



## Shortwave-Infrared ( 1.2 – 2.2 $\mu\text{m}$ ) 640x512 InGaAs Focal Plane Array

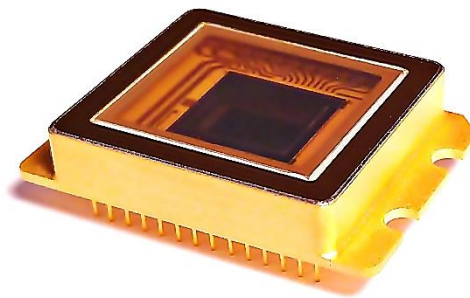
FPA0640P15F-22-T2: with 2-Stage Thermoelectric Cooler

### FEATURES

- 640x512 Array Format
- 28-pin Metal SDIP Package
- Embedded Thermoelectric Cooler
- Built-in Temperature Sensor
- 1.2 $\mu\text{m}$ -2.2 $\mu\text{m}$  Spectral Range
- Quantum Efficiency >70% at 1.9 $\mu\text{m}$
- Typical Pixel Operability >98%
- Snapshot ITR/IWR and IMRO Readout Modes
- 2, 4 or 8 Outputs with up to 18MHz Pixel Rate
- Windowing Capability

### APPLICATIONS

- Shortwave-Infrared Imaging
- Hyper-/Multi-Spectral Imaging
- Semiconductor Inspection / Process Monitoring
- Waste Recycling
- Medical Science and Biology
- Ice/Slush/Moisture Mapping
- High-Speed Industrial Thermal Imaging
- See through Fog/Smoke
- Laser Beam Profiling
- Mineral Identification



### GENERAL DESCRIPTIONS

PARAMETER	UNIT	VALUE
Sensor Technology	---	Planar InGaAs PIN
Spectral Range	$\mu\text{m}$	1.2 - 2.2
Actual Pixel Array	---	640 x 512
Effective Pixel Array	---	636 x 508
Pixel Pitch	$\mu\text{m}$	15
Image Size	mm	9.6 x 7.68
Package Type	---	28-pin Metal SDIP Package
Package Size L x W x T	mm	36.1 x 25.4 x 7.3 (without pins)
Weight	g	19.5 ( $\pm 0.5$ )



## SPECIFICATIONS ( <sup>1</sup>ITS = -40°C )

Parameter	Unit	Typical Value	Conditions
<sup>2,3</sup> Dark Current	fA	≤ 25	Photopixel Biased @ -0.1 V Mode Value
<sup>2,3</sup> Quantum Efficiency * Fill Factor (QE <sub>EFF</sub> )	%	≥ 60	λ = 1.4 μm – 2.1 μm
<sup>2,3</sup> Response Nonuniformity	%	≤ 10	At 50% Well Occupation
<sup>2,3</sup> Response Nonlinearity (Max. Peak-to-Peak Deviation)	%	≤ 4	15% - 85% Well Occupation Range
<sup>3,4</sup> Charge Capacity	@High Gain, 99.9 μV/e <sup>-</sup>	0.019	ROIC Specifications
	@Mid Gain, 20.0 μV/e <sup>-</sup>	0.096	
	@Low Gain, 1.33 μV/e <sup>-</sup>	1.440	
Readout Noise	e <sup>-</sup>	≤ 100	High Gain, Integration Time = 1 ms
Noise-Equivalent Irradiance (NEI)	ph# / cm <sup>2</sup> -s	≤ 6 x 10 <sup>10</sup>	High Gain, Integration Time = 1 ms, λ = 1.9 μm
Mean Detectivity	cm-√Hz / W	≥ 2.4 x 10 <sup>12</sup>	
Output Swing	V	2.3	
<sup>3</sup> Minimum Integration Period	μs	<1	
<sup>2,3</sup> Pixel Operability	%	≥ 98	Percentage of Pixels with Response Output Deviation within ±30% of Mean Value.
<sup>5</sup> Maximum Cooling Capability (ΔT <sub>MAX</sub> )	°C	≥ 60	T <sub>Heatsink</sub> = 20°C

1. Readings from integrated temperature sensor (ITS).
2. These items are defined for central effective pixel array (636x508). Their values correspond to default operation conditions.
3. Contact us for further information.
4. These values are ROIC-version dependent.
5. Adequate heatsink and thermal interface material are the prerequisites for stable operation.

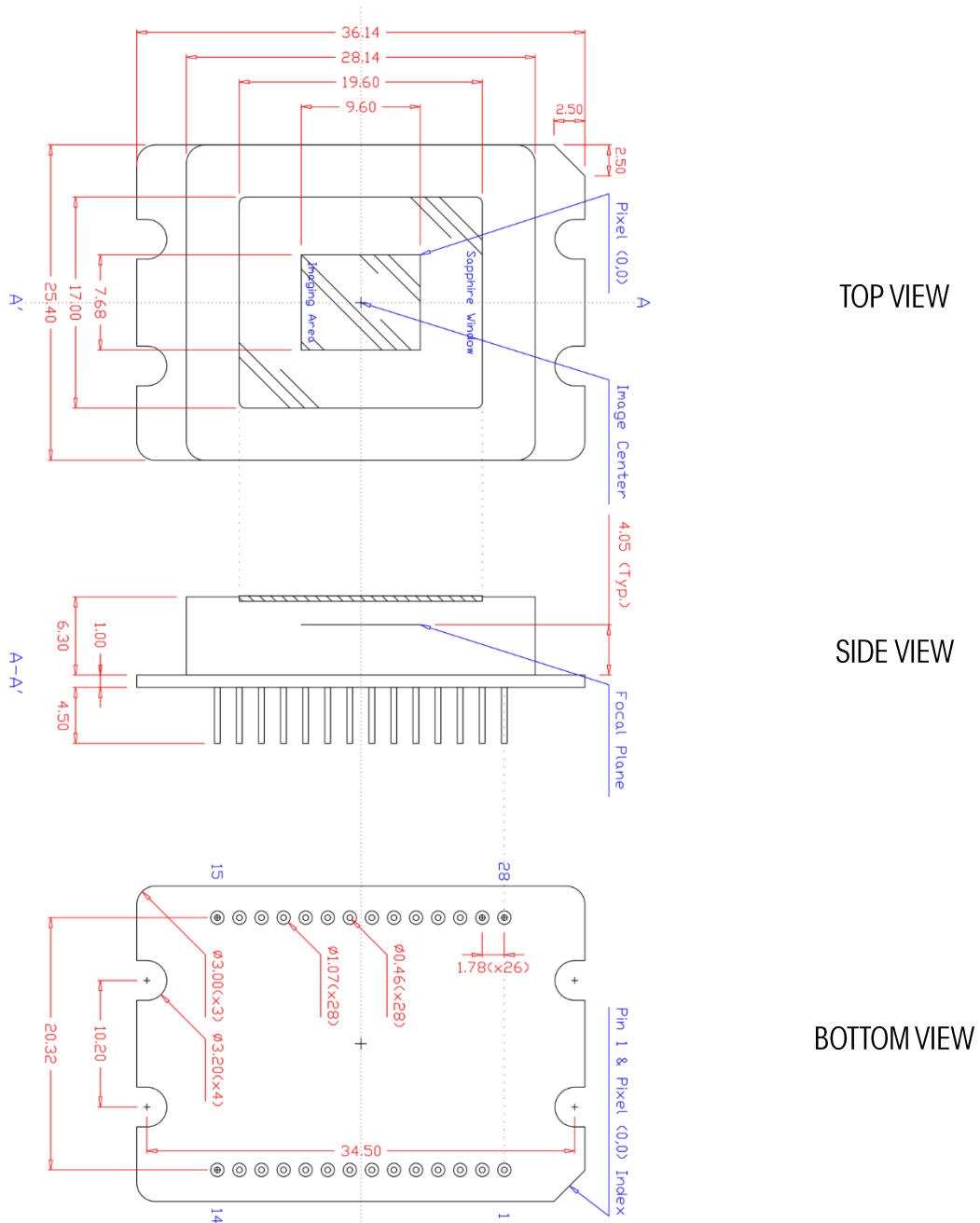
## ABSOLUTE MAXIMUM RATINGS

Parameter	Unit	Min.	Max.
<sup>6</sup> Operating Temperature	°C	-40	+70
<sup>6</sup> Storage Temperature	°C	-40	+70
<sup>7</sup> Power Consumption	mW	---	200
<sup>8</sup> TEC Bias	V	---	10
<sup>8</sup> TEC Current	A	---	2.1

6. Non-condensing environment.
7. Without powering on the thermoelectric cooler.
8. Applied to Pin-1 for cooling operation. Operation above these maximum ratings causes excessive (local) heat accumulation and may result in permanent damage to the cooler.



PACKAGE OUTLINE (Unit: mm)



TOP VIEW

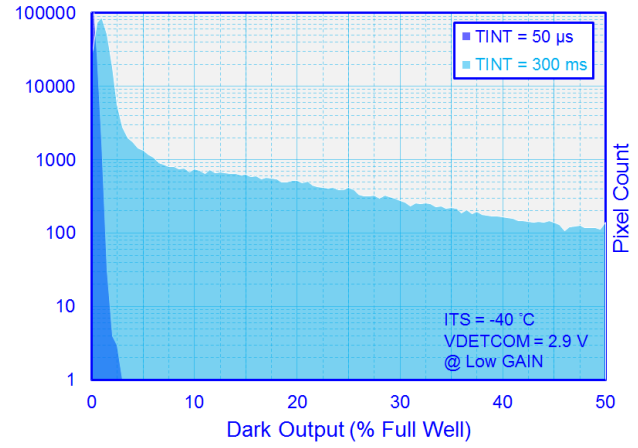
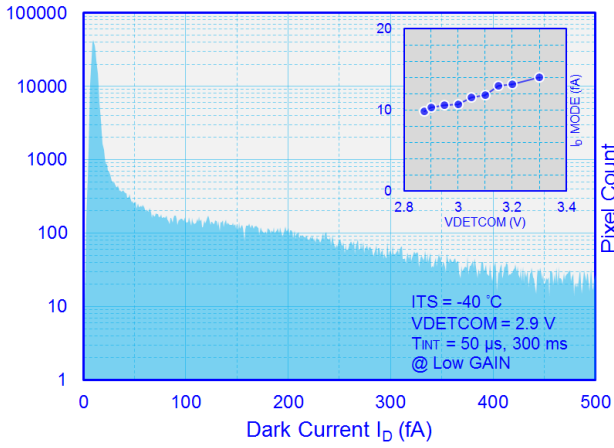
SIDE VIEW

BOTTOM VIEW

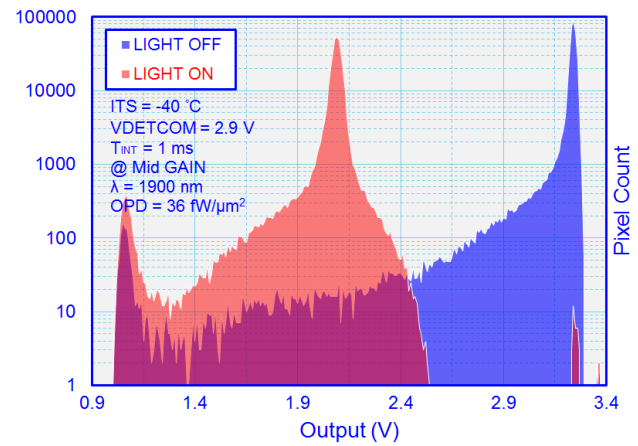
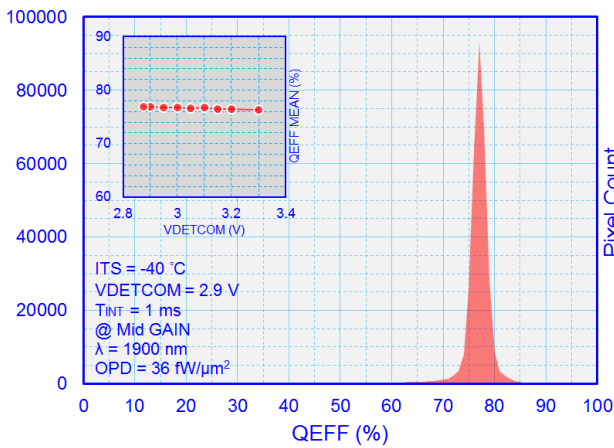


## EXAMPLE CURVES

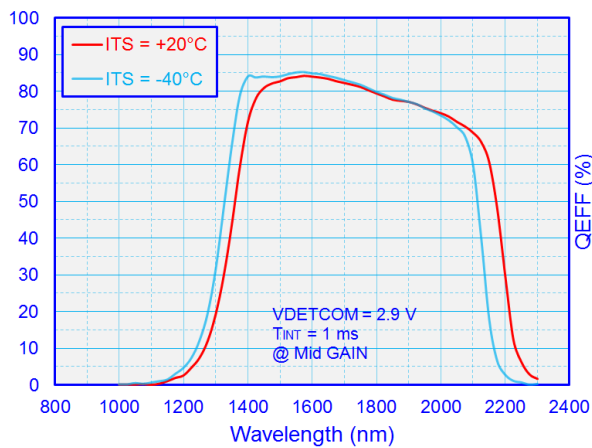
### Histograms of Dark Condition



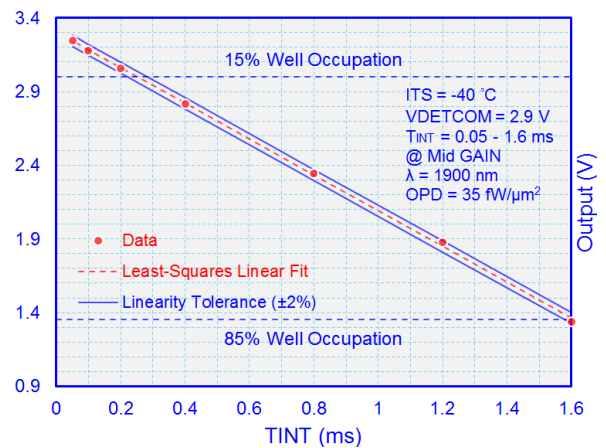
### Histograms of Illumination Condition



### QE FF Spectrum



### Output Linearity



Note: The example curves are subject to change without notice.