IMX137LQK, IMX139LQJ, IMX140LQJ

HD and Full HD High Picture Quality CMOS Image Sensors with MIPI for Industrial Applications

Sony has now released the IMX137LQK and IMX139LQJ, HD CMOS image sensors, and the IMX140LQJ, a full HD CMOS image sensor for industrial applications with the Mobile Industry Processor Interface (MIPI).
They use 2.8 µm and 3.75 µm square pixels developed for industrial applications and have a high signal-to-noise ratio.
Together with Sony's current image sensors, the IMX076LQZ*1, IMX104LQJ*2 and IMX136LQJ*2, the customers now have a wider range of models from which to select the product that best suits their operating environment.
Their use of a standard MIPI facilitates connection to a wide variety of DSPs.

*1: See the New Products section in CX-NEWS, Volume 62.
*2: See the New Products section in CX-NEWS, Volume 68.

IMX137LQK

- Diagonal 4.58 mm (Type 1/4) approx. 1.43M-effective pixels
- Frame rate: 60 frame/s

IMX139LQJ

- Diagonal 6.28 mm (Type 1/3) approx. 1.37M-effective pixels
- Frame rate: 120 frame/s

IMX140LQJ

- Diagonal 6.4 mm (Type 1/2.8) approx. 2.38M-effective pixels
- Frame rate: 60 frame/s

Exmor™

* "Exmor" is a trademark of Sony Corporation. The "Exmor" is a version of Sony's high performance CMOS image sensor with high-speed processing, low noise and low power dissipation by using column-parallel A/D conversion.

To make set development easier in the industrial field, chip sets that combine ISP (image signal processor) and Codec are in demand.
Responding to this demand, Sony has developed a CMOS image sensor series that combine "Xarina"*3 CXD4135GG and CXD4235.
Our product range enables customers to select image sensors in a range from Type 1/3 and 1/4 with 1.3M/720p to Type 1/2.9 sensors offering 1080p.

*3: For details on "Xarina", see the New Products section of this volume.

MIPI Compliant

The image sensors comply with the high-speed serial interface, MIPI (CSI-2 compliant). Use of a standard interface simplifies connection to DSPs.
The IMX137LQK provides a 1 or 2-lane connections while the IMX139LQJ and IMX140LQJ offer 2 and 4-lane connections. The maximum output bit rate for each lane during HD readout for the IMX137LQK and IMX140LQJ is 445.5 Mbps/lane while the bit rate for the IMX139LQJ is 594 Mbps/lane. (See table 1.)

Package

The image sensors are provided in an LGA (Land Grid Array) package.
The IMX137LQK is in a compact 74-pin package. The IMX139LQJ and IMX140LQJ are in the same 94-pin package and pin compatible, so they can be used on similar boards. And the IMX137LQK, IMX139LQJ and IMX140LQJ are provided in packages that can withstand high-temperature reflow soldering (peak temperature: 240°C).

DSP Compatible

In combined with Sony DSPs, "Xarina" CXD4135GG and CXD4235, these image sensors have a high frame rate of up to 60 frame/s. (See photograph 1.)
A wide dynamic range is provided by composing multiple frame set images outputed from these image sensors in DSPs. The IMX137LQK and IMX140LQJ allow combination of two frame sets and the IMX139LQJ can combine up to four frame sets. (The IMX139LQJ enables up to 120 frame/s with this function.)

V O I C E

Industrial fields use many applications and interfaces.
This series was developed to satisfy this demand. A standard MIPI and Sony image sensors have made it possible to easily build cameras with high picture quality. Do not miss this opportunity to make a new visual experience.

Photograph 1 Sample Images (1300 lx, 60 frame/s)

IMX137LQK + CXD4135GG (5 : 4)

IMX139LQJ + CXD4135GG (5 : 4)

IMX140LQJ + CXD4135GG (16 : 9)

Table 1 Device Structure

Item		IMX137LQK	IMX139LQJ	IMX140LQJ
Image size		Diagonal 4.58 mm (Type 1/4) (1.3M mode) Diagonal 4.20 mm (Type 1/4.3) (720p mode)	Diagonal 6.28 mm (Type 1/3) (1.3M mode) Diagonal 5.61 mm (Type 1/3.2) (720p mode)	Diagonal 6.23 mm (Type 1/2.9) (1080p mode)
Transfer method		All-pixel scan	All-pixel scan	All-pixel scan
Number of effective pixels		1368H × 1049V, approx. 1.43M pixels	1305H × 1049V, approx. 1.37M pixels	1944H × 1224V, approx. 2.38M pixels
Chip size		6.05 mm (H) × 5.4 mm (V)	7.80 mm (H) × 7.50 mm (V)	8.50 mm (H) × 7.30 mm (V)
Unit cell size		2.80 µm (H) × 2.80 µm (V)	3.75 µm (H) × 3.75 µm (V)	2.80 µm (H) × 2.80 µm (V)
Optical blacks	Horizontal	Front: 24 pixels, rear: 0 pixel	Front: 4 pixels, rear: 0 pixel	Front: 4 pixels, rear: 0 pixel
	Vertical	Front: 24 pixels, rear: 3 pixels	Front: 20 pixels, rear: 0 pixel	Front: 12 pixels, rear: 0 pixel
Input drive frequency		54 MHz/27 MHz/37.125 MHz	54 MHz/27 MHz/37.125 MHz/74.25 MHz	37.125 MHz/74.25 MHz
Package		74-pin LGA	94-pin LGA	94-pin LGA
Supply voltage V_{DD} (typ.)		2.7 V/1.8 V/1.2 V	3.3 V/1.8 V/1.2 V	2.7 V/1.8 V/1.2 V
Sensitivity (F5.6) (typ.)		425 mV	960 mV	425 mV
Saturation signal		822 mV	1440 mV	812 mV
Output method		MIPI 1, 2 lane	MIPI 2, 4 lane	MIPI 2, 4 lane
Control communication interface		I^2C, 4-lane serial	I^2C, 4-lane serial	I^2C, 4-lane serial
Drive mode (All-pixel scan)		1.3M 60 frame/s 648 Mbps/lane × 2 lane	1.3M 120 frame/s 594 Mbps/lane × 4 lane	—
Drive mode (HD)		720p 60 frame/s 445.5 Mbps/lane × 2 lane	720p 120 frame/s 594 Mbps/lane × 4 lane	1080p 60 frame/s 445.5 Mbps/lane × 4 lane