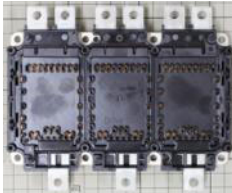
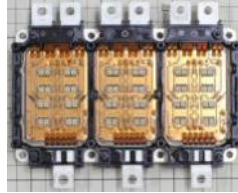


SiC power module (1200V) : Infineon HybridPACK DriveG2 FS02MR12A8MA Module structure, SiC MOSFET Overview, and Structure Analysis Reports



Module appearance



Inside the module



SiC MOSFET die

Overview

Infineon has released the second generation (G2) of its new HybridPACK Drive.

It is a highly compact B6 bridge power module(1200V/390A) optimized for different inverter power classes. LTEC released three reports. (1) Structure analysis report for its module (2) Die overview analysis report of SiC (3) Detailed structure analysis report of SiC

Product features

- Product number: FS02MR12A8MA2B $V_{DSS} = 1200V$, $I_D = 390A$, $R_{ON} = 15.2\text{ m}\Omega$ (Per transistor)
Product release date: April 2024
 - Equipped with second generation CoolSiC Automotive MOSFET(*)
 - For automotive applications
- (*) The second generation CoolSiC Gen2 (IMBG120R078M2H) report is now on sale. Please contact Ltec for more information.

Report Contents (Please see pages 2 to 6)

1. Module Structure Analysis Report (40 pages)

- An external Si temperature sensing diode is used as the temperature detection element.
- A thin Ag sinter is used as the die attach material.

2. SiC MOSFET Overview Analysis Report (11 pages)

- Package and die observations, cross-sectional observations of the die cell and die edge

3. SiC MOSFET Structure Analysis Report (60 pages)

- When comparing the structure of this product with the second generation discrete product (IMBG120R078M2H), differences were found in the top metal material, barrier metal thickness, and ILD shape.
- Cell cross-sectional observation by TEM.
- The contents of the summary analysis report are also included.

Report price

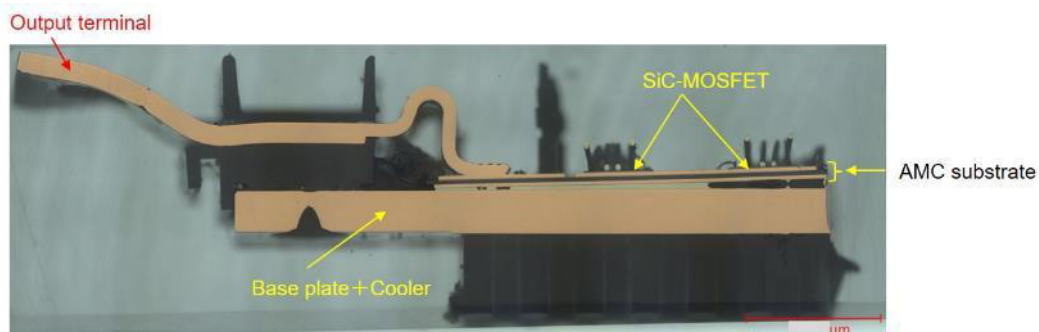
Delivered one week after order placement. Please contact us for report pricing.

(1) Module Structure Analysis Report

Table of Contents

【TABLE OF CONTENTS】		Page
1	Device summary	
	Table1-1: Device summary	... 3
1-1.	Summary of analysis results	... 4
	Table1-2: Module structure summary	... 5
2	Module analysis	
2-1.	Appearance observation	... 7
2-1.	Module internal observation	... 11
2-1.	Mounted die observation	... 14
2-1.	Module cross-sectional observation	... 16

Excerpt from (1) Module Structure Analysis Report



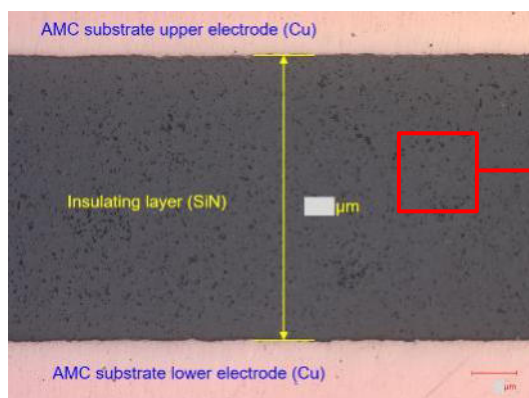
Module cross-sectional structure figure

Number	Measurement points	Length measurement	Materials
1	Output terminal		
2	SiC-MOSFET		
2-1	Bonding wire (Gate)		
2-2	Bonding wire (Source)		
2-3	Surface protection film		
2-4	Top metal		
2-5	Substrate		
2-6	Backside metal-1		
2-7	Backside metal-2		
2-8	Backside metal-3		
3	Die attach		
4	AMC substrate		
4-1	AMC upper metal		
4-2	Insulating substrate		
4-3	AMC lower metal		
5	Solder		
6	Cooler		
6-1	Ni plating layer		
6-2	Base plate		
6-3	Cooling Pin		
7	Case		

Module structure summary

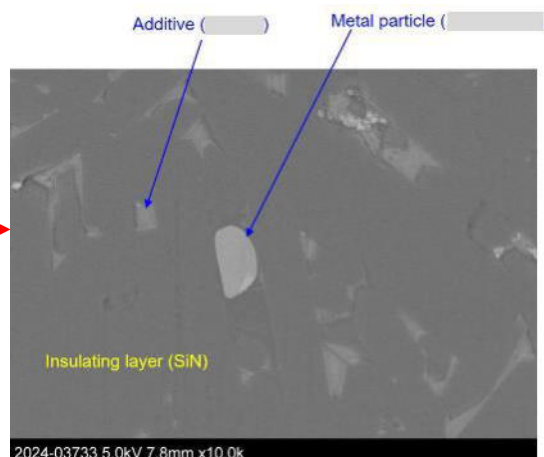


Module internal layout



OM image

AMC substrate insulation layer



SEM image

(2) SiC MOSFET Overview Analysis Report :

Table of Contents

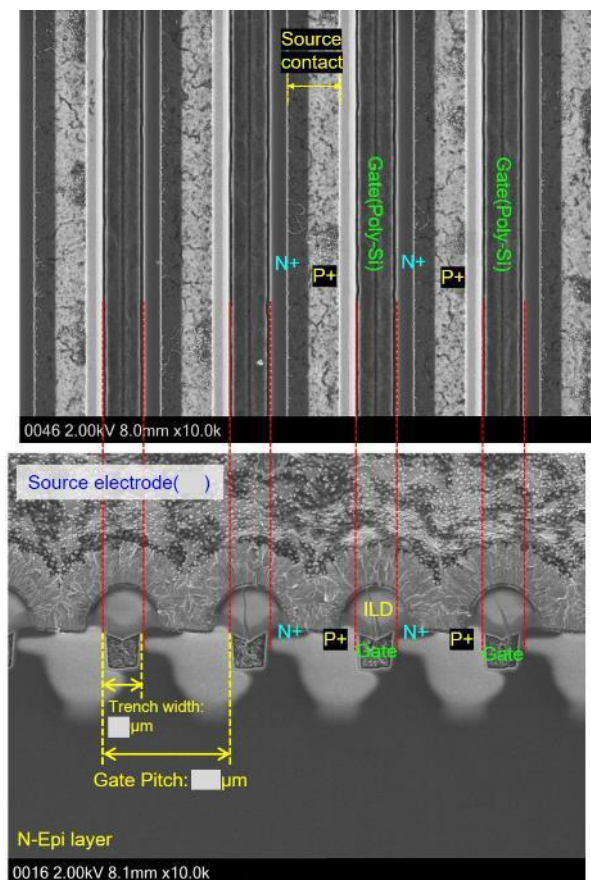
【TABLE OF CONTENTS】		Page
1	Device summary	
	Table1-1: Device summary	... 3
	Table1-2: Device structure : SiC MOSFET	... 4
2	Module observation	
	2-1. Module internal observation	... 7
3	SiC MOSFET die structure analysis	
	3-1. Plane structure analysis by Optical Microscope	... 9
	3-2. Cross-sectional structure analysis of cell array	... 10
	3-3. Cross-sectional structure analysis of die outer periphery	... 11

(3) SiC MOSFET Structure Analysis Report :

Table of Contents

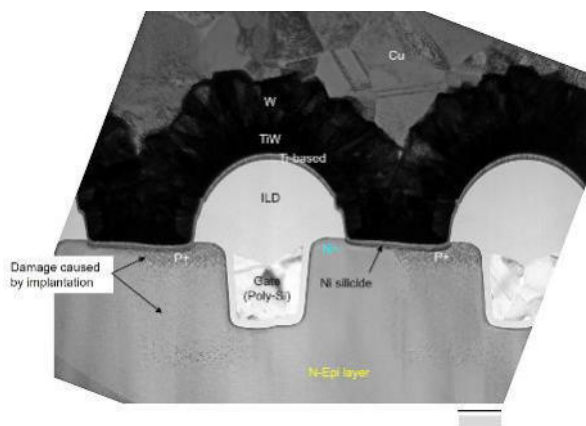
【TABLE OF CONTENTS】		Page
1	Device summary	
	Table1-1: Device summary	... 3
1-1.	Summary of analysis results	... 4
	Table1-2: Device structure : SiC MOSFET	... 5
	Table1-3: Device structure : Layer material and thickness	... 6
2	Module observation	
2-1.	Module internal observation	... 8
3	SiC MOSFET die structure analysis	
3-1.	Plane structure analysis by Optical Microscope	... 11
3-2.	Plane structure analysis by SEM	... 27
3-3.	Cross-sectional structure analysis of cell array	... 36
3-4.	Cross-sectional structure analysis of die outer periphery	... 42
4	TEM analysis	... 51
5	Comparison with 1200V second generation SiC MOSFET(IMBG120R078M2H)	... 59

Excerpt from (3) SiC MOSFET Structure Analysis Report

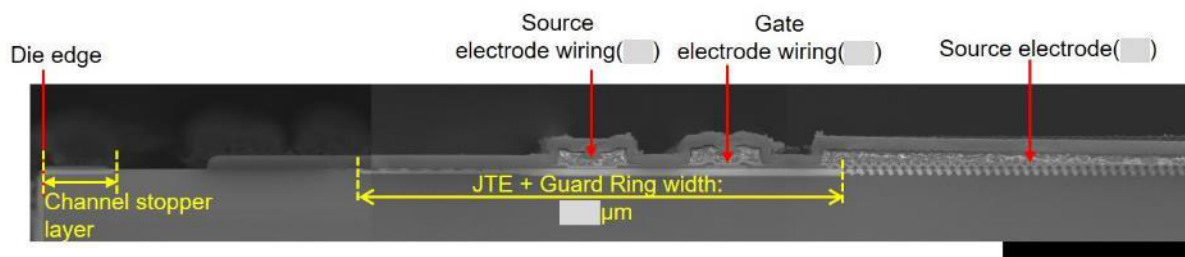


Upper figure: Plane SEM image of Cell array (Poly-Si layer)

Lower figure: Cross-sectional SEM image of Cell array



Cross-sectional TEM image of Cell array



Cross-sectional SEM image of die outer periphery