

# LI7080SA

32.8mm Diagonal 10.8MP CMOS Sensor on 170pin LCC with 6.4µm Square Pixels at 120fps

## DESCRIPTION

LI7080SA is a CMOS type solid-state imaging sensor of Super 35mm size, and 6.4 µm square pixel arrangement with 10.8 mega effective pixels.

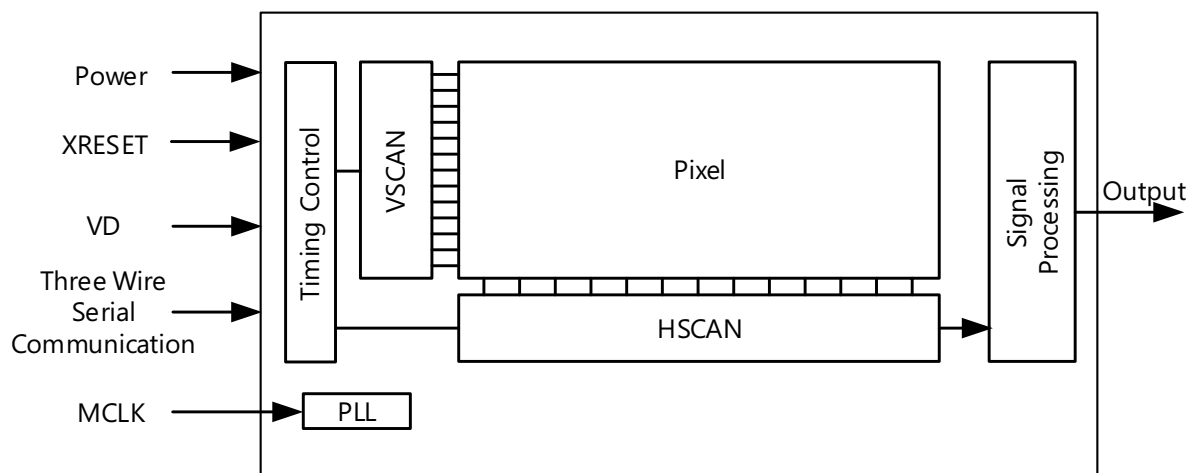
DCI 4K video shooting at 120 fps is available.

LI7080SA offers low noise and high frame rate at DCI 4K video, making it an ideal image sensor for high-end security cameras or cinema cameras.

## FEATURES

- LI7080SAC: color sensor (RGB on-chip color filter)
- Rolling shutter
- Recording screen size: Greater than Super 35mm (29.0 mm x 15.4 mm)
- Number of effective pixels: 4536 x 2400 (Horizontal x Vertical)
- Pixel size: 6.4 µm x 6.4 µm
- Number of output channels: Data 30 lanes, Clock 2 lanes
- Output format: LVDS output, 840 Mbps @14bit
- Main clock frequency: 60 MHz (recommended)
- All pixel readout: 120 fps
- Analog gain: -6dB, 0dB, 6dB, 12dB, 18dB and 24dB
- Serial communication
- Saturation: 82,000 e (Typ.) @120fps
- Sensitivity : 85,000 e/lx/sec (Typ.)
- Dark Random Noise: 2.2 erms (Typ.) @18dB
- Dark Current: 33 e/sec (Typ.) @60°C (package reverse side), 18dB
- Power consumption: 2.3 W (Typ.) @120fps
- Power supply voltage: 3.5V, 3.3 V, 1.8V, -1.2V, 2.62V, 2.5V, 1.6V
- 170 pin ceramic LCC
- Package size: 46.00 mm x 38.00 mm x 3.58 mm

## FUNCTIONAL BLOCK DIAGRAM



### 3. Pixel Arrangement

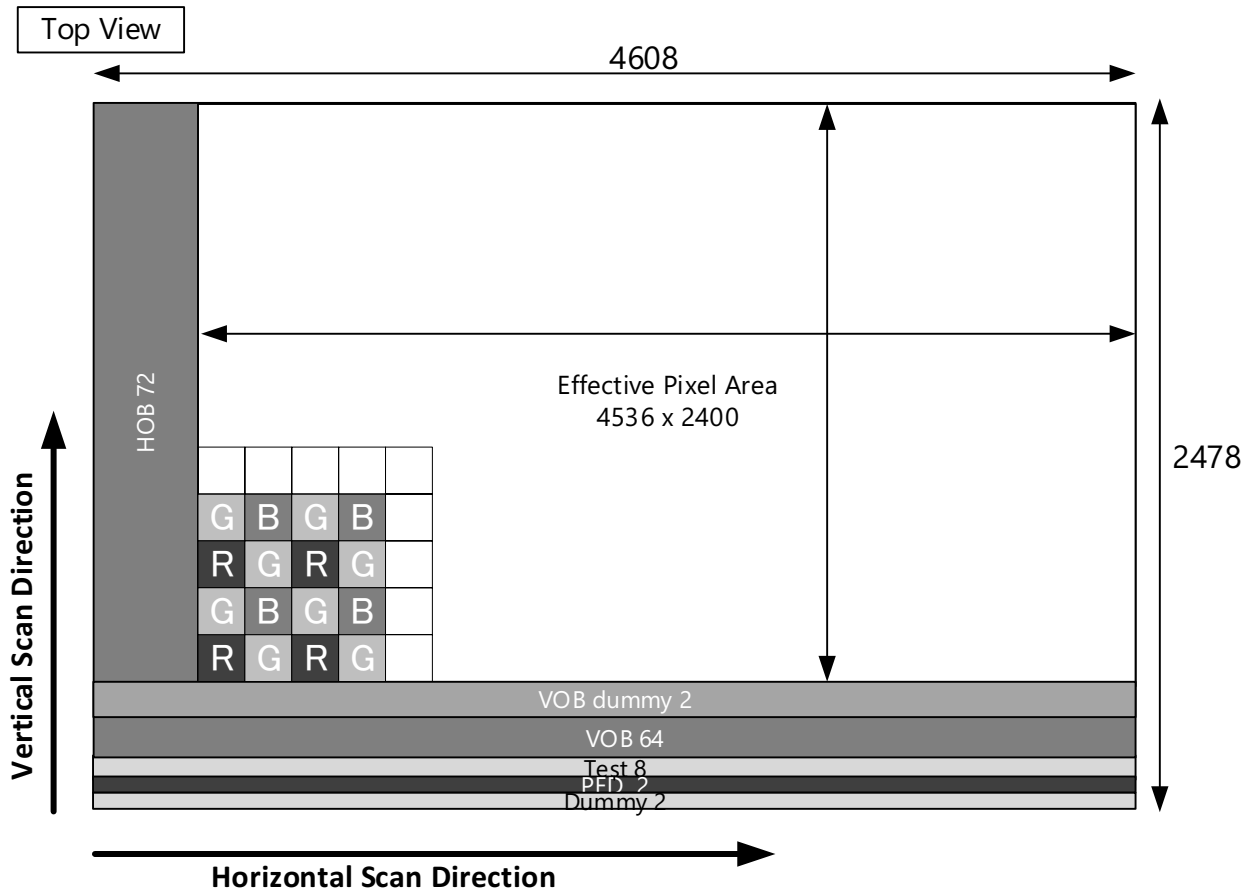


Figure 3-1. Pixel Data Format (Physical Arrangement)

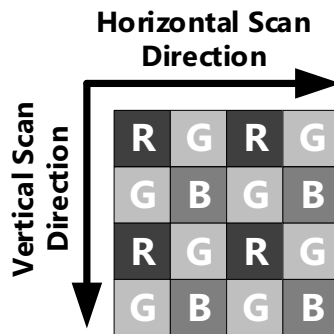


Figure 3-2. Pixel Color Filter Arrangement

## 4. Pin Specifications

**Table 4-1. Pin Specifications 1**

Pin No	Pin Name	Type	Content	Remarks
1	AGND	G	Analog GND	-
2	VREG07	I	External capacitance connection	1000 pF ± 2%
3	VREG06	I	External capacitance connection	820 pF ± 2%
4	EXTC	O	External capacitance connection	0.1 μF ± 10%
5	VREG05	I	0.8V/1.6V power supply	-
6	VREG03	P	1.8V power supply	-
7	TEST02	O	Test pin	Open
8	TEST03	I	Test pin	Open
9	AGND	G	Analog GND	-
10	AVDDH	P	3.3V analog power supply	-
11	EXTR	O	External resistance connection	7.5 kohm ± 1%
12	VREF01	O	Built-in power supply monitor	4.7 μF ± 10%
13	VREF02	O	Built-in power supply monitor	4.7 μF ± 10%
14	TEST06	O	Test pin	Open
15	TEST07	O	Test pin	Open
16	DVDD	P	1.8V digital power supply	-
17	MCLK	I	Digital signal (Main Clock) input	Logic input
18	DGND	G	Digital GND	-
19	SCLK	I	Digital signal (3-wire serial) input	Logic input
20	SCS	I	Digital signal (3-wire serial) input	Logic input
21	SDI	I	Digital signal (3-wire serial) input	Logic input
22	TEST01	I	Test pin	0 ohm
23	XRESET	I	Digital signal (reset) input	Asynchronous, Low active
24	VD	I	Digital signal (VD) input	Logic input
25	DGND	G	Digital GND	-
26	DGND	G	Digital GND	-
27	TEST04	I	Test pin	Open
28	TEST05	O	Test pin	Open
29	DGND	G	Digital GND	-
30	DGND	G	Digital GND	-
31	DGND	G	Digital GND	-
32	DGND	G	Digital GND	-
33	VREG03	P	1.8V power supply	-
34	VREG05	I	0.8V/1.6V power supply	-
35	EXTC	O	External capacitance connection	0.1μF ± 10%
36	VREG06	I	External capacitance connection	820 pF ± 2%
37	VREG07	I	External capacitance connection	1000 pF ± 2%
38	AGND	G	Analog GND	-

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

PAD a, b, c and d located at the four corners should be connected to GND (0 ohm).

Table 4-2. Pin Specifications 2

Pin No	Pin Name	Type	Content	Remarks
39	AVDD	P	1.8V analog power supply	-
40	AGND	G	Analog GND	-
41	AGND	G	Analog GND	-
42	SGND	G	Sensor GND	-
43	SVDD	P	3.5V sensor power supply	-
44	AGND	G	Analog GND	-
45	AVDDH	P	3.3V analog power supply	-
46	DVDDH	P	3.5V digital power supply	-
47	DGND	G	Digital GND	-
48	DVDD	P	1.8V digital power supply	-
49	DGND	G	Digital GND	-
50	DGND	G	Digital GND	-
51	DGND	G	Digital GND	-
52	DGND	G	Digital GND	-
53	DGND	G	Digital GND	-
54	DGND	G	Digital GND	-
55	VREG01	P	2.62V power supply	-
56	VREG02	P	-1.2V power supply	-
57	VREG04	P	2.5V power supply	-
58	DGND	G	Digital GND	-
59	LV30P	O	LVDS data output	-
60	LV30N	O	LVDS data output	-
61	LV29P	O	LVDS data output	-
62	LV29N	O	LVDS data output	-
63	LV28P	O	LVDS data output	-
64	LV28N	O	LVDS data output	-
65	LV27P	O	LVDS data output	-
66	LV27N	O	LVDS data output	-
67	LV26P	O	LVDS data output	-
68	LV26N	O	LVDS data output	-
69	LV25P	O	LVDS data output	-
70	LV25N	O	LVDS data output	-
71	LV24P	O	LVDS data output	-
72	LV24N	O	LVDS data output	-
73	LVCK2P	O	LVDS clock output	-
74	LVCK2N	O	LVDS clock output	-
75	DGND	G	Digital GND	-
76	DVDD	P	1.8V digital power supply	-
77	DGND	G	Digital GND	-
78	DVDDH	P	3.5V digital power supply	-
79	AVDDH	P	3.3V analog power supply	-
80	AGND	G	Analog GND	-
81	SVDD	P	3.5V sensor power supply	-
82	SGND	G	Sensor GND	-
83	TEST09	O	Test pin	Open
84	AVDD	P	1.8V analog power supply	-
85	AGND	G	Analog GND	-

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

Table 4-3. Pin Specifications 3

Pin No	Pin Name	Type	Content	Remarks
86	DGND	G	Digital GND	-
87	DGND	G	Digital GND	-
88	DVDD	P	1.8V digital power supply	-
89	LV23P	O	LVDS data output	-
90	LV23N	O	LVDS data output	-
91	LV22P	O	LVDS data output	-
92	LV22N	O	LVDS data output	-
93	LV21P	O	LVDS data output	-
94	LV21N	O	LVDS data output	-
95	LV20P	O	LVDS data output	-
96	LV20N	O	LVDS data output	-
97	LV19P	O	LVDS data output	-
98	LV19N	O	LVDS data output	-
99	LV18P	O	LVDS data output	-
100	LV18N	O	LVDS data output	-
101	LV17P	O	LVDS data output	-
102	LV17N	O	LVDS data output	-
103	LV16P	O	LVDS data output	-
104	LV16N	O	LVDS data output	-
105	LV01N	O	LVDS data output	-
106	LV01P	O	LVDS data output	-
107	LV02N	O	LVDS data output	-
108	LV02P	O	LVDS data output	-
109	LV03N	O	LVDS data output	-
110	LV03P	O	LVDS data output	-
111	LV04N	O	LVDS data output	-
112	LV04P	O	LVDS data output	-
113	LV05N	O	LVDS data output	-
114	LV05P	O	LVDS data output	-
115	LV06N	O	LVDS data output	-
116	LV06P	O	LVDS data output	-
117	LV07N	O	LVDS data output	-
118	LV07P	O	LVDS data output	-
119	LV08N	O	LVDS data output	-
120	LV08P	O	LVDS data output	-
121	DVDD	P	1.8V digital power supply	-
122	DGND	G	Digital GND	-
123	DGND	G	Digital GND	-

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

Table 4-4. Pin Specifications 4

Pin No	Pin Name	Type	Content	Remarks
124	AGND	G	Analog GND	-
125	AVDD	P	1.8V analog power supply	-
126	TEST08	O	Test pin	Open
127	SGND	G	Sensor GND	-
128	SVDD	P	3.5V sensor power supply	-
129	AGND	G	Analog GND	-
130	AVDDH	P	3.3V analog power supply	-
131	DVDDH	P	3.5V digital power supply	-
132	DGND	G	Digital GND	-
133	DVDD	P	1.8V digital power supply	-
134	DGND	G	Digital GND	-
135	LVCK1N	O	LVDS clock output	-
136	LVCK1P	O	LVDS clock output	-
137	LV09N	O	LVDS data output	-
138	LV09P	O	LVDS data output	-
139	LV10N	O	LVDS data output	-
140	LV10P	O	LVDS data output	-
141	LV11N	O	LVDS data output	-
142	LV11P	O	LVDS data output	-
143	LV12N	O	LVDS data output	-
144	LV12P	O	LVDS data output	-
145	LV13N	O	LVDS data output	-
146	LV13P	O	LVDS data output	-
147	LV14N	O	LVDS data output	-
148	LV14P	O	LVDS data output	-
149	LV15N	O	LVDS data output	-
150	LV15P	O	LVDS data output	-
151	DGND	G	Digital GND	-
152	VREG04	P	2.5V power supply	-
153	VREG02	P	-1.2V power supply	-
154	VREG01	P	2.62V power supply	-
155	DGND	G	Digital GND	-
156	DGND	G	Digital GND	-
157	DGND	G	Digital GND	-
158	DGND	G	Digital GND	-
159	DGND	G	Digital GND	-
160	DGND	G	Digital GND	-
161	DVDD	P	1.8V digital power supply	-
162	DGND	G	Digital GND	-
163	DVDDH	P	3.5V digital power supply	-
164	AVDDH	P	3.3V analog power supply	-
165	AGND	G	Analog GND	-
166	SVDD	P	3.5V sensor power supply	-
167	SGND	G	Sensor GND	-
168	AGND	G	Analog GND	-
169	AGND	G	Analog GND	-
170	AVDD	P	1.8V analog power supply	-

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
Analog Power Supply (1.8V)	AVDD	-	2.1	V	-
Digital Power Supply (1.8V)	DVDD	-	2.1	V	-
Analog Power Supply (3.3V)	AVDDH	-	3.9	V	-
Sensor Power Supply (3.5V)	SVDD	-	3.9	V	-
Digital Power Supply (3.5V)	DVDDH	-	3.9	V	-
Power Supply (2.62V)	VREG01	-	DVDDH +0.3	V	However, it shall not exceed 3.9V.
Power Supply (-1.2V)	VREG02	SVDD -5.0	-	V	-
Power Supply (1.8V)	VREG03	-	DVDDH +0.3	V	However, it shall not exceed 3.9V.
Power Supply (2.5V)	VREG04	-	DVDDH +0.3	V	However, it shall not exceed 3.9V.
Power Supply (1.6V)	VREG05	-	DVDDH +0.3	V	However, it shall not exceed 3.9V.
Input Terminal Voltage (Terminals other than MCLK terminal)	V <sub>in1</sub>	DGND - 0.3	DVDDH +0.3	V	However, it shall not exceed 3.9V.
Input Terminal Voltage (MCLK terminal)	V <sub>in2</sub>	DGND - 0.3	DVDD +0.3	V	However, it shall not exceed 2.1V.
Storage Temperature	T <sub>str</sub>	-30	80	°C	T <sub>j</sub> : Junction Temperature
Maximum Junction Temperature	T <sub>jmax</sub>	-30	100	°C	T <sub>j</sub> : Junction Temperature

## 9. Electrical Specifications

**Table 9-1. Power Supply Voltage Settings**

Item	Symbol	Recommended Supply Voltage (V)			Remarks	
		Min.	Typ.	Max.		
Analog Power Supply (1.8V)	AVDD	1.7	1.8	1.9	-	
Digital Power Supply (1.8V)	DVDD	1.7	1.8	1.9	-	
Analog Power Supply (3.3V)	AVDDH	3.2	3.3	3.4	-	
Sensor Power Supply (3.5V)	SVDD	3.4	3.5	3.6	-	
Digital Power Supply (3.5V)	DVDDH	3.4	3.5	3.6	-	
Power Supply (2.62V)	VREG01	2.60	2.62	2.65	-	
Power Supply (-1.2V)	VREG02	-1.3	-1.2	-1.1	-	
Power Supply (1.8V)	VREG03	1.80	1.85	1.90	-	
Power Supply (2.5V)	VREG04	0.5	0.6	0.7	Analog gain: -6dB, 0dB, 6dB	*To simultaneously change those voltages when changing the register settings of analog gain control.
		2.4	2.5	2.6	Analog gain: 12dB, 18dB, 24dB	
Power Supply (1.6V)	VREG05	1.5	1.6	1.7	Analog gain: -6dB, 0dB, 6dB, 12dB, 18dB	
		0.7	0.8	0.9	Analog gain: 24dB	
Input Terminal Voltage (Terminals other than MCLK terminal)	Vin1	DGND	-	DVDDH	-	
Input Terminal Voltage (MCLK terminal)	Vin2	DGND	-	DVDD	-	

Typ.: Typical

\*For details on setting the supply voltage of VREG04 and VREG05, see **Application Note** section "4.3 Gain Control".



# 15. Package Specification

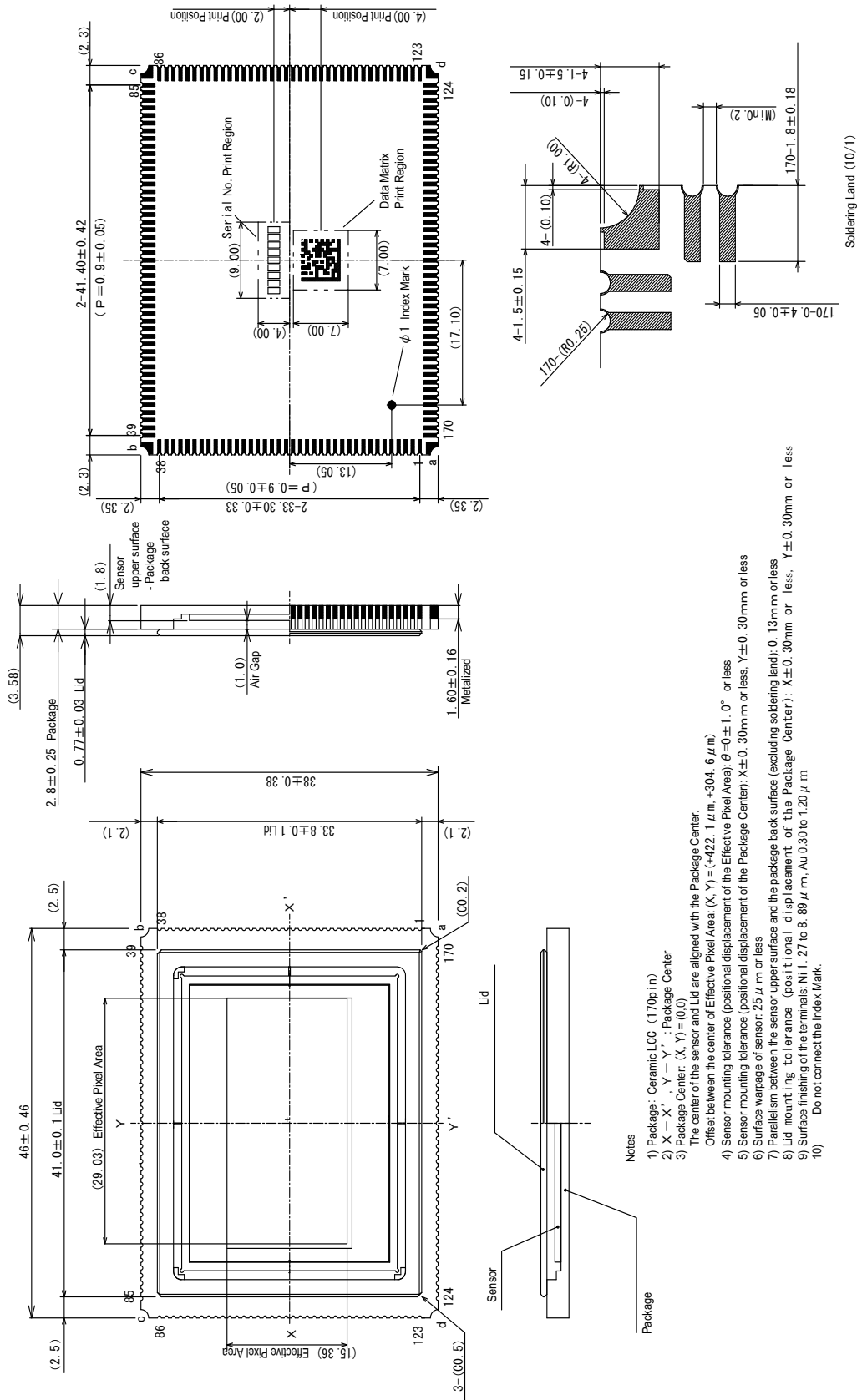


Figure 15-1. Package Specification