BostonElectronics

VS11 Detector Set

Sensitive, fast LWIR set for <2 to 10.6+ microns with laboratory transimpedence preamplifer, 10 Hz to 5 MHz bandwidth.

- PCI-3TE-10.6-1x1
- MIP-10-5M-F-M4
- PTCC-01-BAS

PCI-3TE

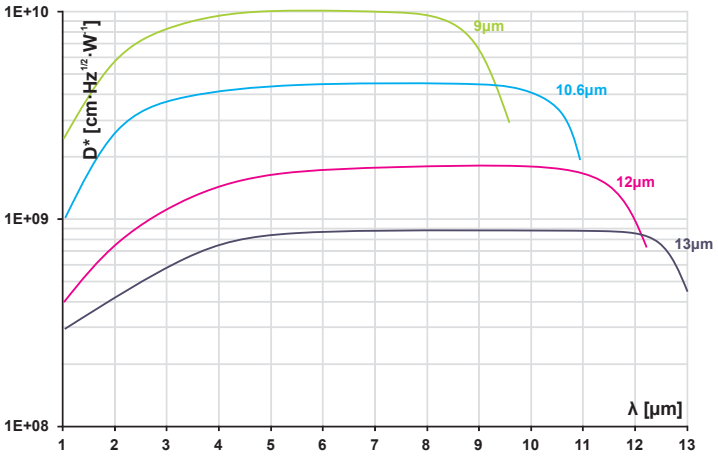
2-13 μm IR PHOTOCONDUCTORS THERMOELECTRICALLY COOLED OPTICALLY IMMERSED

The **PCI-3TE-λ_{opt}** photodetectors series (λ_{opt} – optimal wavelength in micrometers) featureIR photoconductive detector on three-stage thermoelectrical cooler, optically immersed to high refractive index GaAs hyperhemispherical (standard) or hemispherical or any intermediate lens (as option) for different acceptance angle and saturation level.

Detector code description

PCI - 3TE - 10.6 - 1x1 - TO8 - wAI203 - 35

- PCI: VIGO detector type (I - optical immersion)
- 3TE: Cooling
- 10.6: Optimal wavelength
- 1x1: Optical area
- TO8: Detector package
- wAI203: Window
- 35: FOV



Example of D vs Wavelength λ for PC Series HgCdTe Detectors. Spectral Characteristics of individual detectors may vary from those shown on the chart.*

Features:

- High performance in the 2 to 13 μm range
- Fast response
- Convenient to use
- Wide dynamic range
- Compact, rugged and reliable
- Low cost
- Prompt delivery
- Custom design upon request

IR Detector Specification @20°C

Detector type	Cooling, operating temperature $T\,[K]$	Optimal wavelength *) $\lambda_{opt}\,[\mu m]$	Detectivity **) $D^*\left[\frac{cm\cdot\sqrt{Hz}}{W}\right]$ @λ_{peak}, 20kHz	Detectivity **) $D^*\left[\frac{cm\cdot\sqrt{Hz}}{W}\right]$ @λ_{opt}, 20kHz	Current responsivity length product @λ_{opt} $R_i\cdot L\left[\frac{A\cdot mm}{W}\right]$	Time constant $\tau\,[ns]$	1/f noise corner frequency $f_c\,[kHz]$	Bias voltage length ratio $\frac{V_b}{L}\left[\frac{V}{mm}\right]$	Sheet resistance $R_{sq}\,[\Omega]$	Acceptance angle $\varnothing\,[^\circ]$ $\frac{1}{2NA}$	Optical area ***) $[mm\times mm]$	Package	Window ****)
PCI	three-stage TE-cooled (3TE), ~210	9	≥1.0×10^{10}	≥6.2×10^{9}	≥0.7	≤60	≤20	≤2.4	≤400	~36, 1.62	0.25×0.25 0.5×0.5 1×1	TO8, TO66	wedged ZnSe AR coated
		10.6	≥4.5×10^{9}	≥2.5×10^{9}	≥0.17	≤20		≤1.8	≤300				
		12	≥1.8×10^{9}	≥9.0×10^{8}	≥0.07	≤5		≤1.8	≤300				
		13	≥9.0×10^{8}	≥4.5×10^{8}	≥0.03	≤4		≤1.8	≤300				

*) *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*

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.

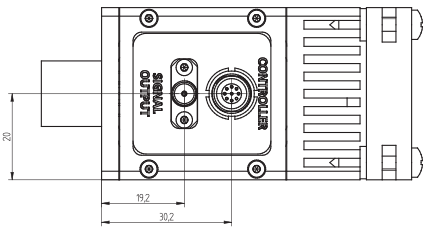
Code description

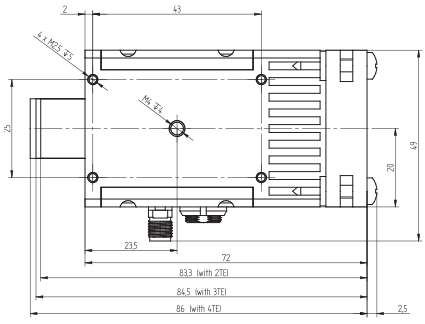
MIP - 10 - 5M - F - M4

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

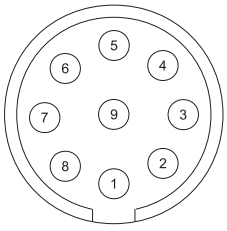
see the preamplifier specification table for additional information

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	±10[5] ±2[6]	max ±20[9]	±15[12] ±9[13]	max ±25	DB9	BNC
100k, 300k, 1M, 5M, 10M, 100M, 200M	fixed up to 1.0×10^5	50	±2[5] ±1[6]	max ±20[9]	±9	max ±50	MOLEX1×3	MMCX
100k, 300k, 1M, 5M, 10M, 100M	fixed up to 2.0×10^5	50	±2[5] ±1[6]	max ±20[9]	+5	max ±50	DC 2.1/5.5	**4×MCX**
100k, 300k, 1M, 5M, 10M, 100M, 250M	tunable[4] up to 1.0×10^5	50	±10[5] ±1[6]	max ±20[9]	±15[12] ±9[13]	max ±50	AMP2×4	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	±10[5] ±2[7] ±1[8]	max ±20[9]	±15[12] ±9[13]	max ±50	LEMO	SMA
150k/1.5M/20M 1.5M/15M/200M	digitally adjustable 500 – 30k[2] 2.5k – 150k[3]	50	±1	max ±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	±2[5] ±1[6]	max ±20[9]	+5[10] +12[11]	max ±50	DC 2.1/5.5	2×SMA (**DC monitor as an option**)

7) $1MHz < f_{hi} \leq 20MHz$, *load resistance* $R_L = 1M\Omega$
8) $20MHz < f_{hi} \leq 250MHz$, *load resistance* $R_L = 50M\Omega$
9) *Measured with equivalent resistor at the input instead of the detector. It's to avoid the environmental thermal radiation's impast*
10) *with uncooled,* 2TE *and* 3TE *detectors*
11) *with* 4TE *detectors*
12) $f_{hi} \leq 1MHz$
13) $f_{hi} > 1MHz$

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_{det}=233K (-40°C), T_{det}=0.1K)
Temperature readout stability [mK]	max 1 (T_{det}=233K (-60°C), T_{det}=0.1K)
Detector temperature settling time [s]	25 (T_{det}=233K (-40°C), T_{det}=0.1K) 45 (T_{det}=233K (-60°C), T_{det}=0.1K) 60 (T_{det}=233K (-80°C), T_{det}=0.1K)
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_{TEC}=0.45A, U_{TEC}=7.5V)
Series resistance of the connecting cable [mΩ]	1000 (total resistance of the wires supplying TEC element)
Storage temperature [°C]	from -20 to +70
Ambient temperature [°C]	from +5 to +45
Relative humidity [%]	from 10 to 90 (from +5°C to +35°C) from 10 to 50 (>+35°C)

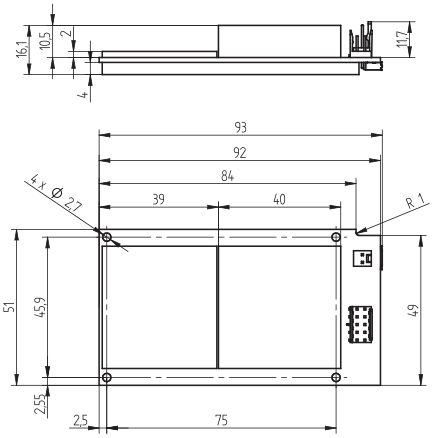
Code description

PTCC-01-BAS

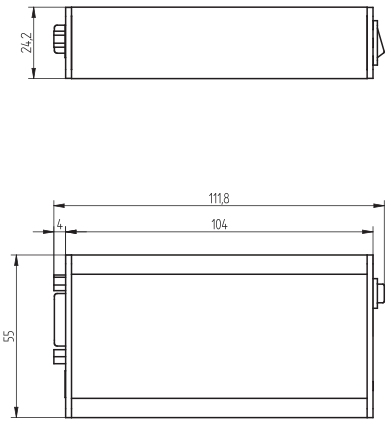
- VIGO thermoelectric cooler controller
- Version:
  - OEM - without package
  - BAS - Basic - with package
  - ADV - Advanced - with package, function buttons and LCD

Dimensions [mm]

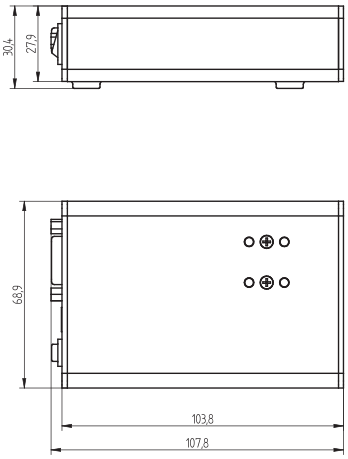
PTCC-01-OEM



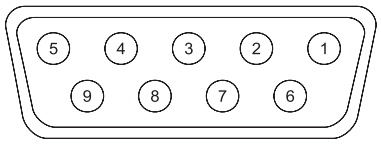
PTCC-01-BAS



PTCC-01-ADV

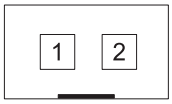


Power supply and control connector (PTCC-01-BAS and PTCC-01-ADV) - DB9 connector female



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

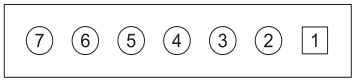


Pin number	Symbol	Function
1	TECC+	TEC controller supply input (+)
2	TECC GND	TEC controller power ground

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)