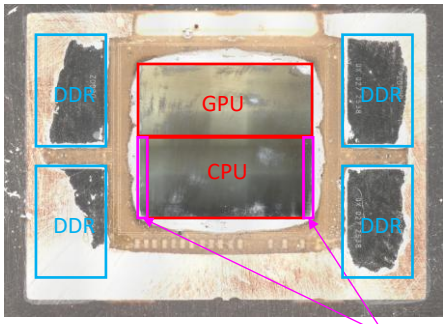
Chiplet : TSMC SoIC-mH Apple M5 Pro_MacBook Pro Cross section and Plane view Analysis Report



M5 Pro PKG Top view
After removing the heatsink

Overview

The SoIC-mH (Molding-Horizontal) technology that TSMC is newly introducing into mass production is an advanced chiplet integration method that enables high-density lateral connections between the CPU and GPU dies, and it is gaining attention as a foundational packaging technology for leading-edge nodes from 2025 onward.

Cross-sectional analysis confirms that the CPU and GPU dies are integrated by molding material, and that the Si interposer formed above them plays a central role in die-to-die interconnection.

In this analysis, cross-sectional observations were used to evaluate the die-to-die connection scheme (bump structure and pitch) as well as the multilayer structure and thickness of the Si interposer, revealing that the interconnect does not rely on conventional solder-based bonding. Furthermore, planar analysis confirmed that the ball density reaches approximately eight times that of similar structures from other competitors.

Product Features

Next-generation processor “Apple M5 Pro

- TSMC’s latest N3P-generation process
- Implements high-density lateral connections between the CPU and GPU dies using SoIC-mH

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Report contents

1. Cross-Section Analysis Report (27 pages)

- Connection scheme between the CPU/GPU dies and the Si interposer (bump structure and pitch)
- Connection scheme between the CPU/GPU dies and the memory (bump structure and pitch)
- Layer structure, thickness, and condition of the insulating layers in the Si interposer

2. Planar Analysis Report (26 pages)

- Photographs of each layer of the 11-layer package substrate
- Measurement of minimum feature sizes
- Three-layer Si interposer: die-to-die connection region
- Measurement of minimum feature sizes
- Comparison of bump pitch sizes (vs. Intel Lunar Lake)

Options

- PKG CAD data (ODB++, Gerber, etc.)
- Si interposer die-to-die connection CAD data (ODB++, Gerber, etc.)

Report price

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

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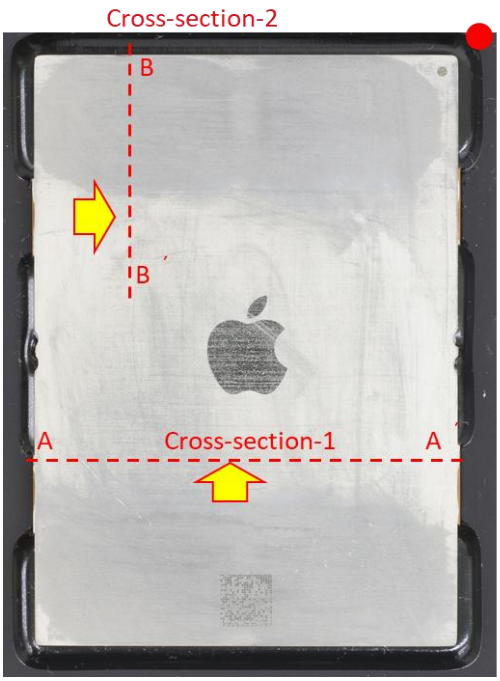
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Package Cross section analysis

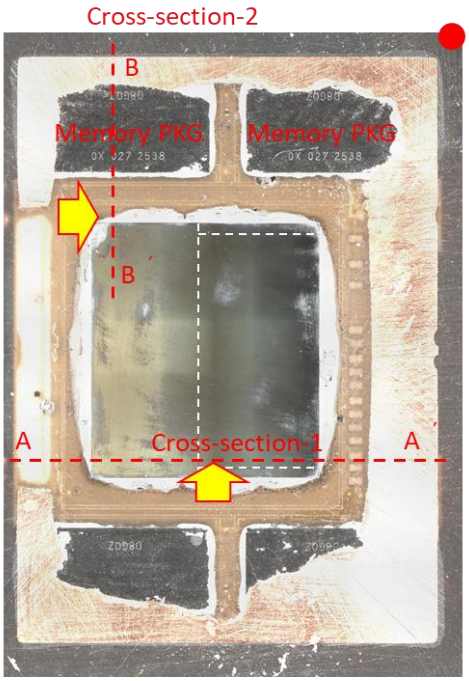
Table of contents

		Page
1. PKG	...	2
2. Analysis summary	...	3
3-1. Cross-section-1 of MacBook Pro M5 Pro (CPU-GPU)	...	5
3-2. Cross-section-2 of MacBook Pro M5 Pro (GPU-Memory)	...	22

Excerpt from the Report



M5 Pro PKG Top View



M5 Pro PKG Top view
After removing the heatsink

Cross-section position



Cross-section-1 (A-A´) OM image



Cross-section-2 (B-B´) OM image

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Package Plane view analysis

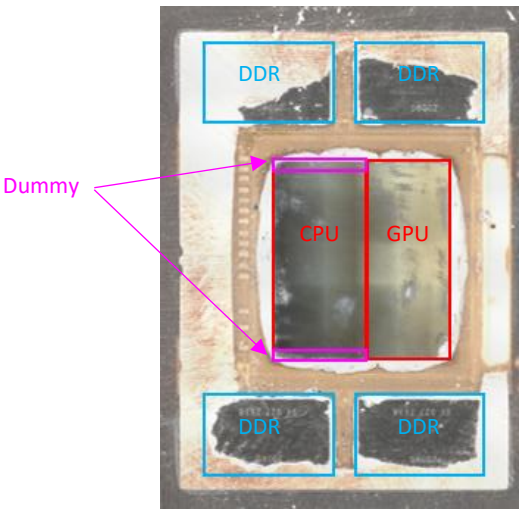
Table of contents

			Page
1. M5 Pro PKG			
Fig. 1-1	OM image of M5 Pro PKG	...	3
Fig. 1-2	OM image of M5 Pro PKG (After shield removal)	...	4
Fig. 1-3	X-Ray image of M5 Pro PKG	...	5
2. Delayer of M5 Pro PKG			
Fig. 2-1	OM image of L1 layer	...	6
Fig. 2-2	OM image of L1-L2 layer	...	6
Fig. 2-3	OM image of L2 layer	...	7
Fig. 2-4	OM image of L2-L3 layer	...	7
Fig. 2-5	OM image of L3 layer	...	8
Fig. 2-6	OM image of L3-L4 layer	...	8
Fig. 2-7	OM image of L4 layer	...	9
Fig. 2-8	OM image of L4-L5 layer	...	9
Fig. 2-9	OM image of L5 layer	...	10
Fig. 2-10	OM image of L5-L6 layer	...	10
Fig. 2-11	OM image of L6 layer	...	11
Fig. 2-12	OM image of L6-L7 layer	...	11
Fig. 2-13	OM image of L7 layer	...	12
Fig. 2-14	OM image of L7-L8 layer	...	12
Fig. 2-15	OM image of L8layer	...	13
Fig. 2-16	OM image of L8-L9 layer	...	13
Fig. 2-17	OM image of L9 layer	...	14
Fig. 2-18	OM image of L9-L10 layer	...	14
Fig. 2-19	OM image of L10 layer	...	15
Fig. 2-20	OM image of L10-L11 layer	...	15
Fig. 2-21	OM image of L11 layer	...	16
3. Delayer of M5 Pro Interposer			
Fig. 3-1	OM image of L1 layer	...	17
Fig. 3-2	SEM image of L1 layer	...	18
Fig. 3-3	OM image of L2 layer	...	19
Fig. 3-4	SEM image of L2 layer	...	20
Fig. 3-5	OM image of L3 layer	...	21
Fig. 3-6	SEM image of L3 layer	...	22
Fig. 3-7	OM image of L4 layer	...	23
Fig. 3-8	SEM image of L4 layer	...	24
4. Bump Pitch Comparison			
Fig. 4-1	OM image of M5 Pro	...	25
Fig. 4-2	OM image of LunarLake	...	25

Report No:25G-1070-1,2 Release day : 2026.08.20

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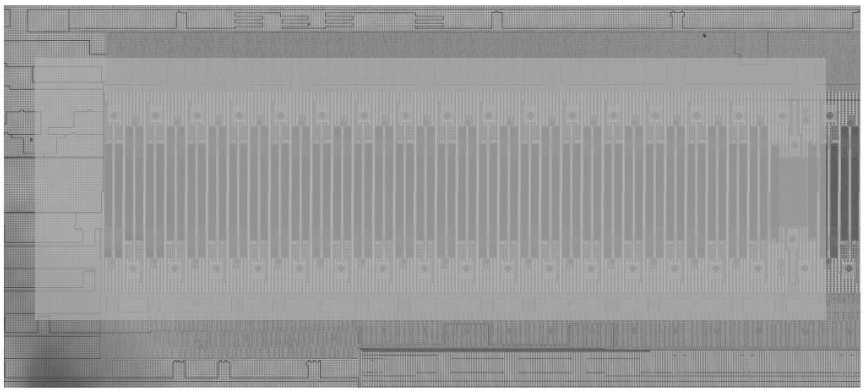
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PKG L3 OM



Si Interposer (Die to die connection area)SEM

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