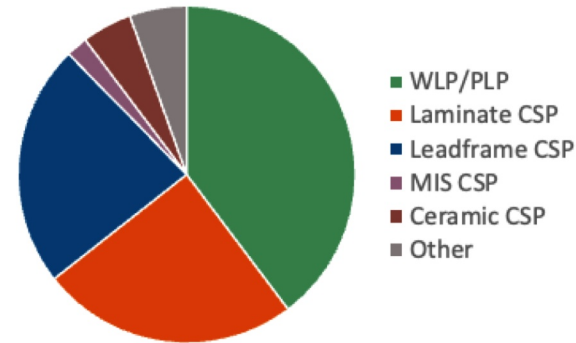


Samsung Galaxy S24 Ultra

Teardown from TechSearch International, Inc.



146 Packages Examined



Contents and Highlights

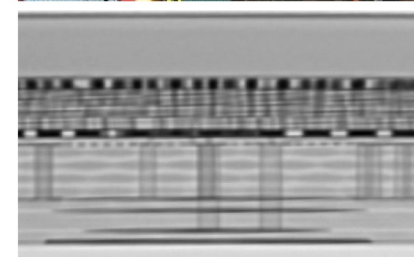
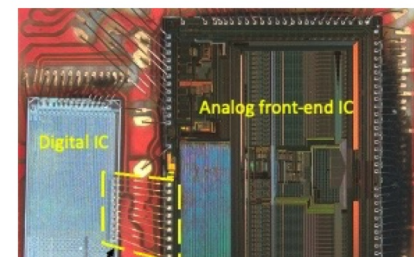
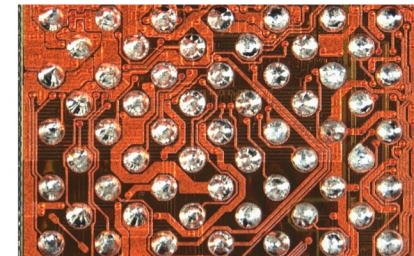
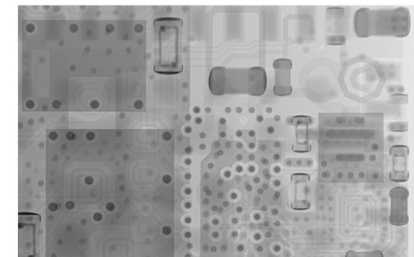
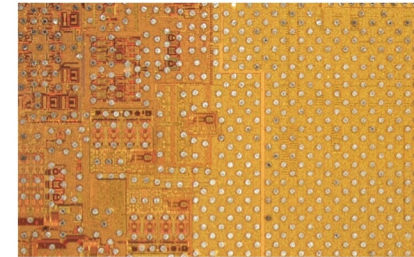
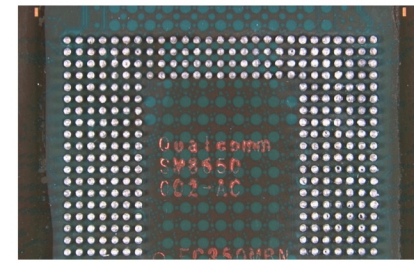
- 196-page report with package quantity summaries, high-resolution photos and x-rays, package dimensions, thermal management analysis
- 25 additional slides with extra details about the Qualcomm Snapdragon 8 Gen 3 application processor and die, Samsung 96Gb LPDDR5X package, Qualcomm SDR875 RF transceiver package and die, Analog Devices MAX77775 PMIC, Qualcomm QTM565 mmWave antenna and transceiver module, NuVolta NU1688 wireless power receiver, Synaptics S3916T touchscreen controller package and die, Qualcomm QFS4008 ultrasonic fingerprint sensor, Samsung S6E3HAFX01 display driver IC, Sony IMX854 50-megapixel CMOS image sensor in the zoom telephoto camera module, and more

Teardowns backed by 36 years serving as the industry's trusted source for semiconductor packaging trend analysis

- Examination of all chips with emphasis on assembly and packaging technologies
- Superb quality photographs and x-ray images
- Both the packages and the die within are identified and characterized
- Detailed construction analysis of key chips and packages



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Sample pages from the report and slides

Samsung Galaxy S24 Ultra

SM-S928U
category Smartphone (high-end)
released Jan 2024



Package quantities (by package type)

WLP/PLP CSP	146
Laminates CSP	0
Leadframe CSP	0
MIS CSP	0
Ceramic CSP	0
Other	0
TOTAL	146

Bare die solutions included excluded

Total area (mm²) **Package area**

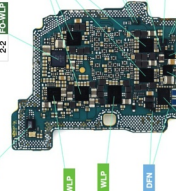
Package - Any device that has completed the packaging steps, includes all bare die solutions. Includes all components that are not on the board, but are part of the assembly. Includes all components that are on the board, but are not on the board, but are part of the assembly.

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Samsung Galaxy S24 Ultra

ASSEMBLY 2 — Main board 1 side 2



2-1 WLP 2-2 WLP 2-3 WLP 2-4 DFN 2-5 DFN 2-6 DFN 2-7 WLP 2-8 WLP 2-9 WLP 2-10 WLP 2-11 DFN 2-12 WLP 2-13 WLP 2-14 WLP

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Qualcomm LB PAM Has Higher Level of Integration

FGA-46
4.9 mm x 5.9 mm x 0.66 mm

QPM6810A
006
0-13-29035

QPM6810 PAM from S23 Ultra

- Compared to QPM6810 used in Galaxy S23 Ultra, new QPM6810A has fewer SAW filter devices, fewer ICs, and fewer passives, but package dimensions are exactly the same

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PACKAGE QUANTITY DETAILS

Board-level	Package-level
WLP/PLP	WLP
Laminates CSP	mWLP
Leadframe CSP	FO-WLP
MIS CSP	FO-PLP
Ceramic CSP	FBGA
Bare die on board/flex	FLGA
Other	COIL
TOTAL	146
Package-level assembled packages	
WLP/PLP	MIS CSP
Laminates CSP	CBGA
Leadframe CSP	CLGA
MIS CSP	SP-C
Ceramic CSP	WB
Other	Other
TOTAL	0

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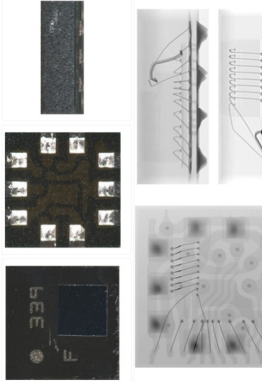
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Samsung Galaxy S24 Ultra

ASSEMBLY 4 — Main board 2 side 1

4-10 1 STMicroelectronics LPS2ZF Sensor-Actuator
Barometric pressure sensor
0.75 mm 0.71 mm 10.049 mm Wire bond, Shaded die

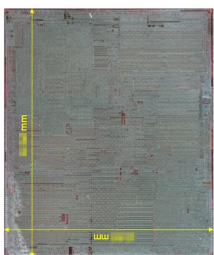
FLGA (Laminite CSP) 1.98 mm x 1.98 mm



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Snapdragon 8 Gen 3 Processor Die



- X75 modem integrated on chip
- TSMC 4nm (N4P) process
- Cu pillars, 100um pitch and 10um diameter (Snapdragon 8 Gen 2 had 5,058 Cu pillars)

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PACKAGES BY SUPPLIER LOCATION

Supplier HQ	Chip Type	mm ²
China	Analog/Mixed-signal	mm ²
Europe	RF analog	mm ²
Japan	Logic	mm ²
Korea	Memory	mm ²
N. America	Sensor-Actuator	mm ²
SE Asia	Image sensor	mm ²
Taiwan	Discrete	mm ²
Other	OPD	mm ²
Unknown	RF Passive	mm ²
TOTAL	IPD	146
TOTAL	Unknown	mm²

Geographic quantities based on chip suppliers. Includes bare die solutions. Measured width x length; includes bare die solutions.

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ASSEMBLY 4 — Main board 2 side 1

4-19 1 Samsung Semiconductor Display PMIC
WLP (MCP/PLP) 3.68 mm x 2.46 mm 0.45 mm 0.130 mm 0.1, 0.4 mm

8200987 Analog/Mix-Sig



Component Details Die count: 1
4-19-1 1 Samsung Semiconductor Die count: 1
WLP/PLP 3.68 mm x 2.46 mm 0.45 mm 0.130 mm 0.1, 0.4 mm
Display PMIC Die count: 1
WLP/PLP 3.68 mm x 2.46 mm 0.45 mm 0.130 mm 0.1, 0.4 mm

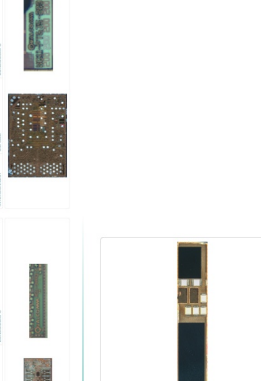
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ASSEMBLY 8 — 5G mmWave modules

Component Details Die count: 2
8-1-1 1 Qualcomm RF Transceiver 8-1-2 1 Qualcomm PMIC
RF Transceiver 8-1-2 1 Qualcomm PMIC
Die count: 2
RF Transceiver 8-1-2 1 Qualcomm PMIC
Die count: 2
RF Transceiver 8-1-2 1 Qualcomm PMIC



Additional Images

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