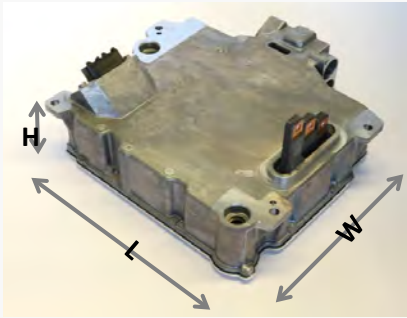
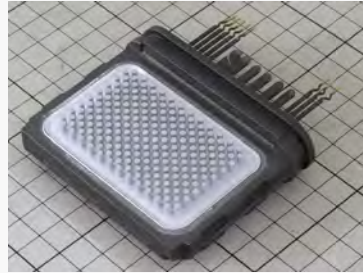


HITACHI AUTOMOTIVE POWER MODULE STRUCTURE ANALYSIS REPORT – Product used in the of the Audi eTRON 55 QUATTRO EV



Inverter unit



Power module



IGBT

Product outline

- Audi eTraon is the first EV from Audi.
- The inverter unit is manufactured by Hitachi Automotive, and it realizes high outpower density by installing double sided cooling power module (approximately 160% higher power density compared to the company's conventional product).

Basic features

- This power module is a compact high-efficiency double-sided cooling power module that incorporates a new generation IGBT (Insulated Gate Bipolar Transistor).
- It uses heat sinks with pin type cooling fins on both sides. An insulating sheet is used between the cooling fin and the lead frame. DBC board is not used.

Report contents

- The internal layout is estimated from the results of the module plane analysis. Cross-section analysis and material analysis are performed centering on the joints and components of the double-sided cooling structure.
- In the IGBT analysis, in addition to the plane and cross-section analysis of the cell area and the die edge, the structure is estimated from the plane observation of the temperature sensing diode and the gate protection diode.
- The module thermal resistance including the water-cooling part of the heat sink is estimated based on the results of the structural analysis.

Report price: \$6,500

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

19G-0018-3

Table of Contents

	Page
<u>Device summary</u>	3
<u>Analysis summary</u>	4
Table 2: Device structure (IGBT)	5
Table 3: Device structure (Material & thickness)	6
Table 4: Module structure	7
<u>Module analysis</u>	
Overview	8
IGBT die image	15
Cross section	16
<u>IGBT structure analysis</u>	
Plane view observation (OM)	36
Plane view observation (SEM)	56
Cross section	64
<u>Appendix</u>	
Thermal resistance modeling	77
Heat sink analysis modeling: Effective heat transfer convection coefficient h_{eff}	78
Comparison between Fuji electric module and Hitachi module	81

19G-0018-3



