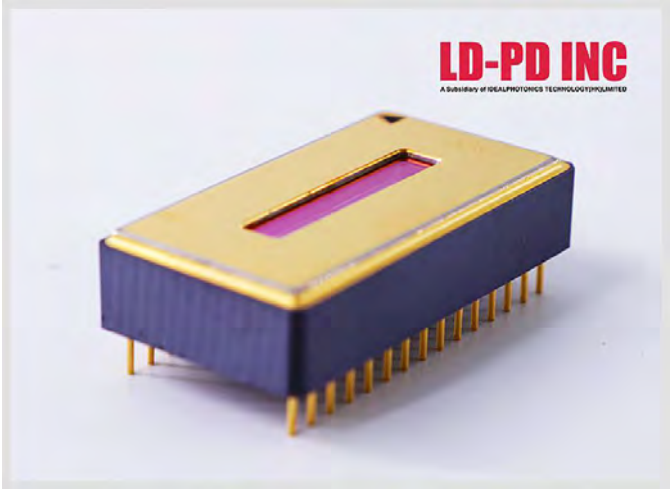
NIR-512×1 InGaAs linear detector



Description:

NIR-512x1 InGaAs linear array detector is mainly composed of low-noise readout circuit (ROIC), P-I-N structure InGaAs photosensitive chip and primary thermoelectric cooler (TEC), and adopts ceramic packaging form. This instruction manual only describes this detector.

Features:

- Positive irradiation structure
- High aspect ratio photosensitive surface
- High sensitivity
- Internally integrated thermoelectric

Applications:

- Industrial testing
- Machine vision
- Spectral analysis
- Material sorting

Specifications:

Optical and electrical performance

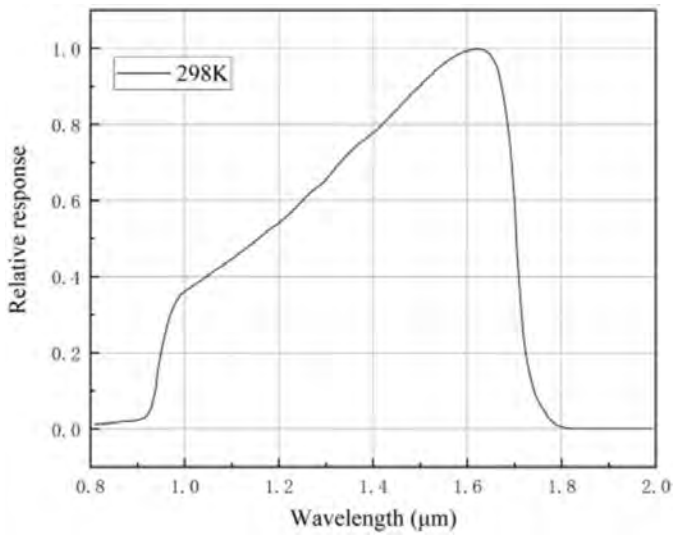
Index Name	Typical	
Response spectrum (μm)*1	0.95 ±0.05~1.7 ±0.05	
Pixel filling rate(%)	100	
Peak quantum efficiency (%)	≥65	
Peak detection rate(cm●Hz/ W)	≥1×10^{12}	
Peak sensitivity (A/W)	≥0.8	
Effective pixel rate (%)*2	100	
Response inconsistency (%)	<4	
playback mode	IWR, ITR, optional	
Readout rate (MHz)	≥10	
Maximum frame rate (fps)	>20k	
Gain gear	8	
Saturation voltage (V)	1.6	
Conversion gain (nV/e-)	Gain gear1: 16000 Gain gear2: 8000 Gain gear3: 4000 Gain gear4: 2665	Gain gear 5: 1775 Gain gear 6: 840 Gain gear 7: 325 Gain gear 8: 160

Notice:

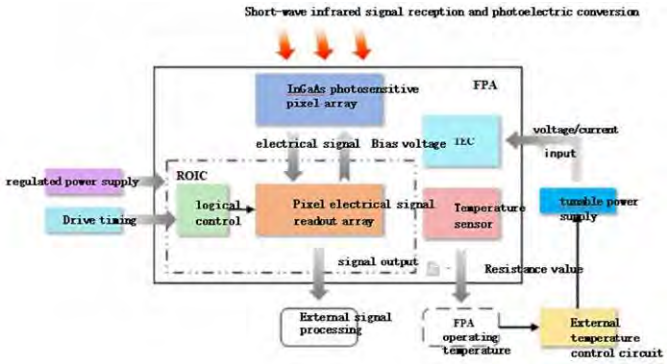
*1 Focal plane temperature=25℃

*2 The deviation between the pixel response signal and the average value is less than a certain range's the percentage of pixels.

Response spectrum(TYP):



Schematic diagram of detector working principle and connection mode:



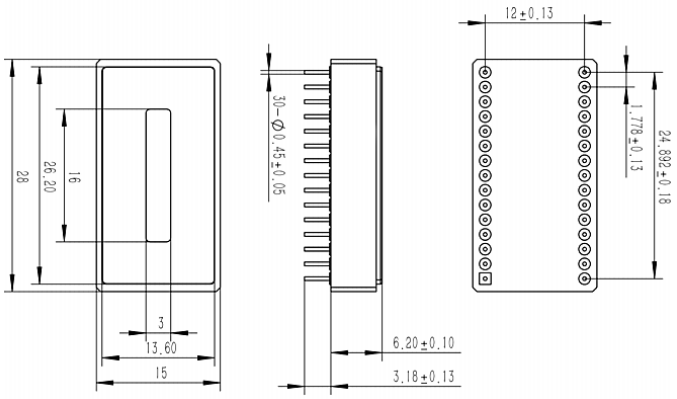
Mechanical capacity:

Terms	TYP
Length x width x height (mm)	28 × 15 × 6.2
Weight (g)	~9
Focal Plane Scale	512 × 1
Pixel Center Distance (μm)	25
Pixel Size (μm)	25 ×250
Sensing Area (mm)	12.8 ×0.25

Mechanical Specifications:

The detector is packaged In ceramic form, filled with atmospheric pressure high purity nitrogen, the shell is made of alumina ceramic, the cover plate and pin are made of FeNiCoSi alloy, the surface is electroplated Ni/Au layer, the window welding is IN brazing, and the cover is resistance welding. The dimensions of the detector are 28mm (L)×15mm (W)×6.2mm (H). There are 30 pins with Φ0.45mm leading from the back on the shell, and the spacing of the pins is 1.778mm. They are used for the input of focal plane power supply and instruction, the electrical extraction of focal plane detection signal and temperature sensor, and the power input of thermoelectric refrigerator.

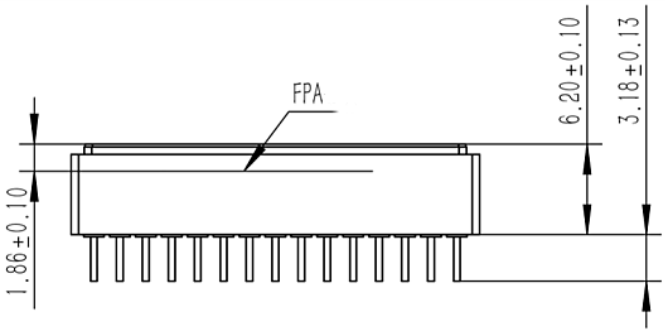
The appearance and size of mechanical interface are shown in the figure below.



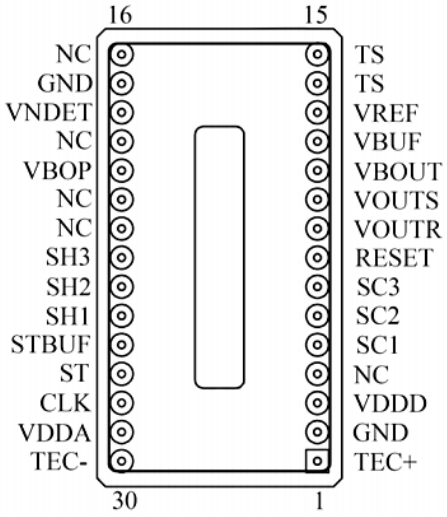
Optical configuation:

This product adopts 512×1 InGaAs focal plane which has two redundant elements at the left and right ends,the overall number of pixels is 516×1.Columns 3 to 514 are recommended for actual use.The shape of the pixel is rectangular, and the photosensitive size is 25μm×250μm.The structure is arranged in a "—" shape, and the pixel center distance is 25μm.The structure is shown in the figure below.

The design distance between the detector's photosensitive surface and the upper surface of the packaging structure is 1.86±0.1mm, the design distance between the photosensitive surface and the lower surface of the window is 1.16 ± 0.1mm,the design distance between the photosensitive surface and the mounting surface or the bottom of the tube shell is 4.34±0.1mm.The window material is sapphire,the thickness is 0.5±0.05mm the window refractive index is 1.76,the surface is coated with AR film,the transmittance in the response band>95%,and the window transmittance area is 16mm×3mm.The center of the photosensitive surface is located at the center of the detector,and the relative position deviation≤0.05mm,rotation displacement≤0.02mm.



Schematic diagram of detector pins:



Pin Names	Input/Output	Pin function	Reference value
GND	Input	ground wire.	Working current<10mA.
CLK	Input	A clock that provides a time reference for circuit driven timing.	Digital voltage. High level 3.3V, low level 0V.
VDDD	Input	Digital circuit power supply, providing voltage to the digital circuit in the detector.	Dc 3.3V, working current needs to be<5mA.
VDDA	Input	An analog circuit power supply that provides voltage to the analog circuit in the detector.	Dc 3.3V, working current needs to be<25mA.
SC1, SC2, SC3	Input	Detector gain selection, control detector output signal size, the control method is detailed in the timing section.	Digital voltage High level 3.3V, low level 0V.
ST	Input	Trigger the pulse, and the circuit begins to collect signals.	Digital voltage High level 3.3V, low level 0V.
RESET	Input	Reset the signal and control the length of the circuit acquisition cycle. See the timing section for the control method.	Digital voltage High level 3.3V, low level 0V.
SH1, SH2, SH3	Input	Sample the control signal, set the pixel integration time, and change the readout mode. See the time sequence section for the control method.	Digital voltage High level 3 3V, low level 0V.

Pin Names	Input/Output	Pin function	Reference value
VBOUT	Input	Buffer offset to provide the bias voltage for the total buffer of the circuit	DC2.3V
VBOP	Input	The amplifier is biased to provide the bias voltage for the signal amplifier	DC2.3V~2.5V, Recommend 2.4V
VREF	Input	Reference voltage, which provides a reference value for the output signal	DC2.3V
VNDET	Input	Chip common N	DC2.3V
VBUF	Input	When in use, short connect with VBOUT pin	DC2.3V
STBUF	Input	When used, it should be short connected with the ST pin	Digital voltage High level 3.3V, low level 0V
VOUTR	Output	Reference signal	0.5V~2.5V
VOUTS	Output	The output signal is subtracted from the reference signal of the same channel to obtain the actual detector response signal value	0.5V~2.5V
TS	-	The temperature sensor measures the resistance value through two pins to feedback the operating temperature of the focal plane	
TEC+, TEC-	-	The input voltage of the thermoelectric refrigerator is + pin for refrigeration when connected to high potential, and for heating when connected to low potential Empty foot	The rated voltage and current of TEC shall not be exceeded
NC	-	The input voltage of the thermoelectric refrigerator is + pin for refrigeration when connected to high potential, and for heating when connected to low potential Empty foot	

Notice:

The DC input directly affects the overall noise of the detector, so the ripple noise of the DC input power supply has the following requirements:

1) VDDA＜2mV
2) VDDD＜10mV
3) VREF, VNDET＜0.3mV
4) VBOP, VBOUT＜1mV