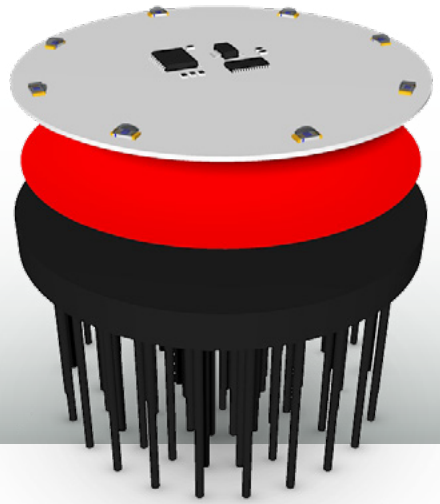
WÜRTH ELEKTRONIK

WE-TTT Design Guideline

Thermal Transfer Tape



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Thermal Transfer Tape

Thermal Management is the term used to describe the methods used take care of the excess heat that electronic devices and components generate. It is a field of upmost importance in order to guarantee reliability of electronic devices and components as well as to prevent premature failure.

1. What is the WE-TTT used for?

The WE-TTT is a double sided tape designed to provide a thermal interface material that at the same time allows for mechanical fixing in both contact surfaces.

The tape itself is composed by three main components as shown in figure 1:

- **Release tape:** The WE-TTT comes with a release tape that protects the adhesive layer from any dust or particles.
- **Thermal conductive acrylic adhesive:** This is the main heat transferring component as well as the adhesive.
- **Fiberglass mesh:** This component brings mechanical stability to the part.

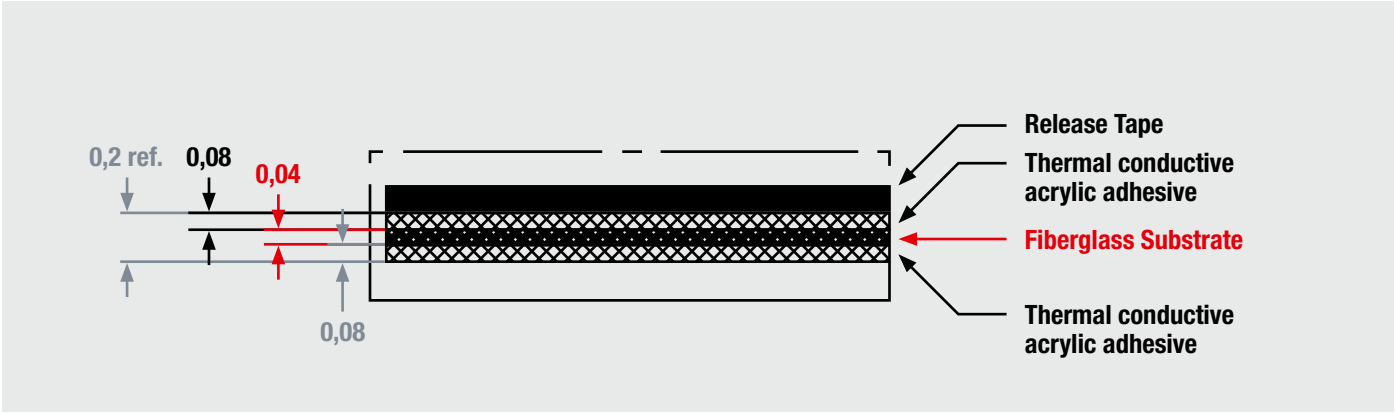

Fig. 1: *WE-TTT components*

Thermal Transfer Tape

2. Where can the WE-TTT be used?

The WE-TTT is designed to be used in low-pressure applications between a component and a cooling assembly. Due to its adhesive properties, it allows the mounting of cooling assemblies on components without additional mechanical fixing.

- **Thermal Conductivity:** WE-TTT offers 1 W/m*K across the entire line-up of the product.
- **Thickness:** Since one of its main purposes is to bind both contacting surfaces, it is required to have a low profile. WE-TTT has a standard thickness of 0.2 mm.
- **Electric Insulation:** Since the product is based on an acrylic substrate, there is complete electric insulation between the component's contact surfaces guaranteeing a minimum of 4 kV/mm.
- **Pressure sensitive adhesive:** When in position apply pressure to the final assembly for optimal mechanical fixing.

Thanks to its adhesive properties cooling assemblies such as heatsinks can be fixed on components without the need of screws or clips.

LEDs generate excess heat, thermally conductive tapes allow for the fixing of cooling assemblies that also act a cover for the device.

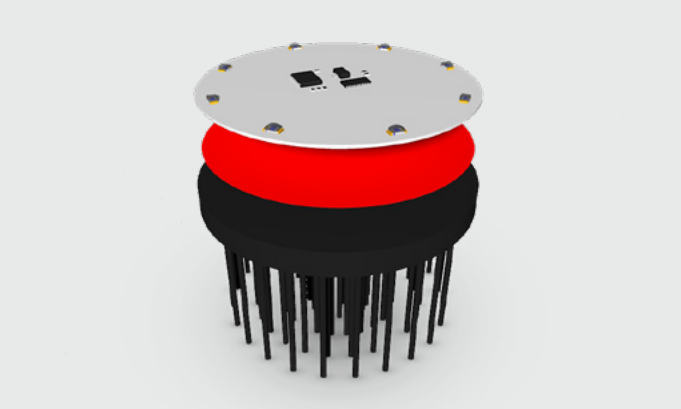

Fig. 2: *Heat sink attached to a PCB without any mechanical fixing*

Thermal Transfer Tape

3. Solutions specially tailored for you

Another benefit of the WE-TTT that adds value to its versatility is the ease of shape customization. Würth Elektronik brings this value to you by providing a customization service with no **MOQ** and **no tooling costs**.

Reach out to your Würth Elektronik representative with the following information and they will get back to you with a personized quotation:

- Volume or number of parts needed
- Technical drawing of the tailored solution
- Any other requirement you may have

4. General use of the WE-TTT recommendations

- For optimal adhesion properties, the surfaces of the component and the cooling assembly must be clean and dry. It is recommended to use Isopropyl alcohol applied with a lint-free wipe or swab for removing any particles on the surfaces.
- Gaps and/or air bubbles between the gap filler and the contact surfaces must be avoided. Otherwise, the performance of the product may be affected.
- The temperature rise of the component which needs thermal management must be taken into consideration. The operating temperature is comprised of ambient temperature and temperature rise of the component.
- It is recommended to compress the material with equal pressure on the whole surface.

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5. Frequently Asked Questions

Q: Can I modify standard parts?

A: There are many ways to tailor the part to fulfil your requirements, please contact your Würth Elektronik representative for your specific solution.

Q: What test method has been used for the thermal performance measurements provided by the datasheet?

A: All thermal related measurements have been performed following ASTM D5470.

Q: Is the WE-TTT electrically insulating?

A: Yes, as long as it is used under the dielectric strength recommended in the datasheet.

Q: Will the material change its mechanical properties under high temperatures?

A: If the material is used under the parameters specified in the datasheet will be no significant change in its hardness or any other mechanical property.

Q: Can the WE-TTT be reworked / re-attached?

A: Rework requires separation of the two substrate that destroys the tape making it unusable again.

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6. Thermal Properties & Glossary

Thermal interface materials (TIMs) are materials that are inserted between two surfaces to improve the thermal coupling between them. The usual application is between a heat source and a cooling assembly.

TIMs can be categorized in two main groups:

- **Vertical Thermal Interfaces:** The commonly used gap filling solution such as silicone elastomers, thermal transfer tapes or greases.
- **Heat spreaders:** These materials work great distributing heat from one spot to a whole surface.

Besides providing a path for heat energy to flow through, these materials provide a seamless interface between all contact surfaces, conforming to any microscopic irregularities in either the heat source or the cooling assembly. This is an important characteristic, since air is a thermal insulator and it can become a barrier that affects the overall performance of the solution.

As represented in **Figure 3**, we can combine two different TIMs to take advantage of a combination between vertical and horizontal interfaces. In the example TIM 2 could be a WE-TGF silicone gap filler and TIM 1 a WE-TGS graphite heat spreader. This combination would allow the use of a larger heatsink than the footprint of the heat source would allow, thus enhancing the cooling capabilities of the whole assembly.

There are many factors that should be taken into consideration when selecting the optimal Thermal Management Solution of your application. The most common ones are:

- **Thermal conductivity:** Determines the overall performance of the heat transfer between contact surfaces.
- **Thermal resistance:** Opposition of the material to transfer heat, the lower the resistance the more efficient the TIM is. This property is the reciprocal of the thermal conductivity.
- **Electrical conductivity:** Depending on the TIM electrical insulation can be an intrinsic property of the material. But for those that are not other layers can be added to the material in order to insulate it.
- **Operating temp range:** TIMs work at different temperature ranges so it must be taken into consideration when selecting a solution.
- **Thickness/Height:** The distance between the mating surfaces is a key factor in order to select a TIM. Depending on the solutions, it must be taken into consideration that the material should be compressed (as recommended in the datasheet) to achieve optimal thermal performance.
- **Pressure:** Depending on the final application, some materials are designed to withstand higher pressure such as the WE-TINS.

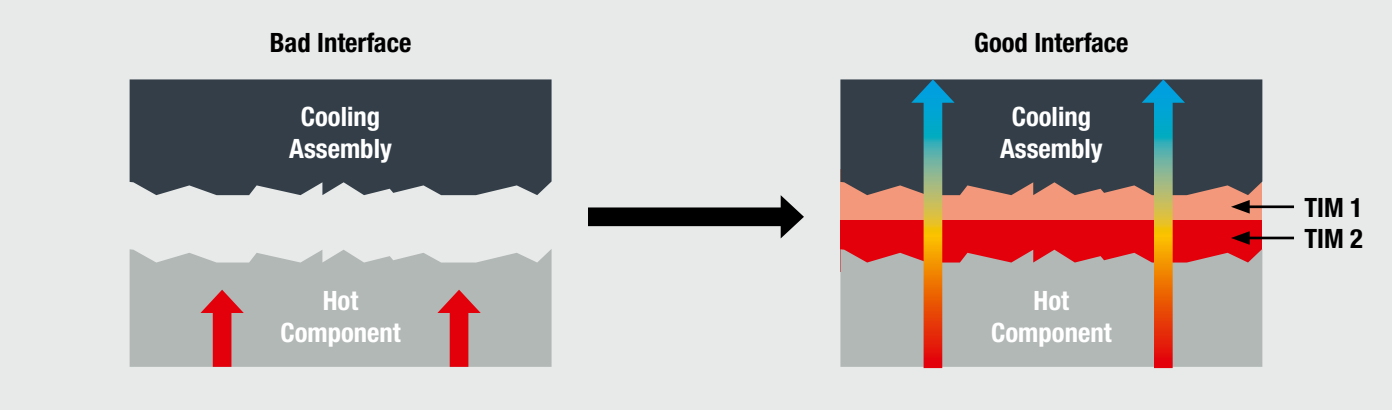

Fig. 3: *Detail of contact surfaces*

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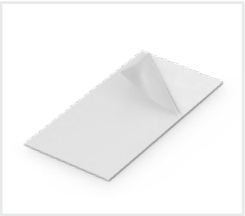
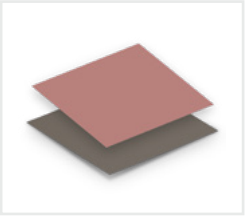
7. Würth Elektronik's Thermal Management Solutions

Gap filling solutions vary in shape and form, there are different criteria to be considered when looking for a solution: dimensions of the gap that needs filling, evaluation of the heat energy that needs to be managed and if electrical insulation is required between the hot component and the cooling assembly.

Würth Elektronik brings to you a broad portfolio with solutions for any gap, interface type and thermal conductivity.



WE-TGF
Silicone Gap Filler Pad
K: 1 – 10 W/mK
Thickness: 0.5 – 18 mm

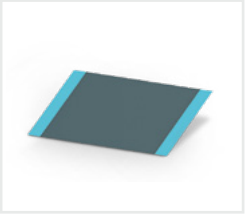


WE-TINS
Thermally Conductive Insulator
K: 1.6 – 3.5 W/mK
Thickness: 0.23 mm

WE-PCM
Phase Changing Material
K: 1.6 – 5 W/mK
Thickness: 0.2 mm

WE-TTT
Thermal Transfer Tape
K: 1 W/mK
Thickness: 0.2 mm

WE-TGFG
Graphite Foam Gasket
K: 400 W/mK
Thickness: 1.5 – 25 mm



WE-TGS
Graphite Sheet
K: 1800 W/mK
Thickness: 0.03 mm