Section 1: For the 20021122, 20021323, 20021444, 20021511, 20021512, 20021521, 20021611, 20021612, 20021621, 20021811, 20021813, 20021814, 20021822, 20021824, 20021831, 20021832, 20021833, 20021834 and 20021835 series parts.

1.0 GENERAL

This specification defines the performance, tests and quality requirements for the 1.27MM Cable to Board (CTB) and Board to Board (BTB) plug and receptacle connectors.

This document is composed of the following sections.

1. General
2. Scope
3. Applicable Documents
4. Requirements
   - ✧ Design and Construction
   - ✧ Material
   - ✧ Finish
5. Test Methods and Requirements
6. Test Plan
7. Applicable Part Number and Product Drawing
8. Revision Record

2.0 SCOPE

This specification is applicable to the termination characteristics of the 1.27MM cable to board and board to board connector family.

3.0 APPLICABLE DOCUMENTS

3.1 Military Standards:

3.1.1 MIL-STD-1344A: Test methods for electronic and electrical component parts.

3.1.2 MIL-STD-202: Test methods for electronic and electrical component parts.

3.2 Industry Specification/Other Standards:

3.2.1 UL-94: Tests for flammability of plastic materials.

4.0 REQUIREMENT

4.1 Design and Construction:

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

4.2 Materials

4.2.1 Housing:

- ✧ The insulators shall be rated flame retardant V-0 in accordance with UL-94.

4.2.2 Contact

- ✧ Copper Alloy, Selected plating over Nickel under-plated overall.

4.3 Ratings
4.3.1 Rated Voltage (Max.): 125 V AC.
4.3.2 Rated Current (Max.): 1A Max. per contact.
4.3.3 Operating Temperature Range: -40℃ to +105℃.(Including temperature rise caused by application of current)

4.4 Finish:
The finish for applicable components shall be specified on the applicable product drawing

5.0 TEST METHODS AND REQUIREMENTS:

TEST REQUIREMENTS AND PROCEDURES SUMMARY

TEST DESCRIPTION	REQUIREMENT	PROCEDURED
Examination of product	Meets requirements of product drawing and Specification.	Visual inspection No physical damage
ELECTRICAL		
Contact Resistance	30 mΩ Max. (After Test 50 mΩ Max.)	MIL-STD-1344A method 3002.1
Insulation Resistance	100 MΩ Min. at 500 V DC / 2 minute	MIL-STD-1344A method 3003.1
Dielectric Withstanding Voltage	No breakdown at 500 V RMS	MIL-STD-1344A method 3001.1
MECHANICAL		
Durability	100 Cycles	MIL-STD-1344A method 2016
Vibration	Meets requirements of product drawing and electrical specification.	MIL-STD-202 method 201
Mating Force	220g Max. /Pin	Speed 25±3mm/minute
Unmating Force	20g Min. /Pin	Speed 25±3mm/minute
Contact Retention Force	Male 300 g Min./Pin Female 150 g Min./Pin	MIL-STD-1344A method 2007.1
ENVIRONMENTAL		
Humidity(Steady state)	Meets requirements of product drawing and electrical specification.	MIL-STD-1344A method 1002.2, Condition B 90-95%, 40C, 96 hours
Thermal Shock	Meets requirements of product drawing and electrical specification.	MIL-STD-1344A method 1003.1, Condition A -55C to 85C, 5 cycle
Dry Heat	Meets requirements of product drawing and electrical specification	The connector housing shall be store at temperature of 105 ± 2°C for 168 hours ICE-60998-1
Cold	Meets requirements of product drawing and electrical specification.	The connector housing shall be store at temperature of -25 ± 3°C for 48 hours

PHYSICAL		
Solderability	The test area shall be covered more than 95% of immersed area with flash solder	Solder Temperature: 245□ ± 5□ Immersion Period: 5 Sec

Test or Examination	Test Group						
	A	B	C	D	E	F	G
	Test Sequence						
Examination of Product	1,10	1,6	1,3	1,5	1,3	1,7	1,9
Contact Resistance	2,7	2,7		2,4			2,8
Insulation Resistance	3,8					2,5	3,7
Dielectric Withstanding Voltage	4,9					3,6	4,6
Durability		4					
Vibration				3			
Mating Force & Unmating Force		3,5					
Contact Retention Force					2		
Humidity-Cycling Test	6						
Thermal Shock	5						
Cold							5
Dry heat						4	
Solderability			2				

Figure 2

Section 2: For the 20021111, 20021112, 20021121, 20021211, 20021212, 20021221, 20021311 and 20021321 series parts.

1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the Minitek 1.27MM pitch Board to Board product.

2.0 Scope

This specification is applicable to the termination characteristics of the Minitek 1.27MM pitch Board to Board connector family of products which provides interconnections via 0.406m square pins between two printed boards.

3.0 Ratings

3.1 Operating Voltage Rating (Max.) = 125 V_{AC}

3.2 Operating Current Rating (Max.) = 1A Max. Per contacts.

3.3 Operating Temperature Range = -55°C to +125 °C. (Including temperature rise caused by application of current)

4.0 Applicable Documents

4.1 FCI Specifications

4.1.1 Engineering drawings

20021111, 20021112, 20021121, 20021211, 20021212, 20021221, 20021311, 20021321

4.1.2 Package specification

GS-14-1420

4.1.3 Application specification(s)

4.1.4 FCI Product Shelf life

Storage-Solderability GS-20-060

4.2 National or International Standards

4.3.1 Flammability: UL94V-0 or similar applicable specification

4.3.2 EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

4.3.3 IPC/ECA J-STD-002C: Solderability Tests and Measurement

4.3 Military Standards

4.2.1 MIL-STD-202F: Test methods for electronic and electrical component parts.

4.2.2 MIL-STD-1344A: Test methods for electrical connectors.

4.4 FCI Laboratory Reports - Supporting Data

List lab report numbers that contain the supporting qualification test data

4.5 Safety Agency Approvals

List the UL, CSA, TUV other product safety agency certification file numbers.

5.0 Requirements

5.1 Qualification

Connectors furnished under this specification shall be capable of meeting the qualification test requirements specified herein.

5.2 Material

The material for each component shall be as specified herein or equivalent.

5.2.1 Housing – High Temperature plastic, UL94-V0 Compliant.

5.2.2 Terminal – Copper alloy

5.3 Finish

The finish for applicable components shall be as specified herein or equivalent.

Contact area: 30u" GXT, 15u" GXT, 10u" Au or Gold flash options, over 50u" Nickel underplating;

Solder tail area: 100u" Matte Tin or Gold flash options, over 50u" Nickel underplating.

5.4 Design and Construction

Connectors shall be of the design, construction, and physical dimensions specified on the applicable product drawing. There shall be no cracks, burrs, or other physical defects that may impair performance.

5.5 Visual

Visual examinations shall be performed using 10X magnification. Parts should be free from blistering, cracks, discoloration, etc.

6.0 Electrical Characteristics

6.1 Low Level Contact Resistance (LLCR)

The low level contact resistance shall not exceed 30 milliohms initially. The low level contact resistance shall also not exceed 20 milliohms increase (from the initial measurement) after any treatment and/or environmental exposure. The following details shall apply:

a. Test Standard: EIA-364-23.

b. Test Voltage: 20 milli-volts DC max open circuit.

c. Test Current: Not to exceed 100 milli-amperes.

6.2 Insulation Resistance

The insulation resistance of unmated connectors shall not be less than 1000 megohms initially or after environmental exposure. The following details shall apply:

a. Test Standard: EIA-364-21.

b. Test Voltage: 500 volts DC ±10%.

c. Electrification Time: 2 minutes, unless otherwise specified.

d. Points of Measurement: Between adjacent contacts.

6.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current > 1 milli-amperes when unmated connectors are tested. The following details shall apply:

a. Test Standard: EIA-364-20.

b. Test Voltage: 500 volts (AC RMS), 60Hz.

c. Test Duration: 60 seconds.

d. Test Condition - 1 (760 Torr - sea level).

e. Points of Measurement: Between adjacent contacts.

6.4 Current Rating

The temperature rise above ambient shall not exceed 30 ° C at any point in the system when all contacts are powered at 1.0 (amperes). The following details shall apply:

a. Test Standard: EIA-364-70.

b. Ambient Conditions – Still air at 25° C.

7.0 Mechanical Characteristics

7.1 Mating/Unmating Force

The force to mate a receptacle connector and compatible header shall not exceed 2.2 Newton per contact. The unmating force shall not be less than 0.2 Newton per contact.

The following details shall apply:

a. Test Standard: EIA-364-13.

b. Cross Head Speed: 25.4 mm per minute.

c. Lubrication: None.

d. Utilize free floating fixtures.

7.2 Durability

The connector pairs shall be capable of withstanding 100 mating/unmating cycles.

The following details shall apply:

a. Test Standard: EIA-364-09.

b. Cycling Rate: 200 cycles Maximum per hour.

c. Utilize free floating fixtures.

7.3 Durability (Preconditioning)

The connector pairs shall be capable of withstanding 20 mating/unmating cycles.

The following details shall apply:

a. Test Standard: EIA-364-09.

b. Cycling Rate: 200 cycles Maximum per hour.

c. Utilize free floating fixtures.

7.4 Contact Retention force

Individual contacts shall withstand an axial load (Retention force) and the contacts without dislodging from the housing cavity. The following details shall apply:

a. Test Standard: EIA-364-29.

b. Contact retention force: Male contact, 5.0 Newton Min. per Pin

Female contact, 3.0 Newton Min. per Pin

c. Cross Head Speed – Applied at a rate of 5.0 mm (0.2 inch) per minute.

7.5 Reseating: Manually insert/extract the connector 3 cycles, there shall no evidence of physical damage.

8.0 Environmental Conditions

After exposure to the following environmental conditions in accordance with the specified test procedure and/or details, the product shall show no physical damage and shall meet the electrical and mechanical requirements per paragraphs 6.0 and 7.0 as specified in the Table 1 test sequences. Unless specified otherwise, assemblies shall be mated during exposure.

8.1 Thermal Shock – EIA-364-32.

a. Test Condition: Method A, test condition VII, test duration A-4

b. Temperature Range: Between -55° C and +125 ° C

c. Number of Cycles: 10 cycles

d. Transfer Time: 5 minutes, maximum

8.2 Humidity, Steady State – EIA-364-31.

a. Test Condition: Method II, Test condition A (96h)

b. Temperature: 40° C

c. Relative Humidity: 95%

8.3 High Temperature Life – EIA-364-17.

a. Test Condition: Test condition 5, Test time condition B

a. Test Temperature: 125° C

b. Test Duration: 250 hours

8.4 High Temperature Life (Preconditioning) – EIA-364-17.

a. Test Condition: Test condition 5, Test time condition A

a. Test Temperature: 125° C

b. Test Duration: 96 hours

8.5 Vibration (Random) – EIA-364-28.

a. Test Condition: Test condition V, Test condition letter A

b. Vibration Amplitude: 5.35 rms G minimum

c. Power spectral density: $0.02g^2$ /Hz

d. Duration: 15 minutes in each of three mutually perpendicular directions

e. Mounting: Rigidly mount assemblies

f. No discontinuities greater than 1 microsecond

8.6 Mechanical Shock – EIA-364-27.

a. Test Condition: Test condition H

b. Shocks: 3 shocks in both directions along each of three orthogonal axes (18 shocks total)

c. Mounting: Rigidly mount assemblies

d. No discontinuities greater than 1 microsecond

8.7 Mixed Flowing Gas corrosion (MFG) – EIA 364-65.

a. Test condition: Class IIA

b. Duration: Refer to table 1 for the level and recommended plating thickness

Table 1

Level	Total MFG exposure hours	Unmated exposure hours	Mated exposure hours	Application plating thickness (on contact area)
Level 1	120 hours	80	40	Gold flash
Level 2	168 hours	112	56	10u" Min. Au or GXT
Level 3	240 hours	160	80	15u" Min. Au or GXT
Level 4	336 hours	224	112	30u" Min. Au or GXT

8.8 Solderability – IPC/ECA J-STD-002C

a. Test Method: S1

b. Minimum solders coverage: 95 %

8.9 Resistance to Solder Heat – EIA-364-56

a. Test Standard: Thru Hold: EIA 364-56, Procedure 3, Condition E

Surface Mount: EIA 364-56, Procedure 5, Level 3

b. Acceptance Criteria: There shall be no evidence of physical or mechanical damage

9.0 QUALITY ASSURANCE PROVISIONS

9.1 Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with ANSI Z-540 and ISO 9000.

9.2 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

a. Temperature: 25 +/- 5 deg C

b. Relative Humidity: 30% to 60%

c. Barometric Pressure: Local ambient

9.3 The sample size is listed for each test in section 9.7 Qualification Test Table.

9.4 Acceptance

9.4.1 Electrical and mechanical requirements placed on test samples as indicated in paragraphs 6.0 and 7.0 shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with this product specification shall meet the stated requirements.

9.4.2 Failures attributed to equipment, test setup, or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

9.5 Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequences shall be as shown in the qualification test table.

9.6 Re-Qualification Testing

If any of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix.

a. A significant design change is made to the existing product which impacts the product form, fit or function. Examples of significant changes shall include, but not be limited to, changes in the plating material composition or thickness, contact force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.

b. A significant change is made to the manufacturing process which impacts the product form, fit or function.

c. A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

9.7 Qualification Test Table

Table 2 – Qualification test sequence

TEST DESCRIPTION	PARA.	Test Group									
		1	2	3	4	5	6	7	8	9	10
		Test Sequence									
Examination of Product	5.5	1 8	1 10	1 10	1 10	1 7	1 8	1 3	1 3	1 3	1 3
Low Level Contact Resistance	6.1	2 5 7	2 5 7 9	2 5 7 9	2 5 7 9	2 6					
Insulation Resistance	6.2						2 6				
Dielectric Withstanding Voltage	6.3						3 7				
Current Rating	6.4							2			
Mating/Unmating Force	7.1					3 5					
Durability	7.2					4					
Durability (Preconditioning,20 cycles)	7.3	3	3	3	3						
Contact Retention force	7.4								2		
Reseating	7.5	6	8		8						
Thermal Shock	8.1		4				4				
Humidity, Steady state	8.2		6				5				
Temperature Life	8.3	4									
Temperature Life (Preconditioning)	8.4			4	4						
Vibration	8.5			6							
Mechanical Shock	8.6			8							
Mixed Flowing Gas	8.7				6						
Solderability	8.8										2
Resistance to Solder Heat	8.9									2	
Sample Size		5	5	5	5	5	5	5	5	5	5

6.0 REVISION RECORD:

REVISION RECORD

Rev	Page	Description	EC#	Date
A	ALL	NEW RELEASE	-	15 Sep. 2009
B	2,3	Change operator temperature from 85ºC to 105ºC; Change dry heat test from 85ºC,96H to 105 ºC 168H; Erase the contact resistance in test group F.	T09-1154	30 Nov. 2009
C	4~13	Add section 2 in the spec.	ECN-ELX-N-14364	28 Mar. 2013