Assembly Instructions

1 Preparation, surface specification

To obtain the maximum thermal conductivity of the module, heat sink and module must fulfil the following specifications.

1.1 Heat sink

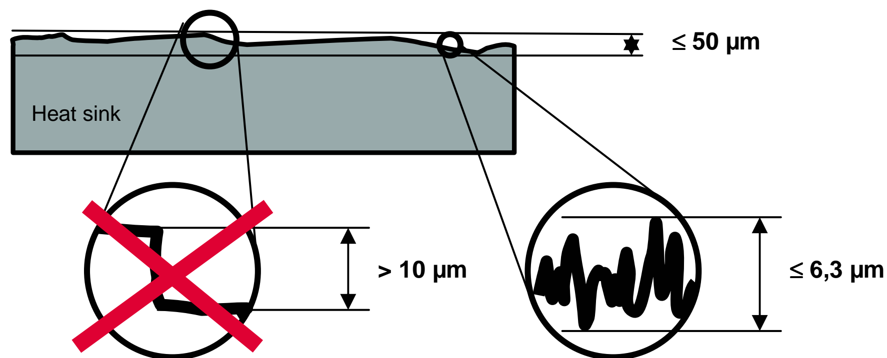

Fig. 1.1 Heat sink surface specification

- Heat sink must be free from grease and particles
- unevenness of heat sink mounting area must be ≤ 50 µm (DIN ISO 1101)
- roughness ≤ 6.3 µm (DIN EN ISO 4287)
- no steps > 10 µm (DIN EN ISO 4287)

1.2 Printed circuit board

- As material for the printed circuit board the FR 4 material can be applied.
- The thickness of copper layers should be according to IEC 326-3.
- The landing pads must be free from plated-through holes (“VIAs”), to prevent any deterioration on a proper contact. In the remaining area VIAs can be placed freely.
- Tin Lead alloy (SnPb) is an approved interface for application with MiniSKiiP modules. A sufficient plating thickness has to be ensured according to PCB manufacturing process.
- A second approved surface for the landing pads is Nickel with a final Gold layer.

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1.3 MiniSKiiP Module

Spring contacts

- The minimum height of the springs is 0.3 mm above the surface.
- For a proper functionality the spring contacts must not be contaminated by oil, sweat or other substances. For this reason SEMIKRON recommends to wear gloves during handling of the MiniSKiiP modules.

Mounting surface

- The mounting surface of MiniSKiiP module must be free from grease and particles.
- Fingerprints on the bottom side do not affect the thermal behaviour.
- Etched dimples around the edges of the MiniSKiiP bottom surfaces (Fig. 1.2) are never below any IGBT- or Diode chip, thus there is no influence on the thermal resistance. The dimples have a diameter of approximately ∅ ≈ 0.6 mm and a depth of approximately 0.3 mm.

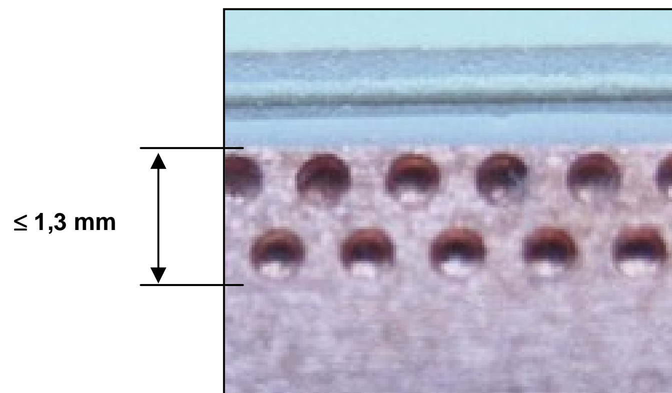

Fig. 1.2 Dimples in the MiniSKiiP bottom surface

- Due to the manufacturing process, the position of substrate in the plastic housing varies (Fig. 1.3). The maximum tolerable gap between housing and substrate is 0.55 mm.

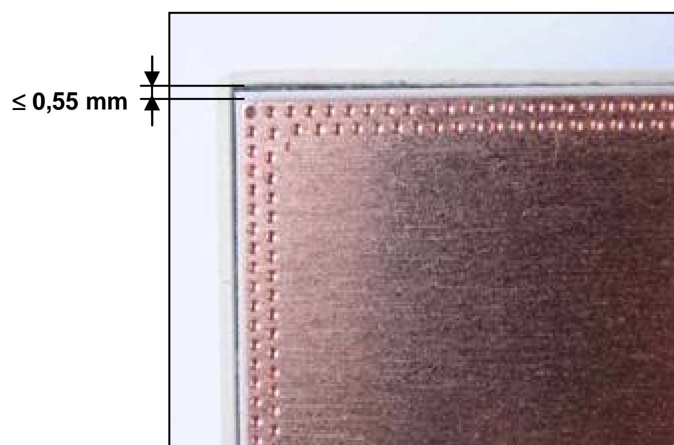

Fig. 1.3 Dimples in MiniSKiiP bottom surface

2 Assembly

2.1 Application of thermal paste

A thin layer of thermal paste should be applied on the heat sink surface or module bottom surface. The following values are recommended for „Silicone Paste P 12“ from WACKER CHEMIE:

- MiniSKiiP 0: 25 µm – 40 µm
- MiniSKiiP 1: 35 µm – 50 µm
- MiniSKiiP 2: 65 µm – 85 µm
- MiniSKiiP 3: 45 µm – 65 µm

SEMIKRON recommends screen printing for applying the thermal paste. In certain cases an applying by a hard rubber roller might be applicable.

2.2 Mounting the MiniSKiiP

Place the MiniSKiiP on the appropriate heat sink area and tighten the screw with the nominal torque: min 2.0 Nm to max 2.5 Nm.

In case of a MiniSKiiP 3 type with two screws, first tighten both screws with max. 1 Nm and then continue with nominal torque (min 2.0 Nm to max 2.5 Nm).

Due to relaxation of the housing and flow of thermal paste, the loosening torque can be reduced to 1 Nm. However, the construction of the housing, the elastic bending of the metal plate in the pressure lid and the adhesion of the thermal paste still ensure electrical contact and sufficient thermal coupling of the module to the heat sink. Do not re-tighten the screw to nominal mounting torque value again.

A MiniSKiiP can be disassembled and remounted three times maximum. The disassembly must be done very carefully, as the thermal paste causes high adhesion when removing the MiniSKiiP from the heat sink. After every disassembly all thermal paste has to be removed carefully from the module and the heat sink. Before remounting the module, thermal paste has to be applied as described above.

2.3 Mounting material:

SEMIKRON recommends as screw

- M4 according to DIN 7991 - 8.8, or similar screw with TORX-head.
- Strength of screw: “8.8”
  - = Tensile strength - Rm = 800 N / mm²
  - = Yield point - Re = 640 N / mm²
- The minimum depth of the screw in the heat sink is 6.0 mm.

3 ESD protection

MiniSKiiP modules are sensitive to electrostatic discharge. All MiniSKiiP modules are ESD protected in the shipment box with an ESD cover. During the handling and assembly of the modules use conductive grounded wristlet and a conductive grounded working place