

LI7050SA

9.12mm Diagonal 2.12MP High Sensitivity FHD CMOS Sensor on PKG with 4.1µm Square Pixels at 60fps

DESCRIPTION

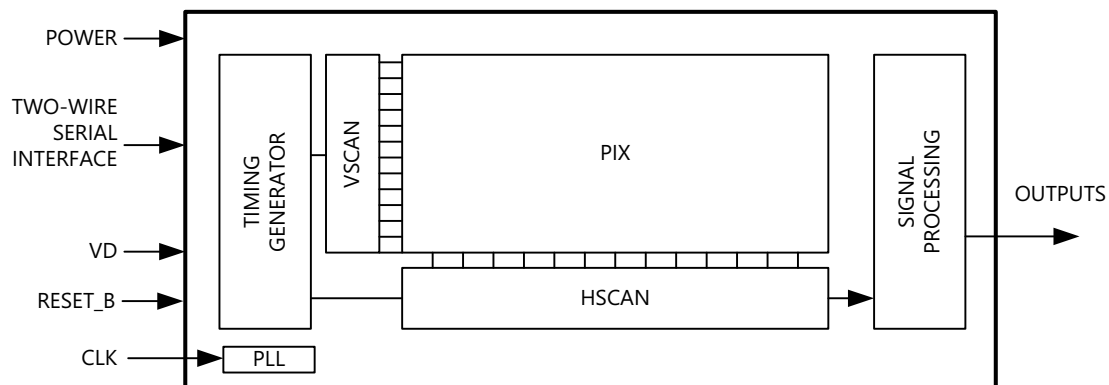
The LI7050SA is a 1/1.8 inch size (diagonal 9.12 mm) color CMOS solid-state image sensor with 2.12M effective pixels in a square pixel array.

This sensor is capable of full area readout at 60 fps and realizes high-sensitivity FHD movie recording.

FEATURES

- LI7050SAC: Color sensor
- Rolling shutter
- Recording screen size: 7.94 mm x 4.49 mm
- Number of effective pixels: 1936 x 1096 (Horizontal x Vertical)
- Pixel size: 4.1 µm x 4.1 µm
- Number of output channels: Data 4 lanes, Clock 1 lane
- Output format: 576 Mbps in MIPI-CSI2 output 60 fps @12 bit (RAW12)
- Main clock frequency: 24MHz (recommended)
- Full area readout: 60fps
- Selectable region of interest feature
- Analog gains 0 dB, 6 dB, 12 dB, 18 dB
- Serial communication
- High sensitivity
- Sensitivity (Green) : 54,000 e/lx/sec
- Saturation : 24,000 e
- Dark random noise : 1.1 e rms @room temperature
- Dark current : 22 e/sec @60°C (package reverse side)
- Power consumption: 320 mW (Typ.) @Full area readout at 60 fps
- Power supply voltages: 3.3V, 1.8V, 1.2V
- 94 pin ceramic LGA
- Package size: 16.88 mm x 13.27 mm x 2.74 mm

FUNCTIONAL BLOCK DIAGRAM



3. Pixel Arrangement

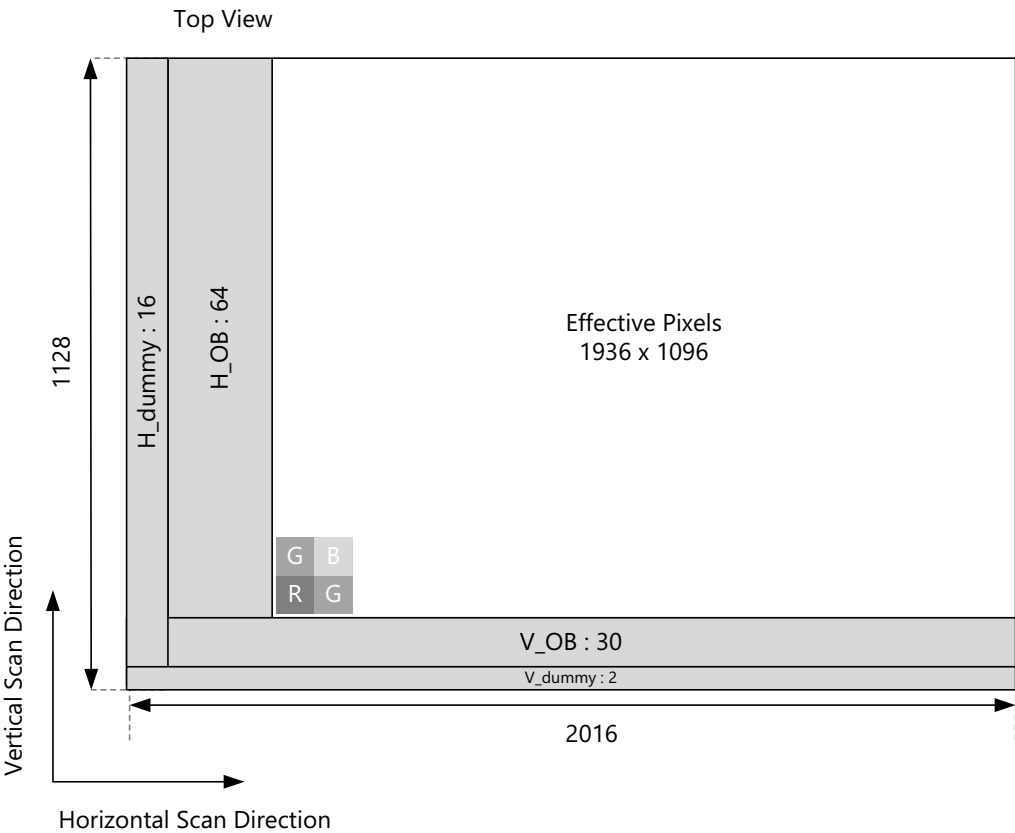


Figure 3-1. Pixel Data Format (Physical Arrangement)

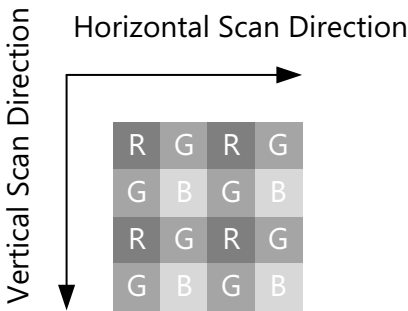


Figure 3-2. Pixel Color Filter Arrangement

4. Pin Specifications

Table 4-1. Pin Specifications 1

Pin No.	Pin Name	Type	Content	Remarks
A01	DGND	G	Digital GND	-
A02	DGND	G	Digital GND	-
A03	D1_P	O	CSI2 lane1 output,positive	-
A04	D2_P	O	CSI2 lane2 output,positive	-
A05	DGND	G	Digital GND	-
A06	DVDD	P	1.8 V digital power supply	-
A07	LVCK_P	O	CSI2 refCLK, positive	-
A08	D3_P	O	CSI2 lane3 output,positive	-
A09	D4_P	O	CSI2 lane4 output,positive	-
A10	DGND	G	Digital GND	-
A11	DGND	G	Digital GND	-
B01	DVDD	P	1.8 V digital power supply	-
B02	VINT03	O	External reference voltage	-
B03	D1_N	O	CSI2 lane1 output,negative	-
B04	D2_N	O	CSI2 lane2 output,negative	-
B05	DGND	G	Digital GND	-
B06	DVDD_RG	P	1.8 V digital power supply	-
B07	LVCK_N	O	CSI2 refCLK, negative	-
B08	D3_N	O	CSI2 lane3 output,negative	-
B09	D4_N	O	CSI2 lane4 output,negative	-
B10	VINT03	O	External reference voltage	-
B11	DVDD	P	1.8 V digital power supply	-
C01	DVDDH	P	3.3 V digital power supply	-
C02	SDA	I/O	I2C data out	Logic input/output
C03	SCL	I	I2C CLK input	Logic input
C04	CLK	I	Digital signal (Main CLK) input	Logic input
C05	DVDD_LP	P	1.2 V digital power supply	-
C06	AVDD	P	1.8 V analog power supply	-
C07	AGND	G	Analog GND	-
C08	DIN3	I	Digital signal input	Logic input
C09	RESET_B	I	Digital signal (reset) input	Asynchronous, Low active

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

Table 4-2. Pin Specifications 2

Pin No.	Pin Name	Type	Content	Remarks
C10	VD	I	Digital signal (VD) input	Logic input
C11	DVDDH	P	3.3 V digital power supply	-
D01	SVDD	P	3.3 V analog power supply	-
D02	DGND	G	Digital GND	-
D10	DGND	G	Digital GND	-
D11	SVDD	P	3.3 V analog power supply	-
E01	AVDDH	P	3.3 V analog power supply	-
E02	AGND	G	Analog GND	-
E10	AGND	G	Analog GND	-
E11	AVDDH	P	3.3 V analog power supply	-
F01	AVDDH	P	3.3 V analog power supply	-
F02	AGND	G	Analog GND	-
F10	AGND	G	Analog GND	-
F11	AVDDH	P	3.3 V analog power supply	-
G01	DVDD	P	1.8 V digital power supply	-
G02	DGND	G	Digital GND	-
G10	DGND	G	Digital GND	-
G11	DVDD	P	1.8 V digital power supply	-
H01	SVDD	P	3.3 V analog power supply	-
H02	DVDDH	P	3.3 V digital power supply	-
H10	DVDDH	P	3.3 V digital power supply	-
H11	SVDD	P	3.3 V analog power supply	-
J01	AVDDH	P	3.3 V analog power supply	-
J02	AGND	G	Analog GND	-
J10	AGND	G	Analog GND	-
J11	AVDDH	P	3.3 V analog power supply	-
K01	AVDDH	P	3.3 V analog power supply	-
K02	AGND	G	Analog GND	-
K10	AGND	G	Analog GND	-
K11	AVDDH	P	3.3 V 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
L01	SVDD	P	3.3 V analog power supply	-
L02	DVDDH	P	3.3 V digital power supply	-
L03	AOUT	O	Analog Output	Open
L04	AGND	G	Analog GND	-
L05	AGND	G	Analog GND	-
L06	DGND	G	Digital GND	-
L07	VINT06	O	External reference voltage	-
L08	VINT07	O	External reference voltage	-
L09	DIN2	I	Digital Input	Open
L10	DVDDH	P	3.3 V digital power supply	-
L11	SVDD	P	3.3 V analog power supply	-
M01	DVDD	P	1.8 V digital power supply	-
M02	TESTSIG2	O	Test pin	Open. Connect to check pin if necessary
M03	TESTSIG1	O	Test pin	Open. Connect to check pin if necessary
M04	AVDDH	P	3.3 V analog power supply	-
M05	AVDDH	P	3.3 V analog power supply	-
M06	DVDD	P	1.8 V digital power supply	-
M07	VINT04	O	External reference voltage	-
M08	VINT05	O	External reference voltage	-
M09	I2C_SADR	I	I2C slave address select	Low : Set slave address to 0110110 High : Set slave address to 0110111
M10	DIN1	I	Digital Input	Open
M11	DVDD	P	1.8 V digital power supply	-
N01	DGND	G	Digital GND	-
N02	VINT09	O	External reference voltage	-
N03	VINT08	O	External reference voltage	-
N04	RE2	O	External resistance connection	Connect 7.5 kΩ to AGND. The accuracy of RE2 influences sensor performance. Use high accuracy resistance greater than ±1%
N05	RE1	O	External resistance connection	Connect 2 kΩ to AGND. The accuracy of RE1 influences sensor performance. Use high accuracy resistance greater than ±1%

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

Table 4-4. Pin Specifications 4

Pin No.	Pin Name	Type	Content	Remarks
N06	CE1	I/O	External capacitance connection	Connect 1000 pF to AGND. The accuracy of CE1 The accuracy of RE2 influences sensor performance. Use high accuracy capacitance greater than $\pm 2\%$
N07	VINT02	O	External reference voltage	-
N08	VINT01	O	External reference voltage	-
N09	AGND	G	Analog GND	-
N10	AVDDH	P	3.3 V analog power supply	-
N11	DGND	G	Digital 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
Power supply voltage 1.2 V	DVDD_LP	-	2.1	V	-
Power supply voltage 1.8 V	DVDD AVDD	-	2.1		-
Power Supply voltage 3.3V	AVDDH DVDDH SVDD	-	3.9		-
Input voltage 1.8 V	Digital Input	GND -0.3	*1 DVDD +0.3, 2.1		Relevant pins: CLK, VD, SDA, SCL, RESET_B, I2C_SADR, DIN1/2/3
Output voltage 1.8V	Digital Output	GND -0.3	*1 DVDD +0.3, 2.1		Relevant pins: TESTSIG1/2, LVCK_P/N, D(1-4)P/N, RE1
Output voltage 3.3V	Analog Output	GND -0.3	*1 AVDDH +0.3, 3.9		Relevant pins: VINT(01-09), RE2, CE1, AOUT
Storage Temperature	T _{str}	-30	105	°C	T _a : ambient temperature
Maximum Junction Temperature	T _{jmax}	-30	105	°C	T _j : Junction Temperature

*1: Both items must be satisfied.

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.	
Analog Power Supply (1.8V)	AVDD	1.7	1.8	1.9	-	1	1	-
Digital Power Supply (1.8V)	DVDD DVDD_RG	1.7	1.8	1.9	-	85	110	The current consumption is the sum of DVDD and DVDD_RG.
Digital Power Supply (1.2V)	DVDD_LP	1.1	1.2	1.3	-	1	10	-
Sensor Power Supply (3.3V)	SVDD	3.2	3.3	3.4	-	13	15	-
Digital Power Supply (3.3V)	DVDDH	3.2	3.3	3.4	-	1	1	-
Analog Power Supply (3.3V)	AVDDH	3.2	3.3	3.4	-	37	46	-

Typ.: Typical

15. Package Specification

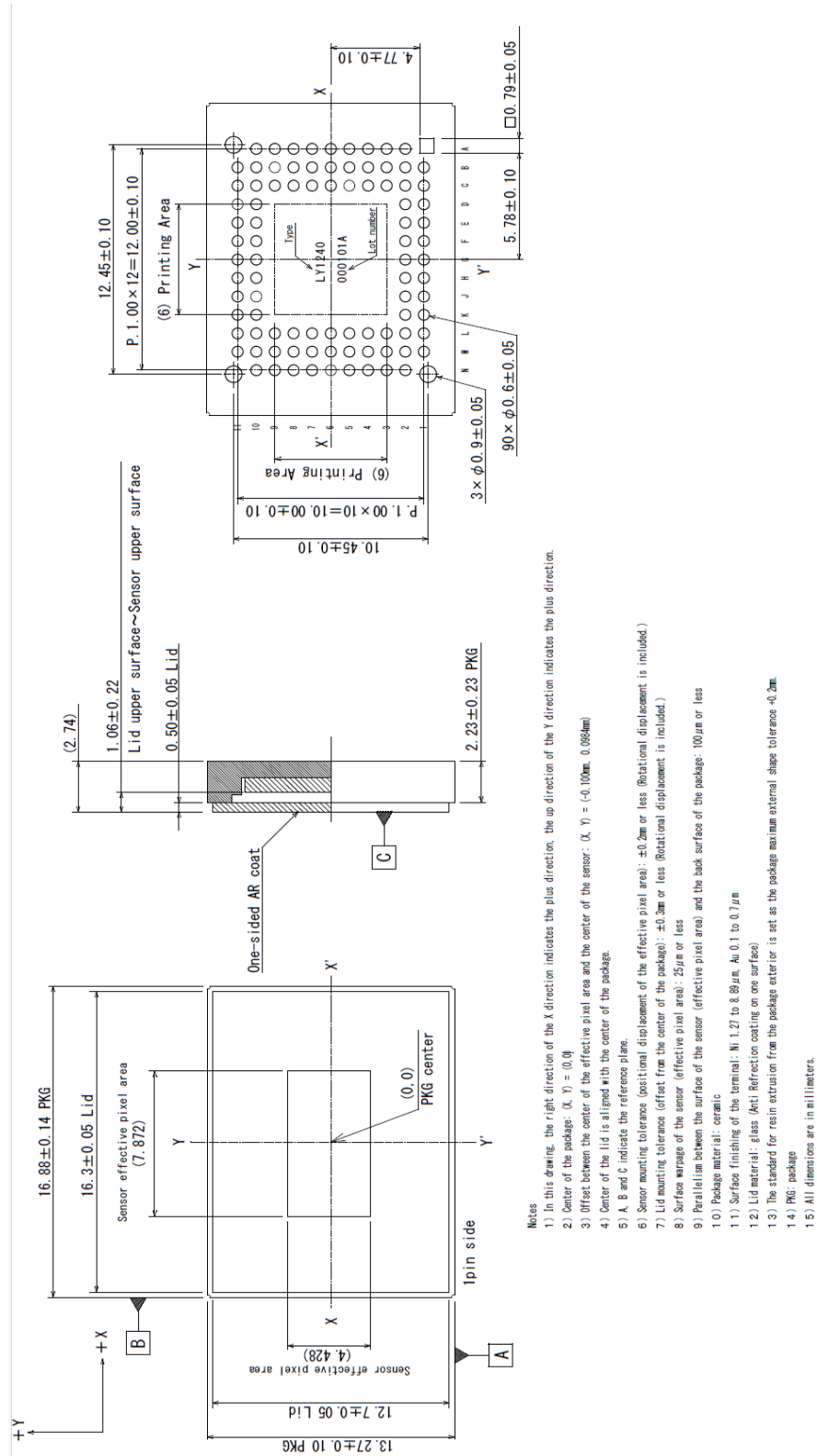


Figure 15-1. Package Specification