

|   |       |                        |               |        |           |  |
|---|-------|------------------------|---------------|--------|-----------|--|
|  | TYPE  | PRODUCT SPECIFICATIONS |               | NUMBER | GS-12-203 |  |
|   | TITLE |                        |               | PAGE   | REVISION  |  |
| Millipacs (2 mm Hard-Metric) Signal Connector – IEC specifications                |       |                        | 1 of 7        |        | C         |  |
|   |       |                        | AUTHORIZED BY |        | DATE      |  |
|   |       |                        | STATUS        |        |           |  |
|   |       |                        | UNRESTRICTED  |        |           |  |

**1.0 OBJECTIVE**

This specification defines the **IEC** test requirements of the Millipacs (2 mm Hard-Metric) signal connector. These are required for Millipacs to comply with the IEC 1076-4-101 Hard Metric standards.

**2.0 SCOPE**

This specification is applicable to the termination characteristics of the Millipacs which provides a separable interconnect for printed circuit boards.

**3.0 GENERAL**

This document is composed of the following sections:

| Paragraph | Title      |
|-----------|------------|
| 1.0       | OBJECTIVE  |
| 2.0       | SCOPE      |
| 3.0       | GENERAL    |
| 4.0       | IEC REPORT |

|   |       |                               |               |        |                  |  |                     |
|---|-------|-------------------------------|---------------|--------|------------------|--|---------------------|
|  | TYPE  | <b>PRODUCT SPECIFICATIONS</b> |               | NUMBER | <b>GS-12-203</b> |  |                     |
|   | TITLE |                               |               | PAGE   | REVISION         |  |                     |
| Millipacs (2 mm Hard-Metric) Signal Connector – IEC specifications                |       |                               | 2 of 7        |        | C                |  |                     |
|   |       |                               | AUTHORIZED BY | DATE   |                  |  |                     |
|   |       |                               | STATUS        |        |                  |  | <b>UNRESTRICTED</b> |

#### 4.0 IEC REPORT

##### Group P - Preliminary

All specimens shall be subjected to the following tests:

| Test phase | IEC 512             |          |  | Measurement to be performed        | IEC 512 | Requirements |          |  |
|------------|---------------------|----------|--|------------------------------------|---------|--------------|----------|--|
|            | Title               | Test No. | Severity or condition of test  |                                    |         | Title        | Test No. | PL   |
| P1         | General examination |          | Unmated connectors   | Visual examination                 | 1a      | 1            | x        | There shall be no defect that would impair normal operation  |
|            |                     |          |  |                                    |         | 2            | x        |  |
|            |                     |          |  | Examination of dimensions and mass | 1b      | 1            | x        | The dimensions shall comply with those specified in 3, including creepage and clearance distances as specified in 4.2.1, and first possible contact point as specified in 3.5.2. |
|            |                     |          |  |                                    |         | 2            | x        |  |
|            |                     |          |  |                                    |         | 3            | x        |  |
| P2         | Polarizing method   | 13e      | Polarizing method: see 4.3.8<br>Robustness of coding: see 4.3.9<br>Insertion force to be applied:<br>Styles A, L and M: 100 N<br>Styles C and N: 50 N<br>Style B: not applicable | Visual examination                 | 1a      | 1            | x        | There shall be no defect that would impair normal operation  |
|            |                     |          |  |                                    |         | 2            | x        |  |
|            |                     |          |  |                                    |         | 3            | x        |  |
| P3         |                     |          | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance                 | 2a      | 1            | x        | 20 mΩ max.<br>See also 4.2.4   |
|            |                     |          |  |                                    |         | 2            | x        |  |
|            |                     |          |  |                                    |         | 3            | x        |  |
| P4         |                     |          | Test voltage 100 V d.c.<br>Method A<br>Mated connectors<br>Five contacts per specimen  | Insulation resistance              | 3a      | 1            | x        | 10 <sup>4</sup> MΩ min.<br>See also 4.2.5  |
|            |                     |          |  |                                    |         | 2            | x        |  |
|            |                     |          |  |                                    |         | 3            | x        |  |
| P5         |                     |          | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4   | Voltage proof                      | 4a      | 1            | x        | There shall be no breakdown or flashover   |
|            |                     |          |  |                                    |         | 2            | x        |  |
|            |                     |          |  |                                    |         | 3            | x        |  |



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|--|--|----------------------------|----------------------|
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| TITLE<br>Millipacs (2 mm Hard-Metric) Signal Connector –<br>IEC specifications |  | PAGE<br><b>3 of 7</b>      | REVISION<br><b>C</b> |
|  |  | AUTHORIZED BY              | DATE                 |
| STATUS<br><b>UNRESTRICTED</b>  |  |                            |                      |

**Group A - Dynamic / Climatic**

| Test phase | IEC 512                      |          |  | Measurement to be performed<br>Title | IEC 512  |                    | Requirements<br>All connector styles   |    |                   |   |
|------------|------------------------------|----------|--|--------------------------------------|----------|--------------------|--|----|-------------------|---|
|            | Title                        | Test No. | Severity or condition of test  |                                      | Test No. | PL                 |  |    |                   |   |
| A1.1       |                              |          | Speed: 10 mm/s max.  | Engaging and separating forces       | 13a      | 1 x<br>2 x<br>3 x  | See also 4.3.2   |    |                   |   |
| A2         | Probe damage                 | 16a      | Not applicable   | Gauge retention force                | 16e      |                    | Not applicable   |    |                   |   |
| A3.1       | Solderability                | 12a      | Not applicable   |                                      |          |                    |  |    |                   |   |
| A3.2       | Resistance to soldering heat | 12d      | Not applicable   |                                      |          |                    |  |    |                   |   |
| A4         |                              |          |  | Voltage proof                        | 4a       |                    | Not applicable   |    |                   |   |
| A5         | Contact retention in insert  | 15a      | Unmated connectors<br>10 contacts per specimen<br>Force applied in two directions:<br>see 4.3.3  |                                      |          | 1 x<br>2 x<br>3 x  | Axial displacement 0,2 mm max.<br>while force is applied<br>0,1 mm max. after removing force |    |                   |   |
|            |                              |          | Unmated connectors   | Visual examination                   | 1a       | 1 x<br>2 x<br>3 x  | There shall be no damage that would impair normal operation                                  |    |                   |   |
| A6         | Bump                         | 6b       | Not applicable   |                                      |          |                    |  |    |                   |   |
| A7         | Vibration                    | 6d       | Arrangement in fixture 5.1.2<br>Frequency 10 Hz to 2000 Hz<br>Amplitude 1,5 mm or 200 m/s <sup>2</sup><br>Eight sweepings in each direction<br>Full duration 3 x 2 h in three axes | Contact disturbance                  | 2e       | 1 x                | Duration of disturbance<br>1 μs max.   |    |                   |   |
|            |                              |          | Frequency range 10 Hz to 500 Hz<br>Amplitude 0.35 mm or 50 m/s <sup>2</sup><br>10 sweepings in each direction<br>Full duration 3 x 2 h in three axes                               |                                      |          | 2 x                |  |    |                   |   |
|            |                              |          | Unmated connectors   |                                      |          | Visual examination |  | 1a | 1 x<br>2 x<br>3 x | There shall be no damage that would impair normal operation |
|            |                              |          | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance                   | 2a       | 1 x<br>2 x         | Rise in relation to initial values<br>5 mΩ max.  |    |                   |   |
| A8         | Shock                        | 6c       | Arrangement in fixture 5.1.2<br>Shock acceleration 500 m/s <sup>2</sup><br>Duration of impact 10 ms<br>Five shocks in two directions<br>of three axes                              | Contact disturbance                  | 2e       | 1 x<br>2 x<br>3 x  | Duration of disturbance<br>1 μs max.   |    |                   |   |
|            |                              |          | Unmated connectors   |                                      |          | Visual examination |  | 1a | 1 x<br>2 x        | There shall be no damage that would impair normal operation |
|            |                              |          | Connecting points: see 5.1.1<br>10 contacts per specimen   |                                      |          | Contact resistance |  | 2a | 1 x<br>2 x        | Rise in relation to initial values<br>5 mΩ max.             |
| A9         | Acceleration steady state    | 6a       | Not applicable   |                                      |          |                    |  |    |                   |   |



TYPE  
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NUMBER  
**GS-12-203**

TITLE  
Millipacs (2 mm Hard-Metric) Signal Connector –  
IEC specifications

PAGE  
**4 of 7**

REVISION  
**C**

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DATE

STATUS  
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|       |                                    |     |  |   |     |             |             |   |
|-------|------------------------------------|-----|--|---|-----|-------------|-------------|---|
| A10   | Rapid change of temperature        | 11d | -55 °C to 125 °C<br>Five cycles 30 min/temp<br>Recovery time 2 h<br>Mated connectors                                     |   |     | 1<br>2<br>3 | x<br>x<br>x |   |
|       |                                    |     | Test voltage 100 V d.c.<br>Method A<br>Mated connectors<br>Five contacts per specimen                                    | Insulation resistance                     | 3a  | 1<br>2<br>3 | x<br>x<br>x | 10 <sup>4</sup> MΩ min.                                     |
|       |                                    |     | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4         | Voltage proof                             | 4a  | 1<br>2<br>3 | x<br>x<br>x | There shall be no breakdown or flashover                    |
|       |                                    |     | Unmated connectors   | Visual examination                        | 1a  | 1<br>2      | x<br>x      | There shall be no damage that would impair normal operation |
| A11   | Climatic sequence                  | 11a | Mated connectors   |   |     |             |             |   |
| A11.1 | Dry heat                           | 11i | Method A, 125 °C, unloaded<br>Duration 16 h, recovery time 2 h<br>Test voltage 100 V d.c.<br>Five contacts per specimen  | Insulation resistance at high temperature | 3a  | 1<br>2<br>3 | x<br>x<br>x | 10 <sup>3</sup> MΩ min.                                     |
| A11.2 | Damp heat, cyclic first cycle      | 11m | 55 °C, Variant 1   |   |     | 1<br>2<br>3 | x<br>x<br>x |   |
|       |                                    |     | 40 °C, Variant 1   |   |     |             |             |   |
|       |                                    |     | Unmated connectors   | Visual examination                        | 1a  | 1<br>2<br>3 | x<br>x<br>x | There shall be no damage that would impair normal operation |
| A11.3 | Cold                               | 11j | -55 °C, duration 2 h<br>Recovery time 2 h  |   |     | 1<br>2<br>3 | x<br>x<br>x |   |
|       |                                    |     | Unmated connectors   | Visual examination                        | 1a  | 1<br>2<br>3 | x<br>x<br>x | There shall be no damage that would impair normal operation |
| A11.4 | Low air pressure                   | 11k | 30 kPa, test voltage 200 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4 | Voltage proof                             | 4a  | 1<br>2<br>3 | x<br>x<br>x | There shall be no breakdown or flashover                    |
| A11.5 | Damp heat cyclic, remaining cycles | 11m | 55 °C, Variant 1   |   |     | 1<br>2<br>3 | x<br>x<br>x |   |
|       |                                    |     | 40 °C, Variant 1   |   |     |             |             |   |
|       |                                    |     | Test voltage 100 V d.c.<br>Method A, mated connectors<br>Five contacts per specimen                                      | Insulation resistance                     | 3a  | 1<br>2<br>3 | x<br>x<br>x | 10 <sup>3</sup> MΩ min.                                     |
|       |                                    |     | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance                        | 2a  | 1<br>2<br>3 | x<br>x<br>x | Rise in relation to initial values<br>5 mΩ max.             |
|       |                                    |     | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4         | Voltage proof                             | 4a  | 1<br>2<br>3 | x<br>x<br>x | There shall be no breakdown or flashover                    |
| A12.1 |                                    |     | Speed: 10 mm/s max.  | Engaging and separating forces            | 13a | 1<br>2<br>3 | x<br>x<br>x | See also 4.3.2  |
| A13   |                                    |     | Unmated  | Visual examination                        | 1a  | 1<br>2<br>3 | x<br>x<br>x | There shall be no damage that would impair normal operation |



|  |                            |                      |
|--|----------------------------|----------------------|
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| TITLE<br>Millipacs (2 mm Hard-Metric) Signal Connector –<br>IEC specifications | PAGE<br><b>5 of 7</b>      | REVISION<br><b>C</b> |
|  | AUTHORIZED BY              | DATE                 |
| STATUS<br><b>UNRESTRICTED</b>  |                            |                      |

**Group B - Mechanical endurance**

| Test phase | IEC 512                          |   |  | Measurement to be performed<br>Title | IEC 512<br>Test No. | Requirements |                      |   |
|------------|----------------------------------|---|--|--------------------------------------|---------------------|--------------|----------------------|---|
|            | Title                            | Test No.                                    | Severity or condition of test  |                                      |                     | PL           | All connector styles |   |
| B1         |                                  |   | Method A<br>10 contacts per specimen.<br>Gauges: see 3.9.1   | Gauge retention force                | 16e                 | 1<br>2<br>3  | x<br>x<br>x          | The gauge shall be retained                                   |
| B2         | Mechanical operation             | 9a  | Speed 10 mm/s max.<br>Rest 30 s (unmated)<br>Half of specified number of operations                              |                                      |                     | 1<br>2<br>3  | x<br>x<br>x          |   |
|            |                                  |   | Unmated  | Visual examination                   | 1a                  | 1<br>2<br>3  | x<br>x<br>x          | There shall be no damage that would impair normal operation   |
|            |                                  |   | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance                   | 2a                  | 1<br>2<br>3  | x<br>x<br>x          | Rise in relation to initial values<br>5 mΩ max.<br>10 mΩ max. |
|            |                                  |   | Test voltage 100 Vd.c.<br>Method A<br>Mated connectors<br>Five contacts per specimen                             | Insulation resistance                | 3a                  | 1<br>2<br>3  | x<br>x<br>x          | 10 <sup>4</sup> MΩ min.                                       |
|            |                                  |   | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4 | Voltage proof                        | 4a                  | 1<br>2<br>3  | x<br>x<br>x          | There shall be no breakdown or flashover                      |
| B3.2       | Corrosion, industrial atmosphere | 11g<br><small>(under consideration)</small> | See annex B<br>Half number mated<br>Half number unmated  |                                      |                     | 1<br>2<br>3  | x<br>x<br>x          | 10 days<br>4 days   |
|            |                                  |   | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance                   | 2a                  | 1<br>2<br>3  | x<br>x<br>x          | Rise in relation to initial values<br>5 mΩ max.               |
| B4         | Mechanical operation             | 9a  | Speed 10 mm/s max.<br>Rest 30 s (unmated)<br>Remaining number of operations                                      | Visual examination                   | 1a                  | 1<br>2<br>3  | x<br>x<br>x          | There shall be no damage that would impair normal operation   |
|            |                                  |   | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance                   | 2a                  | 1<br>2<br>3  | x<br>x<br>x          | Rise in relation to initial values<br>5 mΩ max.<br>10 mΩ max. |
|            |                                  |   | Test voltage 100 Vd.c.<br>Method A<br>Mated connectors<br>Five contacts per specimen                             | Insulation resistance                | 3a                  | 1<br>2<br>3  | x<br>x<br>x          | 10 <sup>4</sup> MΩ min.                                       |
|            |                                  |   | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4 | Voltage proof                        | 4a                  | 1<br>2<br>3  | x<br>x<br>x          | There shall be no breakdown or flashover                      |
|            |                                  |   | Method A<br>10 contacts per specimen<br>Gauges: see 3.9.1  | Gauge retention force                | 16e                 | 1<br>2<br>3  | x<br>x<br>x          | The gauge shall be retained                                   |
| B5         | Probe damage                     | 16a   | Not applicable   |                                      |                     |              |                      |   |
| B6         | Static load, transverse          | 8a  | Arrangement and applicable forces according to 5.1.3   | Visual examination                   | 1a                  | 1<br>2<br>3  | x<br>x<br>x          | No damage nor displacement likely to impair normal operation  |



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|--|--|----------------------------|----------------------|
| TYPE<br><b>PRODUCT SPECIFICATIONS</b>  |  | NUMBER<br><b>GS-12-203</b> |                      |
| TITLE<br>Millipacs (2 mm Hard-Metric) Signal Connector –<br>IEC specifications |  | PAGE<br><b>6 of 7</b>      | REVISION<br><b>C</b> |
|  |  | AUTHORIZED BY              | DATE                 |
| STATUS<br><b>UNRESTRICTED</b>  |  |                            |                      |

**Group C - Moisture**

| Test phase | IEC 512                 |          |  | Measurement to be performed    | IEC 512 |          | Requirements |                      |   |  |
|------------|-------------------------|----------|--|--------------------------------|---------|----------|--------------|----------------------|---|--|
|            | Title                   | Test No. | Severity or condition of test  |                                | Title   | Test No. | PL           | All connector styles |   |  |
| C1         | Damp heat, steady state | 11c      | Unloaded   |                                |         | 1        | x            | 56 days              |   |  |
|            |                         |          | Polarizing voltage 60 V d.c.<br>Wiring according to 5.1.4  |                                |         | 2        | x            | 21 days              |   |  |
|            |                         |          | Test voltage 100 V d.c.<br>Method A, mated connectors<br>Five contacts per specimen                              | Insulation resistance          | 3a      | 1        | x            | 2                    | x   | 10 <sup>3</sup> MΩ min.                        |
|            |                         |          | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance             | 2a      | 1        | x            | 2                    | x   | Rise in relation to initial values<br>5mΩ max. |
|            |                         |          | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4 | Voltage proof                  | 4a      | 1        | x            | 2                    | x   | There shall be no breakdown or flashover       |
|            |                         |          | Speed: 10 mm/s max.  | Engaging and separating forces | 13a     | 1        | x            | 2                    | x   | See also 4.3.2                                 |
|            | Unmated                 |          | Visual examination   | 1a                             | 1       | x        | 2            | x                    | There shall be no damage that would impair normal operation |  |

**Group D - Electrical load**

| Test phase | IEC 512                         |          |  | Measurement to be performed | IEC 512 |          | Requirements |  |   |   |
|------------|---------------------------------|----------|--|-----------------------------|---------|----------|--------------|--|---|---|
|            | Title                           | Test No. | Severity or condition of test  |                             | Title   | Test No. | PL           | All connector styles   |   |   |
| D1         | Mechanical operation            | 9a       | Speed 10 mm/s max.<br>Rest 30 s (unmated)<br>Half of specified number of operations  |                             |         | 1        | x            |  |   |   |
| D2         | Electrical load and temperature | 9b       | Ambient temperature 70 °C<br>Electrical load 1 A<br>Wire gauge = 0,12 mm <sup>2</sup><br>All contacts loaded<br>Duration 1000 h<br>Recovery time 2 h |                             |         | 1        | x            | Temperature in centre of specimens shall not exceed the maximum operating temperature with more than 5 % |   |   |
|            |                                 |          | Connecting points: see 5.1.1<br>10 contacts per specimen   | Contact resistance          | 2a      | 1        | x            | 2  | x | Rise in relation to initial values<br>5 mΩ max.             |
|            |                                 |          | Test voltage 100 V d.c.<br>Method A, mated connectors<br>Five contacts per specimen  | Insulation resistance       | 3a      | 1        | x            | 2  | x | 10 <sup>3</sup> MΩ min.                                     |
|            |                                 |          | Test voltage 750 V r.m.s.<br>Method B, mated connectors<br>50 contacts per specimen<br>Wiring according to 5.1.4                                     | Voltage proof               | 4a      | 1        | x            | 2  | x | There shall be no breakdown or flashover                    |
|            |                                 |          | Unmated  | Visual examination          | 1a      | 1        | x            | 2  | x | There shall be no damage that would impair normal operation |

|   |  |                            |                      |
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|   | TITLE<br>Millipacs (2 mm Hard-Metric) Signal Connector –<br>IEC specifications | PAGE<br>7 of 7             | REVISION<br><b>C</b> |
|   |  | AUTHORIZED BY              | DATE                 |
| STATUS<br><b>UNRESTRICTED</b>   |  |                            |                      |

**REVISION RECORD**

| <b>REV</b> | <b>PAGE</b> | <b>DESCRIPTION</b>  | <b>EC #</b> | <b>DATE</b> |
|------------|-------------|---|-------------|-------------|
| A          | All         | New Release   | B20028      | 11feb2002   |
| B          | All         | Design upgrade on Millipacs RA Receptacle & Shielding Accessory | I04-0112    | 30Dec2004   |
| C          | All         | Logo Change   | I06-0085    | 22 Jun2006  |

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[HM2DK4678PLF](#) [HM2E30PH5000LF](#) [HM2E32PH5000LF](#) [HM2G02LF](#) [HM2G06LF](#) [HM2H00P16LF](#)