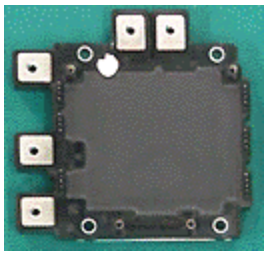
SiCMOSFET : Navitas G3F17MT12FB2 SiCPAK Package Sealing Resin Analysis Report

Navitas：SiCPAK

Navitas：G3F75MT12K



Mitsubishi Electric：J1 Series(CT700CJA060)

Analysis background

Silicone gel sealing was once the mainstream method for sealing power semiconductor modules. However, as power semiconductors requiring high-temperature operation—such as SiC and GaN—have become more widespread, durability concerns (thermal cycle resistance, insulation reliability, etc.) have driven a shift toward the direct potting method (hereinafter referred to as the DP method).Within the DP package products, Navitas's SiCPAK is reportedly designed for harsh operating environments such as EV fast charging, industrial motor drives, and photovoltaic inverters, and employs a specialized encapsulation resin. Based on this, we conducted an analysis to obtain a detailed understanding of its structure and materials.

This report focuses on the encapsulation resin used in SiCPAK—specifically the resin material (resin matrix and filler composition) and its heat resistance (glass transition temperature and coefficient of thermal expansion). The characteristics of SiCPAK are clarified by comparing it with Mitsubishi Electric's J1 series (DP method), which is designed for automotive environments, as well as with general mold encapsulation resins.

Product Features

- Model number:G3F17MT12FB2 V_{DS}=1200V ID=68A RDS(on)=17mΩ
- Release: April 2025
- Applications: DC fast chargers for EVs, industrial motor drives, UPS, ESS, industrial welding

Data sheet：
https://navitassemi.com/wp-content/plugins/gb-navitas-stock-checker/product_files/G3F17MT12FB2.pdf

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Analysis content

- Cross-sectional analysis
  (focusing on the interface between the encapsulation resin and the SiCMOSFET)
- Calculation of filler occupancy rate
  (Cross-section processing of sealing resin + SEM + EDX mapping + image processing)
- FT-IR analysis (material analysis of sealing resin)
- Glass transition temperature and thermal expansion coefficient measurement
  (analysis performed on sealing resin)

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

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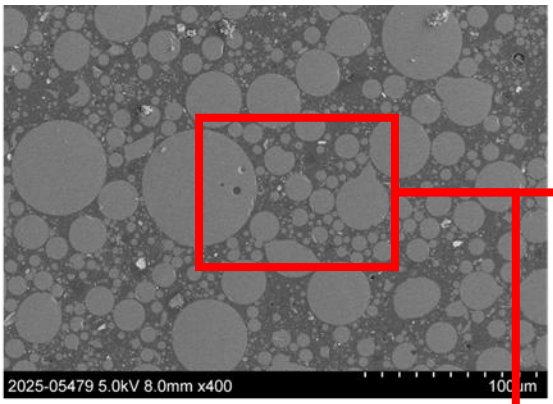
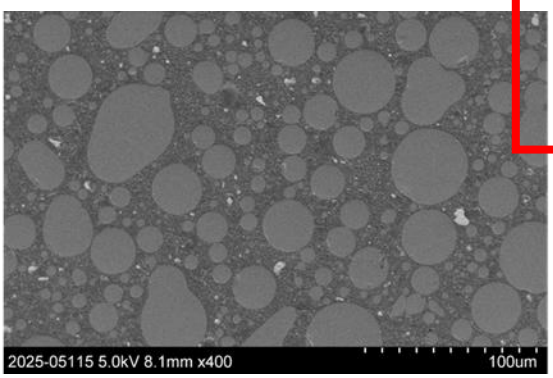
Analysis results (excerpt)

Direct potting method

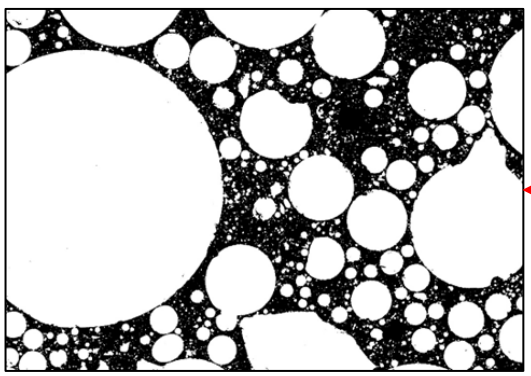
SiCPAK
Cross-sectional SEM image (sealing resin)



J1 SeriesCT700JA060
Cross-sectional SEM image (sealing resin)



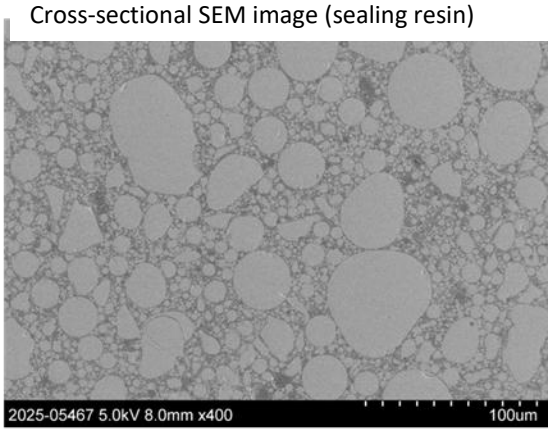
SiCPAK Binary image of filler (sealing resin)



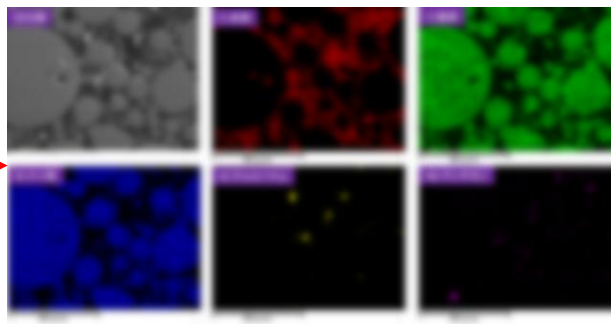
*) To calculate filler occupancy

Transfer molding method

G3F75MT12K
Cross-sectional SEM image (sealing resin)

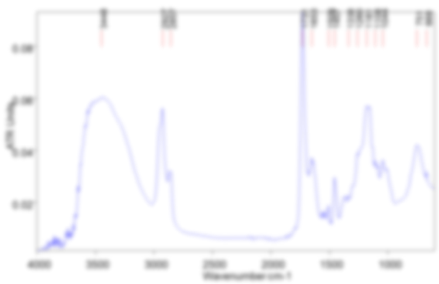


SiCPAK EDX mapping



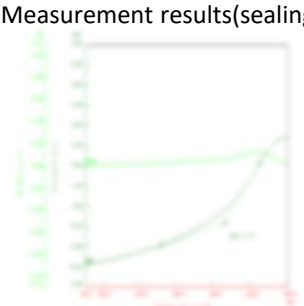
*)Filler material analysis was conducted

SiCPAK FT-IR(sealing resin)



*)Analysis of sealing resin materials was carried out

SiCPAK Tg Measurement results(sealing resin)



*) Conducted to measure the glass transition temperature of the encapsulating resin

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