

LI7030SA

16mm Diagonal 12MP CMOS Sensor on 154pin LGA with 3.2μm Square Pixels at 24fps

DESCRIPTION

LI7030SA is a CMOS type solid-state imaging sensor having a size equivalent to 1 inch, and 3.2 μm square pixel arrangement with 12 mega effective pixels.

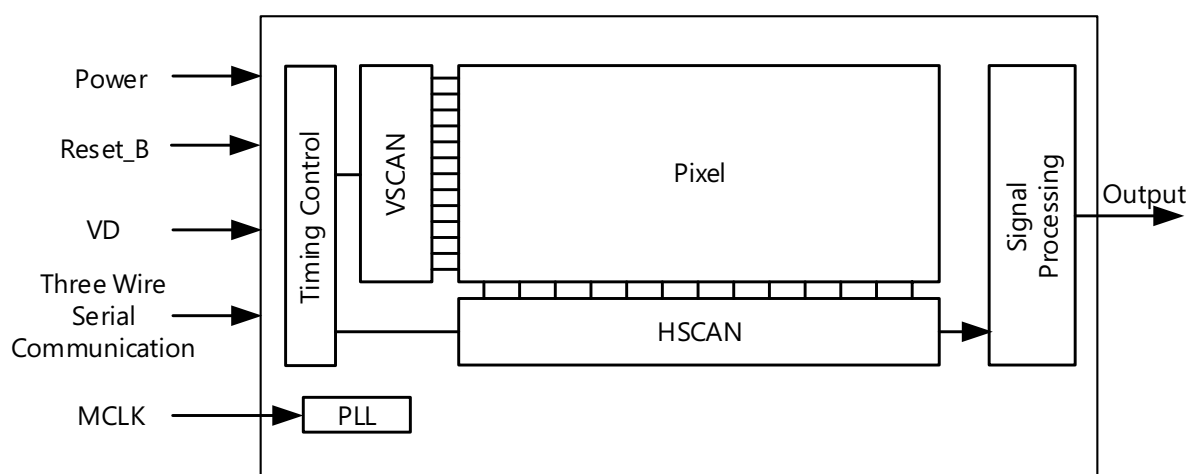
4K3K video at 24 fps (12bit), 4K2K video at 60 fps (10bit) and HD720p video at 120 fps (10bit) are possible.

Based on Canon's low-noise technology, LI7030SA has a high dynamic range and achieved excellent imaging characteristics at low illuminance.

FEATURES

- LI7030SAC: color sensor (RGB on-chip color filter)
- Rolling shutter
- Recording screen size: 1 inch or equivalent (12.8 mm x 9.6 mm)
- Number of effective pixels: 4004 x 3000 (Horizontal x Vertical)
- Pixel size: 3.2 μm x 3.2 μm
- Number of output channels: Data 12 lanes, Clock 2 lanes
- Output format: LVDS output, 648 Mbps (max.)
- Main clock frequency: 27 MHz (recommended)
- 4K3K mode: 24 fps (12bit)
- 4K2K 30fps mode: 30 fps (12bit)
- 4K2K 60fps mode: 60 fps (10bit)
- HD720p mode: 120 fps (10bit)
- Analog gain: 0dB, 6dB, 12dB, 18dB and 24dB
- Serial communication
- Saturation: 25,000 e
- Sensitivity : 22,000 e/lx/sec
- Dark Random Noise: 2.6 erms @4K3K readout, 24 fps (12bit)
- Dark Current: 17 e/sec @60°C (package reverse side), 4K3K readout, 24 fps (12bit)
- Power consumption: 540 mW @4K2K readout, 60fps (10bit)
- Power supply voltage: 3.3 V, 1.8V
- 154 pin ceramic LGA
- Package size: 25.10 mm x 22.20 mm x 2.99 mm

FUNCTIONAL BLOCK DIAGRAM



3. Pixel Arrangement

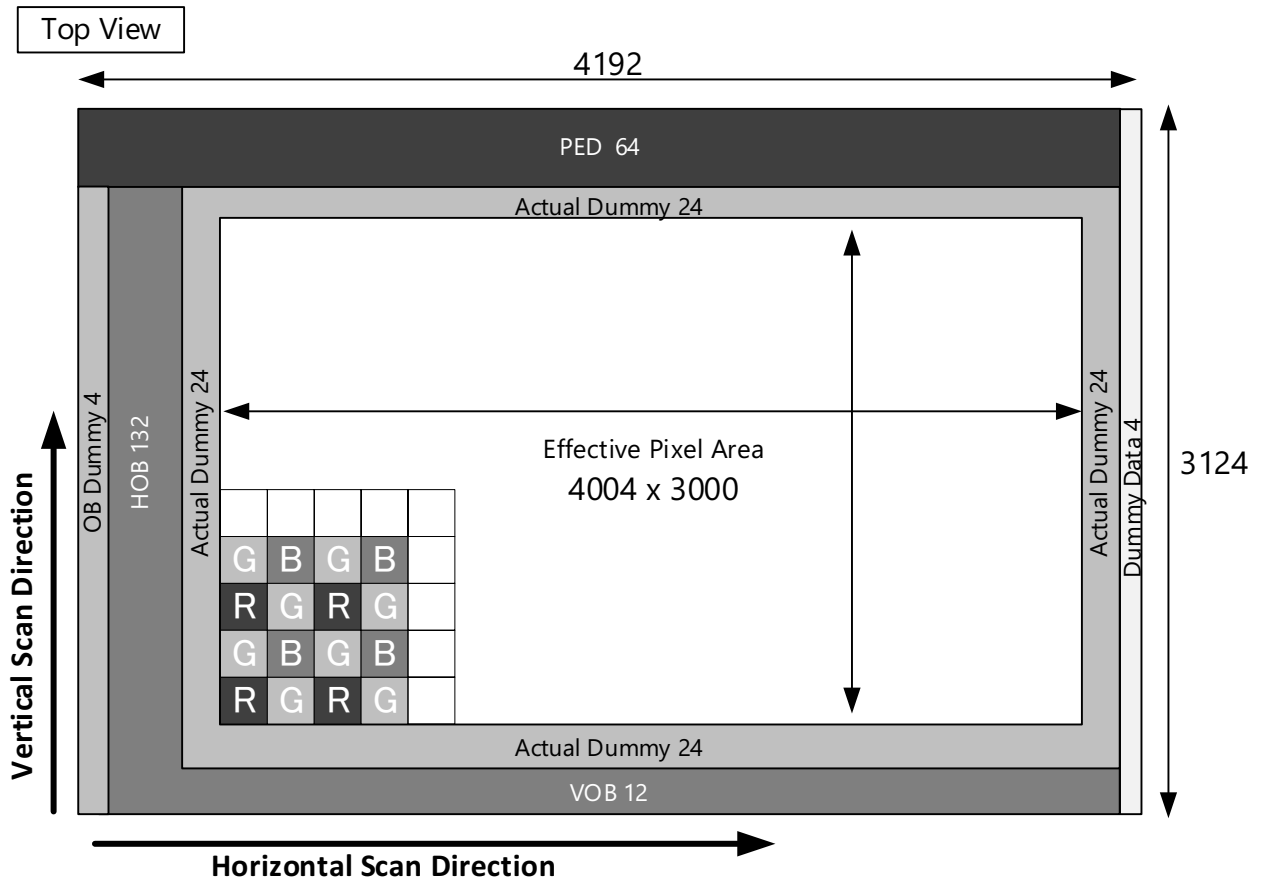


Figure 3-1. Pixel Data Format (Physical Arrangement)

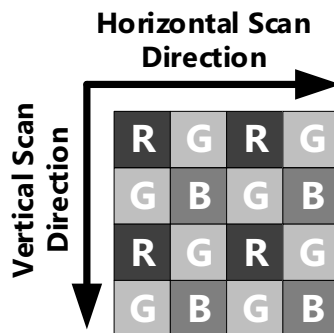


Figure 3-2. Pixel Color Filter Arrangement

4. Pin Specifications

Table 4-1. Pin Specifications 1

Pin No	Pin Name	Type	Content	Remarks
A1	PAD	-	-	connect to GND
A3	D00N	O	LVDS data output	-
A4	D01N	O	LVDS data output	-
A5	LVCK0N	O	LVDS clock output	D00N, D01N, D02N, D00N, D01N, D02N
A6	D10N	O	LVDS data output	-
A9	D22P	O	LVDS data output	-
A10	LVCK1P	O	LVDS clock output	D20P, D21P, D22P, D30P, D31P, D32P
A11	D31P	O	LVDS data output	-
A12	D32P	O	LVDS data output	-
A14	PAD	-	-	connect to GND
B3	D00P	O	LVDS data output	-
B4	D01P	O	LVDS data output	-
B5	LVCK0P	O	LVDS clock output	D00P, D01P, D02P, D00P, D01P, D02P
B6	D10P	O	LVDS data output	-
B7	D12N	O	LVDS data output	-
B8	D20P	O	LVDS data output	-
B9	D22N	O	LVDS data output	-
B10	LVCK1N	O	LVDS clock output	D20N, D21N, D22N, D30N, D31N, D32N
B11	D31N	O	LVDS data output	-
B12	D32N	O	LVDS data output	-
C1	DVDDH	P	3.3V digital power supply	-
C2	DGND	G	-	-
C3	DGND	G	-	-
C4	D02N	O	LVDS data output	-
C5	DGND	G	-	-
C6	D11N	O	LVDS data output	-
C7	D12P	O	LVDS data output	-
C8	D20N	O	LVDS data output	-
C9	D21P	O	LVDS data output	-
C10	DGND	G	-	-
C11	D30P	O	LVDS data output	-
C12	DGND	G	-	-
C13	DGND	G	-	-
C14	DVDDH	P	3.3V digital power supply	-

Type G: Ground, P: Power, I: Input, O: Output

Table 4-2. Pin Specifications 2

Pin No	Pin Name	Type	Content	Remarks
D1	SVDD	P	3.3V analog power supply	-
D2	DVDD	P	1.8V digital power supply	-
D3	DVDD	P	1.8V digital power supply	-
D4	D02P	O	LVDS data output	-
D5	DVDD	P	1.8V digital power supply	-
D6	D11P	O	LVDS data output	-
D7	AVDD	P	1.8V analog power supply	-
D8	AGND	G	Analog GND	-
D9	D21N	O	LVDS data output	-
D10	DVDD	P	1.8V digital power supply	-
D11	D30N	O	LVDS data output	-
D12	DVDD	P	1.8V digital power supply	-
D13	DVDD	P	1.8V digital power supply	-
D14	SVDD	P	3.3V analog power supply	-
E1	AVDDH	P	3.3V analog power supply	-
E2	AGND	G	Analog GND	-
E3	TEST08	O	Test pin	Open
E4	DVDD	P	1.8V digital power supply	-
E11	DVDD	P	1.8V digital power supply	-
E12	MCLK	I	Digital signal (Main Clock) input	Logic input
E13	AGND	G	Analog GND	-
E14	AVDDH	P	3.3V analog power supply	-
F1	AVDDH	P	3.3V analog power supply	-
F2	AGND	G	Analog GND	-
F3	DGND	G	-	-
F4	DVDD	P	1.8V digital power supply	-
F11	DVDD	P	1.8V digital power supply	-
F12	DGND	G	-	-
F13	AGND	G	Analog GND	-
F14	AVDDH	P	3.3V analog power supply	-

Type G: Ground, P: Power, I: Input, O: Output

Table 4-3. Pin Specifications 3

Pin No	Pin Name	Type	Content	Remarks
G1	AVDDH	P	3.3V analog power supply	-
G2	AGND	G	Analog GND	-
G3	DGND	G	-	-
G4	DVDD	P	1.8V digital power supply	-
G11	DVDD	P	1.8V digital power supply	-
G12	DGND	G	-	-
G13	AGND	G	Analog GND	-
G14	AVDDH	P	3.3V analog power supply	-
H2	DVDDH	P	3.3V digital power supply	-
H3	AGND	G	Analog GND	-
H4	DVDD	P	1.8V digital power supply	-
H11	DVDD	P	1.8V digital power supply	-
H12	AGND	G	Analog GND	-
H13	DVDDH	P	3.3V digital power supply	-
J2	SVDD	P	3.3V analog power supply	-
J3	DGND	G	-	-
J4	DVDD	P	1.8V digital power supply	-
J11	SCLK	I	Digital signal (3-wire serial) input	Logic input
J12	DGND	G	-	-
J13	SVDD	P	3.3V analog power supply	-

Type G: Ground, P: Power, I: Input, O: Output

Table 4-4. Pin Specifications 4

Pin No	Pin Name	Type	Content	Remarks
K1	AVDDH	P	3.3V analog power supply	-
K2	AGND	G	Analog GND	-
K3	DGND	G	-	-
K4	DVDD	P	1.8V digital power supply	-
K11	SDI	I	Digital signal (3-wire serial) input	Logic input
K12	DGND	G	-	-
K13	AGND	G	Analog GND	-
K14	AVDDH	P	3.3V analog power supply	-
L1	AVDDH	P	3.3V analog power supply	-
L2	AGND	G	Analog GND	-
L3	DGND	G	-	-
L4	DVDD	P	1.8V digital power supply	-
L5	TEST03	O	Test pin	Open
L6	TEST02	O	Test pin	Open
L7	TEST05	I	Test pin	Open
L8	TEST04	I	Test pin	Open
L9	RESETB	I	Digital signal (reset) input	Asynchronous, Low active
L10	TEST01	I	Test pin	DGND short circuit through 0 Ω
L11	SCS	I	Digital signal (3-wire serial) input	Logic input
L12	DGND	G	-	-
L13	AGND	G	Analog GND	-
L14	AVDDH	P	3.3V analog power supply	-
M1	SVDD	P	3.3V analog power supply	-
M2	AGND	G	Analog GND	-
M3	TEST07	O	Test pin	Open
M4	TEST06	O	Test pin	Open
M5	VI05	O	External reference voltage	-
M6	AGND	G	Analog GND	-
M7	VI04	O	External reference voltage	-
M8	DVDD	P	1.8V digital power supply	-
M9	DVDD	P	1.8V digital power supply	-
M10	VI03	O	External reference voltage	-
M11	DGND	G	-	-
M12	DGND	G	-	-
M13	AGND	G	Analog GND	-
M14	SVDD	P	3.3V analog power supply	-

Type G: Ground, P: Power, I: Input, O: Output

Table 4-5. Pin Specifications 5

Pin No	Pin Name	Type	Content	Remarks
N1	DVDDH	P	3.3V digital power supply	-
N2	AGND	G	Analog GND	-
N3	DGND	G	-	-
N4	VI11	O	Reserved	Open
N5	VI10	O	External reference voltage	-
N6	AGND	G	Analog GND	-
N7	AGND	G	Analog GND	-
N8	DGND	G	-	-
N9	VI01	O	External reference voltage	-
N10	VI08	O	External reference voltage	-
N11	VI09	O	External reference voltage	-
N12	DGND	G	-	-
N13	AGND	G	Analog GND	-
N14	DVDDH	P	3.3V digital power supply	-
P3	AGND	G	Analog GND	-
P4	DGND	G	-	-
P5	AGND	G	Analog GND	-
P6	EXTR1	O	External resistance connection	2.0 kΩ±1% relative to AGND, shielded by AGND
P7	AVDDH	P	3.3V analog power supply	-
P8	SVDD	P	3.3V analog power supply	-
P9	VI07	O	External reference voltage	-
P10	AGND	G	Analog GND	-
P11	AGND	G	Analog GND	-
P12	DVDD	P	1.8V digital power supply	-
Q1	PAD	-	-	connect to GND
Q3	AVDDH_REF	P	3.3V analog power supply	-
Q4	AVDDH_REF	P	3.3V analog power supply	-
Q5	EXTR2	O	External resistance connection	7.5 kΩ±1% relative to AGND, shielded by AGND
Q6	EXTC	O	External capacitance connection	1 nF±2% relative to AGND
Q9	VI02M	O	External reference voltage (Negative voltage)	-
Q10	AVDDH	P	3.3V analog power supply	-
Q11	VI06	O	External reference voltage	-
Q12	VD	I	Digital signal (VD) input	Logic input
Q14	PAD	-	-	connect to GND

Type G: Ground, P: Power, I: Input, O: Output

7. Absolute Maximum Ratings

Table 7-1. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Notes
Sensor Power Supply (3.3V)	SVDD	-	3.9	V	-
Digital Power Supply (3.3V)	DVDDH	-	3.9	V	-
Analog Power Supply (3.3V)	AVDDH	-	3.9	V	-
Analog Power Supply (3.3V)	AVDDH_REF	-	3.9	V	-
Digital Power Supply (1.8V)	DVDD	-	2.1	V	-
Analog Power Supply (1.8V)	AVDD	-	2.1	V	-
Input Terminal Voltage (1.8V)	V _{in1}	DGND - 0.3	1.9	V	Applicable input terminals: RESET_B, VD, SCS, SCLK, SDI, MCLK, TEST01 to 03, LVCK*P/N, D**P/N, EXTR2
Input Terminal Voltage (3.3V)	V _{in2}	DGND - 0.3	3.4	V	Applicable input terminals: TEST04, 05
		-1.3	1.9	V	Applicable input terminals: VI02 (When Using Internal Power Supply)
Storage Temperature	T _{str}	-30	80	°C	T _j : Junction Temperature
Maximum Junction Temperature	T _{jmax}	-30	100	°C	T _j : Junction Temperature

9. Electrical Specifications

Table 9-1. Power Supply Voltage Setting

Item	Symbol	Recommended Supply Voltage (V)			Current Consumption (mA)			Remarks
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Sensor Power Supply (3.3V)	SVDD	3.2	3.3	3.4	-	30	50	-
Digital Power Supply (3.3V)	DVDDH	3.2	3.3	3.4	-	1	5	-
Analog Power Supply (3.3V)	AVDDH	3.2	3.3	3.4	-	55	75	-
Analog Power Supply (3.3V)	AVDDH_REF	3.2	3.3	3.4	-	2	5	-
Digital Power Supply (1.8V)	DVDD	1.7	1.8	1.9	-	160	200	-
Analog Power Supply (1.8V)	AVDD	1.7	1.8	1.9	-	2	5	-

Typ.: Typical

