Fingerprints Cards AB – FPC1268
Capacitive Fingerprint Under Glass from Huawei Mate 9 pro

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Executive Summary

• The Huawei Mate 9 Pro is the first to feature the capacitive fingerprint completely hidden behind the cover glass. The sensor is located under the home button in the front of the device under specific glass cover developed by TPK allowing new highly attractive designs like the ultrasonic fingerprint.

• The sensor has the same process as the previous FPC flagship, the 1025, but its integration doesn’t wire bonding any more but a specific TSV designed by an identify OSAT based on Tessera’s WLCSP solution. Previously used for CIS integration, it’s the first time the fingerprint. Along with the ASIC, the fingerprint is integrated in a LGA package who’s soldered on a flex PCB and covered by a glass specially designed by TPK.

• The solution developed by TPK allows the precise detection and identification of the fingerprint under the glass thanks to conductive layers. Everything is packaged in a metal ring giving the form of the home button.

• Complete chip fabrication and package processes are presented in the report along with the cost estimation. It also includes comparison with the previous generation of capacitive fingerprint from FPC, the FPC1025 and the new ultrasonic fingerprint from Qualcomm, the Sense ID.
Huawei Mate 9 Pro Teardown

Overview button

Huawei Mate 9 Pro Opened View

Huawei Mate 9 Pro Fingerprint Bottom View
PHYSICAL ANALYSIS
Synthesis of the Physical Analysis

Fingerprint Assembly:
- Dimensions:
- Electronic Components assembly:
- Electrical Connections and support:

Assembly:
- Dimensions:
- LGA Package:
- Placement in the assembly:

Sensor:
- Process:
- Electrical Connection:
- Encapsulation:
- Placement in the package:

ASIC:
- Process:
- Electrical Connection:
- Placement in the package:
Package View & Dimensions

Connector
2x10 positions

Package Bottom View

Button Flex – Marking

Fingerprint Flex – Marking
Fingerprint Package Cross-Section – Die TSV
Sensor Die Overview

Die Area:

Nb of PGDW per 8-inch wafer:

Pad number:
- Connected:
Comparison with Qualcomm Fingerprint

- **Component**: FPC1268, Qualcomm Fingerprint
- **Package**: FPC1268, Qualcomm Fingerprint Package Opening
- **Pads Nb**:
- **Connecting Nb**:
Sensor – Back-End Process Flow 1/3

- Temporary Bonding
- Thinning
Sensor Front-End Cost

<table>
<thead>
<tr>
<th>Sensor Front-End</th>
<th>Low Yield</th>
<th>Medium Yield</th>
<th>High Yield</th>
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<tbody>
<tr>
<td></td>
<td>Cost</td>
<td>Breakdown</td>
<td>Cost</td>
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<tr>
<td>Raw wafer Cost</td>
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<td>Equipment Cost</td>
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<td>Consumable Cost</td>
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<td>Labor Cost</td>
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<td>Yield losses Cost</td>
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<td>Sensor Front-End Cost</td>
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<td>Gross Profit</td>
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<tr>
<td>Sensor Front-End Price</td>
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</tbody>
</table>

The **front-end cost** for the Sensor ranges from [ ] according to yield variations.

The largest portion of the manufacturing cost is due to the [ ].

We estimate that [ ] realizes a gross margin of [ ] on the sensor manufacturing, which results in a price ranging from [ ] . This corresponds to the selling price to FPC.
Sensor Back-End Cost

<table>
<thead>
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<td><strong>Back-End Price</strong></td>
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</tbody>
</table>

The **Back-end cost** for the Sensor ranges from  according to yield variations.

The largest portion of the manufacturing cost is due to the

We estimate that  gross margin manufacturing

This scenario
Component Cost

The component cost ranges from [---] according to yield variations.
- The [Component] represents [---] of the component cost.
- The [Flex PCB] represents [---] of the component cost.
- The other components of the BOM represent [---] of the component cost.
- Assembly account for [---] of the component cost.
Related Reports

**MEMS & SENSORS**
- Qualcomm® Snapdragon Sense™ ID 3D Fingerprint
- NEXT Biometrics NB-1010-U/NB-2020-U
- Samsung Galaxy S6 Fingerprint Sensor
- NEEgisTec ET300 Fingerprint Sensor
- Nexus 6P Fingerprint Sensor
- iPhone 6s Plus Fingerprint Sensor
- Huawei Ascend Mate 7 Fingerprint Sensor
- Samsung Galaxy S5 – Home Button Synaptics Fingerprint Sensor
- iPhone 5S Fingerprint Sensor – Apple/AuthenTec TMDR92 & Sapphire

**MARKET AND TECHNOLOGY REPORTS - YOLE SÉVELOPPEMENT**

**MEMS & SENSORS**
- Sensors for Biometry and Recognition
- Finger Print Sensors Applications and Technologies
- Status of the MEMS Industry 2016

**ADVANCED PACKAGING**
- 3DIC and 2.5D TSV Interconnect for Advanced Packaging: 2016 Business Update

**PATENT ANALYSIS - KNOWMADE**

**MEMS**
- Capacitive Fingerprint Sensors Technology and Patent Infringement Risk Analysis 2015
Business Models a Fields of Expertise

- Custom Analyses
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- Reports
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- Costing Tools

- Trainings
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We appreciate to work with you and want to make sure we meet your expectations.

Sincerely,
Wilfried THERON
Quality Manager

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