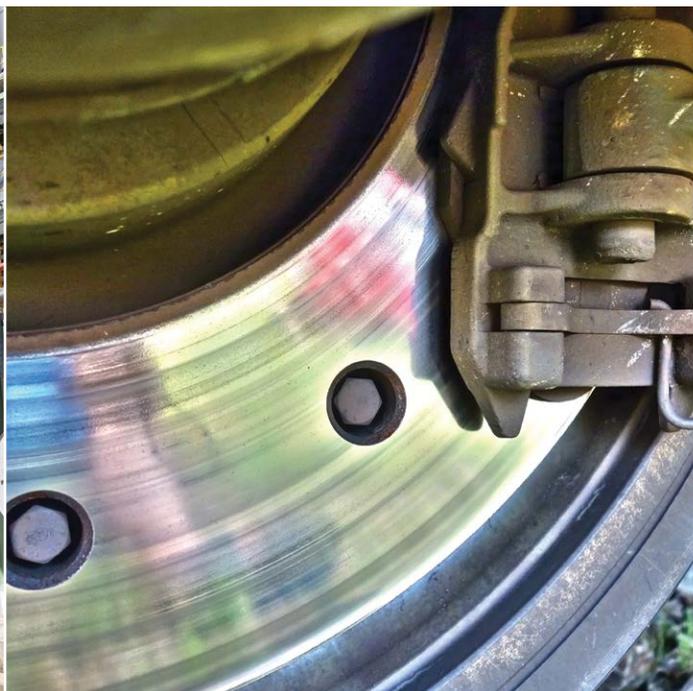




Teledyne Judson Technologies

PC MCT

A Guide to PC MCT Detectors



TE Cooled: 4.0–11 μm
LN2 Cooled: To 22 μm
Cryocooled



PRECISION AND PERFORMANCE

PC MCT Detectors for Cutting-Edge Applications

Teledyne Judson Technologies' PC MCT (Photoconductive Mercury Cadmium Telluride) sensors operate with a cut-off wavelength from 4 μm to 22 μm . These sensors feature a tunable bandgap, allowing users to optimize sensitivity based on the wavelengths of interest. They are available in both thermoelectrically cooled packages and cryocooled dewar-mounted sensors for liquid nitrogen cooling, ensuring ultimate performance.

PC MCT, also known as HgCdTe, is a ternary semiconductor compound with a wavelength cutoff proportional to the alloy composition. The detector consists of a thin layer (10 to 20 μm) of HgCdTe with metalized contact pads defining the active area. Photons with energy greater than the semiconductor band-gap energy excite electrons into the conduction band, thereby increasing the material's conductivity. The wavelength of peak response depends on the material's band-gap energy and can be easily varied by changing the alloy composition. To sense the change in conductivity, a bias current or voltage is required. Typically, detectors are manufactured in a square or rectangular configuration to maintain a uniform bias current distribution throughout the active region.

The wavelength of peak response depends on the specific alloy composition used.

All detectors are designed for cryogenic operation at 77 K. Teledyne's superior technology and careful device selection can provide background limited (BLIP) detectors with state-of-the-art performance.

KEY TECHNOLOGY FEATURES & APPLICATIONS

Features

- Sensitivity from visible to 22 μm
- Thermoelectric or dewar cooling or IDCA
- Can be ordered integrated with an amplifier and TE controller for easy integration
- Superior performance to DTGS, InAs, InSb

Applications

- Pyrometry/Radiometry
- FTIR spectroscopy
- Transport/Rail safety
- Industrial process control
- Gas analysis/Chemical detection
- CO₂ laser detection and monitoring

CUSTOM DESIGN SERVICES

Please contact us with your special requirements.



PRECISION AND PERFORMANCE

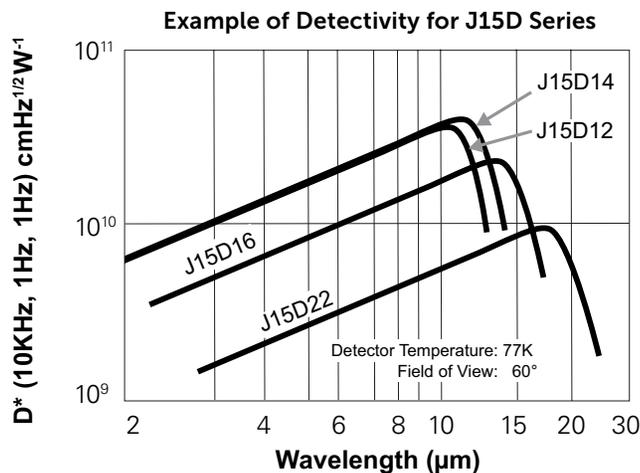
PC MCT (Photoconductive Mercury Cadmium Telluride) Detectors

The **J15 series** are high-performance photoconductive Mercury Cadmium Telluride (MCT) detectors that operate with cutoffs from 4.0–22 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 PC MCT detectors, the **J15 series**, offer high reliability and performance in the spectral range from 1.0–22.0 μm . The **J15TE series** features thermoelectric coolers for precise temperature control, with options for two-stage (J15TE2), three-stage (J15TE3) to four-stage cooling (J15TE4), while the **J15D series** LN2-cooled dewar for mounted detectors ensuring optimal performance by maintaining necessary low temperatures to minimize thermal background. The detectors can also be mounted in a cryocooled package for cryogen-free operation.

The diagram below shows the typical response for the J15D series at various temperatures.



Package Options

The **J15 TE-Cooled Sensor series** offers several packaging options:

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

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

Accessories

For a complete system, Teledyne 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.

PC MCT

TE-COOLED SENSORS

Description	Active Size Diameter (mm)	Operating Temperature °C	50% Cutoff Wavelength (μm), ±0.25 μm	Peak Wavelength (μm), ±0.25 μm	Peak Responsivity (V/W) min	Package	Bias Current, mA	Time Constant, usec	Peak D* (cm Hz ^{1/2} / W) @ 1K Hz typ
J15TE2:4-66C-S250U	0.25	-40	4	4	1.60E+04	66C 	0.5-5	5	4.00E+10
J15TE2:4-66C-S01M	1	-40	4	4	4.00E+03		0.5-5	5	4.00E+10
J15TE2:4.5-66C-S250U	0.25	-40	4.5	4.4	8.00E+03		0.5-5	3	2.50E+10
J15TE2:4.5-66C-S01M	1	-40	4.5	4.4	2.00E+03		0.5-5	3	2.50E+10
J15TE2:5-66C-S250U	0.25	-40	5	4.8	4.00E+03		0.5-5	2	1.50E+10
J15TE2:5-66C-S01M	1	-40	5	4.8	1.00E+03		0.5-5	2	1.50E+10
J15TE3:5-66C-S250U	0.25	-65	>5.0	4.8	1.00E+04		0.5-5	2	3.00E+10
J15TE3:5-66C-S01M	1	-65	>5.0	4.8	3.00E+03		0.5-5	2	3.00E+10
J15TE4:5-3CN-S250U	0.25	-80	>5.0	4.8	1.00E+04	3CN 	0.5-5	2	6.00E+10
J15TE4:5-3CN-S01M	1	-80	>5.0	4.8	3.00E+03		0.5-5	2	6.00E+10
J15TE3:10-66GE-S250U	0.25	-65	>11	10.6	10	66GE 	.175V	1	2.00E+08
J15TE3:10-66GE-S01M	1	-65	>11	10.6	2		3V	5	2.00E+08
J15TE4:10-3GN-S250U	0.25	-80	>11	10.6	20	3GN 	.175V	1	6.00E+08
J15TE4:10-3GN-S01M	1	-80	>11	10.6	5		3V	5	6.00E+08

LN2-COOLED SENSORS

Description	Active Size Diameter (mm)	20% Cutoff Wavelength (μm), ±0.1 μm	Peak Wavelength (μm), ±1 μm	Peak Responsivity (V/W) min	Package	Resistance (Ohm) typ	Bias Current, mA typ	Peak D* (cm Hz ^{1/2} / W) @ 1K Hz typ
J15D12-M204-S025U-60	0.025	>12	11	1.00E+05	M204 	20-120	0.8	5.00E+10
J15D12-M204-S050U-60	0.05	>12	11	8.00E+04		20-120	1.2	5.00E+10
J15D12-M204-S075U-60	0.075	>12	11	6.00E+04		20-120	2	5.00E+10
J15D12-M204-S100U-60	0.1	>12	11	4.00E+04		20-120	3	5.00E+10
J15D12-M204-S250U-60	0.25	>12	11	1.50E+04		20-120	8	5.00E+10
J15D12-M204-S500U-60	0.5	>12	11	6.00E+03		20-120	16	4.00E+10
J15D12-M204-S01M-60	1	>12	11	3.00E+03		20-120	30	4.00E+10
J15D12-M204-S02M-60	2	>12	11	500		20-120	40	2.50E+10
J15D12-M204-S04M-60	4	>12	11	100		20-120	40	1.50E+10
J15D14-M204-S100U-60	0.1	>13.5	13	4.00E+04		20-100	3	5.00E+10
J15D14-M204-S250U-60	0.25	>13.5	13	1.50E+04		20-100	8	5.00E+10

Note: @ 77 K, 60° FOV

PC MCT

LN2-COOLED SENSORS continued

Description	Active Size Diameter (mm)	20% Cutoff Wavelength (μm), $\pm 0.1 \mu\text{m}$	Peak Wavelength (μm), $\pm 1 \mu\text{m}$	Peak Responsivity (V/W) min	Package	Resistance (Ohm) typ	Bias Current, mA typ	Peak D* (cm Hz ^{1/2} / W) @ 1K Hz typ
J15D14-M204-S500U-60	0.5	>13.5	13	6.00E+03	M204 	20-100	16	4.00E+10
J15D14-M204-S01M-60	1	>13.5	13	1.00E+03		20-100	30	4.00E+10
J15D14-M204-S02M-60	2	>13.5	13	500		20-100	40	2.50E+10
J15D16-M204-S100U-60	0.1	~16.6	14	9.00E+03		18-120	3	4.00E+10
J15D16-M204-S250U-60	0.25	~16.6	14	3.00E+03		18-120	8	4.00E+10
J15D16-M204-S01M-60	1	~16.6	14	900		18-120	30	3.00E+10
J15D16-M204-S02M-60	2	~16.6	14	150		18-120	40	2.00E+10
J15D22-M204-S250U-60	0.25	~22	16	800		18-120	15	1.00E+10
J15D22-M204-S01M-60	1	~22	16	150		18-120	40	1.00E+10
J15D22-M204-S02M-60	2	~22	16	30		18-120	50	6.00E+09

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 PC 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 our ability 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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