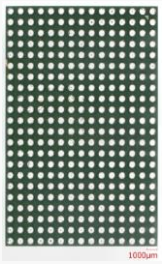
Analog Devices' LTM4700 µModule Structural and Packaging Analysis Report

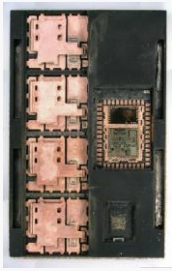
July 2020. LTEC Corporation is currently preparing a structural analysis report of this 100A Dual DC-DC converter ~~produced~~. The report will be released in Aug 2020.

Side view

Top View



Bottom View



Top view after package removal

High power (~100W), small size (less than 1 inch per side) **Power Supply in Package** (**PSiP**) DC-DC converters are highly demanded for data center, server, IT, factory automation, IoT and 5G applications. LTEC has selected and analyzed a representative product for clarifying packaging technologies used in this advanced **PSiP** product.

Product Overview: Analog Devices LTM4700

Among the products of leading **PSiP** manufacturers (TI, Analog Devices, MPS, Enpirion, Artesyn, TDK, Murata, etc.), Analog Devices' LTM4700 Dual DC-DC Converter delivers

- the highest output current rating (100A) for DC-DC micro module products.
- Achieves a maximum current density of 0.303 A/cm^2 (196 A/in^2) per footprint.

Content of this Report

In this analysis report we reveal the key technical elements needed to achieve the exceptional performance of this product. (See Table of Contents of this 42-page report on P2).

Main findings

- High current switching MOSFETs structure and packaging arrangement; HS/LS half-bridge with Source-down LS FET
- Shielded double-PolySi Trench MOSFETs structure for high area efficiency
- Dual Cu lead frame package
- Controller IC identified
- Excellent thermal properties. Heat removal paths are analyzed. *Limitations and possible improvements are being considered.

20G-0002-1

Table of Contents

Excerpt from the report (1)

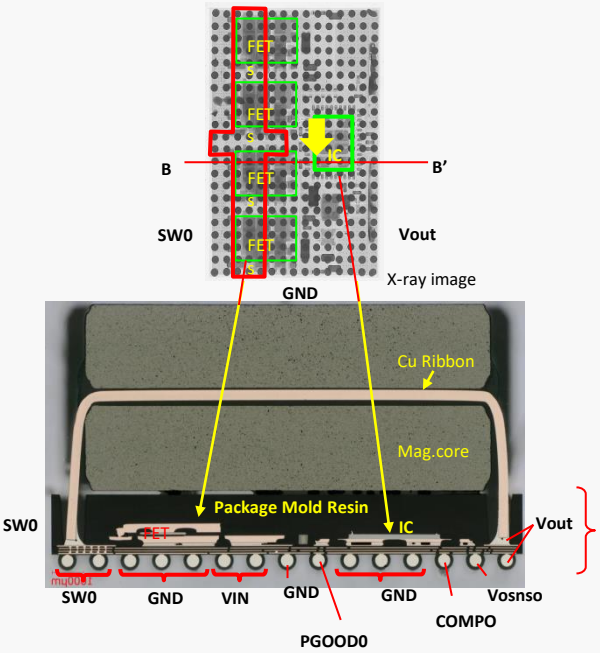


Fig.1: A cross section along the B-B' line showing the designation of the inductor's magnetic core and Cu ribbon, high current switching FET, and major BGA terminals.

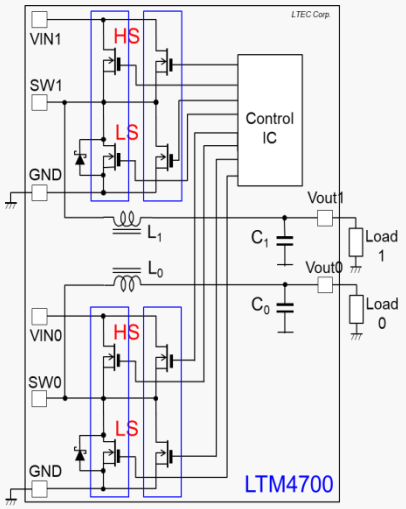


Fig.2: Extracted LTM4700 dual buck converter circuit configuration.

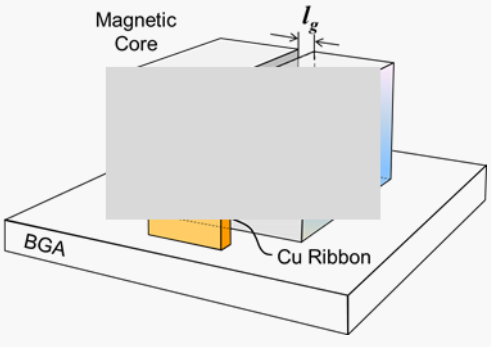


Fig.3: Schematic of inductor structure

5. Considerations on Thermal Management and Estimation of Thermal Resistance

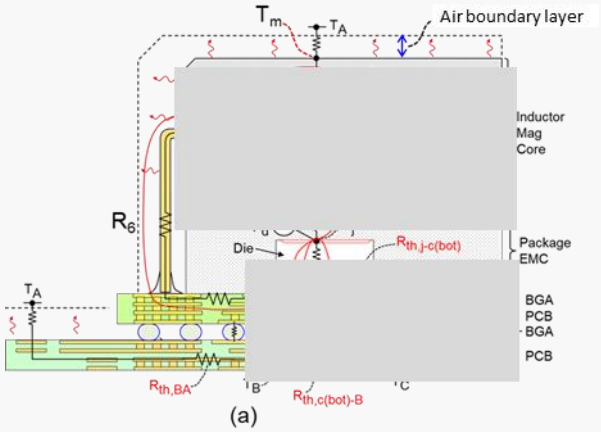


Fig.4: Schematic cross-sectional view of the LTM4700 DC-DC converter, showing its thermal resistance network.

Excerpt from the report (2)

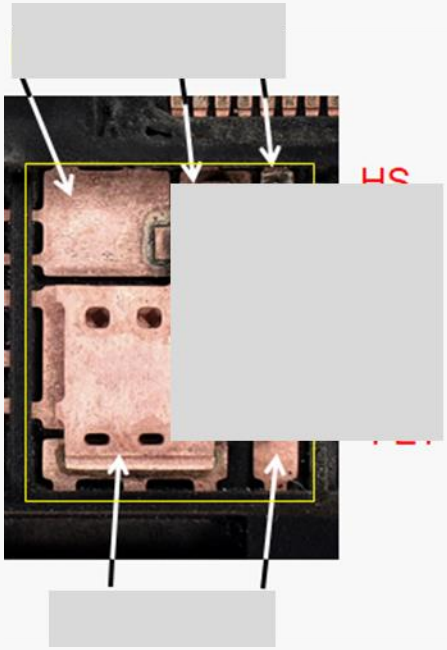


Fig.5: Details of the packaged half-bridge switching transistor (D).

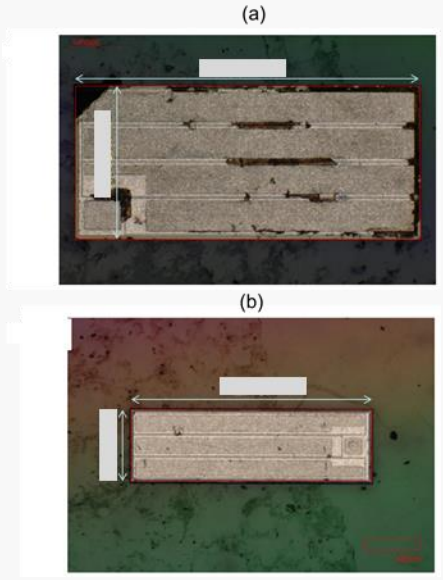


Fig.6: Details of a) low-side (LS) FET and (b) high-side (HS) FET.

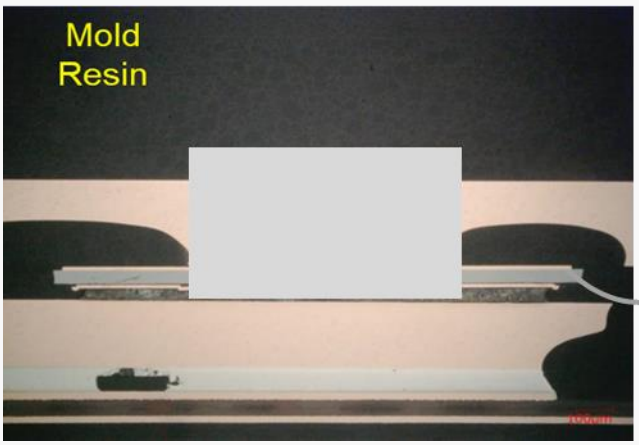


Fig.7: Cross-sectional view of the packaged half-bridge switching transistor (D).

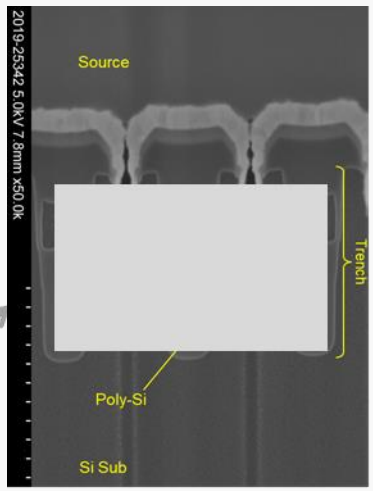


Fig.2-2-5 SEM cross-section image
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Fig.8: Switching power MOSFET die cross section