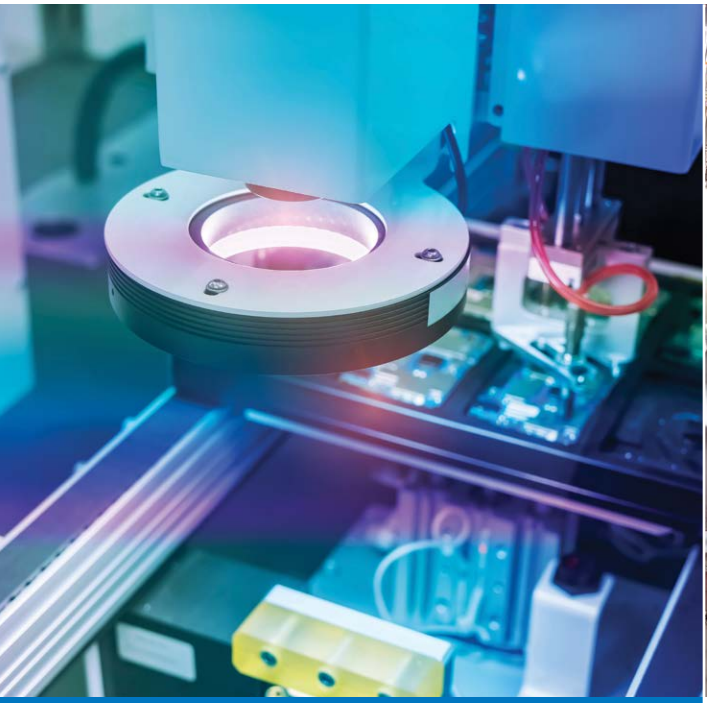
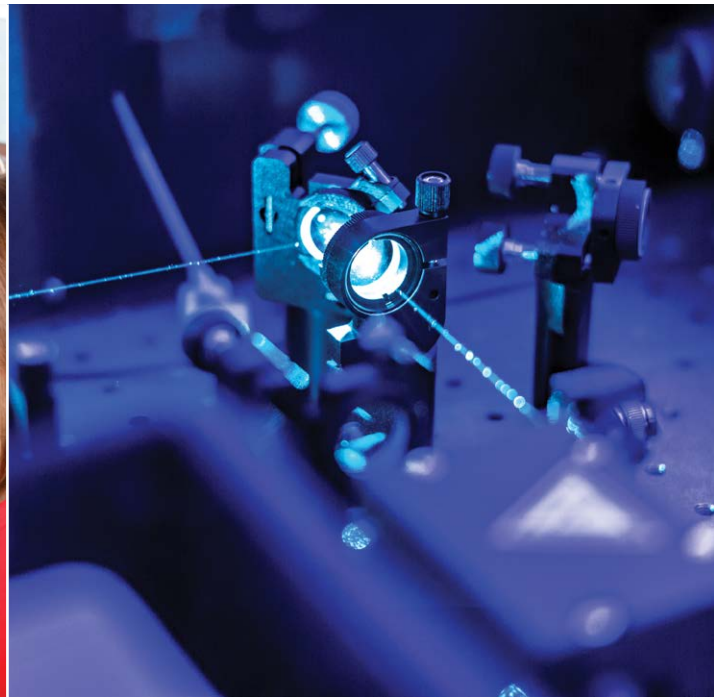
TELEDYNE

Teledyne Judson Technologies

PV MCT

A Guide to PV MCT Detectors





Room Temperature: 2.8–5.0 µm
TE Cooled: 2.8–5.0 µm
LN2 Cryocooled: To 12 µm

www.teledynejudson.com

PRECISION AND PERFORMANCE

PV MCT Detectors for Cutting-Edge Applications

Teledyne Judson Technologies' **PV MCT** (Photovoltaic Mercury Cadmium Telluride), also known as HgCdTe sensors, operate with a cut-off wavelength from 2.8 µm to 12.0 µm.

MCT can be tailored to change the wavelength that the sensor is most sensitive to, allowing the user to optimize sensitivity to the wavelengths of interest and exclude unwanted longer-wavelength thermal radiation without needing expensive optical filters. By changing the material composition when the sensor is grown, Teledyne's sensors can be sensitive from the near-UV to the very-long-wave infrared, providing unparalleled measurement capabilities.

KEY TECHNOLOGY FEATURES & APPLICATIONS

Features

- Sensitivity to infrared radiation is 100x that of competing technologies over a wide range of wavelengths from 1 to 12 microns
- High detection speed with bandwidths up to and beyond 1 MHz, compared to bolometers and thermopiles (about 100 Hz) and pyroelectric sensors (1 KHz)
- Smaller device sizes, with the sensing element as small as the diameter of a hair, compared to competing technologies around 1 mm in size
- Ability to create small arrays of MCT sensors for multi-point temperature measurements without the overhead of a full image sensor
- Use of molecular beam epitaxy for growing very pure and exact layers of MCT, ensuring superior performance

Applications

- Industrial process measurement
- Gas analysis
- Spectroscopy
- High-speed process monitoring

Preamplifiers

For best results, connect the PV MCT detector to a Judson transimpedance gain preamplifier.

Custom Design Services

For more demanding applications, Teledyne Judson's team of engineers offers custom design services.

Please contact us with your special requirements.

PRECISION AND PERFORMANCE

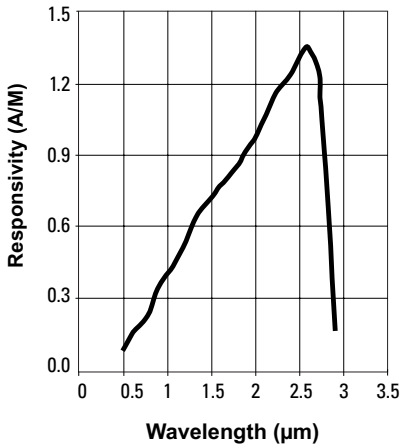
PV MCT (Photovoltaic Mercury Cadmium Telluride) Detectors

The **J19 series** are high-performance photovoltaic Mercury Cadmium Telluride (MCT) detectors that operate with cutoffs from 2.8-12 µm. These detectors provide fast rise time, uniform response, excellent sensitivity, and long-term reliability for a wide range of applications.

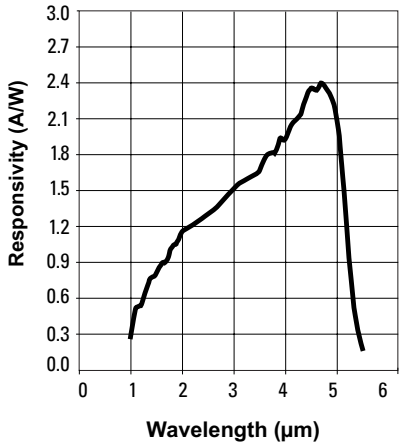
Device Options

Teledyne's PV MCT detectors, the J19 series, offer high reliability and performance in the spectral range from 1.0 to 12.0 µm. The J19TE TE-cooled series are available in multi-stage thermoelectric cooler from room temperature to four-stage cooling. These detectors are designed for applications requiring high signal-to-noise ratios or sensitivity to low signals, such as process temperature monitoring and infrared spectroscopy. The J19D LN2-cooled dewars enable photovoltaic sensors for longwave detection out to 12.0 µm and these can be provided as cryocooled sensors for cryogen-free operation.

Typical Spectral Response, PV MCT, 2.8µm cutoff, 1mm, 180° FOV



Typical Spectral Response, PV MCT, 5µm cutoff, 1mm, TE1-4 180° FOV



Package Options

The J19 series offers several packaging options:

TO-18, 66, 3: Compact design for space-constrained applications encompassing room temperature to four-stage TE cooling.

3VN: Vacuum sealed, very high performing sensor built to exacting standards. TO-3 package with built-in 4-stage TE cooling

LN2-Cooled Dewar (M204): The M204 dewar provides a stable and controlled environment for the detectors, ensuring optimal performance by maintaining the necessary low temperatures:

- Hold Time: 8 hours
- Field of View (FOV): Standard 60° field of view
- Temperature: Designed for detectors that require 77 K operating temperatures

The **J508** is a compact cryocooler that maintains the detector at 77 K without liquid nitrogen. It offers a MTBF of greater than 25,000 hours.

We also offer different hold times, window materials, or optical filter options to enhance the detector's performance by modifying the light that reaches it. For more demanding applications, Teledyne's team of engineers can provide custom design services. Please contact us with your special requirements.

Accessories

For a complete system, Teledyne Judson offers a range of accessories to enhance the performance of PC MCT sensors. These include the TC9 temperature controller, a RoHS compliant, self-contained unit for single and multistage TEC-cooled photodetectors. For TO-66 and TO-3 packaged sensors, Teledyne Judson offers heat sink assemblies such as the HSAMP (heatsink and amplifier), CM Assembly (heatsink and temperature controller), and CMAMP package (heatsink, temperature control, and amplifier). These accessories ensure optimal operating conditions and improved signal quality for your detectors.

For further details, please visit our website.

PV MCT

ROOM TEMPERATURE SENSORS

Description	Active Size Diameter (mm)	Operating Temperature °C	50% Cutoff Wavelength (µm), ±0.1 µm	Peak Wavelength (µm), ±0.1 µm	Peak Responsivity (A/W) min	Package	Shunt Impedance (Ohm) typ	Dark Current (A) @ -0.1V typ	Peak D* (cm Hz^1/2 / W) @ 1K Hz typ
J19:2.8-18C-R250U	0.25	22	2.8	2.6	1.3	18C 	1.50E+04	2.00E-06	2.80E+10
J19:2.8-18C-R01M	1	22	2.8	2.6	1.3		1.50E+03	2.00E-05	3.50E+10
J19TE1:2.8-66C-R250U	0.25	-20	2.8	2.6	1.3	66C 	2.00E+05	1.00E-07	1.10E+11
J19TE1:2.8-66C-R01M	1	-20	2.8	2.6	1.3		2.00E+04	1.00E-06	1.40E+11
J19TE2:2.8-66C-R250U	0.25	-40	2.8	2.6	1.3		1.50E+06	2.00E-08	2.90E+11
J19TE2:2.8-66C-R01M	1	-40	2.8	2.6	1.3		1.50E+05	2.00E-07	3.70E+11
J19TE3:2.8-66C-R250U	0.25	-65	2.8	2.6	1.3		8.00E+06	5.00E-09	5.90E+11
J19TE3:2.8-66C-R01M	1	-65	2.8	2.6	1.3		8.00E+05	5.00E-08	7.40E+11
J19TE4:2.8-3CN-R250U	0.25	-85	2.8	2.6	1.3	3CN 	3.20E+07	3.00E-09	8.00E+11
J19TE4:2.8-3CN-R01M	1	-85	2.8	2.6	1.3		3.20E+06	3.00E-08	1.00E+12
J19TE4:2.8-3VN-R250U	0.25	-90	2.8	2.6	1.3	3VN 	6.40E+07	2.00E-09	8.60E+11
J19TE4:2.8-3VN-R01M	1	-90	2.8	2.6	1.3		6.40E+06	2.00E-08	1.10E+12

TE-COOLED SENSORS

Description	Active Size Diameter (mm)	Operating Temperature °C	50% Cutoff Wavelength (µm), ±0.1 µm	Peak Wavelength (µm), ±0.1 µm	Peak Responsivity (A/W) min	Package	Shunt Impedance (Ohm) typ	Dark Current (A) @ -0.1V typ	Peak D* (cm Hz^1/2 / W) @ 10K Hz typ
J19TE1:5-66C-R250U	0.25	-20	5	4.5	1.5	66C 	4.00E+02	5.00E-05	5.60E+09
J19TE1:5-66C-R01M	1	-20	5	4.5	1		4.00E+01	5.00E-04	4.70E+09
J19TE2:5-66C-R250U	0.25	-40	5	4.5	1.7		1.00E+03	2.00E-05	1.10E+10
J19TE2:5-66C-R01M	1	-40	5	4.5	1.3		1.00E+02	2.00E-04	1.00E+10
J19TE3:5-66C-R250U	0.25	-65	5	4.5	1.9		3.20E+03	6.00E-06	2.20E+10
J19TE3:5-66C-R01M	1	-65	5	4.5	1.6		3.20E+02	6.00E-05	2.40E+10
J19TE4:5-3CN-R250U	0.25	-80	5	4.5	2.1	3CN 	7.20E+03	3.00E-06	3.80E+10
J19TE4:5-3CN-R01M	1	-80	5	4.5	2		7.20E+02	3.00E-05	4.60E+10
J19TE4:5-3VN-R250U	0.25	-90	5	4.5	2.2	3VN 	1.20E+04	2.00E-06	5.40E+10
J19TE4:5-3VN-R01M	1	-90	5	4.5	2.2		1.20E+03	2.00E-05	6.80E+10

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LN2-COOLED SENSORS

Description	Active Size Diameter (mm)	FOV deg	Operating Temperature °C	50% Cutoff Wavelength (µm), ±0.1 µm	Peak Responsivity (A/W) min	Package	Shunt Impedance (Ohm) min	Capacitance (pF) @ 0V typ	Peak D* (cm Hz^1/2 / W) @ 10K Hz min
J19D12-M204-R250U-60	0.25	60	77 K	11.5	4	M204	1000	60	3.00E+10
J19D12-M204-R01M-60	1	60	77 K	12	4	M204	60	600	3.00E+10

Note: @ 77 K, 60° FOV

A wealth of knowledge and broad product line to help address today's pressing challenges in the infrared.

All of our semiconductor fabrication and product manufacture operations are located in our Montgomeryville, Pennsylvania facility. We are proud to be a US-based semiconductor company, providing our customers the highest standards of quality, performance, and value.

In addition to Teledyne Judson PV MCT products, we offer a wide range of high-performance standard, custom and space-qualified detectors and accessories.

FOCUSED ON INFRARED SENSING

Teledyne Judson Technologies is a world leader in the design and manufacture of high-performance infrared (IR) sensors. Some of the most prestigious and challenging scientific space missions, such as the James Webb Space Telescope (JWST) and the Perseverance Mars Rover, benefit from our superior performance and reliability. Beyond these missions, Teledyne Judson's sensors have been helping OEMs and researchers solve challenging problems across the infrared spectrum since 1969.

DEVELOPING TOP-QUALITY PRODUCTS FOR LEADING OEMs

When working with Teledyne Judson Technologies, clients benefit from ourability to handle the entire value chain in IR sensor technology, from the wafer substrate to packaging and software. Our customers rely on us for solutions ranging from standard imaging products to custom products integrated with electronics and camera systems.

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