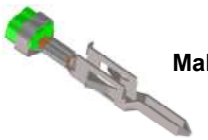
PRODUCT SPECIFICATION

PRODUCT SPECIFICATION FOR
Mini-Fit Plus HCS™

INTERCONNECT SYSTEMS



46012
Male Terminal

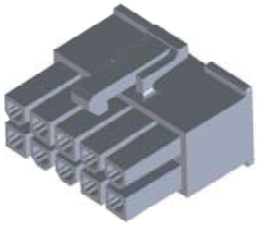
45750
Female Terminal



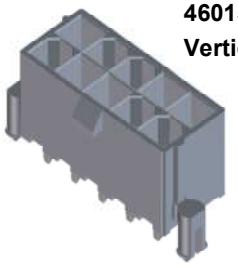
5559
Plug Housing



5557
Receptacle Housing

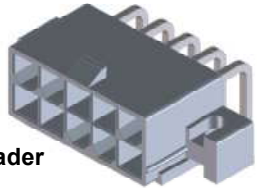


Crimp Terminals and Housing for Wire-Wire



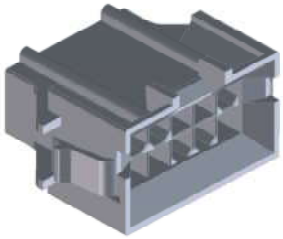
46015
Vertical Header

5569
Right Angle Header

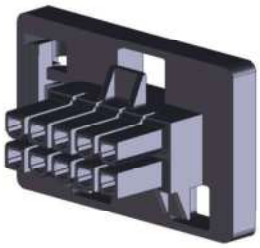


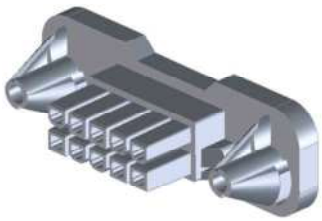
Headers for Wire-Board

42475
BMI Plug Housing



44516
BMI Slide and Lock Receptacle



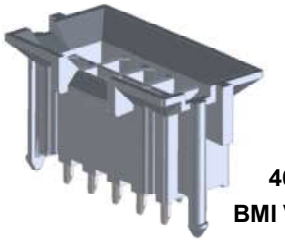


42474
BMI Receptacle w/ Spirals

BMI Style Panel Mount Housings for Wire-Panel, Panel-Panel and Panel-Board

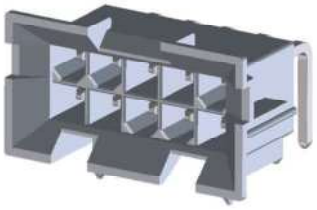


46010
BMI Receptacle Header

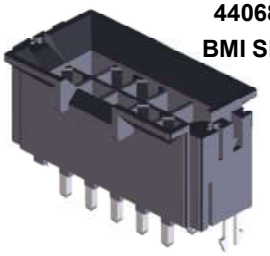


46011
BMI Vertical Header

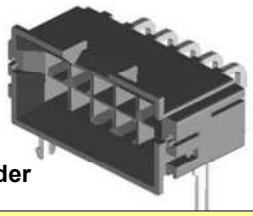
42404
BMI Right Angle Header



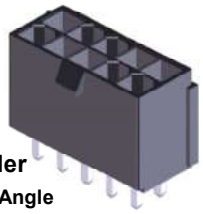
BMI Style Headers for Panel-Board or Board-Board



44068
BMI SMC Vertical Header



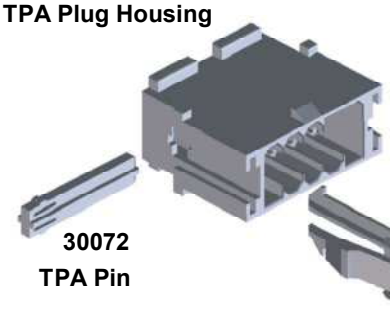
43810
BMI SMC Right Angle Header



87427
SMC Vertical Header
Also available in Right Angle

BMI Surface Mount Compatible Style Headers

30068
TPA Plug Housing



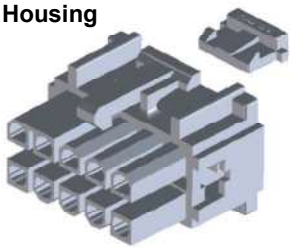
30072
TPA Pin

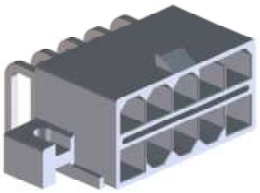


43130
Mounting Ears

30067
TPA Receptacle Housing

30070
CPA Key





30070
TPA Right Angle Header

TPA Series Header and Housings for use with Plus HCS Terminals

Product feature designations:

BMI Blind Mate Interface – features allowing easier alignment in panel-board and board to board applications.

SMC Surface Mount Compatible - reflow solder temperatures up to 245°C.

TPA Terminal Position Assurance – helps ensure crimp terminals are fully engaged and prevents terminals from backing out in high vibration applications.

CPA Connector Position Assurance – assures housing cannot be inadvertently disengaged.

MINI-FIT PLUS HCS

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1.0 SCOPE

This Product Specification covers the electrical, mechanical and environmental performance requirements for the **Mini-Fit Plus HCS**™ (High Current System) in 4.20 mm (.165 inch) pitch. The **Mini-Fit Plus HCS**™ uses contacts stamped in High Performance Alloy for increased current carrying capacity, while maintaining properties at elevated operating temperatures. Wire-Wire, Wire-Panel, Wire-Board, Panel-Panel, Panel-Board, and Board-Board configurations in Tin and Gold plated systems. Crimp terminals accept 16 to 20 AWG stranded wire.

2.0 PRODUCT DESCRIPTION

2.1 SERIES NUMBERS, DESCRIPTION, SALES DRAWING NUMBERS

SERIES	DESCRIPTION	SALES DRAWING	TPA	BMI	SMC	AGENCY APP'L
CRIMP TERMINALS						
45750	Female Crimp Terminal	SD-46012-001				NA
46012	Male Crimp Terminal	SD-45750-001				NA
HOUSINGS						
5557	Receptacle Housing	SD-5557-003				U,C,T
5559	Plug Housing	SD-5559-NP				U,C,T
42475	Panel Mount BMI Plug Housing	SD-42475-***1		X		U,C,T
43770	Panel Mount Plug Housing, 36 Ckt	SD-43770-001		X		U,C,T
42474	Panel Mount Receptacle Housing	SD-42474-****		X		U,C,T
43974	Panel Mount Receptacle Hsg 40 Ckt	SD-43974-005			X	U,C,T
44516	Panel Mount Receptacle Housing, Slide-and-Lock	SD-44516-00*		X		U,C
30067	TPA Receptacle Housing	SD-30067-*	X			U,C,T
30068	Panel Mount TPA Plug Housing	SD-30068-*	X	X		U,C,T
VERTICAL HEADERS						
44068	Vertical BMI SMC Header, solid pin	SD-44068-031		X	X	U,C,T
46010	Vertical PCB Receptacle Header	SD-46010-001		X		U,C
46011	Vertical BMI Header	SD-46011-001		X		U,C
46014	Vertical Header, single row	SD-46014-001				U,C
46015	Vertical Header, dual row	SD-46015-001				U,C
87427	Vertical SMC Header	SD-87427-**4*			X	U,C
RIGHT ANGLE HEADERS						
5569	Right Angle Header	SD-5569-002				U,C,T
30070	Right Angle TPA Header with mounting flanges	SD-30070-001 SDA-30070-****	X			U,C,T
42404	Right Angle BMI Header	SDA-42404-****		X		U,C,T
43810	Right Angle BMI SMC Header	SD-43810-0**		X	X	U,C,T
43973	Right Angle Header, 40 Ckt	SD-43973-00*		X	X	U,C,T
45567	Right Angle Header, 36 Ckt	SD-45567-001		X		U,C
87427	Right Angle SMC Header	SD-87427-**0*, -**1*, -**2*			X	U,C

Agency Approval designations:

U-UL C-CSA T-TUV

2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

For details regarding dimensions, materials and terminal platings, refer to the appropriate sales drawings for further information.

2.3 SAFETY AGENCY APPROVALS

UL File: E29179
CSA Certificate: LR19980
TUV Certificate: R72081037

3.0 APPLICABLE STANDARDS AND SPECIFICATIONS

- EIA-364-1000
- Molex solderability specification SMES-152

4.0 PACKAGING

Parts shall be packaged to protect against damage during normal handling, transit and storage. For details refer to the Packaging Specification as called out on the applicable product Sales Drawing.

5.0 RATINGS

5.1 VOLTAGE

600 Volts AC RMS or 600 Volts DC

5.2 APPLICABLE WIRES

WIRE GAUGE	INSULATION DIAMETER
16 AWG	1.80-3.10 millimeters / .071-.122 inches
18-20 AWG	1.65-2.95 millimeters / .065-.116 inches

5.3 TEMPERATURE RATING

Mini-Fit Plus HCS has a field temperature of 65°C and field life rating for 10 years based on testing per EIA-364-17B, Method A.

5.4 WAVE SOLDER PROCESS TEMPERATURE

Headers with molded pegs: 240°C MAX.
Headers without pegs: 265°C MAX

5.5 DURABILITY (MATING CYCLES)

Tin: 100 cycles
Gold: 250 cycles

Durability ratings established as tested per Durability Test Procedures described by EIA-364-09C and meet requirements for low level contact resistance and DWV as prescribed per EIA-364-1000 Test Sequence Group 7.

5.6 MAXIMUM CURRENT RATING (AMPERES)**

WIRE-TO-WIRE									
Wire Size	Single Row Circuit Sizes			Dual Row Circuit Sizes					
	3	4	5	2	4	6, 8	10, 12	14, 16, 18	20, 22, 24
16 AWG	13A	12.5A	12A	13A	12A	11A	10.5A	10A	9.5A
18 AWG	11A	10.5A	10A	11A	10A	9A	8.5A	8A	7.5A
20 AWG	9.5A	9A	9A	9.5A	8.5A	8A	7.5A	7A	6.5A

WIRE-TO-BOARD									
Wire Size	Single Row Circuit Sizes			Dual Row Circuit Sizes					
	3	4	5	2	4	6, 8	10, 12	14, 16, 18	20, 22, 24
16 AWG	12.5A	12A	11.5A	12.5A	11.5A	10A	9A	8.5A	8.0A
18 AWG	10.5A	10A	9.5A	10.5A	9.5A	8.5A	8A	7.5A	7A
20 AWG	9A	8.5A	8.5A	9A	8A	7A	6.5A	6A	5.5A

BOARD-TO-BOARD					
Dual Row Circuit Sizes					
2	4	6, 8	10, 12	14, 16, 18	20, 22, 24
11.5A	11A	9.5A	8A	6.5A	5A

** Ratings shown represent *MAXIMUM* current carrying capacity of a fully loaded connector with all circuits powered. Ratings are based on a 30°C maximum temperature rise limit over ambient (room temperature). Testing conducted with tinned copper conductor stranded wire. Above charts are intended as a guideline. Current rating is application dependent. Appropriate de-rating is required depending on factors such as higher ambient temperature, smaller copper weight of PCB traces, gross heating from adjacent modules or components and other factors that influence connector performance.

6.0 PRODUCT PERFORMANCE TESTS & REQUIREMENTS

6.1 ELECTRICAL REQUIREMENTS

ITEM	TEST	TEST PROCEDURE	REQUIREMENT
1	**Contact Resistance (Low Level)**	EIA-364-23: Mate connectors; apply a maximum voltage of 20 mV and a current of 100 mA. Wire resistance shall be removed from the measured value.	10 mΩ Maximum Initial resistance for each test sequence. Resistance measurements for subsequent tests are the Maximum change from Initial as specified.
2	**Insulation Resistance**	Mate connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	1000 Megohms MINIMUM
3	**Dielectric Withstanding Voltage**	EIA-364-20: Apply a voltage of 1500 VAC for 1 minute between adjacent contacts.	No breakdown. Current leakage < 5 mA
4	**Temperature Rise (via Current Cycling)**	EIA-364-70 (Temperature Rise) & EIA-364-55 (Current Cycling): Apply current to mated connectors & incrementally increase until specified T-Rise is reached to establish rated current. Measure the T-Rise at the rated current after 96 hours, during current cycling (45 minutes ON and 15 minutes OFF per hour) for 240 hours, and after final 96-hour steady state.	Temperature rise: +30°C MAXIMUM

6.2 MECHANICAL REQUIREMENTS

ITEM	TEST	TEST PROCEDURE	REQUIREMENT
1	**Terminal Mate / Unmate Forces Per Circuit for:** **Wire – Wire; Wire – Board (formed pin header); and Wire – Board (solid pin header)**	Mate and unmate female to male crimp terminal or female terminal to header at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute. Testing to be conducted with individual (single) circuit. Measure and record the maximum mate and unmate forces across 5 mating cycles.	**Tin, W-W & W-B (formed pin):** Mate: 15.6 N (3.50 lbf) MAX. Unmate: 13.8N (3.10 lbf) MAX.
			Gold, W-W & W-B (formed pin): Mate: 4.9 N (1.10 lbf) MAX. Unmate: 4.0 N (0.91 lbf) MAX.
			Tin, W-B (solid pin): Mate: 10.5 N (2.36 lbf) MAX. Unmate: 11.0N (2.47 lbf) MAX.
			Gold, W-B (solid pin): Mate: 3.4 N (0.77 lbf) MAX. Unmate: 2.8 N (0.63 lbf) MAX.

6.2 MECHANICAL REQUIREMENTS (CON'D)			
ITEM	**TEST**	**TEST PROCEDURE**	**REQUIREMENT**
2	**Normal Force**	Apply a perpendicular force simultaneously to each beam until the desired total deflection is achieved. Return to original size, then deflect beams a second time and measure normal force.	3.5 N (360 g) MINIMUM
3	**Durability**	Per EIA-364-09C, mate connectors 100 cycles for tin plated product, 250 cycles for gold plated product at a maximum rate of 500 cycles per minute.	10 mΩ Max. chg. from Initial; Visual: No Damage
4	**Durability (preconditioning)**	Mate connectors by hand, 20 cycles for tin plated product, 50 cycles for gold as required prior to environmental test sequence as indicated.	Visual: no damage
5	**Reseating**	Unmate / mate connectors by hand three cycles.	Visual: no damage
6	**Vibration (Random)**	EIA 364-28: Mate connectors and vibrate per, test condition VII.	10 mΩ Max. chg. from Initial; Discontinuity < 1 microsecond
7	**Crimp Terminal Insertion Force (into housing)**	Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm (1 ± ¼ inches).	15.0 N (3.37 lbf) MAXIMUM insertion force
8	**Crimp Terminal Retention Force (in housing)**	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	30 N (6.74 lbf) MINIMUM retention force
9	**Wire Crimp Retention**	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm (1 ± ¼ inches) per minute.	16 Awg = 68.4 N (15.4 lbf) Min. 18 Awg = 68.4 N (15.4 lbf) Min. 20 Awg = 58.7 N (13.2 lbf) Min.
10	**Thumb Latch Operation Force**	Depress latch at a rate of 25 ± 6mm (1 ± ¼ inches) per minute.	16.7 N (3.75 LBF) MAX.
11	**Thumb Latch Yield Strength**	Manually mate and unmate unloaded housings for 30 cycles. Following the 30th mate, pull apart housings in an axial direction at a rate of 25 ± 6mm (1 ± ¼ inches) per minute.	75.2 N (16.9 LBF) MIN.

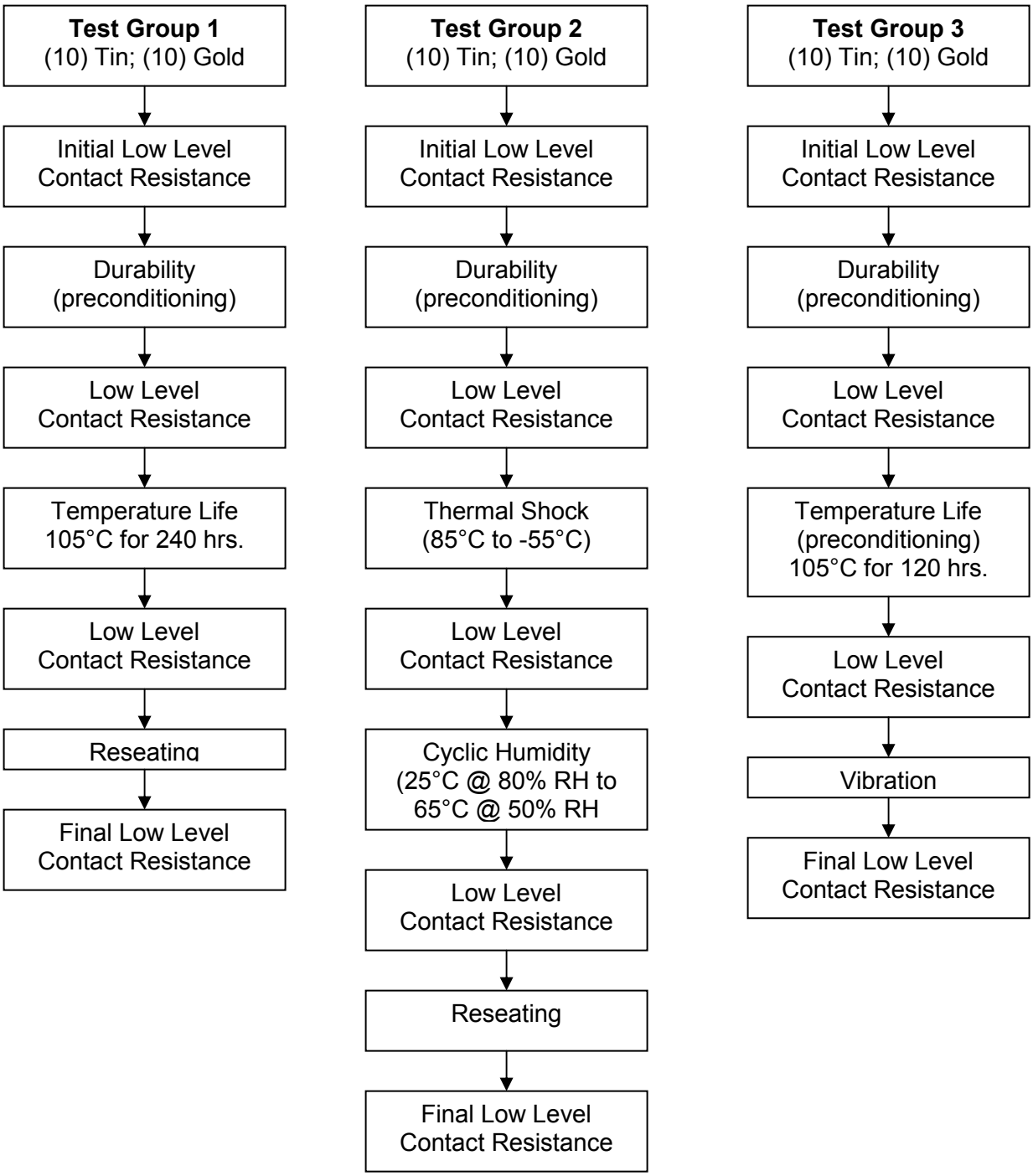
6.2 MECHANICAL REQUIREMENTS (CON'D)				
ITEM	**TEST**	**TEST PROCEDURE**	**REQUIREMENT**	
12	**Header Solid Pin Retention Force in Housing**	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	Tin	4.45 N (1.00 lbf) MINIMUM
			Gold	4.45 N (1.00 lbf) MINIMUM
13	**Header Stamped Pin Retention Force in Housing**	Axial pullout force on terminal from housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	30 N (6.74 lbf) MINIMUM retention force	
14	**PCB Peg Engagement and Separation Forces**	Engage and separate a connector at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute. (Applies to parts with PCB retention features only)	98.0 N (22.0 lbf) MAX. insertion force; 10.0 N (2.24 lbf) MIN. withdrawal force	

6.3 ENVIRONMENTAL REQUIREMENTS			
ITEM	**TEST**	**TEST PROCEDURE**	**REQUIREMENT**
1a	**Temperature Life Group 1**	Per EIA-364-17, method A: mate connectors and expose to 240 hours at 105 ± 2°C.	10 mΩ Max. chg. from Initial; Visual: No Damage
1b	**Temperature Life (preconditioning) Groups 3 & 5**	Per EIA-364-17, method A: mate connectors and expose to 120 hours at 105 ± 2°C.	10 mΩ Max. chg. from Initial; Visual: No Damage
1c	**Temperature Life (preconditioning) Group 4**	Per EIA-364-17, method A: mate connectors and expose to 300 hours at 105 ± 2°C.	10 mΩ Max. chg. from Initial; Visual: No Damage
2	**Thermal Shock**	Per EIA-364-32, method A, test condition I, test duration A-4: mate connectors and expose for 10 cycles between –55°C and 105° C; dwell 0.5 hours at each temperature.	10 mΩ Max. chg. from Initial; Visual: No Damage Dielectric Strength per 5.1.3 Insulation Resistance per 5.1.2
3	**Cyclic Temperature & Humidity**	Per EIA-364-31, method III w/o conditioning, initial measurements, cold shock and vibration. Cycle mated connectors between 25°C ±3°C @ 80% ±3% RH and 65°C ±3°C @ 50% ±3RH. Ramp time: 0.5 hr.; dwell time: 1 hr. Perform 24 cycles.	10 mΩ Max. chg. from Initial; Visual: No Damage

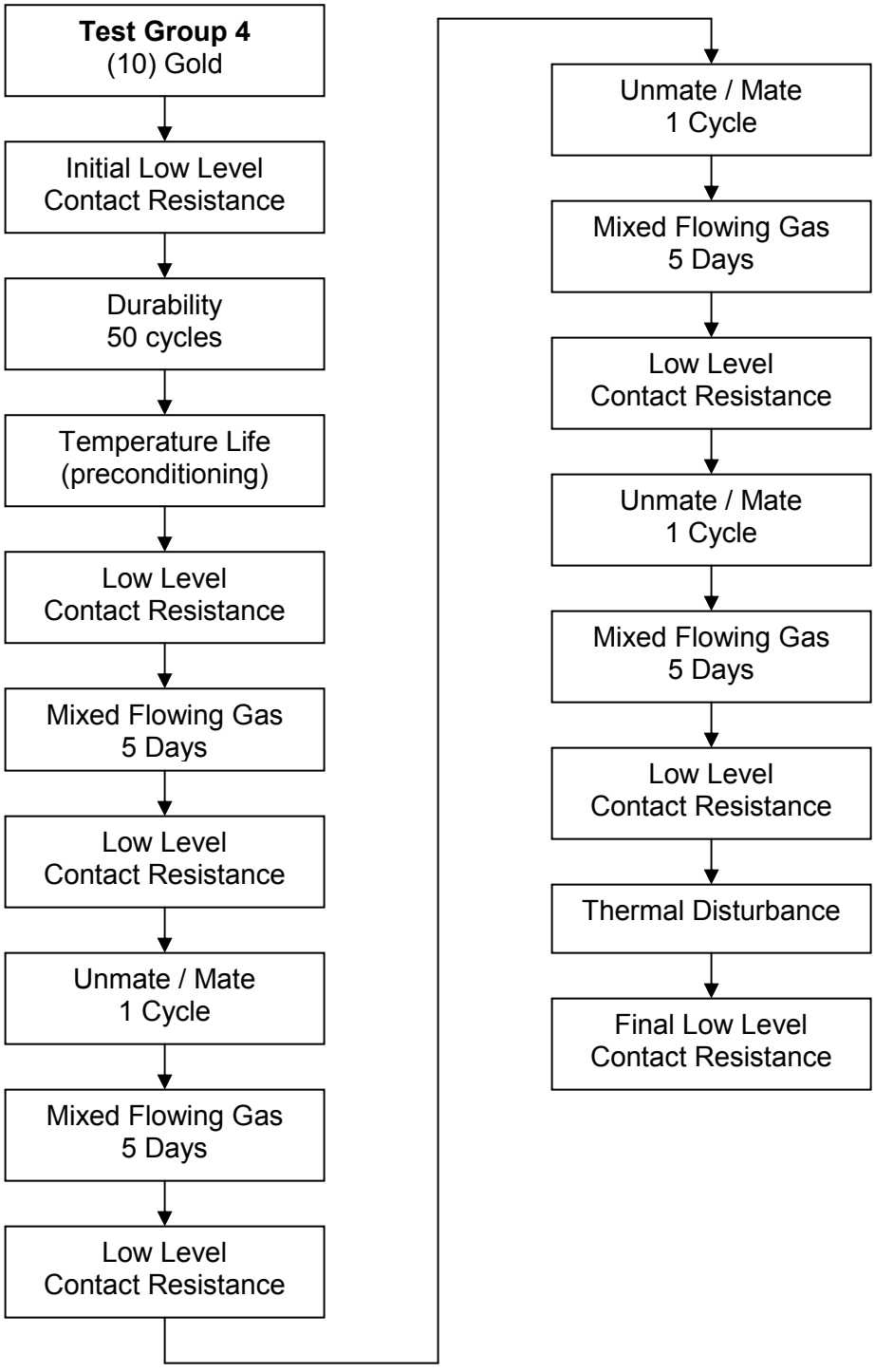
6.3 ENVIRONMENTAL REQUIREMENTS (CON'D)			
4	**Mixed Flowing Gas**	Per EIA-364-65 with Class IIA gas concentrations following Telcordia Specification GR1217.	10 mΩ Max. chg. from Initial; Visual: No Damage
5	**Thermal Cycling**	Per EIA-364-1000 Test Group 5: Cycle mated connector between 15°C±3°C and 85°C±3°C as measured on the part. Ramps should be a minimum of 2°C per minute, and dwell times should insure contacts reach the temperature extremes (minimum of 5 minutes). Humidity is not controlled. Perform 500 cycles.	10 mΩ Max. chg. from Initial; Visual: No Damage
6	**Solderability**	Per SMES-152	Solder coverage: 95% MINIMUM (per SMES-152)
7	**Solder Temperature Heat Transfer Resistance**	Expose connector terminals tails to wave solder process. Dwell time duration: 5 ± 0.5 seconds; Solder Temperature: 260 ± 5°C	Visual: No Damage to the insulator where terminal or pin locks to the connector housing.

7.0 TEST SEQUENCES

Environmental test sequences for Groups 1, 2, 3, 5 and 7 performed in accordance with EIA-364-1000. Sequence for Group 4 per Nortel Optical Networks specification test plan.



7.0 TEST SEQUENCES (CON'D)



7.0 TEST SEQUENCES (CON'D)

