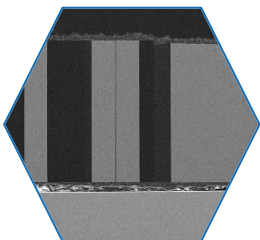
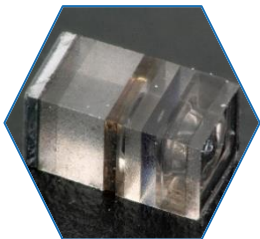


## OmniVision's OVM6948 CameraCubeChip

*The smallest camera in the world for endoscopes is based on a fully wafer bonded technology, with CIS, packaging and optic on the same wafer.*



The endoscopy market was worth \$6B in 2019, with reusable flexible endoscopy being the major market, worth more than \$4B. However the new standard for small diameter endoscopes, specifically bronchoscopes and urethoscopes, is now becoming disposable flexible endoscopes. Omnivision is one of the leaders in providing very small camera modules aiming at supplying this new, developing market.

This full reverse costing study has been conducted to provide insights into technology data, manufacturing cost and selling price of the OVM6948 CameraCubeChip module supplied by OmniVision. This complete module can be integrated into a disposable guidewire, catheter or endoscope.

The smallest camera in the world, it is a Video Graphics Array (VGA) camera module. It integrates a Wafer-Level Packaged (WLP) OmniVision CMOS Image Sensor (CIS) and a small Wafer-Level Optic (WLO) manufactured by VisEra. The entire camera module is provided in a 0.65mm x 0.65mm x 1.2mm 4-pin package including a 0.58mm x 0.58mm CIS die. The CIS die is packaged by Xintec's new WLP technology for CIS. The bumps on the backside are connected with Through Silicon Vias (TSVs). A complex stacking of eight optical layers in 1mm is necessary to provide the wide 120 degree field of view and an extended focus range of 3mm to 30mm. Moreover, the OMV6948 is a fully wafer bonded solution.

The report includes technology and cost analyses of the OmniVision's camera module. These analyses focuses on the three parts, CIS, WLP and WLO. That includes a Back-Side Illumination (BSI) image sensor with a resolution of 40 kilopixels developed by Omnivision, and the multilens module developed by Visera Tech.

Along with the complete physical analysis, this report analyzes costs and estimates prices for the OVM6948 CameraCubeChip. This report includes a comparison between the new WLP from Xintec and WLO from VisEra used for the OVM6948 and their oldest technologies studied for extra small VGA cameras. The comparisons highlight differences in terms of structure.

### COMPLETE TEARDOWN WITH

- Analysis of the camera module structure, including CIS, WLP and WLO
- Detailed optical and SEM photos
- Precise measurements
- Supply chain evaluation
- Manufacturing cost analysis
- Estimated selling price
- Technology comparisons between the new Xintec WLP and VisEra WLO technologies and the older CameraCubeChip model

**Title:** OmniVision's OVM6948 CameraCubeChip

**Pages:** 114

**Date:** April 2020

**Format:** PDF & Excel file

**Price:** EUR 3,990

**Reference:** SP20515

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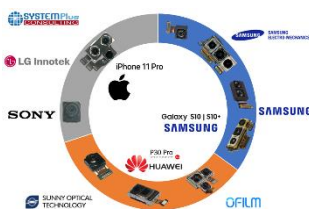


*Sylvain Hallereau has been Project Manager at System Plus Consulting since 2000. He is in charge of costing analyses for Integrated Circuits, Power semiconductors and LEDs. He has significant experience in the modeling of manufacturing costs for electronics components.*



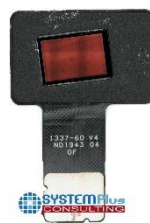
*Guillaume Chevalier has joined System Plus Consulting in early 2018 to perform physical analyses. He holds a two-year university degree in technology of physical measurements and instrumentation technics, and previously worked for four years for chemistry, mechanical and mass-metrology laboratories.*

## RELATED REPORTS



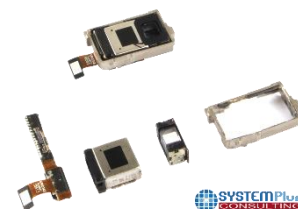
### Smartphone Camera Module Comparison 2020 Vol. 1

*Overview of the latest flagship smartphone cameras released in 2019 (Huawei P30 Pro, Samsung Galaxy S10 5G/S10+ and Apple iPhone 11 Pro).*  
March 2020 - EUR 6,490\*



### Goodix's Ultra-Thin Optical Under-Display Fingerprint

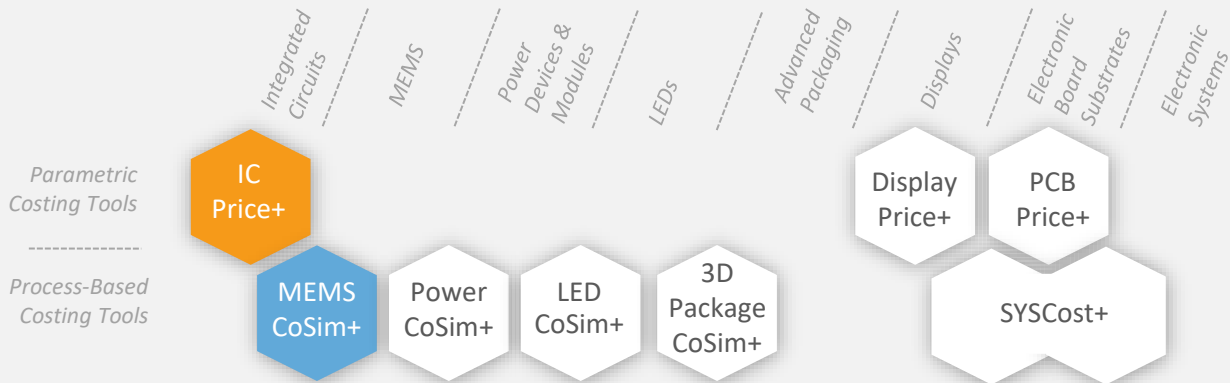
*Deep analysis of the latest generation of under-display optical fingerprint sensors using micro-optics.*  
April 2020 - EUR 3,990\*



### Sunny Optical Folded Optics "Periscope" Camera Module

*Major Camera Module innovation offering x5 optical zoom in Huawei P30 Pro.*  
July 2019 - EUR 3,990\*

## COSTING TOOLS



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

System Plus Consulting offers powerful costing tools to evaluate any process or device, the production cost and selling price, from single chip to complex structures. All these tools are on sale under corporate license.

### IC Price+

The tool performs the necessary cost simulation of any Integrated Circuit: ASICs, microcontrollers, memories, DSP, smartpower...

### MEMS CoSim+

Cost simulation tool to evaluate the cost of any MEMS process or device.

## ABOUT SYSTEM PLUS CONSULTING

## WHAT IS A REVERSE COSTING®?

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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System Plus Consulting is specialized in the cost analysis of electronics from semiconductor devices to electronic systems. A complete range of services and costing tools to provide in-depth production cost studies and to estimate the objective selling price of a product is available.

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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.

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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.

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

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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.

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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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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

Any dispute that may arise about the interpretation or execution of the current terms and conditions shall be resolved applying the French law.

If the dispute cannot be settled out-of-court, the competent Court will be the Tribunal de Commerce de Nantes.