Following Oppo and Xiaomi, two of its major competitors in China, Huawei has introduced 3D depth-sensing hardware in one of its latest flagship phones, the Mate 20 Pro. Unlike Oppo or Xiaomi, which have made some compromises in the performance of their 3D systems, Huawei, with its large sensor coupled with patterned wafer-level optics (WLO), is the closest solution to Apple’s (which relies on high dynamic range and DOE). Huawei’s 3D system includes a DOT projector in a camera module assembly configuration. On the receiver side, the NIR image is captured by a global shutter (GS) near-infrared (IR) camera module.

The front optical hub packaged in one metal enclosure features several cameras and sensors. The complete system features an RGB camera module, a proximity sensor, and an ambient light sensor. The 3D depth-sensing system consists of the NIR camera module, the flood illuminator, and the DOT projector.

This report constitutes a thorough analysis of the Mate 20 Pro’s 3D depth-sensing system. All components are standard and can be found on the market. This includes a GS image sensor featuring 3 µm-size pixels and a standard resolution of 1.5 megapixels, and two vertical cavity surface-emitting lasers (VCSEL): one for the DOT projector and one for the flood illuminator, each coming from a different supplier. The camera and DOT projector use a standard camera module assembly with wire bonding and an optical module featuring lenses. In order to provide the structured light features, a WLO is integrated with the DOT projector structure.

This report analyzes the complete 3D depth-sensing system, including a full analysis of the NIR camera module and the dot projector, along with a cost analysis and price estimate for the system. Also included is a physical and technical comparison with other 3D sensing systems, such as those from Apple in the iPhone X; Oppo in the Find X; and Xiaomi in its Mi 8 Explorer. This comparison examines system integration, the NIR camera module, and the dot projector architecture.
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