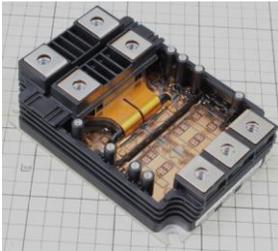
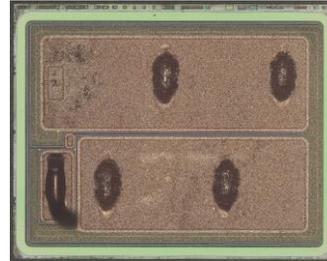


SiC Power Module (3300V): Infineon FF4000UXTR33T2M1 Module and SiC MOSFET Structure Analysis Reports



Module appearance



SiC MOSFET die

Overview

Due to the increasing efficiency of traction systems such as railroads and the growing demand for solar, wind power, and energy storage systems, Infineon released the XHP2 Cool SiC MOSFET half-bridge module (3300V) for high-voltage and high-power applications.

We have analyzed the structure of the module and the SiC MOSFETs mounted on it, and released the following two reports that clarify the structure of the product and its features.

Product features

Product type: FF4000UXTR33T2M1 $V_{DSS}=3300V$ 、 $I_{DN}=500A$ 、 $R_{DS(ON)}=3.8m\Omega$

Released : July 2024 (Datasheet)

Datasheet:

https://www.infineon.com/dgdl/Infineon-FF4000UXTR33T2M1-DataSheet-v01_00-JA.pdf?fileId=8ac78c8c93dda25b0194ca7eb93e2695

- CoolSiC™ Trench MOSFET built in
- Applications: Railway transportation traction converters, solar power generation, energy storage systems, etc.

Analysis Results (For details of the analysis, see pages 2 and 4)

(1) Module Structure Analysis Report : (41page)

- Cu is used for the bonding wire and source electrode.
- Uses the company's unique XT junction that achieves low thermal resistance Rth.
- AMC substrates made of AlN with additives are used for the insulation layer.
- AlSiC base plate is used for the base plate.

(2) SiC MOSFET Structure Analysis Report: (63page)

- Special multilayer wiring structure to use Cu for Source electrode.
- Epi layer and termination structure for high breakdown voltage.

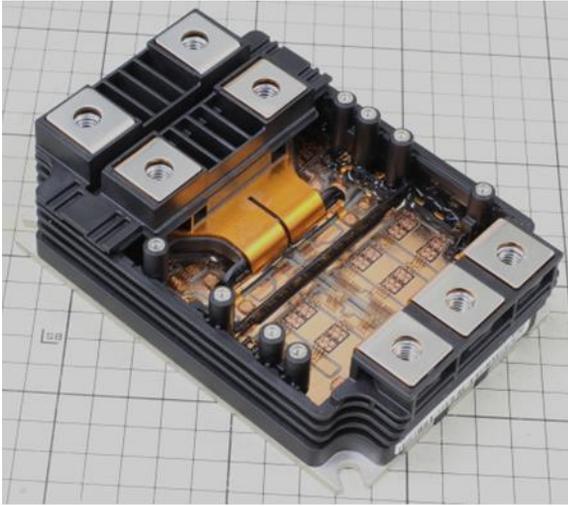
Report price

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

(1) Module structure analysis report (Table of contents)

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2-2.	Internal layout observation	... 10
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2-4.	Module cross-sectional observation	... 15
3	Thermal expansion coefficient of base plate	... 40

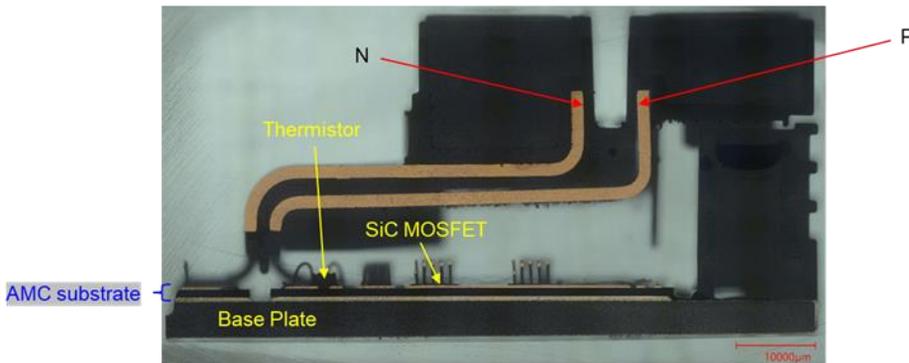
Excerpt from (1) Module structure analysis report



Module bird's-eye view front

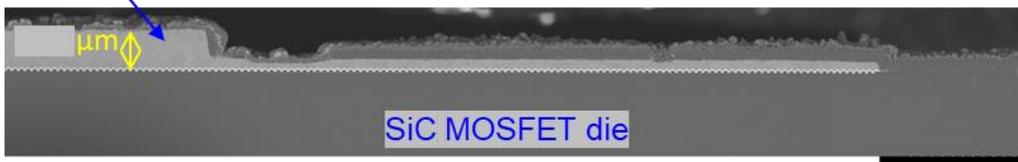
Number	Measurement points	Length measurement	Materials
1	Power supply terminal / GND terminal		
2	SiC MOSFET		
2-1	Bonding wire (Source)		
2-2	Bonding wire (Gate)		
2-3	Surface protection film		
2-4	substrate		
2-5	Backside metal-1		
2-6	Backside metal-2		
2-7	Backside metal-3		
3	Die attach		
4	AMC 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	Al layer		
6-3	Base plate		
6-4	Al layer		
6-5	Ni plating layer		
7	Case		

Module cross-section structure overview



Module cross-section

Source electrode (Cu)



Cross-sectional SEM image of SiC MOSFET pad

(2) SiC MOSFET structure analysis report (Table of contents)

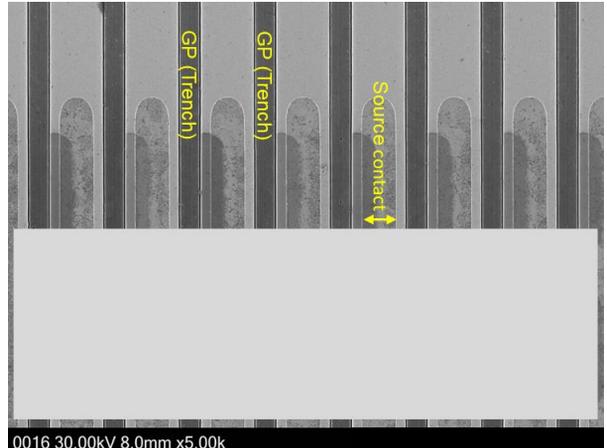
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Excerpt from (2) SiC MOSFET structure analysis report

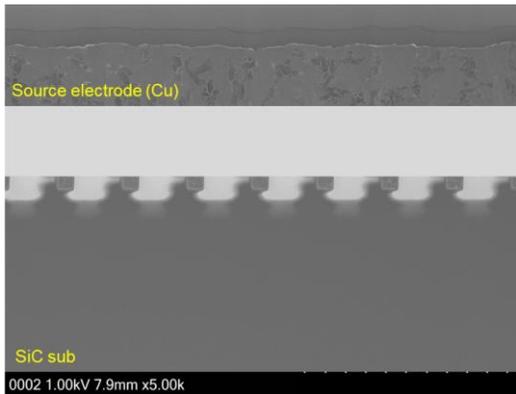
Thick Cu layer



SiC MOSFET die(Top metal layer)



Plane SEM image of cell array edge(Poly-Si layer)



Cross-sectional SEM image of cell array



Cross-sectional TEM image of cell array



Cross-sectional SEM image of die outer periphery