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# har-modular D2 data module male str 4,8



Image is for illustration purposes only. Please refer to product description.

|                    |                                                                               |
|--------------------|-------------------------------------------------------------------------------|
| Part number        | 02 53 902 1502                                                                |
| Specification      | har-modular D2 data module male str 4,8                                       |
| HARTING eCatalogue | <a href="https://harting.com/02539021502">https://harting.com/02539021502</a> |

## Identification

|                            |                |
|----------------------------|----------------|
| Category                   | Connectors     |
| Series                     | har-modular®   |
| Element                    | Male connector |
| Description of the contact | Straight       |

## Version

|                       |                                        |
|-----------------------|----------------------------------------|
| Width of the module   | 5.08 mm                                |
| Termination method    | Solder termination                     |
| Shielding             | Fully shielded, 360° shielding contact |
| Connection type       | Mezzanine                              |
| Number of contacts    | 2                                      |
| Contact configuration | r+t                                    |
| Termination length    | 4.8 mm                                 |

## Technical characteristics

|                              |                       |
|------------------------------|-----------------------|
| Transmission characteristics | 10GBASE-KR Ethernet   |
|                              | 100GBASE-KR4 Ethernet |
|                              | PCIe Gen 2            |
|                              | PCIe Gen 3            |
|                              | PCIe Gen 4            |
|                              | USB 3.0               |
|                              | USB 3.1               |
|                              | Hypertransport 3      |
|                              | SAS 2.0               |
|                              | SAS 3.0               |
|                              | Infiniband FDR        |
|                              | SATA 3.2              |



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## Technical characteristics

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| Data rate              | 10 Mbit/s                                                       |
|                        | 100 Mbit/s                                                      |
|                        | 1 Gbit/s                                                        |
|                        | 5 Gbit/s                                                        |
|                        | 10 Gbit/s                                                       |
|                        | 25 Gbit/s                                                       |
| Clearance distance     | 2.05 mm in the module<br>0.25 mm to module edge                 |
| Creepage distance      | 2.05 mm in the module<br>0.25 mm to module edge                 |
| Insulation resistance  | $>10^{11} \Omega$                                               |
| Contact resistance     | $<20 \text{ m}\Omega$                                           |
| Shielding resistance   | $<100 \text{ m}\Omega$                                          |
| Impedance differential | 100 $\Omega$                                                    |
| Limiting temperature   | -55 ... +125 °C (during reflow soldering max. +240 °C for 15 s) |
| Insertion force        | 10 N                                                            |
| Withdrawal force       | 10 N                                                            |
| Performance level      | 1                                                               |
| Mating cycles          | $\geq 500$                                                      |
| Hot plugging           | No                                                              |

## Material properties

|                                           |                                            |
|-------------------------------------------|--------------------------------------------|
| Material (insert)                         | Polyamide (PA)                             |
| Colour (insert)                           | Black                                      |
| Material (contacts)                       | Copper alloy                               |
| Surface (contacts)                        | Noble metal over Pd/Ni over Ni Mating side |
|                                           | Sn over Ni Termination side                |
|                                           | Ni Mating side (shielding)                 |
|                                           | Sn over Ni Termination side (shielding)    |
| Material flammability class acc. to UL 94 | V-0                                        |
| RoHS                                      | compliant                                  |
| ELV status                                | compliant                                  |
| China RoHS                                | e                                          |
| REACH Annex XVII substances               | Not contained                              |
| REACH ANNEX XIV substances                | Not contained                              |
| REACH SVHC substances                     | Not contained                              |
| California Proposition 65 substances      | Not contained                              |



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Material properties

|                                    |     |
|------------------------------------|-----|
| Requirement set with Hazard Levels | R26 |
|------------------------------------|-----|

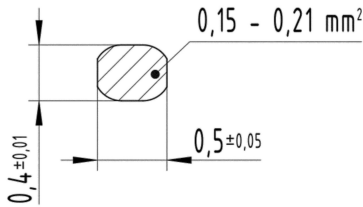
Specifications and approvals

|                        |                              |
|------------------------|------------------------------|
| Railway classification | F1/I2 acc. to NFF 16-101/102 |
|------------------------|------------------------------|

Commercial data

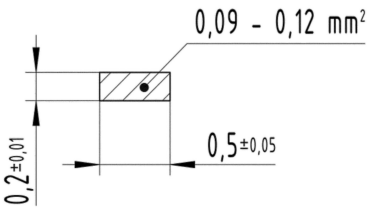
|                                |                                          |
|--------------------------------|------------------------------------------|
| Packaging size                 | 40                                       |
| Net weight                     | 1.2 g                                    |
| Country of origin              | Romania                                  |
| European customs tariff number | 85366990                                 |
| GTIN                           | 5713140573482                            |
| eCl@ss                         | 27460201 PCB connector (board connector) |
| ETIM                           | EC002637                                 |
| UNSPSC 24.0                    | 39121415                                 |

Cross section of solder termination



2x Contacts

Cross section of solder termination



6x Shielding



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## Quantity of solder paste

Before the components are assembled, solder paste must be applied to all the solder pads (for connecting surface-mount components) and the plated through holes. To ensure that the plated through holes are completely filled, significantly more solder paste must be applied than traditional solder pads on the pcb surface. There are numerous calculation methods available which are complicated to apply. The following rule of thumb has proved valuable in practice.

Required volume of paste = 2x (Volume of plated through hole - Volume of the connector termination in the hole)

Comment: the multiplier "2" compensates for solder paste shrinkage during soldering. For this purpose, it was assumed that 50% of the paste consists of the actual solder, the other 50% being soldering aids.

## Soldering instructions

THR (ThroughHoleReflow) connectors are designed to be used in a reflow oven together with other SMD (SurfaceMountDevice) components. In the process, called as well "Pin in Hole Intrusive Reflow", the connectors are inserted into plated through holes in a comparable way to conventional component mounting. All other components can be assembled on the pcb surface.

The length of the connector contacts should be such that they protrude by no more than 1.5 millimetres after insertion to the pcb. Each contact collects solder on its tip as it penetrates the solder paste in the hole. So if the contact is too long, this solder would no longer be able to reflow back into the plated through hole by capillary action during the soldering process, therefore the quality of the soldered connection would suffer as a result.

## Soldering instructions

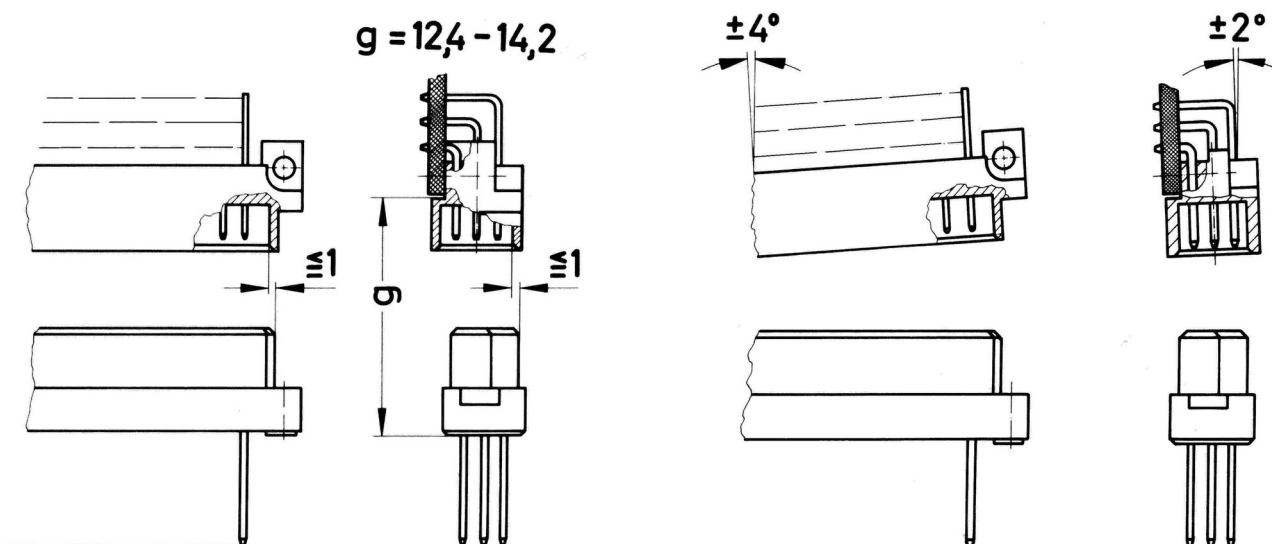
The connectors should be protected when being soldered. Otherwise, they might become contaminated as a result of soldering operations or deformed as a result of overheating.

1) For prototypes and short runs protect the connectors with an industrial adhesive tape, e.g. Tesaband 4331 ([www.tesa.de](http://www.tesa.de)). Cover the underside of the connector moulding and the adjacent parts of the pcb as well as the open sides of the connector. This will prevent heat and gases of the soldering apparatus from damaging the connector. About 140 + 5 mm of the tape should suffice.

2) For large series a jig is recommended. Its protective cover with a fast action mechanical locking device shields the connectors from gas and heat generated by the soldering apparatus. As an additional protection a foil can be used for covering the parts that should not be soldered.

3) For prototypes and short runs the protection described under point 1) can be replaced by a solder protection cap. This cap can be ordered under the part no. 09 02 000 9935.

## Mating conditions



To ensure reliable connections and prevent unnecessary damage, please refer to the application data diagrams. These recommendations are set out in IEC 60603-2.

The connectors should not be coupled and decoupled under electrical load.

har-modular®

## Data rate

| har-modular Data-module Product Data Rate: 25Gbit/s |                         |                                |                                |                               |
|-----------------------------------------------------|-------------------------|--------------------------------|--------------------------------|-------------------------------|
| Protocol                                            | Serial Data Rate / Pair | Single Interface Short Channel | Double Interface Short Channel | Double Interface Long Channel |
| 400GBASE-KR4                                        | 56 Gbit/s               | not recommended                | not recommended                | not recommended               |
| 100GBASE-KR4                                        | 25 Gbit/s               | suitable <sup>[1]</sup>        | not recommended                | not recommended               |
| 40GBASE-KR4                                         | 10 Gbit/s               | suitable                       | suitable                       | suitable <sup>[1]</sup>       |
| Infiniband HDR                                      | 50 Gbit/s               | not recommended                | not recommended                | not recommended               |
| Infiniband EDR                                      | 25.8 Gbit/s             | not recommended                | not recommended                | not recommended               |
| Infiniband FDR                                      | 14 Gbit/s               | suitable <sup>[1]</sup>        | suitable <sup>[1]</sup>        | not recommended               |
| PCIe Gen 4                                          | 16 Gbit/s               | suitable <sup>[1]</sup>        | suitable <sup>[1]</sup>        | not recommended               |
| PCIe Gen 3                                          | 8 Gbit/s                | suitable                       | suitable                       | suitable                      |
| PCIe Gen 2                                          | 5 Gbit/s                | suitable                       | suitable                       | suitable                      |
| USB3.2 Gen2x1                                       | 10 Gbit/s               | suitable                       | suitable                       | suitable                      |
| USB3.2 Gen1x1                                       | 5 Gbit/s                | suitable                       | suitable                       | suitable                      |
| Hypertransport 3                                    | 5.2 Gbit/s              | suitable                       | suitable                       | suitable                      |
| SATA 3.2                                            | 16 Gbit/s               | suitable <sup>[1]</sup>        | suitable <sup>[1]</sup>        | not recommended               |
| SAS 4.0                                             | 22.5 Gbit/s             | not recommended                | not recommended                | not recommended               |
| SAS 3.0                                             | 12 Gbit/s               | suitable <sup>[1]</sup>        | suitable <sup>[1]</sup>        | not recommended               |
| SAS 2.0                                             | 6 Gbit/s                | suitable                       | suitable                       | suitable                      |

[1] using Mid-Performing PCB-Material [2] using High-Performing PCB-Material

Table 1: Product Data Rate Matrix of har-modular Data-module

The protocol recommendations are based on a set of defined channels. For more information please refer to the reference channel descriptions:

[https://d33y5j6752j001.cloudfront.net/asset/201312468866/document\\_ifd9i1f1bd01t6mk6dr9s45u2u](https://d33y5j6752j001.cloudfront.net/asset/201312468866/document_ifd9i1f1bd01t6mk6dr9s45u2u)