Fingerprint sensing has become a hard market, with several technologies developed and integrated in smartphones. Capacitive, ultrasonic, and light sensors have been proposed by companies offering different grades of performance, power consumption and cost-effectiveness. The technology leaders in the fingerprint sensor market are Fingerprint Cards (FPC) for capacitive, Qualcomm for ultrasonic and Goodix for light. Last year, Goodix flooded the market with its slim under-display fingerprint sensor, with an optical lens design that fits between the battery and the glass display.

With more than 120 designs in several flagships on the market, Goodix this year offers a new version of the fingerprint sensor. It’s called the ultra-thin in-display optical fingerprint sensor, and it uses a micro lens design instead of optical lenses. The sensor is located on the front of the device, directly under the glass display and the organic light emitting diode (OLED) material.

This report focuses on analyzing the optical sensor and its integration under the display. The sensor is manufactured from a Front-Side Illumination CMOS Image Sensor (FSI-CIS), with an on-chip Near InfraRed (NIR) filter, collimator and Micro Lens Array (MLA). The component also includes features to provide a small gap between the CIS and the OLED material.

Since the last version of the device, Goodix made several changes at the optical level but also at the integrated circuit (IC) level. Indeed, the sensor doesn’t require any additional circuits besides the sensor IC. Power management and signal processing rely on the main board chipset.

This complete analysis of the optical fingerprint module includes analyses of the sensor die and the optical part, along with cost analysis and price estimation for the module. It also includes a physical and technical comparison with the previous generation of the sensor from Goodix. Finally, a cost comparison is included with Goodix’s previous fingerprint sensor with an optical lens.

**Deep analysis of the latest generation of under-display optical fingerprint sensors using micro-optics**

**Goodix’s Ultra-Thin Optical Under-Display Fingerprint**

**Title:** Goodix’s Ultra-Thin Optical In-Display Fingerprint Sensor

**Pages:** 107

**Date:** April 2020

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**Price:** EUR 3,990

**Reference:** SP20552

**COMPLETE TEARDOWN WITH**

- Detailed photos
- Precise measurements
- Materials analysis
- Manufacturing process flow
- Supply chain evaluation
- Manufacturing cost analysis
- Estimated sales price
- Comparison with Goodix’s latest under-display fingerprint sensor using an optical lens
TABLE OF CONTENTS

Overview/Introduction
Goodix Company Profile and Optical Sensing Technology
OnePlus 7T Pro 5G McLaren Teardown
Market Analysis
Physical Analysis
  • Physical Analysis Methodology
  • Module Assembly
    ✓ View, disassembly and cross-section
  • Sensor Die
    ✓ View, dimensions and marking
    ✓ Die overview: Lens, filter, pixel
    ✓ Cross-section: Lens, filter, collimator
    ✓ Process characteristics
Physical Comparison with Goodix’s 2019 Optical Fingerprint Sensor with Optical Lens Design
  • Integration, Structure, Die, Process
Manufacturing Process Flow
  • Overview
  • Sensor Process and Fabrication Unit
  • Optical Back-End Process and Fabrication Unit
  • Assembly and Final Test
Cost Analysis
  • Cost Analysis Overview
  • The Main Steps Used in the Economic Analysis
  • Yield Hypotheses
  • Sensor Die Cost
    ✓ Front-end cost
    ✓ Optical back-end cost
    ✓ Optical back-end cost per process step
    ✓ Back-end: Tests and dicing
    ✓ Wafer and die cost
  • Module Cost
Physical Comparison with Goodix’s 2019 Optical Fingerprint Sensor with Optical Lens Design
Cost Comparison with Goodix’s 2019 Optical Fingerprint Sensor with Optical Lens Design
Estimated Price Analysis

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