

## har-modular F4-module male angled

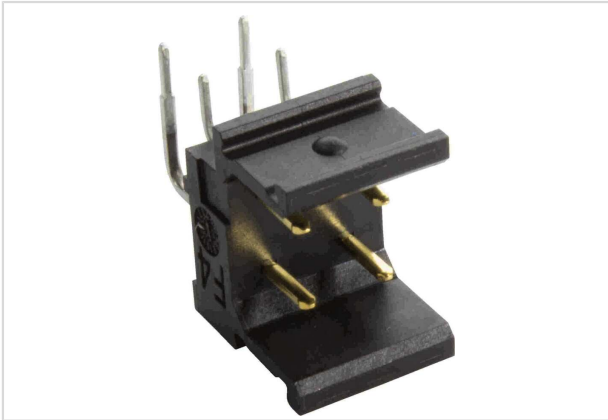


Image is for illustration purposes only. Please refer to product description.

|                    |                                                                               |
|--------------------|-------------------------------------------------------------------------------|
| Part number        | 02 51 904 1201                                                                |
| Specification      | har-modular F4-module male angled                                             |
| HARTING eCatalogue | <a href="https://harting.com/02519041201">https://harting.com/02519041201</a> |

### Identification

|                            |                |
|----------------------------|----------------|
| Category                   | Connectors     |
| Series                     | har-modular®   |
| Identification             | F4 module      |
| Element                    | Male connector |
| Description of the contact | Angled         |

### Version

|                       |                                                                  |
|-----------------------|------------------------------------------------------------------|
| Width of the module   | 10.16 mm                                                         |
| Termination method    | Reflow soldering termination (THR)<br>Wave soldering termination |
| Connection type       | Motherboard to daughtercard                                      |
| Number of contacts    | 4                                                                |
| Contact configuration | Rows a and c, positions 1 and 3                                  |
| Termination length    | 3 mm                                                             |

### Technical characteristics

|                               |                                             |
|-------------------------------|---------------------------------------------|
| Contact spacing (mating side) | 5.08 mm                                     |
| Rated current                 | 6 A                                         |
| Clearance distance            | 3 mm in the module<br>1.6 mm to module edge |
| Creepage distance             | 3 mm in the module<br>1.6 mm to module edge |
| Insulation resistance         | $>10^{11} \Omega$                           |
| Contact resistance            | $\leq 15 \text{ m}\Omega$                   |



**Pushing Performance**  
Since 1945

## Technical characteristics

|                                  |                                                                 |
|----------------------------------|-----------------------------------------------------------------|
| Limiting temperature             | -55 ... +125 °C (during reflow soldering max. +240 °C for 15 s) |
| Insertion force                  | ≤5 N                                                            |
| Withdrawal force                 | ≤5 N                                                            |
| Performance level                | 1<br>acc. to IEC 60603-2                                        |
| Mating cycles                    | ≥500                                                            |
| Test voltage $U_{r.m.s.}$        | 1.55 kV                                                         |
| Isolation group                  | I ( $600 \leq CTI$ )                                            |
| Hot plugging                     | No                                                              |
| Moisture Sensitivity Level (MSL) | 1 acc. to ECA/IPC/JEDEC J-STD-020D                              |

## Material properties

|                                           |                                                                |
|-------------------------------------------|----------------------------------------------------------------|
| Material (insert)                         | Polyamide (PA)                                                 |
| Colour (insert)                           | Black                                                          |
| Material (contacts)                       | Copper alloy                                                   |
| Surface (contacts)                        | Noble metal over Ni Mating side<br>Sn over Ni Termination side |
| 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                                                  |
| Fire protection on railway vehicles       | EN 45545-2 (2020-08)                                           |
| Requirement set with Hazard Levels        | R26                                                            |

## Specifications and approvals

|                        |                                                            |
|------------------------|------------------------------------------------------------|
| UL / CSA               | UL 1977 ECBT2.E102079<br>CSA-C22.2 No. 182.3 ECBT8.E102079 |
| Railway classification | F1/I2 acc. to NFF 16-101/102                               |

## Commercial data

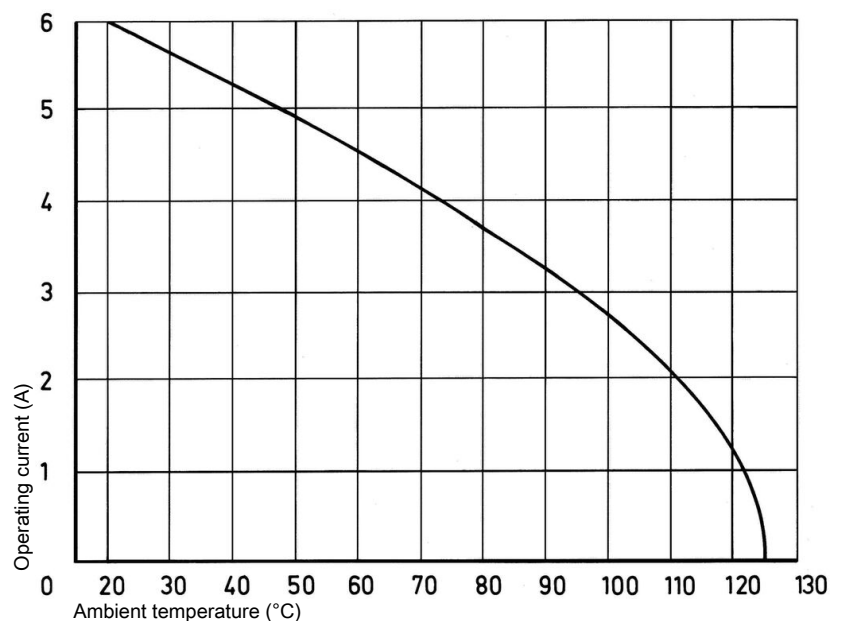
|                |    |
|----------------|----|
| Packaging size | 20 |
|----------------|----|

## Commercial data

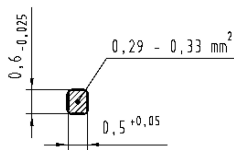
|                                |                                          |
|--------------------------------|------------------------------------------|
| Net weight                     | 2.222 g                                  |
| Country of origin              | Romania                                  |
| European customs tariff number | 85366990                                 |
| GTIN                           | 5713140197923                            |
| eCl@ss                         | 27460201 PCB connector (board connector) |
| ETIM                           | EC002637                                 |
| UNSPSC 24.0                    | 39121415                                 |

## Current carrying capacity

The current carrying capacity of the connectors is limited by the thermal load capability of the contact element material including the connections and the insulating parts. The derating curve is therefore valid for currents which flow constantly (non-intermittent) through each contact element of the connector evenly, without exceeding the allowed maximum temperature.  
Measuring and testing techniques acc. to IEC 60512-5-2



## Cross section of solder termination



## 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.

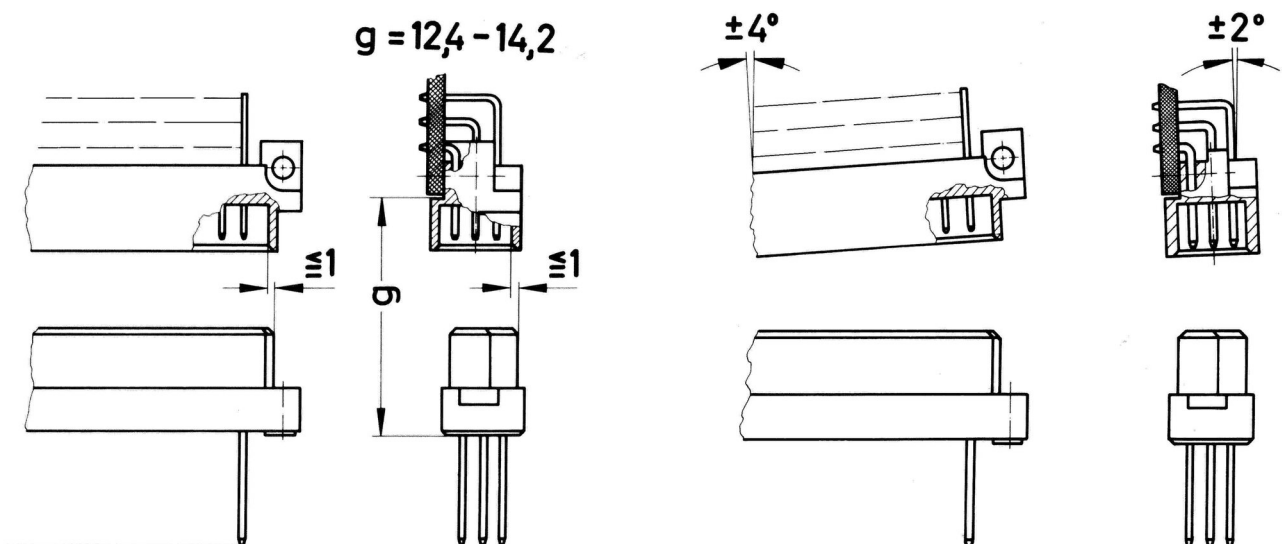
The length of the connector contacts should be such that they protrude by no more than 1.5 millimetres after insertion to the pcb. Each contact collects solder on its tip as it penetrates the solder paster in the hole. So if the contact is too long, this solder would no longer be able to reflow back 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.