

The **ICT-Ip50 and 60** is a graphite-filled, solvent-free, very cost-effective, electrically insulating high performance phase change material, which is used as a thermally conductive carrier of a so-called aluminum substrate. An efficient thermal connection to the contact surfaces is only possible, however, by attaching an absolutely uniform coating of the ICT-Ip50|60 phase-change-material on both sides of the substrate liner. Through the development of this unique formulation, the ICT-Ip50|60 compound already offers a very efficient thermal transmission by phase change at normal operating temperatures, while maintaining a uniform connection line during the expansion process. The result is that air is efficiently expelled and therefore any surface irregularities or flatness conditions that are present on the interface can be minimised.

**ICT-IP50 and 60** can be produced by several consecutive, innovative and technically very mature production steps also in further different material thicknesses and with the inclusion of other other aluminium substrate thicknesses. Using this thermal interface solution, for example, the heat generated by power electronics, transistors, diodes, microprocessors or any other application can be successfully heated. With the different material thicknesses available, it is also possible to cover a wide range of insulated power supplies. Only through efficient and reliable contact connection between heat generation and heat sink can an optimal thermal to the heat sink or to the housing tray be done.

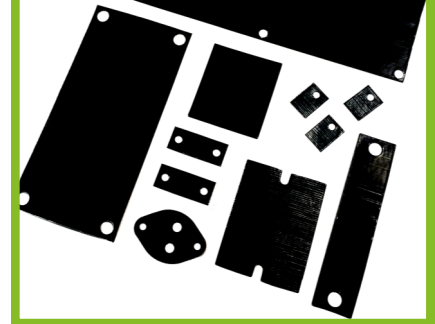
## THERMAL CONDUCTIVITY

( W/mK )

# 220

(Aluminum Substrate-liner)

$R_{th} = 0.02^{\circ} \text{C} \cdot \text{in}^2 / \text{Watt}$



### Typical areas of application

- **Power Module** (IGBT)
- **LED**
- Diodes / Relays
- **Power Semiconductors**
- Heat sinks/Housings
- Power Electronics
- Transistors
- Microprocessors
- RF Components
- Big Surfaces

### What is ICT-Ip50 and 60 ?

ICT-Ip50 | 60 is designed as a pre-formed, so-called heat-conductive "drop in place" TIM, which not only offers excellent heat transfer properties by the construction of the composite formulation itself, but also by the formulation of graphite particles into their uniform layer thickness in X-, Y-and Z-dimensions, the surface cooling again is demonstrably optimized. From the installation perspective, heat conducting pastes are more difficult to process and can only be distributed with considerable additional effort on the surfaces to be contacted. As a result, these tend to provide insufficient coverage and an uneven thickness over the boundary surface, which then sometimes tends to leave trapped air, which in turn leads to poor heat transfer. The topic of cleaning residues of thermal paste in undesirable areas is also required and must be taken into account.

### Superior alternative to thermal paste

ICT-Ip50 and 60 is a solvent-free thermal interface material which is designed to provide an efficient thermal transmission by providing a precise phase change and a uniform layer thickness via a device/component mounting interface. The ability to manufacture ICT Ip50|60 in a variety of different layer thicknesses using aluminum substrate thicknesses as well as in rolls, sheets or stamped allows us to meet a wide range of requirements for multiple industries. The inherent flexibility of ICT-Ip50|60 from manufacturing to installation makes it an ideal solution for applications ranging from very low small volumes (prototype) to high volume environments.

### Heat conducting paste

- No guaranteed layer thickness
- Included air share
- No process safe to install
- Requires cleaning
- Can dry out or expel

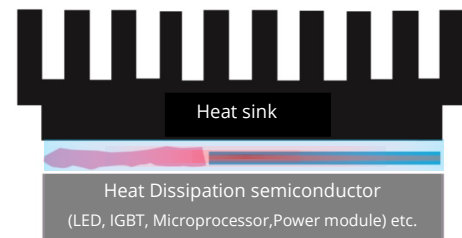
### ICT-Ip50|60 Interface material

- Removes air
- Uniform and very good flatness
- No cleaning necessary
- Quickly and easy installation

### Standard Interface Setup

|   |
|---|
| ICT-Ip50 60 Thermal Phase Change Compound |
| Aluminum 1145-O Substratliner             |
| ICT-Ip50 60 Thermal Phase Change Compound |

On Page 2 you get further information.



## Thinner vs Thicker

The ICT-IP50 and 60 series are manufactured in a number of different phase coating thicknesses as well as aluminium substrate thicknesses to meet different surface flatness conditions such as total interface size or nominal gap filling requirements. It is typically advisable to use larger surfaces with surface finishes of more than 64 microns and/or flatness conditions exceeding 0.012 mm, to use thicker composite coating thicknesses to enable the ICT Ip50 | 60 connection to adapt to these characteristics during the initial phase change. Filling a nominal gap requirement with processed and clean interface surfaces can typically also be achieved with thicker substrate options.

## Removing air pockets

A primary advantage of using the ICT Ip50 (60) phase change material is the ability to expel air from the inside of the interface during the initial device cycle, resulting in a phase change and excellent surface wetting of the thermal composite coating.

## Standard ICT-Ip50 and 60 material composition

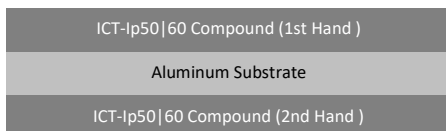
The ICT-IP50 and 60 series is manufactured by default in a range of phase change coating thicknesses as well as aluminium-1145-O (turnout) aluminium substrate thicknesses, which enable us to access standard and customer-specific equipment/assembly requirements. Below you will find an overview of the standard ICT AP60 material variants for selection

| Standard ICT-Ip50   60<br>Material Composition    | 0.001" / 0.025mm<br>Aluminum 1145-O | 0.002" / 0.051mm<br>Aluminum 1145-O | 0.003" / 0.076mm<br>Aluminum 1145-O | 0.005" / 0.127mm AL 1145<br>Aluminum 1145-O  | 0.010" / 0.254mm<br>Aluminum 1145-O |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--|-------------------------------------|
| F   G05 (0.00025" / 0.006mm)<br>compound per side |                                     | AL2-F   G03 *<br>0.0025" / 0.064mm  | AL3-F   G03<br>0.0035" / 0.089mm    | The F   G03-Coating is a nominal, thin coating process in which a so-called strip (strip) coating is applied.          |                                     |
| F   G05 (0.0005" / 0.013mm)<br>compound per side  | AL1-F   G05<br>0.002" / 0.051mm     | AL2-F   G05 *<br>0.003" / 0.076mm   | AL3-F   G05<br>0.004" / 0.100mm     | AL5-F   G05<br>0.006" / 0.152mm  | AL10-F   G05<br>0.011" / 0.279mm    |
| F   G06 (0.00065" / 0.017mm)<br>compound per side | AL1-F   G06<br>0.0023" / 0.058mm    | AL2-F   G06 *<br>0.0033" / 0.084mm  | AL3-F   G06<br>0.0043" / 0.109mm    | AL5-F   G06<br>0.0063" / 0.160mm   | AL10-F   G06<br>0.0113" / 0.287mm   |
| F   G13 (0.00125" / 0.032mm)<br>compound per side | AL1-F   G13<br>0.0035" / 0.089mm    | AL2-F   G13*<br>0.0045" / 0.114mm   | AL3-F   G13<br>0.0055" / 0.139mm    | * Custom substrate liner types and thicknesses available on request, double laminated constructions are also available |                                     |

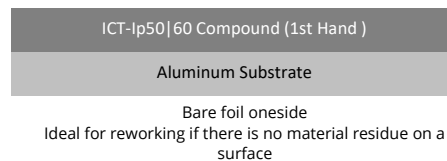
## ICT-Ip50 | 60 Standard and customer specific material variations

\* Frequently used material compositions of IP 60 used by customers.

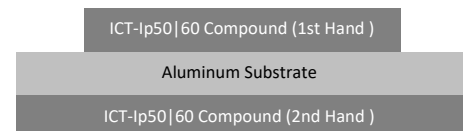
### Standard coated on both sides



### Coated on one side



### Partial coating

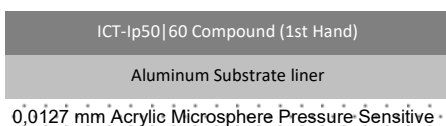


## ICT-Ip50 | 60 One-sided adhesive liner options

### (100% adhesive-backed, with self-adhesive back)

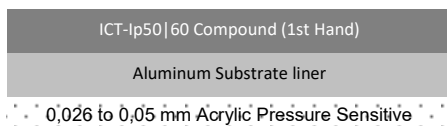
Note: the use of an additional adhesion layer to 100% for the surface to be used will affect the overall thermal performance of the material.

#### Low Tack Repositionable (LT05)



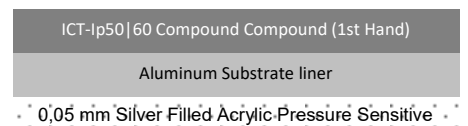
0,0127 mm Acrylic Microsphere Pressure Sensitive

#### High Tack Permanent (HT1 or HT2)



0,026 to 0,05 mm Acrylic Pressure Sensitive

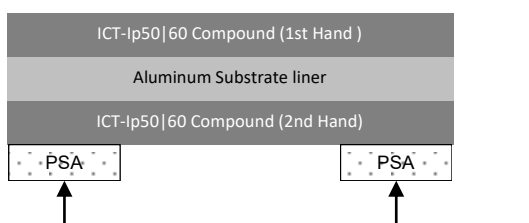
#### High Tack Permanent Silver Filled (ZE2)



0,05 mm Silver Filled Acrylic Pressure Sensitive

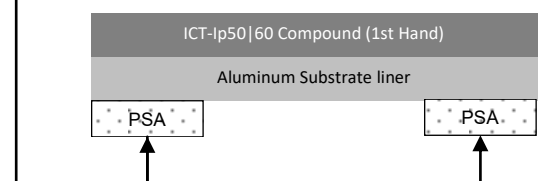
## ICT-Ip50 | 60 One-sided adhesive liner options (Partial adhesive back-strip on the edges)

### One-sided adhesive strip on the compound



Note: The partial placement, which is designed for the application of adhesion strips outside the primary heat over such a thermal performance is not affected.

### One-sided adhesive strip without compound



## Physical Properties/ Shapes/ Characteristics

| Properties  | ICT-Ip50 and 60 Series   |
|---|--|
| Basic formulation (connection)  | Proprietary  |
| Phase Change temperature  | 50   60°C / 122   140°F  |
| Viscosity @ Phase Change  | Thixotropic  |
| Total thickness tolerance   | Thickness +/- 10% (typical)  |
| ICT-Ip50 (60) Color   | Black  |
| Separator / Color   | Separating paper/ white  |
| Available formats   | Master Rolls / Slit Rolls / Lose or on Carrier Kiss cut                                  |
| Maximum Master Roll width   | (29.2cm) or (44.5cm)   |
| Standard Master Roll length   | 7,5 / 15 / 30 / 76 and 152 meter   |
| Custom role lengths and widths available  | Yes (depending on customer request from 15mm width)                                      |
| Standard sheet sizes  | Standard DIN A4 / 30 cm x 60 cm or (40 cm x 60/100 cm) and depending on customer request |
| Thermal Gassing rate (Only ICT-IP 50   60 (PCM compound))   | Result   |
| Total Mass Loss,% TML   | 0.138  |
| Measurable evaporation of the condensable material, % CVC<br>(Collectible Volatile, Condensable Matter) | 0.130  |
| Water Vapor Gain, % WVR   | 0.021  |

**Note:** Thermal gassing rate referring to [ASTM E595-93](#) only carried out with thermal compound formulation.  
Due to the gassing, the ICT IP50 and 60 are suitable for aerospace.

| ICT-Ip50   60 Storage conditions & shelf life                 | Result  |
|---|---|
| Shelf life and temperature                                    | Refrigerated storage without direct sun exposure 20-25 °C (under 95°F/ 35°C)<br>And humidity of HR 50%  |
| Durability  | Unlimited in compliance with storage conditions   |
| Necessary transports to be planned<br><br>Methods/ Conditions | Due to the temperature-sensitive design of the mixing conductive materials/products it is advisable to plan transports and air freight so that during the warm months the products are packaged so that the phase change of the thermal connection is not activated.<br><br>Long-lasting transports in elevated temperature environments (May to September) can be avoided by using cooling packages. |

## Formulation revision (production of PCM according to customer specification)

Due to the flexibility in terms of technology and performance it is possible for ICT SUEDWERK that in consultation with the manufacturer of these PCM products additional form factors can be made available to the customer (customer-specific application requirements) in addition to the standard formulations. For example, the material manufacturer can also provide the customer with smaller formulation adjustments if necessary. This is done through basic composite modification in relation to filler particles, size or structure. These options are available to the customer as needed, as the standard formulations that the users have tested and can be used to provide the basis for further modifications/developments by means of targeted feedback.

## Application: Repair work/ cleaning of the surfaces after use

A residue-free removal of ICTIp50|60 of your application is possible at any time. Remove the electronic component from the heat sink, or the housing tray, and then remove the pad. Please do not use any mechanical tools that may cause damage to the surfaces. The PCM compound residue on the application surface should not be removed with aggressive mineral spirits, solvents or isopropyl alcohol and a soft cloth. Light heating of contaminated surfaces supports the cleaning process and makes the removal of material residues.

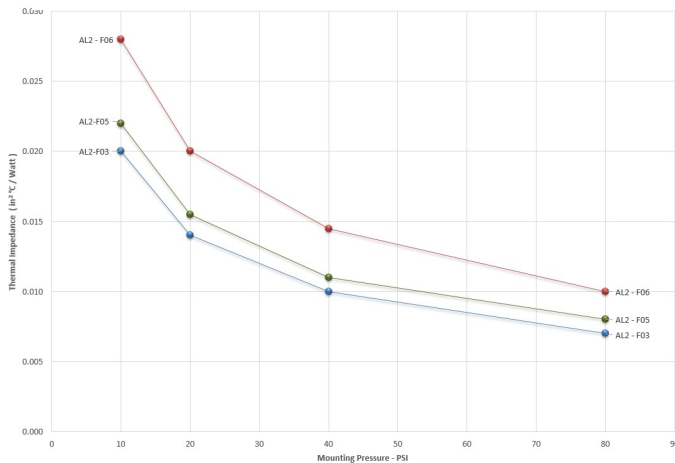
It is important to make sure that the surfaces to be contacted are completely clean and free of dirt, grease and other residues before applying the new P-C-M pad.

## Overview of thermal heat transfer resistors versus contact pressure (in<sup>2</sup>= 645 mm<sup>2</sup>)

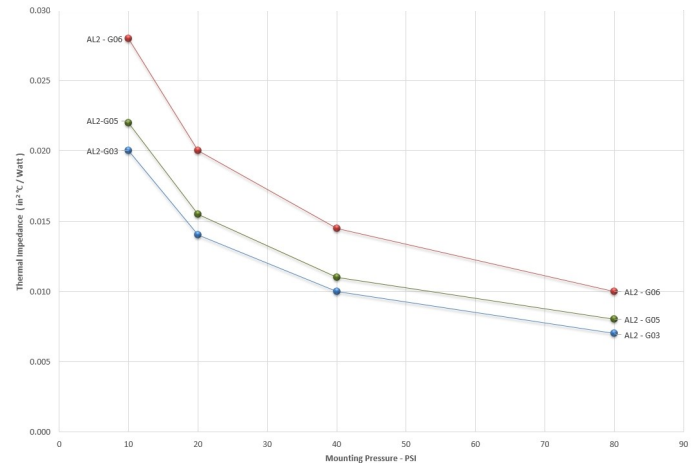
| Type Name            | @ 10 PSI   0,006 kN/cm <sup>2</sup> | @ 20 PSI   0,013 kN/cm <sup>2</sup> | @ 40 PSI   0,027 kN/cm <sup>2</sup> | @ 80 PSI   0,055 kN/cm <sup>2</sup> |
|----------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| ICT-Ip50-F03-AL2     | 0.020 °C-in <sup>2</sup> / Watt     | 0.014 °C-in <sup>2</sup> / Watt     | 0.010 °C-in <sup>2</sup> / Watt     | 0.007 °C-in <sup>2</sup> / Watt     |
| ICT-Ip50-F05-AL2     | 0.022 °C-in <sup>2</sup> / Watt     | 0.015 °C-in <sup>2</sup> / Watt     | 0.011 °C-in <sup>2</sup> / Watt     | 0.008 °C-in <sup>2</sup> / Watt     |
| ICT-Ip50-F06-AL2-H   | 0.028 °C-in <sup>2</sup> / Watt     | 0.020 °C-in <sup>2</sup> / Watt     | 0.014 °C-in <sup>2</sup> / Watt     | 0.010 °C-in <sup>2</sup> / Watt     |
| *ICT-Ip50-F13-AL2-H2 | 0.028 °C-in <sup>2</sup> / Watt     | 0.020 °C-in <sup>2</sup> / Watt     | 0.014 °C-in <sup>2</sup> / Watt     | 0.010 °C-in <sup>2</sup> / Watt     |
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| *ICT-Ip60-G13-AL2-H2 | 0.028 °C-in <sup>2</sup> / Watt     | 0.020 °C-in <sup>2</sup> / Watt     | 0.014 °C-in <sup>2</sup> / Watt     | 0.010 °C-in <sup>2</sup> / Watt     |

**Note:** \*ICT-Ip50-F13-AL2-H2 and ICT-Ip60-G13-AL2-H2 have a quadruple coating. The values are comparable to the AL2 F06 and AL2 G06. The material flows under pressure.

### ICT-Ip50 Thermal Impedance vs. contact pressure



### ICT-Ip60 Thermal Impedance vs. contact pressure



The information contained in this technical data sheet, including recommendations for the use and application of the product described, is based purely on the knowledge and experience of the material manufacturer at the current exhibition date of this publication. The information listed in this technical data sheet does not go beyond the specifications described in this TDs and only explain or describe the typical performance of the product as a single component, therefore, before using and using the product, the user has to evaluate and test this accordingly, whether they are suitable and can also be installed in his products.

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The Rep Company



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