

Using screen-printing templates to apply thermal grease in IGBT modules

About this document

Scope and purpose

This application note provides a guideline on how to apply thermal grease or paste on IGBT power modules using a stencil.

Intended audience

This document is intended for all technical experts using Infineon power modules in various applications.

Table of contents

	About this document	1
	Table of contents	1
1	Introduction	2
2	Screen-printing template	3
3	Application of thermal compound	4
4	Advantages of screen-printing process	7
	Revision history	8
	Disclaimer	9

1 Introduction

While operating semiconductor modules, power losses need to be transferred to a heat sink, so that the maximum junction temperature of the components is not exceeded. A thermal compound is normally used to reinforce thermal contact between the module and the heat sink, thus compensating a potential unevenness or surface roughness of the heat sink or the baseplate. The screen-printing process for applying thermal compounds is described in the subsequent chapters.

2 Screen-printing template

2 Screen-printing template

In contrast to conventional paste-application methods, the screen-printing procedure applies the thermal compound only to areas where it is required. For this process, a surface scan of the baseplate is used to determine the quantity of thermal compound required. [Figure 1](#) shows the baseplate surface structure of a mounted EconoPACK™ 3 module.

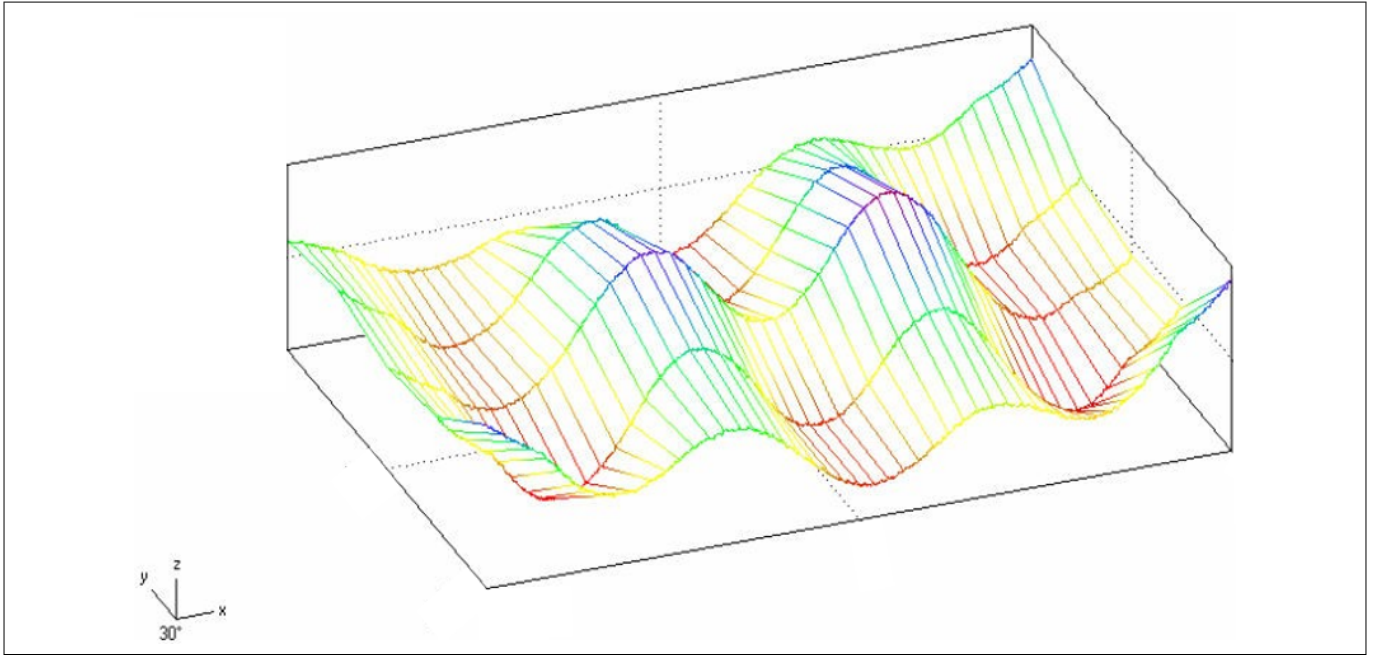


Figure 1 Surface of a mounted EconoPACK™ 3 baseplate

The blue or violet lines represent the metallic contact with the heat sink, and the red lines indicate areas that do not show thermal contact with the heat sink. The cavities in the baseplate have to be filled with thermal compounds. To determine the required paste, divide the surface scan into a grid. For each grid point, a sufficient amount of paste has to be determined. [Figure 2](#) shows the screen-printing template of an EconoPACK™ 3 with three DCBs from this procedure.

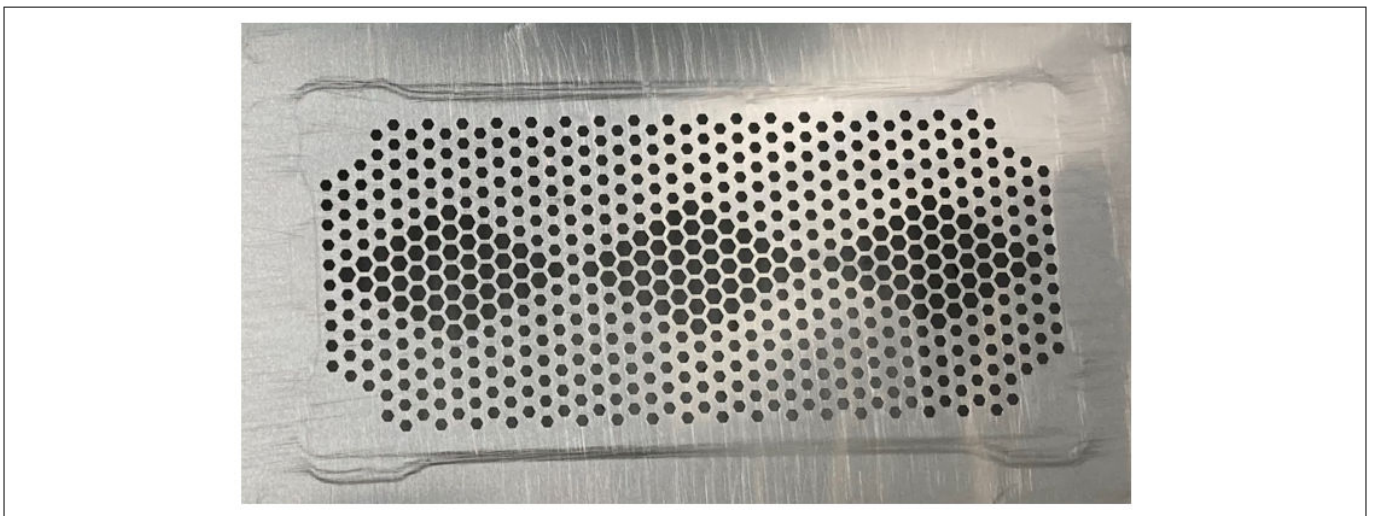


Figure 2 Screen-printing template for an EconoPACK™ 3 baseplate

Note: Corresponding drawings for different module types are available in CAD format, and can be ordered through your sales partner.

3 Application of thermal compound

3 Application of thermal compound

An example of the process of screen printing for applying thermal compound to an EconoPACK™ 3 module is shown below.

The following items are required to perform this process:

- Isopropyl or ethylene alcohol
- Putty knife

Steps

1. Clean the dirt and residue from the heat sink and template by using isopropyl or ethylene alcohol according to [Figure 3](#).

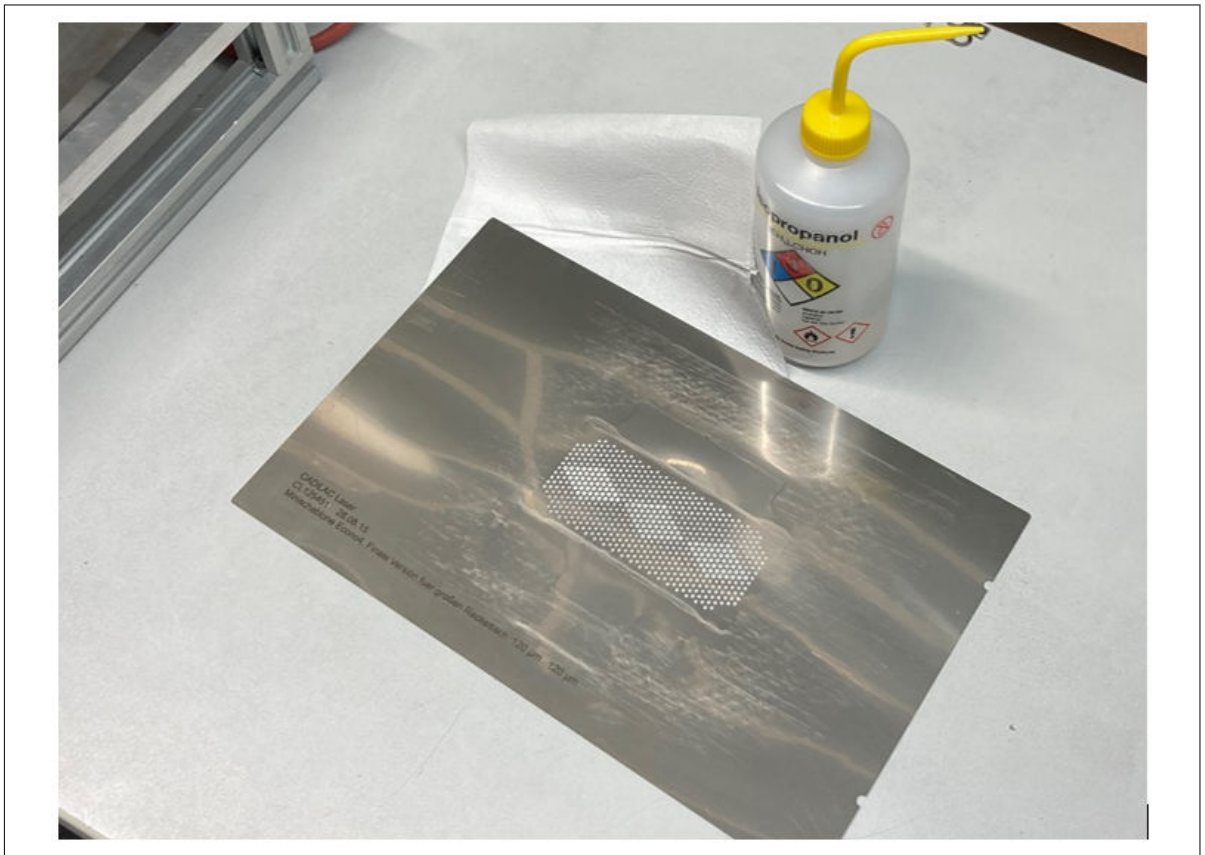


Figure 3 Cleaning the screen-printing template

2. To align the template and module, insert the module into the corresponding holding fixture and hold it in position. Next, align the baseplate, on which the thermal compound is to be applied, upwards, and place the corresponding template on it. The holding fixture is shown in [Figure 4](#).

3 Application of thermal compound

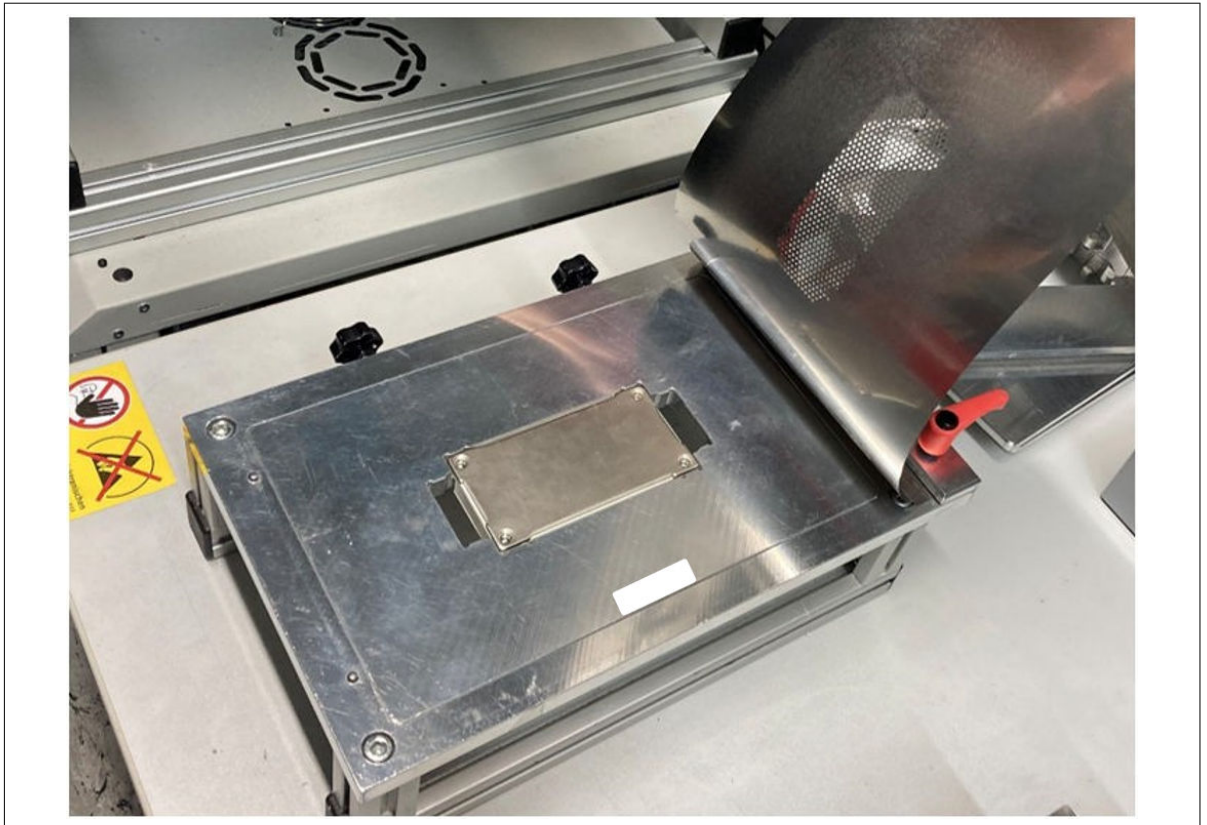


Figure 4 Alignment of the module

3. Apply the paste into the holes of the template with a putty knife. [Figure 5](#) shows an example of this procedure.

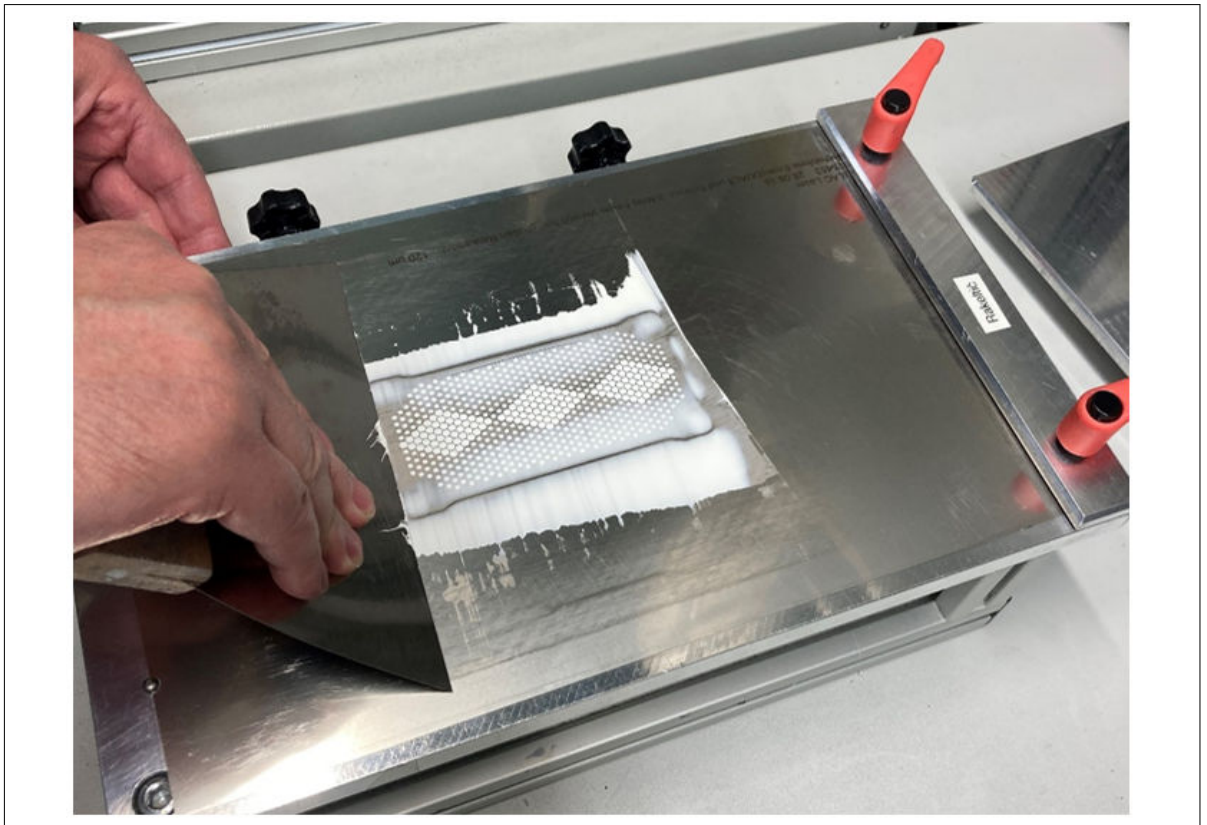


Figure 5 Paste spreading

3 Application of thermal compound

4. Remove the template carefully from the baseplate according to the following [Figure 6](#).

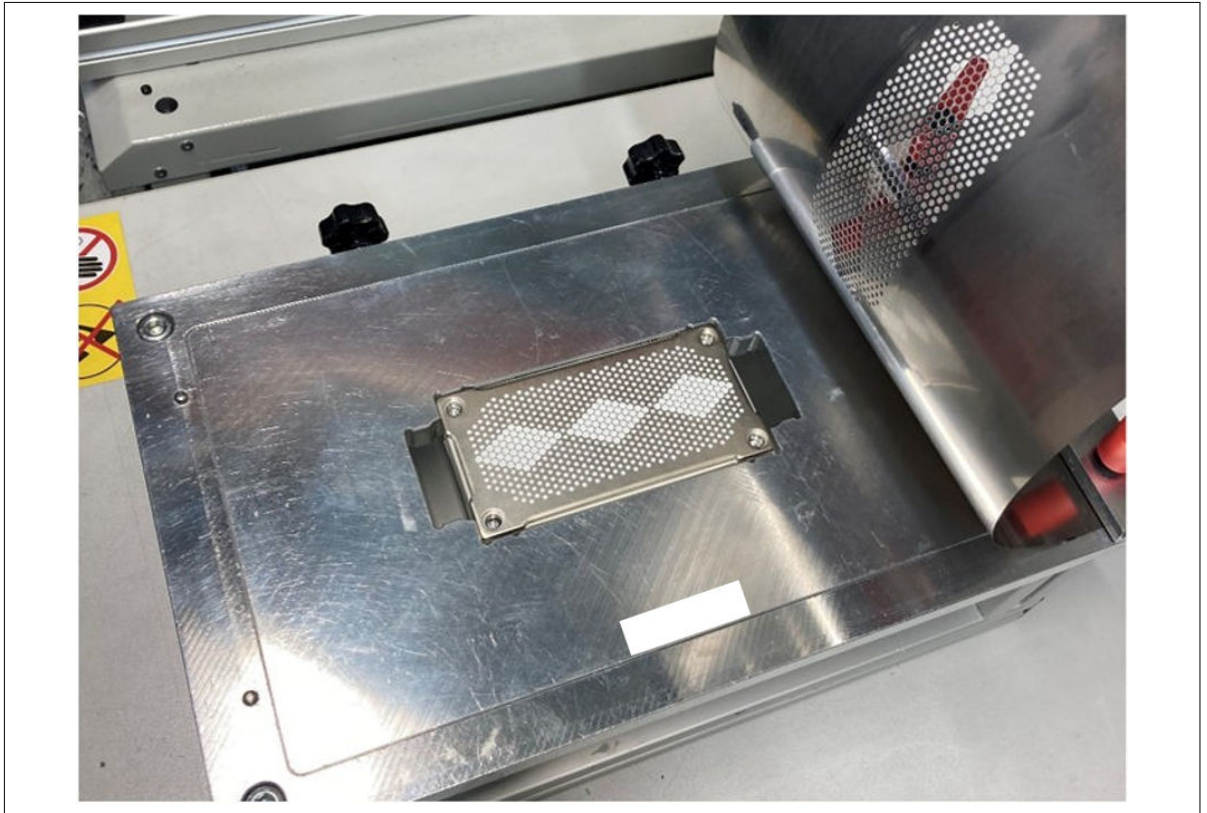


Figure 6 Removing the screen-printing template

5. The resulting print image of the thermal compound on the module baseplate is shown in [Figure 7](#).

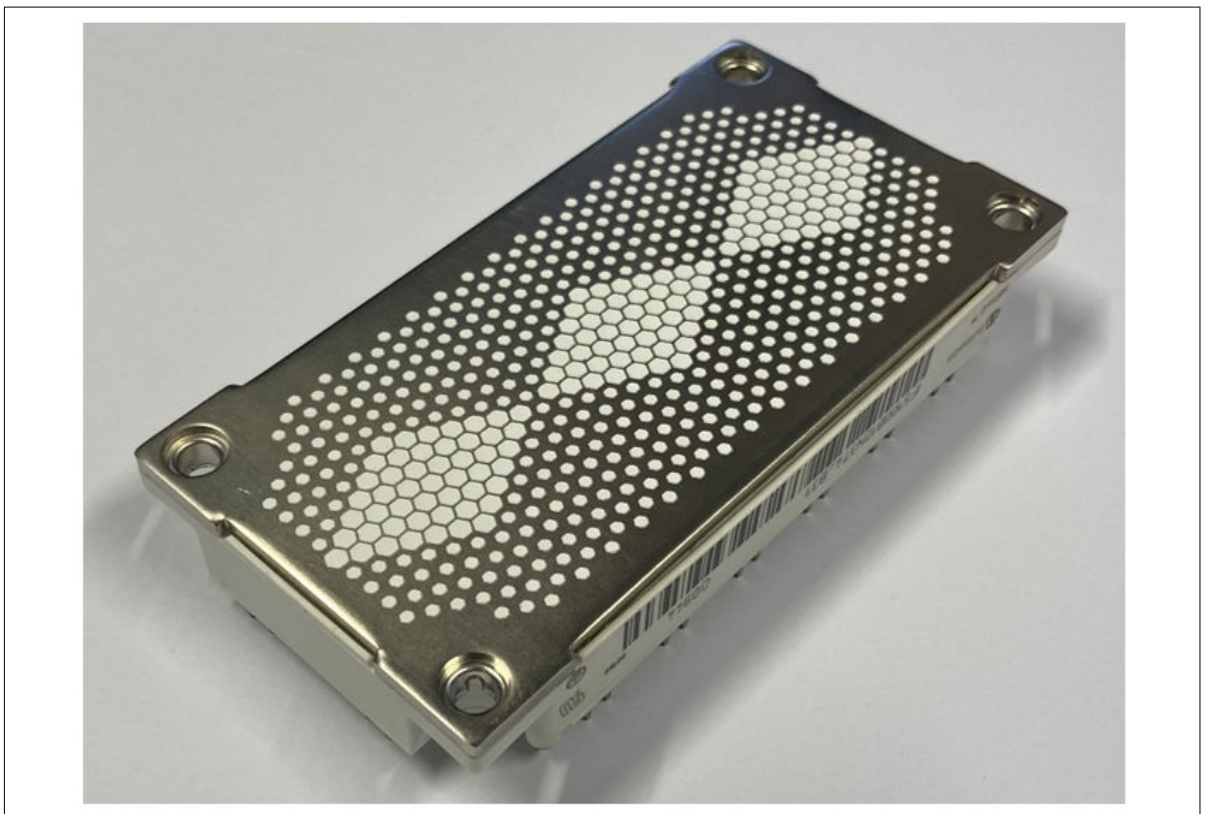


Figure 7 Print image after paste has been applied

4 Advantages of screen-printing process

4 Advantages of screen-printing process

Compared to conventional methods of paste application, the screen-printing process ensures that:

- the thermal compound is only applied to areas where it is required
- the application is reproducible
- better thermal coupling is achieved

Figure 8 and Figure 9 show images of paste application done by screen printing and by roller, respectively.

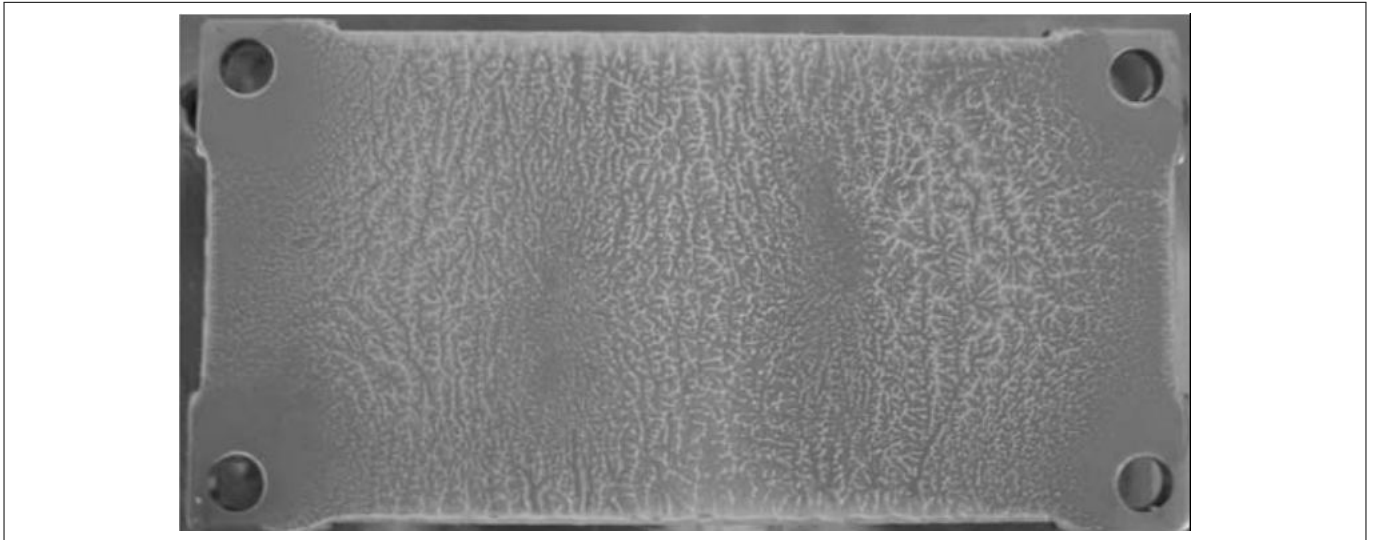


Figure 8 Applied with a template

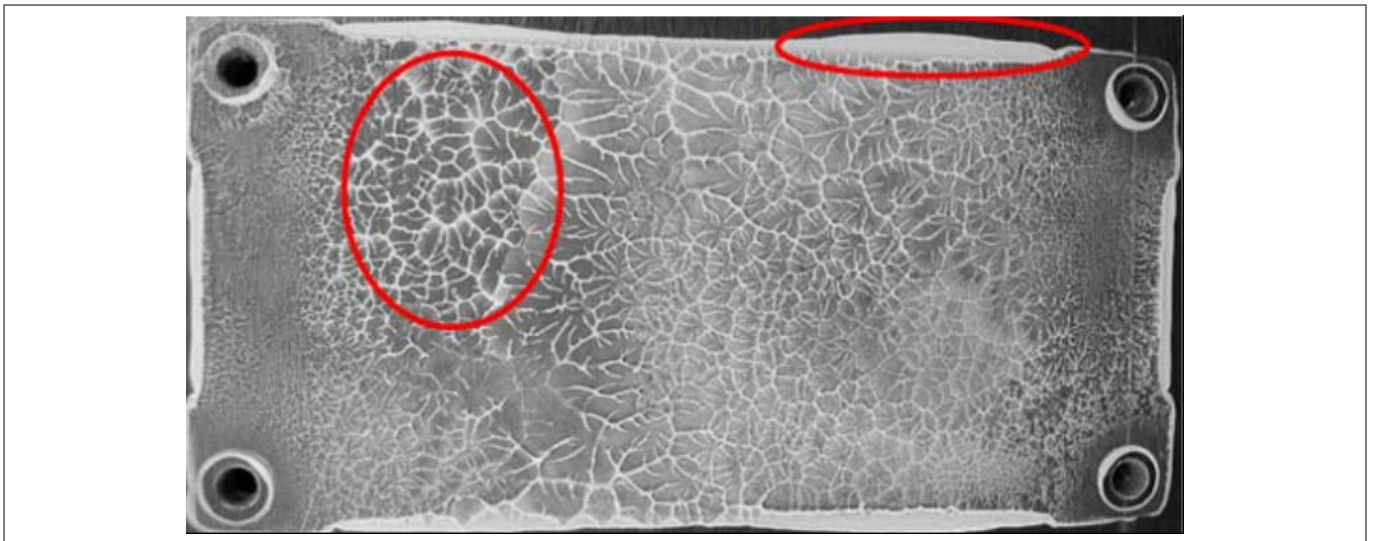


Figure 9 Applied with a roller

In the above figure, the areas marked with a red circle show excess thermal paste and a rough structure. The images demonstrate clearly that the screen-printing application ensures an optimum distribution and structure of the thermal paste.

Attention: For penetration levels lower than 370 as per DIN ISO 2137, it is recommended to check the print image of a module or heat sink in cold and warm conditions.

Revision history

Document version	Date of release	Description of changes
V0.2	2005-12	Initial version
V1.10	2021-12	Current state of the technology + update of format and some figures

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2021-12-10

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2021 Infineon Technologies AG

All Rights Reserved.

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference

IFX-jbh1635260531612

IMPORTANT NOTICE

The information contained in this application note is given as a hint for the implementation of the product only and shall in no event be regarded as a description or warranty of a certain functionality, condition or quality of the product. Before implementation of the product, the recipient of this application note must verify any function and other technical information given herein in the real application. Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind (including without limitation warranties of non-infringement of intellectual property rights of any third party) with respect to any and all information given in this application note.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.