



# FPA 640x512\_P15-1.9-TX2(a) (Badger-1.9-T2(a))

## Shortwave-Infrared (1.1 - 1.9 $\mu\text{m}$ ) 640x512 InGaAs Focal Plane Array

FPA 640x512\_P15-1.9-TE2 with 2-Stage Thermoelectric Cooler, high power  
FPA 640x512\_P15-1.9-TS2a with 2-Stage Thermoelectric Cooler, low power

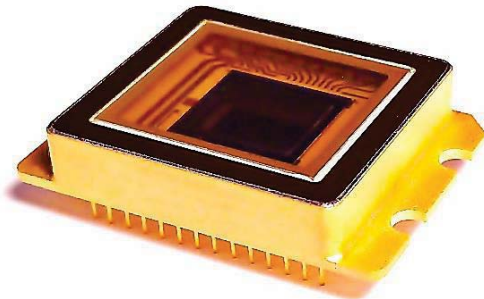
### FEATURES

- 640 x 512 Array Format
- 28-pin Metal SDIP Package
- Embedded Thermoelectric Cooler
- Built-in Temperature Sensor
- 1.1  $\mu\text{m}$  - 1.9  $\mu\text{m}$  Spectral Range
- Quantum Efficiency > 70 % at 1.7  $\mu\text{m}$
- Typical Pixel Operability > 99 %
- Snapshot ITR<sup>1</sup>/IWR<sup>2</sup> and IMRO<sup>3</sup> Readout Modes
- 2,4 or 8 Outputs with up to 18 MHz 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

<sup>1</sup>ITR: Integrate-Then-Read - <sup>2</sup>IWR: Integrate-While-Read - <sup>3</sup>IMRO : Integration with Multiple ReadOut



Raw Image @ -30°C

### GENERAL DESCRIPTIONS

PARAMETER	UNIT	VALUE
Sensor Technology	--	Planar InGaAs PIN
Spectral Range	$\mu\text{m}$	1.1 - 1.9
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 (ITS<sup>1</sup> = -30°C)

PARAMETER	UNIT	TYPICAL VALUE	COMMENTS
Dark Current <sup>2,3</sup>	fA (= 6250 e <sup>-</sup> /s)	≤ 100	Photopixel Biased @ -0.1 V Mean Value
Quantum Efficiency * Fill Factor (QE <sub>EFF</sub> ) <sup>2,3</sup>	%	≥ 70	λ = 1.2 μm - 1.8 μm
Response Nonuniformity <sup>2,3</sup>	%	≤ 10	At 50 % Well Occupation
Response Nonlinearity <sup>2,3</sup> (Max. Peak-to-Peak Deviation)	%	≤ 4	15 % - 85 % Well Occupation Range
Charge Capacity <sup>4</sup> (Option 2 ROIC)	@ High Gain, 46.2 μV/ e <sup>-</sup>	0.041	ROIC Specifications
	@ Mid Gain, 16.2 μV/ e <sup>-</sup>	0.118	
	@ Low Gain, 1.39 μV/ e <sup>-</sup>	1.380	
Readout Noise Floor <sup>4</sup>	e <sup>-</sup>	< 35	In High Gain Mode
Noise-Equivalent Irradiance (NEI) <sup>3</sup>	ph# / cm <sup>2</sup> s	≤ 2.4 x 10 <sup>10</sup>	In High Gain Mode, Integration Time = 3.33 ms λ = 1.7 μm
Mean Detectivity <sup>3</sup>	cm-√Hz / W	≥ 2.9 x 10 <sup>12</sup>	
Output Swing	V	2.25	
Minimum Integration Period <sup>3</sup>	μs	< 1	
Pixel Operability <sup>2,5</sup>	%	≥ 99	Percentage of Pixels with Response Output Deviation within ±30% of Mean Value
Maximum Cooling Capability <sup>6</sup> (ΔT <sub>MAX</sub> )	°C	≥ 55	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. FPA with pixel operability lower than 99% (< 99%) is categorized as a test-grade device, which, if available in stock, can be provided on request
6. Adequate heatsink and thermal interface material are the prerequisites for stable operation.

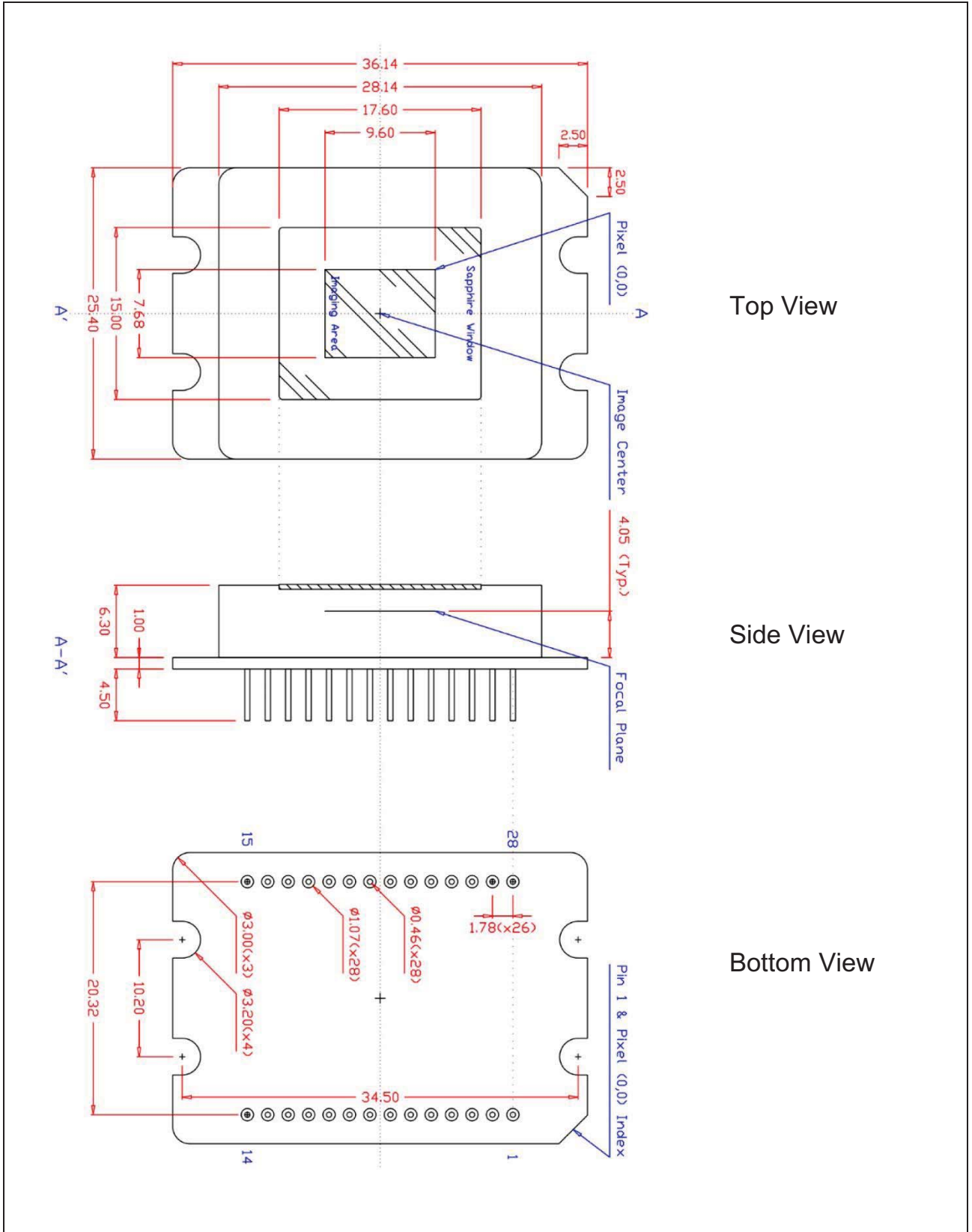
## ABSOLUTE MAXIMUM RATINGS

PARAMETER	UNIT	MIN.	MAX.
Operation Temperature <sup>7</sup>	°C	-40	+71
Storage Temperature <sup>7</sup>	°C	-40	+80
Power Consumption <sup>8</sup>	mW	---	200
TEC Bias <sup>9</sup>	FPA 640x512_P15-1.9-TE2	V	10
	FPA 640x512_P15-1.9-TS2a		5
TEC Current <sup>9</sup>	FPA 640x512_P15-1.9-TE2	A	2.1
	FPA 640x512_P15-1.9-TS2a		2.1

7. Non-condensing environment.
8. Without powering on the thermoelectric cooler.
9. 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.



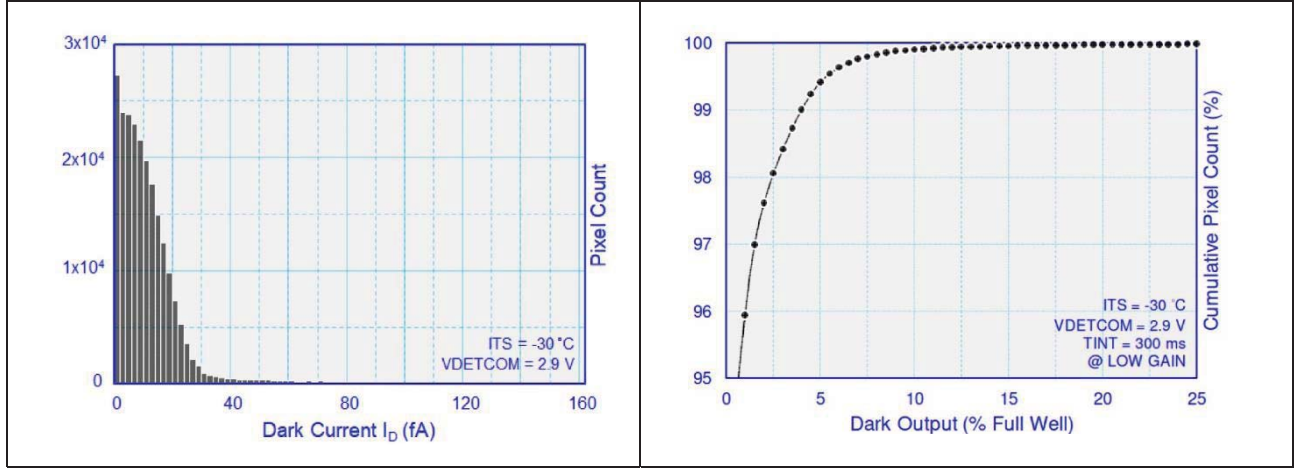
### PACKAGE OUTLINE (Unit: mm)



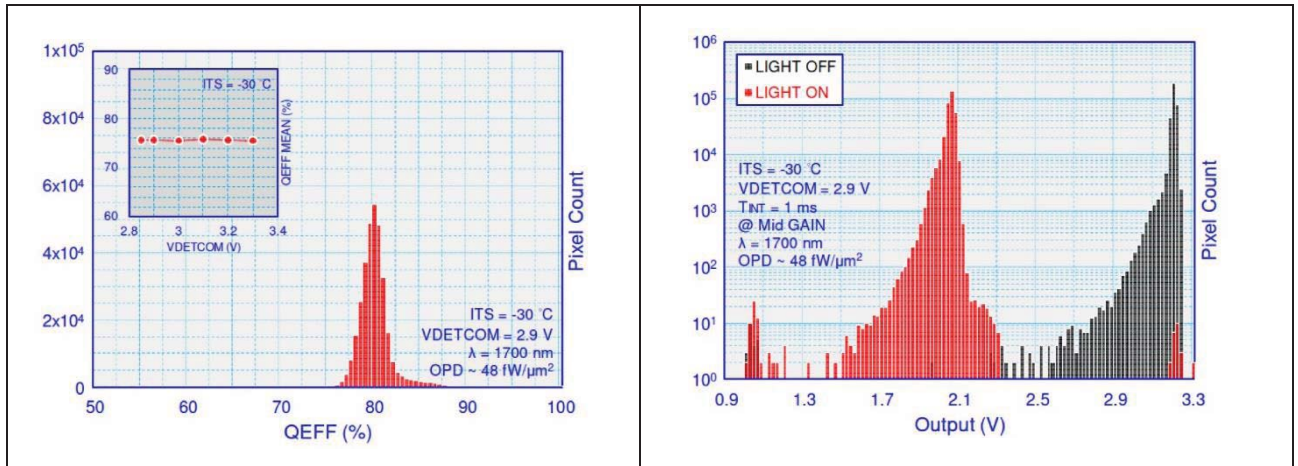


## EXAMPLE CURVES

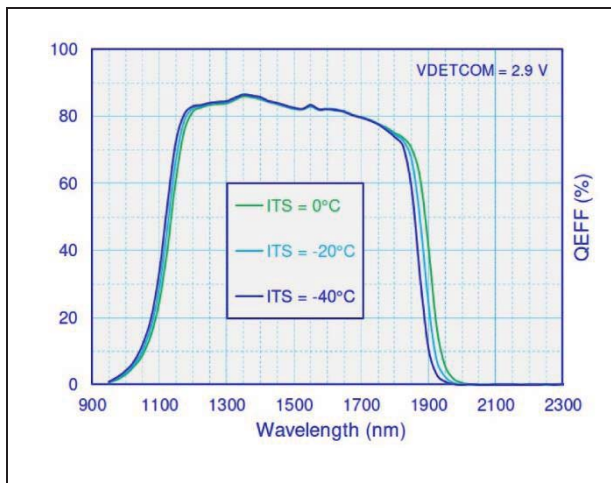
### Histograms of Dark Condition



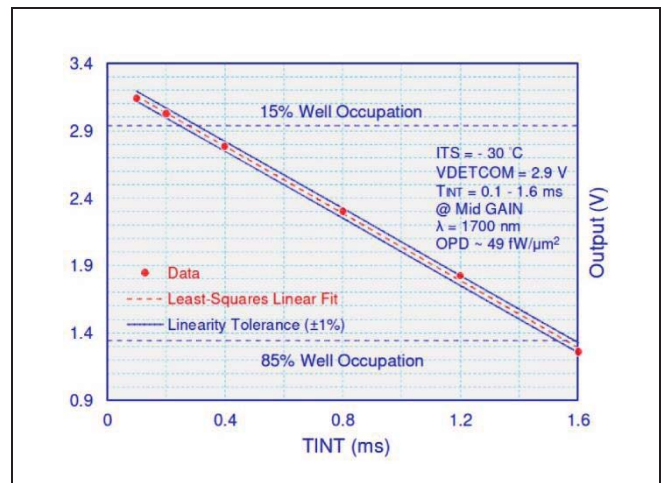
### Histograms of Illuminated Condition



### QEFF Spectrum



### Output Linearity



The information in this document is subject to change without notice. Copyright © 2023 ANDANTA GmbH. All rights reserved.