1.0 <u>SCOPE</u>

This specification covers performance, test, and quality requirement for terminal block pluggable plug, socket and fixed plug. Centerline spacing are 3.50, 3.81, 5.00, 5.08, and 7.62mm.

2.0 APPLICABLE DOCUMENTS

2.1 Drawing

| Pitch | Туре | FCI series name | Drawing number | FCI part number | Poles | |
|-----------|--------|--------------------|-------------------|-------------------|--------|--|
| | | 01-350 | 20020004 | 20020004-CxxxxxLF | 02~24p | |
| | Plug | 01-350 | 20020000 | 20020000-CxxxxxLF | 02~24p | |
| 3.50mm | Flug | 02-350 | 20020009 | 20020009-CxxxxxLF | 02~24p | |
| | | 02-350 | 20020008 | 20020008-CxxxxxLF | 02~24p | |
| 3.30mm | | 06-350 | 20020107 | 20020107-CxxxxxLF | 02~24p | |
| | Socket | 06-350 | 20020108 | 20020108-CxxxxxLF | 02~24p | |
| | SUCKEL | 06-350 | 20020111 | 20020111-CxxxxxLF | 02~24p | |
| | | 06-350 | 20020110 | 20020110-CxxxxxLF | 02~24p | |
| | | 01-381 | 20020004 | 20020004-DxxxxxLF | 02~24p | |
| | Plug | 01-381 | 20020000 | 20020000-DxxxxxLF | 02~24p | |
| | | 02-381 | 20020009 | 20020009-DxxxxxLF | 02~24p | |
| 3.81mm | | 02-381 | 20020008 | 20020008-DxxxxxLF | 02~24p | |
| 3.0111111 | Socket | 06-381 | 20020107 | 20020107-DxxxxxLF | 02~24p | |
| | | 06-381 | 20020108 | 20020108-DxxxxxLF | 02~24p | |
| | | 06-381 | 20020111 | 20020111-DxxxxxLF | 02~24p | |
| | | 06-381 | 20020110 | 20020110-DxxxxxLF | 02~24p | |
| | | 01-500 | 20020006 | 20020006-GxxxxxLF | 02~24p | |
| | Plug | 01-500 | 20020003 | 20020003-GxxxxxLF | 02~24p | |
| | | 02-500 | 20020009 | 20020009-GxxxxxLF | 02~24p | |
| 5.00mm | | 02-500 | 20020008 | 20020008-GxxxxxLF | 02~24p | |
| 5.0011111 | | 06-500 | 20020107 | 20020107-GxxxxxLF | 02~24p | |
| | Socket | 06-500 | 20020108 | 20020108-GxxxxxLF | 02~24p | |
| | SUCKEL | 06-500 | 20020110 | 20020110-GxxxxxLF | 02~24p | |
| | | 06-500 | 20020111 | 20020111-GxxxxxLF | 02~24p | |
| | | 01-508 | 20020003 | 20020003-HxxxxxLF | 02~24p | |
| | | 01-508 | 20020006 | 20020006-HxxxxxLF | 02~24p | |
| 5.08mm | Plug | 02-508 | 20020009 | 20020009-HxxxxxLF | 02~24p | |
| | | 06-508 | 20020108 | 20020108-HxxxxxLF | 02~24p | |
| | | 06-508 | 20020111 | 20020111-HxxxxxLF | 02~24p | |

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| | ^{DATE} Nov. 11 th , 2009 |
| CLASSIFICATION | ted |

| | | 02-508 | 20020008 | 20020008-HxxxxxLF | 02~24p |
|--------|--------|--------|----------|-------------------|--------|
| | Socket | 06-508 | 20020107 | 20020107-HxxxxxLF | 02~24p |
| | SUCKEL | 06-508 | 20020110 | 20020110-HxxxxxLF | 02~24p |
| | Dive | 04-762 | 20020516 | 20020516-MxxxxxLF | 02~16p |
| | Plug | 04-762 | 20020517 | 20020517-MxxxxxLF | 02~16p |
| | | 07-762 | 20020618 | 20020618-MxxxxxLF | 02~16p |
| 7.62mm | Socket | 07-762 | 20020619 | 20020619-MxxxxxLF | 02~16p |
| | | 07-762 | 20020620 | 20020620-MxxxxxLF | 02~16p |
| | | 07-762 | 20020621 | 20020621-MxxxxxLF | 02~16p |
| | | 07-762 | 20020622 | 20020622-MxxxxxLF | 02~16p |
| 3.50mm | | 26-350 | 20020327 | 20020327-CxxxxxLF | 02~24p |
| 3.81mm | | 26-381 | 20020327 | 20020327-DxxxxxLF | 02~24p |
| 5.00mm | Fixed | 21-500 | 20020316 | 20020316-GxxxxxLF | 02~24p |
| E 00mm | Plug | 21-508 | 20020316 | 20020316-HxxxxxLF | 02~24p |
| 5.08mm | | 21-508 | 20020336 | 20020336-HxxxxxLF | 04~05p |
| 7.62mm | | 12-762 | 20020705 | 20020705-MxxxxxLF | 02~03p |

2.2 Other Standard and Specification

- 4.2.1 IEC 60998-1: Connecting Devices for Low Voltage Circuits for Household and Similar Purposes. Part 1: General Requirements.
- 4.2.2 IEC 60998-2-1: Connecting Devices for Low Voltage Circuits for Household and Similar Purposes. Part 2-1: Particular Requirements for Connecting Device as Separate Entities with Screw-type Clamping Units.
- 4.2.3 UL 1059: Terminal Blocks
- 4.2.4 EIA-364:

Electrical Connector/Socket Test Procedure Including Environmental Classifications

2.3 FCI SPECIFICATIONS

- 4.3.1 GES-03-601 Current Rating
- 4.3.2 GS-14 -1394 Package Specification

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REQUIREMENTS 3.0

3.1 **Design and Construction**

Connectors shall be of the design, construction and physical dimensions specified on the applicable product drawings and shall consider the requirements mentioned on IEC 998-2-1 paragraph 10, relevant to clamping units.

3.2 Materials, Dimensions, Plating and Markings

All of these items are described on the individual drawings.

3.3 Ratings

Voltage rating, current rating, operation temperature and rated screw torque are described on the individual drawings.

3.4 **Performance and Test Description**

Product is designed to meet the electrical, mechanical and environment performance requirement list in section 3.5.

Unless otherwise specified, all tests shall be performed at ambient environmental conditions per IEC 160.

3.5 **Test Requirements and Procedures Summary**

| 3.5.1 | 3.5.1 | | | | | | |
|--|--|---|--|--|--|--|--|
| ELECTRICAL REQUIREMENTS | | | | | | | |
| DESCRIPTION | TEST CONDITION | REQUIREMENT | | | | | |
| 3.5.1.1 Product Examination | Visual, dimensional and functional | Meet requirements of product drawing. | | | | | |
| 3.5.1.2 Low Level Contact Resistance | Mated connectors, apply a maximum voltage of 0.2 V between wire pole and terminated terminal. | 20 milliohms maximum. | | | | | |
| 3.5.1.3 Insulation resistance | IEC 60998-1, paragraph 13e 13.3. Initial 1000Volts DC, or 500Volts DC after environment test applied between two adjacent contact with measurements made 1 minute after the application of the voltage. | 5000 MΩ Min. initial. 5 MΩ minimum after environment test. | | | | | |
| 3.5.1.4 Dielectric Withstanding Voltage | IEC 60998-1, paragraph 13e 13.4. Apply 1.6K VAC, Test between adjacent contacts of connector assemblies. | No breakdown; Current leakage<5 mA | | | | | |

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| NUMBER GS-12-625 | | Product Specification | FÇ | J |
|---------------------|----------------|----------------------------|----------------------------|--------------------------------------|
| TITLE | | | PAGE 4 of 8 | REVISION D |
| Terr | minal block- P | lug and Socket, Fixed Plug | AUTHORIZED BY Jason Hsu | DATE Nov. 11 th , 2009 |
| | | | CLASSIFICATION Unrestri | cted |

| 3.5.1.5 Temperature rise VS current | UL 1059 Measurements are made when the specimen had reached thermal equilibrium at the rated current specified on | +30 °C Maximum |
|---|---|----------------|
| | individual drawing. | |

| 3.5.2 | | | |
|--|---|--|----------------------|
| MECHANICAL REC | UIREMENTS | | • |
| DESCRIPTION | TEST CONDITION | REQUIREMENT | Applicable |
| 3.5.2.1 Mating force | Mate connector and measure the force required. | 5.5N Maximum. (Per mating pole.) | Plug/socket |
| 3.5.2.2 Unmating force | Unmate connector and measure the force required. | 1.0N Minimum. (Per unmating pole.) | Plug/socket |
| 3.5.2.3 Durability (mate/unmate) | After durability cycles, low level contact resistance shall be less than 20millionohm. | 200 Cycles | Plug/socket |
| 3.5.2.4 Wire Pull Strength | IEC 60998-2-1 paragraph 10.105, Subject connector to a pull force for 1 minute in the axis of tapping connector. Connector shall not slip out of the connecting device. | 10AWG: Min 80N 12AWG: Min 60N 16AWG: Min 30N 24AWG: Min 13N | Plug/Fixed plug |
| 3.5.2.5 Torque | UL1059 Apply the rated torque (refer to drawings) for wire attachment. | No visible crack | Plug/Fixed Plug |
| 3.5.2.6 Pin Retention | Force required to unload pin from the housing in the direction of plug entry. | Min 20N. | Socket |
| 3.5.2.7 Solder ability | Soldering time 5 second. (flux is applied) Soldering temperature: 250±10°C | 95% min of solder area and the plastics have not been melted | Fixed plug/Socket |

| 3.5.3 ENVIRONMENT REQUIREMENTS | | | | | | |
|-----------------------------------|--|---|--|--|--|--|
| DESCRIPTION | TEST CONDITION | REQUIREMENT | | | | |
| 3.5.3.1 | IEC 60998-2-1, paragraph 12.1 | No cracks visible. | | | | |
| Heat Resistance | Subject specimens to 115±2°C for 168 hours and shall be | No material becomes sticky. | | | | |
| | left alone for 1 to 2 hours in a room ambient for next examination/testing. | No material becomes greasy. Specimen shall not undergo | | | | |
| 3.5.3.2 Cold resistance | IEC 60998-2-1, paragraph 12.1 | any change impairing their further use. | | | | |
| | Subject specimens to -40±2°C for 168 hours and shall be | | | | | |
| | left alone for 1 to 2 hours in a room ambient for next examination/testing | | | | | |
| 3.5.3.3 | IEC 60998-1, paragraph 12.2. | | | | | |
| Humidity | Subject specimens to 30±2°C, relative humidity 91%~95% | | | | | |
| | for 48 hours and shall be left alone for 1 to 2 hours in a room ambient for next examination/testing | | | | | |
| 3.5.3.4 | EIA-364-26B, condition A | | | | | |
| Salt Spray | Salt concentration: 5%, temperature 32±2°C, 48hours. | | | | | |
| · Dov ·E | STATUS-Balageod | Drintod: Mar 05 201 | | | | |

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| NUMBER GS-12-625 | TYPE Product Specification | F | |
|---------------------|--------------------------------------|----------------------------|-----------------------------------|
| TITLE | I | PAGE 5 of 8 | REVISION |
| Termina | I block- Plug and Socket, Fixed Plug | AUTHORIZED BY Jason Hsu | DATE Nov. 11 th , 2009 |
| | | tricted | |

| | Samples were measured after salt is removed by running water. | |
|--|--|---|
| 3.5.3.5 Fire Test (Glow wire test) | Specimens with no visible flame and no sustained glowing; or flames and glowing on the specimen extinguished 30 seconds after the removal of the glow wire. | IEC 60695-2-10,-2-11,-2-12 Apply the glow-wire once for no longer than 5 seconds. |

4.0 QUALITY ASSUREANCE PROVISIONS

4.1 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 QS9000.

4.2 Inspection Conditions

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

- a) Temperature: 25+/- 5°C
- b) Relative Humidity: 30% to 60%
- c) Barometric Pressure: Local ambient

4.3 Acceptance

- 4.3.1 Electrical and Mechanical requirements shall be as indicated in Paragraphs 3.5 using test data and appropriate statistical techniques.
- 4.3.2 Failures attributed to equipment, test setup or operator error shall not disqualify the product.

4.4 **Qualification Testing**

Qualification testing shall be performed on sample units predicted with equipment and procedures normally used in production. Test sequence are shown in Table 1(Pluggable plug), Table 2(pluggable socket), and Table3(Fixed plug).

| NUMBER GS-12-625 | | TYPE Product Specification | FÇ | |
|---------------------|-------------------|-------------------------------|----------------------------|--------------------------------------|
| TITLE | | | PAGE 6 of 8 | REVISION D |
| | Terminal block- P | lug and Socket, Fixed Plug | AUTHORIZED BY Jason Hsu | DATE Nov. 11 th , 2009 |
| | | | | icted |

TABLE 1: QUALIFICATION TESTING SEQUENCE for Pluggable Plug

| | | | | | Test | Group | | | |
|---------------------------|-----------|---|---|---|---------|---------|---|---|---|
| TEST | PARA | Α | В | С | D | E | F | G | Н |
| | | | | | Test Se | equence | | | |
| Product examination | 3.5.1.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| LLCR | 3.5.1.2 | 2 | | | | | | 3 | |
| Insulation Resistance | 3.5.1.3 | 3 | | | 3 | 3 | 3 | 4 | |
| Dielectric withstanding | 3.5.1.4 | 4 | | 4 | 4 | 4 | 4 | | |
| voltage | | | | | | | | | |
| Mating/Un-mating force | 3.5.2.1 | | 2 | | | | | | |
| | 3.5.2.2 | | | | | | | | |
| Torque | 3.5.2.5 | | 3 | | | | | | |
| Wire Pull Strength | 3.5.2.4 | | | 2 | | | | | |
| Temperature rise | 3.5.1.5 | | | 3 | | | | | |
| humidity test | 3.5.3.3 | | | | 2 | | | | |
| Heat resistance | 3.5.3.1 | | | | | 2 | | | |
| Cold resistance | 3.5.3.2 | | | | | | 2 | | |
| Salt Spray | 3.5.3.4 | | | | | | | 2 | |
| Fire Test | 3.5.3.5 | | | | | | | | 2 |
| (Glow wire test) | | | | | | | | | |
| Qualification connector p | per group | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

TABLE 2: QUALIFICATION TESTING SEQUENCE-Pluggable Socket

| | | Test Group | | | | | | | | | |
|---------------------------------|---------|------------|---|---|---------|---------|----|---|---|--|--|
| TEST | PARA | Α | В | С | D | E | F | G | Н | | |
| | | | | | Test Se | equence | ce | | | | |
| Product examination | 3.5.1.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Insulation Resistance | 3.5.1.3 | 2 | | 3 | 3 | 3 | | | | | |
| Dielectric withstanding voltage | 3.5.1.4 | 3 | | 4 | 4 | 4 | | | | | |
| Pin Retention (Pull force) | 3.5.2.6 | | 2 | | | | | | | | |
| Humidity | 3.5.3.3 | | | 2 | | | | | | | |
| Heat resistance | 3.5.3.1 | | | | 2 | | | | | | |
| Cold resistance | 3.5.3.2 | | | | | 2 | | | | | |
| Salt Spray | 3.5.3.4 | | | | | | 2 | | | | |
| Fire Test | 3.5.3.5 | | | | | | | 2 | | | |
| (Glow wire test) | | | | | | | | | | | |
| Solder ability | 3.5.2.7 | | | | | | | | 2 | | |

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| GS-12-625 | Pro | duct Spe | ecification | | FCI | | | | |
|---|-----|----------|-------------|---|--------------|---|--------|---|--|
| TITLE | | | | | | PAGE REVISION D | | | |
| Terminal block- Plug and Socket, Fixed Plug | | | | | | AUTHORIZED BY DATE Jason Hsu Nov. 11 th , 2009 | | | |
| | | | | | CLASSIFICATI | ON Unrest | ricted | | |
| Qualification connector per group | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |

TABLE 3: QUALIFICATION TESTING SEQUENCE-Fixed Plug

| | | Test Group | | | | | | | | |
|-----------------------------------|---------|------------|---|---|-----|---------------|---|---|---|----------|
| TEST | PARA | Α | В | С | D | E | F | G | Н | J |
| | | | | | Tes | Test Sequence | | | | |
| Product examination | 3.5.1.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| LLCR | 3.5.1.2 | 2 | | | | | | 3 | | |
| Insulation Resistance | 3.5.1.3 | 3 | | | 3 | 3 | 3 | 4 | | |
| Dielectric withstanding voltage | 3.5.1.4 | 4 | | 4 | 4 | 4 | 4 | | | |
| Torque | 3.5.2.5 | | 2 | | | | | | | |
| Wire Pull Strength | 3.5.2.4 | | | 2 | | | | | | |
| Temperature rise | 3.5.1.5 | | | 3 | | | | | | |
| humidity test | 3.5.3.3 | | | | 2 | | | | | |
| Heat resistance | 3.5.3.1 | | | | | 2 | | | | |
| Cold resistance | 3.5.3.2 | | | | | | 2 | | | |
| Salt Spray | 3.5.3.4 | | | | | | | 2 | | |
| Solder ability | 3.5.2.7 | | | | | | | | 2 | |
| Fire Test | 3.5.3.5 | | | | | | | | | 2 |
| (Glow wire test) | | | | | | | | | | <u> </u> |
| Qualification connector per group | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| NUMBER GS-12-625 | TYPE Product Specification | F | FC | | |
|---------------------|--------------------------------------|----------------------------|--------------------------------------|--|--|
| TITLE | | PAGE 8 of 8 | REVISION D | | |
| Termina | I block- Plug and Socket, Fixed Plug | AUTHORIZED BY Jason Hsu | DATE Nov. 11 th , 2009 | | |
| | CLASSIFICATION | | tricted | | |

REVISION RECORD

| REV | PAGE | DESCRIPTION | ECR# | DATE |
|-----|------|--|-----------|-----------------------------|
| А | All | Initial Release | DG09-0204 | Nov 11 th , 2009 |
| В | 3 | 3.5.2.7 solderability test, | T09-1162 | Dec 17 th , 2009 |
| | | Temperature change form 260 +/- 5 °C to 250 +/- 10°C | | |
| С | All | Add phase-2 product series | T10-0079 | Jun 15 th , 2010 |
| D | 2 | Add p/n 20020336 | | Jan 31 th , 2010 |



2

FCI:

20020004-C081B01LF 20020004-D021B01LF 20020004-D031B01LF 20020004-D101B01LF 20020006-H031B01LF 20020006-H061B01LF 20020008-C051B01LF 20020008-C081B01LF 20020008-G081B01LF 20020008-H021B01LF 20020107-C021A01LF 20020107-C041A01LF 20020107-C061A01LF 20020107-C081A01LF 20020107-D021A01LF 20020107-G041A01LF 20020107-G081A01LF 20020107-H021A01LF 20020107-H031A01LF 20020110-C021A01LF 20020110-C061A01LF 20020110-C081A01LF 20020110-C141A01LF 20020110-D021A01LF 20020110-D031A01LF 20020110-D041A01LF 20020110-D051A01LF 20020110-D071A01LF 20020110-D081A01LF 20020110-G061A01LF 20020110-H021A01LF 20020110-H031A01LF 20020110-H041A01LF 20020110-H061A01LF 20020516-M021B01LF 20020516-M041B01LF 20020000-C022B01LF 20020000-C105B01LF 20020004-C045B01LF 20020107-C022A01LF 20020107-C045A01LF 20020107-C105A01LF 20020111-C022A01LF 20020002-H022B01LF 20020111-H022A01LF 20020618-M021A01LF 20020618-M031A01LF 20020618-M041A01LF 20020618-M051A01LF 20020618-M061A01LF 20020618-M071A01LF 20020618-M081A01LF 20020618-M091A01LF 20020618-M101A01LF 20020618-M111A01LF 20020618-M121A01LF 20020618-M131A01LF 20020618-M141A01LF 20020618-M151A01LF 20020618-M161A01LF 20020620-M021A01LF 20020620-M031A01LF 20020620-M041A01LF 20020620-M051A01LF 20020620-M061A01LF 20020620-M071A01LF 20020620-M081A01LF 20020620-M091A01LF 20020620-M101A01LF 20020620-M111A01LF 20020620-M121A01LF 20020620-M131A01LF 20020620-M141A01LF 20020620-M151A01LF 20020620-M161A01LF 20020007-G021B01LF 20020007-G031B01LF 20020007-G041B01LF 20020007-G061B01LF 20020007-G081B01LF 20020007-H021B01LF 20020007-H031B01LF 20020007-H041B01LF 20020007-H061B01LF 20020007-H081B01LF 20020106-G021A01LF 20020106-G031A01LF 20020106-G041A01LF 20020106-G061A01LF 20020106-G081A01LF 20020106-G101A01LF 20020106-H021A01LF 20020106-H031A01LF 20020106-H041A01LF 20020106-H061A01LF 20020106-H081A01LF 20020106-H101A01LF 20020007-G051B01LF 20020007-G071B01LF 20020007-G091B01LF