


NUMBER GS-12-1326	TYPE PRODUCT SPECIFICATION		
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		CLASSIFICATION UNRESTRICTED	

1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the Minithek Receptacle product.

2.0 Scope

This specification is applicable to the termination characteristics of the Minithek Receptacle family of products when mated with FCI Minithek™ headers or other 0.51mm pin compatibles headers, 2mm centerline. This product provides board to board in vertical/horizontal, single row/double row/ triple row, PiP/SMT/TMT configurations.

3.0 Ratings

- 3.1 Operating Voltage Rating = 200 Volts
- 3.2 Operating Current Rating = 2A
- 3.3 Operating Temperature Range = -55°C to 125°C (1)

4.0 Applicable Documents


4.1 FCI Specifications

	P/N	Designation		P/N	Designation	Process		P/N	Material
Engineering drawings	10131920	VCC DR SMT (LP)	Process drawings	10132480	CAP SR	Molding	Material specification	10131820	CuSn8
	10131921	VCC DR TMT (LP)		10131900	VCC DR (LP)	Molding		10131821	HP Brass CuZn30Sn1Fe0.6
	10131922	VCCSR TMT (LP)		10131903	VCCSR (LP)	Molding		10131822	CuSn8
	10131923	VCCSR SMT (LP)		10131910	VCC DR	Molding		10131823	HP Brass CuZn30Sn1Fe0.6
	10131930	HCCSR TMT		10131911	VCCSR	Molding		16-508-159	Thermx CG933
	10131931	HCCSR SMT		10131912	HCCSR	Molding		16-522-015	Zenite 6130L
	10131932	HCC DR TMT		10131913	HCC DR	Molding		FR52G30NH	Zytel HTN
	10131933	HCC DR SMT		10132520	/	Molding		10157055	Black GENESTAR
	10131934	VCCSR TMT		10132525	/	Molding		10157056	Gray GENESTAR
	10131935	VCCSR SMT		10131812	Pre Stamp LP	Stamping		10157527	CuTi C19910
	10131936	VCC DR TMT		10131814	Pre Stamp HP	Stamping			
	10131937	VCC DR SMT		10131815	Final Stamp	Stamping			
	10131938	VCC DR TMT		10148597	VCCSR 1mm	Molding			
	10132511	/		10148599	Pre Stamp 1mm	Stamping			
	10132515	/		10148598	Final Stamp 1mm	Stamping			
	10148596	VCCSR SMT 1mm		10149017	VCC TR	Molding			
	10149018	VCC TR PIP		10149356	CAP TR	Molding			
10155827	VCC TR PIP	10155826	VCC TR	Molding					
10157637	VCCSR SMT 1.2mm	10157623	VCCSR CUSTOM	Molding					
		10157616	Pre Stamp 1.2mm	Stamping					
		10157615	Final Stamp 1.2mm	Stamping					

4.2 Industry or Trade Association standards

List any applicable specifications, such as Telcordia Technologies, USB, etc

4.3 National or International Standards

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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 IEC 60512: Connectors for Electronic Equipment – Tests and Measurement

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 Glass-filled polymer with a flame retardant rating of UL-94-V0

5.2.2 Terminal : Copper Alloy

5.3 Finish

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

5.3.1 Solder tails: 2µm min. pure matte Tin over 1.27µm nickel MIN under plating.


5.3.2 Contact areas : defined on the product drawings

- 0.76µm Gold over 1.27µm nickel MIN under plating
- 0.76µm GXT over 1.27µm nickel MIN under plating
- 0.38µm Gold over 1.27µm nickel MIN under plating
- 0.38µm GXT over 1.27µm nickel MIN under plating
- 0.20µm Gold over 1.27µm nickel MIN under plating
- 0.20µm GXT over 1.27µm nickel MIN under plating
- 2µm min full Tin over 1.27µm nickel MIN under plating

5.3.3 All other areas will be plated with 1.27µm min of nickel.

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.

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6.0 Electrical Characteristics

6.1 Contact Resistance, Low Level (LLCR)

The low level contact resistance shall not exceed 15 milliohms initially. The low level contact resistance shall also not exceed 20 milliohms in resistance after any treatment and/or environmental exposure. Measurements shall be in accordance with EIA 364-23.

(For the HCC, the low level contact resistance shall not exceed :

Upper row : 25 milliohms initially and 30 milliohms after

Lower row : 20 milliohms initially and 25 milliohms after.)

The following details shall apply:

- a. Method of Connection - Attach current and voltage leads as shown in Figure 1.
- b. Test Voltage - 20 milli-volts DC max open circuit.
- c. Test Current - Not to exceed 100 milli-amperes.

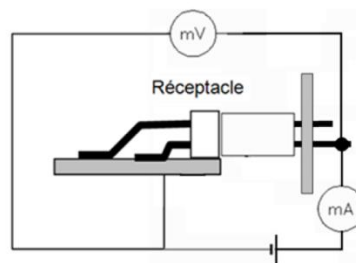


Figure 1

6.2 Insulation Resistance

The insulation resistance of unmated connectors shall not be less than 1000 Mohms initially and after environmental exposure.

Measurements shall be in accordance with EIA 364-21.

The following details shall apply:


- a. Test Voltage - 500 volts DC.
- b. Electrification Time - 2 minutes, unless otherwise specified.
- c. Points of Measurement - Between adjacent contacts (*and between contacts and other conductive surfaces, if applicable*).

6.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current >1mA when unmated connectors are tested in accordance with EIA 364-20.

The following details shall apply:

- a. Test Voltage - 650 volts (AC RMS, 60Hz).
- b. Test Duration - 60 seconds.

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

d. Points of Measurement - Between adjacent contacts (*and between contacts and other conductive surfaces, if applicable*).

6.4 Current Rating

The temperature rise above ambient shall not exceed 30 deg C at any point in the system when all contacts are powered at 1A or one contact is powered at 2A.

The following details shall apply:

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

b. Test configuration (*specify wire gage, test board requirements, thermocouple placement, sample orientation, etc.*)

c. Reference - EIA 364-70

7.0 Mechanical Characteristics

7.1 Mating/Unmating Force

The force to mate a receptacle connector and compatible header shall not exceed 1.8N for Gold or GXT plating and 2N for Tin plating per contact. The unmating force shall not be less than 0.2N per contact.

The following details shall apply:

a. Cross Head Speed - 25 mm per minute.

b. Utilize free floating fixtures.


c. Reference – EIA 364-13.

7.2 Durability

The connector pairs shall be capable of withstanding the mating/unmating cycles specified in table below.

When used for pre-conditioning treatment, half of mating/unmating cycles shall be applied prior to mechanical/environmental exposure. Half of mating/unmating cycles shall be applied after mechanical/environmental exposure for sequence of group#9 (MFG test). Reference EIA-364-09.

Plating options	Durability Cycles
0.76µm Gold or GXT	100
0.38µm Gold or GXT	50
0.20µm Gold or GXT	30
2.54µm Tin	10


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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.

Use recommended details or select others as appropriate

- 8.1 Thermal Shock –EIA 364-32.
 - a. Number of Cycles – 5
 - b. Temperature Range - Between -55°C and +125°C
 - c. Time at Each Temperature - 30 minutes
 - d. Transfer Time - 5 minutes, maximum
- 8.2 Humidity –EIA 364-31 method II (steady state)
 - a. Relative Humidity - 90% (for cyclic humidity, specify for temperature ramps, if applicable, and temperature dwells)
 - b. Temperature – 40°C
 - c. Duration – 96h (hours, days, # of cycles, etc.)
- 8.3 High Temperature Life – EIA 364-17.
 - a. Test Temperature – 125 C°
 - b. Test Duration – 250h
- 8.4 Mixed Flowing Gas corrosion (MFG) – EIA 364-65
 - a. Class - IIA
 - b. Duration - 20 days
 - c. Receptacles only exposed unmated, remated with headers no exposed
Unmated for 2/3 the duration (13 days) and mated the remaining 1/3 duration (7days)
- 8.5 Salt Spray – EIA-364-26
 - a. Test Condition - B (refer to specified test method for condition)
 - b. Duration – 48h / 5% by weight (hours if not specified by selected condition above)
 - c. Acceptance criteria – (visual examination requirements and/or LLCR criteria)

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- 8.6 Vibration Sinusoidal – EIA 364-28
 - a. Test Condition - II (refer to specified test method for appropriate test condition)
 - b. Vibration Amplitude – +/-10 G
 - c. Frequency Range - 10 to 500 to 10 hertz
 - d. Sweep Time and Duration - 15 minutes per sweep, 3 hours along each of three orthogonal axes (9 hours total)
 - e. Mounting - Rigidly mount assemblies; specify cable length and mounting location if appropriate.
 - f. No discontinuities greater than 1 microseconds
- 8.7 Mechanical Shock – EIA 364-27
 - a. Condition – 30 G, 11 millisecond, half-sine pulse type
 - b. Shocks - 3 shocks in both directions along each of three orthogonal axes (18 shocks total)
 - c. Mounting - Rigidly mount assemblies; specify cable length and mounting location if appropriate.
 - d. No discontinuities greater than 1 microseconds
- 8.8 Solderability – FCI GS-19-037
 - a. Test Condition : A section 4.3 (TMT and PiP version), section 4.5 (SMT version)
- 8.9 Resistance to Solder Heat –
 - a. Test Condition : GS-22-011 (5.4.3 reflow 260°C)
 - b. There shall be no evidence of physical or mechanical damage
- 8.10 MSL test
 - a. Test condition : GS-19-031 and IPC/JEDEC J-STD-020D (level 1 or level 2)
 - b. Acceptance criteria : No blisters, cracks, or obvious deformation
- 8.11 Whiskers test – GS19-028C and JEDEC JESD201
 - a. Test condition : High temperature / Humidity aging: 55°C, 85%, 4000hours.
 Thermal cycling: -55°C~85°C, 20minutes/cycle, total 1500cycles.
 - b. Sample size (Recommendation):
 A minimum of six connectors shall be used with a minimum of 96 terminals, whichever is greater, for each condition.

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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 Sample Quantity And Description

Use this paragraph to describe the test samples required for the specific Test Groups in the qualification test table. Include information such as: number and size of plug and receptacle connectors and/or mated pairs, terminated or not terminated, printed wiring board conditions, wire size, crimp conditions, lubrication conditions, etc. Attach and reference drawings if necessary to clarify the description.

Unless otherwise specified in the application specification, sample quantities for each test group shall be specified in this section and/or the qualification test table. Refer to GS-01-029 section 5.9 for sample quantity recommendations.

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. Data shall be provided with the samples noting production history: production lot codes for components and assemblies, components and assemblies produced to print revision __, verification of plating composition and thickness, etc.

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.

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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 Annual Re-Qualification Testing

An annual re-qualification testing shall be performed every year on sample units produced with equipment and procedures normally used in production. The test sequences #4, #7, #9, #10 shall be performed as shown in the qualification test table.

9.8 Qualification Test Table

Group 9, 10 are not be performed for Tin plated samples.

<i>Annual Re-Qualification :</i>					x			x		x	x		
<i>Samples quantity :</i>		5	5	5	5	5	5	5	5	5	5	21	50
Test	Para.	1	2	3	4	5	6	7	8	9	10	11	12
Visual Exam		1, 3	1, 3	1, 3, 5	1, 7	1, 5	1, 7	1, 8	1, 11	1, 11	1, 6	1, 3	1, 3
LLCR	6.1			4	2, 6	2, 4	2, 6	2, 5, 7		2, 4, 6, 8, 10	2, 5		
Insulation resistance	6.2								2, 6, 9				
Dielectric Withstanding Voltage	6.3								3, 7, 10				
Current rating	6.4	2											
Mating/Unmating Force	7.1				3, 5								
Durability Cycling	7.2				4		3	3	4	3, 9	3		
Thermal Shock	8.1							4	5				
Humidity	8.2							6	8				
Temperature Life	8.3					3							
Mixed Flowing Gas 13 days unmated Only Receptacle	8.4									5			
Mixed Flowing Gas 7 days mated	8.4									7			
Salt Spray	8.5										4		
Vibration	8.6						4						
Mechanical Shock	8.7						5						
Solderability	8.8		2										
Resistance to solder heat	8.9			2									
MSL	8.10											2	
Whiskers	8.11												2

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REVISION RECORD

Rev	Page	Description	EC#	Date
1	All	Document initialization		02/03/15
2	All	Document revision		02/04/15
3	5, 6, 8	Add Salt Spray and correct group test		20/05/15
4	8	Add annual re-qualification testing information		10/06/15
5	4,5,8	Modification according to tin plating requirements		15/10/15
6	6, 8	Modification of mechanical shock condition Modification of group 11 sequence		07/12/15
7	2, 4, 6, 8	Adding of GXT plating Modification of mating force requirement for Tin plating Removing of corrosive sulfur gas test		30/03/16
8	6	Modification of vibration conditions		07/04/16
9	6	Modification of mechanical shock conditions		13/04/16
10	6, 8	Removing of specific test for Tin product		19/05/16
11	3	Adding specific contact resistance for the HCC		25/10/16
12	1	Scope Modification (add PiP and triple row)		12/11/18
13	1 7	FCI Specifications updated Add "PiP" for solderability tests		28/02/19
14	7 and 9	Add the MSL test and whiskers test		06/06/2019
15	1	Add new PN		06/07/2020
16	A	Release		22/11/2023