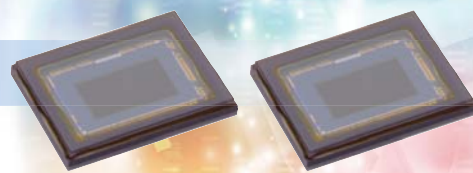


IMX290LQR, IMX291LQR

Diagonal 6.46 mm (Type 1/2.8) Square Pixel Array
Color CMOS Image Sensor



Back-Illuminated CMOS image Sensors with Improved Visible Light and Near Infrared Sensitivity that Support 1080p

Sony has developed the approx. 2.13M effective pixel back-illuminated CMOS image sensors IMX290LQR and IMX291LQR with improved sensitivity in the visible-light and near infrared light regions for industrial applications.

A new 2.9 μm -square unit pixel has been developed that combines a back-illuminated structure with technology for improving near infrared sensitivity to further enhance picture quality at low illumination while at the same time realizing Full HD cameras for industrial applications. This realizes two or

more times the sensitivity in the visible-light region and three or more times the sensitivity in the near infrared light region than that of the existing Sony product (IMX236LQJ)*¹. In addition, two types of WDR (Wide Dynamic Range) technology are also provided to further improve imaging performance.

The new lineup includes the two types of the IMX290LQR, which has the DOL (Digital Overlap) -WDR function and the IMX291LQR, which does not have the DOL-WDR function.

*¹ See the New Product Information released in September 2013.

- Back-illuminated structure with 2.9 μm -square unit pixel
- High sensitivity characteristics (two or more times that of the existing product)
- Improved sensitivity in the near infrared light region (three or more times that of the existing product)
- Supports WDR (multiple exposure WDR, DOL-WDR)
- Versatile interface (CMOS parallel, low-voltage LVDS serial, MIPI CSI-2)

Exmor R

* Exmor R is a trademark of Sony Corporation. The Exmor R is a Sony's CMOS image sensor with significantly enhanced imaging characteristics including sensitivity and low noise by changing fundamental structure of ExmorTM pixel adopted column parallel A/D converter to back-illuminated type.

STARVIS

*STARVIS is a trademark of Sony Corporation. The STARVIS is back-illuminated pixel technology used in CMOS image sensors for surveillance camera applications. It features a sensitivity of 2000 mV or more per 1 μm^2 (color product, when imaging with a 706 cd/m² light source, F5.6 in 1 s accumulation equivalent), and realizes high picture quality in the visible-light and near infrared light regions.

Back-Illuminated Structure + Improved Sensitivity in the Near Infrared Light Region

Good sensitivity characteristics at low illumination and in the near infrared light region are a required performance of cameras for industrial applications. These new image sensors use a back-illuminated structure and also have an expanded photodiode area, which simultaneously improve sensitivity in both light regions compared to the existing front-illuminated structure.

In addition, the new image sensors realize improved sensitivity characteristics two or more times in the visible-light region and three or more times in the near infrared light region (850 nm) compared to the existing Sony product (IMX236LQJ) with the same pixel size and increased sensitivity in the near infrared light region (Photograph 2).

WDR Function

The IMX290LQR supports both multiple exposure and DOL-type WDR functions. (The IMX291LQR supports only the multiple exposure-type WDR function.)

The multiple exposure-type WDR function outputs one set of two or four frames with different exposure times. In this case, the gain can also be set separately for each frame in addition to the exposure time.

The DOL-type WDR function outputs the data for up to three frames with different storage times line by line. By performing special signal processing with an ISP (Image Signal Processor) or other device at the image sensor rear-end, this enables improvement of picture quality under low illumination compared to the multiple exposure-type WDR function.

Versatile interface

The IMX290LQR and IMX291LQR are equipped with three different types of output interface (low-voltage LVDS serial, MIPI CSI-2, CMOS parallel) to meet diverse needs. The low-voltage LVDS serial interface has a maximum output data rate of 445.5 Mbps/ch and the number of output channels

can be selected from 2ch, 4ch or 8ch. The MIPI CSI-2 interface has a maximum output data rate of 891 Mbps/lane and the number of output channels can be selected from 2 lanes or 4 lanes. The CMOS parallel interface has a maximum output data rate of 74.25 Mpixels/s.

< Photograph 1 > IMX290LQR Sample Image

Condition: 400 lx F1.4 (Full HD image, 60 frames/s)



IMX290LQR (Internal gain 0 dB)

< Photograph 2 > Comparisons with the Existing Sony Product

Condition1: 0.08 lx F1.4 (Full HD image, 30 frames/s)



Existing IMX236LQJ
Internal gain 48 dB



IMX290LQR
Internal gain 63 dB

Condition 2: 0 lx (850 nm IR) F1.4 (Full HD image, 30 frames/s)



Existing IMX236LQJ
Internal gain 0 dB



IMX290LQR
Internal gain 0 dB

< Table 1 > Device Structure

Item	IMX290LQR / IMX291LQR	
Output Image size	Diagonal 6.46 mm (Type 1 / 2.8) (Full HD mode) Diagonal 4.31 mm (Type 1 / 4.2) (HD720p mode)	
Number of effective pixels	1945 (H) × 1097 (V) approx. 2.13M pixels 1305 (H) × 729 (V) approx. 0.95M pixels	
Unit cell size	2.9 μm (H) × 2.9 μm (V)	
Optical blacks	Horizontal	Front: 0 pixels, rear: 0 pixels
	Vertical	Front: 10 pixels, rear: 0 pixels
Input drive frequency	74.25 MHz / 37.125 MHz	
Package	110-pin LGA	
Supply voltage V _{DD} (Typ.)	2.9 V / 1.8 V / 1.2 V	

< Table 2 > Image Sensor Characteristics

Item	Value	Remarks
Sensitivity (F5.6)	Typ.	1300 mV / 1/30s accumulation
Saturation signal	Min.	914 mV / T _j = 60 °C

< Table 3 > Basic Drive Mode

Drive mode	Interface	ADC	Frame rate (Max.)	Bit rate (Max.)
Full HD 1080p	Low voltage LVDS serial 8 ch	10 bit	120 frame/s	445.5 Mbps/ch
	Low voltage LVDS serial 8 ch	12 bit	60 frame/s	222.75 Mbps/ch
	CSI-2 4 lane	10 bit	120 frame/s	891 Mbps/lane
	CSI-2 4 lane	12 bit	60 frame/s	445.5 Mbps/lane
HD720p	CMOS parallel	10 bits / 12 bits	30 frame/s	74.25 Mpixel/s
	Low voltage LVDS serial 4 ch	10 bit	120 frame/s	594 Mbps/ch
	Low voltage LVDS serial 4 ch	12 bit	60 frame/s	297 Mbps/ch
	CSI-2 4 lane	10 bit	120 frame/s	594 Mbps/lane
	CSI-2 4 lane	12 bit	60 frame/s	297 Mbps/lane
	CMOS parallel	10 bits / 12 bits	60 frame/s	74.25 Mpixel/s