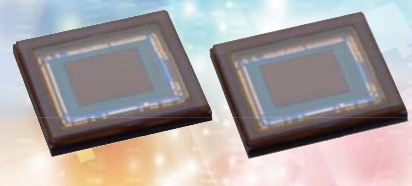
SONY

IMX224LQR, IMX225LQR

Diagonal 6.09 mm (Type 1/3) Approx. 1.27M-Effective Pixel Color CMOS Image Sensor



CMOS Image Sensors for Industrial Applications Realize High Sensitivity Approximately Twice That of the Existing Product

Sony has developed the CMOS image sensors "IMX224LQR" and "IMX225LQR" for industrial applications. These new image sensors realize high sensitivity approximately twice that of the existing product (IMX238LQJ)*1.
The IMX224LQR and IMX225LQR pursue picture quality at low illumination, which is the characteristic most required by cameras for industrial applications, and realize pixels with the highest sensitivity among Sony image sensors for industrial applications*2. In addition, a minimum subject illumination of 0.005 lx or less is achieved by mounting an internal programmable gain amplifier that can support up to 72 dB. Superior performance as image sensors for industrial applications is achieved by combining new WDR (Wide Dynamic Range) technology with technology that improves sensitivity in the near infrared light region.
The new lineup includes the two types of the IMX224LQR, which has a WDR function, and the IMX225LQR, which does not have a WDR function.

*1: See the New Product Information released in September 2013.
*2: As of August 2014 (based on Sony's research)

- High sensitivity characteristics using a newly developed 3.75 μm pixel (Sensitivity improved to approximately twice that of the existing product)
- Minimum subject illumination of 0.005 lx or less (at a gain of 72 dB)
- Improved sensitivity in the near infrared light region
- New WDR function (IMX224LQR only)
- Versatile interface (CMOS parallel, low-voltage LVDS serial, MIPI CSI-2)

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.

High Sensitivity Characteristics Using A Newly Developed Pixel

Cameras for industrial applications are required to produce color images with high picture quality even under dark conditions. High sensitivity characteristics approximately twice that of the existing product (IMX238LQJ) with the same 3.75 μm pixel size have been achieved by developing a new pixel with the highest sensitivity among Sony image sensors for industrial applications.
In addition, mounting a sensor gain of 72 dB enables shooting of color images with high picture quality, even in a super-low-illumination environment of 0.005 lx.
Furthermore, combination with technology for improving sensitivity in the near infrared light region also improves picture quality under near infrared LED lighting.

New WDR Function (IMX224LQR Only)

The IMX224LQR supports a DOL (digital overlap)-type WDR function. This function uses a method that outputs the data for three frames with different storage times line by line instead of frame by frame, enabling improvement of picture quality especially under low illumination compared to the existing multiple exposure WDR function.

Versatile Interface

The IMX224LQR and IMX225LQR are equipped with three different types of output interface (low-voltage LVDS serial, MIPI CSI-2, and CMOS parallel) to meet the diverse needs of customers. The low-voltage LVDS serial and MIPI CSI-2 interfaces have a maximum output data rate of 594 Mbps/ch (lane), and the number of output channels can be selected from 1ch, 2ch or 4ch (lane). The CMOS parallel interface has a maximum output data rate of 74.25 Mpixel/s.

＜Photograph 1＞
IMX224LQR Sample Image

Condition: 400 lx F1.4 (Quad VGA image 60 frames/s)

IMX224LQR (Internal gain 0 dB)

＜Photograph 2＞
Comparisons with the Existing Sony Product

Condition 1 : 0.05 lx F1.4 (Quad VGA image 30 frames/s)

Existing IMX238LQJ (FI 3.75 µm SXGA)
Internal gain 42 dB (Maximum gain)

IMX224LQR
HCG + Internal gain 60 dB

Condition 2 : 0 lx (with IR) F1.4 (Quad VGA image 30 frames/s)

Existing IMX238LQJ (FI 3.75 µm SXGA)
Internal gain -6 dB

IMX224LQR
HCG + Internal gain 0 dB

＜Photograph 3＞
Sample Images with WDR

Sample image with single exposure

Sample image with DOL-WDR

＜Table 1＞ Device Structure

Item		IMX224LQR / IMX225LQR
Image size		Diagonal 6.09 mm (Type 1/3) (Quad VGA mode) Diagonal 5.59 mm (Type 1/3.2) (HD720p mode)
Number of effective pixels		1305 (H) × 977 (V) approx. 1.27M pixels
Unit cell size		3.75 µm (H) × 3.75 µm (V)
Optical blacks	Horizontal	Front: 4 pixels, rear: 0 pixels
	Vertical	Front: 16 pixels, rear: 0 pixels
Input drive frequency		54 MHz / 27 MHz /37.125 MHz / 74.25 MHz
Package		110-pin LGA
Supply voltage V_{DD} (Typ.)		3.3 V / 1.8 V / 1.2 V

＜Table 2＞ Image Sensor Characteristics

Item		Value	Remarks
G sensitivity (F5.6)	Typ.	2350 mV	1/30s accumulation
Saturation signal	Min.	1210 mV	Tj = 60 °C

＜Table 3＞ Basic Drive Mode

Mode	Interface	ADC	Frame rate (Max.)	Bit rate (Max.)
Quad VGA	Low voltage LVDS serial 4 ch	10 bits	120 frames/s	594 Mbps/ch
	Low voltage LVDS serial 4 ch	12 bits	60 frames/s	594 Mbps/ch
	CSI-2 4 lane	10 bits	120 frames/s	594 Mbps/lane
	CSI-2 4 lane	12 bits	60 frames/s	594 Mbps/lane
	CMOS parallel	10 bits / 12 bits	30 frames/s	74.25 Mpixel/s
720p HD	Low voltage LVDS serial 4 ch	10 bits	120 frames/s	594 Mbps/ch
	Low voltage LVDS serial 4 ch	12 bits	60 frames/s	594 Mbps/ch
	CSI-2 4 lane	10 bits	120 frames/s	594 Mbps/lane
	CSI-2 4 lane	12 bits	60 frames/s	594 Mbps/lane
	CMOS parallel	10 bits / 12 bits	60 frames/s	74.25 Mpixel/s