New Release

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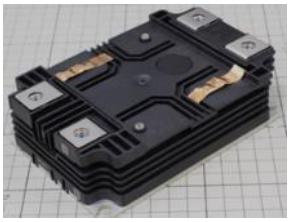
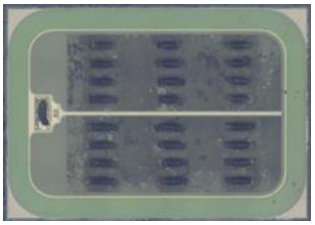
IGBT power module (4500V): Infineon FF450R45T3E4-B5 Module and IGBT Structural Analysis Report



Power module(FF450R45T3E4-B5)



Si IGBT

Overview

In December 2023, Infineon's 4500V XHP™ 3 IGBT module was announced.

This product is an IGBT module for large motor inverters in traction (railway), motor control, construction, and agricultural (CAV) applications, where high reliability and high efficiency are required.

This is a report on the insulation structure and material analysis of a high voltage, high current module product equipped with a TRENCHSTOP™ IGBT4 (4500V) equipped with an emitter controlled diode.

Product features

- Product number : FF450R45T3E4-B5 V_{CES}=4500V I_{CDC}=450A
- Product release date : December.2024
- XHP™ 3 package 140mm(L) x 100mm(W) x 40mm(H)
- 450A dual IGBT module with TRENCHSTOP™ IGBT4 and emitter control diodes .
- Use of AlSiC base plate for improved thermal cycling capability

https://www.infineon.com/dgdl/Infineon-FF450R45T3E4_B5-DataSheet-v01_00-EN.pdf?fileId=8ac78c8c8b6555fe018bec07e112480b

Reports Contents/Overview of Results

(1) Module structure analysis report (34 pages)

- The product does not have a thermistor or a temperature-sense diode on the IGBT chip.
- The insulating layer of the aluminum nitride AMC substrate is thickly formed and contains additives.
- Thick molded resin is used for insulation between terminals.

(2) IGBT structure analysis report (75 pages)

- The current density of the mounted IGBTs is 0.5A/mm2 (calculated from collector current/transistor area).
- Wide JTE is used for the pressure-resistant structure of the termination.
- Thick N-Base layers are used to achieve a rated operating voltage of 4500V.
- SR analysis confirms carrier concentration in P+ Collector, N Field Stop, and N-Base layers

Report price

Delivered one week after order placement

Please contact us for report pricing.

LTEC Corporation US Representative Office www.ltec-biz.com/en/
2310 Homestead Rd, C1 #231 Los Altos, CA 94024
Phone: +1-(650) 382-1181
Contact2@ltec.biz

Report No : 23R-0973-1,2
Release day : 2024.06.12

(1) Module structure analysis report

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(2) IGBT structure analysis report

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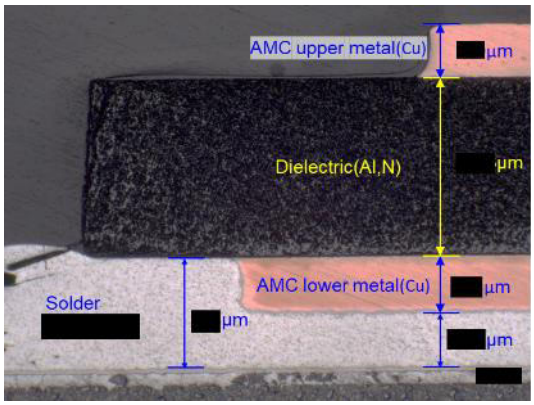
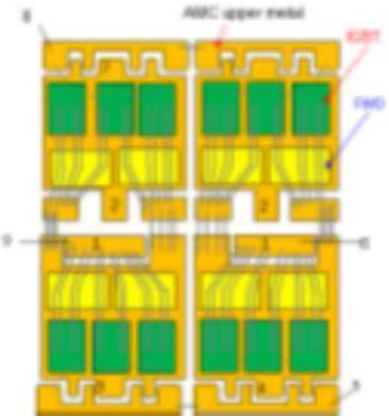
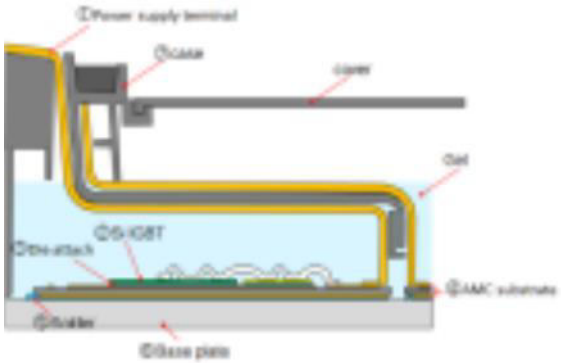
(1) Excerpt from Structural Analysis Report



AMC substrate cross-sectional structure



Module plan layout (image)



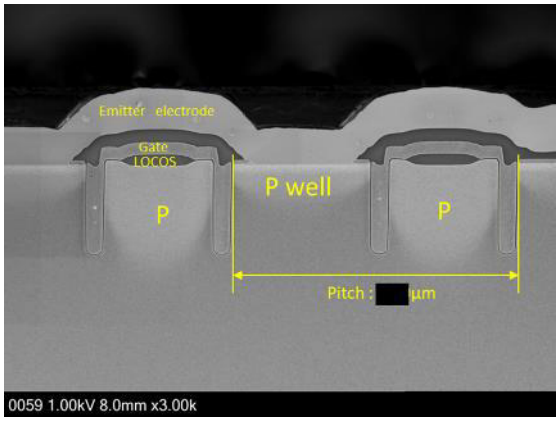
Module cross-sectional structure (image)

#	Measureed part		thickness	Material
1	Power supply terminal			
2	Si-IGBT			
2-1		Bonding Wire		
2-2		Surface protective film		
2-3		Semiconductor substrate		
2-4		Backside metal-1		
2-5		Backside metal-2		
2-6		Backside metal-3		
3	Die attach(IGBT)			
4	AMC substrate			
4-1		AMC upper metal		
4-2		Dielectric		
4-3		AMC lower metal		
5	Solder			
6	Heat sink			
6-1		Ni plated layer		
6-2		Al layer		
6-3		Base plate		
6-4		Al layer		
6-5		Cooler Pin		
7	Case			

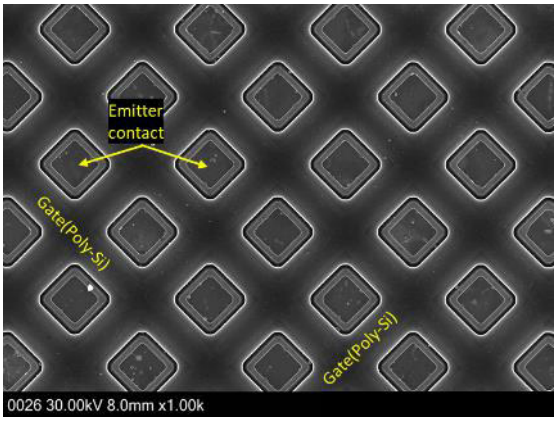
Abstract of module structure

Enlarged photographs of each part of the module and measurement of film thickness

(2) Excerpt from Structural Analysis Report



Transistor cell cross-section SEM image



Transistor cell plane SEM image

Cross-sectional structure of the termination, schematic diagram, and backside SR analysis.

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