	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008				
	TITLE	LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)			PAGE	1 of 10	REVISION	E	
					AUTHORIZED BY	KH LEE		DATE	13 OCT 2006
					CLASSIFICATION				

## 1.0 OBJECTIVE

This specification defines the performance, test, quality and reliability requirements of the Low Profile Vertical Card Connector (LPVCC) Product.


## 2.0 SCOPE

This specification is applicable to the termination characteristics of the Low Profile Vertical Card Connector family of products which provides interconnections, via 0.5 mm square pins, between two parallel printed wiring boards and/or flex circuits.

## 3.0 GENERAL

This document is composed of the following sections :

<u>Paragraph</u>	<u>Title</u>
1.0	OBJECTIVE
2.0	SCOPE
3.0	GENERAL
4.0	APPLICABLE DOCUMENTS
5.0	REQUIREMENTS
5.1	Qualification
5.2	Material
5.3	Finish
5.4	Design and Construction
6.0	ELECTRICAL CHARACTERISTICS
7.0	MECHANICAL CHARACTERISTICS
8.0	ENVIRONMENTAL CONDITIONS
9.0	QUALITY ASSURANCE PROVISIONS
9.1	Equipment Calibration
9.2	Inspection Conditions
9.3	Sample Quantity and Description
9.4	Acceptance
9.5	Qualification Testing
9.6	Requalification Testing
TABLE 1	QUALIFICATION TESTING MATRIX

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008					
	TITLE	<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			PAGE	2 of 10	REVISION	E		
					AUTHORIZED BY	KH LEE		DATE	13 OCT 2006	
					CLASSIFICATION					<b>UNRESTRICTED</b>

#### 4.0 APPLICABLE DOCUMENTS

##### 4.1 Specifications

- 4.1.1 Engineering drawings
- 4.1.2 Process drawings

##### 4.2 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

##### 4.3 Federal Specifications

- 4.3.1 QQ-N-290 : Nickel Plating (electro-deposited).
- 4.3.2 ASTM B-194 : Beryllium Alloy Copper Strip.

##### 4.4 Other Standards and Specifications

- 4.4.1 UL94-V0 : Flammability

##### 4.5 FCI Specifications

- 4.5.1 BUS-03-404 : Normal force Measurement


##### 4.6 FCI Lab Reports - Supporting Data

Contact finish for 5.3.1 -- Test report EL-92-07-068

#### 5.0 REQUIREMENTS

##### 5.1 Qualification

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

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008		
	TITLE			PAGE	3 of 10		REVISION
<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			AUTHORIZED BY	KH LEE		DATE	13 OCT 2006
			CLASSIFICATION				

## 5.2 Material

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

5.2.1 Housing - High Temperature Plastic.

5.2.2 Terminal - Beryllium Copper

## 5.3 Finish

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

5.3.1 Terminal : 8u" , 15u" , or 30u" minimum Au over 50u" minimum nickel.

## 5.4 Design and Construction


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

## 6.0 ELECTRICAL CHARACTERISTICS

### 6.1 Contact Resistance, Low Level (LLCR)

The low level contact resistance shall not exceed 15 milliohms (20 milliohms after environmental exposure) when measured in accordance with MIL-STD-1344A, Method 3002.1. The following details shall apply :

- a. Method of Connection - Attach current and voltage leads as per MIL-STD.
- b. Test Voltage - 20 millivolts DC max open circuit.
- c. Test Current - Not to exceed 100 milliamperes.

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008		
	TITLE	<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			PAGE	4 of 10	REVISION
	AUTHORIZED BY				KH LEE		DATE
				CLASSIFICATION	<b>UNRESTRICTED</b>		

## 6.2 Insulation Resistance

The insulation resistance of unmated connectors shall not be less than 1000 megohms initially or after environmental exposure when measured in accordance with MIL-STD-202F, Method 302. The following details shall apply :

- a. Test Voltage - 500 volts DC.
- b. Electrification Time - 2 minutes
- c. 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 milliampere) when unmated connectors are tested in accordance with MIL-STD-1344A, Method 3001.1. The following details shall apply :

- a. Test Voltage - 500 volts RMS, 60 Hz.
- b. Test Duration - 60 seconds.
- c. Test Condition - 1 (760 Torr - sea level).
- d. 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 ampere or when one contact is powered at 2.0 amperes. The following details shall apply :

- a. Ambient Conditions - Still air at 25°C.
- b. Reference - EIA-364-70

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008		
	TITLE	<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			PAGE	5 of 10	REVISION
	AUTHORIZED BY				KH LEE		DATE
				CLASSIFICATION	<b>UNRESTRICTED</b>		

## 7.0 MECHANICAL CHARACTERISTICS

### 7.1 Mating/Unmating Force

The force to mate a receptacle connector and compatible header shall not exceed 7.0 ounces per contact. The unmating force shall not be less than 0.7 ounces per contact.

- a. Cross Head Speed - 2 inches per minute
- b. Lubrication - None
- c. Utilize free floating fixtures
- d. Reference - MIL-STD-1344A, Method 2013.1

### 7.2 Normal Force

The contact normal force shall not be less than 50 grams when tested in accordance with Berg Test specification BUS-03-404. Required fixturing shall be as defined in BUS-03-404.

### 7.3 Contact Retention


Individual contacts shall withstand an axial load of 1.1 pounds minimum applied at a rate of 0.2 inches/minute without dislodging from the housing cavity. Reference MIL-STD-1344A, Method 2007.1.

## 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 - MIL-STD-202F, Method 107G.

- a. Test Condition - A (25, 1-hour cycles)
- b. Temperature Range - Between -55 and +105°C
- c. Time at Each Temperature - 30 minutes
- d. Transfer Time - 5 minutes, maximum

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008		
	TITLE	<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			PAGE	6 of 10	REVISION
	AUTHORIZED BY				KH LEE		DATE
				CLASSIFICATION	<b>UNRESTRICTED</b>		

8.2 Humidity, Steady State - MIL-STD-202F, Method 103B

- a. Relative Humidity - 95 %
- b. Temperature - +40°C
- c. Test Condition - B (96 hours)

8.3 High Temperature Life - MIL-STD-202F, Method 108A

- a. Test Temperature - 105°C
- b. Test Duration - 315 hours

8.4 Vibration - MIL-STD-202F, Method 204D

- a. Condition - B
- b. Vibration Amplitude - 0.06\* DA or +/-15G
- c. Frequency Range - 10 to 2000 to 10 hertz
- d. Sweep Time and Duration - 20 minutes per sweep, 4 hours along each of three orthogonal axes (12 hours total)
- e. Mounting - Rigidly mount assemblies
- f. No discontinuities greater than 1 microsecond

8.5 Mechanical Shock - MIL-STD-202F, Method 213B

- a. Condition - I (100G, 6 millisecond sawtooth)
- b. Shocks - 3 shocks in both directions along each of three orthogonal axes (18 total)
- c. Mounting - Rigidly mount assemblies
- d. No discontinuities greater than 1 microsecond


8.6 Durability

Standard laboratory procedure as applicable to the specific product.

- a. Number Cycles - 50 cycles
- b. Cycling Rate - 5 inches per minute

8.7 Solderability - MIL-STD-202F, Method 208F

- a. Steam aging - Greater than 1 hour
- b. Contact areas evaluated shall meet the Method 208 requirements.

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008				
	TITLE	<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			PAGE	7 of 10	REVISION	E	
	AUTHORIZED BY				KH LEE		DATE	13 OCT 2006	
	CLASSIFICATION				<b>UNRESTRICTED</b>				

### 8.8 I.R. Heat Exposure

- a. Environment : 220°C @ 60 seconds and 260°C @ 10 seconds.

## 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 MIL-C-45662 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
- d. Relative Humidity : 30% to 60%
- c. Barometric Pressure : Local ambient

### 9.3 Sample Quantity And Description

Sample quantities for the respective test groups shall consist of the following :

- Test Groups 1 thru 9 : Three connector assemblies/test group.
- Test Groups 1, 2, 3, 6 & 8 : Soldered to PCB and mated with compatible headers during environmental exposure.
- Test Groups 4, 7, & 9 : Unterminated and unmated during environmental exposure and/or testing.
- Test Group 5 : Soldered to PCB for testing purposes.

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008				
	TITLE	<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			PAGE	8 of 10	REVISION	E	
	AUTHORIZED BY				KH LEE		DATE	13 OCT 2006	
	CLASSIFICATION				UNRESTRICTED				

#### 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 sequence shall be as shown in Table 1.

#### 9.6 Requalification Testing

If either of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix, Table 1.

9.6.1 A significant design change is made to the existing product. A significant change shall include, but is not limited to, changes in the overplate composition, plating thickness, contact force, contact surface geometry, underplate material composition, insulator design, contact base material, or contact lubrication requirements.

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

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





	TYPE	PRODUCT SPECIFICATION	NUMBER	GS-12-008
	TITLE	LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)		PAGE 9 of 10 REVISION E AUTHORIZED BY KH LEE DATE 13 OCT 2006 CLASSIFICATION UNRESTRICTED

TABLE 1 - QUALIFICATION TESTING

		TEST GROUP								
		1	2	3	4	5	6	7	8	9
TEST	PARA	TEST SEQUENCE								
EXAMINATION OF PRODUCT	5.4	1 7	1 7	1 6	1 10	1 3	1 6	1 3 6	1 3	1 3
CONTACT RESISTANCE LOW LEVEL	6.1	2 4 6	3 5	2 5			2 4			
INSULATION RESISTANCE	6.2				3 7					
DIELECTRIC WITHSTANDING	6.3				4 8					
CURRENT RATING	6.4								2	
MATING/UNMATING FORCE	7.1		2 6					4		
NORMAL FORCE	7.2					2	5			
CONTACT RETENTION	7.3				2 9			5		
THERMAL SHOCK	8.1	3			5					
HUMIDITY, STEADY STATE	8.2	5			6					
HIGH TEMPERATURE LIFE	8.3						3			
VIBRATION	8.4			3						
MECHANICAL SHOCK	8.5			4						
DURABILITY	8.6		4							
SOLDERABILITY	8.7									2
I.R. EXPOSURE	8.8							2		

	TYPE	PRODUCT SPECIFICATION		NUMBER	GS-12-008		
	TITLE			PAGE	10 of 10		REVISION
<b>LOW PROFILE VERTICAL CARD CONNECTOR (LPVCC)</b>			AUTHORIZED BY	KH LEE		DATE	13 OCT 2006
			CLASSIFICATION				

**REVISED RECORD**

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1	ALL	First issue of document – preliminary		03 MAR 92
2	ALL	Preliminary document submitted to DCU	V 20488	23 MAR 92
3	ALL	Complete re-write	V 22823	21 SEP 92
4	8	Delete Test Group 10 and update Table	V 22873	22 OCT 92
A	ALL	Released	V 23620	12 NOV 92
B	ALL	Transfer guardianship	V 30079	12 FEB 93
C	5 6 ALL	1,1 pounds was 0,5 pounds (sect 7.3) 50 cycles was 25 cycles (sect 8.6) Redrawn	S 50057	28 MAR 95
D	2  ALL	Update: All Berg to FCI FCI Lab Reports: EL-92-07-068 Update: GES to GS Latest GS format	S 20047	29 APR 02
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