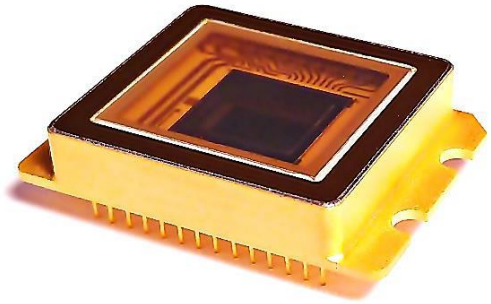
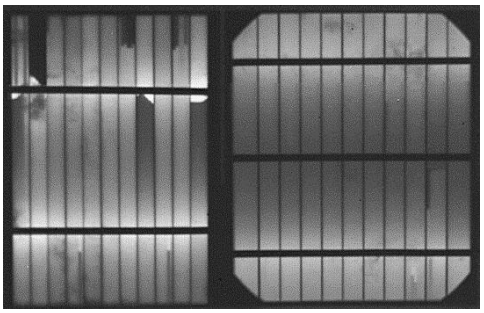
Near-Infrared (0.9 – 1.7 µm) 640 x 512 InGaAs Focal Plane Array

Badger-1.7-T1 (FPA640x512_P15-1.7-T1) with 1-Stage Thermoelectric Cooler
Badger-1.7-T1a (FPA640x512_P15-1.7-T1a) with 1-Stage Low-Power Thermoelectric Cooler
Badger-1.7-T2 (FPA640x512_P15-1.7-T2) with 2-Stage Thermoelectric Cooler
Badger-1.7-T2a (FPA640x512_P15-1.7-T2a) with 2-Stage Low-Power Thermoelectric Cooler





FEATURES

- 640 x 512 Array Format
- 0.9 µm - 1.7 µm Spectral Range
- 28-pin Metal SDIP Package
- Embedded Thermoelectric Cooler
- Typical Pixel Operability > 99.9 %
- Quantum Efficiency > 70 %
- Built-in Temperature Sensor
- Snapshot ITR/IWR and IMRO Readout Modes
- 2,4 or 8 Outputs with up to 18 MHz Pixel Rate
- Windowing Capability

APPLICATIONS

- Near-Infrared Imaging
- Covert Surveillance
- Semiconductor/
  Solar Panel Inspection
- Medical Science and Biology
- Fiberoptic Telecommunication
- See through Fog/Smoke
- Ice / Slush / Moisture Mapping
- Industrial Thermal Imaging
- Astronomy and Scientific

GENERAL DESCRIPTIONS

PARAMETER	UNIT	VALUE
Sensor Technology	--	Planar InGaAs PIN
Spectral Range	µm	0.9 - 1.7
Actual Pixel Array	--	640 x 512
Effective Pixel Array	--	636 x 508
Pixel Pitch	µm	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 (±0.5) (all models)

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SPECIFICATIONS (ITS[1] = 20°C)

PARAMETER		UNIT	TYPICAL VALUE	CONDITIONS
Dark Current [2,3]		fA (= 6250e⁻/s)	≤ 20	Pixel Biased @ -0.5 V, Mean Value
Quantum Efficiency * Fill Factor(QEFF)[2,3]		%	≥ 70	λ = 1.0 µm - 1.6 µm
Response Nonuniformity [2,3]		%	≤ 5	At 50 % Well Occupation
Response Nonlinearity [2,3] (Max. Peak-to-Peak Deviation)		%	≤ 2	15 % - 85 % Well Occupation Range
Charge Capacity [4]	@ High Gain, 46.2 µV/e⁻	Me⁻	0.041	ROIC Specifications
	@ Mid Gain, 16.2 µV/e⁻		0.118	
	@ Low Gain, 1.39 µV/e⁻		1.380	
Readout Noise Floor [4]		e⁻	< 35	In High Gain Mode
Noise-Equivalent Irradiance (NEI) [3]		ph# / cm²s	≤ 1.8 x 10¹⁰	In High Gain Mode, Integration Time = 3.33 ms, λ = 1.55 µm
Mean Detectivity [3]		cm-√Hz /W	≥ 3.5 x 10¹²	
Output Swing		V	2.25	
Minimum Integration Period [3]		µs	< 1	
Pixel Operability [2,5]		%	≥ 99.9	Pixels with QEFF Deviation within ±20 % of QEFF Mean
Max, Cooling Capability (ΔT_{MAX}) [6]	Badger-1.7-T1(a)	°C	≥ 40	$T_{Heatsink}$ = 20°C
	Badger-1.7-T2(a)		≥ 55	

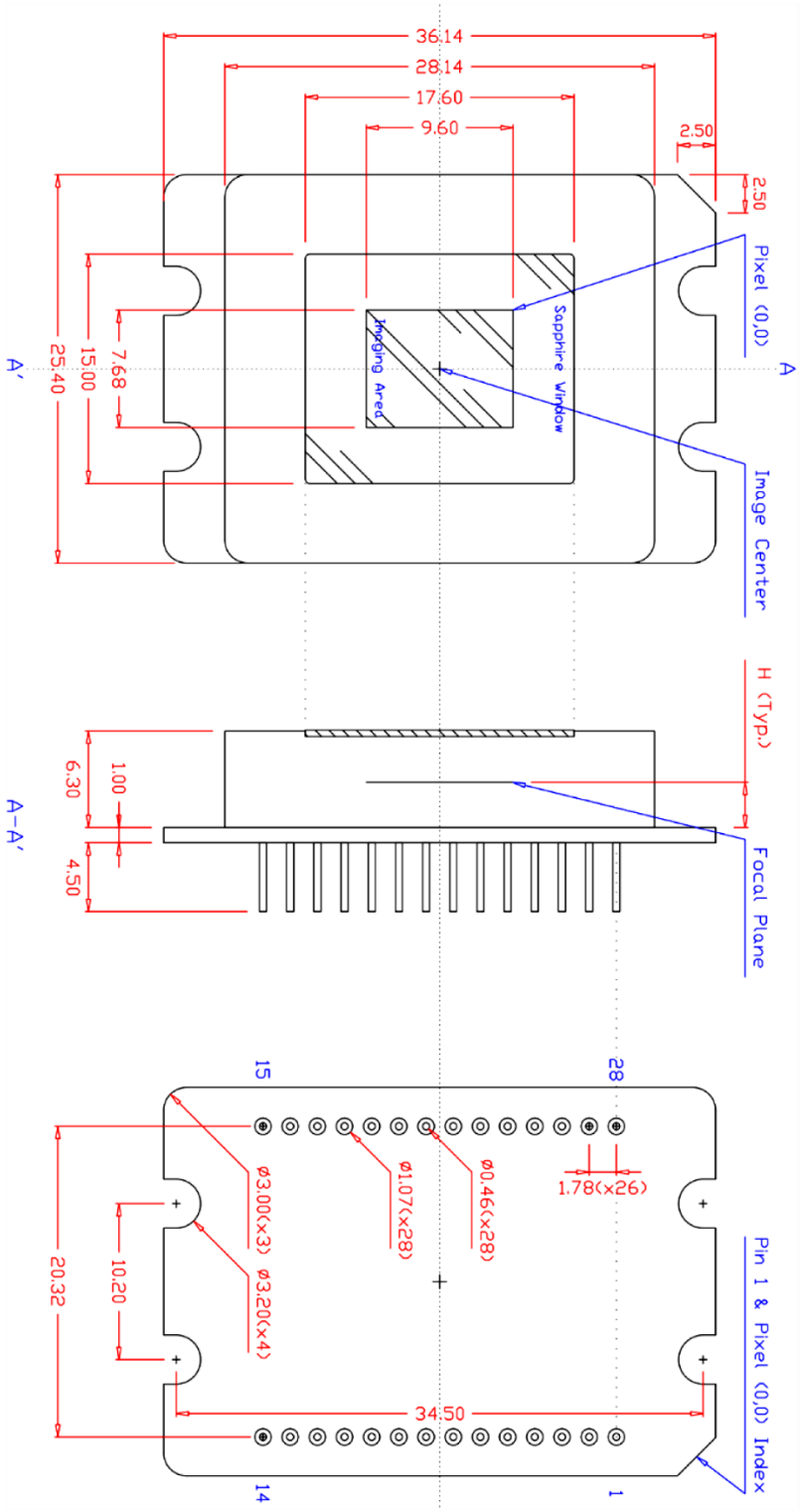
1. Readings from integrated temperature sensor (ITS).
2. These items are defined for central effective pixel array (636x508). Their values correspond to default operation conditions.
3. Contact us for further information.
4. These values are ROIC-version dependent.
5. FPA with pixel operability lower than 99.9 % (< 99.9 %) is categorized as a test-grade device, which could 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 [7]		°C	-40	+71
Storage Temperature [7]		°C	-40	+80
Power Consumption [8]		mW	---	200
TEC Bias [9]	Badger-1.7-T1	V	---	12
	Badger-1.7-T1a			3
	Badger-1.7-T2			10
	Badger-1.7-T2a			5
TEC Current [9]	Badger-1.7-T1	A	---	1.4
	Badger-1.7-T1a			2.5
	Badger-1.7-T2			2.1
	Badger-1.7-T2a			2.1

7. Non-condenslng 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)



Top View

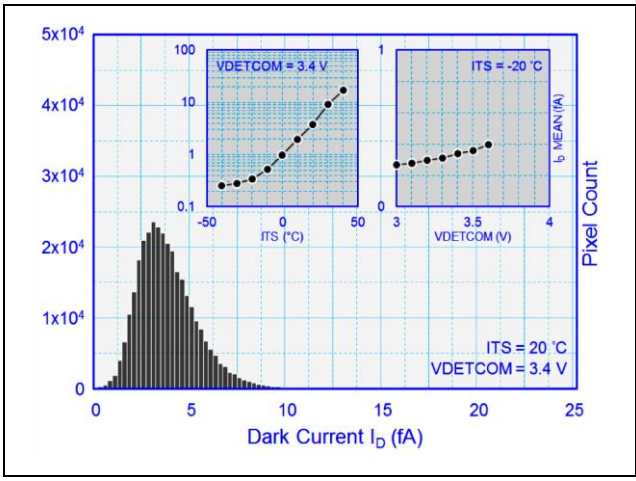
Side View

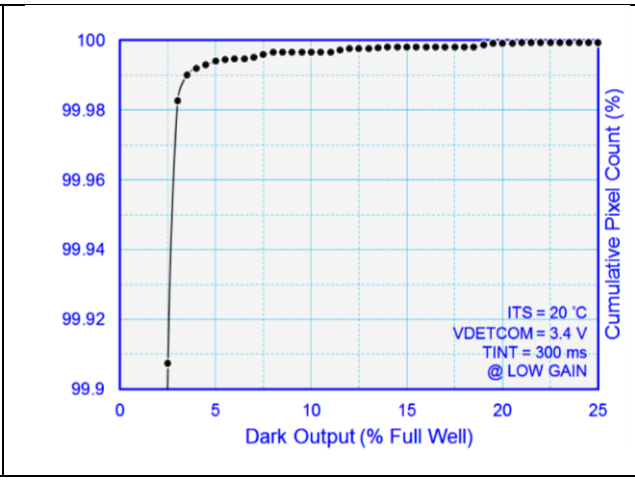
Model	H
Badger-1.7-T1	2.95
Badger-1.7-T1a	3.45
Badger-1.7-T2	4.05
Badger-1.7-T2a	4.05

Bottom View

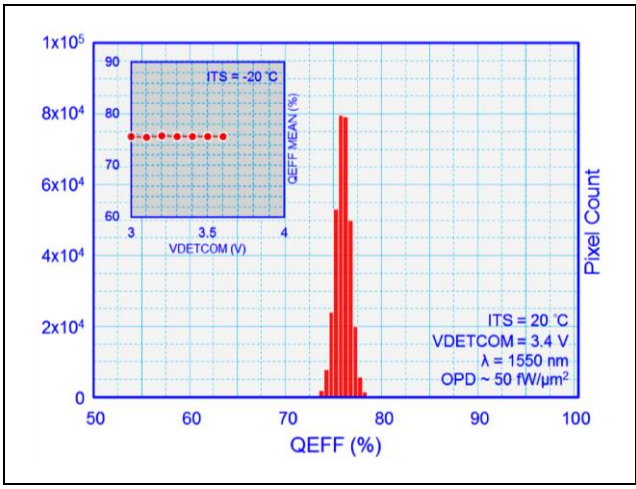
EXAMPLE CURVES

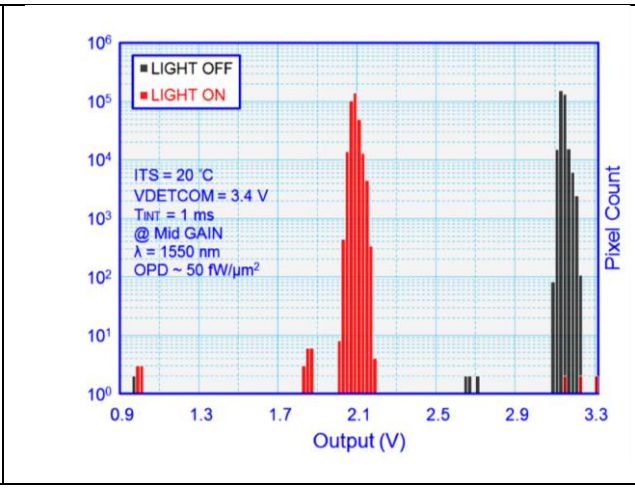
Histograms of Dark Condition



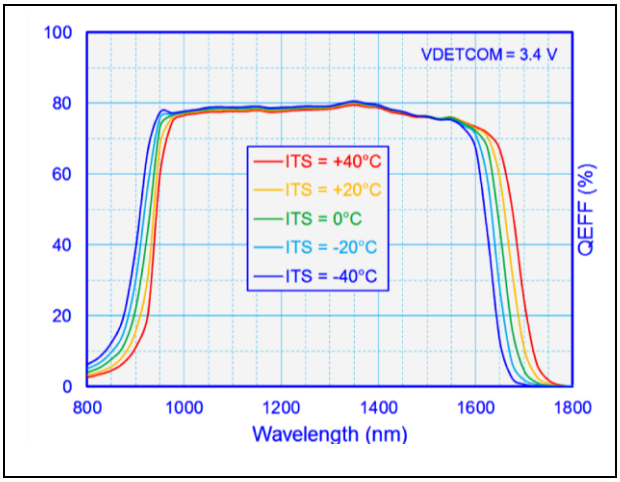


Histograms of Illuminated Condition





QEFF Spectrum



Output Linearity