New Release

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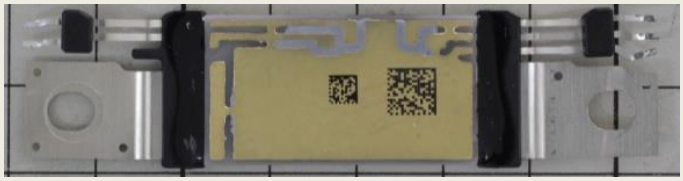
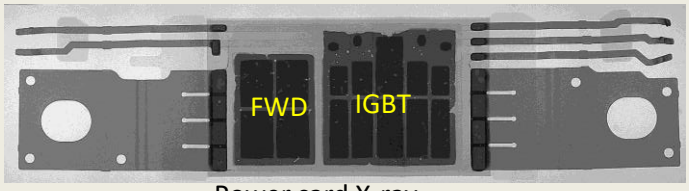
DELPHI'S PHEV INVERTER POWER CARD STRUCTURE ANALYSIS REPORT

February 2020. This IGBT power module is produced by Delphi and it is used in the inverter unit of Geely Automobile's flagship PHEV sedan, model name: Bo Rui. The same module is also found in some Volvo and BMW models.

Bo Rui PHV of Geely Automotive



Power card



Power card X-ray

Product overview

The power semiconductor dies of the power card are sandwiched between Direct Bonded Aluminum (DBA) substrates cooled by double-sided cooling system. The terminals are coated with resin mold. Temperature sensing diode, current sensing element, and the gate protection diode are integrated within the IGBT die.

Report content (87 pages)

Module structure

- The interface between components and DBA, and the DBA structure
- DBA layout based on module plane analysis
- Thermal resistance calculation based on thermal analysis

IGBT structure

- Planar and cross-sectional analysis (transistor area and die edge)
- Planar analysis of the temperature sensing and protection diodes.

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

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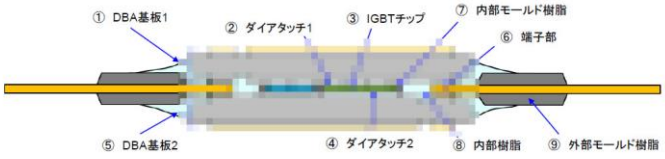
Excerpts of figures and tables

(English versions are provided in the report)

表4:実装モジュール構造概要



番号	測定箇所		測長	材料
1	DBA基板1			
1-1		上部金属層		
1-2		絶縁層		
1-3		追加物		
1-4		下部金属層		
2	ダイアタッチ1			
3	IGBT			
3-1		表面保護膜		
3-2		ILD		
3-3		配線層		
3-4		バリアメタル		
3-5		FOX		
3-6		基板		
3-7		ゲート		
3-8		ゲート絶縁膜		
3-9		裏面電極-1		
3-10		裏面電極-2		
3-11		裏面電極-3		
4	ダイアタッチ2			
5	DBA基板2			
5-1		上部金属層		
5-2		絶縁層		
5-3		追加物		
5-4		下部金属層		

番号	測定箇所		測長	材料
6	端子部			
6-1		ダイアタッチ		
6-2		端子		
6-3		ダイアタッチ		
7	内部モールド	樹脂		
7-1		フィラー1		
7-2		フィラー2		
7-3		フィラー3		
7-4		樹脂		
8	内部樹脂			
9	外部モールド樹脂			
9-1		フィラー1		
9-2		フィラー2		
9-3		フィラー3		
9-4		樹脂		

2-2. モジュール平面構造解析

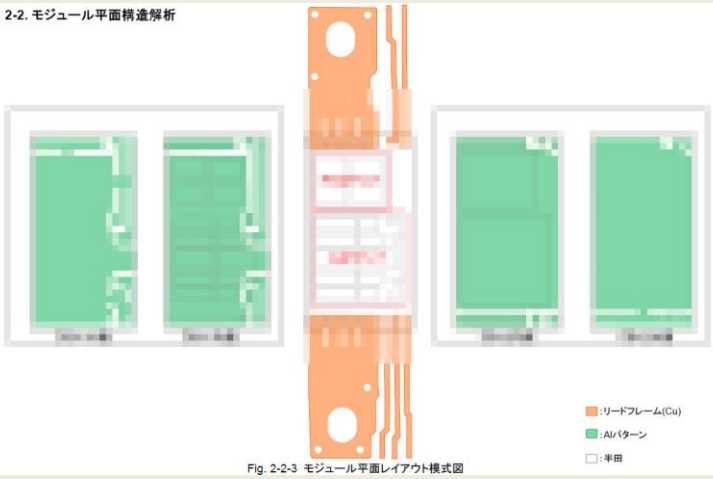


Fig. 2-2-3 モジュール平面レイアウト模式図

4. モジュールの熱解析

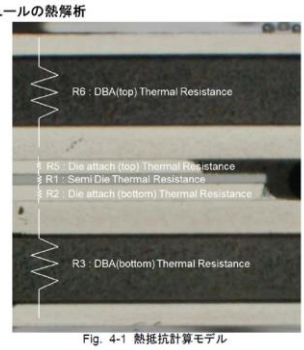
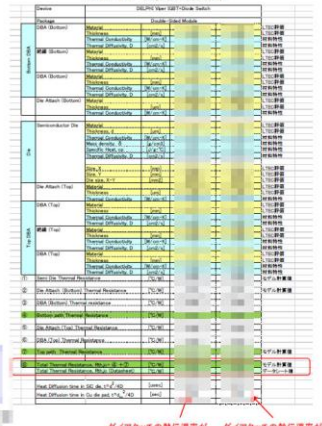


Fig. 4-1 熱抵抗計算モデル

Table. 4-1 熱抵抗計算結果



ダイアタッチの熱伝導率がSn-Ag系はんだの一般的な値を想定するケース

ダイアタッチの熱伝導率が想定の半分となるケース

4. モジュールの熱解析

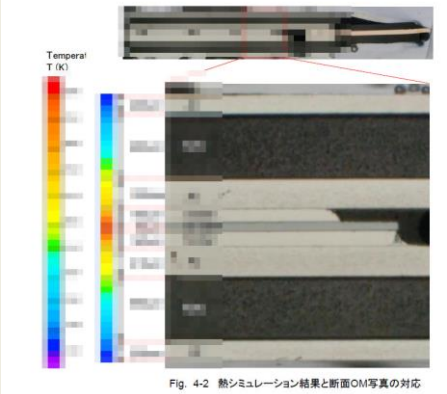


Fig. 4-2 熱シミュレーション結果と断面OM写真の対応

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