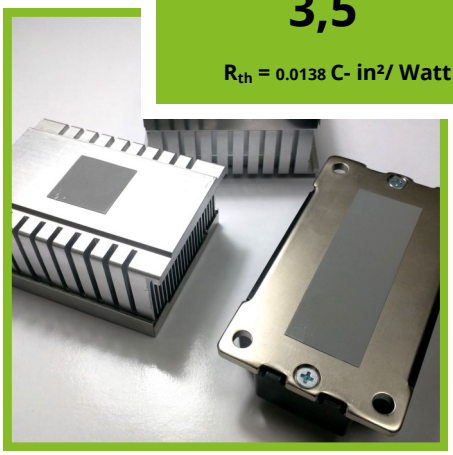
ICT-Xp45-W Series

High-Performance Phase-Change-Material
45°C/113°F Phase-Change Temperature

THERMAL CONDUCTIVITY
(W/mK)

3,5

R_{th} = 0.0138 C- in²/ Watt



ICT-Xp45-W is a completely substrate-free 45 °c phase-change film. This latest product development offers excellent heat transfer for a wide range of electronic applications, including IGBT power modules as well as high-power LED Cob's for connection to heat sinks and microprocessor cooling.

ICT-Xp45-W is available as a standard phase change film in various thicknesses (0.1 mm, 0.2 mm, 0.3 mm), and in addition as roll, sheets or even in pre-stamped shapes according to customer specification, which enable a quick and clean installation on the surface.

Through the development of this unique formulation, the high-performance compound already offers a very efficient thermal transmission by phase change at low operating temperatures, while maintaining a uniform connection line during the expansion process. With the result that air is effectively expelled and thus any surface irregularities or flatness conditions that are present on the interface can be demonstrably minimised.

Using this thermal interface solution, for example, power electronics, transistors, diodes, microprocessors, and especially led applications, can be successfully deheated at low operating temperatures. With the different available material thicknesses it is also possible that a wide range of insulated semiconductors can be covered. Only through efficient and reliable contact connection between heat generation and heat sink can therefore also be an optimal thermal in the heat sink or in the housing tray.

Typical areas of application										
	• Power Module (IGBT)	• **LED**	• Diodes / Relays	• Power Semiconductors	• Heat sinks/ Housings
	• Power Electronics	• Transistors	• Microprocessors	• RF Components	• Big surfaces / Transfer

What is ICT-Xp45-W ?

ICT-Xp45-W is designed as a preformed, so-called heat-conducting "drop in place" Tim, which not only provides excellent heat transfer properties by the design of the composite formulation itself, but also through its uniform layer thickness in x, y and z dimensions. From the point of view of the installation perspective, thermal compounds 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 an insufficient coverage and a uniform thickness over the interface, which then sometimes leaves more trapped air, which in turn leads to poor heat transfer. The subject of the cleaning of residues of the thermal paste in undesirable areas is also required after and must be taken into account.

Superior alternative to heat conducting paste

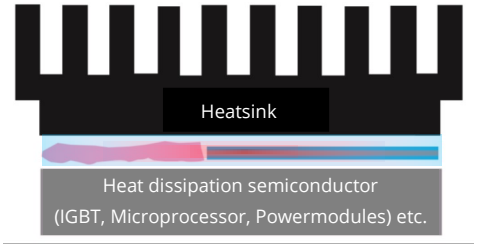
ICT-Xp45-W is a solvent-free, thermal-interface material, which is technically designed to provide an efficient thermal transmission at a precise phase change temperature in conjunction with an even layer thickness. The ability to manufacture ICT-Xp45-W in a variety of different layer thicknesses in rolls, sheets cut or stamped, allows us to meet a wide range of requirements for multiple industries. The inherent flexibility of ICT-Xp45-W 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

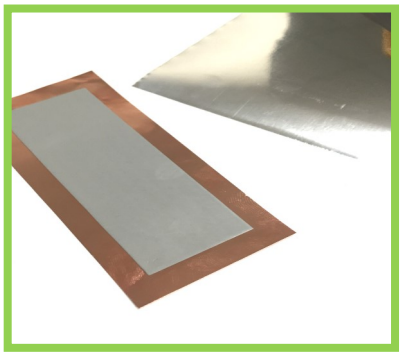
- Unevenly applied
- Trapped air in air pockets
- Not process safe to install
- Requires cleaning
- Defunds and dries out

ICT-Xp45-W Interface

- Efficiently removes air pockets
- Uniform and very good flatness
- Quick and easy installation
- Process-safe replacements
- Exzellente Thermische Performance



On page 2 you get further technical informations



It is also possible to coat the ICT-Xp45-W phase change material on one side of the thin metal foil substrate for customers who need one side of an interface to assemble for the restoration or component design.

Telephone: +49-89-2123102-0 e-mail: info@ict-suedwerk.de website: www.ict-suedwerk.de

Thinner vs thicker

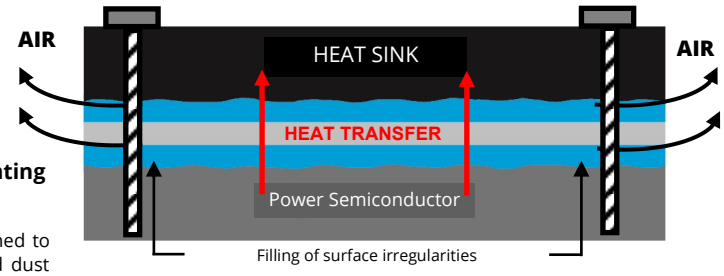
ICT-Xp45-W is available in three so-called interface thicknesses (0.1mm, 0.2mm, 0.3mm). These thicknesses cover the different types of surface conditions, as well as all interface sizes and/or nominal gap filling requirements. Typically surfaces whose conditions exceed 0.051mm mm should be bridged with the available material thickness 0.2mm or 0.3mm.

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 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.

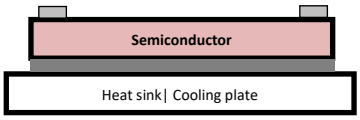
Note : During the initial phase change, it is recommended that you re-check the torque settings if the device uses a screw system for pressurization



Increasing by means of additional torque during the initial phase change will improve or minimize the material connection, resulting in further improved thermal performance.

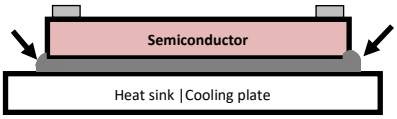
Correct selection of material thickness and surface when mounting with glands

The general x and Y dimensions of the ICT-Xp45-W should of course be tuned to the application to be fastened. The surface must be absolutely grease and dust free and must not have any shavings or even burring. Consideration must also be given to the use of different metal alloys in fastening management. The initial torque when attaching the application should be calculated using the different temperature strokes during operation, so that re-tightening after the phase change process is not absolutely necessary...



Material flows to the perimeter without leaving the affected interface.

The determination of optimal pad sizing is more critical in this scenario if no perimeter bead is allowed in this requirement.

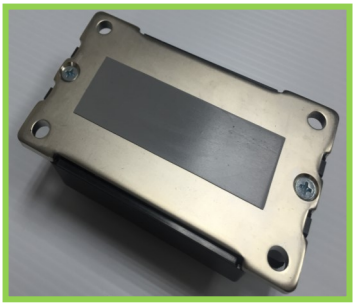


Material that can leave the interface and form a peripheral bead where it comes into contact with the ambient air.

The bead is only moved on the outer side of the interface and goes back to its fixed state.

The following example shows a 0.10 mm thick interface pad that follows the outer contour of the boundary surface and has the mounting holes, since the propagation is not so significant in the initial phase change.

The following example is a 0.25 mm thick Tim Pad, which due to the increased thickness of the film is significantly below the circumference, because the flow/expansion will be more significant at the initial phase change.



How big should a Tim pad be dimensioned in a clip system?

As a general guideline for traditional microprocessor or memory module applications within a heatsink clip mounting scenario, a nominal Tim-pad overvalue of the processor or chip-factor should be taken into account, as typically lighter pressures may also be involved.

Re-tightening the screws after first phase change process yes or no ?

A re-tightening of the fixing screws after initial start-up and the associated phase-change process is always not necessary if all technical parameters are complied with in relation to cleanliness, tolerances and planarity.

A re-tightening of the fastening screws is also not harmful, because different, used materials around the application are subject inevitably to different thermal expansion coefficients.

The so-called fine-tuning, which is caused by post-regulation, means a further additional pressure loading which in the result reduces the bond line again and contributes to an increased thermal performance.

It is therefore always recommended to calculate a possible pressure loss after the first phase change process in advance into the corresponding total calculation of the thermal path.

Galvanic isolation!

ICT-Xp45-W is a specially formulated composite base with a defined mixing of conductive particles.

Although the material is not electrically conductive, it cannot be used as an dielectric barrier for insulation requirements.

Please refer to our ICT-Dp60, our ICT-Up60 or our ICT-Ep60 product lines.

Further information on dielectric, thermal interface solutions for non-insulated electronic components can be obtained at: info@ict-suedwerk.de or www.ict-suedwerk.de

Physical properties/ shapes/ characteristics

Properties	ICT-Xp45-W-Series
Basic formulation (connection)	Proprietary
Thermal conductivity	3,5 W/m*K
Phase change temperature	45°C (+/- 6C)
Viscosity @ Phase change Volumetric Expansion	Thixotropic 15%
Total thickness tolerance	4 mil (0.10mm) +/- 20% 8 Mil (0.20mm) +/- 15% 12 Mil (0.30mm) +/- 10%
ICT-Xp45-W color	Grey
Separator / Color	PET / Silicone paper white
Available formats	Roll formats / Slit Rolls/ Die Cut Frame System
Maximal master roll width	ICT-Xp45-W width = 35.6cm T300-12 (Top Liner) -0.076mm /PET Liner /40.6cm T200W white or T200C-PET Liner 0.051mm / 40.6cm
Standard master roll length	30 meter / 76 meter / 152 meter and by arrangement
Custom role lengths and widths available	Sheet Size = 14.00" x 12.00" (35.6cm x 30.5cm) T300-12 (Top Liner) - 0.003" (0.076mm) Clear—16" (40.6cm) T200W (white) or T200 (clear) - 0.002" (0.051mm) - 16" (40.6cm)
Standard sheed sizes	Standard DIN A4 / 30 cm x 60 cm or (30 cm x 100 cm) and depending on customer request

ICT-Xp45-W Storage conditions and shelf life	Results
Storage conditions and temperature	Refrigerated storage without direct sun exposure 20-25 °C (under 95°F 35°C) And humidity by HR 50 %
Storage durability	At least 2 years from the date of manufacture. It is recommended to leave the product in the original packaging until its used.
Necessary transports to be planned Methods/ Conditions	Due to the temperature-sensitive design of the thermal conductive materials/products it is advisable to plan transport and air freight so that during the warm months the products are packaged in such a way that the phase change of the thermal connection is not activated. Long-lasting transport conditions in elevated temperature environments (May to September) must 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 to provide further form factors to the customer in consultation with the manufacturer of these PCM products in addition to the standard formulations (customer-specific application requirements). 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 ICT-Xp45-W at your application is possible at any time. Remove the electronic component from the heat sink, heatsink or 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 be removed with non-aggressive mineral spirits solvent or isopropyl alcohol and a soft cloth. Light heating of contaminated surfaces supports the cleaning process and makes the removal of unwanted glue.

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.

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The Cut Frame Transfer System

The primary goal of the new development of ICT-Xp45-W was not only excellent thermal performance, but also a decisive advantage in handling compared to other competitor materials already available on the market to offer the user.

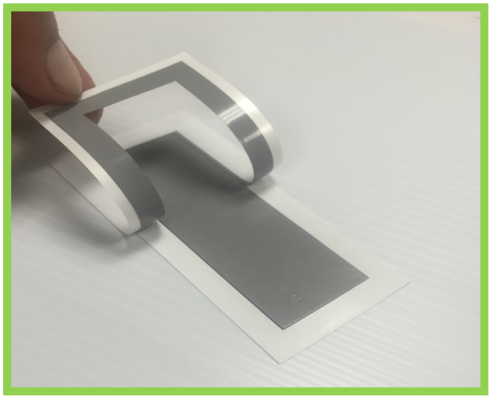
In addition to a better thermal conductivity from the manufacturer, the so-called cut thermal pad transfer system was developed, which was further refined during the processing process by ICT SUEDWERK. The purpose of this-cut frame system-is to avoid commonly known problems with phase-change application systems that are similar to those available on the market.

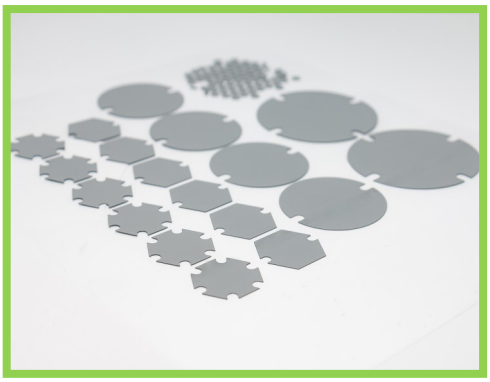
⇒ The direct touching of the phase change films when attaching to the contact area

⇒ Breaking the film during the fixation process

⇒ Inconsistent attaching of the pads to the modules or heat sink

⇒ The inconsistent transfer of the Tim pad from the release liner to the surface. The PCM film remains attached to the release liner and rips partially apart -> new install or same new Tim pad required





Overview of thermal heat transfer resistors versus contact pressure (in²= 645 mm²)

ICT-Xp45-W Thermal impedance

tested & performed per ASTM D5470

ICT-Xp45-W-4 (0.10mm)

*	**10 PSI**.....0.0138 °C-in² / W	|	*0.089 °C-cm² / W*
*	**20 PSI**.....0.0114 °C-in² / W	|	*0.074 °C-cm² / W*
*	**40 PSI**.....0.0087 °C-in² / W	|	0.056 °C-cm² / W
*	**80 PSI**.....00070 °C-in² / W	|	*0.045 °C-cm² / W*
*	**100 PSI**....0.0064 °C-in² / W	|	*0.041 °C-cm² / W*

ICT-Xp45-W-8 (0.20mm)

*	**10 PSI**.....0.0148 °C-in² / W	|	*0.095 °C-cm² / W*
*	**20 PSI**.....0.0118 °C-in² / W	|	*0.076 °C-cm² / W*
*	**40 PSI**.....0.0093 °C-in² / W	|	*0.060 °C-cm² / W*
*	**80 PSI**.....0.0076 °C-in² / W	|	*0.049 °C-cm² / W*
*	**100 PSI**....0.0069 °C-in² / W	|	*0.045 °C-cm² / W*

ICT-Xp45-W-12 (0.30mm)

*	**10 PSI**.....0.0158 °C-in² / W	|	*0.102 °C-cm² / W*
*	**20 PSI**.....0.0124 °C-in² / W	|	*0.080 °C-cm² / W*
*	**40 PSI**.....0.0100 °C-in² / W	|	*0.065 °C-cm² / W*
*	**80 PSI**.....0.0082 °C-in² / W	|	*0.053 °C-cm² / W*
*	**100 PSI**....0.0076 °C-in² / W	|	*0.049 °C-cm² / W*

Further information:

* RoHs Compliant / Halogen Free Compliant

ICT-Xp45-W different methods for applying the Tim pad

By using new release liner specially developed for this product in conjunction with new special CNC cutting techniques, ICT-CONSIDERATIONS45-W can now be installed by the user without touching or damaging the soft phase change material. The pad transfer System thus simplifies the calibration and eliminates the aforementioned problems in the handling of the PCM product.

⇒ Tim-Pad Attach: Place Tim, the thermal film begins to transfer under its own weight to the contact surface. The release liner can then be removed between approximately 30-60 minutes depending on the ambient temperature (21 °c to 25 °c).

⇒ Nominal finger pressure: Place Tim-pad, exert nominal finger pressure on the perimeter and on the inside of the pad before the release liner is removed (duration: 1-2 minutes)

⇒ Mounting with Roller: Place Tim-pad, with one hand (automatic)-roller with pressure at least 4 times before and then go back before the release liner is removed (duration: immediately)

⇒ Pneumatic press: Place the pad, press it with a low pressure and insert a press pad (1-5 seconds) and then remove the release liner (Duration: immediately)

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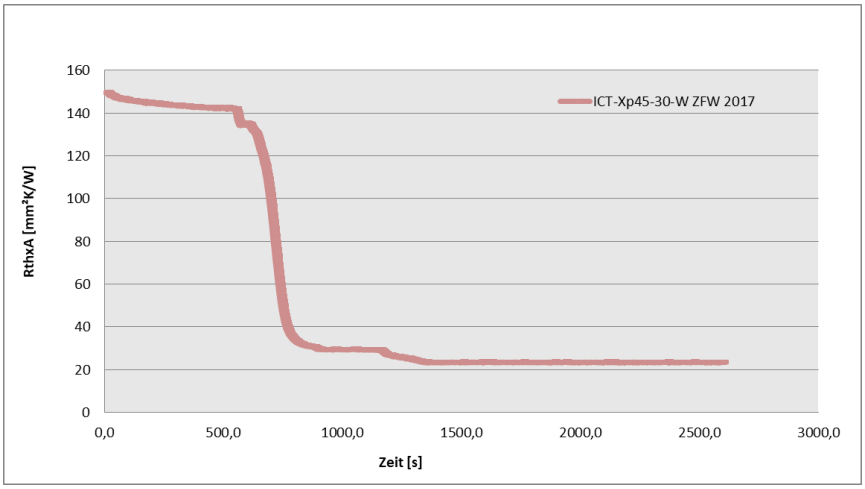
Stationary cylinder method according to ASTM D5470-12



Test report: ICT|TIM: 141012013 Datum: 04.07.2017

Material: **ICT-Xp45-W-30 ZFW 2017**

Measuring surface: 706,86 A [mm²] Probable error* [%] related to RthxA [mm²K/W]

const. pressure

Time [s]	Gap [mm]	Force [N]	Rth [K/W]	λ_{eff} [W/mK]	RthxA [mm²K/W]	Pressure [bar]	T_{Sample} [°C]	Q_{Medium} [W]	Error* [%]
1	0,225	40	0,21	1,51	149,4	0,6	34,9	25,7	7,2
2	0,225	40	0,21	1,51	149,4	0,6	34,9	25,7	7,2
3	0,225	40	0,21	1,51	149,5	0,6	34,9	25,7	7,2
4	0,225	40	0,21	1,51	149,5	0,6	34,9	25,7	7,1
2583	0,039	71	0,03	1,68	23,2	1,0	35,5	28,6	24,4
2584	0,039	71	0,03	1,68	23,2	1,0	35,5	28,6	24,1
2585	0,039	71	0,03	1,67	23,3	1,0	35,5	28,6	23,8
2586	0,039	71	0,03	1,66	23,3	1,0	35,5	28,6	24,1
2587	0,039	71	0,03	1,66	23,4	1,0	35,5	28,6	24,3
2588	0,039	71	0,03	1,66	23,4	1,0	35,5	28,6	24,2
2589	0,039	71	0,03	1,67	23,3	1,0	35,5	28,6	24,1
2590	0,039	71	0,03	1,67	23,2	1,0	35,5	28,6	24,0

The effective λeff thermal conductivity is 1,67 W/m*K

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