



VS8 Detector Set

Sensitive, fast MWIR set for <3.5 to 6+ microns with laboratory transimpedance preamplifier, DC to 5 MHz bandwidth.

- PVI-4TE-6-1x1
- MIP-DC-5M-F-M8
- PTCC-01-BAS

Photovoltaic detectors optically immersed PVI

PVI series features room temperature and TE cooled IR photovoltaic detectors, optically immersed (achieved by using high refractive index micro lenses) in order to improve performance of the devices, different acceptance angle and saturation level. The devices are optimized for the maximum performance at λ_{opt} . Cut-on wavelength can be optimized upon request. Reverse bias may significantly increase speed of response and dynamic range. It results also in improved performance at high frequencies, but 1/f noise that appears in biased devices may reduce performance at low frequencies. Highest performance and stability are achieved by application of variable gap HgCdTe semiconductor, optimized doping and sophisticated surface processing.

Detector type	Cooling, operating temperature $T [K]$	Optimal wavelength ^{*)} $\lambda_{opt} [\mu m]$	Detectivity ^{**)} $D^* \left[\frac{cm \cdot \sqrt{Hz}}{W} \right]$		Current responsivity $@\lambda_{opt} \left[\frac{A}{W} \right]$	Time constant $\tau [ns]$	Resistance optical area product $R \cdot A [\Omega \cdot cm^2]$	Acceptance angle $\varnothing [^\circ]_{\frac{1}{2} \Delta \lambda}$	Optical area ^{***)} $[mm \times mm]$	Package	Window ^{****)}			
PVI	uncooled, ~300	3	$\geq 5.0 \times 10^{10}$	$\geq 5.0 \times 10^{10}$	≥ 0.5	≤ 350	≥ 100	~36, 1.62	0.5×0.5 1×1	BNC, TO39	no window			
		3.4	$\geq 5.0 \times 10^{10}$	$\geq 4.5 \times 10^{10}$	≥ 0.8	≤ 260	≥ 50							
		4	$\geq 3.0 \times 10^{10}$	$\geq 2.0 \times 10^{10}$	≥ 1	≤ 150	≥ 6							
		5	$\geq 1.5 \times 10^{10}$	$\geq 9.0 \times 10^9$	≥ 1	≤ 120	≥ 1							
		6	$\geq 8.0 \times 10^9$	$\geq 4.0 \times 10^9$	≥ 1	≤ 80	≥ 0.2							
	two-stage TE-cooled (2TE), ~230	3	$\geq 8.0 \times 10^{11}$	$\geq 5.5 \times 10^{11}$	≥ 0.5	≤ 280	≥ 15000		0.5×0.5 1×1	TO8, TO66	wedged Al ₂ O ₃			
		3.4	$\geq 6.0 \times 10^{11}$	$\geq 3.0 \times 10^{11}$	≥ 0.8	≤ 200	≥ 300							
		4	$\geq 3.0 \times 10^{11}$	$\geq 2.0 \times 10^{11}$	≥ 1.0	≤ 100	≥ 200							
		5	$\geq 1.0 \times 10^{11}$	$\geq 6.0 \times 10^{10}$	≥ 1.3	≤ 80	≥ 10							
		6	$\geq 5.0 \times 10^{10}$	$\geq 2.0 \times 10^{10}$	≥ 1.5	≤ 50	≥ 2							
		8	$\geq 4.0 \times 10^9$	$\geq 2.0 \times 10^9$	≥ 0.8	≤ 30 ≤ 45	≥ 0.02				0.3×0.3 0.5×0.5 1×1	wedged ZnSe AR coated		
		10.6	$\geq 2.0 \times 10^9$	$\geq 1.0 \times 10^9$	≥ 0.4	≤ 10	≥ 0.01				0.3×0.3 0.5×0.5			
	three-stage TE-cooled (3TE), ~210	3	$\geq 9.0 \times 10^{11}$	$\geq 7.0 \times 10^{11}$	≥ 0.5	≤ 280	≥ 24000		0.5×0.5 1×1		wedged Al ₂ O ₃			
		3.4	$\geq 7.0 \times 10^{11}$	$\geq 5.0 \times 10^{11}$	≥ 0.8	≤ 200	≥ 1500							
		4	$\geq 5.0 \times 10^{11}$	$\geq 3.0 \times 10^{11}$	≥ 1.0	≤ 100	≥ 600							
		5	$\geq 1.0 \times 10^{11}$	$\geq 8.0 \times 10^{10}$	≥ 1.3	≤ 80	≥ 30							
		6	$\geq 6.0 \times 10^{10}$	$\geq 3.0 \times 10^{10}$	≥ 1.5	≤ 50	≥ 2.5							
		8	$\geq 5.0 \times 10^9$	$\geq 3.0 \times 10^9$	≥ 1.0	≤ 30 ≤ 45	≥ 0.04		0.3×0.3 0.5×0.5 1×1		wedged ZnSe AR coated			
		10.6	$\geq 3.0 \times 10^9$	$\geq 1.5 \times 10^9$	≥ 0.7	≤ 10	≥ 0.02		0.3×0.3 0.5×0.5					
	four-stage TE-cooled (4TE), ~195	3	$\geq 1.0 \times 10^{12}$	$\geq 8.0 \times 10^{11}$	≥ 0.5	≤ 280	≥ 30000		0.5×0.5 1×1		wedged Al ₂ O ₃			
		3.4	$\geq 8.0 \times 10^{11}$	$\geq 7.0 \times 10^{11}$	≥ 0.8	≤ 200	≥ 2000							
		4	$\geq 6.0 \times 10^{11}$	$\geq 4.0 \times 10^{11}$	≥ 1.0	≤ 100	≥ 800							
		5	$\geq 3.0 \times 10^{11}$	$\geq 1.0 \times 10^{11}$	≥ 1.3	≤ 80	≥ 40							
		6	$\geq 6.0 \times 10^{10}$	$\geq 4.0 \times 10^{10}$	≥ 1.5	≤ 50	≥ 3							
		8	$\geq 5.0 \times 10^9$	$\geq 4.0 \times 10^9$	≥ 1.5	≤ 30 ≤ 45	≥ 0.06		0.3×0.3 0.5×0.5 1×1		wedged ZnSe			
		10.6	$\geq 4.0 \times 10^9$	$\geq 2.0 \times 10^9$	≥ 0.7 ≥ 0.5	≤ 10 ≤ 25	≥ 0.05		0.3×0.3 0.5×0.5 1×1		AR coated			

^{*)} Other optimal wavelengths available upon request.

^{**) Data sheet states minimum guaranteed D* values for each detector model. Higher performance detectors can be provided upon request.}

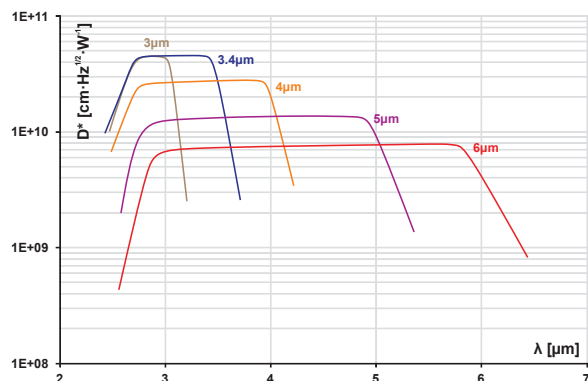
^{***)} Other optical areas available upon request.

^{****)} Other windows available upon request.

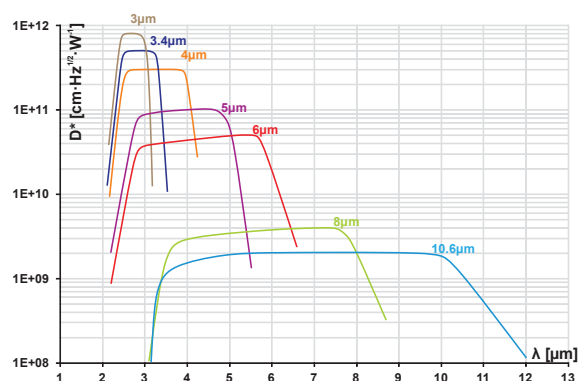
¹⁾ Optical area available only for uncooled detectors

Spectral characteristics^{*)}

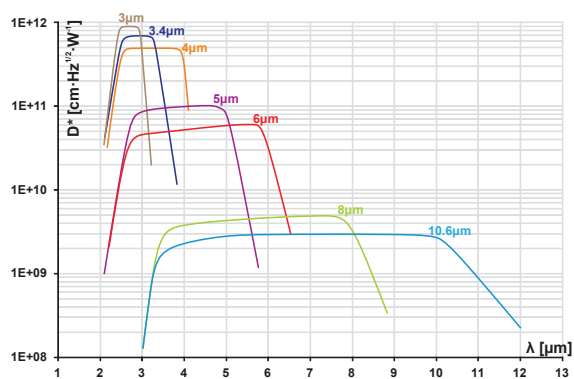
PVI



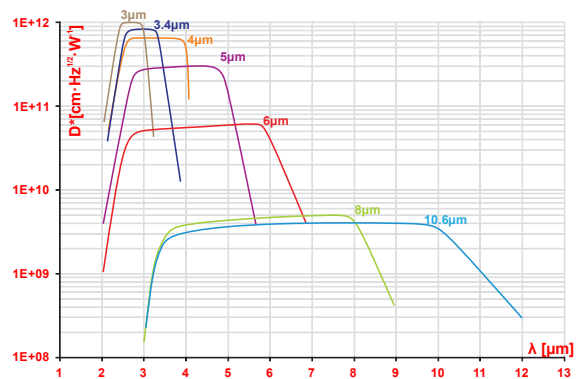
PVI-2TE



PVI-3TE



PVI-4TE



^{*)}Example of D^* vs wavelength λ for HgCdTe detectors.
Spectral characteristics of individual detectors may vary from those shown on the chart.



MIP preamplifier



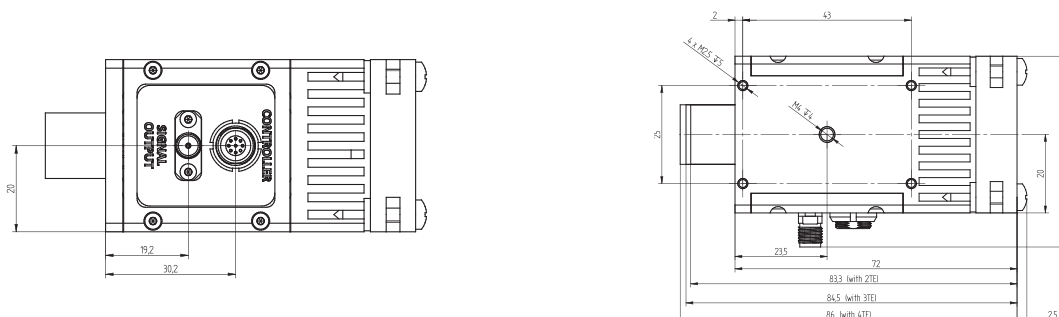
MIP is the transimpedance, AC or DC coupled preamplifier, intended to operation with either biased or non-biased detectors. It is dedicated for benchtop applications and recommended to laboratory usage. Medium-size preamplifier is convenient device with internal built-in heat sink. MIP is integrated into package type F which is equipped with fan and does not require any additional heat sink. MIP is one of the most user-friendly preamplifier which surely facilitate work.

Code description

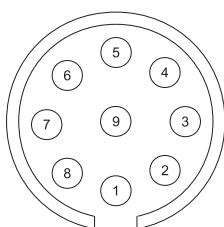
MIP - 1k - 100M - F - M4				
VIGOpreamplifiertype MIP	Lowcut-of ffrequency f_{lo} [Hz]: DC 10 100 1k 10k	Highcut-of ffrequency f_{hi} [Hz]: 100k 300k 1M 10M 20M 50M 100M 250M	Package: F - withfan	Mountinghole: M4 - M4 mounting hole M8 - M8x1 mounting hole

see the preamplifier specification table for additional information

Dimensions [mm]



Power supply and TEC control connector - LEMO connector female



Pin number	Symbol	Function
1	FAN +	FAN (+)
2	TH2	thermistor output (2)
3	TEC-	TEC supply input (-)
4	$-V_{sup}$	power supply input (-)
5	GND	power ground
6	$+V_{sup}$	power supply input (+)
7	TEC +	TEC supply input (+)
8	TH1	thermistor output (1)
9	DATA	data pin

Preamplifier type	Main feature	Detector package	Detector type	Detector cooling	Radiator, cooling, TEC controlling	Input noise voltage density	Input noise current density	Low cut-off frequency
						$e_n \left[\frac{nV}{\sqrt{Hz}} \right]$	$i_n \left[\frac{pA}{\sqrt{Hz}} \right]$	$f_{lo} [Hz]$
VIP	standalone	BNC	PV, PVI, PVM, PVMI	uncooled	not needed	0.97 – 8.0 ¹⁾	0.02 – 3.5 ¹⁾	DC, 10, 100, 1k, 10k
μIP	micro-size	TO39	PC, PCI, PV, PVI, PVM, PVMI	uncooled	not needed	0.97 – 8.0 ¹⁾	0.02 – 3.5 ¹⁾	DC, 10, 100, 1k, 10k
QIP	four-channel	TO8	PCQ, PVQ, PVMQ	uncooled	on board radiator and TEC controller, fan	0.97 – 8.0 ¹⁾	0.02 – 3.5 ¹⁾	DC, 10, 100, 1k, 10k
SIP	ultra-small, OEM	TO39 TO8	PC, PCI, PV, PVI, PVM, PVMI	uncooled 2TE, 3TE, 4TE	external heatsink needed	0.97 – 8.0 ¹⁾	0.02 – 3.5 ¹⁾	DC, 10, 100, 1k, 10k
FIP	very fast	TO8	PC, PCI, PV, PVI, PVM, PVMI	2TE, 3TE, 4TE	on board radiator, fan	1.1	5.0	1k, 10k
MIP	standard	TO8	PC, PCI, PV, PVI, PVM, PVMI	2TE, 3TE, 4TE	on board radiator, fan	0.97 – 8.0 ¹⁾	0.02 – 3.5 ¹⁾	DC, 10, 100, 1k, 10k
PIP	programmable	TO8	PC, PCI, PV, PVI, PVM, PVMI	2TE, 3TE, 4TE	on board radiator, fan	0.95	4.5 7.0	DC/10
AIP	on board TEC controller	TO8	PC, PCI, PV, PVI, PVM, PVMI	2TE, 3TE, 4TE	on board radiator and TEC controller, fan	0.97 – 8.0 ¹⁾	0.02 – 3.5 ¹⁾	DC, 10, 100, 1k, 10k

1) noise measurement frequency $f_0 = 10kHz$

2) first stage transimpedance = $1k\Omega$

3) first stage transimpedance = $5k\Omega$

4) transimpedance range $\frac{K_{imax}}{K_{imin}}$ up to 5 (dependent on f_{hi})

5) $f_{hi} \leq 1MHz$, load resistance $R_L = 1M\Omega$

6) $f_{hi} > 1MHz$, load resistance $R_L = 50\Omega$

High cut-off frequency	Transimpedance	Output impedance	Output voltage swing	Output voltage offset	Power supply voltage	Power supply current	Supply connector	Signal output
$f_{hi}[Hz]$	$K_i \left[\frac{V}{A} \right]$	$R_{out}[\Omega]$	$V_{out}[V]$	$V_{off}[mV]$	$V_{sup}[V]$	$I_{sup}[mA]$		
100k, 300k, 1M, 5M, 10M, 20M	fixed up to 1.0×10^5	50	$\pm 10^{5j}$ $\pm 2^{6j}$	max $\pm 20^{9j}$	$\pm 15^{12j}$ $\pm 9^{13j}$	max ± 25	DB9	BNC
100k, 300k, 1M, 5M, 10M, 100M, 200M	fixed up to 1.0×10^5	50	$\pm 2^{5j}$ $\pm 1^{6j}$	max $\pm 20^{9j}$	± 9	max ± 50	MOLEX1x3	MMCX
100k, 300k, 1M, 5M, 10M, 100M	fixed up to 2.0×10^5	50	$\pm 2^{5j}$ $\pm 1^{6j}$	max $\pm 20^{9j}$	+5	max ± 50	DC 2.1/5.5	4xMCX
100k, 300k, 1M, 5M, 10M, 100M, 250M	tunable ^{4j} up to 1.0×10^5	50	$\pm 10^{5j}$ $\pm 1^{6j}$	max $\pm 20^{9j}$	$\pm 15^{12j}$ $\pm 9^{13j}$	max ± 50	AMP2x4	MMCX
1G	fixed up to 8.5×10^3	50	± 1	-	+12/-5	+100 -50	LEMO	SMA (DC monitor as an option)
100k, 300k, 1M, 5M, 10M, 100M, 250M	fixed up to 2.0×10^5	50	$\pm 10^{5j}$ $\pm 2^{7j}$ $\pm 1^{8j}$	max $\pm 20^{9j}$	$\pm 15^{12j}$ $\pm 9^{13j}$	max ± 50	LEMO	SMA
150k/1.5M/20M 1.5M/15M/200M	digitally adjustable 500 – 30k ^{2j} 2.5k – 150k ^{3j}	50	± 1	max $\pm 20^9$ (DC) max ± 10 (AC)	± 9	typ ± 80 max ± 100	LEMO	SMA
100k, 300k, 1M, 5M, 10M, 100M, 250M	fixed up to 2.0×10^5	50	$\pm 2^{5j}$ $\pm 1^{6j}$	max $\pm 20^{9j}$	+5 ^{10j} +12 ^{11j}	max ± 50	DC 2.1/5.5	2xSMA (DC monitor as an option)

^{7j} $1MHz < f_{hi} \leq 20MHz$, load resistance $R_L=1M\Omega$

^{8j} $20MHz < f_{hi} \leq 250MHz$, load resistance $R_L=50M\Omega$

^{9j} Measured with equivalent resistor at the input instead of the detector. It's to avoid the environmental thermal radiation's impact

^{10j} with uncooled, 2TE and 3TE detectors

^{11j} with 4TE detectors

^{12j} $f_{hi} \leq 1MHz$

^{13j} $f_{hi} > 1MHz$

PTCC-01 – Programmable “smart” TEC controller



PTCC-01 is the programmable, precision, low noise, thermoelectric cooler controller, intended to operate with VIGO IR detection modules. It is compatible with both classic (MIP, SIP, FIP) and new, programmable PIP preamplifiers.

Available options:

PTCC-01-OEM

- TE C controller with built-in power supply, without housing
- configurable by PC software
- status LED indicator and status/data connector

PTCC-01-BAS

- TEC controller with built-in power supply, encapsulated in a small package
- configurable by PC software
- status LED indicator

PTCC-01-ADV

- TEC controller with built-in power supply, encapsulated in a small package
- configurable by built-in function keys or PC software
- user interface: LCD and buttons

Specification

Parameter	Value
Temperature stability [K]	± 0.01 ($T_{\text{det}} = 233\text{K}$ (-40°C), $T_{\text{det}} = 0.1\text{K}$)
Temperature readout stability [mK]	max 1 ($T_{\text{det}} = 233\text{K}$ (-60°C), $T_{\text{det}} = 0.1\text{K}$)
Detector temperature settling time [s]	25 ($T_{\text{det}} = 233\text{K}$ (-40°C), $T_{\text{det}} = 0.1\text{K}$) 45 ($T_{\text{det}} = 233\text{K}$ (-60°C), $T_{\text{det}} = 0.1\text{K}$) 60 ($T_{\text{det}} = 233\text{K}$ (-80°C), $T_{\text{det}} = 0.1\text{K}$)
Maximum TEC current [A]	1.2 (2TE) 0.45 (3TE) 0.45 (4TE)
Output voltage range [V]	min 3, max 14.5
Output current of the built-in power supply [mA]	± 200 (output voltage: 3...14.5V)
Power supply voltage V_{sup} [V]	min 9, max 16 (wider range available upon request)
Power supply current I_{sup} [mA]	500 ($I_{\text{TEC}} = 0.45\text{A}$, $U_{\text{TEC}} = 7.5\text{V}$)
Series resistance of the connecting cable [$\text{m}\Omega$]	1000 (total resistance of the wires supplying TEC element)
Storage temperature [$^{\circ}\text{C}$]	from -20 to $+70$
Ambient temperature [$^{\circ}\text{C}$]	from $+5$ to $+45$
Relative humidity [%]	from 10 to 90 (from $+5^{\circ}\text{C}$ to $+35^{\circ}\text{C}$) from 10 to 50 ($> +35^{\circ}\text{C}$)

Code description

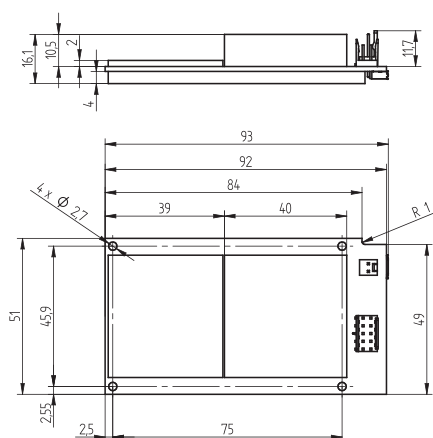
PTCC-01-BAS

VIGO thermoelectric cooler controller

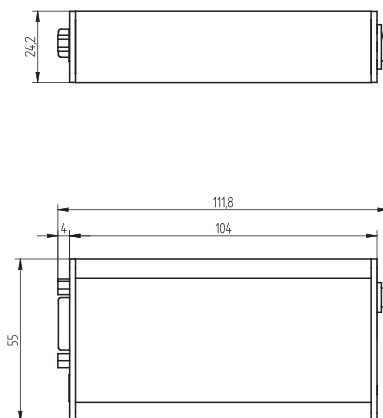
Version:
 OEM - without package
 BAS - Basic - with package
 ADV - Advanced - with package, function buttons and LCD

Dimensions [mm]

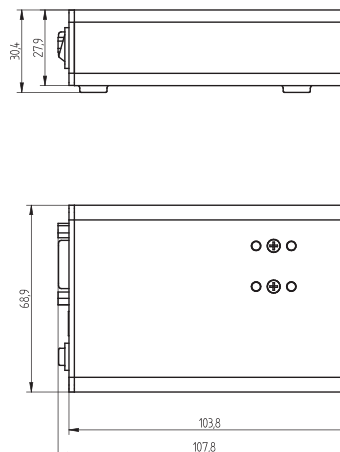
PTCC-01-OEM



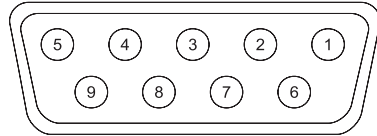
PTCC-01-BAS



PTCC-01-ADV



Power supply and control connector (PTCC-01-BAS and PTCC-01-ADV) - DB9 connector female



Pin number	Symbol	Function
1	TEC+	TEC supply output (+)
2	TEC-	TEC supply output (-)
3	GND	power ground
4	TH1	thermistor input (1)
5	TH2	thermistor input (2)
6	-V _{sup}	power supply output (-)
7	+5V	FAN and programmable preamp internal logic auxiliary supply
8	DATA	bidirectional data port
9	+V _{sup}	power supply output (+)
metal cover	GND-SH	shield

Power supply connector (PTCC-01-OEM) - KK2 connector male



Pin number	Symbol	Function
1	TECC+	TEC controller supply input (+)
2	TECC GND	TEC controller power ground

Control connector (PTCC-01-OEM) - DUBOX2x5 connector male



Pin number	Symbol	Function
1	TEC+	TEC supply output (+)
2	TEC-	TEC supply output (-)
3	GND	power ground
4	TH1	thermistor input (1)
5	TH2	thermistor input (2)
6	-V _{sup}	tower supply output (-)
7	+5V	FAN and PIP preamp internal logic auxiliary supply
8	DATA	bidirectional data port
9	+V _{sup}	power supply output (+)
10	GND-SH	shield

Status/DATA connector (PTCC-01-OEM) - Pin Header 1x7



Pin number	Symbol	Function
1	ERR - LED	error indicator
2	LOCK - LED	temperature control loop lock indicator
3	SUP - LED	module power supply on indicator
4	3.3 V	auxiliary supply
5	TXD	transmitted data (RS-232)
6	GND	common (signal) ground (RS-232)
7	RXD	received data (RS-232)