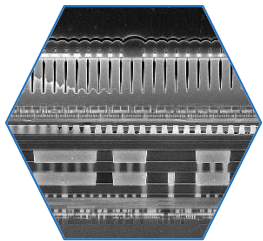
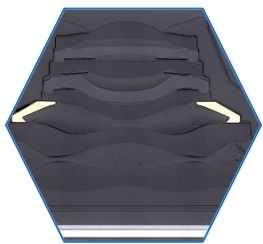


## Camera Module Comparison 2021 Vol. 4 – Huawei P Series Evolution



*Huawei P series' camera design choices and evolution, from the P9 to the P50 Pro*



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The CMOS camera module industry is on track for \$36B in revenue in 2021, up 7.5% from last year. While applications like automotive and computing are growing quickly, the bulk of the market is still represented by smartphone cameras, and this is also where most new technologies enter the market. Huawei is one company at the forefront of this space, and even though its market dominance is under threat by geopolitical tensions and increasingly fierce domestic competition, Huawei's continued investment and innovation in smartphone photography makes them a benchmark leader that cannot be ignored.

Huawei's flagship offering is divided into the Mate and P series. The Mate series is often used as a vehicle to be first-to-market with the latest technology, whereas the P series represents the company's more refined vision of the cutting-edge smartphone photography experience. This doesn't mean the P series isn't a powerhouse of innovation – in fact, the P9 was the first smartphone to add a second rear camera module, which had a monochrome sensor to speed up light collection. Moreover, the P20 Pro was the first smartphone to use a quad-Bayer color filter pattern, and Huawei pioneered the 'Super-Spectrum' RYBY color filter patterns starting with the P30 Pro, which also incorporated the first smartphone periscope telephoto module. Most recently the P50 Pro, despite supply chain issues, recently debuted at the top of DXOMARK's smartphone camera rankings by combining many of these

technologies.

This report summarizes the results of detailed physical analyses and costing studies to provide insights into the physical and cost evolution of the last six years of Huawei P series cameras. Optical, x-ray, and SEM imaging was used to collect very detailed information about the 23 front and rear photography camera modules in the P9, P10, P20 Pro, P30 Pro, P40 Pro, and P50 Pro. Our analysis includes the structure, lens module, voice coil motor system, and bill of materials of the camera modules, as well as the dimensions, technology nodes, and packaging technologies used in the CMOS image sensors. This allowed us to perform and compare detailed costing simulations of the all the components and estimate the final selling prices of the cameras. 3D sensing modules are not covered.

### 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
- Selling price estimate
- Cost and price comparisons

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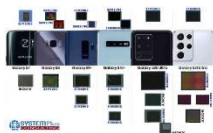


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## RELATED ANALYSES



### 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.

July 2021 - EUR 6,490\*



### Camera Module Comparison 2021 Vol. 2 – Apple iPhone Evolution

Apple's camera design choices from the iPhone 6S Plus to the 12 Pro Max.

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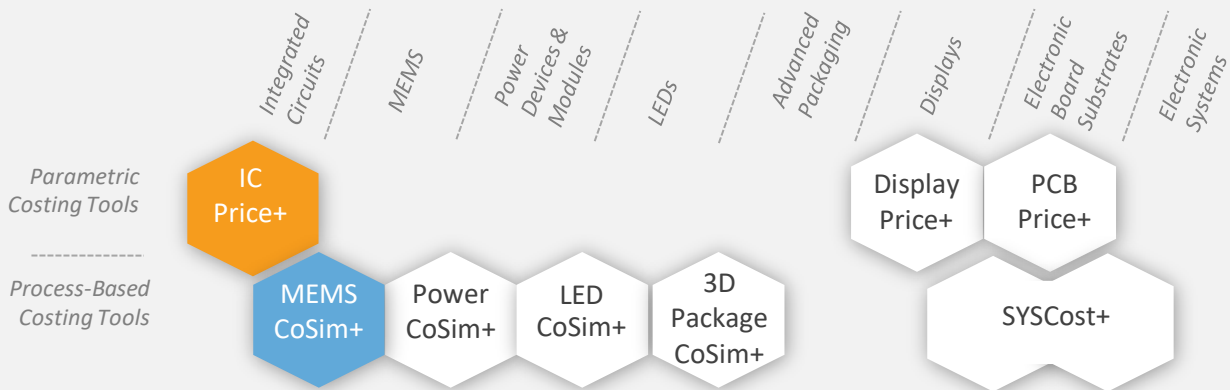


### Status of the Camera Module Industry 2021

The spread of the multi-camera approach from mobile phones to cars will continue to drive the CCM industry forward.

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## COSTING TOOLS



Our analysis is performed with our costing tools MEMS CoSim+ and IC Price+.

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Reverse Costing® is the process of disassembling a device (or a system) in order to identify its technology and calculate its manufacturing cost, using in-house models and tools.



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# TERMS AND CONDITIONS OF SALES

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## 1. INTRODUCTION

The present terms and conditions apply to the offers, sales and deliveries of services managed by System Plus Consulting except in the case of a particular written agreement.

Buyer must note that placing an order means an agreement without any restriction with these terms and conditions.

## 2. PRICES

Prices of the purchased services are those which are in force on the date the order is placed. Prices are in Euros and worked out without taxes. Consequently, the taxes and possible added costs agreed when the order is placed will be charged on these initial prices.

System Plus Consulting may change its prices whenever the company thinks it necessary. However, the company commits itself in invoicing at the prices in force on the date the order is placed.

## 3. REBATES and DISCOUNTS

The quoted prices already include the rebates and discounts that System Plus Consulting could have granted according to the number of orders placed by the Buyer, or other specific conditions. No discount is granted in case of early payment.

## 4. TERMS OF PAYMENT

System Plus Consulting delivered services are to be paid within 30 days end of month by bank transfer except in the case of a particular written agreement.

If the payment does not reach System Plus Consulting on the deadline, the Buyer has to pay System Plus Consulting a penalty for late payment the amount of which is three times the legal interest rate. The legal interest rate is the current one on the delivery date. This penalty is worked out on the unpaid invoice amount, starting from the invoice deadline. This penalty is sent without previous notice.

When payment terms are over 30 days end of month, the Buyer has to pay a deposit which amount is 10% of the total invoice amount when placing his order.

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System Plus Consulting remains sole owner of the delivered services until total payment of the invoice.

## 6. DELIVERIES

The delivery schedule on the purchase order is given for information only and cannot be strictly guaranteed. Consequently any reasonable delay in the delivery of services will not allow the buyer to claim for damages or to cancel the order.

## 7. ENTRUSTED GOODS SHIPMENT

The transport costs and risks are fully born by the Buyer. Should the customer wish to ensure the goods against lost or damage on the base of their real value, he must imperatively point it out to System Plus Consulting when the shipment takes place. Without any specific requirement, insurance terms for the return of goods will be the carrier current ones (reimbursement based on good weight instead of the real value).

## 8. FORCE MAJEURE

System Plus Consulting responsibility will not be involved in non execution or late delivery of one of its duties described in the current terms and conditions if these are the result of a force majeure case. Therefore, the force majeure includes all external event unpredictable and irresistible as defined by the article 1148 of the French Code Civil?

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As a rule, all information handed by customers to system Plus Consulting are considered as strictly confidential.

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## 10. RESPONSABILITY LIMITATION

The Buyer is responsible for the use and interpretations he makes of the reports delivered by System Plus Consulting. Consequently, System Plus Consulting responsibility can in no case be called into question for any direct or indirect damage, financial or otherwise, that may result from the use of the results of our analysis or results obtained using one of our costing tools.

## 11. APPLICABLE LAW

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