

Mounting instructions for the EconoDUAL™ 3 modules

About this document

Scope and purpose

This application note provides guidelines on how to mount the EconoDUAL™ 3 modules.

Intended audience

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

Keypoints

EconoDUAL™ 3, Press in Process, Press in Tool, Soldering process, Requirements of PCB, Thermal Conductive paste

About this product family

Product family

EconoDUAL™ 3 650V, 1200V, 1700V

Target Applications

Industrial Drives, Commercial application vehicles, High Power converters, UPS systems, Solar converters, Wind converters

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General information

1 General information

1.1 General application information

This application note does not cover all the different applications and application conditions. It cannot replace a detailed technical evaluation and examination by users. Therefore, this application notes should under no circumstances be considered a part of any supplier agreed warranty, unless the supply agreement determines otherwise in writing.

Compliance with the requirements for Infineon IGBT modules is assured by appropriate reliability tests and by 100% final tests that are performed during production.

The maximum values given in the product datasheets and application notes of IGBT modules are definite limits that should not be exceeded, even for a short period of time, because it could destroy the components.

1.2 Electrostatic protective measures

Power semiconductors components are electrostatic-sensitive devices that require handling according to the electrostatic discharge (ESD) directives. Uncontrolled discharge, voltage from non-earthed operating equipment, personnel, static discharges, or similar effects can destroy the devices.

The gate emitter (IGBT)/gate source (MOSFET) control terminals are electrostatic-sensitive contacts. Users must NOT operate or measure power modules with open circuits, gate-emitter terminals.



Figure 1 ESD label

Attention: *ESD can partially or even completely damage the power modules. Users must observe all precautions to avoid electrostatic discharge during handling, movement, and packing of these components.*

To avoid destruction or pre-damage to the power semiconductor components by electrostatic discharge, the devices are made using suitable ESD packaging. The module is delivered with ESD protection at module terminals according to the ESD directives.

Note: *Installing ESD workstations is mandatory for unpacking the module, removing the ESD protection, and handling unprotected modules.*

Subsequent work steps must only be carried out at special workstations complying with the following requirements:

- High-impedance ground connection
- Conductive workstation surface
- ESD wrist straps

General information

Further information is available in the currently valid standards:

- IEC 61340-5-2: Protection of electronic devices from electrostatic phenomena, general requirements
- ANSI/ESD S2020
- MIL-STD 883C: Method 3015.6 for testing and classification
- DIN VDE 0843 T2: Identical to IEC801-2

Mounting Recommendations

2 Mounting Recommendations

2.1 Assembling instructions for PCB-to-EconoDUAL™ 3 modules with solder-only AUX pins

All datasheet drawings specify power modules at the state of delivery. Deformations can occur when the power module is mounted on a cooling system (depending on the flatness of the heat sink and the screw torque.)

To avoid deformation, the following mounting order is recommended:

1. Place the printed circuit board (PCB)/gate control board (GCB) on the power module.
2. Screw the PCB to the power module.
3. Apply the Aux Pin Soldering.
4. Place the module on the heat sink.
5. Screw the module baseplate to the heat sink according to the recommended steps in section 5.2.
6. Connect the module power terminals to the external parts such as the busbar, capacitor, etc.

The final minimum diameter of the through-hole is determined considering the pin circumference and tolerances. To fit and solder the module mechanically into the printed circuit board, a hole with final minimum hole diameter of 1.25 mm is recommended for soldering the modules. The final diameter of the through-holes in a standard solder module is defined as “ $D = 1.25 \text{ mm} + X$ ” as shown in *Figure 2*. “X” must be chosen according to the recommendations in the IPC2220 Series.

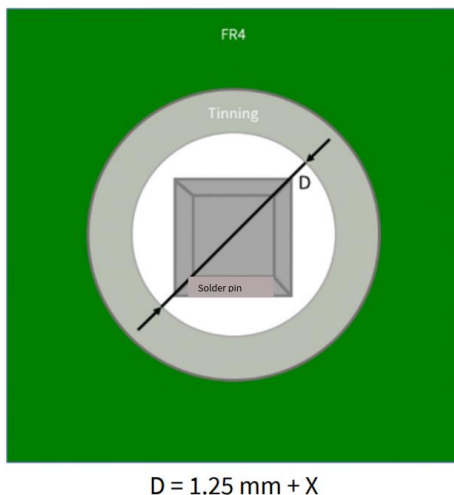


Figure 2 **Cross-section of the standard solder pin**

Align the module onto the PCB by inserting the solder pins through PCB through-holes. Screw the PCB to the module using the self-tapping screws. Besides screwing the PCB to the mounting domes by hand, an electronically controlled or at least a slowly turning electric screwdriver ($U \leq 300 \text{ U/min}$) is a preferred tool for this process.

Mounting Recommendations

2.2 Assembly instructions for PressFIT modules

All datasheet drawings specify power modules at the time of delivery. The following mounting order is recommended:

1. Place the PCB onto the bottom tool.
2. Align the module onto the PCB by inserting the pins into the PCB through-holes and the module domes into the guiding pins.
3. Using controlled force and press-in path method, press the module into the PCB with suitable press-in tools.
4. Screw the PCB to the power module.
5. Place the module on the heat sink.
6. Screw the module baseplate to the heat sink according to the steps recommended in section 5.2.
7. Connect the module's power terminals to external parts such as the busbar, capacitor, etc.

2.2.1 Requirements for the PressFIT printed circuit board

The PressFIT technology used in the EconoDUAL™ 3 PressFIT modules have been tested and qualified by Infineon Technologies AG for standard FR4 PCBs with “chemical tin” surface (according to the IEC 60352-5 + IEC60747-15 standards). If a PCB has been produced using any other technology, it must be tested, inspected, and qualified separately.

The requirements for PCB material are:

- Double-sided PCB according to IEC 60249-2-4 or IEC 6249-2-5
- Multilayer PCB according to IEC 60249-2-11 or IEC 60249-2-12

To ensure good contact between the holes of the PCB and the PressFIT pin, follow the specifications listed in *Table 1*.

If the specification of the PCB holes included only the final hole dimension (i.e. the metallized hole), different drill sizes and metalization thicknesses could be used depending on the PCB manufacturer and his production capability. This could result in varying results and so compromise the quality of the electrical contact. The end hole diameter is a function of the drill hole, the copper thickness and the metallization in the hole. If the end hole diameter is too small, the press-in force can be too high. The FR4 material can also have an influence on the press-in force. For this reason, it is recommended to follow the complete guidelines provided in *Table 1*. A further recommendation is to always drill the holes in the PCB with a drill of 1.15mm in diameter, and not to mill it. Experience has shown that with milling the final hole diameter is typically between 1.12mm and 1.15mm due to the runout tolerances of the spindles used and due to shrinkage of the FR4 material.

Table 1 Requirements for the printed circuit board (mm)

	Min.	Typ.	Max.
Drill hole diameter	1.125	1.15	1.175
Copper thickness in hole	0.025	0.035	0.05
Metallization in hole			< 15 µm
Final hole diameter	1.00	1.05	1.10
Copper thickness of conductors	35 µm	70 µm – 105 µm	400 µm
Metallization of PCB	Tin (chemical)		
Metallization of pin	Tin (galvanic)		

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With a copper thickness of 25µm to 50 µm in the hole and a tin layer (of about 1µm for chemically applied tin) the final hole diameter can be obtained as a test dimension. Due to the thinner tin layer thickness, this diameter is always higher than the value of 1 mm that is given in the according standard (IEC 60352-5). The final hole diameter, considering the drilled hole diameter, copper thickness and tin thickness is typically between 1.00 to 1.10 mm.

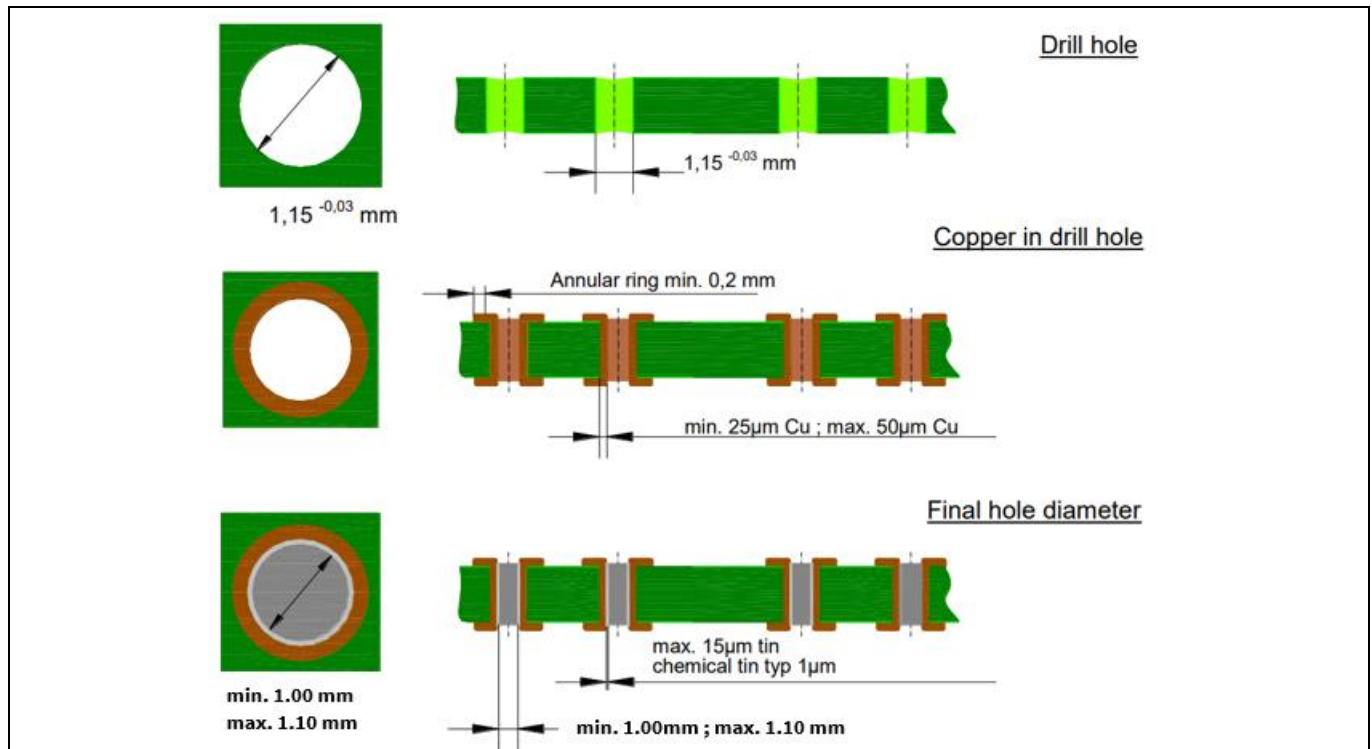


Figure 3 **Structure of the printed circuit board**

After a reflow, the soldering process is carried out on the PCB, but the module can still be pressed into the board. The contact and retention forces of the PressFIT pins are not lessened.

As with the Easy and Econo PressFIT modules, a distance of 5 mm must be maintained from the center of each pin to other components on the PCB. The same dimensions must be considered when positioning components on the PCB even when Press-in tools developed by users are utilized.

A PressFIT module can be replaced up to two times. This means that a printed circuit board can be used up to three times in total. This is why the correct handling of components is essential.

Note: *A module that has been pressed in and then pressed out again can no longer be pressed in. The plastic deformation of the PressFIT pin does not allow further press fitting.*

The PressFIT pin offers a solderable surface. With this feature, the PressFIT pin can be connected in a standard soldering process with the same/comparable quality as with the solder-only pin. The key element here is the quality of the soldering process itself in combination with the diameter of the finished hole. The quality of the soldering process with the given target for the finished hole diameter is the responsibility of the process owner (manufacturer).

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2.2.2 The Press-in Process

The PressFIT module is inserted into a printed circuit board by pressing in. The press-fitting can be performed either using a simple toggle lever press or a machine. A press-in tool that can record the necessary force and the distance moved is recommended as this will ensure consistent quality. The press-fitting speed should be between 25mm/min and 100 mm/min according to IEC 60352-5.

Note: During the press-in process, the placement area of the printed circuit board and the pressing area of the pressure plate must be parallel towards each other.

Note: The PCB and the module can be aligned using the two diagonally arranged guide pins of the press that engage the module's PCB mounting spacers (see Figure 4). Aligning the PCB to the module via these two positions ensures that the PressFIT pin tips are aligned with the PCB holes and that the press-in forces are evenly distributed.

Note: Alignment via additional module mounting positions is not recommended and must be avoided to prevent the module from jamming due to an overly specific alignment system.

The pressure plate should be mechanically fixed into position. The module should be pressed into the printed circuit board by a uniform movement. The module pins should penetrate the printed circuit board during press-in until the PCB touches the bearing areas of the module housing.

To limit the force at the end of the press-in process, springs could be attached to the upper part of the press-in tool. The spring-biased force of the tool can be adjusted to the number of pins and the necessary press-in force. The springs may not be necessary in certain cases, especially if the press-in force is controlled and limited.

Figure 4 shows the press-in process of an EconoDUAL™ 3 as it is implemented in Infineon Technologies AG lab.

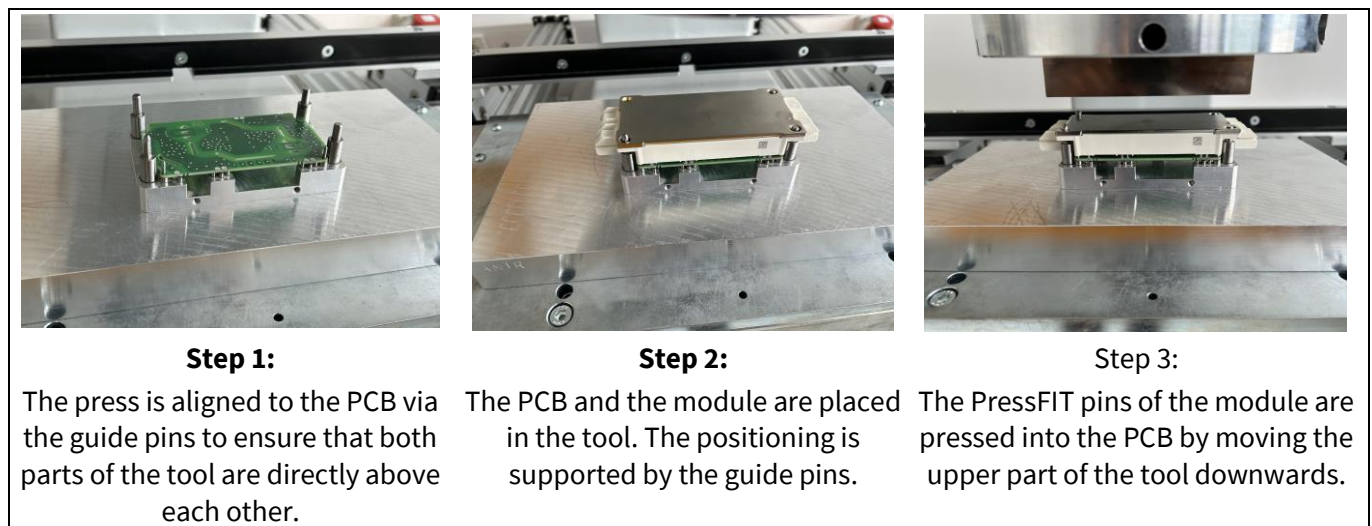


Figure 4 **Example of the press-in process for an EconoDUAL™ 3 module**

2.3 The soldering process

Screws can also be used to mount the PCB on the module. Keeping the thickness and weight of the mounted PCB in mind, the minimum effective length, l_{min} , of the screw thread entering the PCB mounting stand-off should be $\geq$

Mounting Recommendations

4 mm and a maximum length, $l_{\max}$, should be ≤ 10 mm, considering the specific PCB thickness and the weight of the mounted PCB.

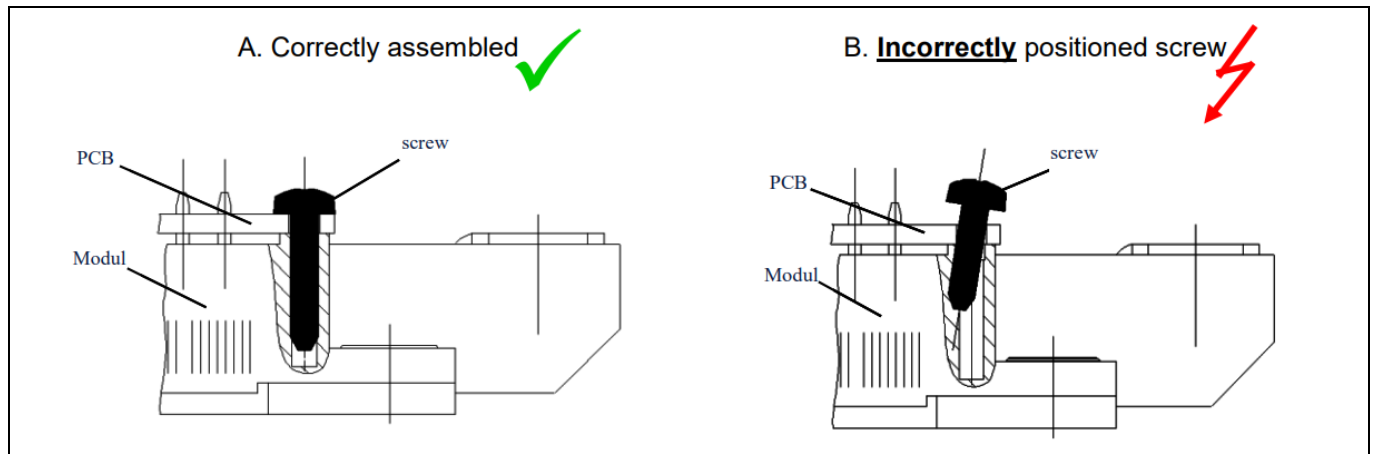


Figure 5 **A. Correctly assembled screw in the PCB mounting stand-off**
B. Incorrectly positioned screw in the PCB mounting stand-off

The upper 1.5 mm of the mounting stand-off only serves as guidance and cannot take any force. The thread in the plastic will deform when the screw is driven in. Due to a lack of accuracy, using pneumatic screw drivers is not recommended.

EJOT PT WN 1451 K25x10 A2K: $M_{\max} = 0.45 \text{ Nm} \pm 10\%$

To avoid damage or splitting of the mounting stand-off, the screws should be inserted straight into the stand-offs during assembly, as shown in Figure 5.

The recommended screw and torque is based on laboratory tests. Depending on the type of screws and tools used it may be necessary to adjust the assembly process accordingly.

After mounting the PCB, the solder process (manual soldering, selective soldering, or wave soldering) can be started. Adhering to this sequence of assembly can minimize the mechanical strain on the solder points.

If the modules are pre-heated before the soldering process using heat plates below the baseplate or by circulating air, the soldering process must be adjusted such that a pre-heat temperature of $T \leq 150^\circ\text{C}$ for $t \leq 30$ min is not exceeded.

During the entire soldering process care needs to be taken that neither too high soldering temperature nor too long a process time at the auxiliary pins overheats the plastic case and thus deforms it.

According to IEC 68 section 2, a maximum solder temperature of $T = 260^\circ\text{C}$ for a maximum process time of $t_{\max} \leq 10$ seconds must be observed during the solder process.

Further information regarding solder processes is detailed in the application note AN2005-06: Soldering of EconoPACK™, EconoPIM™, EconoBRIDGE™, EconoPACK™+, EconoDUAL™, EasyPACK™ and EasyPIM™ modules. [1].

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2.4 Press-in tool for EconoDUAL™ 3 modules

Infineon has developed a sample press-in tool for EconoDUAL™ 3 modules. *Figure 6* shows the press-in tool. Drawings of the tool can be requested through the normal Infineon channels. Its suitability for specific assembly processes and applications has to be tested and qualified by the user.

When developing a new press-in tool or while adjusting the existing one for a specific PCB, consider the positioning of PCB components close to the load-bearing areas of the tool to avoid damaging these components during the press-in process.

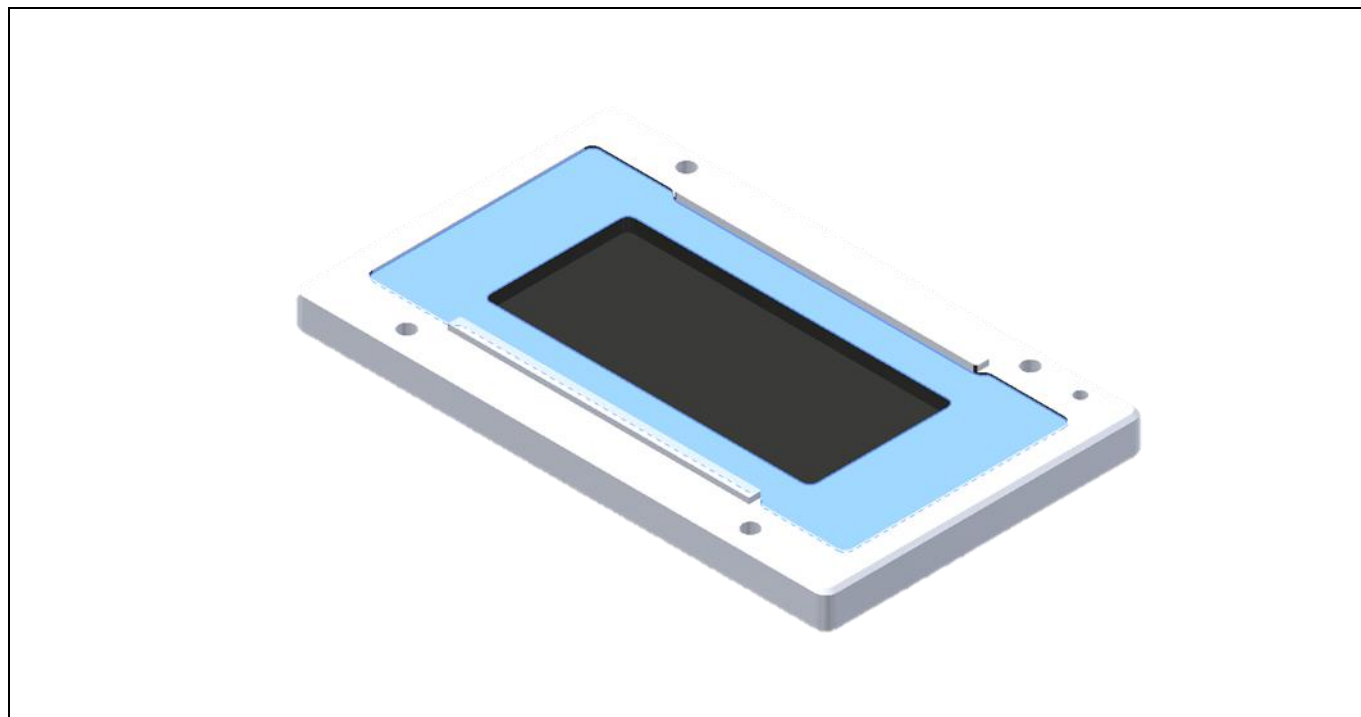


Figure 6 The press-in tool for EconoDUAL™ 3 module

2.4.1 Press-in force

The press-in forces depends on the PCB hole diameters. As the EconoDUAL™ 3 features 7 PressFIT pins, the typical necessary press-in force required would be approximately 0.085 kN per pin. If the holes in the PCB are at the lower limit of the tolerance and/ or several modules will be pressed in parallel, the press-in force can be much higher. It is the responsibility of the customer that the surface-mounted devices on the PCB are not damaged.

Table 2 Typical press-in force for the EconoDUAL™ 3

	Minimum	Typical	Maximum
Press-in speed	> 25 mm/min according to IEC 60352-5 qualification 100 mm/min recommended		
Typical press-in force per pin		85 N	< 100 N
PCB temperature (TG)		125°C	

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2.5 Relieve the contact area between the module and the PCB

After the soldering or press-in process, it is recommended to relieve the contact areas between the module and printed circuit board mechanically. This can be achieved by mounting the PCB onto the module using four PCB mounting stand-offs (see *Figure 7*) using self-tapping screws or similar fastening methods.

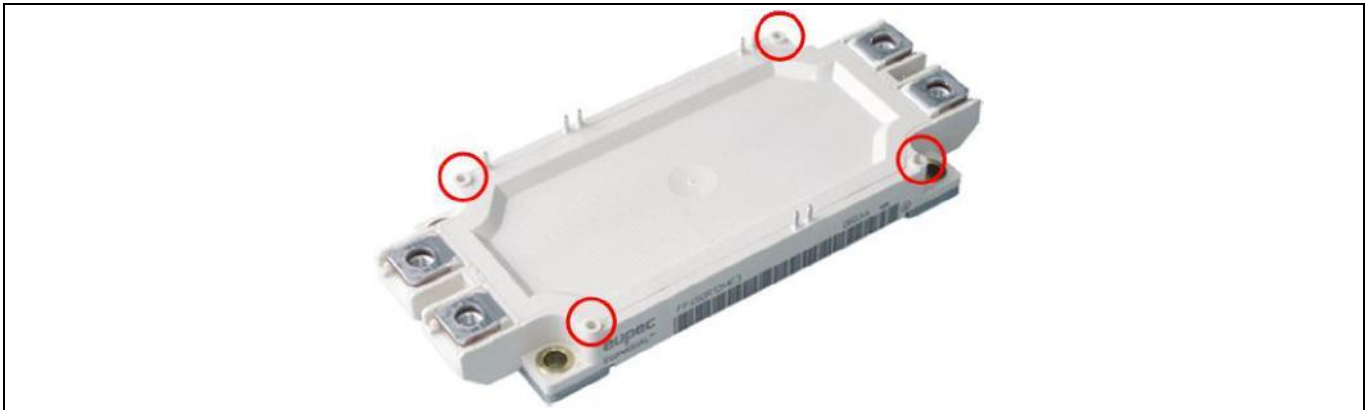


Figure 7 **PCB mounting stand-offs on the EconoDUAL™ 3 module (marked in red)**

During the design in process, both evaluation driver boards as well as evaluation module adapter boards (module adapter to hold gate resistors and clamping diodes) are available on request. Further information regarding EconoDUAL™ evaluation drivers is contained in the application note AN2006-04: “2ED100E12-F Evaluation Driver Board for EconoDUAL™ IGBT Modules” [2].

2.6 General press-in process for several modules on the PCB

Pressing several power modules onto a large PCB requires a special procedure due to manufacturing related tolerances of the modules and the PCB. This procedure is necessary to address the deviations in the height between the modules and the DCB (Direct Copper Bonds) and PCB surfaces. These deviations can have a significant impact on the thermal performance and lifetime of the modules. The target is to minimize the deviations to prevent mechanical deformation of the PCB and avoid unwanted forces on the modules and PressFIT pins.

The modules should not be pressed completely into the PCB, but only down till a defined distance. U-shaped distance pieces or additional guiding spacers mounted on the top insert tool can also be used. Here, the distance piece touches the PCB before the module housing. Ensure that there is sufficient space on the PCB surface for the spacers between the neighboring modules.

It is possible to insert several modules into a PCB at the same time, but it is challenging to ensure a consistent quality of the press-in process.

Information on the specifications and process to be followed when using guiding spacers is provided in section 3.2.3 of AN2009-01: “Assembly Instructions for the Easy Modules” [3].

3 Heat sink requirements for module assembly

The power loss generated in the module must be dissipated via a heat sink to avoid exceeding the maximum permissible temperature specified in the datasheet during switching (T_{vjop}). Detailed information can be found in AN2008-01: “Technical Information IGBT Modules – Definition and use of junction temperature values” [4].

The interface between the heat sink and the module has a large impact on the efficiency of heat transfer from the module to the ambient. Therefore, the condition of the heat sink's surface in the module mounting area is very important.

The contact surfaces, the baseplate of the module, and the surface of the heat sink must not be degraded or contaminated. They should only be cleaned with fresh, lint-free cloth.

The contact surface between the module baseplate and the heat sink should not exceed the following values:

- Surface flatness $\leq 30 \mu\text{m}$
- Surface roughness $R_z \leq 10 \mu\text{m}$

The heat sink must be of sufficient stiffness for the assembly and subsequent shipping to prevent additional strain or pulling forces on the baseplate of the module. The heat sink must be handled twist-free during the entire assembly process, particularly when the PCB is linked to the heat sink.

Application of the thermal interface material

4 Application of the thermal interface material

Due to the different surface shapes of the module baseplates and the heat sinks, there are inherent air gaps in-between the connecting surfaces of both. To dissipate the losses in the module and to achieve an efficient heat flow from the chip to the heat sink, these gaps or cavities must be filled by a thermal interface material (TIM). An optimally thick layer displaces all the air but does not prevent metal-to-metal contact between the baseplate and the heat sink surface.

A TIM with permanent elastic features should be selected to ensure consistently good heat-transfer resistance. When applying TIM, ensure that no screw holes are contaminated. This to avoid compromising the screw torque.

4.1 Applying thermal conductive paste using screen printing

When using a thermal conductive paste (TCP), a homogenous application must be ensured. Manually applying a TCP with a constant thickness in the μm range is very difficult. The homogeneity and reproducibility of the resulting thermal layer always remain questionable in this case. Therefore, it is recommended that the thermal conductive paste be applied by screen printing (see *Figure 8*). Besides applying the TCP homogeneously and reproducibly, this method offers the possibility of adjusting the distribution of the paste to the individual module.

Proposals for module-specific drawings of such screen-printing stencils can be requested using the normal Infineon channels. Users must test and qualify the suitability of the stencil in combination with the specific TCP and the assembly and application process by themselves.

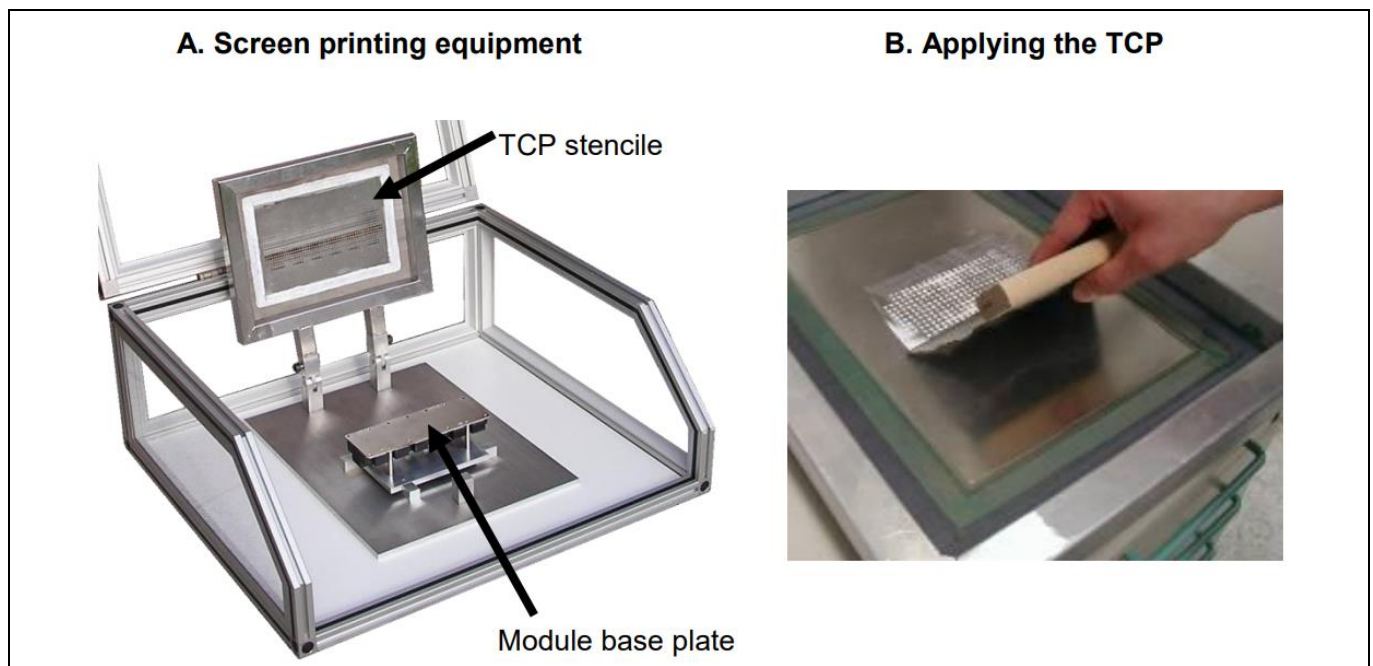


Figure 8 A screen printing equipment to apply TCP

B. Applying the TCP using a stencil

A typical distribution of the thermal conductive paste on the baseplate of an EconoDUAL™ 3 applied using screen printing is shown in *Figure 9*.

Application of the thermal interface material

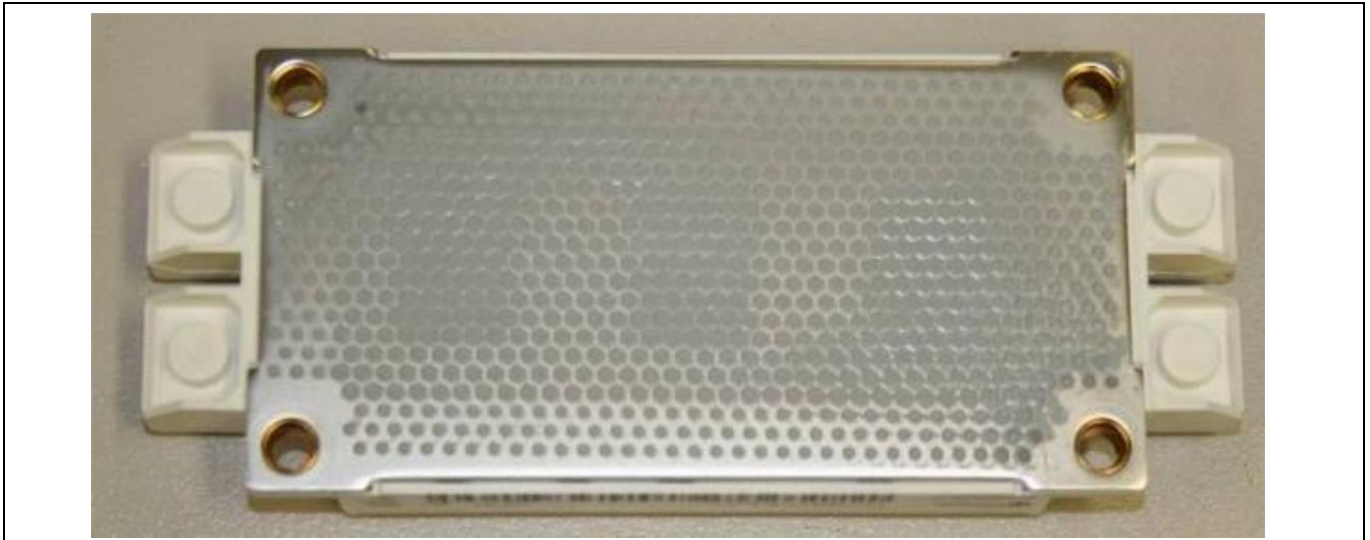


Figure 9 **Baseplate of an EconoDUAL™ 3 after applying the TCP using screen printing**

Detail information on the use of stencils to apply the thermal conductive paste using screen printing is available in the application note AN2006-02: “Application of screen print templates to paste thermal grease within Infineon modules” [5].

4.2 Applying TCP using a roller or a spatula

If the thermal conductive paste cannot be applied by the recommended screen-printing process, it can be applied using a roller or a spatula. The layer of the applied grease should be typically 50 to 100 µm thick.

The amount of thermal conductive paste required depending on the thickness of the applied layer can be tentatively given as:

- $d = 50 \text{ µm} \rightarrow VTCP \approx 0.4 \text{ cm}^3$
- $d = 100 \text{ µm} \rightarrow VTCP \approx 0.8 \text{ cm}^3$

These volumes can either be measured using a syringe or applied from a tube.

Common rollers or fine-toothed spatulas can be used to apply the thermal conductive paste. Unfortunately, the homogeneity and reproducibility of the resulting layer is always uncertain. For qualifying and verifying the assembly process or during training, the thickness of the layer can be controlled using a wet film comb.

Mounting the module to the heat sink

5 Mounting the module to the heat sink

5.1 Screws to mount the module to the heat sink

To mount the modules, use DIN M5 bolts that comply with class 6.8 at least. For example, according to DIN912 (ISO4762), ISO 7380, DIN6912, or DIN7984. These bolts should be used in combination with a suitable washer and spring washer, for example, according to DIN433, DIN125, or comparable combined screws.

The clearance and creepage distances specified in the EconoDUAL™ 3 datasheets are the shortest in an unassembled and unconnected module.

When selecting the M5 screws, washers, and spring washers to mount the module, consider the clearance and creepage distances between the power terminals and the nearest screw head or washer during the development phase and choose according to the valid standards.

5.2 Mounting the module on the heat sink

While mounting the modules, the permissible module tolerances for both screw and hole on the baseplate must be considered. The hole diameter follows the positional tolerance according to the ISO 2768-mK standard. For more information and module drawings, refer to the relevant datasheet.

The clamping force of the module resulting from the assembly process depends on the applied torque and the condition of the heat sink. The screws used to fasten the module must be tightened uniformly in the recommended sequences with the specified torque.

If steel screws are used in an aluminum heat sink with a dry M5 thread and a typical friction factor of $\mu_G = 0.2$ to 0.25 (μ_G = friction coefficient thread in the heat sink), the torque value is: $M_{\min} = 3 \text{ Nm}$ and $M_{\max} = 6 \text{ Nm}$. This is the value specified in the datasheet.

Other material combinations of screws and/or heat sink material may require an adjustment to the mechanical parameters.

To ensure good thermal contact with the heat sink, follow this process while tightening the M5 fastening screws:

1. Place the module on which the thermal compound is applied onto the heat sink and fix the screws as follows (see *Figure 10*):
2. Fix the screws with 0.5 Nm (hand tight, crosswise) in the sequence: Screw number: 1 – 2 – 3 – 4
3. Tighten the screws with 3 Nm to 6 Nm in the same sequence (crosswise): Screw number: 1 – 2 – 3 – 4

Depending on the viscosity of the thermal compound used, an intermediate step 2a may be required, especially for pastes with high viscosity. This additional step will distribute the thermal compound during the assembly process and mold it to the shape of the module's baseplate and heat sink.

After a certain time, depending on the thermal compound, step 3 has to be carried out.

2a. Tighten the screws with approximately 2 Nm in the same sequence (crosswise): Screw number: 1 – 2 – 3 – 4

Mounting the module to the heat sink

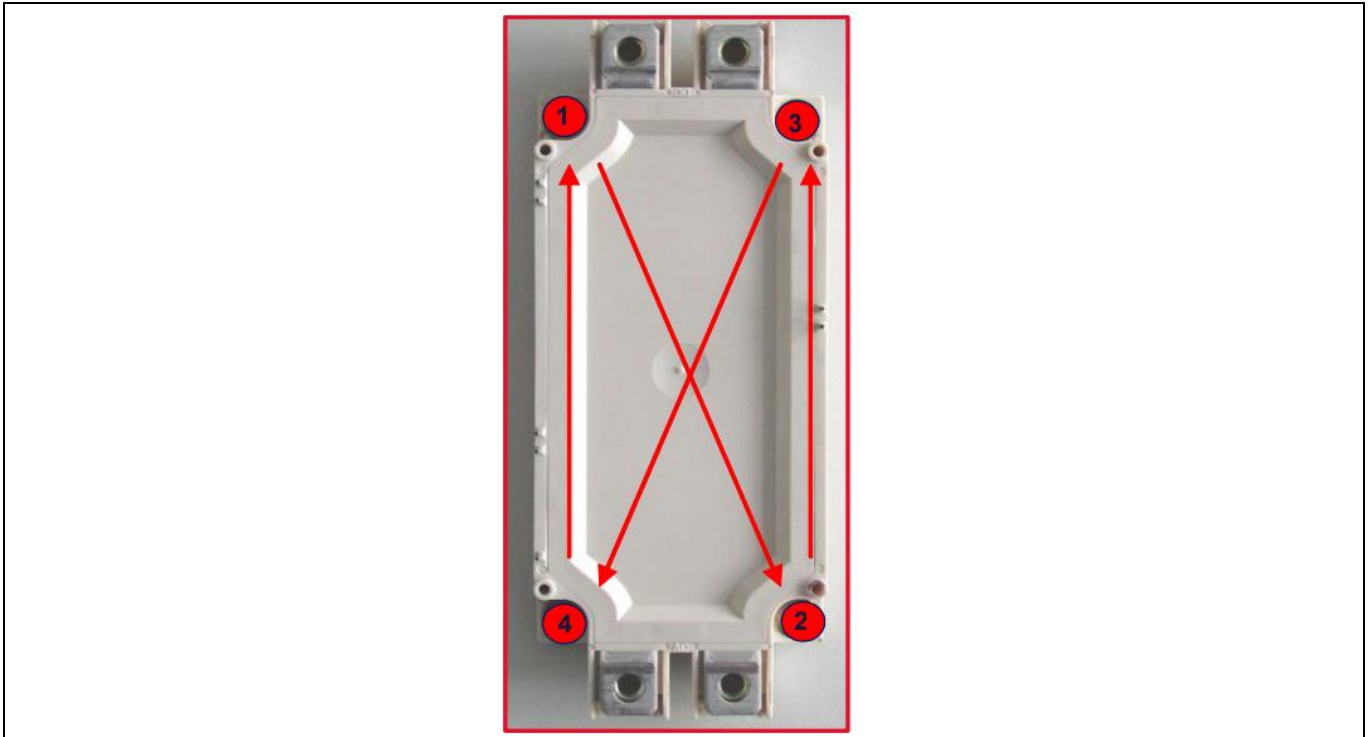


Figure 10 **Tightening sequence to mount the module on the heat sink**

When using a thermal compound, depending on the type of paste it may be necessary to check the tightening torques of the fastening screws for the correct value after a heat-up test. This additional check is especially recommended if thermal foils are used instead of a TCP.

Note: *The information and torque values given in this application note are only valid for thermal conductive pastes. Customers must conduct their own tests and measurements if heat-conductive foils are used.*

When selecting a thermal interface material, the quality of thermal contact and long-term stability should be considered and discussed with the manufacturer of the thermal interface material.

Connecting the bus bars to the power terminals

6 Connecting the bus bars to the power terminals

While connecting the module, consider the permissible module tolerances given in the individual datasheets.

The DC-power side should be connected to a laminated bus bar to minimize stray inductance and keep the switching overvoltage as low as possible. The maximum permissible value of the voltage at the power terminals and at the IGBT chip given in the relevant datasheet must be adhered to (see RBSOA).

To connect to the power terminals, DIN M6 screws that comply with at least class 6.8 are required in combination with suitable washers and spring washers, or complete combination screws. These should be tightened using the following recommended torque: $M_{\min} = 3 \text{ Nm}$ and $M_{\max} = 6 \text{ Nm}$.

When selecting the screw length, the thickness of the connected parts must be subtracted from the total length of the screws. The effective length of engagement into the module thread may not exceed the maximum specified depth of 10 mm.

The connected parts must be mounted on the power terminals so that the specified forces (see *Figure 11*) are not exceeded during assembly or later during operation.

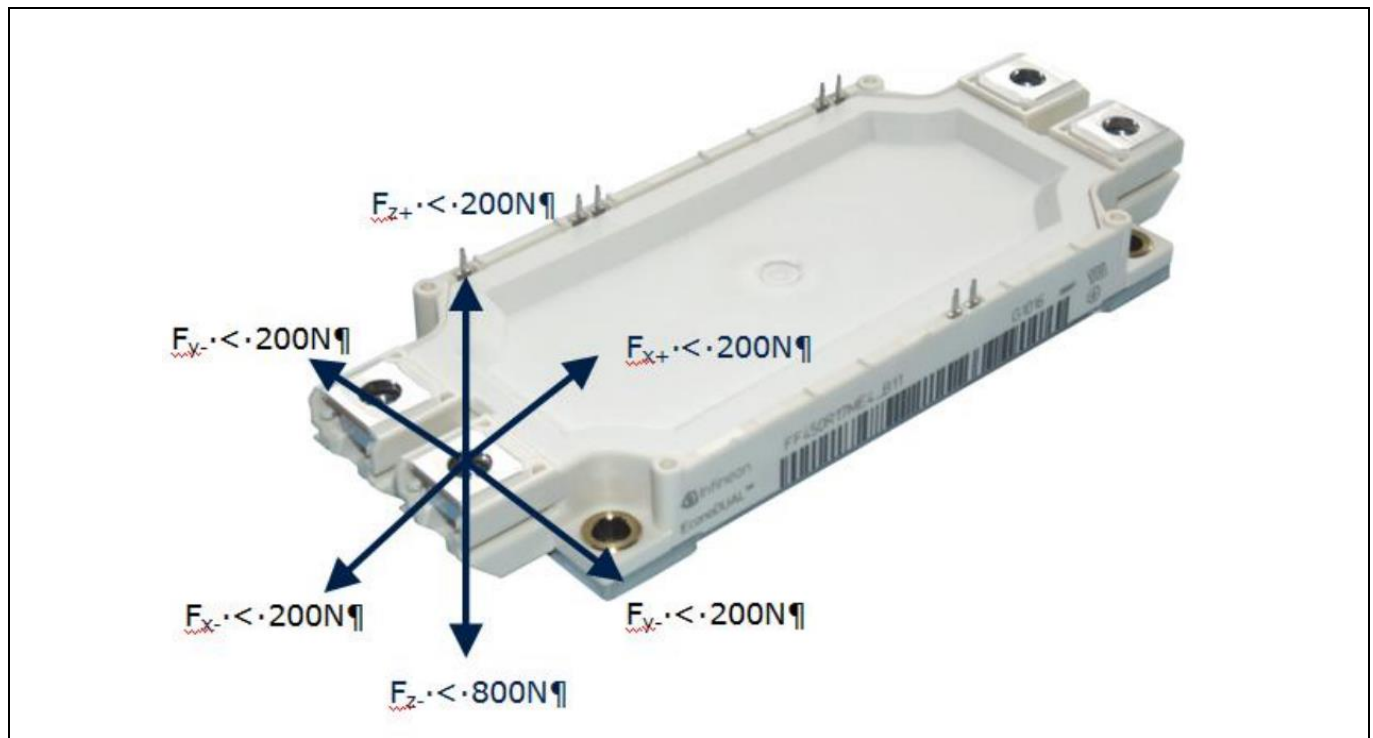


Figure 11 Maximum permissible pull and push forces at the power terminals of the EconoDUAL™ 3 only during the screw-in process

6.1 Connecting the power terminals with ideal strain relief

To connect the power terminals with the best possible strain relief, an assembly according to the concept drawings shown in *Figure 12* and *Figure 13*, is recommended.

Considering all tolerances, the mounting block should be approximately 0.5 mm lower than the height of the power terminals to create a pre-tension in the power terminals and avoid a damaging permanent force in the F_{z+} direction (see *Figure 11*).

Connecting the bus bars to the power terminals

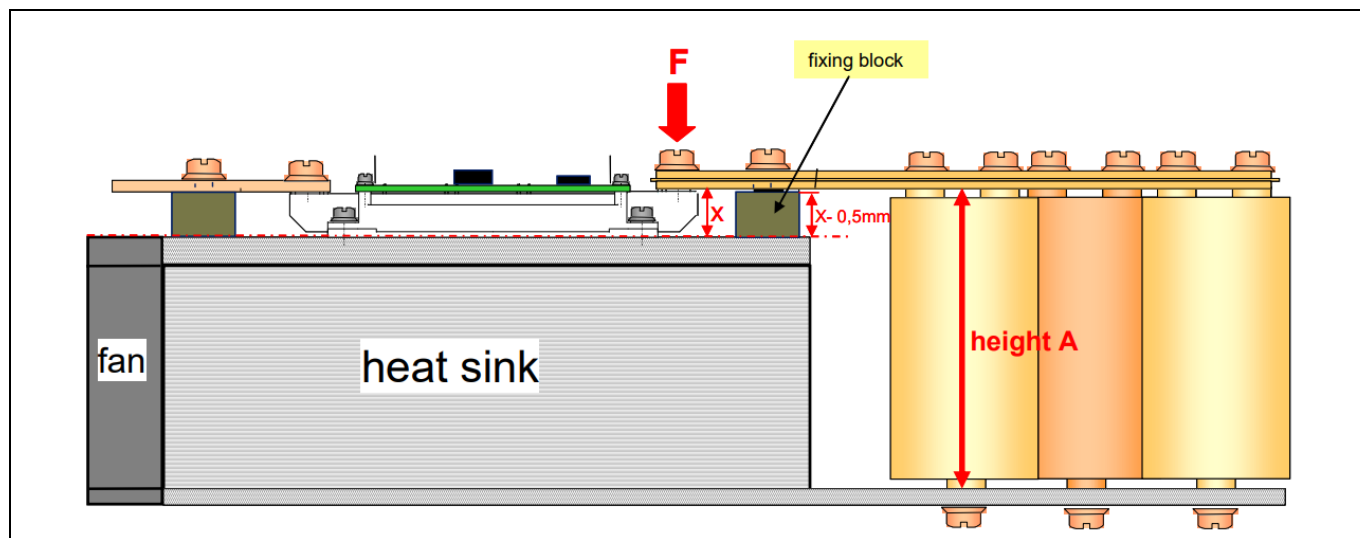


Figure 12 **Concept drawing 1 of EconoDUAL™ 3 assembly with ideal strain relief**

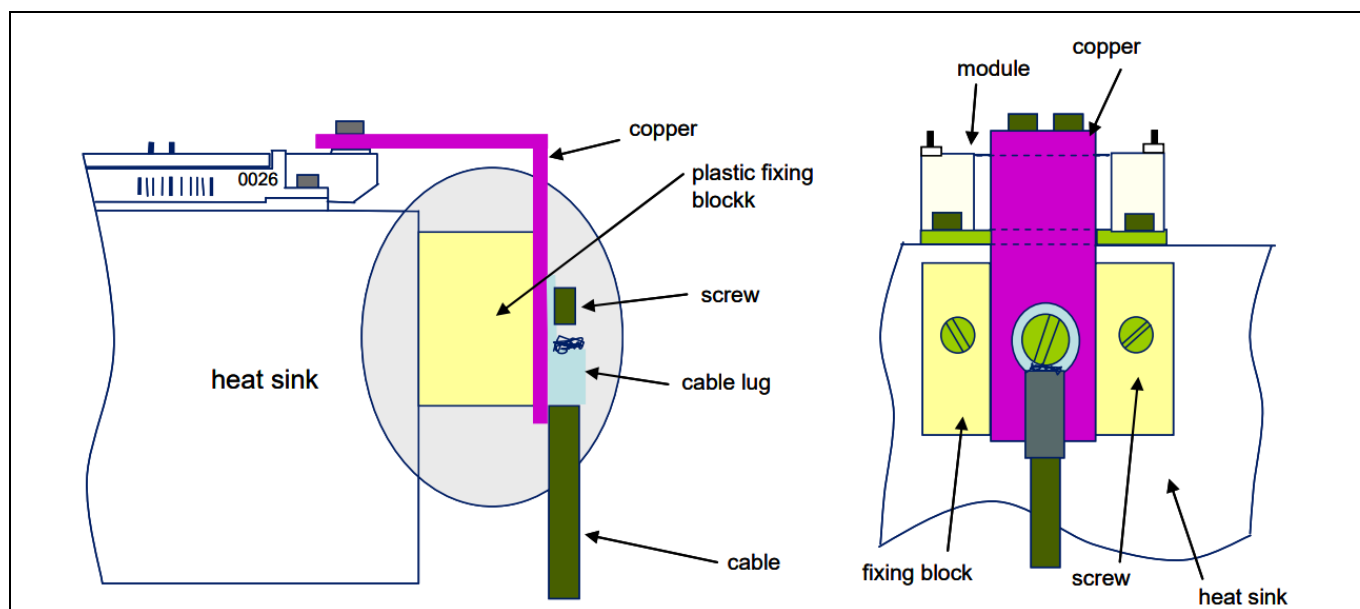


Figure 13 **Concept drawing 2 of EconoDUAL™ 3 assembly with ideal strain relief**

Mechanical loads (vibration and shock)

7 Mechanical loads (vibration and shock)

The EconoDUAL™ 3 modules exhibit a rugged construction that has been developed to offer the best mechanical robustness in applications.

The maximum permissible values for the pull and push forces at the power terminals mentioned in *Figure 11*, and the press-in force values at the auxiliary terminals given in section 2.2.1 are applicable only for one-time mechanical load during the mounting process.

The impact of continuous mechanical load on the module, especially generated by vibration or shock, strongly depends on the mechanical setup of the inverter and the load profile in the application. This cannot be specified in general.

The ability of the modules to operate under specific mechanical loads must be tested and qualified by customers in their mechanical setup with those specific profiles.

Storage and transportation of the modules

8 Storage and transportation of the modules

Shock or extreme environment influences must be avoided while transporting and storing the EconoDUAL™ 3 modules. It is possible to store the modules at temperatures above those mentioned in the datasheet, but it is not recommended.

The recommended storage conditions according to TR14 should be followed for the recommended storage time of 2 years maximum.

If the EconoDUAL™ 3 modules are stored according to the recommended conditions, pre-drying them before the assembly process is not required.

Climatic conditions during active, current carrying operation of EconoDUAL™ 3 modules

9 Climatic conditions during active, current carrying operation of EconoDUAL™ 3 modules

EconoDUAL™ 3 modules are not hermetically sealed. The housing and the molding compound used for electrical isolation within the housing can be permeated by humidity and gases from both directions. Humidity differences should therefore be equalized in both directions.

Exposure to corrosive gases must be avoided during both operation and storage of the devices.

The climatic conditions for Infineon EconoDUAL™ 3 modules during active, current carrying operation are specified as per EN60721-3-3 class 3K3 for fixed installations. Operating the modules in a humid environment, caused by condensation, or in climatic conditions beyond class 3K3 of EN60721-3-3 must be avoided. If that is not possible, additional counter measures should be taken to protect the modules.

Related Resources

Related Resources

- <https://www.infineon.com/product-information/power/igbt/igbt-modules/econo/econodual-3>
- <https://www.infineon.com/assets/row/public/documents/60/42/infineon-an2006-05-mounting-instructions-econodual-3-applicationnotes-en.pdf?fileId=db3a304412b407950112b40ecdaf1288&folderId=db3a304412b407950112b408e8c90004>

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- [3] Infineon Technologies AG. AN2009-01 (2025): Assembly Instructions for the Easy Modules. V1.1 www.infineon.com
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Revision history

Revision history

Document revision	Date	Description of changes
Revision 1.00	2011-01-31	Initial version
Revision 1.01	2013-02-01	Additional chapter 9. Climatic conditions, chapter 2.2.4 typical press-in force 110 N/pin
Revision 1.02	2026-07-06	Updated information regarding mounting order, PCB hole diameter, and press-in tool

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