CIPOS™ Prime molded module: assembly guidelines

Heatsink assembly, insulation coordination, handling and storage

About this document

Scope and purpose

This document provides guidelines on how to mount Infineon's CIPOS™ Prime molded module to a heatsink ensuring a mechanically reliable, thermally performant and electrically safe assembly in the customer application.

Intended audience

The intended audiences for this document are design engineers, technicians, and developers of electronic systems.

Keypoints

- Heatsink assembly
- Selection of screws and thermal interface material
- Insulation coordination
- Handling and storage

About this product family

Product family

The CIPOS™ Prime product offers an integrated solution for high frequency power conversion applications. The power module includes four or six SiC MOSFETs and a NTC and enables high power density. The DCB substrate enables optimal thermal performance as well as electrical insulation with the package being designed to ensure a high creepage distance.

Target applications

- On-board charger (OBC): Application web-page
- DC-DC converter: Application web page
- Electric vehicle (EV) charging: Application web page
- Power conversion AC-DC, DC-AC: Application web page

Table of contents

About this document **1**
About this product family **1**
Table of contents **2**
1 Product information **3**
2 General package characteristics **5**
2.1 Package structure 5
2.2 PG MDIP-32-1 5
2.3 Footprint 7
2.4 Warpage 8
3 Heatsink assembly **10**
3.1 General principles 10
3.2 Different assembly sequences 10
3.3 Thermal interface material selection and application 12
3.3.1 TIM application 12
3.4 Screw selection and tightening 15
3.5 Soldering process 17
4 Insulation coordination **18**
4.1 Extending the pin-to-heatsink clearance by using insulation foil 20
4.2 Alternative approach to stepped heatsink design 21
5 Device handling **23**
5.1 Device marking specification 23
5.2 Device packing and storage specification 23
5.3 ESD handling 25
6 Appendix **26**
7 Related resources **29**
References **30**
Revision history **31**
Disclaimer **32**

1 Product information

CIPOS™ Prime is available in a 4-pack and 6-pack configuration with different pin maps. Table 1 gives an overview.

Table 1 CIPOS Prime product line-up

Sales code	**Nominal $R_{ds,on}$ [mΩ]**	**Topology**	**Pin map**
AMF12S18LB2Z	18	4-pack	4-pack pin map 1
AMF12S25LB2Z	25	4-pack	4-pack pin map 1
AMF12S36LB2Z	36	4-pack	4-pack pin map 1
AMF12S54LB2Z	54	4-pack	4-pack pin map 1
AMF12S62LB2Z	62	4-pack	4-pack pin map 1
AMM12S18LB1Z	18	6-pack	6-pack pin map 1
AMM12S25LB1Z	25	6-pack	6-pack pin map 1
AMM12S36LB1Z	36	6-pack	6-pack pin map 1
AMM12S36LB1Z2	18 and 36	4-pack 36mΩ + half-bridge 18mΩ	6-pack pin map 1
AMM12S54LB1Z	54	6-pack	6-pack pin map 1
AMM12S54LB2Z	54	6-pack	6-pack pin map 2
AMM12S62LB1Z	62	6-pack	6-pack pin map 1
AMM12S62LB2Z	62	6-pack	6-pack pin map 2

The three different pin maps can be found in the appendix to this document. The nomenclature of the product sales code is explained in Figure 1.

1	2	3	4		5	6		7	8	9		
A	M	M	1	2	S	1	8	L	B	(x)	(x)	(x)

1. Qual grade

Code	Meaning
A	Automotive
(blank)	Industrial

2. Gate driver option

Code	Meaning
I	IPM: with integrated gate driver
M	MM: molded module without gate driver

3. Configuration

Code	Meaning
F	4-pack
M	6-pack

4. Voltagte class

Code	Meaning
1 2	1200 V

5. Power switch technology

Code	Meaning
S	SiC
G	GaN

6. On resistance

Code	Meaning
1 8	18 mOhm

7. Package option

Code	Meaning
L	DIP 44x28DA
M	

8. Derivatives

Code	Meaning
B	The second generation of SiC MOSFET

9. Other options

Code	Meaning
1	Pin map 1
2	Pin map 2
Z	Zig-zag pin
2	Two different chips
E	Short-circuit rated

Figure 1 CIPOS™ Prime product nomenclature

2 General package characteristics

2.1 Package structure

The general structure of CIPOS™ Prime molded module is shown in Figure 2 below. Please note that this figure is only illustrative and not to scale.

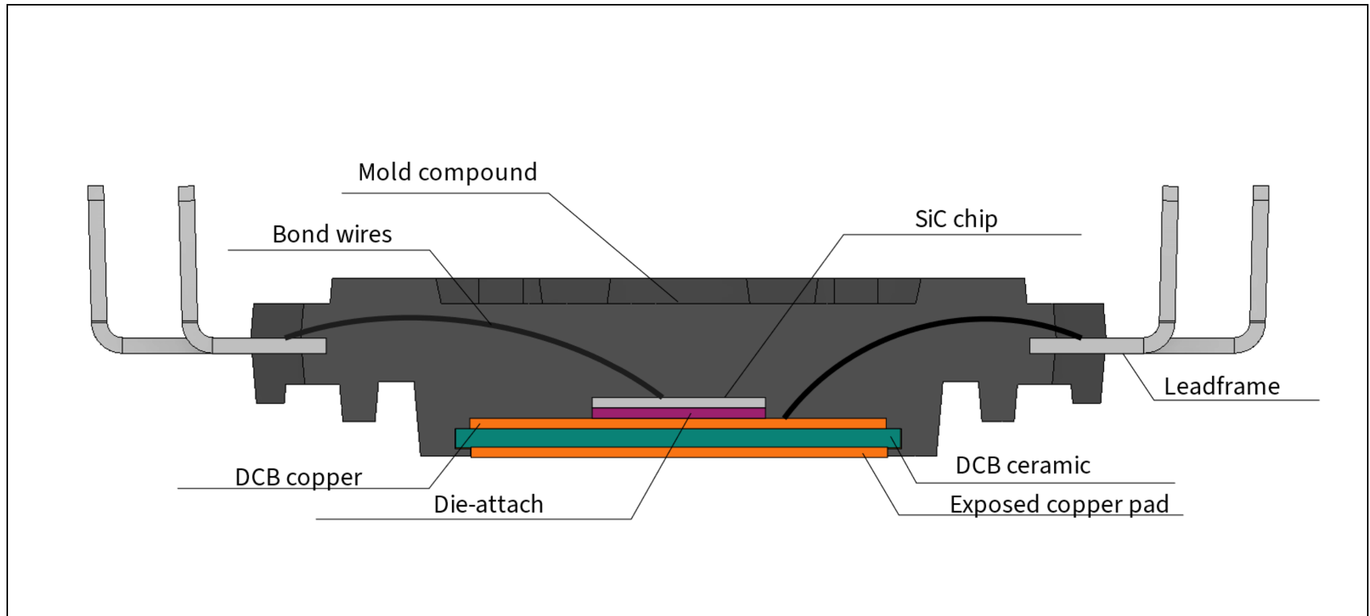


Figure 2 Package structure of molded module (not to scale)

The central feature of the molded module package is the direct-bonded-copper-substrate (DCB). This structure consists of a layer of ceramic enclosed by layers of copper on the top and bottom. The ceramic layer acts as electrical isolator thus making sure the exposed copper pad is insulated from the high-voltage potential and no extra insulation measures are required when connecting the exposed copper pad of the module to a heatsink. In case of CIPOS™ Prime molded module, aluminum-nitride (AlN) is used as the ceramic layer which is a high-performance, state-of-the-art material. The top copper layer of the DCB carries the SiC MOSFET chips that are connected to the copper plane by a die-attach-process. The die-attach ensures both electrical connection of the SiC MOSFET to the copper plane as well as transfer of dissipated heat through the DCB to the heatsink. The top side of the SiC dies is connected to the leadframe by bondwires. These are also used to connect the top copper layer with the leadframe. The whole structure is encapsulated in an electrically insulating mold compound.

2.2 PG MDIP-32-1

PG-MDIP-32-1 is the official name of the package for CIPOS™ Prime modules. It's a dual in-line through-hole-technology (THT)-package with 32 pins. It's outer dimensions are 44 mm of length, 27.4 mm width and 5.7mm package height. Notable package features are the insulated exposed copper pad, as explained in section 2.1, and two screw holes at the end faces of the package that are used to mount the module on a heatsink. These dimensions and basic features are shown in Figure 3. Figure 4 is the detailed package outline drawing (POD) showing all dimensions and tolerances.

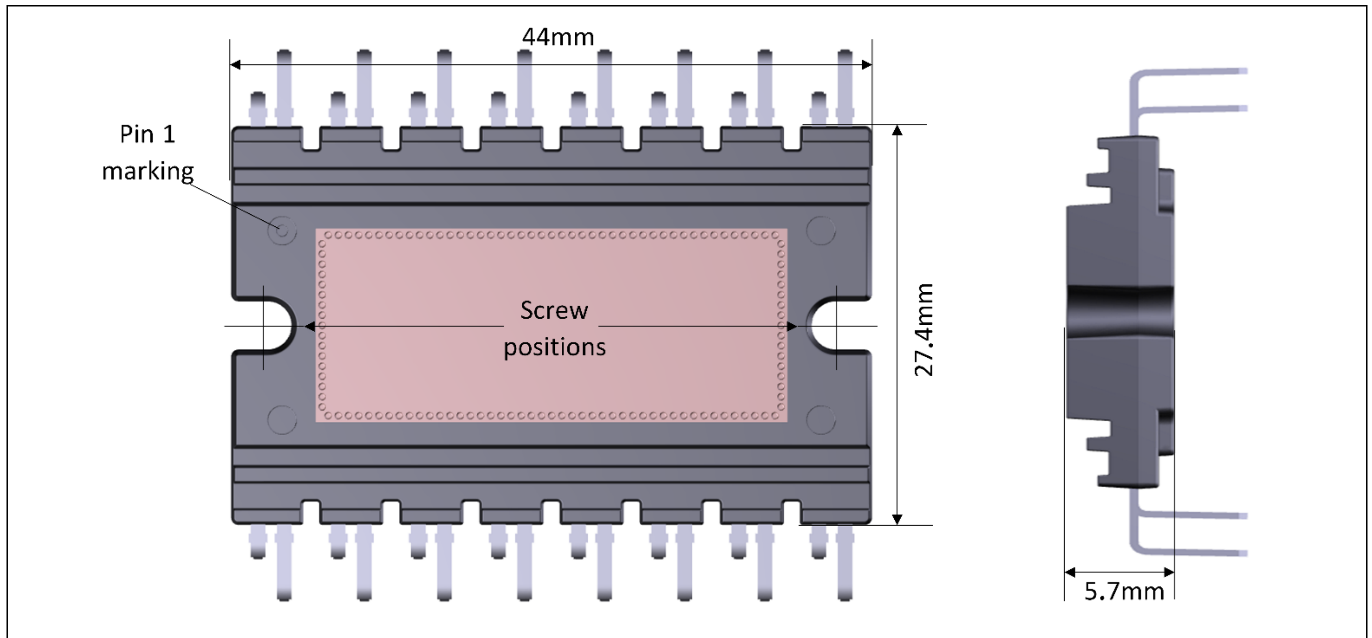


Figure 3 PG MDIP-32-1: dimensions and basic features

Figure 4 PG-MDIP-32-1: package outline drawing

2.3 Footprint

When designing a PCB with CIPOS™ Prime, it's recommended to use the footprint given below in Figure 5.

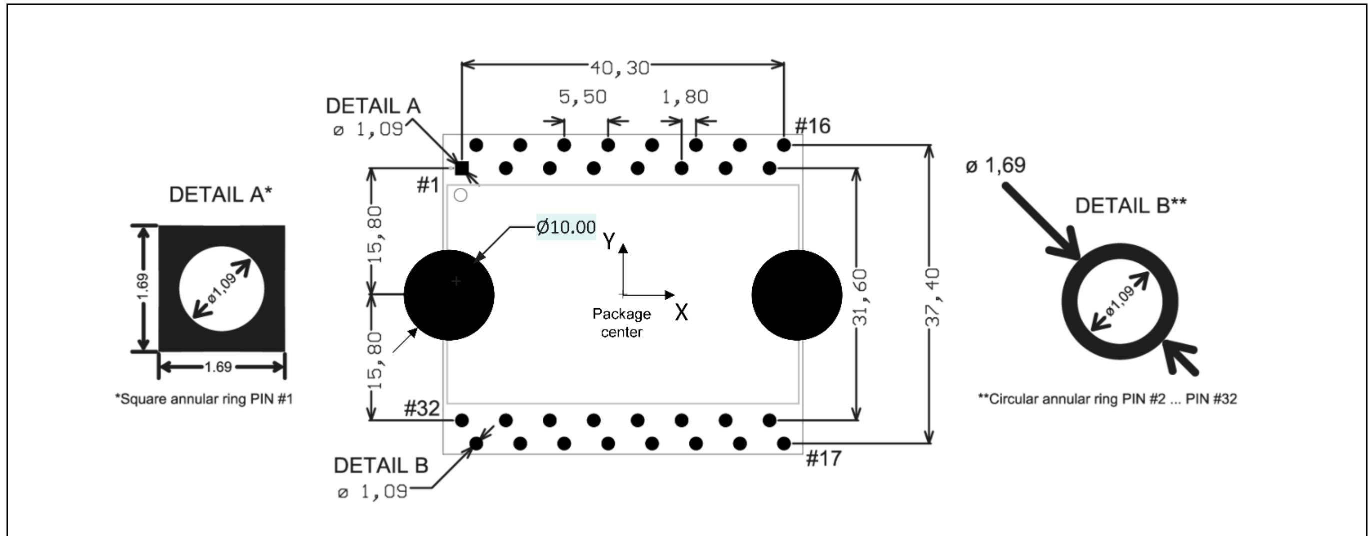


Figure 5 PG MDIP-32-1: PCB footprint

The coordinates of each pad's center are given in Table 2. The package center is set to be X=0, Y=0. The diameter of the screwholes is set to 10mm so that the screwhead with a washer can fit through it.

Table 2 Pad and screw holes coordinates for PCB footprint

Pin number	X coordinate in mm	Y coordinate in mm	Pin number	X coordinate in mm	Y coordinate in mm
1	-20.15	15.8	18	18.35	-15.8
2	-18.35	18.7	19	14.65	-18.7
3	-14.65	15.8	20	12.85	-15.8
4	-12.85	18.7	21	9.15	-18.7
5	-9.15	15.8	22	7.35	-15.8
6	-7.35	18.7	23	3.65	-18.7
7	-3.65	15.8	24	1.85	-15.8
8	-1.85	18.7	25	-1.85	-18.7
9	1.85	15.8	26	-3.65	-15.8
10	3.65	18.7	27	-7.35	-18.7
11	7.35	15.8	28	-9.15	-15.8
12	9.15	18.7	29	-12.85	-18.7
13	12.85	15.8	30	-14.65	-15.8
14	14.65	18.7	31	-18.35	-18.7
15	18.35	15.8	32	-20.15	-15.8
16	20.15	18.7	Screw hole 1	-19.5	0
17	20.15	-18.7	Screw hole 2	-19.5	0

2.4 Warpage

At room temperature and in an unloaded state, the exposed pad of the package will not be even but will rather follow a convex shape meaning that the center of the package is first to touch the contact area with the edges of the device being elevated. This so-called warpage is a result of the production process of the module in which the molding compound is injected at high temperature. When the product cools down the different thermal expansion coefficients of copper, ceramic and mold compound cause the warpage. The magnitude of warpage is measured by first defining the center point of the package as the reference point of 0 µm elevation. An aedequate measurement instrument, e.g. a digital indicator, has to be calibrated with this reference 0 point. Afterwards the elevation is measured at four points at the edges of the package as shown in Figure 6. The maximum difference in elevation from the center point is the package warpage. Typical values of warpage are around 100µm for PG-MDIP-32-1.

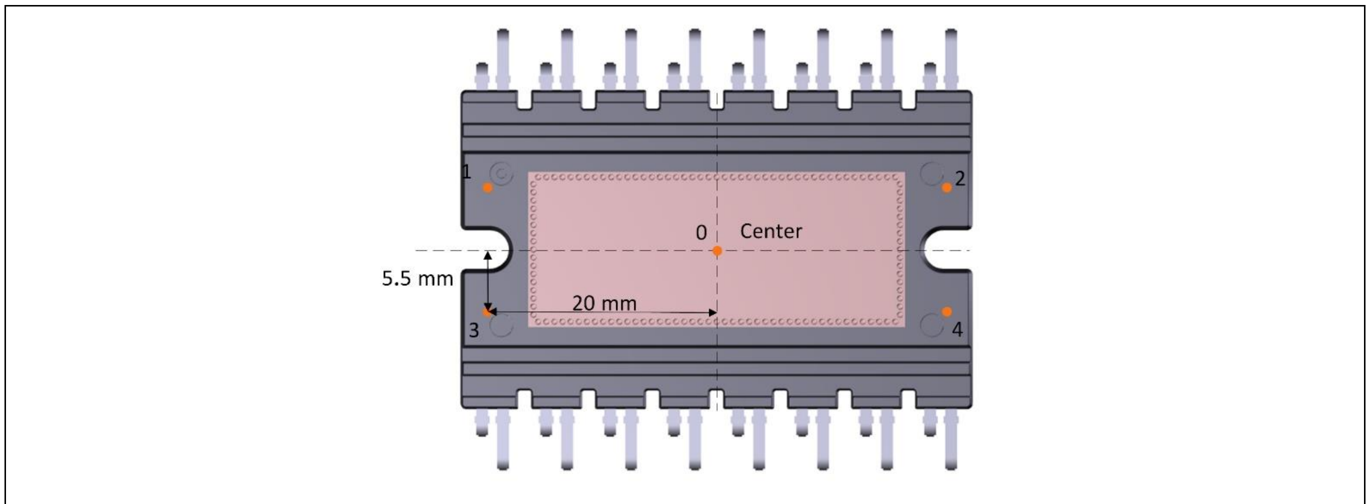


Figure 6 Measurement points for package warpage

The warpage can also be defined as flatness of the DCB. Then the measurement points are set to the outer corners of the exposed copper pad as shown below in Figure 7. DCB flatness is given in the datasheet of CIPOS™ Prime.

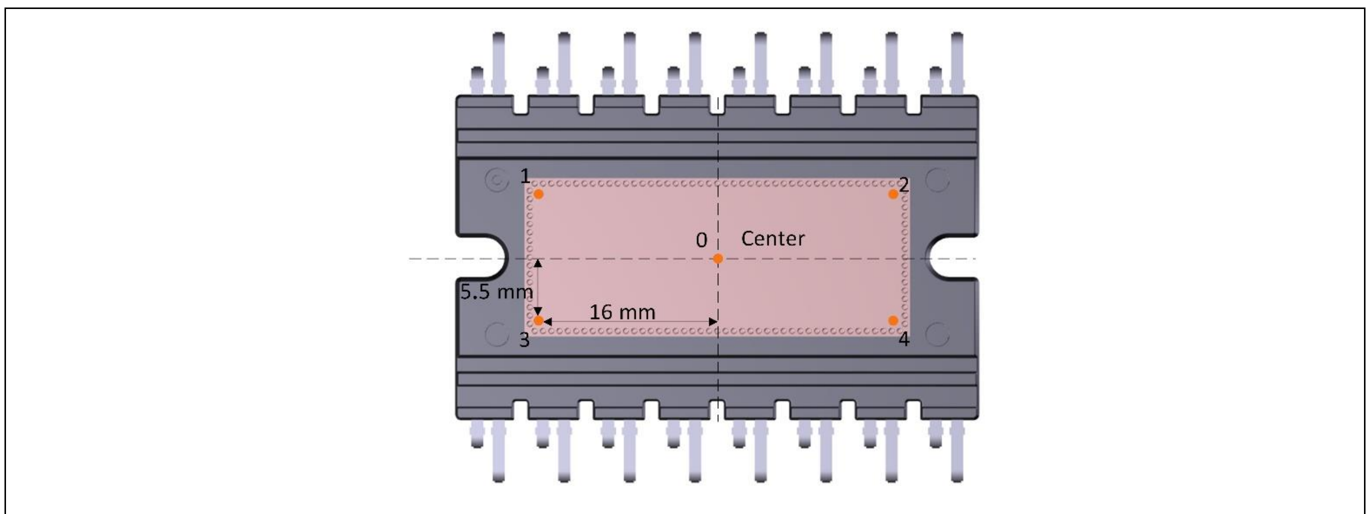


Figure 7 Measurement points for DCB flatness

The phenomenon of package warpage can also be simulated in suitable thermo-mechanical simulation software. Below in Figure 8 a warpage simulation result of PG-MDIP-32-1 carried out in Ansys 2024 is shown for illustrative purposes. Please note that the deformation in this picture is scaled by a factor of 25 to increase visibility. The simulation result in this case was 100µm of warpage across the package diagonal which matches measurement results closely.

The convex shape of the package in unloaded state means that not the complete area of the exposed pad is in close contact to the surface of the heatsink but there is only contact in the center. For optimum heat transfer however, the contact gap between exposed pad and heatsink has to be even and as small as possible so the warpage needs to be evened out. This is achieved by the clamping force of the screws at the face ends of the package.

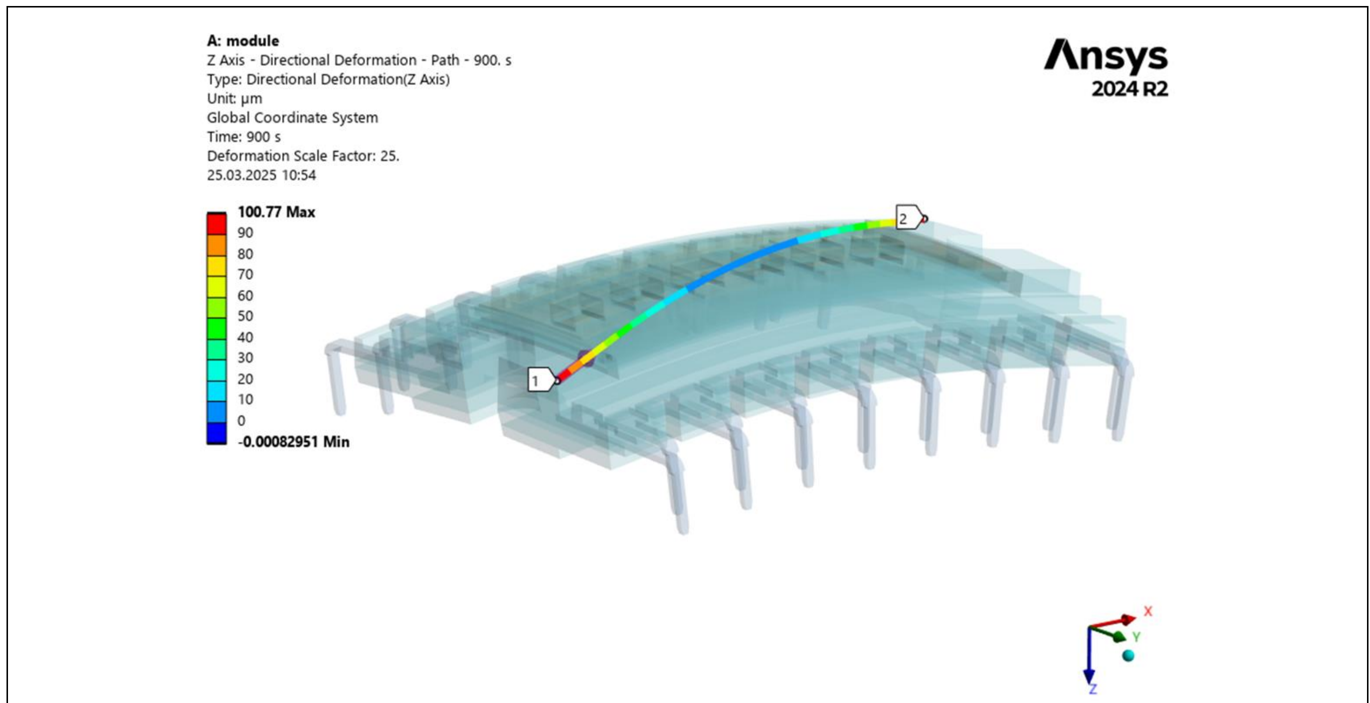


Figure 8 PG-MDIP-32-1: simulated package warpage

3 Heatsink assembly

3.1 General principles

To ensure mechanical stability of the device in the mounted state and achieve optimum transfer of dissipated heat thus enabling the best device performance, it's important to follow some general principles when assembling the module to a heatsink.

- There must be no burrs, scratches or unevenness in the surface of the heatsink that's in contact with the module.
- Screw holes must be countersunk.
- There must be no particles or contamination on the contact surface between exposed pad and heatsink during the assembly process.

3.2 Different assembly sequences

In the course of the assembly process the module needs to be soldered to the PCB, connected to the heatsink with a layer of TIM between exposed copper pad and contact area and fixed by screws. These assembly steps can be performed in two general sequences that are illustrated in Figure 9 below. Section 3.2 gives an overview of the assembly sequences and their advantages and disadvantages while the following sections go into more detail on the individual assembly steps. Section 3.3 covers thermal interface materials (TIM) and their application, section 3.4 explains the selection and handling of the screws and section 3.5 explains the soldering process.

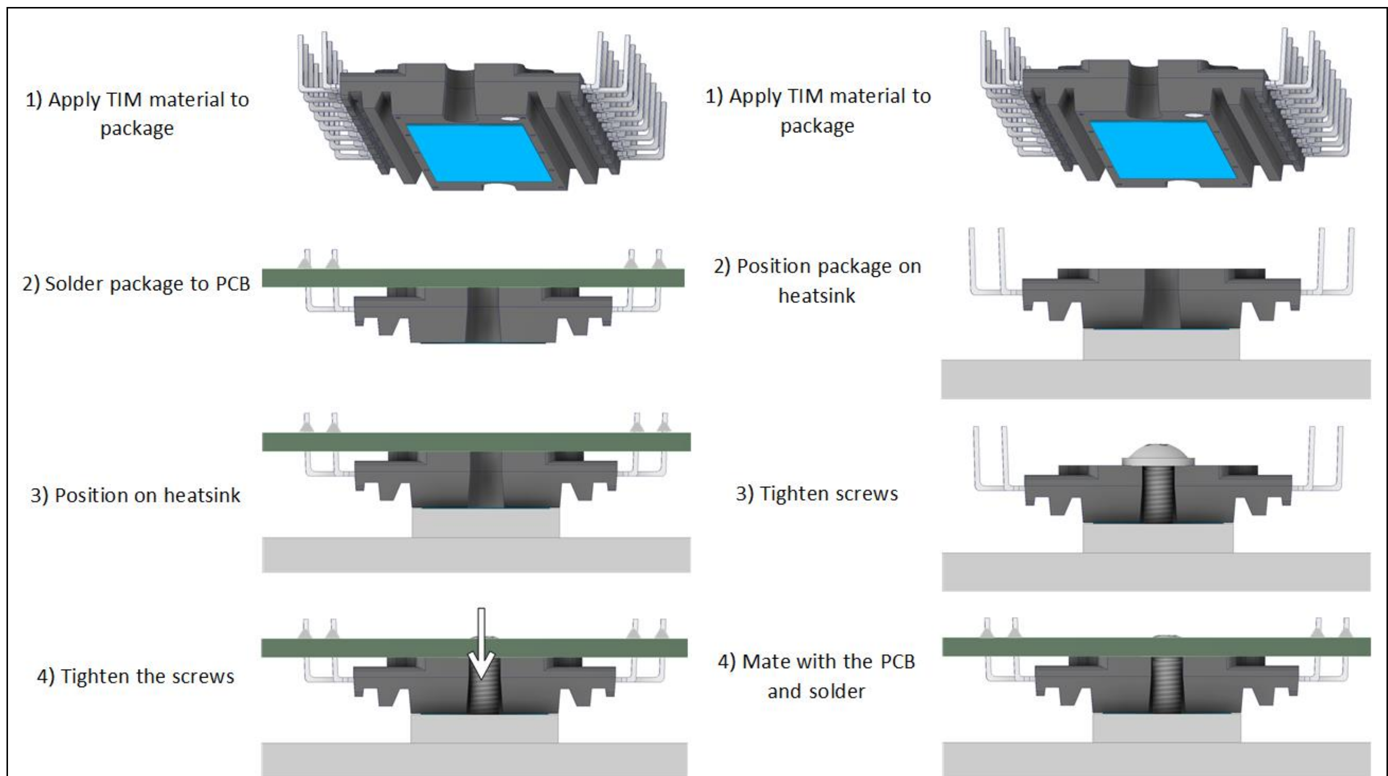


Figure 9 Assembly sequences: Method 1 (left), method 2(right)

Assembly method 1 can be labeled “PCB first, heatsink second”. It starts by applying a suitable thermal interface material (TIM) to the exposed copper pad of the package. Afterwards the module’s pins are soldered to the PCB. The assembled stack is then placed on the heatsink. Ultimately the screws are aligned to the screwholes and tightened. On the other hand, method 2 is following the sequence “Heatsink first, PCB second”. Here as well, the TIM is first applied to the exposed copper pad of the package. Then, however it’s directly placed on the heatsink, the screws are aligned and tightened. Finally, the stack of module and heatsink is mated with the PCB and the pins of the module are soldered. Both methods have advantages and disadvantages. Soldering the module is easier for assembly method 1 as it happens during the regular soldering process in which also eventual other THT-components are assembled on to the PCB. Method 2 has the downside that the soldering process is the last step of the sequence. It means that the heatsink which often is the same as the housing of the complete system is already attached to the module and the soldering station needs to be able to handle this potentially bulky stack. The major advantage of assembly method 2 is that the connection of the module with the heatsink happens as early as possible. It means the dimension of the gap between exposed copper pad and heatsink surface is defined and is not governed by tolerances of the package body or the housing. Table 4 summarizes the pros and cons of both methods.

Table 3 Assembly sequences – advantages and disadvantages

	Avantage	**Disadvantage**
Method 1 – PCB first, heatsink second	Uncomlicated soldering process Module can be populated together other THT components	Module position already fixed after soldering. Height tolerances can’t easily be compensated when mouting the module on the heatsink.
Method 2 – Heatsink first, PCB second	Connection to the heatsink is defined early. Height tolerances can be compensated.	Complicated soldering process. Assembled housing needs to be processed in the soldering station.

In general, method 2 is the preferred way of assembling the module as it gives the thinnest thermal interface and the best thermal performance.

3.3 Thermal interface material selection and application

Even when screwing the exposed pad of the module to a heatsink, there will be no continuos and even contact between both planes as there's roughness on both surfaces in contact. There will be some points where the surfaces touch but also inclusions of air. As air has a very poor thermal conductivity of around 0.02W/mK, bubbles of air in the interface between module and heatsink have to be avoided at all cost. To achieve this, thermal interface materials (TIM) are used that have a much higher thermal conductivity than air. They're used to fill the cavities and compensate eventual vertical tolerances of the assembly. Figure 10 shows the working principle of TIM in an exemplary manner. Please note that the surface roughnes is not to scale.

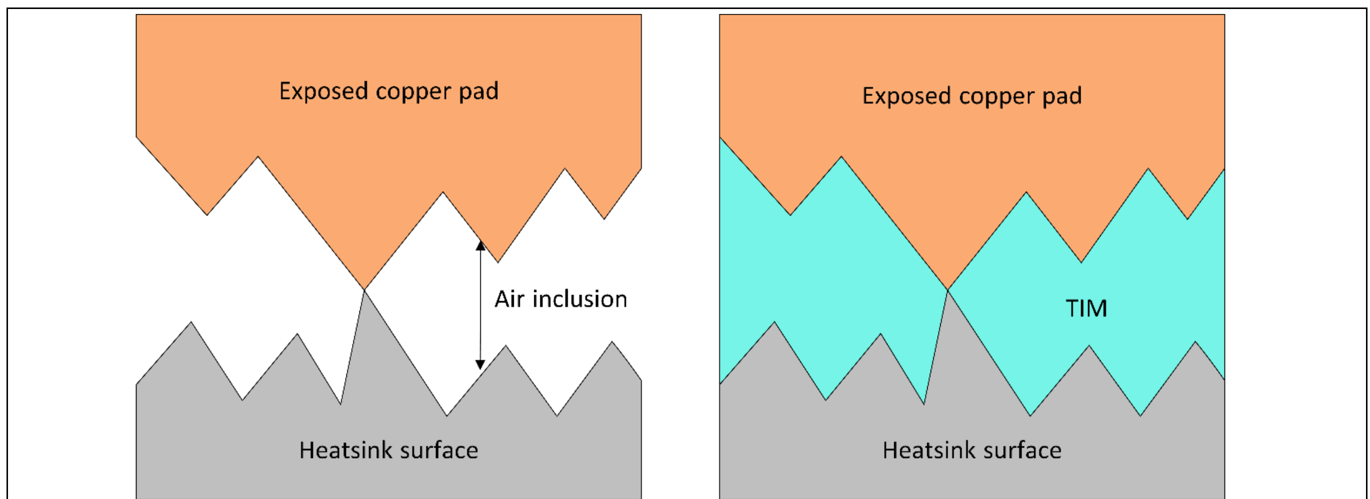


Figure 10 TIM filling the cavity between exposed copper pad and heatsink surface (not to scale)

There are several types of TIM usually used in power electronics applications such as thermal greases, thermal gap pads, phase change materials or solid matter such as solder [2]. Infineon recommends to use a thermal grease when assembling CIPOS™ Prime due to it's very low bondline thicknes together with good thermal performance. One potential disadvantage of thermal grease or other liquid TIMs is that they can pumped out in the course of operational life when the package body performs small movements due to temperature changes resulting in a degradation of thermal performance. To prevent this phenomenon, the guide lines for heatsink assembly and screw tightening from sections 3.1 and 3.4. Thermal grease can be used best when assembly method 2 as explained in Figure 9 and Table 3 is used. If larger vertical tolerances have to be filled by the TIM during assembly, also gap pads or gapfiller can be used. In this case, materials with higher thermal conductivity shall be used to compensate for the higher bondline thickness.

3.3.1 TIM application

This section gives step by step guidance on how to apply a thermal grease to a CIPOS™ module. Please note that the specific device used for this demonstration is not CIPOS™ Prime but a slightly different product but it belongs to the same CIPOS™ product family. The same procedure however can also be applied to CIPOS™ Prime. The method here features a silk screen to apply a defined TIM layer on the exposed copper pad of the device that is held in position on a jig during the process.

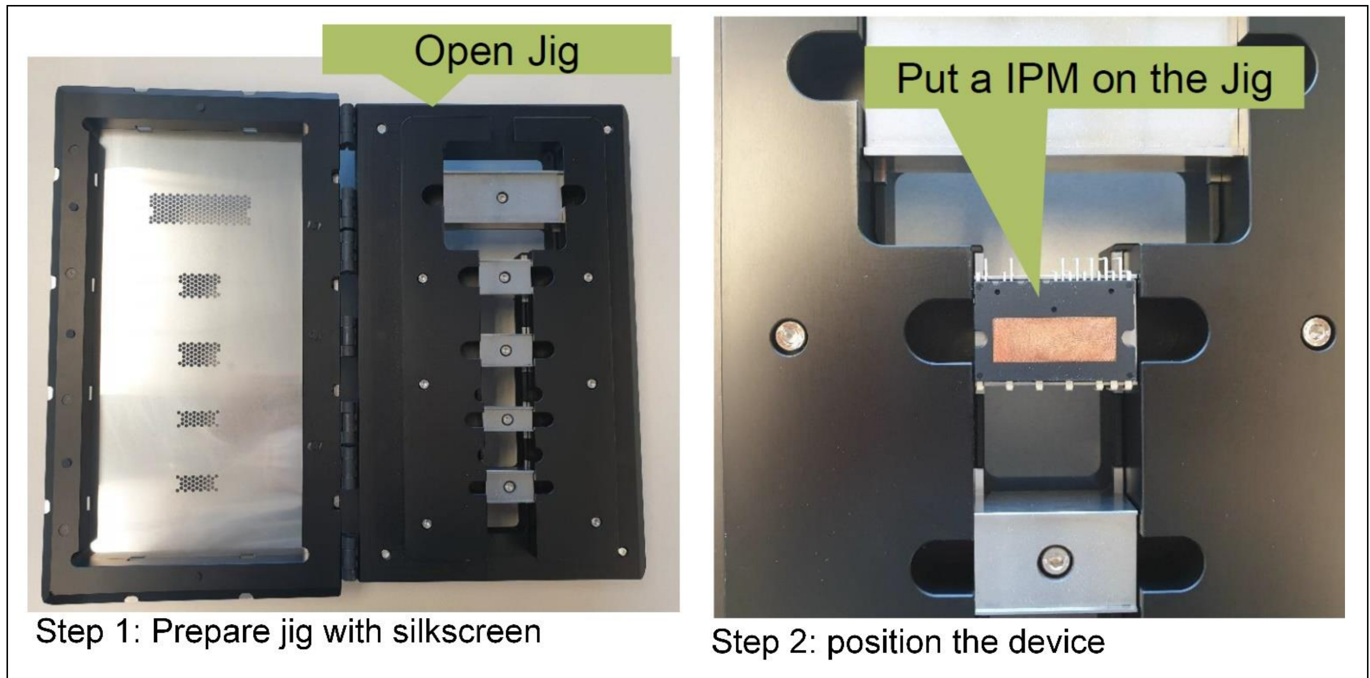


Figure 11 Application of TIM: steps 1 and 2

The process starts by preparing the jig and positioning the device on it as shown in Figure 11. The jig has to be designed in a way that it fixes the device in a planar postion in parallel to the silkscreen so the TIM is evenly dispensed later on. Also, the jig must make sure that the device can’t move in any direction while the TIM is applied.

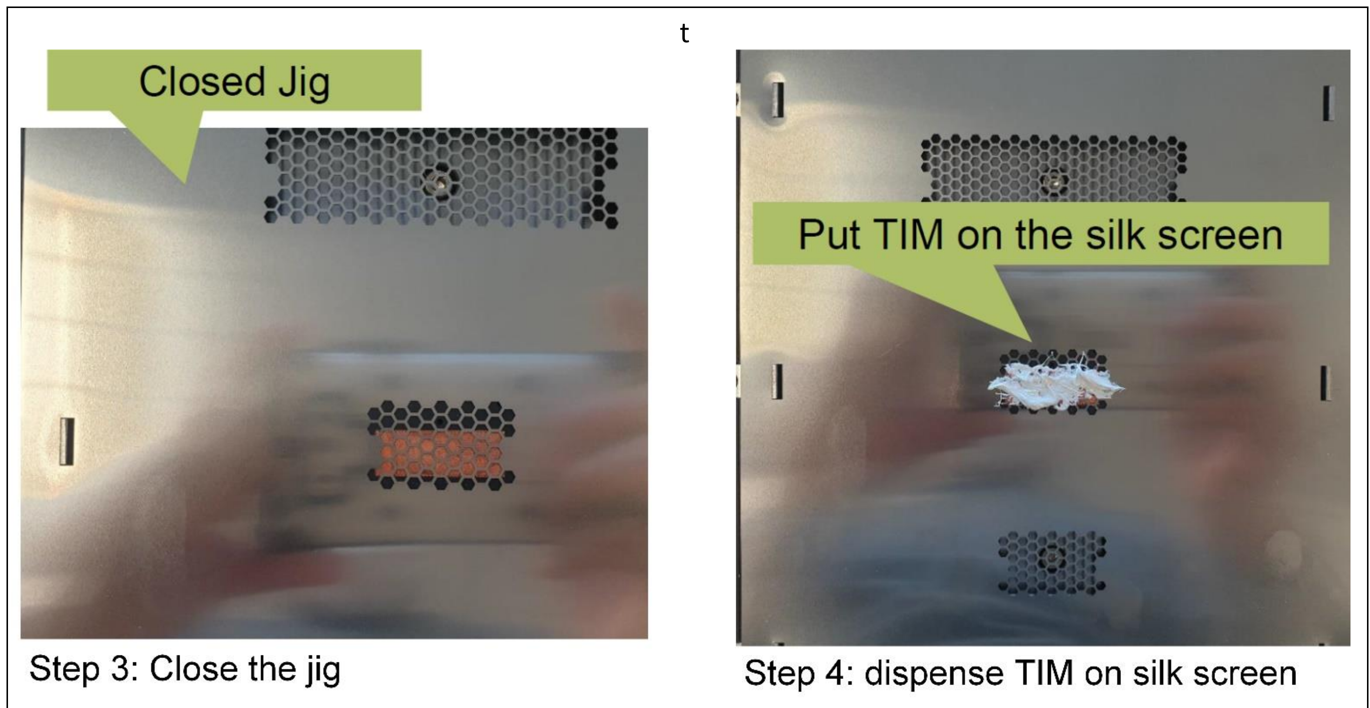


Figure 12 Application of TIM: steps 3 and 4

Moving on the jig is closed so the silkscreen touches the exposed copper pad of the device. The holes in the silk screen shall cover an area slightly larger than the exposed copper pad of the module as shown on the left-hand side of Figure 12. After that the TIM is dispensed on the perforated area of the silk screen over the exposed copper pad. The TIM shall be dispensed by a tool that can accurately control the amount of material dispensed such as a syringe. The amount of TIM required depends on the properties of the material selected as density, viscosity and minimum bondline thickness. General guidance is that the typical thickness that can be achieved with thermal greases is in the range of 30-100µm so the amount of TIM shall be selected accordingly. The exact value needed shall either be provided by the manufacturer of the TIM or determined by experiments.

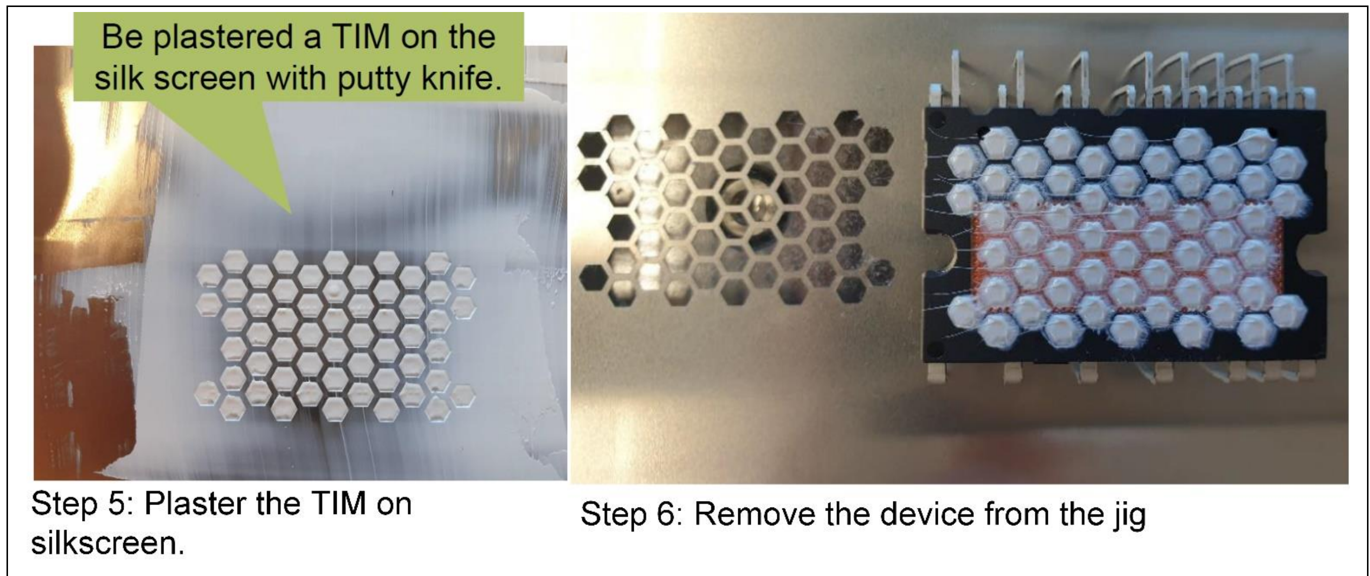


Figure 13 Application of TIM: steps 5 and 6

After the TIM was dispensed, it's plastered on the perforations with a suitable tool such as a spatula or a putty knife in working step 5 as shown in Figure 13. The thickness of the silk screen then sets the thickness of the TIM layer. As mentioned above, typical thickness for thermal greases used with CIPOS™ modules are in a range of 30-100µm. After the TIM is evenly distributed, the jig is opened and the device can be removed.

The design of the jig and the silk screen are only illustrative examples. The perforated area of the silk screen can also be designed in a different layout but the honeycomb-strucutre shown here is considered quite common.

3.4 Screw selection and tightening

Infineon recommends to use M3 SEMS screws to mount the module on a heatsink following the specifications given in Table 4 below.

Table 4 Recommended screw specifications

Screw dimensions				Flat washer		Spring washer	
		A	H	D	W		
Size	Thread pitch [mm]	Head diameter [mm]	Head height [mm]	Outer diameter [mm]	Thickness [mm]	Outside diameter [mm]	B xT [mm]
M3	0.5	5.2	2.0	7.0	0.5	5	1.1 x 0.7

The drawing of the screw and the mentioned abbreviations are show in Figure 14. The length of the screw can be chosen so that it fits the customer assembly space especially the thicknes of the heatsink. Typical values are 10 mm or 12 mm, so M3x10 or M3x12 screws.

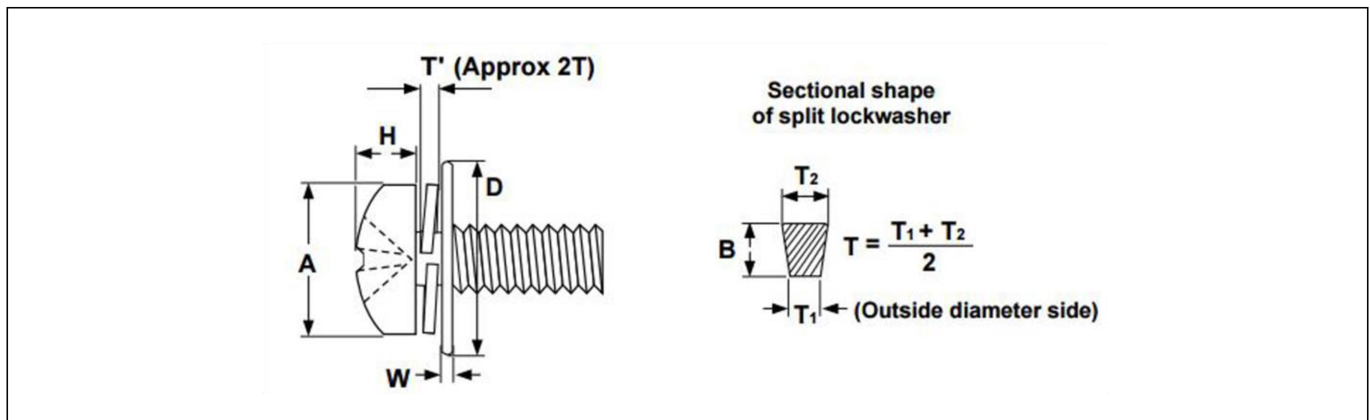


Figure 14 M3 screw dimensions

When tightening the screws, a torque-controlled tool must be used. The typical and maximum allowed values of torque are given in Table 5.

Table 5 Mounting torque specification

Parameter	Values			Unit
Mounting torque	**Min.**	**Typ.**	**Max.**	**Nm**
	0.39	0.68	0.98	

Mounting torque exceeding the maximum value can cause cracks in the mold body due to excessive mechanical stress on the package. To prevent uneven loading of the package during assembly, it's recommended to tighten the two screws alternatively following the described scheme and illustrated below in Figure 15.

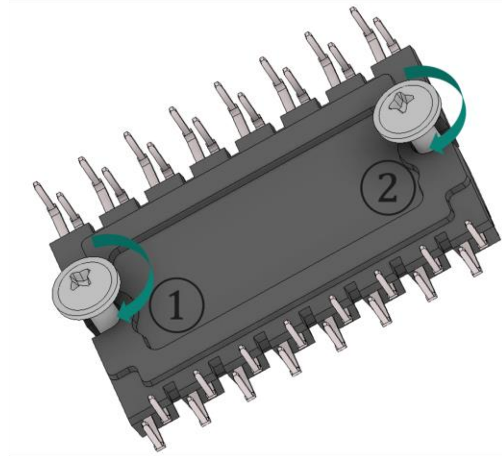


Figure 15 Recommended screw tightening sequence

1) Tighten screw 1 to 30% of final torque
2) Tighten screw 2 to 30% of final torque
3) Tighten screw 1 to 100% of final torque
4) Tighten screw 2 to 100% of final torque

3.5 Soldering process

Typical processes for soldering THT-components are wave soldering and selective soldering. CIPOS™ Prime is not qualified for reflow soldering profiles. The most commonly used method is dual-wave soldering where a first wave of solder guarantees wetting of nearly all leads and PCB pads but also creates some solder bridges. These solder bridges are removed by the second wave that brings a laminar wave of solder [1]. Normally PCBs contain much more SMD than THT-components. The SMD components are usually soldered first by reflow soldering and in a second step the THT-components by wave soldering. A typical wave soldering profile is shown in Figure 16. The peak temperatures, ramp rates and times depend on the materials and the wave soldering equipment used.

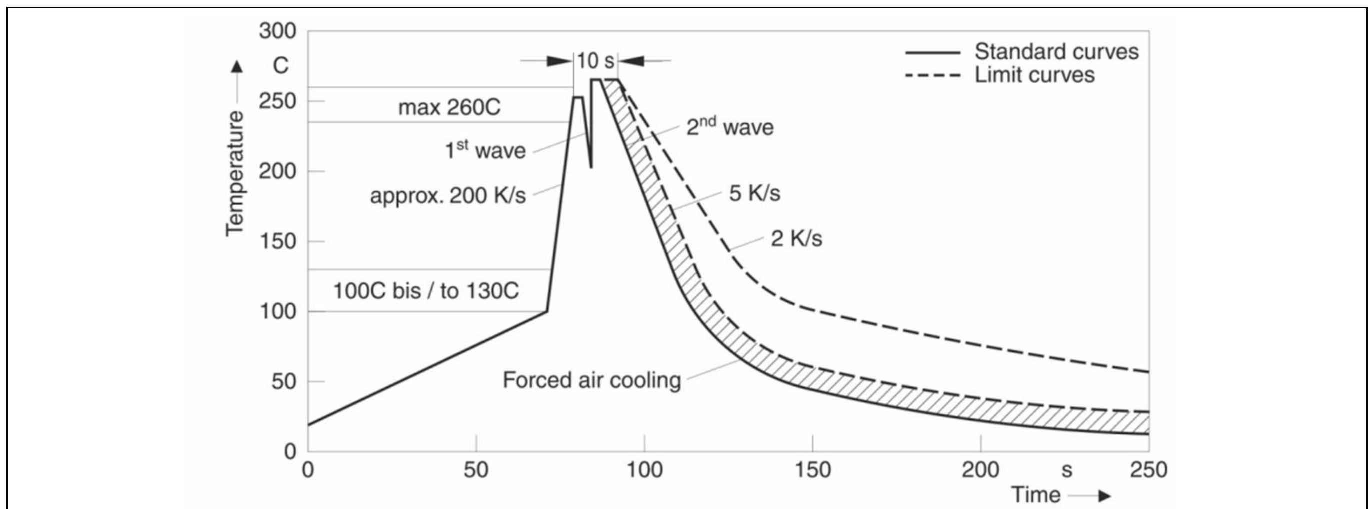


Figure 16 Typical dual-wave soldering profile

The leadframe material of CIPOS™ Prime is copper with the pins being coated with tin (Sn). When using lead-free solder alloys, a nitrogen atmosphere shall be employed.

4 Insulation coordination

CIPOS™ Prime molded module is designed for use in automotive HV applications, meaning voltage class B according to ISO6469-3, with DC-voltages greater than 60V and AC-voltages greater than $30V_{rms}$. In order to ensure electrical safety, the necessary insulation distances have to be considered when assembling the device into a system. The fundamental standard to consider here is IEC60664-1 [3]. It defines clearance as the shortest distance in air between two conductive parts and creepage as the shortest distance along the surface of a solid insulating material between two conductive parts. Applying this concept to the module's package, there are two scenarios: the insulation distances between the pins of the package themselves and the distances of the pins to the heatsink in an assembled state. These scenarios are shown in Figure 23.

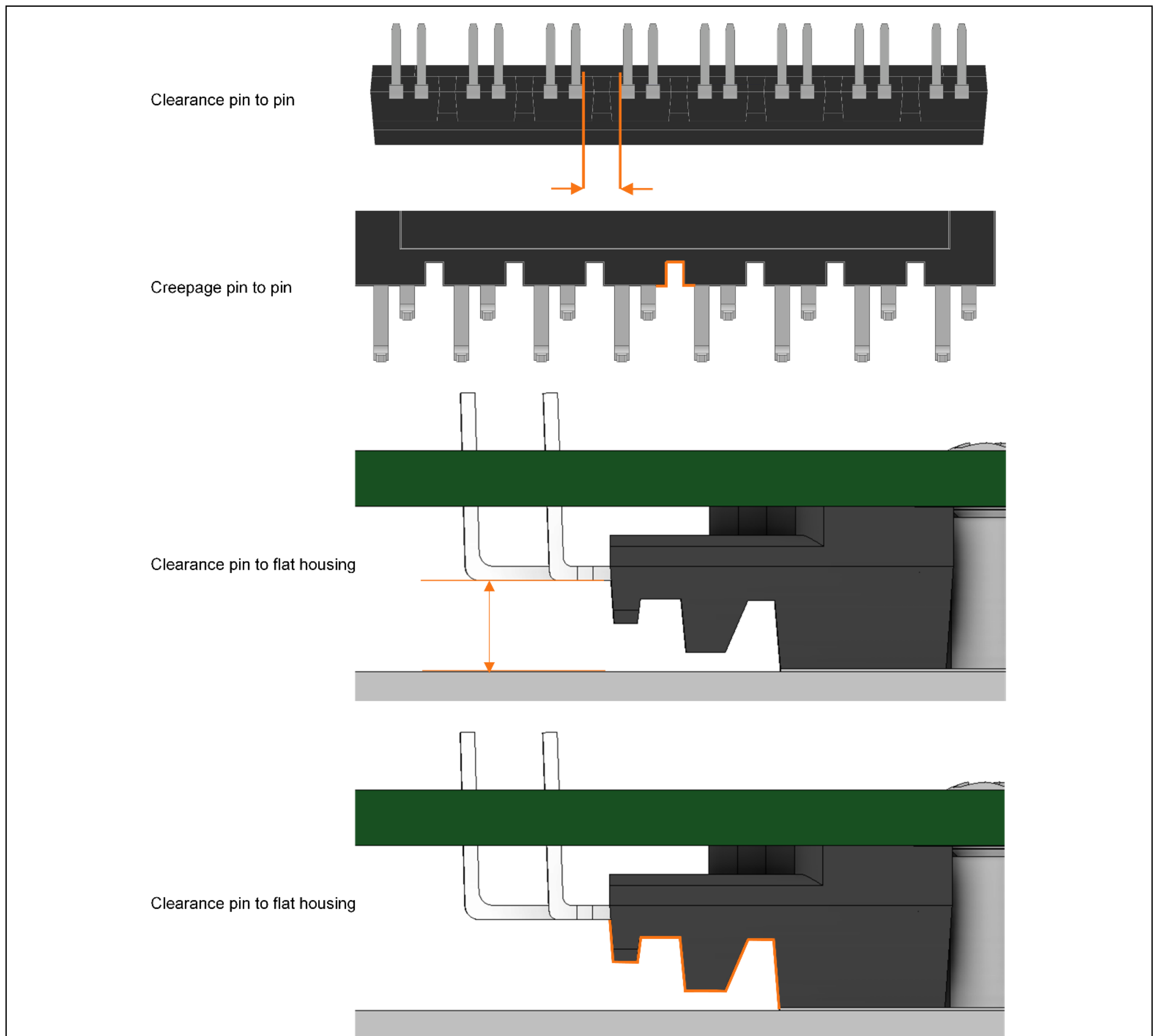


Figure 17 Insulation distances: pin to pin and pin to flat heatsink

Table 6 shows the corresponding minimum values that result from the worst-case package tolerances according to the package outline drawing.

Table 6 Creepage and clearance distances for pin-to-pin and pin-to-heatsink

	Condition	Min value	Unit
Clearance distance	Pin to pin	2.4	mm
	Pin to flat heatsink	3.3	mm
Creepage distance	Pin to pin	5.50	mm
	Pin to DCB[1]	12.12	mm

1: Please note that the creepage distance is only valid for pollution degree 1 or 2. For pollution degree 3, grooves need to be wider according to IEC 60664-1:2020 6.8 table 1. [3]

An example shows the required insulation distances for the following boundary conditions that are considered typical for a HV automotive environment:

- Working voltage: 800V
- Overvoltage category II
- Maximum operating altitude: 5000m
- Pollution degree 2
- Material group 1: CIPOS™ Prime has comparative tracking index (CTI)>600 V
- Insulation category pin to heatsink: reinforced
- Insulation category pin to pin: basic

Table 7 Required insulation distances for example use case and comparison to CIPOS™ Prime values

Parameter	Application requirement	CIPOS™ Prime	Comment
Clearance pin to pin	2.3mm[1]	2.4mm	OK
Creepage pin to pin	4mm[2]	5.5mm	OK
Clearance pin to heatsink	4.44mm[3]	3.3mm	NOK
Creepage pin to heatsink	8mm [4]	12.12mm	OK

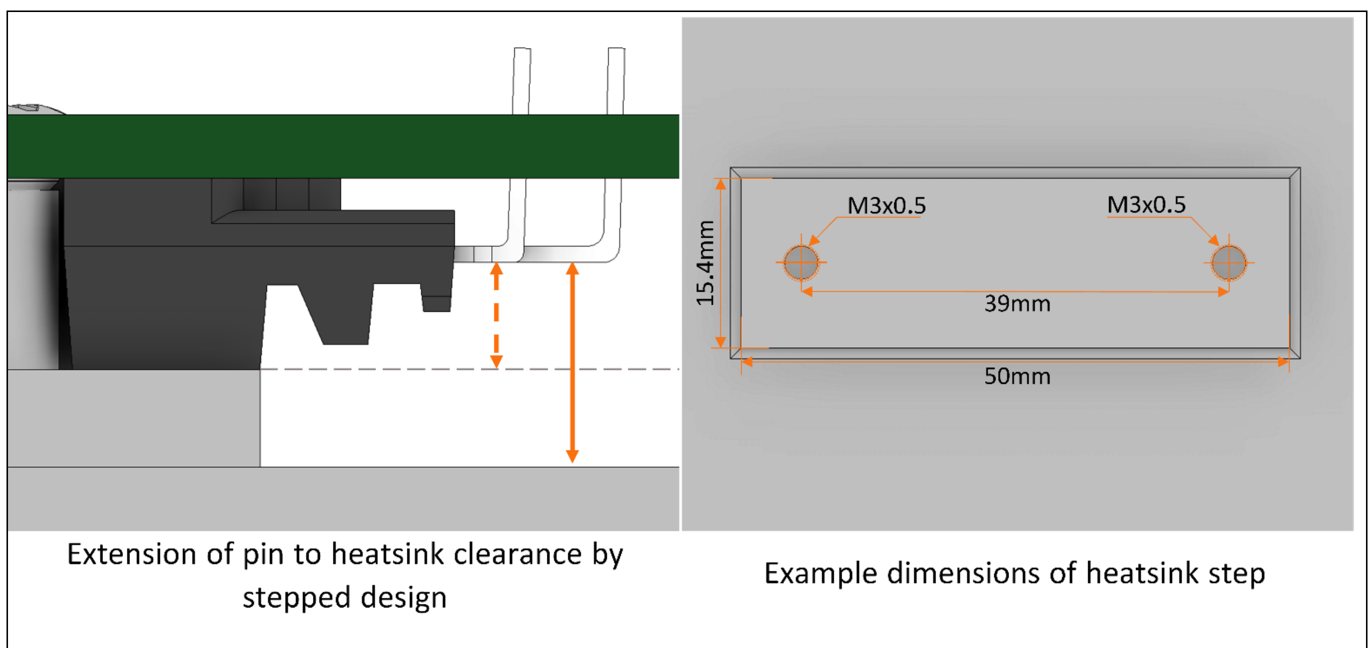
1: Rated impulse voltage: 2.5kV, 1.5mm clearance acc. To IEC60664-1 table F.2 for inhomogenous fields, multiplied by 1.48 correction factor for 5000m altitude

2: Basic creepage according to IEC60664-1 table F.5. Often additional margin is considered to account for conductive particle contamination in the system.

3: Rated impulse voltage 4kV; 3mm clearance acc. To IEC60664-1 table F.2 for inhomogenous fields, multiplied by 1.48 correction factor for 5000m altitude

4: Double of basic creepage

This example shows that the clearance from pin to a flat heatsink is insufficient under the given conditions. The typical measure to overcome this problem is a stepped heatsink design as shown in Figure 18. The dimensions of the step shall be selected so that they match the exposed copper pad of CIPOS™ Prime with some margin. The height can be set so the required clearance is achieved. In the example given above, the height of the step can be set to 2mm.



Extension of pin to heatsink clearance by stepped design

Example dimensions of heatsink step

Figure 18 Stepped heatsink design for extended pin to heatsink clearance

4.1 Extending the pin-to-heatsink clearance by using insulation foil

The clearance distance between the pins and a flat heatsink can also be interrupted by taping an insulation sheet or foil on the heatsink surface underneath the module's pins as shown in Figure 19. As insulation sheets usually have a very bad thermal conductivity they musn't be placed under the exposed copper pad as this would drastically worsen the performance of the module. One important feature of the PG MDIP 32-1 is that the distance from the outer edge of the mold body to the flat heatsink surface is 1.823mm as also indicated in Figure 19. Typical insulation foils have a thickness of some hundred micrometers meaning that they can be extended under the first dent of the mold body.

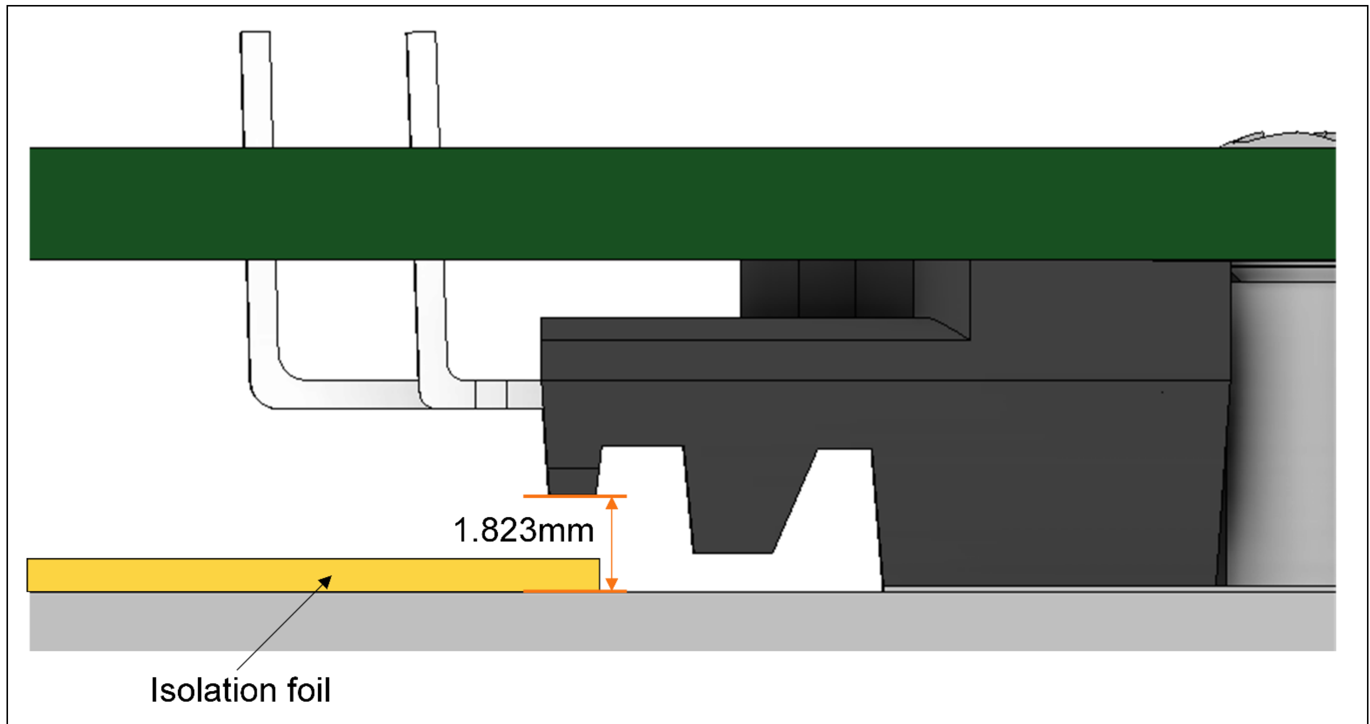


Figure 19 Extending pin to heatsink clearance by insulation foil

4.2 Alternative approach to stepped heatsink design

Adding a step to the heatsink as shown in Figure 18 is common practice but it comes with extra machining effort and cost in heatsink design. This section suggests another approach using a dielectric spacer used with the module to achieve the required clearance even with a flat heatsink. Figure 20 demonstrates the general idea. A spacer made of dielectric, anti ESD-material such as Acrylonitrile Butadiene Styrene (ABS) is clipped on the module so that it covers the pins and interrupts the distance in air between the pin and the heatsink thus resulting in longer clearance. Effectively the clearance then becomes the creepage around the outer edge of the spacer as shown in drawing on the left of Figure 20. With the given dimensions the clearance then amounts to 7.1mm which is sufficiently large even without a stepped heatsink. When using such spacer in the assembly process it should be clipped to the module between steps 1 and 2 of the assembly procedures shown in Figure 9.

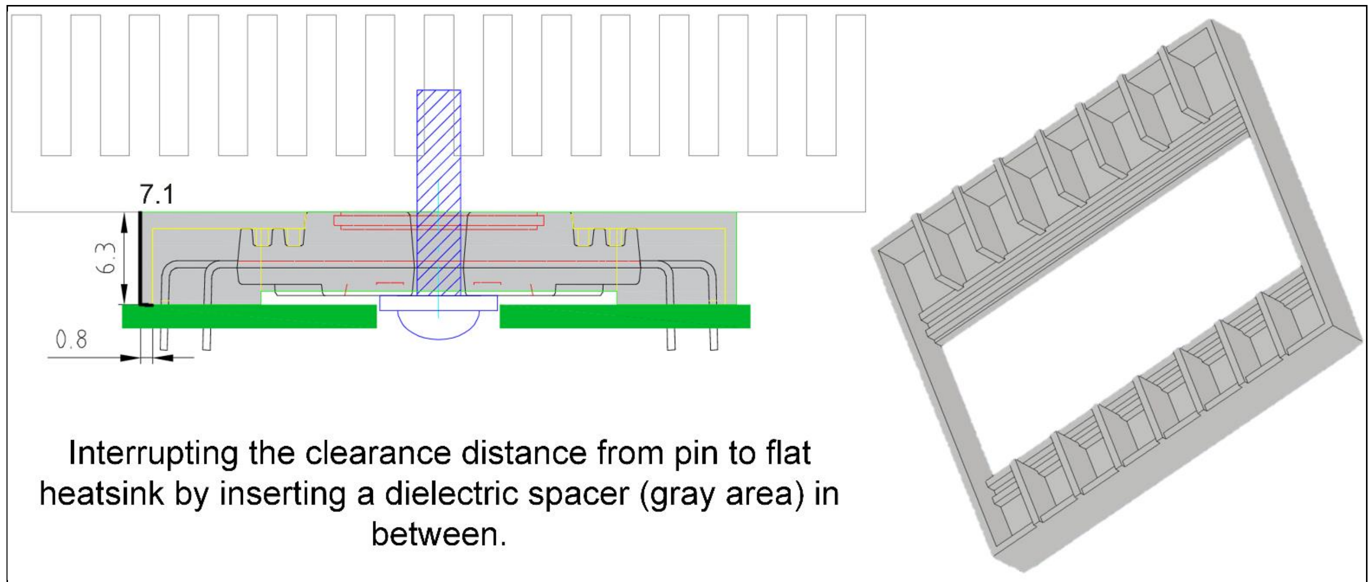


Figure 20 Extending pin to heatsink clearance with a dielectric spacer

Figure 21 shows the dimensions of the spacer that's used in Figure 20 to achieve a pin to heatsink clearance of 7.1mm.

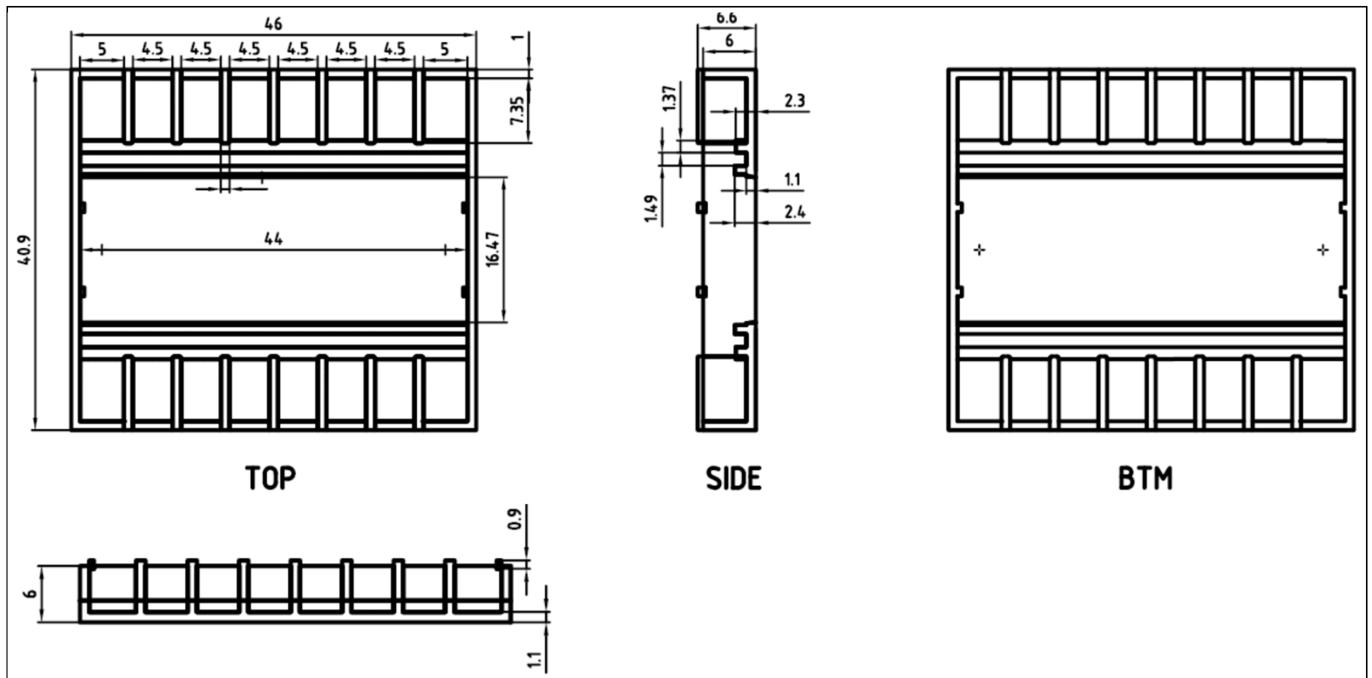


Figure 21 Technical drawing of dielectric spacer

5 Device handling

5.1 Device marking specification

All devices come with a laser marking on the rear side. The information contained in this marking is shown in Figure 22.

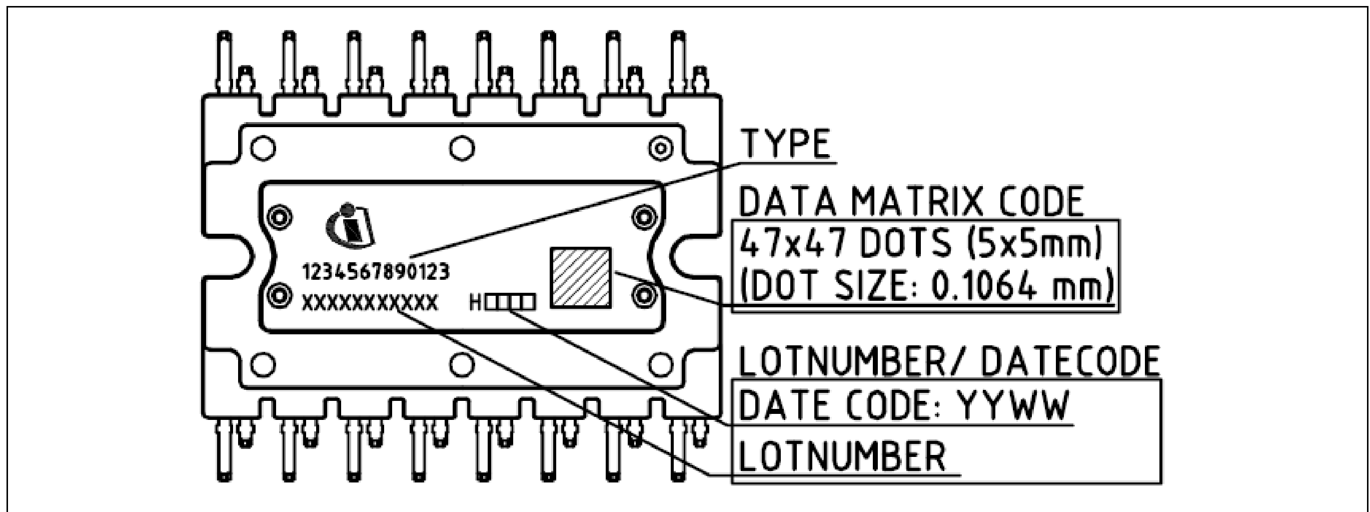


Figure 22 Package rear marking

Type is the product sales code that follows the nomenclature explained in Figure 1. The lotnumber is a unique identifier of the device's production lot and the date code indicates the calendar week in which the lot was produced.

5.2 Device packing and storage specification

The devices are packed in anti-static tubes. Figure 23 shows the dimensions of the tube and Figure 24 shows the cross-section of the tube holding the device in it. One tube holds 11 pieces of CIPOS™ Prime. For shipping the tubes are stacked in boxes that are sized according to Figure 25 and which hold 16 tubes each meaning that one box contains in total 176 devices. The devices are packed and stored under non-dry moisture protection conditions. The maximum storage time of the devices is recommended not to exceed 1095 days. The typical weight of one CIPOS™ Prime device is 13.8 g.

When the outer copper pad CIPOS™ Prime is exposed to air during storage or operation, oxidization happens and can form a thin layer of copper oxide (Cu_2O/CuO). This is an inherent characteristic of copper when exposed to oxygen and does not affect the electrical or thermal performance of the module in any significant way. AN2025-01 gives more details on this phenomenon [4].

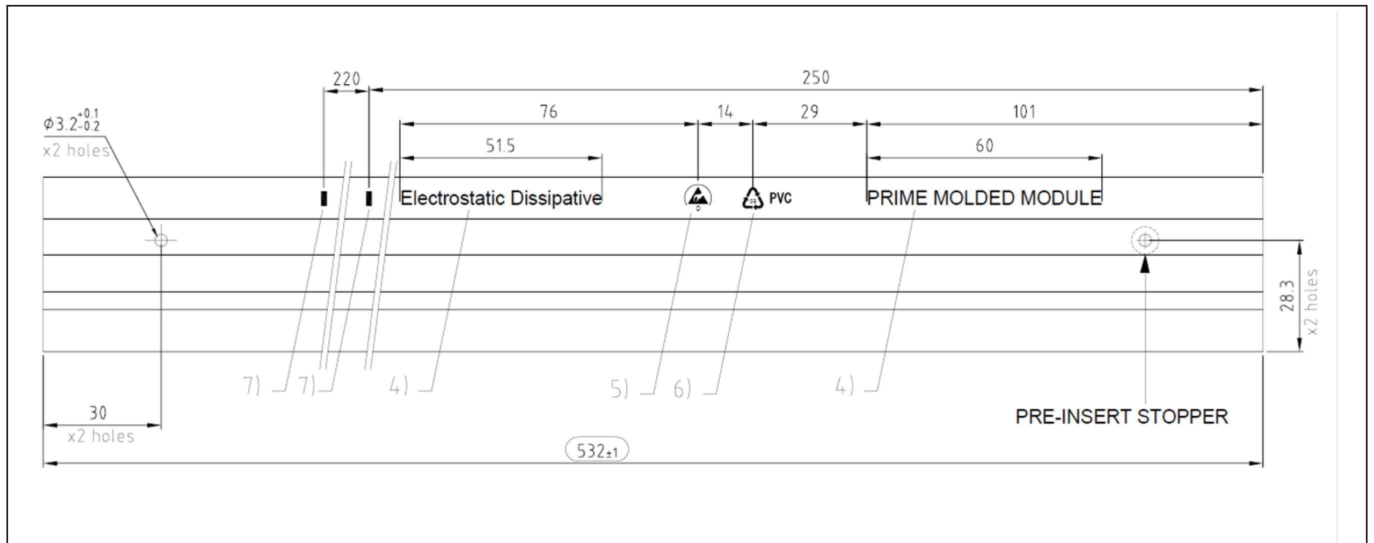


Figure 23 Dimensions of packing tube

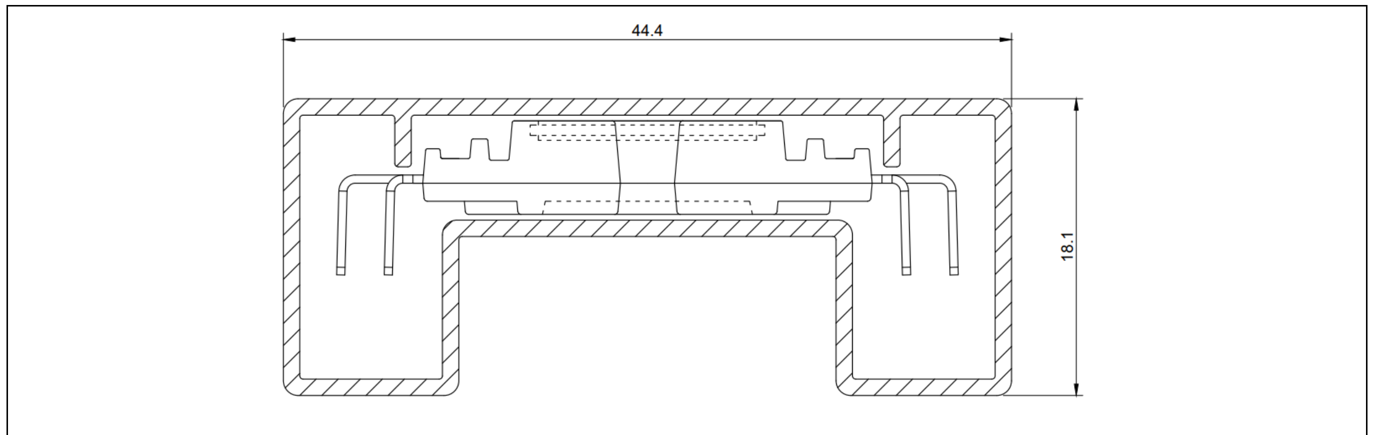


Figure 24 Cross section of packing tube

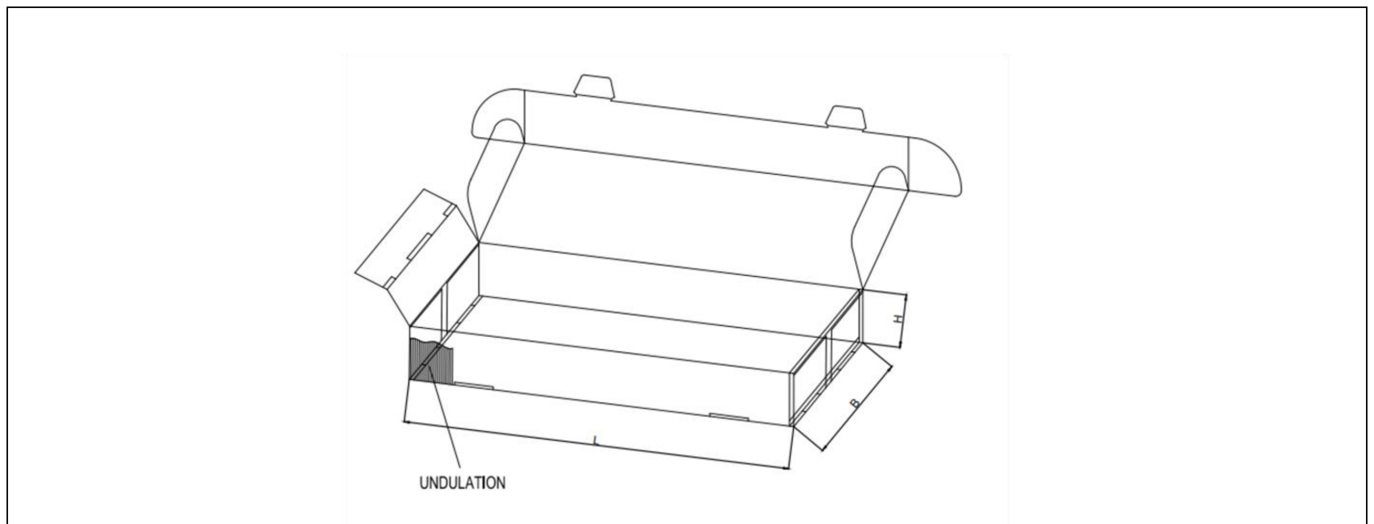


Figure 25 Dimensions of packing boxes for tubes: L=555mm, B=151mm, H=96mm

5.3 ESD handling

CIPOS™ Prime is sensitive to electrostatic discharge (ESD) events which might cause damage to the device inner structures. Therefore, protective measures have to be employed during all handling steps of the device. Guidelines on handling and processing are provided below: [1]

Equipment for Staff

- Dissipative/ conductive footwear or heel straps
- Suitable smocks • Wrist straps with safety resistors
- Gloves or finger coats which are ESD-proven (with specified volume resistivity)

Workplace configuration

- Standard marking of ESD protected areas
- Access controls, with wrist strap and footwear testers
- Air conditioning
- Dissipative and grounded floor
- Dissipative and grounded working and storage areas
- Dissipative chairs
- “Ground” potential bonding points for wrist straps
- Trolleys or carts with dissipative surfaces and wheels
- Suitable shipping and storage containers
- Protection against sources of electrostatic fields

Production installations and processing tools

- Machine and tool parts made of dissipative or metallic materials
- No materials having thin insulating layers for sliding tracks
- All parts reliably connected to ground potential
- No electric potential difference between individual machine and tool parts
- No sources of electrostatic fields

Detailed information on ESD protective measures may be obtained from the ESD specialist thorugh the Area Sales Offices of Infineon Technologies AG:

6 Appendix

4-pack pin map #1

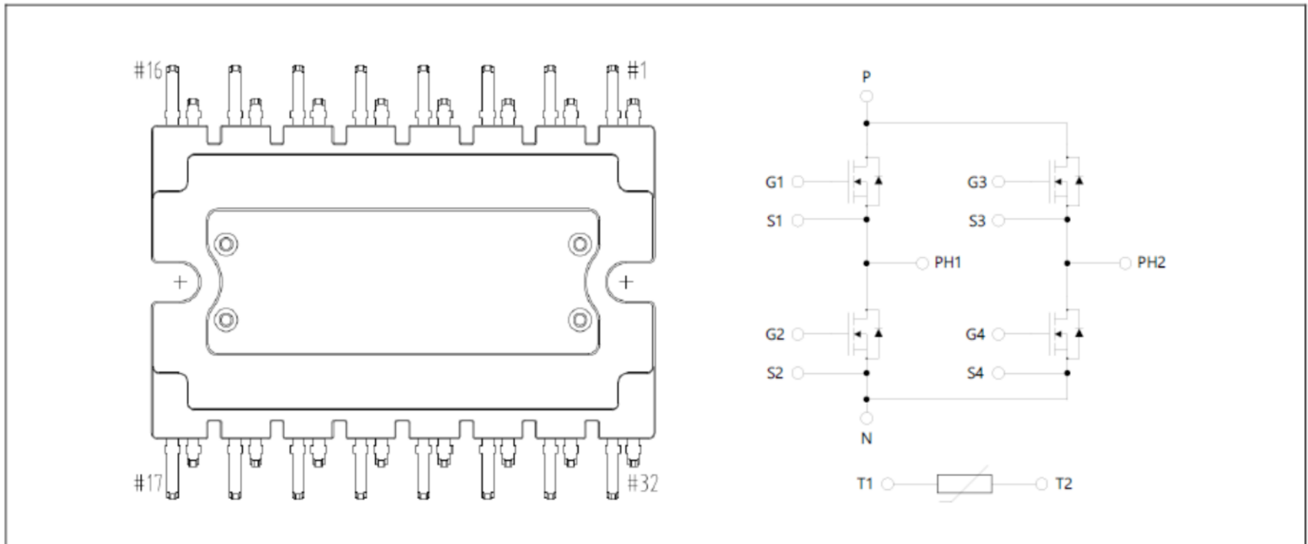


Figure 1 Pin-out (bottom view)

Table 9 Pin description

Pin number	Description	Pin number	Description
1	N	17	NC
2	N	18	NC
3	NC	19	G3
4	NC	20	S3
5	PH1	21	G4
6	PH1	22	S4
7	NC	23	NC
8	NC	24	NC
9	PH2	25	NC
10	PH2	26	NC
11	NC	27	S1
12	NC	28	G1
13	T2	29	S2
14	T1	30	G2
15	P	31	NC
16	P	32	NC

Figure 26 Pin map 1 for 4-pack topology

6-pack pin map #1

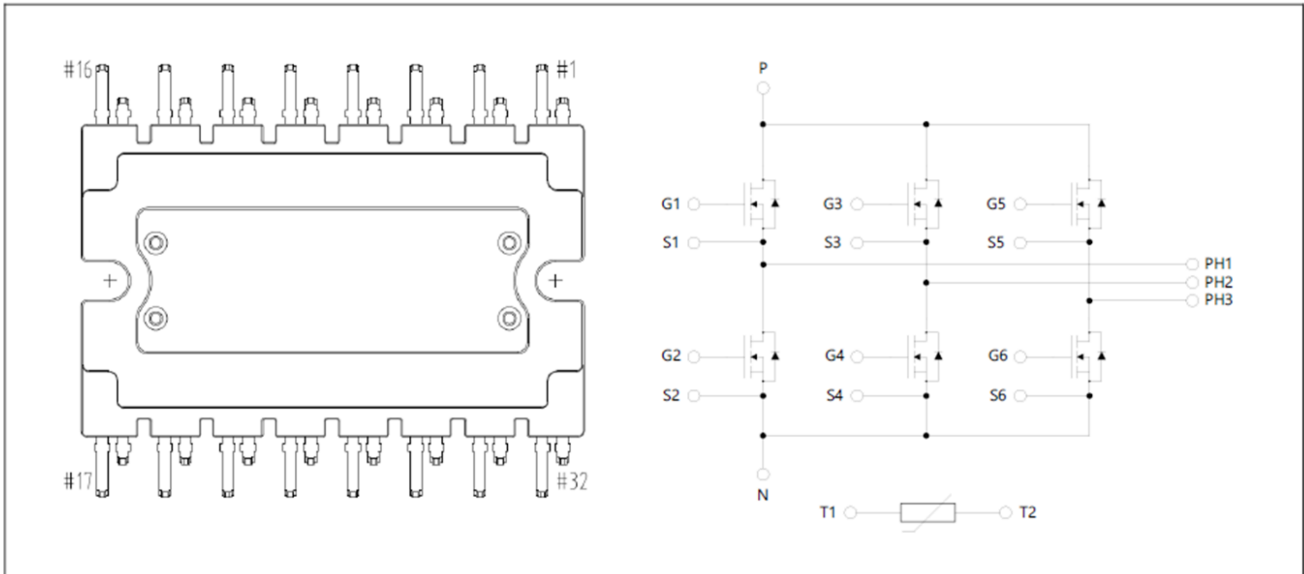


Figure 1 Pin-out (bottom view)

Table 9 Pin description

Pin number	Description	Pin number	Description
1	N	17	P
2	N	18	P
3	NC	19	G1
4	NC	20	S1
5	PH3	21	G2
6	PH3	22	S2
7	NC	23	G3
8	NC	24	S3
9	PH2	25	G4
10	PH2	26	S4
11	NC	27	G5
12	NC	28	S5
13	PH1	29	G6
14	PH1	30	S6
15	T2	31	NC
16	T1	32	NC

Figure 27 Pin map 1 for 6-pack topology

6-pack pin map #2

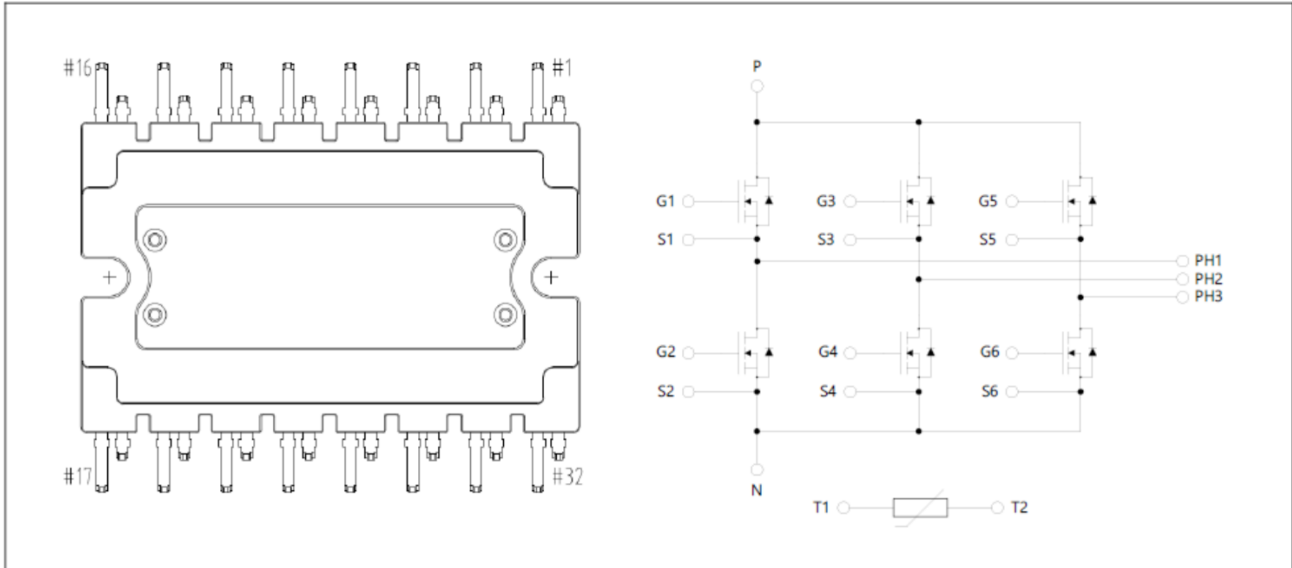


Figure 1 Pin-out (bottom view)

Table 9 Pin description

Pin number	Description	Pin number	Description
1	N	17	P
2	N	18	P
3	NC	19	G6
4	NC	20	S6
5	PH1	21	G5
6	PH1	22	S5
7	PH2	23	G3
8	PH2	24	S3
9	NC	25	S4
10	NC	26	G4
11	PH3	27	S1
12	PH3	28	G1
13	NC	29	S2
14	NC	30	G2
15	T1	31	NC
16	T2	32	NC

Figure 28 Pin map 2 for 6-pack topology

7 Related resources

- CIPOS™ product family: Link to webpage
- Infineon developer community

References

[1] Infineon Technologies AG: General recomendations for assembly of Infineon packages; 2017; https://www.infineon.com/assets/row/public/documents/60/42/infineon-general-recommendations-for-assembly-of-infineon-packages-an-en.pdf?fileId=5546d46268554f4a016893f69ddf5e63

[2] Hansson, Zandén, Ye, Liu: Review of Current Progress of Thermal Interface Materials for Elctronics Thermal Management Applications; Sendai, Japan; 2016

[3] International Electrotechnical Comission: IEC 60664-1, Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests; 2020

[4] Infineon Technologies AG: AN2025-01 Control integrated power system (CIPOS™) Oxidized copper layer on CIPOS™ IPMs and MMs products; 2025; https://www.infineon.com/assets/row/public/documents/60/42/infineon-oxidized-copper-layer-on-cipos-mini-and-mm-products-applicationnotes-en.pdf

Revision history

Document revision	Date	Description of changes
1.00	16.02.2026	Initial creation

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Edition 2026-02-16

Published by

Infineon Technologies AG

Am Campeon 1-15

85579 Neubiberg

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