

New I²PAKFP (TO-281) package, practical approach for compact and slim product design needs

Introduction

STMicroelectronics has introduced a new package family, I²PAKFP, which is JEDEC approved as TO-281. The package provides product system designers additional options to meet compact and slim product design needs, such as those addressing the fast growing ultrabook / notebook / netbook semi-slim adaptor market, as well as other potential applications in AIO PC, compact lighting dimmer/ballast...etc. This fully molded I²PAKFP (TO-281) package is 30% shorter in body height compared to the current TO-220FP package and yet maintains the same level of thermal resistance, electrical isolation and heatsink mounting possibilities as the current TO-220FP package.

Figure 1. I²PAKFP (TO-281) vs. TO-220FP size comparison

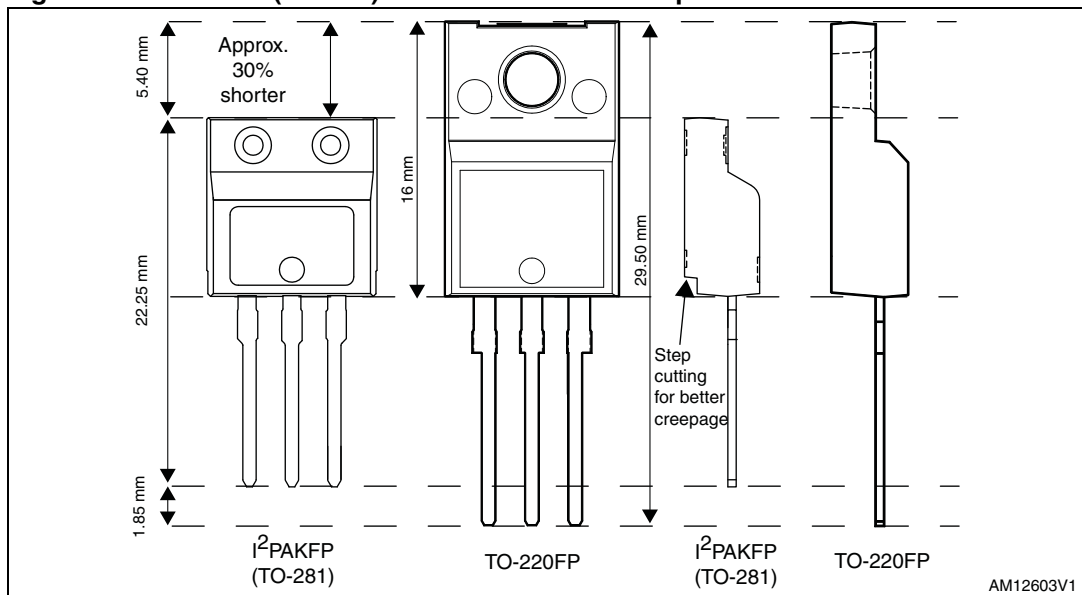
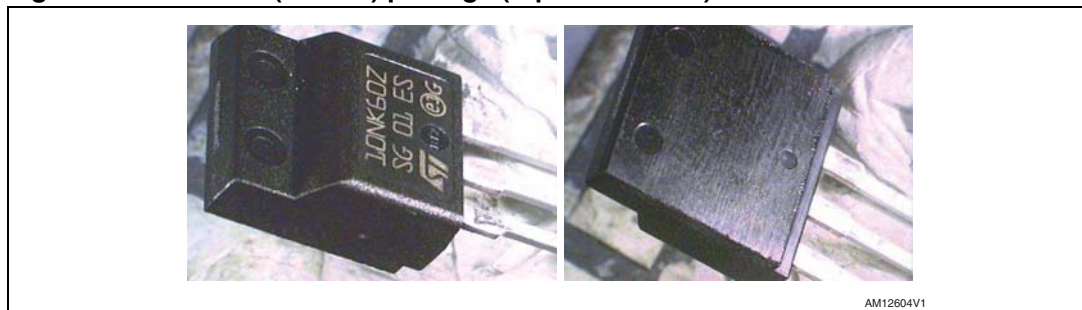


Figure 2. I²PAKFP (TO-281) package (top and bottom)

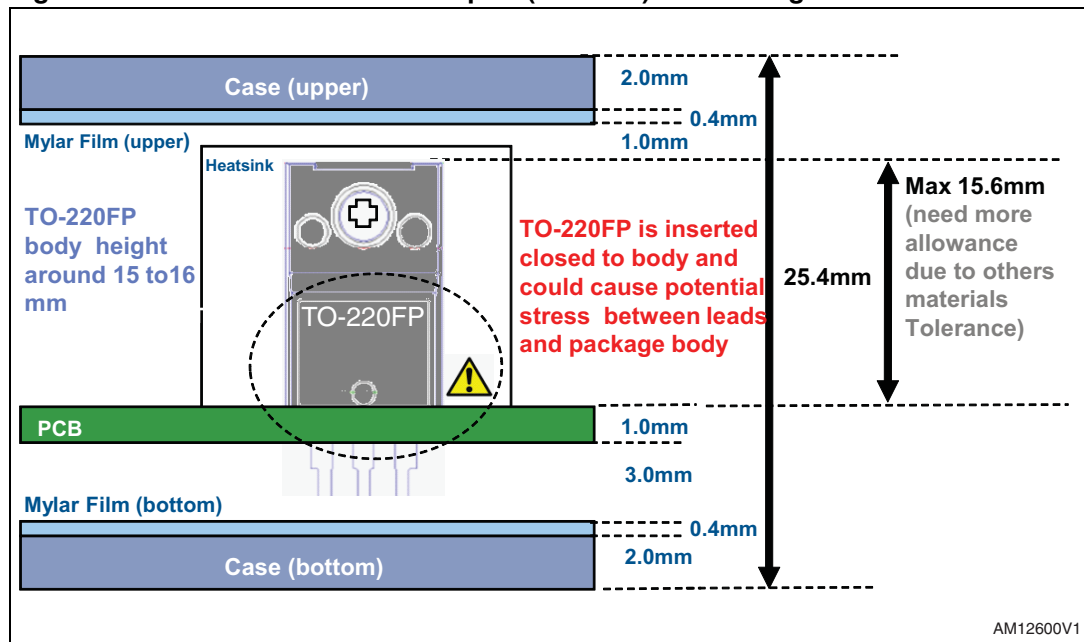


1 Example of semi-slim notebook adaptor (25.4 mm height) TO-220FP vs. I²PAKFP (TO-281)

Figure 3 shows a typical cross section view of the semi-slim adaptor. The remaining allowable component height is limited to 15.6 mm or less with all the device elements taken into consideration.

Typically, the TO-220FP body height is already in the range of 15 to 16 mm, so in the case of TO-220FP being used in a semi-slim adaptor design, the package body must be inserted very close to the PCB, this means above the standoff of the leads of the package as shown in the diagram. This may have a potential impact on device life-time performance.

Figure 3. Semi-slim notebook adaptor (25.4 mm) when using TO-220FP

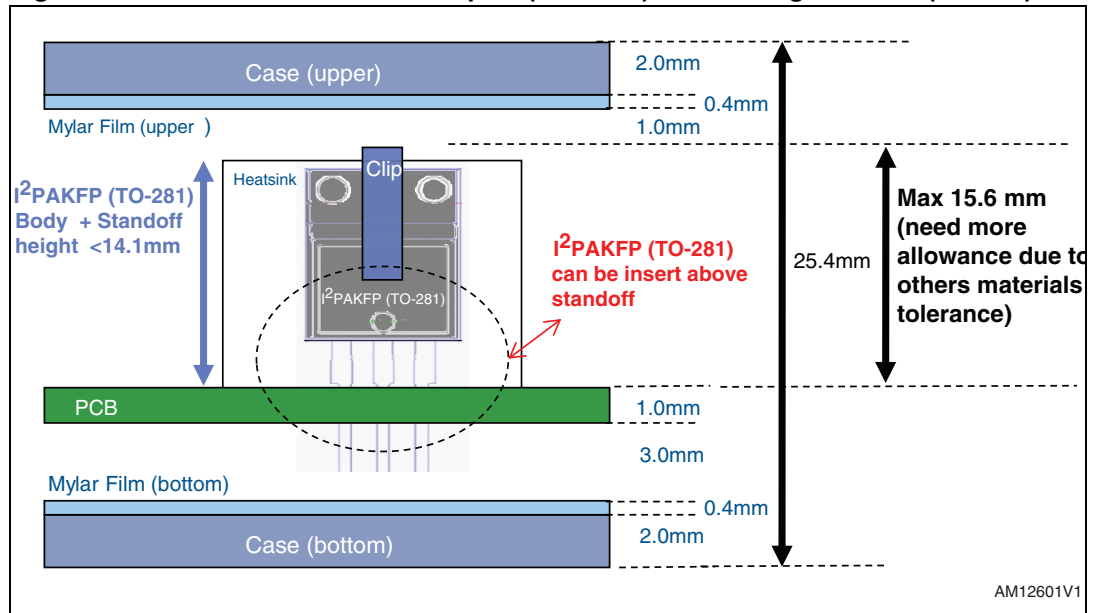


Full insertion of the TO-220FP body flush with, or very close to, the PCB may lead to potential stress that can cause defects not only on the connection between leads and the package body but also on the internal structure of the package. Potential damage may be further aggravated by thermal stresses from soldering and operating conditions and any failures can appear immediately at the final test or may be latent and show up in the field.

This potential damage may include:

- mold compound delamination
- leads bending or fracturing at standoff / Dambar area
- cracked mold compound
- soldering joint issues

Figure 4. Semi-slim notebook adaptor (25.4 mm) when using I²PAKFP (TO-281)



By using I²PAKFP (TO-281) in a semi-slim adaptor design, as shown in [Figure 4](#), the package can be mounted above the standoff to avoid stress between the leads and package body when TO-220FP is used, therefore improving reliability.

In summary, the I²PAKFP (TO-281) offers the following benefits:

- Low profile package with enhanced creepage
- Fully molded, isolated, cost effective and reliable package
- Body height shorter by 30% compared to the TO-220FP package
- Same thermal resistance as TO-220FP and heatsink mountable
- Clip can be used to mount the package which results in more uniform contact pressure and good thermal contact.

2 I²PAKFP (TO-281) product availability

Power MOSFET products available in the I²PAKFP (TO-281) package start with the prefix “STFI” and can be found on the STMicroelectronics website (www.st.com).

Figure 5. I²PAKFP (TO-281) sample kit



AM12602V1

3 Revision history

Table 1. Document revision history

Date	Revision	Changes
23-Mar-2012	1	Initial release.

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