1.1.5 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:

- Simple sensor, with raw analog output
- Sensor with electronics providing an analog 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.

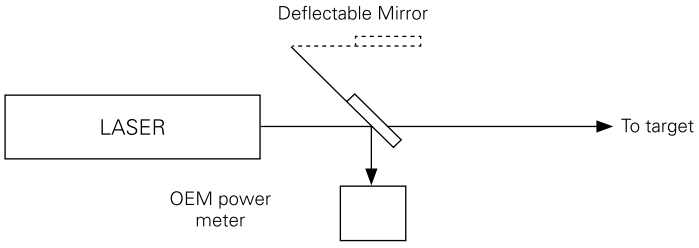
Thermal OEM Sensors

Ophir pioneered the compact self-contained laser power meter sensors with built-in amplifiers. These sensors are easy to install and give a calibrated voltage, proportional to power. They contain all the electronics needed including a speed up circuit to increase the speed of response of the sensor to the order of 1s, 0-95%. Connections to the sensors are simple, with the host providing DC power and the sensor providing a voltage output proportional to power.

In most cases, the sensor is used in one of three ways:

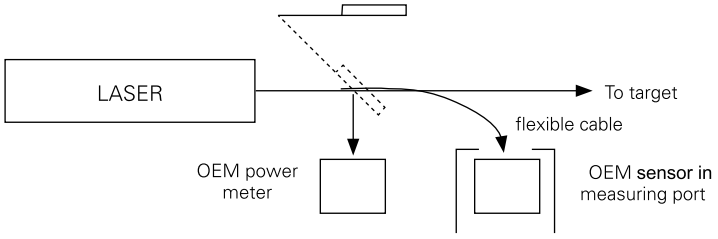
1. Beam Dump Mode

For lasers, such as surgical lasers, which are used in short bursts, the sensor is a beam dump with full power on it at all times except for the short periods of beam use when the beam is deflected to the work area.



2. Sampling Mode

In this mode, the laser is usually available to the user and is only deflected to the monitor for short times when the beam is sampled by the sensor. Sampling is performed with a deflection mirror or with an output fiber optic cable which is inserted into the measuring port from time to time.



3. Rear Leak Mode

In this mode, a small fraction (0.5-2%) of the laser beam "leaks" out of the rear mirror of the laser and is constantly monitored by the sensor.

Advantages of Ophir Thermal OEM Sensors

Compactness

Available in sizes down to 38x38x25mm or 48x48x15mm.

Versatility

Ophir offers OEM sensors for any type and wavelength of laser, for any power or configuration. Although the power measured usually ranges from 1-150 watts, the sensors can measure from tens of mW or mJ to Kilowatts or hundreds of Joules, and can be cooled with water, air or conduction. Ophir offers a large selection of standard OEM sensors at competitive prices and excellent delivery times. If required, the package, including the connectors, can be customized to customer specifications.

Reliability and accuracy

Ophir's measuring sensors use the reliable and accurate thermopile disc principle: the output is a low impedance voltage proportional to power. The thermopile disc samples the entire beam, making it more accurate than silicon detectors. The thermopile provides a faster response than thermoelectric types. Suitable absorbers which will not burn out or change reading with high power density lasers are available for any application.

Calibration

Ophir sensors can be factory calibrated at all required wavelengths.

In addition to the sensors described below, Ophir offers a number of other OEM sensors with larger aperture, diffusers in front, special absorbers, single sided amplifiers (± voltage and ground is not required, only + voltage and ground) and other special features. Ophir also offers an OEM version of the Nova power meter consisting of just circuit boards with no casing, as well as OEM sensors with RS232 or USB output instead of analog voltage.

Possible configurations of thermal OEM solutions include:

- Disc with raw analog output
- Disc with separate amplifier board
- Sensor with either raw or amplified analog output
- Sensor with RS232 interface
- Sensor with USB interface
- Complete solution including sensor and meter

1.1.5.1 Standard OEM Thermal Sensors

20mW to 20W

Features

- Conduction cooled
- Spectrally flat
- "A" version gives analog voltage calibrated to power
- "UA" version can give analog voltage output or digital RS232 output and can measure power or energy. Can also have multiple switchable ranges and/or multiple switchable wavelengths
- "UAU" version is similar to the UA version but operates via the USB terminal of the PC

20C-SH

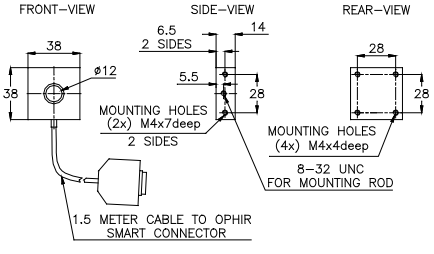
20C-A

20C-UAU

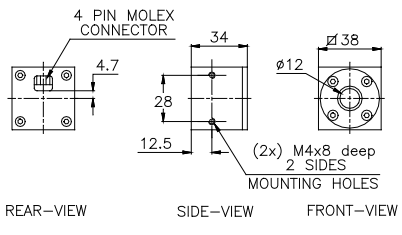
These specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model	**20C-SH**	**20C-A**	**20C-UAU**
Type	**Smart sensor**	**Analog OEM sensor**	**Digital USB connection digital output**
Features	**Compact smart sensor**	**Compact, built in amplifier**	**Compact, external amplifier board**
Absorber Type	Broadband	Broadband	Broadband
Spectral Range µm	0.19 - 20	0.19 - 20 [c]	0.19 - 20 [c]
Aperture mm	φ12	φ12	φ12
Power Mode			
Maximum power [a]	4W free standing 20W heat sinked	4W free standing 20W heat sinked	4W free standing 20W heat sinked
Minimum power	20mW	20mW	20mW
Power Noise Level	0.5mW	0.5mW	0.5mW
Maximum Average Power Density kW/cm²	23 at 20W 35 at 4W	23 at 20W 35 at 4W	23 at 20W 35 at 4W
Response Time (0-95%), typ. (sec)	0.8	0.8	0.8
Power Accuracy +/-% at calibrated wavelength	3	3	3
Linearity with Power +/-%	1	1	1
Amplifier power supply (for A, UAU versions)	NA	±5V to ±18V regulated	Via host USB
Energy Mode			
Maximum Energy	10J	NA	NA
Minimum Energy	6mJ	NA	NA
Energy Accuracy +/-% at calibrated wavelength	5	NA	NA
Maximum Energy Density J/cm²			
<100ns	0.3	NA	NA
0.5ms	2	NA	NA
2ms	2	NA	NA
10ms	2	NA	NA
Cooling	conduction	conduction	conduction
Output	Ophir smart plug	4 pin Molex [b]	Mini B USB connector
Dimensions	38x38x14mm	38x38x34mm	38x38x14mm
Part number	**7Z02602**	**Consult Ophir representative**	**Consult Ophir representative**
Note: (a)	With analog "A" version, maximum power is also limited by maximum output voltage where output voltage is at most 2V less than input voltage.		
Note: (b)	4 pin Molex connections: +Voltage, -Voltage, Analog signal out, Ground		
Note: (c)	Calibrated at customer selected wavelength		

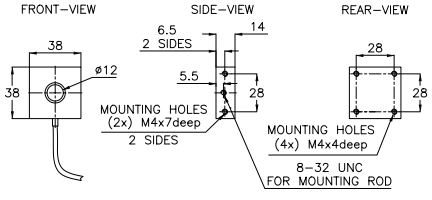
20C-SH



20C-A



20C-UAU



1.1.5.1 Standard OEM Thermal Sensors

80mW to 50W

Features

- Conduction cooled
- Spectrally flat
- "UA" version can give analog voltage output or digital RS232 output and can measure power or energy Can also have multiple switchable ranges and/or multiple switchable wavelengths
- "UAU" version is similar to the UA version but operates via the USB terminal of the PC

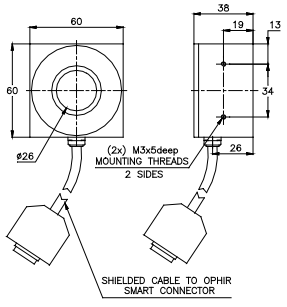
L30C-SH

L30C-UA

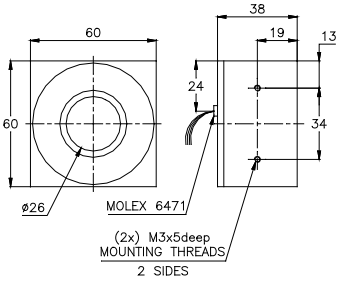
These specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model	**L30C-SH**	**L30C-UA**	**L30C-UAU**
Type	**Smart sensor**	**Digital RS232 connection analog or digital output**	**Digital USB connection digital output**
Features	**Medium aperture smart sensor**	**Medium aperture, built in amplifier**	**Medium aperture, built in amplifier**
Absorber Type	Broadband	Broadband	Broadband
Spectral Range µm	0.19 - 20	0.19 - 20 (c)	0.19 - 20 (c)
Aperture mm	φ26	φ26	φ26
Power Mode			
Maximum power (a)	10W free standing 50W heat sinked	10W free standing 50W heat sinked	10W free standing 50W heat sinked
Minimum power	80mW	80mW	80mW
Power Noise Level	4mW	4mW	4mW
Maximum Average Power Density kW/cm²	17 at 50W 28 at 10W	17 at 50W 28 at 10W	17 at 50W 28 at 10W
Response Time (0-95%), typ. (sec)	1.5	1.5	1.5
Power Accuracy +/-% at calibrated wavelength	3	3	3
Linearity with Power +/-%	1	1	1
Amplifier power supply (for UA, UAU versions)	NA	±6V to ±24V	Via host USB
Energy Mode			
Maximum Energy	30J	100J	100J
Minimum Energy	30mJ	30mJ	30mJ
Energy Accuracy +/-% at calibrated wavelength	5	5	5
Maximum Energy Density J/cm²			
<100ns	0.3	0.3	0.3
0.5ms	5	5	5
2ms	10	10	10
10ms	30	30	30
Cooling	conduction	conduction	conduction
Output	Ophir smart plug	6 pin Molex (b)	Mini B USB connector
Dimensions	60x60x38mm	60x60x38mm	60x60x38mm
Part number	**773434**	**Consult Ophir representative**	**Consult Ophir representative**
Note: (a)	With analog "UA" version, maximum power is also limited by maximum output voltage where output voltage is at most 2V less than input voltage.		
Note: (b)	4 pin Molex connections: +Voltage, -Voltage, Analog signal out, Ground 6 pin Molex connections: RS232 input, Ground, +Voltage, Analog signal out, high/low voltage or switch input when used, RS232 output		
Note: (c)	Calibrated at customer selected wavelength		

L30C-SH



L30C-UA



1.1.5.1 Standard OEM Thermal Sensors

60mW to 100W

Features

- Conduction or water cooled
- Spectrally flat
- "UA" version can give analog voltage output or digital RS232 output and can measure power. Can also have multiple switchable ranges and/or multiple switchable wavelengths
- "UAU" version is similar to the UA version but operates via the USB terminal of the PC

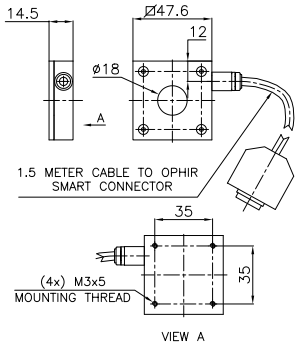
100C-SH

100C-UA/100C-UAU

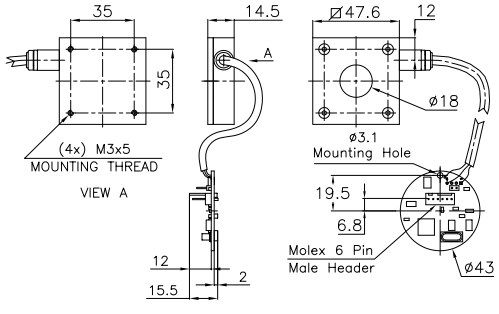
The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model	**100C-SH**	**100C-UA**	**100C-UAU**
Type	**Smart sensor**	**Digital RS232 connection analog or digital output**	**Digital USB connection digital output**
Features	**Low profile, smart sensor**	**Low profile, separate amplifier**	**Low profile, separate amplifier**
Absorber Type	Broadband	Broadband	Broadband
Spectral Range µm	0.19 - 20	0.19 - 20 [c]	0.19 - 20 [c]
Aperture mm	φ 18	φ 18	φ 18
Power Mode			
Maximum power [a]	100W if used with suitable heat sink, 4W free standing	100W if used with suitable heat sink, 4W free standing	100W if used with suitable heat sink, 4W free standing
Minimum power	60mW	60mW	60mW
Power Noise Level	3mW	3mW	3mW
Maximum Average Power Density kW/cm²	30 at 4W 14 at 100W	30 at 4W 14 at 100W	30 at 4W 14 at 100W
Response Time (0-95%), typ. (sec)	1.2	1.2	1.2
Power Accuracy +/-% at calibration wavelength	3	3	3
Linearity with Power +/-%	1	1	1
Amplifier power supply (for UA, UAU versions)	NA	±6V to ±24V	Via host USB
Energy Mode (where applicable)			
Maximum Energy	NA	NA	NA
Minimum Energy	NA	NA	NA
Maximum Energy Density J/cm²			
<100ns	NA	NA	NA
0.5ms	NA	NA	NA
2ms	NA	NA	NA
10ms	NA	NA	NA
Cooling	conduction	conduction	conduction
Output	Ophir smart plug	6 pin Molex [b]	Mini B USB connector
Dimensions	48x48x14.5mm	48x48x14.5mm	48x48x14.5mm
Part number	**7Z02680**	**Consult Ophir representative**	**Consult Ophir representative**
Note: (a)	With analog "UA" version, maximum power is also limited by maximum output voltage where output voltage is at most 2V less than input voltage.		
Note: (b)	4 pin Molex connections: +Voltage, -Voltage, Analog signal out, Ground 6 pin Molex connections: RS232 input, Ground, +Voltage, Analog signal out, high/low voltage or switch input when used, RS232 output		
Note: (c)	Calibrated at customer selected wavelength		

100C-SH



100C-UA



1.1.5.1 Standard OEM Thermal Sensors

60mW to 150W

Features

- Conduction or water cooled
- Spectrally flat
- "UA" version can give analog voltage output or digital RS232 output and can measure power or energy. Can also have multiple switchable ranges and/or multiple switchable wavelengths
- "UAU" version is similar to the UA version but operates via the USB terminal of the PC

150C-SH

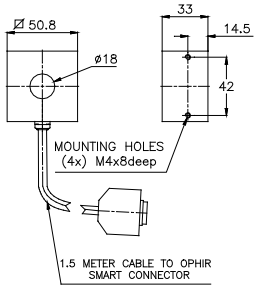
150C-UA/150C-UAU

150W-UA/150W-UAU

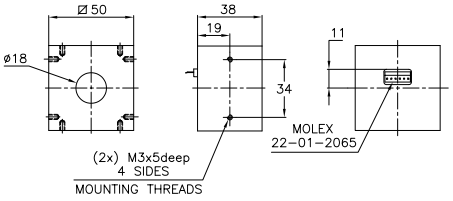
The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model	**150C-SH**	**150C-UA**	**150W-UA**	**150C / W-UAU**
Type	**Smart sensor**	**Digital RS232 connection analog or digital output**	**Digital RS232 connection analog or digital output**	**Same as UA but with digital mini USB connection digital output only**
Features	**High power, smart sensor**	**High power, built-in amplifier**	**High power, built-in amplifier, water cooled**	
Absorber Type	Broadband	Broadband	Broadband	
Spectral Range µm	0.19 - 20	0.19 - 20 (c)	0.19 - 20 (c)	
Aperture mm	φ 18	φ 18	φ 18	
Power Mode				
Maximum power (a)	60W if used with suitable heat sink, 5W free standing	60W if used with suitable heat sink, 5W free standing	150W	
Minimum power	60mW	60mW	100mW	
Power Noise Level	3mW	3mW	5mW	
Maximum Average Power Density kW/cm²	30 at 5W 20 at 60W	30 at 5W 20 at 60W	12 at 150W	
Response Time (0-95%), typ. (sec)	1.2	1.2	1.2	
Power Accuracy +/-% at calibration wavelength	3	3	3	
Linearity with Power +/-%	1	1	1	
Amplifier power supply (for UA, UAU versions)	NA	±6V to ±24V	±6V to ±24V	Via host USB
Energy Mode (where applicable)				
Maximum Energy	100J	100J	100J	
Minimum Energy	20mJ	20mJ	50mJ	
Maximum Energy Density J/cm²				
<100ns	0.3	0.3	0.3	
0.5ms	5	5	5	
2ms	10	10	10	
10ms	30	30	30	
Cooling	Conduction	Conduction	Water	
Output	Ophir smart plug	6 pin Molex (b)	6 pin Molex (b)	Mini B USB connector
Dimensions	50.8x50.8x33mm	50x50x38mm	50x50x38mm	
Part number	**77023**	**Consult Ophir representative**	**Consult Ophir representative**	**Consult Ophir representative**
Note: (a)	With analog "UA" version, maximum power is also limited by maximum output voltage where output voltage is at most 2V less than input voltage.			
Note: (b)	4 pin Molex connections: +Voltage, -Voltage, Analog signal out, Ground 6 pin Molex connections: RS232 input, Ground, +Voltage, Analog signal out, high/low voltage or switch input when used, RS232 output			
Note: (c)	Calibrated at customer selected wavelength			

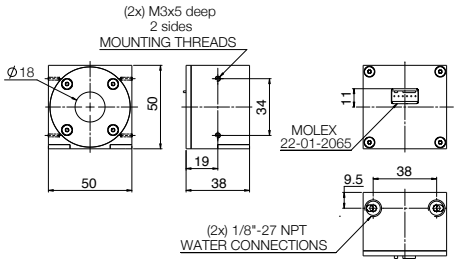
150C-SH



150C-UA



150W-UA



1.1.5.1 Standard OEM Thermal Sensors

0.2W to 300W

Features

- Conduction and water cooled
- Spectrally flat
- "UA" version can give analog voltage output or digital RS232 output and can measure power or energy. Can also have multiple switchable ranges and/or multiple switchable wavelengths
- "UAU" version is similar to the UA version but operates via the USB terminal of the PC

L150C-UA / L150C-UAU

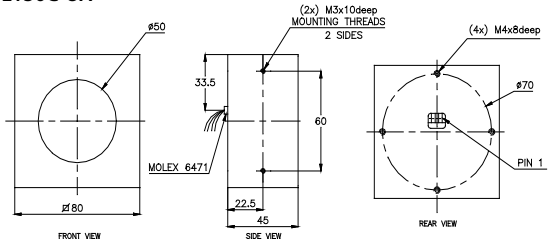
L250W-UA / L250W-UAU
L300W-UA / L300W-UAU

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.

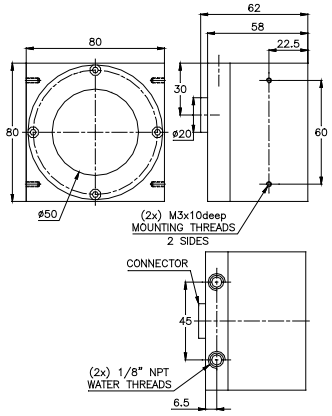
Model	**L150C-UA**	**L250W-UA**	**L300W-UA**	**L150C-UAU L250W-UAU L300W-UAU**
Type	**Digital RS232 connection analog or digital output**	**Digital RS232 connection analog or digital output**	**Digital RS232 connection analog or digital output**	**Same as UA but with digital mini USB connection digital output only**
Features	**Large aperture, built-in amplifier**	**Large aperture, built-in amplifier, water cooled**	**Large aperture, built-in amplifier, water cooled**	
Absorber Type	Broadband	Broadband	Broadband	
Spectral Range µm	0.19 - 20 (c)	0.19 - 20 (c)	0.19 - 20 (c)	
Aperture mm	φ 50	φ 50	φ 50	
Power Mode				
Maximum power (a)	20W free standing, 150W heat sinked	250W water cooled	300W water cooled	
Minimum power	0.2W	0.3W	0.5W	
Power Noise Level	10mW	15mW	25mW	
Maximum Average Power Density kW/cm²	27 at 20W 12 at 150W	10 at 250W	9 at 300W	
Response Time (0-95%), typ. (sec)	2.5	2.5	2.5	
Power Accuracy +/-% at calibration wavelength	3	3	3	
Linearity with Power +/-%	1	2	2	
Amplifier power supply (for UA, UAU versions)	±6V to ±24V	±6V to ±24V	±6V to ±24V	Via host USB
Energy Mode (where applicable)				
Maximum Energy	100J	200J	300J	
Minimum Energy	80mJ	120mJ	200mJ	
Maximum Energy Density J/cm²				
<100ns	0.3	0.3	0.3	
0.5ms	5	5	5	
2ms	10	10	10	
10ms	30	30	30	
Cooling	conduction	water	water	
Output	6 pin Molex (b)	6 pin Molex (b)	6 pin Molex (b)	Mini B USB connector
Dimensions	80x80x45mm	80x80x58mm	80x80x58mm	
Part number	**Consult Ophir representative**	**Consult Ophir representative**	**Consult Ophir representative**	**Consult Ophir representative**

Note: (a)	With analog "UA" version, maximum power is also limited by maximum output voltage where output voltage is at most 2V less than input voltage.
Note: (b)	4 pin Molex connections: +Voltage, -Voltage, Analog signal out, Ground 6 pin Molex connections: RS232 input, Ground, +Voltage, Analog signal out, high/low voltage or switch input when used, RS232 output
Note: (c)	Calibrated at customer selected wavelength

L150C-UA



L250W-UA / L300W-UA



1.1.5.2 Examples of Custom OEM Power Sensor Solutions

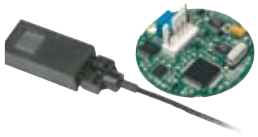
In addition to the standard OEM products described above, Ophir has accumulated over 25 years experience in developing products which are tailored to precise physical configurations provided by the OEM customer. These products include custom discs (with or without electronics), specially configured thermal- or photodiode-based power sensors, and much more. A number of these special OEM products are shown below.

OEM Photodiode Sensor with RS232 Output

This sensor is similar to the UA thermal OEM sensors described above, except it has a photodiode instead of thermal detector. The sensor shown has 5 decades of dynamic range and has the following dimensions: 50mm x 50mm x 33mm.

OEM Photodiode Sensor with Universal Amplifier Board

Truncated PD300 sensor with Universal amplifier board giving calibrated voltage output. Either analog or RS232 communication.



Flat Profile Thermal Sensor

This sensor with 50mm aperture is used as an exposure detector for photolithography and is only 10mm thick.

Super Compact Thermal Sensor

Thermal OEM sensor designed to be cemented into user system. Dimensions are under 10mm x 20mm footprint and 4mm height. The sensor can be connected to an Ophir smart meter to measure power or energy or can be used directly with voltage output.

Compact, hand held thermal Smart Sensor

This thermal sensor is only 20mm thick to enable probing in hard-to-reach locations, and can measure up to 25W. It is designed specifically to be hand-held, and works with any Ophir Smart Meter.

Ultra Fast OEM Power Sensor

Using an innovative new axial thermopile method, this sensor is designed to be built into an industrial CO_2 or YAG laser for fast feedback to control the laser power stability.
It has a response time of 50ms and power capacity of 100W.

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.

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.

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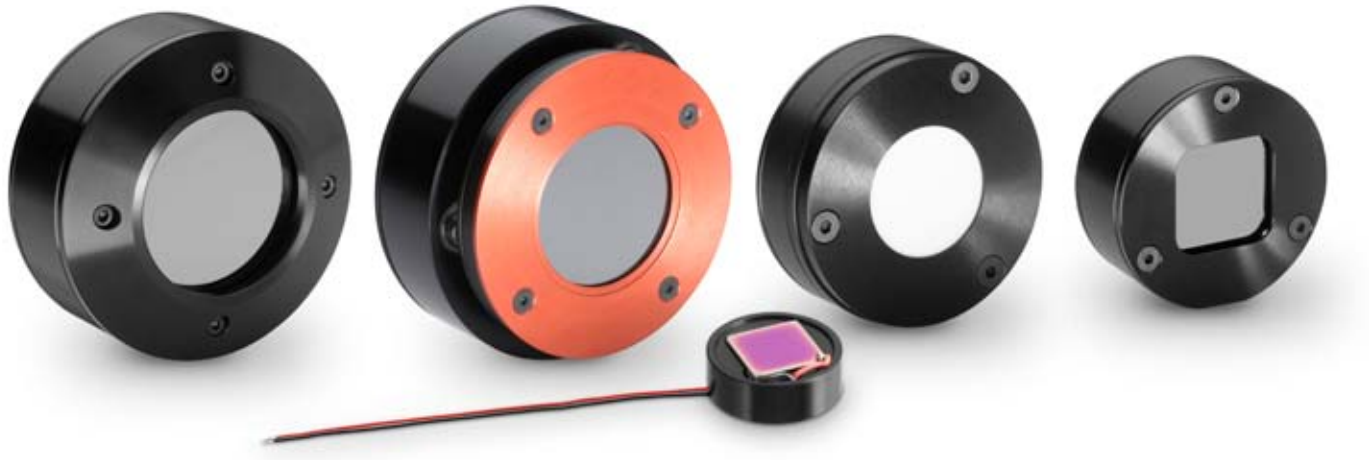
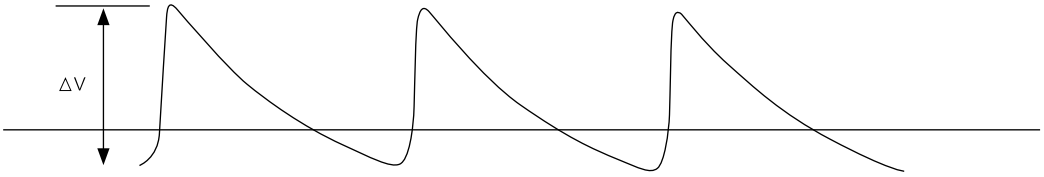


Standard Pyroelectric OEM Sensors - Introduction

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).

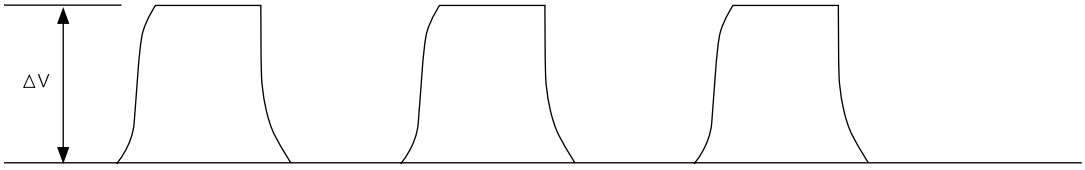
Typical output from a low-profile pyroelectric sensor appears as follows:



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

2µJ to 20mJ

Features

- Compact
- Low Profile
- Low Cost

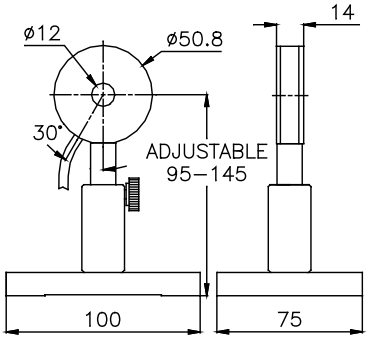
PE10-S

PE10-S-Q

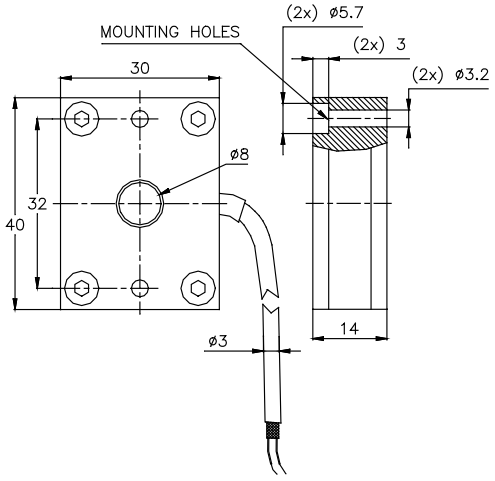
The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

Model	**PE10-S**	**PE10-S-Q**
Features	**High sensitivity and rep rate**	**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 1MΩ	15V/J into 1MΩ and 5nF load
Max Pulse Width [b]	25us	500us
Maximum Pulse Rate pps [b]	400	100
Maximum Energy	20mJ	20mJ
Minimum Energy	2µJ	2µJ
Noise Equivalent Energy, approx	100nJ	100nJ
Output	BNC	Flying Leads
Damage Threshold J/cm²		
<100nm	0.1	0.1
1µs	0.2	0.2
300µs	3	3
Maximum Average Power W	2	2
Maximum Average Power Density W/cm²	50	50
Dimensions	Ø50.8 x 14mm	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

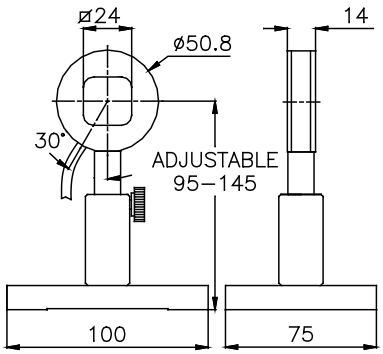
PE25-A-DIF-XXX-YYY(c)

PE25BB-S-DIF

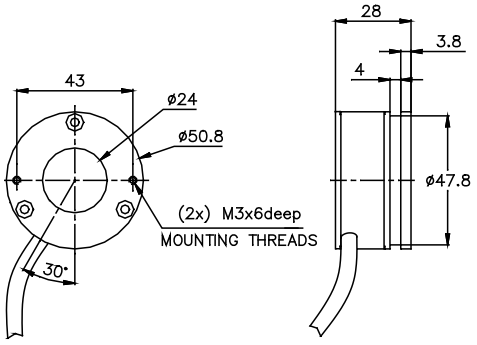
The following specifications refer to standard OEM sensors, and are to be understood as generic, describing sensor families. Ophir will be happy to help you with a specific solution for your particular application.

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/cm²				
<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/cm²	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

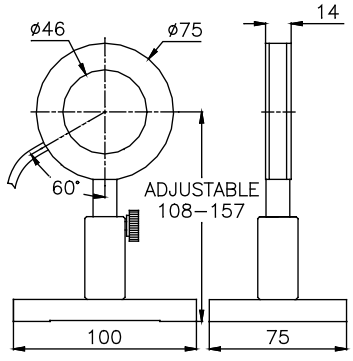
- Large apertures
- Compact
- Low Profile
- Low Cost

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	**PE50-S**	**PE50BB-S**
Features	**Large aperture**	**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	20uJ	0.5mJ
Output	BNC	BNC
Damage Threshold for 10ns pulses J/cm²		
<100nm	0.1	0.3
1µs	0.2	0.3
300µs	2	1
Maximum Average Power W	20	15
Maximum Average Power Density W/cm²	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 φ22 x 7.5mm 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.