


NUMBER GS-12-1457	TYPE GENERAL PRODUCT SPECIFICATION		
TITLE ENHANCED HIGH POWER CARD EDGE (eHPCE®) RIGHT ANGLE CONNECTOR		PAGE 1 of 9	REVISION B
		AUTHORIZED BY Andy Lu	DATE June 26 2019
		CLASSIFICATION UNRESTRICTED	

1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the eHPCE® connector system which includes the right angle type configurations.

2.0 Scope

This specification is applicable to the termination characteristics of the eHPCE® Connector System which provides a separable interface for power to edge card applications.

3.0 Ratings

- 3.1 Operating Voltage Rating: 300V_{DC} for power contact, 100V_{DC} for signal contact.
- 3.2 Operating Current Rating: refer to values in the table in section 6.5.
- 3.3 Operating Temperature Range = -55°C ~ +140°C¹

Note 1: includes the terminal temperature rise when powered

4.0 Applicable Documents

4.1 Specifications

- 4.1.1 Engineering drawings: 10139371, 10145500, 10145862, 10147875, etc.
- 4.1.2 Application specification: GS-20-0554

4.2 National or International Standards

- 4.2.1 Flammability: UL94V-0
- 4.2.2 EIA 364: Electrical connector/Socket test procedures include environmental classification.
- 4.2.3 EIA 364-1000: Environmental test methodology for assessing the performance of electrical connectors and sockets used in business office applications.
- 4.2.4 EIA 364-1004: Environmental test methodology for verifying the current rating of freestanding power contacts or electrical connectors and sockets.

4.3 Laboratory Reports - Supporting Data

DL-2018-03-015-CR

4.4 Safety Agency Approvals

UL/CSA File #: E66906 Vol. 1 Sec. 124

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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

Power Receptacle Contacts: Copper alloy

Signal Receptacle contacts: Copper alloy

Housings: High temperature thermoplastic, UL 94V-0 compliant

5.3 Finish

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

Contact Area (Power & Signal):

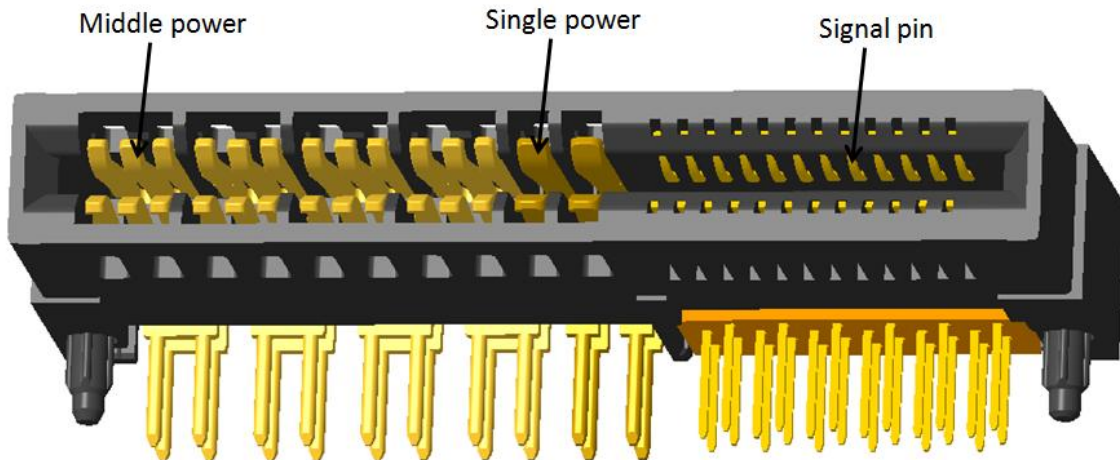
GCS® for Power contacts, GXT® for Signal contacts

Tails (Power & Signal):

Tin plated over 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.



Configuration **Middle power + Single power + Signal** as shown

One Middle power has three contact beams and two solder tails

One Single power has one contact beams and one solder tails

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6.0 Electrical Characteristics

6.1 Contact Resistance, Low Level (Signal contact)

The low level contact resistance shall not exceed 50mΩ initially. The low level contact resistance shall also not exceed 10mΩ change in resistance (from the initial measurement) after any treatment and/or environmental exposure. Measurements shall be in accordance with EIA 364-23.

The following details shall apply:

- a. Test Voltage - 20 milli-volts DC max open circuit.
- b. Test Current - Not to exceed 100 milli-amperes.

6.2 Contact Resistance, Specified Current (Power contact)

The contact resistance at a specified current shall not exceed 1.0mΩ for middle power and 4.0mΩ for single power initially or after any treatment and/or environmental exposure.

Measurements shall be in accordance with EIA 364-06.

The following details shall apply:

- a. Test Current – refer to section 6.5.

6.3 Insulation Resistance

The insulation resistance of unmated connectors shall not be less than 5000MΩ (mega ohms) for power contact and 500MΩ for signal contact.

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.

6.4 Dielectric Withstanding Voltage

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

The following details shall apply:

- a. Test Voltage - 1800 VDC for power contact and 500 VDC for signal contact.
- b. Test Duration - 60 seconds.
- c. Test Condition - 1 (760 Torr - sea level).
- d. Points of Measurement - Between adjacent contacts.

6.5 Current Rating

The temperature rise above ambient shall not exceed 30°C at any point in the system when all contacts are powered at specified current as below.

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Contact current rating	
Contact type	Current (Amperes)
AMPS per MP	22A
AMPS per SP	10A
AMPS per Signal	1.0A (2.5A/pin if it is applied for standby power)

NOTES:

1. The applicable maximum configuration: 28MP4SP+24S
2. "MP" stands for Middle Power with 2 tails, "SP" stands for Single Power with 1 tails
3. Temperature rise: 30 °C Max.
4. Test board has 8 layers and 2oz copper for each layer; top layer and bottom layer are for both signal and power, all 8 layers including (top and bottom layers) for current carrying of power
5. The maximum quantity of signal pin used for standby power is 4 pieces among total 24 pcs signal pins when signal pins are used as standby power pin with 2.5 Amp Max.

The following details shall apply:

- a. Ambient Conditions – still air at lab room ambient;
- b. Reference - EIA 364-70.

7.0 Mechanical Characteristics

7.1 Mating/Unmating Force

The following details shall apply:

- a. Cross Head Speed - 25.4mm per minute.
- b. Utilize free floating fixtures.
- c. Reference – EIA 364-13.

eHPCE Right Angle	Mating Force (N) (Max. Allowance)	Un-Mating Force (N) (Min. Allowance)
Per MP Contact	4.15	0.55
Per SP Contact	2.20	0.30
Per signal Contact	0.22	0.06

7.2 Contact retention

Test condition: Per EIA-364-29C, method C, a maximum rate of 5mm per minute

Requirement:

Signal Pin: individual signal pin shall withstand an axial retention load of 6 N minimum

Power Contact: individual power pin shall withstand an axial retention load of 6 N minimum

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7.3 Reseating

Test condition: Manual plug/unplug the connector with module board.

Requirement: Perform 3 such cycles.

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. Number of Cycles - 25
- b. Temperature Range - Between -55°C and +105°C
- c. Time at Each Temperature - 60 minutes
- d. Transfer Time - 5 minutes, maximum

8.2 Cyclic Temperature & Humidity – EIA 364-31E method IV (condition B, including cold cycling)

- a. Relative Humidity - 80% to 98%
- b. Temperature - 25°C~65°C
- c. Duration - 240 hours
- d. Omit step 7b (vibration) where applicable

8.3 High Temperature Life – EIA 364-17.

- a. Test Temperature - 140± 2°C
- b. Test Duration - 1008 hours

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

- a. Test Temperature - 140± 2°C
- b. Test Duration - 132 hours

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

- a. Class - IIA
- b. Duration - 10 days
- c. Specify mated state

8.6 Vibration (Random) – EIA 364-28

- a. Test Condition - method VII, letter E
- b. Vibration Amplitude - 4.90 rms G

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- c. Duration – 1.5 hours along each of three orthogonal axes
- d. Mounting - Rigidly mount assemblies
- e. No discontinuities greater than 1 microseconds
- 8.7 Mechanical Shock – EIA 364-27
 - a. Condition - Test condition A (50G, 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
 - d. No discontinuities greater than 1 microseconds.
- 8.8 Durability - EIA 364-09
 - a. Number Cycles - 200 cycles
 - b. Cycling Rate - 127 mm/minute
 - c. Use free floating fixtures
- 8.9 Durability (preconditioning) - EIA 364-09
 - a. Number Cycles - 20 cycles
 - b. Cycling Rate - 127 mm/minute
 - c. Use free floating fixtures
- 8.10 Solderability – ANSI-J-STD-002
 - a. Test Condition - method D
 - b. High temperature - 155°C for 4 hours, 245°C for 5s
 - c. Minimum solder coverage: 95%
- 8.11 Thermal Disturbance – EIA 364-110
 - a. Number of Cycles – 10, 2hours/cycle
 - b. Temperature Range - Between 15 ±3°C and +85 ±3°C
 - c. Dwell time for each extreme temperature – 5 minutes minimum
 - d. Ramp rate - a minimum of 2°C per minute
- 8.12 Dust - EIA 364-91
 - a. Dust Composition #1 (benign)
 - b. Duration: 1.0 hour
 - c. Unmated connector to be placed in the chamber
- 8.13 Resistance to Solder Heat – EIA 364-56
 - a. Test Condition - Condition H, Procedure 3, 275 ±5°C, 10s, 2 times

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b. 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°C
- b. Relative Humidity: 30% to 60%
- c. Barometric Pressure: Local ambient

9.3 Sample Quantity and Description

The sample size and description is listed for each test in the appropriate section of this document.

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.

- 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.

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9.7 Qualification Test Table

TEST GROUP ID:		1	2	3	4	5	6	7	8	9
TEST DESCRIPTION	SECTION	Temp Life	Thermal Shock & Humidity	Mech. Shock & Vibration	Mixed Flowing Gas	Dielectric	Dust	Durability	Current Rating	Terminal
VISUAL EXAMINATION		1,12	1,15	1,15	1, 18	1,10	1,15	1,12	1,4	1
MATE RECEPTACLE & EDGE CARD		2	2	2	2		2	3	2	
ELECTRICAL:										
CONTACT RESISTANCE AT LOW LEVEL (Signal)	6.1	3,7,10	3,7, 10,13,	3,7, 10,13,	3,7,10, 13,16		3,7, 10,13	4,9		
CONTACT RESISTANCE (Power)	6.2	4,8,11	4,8, 11,14,	4,8, 11,14,	4,8,11, 14,17		4,8, 11,14	5,10		
INSULATION RESISTANCE	6.3					2,5,8				
DIELECTRIC WITHSTANDING VOLTAGE	6.4					3,6,9		2,11		
CURRENT RATING(Power& Signal)	6.5								3	
MECHANICAL:										
MATING / UNMATING FORCE	7.1							6,8		
CONTACT RETENTION (Power & Signal)	7.2									2
RESEATING	7.3	9	12		15		12			
COMPLIANT PIN INSERTION FORCE (Power & Signal)	7.4									
COMPLIANT PIN RETENTION FORCE (Power & Signal)	7.5									
PCB HOLE DEFORMATION RADIUS	7.6									
PCB HOLE WALL DAMAGE	7.7									
ENVIRONMENTAL:										
THERMAL SHOCK	8.1		6			4				
Cyclic Temperature & Humidity	8.2		9			7				
HIGH TEMPERATURE LIFE	8.3	6								
HIGH TEMPERATURE LIFE (Preconditioning)	8.4			6	6					
MFG (EIA-364-65 Class IIA)	8.5				9					
RANDOM VIBRATION	8.6			9						
MECHANICAL SHOCK	8.7			12						
DURABILITY, 200 Cycles	8.8							7		
DURABILITY, 20 CYCLES (Preconditioning)	8.9	5	5	5	5		5			
SOLDERABILITY	8.10									4
THERMAL DISTURBANCE	8.11				12		9			
DUST CONTAMINATION	8.12						6			
COMPONENT HEAT RESISTANCE TO SOLDERING	8.13									3
SAMPLES QUANTITY(PCS)		5	5	5	5	5	5	5	3	5

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REVISION RECORD

Rev	Page	Description	EC#	Date
A	All	Initial released	N/A	2019/Feb/15
B	All	Tying errors correcting	N/A	2019/Jun /26