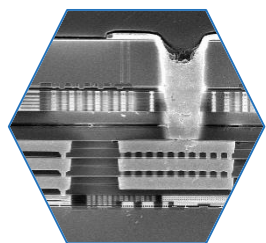
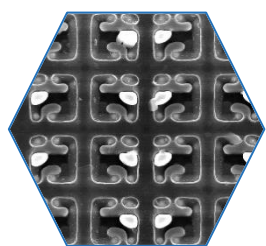




Camera Module Comparison 2021 Vol. 3 – Samsung Galaxy S Evolution

Samsung Galaxy S camera design choices, technical and cost evolution from the S7 to the S21 Ultra.



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Samsung's Galaxy S series has long been at the forefront of smartphone cameras. That includes the dual-pixel autofocus in the Galaxy S7, the Voice Coil Motor (VCM)-controlled aperture in the S9+ and most recently the 100x "Space Zoom" made possible by the periscope module in the S20 Ultra. Now that the S21 Ultra has launched, we continue our series of camera module comparison reports by summarizing the results of detailed physical analyses and costing studies to compare the cameras of the Galaxy S7, S8, S9+, S10+, S20 Ultra and S21 Ultra. This report aims to offer insights into the physical and cost evolution of the camera modules and CMOS Image Sensors (CIS) in the last six years of Samsung flagship smartphones.

The report analyzes the rear and front-facing photography camera modules. The analysis includes the complete structure, design, and component list of the camera modules. It also describes the dimensions, technology node and stacking technology in the CIS.

Over the years, the Galaxy S series rear cameras have led the market, increasing module count from one to four. The Galaxy S20 Ultra was a big step up, debuting the 108 megapixel HM1 CIS and the periscope module with a 4x optical zoom that made possible a 100x hybrid "Space" zoom. The S21 Ultra improved upon this by debuting the HM3 CIS and including a larger

periscope module with a double bounce and 10x optical zoom. This results in higher-quality long-distance photography by relying less on digital zoom. This also allowed Samsung to use larger pixels and lower resolution for the periscope module, but the super long focal length required a conventional telephoto module to cover intermediate focal distances.

Samsung has opted to mostly rely on its own ISOCELL CIS line, but occasionally includes sensors from Sony's Exmor RS line. Some modules can come with either an ISOCELL CIS or an equivalent Exmor RS as a supply chain alternative. This report will only include the CIS in the module versions that we happened to analyze.

The report does not cover special purpose and depth cameras, such as the iris scanner in the Galaxy S8 or the ToF camera in the S20 Ultra.

COMPLETE TEARDOWN WITH

- Detailed photos
- Precise measurements
- Module cross-sections
- Sensor cross-sections
- Sensor measurements
- Manufacturing process flow
- Supply chain evaluation
- Manufacturing cost analysis
- Physical comparisons
- Cost and price comparisons

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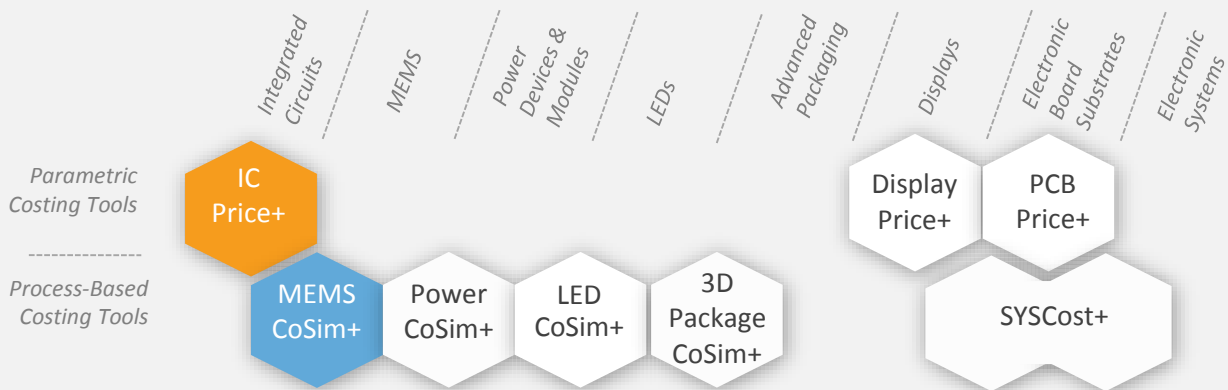


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