



# LDA1024P12.5X-1.7-T1

## Near Infrared Linear Image Sensor (0.9 - 1.7µm) with 1024 x 1 pixels

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> <li>● 1024 x 1 pixels ([pixel size: S 12.5 x 12.5, M 12.5 x 250 µm])</li> <li>● 28-pin Metal DIP Package</li> <li>● Embedded Thermoelectric Cooler</li> <li>● Built-in Temperature Sensor</li> <li>● 0.9µm - 1.7µm Spectral Range</li> <li>● Minimum Pixel Operability &gt; 99%</li> <li>● Quantum Efficiency &gt; 70 %</li> <li>● Snapshot ITR / IWR</li> <li>● 2 Outputs with up to 22 MHz Pixel Rate</li> </ul>	<ul style="list-style-type: none"> <li>● Shortwave-Infrared Imaging</li> <li>● Hyper- / Multi-Spectral Imaging</li> <li>● Semiconductor Inspection / Process Monitoring</li> <li>● Sorting, Recycling</li> </ul>



The LDA1024 is a near-infrared linear image sensor consisting of a linear InGaAs-detector array bonded to two p-on-n readout-ICs. The series includes two products with different sensor pixel sizes, LDA1024P12.5S-1.7-T1 and LDA1024P12.5M-1.7-T1.

## GENERAL DESCRIPTIONS

PARAMETER	UNIT	VALUE	
Sensor Technology	---	Planar InGaAs PIN	
Spectral Range	µm	0.9 - 1.7	
Actual Pixel Array	--	1024 x 1	
Pixel Pitch	µm	12.5	
Pixel Size	µm	Pixel Size	Dimension
		S	12.5 x 12.5
		M	12.5 x 250
Chip Size	mm	15.3 x 9.0	
Package Type	---	28-pin Metal DIP Package	
Package Size L x W x T	mm	50.0 x 25.4 x 11.67	
Weight	g	25.9	



## SPECIFICATIONS (ITS<sup>1</sup> = 20 +/- 1°C)

PARAMETER	UNIT	TYPICAL VALUE		CONDITIONS
		S	M	
Dark Current <sup>2,3</sup>	fA	≤ 600	≤ 1000	Photo pixel biased @ -0.5 V
Quantum Efficiency <sup>2</sup> * Fill Factor (QEFF)	%	≥ 70		λ = 1550 nm
Response Nonuniformity <sup>2</sup>	%	≤ 5		At 50% Full Well
Response Nonlinearity <sup>2</sup>	%	≤ 2		15% - 85% Well Occupation Range
Charge Capacity	Cint=6.4fF	μV/e <sup>-</sup>	25	16 settings from 6.4fF to 2.1pF
			10	
			5.3	
			1.3	
			0.076	
Readout Noise	Cint=6.4fF	mV	1.2	ROIC Specifications
			0.8	
			0.6	
			0.5	
			0.25	
Output Swing	V	≥ 2.0		Gain @16fF (High Gain Mode)
Minimum Integration Period	μs	5		ROIC Specifications
Maximum Pixel Rate	MHz	22		ROIC Specifications
Pixel Operability <sup>2</sup>	%	≥ 99		Percentage of Pixels with QEFF Deviation within ± 20%* (QEFF Mean)

1. Readings from Integrated Temperature Sensor (ITS).
2. These items are defined for central effective pixel array (1024x1). Their values correspond to default operation conditions.
3. High gain, charge capacity @16fF, integration time 5ms.

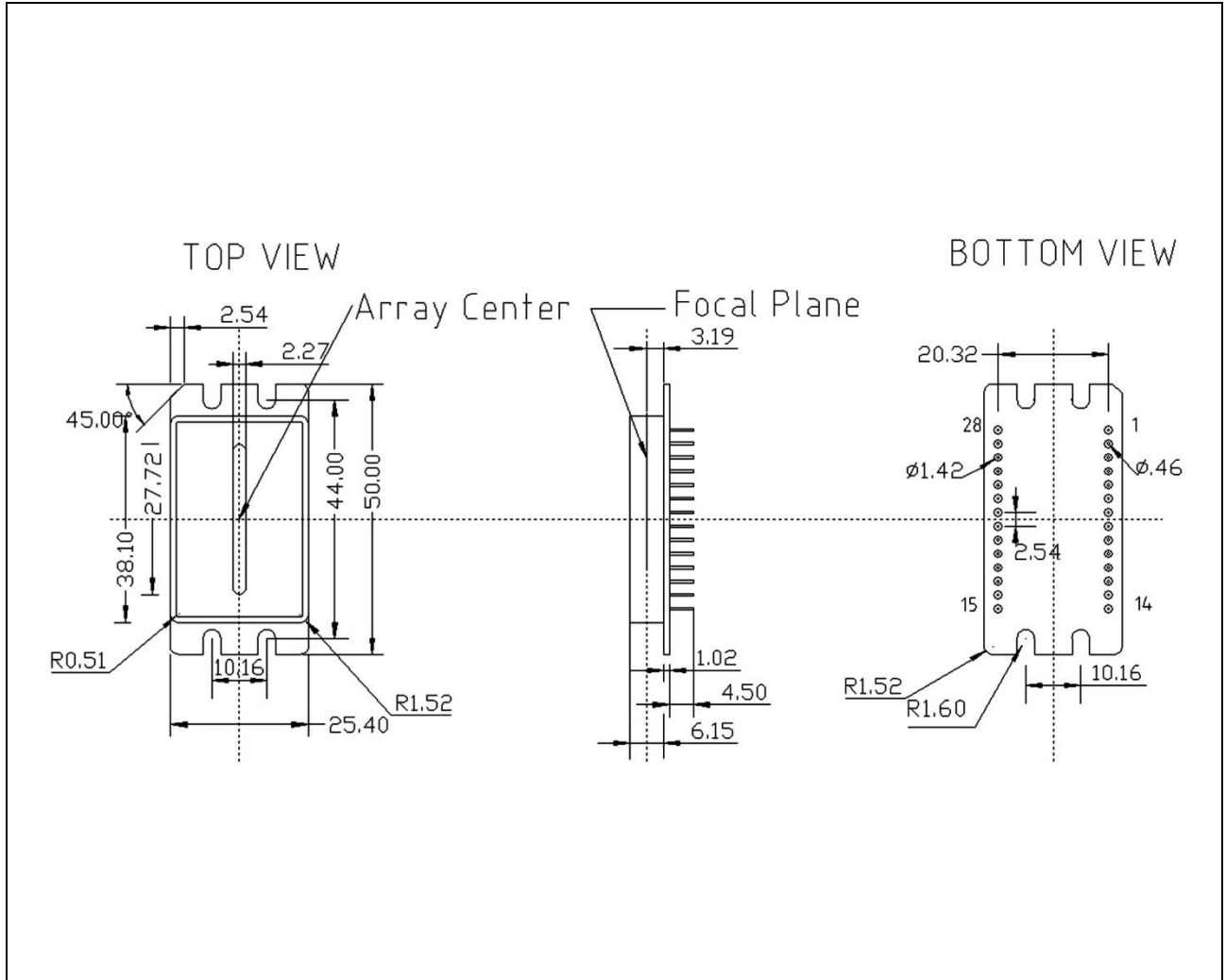
## ABSOLUTE MAXIMUM RATINGS

PARAMETER	UNIT	MIN.	MAX.
Operating Temperature <sup>4</sup>	°C	-40	+70
Storage Temperature <sup>4</sup>	°C	-40	+70
Power Consumption <sup>5</sup>	mW	---	190

4. In non-condensing environment.
5. Without powering on the thermoelectric cooler.



## PACKAGE OUTLINE (Unit: mm)



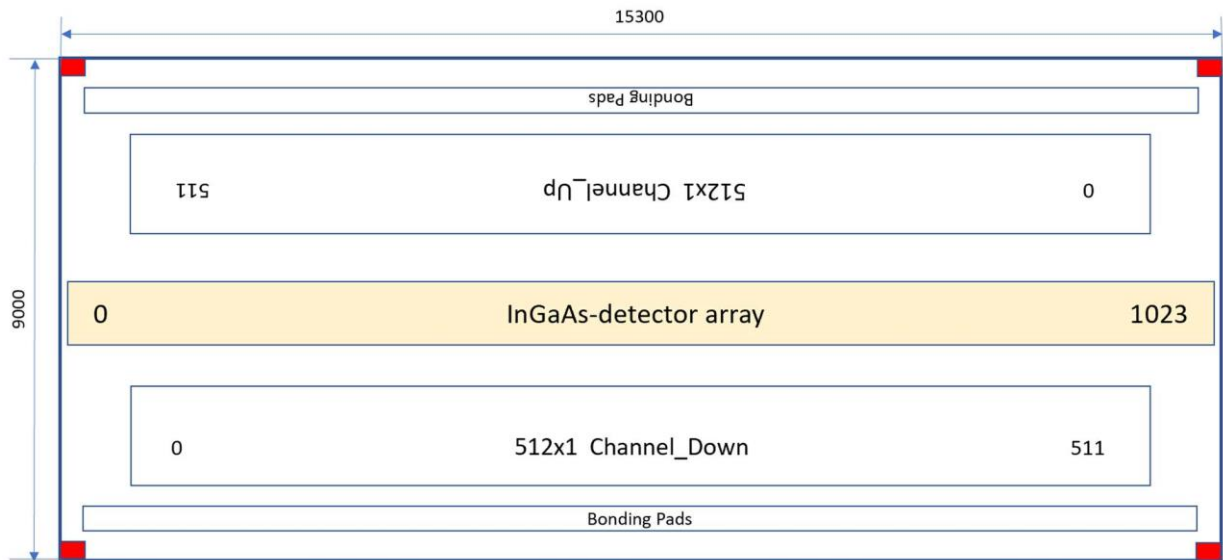
## PIN DEFINITION

01	VDD_D	08	SDOUT_D	15	GND	22	SDIN_U
02	RESET_D	09	DATVALID_D	16	VR1_U	23	CEB_U
03	TEC+	10	VOUT_D	17	VR2_U	24	MC_U
04	INT_D	11	VDDA_D	18	VTEMP_U	25	INT_U
05	MC_D	12	VR2_D	19	VDDA_U	26	TEC-
06	CEB_D	13	VR1_D	20	VOUT_U	27	RESET_U
07	SDIN_D	14	VDETCOM	21	SDOUT_U	28	VDD_U



## CHIP PROFILE

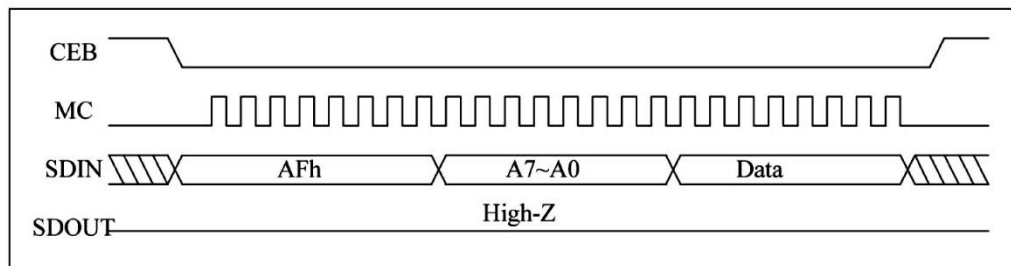
### Layout



Chip size:15.3mm x 9.0mm

## SPI Interface

LDA1024 supports SPI protocol to set the command registers. There are functions of the gain mode, power consumption control and the sequence of pixel output. The 1024x1 photodiode array is connected to two 512x1 readout ICs.



SPI Protocol Schematic



## OPERATING CONDITIONS

### Bias Input

Pin #	Bias	Voltage	Current	Remark
01, 28	VDD_D, VDD_U	1.8V	> 30mA	Positive logic supply
11, 19	VDDA_D, VDDA_U	3.6V	> 60mA	Positive analog supply
12, 17	VR2_D, VR2_U	0.3V	> 30mA	External Input Bias
13, 16	VR1_D, VR1_U	2.3V	> 5mA	External Input Bias
14	VDETCOM	> VR1_D&U	--	Detector common voltage Detector bias <sup>6</sup> = VDETCOM-VR1_D&U
15	GND	0V	--	Ground
03	TEC+	0V~5.3V	< 2.2A	Positive TEC supply
26	TEC-	0V	--	TEC ground
02, 27	RESET_D, RESET_U	1.8V	--	Chip reset

6. VDETCOM lower than 2.3V will forward bias the sensor, the exact zero bias voltage is device and temperature dependent.

### Digital Pattern Input

Pin #	Clocks	Levels	Rise/Fall	Remark
04, 25	INT_D, INT_U	1.8V / 0V	< 50ns	Integration time
05, 24	MC_D, MC_U	1.8V / 0V	< 5ns	Master clock, Max. Freq.=22MHz
06, 23	CEB_D, CEB_U	1.8V / 0V	< 10ns	Chip enable <sup>7</sup>
07, 22	SDIN_D, SDIN_U	1.8V / 0V	< 5ns	Data code input

7. The input and output of all commands start after the falling edge of CEB.

### Digital Pattern Output

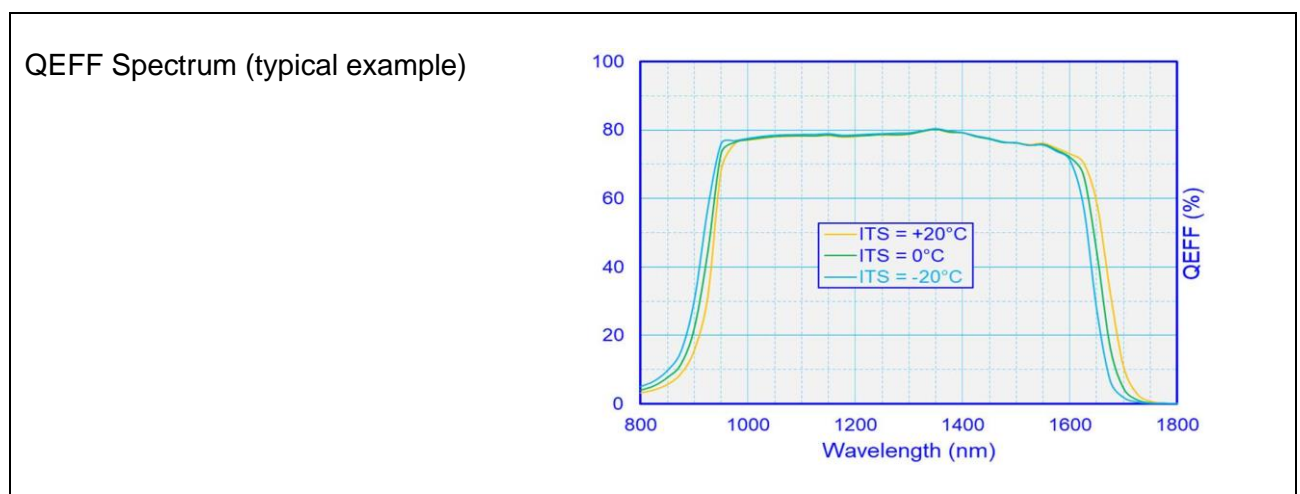
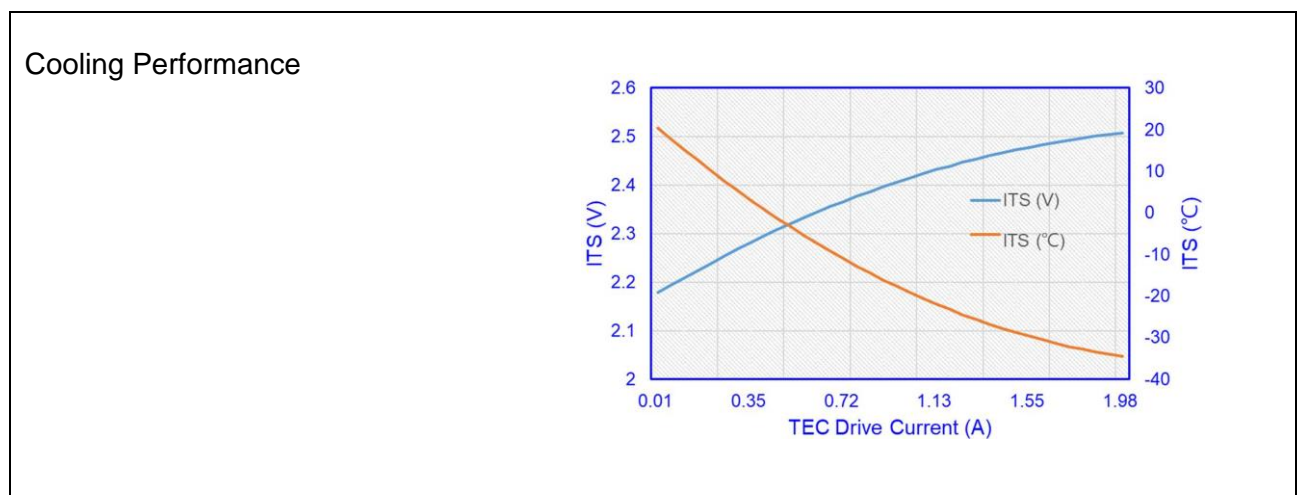
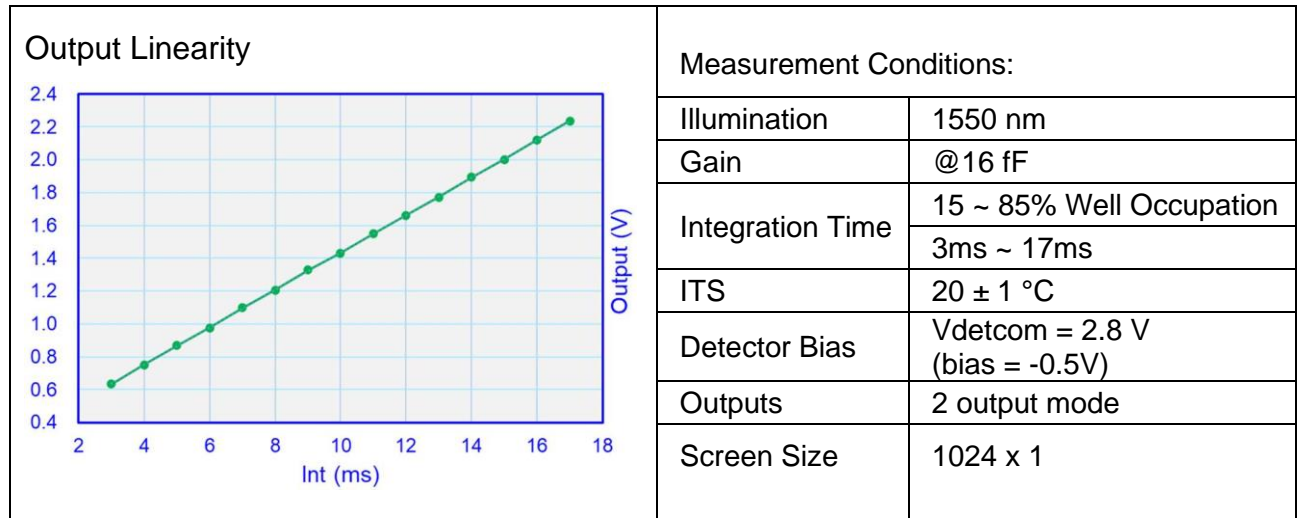
Pin #	Clocks	Levels	Rise/Fall	Remark
08, 21	SDOUT_D, SDOUT_U	1.8V / 0V	--	Data code output
09	DATVALID_D	1.8V / 0V	--	Valid data output flag signal

### Analog Output

Pin #	Outputs	Levels	Value	Remark
10, 20	VOUT_D, VOUT_U	0.2 ~ 2.4V	--	Video output
18	VTEMP_U	2.138V	27 °C	Integrated Temperature Sensor (-0.6 mV/°C)



## EXAMPLE CURVES



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