Product Brief

PressFIT

Our established, reliable mounting technology

Infineon's established PressFIT technology offers the possibility for reliable, solder-less mounting of power modules, meeting the nowadays demands of lead-free technology. According to the RoHS directive, since 2006 most lead-containing solder alloys have to be replaced by lead-free solders. This results in higher melting point solders and lead-free tin metallization of the PCB, which has significant effects on the mounting process.

PressFIT technology is one time-saving possibility for lead-free solderless mounting of power modules. The low electrical and thermal contact resistance makes the contact suitable for a wide range of currents and applications.

Environmental tests show that vibration loads and climate sequences have no negative influence on the contact resistance. This results from the gas-tight contact and high contact force. The high holding forces of the contact are independent of the PCB hole tolerances. This reduces the effort for mechanical fixing.

The PressFIT process can be separated from soldering and allows module mounting on the soldering and the component side of the PCB. This increases the design flexibility. Additionally, the module mounting process can be separated from the soldering process of the PCB. The high reliability of PressFIT contacts in general promises increased system reliability. This is especially of interest if modules are operating in harsh environments.

Key features

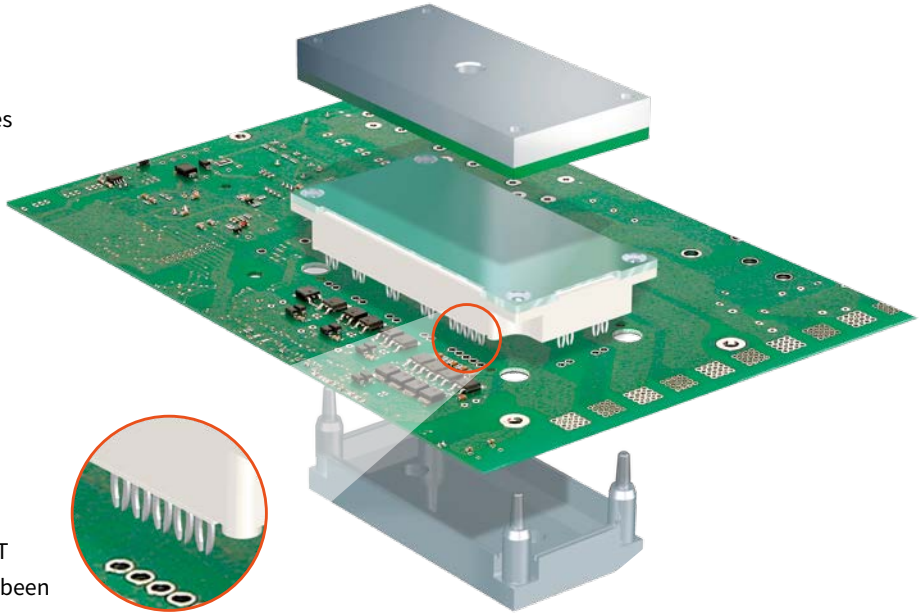
- PressFIT saves process time
- Reliable cold welding connection of module pins and PCB
- Low ohmic resistance
- Module mounting possible on soldering and component side of PCB
- Established technology in automotive, communication & industrial applications
- Decrease of FIT rate

Applications

- Industrial drives
- Uninterruptable power supplies
- Renewable energy systems
- Air conditioning
- Welding
- Inductive heating
- Medical equipment
- Commercial and agricultural vehicles (CAV)

PressFIT

Background of PressFIT technology



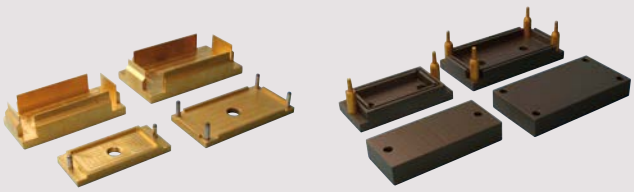
As mentioned above, the PressFIT technology enables lead-free solderless solder less mounting of power modules. In addition, it offers the possibility of quicker mounting of the assembly, thus saving process time and costs with the resulting potential of higher output capacity. The possibility of mounting the module on either the soldering or the component side of the PCB provides further flexibility to meet the requirements of modern assembly lines.

Quality of PressFIT modules

Several tests regarding the application of the PressFIT technology and its reliability in power modules have been performed according to the well-known IEC standards (e.g. IEC 60352-5), but with enhanced conditions. The result of the whole program can be concluded as follows: Not one of the tests caused any measurable contact degradation. The resistance of the connection, which is the leading indicator for the quality of the connection, is very stable during and after several loadings. This means not only that high current can be handled safely over the lifetime, but also the advanced integrated functions with low voltage and current (e.g. current sensing) will be kept absolutely stable beyond the lifetime of the system. Due to this, the PressFIT technology is well suited to power semiconductor modules – especially for future high-reliability requirements.

Overview

Econo press-in & press-out tools



Easy press-in & press-out tools

Modules

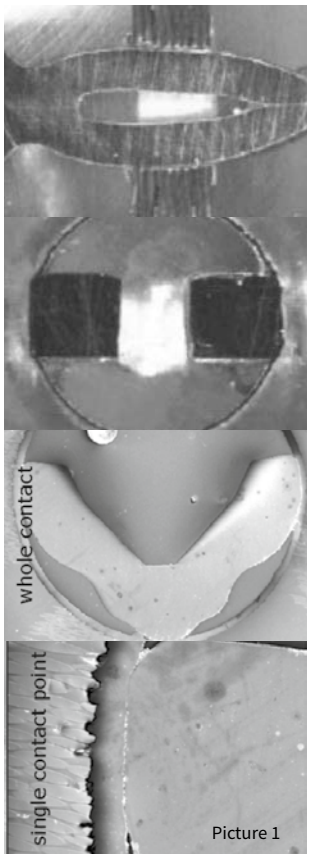
PressFIT

Background of PressFIT technology

Type of connection	Conductor cross-section in mm [2]	Failure rate λref in FIT [1]	Notes: Standards/Guide
Solder manual machine		0.5 0.03	IPC 610 [2]. class 2
Wire bond for hybrid circuits Au		0.1 0.1	28µm / Wetch - Bond 25µm / Ball - Bond
Wire-warp	0.05 to 0.5	0.002	DIN EN 60352 - 1 / IEC 60352 - 1 CORR1
Crimp manual, machine	0.05 to 300	0.25	DIN EN 60352 - 2 / IEC 60352 - 2A 1+2
Termi-point	0.1 to 0.5	0.02	DIN 41611-4
Press in	0.3 to 2	0.005	IEC 60352 - 5
Insulation displacement	0.05 to 1	0.25	IEC 60352 - 3. IEC 60352 - 4
Screw	0.5 to 16	0.5	DIN EN 60999 - 1
Clamp (elastic force)	0.5 to 16	0.5	DIN EN 60999 - 1

[1] 1 FIT equals one failure in 109 component hours

[2] Acceptability of Printed Board Assemblies



Picture 1

Usually if two contact faces are assembled, there are only a few spots which are really connected (metal to metal) and which carry the current – this is also true for polished surfaces. The minimum radius of such a microscopic metal-metal contact is typically 10 µm. In force-fitting technologies like PressFIT, there is always a necessary plastic deformation on these truly effective contact points within the contact zone. The contact radius increases due to the high contact pressure that occurs since the macroscopic contact force concentrates on a small microscopic contact area. That means the two faces will be merged.

Thus, the effective contact zone will be increased and – most importantly – a gas-tight contact zone is generated, which is very robust against corrosive environments. The connection principle is the well-known cold welding effect. Here, free electrons are generated from the plastic deformation of both contact faces. The metal-bond electron cloud links the free electrons and connects them again with the same mechanism as in the basic metal. The bonding force is indeed lower than in the prior grid, but is increasing within the first hours of the connection due to recrystallization effects.
Cold welding is not suitable for detachable contacts (e.g. bonding of relay contacts) but is well suited for permanent contacts, where the requirements regarding reliability are often much higher.

Picture 1:
SEM micrograph from a cross section of well-merged surfaces in a force-fitting connection

PressFIT Portfolio

From 10 A to 600 A

I_c [A]	6-pack modules 650 V	6-pack modules 1200 V	6-pack modules 1700 V	PIM modules 650 V	PIM modules 1200 V
500			FS500R17OE4D*		
450		FS450R12OE4	FS450R17OE4		
300		FS300R12OE4	FS300R17OE4		
225		FS225R12OE4	FS225R17OE4		
200	FS200R07N3E4R_B11	FS200R12PT4			
	FS200R07PE4	FS200R12KT4R_B11			
150	FS150R07N3E4_B11	FS150R12PT4	FS150R17PE4	FP150R07N3E4_B11	
	FS150R07PE4	FS150R12KT4_B11	FS150R17N3E4_B11		
100	FS100R07N3E4_B11	FS100R12PT4	FS100R17PE4	FP100R07N3E4_B11	FP100R12KT4_B11
	FS100R07N2E4_B11	FS100R12KT4G_B11	FS100R17N3E4_B11		
	FS100R07PE4	FS100R12KT4_B11			
75	FS75R07N2E4_B11	FS75R12KT4_B11		FP75R07N2E4_B11	FP75R12KT4_B11
		FS75R12W2T4_B11			
50	FS50R07N2E4_B11	FS50R12KT4_B11		FP50R07N2E4_B11	FP50R12KT4_B11
	FS50R06W1E3_B11	FS50R12W2T4_B11		FP50R06W2E3_B11	
35		FS35R12W1T4_B11			FP35R12KT4_B11
		FS35R12KT4_B11			FP35R12W2T4_B11
30	FS30R06W1E3_B11			FP30R06W1E3_B11	
25		FS25R12W1T4_B11			FP25R12W2T4_B11
					FP25R12KT4_B11
20	FS20R06W1E3_B11			FP20R06W1E3_B11	
15				FP15R06W1E3_B11	FP15R12W1T4_B11
10				FP10R06W1E3_B11	FP10R12W1T4_B11

I_c [A]	Dual modules 650 V	Dual modules 1200 V	Dual modules 1700 V	Bridge rectifier 1600 V
600	FF600R07ME4_B11	FF600R12ME4A_B11	FF600R17ME4_B11	
		FF600R12ME4_B11		
500		FF600R12ME4C_B11		
450	FF450R07ME4_B11	FF450R12ME4_B11	FF450R17ME4_B11	
360				TDB6HK360N16P
300	FF300R07ME4_B11	FF300R12ME4_B11	FF300R17ME4_B11	
240				TDB6HK240N16P
225		FF225R12ME4_B11	FF225R17ME4_B11	
180				DDB6U180N16RR_B11
				DDB6U180N16RRP_B37
				TDB6HK180N16RR_B11
134				DDB6U134N16RR_B11
104				DDB6U104N16RRP_B37
75				DDB6U75N16W1R_B11

- EconoPACK™ + / PressFIT
- EconoDUAL™ 3 PressFIT
- EconoPACK™ 4
- Econo3 PressFIT
- Econo2 PressFIT
- Easy2B PressFIT
- Easy1B PressFIT

* with enhanced diode

Published by
Infineon Technologies AG
85579 Neubiberg, Germany

© 2016 Infineon Technologies AG.
All Rights Reserved.

Order Number: B133-H9210-V8-7600-EU-EC-P
Date: 05 / 2016

Please note!
THIS DOCUMENT IS FOR INFORMATION PURPOSES ONLY AND ANY INFORMATION GIVEN HEREIN SHALL IN NO EVENT BE REGARDED AS A WARRANTY, GUARANTEE OR DESCRIPTION OF ANY FUNCTIONALITY, CONDITIONS AND/OR QUALITY OF OUR PRODUCTS OR ANY SUITABILITY FOR A PARTICULAR PURPOSE. WITH REGARD TO THE TECHNICAL SPECIFICATIONS OF OUR PRODUCTS, WE KINDLY ASK YOU TO REFER TO THE RELEVANT PRODUCT DATA SHEETS PROVIDED BY US. OUR CUSTOMERS AND THEIR TECHNICAL DEPARTMENTS ARE REQUIRED TO EVALUATE THE SUITABILITY OF OUR PRODUCTS FOR THE INTENDED APPLICATION.

WE RESERVE THE RIGHT TO CHANGE THIS DOCUMENT AND/OR THE INFORMATION GIVEN HEREIN AT ANY TIME.

Additional information
For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office (www.infineon.com).

Warnings
Due to technical requirements, our 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 us in a written document signed by authorized representatives of Infineon Technologies, our products may not be used in any life-endangering applications, including but not limited to medical, nuclear, military, life-critical or any other applications where a failure of the product or any consequences of the use thereof can result in personal injury.