



Model HPPD-M-B

TEC-cooled HgCdTe(MCT) Amplified Photodetector

User's Manual



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Ningbo Healthy Photon Technology Co., Ltd.

Safety

Thank you for using Healthy Photon's MCT Photodetector.

Please read this manual carefully before using this product.

All statements and technical parameters involved in this document are only applicable to a safe working environment and standard operating methods. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Caution:

- ◆ Use proper protections to avoid electrostatic discharges (ESD) in storage, transport, and use.
- ◆ Mount the unit in a position that does not block airflow to the fan and heat sink!
- ◆ Make sure that the cooling fan is working properly at the moment you turn on the power. If it doesn't work, Please turn off the power quickly and contact us.
- ◆ Do not touch the surface of the window with hard, rough or sharp objects which will cause irreparable damage to the detection chip!
- ◆ Make sure the load impedance of the detector is high If the output is DC coupled. Otherwise, the excessive output current will easily damage the output driver of the HPPD.
- ◆ Avoid exposure to spray, liquids, or solvents! The product is not water resistant.
- ◆ For best results, allow the unit to warm up for about 10 minutes.

Environmental protection requirements

Electronic product waste will release some toxic substances. For environmental protection and the safety of other people's lives, wastes need to be appropriately disposed of in accordance with the relevant rules and



regulations on waste disposal. Do not dispose of the unit in a litter bin or at a public waste disposal site.



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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.



Contents

Safety.....	- 2 -
1. Description.....	- 6 -
1.1 Introduction.....	- 6 -
1.2 Specifications.....	- 6 -
1.2.1 Technical Data.....	- 6 -
1.2.2 Code Description.....	- 7 -
2. Parts List.....	- 9 -
3. Operation.....	- 10 -
3.1 Panel description.....	- 10 -
3.2 Operation Procedures.....	- 10 -
4. Mechanical Drawings.....	- 13 -
5. Maintenance and Service.....	- 14 -
5.1 Maintenance.....	- 14 -
5.2 Service.....	- 14 -
Appendix.....	- 15 -



1. Description

1.1 Introduction

The mid-infrared photodetector is a photoelectric sensitive device based on mercury-cadmium telluride material (HgCdTe, also called MCT). This material is sensitive to light waves in the mid-infrared spectral band of 2-14 μ m. The HPPD detector can use DC or AC coupling (AC coupling by default). The detector is mounted on a thermoelectric cooler in which refrigeration stage numbers are selected by the customer and factory set to cool the detector at a very low temperature with a thermistor providing feedback. Thereby minimizing the effects of thermal noise on the output signal. To effectively reduce the influence of environmental radiation on the output signal, the detector housing uses a shielded aluminum alloy. More importantly, the HPPD-M-B detector integrates low-noise op-amps with TEC control circuits, which greatly facilitates customer operation and use.

Caution:

For best results, do not block, limit airflow, or stop the cooling fan. Without the fan, the TEC current will operate at its limit and the detector element will no longer be temperature stabilized. Offsets will increase and fluctuate, and output noise will increase.

1.2 Specifications

1.2.1 Technical Data

Detector Specifications	
Detector Material	MCT (HgCdTe)
Wavelength Range	2 – 12 μ m — Note
Transimpedance	15000 V/A
Output Bandwidth	0-100 kHz (DC coupling) 5 Hz-100 kHz (AC coupling)



Output Voltage	+5 V (DC coupling) ±2.5 V (AC coupling)
Output Impedence	50 Ω
Power Supply	+5 VDC/3A
Max Output Current	20 mA
Load Impedance	High Z (DC coupling) 50 Ω to High Z (AC coupling)
Output Voltage Offset	20 mV (45 mV Max)
Electrical Output	SMA
Operation Temperature	10 – 40 °C
Storage Temperature	-25 – 70 °C
Dimensions	60 × 60 × 63.5 mm ³
Weight	0.227 kg

Note:

1. Optimal response parameters depend on user selection of detector chips.
2. The detector is AC coupled by default.

1.2.2 Code Description

HPPD - X_① - X_② - XX_③ - XX_④ - XX_⑤

① =A	Ambient detector without TEC driver
① =M	Multi-stage cooling detector with TEC driver (default)
② =A	DC-coupling output
② =B	AC-coupling output(default)
③ =02,03...	Peak Wavelength;02 means the peak wavelength is 2 μm,03 means the peak wavelength is 3 μm...



④ =05,10...	Active area;05 means the active area is $0.5*0.5\text{mm}^2$,10 means the active area is $1*1\text{mm}^2$...
⑤ =01,02 ...	Transimpedance gain; 01 means the gain is 1 kV/A, 02 means the gain is 2 kV/A...default is 15kV/A.

For example:

HPPD-M-B-08-10-10

The code describes a TEC-cooled MCT photodetector that has an active area of 1.0mm^2 and a cut-off wavelength of $8\mu\text{m}$, and is AC-coupled with a transimpedance gain of 10k V/A.

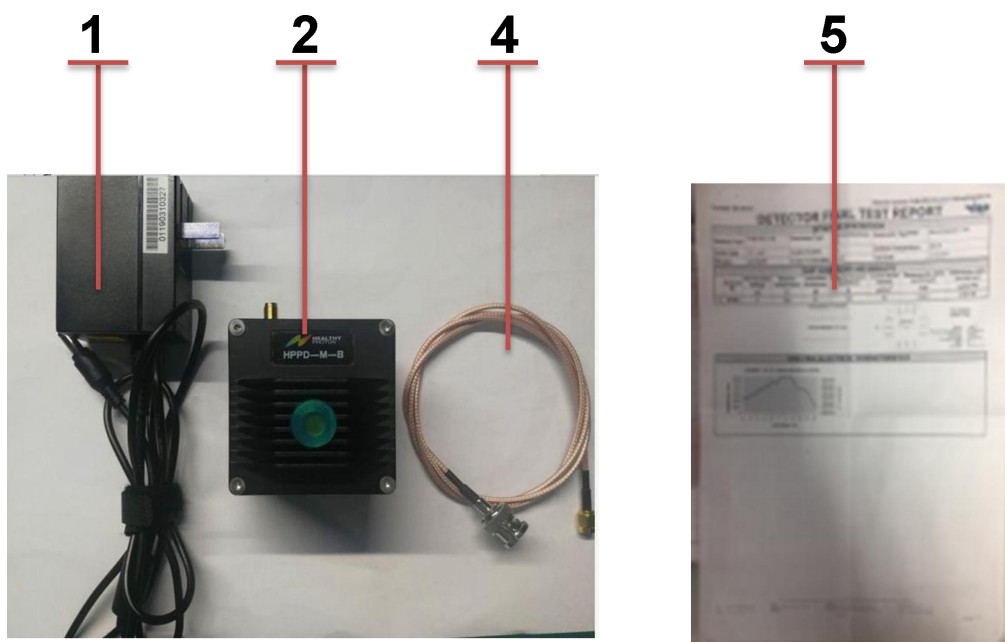
Cautions:

- ◆ The above product specifications are subject to change without notice.
- ◆ Please consult the detector parameters before purchasing.



2. Parts List

Item	Name	Description	Quantity
1.	Power Adapters	IN:50-60Hz/100-240VAC OUT: +5VDC/3A	1
2.	Photodetector	-	1
3.	User's Manual	-	1
4.	Signal Cable	SMA to BNC Length = 1 m	1
5.	Factory Test Report	-	1



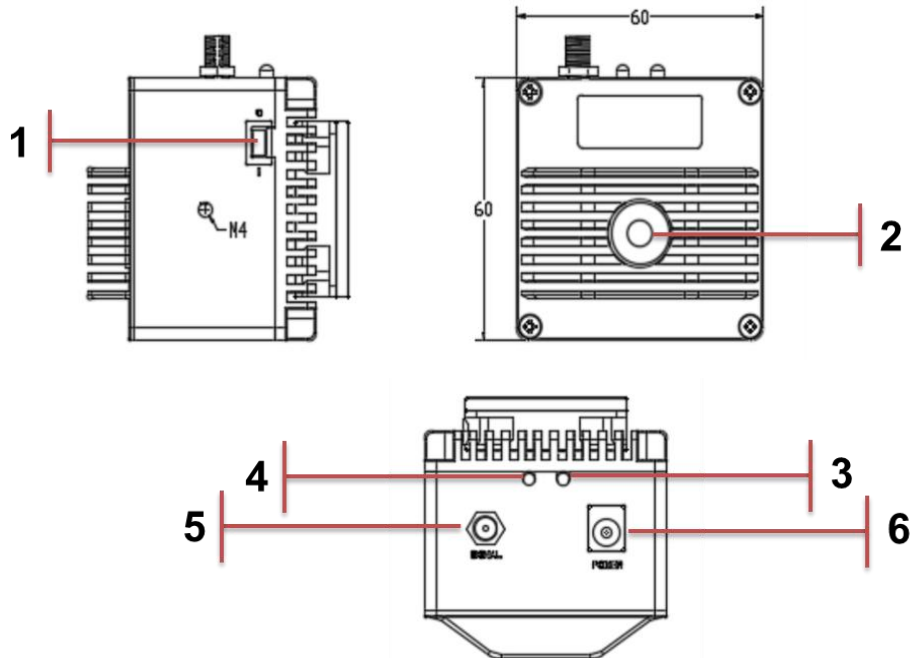
Cautions:

- ◆ Check for mechanical damage or screw loose due to possible improper handling during shipment.
- ◆ Make sure the items supplied, and the information on the test report corresponds to the ordering information.
If you find any problem, please contact the distributor immediately.



3. Operation

3.1 Panel description



Number	Name	Function
1	Power Toggle Switch	I=ON, O=OFF
2	Sensor	detect light signals
3	Power Indicator LED	power supply on indicator
4	Temperature Indicator LED	temperature control loop lock indicator
5	SMA Connector	signal output (AC-coupling by default)
6	Power Supply Connector	+5VDC/3A

3.2 Operation Procedures

1. Unpack the photodetector and accessories.
2. Mount the photodetector on an optical table using the M4 threaded holes.

Cautions:



- ◆ Mount the photodetector in a position that does not block airflow to the fan and heat sink!
 - ◆ Do not touch the window with hard, rough or sharp objects which will cause irreparable damage to the detection chip!
 - ◆ Do not touch the window with your hand!
3. Plug the power connector cable into the power supply connection socket on the HPPD-M-B.
 4. Plug the power supply into a 50 - 60 Hz, 100 - 240 VAC outlet.

Caution:

- ◆ All connectors must be connected carefully and firmly.
5. Turn the power switch to I. The power indicator LED on the side of the photodetector indicates the correct power supply.

Caution:

- ◆ Make sure that the cooling fan is working properly at the moment you turn on the power. If it doesn't work, Please turn off the power quickly and contact us.
6. Wait until the detector operating temperature is reached and stabilized. Ready state will be indicated by the temperature indicator green LED light.

Caution:

- ◆ Allow a minute for the TEC controller to stabilize the temperature. For best results, allow the unit to warm up for about 10 minutes.
7. Install any desired optics, adapters, or fiber adapters in front of the input aperture.
 8. Attach a 50 Ω coaxial cable to the output SMA connector of the HPPD-M-B while the other end is connected to the oscilloscope. Start a measurement to make sure the detector is working properly.

Caution:

- ◆ Make sure the load impedance of the detector is high If the output is DC coupled. Otherwise, the excessive output current will damage the output driver of the HPPD.



9. Turn the power switch to O after finishing the measurement.

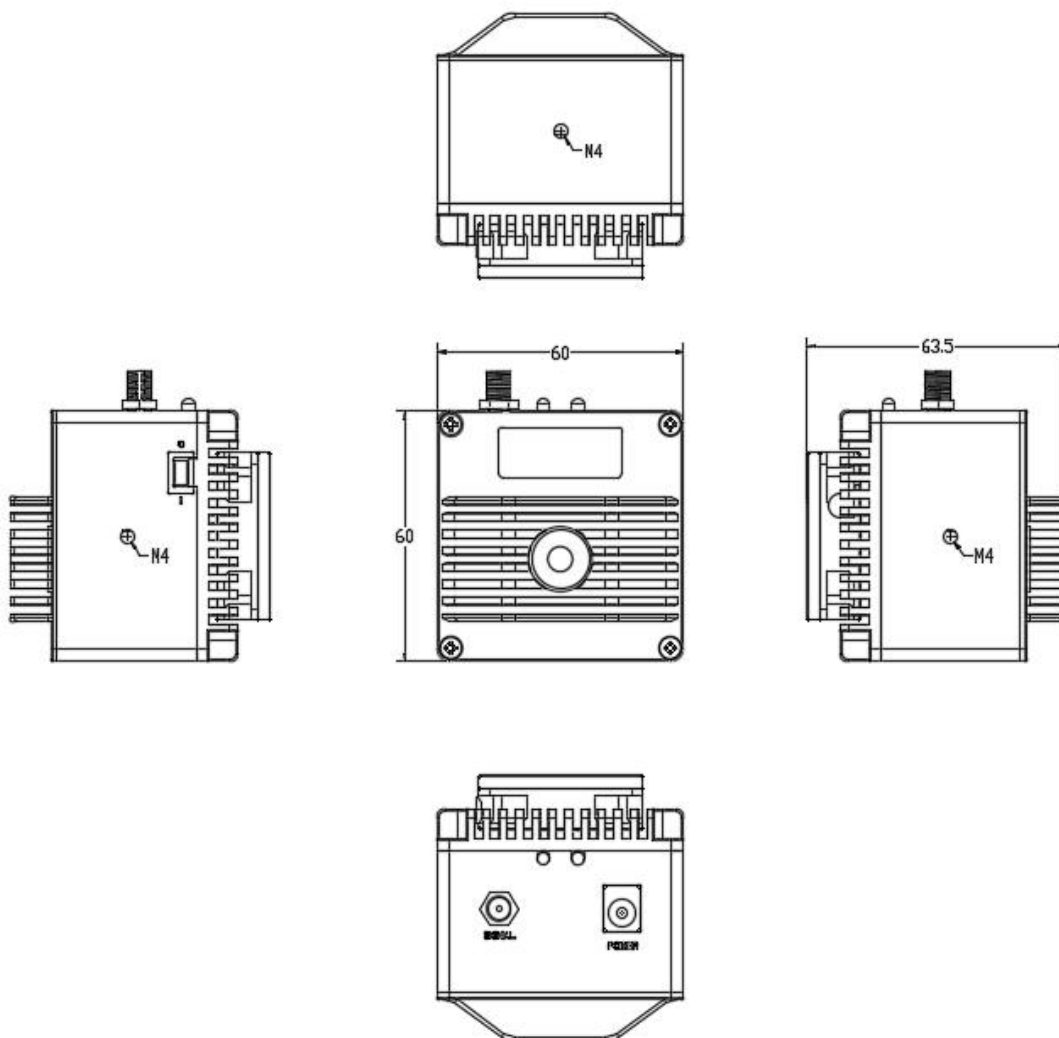
Cautions:

- ◆ Use proper protections to avoid electrostatic discharges (ESD).
- ◆ Avoid exposure to spray, liquids, or solvents! The product is not water resistant.



4. Mechanical Drawings

Unit: mm





5. Maintenance and Service

5.1 Maintenance

The HPPD-M-B is a sensitive photodetector. Handle with great care. HPPD-M-B housing may be cleaned by wiping with a soft damp cloth. The window of the photodetector should only be cleaned using optical grade wipes.

Cautions:

- ◆ Do not open the housing. There are no user-serviceable parts inside!
- ◆ Please be very careful when cleaning the window.

5.2 Service

Please contact us, or the distributor for technical support and product selection.

Contact us:

Web: <http://en.healthyphoton.com>

TEL: +86-574-88357326

Email: info@healthyphoton.com

All repairs or services require the user to provide the product serial number or repair number. If no serial number or repair number, services would be rejected.



Appendix

Healthy Photon Amplified MCT Test Report



Date	Note
2019/5	V1.0



AMPLIFIED MCT PD TEST REPORT

DETECTION MODULE		
Preamplifier Model	M-A-08-10-15	
Detector type	PV8-TE	
Preamplifier Power Supply	+5V, 3A	
TEST CONDITIONS AND RESULTS		
Parameter	Unit	Value
Trans-impedance @ $R_{load}=1M\Omega$	V/A	15 k
Low Cut-off Frequency	Hz	0
High Cut-off Frequency	kHz	100
Output Noise Density @200kHz	nV/\sqrt{Hz}	100
Voltage Responsivity $\pm 20\%$ (8um)	V/W	5.2E+2
Detectivity $\pm 20\%$ (8um)@200kHz	$cm\sqrt{Hz}/W$	6.1E+8
Detector temperature	K	223

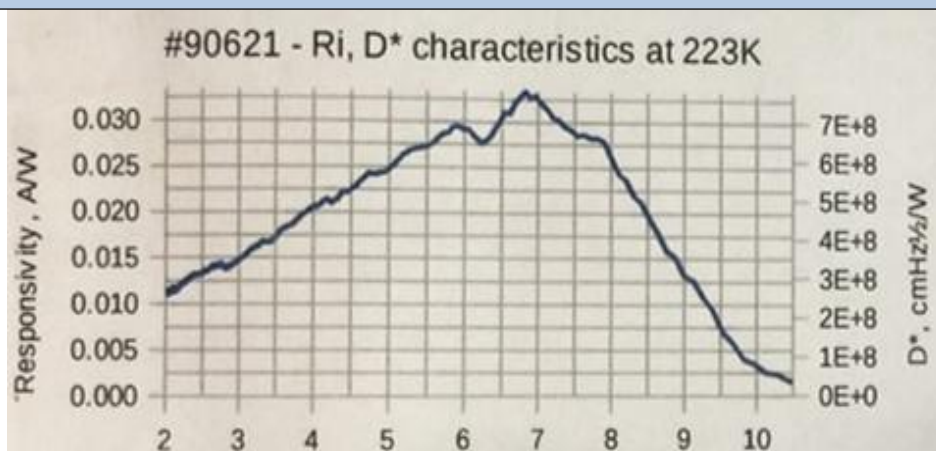
DETECTOR HEAD TEST REPORT

DETECTOR DESCRIPTION							
Active Area	1mm ×1mm	Cooler Current	1.00A	Ambient Temperature	293 K		
Window	wZnSeAR	Cooler Current Max	1.20A	Test Date	10.6.2019		
TEST CONDITIONS AND RESULTS							
Detector No	Reverse Bias Voltage	Detector Temperature	Thermistor Resistance	Detector Dynamic Resistance	Current Noise Density	Responsivity $\pm 20\%$ (8um)	Detectivity $\pm 20\%$ (8um)
	mV	K	K Ω	Ω	pA/Hz ^{1/2}	A/W	cmHz ^{1/2} /W
90621	0	223	91	669	8.051	0.026	6.1E+8

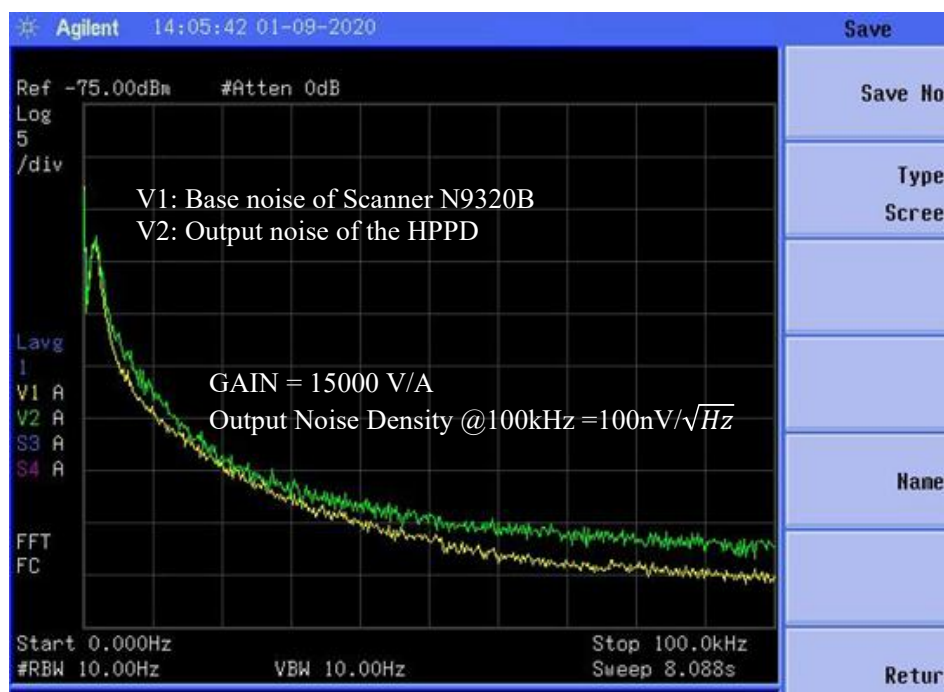
测试人员	
测试日期	2019年6月10日



SPECTRAL/ELECTRICAL CHARACTERISTICS



OUTPUT ELECTRONIC NOISE SPECTRA



测试人员	
测试日期	2019年6月10日