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New Release

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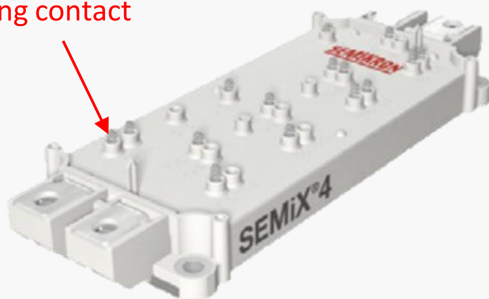
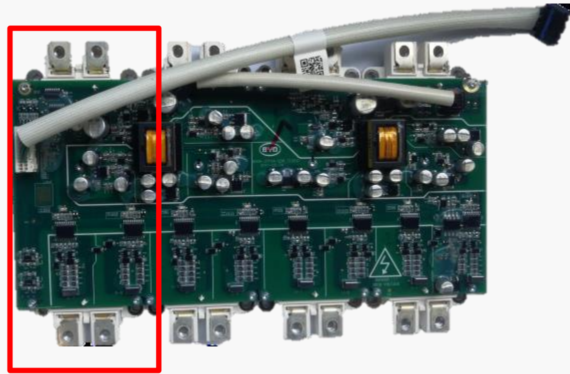
SEMIKRON SEMiX604GB12T4s IGBT POWER MODULE STRUCTURE ANALYSIS REPORT – Product used in BYD's SONG EV500

Spring contact



Power module



Power module after resin removal

Product outline

- The Model Song EV500 SUV has a mileage range od 400km/charge

Basic features

- SEMIKRON's IGBT module is used in the motor control inverter
- Spring contact control terminals create solder-free connection
- The maximum rated voltage is 1,200V and the maximum collector current is 916A

Report contents

- In the module analysis cross-section and EDX analysis of the spring contacts, die attach, and key components are performed.
- Plane and cross-section analysis of the cell area and die edge were performed in order to determine what type of IGBT technology is used by the Chinese manufacturer. The device was analyzed to determine how it was optimized to support the breakdown voltage specification.
- The thermal resistance is estimated from the dimensions of the module and the results of material analysis.

Note: The report price may change over time. For current price contact **info@ltecusa.com**.

19G-0023-3

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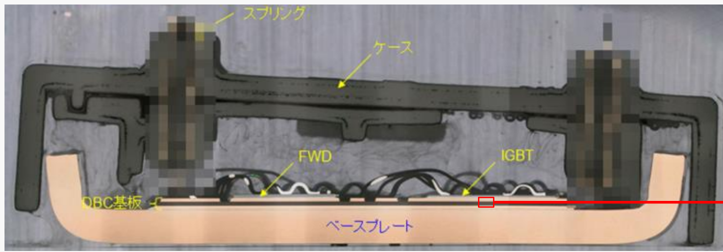
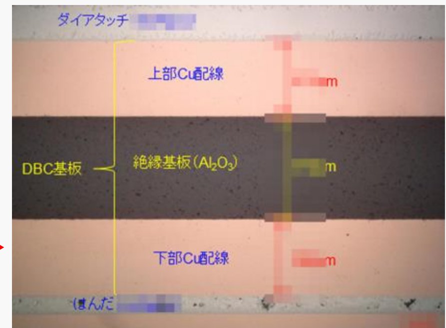
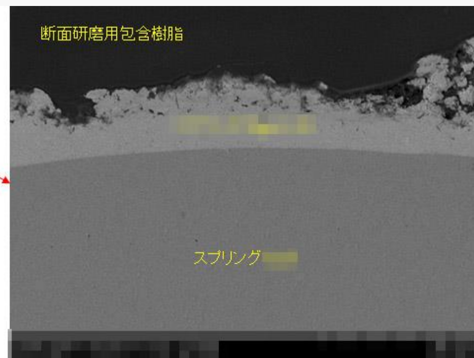
Excerpts from the analysis report

Module cross section





Spring contact cross section



Thermal analysis

IGBT

	Device	SEMIKRON IGBT Half-Bridge Power Module			
		SEMiX 604GB12T4s			
	Package	Power Module			
				Case 1: Nominal	
Die	Semiconductor Die IGBT	Device		IGBT	
		Material		[illegible]	LTEC評価
		Thickness, d	[um]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Mass density, δ	[g/cm3]	[illegible]	材料特件
		Number of Transistors		[illegible]	
		Size, X	[mm]	[illegible]	LTEC評価
		Size, Y	[mm]	[illegible]	LTEC評価
		Die size, X・Y	[mm2]	[illegible]	LTEC評価
	Die Attach	Material		[illegible]	LTEC評価
		Thickness	[um]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
DBC	DBC (top)	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Thermal Diffusivity, D	[cm2/s]	[illegible]	材料特件
	Insulated substrate	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
	DBC (Bottom)	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Thermal Diffusivity, D	[cm2/s]	[illegible]	材料特性
	・Total DBC Thickness		[mm]	[illegible]	
	DBC-Base Plate Solder	Material		[illegible]	LTEC評価
		Thickness	[um]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
Base Plate	Base Plate	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Thermal Diffusivity, D	[cm2/s]	[illegible]	材料特件
①	Semi Die Thermal Resistance		[℃/W]	[illegible]	モデル計算値
②	Die Attach Thermal Resistance		[℃/W]	[illegible]	モデル計算値
?	DBC Thermal resistance		[℃/W]	[illegible]	
?	DBC-BasePlate Solder Thermal resistance		[℃/W]	[illegible]	
⑤	Base Plate Thermal resistance		[℃/W]	[illegible]	
⑥	Bottom Path Thermal resistance per Transistor		[℃/W]	[illegible]	
⑦	Switch Thermal Resistance, Rth jc		[℃/W]	[illegible]	モデル計算値
	Total Thermal Resistance, Rth jc (Datasheet)		[℃/W]	0.049 (MAX)	データシート値

FWD

	Device	SEMIKRON IGBT Half-Bridge Power Module			
		SEMiX 604GB12T4s			
	Package	Power Module			
				Case 1: Nominal	
Die	Semiconductor Die FWD	Device		Diode	
		Material		[illegible]	LTEC評価
		Thickness, d	[um]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Mass density, δ	[g/cm3]	[illegible]	材料特件
		Number of Transistors		[illegible]	
		Size, X	[mm]	[illegible]	LTEC評価
		Size, Y	[mm]	[illegible]	LTEC評価
		Die size, X・Y	[mm2]	[illegible]	LTEC評価
	Die Attach	Material		[illegible]	LTEC評価
		Thickness	[um]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
DBC	DBC (top)	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Thermal Diffusivity, D	[cm2/s]	[illegible]	材料特件
	Insulated substrate	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
	DBC (Bottom)	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Thermal Diffusivity, D	[cm2/s]	[illegible]	材料特件
	・Total DBC Thickness		[mm]	[illegible]	
	DBC-Base Plate Solder	Material		[illegible]	LTEC評価
		Thickness	[um]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
Base Plate	Base Plate	Material		[illegible]	LTEC評価
		Thickness	[mm]	[illegible]	LTEC評価
		Thermal Conductivity	[W/cm・K]	[illegible]	材料特件
		Thermal Diffusivity, D	[cm2/s]	[illegible]	材料特件
①	Semi Die Thermal Resistance		[℃/W]	[illegible]	モデル計算値
②	Die Attach Thermal Resistance		[℃/W]	[illegible]	モデル計算値
?	DBC Thermal resistance		[℃/W]	[illegible]	
?	DBC-BasePlate Solder Thermal resistance		[℃/W]	[illegible]	
⑤	Base Plate Thermal resistance		[℃/W]	[illegible]	
⑥	Bottom Path Thermal resistance per Transistor		[℃/W]	[illegible]	
⑦	Switch Thermal Resistance, Rth jc		[℃/W]	[illegible]	モデル計算値
	Total Thermal Resistance, Rth jc (Datasheet)		[℃/W]	0.085 (MAX)	データシート値

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