

## Global and China CMOS Camera Module Industry Report, 2009-2010

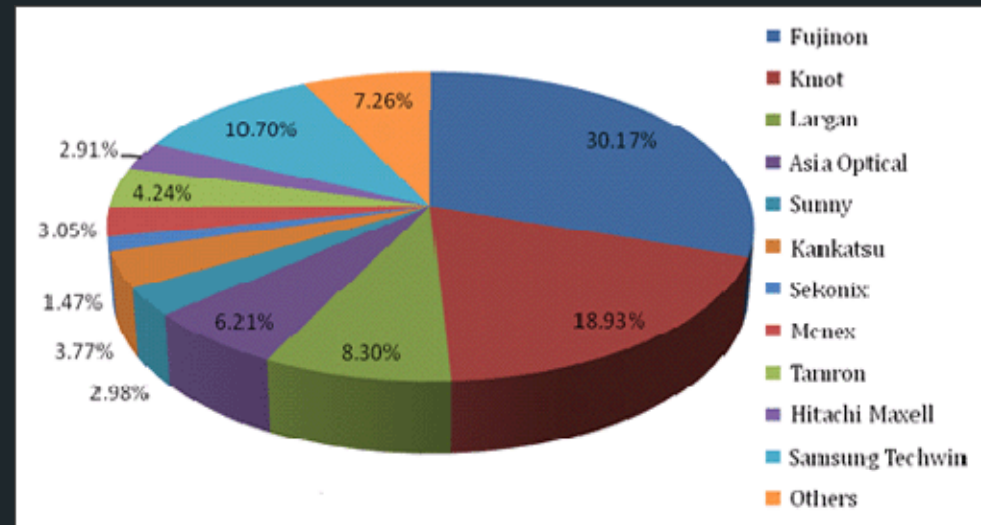


Cell phone camera module characterizes an exceptionally complicated industrial chain which has three cores, namely CMOS image sensors, optical lens, module assembly factories. With the growing pixels of cell phone camera, packaging manufacturers have been playing increasingly important roles, while module assembly factories are on the wane. CMOS image sensor manufacturers can not only deliver products to cell phone manufacturers directly by integrating optical components and adopting special packaging; but also deliver products to module assembly factories after professional packaging firms fulfill packaging; besides, they can choose to deliver products in the form of uncut wafers to COB module manufacturers. Yet, part of optical component manufacturers also has the ability to assemble COB modules.

Usually, CMOS image sensor manufacturers can be grouped into the three. First, the associated companies of wafer giants; second, large IDM companies; third, traditional digital camera manufacturers. Omnivision and the world's largest wafer foundry have close relationship, and they own two joint ventures. Aptina was formerly a subsidiary of MICRON that is a large memory vendor, and MICRON is a wafer OEM of Aptina now. SETI is an affiliated company of Dongbu Anany. Samsung, Toshiba, STMICRO are IDMs. Traditional digital camera manufacturers, including Sony, Canon, Sharp, Kodak, Fuji, produce high-performance CMOS image sensors at small quantities and high prices. Only wafer fabs can guarantee the production of CMOS image sensors and help reduce the costs. Wafer fabs can make use of CMOS image sensor business to supplement the production capacity of 8-inch wafer fabs, so that both of them can win. A pure IC design company has no competitiveness at all.

Lens is included in optical components of which the production needs rich experience in the manufacturing process. It is difficult to enter the field, though it will bring high gross profit margin. Many super-large electronics manufacturers try to get through vertical supply chain, but it is particularly difficult to do so in optical field. Additionally, optical manufacturers are highly dependent on human resources and rarely willing to be acquired. FUJINON which is subject to Fuji Film enjoys over 50% shares in 3-megapixel (or above) mobile phone camera market. KMOT is the optical components division of Konica Minolta; just like Fuji film, it is also a well-known optics maker and focuses on high-end products. Both of Largan and Asia Optical are supported by Japanese manufacturers in technology. Particularly, Japan's Sekon, Olympus, Ricoh, Nikon and Sony have given technical guidance to Asia Optical or established joint ventures with them. Largan is closely related to smart camera manufacturers; the three smart phone giants APPLE, HTC and RIM are Largan's loyal clients. KANKATSU, TAMRON and Hitachi Maxell are Japanese manufacturers, and the former two are traditional camera lens Manufacturers.

### Market Shares of Cell Phone Camera Lens Manufacturers, 2009



Mobile phone camera module manufacturers are normally divided into three groups.

First, CMOS image sensor giants establish module factories in order to integrate resources and expand vertical systems. Before the end of 2007, Toshiba entrusted most of camera module business to other manufacturers. After 2008, it has always completed its camera module business in the semiconductor plant in Iwate. Sharp is a big producer of CCD camera module, with rich experience and monthly output of about 9.8 million units. STMICRO holds advanced CMOS image sensor technology. Samsung entrusts part of module business to Samsung Electro-Mechanics, while it fulfills the remaining part by itself.

Second, cell phone OEMs, mobile phone or laptop component manufacturers. Foxconn, BYD and VISTAPIONT are big cell phone OEMs. Besides, small manufacturers of cell phone components are as usual adept in LCD field, With resources in dust-free rooms, such as LG INNOTEK, Truly Semiconductors, and ALPS. Chicony is the world's largest laptop keyboard manufacturer which almost monopolizes the laptop and camera module business.

Third, professional optoelectronic manufacturers, such as KMOT and Liteon.

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