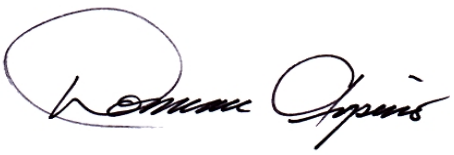
JULY 9, 2010

TEST REPORT #210185 & 210386
REVISION 1.1

FS5 QUALIFICATION TESTING

PART NUMBERS
FS5-30-04.0-L-DV-TH
FT5-30-03.0-L-DV-TH

SAMTEC, INC.



APPROVED BY: DOMINIC ARPINO
PROJECT ENGINEERING MANAGER
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ATTLEBORO, MA

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REVISION HISTORY

DATE	REV. NO.	DESCRIPTION	ENG.
7/9/2010	1.0	Initial Issue	DA
7/12/2010	1.1	Correct Part Numbers	APH

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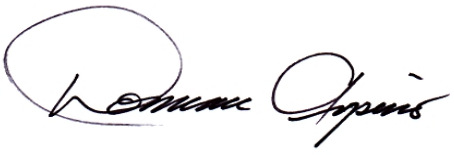
CERTIFICATION

This is to certify that the FX5 series connector evaluation described herein was designed and executed by personnel of Contech Research, Inc. It was performed with the concurrence of Samtec, Inc. of New Albany, IN who was the test sponsor.

All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1, 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.



Dominic Arpino
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SCOPE

To perform qualification testing on the FX5 connector assembly as manufactured and submitted by the test sponsor, Samtec, Inc.

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. Samtec Test Plan: TC109-3224FX5Qualrev1

3. Standard: EIA Publication 364

TEST SAMPLES AND PREPARATION

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

	Description	Part Number
a)	Plug connector	FS5-30-04.0-L-DV-TH
b)	Receptacle connector	FT5-30-03.0-L-DV-TH

2. Mating parts were supplied assembled and terminated to test boards by the test sponsor. Specific test boards orientations were supplied for the following tests:

   - LLCR
   - IR and DWV
   - Shock & Vibration, nanosecond event detection

3. Test leads were attached to the appropriate measurement areas of the test samples and applicable mating elements.

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

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

6. The mated test samples were secured via a stabilizing medium to maintain mechanical stability during testing, as noted in the specific test procedures.

TEST SELECTION

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

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:

Seq A: Group A1 - A-A1-1, A-A1-2
Group A2 – A-A2-1, A-A2-2
Group A3 – A-A3-1, A-A3-2
Group B - A-B-1, A-B-2

Seq B: Group A - B-A-1, B-A-2, B-A-3, B-A-4, B-A-5, B-A-6, B-A-7, B-A-8

Seq C: Group A - C-A-1, C-A-2, C-A-3, C-A-4, C-A-5, C-A-6, C-A-7, C-A-8

Seq D: Group A - D-A-1, D-A-2, D-A-3

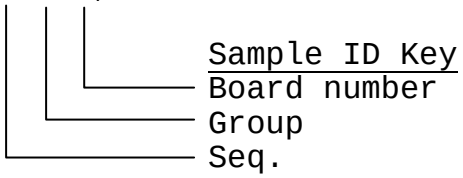

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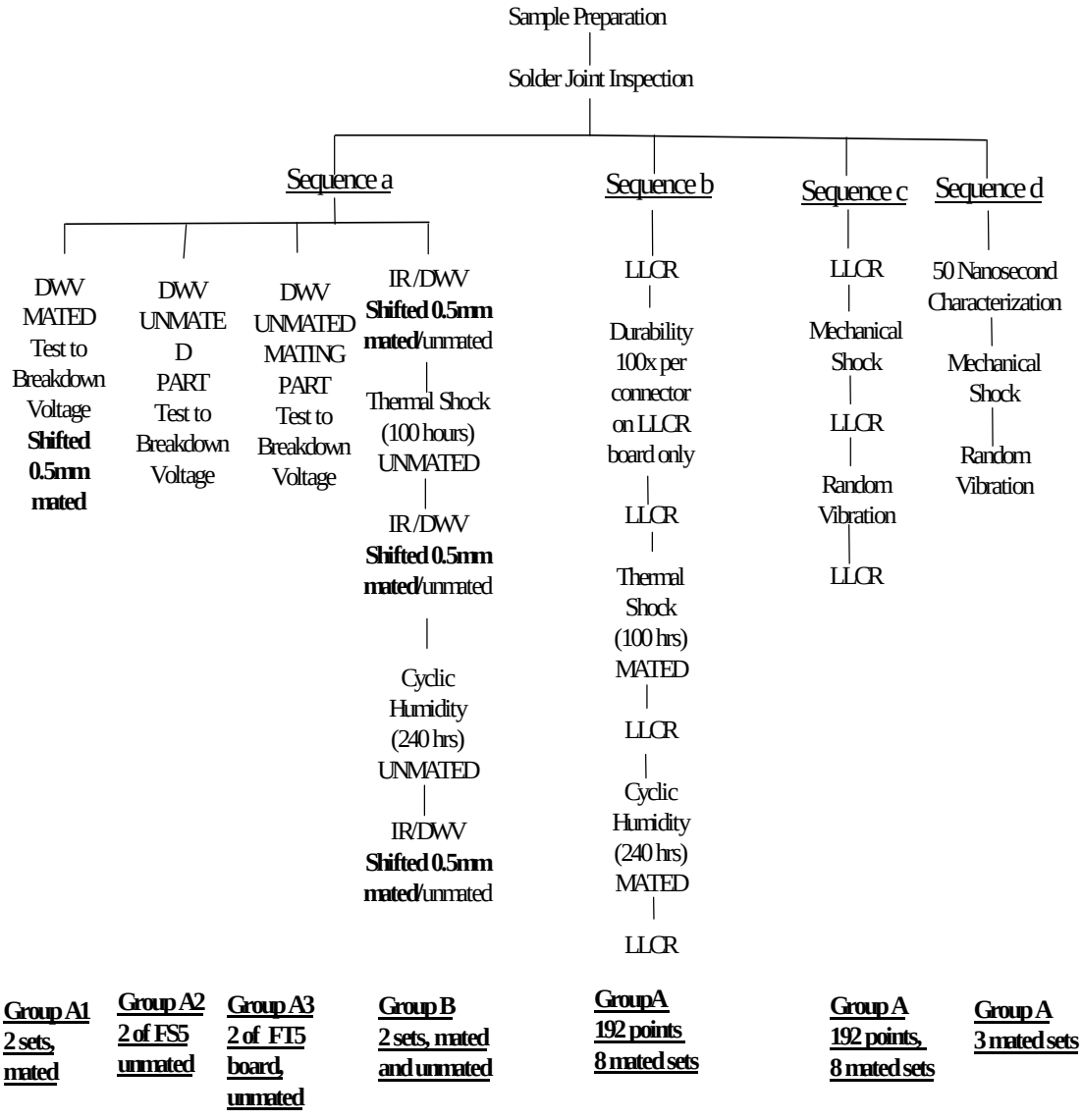
FIGURE #1

TEST PLAN FLOW DIAGRAM



IR : Insulation Resistance
DWV : Dielectric Withstanding Voltage
LLCR : Low Level Circuit Resistance

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DATA SUMMARY

TEST	REQUIREMENT	RESULTS
SEQUENCE A		
GROUP A1		
DWV, BOTH MATED PAIRS	BREAKDOWN	800 VAC
GROUP A2		
DWV, 2 BOARDS, UNMATED	BREAKDOWN	900 VAC
GROUP A3		
DWV, 2 BOARDS, UNMATED	BREAKDOWN	920 VAC
GROUP B		
INITIAL		
IR, MATED PAIRS	>5000 MEGOHMS	>50,000 MEGOHMS
IR, UNMATED	>5000 MEGOHMS	>50,000 MEGOHMS
DWV, MATED PAIRS	600 VAC	PASSED
DWV, UNMATED	600 VAC	PASSED
POST THERMAL SHOCK		
THERMAL SHOCK	NO DAMAGE	PASSED
IR, MATED PAIRS	>1000 MEGOHMS	>50,000 MEGOHMS
IR, UNMATED	>1000 MEGOHMS	>50,000 MEGOHMS
DWV, MATED PAIRS	600 VAC	PASSED
DWV, UNMATED	600 VAC	PASSED
POST CYCLIC HUMIDITY		
CYCLIC HUMIDITY	NO DAMAGE	PASSED
IR, MATED PAIR A-B-1	>5000 MEGOHMS	15,000 MEGOHMS
IR, UNMATED A-B-1	>5000 MEGOHMS	>50,000 MEGOHMS
IR, MATED PAIR A-B-2	>5000 MEGOHMS	25,000 MEGOHMS
IR, UNMATED A-B-2	>5000 MEGOHMS	>10,000 MEGOHMS
DWV, MATED PAIRS	600 VAC	PASSED
DWV, UNMATED	600 VAC	PASSED

-continued on next page.

DATA SUMMARY -continued

TEST	REQUIREMENT	RESULTS
SEQUENCE B		
GROUP A		
LLCR	RECORD	23.6 MΩ MAX.
DURABILITY (100X)	NO DAMAGE	PASSED
LLCR	+10.0 MΩ MAX.CHG.	+1.5 MΩ MAX.CHG.
THERMAL SHOCK	NO DAMAGE	PASSED
LLCR	+10.0 MΩ MAX.CHG.	+0.7 MΩ MAX.CHG.
CYCLIC HUMIDITY	NO DAMAGE	PASSED
LLCR	+10.0 MΩ MAX.CHG.	+2.4 MΩ MAX.CHG.
SEQUENCE C		
LLCR	RECORD	24.6 MΩ MAX.
MECHANICAL SHOCK	NO DAMAGE	PASSED
LLCR	+10.0 MΩ MAX.CHG.	+1.8 MΩ MAX.CHG.
RANDOM VIBRATION	NO DAMAGE	PASSED
LLCR	+10.0 MΩ MAX.CHG.	+2.2 MΩ MAX.CHG.
SEQUENCE D		
MECHANICAL SHOCK	NO DAMAGE	PASSED
	50 NANOSECOND	PASSED
RANDOM VIBRATION	NO DAMAGE	PASSED
	50 NANOSECOND	PASSED

EQUIPMENT LIST

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq.Cal
95	12/1/2010	12/1/2009	AC Hypot	Peschell Instr.	P10*	5570	±3%Full Scale	12mon
150			Drill Press Stand	Craftsman	25921	N/A	N/A	N/A
207	12/10/2010	12/10/2009	Micro-Ohm Meter	Keithley Co.	580	438208	See Cal Cert	12mon
282			Vibration Shaker Table	Ling Dynamics	V-730	163	N/A	N/A
315			X-Y Table	NE Affiliated Tech.	XY-6060	N/A	N/A	N/A
421	4/24/2011	4/24/2010	Megohmeter	Hipotronics Co.	HM3A	031423-00	See Cal Cert	12 mon.
466	12/3/2010	12/3/2009	Precision Resistor	Victoreen Co.	50,000 mego	N/A	± 1 %	12 mon.
545	5/28/2011	5/28/2010	Event Detector	Anatech	32/64 EHD	941206	See Cal Cert	12mon
553	3/19/2011	3/19/2010	12 channel Power Unit	PCB Co.	483A	1303	See Cal Cert	12mon
614			Oven	Tenney Co.	TH Jr.	9712-510	See Manual	Ea Test
628	10/20/2010	10/20/2009	Digital Thermometer	Omega Eng.	DP 116	6210125	±1.1DegC	12mon
684	6/9/2011	6/9/2010	Accelerometer	PCB. Co.	353B04	47648	See Cal Cert.	12mon
874			Computer	M&P	Vectra	us75203327	N/A	N/A
1156	3/17/2011	3/17/2010	High Voltage Probe	Fluke	80k-6	885967	See Cal Cert	12mon
1166	8/24/2010	8/24/2009	Sine/Rndm Vib Control Digitizer	Hewlett Packard	E1432A	US39342279	See Cal Cert	12mon
1167			Interface	Hewlett Packard	E8491B	US390100753	N/A	N/A
1168			Mainframe	Hewlett Packard	E8408A	US39000357	N/A	N/A
1230			Temp-humid-Chamber	Blue M.	FRM-256B	FRM277	See Manual	Ea Test
1271			Amplifier	Unholtz Dickie	SA15	3483	N/A	N/A
1272			Shaker Table	Unholtz Dickie	S202PB	263	N/A	N/A
1276			Computer	ARC.Co.	Pent-450	N/A	N/A	N/A
1360	2/2/2011	2/2/2010	Data Aquisition Multimeter	Keithley	2700	0914136	See Cal Cert	12mon
1366			Main Frame	Agilent H.P.	8408A		N/A	N/A
1367			Interface	Agilent H.P.	E8491A		N/A	N/A
1368	4/30/2011	4/30/2010	Sine/Rnd Control digitizer	Agilent H.P.	E1432A	US35470169	See Manual	12mon

EQUIPMENT LIST -continued

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq.Cal
1457	1/19/2011	11/19/2010	Precision Resistor	Victorine	5KMOHM	465	See Cal Cert	12mon
1474			Vib Pwr Amp	tira	A58312	003/06	N/A	N/A
1549	2/2/2011	2/2/2010	Multiplexer Card	Keithley	7708	171629	See Cert	12mon
1550	2/2/2011	2/2/2010	Multiplexer Card	Keithley	7708	171626	See Cert	12mon
1609	5/26/2011	5/26/2010	Vert Thermal Shock Chamber	C.S.Z.	VTS-1.0-2-2-H/AC	08-VT14810	See Manual	12mon
1620	2/11/2011	2/11/2010	Accelerometer	PCB	353B04	132590	See Cal Cert	12mon
1634	9/11/2010	9/11/2009	Vibration Controller	HP Agilent	E1434A	US38090307	See Cal Cert	12 mon

TEST RESULTS

SEQUENCE A

Group B

Contech Research
An Independent Test and Research Laboratory

PROJECT NO.: 210386 SPECIFICATION: TC109-3224FX5rev1

PART NO.: See Page 4 PART DESCRIPTION: FX5 series

SAMPLE SIZE: 2 Samples TECHNICIAN: S-R

START DATE: 6/23/10 COMPLETE DATE: 6/23/10

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 51%

EQUIPMENT ID#: 421, 466, 1457

INSULATION RESISTANCE(IR)

PURPOSE:

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 21.

2. Test Conditions:

    a) Between Adjacent Contacts : Yes
    b) Mated Condition : Mated and Unmated
    c) Mounting Condition : Mounted and Unmounted
    d) Electrification Time : 2.0 Minutes
    e) Test Voltage : 500 VDC

3. The test voltage was applied to specific test points on the test boards.

REQUIREMENTS:

When the specified test voltage is applied, the insulation resistance shall not be less than 5,000 megohms.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 210386	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 2 Samples	TECHNICIAN: S-R
START DATE: 6/23/10	COMPLETE DATE: 6/23/10
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 52%
EQUIPMENT ID#: 95, 1156	

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

1. To determine if the connector 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 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 and Unmated
c)	Mounting Condition	: Mounted and Unmounted
d)	Hold Time	: 60 Seconds
e)	Rate of Application	: 500 volts/sec.
f)	Test Voltage	: 75% of Breakdown Voltage
g)	Applied Voltage	: 600 VAC

3. To determine the Applied Voltage as listed above, AC voltage was applied to the specified test points until breakdown. The Applied Voltage used was 75% of the minimum breakdown voltage as tested. The test samples were tested mated (Sequence a Group A1), and each T2SD cable and S2M connector was tested unmated (Sequence a Groups A2, A3)to determine the minimum breakdown voltage.

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PROCEDURE:-continued

4. The voltage was applied to specific test points on each board or cable.

REQUIREMENTS:

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

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 210386	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 2 Samples	TECHNICIAN: S-R
START DATE: 6/24/10	COMPLETE DATE: 6/28/10
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 52%
EQUIPMENT ID#: 1360, 1549, 1550, 1609	

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 32, Method A, Test Condition I.

2. Test Conditions:
   a) Number of Cycles : 100 Cycles
   b) Hot Extreme : +85°C +3°C/-0°C
   c) Cold Extreme : -55°C +0°C/-3°C
   d) Time at Temperature : 30 Minutes
   e) Mating Conditions : Unmated
   f) Mounting Conditions : Mounted and Unmounted
   g) Transfer Time : Instantaneous

3. The total number of cycles was performed continuously.

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

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

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PROCEDURE: -continued

6. Testing was completed within 1 hour of removal of the samples from the chamber.

REQUIREMENTS:

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

2. The insulation resistance shall not be less than 5,000 megohms.

3. When a 600 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc.

RESULTS:

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

2. The insulation resistance exceeded 5,000 megohms.

3. There was no evidence of arcing, breakdown, etc., when a 600 VAC voltage was applied.

PROJECT NO.: 210386	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 2 Samples	TECHNICIAN: S-R
START DATE: 6/28/10	COMPLETE DATE: 7/9/10
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 52%
EQUIPMENT ID#: 614, 628, 1230, 1360, 1549, 1550	

HUMIDITY (THERMAL CYCLING)

PURPOSE:

The purpose of this test is to permit evaluation of the properties of materials used in connectors as they are influenced or deteriorated by the effects of high humidity and heat conditions. Measurements made under high humidity conditions may reflect the peculiar conditions under which the readings were made, and should be compared only to initial readings when careful analysis indicates that such a comparison is valid and applicable.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 31, Test Condition B, Method III (omitting steps 7a and 7b).

2. Test Conditions:

a) Preconditioning (24 hours)	: 50°C ± 5°C
b) Relative Humidity	: 90% to 98%
c) Temperature Conditions	: 25°C to 65°C
d) Cold Cycle	: No
e) Polarizing Voltage	: No
f) Mating Conditions	: Unmated
g) Mounting Conditions	: Mounted and Unmounted
h) Duration	: 240 hours

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

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PROCEDURE:-continued

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

5. The voltage was applied to specific test points on the board or cable.

6. Testing was completed within 1 hour of removal of the samples from the chamber.

REQUIREMENTS:

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

2. The insulation resistance shall not be less than 5,000 megohms.

3. There shall be no evidence of arcing or breakdown when a 600 VAC test voltage is applied.

RESULTS:

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

2. The insulation resistance exceeded 5000 megohms.

3. There was no evidence of breakdown, arcing, etc., when a 600 VAC test voltage was applied.

TEST RESULTS

SEQUENCE B

Group A

Contech Research
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PROJECT NO.: 210185 SPECIFICATION: T2SD Test Plan

PART NO.: See Page 4 PART DESCRIPTION: FX5 series

SAMPLE SIZE: 8 Samples TECHNICIAN: MHB

START DATE: 5/6/10 COMPLETE DATE: 5/6/10

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 207, 1276

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

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 : 24 per test sample

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.
B-A-1	21.4	23.0	20.5
B-A-2	21.6	23.1	20.8
B-A-3	21.4	23.6	20.4
B-A-4	22.3	23.6	21.1
B-A-5	21.5	22.9	20.5
B-A-6	21.8	23.0	21.0
B-A-7	20.8	21.9	19.9
B-A-8	21.5	22.8	20.5

2. See data files 21018531 through 21018538 for individual data points.

PROJECT NO.: 210185	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 8 Samples	TECHNICIAN: MHB
START DATE: 5/6/10	COMPLETE DATE: 5/6/10
ROOM AMBIENT: 21°C	RELATIVE HUMIDITY: 42%
EQUIPMENT ID#: 150, 315	

DURABILITY

PURPOSE:

1. 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.

2. This type of conditioning sequence is also used to mechanically stress the connector system as would normally occur in actual service. This sequence in conjunction with other tests is used to determine if a significant loss of contact pressure occurs from said stresses which in turn, may result in an unstable electrical condition to exist.

PROCEDURE:

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

2. Test Conditions:

   a) No. of Cycles : 100 – Group A
   b) Rate : 1.0 inch per minute

3. The plug side was assembled to special holding devices; the receptacle part was attached to an X-Y table. Speed is approximate.

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PROCEDURE:–continued

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

5. Care was taken to prevent the mating faces of the test samples from contacting each other.

6. 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 low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

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

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

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
B-A-1	-0.3	+0.5
B-A-2	-0.5	+0.5
B-A-3	-0.5	+0.3
B-A-4	-0.9	+0.2
B-A-5	-0.6	+0.2
B-A-6	-0.5	+0.9
B-A-7	+0.4	+1.5
B-A-8	-0.2	+0.9

3. See data files 21018531 through 21018538 for individual data points.

PROJECT NO.: 210185 SPECIFICATION: TC109-3224FX5rev1

PART NO.: See Page 4 PART DESCRIPTION: FX5 series

SAMPLE SIZE: 8 Samples TECHNICIAN: MHB

START DATE: 5/13/10 COMPLETE DATE: 5/17/10

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 36%

EQUIPMENT ID#: 1360, 1549, 1550, 1609

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 32, Method A, Test Condition I.

2. Test Conditions:
   a) Number of Cycles : 100 Cycles
   b) Hot Extreme : +85°C +3°C/-0°C
   c) Cold Extreme : -55°C +0°C/-3°C
   d) Time at Temperature : 30 Minutes
   e) Mating Conditions : Mated
   f) Mounting Conditions : Mounted

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

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

REQUIREMENTS:

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

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REQUIREMENTS: -continued

2. The change in low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

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

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

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
B-A-1	-0.8	-0.1
B-A-2	-1.0	+0.0
B-A-3	-0.8	+0.0
B-A-4	-0.6	+0.7
B-A-5	-1.1	-0.4
B-A-6	-1.2	-0.2
B-A-7	-0.6	+0.4
B-A-8	-0.8	-0.1

3. See data files 21018531 through 21018538 for individual data points.

PROJECT NO.: 210185	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 8 Samples	TECHNICIAN: MHB
START DATE: 5/13/10	COMPLETE DATE: 5/24/10
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 24%
EQUIPMENT ID#: 614, 628, 1230, 1360, 1549, 1550	

HUMIDITY (THERMAL CYCLING)

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, Test Condition B, Method III (omitting steps 7a and 7b) with the following conditions.

2. Test Conditions:

a) Preconditioning (24 hours)	:	50°C ± 5°C
b) Relative Humidity	:	90% to 98%
c) Temperature Conditions	:	25°C to 65°C
d) Cold Cycle	:	No
e) Polarizing Voltage	:	No
f) Mating Conditions	:	Mated
g) Mounting Conditions	:	Mounted
h) Duration	:	240 hours

-continued on next page.

PROCEDURE:–continued

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 low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

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

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

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
B-A-1	-0.9	+0.7
B-A-2	-1.1	-0.3
B-A-3	-1.1	+0.4
B-A-4	-0.9	-0.2
B-A-5	-1.3	-0.5
B-A-6	-1.3	+0.3
B-A-7	-0.9	+0.0
B-A-8	-0.8	+2.4

3. See data files 210118531 through 21018538 for individual data points.

LLCR DATA FILES

FILE NUMBERS

21018531
21018532
21018533
21018534
21018535
21018536
21018537
21018538

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Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018531
Description:	ID#: B-A-1 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	22	22	21
R.H. %	42	42	34	44
Date:	06May10	06May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	23.0	-2.1	-2.0	-1.8
2	21.9	-0.5	-1.2	-1.2
3	22.5	-0.9	-1.2	-1.3
4	21.9	-1.3	-1.5	-1.4
6	20.7	-0.1	-0.7	-1.0
7	21.6	0.0	-0.8	-1.0
8	21.2	-0.1	-0.6	-0.7
9	21.6	-0.2	-0.9	-0.9
10	21.9	-0.3	-1.2	-4.8
11	20.9	0.4	-0.1	-0.1
12	21.1	0.0	-0.4	-0.4
13	22.3	-0.9	-1.6	-1.6
14	20.9	0.1	-0.1	-0.2
15	21.3	-0.1	-0.3	-0.5
16	21.8	-0.4	-1.0	-1.3
17	20.5	0.0	-0.5	-0.9
18	20.7	0.2	-0.6	-0.3
19	20.7	0.4	-0.3	-0.4
20	20.6	-0.2	-0.7	-0.8
21	20.5	-0.1	-0.6	0.7
22	21.0	-0.5	-0.8	-0.7
23	21.7	-0.6	-0.9	-1.0
24	20.8	0.5	-0.4	-0.2
MAX	23.0	0.5	-0.1	0.7
MIN	20.5	-2.1	-2.0	-4.8
AVG	21.4	-0.3	-0.8	-0.9
STD	0.7	0.6	0.5	1.0
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018532
Description:	ID#: B-A-2 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	21.6	-0.5	-0.9	-0.8
2	22.6	-1.0	-3.0	-0.4
3	22.3	-0.6	-1.1	-0.3
4	22.6	-1.2	-1.3	-0.7
6	20.9	-0.6	-0.8	-1.5
7	22.2	-1.0	-1.6	-1.8
8	21.2	-0.4	-0.9	-0.6
9	22.0	-0.7	-1.4	-1.8
10	21.2	0.1	-0.4	-0.3
11	21.2	-0.4	-0.9	-0.3
12	21.7	-0.9	-1.1	-0.9
13	21.3	0.5	-0.7	-1.1
14	21.6	-0.3	0.0	-2.4
15	21.1	0.2	-0.5	-0.6
16	21.2	-0.3	-0.6	-1.7
17	22.1	-0.7	-1.3	-2.0
18	21.3	-0.4	-0.9	-0.3
19	20.9	-0.3	-0.6	-0.5
20	20.8	0.1	-0.6	-0.8
21	21.5	-0.5	-1.0	-2.2
22	21.3	-0.4	-1.0	-1.4
23	21.5	-1.1	-1.2	-1.5
24	23.1	-1.5	-1.7	-1.8
MAX	23.1	0.5	0.0	-0.3
MIN	20.8	-1.5	-3.0	-2.4
AVG	21.6	-0.5	-1.0	-1.1
STD	0.6	0.5	0.6	0.7
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276		244
	207	207		1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018533
Description:	ID# B-A-3 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	23.6	-1.4	-1.9	-7.7
2	22.4	-0.9	-1.8	-1.9
3	22.8	-1.4	-1.9	-1.9
4	23.0	-2.1	-2.2	-2.0
6	21.3	-0.2	-0.7	-0.8
7	21.7	-1.0	-1.6	-1.6
8	20.8	-0.2	-0.5	-0.7
9	21.5	-0.8	-1.4	-2.3
10	21.1	-0.2	-0.5	-1.7
11	20.7	0.2	-0.1	-0.2
12	20.7	0.0	-0.3	-0.3
13	20.4	-0.3	-0.2	0.0
14	21.1	-0.8	-0.6	-0.5
15	21.0	-0.3	-0.8	-0.9
16	20.4	0.3	-0.1	-0.3
17	20.7	-0.1	0.0	-0.2
18	21.5	-1.1	-1.1	-1.2
19	20.6	-0.1	-0.5	-0.5
20	20.6	-0.2	-0.5	-0.6
21	21.2	-0.1	-0.5	-0.3
22	21.2	-0.2	0.0	0.4
23	21.7	-0.5	-0.8	-1.2
24	21.2	-0.6	-0.7	0.2
MAX	23.6	0.3	0.0	0.4
MIN	20.4	-2.1	-2.2	-7.7
AVG	21.4	-0.5	-0.8	-1.1
STD	0.9	0.6	0.7	1.6
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018534
Description:	ID#: B-A-4 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	22.1	0.2	0.2	-0.3
2	21.8	-0.3	-0.5	-0.7
3	21.8	-0.3	-0.1	-0.2
4	21.7	-0.6	-0.5	-0.6
6	21.5	-0.7	-0.4	-0.6
7	22.5	-1.3	0.7	-0.5
8	23.0	-1.6	-0.7	-1.1
9	22.7	-1.1	0.0	-0.3
10	23.6	-2.5	-1.3	-1.5
11	23.6	-2.0	-0.7	-1.5
12	22.7	-1.6	-1.5	-1.5
13	23.5	-1.9	-2.2	-2.2
14	22.7	-1.0	-0.3	-0.6
15	22.9	-1.2	-1.0	-1.4
16	22.4	-1.1	-0.6	-0.9
17	21.9	-0.4	-0.4	-0.7
18	22.0	-0.4	-0.6	-0.7
19	22.0	-0.9	-0.6	-1.9
20	21.1	-0.2	-0.1	-0.3
21	21.4	-0.6	-0.7	-0.2
22	21.7	-0.1	-0.8	-0.7
23	22.0	-0.6	-0.7	-1.1
24	21.9	-0.4	-0.6	-0.6
MAX	23.6	0.2	0.7	-0.2
MIN	21.1	-2.5	-2.2	-2.2
AVG	22.3	-0.9	-0.6	-0.9
STD	0.7	0.7	0.6	0.6
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	IX7 Series Connector		File No:	21018535
Description:	ID#: B-A-5 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	21.5	-0.4	-1.1	-0.5
2	22.2	-0.8	-1.2	-1.2
3	22.6	-0.4	-1.4	-1.4
4	22.2	-0.3	-1.1	-1.4
6	21.6	-0.8	-1.1	-1.1
7	20.9	0.0	-0.4	-3.0
8	22.0	-1.3	-1.6	-2.0
9	22.0	-0.9	-1.6	-1.7
10	21.0	-0.4	-0.4	-0.5
11	21.4	-0.8	-1.2	-0.7
12	21.0	-0.1	-0.7	-1.1
13	21.5	-0.9	-1.0	-0.8
14	20.9	0.2	-0.8	-1.3
15	21.1	0.0	-0.8	-1.5
16	21.3	-0.4	-0.7	-0.7
17	21.0	-0.3	-0.9	-1.2
18	20.5	0.0	-0.4	-0.5
19	21.0	-0.7	-1.1	-1.3
20	20.6	-0.4	-0.6	-0.7
21	21.7	-0.9	-1.5	-1.4
22	22.4	-0.9	-1.7	-1.7
23	21.3	0.0	-1.2	-1.2
24	22.9	-2.3	-2.7	-2.8
MAX	22.9	0.2	-0.4	-0.5
MIN	20.5	-2.3	-2.7	-3.0
AVG	21.5	-0.6	-1.1	-1.3
STD	0.6	0.5	0.5	0.6
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018536
Description:	ID#: B-A-6 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	22.6	0.7	-0.9	-1.1
2	21.7	0.4	-0.9	-1.1
3	22.2	0.9	-0.8	-0.9
4	22.7	-1.1	-1.7	-1.9
6	21.3	-0.2	-1.3	-1.5
7	21.1	-0.3	-0.9	-1.0
8	21.4	-0.1	-0.4	-1.3
9	21.5	0.0	-0.9	-1.1
10	21.0	0.4	-0.2	0.3
11	21.9	-1.0	-1.4	-1.6
12	21.5	-0.6	-1.1	-1.2
13	22.2	-1.4	-1.6	-1.7
14	21.1	-0.3	-0.6	-0.7
15	21.5	-0.7	-1.0	-1.3
16	22.1	-1.1	-1.2	-1.3
17	22.2	-1.5	-1.5	-1.7
18	21.7	-0.8	-1.1	-1.2
19	21.3	-0.6	-0.9	-1.1
20	21.2	-0.7	-1.1	-1.3
21	22.2	0.0	-0.9	-1.0
22	22.6	-1.3	-2.2	-2.4
23	22.2	-1.3	-1.9	-2.1
24	23.0	-1.9	-2.3	-2.5
MAX	23.0	0.9	-0.2	0.3
MIN	21.0	-1.9	-2.3	-2.5
AVG	21.8	-0.5	-1.2	-1.3
STD	0.6	0.7	0.5	0.6
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018537
Description:	ID#: B-A-7 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	21.1	-0.2	-0.9	-1.3
2	21.9	-1.5	-1.7	-1.8
3	21.6	-0.5	-1.3	-1.5
4	21.3	0.0	-0.8	-1.3
6	20.7	0.6	-0.3	-0.4
7	20.9	0.7	-0.4	-0.7
8	20.4	1.0	0.0	-0.1
9	20.3	1.5	0.1	0.0
10	20.4	0.8	-0.2	-0.2
11	20.5	1.3	-0.1	-0.3
12	20.5	0.7	-0.2	-0.4
13	20.3	0.7	-0.3	0.0
14	20.3	1.0	-0.1	-2.1
15	20.6	0.4	-0.9	-0.8
16	20.9	0.1	-1.1	-1.6
17	21.1	-0.2	-1.2	-1.2
18	20.0	1.0	0.4	-1.3
19	19.9	1.2	-1.1	-0.4
20	20.3	0.8	-0.4	-0.3
21	21.8	-0.4	-1.2	-1.4
22	20.9	-0.1	-0.8	-1.1
23	21.0	-0.6	-1.1	-1.4
24	21.2	-0.2	-0.9	-1.0
MAX	21.9	1.5	0.4	0.0
MIN	19.9	-1.5	-1.7	-2.1
AVG	20.8	0.4	-0.6	-0.9
STD	0.6	0.7	0.5	0.6
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

Low Level Circuit Resistance - Delta Values				
Project:	210185		Spec:	EIA 364, TP 23
Customer:	Samtec		Subgroup:	Sequence B
Product:	FX5 Series Connector		File No:	21018538
Description:	ID#: B-A-8 Signal		Tech:	MHB
Open circuit voltage: 20mV			Current:	10mA
Units: milliohms				
Temp ºC	22	20	22	21
R.H. %	42	34	34	44
Date:	06May10	10May10	17May10	28May10
Pos. ID	Initial	Durability	T.Shock	Humidity
1	22.8	-0.3	-1.7	-2.0
2	22.2	-0.7	-1.0	-1.3
3	22.1	0.2	-0.8	-1.3
4	21.6	0.1	-0.4	-0.4
6	21.0	-0.1	-0.3	-0.4
7	21.1	-0.4	-0.7	-0.9
8	21.1	-0.7	-0.5	-0.8
9	21.8	-0.8	-0.7	2.4
10	20.5	0.9	-0.4	-0.5
11	21.8	-0.7	-0.8	-0.8
12	21.7	-1.1	-1.2	-1.6
13	21.1	-0.2	-0.9	-1.1
14	21.6	-0.6	-0.9	-1.1
15	22.1	-1.0	-1.1	-1.2
16	21.4	-0.5	-0.5	-0.7
17	21.1	-0.2	-0.7	-0.7
18	20.7	-0.1	-0.1	-0.4
19	21.3	-0.5	-0.7	-0.6
20	20.7	-0.2	-1.1	-1.1
21	21.2	0.2	-0.7	-0.9
22	21.2	0.1	-0.7	-0.9
23	21.2	0.5	-0.6	-0.8
24	22.6	0.9	-1.7	-2.0
MAX	22.8	0.9	-0.1	2.4
MIN	20.5	-1.1	-1.7	-2.0
AVG	21.5	-0.2	-0.8	-0.8
STD	0.6	0.5	0.4	0.8
Open	0	0	0	0
Tech	MHB	MHB	MHB	AJP
Equip ID	1276	1276	1276	244
	207	207	207	1647

TEST RESULTS

SEQUENCE C

Group A

Contech Research
An Independent Test and Research Laboratory

PROJECT NO.: 210185	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 8 Samples	TECHNICIAN: MHB
START DATE: 5/10/10	COMPLETE DATE: 5/10/10
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 42%
EQUIPMENT ID#: 207, 1276	

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

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
b) Open Circuit Voltage : 20 millivolts
c) No. of positions tested : 24 per sample

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.
C-A-1	21.4	22.8	20.4
C-A-2	22.2	23.2	21.2
C-A-3	21.6	23.2	20.6
C-A-4	21.7	24.6	20.2
C-A-5	21.4	22.6	20.5
C-A-6	21.3	22.6	20.0
C-A-7	20.8	22.6	20.1
C-A-8	21.1	22.0	20.2

2. See data files 21018501 through 21018508 for individual data points.

PROJECT NO.: 210185 SPECIFICATION: TC109-3224FX5rev1

PART NO.: See Page 4 PART DESCRIPTION: FX5 series

SAMPLE SIZE: 8 Samples TECHNICIAN: MHB

START DATE: 5/17/10 COMPLETE DATE: 5/18/10

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 34%

EQUIPMENT ID#: 553, 1166, 1167, 1168, 1271, 1272, 1620, 1634, 1926

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 C.

2. Test Conditions:

   a) Peak Value : 100 G
   b) Duration : 6 Milliseconds
   c) Wave Form : Half-Sine
   d) Velocity : 12.3 feet per second
   e) No. of Shocks : 3 Shocks/Direction, 3 Axes (18 Total)

3. A stabilizing medium was used such that the mated test samples did not separate during testing.

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

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 low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

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

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

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
C-A-1	-0.2	+0.9
C-A-2	-1.0	+1.5
C-A-3	-0.4	+0.3
C-A-4	-0.1	+0.3
C-A-5	-0.2	+0.4
C-A-6	-0.6	+0.0
C-A-7	+0.3	+1.8
C-A-8	+0.1	+0.5

3. See data files 21018501 through 21018508 for individual data points.

4. The Mechanical Shock characteristics are shown in Figures #3 (Calibration Pulse) and #4 (Test Pulse). Each figure displays the shock pulse contained within the upper and lower limits as defined by the appropriate test specification.

FIGURE #2

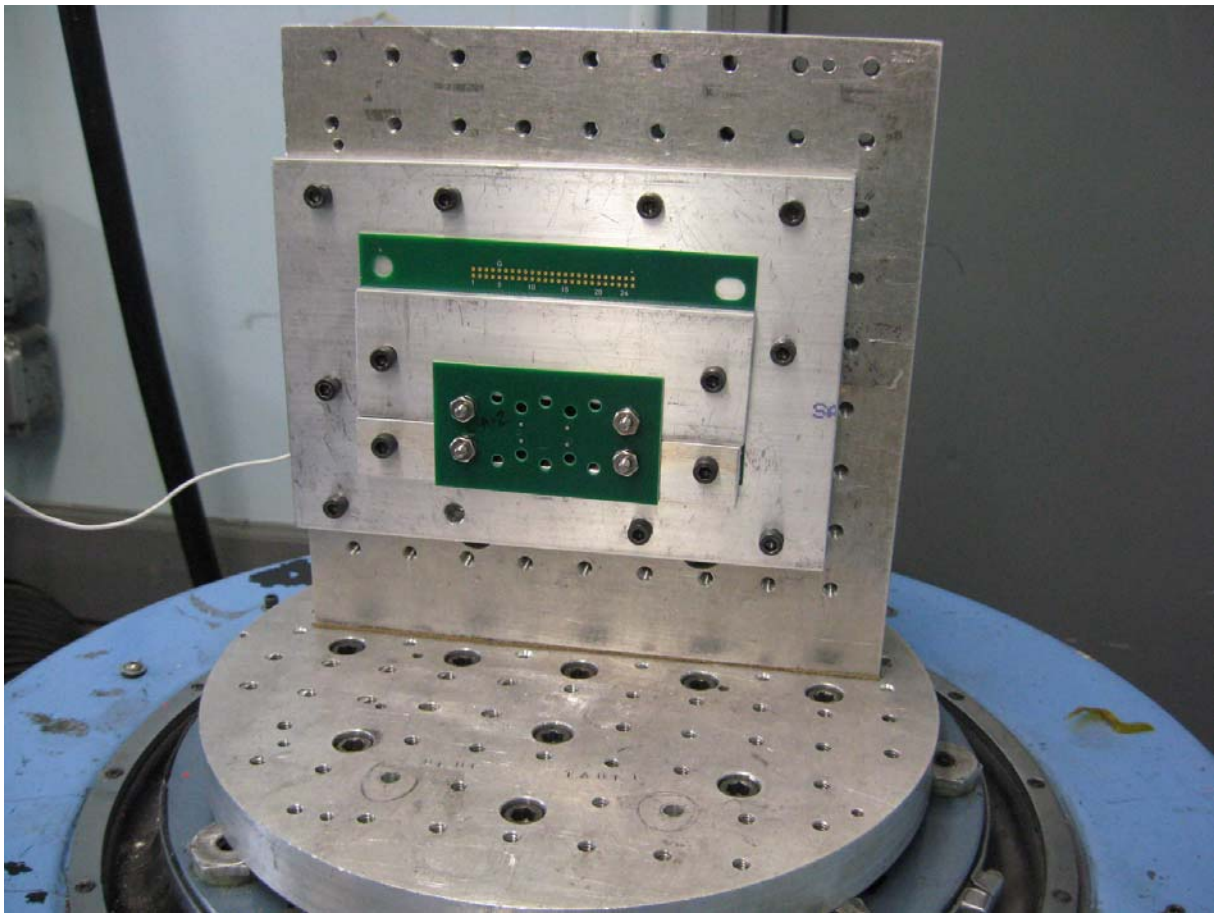

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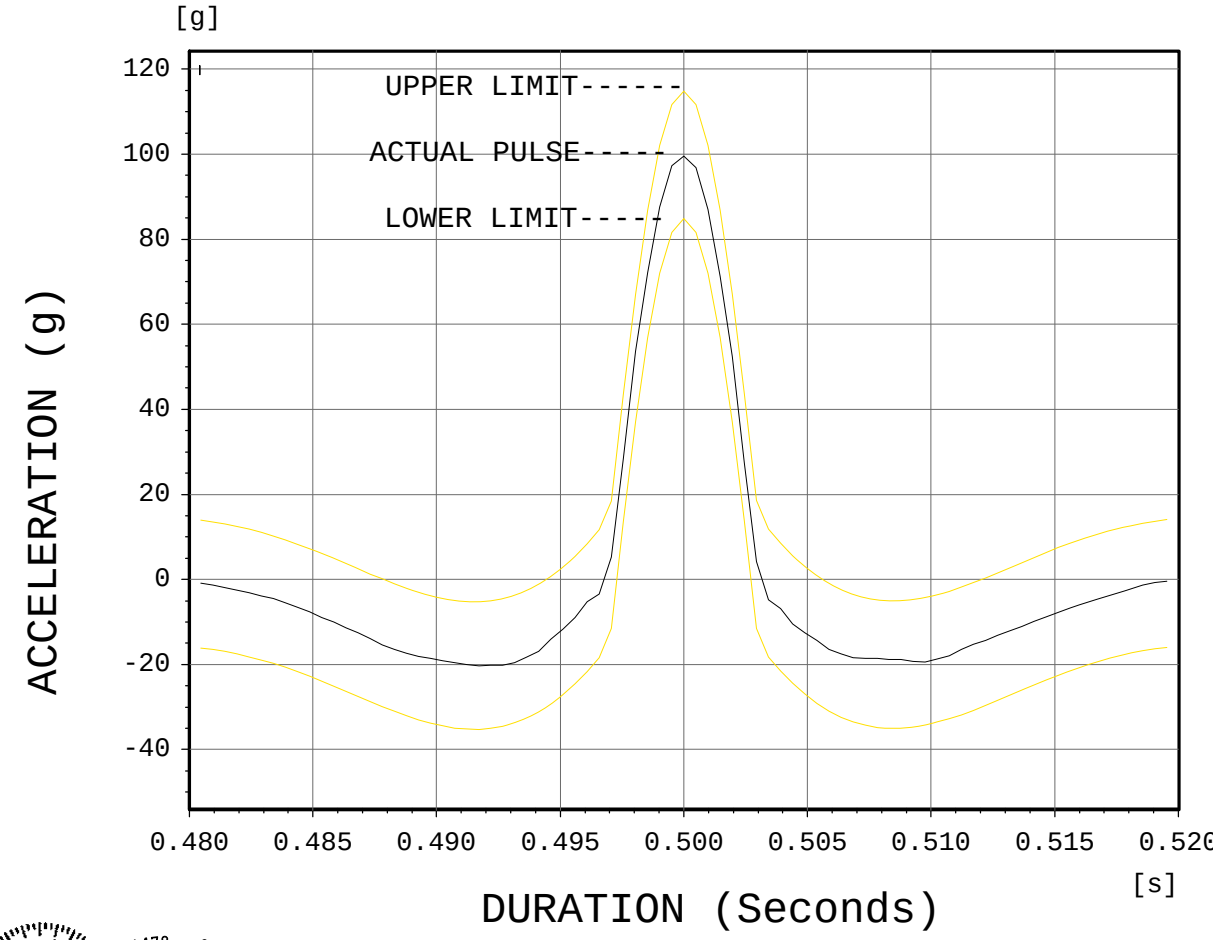
FIGURE #3

Classical Shock

Channel 1

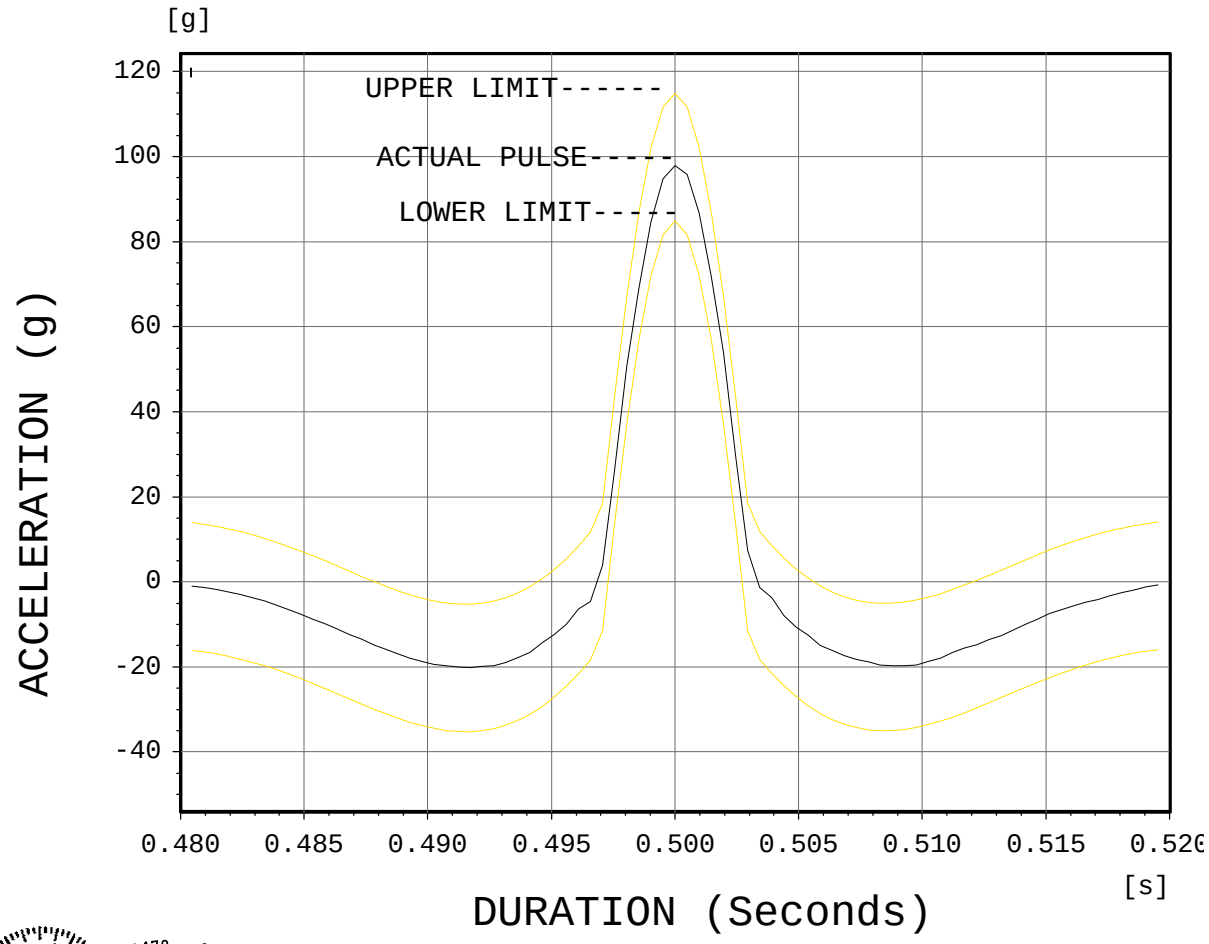


Project 210185
Samtec
Cal. Wave 1
Date:17May10
Tech: MHB

FIGURE #4

Classical Shock

Channel 1



Project 210185
Samtec
Actual Wave
Date:17May10
Tech: MHB

PROJECT NO.: 210185 SPECIFICATION: T2SD Test Plan

PART NO.: See Page 4 PART DESCRIPTION: FX5 series

SAMPLE SIZE: 8 Samples TECHNICIAN: MHB

START DATE: 5/28/10 COMPLETE DATE: 5/28/10

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 282, 553, 874, 684, 1366, 1367, 1368, 1474

VIBRATION, RANDOM

PURPOSE:

1. To establish the mechanical integrity of the test samples exposed to external mechanical stresses.

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 B.

2. Test Conditions:

   a) Power Spectral Density : 0.04 g^2/Hz
   b) G 'rms' : 7.56
   c) Frequency : 50 to 2000 Hz
   d) Duration : 2.0 hrs per axis, 3 axes total

3. A stabilizing medium was used such that the mated test samples did not separate during the test.

4. Figure #5 illustrates the test sample fixturing utilized during the test.

-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. The change in low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

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

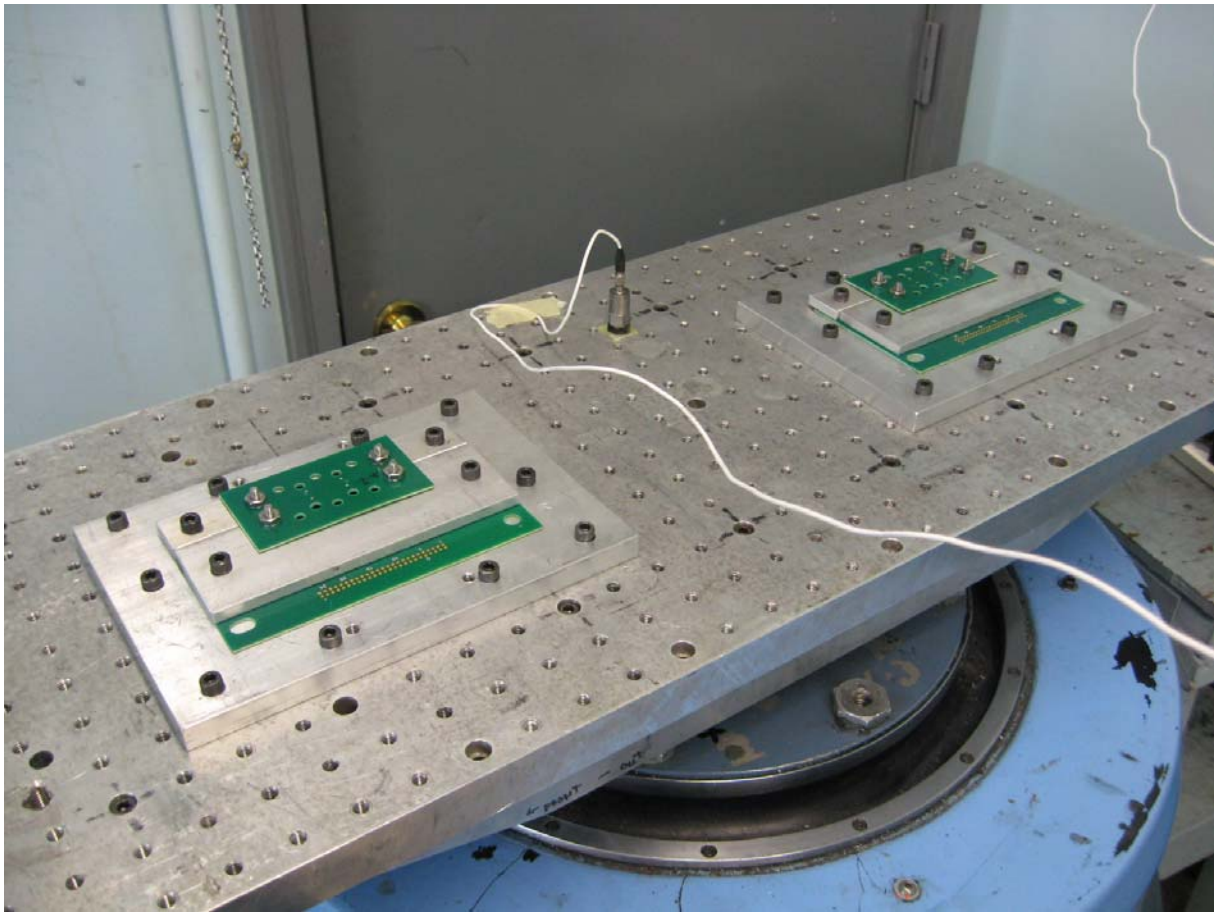
2. The following is a summary of the observed data:

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg. Change	Max. Change
C-A-1	-0.3	+0.4
C-A-2	-0.1	+0.7
C-A-3	-0.2	+2.2
C-A-4	-0.1	+0.4
C-A-5	-0.3	+0.2
C-A-6	-1.0	-0.1
C-A-7	+0.5	+2.2
C-A-8	+0.4	+2.1

3. See data files 21018501 through 21018508 for individual data points.

FIGURE #5



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LLCR DATA FILES

DATA FILE NUMBERS

21018501
21018502
21018503
21018504
21018505
21018506
21018507
21018508

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Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018501
Description:	ID#: C-A-1 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	34	41	44
Date:	10May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	21.3	0.0	-0.1
2	22.0	0.0	0.4
3	22.1	-0.2	0.0
4	20.9	-0.4	-0.2
6	20.9	-0.4	-0.3
7	21.4	-0.3	-0.3
8	21.3	-0.2	-0.1
9	22.8	0.9	-0.3
10	22.1	-0.3	-1.3
11	21.5	-0.3	-0.3
12	20.4	-0.3	-0.4
13	21.6	-0.4	-0.5
14	21.9	-0.3	-0.2
15	20.9	0.0	0.0
16	21.0	0.0	0.1
17	20.7	-0.3	-0.2
18	21.6	-0.1	-0.2
19	20.6	0.1	-0.1
20	21.0	-0.2	-0.4
21	21.4	-0.5	-0.6
22	21.3	-0.7	-0.5
23	20.9	-0.2	-0.1
24	21.4	-0.5	-0.4
MAX	22.8	0.9	0.4
MIN	20.4	-0.7	-1.3
AVG	21.4	-0.2	-0.3
STD	0.6	0.3	0.3
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018502
Description:	ID#: C-A-2 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	34	41	44
Date:	10May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	23.2	-1.9	-0.5
2	22.8	-0.7	-0.4
3	22.0	-0.1	0.6
4	21.7	-1.1	-0.7
6	22.5	-1.9	-0.1
7	22.7	-1.5	0.6
8	22.4	-1.2	0.2
9	22.3	1.5	-1.2
10	22.6	-0.8	0.7
11	22.0	-0.7	-0.1
12	22.1	-1.9	0.0
13	23.0	-1.7	0.6
14	22.4	-0.8	-1.1
15	22.0	-1.1	0.2
16	21.8	-0.8	0.6
17	22.2	-1.8	0.1
18	21.7	-0.1	0.1
19	21.9	-1.1	-0.4
20	21.6	-0.8	-0.3
21	21.2	-0.3	0.0
22	21.3	-0.6	0.1
23	22.4	-1.7	-0.3
24	21.9	-0.9	0.0
MAX	23.2	1.5	0.7
MIN	21.2	-1.9	-1.2
AVG	22.2	-1.0	-0.1
STD	0.5	0.8	0.5
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018503
Description:	ID#: C-A-3 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	34	41	44
Date:	10May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	22.4	-0.6	-0.2
2	23.2	-0.6	-0.6
3	22.5	-0.2	1.9
4	22.8	-0.7	-0.5
6	20.9	-0.2	0.6
7	21.4	0.3	-0.1
8	20.9	-0.5	0.1
9	20.9	0.0	0.1
10	21.1	-0.6	-0.7
11	22.3	-0.6	-0.8
12	21.4	-0.6	-0.8
13	20.9	-0.5	2.2
14	21.4	-0.6	-0.8
15	21.7	-0.7	-0.9
16	21.9	-1.0	-1.4
17	21.5	-0.3	0.0
18	20.8	-0.3	-0.2
19	21.0	-0.1	-0.5
20	20.6	-0.3	-0.5
21	20.8	-0.1	-0.3
22	21.9	0.0	-0.5
23	21.9	0.3	-0.6
24	22.5	-0.3	-0.3
MAX	23.2	0.3	2.2
MIN	20.6	-1.0	-1.4
AVG	21.6	-0.4	-0.2
STD	0.7	0.3	0.8
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018504
Description:	ID#: C-A-4 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	34	41	44
Date:	10May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	22.5	0.2	0.2
2	24.6	-0.4	-0.4
3	22.7	-0.1	0.2
4	21.8	0.3	0.4
6	21.3	-0.2	-0.1
7	21.3	-0.2	-0.2
8	21.3	-0.3	-0.2
9	21.5	-0.1	-0.2
10	22.3	-0.4	-0.3
11	21.4	-0.2	-0.1
12	21.5	-0.4	-0.4
13	21.5	-0.2	-0.2
14	20.9	-0.3	-0.4
15	21.4	-0.2	-0.2
16	21.8	-0.2	-0.3
17	22.4	-0.4	-0.5
18	21.8	0.0	0.0
19	20.9	0.0	0.0
20	20.2	0.0	0.1
21	20.9	-0.1	0.1
22	21.5	0.0	0.1
23	21.5	-0.1	0.0
24	21.8	0.0	0.1
MAX	24.6	0.3	0.4
MIN	20.2	-0.4	-0.5
AVG	21.7	-0.1	-0.1
STD	0.8	0.2	0.2
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018505
Description:	ID#: C-A-5 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	34	41	44
Date:	10May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	21.4	0.1	-0.1
2	21.2	-0.4	-0.4
3	22.6	-0.3	-0.6
4	22.3	-0.3	-0.9
6	21.7	-0.5	-0.5
7	21.9	-0.1	-0.1
8	21.6	0.1	-0.3
9	21.2	-0.1	-0.3
10	21.1	0.0	-0.2
11	22.1	-0.2	-0.3
12	21.9	-0.2	-0.4
13	21.3	-0.1	-0.3
14	20.7	-0.2	-0.7
15	20.9	-0.3	-0.4
16	21.0	0.0	-0.2
17	20.5	0.4	0.2
18	21.4	0.0	-0.3
19	21.1	-0.2	-0.4
20	20.6	-0.1	-0.2
21	21.1	-0.2	-0.2
22	21.4	-0.3	-0.4
23	22.4	-0.3	-0.3
24	21.3	-0.4	-0.4
MAX	22.6	0.4	0.2
MIN	20.5	-0.5	-0.9
AVG	21.4	-0.2	-0.3
STD	0.6	0.2	0.2
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018506
Description:	ID#: C-A-6 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	34	41	44
Date:	10May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	21.6	-0.7	-1.1
2	22.0	-0.8	-1.2
3	22.6	-1.1	-0.1
4	21.4	-0.9	-1.1
6	21.0	-1.0	-1.2
7	21.9	-1.4	-1.4
8	21.3	-0.6	-1.2
9	21.9	-0.9	-1.1
10	21.3	-1.2	-1.3
11	21.1	-0.2	-0.2
12	22.0	-1.0	-1.1
13	21.3	-0.7	-1.1
14	21.7	-0.5	-1.2
15	20.9	-0.7	-0.9
16	20.4	-0.4	-0.5
17	20.3	0.0	-0.2
18	20.0	0.0	-0.3
19	20.6	-0.3	-0.5
20	20.5	-0.1	-0.6
21	21.1	-0.6	-1.1
22	21.7	-0.8	-2.1
23	21.8	-0.5	-3.3
24	22.1	0.0	-0.7
MAX	22.6	0.0	-0.1
MIN	20.0	-1.4	-3.3
AVG	21.3	-0.6	-1.0
STD	0.7	0.4	0.7
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

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Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018507
Description:	ID#: C-A-7 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	30	41	44
Date:	11May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	22.6	1.8	2.2
2	21.5	1.2	1.0
3	20.6	1.8	1.6
4	20.9	0.8	1.1
6	20.6	-0.1	-0.1
7	20.3	0.0	0.0
8	20.7	-0.5	-0.4
9	20.8	0.1	0.2
10	20.8	-0.5	-0.5
11	20.4	0.3	0.1
12	20.6	0.3	0.1
13	20.2	0.2	0.1
14	20.8	-0.3	-0.4
15	20.1	-0.1	0.0
16	20.8	-0.2	0.8
17	20.2	0.1	0.5
18	20.2	0.2	0.8
19	20.3	0.5	0.3
20	20.6	0.1	1.2
21	21.0	0.5	0.7
22	21.2	0.7	0.8
23	21.8	0.5	0.7
24	21.1	0.3	1.2
MAX	22.6	1.8	2.2
MIN	20.1	-0.5	-0.5
AVG	20.8	0.3	0.5
STD	0.6	0.6	0.7
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

Low Level Circuit Resistance - Delta Values			
Project:	210185	Spec:	EIA 364, TP 23
Customer:	Samtec	Subgroup:	Sequence C
Product:	FX5 Series Connector	File No:	21018508
Description:	ID#: C-A-8 Signal	Tech:	MHB
Open circuit voltage: 20mV		Current:	10mA
Units: milliohms			
Temp ºC	20	22	21
R.H. %	30	41	44
Date:	11May10	19May10	28May10
Pos. ID	Initial	M.Shock	Vibration
1	20.7	0.0	2.1
2	21.1	0.1	0.3
3	21.2	0.2	0.7
4	21.7	0.1	0.4
6	20.9	0.2	0.7
7	21.0	0.5	0.7
8	21.3	-0.1	0.0
9	21.2	0.0	0.2
10	21.9	0.0	0.1
11	21.3	-0.3	0.0
12	20.8	0.1	0.2
13	21.4	0.1	0.3
14	22.0	-0.2	-0.1
15	21.8	0.0	0.2
16	20.6	0.0	0.3
17	20.7	0.3	0.6
18	21.0	0.0	0.2
19	20.4	0.4	0.7
20	20.2	0.3	0.6
21	20.8	0.3	0.4
22	21.0	0.3	0.4
23	21.1	-0.1	0.0
24	20.9	0.3	0.3
MAX	22.0	0.5	2.1
MIN	20.2	-0.3	-0.1
AVG	21.1	0.1	0.4
STD	0.5	0.2	0.4
Open	0	0	0
Tech	MHB	MHB	MHB
Equip ID	1276	1276	1276
	207	207	207

TEST RESULTS

SEQUENCE D

Group A

PROJECT NO.: 210185	SPECIFICATION: TC109-3224FX5rev1
PART NO.: See Page 4	PART DESCRIPTION: FX5 series
SAMPLE SIZE: 3 Samples	TECHNICIAN: MHB
START DATE: 5/17/10	COMPLETE DATE: 5/18/10
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 34%
EQUIPMENT ID#: 545, 553, 1166, 1167, 1168, 1271, 1272, 1620, 1634	

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 C.

2. Test Conditions:

    a) Peak Value : 100 G
    b) Duration : 6 Milliseconds
    c) Wave Form : Half-Sine
    d) Velocity : 12.3 feet Per Second
    e) No. of Shocks : 3 Shocks/Direction, 3 Axes (18 Total)

3. A stabilizing medium was used such that the mated test samples did not separate during the test.

4. Figure #6 illustrates the test sample fixturing utilized during the test.

5. The samples were characterized to assure that the low nanosecond event being monitored will trigger the detector.

-continued on next page.

PROCEDURE:-continued

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

REQUIREMENTS:

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

2. There shall be no low nanosecond event detected greater than 50 nanoseconds.

RESULTS:

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

2. There was no low nanosecond event detected greater than 50 nanoseconds.

3. The Mechanical Shock characteristics are shown in Figures #7 (Calibration Pulse) and #8 (Test Pulse). Each figure displays the shock pulse contained within the upper and lower limits as defined by the appropriate test specification.

FIGURE #6

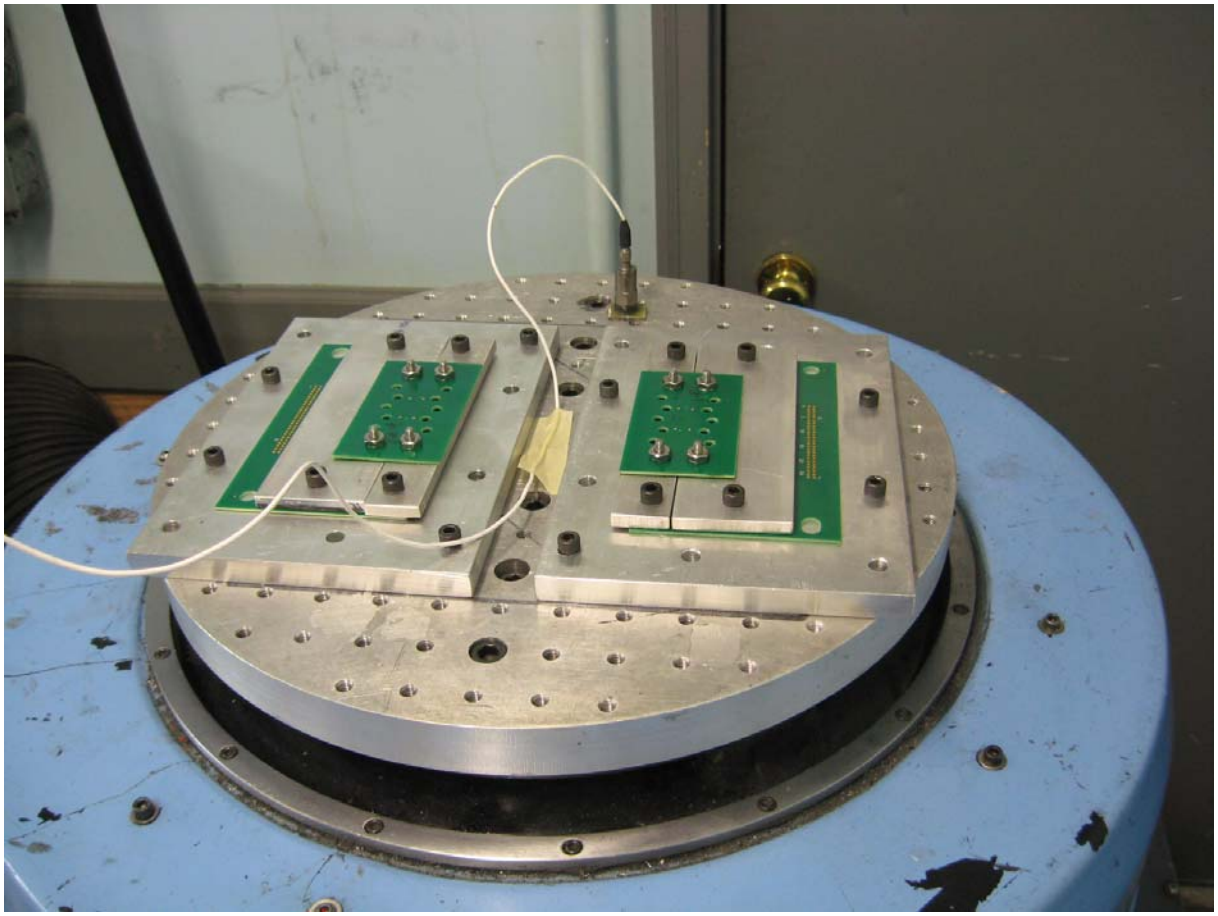

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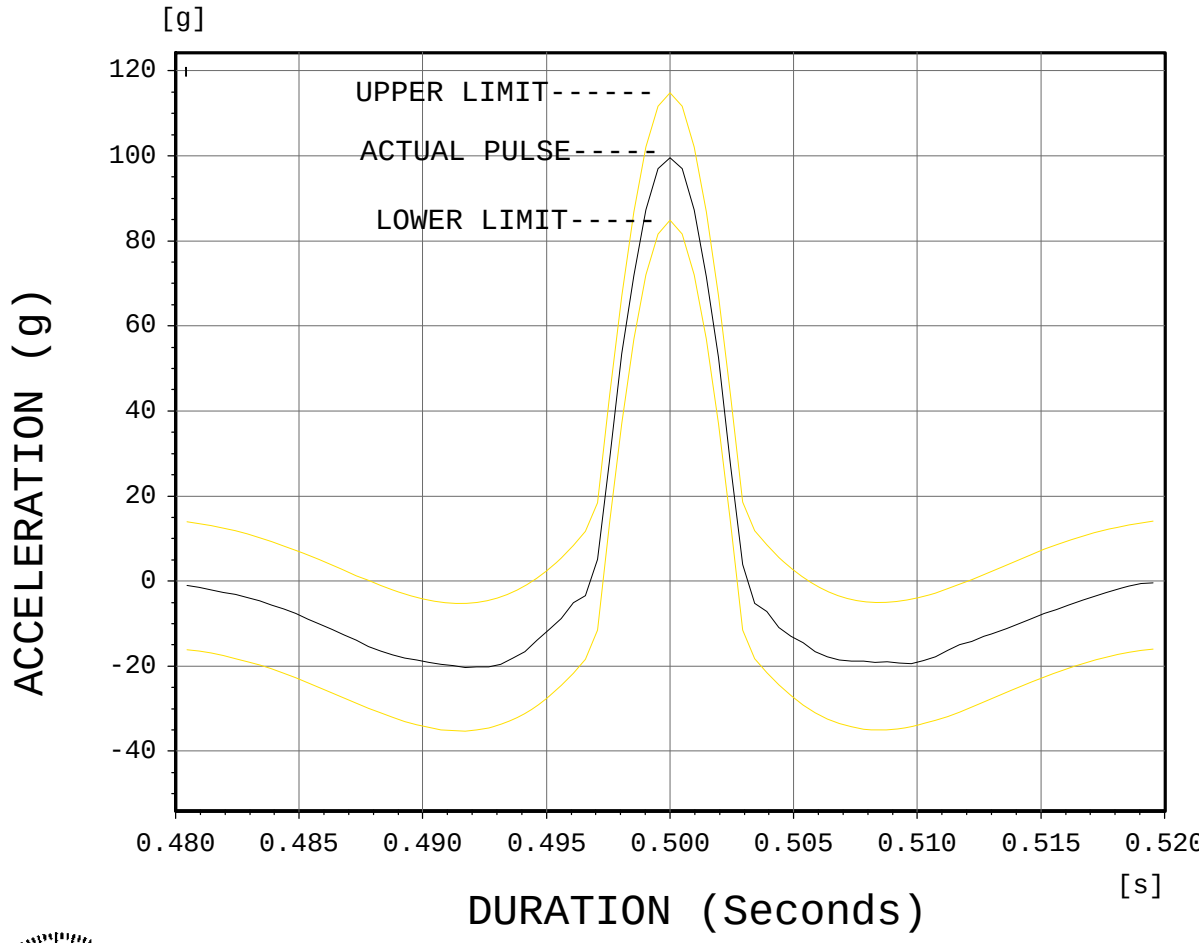
FIGURE #7

Classical Shock

Channel 1

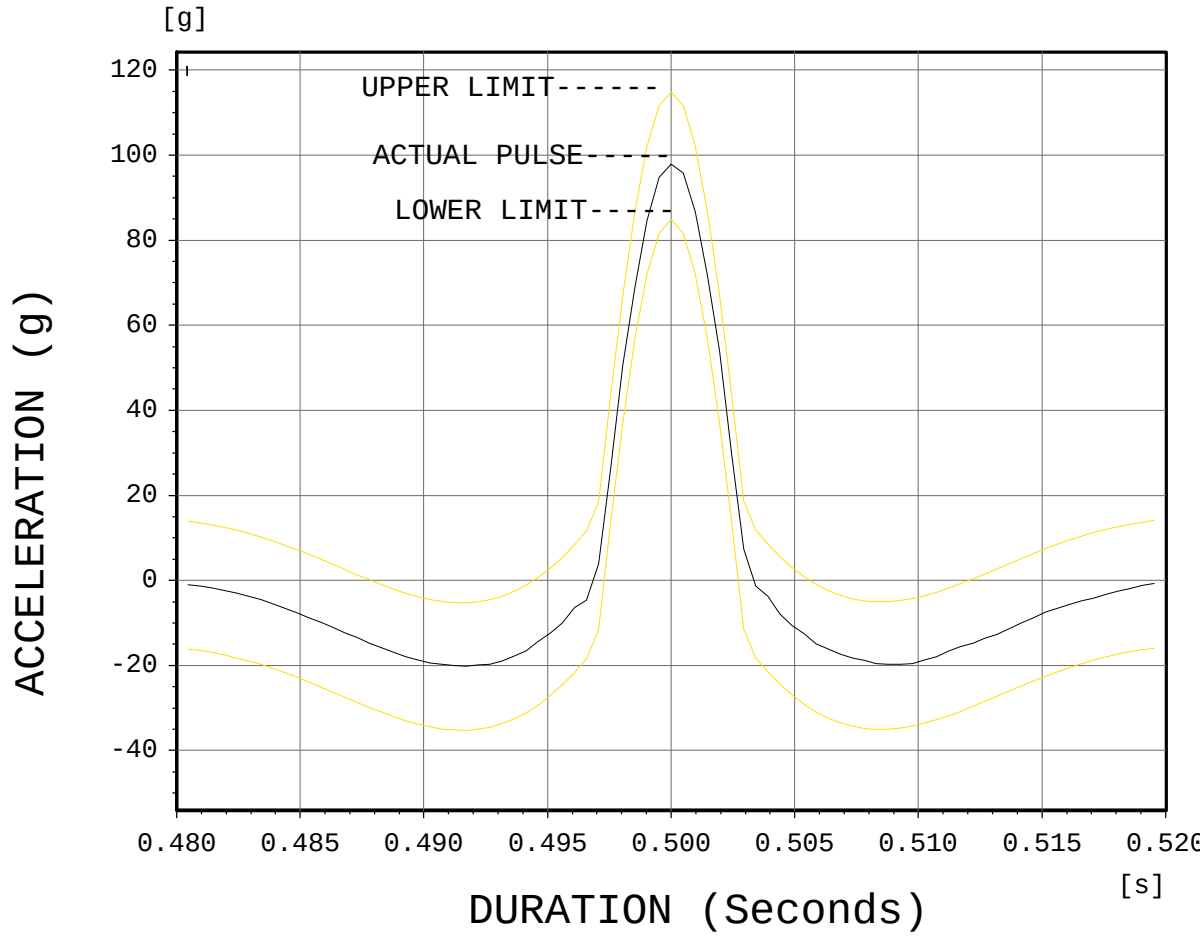


Project 210185
Cal. Wave 2
Date:17May10
Tech: MHB

FIGURE #8

Classical Shock

Channel 1



Project 210185
Samtec
Actual Wave
Date:17May10
Tech: MHB

PROJECT NO.: 210185 SPECIFICATION: TC109-3224FX5rev1

PART NO.: See Page 4 PART DESCRIPTION: FX5 series

SAMPLE SIZE: 3 Samples TECHNICIAN: MHB

START DATE: 5/28/09 COMPLETE DATE: 5/28/09

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 44%

EQUIPMENT ID#: 282, 545, 553, 1366, 1367, 1368, 1474, 1620

VIBRATION, RANDOM

PURPOSE:

1. To establish the mechanical integrity of the test samples exposed to external mechanical stresses.

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

3. To determine if electrical discontinuities at the level specified exist.

PROCEDURE:

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

2. Test Conditions:

   a) Power Spectral Density : 0.04 g^2/Hz
   b) G 'rms' : 7.56
   c) Frequency : 50 to 2000 Hz
   d) Duration : 2.0 hrs per axis, 3 axes total

3. A stabilizing medium was used such that the mated test samples did not separate during the test.

4. Figure #9 illustrates the test sample fixturing utilized during the test.

-continued on next page.

PROCEDURE: -continued

5. Prior to testing, the connectors were characterized to assure that the desired event being monitored was capable of being detected.

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

REQUIREMENTS:

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

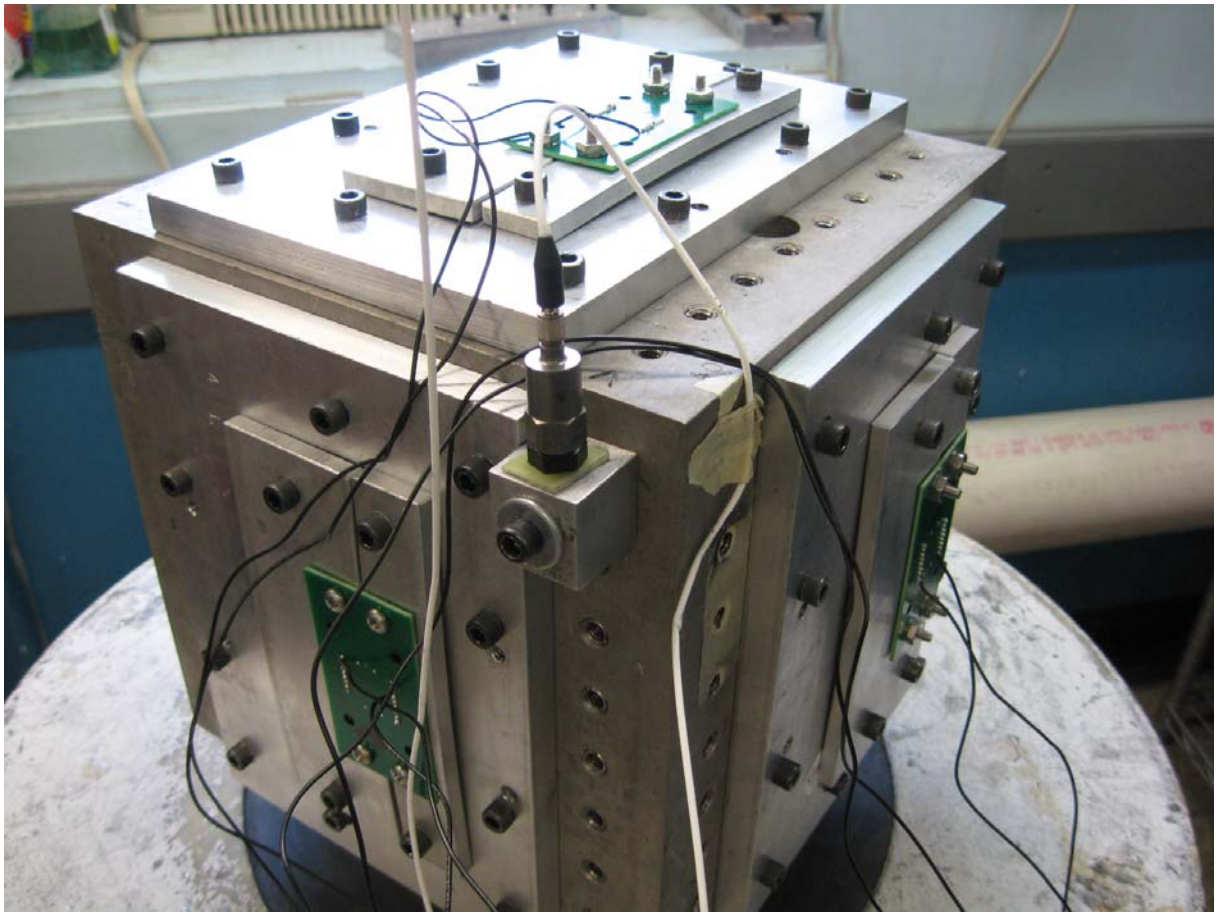
2. There shall be no low nanosecond event detected greater than 50 nanoseconds.

RESULTS:

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

2. There was no low nanosecond event detected greater than 50 nanoseconds.

FIGURE #9



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