

1.3.7 OEM Solutions

Introduction

Many laser systems manufacturers need to have a measuring capability built into their systems.

Ophir is the world's leading supplier of OEM laser power/energy measurement instrumentation which can be built into host systems (such as medical, industrial, etc). With extensive experience accumulated in the field, Ophir offers the largest variety of OEM products and is therefore best able to satisfy customer requirements.

Many configurations possible

An OEM solution is usually needed to monitor laser performance in the system, and possibly to provide fast feedback for system control. Depending on your application, various configurations can be used, such as:

- Just a sensor, with raw analog output
- Sensor with electronics providing an amplified – or digital - output
- Complete instrument, including numeric display and/or PC interface
- Custom designed solution for special requirements

In the following pages, you will see a range of "standard" OEM sensors available; these are actually families of existing OEM sensors with typical specifications shown. They can be tailored as needed to fit your specific requirements.

In addition to the products described below, Ophir has developed hundreds of other OEM solutions. Simply contact your Ophir representative who is likely to have just the right solution to your needs.

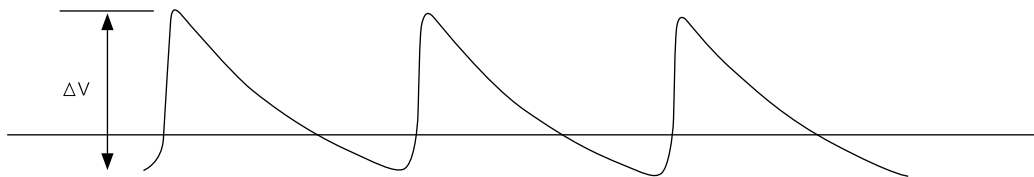


Standard Pyroelectric OEM Sensors - Introduction

Ophir manufactures three main types of pyroelectric OEM sensors:

- Low profile pyro sensors with no electronics with a BNC output to connect to the host electronics. These sensors can also be connected to an oscilloscope to measure pulse energy. Since the energy of pyro sensors is proportional to the peak to valley voltage output and not the maximum voltage output, the user has to take this into account in designing the electronic interface (see below).
- Low profile smart sensors to be used with Ophir smart meters. These PE-RE type sensors have a Remote Electronics (RE) module to enable interface with the meter.
- Compact pyroelectric sensors with built-in amplifiers and signal conditioners which put out a voltage proportional to energy and hold this voltage for a preset period after each pulse (see below).

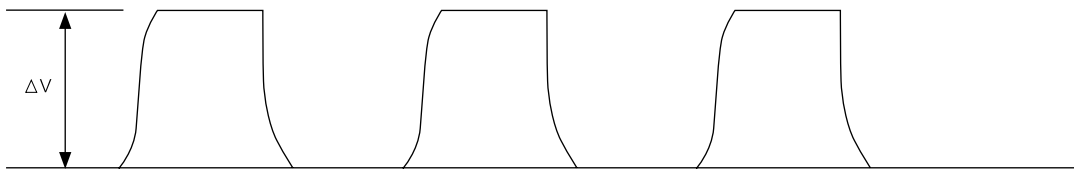
Typical output from a low-profile pyroelectric sensor appears as follows:



Ophir low profile pyroelectric sensor output for repetitively pulsing laser

In the example shown above using a low-profile sensor, note that energy is proportional to ΔV and not to the voltage above the zero level. Note also that the peak rapidly decays and therefore the output depends on pulse rate and duration. It follows therefore that in order to measure pyroelectric pulses, the voltage level must be known before the pulse and must also compensate for pulse rate (or work at a low enough pulse rate for the correction to be rendered negligible).

When using a sensor with built-in electronics, typical output appears as follows:



Output from Ophir pyroelectric OEM sensor with built-in signal conditioning

Note that the energy is now proportional to the output voltage and since the voltage is held for a fixed time, the output is much less dependent on pulse rate or duration.

In the above example, the user does not need to perform any signal conditioning but simply has to read the voltage level to determine the energy.

1.3.7.1 Standard OEM Pyroelectric Energy Sensors

2 μ J to 20mJ

Features

- Compact
- Low Profile
- Low Cost

PE10-S



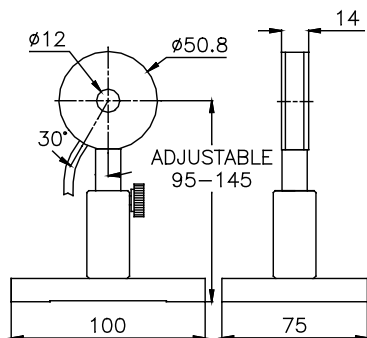
PE10-S-Q



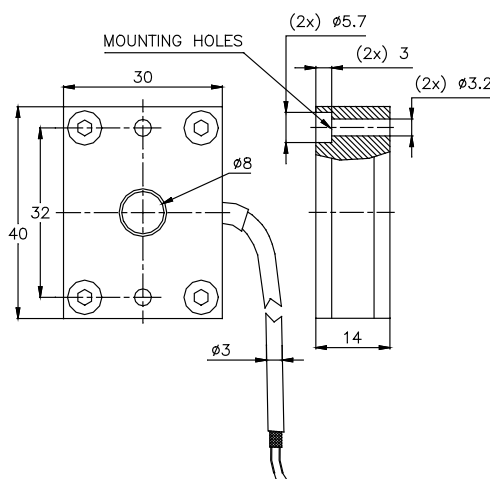
The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model Features	PE10-S High sensitivity and rep rate	PE10-S-Q Very compact
Aperture mm	12	8
Absorber Type	Metallic	Metallic
Spectral Range μm ^(a)	0.19-3	0.19-3
Surface Reflectivity % approx.	50	50
Calibration Accuracy +/- % ^(a)	3	3
Sensitivity (approx) at 1064nm	100V/J into 1M Ω	15V/J into 1M Ω and 5nF load
Max Pulse Width ^(b)	25 μs	500 μs
Maximum Pulse Rate pps ^(b)	400	100
Maximum Energy	20mJ	20mJ
Minimum Energy	2 μJ	2 μJ
Noise Equivalent Energy, approx	100nJ	100nJ
Output	BNC	Flying Leads
Damage Threshold J/cm ²		
<100nm	0.1	0.1
1 μs	0.2	0.2
300 μs	3	3
Maximum Average Power W	2	2
Maximum Average Power Density W/cm ²	50	50
Dimensions	$\varnothing 50.8 \times 14\text{mm}$	30 x 40 x 14mm
Part Number	Consult Ophir representative	Consult Ophir representative
Notes: (a)	At calibrated wavelength, standard 1064nm. Others on request.	
Notes: (b)	There is a trade off between repetition rate, sensitivity and maximum pulse width. If standard products are not suitable, these parameters can be tailored to customer requirements.	

PE10-S



PE10-S-Q



1.3.7.1 Standard OEM Pyroelectric Energy Sensors

0.1mJ to 10J

Features

- Compact
- Low Profile
- Low Cost
- With built-in electronics, for complete self-contained OEM solution with calibrated square pulse output

PE25-S / PE25BB-S

PE25-A-DIF-XXX-YYY^(c)

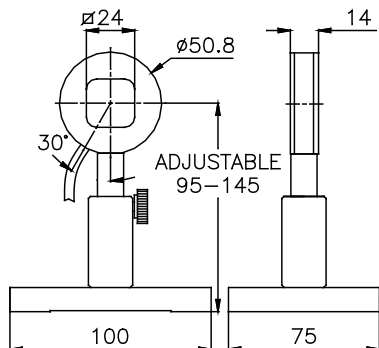
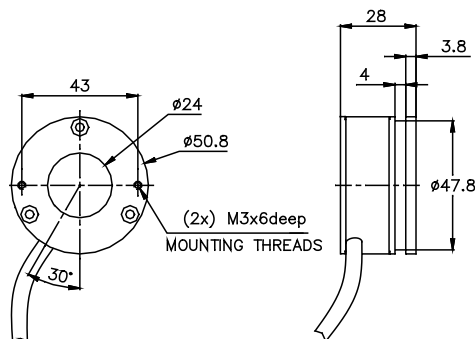
PE25BB-S-DIF



The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model	PE25-S	PE25BB-S	PE25BB-S-DIF	PE25-A-DIF-XXX-YYY ^(c)
Features	General purpose	Spectrally flat	High damage threshold	Built in amplifier. Output of calibrated square pulses
Aperture mm	24 x 24	24 x 24	φ 20	φ 24
Absorber Type	Metallic	Broadband	Broadband + diffuser	Metallic + diffuser
Spectral Range μm	0.19-3 ^(a)	0.19-20 ^(a)	0.4-3 ^(a)	0.4-3
Surface Reflectivity % approx.	50	10	15	15
Calibration Accuracy +/-%	3 ^(a)	3 ^(a)	3 ^(a)	3
Sensitivity (approx) at 1064nm	9V/J into 1MΩ	5.5V/J into 1MΩ	2V/J into 1MΩ at 2.9μm	
Max Pulse Width	300us ^(b)	1ms ^(b)	1ms ^(b)	3ms
Maximum Pulse Rate pps	40 ^(b)	20 ^(b)	20 ^(b)	1000
Frequency Dependence				<±2% to maximum frequency
Pulse Width Dependence				<±2% to maximum pulse width
Noise Equivalent Energy, approx	5μJ	50μJ	150μJ	
Output	BNC	BNC	BNC	Customer specified Volt/J into input impedance of >3kΩ ^(d)
Output Hold				Hold time can be specified by customer ^(e)
Calibration Adjustment				Trimpot accessible through back cover of sensor
Maximum Energy	10J	10J	10J	10J
Minimum Energy	0.1mJ	1mJ	3mJ	0.1mJ
Damage Threshold J/cm ²				
<100nm	0.1	0.3	3	1.5
1μs	0.2	0.3	3	3
300μs	2	1	10	8-100, depending on wavelength
Linearity with Energy				±2% for > 10% of full scale
Maximum Average Power W	10	10	30	50
Maximum Average Power Density W/cm ²	10	10	300	
Dimensions	Ø50.8 x 14mm	Ø50.8 x 14mm	Ø50.8 x 18mm	Ø50.8 x 28mm
Part Number	Consult Ophir representative			
Notes: (a)	At calibrated wavelength, standard 1064nm. Others on request.			
Notes: (b)	There is a trade off between repetition rate, sensitivity and maximum pulse width. If standard products are not suitable, these parameters can be tailored to customer requirements.			
Notes: (c)	XXX denotes the calibration wavelength in μm and the YYY denotes the calibrated sensitivity in V/J.			
Notes: (d)	Output voltage is limited to 1.5 volt less than input V+. For example if input voltage is +6V and sensitivity is 10V/J, then maximum pulse energy is limited to 4.5V = output of 0.45J.			
Notes: (e)	Accuracy of hold time is ±20%. Maximum hold time limited to 50% of duty cycle. At end of hold time, voltage drops to below 0.2V.			

PE25-S / PE25BB-S

PE25-A-DIF-XXX-YYY ^(c)

1.3.7.1 Standard OEM Pyroelectric Energy Sensors

1mJ to 10J

Features

- Large apertures
- Compact
- Low Profile
- Low Cost

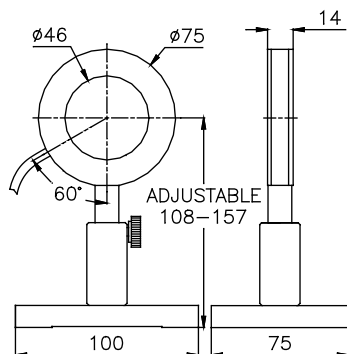
PE50-S / PE50BB-S



The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model Features	PE50-S Large aperture	PE50BB-S Large aperture, spectrally flat
Aperture mm	φ 46	φ 46
Absorber Type	Metallic	Broadband
Spectral Range μm ^(a)	0.19-3	0.19-20
Surface Reflectivity % approx.	50	5
Calibration Accuracy +/- % ^(a)	3	3
Sensitivity (approx) at 1064nm	2.5V/J into 1MΩ	1.8V/J into 1MΩ
Max Pulse Width ^(b)	800μs	2ms
Maximum Pulse Rate pps ^(b)	10	10
Maximum Energy	10J	10J
Minimum Energy	1mJ	10mJ
Noise Equivalent Energy, approx	20μJ	0.5mJ
Output	BNC	BNC
Damage Threshold for 10ns pulses J/cm ²		
<100nm	0.1	0.3
1μs	0.2	0.3
300μs	2	1
Maximum Average Power W	20	15
Maximum Average Power Density W/cm ²	10	10
Dimensions	Ø75 x 14mm	Ø75 x 14mm
Part Number	Consult Ophir representative	Consult Ophir representative
Notes: (a)	At calibrated wavelength, standard 1064nm. Others on request.	
Notes: (b)	There is a trade off between repetition rate, sensitivity and maximum pulse width. If standard products are not suitable, these parameters can be tailored to customer requirements.	

PE50-S / PE50BB-S



1.3.7.2 Examples of Custom OEM Energy Sensor Solutions

In addition to the standard OEM products described above, Ophir has accumulated over 25 years experience in developing products which are tailored to precise physical configurations provided by the OEM customer. These products include special antireflection coatings for specific wavelengths, specially configured pyroelectric sensors (with or without electronics), and much more. A number of these special OEM products are shown below.

OEM Pyroelectric Sensor with Built-In Amplifier

This sensor requires a compact cylindrical case with detector sensitivity reaching the diameter edge. The Ø32 x 30mm device has a built in amplifier.



Ophir Pyroelectric Sensor with add on OEM Electronics Module

This pyroelectric sensor is designed to be used as a Smart Sensor compatible with Ophir Smart meters, but also comes with an OEM I/F module providing calibrated analog voltage output to host system.



PE10-OEM Sensor

This is a highly compact OEM pyroelectric sensor, measuring only $\phi 22 \times 7.5$ mm with an AR coating on the surface for the wavelength of measurement. It can have a simple analog output or can be supplied with a circuit board to produce calibrated analog or digital RS232 or USB output.



PE-C RS232 OEM Sensors

The new PE – C Series of pyroelectric sensors has an option of RS232 output suitable for OEM use. The sensors give numerical energy output and the ranges and wavelength settings can be controllable from the host PC. The input and output is available at the DB9 connector at the end of the cable.



Ordering Information:

The products shown above are examples of OEM solutions developed for specific customer applications. Please consult with your Ophir representative who will be happy to help you with any requirements you may have.