SONY

Ver.1.0

IMX678-AAQR1

Diagonal 8.86 mm (Type 1/1.8) CMOS Solid-state Image Sensor with Square Pixel for Color Cameras

Description

The IMX678-AAQR1 is a diagonal 8.86 mm (Type 1/1.8) CMOS active pixel type solid-state image sensor with a square pixel array and 8.40 M effective pixels. This chip operates with analog 3.3 V, digital 1.1 V, and interface 1.8 V triple power supply, and has low power consumption. High sensitivity, low dark current and no smear are achieved through the adoption of R, G and B primary color mosaic filters. This chip features an electronic shutter with variable charge-integration time.
(Applications: Security cameras)

Features

- ◆ CMOS active pixel type dots
- ◆ Built-in timing adjustment circuit, H/V driver and serial communication circuit
- ◆ Input frequency: 13.5MHz / 18MHz / 24MHz / 27MHz / 36MHz / 37.125 MHz / 72 MHz / 74.25 MHz
- ◆ Number of recommended recording pixels: 3840 (H) × 2160 (V) approx. 8.29M pixel
- ◆ Readout mode
  - All-pixel scan mode
  - Horizontal / Vertical 2/2-line binning mode
  - Window cropping mode
  - Horizontal / Vertical direction - Normal / Inverted readout mode
- ◆ Readout rate: Maximum frame rate in All-pixel scan mode: 12 bit: 60 frame/s, 10 bit: 60 frame/s
- ◆ High dynamic range (HDR) function
  - Digital overlap HDR
  - Clear HDR
- ◆ Synchronizing sensors function
- ◆ Variable-speed shutter function (resolution 1H units)
- ◆ CDS / PGA function
  - 0 dB to 30 dB: Analog Gain 30 dB (step pitch 0.3 dB)
  - 30.3 dB to 72 dB: Analog Gain 30 dB + Digital Gain 0.3 dB to 42 dB (step pitch 0.3 dB)
- ◆ Supports I/O
  - CSI-2 serial data output (2 Lane / 4 Lane / 8Lane / 4Lane × 2ch)
  - RAW10 / RAW12 output

STARVIS 2

* STARVIS 2 is a registered trademark or trademark of Sony Group Corporation or its affiliates. The STARVIS 2 is back-illuminated pixel technology used in CMOS image sensors for security camera applications. It features a sensitivity of 2000 mV or more per 1 μm^2 (color product, when imaging with a 706 cd/m^2 light source, F5.6 in 1 s accumulation equivalent). It also has a wide dynamic range (AD 12 bit) of more than 8 dB compared to STARVIS for the same pixel size in a single exposure, and achieves high picture quality in the visible-light and near infrared light regions.

Device Structure

- ◆CMOS image sensor
- ◆Image size: Diagonal 8.86 mm (Type 1/1.8) approx. 8.40 M pixels, All pixels
- ◆Total number of pixels: 3856 (H) × 2200 (V) approx. 8.48 M pixels
- ◆Number of effective pixels: 3856 (H) × 2180 (V) approx. 8.40 M pixels
- ◆Number of active pixels: 3856 (H) × 2176 (V) approx. 8.39 M pixels
- ◆Number of recommended recording pixels: 3840 (H) × 2160 (V) approx. 8.29 M pixels
- ◆Unit cell size: 2.0 µm (H) × 2.0 µm (V)
- ◆Optical black: Horizontal (H) direction: Front 0 pixels, rear 0 pixels
  Vertical (V) direction: Front 20 pixels, rear 0 pixels
- ◆Dummy: Horizontal (H) direction: Front 0 pixels, rear 0 pixels
  Vertical (V) direction: Front 0 pixels, rear 0 pixels
- ◆Package: 132 pin LGA

Image Sensor Characteristics

(Tj = 60 °C)

Item		Value	Remarks
Sensitivity (F5.6)	Typ.	15886 Digit/lx/s	12 bit converted value
Saturation signal	Min.	3895 Dight	12 bit converted value

Basic Drive Mode

Drive mode	Recommended number of recording pixels	Maximum frame rate [frame/s]	Output interface	ADC [bit]
All-pixel	3840 (H) × 2160 (V) approx. 8.29 M pixels	60	CSI-2	10
Horizontal/ Vertical 2/2-line binning	1920 (H) × 1080 (V) approx. 2.07 M pixels	60	CSI-2	10

Comparison Image under 0.2 lux

Gain setting of IMX334 is 4times of IMX678, however they can get same output brightness.

IMX334

Condition: F1.6, exposure time 33.3 ms, gain 60 dB

IMX678

Condition: F1.6, exposure time 33.3 ms, gain 48 dB

Comparison Image under NIR at 850 nm

IMX334

Condition: F1.6, exposure time 33.3 ms, gain 0 dB

IMX678

Condition: F1.6, exposure time 33.3 ms, gain 0 dB

Image Sensors for Security Cameras:
https://www.sony.net/cis-security/