PROCEDURE: -continued

4. During the exposure, resistance measurements were taken at specific intervals and in the following sequence.

   a) The test samples were placed with the supplied enclosure and placed in the test chamber.

   b) At each designated measurement period (after 48 hours of exposure), the test sample was removed from the test chamber and returned to Contech Research for post variable testing.

   c) Measure and record the signal contact, safety ground contact low level circuit resistance and the DWV measurements.

   d) Upon completion of the measurements, the sample was returned to Element Material Technologies for the second, 48 hour test. Steps a – c were repeated.

5. The test exposure was performed with the mated test sample placed within a sheet metal enclosure (see Figure #85).

6. All subsequent variable testing was performed in accordance with the procedures as previously indicated.

REQUIREMENTS:

1. There shall be no evidence of corrosion due to exposure of the underplate or base metal that may degrade electrical or mechanical performance.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS: See Next Page

RESULTS:

1. There was no exposure of the underplate or base metal that would degrade electrical or mechanical performance.

2. There was no evidence of exposure of underplate or base metal, pitting on finishes. There were no abnormal nicks, cracks or scratches on finished surfaces that indicate the removal of the normal protective coating.

3. There was no evidence of arcing or breakdown nor did the leakage current exceed 5.0 milliamps when a 500 VAC test voltage was applied.

4. The following is a summary of the data observed:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

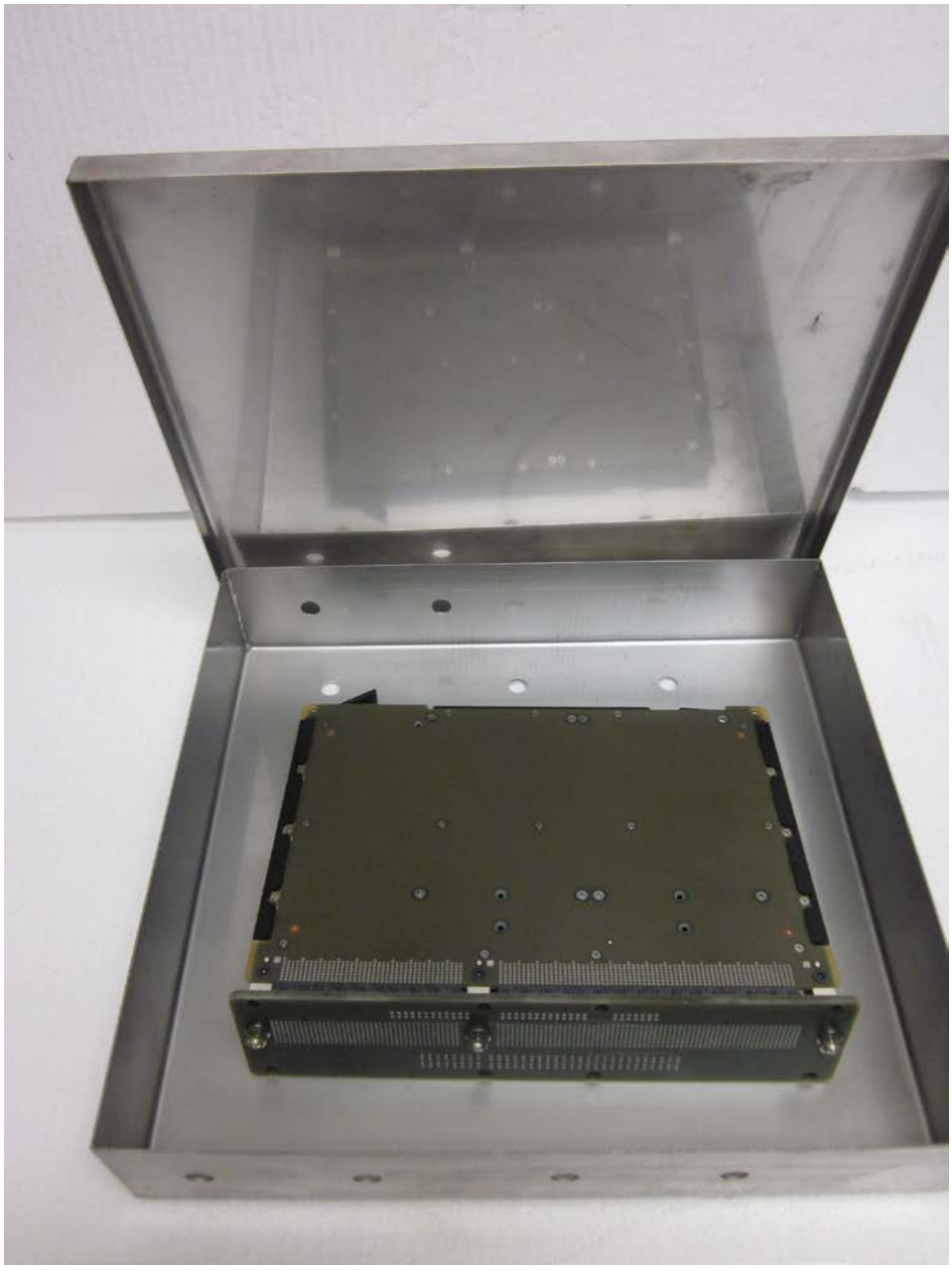
	1ST RUN		2ND RUN	
Sample ID#	Avg. Change	Max. Change	Avg. Change	Max. Change
ID# D1	+0.1	+2.9	+0.3	+3.1

CHANGE IN
SAFETY GROUND
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

	1ST RUN			2ND RUN		
Sample ID#	Avg.	Max.	Min.	Avg.	Max.	Min.
ID# D1	0.4	0.4	0.4	0.4	0.4	0.3

5. See data files 213041B07 and 213041B08 for individual data points.

FIGURE #85



SIGNAL CONTACT LLCR DATA FILES

FILE NUMBER

213041B07

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	D/ ID# D1
Product:	VITA46 Connector		File No.:	21304107
Description:	Signal Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Units:				
Temp ºC	21°C	22°C	22°C	
R.H. %	58%	41%	50%	
Date:	15-Aug-2013	24-Sep-2013	03-Oct-2013	
Pos. ID	Initial	Salt Spray	Salt Spray	
		W/So2	W/So2	
1	21.1	0.0	-0.1	
2	26.0	-0.1	0.0	
3	18.4	0.1	0.2	
4	20.9	-0.1	-0.1	
5	26.0	0.0	-0.1	
6	19.8	-0.1	0.1	
7	25.8	0.1	-0.1	
8	19.2	0.4	0.0	
9	23.8	-0.2	-0.2	
10	19.2	0.1	0.0	
11	23.9	0.0	-0.1	
12	19.6	0.3	0.0	
13	23.5	0.0	0.0	
14	19.2	-0.1	-0.4	
15	28.9	0.9	1.9	
16	24.1	-0.1	0.6	
17	27.3	0.1	0.3	
18	25.5	0.0	0.1	
19	19.8	0.1	-0.1	
20	26.2	0.0	0.0	
21	20.0	0.2	0.2	
22	25.9	-0.1	-0.1	
23	20.0	0.1	0.7	
24	25.9	0.2	0.4	
25	21.4	-0.1	-0.1	
26	33.4	0.2	0.2	
27	10.7	0.1	0.1	
28	23.3	-0.1	0.1	
29	10.3	0.0	-0.1	
30	10.1	0.1	0.0	

31	23.3	-1.0	-0.1	
32	6.9	-0.1	-0.2	
33	21.1	0.1	0.0	
34	26.2	0.5	0.5	
35	19.3	0.2	0.1	
36	21.1	0.0	0.1	
37	26.3	0.1	0.1	
38	19.3	2.5	3.1	
39	26.7	-0.1	-0.1	
40	19.7	0.1	0.1	
41	21.3	-0.1	-0.5	
42	17.6	0.0	0.1	
43	21.1	-0.1	-1.1	
44	18.0	-0.1	-0.1	
45	22.2	-0.3	1.1	
46	17.5	0.2	2.7	
47	27.6	0.4	0.6	
48	21.4	-0.1	-0.3	
49	27.4	-0.4	-0.1	
50	23.5	0.0	0.8	
51	17.7	0.3	1.0	
52	23.1	0.1	0.2	
53	18.1	0.4	0.7	
54	23.4	-0.1	0.0	
55	17.3	0.1	-0.1	
56	23.8	-0.1	-0.3	
57	10.9	0.0	0.0	
58	24.2	0.0	-0.1	
59	27.7	-0.3	0.2	
60	31.2	2.9	2.2	
61	30.0	0.0	0.9	
62	28.5	0.3	1.4	
63	32.7	0.1	0.9	
64	25.2	-0.2	0.2	
MAX	33.4	2.9	3.1	
MIN	6.9	-1.0	-1.1	
AVG	22.2	0.1	0.3	
STD	5.3	0.5	0.7	
Open	0	0	0	
Tech:	MHB	MHB	MHB	
EQUIP. ID	1727	1727	1727	
	1047	1047	1047	

SAFETY GROUND LLCR DATA FILES

FILE NUMBER

213041B08

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertonics		Subgroup:	D/ ID#D1
Product:	VITA46 Connector		File No.:	21304108
Description:	Safety Ground Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C	22°C	
R.H. %	58%	41%	50%	
Date:	15-Aug-2013	24-Sep-2013	03-Oct-2013	
Pos. ID	Initial	Salt Spray	Salt Spray	
		W/So2	W/So2	
1	0.2	0.4	0.4	
2	0.3	0.4	0.4	
3	0.4	0.4	0.3	
MAX	0.4	0.4	0.4	
MIN	0.2	0.4	0.3	
AVG	0.3	0.4	0.4	
STD	0.1	0.0	0.1	
Open	0	0	0	
Tech:	MHB	MHB	MHB	
EQUIP. ID	1727	1727	1727	
	1047	1047	1047	

TEST RESULTS

GROUP E

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN: MHB

START DATE: 8/21/13 COMPLETE DATE: 8/21/13

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 63%

EQUIPMENT ID#: 1047, 1727

LOW LEVEL CIRCUIT RESISTANCE –SIGNAL CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the signal contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 64 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The signal contacts low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# E1	21.7	34.1	6.9

2. See data file 213041B09 for individual data points.

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN:

START DATE: 8/21/13 COMPLETE DATE: 8/21/13

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 63%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

    a) Between Adjacent Contacts : Yes
    b) Mated Condition : Mated
    c) Mounting Condition : Mounted
    d) Test Voltage : 500 VAC
    e) Holt Time : 1 Minute
    f) Rate of Application : 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 8/21/13	COMPLETE DATE: 8/21/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 63%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground contacts under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# E1	0.3	0.3	0.2

2. See data file 213041B10 for individual data points.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 8/22/13	COMPLETE DATE: 8/22/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 68%
EQUIPMENT ID#: 26, 321, 403, 1047, 1727	

DUST EXPOSURE

PURPOSE:

To simulate applications where components may be exposed unmated for extended periods of time and are susceptible to exposure to a dust environment. To determine the impact of residual dust on the electrical stability of the contact system.

PROCEDURE:

1. Testing was performed in accordance with MIL-STD-810F, Method 510.4, Procedure I.

2. Test Conditions:

    a) Dust Type : Talcum (<150 µm)
    b) Size of Chamber : 4.8 ft.^{3} (0.136m^3)
    c) Amount of Dust : 9 grams/ft^3
    d) Time of Exposure : 90 Minutes
    e) Fan Speed : 360 cfm

3. The chamber fan was located in the bottom of the chamber below the connectors. The fan was located in a manner whereby the flow was directed in an upward direction.

4. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

5. All subsequent variable testing was performed in accordance with the procedures as previously indicated.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as exposed.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS:

1. There was no evidence of physical damage to the test samples as exposed.

2. The following is a summary of the observed data:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# E1	+0.0	+0.6

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# E1	0.3	0.3	0.2

3. See data files 213041B09 and 213041B10 for individual data points.

4. There was no evidence of breakdown, arcing, etc., nor did the leakage current exceed 5 milliamps when a 500 VAC test voltage was applied.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN:

START DATE: 8/23/13 | COMPLETE DATE: 8/23/13

ROOM AMBIENT: 21°C | RELATIVE HUMIDITY: 64%

EQUIPMENT ID#: 321, 339, 1047, 1727

SAND TEST

PURPOSE:

To evaluate the ability of the connector to be stored and operated in blowing sand conditions without degradation in performance.

PROCEDURE:

1. Testing was performed in accordance with MIL-STD-810F, Method 510.4, Procedure II.

2. Test Conditions:

    a) Particle Size : 150 to 850 µm
    b) Particles : 140 Mesh Silica
    b) Velocity : 350 cfm
    c) Mated Condition : Mated
    d) Mounting : Mounted
    e) Duration : 90 Minutes

3. The chamber fan was located in the bottom of the chamber below the connectors. The fan was located in a manner whereby the flow was directed in an upward direction.

4. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

5. All subsequent variable testing was performed in accordance with the procedures as previously indicated.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as exposed.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground resistance shall not exceed 100.0 milliohms.

4. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS:

1. There was no evidence of physical damage to the test samples as exposed.

2. The following is a summary of the observed data:

CHANGE IN SIGNAL CONTACT
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# E1	-0.1	+0.8

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# E1	0.3	0.3	0.2

3. See data files 213041B09 and 213041B10 for individual data points.

4. There was no evidence of breakdown, arcing, etc., nor did the leakage current exceed 5.0 milliamps when a 500 VAC test voltage was applied.

SIGNAL CONTACT LLCR DATA FILES

FILE NUMBER

213041B09

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertonics		Subgroup:	E/ ID# E1
Product:	VITA46 Connector		File No.:	21304109
Description:	Signal Contacts			
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C	22°C	
R.H. %	59%	61%	62%	
Date:	21-Aug-2013	22-Aug-2013	23-Aug-2013	
Pos. ID	Initial	Dust	Sand	
1	20.4	0.1	0.3	
2	25.4	0.6	0.0	
3	17.1	0.5	0.3	
4	20.5	0.0	-0.1	
5	25.8	-0.1	-0.1	
6	18.8	0.1	0.2	
7	25.8	-0.4	-0.3	
8	17.0	0.1	0.1	
9	23.0	-0.2	-0.1	
10	18.7	0.1	0.0	
11	23.4	0.1	-0.1	
12	18.8	0.0	0.1	
13	23.3	0.0	-0.1	
14	18.7	0.0	-0.1	
15	26.7	0.1	0.0	
16	23.3	0.0	-0.1	
17	26.9	0.1	0.0	
18	26.4	-0.8	-1.0	
19	19.3	0.3	-0.1	
20	25.4	0.4	0.2	
21	20.2	-0.5	-0.5	
22	25.5	0.4	0.0	
23	18.7	0.1	0.0	
24	25.6	0.1	-0.1	
25	20.7	-1.2	-0.1	
26	32.5	0.1	0.0	
27	10.6	-0.3	-0.2	
28	23.3	0.1	0.0	
29	10.1	0.0	-0.1	
30	10.1	0.0	-0.1	
31	23.7	0.1	-0.1	
32	6.9	-0.1	0.0	
33	20.6	0.0	0.1	

			File No.:	21304109
Temp ºC	21°C	22°C	22°C	
R.H. %	59%	61%	62%	
Date:	21-Aug-2013	22-Aug-2013	23-Aug-2013	
Pos. ID	Initial	Dust	Sand	
34	25.9	0.0	0.0	
35	19.3	0.0	0.1	
36	21.6	-0.8	-0.9	
37	26.0	-0.1	0.1	
38	17.0	0.0	0.0	
39	26.5	0.1	-0.1	
40	19.0	0.0	-0.1	
41	21.1	0.5	-0.1	
42	16.7	0.5	0.5	
43	22.1	-0.9	-1.5	
44	16.9	0.2	0.0	
45	21.2	0.0	-0.1	
46	17.2	-0.1	-0.3	
47	27.1	-0.3	-0.1	
48	21.3	-0.1	-0.1	
49	26.8	0.2	-0.1	
50	23.5	0.0	-0.1	
51	17.4	-0.3	-0.3	
52	23.2	0.1	0.0	
53	17.0	0.0	0.0	
54	23.5	0.0	0.0	
55	17.0	-0.6	0.0	
56	23.3	0.0	0.0	
57	10.3	0.0	0.0	
58	23.7	0.2	-0.1	
59	26.9	0.1	0.0	
60	34.1	0.0	-0.2	
61	27.9	0.0	0.8	
62	27.6	0.0	0.0	
63	31.9	0.0	-0.1	
64	22.8	0.0	0.0	
MAX	34.1	0.6	0.8	
MIN	6.9	-1.2	-1.5	
AVG	21.7	0.0	-0.1	
STD	5.3	0.3	0.3	
Open	0	0	0	
Tech:	MHB	MHB	MHB	
EQUIP. ID	1727	1727	1727	
	1047	1047	1047	

SAFETY GROUND LLCR DATA FILES

FILE NUMBER

213041B10

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertonics		Subgroup:	E/ ID# E1
Product:	VITA46 Connector		File No.:	213041B10
Description:	Safety Ground Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C	22°C	
R.H. %	59%	61%	62%	
Date:	21-Aug-2013	22-Aug-2013	23-Aug-2013	
Pos. ID	Initial	Dust	Sand	
1	0.2	0.2	0.2	
2	0.3	0.3	0.2	
3	0.3	0.3	0.3	
MAX	0.3	0.3	0.3	
MIN	0.2	0.2	0.2	
AVG	0.3	0.3	0.3	
STD	0.0	0.0	0.0	
Open	0	0	0	
Tech:	MHB	MHB	MHB	
EQUIP. ID	1727	1727	1727	
	1047	1047	1047	

TEST RESULTS

GROUP F

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: OG/CMG
START DATE: 10/1/13	COMPLETE DATE: 10/7/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 44%

EQUIPMENT ID#: See Appendix A

ESD TESTING

PURPOSE:

To determine if the connector can withstand electrostatic discharge.

PROCEDURE:

1. One sample shall be tested for ESD protection in accordance with EN 61000-4-2.

2. The ESD generator was set to 8 KV and an oscilloscope was connected to a signal contact. This connection was accomplished via a custom oscilloscope probe consisting of a small diameter coax cable with a the shield connected to the ground contact ground plane and to the signal contact via a 50 Ohm resistor.

3. Testing was performed by CMG Corporation.

REQUIREMENTS:

The discharge as stated above shall not result in greater than 20 volts to any contact, measured relative to ground.

RESULTS:

1. The sample met the requirements as specified.

2. See Appendix A for the CMG test report.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 10/8/13 | COMPLETE DATE: 10/8/13

ROOM AMBIENT: 22°C | RELATIVE HUMIDITY: 53%

EQUIPMENT ID#: 1047, 1727

LOW LEVEL CIRCUIT RESISTANCE –SIGNAL CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the signal contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 64 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The signal contact low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# F1	22.2	33.7	7.0

2. See data file 213041B13 for individual data points.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 10/8/13 | COMPLETE DATE: 10/8/13

ROOM AMBIENT: 22°C | RELATIVE HUMIDITY: 53%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

   a) Between Adjacent Contacts : Yes
   b) Mated Condition : Mated
   c) Mounting Condition : Mounted
   d) Test Voltage : 500 VAC
   e) Holt Time : 1 Minute
   f) Rate of Application : 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 10/8/13	COMPLETE DATE: 10/8/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY:53%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground contacts under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

REQUIREMENTS:

The safety ground resistance shall not exceed 100.0 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# F1	0.3	0.4	0.2

2. See data file 213041B14 for individual data points.

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN: MAG

START DATE: 10/8/13 COMPLETE DATE: 10/8/13

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 53%

EQUIPMENT ID#: 398

MATING AND UNMATING FORCE

PURPOSE:

To determine the mechanical forces required to mate and unmate the connector halves.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 13.

2. The test samples were fixtured to the base plate of the test stand and applicable force gauge.

3. The fixturing was accomplished in a manner to prevent “bowing” of the test samples during the performance of the test.

4. The fixturing was accomplished to assure axial alignment and allowed self-centering movement to exist.

5. See Figure #86 for test set-up.

REQUIREMENTS:

The force required to mate/unmate the connectors shall be measured and recorded.

RESULTS: See Next Page

RESULTS:

The following is a summary of the observed data:

Sample ID#	MATING FORCE (Pounds)	UNMATING FORCE (Pounds)
ID# F1	104.5	74.0

FIGURE #86

MATING FORCE

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: RT/MAG
START DATE: 10/9/13	COMPLETE DATE: 10/10/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 42%
EQUIPMENT ID#: 46, 321, 398, 1047, 1727	

DURABILITY

PURPOSE:

This is a conditioning sequence which is used to induce the type of wear on the contacting surfaces which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 09.

2. Test Conditions:

   a) No. of Cycles : 200 cycles
   b) Rate : 300 cycles per hour max.

3. The test samples were assembled to special holding devices and attached to the manual cycling equipment.

4. The test samples were axially aligned to accomplish the mating and unmating function allowing for self-centering movement.

5. Figure #86 illustrates the test set-up.

-continued on next page.

PROCEDURE: -continued

6. ESD testing was performed on the test sample following 200 cycles of Durability. The ESD was performed in accordance with the procedures previously indicated.

7. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. The force required to mate and unmate the connector samples shall be measured and recorded.

5. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

6. The discharge voltage shall not result in greater than 20 volts to any contact measured relative to ground.

RESULTS:

1. The discharge voltage to any contact measured relative to ground was less than 20 volts after 200 of durability.

2. There was no evidence of physical damage to the test samples as tested.

-continued on next page.

RESULTS: -continued

3. The following is a summary of the data observed:

Sample ID#	Mating Force (Pounds)	Unmating Force (Pounds)
ID# F1	121.0	85.5

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

@200 CYCLES

Sample ID#	Avg. Change	Max. Change
ID# F1	-0.2	+0.6

SAFETY GROUND RESISTANCE
(milliohms)

@200 CYCLES

Sample ID#	Avg.	Max.	Min.
ID# F1	0.4	0.5	0.2

4. See data files 213041B13 and 213041B14 for individual data points.

5. There was no evidence of breakdown, arcing, etc., nor did the leakage current exceed 5.0 milliamps when a 500 VAC test voltage was applied.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: OG/CMG
START DATE: 10/18/13	COMPLETE DATE: 10/19/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 38%
EQUIPMENT ID#: See Appendix A	

ESD TESTING

PURPOSE:

To determine if the connector can withstand electrostatic discharge.

PROCEDURE:

1. One sample shall be tested for ESD protection in accordance with EN 61000-4-2.

2. The ESD generator was set to 8 KV and an oscilloscope was connected to a signal contact. This connection was accomplished via a custom oscilloscope probe consisting of a small diameter coax cable with a the shield connected to the ground contact ground plane and to the signal contact via a 50 Ohm resistor.

3. Testing was performed by CMG Corporation.

REQUIREMENTS:

The discharge as stated above shall not result in greater than 20 volts to any contact, measured relative to ground.

RESULTS:

1. The sample met the requirements as specified.

2. See Appendix A for the CMG test report.

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN: RT/MAG

START DATE: 10/22/13 COMPLETE DATE: 10/25/13

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 46, 321, 398, 1047, 1727

DURABILITY

PURPOSE:

This is a conditioning sequence which is used to induce the type of wear on the contacting surfaces which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 09.

2. Test Conditions:

   a) No. of Cycles : 300 cycles
   b) Rate : 300 cycles per hour max.

3. The test samples were assembled to special holding devices and attached to the manual cycling equipment.

4. The test samples were axially aligned to accomplish the mating and unmating function allowing for self-centering movement.

5. Figure #86 illustrates the test set-up.

-continued on next page.

PROCEDURE: -continued

6. ESD testing was performed on the test sample following 300 cycles of Durability. The ESD was performed in accordance with the procedures previously indicated.

7. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. The force required to mate and unmate the connectors following Durability shall be measured and recorded.

5. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

6. The discharge voltage shall not result in greater than 20 volts to any contact measured relative to ground.

RESULTS:

1. The discharge voltage to any contact measured relative to ground was less than 20 volts after 300 of durability.

2. There was no evidence of physical damage to the test samples as tested.

-continued on next page.

RESULTS: -continued

3. The following is a summary of the data observed:

Sample ID#	Mating Force (Pounds)	Unmating Force (Pounds)
ID# F1	133.0	87.5

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

@200 CYCLES

Sample ID#	Avg. Change	Max. Change
ID# F1	-0.2	+0.5

SAFETY GROUND RESISTANCE
(milliohms)

@200 CYCLES

Sample ID#	Avg.	Max.	Min.
ID# F1	0.4	0.4	0.4

4. See data files 213041B13 and 213041B14 for individual data points.

5. There was no evidence of breakdown, arcing, etc., nor did the leakage current exceed 5.0 milliamps when a 500 VAC test voltage was applied.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: OG/CMG
START DATE: 10/30/13	COMPLETE DATE: 11/5/13
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 42%
EQUIPMENT ID#: See Appendix A	

ESD TESTING

PURPOSE:

To determine if the connector can withstand electrostatic discharge.

PROCEDURE:

1. One sample shall be tested for ESD protection in accordance with EN 61000-4-2.

2. The ESD generator was set to 8 KV and an oscilloscope was connected to a signal contact. This connection was accomplished via a custom oscilloscope probe consisting of a small diameter coax cable with a the shield connected to the ground contact ground plane and to the signal contact via a 50 Ohm resistor.

3. Testing was performed by CMG Corporation.

REQUIREMENTS:

The discharge as stated above shall not result in greater than 20 volts to any contact, measured relative to ground.

RESULTS:

1. The sample met the requirements as specified.

2. See Appendix A for the CMG test report.

SIGNAL CONTACT LLCR DATA FILES

FILE NUMBER

213041B13

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	F/ ID F
Product:	VITA46 Connector		File No.:	21304113
Description:	Signal Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	22°C	22°C	22°C	
R.H. %	53%	42%	40%	
Date:	08-Oct-2013	10-Oct-2013	25-Oct-2013	
Pos. ID	Initial	200X	300X	
1	21.4	-0.2	-0.2	
2	26.1	0.1	0.0	
3	17.8	-0.1	0.0	
4	20.5	0.0	-0.1	
5	26.1	-0.1	-0.2	
6	18.9	0.2	0.0	
7	26.0	-0.1	-0.2	
8	17.3	0.2	0.2	
9	23.2	0.0	0.1	
10	18.8	0.0	-0.1	
11	23.9	-0.1	-0.3	
12	19.4	-0.3	-0.2	
13	23.6	0.0	0.0	
14	20.3	-1.0	-0.8	
15	27.3	0.2	0.2	
16	24.6	-1.2	-1.2	
17	28.5	-1.6	-1.5	
18	27.7	-1.7	-1.5	
19	20.4	-1.1	-1.1	
20	27.1	-1.1	-1.1	
21	20.4	-0.6	-0.6	
22	26.8	-0.8	-0.7	
23	20.4	-0.9	-1.3	
24	26.4	-0.8	-0.5	
25	21.4	-0.3	-0.3	
26	33.0	0.6	0.3	
27	9.7	0.3	0.3	
28	23.7	0.0	-0.2	
29	9.7	-0.1	-0.1	
30	10.2	0.1	0.0	
31	23.7	0.0	0.0	
32	7.0	0.1	0.2	
33	20.6	0.0	0.0	

			File No.:	21304113
Temp ºC	22°C	22°C	22°C	
R.H. %	53%	42%	40%	
Date:	08-Oct-2013	10-Oct-2013	25-Oct-2013	
Pos. ID	Initial	200X	300X	
34	27.0	-0.2	-0.2	
35	19.7	0.1	0.1	
36	21.3	-0.1	0.0	
37	27.2	0.0	-0.2	
38	17.6	0.2	0.3	
39	26.7	0.0	0.1	
40	19.4	0.2	0.2	
41	20.6	-0.2	0.0	
42	18.0	-0.1	0.0	
43	21.1	0.1	0.1	
44	17.6	0.3	0.3	
45	21.4	0.1	0.1	
46	17.9	0.4	0.4	
47	27.2	0.1	0.0	
48	21.5	-0.3	-0.2	
49	27.5	-0.4	-0.4	
50	24.4	-0.7	-0.6	
51	18.8	-0.8	-0.7	
52	24.0	-0.5	-0.6	
53	18.4	-0.4	-0.3	
54	24.5	-1.0	-0.9	
55	18.6	-0.8	-0.9	
56	24.0	-1.0	-0.9	
57	10.9	0.3	0.4	
58	23.7	0.3	0.5	
59	27.6	-0.2	-0.3	
60	33.7	0.0	0.1	
61	28.0	-0.1	0.0	
62	28.2	0.1	0.1	
63	31.5	0.0	0.0	
64	22.9	0.0	0.1	
MAX	33.7	0.6	0.5	
MIN	7.0	-1.7	-1.5	
AVG	22.2	-0.2	-0.2	
STD	5.4	0.5	0.5	
Open	0	0	0	
Tech:	MAG	MAG	MHB	
EQUIP. ID	1047	1047	1047	
	1727	1727	1727	

SAFETY GROUND LLCR DATA FILES FILE NUMBERS

FILE NUMBER

213041B14

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	F/ ID F
Product:	VITA46 Connector		File No.:	21201614
Description:	Safety Ground Contacts		Tech:	MAG
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	22°C	22°C	22°C	
R.H. %	53	42	40	
Date:	08-Oct-2013	10-Oct-2013	25-Oct-2013	
Pos. ID	Initial	200X	300X	
1	0.3	0.4	0.4	
2	0.4	0.5	0.4	
3	0.2	0.2	0.4	
MAX	0.4	0.5	0.4	
MIN	0.2	0.2	0.4	
AVG	0.3	0.4	0.4	
STD	0.1	0.1	0.0	
Open	0	0	0	
Tech:	MAG	MAG	MHB	
EQUIP. ID	1047.0	1047	1047	
	1727.0	1727	1727	

APPENDIX A

ESD TEST REPORT

In summary

For the third pass of testing: Mean 48.5mV Measured voltage measured thru 2 each 10 dB attenuators and 3 dB loss probe network giving mean voltage at signal pin as protected by ground pins as 9.7 volts which is less than specification and a maximum of 14.2 volts at the pin which is less than the specification of 20 volts. Third pass testing was worst case.

Testing was difficult as there was much coupling or cross talk between ESD pulse to ground thru ground blade or directly to ground and the probed signal pin. ESA discharges to ground pin. Many variations of grounding the test sample and the probes were tried to minimize this, with little effect

Discharges to the connector do not result in greater than 20 volts to any contact point measured relative to ground.

Owen Gallagher
Compliance Design 01 November 2013

Pass 3
30 October 2013 testing of connector from Curtis Wright as supplied by Contech Research

Test setup same as 01 October testing

Improvements in grounding were tried without any reduction in crosstalk.

Test Data

71 mV
32 mV
49 mV
34 mV
42 mV
50 mV
42 mV
54 mV
62 mV

Mean 48.5mV Measured voltage measured thru 2 each 10 dB attenuators and 3 dB loss probe network giving mean voltage at signal pin as protected by ground pins as 9.7 volts which is less than specification and a maximum of 14.2 volts at the pin which is less than the specification of 20 volts.

Pass 2
18 October 2013 testing of connector from Curtis Wright as supplied by Contech Research

Test setup same as 01 October testing

Test Data

Initial ground scheme of attenuators
23 dB total attenuation to protect oscilloscope
This measures zero to peak amplitude of
165 MHz ring wave. Attenuators clamped to
ground plane

17 mV
15 mV
15mV
17 mV
15mV
47mV Higher reading unknown cause
15mV
19 mV
19 mV
15 mV

Zap to other end of connector
19mV
13 mV
15 mV

Zap to ground tape on other end of connector
15 mV
19 mV
17 mV

Improved ground scheme of attenuators
23 db total attenuation to protect oscilloscope.
Second ground point on cable clamped similarly to
ground plane

15 mV
15 mV
15 mV
15 mV
17 mV
17 mV
17 mV
17 mV
15 mV
125mV

Zap to ground tape on connector
19mV
17 mV
35 mV

Occasional noise from pulling trigger on
ESD gun with no contact made
6 mV but no ring wave at 165 MHz

Pass 1
4 October 2013 testing of connector from Curtis Wright as supplied by Contech Research

Test setup

Connector on PCB was placed on aluminum ground plane and all but small area surrounding pins chosen for test was grounded to the table with Chromerics conductive adhesive copper tape. Pins under test were probed by connecting small diameter coax to them via a 50 Ohm resistor. Zaps at 8 kV were applied to the mating surface of the connector. Coupling to signal pins was measured after a 20 dB attenuator stack by a digital oscilloscope. Zero to peak amplitudes of the 165 MHz ring wave.

What a zap direct to the monitored pin would have been

In somewhat reverse order as this part of the test was done last, a 50 dB stack of 10 dB attenuators was clamped to the ground plane and a BNC connector was put on the end to be zapped to provide a contact point. The attenuator at the end of the stack to be zapped was a 50 Watt attenuator and was rated for 4 kV. This end of the stack was zapped. The rest of the test setup was the same as used for testing the EUT. Voltage recorded on the oscilloscope was 44 mV for all three tests. This corresponds to a little above 8000 Volts at the zapped BNC connector. ESD gun was set to 8 kV. This duplicates a zap that would have gone to the monitored pin of the EUT if it did not divert to the longer ground separators.

More details on test setup and equipment

Schaffner NSG 438 ESD Simulator (SN# 528)
Tektronix TDS 7104 1 GHz Digital Oscilloscope (SN# B010345)

Low power attenuators were Western Electric units rated to 10 GHz and this had been previously confirmed using an Anritsu 65 GHz vector network analyzer. 50 Watt attenuator was 40 mV.

Zaps to the EUT were done with a 20 dB attenuator to protect the oscilloscope that was rated for maximum of 50 Volts at the input.

Testing of unit under test

Prior to starting testing the PCB layout was examined using the Gerber files provided and a Gerber file viewer. The PCB was designed for wear tests. The ground plane was connected to ground pins of the connector but as far as can be observed, nothing else. This meant that grounding of the ground plane had to be done with conductive adhesive copper tape applied over the portions of the connector that were not probed for testing.

Unit under test was placed on ground plane table usually used for ESD testing. Portion of infield of unit that was not being zapped was grounded to table with Chromerics conductive adhesive copper tape. The tape sections were also tack soldered together. A small area to be tested was left open and test probes of mini coaxial cable were connected to selected signal pins. Signal pin connections were

chosen after examining Gerber files of PCB layout. Conductive adhesive tape was added to shield probed area. ESD gun was set to 8 kV. It was found that at the 4 kV setting, the spark was too short to jump randomly to ground points in the connector under test.

Test was done twice. First test was with 20 dB attenuator stack grounded with conductive adhesive copper tape only. Second test was with attenuator stack clamped to table ground plane for what turned out to be better grounding. Results of second try were better.

Zaps were done to other end of the connector that was grounded and results showed significant stray coupling of 165 MHz ring wave shown on the oscilloscope from the pins that were probed.

To determine if the connector is diverting ESD from the signal pins to the extended grounds compare the test results to the ESD zap to the exposed BNC connector center pin. This was with 50 dB attenuator stack instead of 20 dB attenuator stack. ESD coupling to signal pin when protected by extended grounds was more than 30 dB less than ESD direct to signal pin would have been.

In Conclusion
When a substitute pin as shown above was zapped full 8 kV went to the pin and was 53 db attenuated as seen at the oscilloscope. The oscilloscope was safe.

If 20 mV was recorded at the oscilloscope the combination of stray coupling and coupling to the pin was 4 Volts zero to peak of the ring wave. As shown by zapping ground plane and other end of connector some significant portion of this was stray coupling.

Discharges to the connector do not result in greater than 20 volts to any contact point measured relative to ground.

Owen Gallagher
Compliance Design
6 October 2013

Test Data

Initial ground scheme of attenuators
23 dB total attenuation to protect oscilloscope
This measures zero to peak amplitude of
165 MHz ring wave

22 mV
26 mV
24 mV
30 mV
34 mV
26 mV
20 mV
26 mV
32 mV
24 mV

Zap to other end of connector
32 mV
22 mV
22 mV
16 mV

Zap to ground tape on other end of connector
14 mV
14 mV
26 mV
14 mV

Zap to table ground plane near to connector
12 mV
22 mV
12 mV
12 mV

Improved ground scheme of attenuators
Improved ground scheme of attenuators
23 db total attenuation to protect oscilloscope

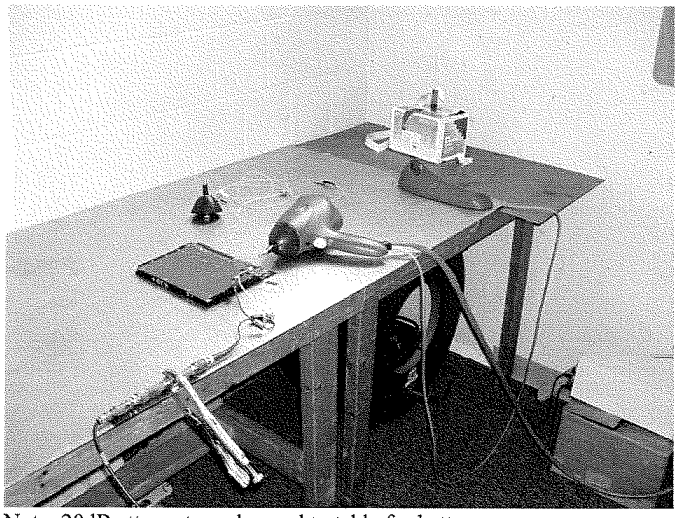
14 mV
14 mV
10 mV
10 mV
8 mV
18 mV
17 mV
12 mV
12 mV
12 mV

Second pass of same setup
8 mV
8 mV
6 mV
14 mV
10 mV
8 mV
14 mV
8 mV
12 mV
12 mV

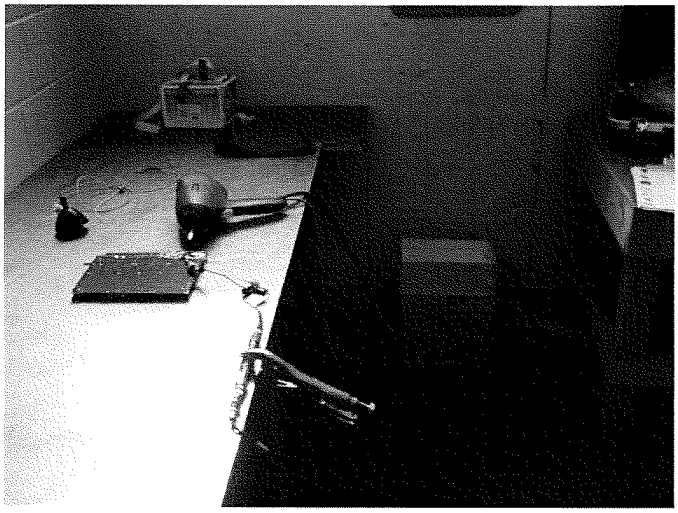
Zap to other end of connector
10 mV
12 mV
12 mV

Zap to ground tape on connector
8mV
8 mV
10 mV

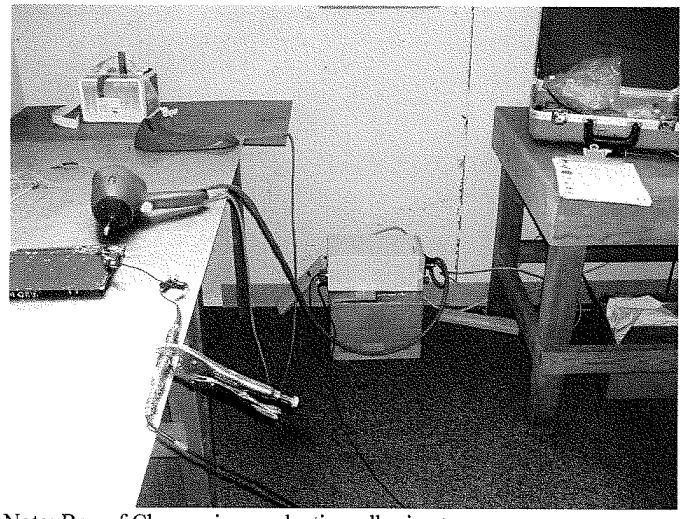
Occasional noise from pulling trigger on
ESD gun with no contact made
6 mV but no ring wave at 165 MHz wave
frequency of observed noise on signal pin.



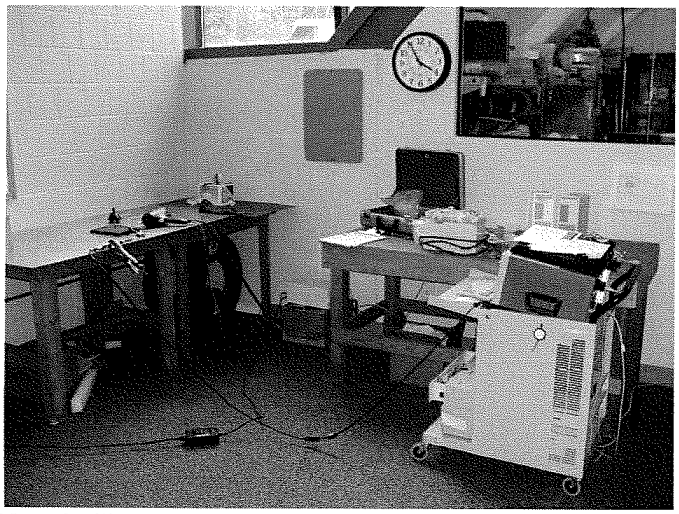
Note: 20dB attenuators clamped to table for better ground than just tape. ESD generator was on a box on the floor to reduce coupling to device under test. This is standard ESD test setup with product on table except this product is grounded to table ground plane.



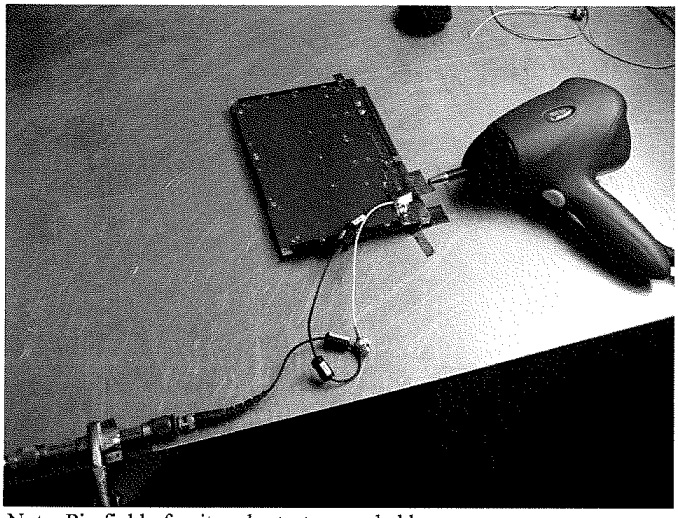
Note: Green 8ga (approximate) return wire of ESD generator. This is significant impedance at ring



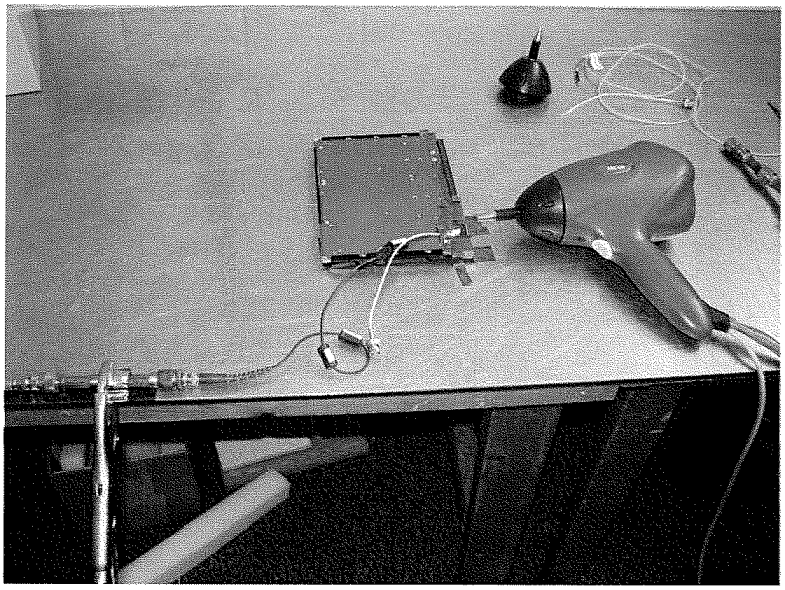
Note: Box of Chromerics conductive adhesive tape behind ESD gun.



Note: Oscilloscope across room to reduce coupling. The power supply and cord of the ESD generator were kept away from unit under test to reduce coupling.

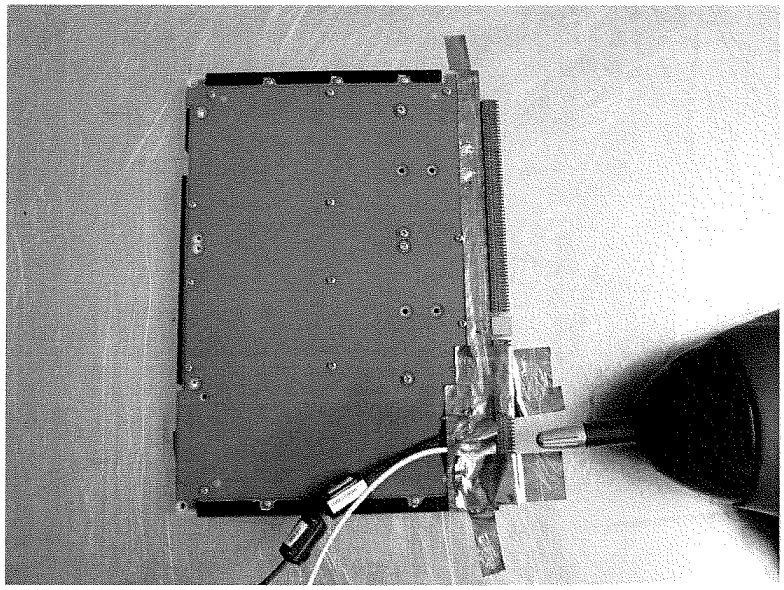


Note: Pin field of unit under test grounded by conductive adhesive copper tape. Ferrite sleeves on test cable to reduce coupling to oscilloscope.

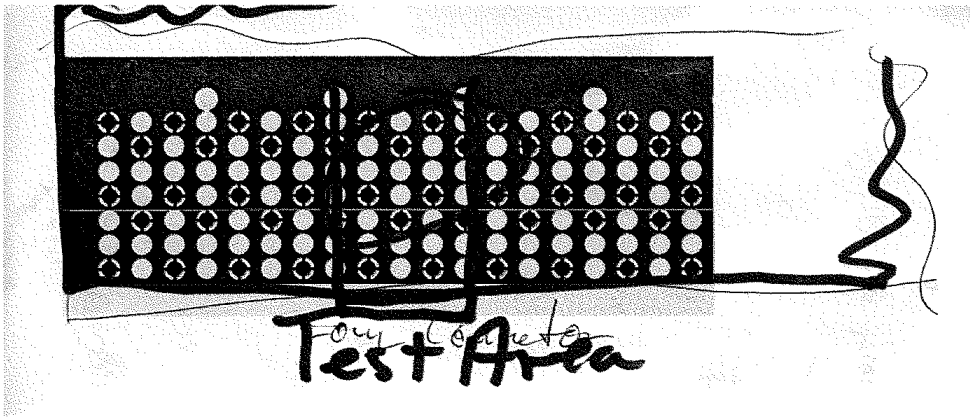


Note: 20dB attenuator stack clamped to aluminum table ground plane.

8



Note: Exposed area on unit under test to be zapped. Test cable (black) with ferrite sleeves to reduce coupling to oscilloscope. Ground tape extended over 50 Ohm probe area to reduce coupling to ESD zap.



TEST RESULTS

GROUP G

PROJECT NO.: 213041B SPECIFICATION: VITA46

PART NO.: See Page 4 PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample TECHNICIAN: MHB

START DATE: 8/21/13 COMPLETE DATE: 8/21/13

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 59%

EQUIPMENT ID#: 1047, 1727

LOW LEVEL CIRCUIT RESISTANCE –SIGNAL/POWER CONTACTS

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 10 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : Various per contact type

3. The points of application are shown in Figure #4.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# G1			
Signal Contacts	21.7	33.6	6.9
Single/Double	22.4	35.6	8.1
Power Contacts	4.4	4.7	4.1

2. See data files 213041B11, 213041B100 and 213041B111 for individual data points.

PROJECT NO.: 213041B | SPECIFICATION: VITA46

PART NO.: See Page 4 | PART DESCRIPTION: Connector

SAMPLE SIZE: 1 Sample | TECHNICIAN: MHB

START DATE: 8/21/13 | COMPLETE DATE: 8/21/13

ROOM AMBIENT: 22°C | RELATIVE HUMIDITY: 59%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connectors can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

2. To determine if the connectors maintain their dielectric integrity after being stressed by exposure to mechanical and environmental conditioning.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 20.

2. Test Conditions:

    a) Between Adjacent Contacts : Yes
    b) Mated Condition : Mated
    c) Mounting Condition : Mounted
    d) Test Voltage : 500 VAC
    e) Holt Time : 1 Minute
    f) Rate of Application : 500 Volts/Second

3. Testing was performed on 16 adjacent contacts.

REQUIREMENTS: See Next Page

REQUIREMENTS:

1. When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

2. The leakage current shall not exceed 5.0 milliamps.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 8/21/13	COMPLETE DATE: 8/21/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 59%
EQUIPMENT ID#: 1047, 1727	

SAFETY GROUND RESISTANCE

PURPOSE:

1. To evaluate contact resistance characteristics of the safety ground contacts under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.

3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23.

-continued on next page.

PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 100 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 3 per test sample

3. The points of application are shown in Figure #4.

REQUIREMENTS:

The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

RESULTS:

1. The following is a summary of the data observed:

SAFETY GROUND RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# G1	0.4	0.4	0.4

2. See data file 213041B112 for individual data points.

PROJECT NO.: 213041B	SPECIFICATION: VITA46
PART NO.: See Page 4	PART DESCRIPTION: Connector
SAMPLE SIZE: 1 Sample	TECHNICIAN: MHB
START DATE: 8/26/13	COMPLETE DATE: 8/27/13
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 62%
EQUIPMENT ID#: 321, 611, 689, 1047, 1727	

CURRENT OVERLOAD

PURPOSE:

The purpose is to simulate the aging process relative to the stresses induced by overload.

PROCEDURE:

1. The test was performed in accordance with IEC 60512-3.

2. Test Conditions:

   a) Apply a current of 150 % of rated load for 5 minutes, then 125 % for 2 hours on each sample.

   b) Power Contact (one contact tested) rated at 8 Amps; test at 12 Amps and 10 Amps.

   c) Single Contact (5 contacts) rated at 1 Amp; test at 1.5 and 1.25 Amps.

   d) Double Contact (5 contacts) rated at 1 Amp; test at 1.5 and 1.25 Amps.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as exposed.

-continued on next page.

REQUIREMENTS: -continued

2. The change in signal contact low level circuit resistance shall not exceed +10.0 milliohms nor shall the average change in low level circuit resistance exceed +5.0 milliohms.

3. The safety ground low level circuit resistance shall not exceed 100.0 milliohms.

4. When a 500 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc. nor shall the leakage current exceed 5.0 milliamps.

RESULTS:

1. There was no evidence of physical damage to the test samples as exposed.

2. The following is a summary of the observed data:

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
ID# G1		
Signal Contacts	+0.5	+2.3
Single/Double	+0.6	+1.8
Power Contacts	+0.2	+0.2

SAFETY GROUND
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
ID# G1	0.4	0.6	0.3

3. See data files 213041B11, 213041B100, 213041B101 and 213041B12 for individual data points.

4. There was no evidence of breakdown, arcing, etc., when a 500 VAC test voltage was applied.

SINGLE, DOUBLE CONTACT LLCR/ GROUND RESISTANCE DATA FILES

FILE NUMBER

213041B100

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	G/ ID# G1
Product:	VITA46 Connector		File No.:	213041100
Description:	Signal Contacts			
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	22	22		
R.H. %	59	62		
Date:	08/21/13	08/27/13		
Pos. ID	Initial	Current		
		Overload		
D1	27.9	0.3		
D2	35.6	0.1		
D3	29.0	0.5		
D4	29.2	0.5		
D5	28.5	-0.5		
S1	16.2	0.1		
S2	8.5	0.9		
S3	22.0	1.8		
S4	8.1	0.8		
S5	18.5	1.2		
MAX	35.6	1.8		
MIN	8.1	-0.5		
AVG	22.4	0.6		
STD	9.3	0.7		
Open	0	0		
Tech:	MHB	MHB		
EQUIP. ID	1727	1727		
	207	207		

SINGLE CONTACT LLCR DATA FILES

FILE NUMBER

213041B11

Low Level Contact Resistance - Delta Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertonics		Subgroup:	G/ ID# G1
Product:	VITA46 Connector		File No.:	21304111
Description:	Signal Contacts			
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C		
R.H. %	59%	62%		
Date:	21-Aug-2013	27-Aug-2013		
Pos. ID	Initial	Current Overload		
1	20.6	0.5		
2	25.0	0.3		
3	16.0	2.3		
4	20.7	0.5		
5	25.8	0.2		
6	19.2	0.6		
7	25.5	-0.5		
8	17.4	0.4		
9	21.3	2.2		
10	19.2	0.6		
11	22.7	1.0		
12	19.1	0.5		
13	23.5	0.5		
14	19.3	0.5		
15	27.2	0.2		
16	23.4	0.4		
17	27.2	0.3		
18	25.7	1.0		
19	19.3	0.6		
20	26.2	0.3		
21	19.4	0.3		
22	25.9	0.4		
23	19.7	0.4		
24	25.7	0.6		
25	21.2	0.2		
26	32.6	0.4		
27	9.7	1.3		
28	23.7	0.4		
29	10.1	0.8		
30	10.3	0.6		
31	23.6	0.4		
32	6.9	0.6		
33	20.6	0.4		

			File No.:	21304111
Temp ºC	21°C	22°C		
R.H. %	59%	62%		
Date:	21-Aug-2013	27-Aug-2013		
Pos. ID	Initial	Current Overload		
34	25.8	0.9		
35	19.4	0.4		
36	20.7	0.4		
37	25.6	0.1		
38	17.6	0.7		
39	26.5	0.4		
40	19.3	1.2		
41	21.0	1.7		
42	16.5	0.8		
43	21.2	0.4		
44	17.5	0.5		
45	21.2	0.1		
46	16.9	0.2		
47	27.3	0.2		
48	21.2	0.3		
49	27.2	0.0		
50	23.3	0.3		
51	16.2	1.2		
52	23.7	0.2		
53	17.4	0.5		
54	23.5	0.2		
55	17.5	0.4		
56	23.0	0.4		
57	10.8	0.6		
58	23.8	0.5		
59	27.0	0.5		
60	33.6	0.4		
61	28.1	0.9		
62	27.7	0.8		
63	31.4	0.1		
64	23.2	-0.7		
MAX	33.6	2.3		
MIN	6.9	-0.7		
AVG	21.7	0.5		
STD	5.3	0.5		
Open	0	0		
Tech:	MHB	MHB		
EQUIP. ID	1727	1727		
	1047	1047		

POWER CONTACTS LLCR DATA FILES

FILE NUMBER

213041B101

Low Level Contact Resistance - Delta Values				
Project:	212016		Spec:	EIA 364,TP 23
Customer:	Hypertronics		Subgroup:	G/ ID# G1
Product:	VITA46 Connector		File No.:	213041101
Description:	Power contacts			
Open Circuit Voltage:		20mV	Current:	10mA
Units:				
Temp ºC	22	22		
R.H. %	59	62		
Date:	08/21/13	08/27/13		
Pos. ID	Initial	Final		
1	4.7	0.2		
2	4.1	0.2		
MAX	4.7	0.2		
MIN	4.1	0.2		
AVG	4.4	0.2		
STD	0.4	0.0		
Open	0	0		
Tech:	MHB	MHB		
EQUIP. ID	1727	1727		
	207	207		

SAFETY GROUND LLCR DATA FILES

FILE NUMBER

213041B112

Low Level Contact Resistance - Actual Values				
Project:	213041		Spec:	EIA 364,TP 23
Customer:	Hypertonics		Subgroup:	G/ ID# G1
Product:	VITA46 Connector		File No.:	21304112
Description:	Safety Ground Contacts		Tech:	MHB
Open Circuit Voltage:		20mV	Current:	10mA
Temp ºC	21°C	22°C		
R.H. %	59%	62%		
Date:	21-Aug-2013	27-Aug-2013		
Pos. ID	Initial	Current Overload		
1	0.4	0.3		
2	0.4	0.6		
3	0.4	0.3		
MAX	0.4	0.6		
MIN	0.4	0.3		
AVG	0.4	0.4		
STD	0.0	0.2		
Open	0	0		
Tech:	MHB	MHB		
EQUIP. ID	1727	1727		
	1047	1047		