

Light Emitting Diode Drivers Selection Guide

Pages 505-533

Light Emmiting Diodes

- Bare LEDs, 340nm-4500nm
- High Power (275 - 730mW) Mounted LEDs,
Visible Wavelength Range
- Closely Collimated, High Power LEDs Designed to Mount Into
Popular Microscopes: Olympus BX/IX, Leica DMI, Nikon
F-Mount, and Zeiss Axioskope

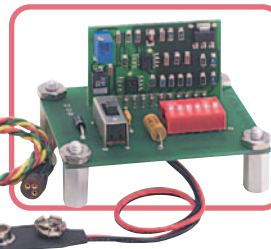
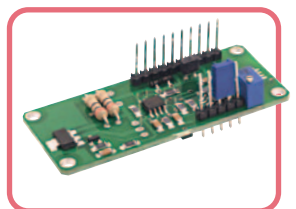
See Pages 505-523



LED Drivers

- Benchtop and OEM Drivers
- Constant Current Drivers up to 8A
- Constant Power Drivers for LEDs With Integrated Photodiodes
- Compliance Voltage up to 13V

See Pages 524-528



LED Mounts and Accessories

- Lens Tube Compatible Bare LED Mounts
- Post Mountable LED Mounts
- IR Alignment Accessories
- Electronic Accessories
- ESD Protection for Sensitive LEDs

See Pages 529-533



Light Emitting Diode Drivers Selection Guide

Pages 506-523

ITEM#	WAVELENGTH	POWER	VIEWING HALF ANGLE	PACKAGE	PAGE
LED341W	340nm	0.35mW	7.5°	TO-39	507
LED370E	375nm	2.5mW	19°	T-1 3/4	507
LED405E	405nm	6mW	5°	T-1 3/4	507
LEDC2	455nm	239.85mW	-	Leica DMI Microscope	508
LEDC3	455nm	323.94mW	-	Nikon Eclipse Microscope	508
LEDC4	455nm	339.19mW	-	Zeiss Axioskop Microscope	508
LEDC1	455nm	438mW	-	Olympus BX & IX Microscopes	508
MRMLED	455nm	730mW	75°	SM1	508
LED470E	470nm	8.5mW	7.5°	T-1 3/4	509
LEDC6	470nm	205.35mW	-	Leica DMI Microscope	509
LEDC7	470nm	277.35mW	-	Nikon Eclipse Microscope	509
LEDC8	470nm	290.4mW	-	Zeiss Axioskop Microscope	509
LEDC5	470nm	375mW	-	Olympus BX & IX Microscopes	509
MBLED	470nm	625mW	75°	SM1	510
LEDC10	505nm	138mW	-	Leica DMI Microscope	510
LEDC11	505nm	186.38mW	-	Nikon Eclipse Microscope	510
LEDC12	505nm	195.15mW	-	Zeiss Axioskop Microscope	510
LEDC9	505nm	252mW	-	Olympus BX & IX Microscopes	510
MCLED	505nm	420mW	-	SM1	511
LED521M	525nm	2mW	55°	TO-18	512
LED525E	525nm	2.6mW	7.5°	T-1 3/4	512
LEDC14	530nm	90.35mW	-	Leica DMI Microscope	512
LEDC15	530nm	122.03mW	-	Nikon Eclipse Microscope	512
LEDC16	530nm	127.78mW	-	Zeiss Axioskop Microscopex	512
LEDC13	530nm	165mW	-	Olympus BX & IX Microscopes	512
MGLED	530nm	275mW	75°	SM1	512
LED528E	535nm	1.5mW	10°	T-1 3/4	513
LEDRGBE	540nm	6.2mW	12.5°	T-1 3/4	513
LEDC18	540nm	164.28mW	-	Leica DMI Microscope	514
LEDC19	540nm	221.88mW	-	Nikon Eclipse Microscope	514
LEDC20	540nm	232.32mW	-	Zeiss Axioskop Microscope	514
LEDC17	540nm	300mW	-	Olympus BX & IX Microscopes	514
MWLED	540nm	500mW	75°	SM1	514
LEDWE-15	white	1mW	7.5°	T-1 3/4	515
LEDWE-10	white	2.6mW	10°	T-1 3/4	515
LEDWE-50	white	3.7mW	25°	T-1 3/4	515
LED591E	590nm	2mW	10°	T-1 3/4	516
LED631E	635nm	4mW	10°	T-1 3/4	516
LED630E	639nm	7.2mW	7.5°	T-1 3/4	516
LED661L	655nm	1.7mW	6°	TO-18	517
LED661W	670nm	0.45mW	15°	TO-18	517
LED781W	780nm	6mW	55°	TO-18	517
LED780E	780nm	18mW	10°	T-1 3/4	518
LED851W	850nm	8mW	10°	TO-18	518
LED851L	850nm	18mW	10°	TO-18	518
LED870E	870nm	22mW	10°	T-1 3/4	519
LED940E	940nm	18mW	10°	T-1 3/4	519
LED1050E	1050nm	2.5mW	15°	T-1 3/4	520
LED1200E	1200nm	2.5mW	15°	T-1 3/4	520
LED1300E	1300nm	2mW	15°	T-1 3/4	520
LED1450E	1450nm	2mW	15°	T-1 3/4	520
LED1550E	1550nm	2mW	15°	T-1 3/4	521
LED1650P	1650nm	0.9mW	<10°	TO-18R	521
LED2050P	2050nm	1.1mW	<10°	TO-18R	521
LED3100P	3100nm	14μW	<10°	TO-18R	521
LED4600P	4500nm	6μW	<10°	TO-18R	521

Radiometric vs. Photometric Units

For many applications, light emitting diodes (LEDs) provide a low cost, reliable alternative to traditional light sources such as the incandescent light bulb, halogen bulbs, or arc lamps. Applications involving these former light sources gave rise to photometric measures for power, brightness, etc. Since Thorlabs typically provides radiometric specifications for our laser diodes, this overview is to serve as the bridge between the two regimes.

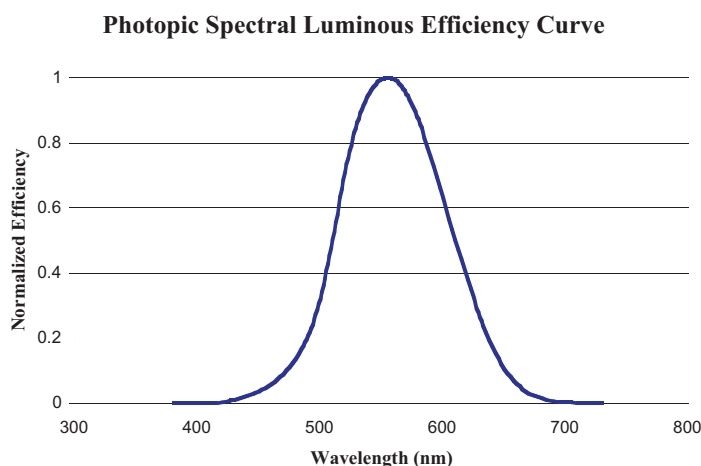
Depending on the LED, the specifications might be given using any of the following radiometric quantities: power (also called radiant flux and measured in watts (W)), irradiance (measured in W/m²), radiant intensity (measured in watts per steradian (W/sr)), and radiance (measured in W/m²·sr). The corresponding photometric quantities, which are listed in the table below, are based on the SI unit for luminous intensity, the candela (cd). Values reported in candelas are weighted by a spectral luminous efficiency function, which represents the human eye's sensitivity to the light at a given wavelength. Hence, candelas are a photometric unit, thereby giving information about the perceived brightness of a source; in contrast, power, irradiance, radiant intensity, and radiance are radiometric units, thus providing information about the absolute brightness of a source.

Based on the candela, three other photometric quantities are also commonly used to specify power measurements for LEDs: luminance (measured in cd/m², which is also sometimes referred to as a Nit), luminous flux (whose SI unit is the lumen (lm)), and illuminance (whose SI unit is the lux (lx)). Therefore, each radiometric quantity has a photometric counterpart, which is weighted by the spectral response of the human eye.

To convert between radiometric and photometric units, one needs to know the photopic spectral luminous efficiency curve $V(\lambda)$, which gives the spectral response of the human eye to various wavelengths of light. The original curve, which is shown below, was adopted by the Commission on Illumination (CIE) as the standard in 1924 and is still used today even though modifications have been suggested.

QUANTITY	RADIOMETRIC	PHOTOMETRIC
Power	W	Lumen (lm) = cd·sr
Power Per Unit Area	W/m ²	Lux (lx) = cd·sr/m ² = lm/m ²
Power Per Unit Solid Angle	W/sr	Candela (cd)
Power Per Unit Area Per Unit Solid Angle	W/m ² ·sr	cd/m ² = lm/m ² ·sr = nit

Empirical data shows that the curve has a maximum value of unity at 555nm, which is the wavelength of light at which the human eye is most sensitive, and trails off to levels below 10⁻⁵ for wavelengths below 370nm and above 780nm.



A non-linear regression fit to the experimental data yields the approximation,

$$V(\lambda) = 1.019e^{-285.4(\lambda - 0.559)^2},$$

where the wavelength is in micrometers.

According to the definition for a candela, there are 683 lumens per watt for 555nm light that is propagating in a vacuum. Hence, for a monochromatic light source, it is fairly simple to convert from watts to lumens; simply multiply the power in watts by the appropriate $V(\lambda)$ value, and use the conversion factor from the definition for a candela.

For example, the photometric power of a 5mW red ($\lambda = 650$ nm) laser pointer, which corresponds to $V(\lambda) = 0.096$, is $0.096 \times 0.005\text{W} \times 683\text{lm/W} = 0.33\text{lm}$, whereas the value for a 5mW green ($\lambda = 532$ nm) laser pointer is $0.828 \times 0.005\text{W} \times 683\text{lm/W} = 2.83\text{lm}$. Thus, although both laser pointers have the exact same radiant flux, the green laser pointer will appear approximately 8.5 times brighter than the red one assuming both have the same beam diameter.

Conversion from radiometric to photometric units becomes more complex if the light source is not monochromatic. In this case, the mathematical quantity of interest is

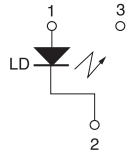
$$\Phi_v = K_m \int_{\lambda=380}^{\lambda=830} \Phi_E(\lambda) V(\lambda) d\lambda$$

where Φ_v is the luminous flux in lumens, K_m is a scaling factor equal to 683 lumens per watt, $\Phi_E(\lambda)$ is the spectral power in watts per nanometer, and $V(\lambda)$ is the photopic spectral luminous efficiency function. Note that the integration is only carried out over the wavelengths for which $V(\lambda)$ is non-zero (i.e. $\lambda = 380 - 830$ nm). Since $V(\lambda)$ is given by a table of empirical values, it is best to do the integration numerically.

$\lambda = 340\text{nm}$, $P = 0.35\text{mW}$ LED

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	20mA
Pulse Forward Current	I_{fw-pls}	-	-	100mA
Reverse Voltage	V_r	-	-	6V
Forward Voltage	V_{fwd}	-	5.5V	7.5V
Peak Wavelength	λ_p	330nm	340nm	350nm
Output Power	P	0.3mW	-	0.35mW
Spectral Half Width	HW	-	15nm	-
Viewing Half Angle	$\theta_{1/2}$	-	7.5°	-
Operating Temperature	T_o	-30°C	-	50°C
Storage Temperature	T_c	-30°C	-	100°C



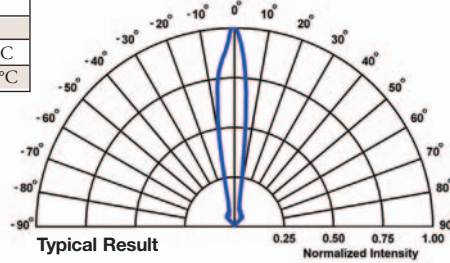
Pin Description

- 1 LED anode
- 2 LED cathode
- 3 no connection

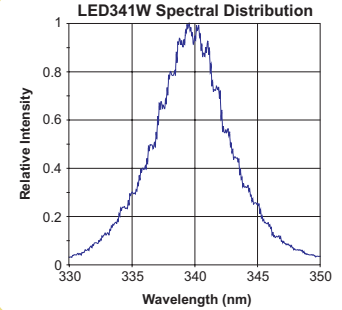
- Center Wavelength: 340nm (Typ.)
- Output Power: 0.35mW CW
- UV-Transparent Optical Window
- Package: TO-39



TO-39 Can



Typical Result



ITEM#	\$	£	€	RMB	DESCRIPTION
LED341W	\$ 175.00	£ 110.30	€ 162.80	¥ 1,671.30	340nm, 0.35mW, TO-39 LED

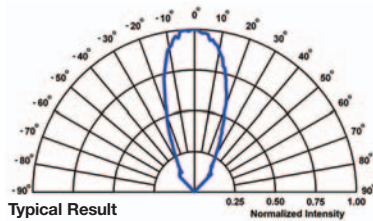
$\lambda = 375\text{nm}$, $P = 2.5\text{mW}$ LED

- Center Wavelength: 375nm (Typ.)
- Output Power: 2.5mW CW
- Epoxy Lens, 19° Viewing Half Angle
- Package: T-1 3/4

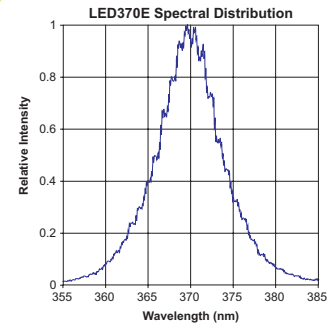


Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	30mA
Reverse Voltage	V_r	-	-	3V
Forward Voltage	V_{fwd}	-	3.5V	4.3V
Peak Wavelength	λ_p	365nm	375nm	385nm
Spectral Half Width	HW	-	10nm	-
Output Power	P	-	2.5mW	-
Viewing Half Angle	$\theta_{1/2}$	-	19°	-
Operating Temperature	T_o	-30°C	-	85°C
Storage Temperature	T_c	-30°C	-	100°C



Typical Result

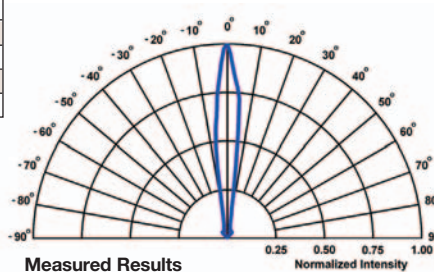


ITEM#	\$	£	€	RMB	DESCRIPTION
LED370E	\$ 4.40	£ 2.80	€ 4.10	¥ 42.00	375nm, 2.5mW, T-1 3/4 LED

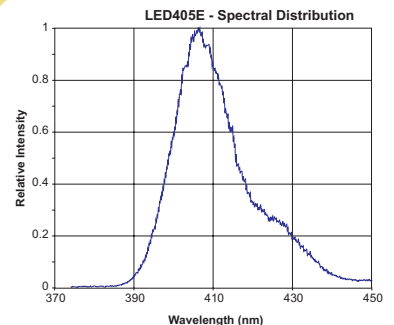
$\lambda = 405\text{nm}$, $P = 6\text{mW}$ LED

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	30mA
Optical Power	P	-	6mW	10mW
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	3.8V	4.3V
Peak Wavelength	λ_p	395nm	405nm	415nm
Spectral Half Width	HW	-	15nm	-
Viewing Half Angle	$\theta_{1/2}$	-	5°	-
Operating Temperature	T_o	-30°C	-	85°C
Storage Temperature	T_c	-30°C	-	100°C



Measured Results



- Center Wavelength: 405nm (Typ.)
- Output Power: 6mW CW
- Epoxy Lens, 5° Viewing Half Angle
- Package: T-1 3/4

ITEM#	\$	£	€	RMB	DESCRIPTION
LED405E	\$ 14.50	£ 9.10	€ 13.50	¥ 138.50	405nm, 6mW, T-1 3/4 LED

Light Emitting Diode Technologies

LEDs

LED Drivers

LED Mounts and Accessories

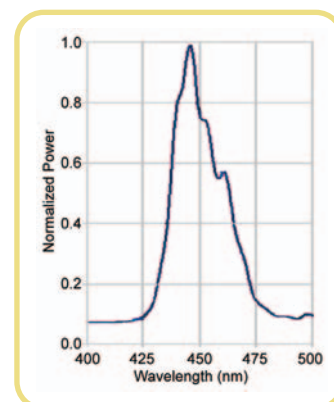
$\lambda = 455\text{nm}$, $P > 240\text{mW}$ Collimated LEDs



16 Emitters

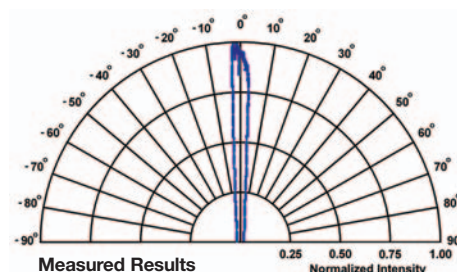
LEDC2
for Leica DMI Microscopes
Shown

- Closely Collimated Beam
- High Power Density
- Designed to Integrate Into Standard Microscopes
- High Output Power up to 440mW
- Average Lifetime: 100,000 Hours



Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Peak Wavelength	λ_p	430nm	455nm	470nm
Spectral Half Width	HW	—	20nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$d\lambda_p/dT_j$	—	0.04nm/ $^\circ\text{C}$	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40 $^\circ\text{C}$	—	120 $^\circ\text{C}$
Storage Temperature	T_{st}	-40 $^\circ\text{C}$	—	120 $^\circ\text{C}$



Measured Results



LEDD1
See Page 525 For Details

ITEM#	MICROSCOPE	POWER IN BEAM	BEAM DIAMETER	BEAM AREA
LEDC1	Olympus BX/IX	438mW	50mm	1960mm ²
LEDC2	Leica DMI	240mW	37mm	1080mm ²
LEDC3	Nikon F Mount	324mW	43mm	1450mm ²
LEDC4	Zeiss Axioskop	339mW	44mm	1520mm ²



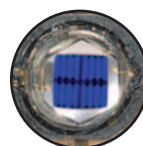
Pin	Description
1	LED +ve
2	LED -ve
3	Not Connected
4	Not Connected

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDC1	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Royal Blue LED (455nm) for Olympus BX & IX Microscopes
LEDC2	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Royal Blue (455nm) LED for Leica DMI Microscopes
LEDC3	\$ 374.00	£ 235.60	€ 347.80	¥ 3,571.70	Collimated Royal Blue (455nm) LED for Nikon Eclipse (F Mount) Microscopes
LEDC4	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Royal Blue (455nm) LED for Zeiss Axioskop Microscopes
LEDD1	\$ 249.00	£ 156.90	€ 231.60	¥ 2,378.00	T-Cube LED Driver

$\lambda = 455\text{nm}$ $P = 730\text{mW}$, Mounted LED

Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

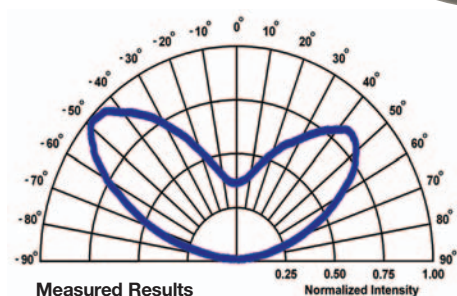
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Peak Wavelength	λ_p	430nm	455nm	470nm
Output Power	P	—	—	730mW
Spectral Half Width	HW	—	20nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/ $^\circ\text{C}$	—
Viewing Half Angle	$\theta_{1/2}$	—	75 $^\circ$	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40 $^\circ\text{C}$	—	120 $^\circ\text{C}$
Storage Temperature	T_{st}	-40 $^\circ\text{C}$	—	120 $^\circ\text{C}$



16 Emitters

Internal 1.035"-40
SM1 Lens Tube
Compatible Thread

MRMLD



Measured Results



Pin	Description
1	LED +ve
2	LED -ve
3	Not Connected
4	Not Connected

- Uncollimated, Lambertian Radiation Pattern
- High-Power LED, 730mW
- Mounted on Heat Sink
- Internal SM1 Lens Tube Compatible Threading
- Average Lifetime: 100,000 Hours

ITEM#	\$	£	€	RMB	DESCRIPTION
MRMLD	\$ 127.50	£ 80.30	€ 118.60	¥ 1,217.60	455nm, 730mW, SM1-Mounted LED
LEDD1	\$ 249.00	£ 156.90	€ 231.60	¥ 2,378.00	T-Cube LED Driver

$\lambda = 470\text{nm}$, $P = 8.5\text{mW}$ LED

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	30mA
Pulse Forward Current	I_{fw-pls}	-	-	100mA
Power		-	-	8.5mW
Reverse Voltage	V_r	-	-	-
Forward Voltage	V_{fwd}	5V	3.2V	3.85V
Peak Wavelength	λ_p	460nm	470nm	480nm
Spectral Half Width	HW	-	23nm	-
Viewing Half Angle	$\theta_{1/2}$	-	7.5°	-
Thermal Resistance	R	-	240°C/W	-
Operating Temperature	T_{op}	-40°C	-	85°C
Storage Temperature	T_{st}	-40°C	-	120°C

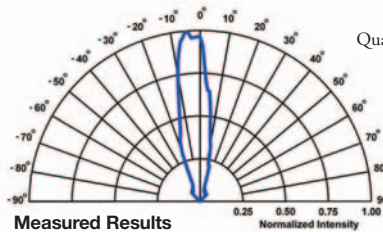
Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LED470E	\$ 9.00	£ 5.70	€ 8.40	¥ 86.00	470nm, 8.5mW, T-1 3/4 LEDs (Qty. 5)

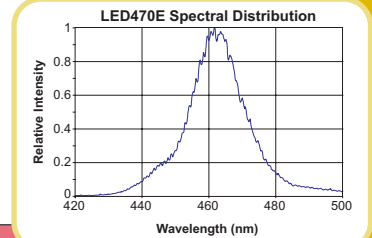
- Center Wavelength: 470nm (Typ.)
- Output Power: 8.5mW CW
- Epoxy Lens, 7.5° Viewing Half Angle
- Package: T-1 3/4



LED470E
(Sold in
Quantities of
Five)

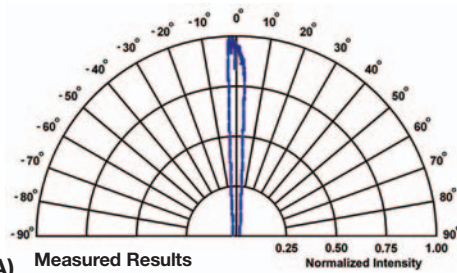


Measured Results



$\lambda = 470\text{nm}$, $P > 205\text{mW}$ Collimated LEDs

- Closely Collimated Beam
- High Power Density
- Designed to Integrate into Standard Microscopes
- High Output Power up to 375mW
- Average Lifetime: 100,000 Hours



Measured Results

Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Wavelength	λ_p	450nm	470nm	500nm
Spectral Half Width	HW	-	25nm	-
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	-	-	700mA
Peak Pulsed Forward Current	I_{fw-pls}	-	-	1000mA
Temperature Coefficient of Dominant Wavelength	$d\lambda_p/dT_j$	-	0.04nm/°C	-
Dynamic Resistance	R_D	-	1.0	-
Operating Temperature	T_{op}	-40°C	-	120°C
Storage Temperature	T_{st}	-40°C	-	120°C



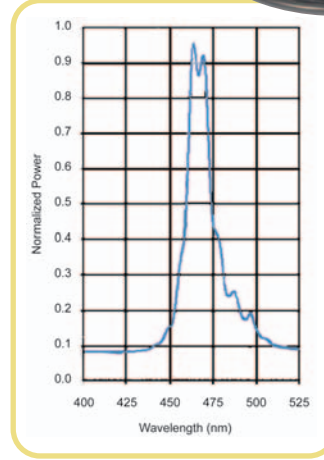
16 Emitters



Pin	Description
1	LED +ve
2	LED -ve
3	Not Connected
4	Not Connected



LED C8
Shown



ITEM#	MICROSCOPE	POWER IN BEAM	BEAM DIAMETER	BEAM AREA
LEDC5	Olympus BX/IX	375mW	50mm	1960mm²
LEDC6	Leica DMI	205mW	37mm	1080mm²
LEDC7	Nikon F Mount	277mW	43mm	1450mm²
LEDC8	Zeiss Axioskop	290mW	44mm	1520mm²

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDC5	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Blue LED (470nm) for Olympus BX & IX Microscopes
LEDC6	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Blue (470nm) LED for Leica DMI Microscopes
LEDC7	\$ 374.00	£ 235.60	€ 347.80	¥ 3,571.70	Collimated Blue (470nm) LED for Nikon Eclipse (F Mount) Microscopes
LEDC8	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Blue (470nm) LED for Zeiss Axioskop Microscopes

TOOLS
OF THE
TRADE

Expanding the Line OPTICAL POWER AND ENERGY METERS

- Large Selection of UV to IR Sensors Covering the Power Range 35nW to 30W
- Interchangeable Sensors With NIST Traceable Calibration Data



NEW PM300 Dual
Channel Power Meter

SEE OUR ENTIRE POWER METER LINE ON PAGES 946-961



LEDs

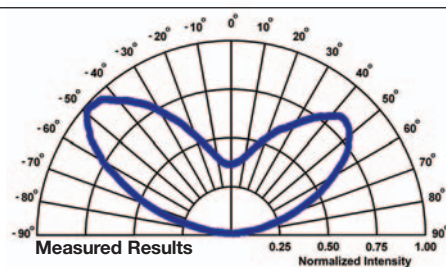
LED Drivers

LED Mounts and Accessories

Light Emitting Diode Technologies

 $\lambda = 470\text{nm}$ P = 625mW, Mounted LED

- Uncollimated, Lambertian Radiation Pattern
- High-Power LED, 625mW
- Mounted on Heat Sink
- Internal SM1 Lens Tube Compatible Threading
- Average Lifetime: 100,000 Hours

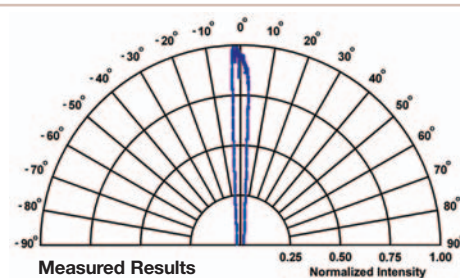
Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Peak Wavelength	λ_p	450nm	470nm	500nm
Output Power	P	—	—	625mW
Spectral Half Width	HW	—	25nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/ $^\circ\text{C}$	—
Viewing Half Angle	$\theta_{1/2}$	—	75°	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C

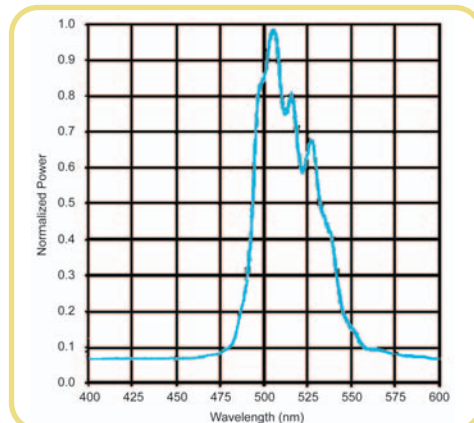
ITEM#	\$	£	€	RMB	DESCRIPTION
MBLED	\$ 127.50	£ 80.30	€ 118.60	¥ 1,217.60	470nm, 625mW, SM1-Mounted LED
LEDD1	\$ 249.00	£ 156.90	€ 231.60	¥ 2,378.00	T-Cube LED Driver

 $\lambda = 505\text{nm}$, P >138mW Collimated LEDs

- Closely Collimated Beam
- High Power Density
- Designed to Integrate Into Standard Microscopes
- High-Power (up to 252mW)
- Average Lifetime: 100,000 Hours

Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Wavelength	λ_p	485nm	505nm	550nm
Spectral Half Width	HW	—	30nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/ $^\circ\text{C}$	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C



LEDD1

See Page 525 For Details

ITEM#	MICROSCOPE	POWER IN BEAM	BEAM DIAMETER	BEAM AREA
LEDC9	Olympus BX/IX	252mW	50mm	1960mm ²
LEDC10	Leica DMI	138mW	37mm	1080mm ²
LEDC11	Nikon F Mount	186mW	43mm	1450mm ²
LEDC12	Zeiss Axioskop	195mW	44mm	1520mm ²

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDC9	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Cyan LED (505nm) for Olympus BX & IX Microscopes
LEDC10	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Cyan (505nm) LED for Leica DMI Microscopes
LEDC11	\$ 374.00	£ 235.60	€ 347.80	¥ 3,571.70	Collimated Cyan (505nm) LED for Nikon Eclipse (F Mount) Microscopes
LEDC12	\$ 331.50	£ 208.80	€ 308.30	¥ 3,165.80	Collimated Cyan (505nm) LED for Zeiss Axioskop Microscopes
LEDD1	\$ 249.00	£ 156.90	€ 231.60	¥ 2,378.00	T-Cube LED Driver

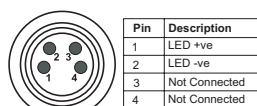


$\lambda = 505\text{nm}$ P = 420mW, Mounted LED

Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Peak Wavelength	λ_p	490nm	505nm	520nm
Output Power	P	—	—	420mW
Spectral Half Width	HW	—	30nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$d\lambda_p/dT_j$	—	0.04nm/ $^\circ\text{C}$	—
Viewing Half Angle	$\theta_{1/2}$	—	75°	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C

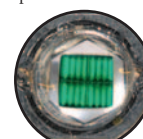
- Uncollimated, Lambertian Radiation Pattern
- High-Power LED, 420mW
- Mounted on Heat Sink
- Internal SM1 Lens Tube Compatible Threading
- Average Lifetime: 100,000 Hours



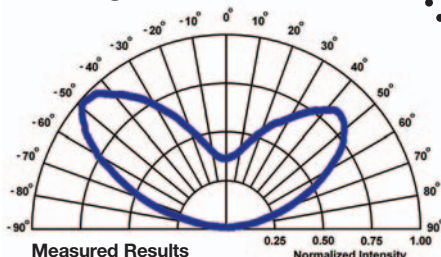
MCLED



Internal 1.035"-40 SM1 Lens Tube Compatible Threading



16 Emitters



ITEM#	\$	£	€	RMB	DESCRIPTION
MCLED	\$ 127.50	£ 80.30	€ 118,60	¥ 1,217.60	505nm, 420mW, SM1-Mounted LED

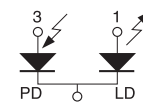
$\lambda = 525\text{nm}$, P = 2mW LED with Monitoring Photodiode

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	—	30mA	—
Reverse Voltage	V_r	—	—	5V
Forward Voltage	V_{fwd}	—	3.5V	4.3V
Peak Wavelength	λ_p	515nm	525nm	535nm
Spectral Half Width	HW	—	40nm	—
Viewing Half Angle	$\theta_{1/2}$	—	55°	—
PD Reverse Voltage	V_{pd}	—	—	100V
PD Output Current	I_{pd}	—	$55\mu\text{A}$	—
Operating Temperature	T_{op}	-20°C	—	85°C
Storage Temperature	T_{st}	-30°C	—	95°C

- Monitoring Photodiode for Constant Power Operation
- Center Wavelength: 525nm (Typ.)
- Output Power: 2.0mW CW
- UV-Transparent Optical Window
- Package: TO-18

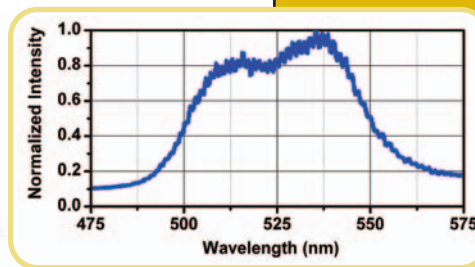
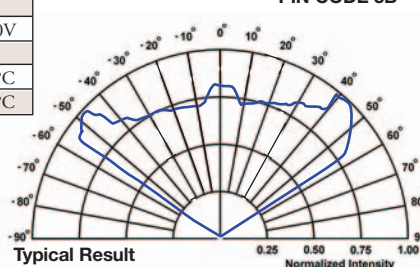
Pin Description
1 LED anode
2 common case
3 monitor diode anode



PIN CODE 5B



TO-18 can
5mm Diameter



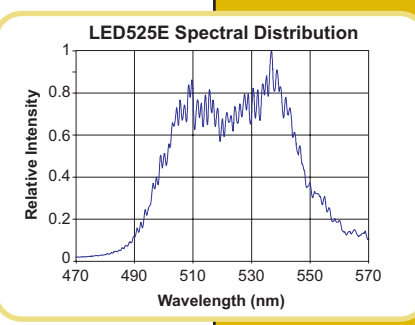
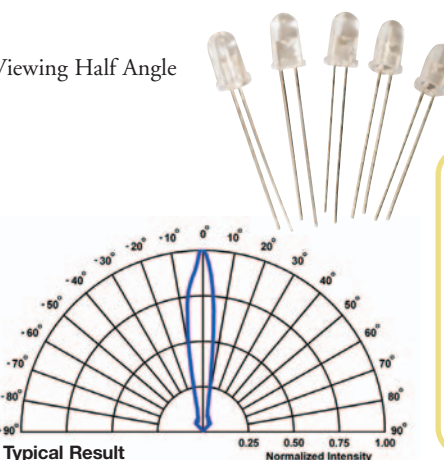
ITEM#	\$	£	€	RMB	DESCRIPTION
LED521M	\$ 80.00	£ 50.40	€ 74,40	¥ 764.00	525nm, 2mW, To-18 LED With Built-In Photodiode

$\lambda = 525\text{nm}$, P = 2.6mW LED

- Central Wavelength: 525nm
- Output Power: 2.6mW CW
- Epoxy Lens, 7.5° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	—	—	30mA
Power	P	—	—	2.6mW
Reverse Voltage	V_r	—	—	5V
Forward Voltage	V_{fwd}	—	3.3V	3.85V
Peak Wavelength	λ_p	520nm	525nm	540nm
Spectral Half Width	HW	—	32nm	—
Viewing Half Angle	$\theta_{1/2}$	—	7.5°	—
Operating Temperature	T_{op}	-40°C	—	85°C
Storage Temperature	T_{st}	-40°C	—	120°C



Sold in Packages of 5

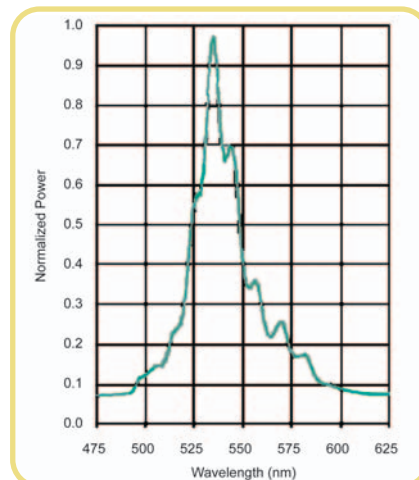
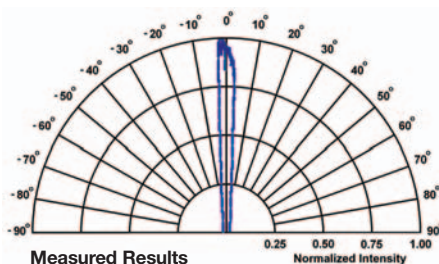
ITEM#	\$	£	€	RMB	DESCRIPTION
LED525E	\$ 9.00	£ 5.70	€ 8,40	¥ 86.00	525nm, 2.6mW, T-1 3/4 LEDs (Qty. 5)

LEDs

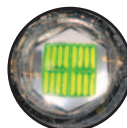
LED Drivers

LED Mounts and Accessories

Light Emitting Diode Technologies

 $\lambda = 530\text{nm}$, $P > 90\text{mW}$ Collimated LEDsCharacteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Wavelength	λ_p	520nm	530nm	550nm
Spectral Half Width	HW	—	35nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/ $^\circ\text{C}$	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C



- Closely Collimated Beam
- High Power Density
- Designed to Integrate into Standard Microscopes
- High Output Power up to 165mW
- Average Lifetime: 100,000 Hours



Pin	Description
1	LED +ve
2	LED -ve
3	Not Connected
4	Not Connected

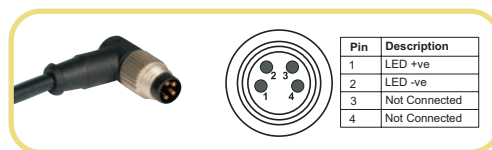
ITEM#	MICROSCOPE	POWER IN BEAM	BEAM DIAMETER	BEAM AREA
LEDC13	Olympus BX/IX	165mW	50mm	1960mm ²
LEDC14	Leica DMI	90mW	37mm	1080mm ²
LEDC15	Nikon F Mount	122mW	43mm	1450mm ²
LEDC16	Zeiss Axioskop	128mW	44mm	1520mm ²

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDC13	\$ 331.50	£ 208.80	€ 308,30	¥ 3,165.80	Collimated Green LED (530nm) for Olympus BX & IX Microscopes
LEDC14	\$ 331.50	£ 208.80	€ 308,30	¥ 3,165.80	Collimated Green LED (530nm) LED for Leica DMI Microscopes
LEDC15	\$ 374.00	£ 235.60	€ 347,80	¥ 3,571.70	Collimated Green LED (530nm) LED for Nikon Eclipse (F Mount) Microscopes
LEDC16	\$ 331.50	£ 208.80	€ 308,30	¥ 3,165.80	Collimated Green LED (530nm) LED for Zeiss Axioskop Microscopes
LEDD1	\$ 249.00	£ 156.90	€ 231,60	¥ 2,378.00	T-Cube LED Driver

 $\lambda = 530\text{nm}$ $P = 275\text{mW}$, Mounted LEDCharacteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

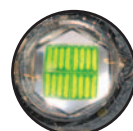
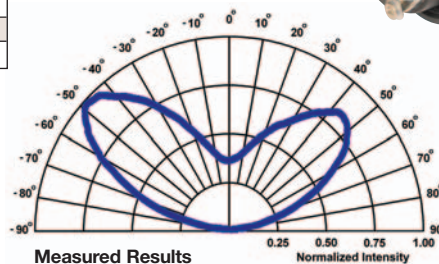
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Wavelength	λ_p	520nm	530nm	550nm
Output Power	P	—	—	275mW
Spectral Half Width	HW	—	35nm	—
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/ $^\circ\text{C}$	—
Viewing Angle	$\theta_{1/2}$	—	75°	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C

- Uncollimated, Lambertian Radiation Pattern
- High-Power LED, 275mW
- Mounted on Heat Sink
- Internal SM1 Lens Tube Compatible Threading
- Average Lifetime: 100,000 Hours



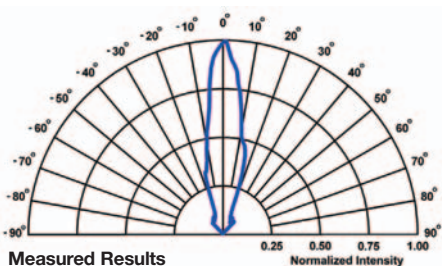
MGLED

Internal 1.035"-40
SM1 Lens Tube
Compatible Thread

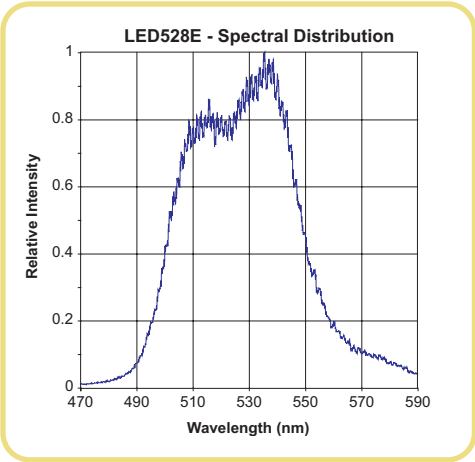


ITEM#	\$	£	€	RMB	DESCRIPTION
MGLED	\$ 127.50	£ 80.30	€ 118,60	¥ 1,217.60	530nm, 275mW, SM1-Mounted LED
LEDD1	\$ 249.00	£ 156.90	€ 231,60	¥ 2,378.00	T-Cube LED Driver

$\lambda = 535\text{nm}$, $P = 1.5\text{mW}$ LED



- Center Wavelength: 535nm (Typ.)
- Output Power: 1.5mW CW
- Epoxy Lens, 10° Viewing Half Angle
- Package: T-1 3/4



Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	30mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	3.5V	4.3V
Peak Wavelength	λ_p	525nm	535nm	545nm
Spectral Half Width	HW	-	40nm	-
Viewing Half Angle	$\theta_{1/2}$	-	10°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C

Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LED528E	\$ 15.00	£ 9.50	€ 14.00	¥ 143.30	535nm, 1.5mW T-1 3/4 LEDs (Qty. 5)

RGB $P = 5.8\text{mW}/3.1\text{mW}/6.2\text{mW}$ LED

- Three LEDs Packaged Together: Red, Green, and Blue
- Wavelengths: 625nm, 524nm, and 466nm
- Each LED can be Operated Separately
- Power: Red - 5.8mW, Green - 3.1mW, Blue - 6.2mW
- Epoxy Lens, 12.5° Viewing Half Angle
- Package: T-1 3/4

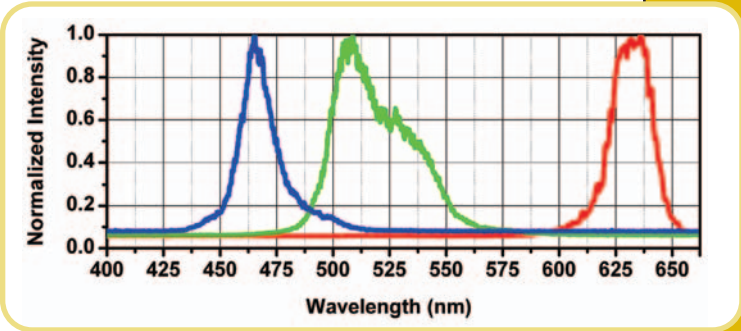
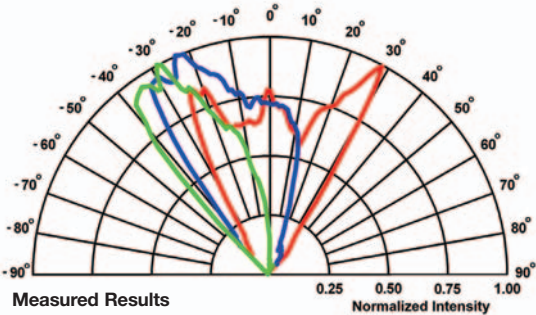
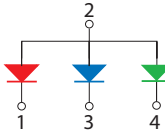


LEDRGBE
(Sold in Quantities of Five)

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN. (R/G/B)	TYP. (R/G/B)	MAX. (R/G/B)
Forward Current	I_{fw}	-	-	50mA
Pulse Forward Current	I_{fw-pls}	-	-	100mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage V_{fwd}	V_{fwd}	1.7V/2.8V/2.8V	-	2.4V/3.6V/3.6V
Dominant Wavelength	λ_D	620nm/460nm/515nm	-	635nm/475nm/535nm
Power	P	-	5.8mW/3.1mW/6.2mW	-
Viewing Half Angle	$\theta_{1/2}$	-	12.5°	-
Operating Temperature	T_{op}	-40°C	-	95°C
Storage Temperature	T_{st}	-40°C	-	100°C

- Pin Description**
- 1 Red LED Cathode
 - 2 Common Anode
 - 3 Blue LED Cathode
 - 4 Green LED Cathode



Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDRGBE	\$ 7.75	£ 4.90	€ 7.20	¥ 74.00	Combined RGB LEDs (Qty. 5)

Light Emitting Diode Technologies

LEDs

LED Drivers

LED Mounts and Accessories

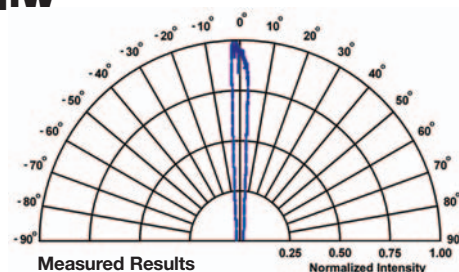
White Light Collimated LEDs, P>164mW



LED C20
Shown



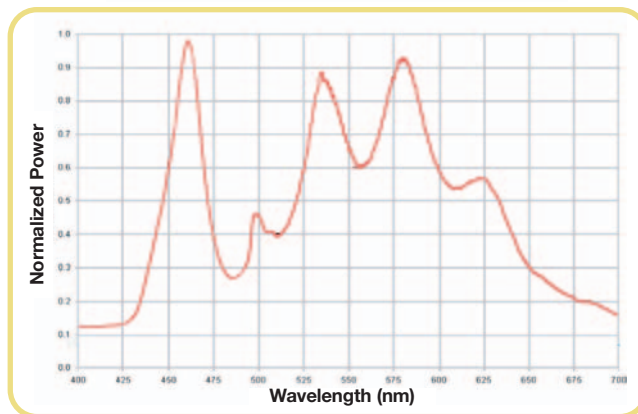
16 Emitters



- Closely Collimated Beam
- High Power Density
- Designed to Integrate into Standard Microscopes
- High Output Power up to 300mW
- Average Lifetime: 100,000 Hours

Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Wavelength	λ_p	435nm	—	675nm
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/°C	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C



ITEM#	MICROSCOPE	POWER IN BEAM	BEAM DIAMETER	BEAM AREA
LEDC17	Olympus BX/IX	300mW	50mm	1960mm ²
LEDC18	Leica DMI	164.mW	37mm	1080mm ²
LEDC19	Nikon F Mount	222mW	43mm	1450mm ²
LEDC20	Zeiss Axioskop	232mW	44mm	1520mm ²



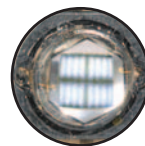
Pin	Description
1	LED +ve
2	LED -ve
3	Not Connected
4	Not Connected

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDC17	\$ 331.50	£ 208.80	€ 308,30	¥ 3,165.80	Collimated White Light LED (435-675nm) for Olympus BX & IX Microscopes
LEDC18	\$ 331.50	£ 208.80	€ 308,30	¥ 3,165.80	Collimated White Light LED (435-675nm) for Leica DMI Microscopes
LEDC19	\$ 374.00	£ 235.60	€ 347,80	¥ 3,571.70	Collimated White Light LED (435-675nm) for Nikon Eclipse (F Mount) Microscopes
LEDC20	\$ 331.50	£ 208.80	€ 308,30	¥ 3,165.80	Collimated White Light LED (435-675nm) or Zeiss Axioskop Microscopes
LEDD1	\$ 249.00	£ 156.90	€ 231,60	¥ 2,378.00	T-Cube LED Driver

White Light Mounted LED, P = 500mW

Characteristics ($T_c=25^\circ\text{C}$, $I=700\text{mA}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Wavelength	λ_p	435nm	—	675nm
Output Power	P	—	—	500mW
Operation Voltage	V_{op}	5.43V	6.84V	8.31V
DC Forward Current	I_{fw}	—	—	700mA
Peak Pulsed Forward Current	I_{fw-pls}	—	—	1000mA
Temperature Coefficient of Dominant Wavelength	$\Delta\lambda_o/\Delta T_j$	—	0.04nm/°C	—
Viewing Angle	$\theta_{1/2}$	—	150°	—
Dynamic Resistance	R_D	—	1.0	—
Operating Temperature	T_{op}	-40°C	—	120°C
Storage Temperature	T_{st}	-40°C	—	120°C



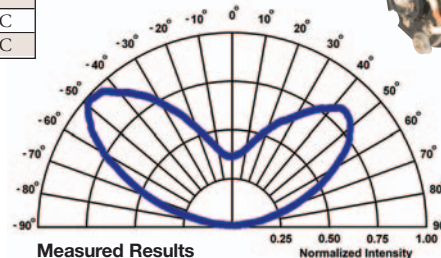
16 Emitters



Pin	Description
1	LED +ve
2	LED -ve
3	Not Connected
4	Not Connected

MWLED

Internal 1.035"-40
SM1 Lens Tube
Compatible Thread



Measured Results

ITEM#	\$	£	€	RMB	DESCRIPTION
MWLED	\$ 127.50	£ 80.30	€ 118,60	¥ 1,217.60	White Light, 500mW, SM1-Mounted LED
LEDD1	\$ 249.00	£ 156.90	€ 231,60	¥ 2,378.00	T-Cube LED Driver



LEDD1

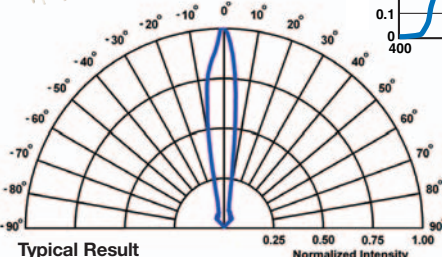
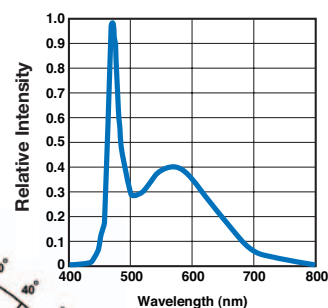
See Page 525 for Details

- Uncollimated
- High-Power LED, 500mW
- Mounted on Heat Sink
- Internal SM1 Lens Tube Compatible Threading
- Average Lifetime: 100,000 Hours

White Light LED, P = 1mW

- Output Power: 1mW
- Epoxy Lens, 7.5° Viewing Half Angle
- Package: T-1 3/4

LEDWE-15
(Sold in
Quantities of Five)



Optical-Electrical Characteristics (T_a=25°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I _{fw}	-	-	30mA
Pulse Forward Current	I _{fw-pls}	-	-	100mA
Power	P	1mW	-	-
Reverse Voltage	V _r	-	-	5V
Forward Voltage	V _{fwd}	-	3.2V	3.7V
Viewing Half Angle	θ _{1/2}	-	7.5°	-
Operating Temperature	T _{op}	-40°C	-	80°C
Storage Temperature	T _{st}	-40°C	-	100°C

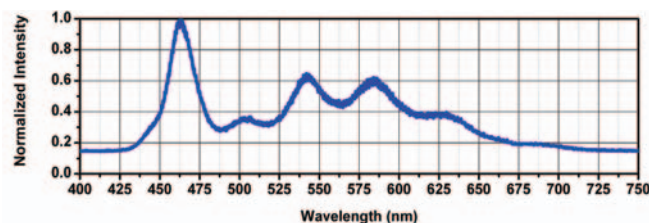
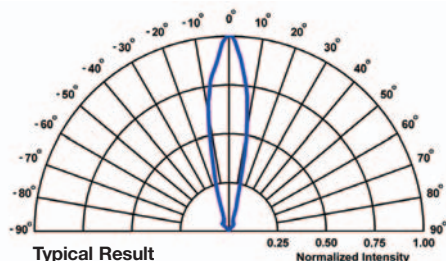
Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDWE-15	\$ 9.00	£ 5.70	€ 8.40	¥ 86.00	White Light LEDs, 1mW (Qty. 5)

White Light LED, P = 2.6mW

- Output Power: 2.6mW
- Epoxy Lens, 10° Viewing Half Angle
- Package: T-1 3/4

LEDWE-10
(Sold in Quantities of Five)



Optical-Electrical Characteristics (T_a=25°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I _{fw}	-	-	30mA
Pulse Forward Current	I _{fw-pls}	-	-	150mA
Power	P	-	2.6mW	-
Reverse Voltage	V _r	-	-	5V
Forward Voltage	V _{fwd}	-	3.1V	3.6V
Viewing Half Angle	θ _{1/2}	-	10°	-
Operating Temperature	T _o	-40°C	-	80°C
Storage Temperature	T _c	-40°C	-	-85°C

Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDWE-10	\$ 10.00	£ 6.30	€ 9.30	¥ 95.50	White Light LEDs, 2.6mW (Qty. 5)

White Light LED, P = 3.7mW

- Output Power: 3.7mW
- Epoxy Lens, 25° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics (T_a=25°C)

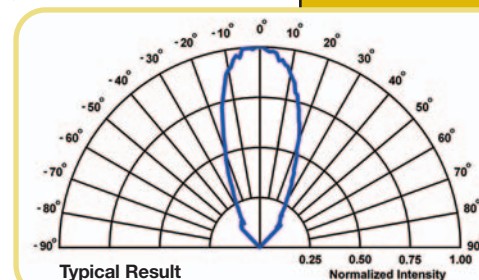
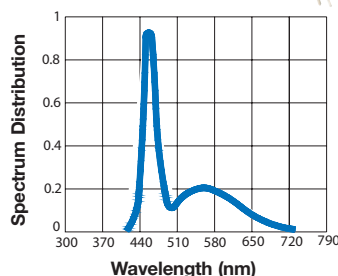
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I _{fw}	-	-	30mA
Pulse Forward Current	I _{fw-pls}	-	-	150mA
Power	P	-	3.7mW	-
Reverse Voltage	V _r	-	-	5V
Forward Voltage	V _{fwd}	-	3.1V	3.6V
Spectral Half Width	HW	-	-	18nm
Viewing Half Angle	θ _{1/2}	-	25°	-
Operating Temperature	T _{op}	-40°C	-	80°C
Storage Temperature	T _{st}	-40°C	-	85°C

Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDWE-50	\$ 5.75	£ 3.60	€ 5.30	¥ 54.90	White Light LEDs, 3.7mW (Qty. 5)



LEDWE-50
(Sold in
Quantities of Five)



Optical Power Meters



See Page 946

Light Emitting Diode Technologies

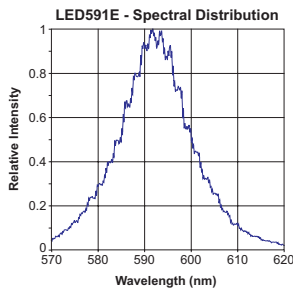
LEDs

LED Drivers

LED Mounts and Accessories

$\lambda = 590\text{nm}$, $P = 2.0\text{mW}$ LED

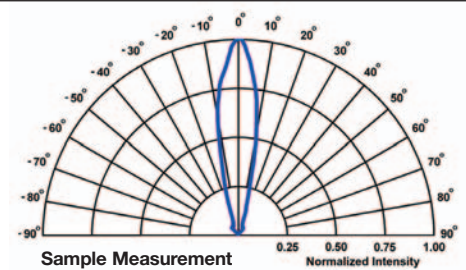
- Center Wavelength: 590nm (Typ.)
- Output Power: 2.0mW CW
- Epoxy Lens, 10° Viewing Half Angle
- Package: T-1 3/4



LED591E
(Sold in Quantities of Five)

Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LED591E	\$ 18.00	£ 11.30	€ 16.70	¥ 171.90	590nm, 2mW LEDs (Qty. 5)

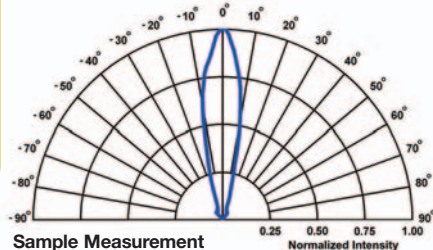
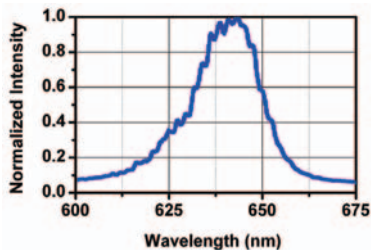


Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	50mA
Pulse Forward Current	I_{fw-pls}	-	-	140mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	2.2V	2.6V
Optical Power	P	-	2mW	-
Peak Wavelength	λ_p	580nm	590nm	600nm
Spectral Half Width	HW	-	20nm	-
Viewing Half Angle	$\theta_{1/2}$	-	10°	-
Operating Temperature	T_{op}	-25°C	-	85°C
Storage Temperature	T_{st}	-25°C	-	100°C

$\lambda = 635\text{nm}$, $P = 4\text{mW}$ LED

- Center Wavelength: 635nm (Typ.)
- Output Power: 4mW CW
- Epoxy Lens, 20° Viewing Half Angle
- Package: T-1 3/4



LED631E

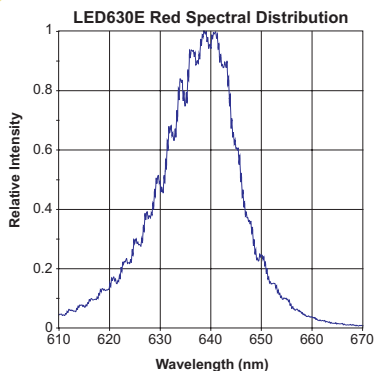
Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	50mA
Pulse Forward Current	I_{fw-pls}	-	-	140mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	2.2V	2.6V
Optical Power	P	-	4mW	-
Peak Wavelength	λ_p	625nm	635nm	645nm
Spectral Half Width	HW	-	10nm	-
Viewing Half Angle	$\theta_{1/2}$	-	20°	-
Operating Temperature	T_{op}	-25°C	-	85°C
Storage Temperature	T_{st}	-25°C	-	100°C

ITEM#	\$	£	€	RMB	DESCRIPTION
LED631E	\$ 3.00	£ 1.90	€ 2.80	¥ 28.70	635nm, 4mW LED

$\lambda = 639\text{nm}$, $P = 7.2\text{mW}$ LED

- Center Wavelength: 639nm (Typ.)
- Output Power: 7.2mW CW
- Epoxy Lens, 7.5° Viewing Half Angle
- Package: T-1 3/4

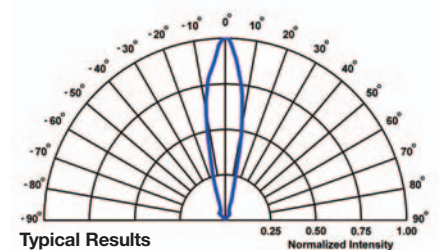


Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	50mA
Pulse Forward Current	I_{fw-pls}	-	-	100mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	2.0V	2.5V
Power	P	-	7.2mW	-
Peak Wavelength	λ_p	-	639nm	-
Spectral Half Width	HW	-	17nm	-
Viewing Half Angle	$\theta_{1/2}$	-	7.5°	-
Rise Time	T	-	20ns	-
Fall Time	T	-	20ns	-
Capacitance	C	-	40pF	-
Operating Temperature	T_{op}	-40°C	-	100°C
Storage Temperature	T_{st}	-40°C	-	120°C



LED630E
(Sold in Quantities of Five)



Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LED630E	\$ 6.00	£ 3.80	€ 5.60	¥ 57.30	639nm, 7.2mW LEDs (Qty. 5)

Light Emitting Diode Technologies

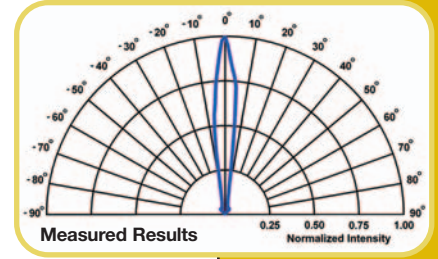
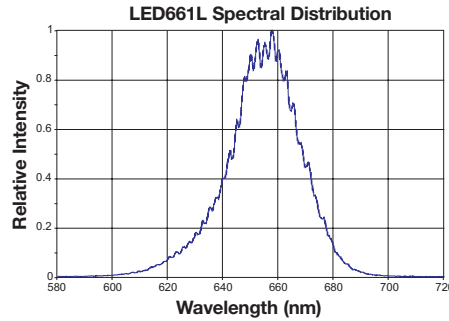
$\lambda = 655\text{nm}$, $P = 1.7\text{mW}$ LED with Glass Lens

- Center Wavelength: 655nm (Typ.)
- Output Power: 1.7mW CW
- Glass Lens, 6° Viewing Half Angle
- Package: TO-18 Can



Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	50mA
Pulse Forward Current	I_{fw-pls}	-	-	75mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.9V	2.2V
Optical Power	P_{op}	-	1.7mW	-
Peak Wavelength	-	645nm	655nm	665nm
Spectral Half Width	HW	-	20nm	-
Viewing Half Angle	$\theta_{1/2}$	-	6°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C



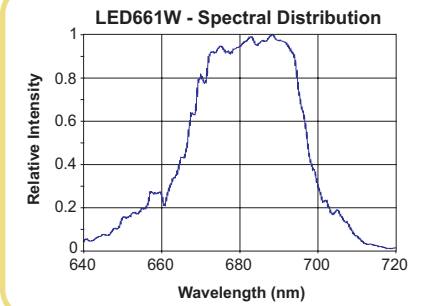
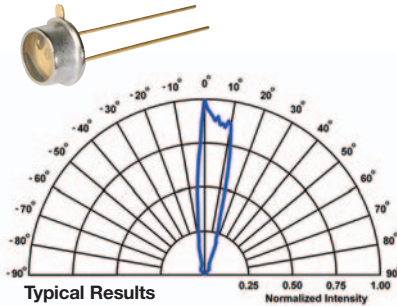
ITEM#	\$	£	€	RMB	DESCRIPTION
LED661L	\$ 4.25	£ 2.70	€ 4.00	¥ 40.60	655nm, 1.7mW LED With Glass Lens

$\lambda = 670\text{nm}$, $P = 0.45\text{mW}$ LED

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	60mA
Pulse Forward Current	I_{fw-pls}	-	-	500mA
Reverse Voltage	V_r	-	-	3V
Forward Voltage	V_{fwd}	-	1.9V	2.2V
Optical Power	P_{op}	0.35mW	0.45mW	-
Peak Wavelength	-	650nm	670nm	700nm
Spectral Half Width	HW	-	20nm	-
Viewing Half Angle	$\theta_{1/2}$	-	15°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-40°C	-	100°C
Rise Time	-	-	60ns	100ns
Fall Time	-	-	60ns	100ns

- Center Wavelength: 670nm
- Output Power: 0.45mW
- Package: TO-18 Can



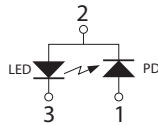
ITEM#	\$	£	€	RMB	DESCRIPTION
LED661W	\$ 3.75	£ 2.40	€ 3.50	¥ 35.80	670nm, 0.45mW LED With Glass Window

$\lambda = 780\text{nm}$, $P = 6\text{mW}$ LED With Integrated Photodiode

- Center Wavelength: 780nm (Typ.)
- Output Power: 6mW CW
- Glass Window, 55° Viewing Half Angle
- Package: TO-18 Can

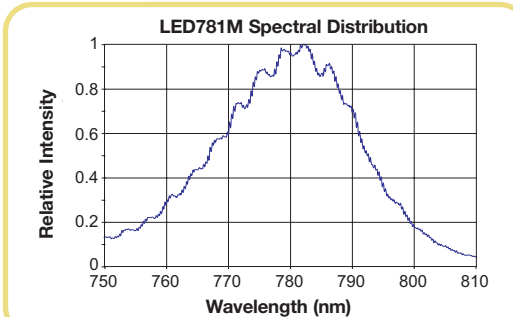
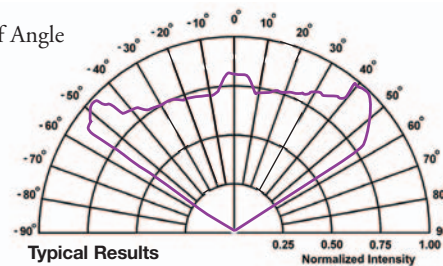
Pin Description

- monitor diode anode
- common case
- LED cathode



Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	500mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.7V	2V
Optical Power	P_{op}	3mW	6mW	-
Peak Wavelength	-	765nm	780nm	795nm
Spectral Half Width	HW	-	35nm	-
Viewing Half Angle	$\theta_{1/2}$	-	55°	-
Photodiode Reverse Voltage	-	-	-	100V
Photodiode Output Current	-	0.25mA	0.5mA	-
Operating Temperature	T_{op}	-20°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time	-	-	60ns	-
Fall Time	-	-	40ns	-



ITEM#	\$	£	€	RMB	DESCRIPTION
LED781M	\$ 72.00	£ 45.40	€ 67.00	¥ 687.60	780nm, 6mW LED With Integrated Photodiode

Aspheric Lenses



See Page 737

Light Emitting Diode Technologies

LEDs

LED Drivers

LED Mounts and Accessories

$\lambda = 780\text{nm}$, $P = 18\text{mW}$ LED

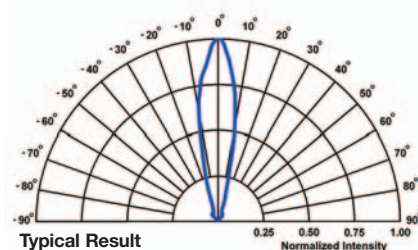
- Center Wavelength: 780nm (Typ.)
- Output Power: 18mW CW
- Epoxy Lens, 10° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

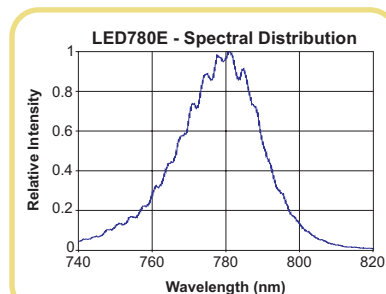
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	500mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.75V	1.95V
Optical Power	P_{op}	13mW	18mW	-
Peak Wavelength		-	780nm	-
Spectral Half Width	HW	-	30nm	-
Viewing Half Angle	$\theta_{1/2}$	-	10°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	80ns	-
Fall Time		-	80ns	-

Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LED780E	\$ 16.25	£ 10.20	€ 15.10	¥ 155.20	780nm, 18mW LEDs (Qty. 5)

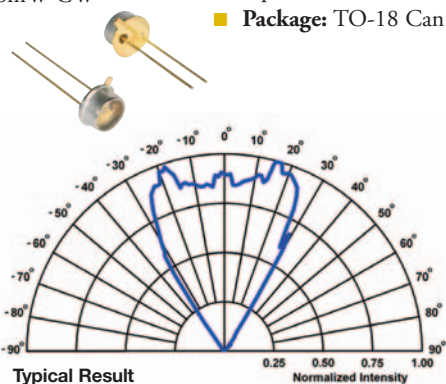
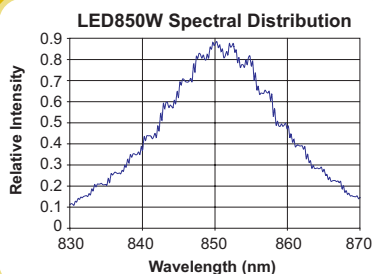


LED780E
(Sold in Quantities of Five)



$\lambda = 850\text{nm}$, $P = 8\text{mW}$ LED

- Center Wavelength: 850nm (Typ.)
- Output Power: 8mW CW
- UV-Transparent Optical Window
- Package: TO-18 Can



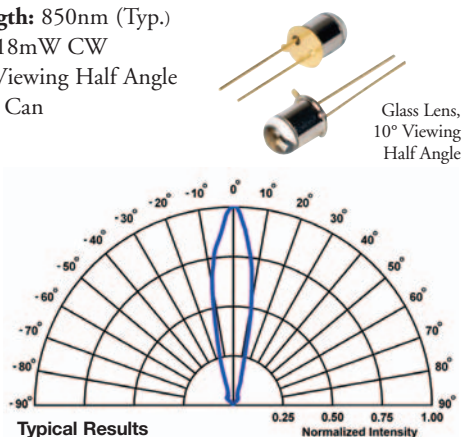
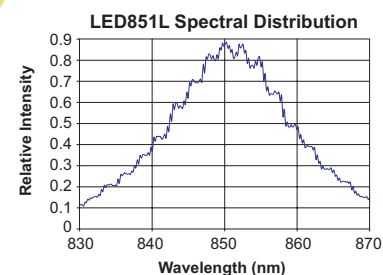
Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.55V	1.7V
Optical Power	P_{op}	5mW	8mW	-
Peak Wavelength		835nm	850nm	865nm
Spectral Half Width	HW	-	40nm	-
Viewing Half Angle	$\theta_{1/2}$	-	55°	-
Operating Temperature	T_{op}	-30°C	-	90°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	30ns	-
Fall Time		-	25ns	-

ITEM#	\$	£	€	RMB	DESCRIPTION
LED851W	\$ 3.80	£ 2.40	€ 3.50	¥ 36.30	850nm, 8mW LED With Glass Window, TO-18 Package

$\lambda = 850\text{nm}$, $P = 18\text{mW}$ LED

- Center Wavelength: 850nm (Typ.)
- Output Power: 18mW CW
- Glass Lens, 10° Viewing Half Angle
- Package: TO-18 Can



Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.55V	1.7V
Optical Power	P_{op}	11mW	18mW	-
Peak Wavelength		835nm	850nm	865nm
Spectral Half Width	HW	-	40nm	-
Viewing Half Angle	$\theta_{1/2}$	-	10°	-
Operating Temperature	T_{op}	-30°C	-	90°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	30ns	-
Fall Time		-	25ns	-

ITEM#	\$	£	€	RMB	DESCRIPTION
LED851L	\$ 3.75	£ 2.40	€ 3.50	¥ 35.80	850nm, 18mW LED With Glass Lens, TO-18 Package

$\lambda = 870\text{nm}$, $P = 22\text{mW}$ LED

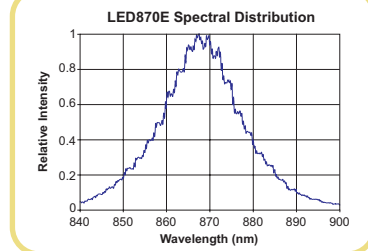
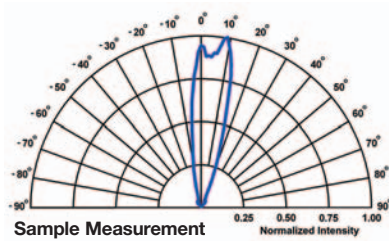
- Wavelength: 870nm (Typ.)
- Output Power: 22mW CW
- Epoxy Lens, 10° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.5V	1.7V
Optical Power	P_{op}	18mW	22mW	-
Peak Wavelength		-	870nm	-
Spectral Half Width	HW	-	40nm	-
Viewing Half Angle	$\theta_{1/2}$	-	10°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	15ns	-
Fall Time		-	10ns	-



LED870E
(Sold in
Quantities of Five)



Sold in Packages of 5

ITEM#	\$	£	€	RMB	DESCRIPTION
LED870E	\$ 16.25	£ 10.20	€ 15.10	¥ 155.20	870nm, 22mW Epoxy T-1 3/4 LEDs (Qty. 5)

$\lambda = 940\text{nm}$, $P = 18\text{mW}$ LED

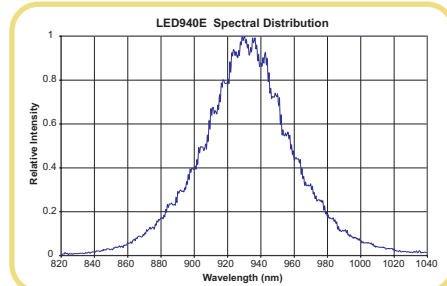
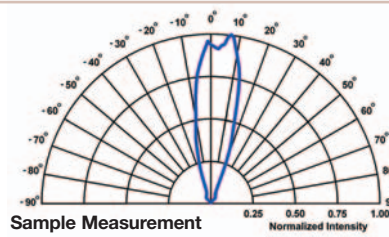
- Center Wavelength: 940nm (Typ.)
- Output Power: 18mW CW
- Epoxy Lens, 10° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.3V	1.45V
Optical Power	P_{op}	14mW	18mW	-
Peak Wavelength		-	940nm	-
Spectral Half Width	HW	-	50nm	-
Viewing Half Angle	$\theta_{1/2}$	-	10°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	1μs	-
Fall Time		-	0.5μs	-



LED940E
(Sold in Quantities
of Five)



Sold in Packages of 5

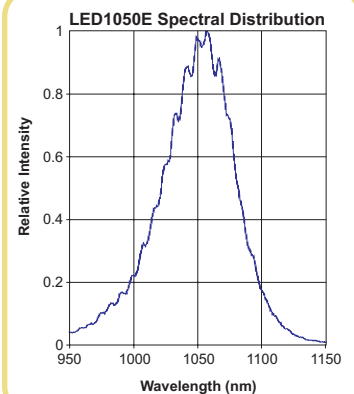
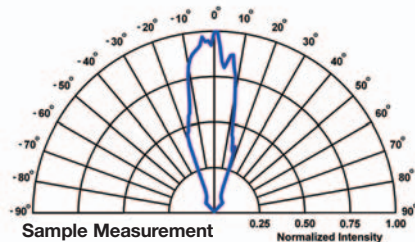
ITEM#	\$	£	€	RMB	DESCRIPTION
LED940E	\$ 11.25	£ 7.10	€ 10.50	¥ 107.40	940nm, 18mW T-1 3/4 LEDs (Qty. 5)

$\lambda = 1050\text{nm}$, $P = 2.5\text{mW}$ LED

- Center Wavelength: 1050nm (Typ.)
- Output Power: 2.5mW CW
- Epoxy Lens, 15° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	500mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.25V	1.55V
Optical Power	P_{op}	1mW	2.5mW	-
Peak Wavelength		1000nm	1050nm	1100nm
Spectral Half Width	HW	-	55nm	-
Viewing Half Angle	$\theta_{1/2}$	-	15°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	10ns	-
Fall Time		-	10ns	-



ITEM#	\$	£	€	RMB	DESCRIPTION
LED1050E	\$ 14.25	£ 9.00	€ 13.30	¥ 136.10	1050nm, 2.5mW T-1 3/4 Lens LED

LEDs

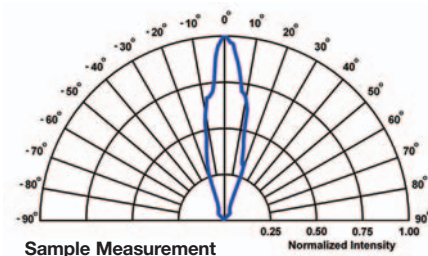
LED Drivers

LED Mounts and Accessories

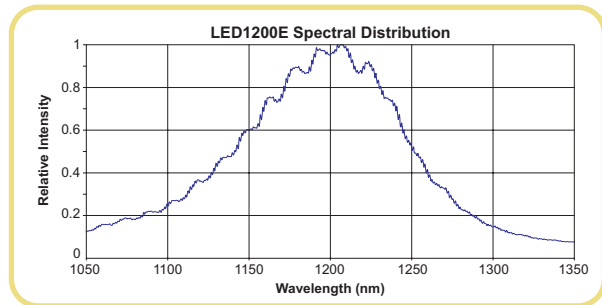
Light Emitting Diode Technologies

 $\lambda = 1200\text{nm}$, $P = 2.5\text{mW}$ LED

- Center Wavelength: 1200nm (Typ.)
- Output Power: 2.5mW CW
- Epoxy Lens, 15° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

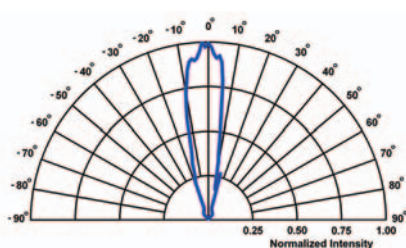
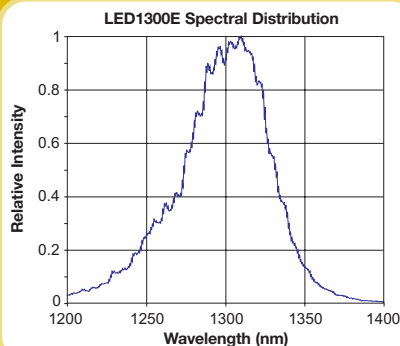
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.2V	1.5V
Optical Power	P_{op}	-	2.5mW	-
Peak Wavelength		1150nm	1200nm	1250nm
Spectral Half Width	HW	-	100nm	-
Viewing Half Angle	$\theta_{1/2}$	-	15°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	10ns	-
Fall Time		-	10ns	-



ITEM#	\$	£	€	RMB	DESCRIPTION
LED1200E	\$ 14.50	£ 9.10	€ 13.50	¥ 138.50	1200nm, 2.5mW T-1 3/4 LED

 $\lambda = 1300\text{nm}$, $P = 2.0\text{mW}$ LED

- Center Wavelength: 1300nm (Typ.)
- Output Power: 2.0mW CW
- Epoxy Lens, 15° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.2V	1.5V
Optical Power	P_{op}	-	2mW	-
Peak Wavelength		1250nm	1300nm	1250nm
Spectral Half Width	HW	-	100nm	-
Viewing Half Angle	$\theta_{1/2}$	-	15°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	10ns	-
Fall Time		-	10ns	-

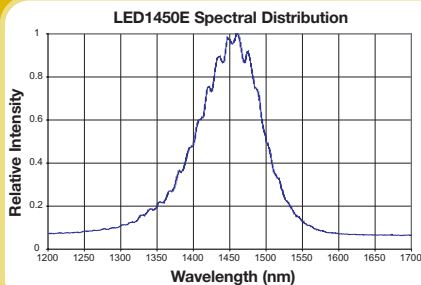
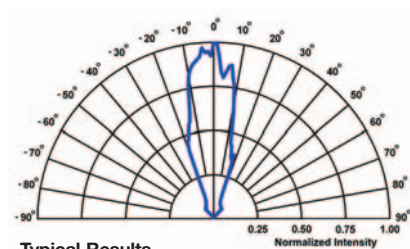
ITEM#	\$	£	€	RMB	DESCRIPTION
LED1300E	\$ 16.25	£ 10.20	€ 15.10	¥ 155.20	1300nm, 2.0mW T-1 3/4 LED

 $\lambda = 1450\text{nm}$, $P = 2.0\text{mW}$ LED

- Center Wavelength: 1450nm (Typ.)
- Output Power: 2.0mW CW
- Epoxy Lens, 15° Viewing Half Angle
- Package: T-1 3/4

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.2V	1.5V
Optical Power	P_{op}	-	2mW	-
Peak Wavelength		1400nm	1450nm	1500nm
Spectral Half Width	HW	-	100nm	-
Viewing Half Angle	$\theta_{1/2}$	-	15°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	10ns	-
Fall Time		-	10ns	-



ITEM#	\$	£	€	RMB	DESCRIPTION
LED1450E	\$ 16.85	£ 10.60	€ 15.70	¥ 160.90	1450nm, 2.0mW T-1 3/4 LED

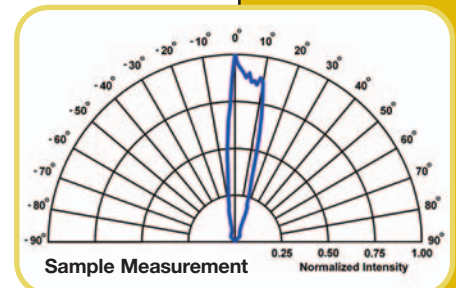
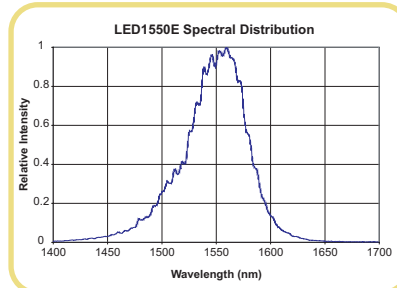
$\lambda = 1550\text{nm}$, $P = 2.0\text{mW}$ LED



Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	100mA
Pulse Forward Current	I_{fw-pls}	-	-	1000mA
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	1.2V	1.5V
Optical Power	P_{op}	-	2mW	-
Peak Wavelength		1500nm	1550nm	1600nm
Spectral Half Width	HW	-	100nm	-
Viewing Half Angle	$\theta_{1/2}$	-	15°	-
Operating Temperature	T_{op}	-30°C	-	85°C
Storage Temperature	T_{st}	-30°C	-	100°C
Rise Time		-	10ns	-
Fall Time		-	10ns	-

- Center Wavelength: 1550nm (Typ.)
- Output Power: 2.0mW CW
- Epoxy Lens, 15° Viewing Half Angle
- Package: T-1 3/4



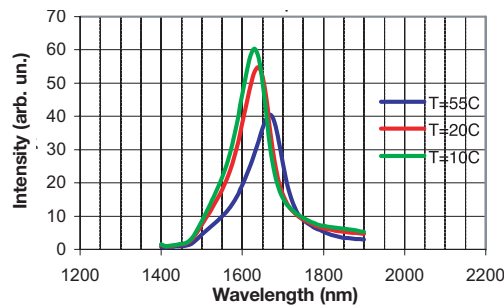
ITEM#	\$	£	€	RMB	DESCRIPTION
LED1550E	\$ 15.25	£ 9.60	€ 14,20	¥ 145.60	1550nm, 2.0mW Epoxy Lens LED

$\lambda = 1650\text{nm}$, $P = 0.9\text{mW}$ LED with Parabolic Reflector



- Center Wavelength: 1650nm (Typ.)
- Viewing Half Angle: <10°
- Package: TO-18 with Parabolic Reflector (TO-18R)

Typical Spectra at Different Temperatures

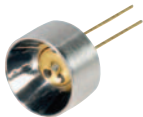


Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	200mA
Pulse Forward Current	I_{fw-pls}	-	-	1A
Reverse Voltage	V_r	-	-	5V
Forward Voltage	V_{fwd}	-	-	1V
Optical Power (200mA Pulse)	P	0.7mW	0.9mW	1.1mW
Optical Power (1A Pulse)	P	15mW	20mW	25mW
Peak Wavelength	λ_p	1600nm	1650nm	1690nm
Spectral Half Width	HW	100nm	150nm	200nm
Operating Temperature	T_{op}	-240°C	-	50°C
Rise/Fall Time		10ns	30ns	50ns

ITEM#	\$	£	€	RMB	DESCRIPTION
LED1650P	\$ 95.00	£ 59.90	€ 88,40	¥ 907.30	1650nm, 0.9mW LED, TO-18R With Parabolic Reflector

$\lambda = 2050\text{nm}$, $P = 1.1\text{mW}$ LED with Parabolic Reflector

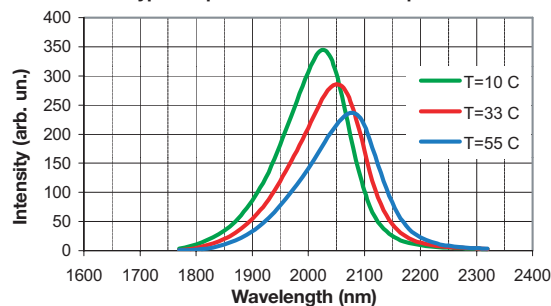


- Center Wavelength: 2050 nm (Typ.)
- Output Power: 1.1mW With 200mA Pulse
- Package: TO-18 with Parabolic Reflector (TO-18R)
- Viewing Half Angle: <10°

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	200mA
Pulse Forward Current	I_{fw-pls}	-	-	1A
Reverse Voltage	V_r	-	-	3V
Forward Voltage	V_{fwd}	-	-	0.8V
Optical Power (200mA Pulse)	P	0.9mW	1.1mW	1.3mW
Optical Power (1A Pulse)	P	25mW	28mW	30mW
Peak Wavelength	λ_p	2000nm	2050nm	2090nm
Spectral Half Width	HW	150nm	200nm	250nm
Operating Temperature	T_{op}	-240°C	-	50°C
Rise Time		10ns	30ns	50ns
Fall Time		10ns	30ns	50ns

Typical Spectra at Different Temperatures



ITEM#	\$	£	€	RMB	DESCRIPTION
LED2050P	\$ 102.00	£ 64.30	€ 94,90	¥ 974.10	2050nm, 1.1mW TO-18R LED With Parabolic Reflector

Light Emitting Diode Technologies

LEDs

LED Drivers

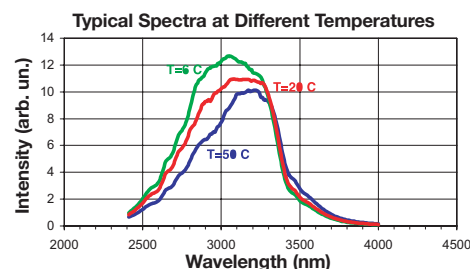
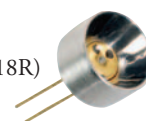
LED Mounts and Accessories

$\lambda = 3100\text{nm}$, $P = 14\mu\text{W}$ LED

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	200mA
Pulse Forward Current	I_{fw-pls}	-	-	1A
Reverse Voltage	V_r	-	-	2.5V
Forward Voltage	V_{fwd}	-	-	0.5V
Optical Power (200mA Pulsed)	P	12 μW	14 μW	16 μW
Optical Power (1A Pulse)	P	180 μW	200 μW	220 μW
Peak Wavelength	λ_p	3000nm	3100nm	3200nm
Spectral Half Width	HW	600nm	700nm	800nm
Operating Temperature	T_{op}	-240 $^\circ\text{C}$	-	50 $^\circ\text{C}$
Rise/Fall Time		10ns	30ns	50ns

- Center Wavelength: 3100nm (Typ.)
- Viewing Half Angle: $<10^\circ$
- Package: TO-18 With Parabolic Reflector (T-18R)



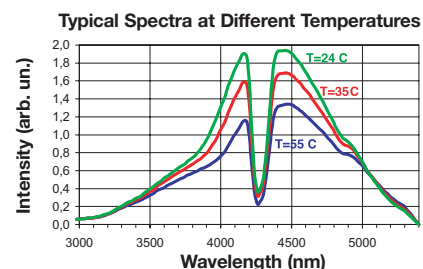
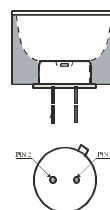
ITEM#	\$	£	€	RMB	DESCRIPTION
LED3100P	\$ 140.00	£ 88.20	€ 130.20	¥ 1,337.00	3100nm, 14 μW LED TO-18R With Parabolic Reflector

$\lambda = 4500\text{nm}$, $P = 6.0\mu\text{W}$ LED

Optical-Electrical Characteristics ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Forward Current	I_{fw}	-	-	200mA
Pulse Forward Current	I_{fw-pls}	-	-	1A
Reverse Voltage	V_r	-	-	4.5V
Forward Voltage	V_{fwd}	-	-	0.5V
Optical Power (200mA Pulse)	P	4 μW	6 μW	8 μW
Optical Power Pulsed (1A Pulse)	P	100 μW	120 μW	140 μW
Peak Wavelength	λ_p	4400nm	4500nm	4600nm
Spectral Half Width	HW	1000nm	1100nm	1200nm
Operating Temperature	T_{op}	-240 $^\circ\text{C}$	-	50 $^\circ\text{C}$
Rise/Fall Time		10ns	30ns	50ns

- Center Wavelength: 4500nm (Typ.)
- Viewing Half Angle: $<10^\circ$
- Package: TO-18 With Parabolic Reflector (T-18R)



ITEM#	\$	£	€	RMB	DESCRIPTION
LED4600P	\$ 180.00	£ 113.40	€ 167.40	¥ 1,719.00	4500nm, 6 μW LED TO-18R With Parabolic Reflector

TOOLS OF THE TRADE

Expanding the Line OPTICAL POWER AND ENERGY METERS

- Large Selection of Sensors and Displays
- Interchangeable Sensors With NIST Traceable Calibration Data
- Power Meters for Measurements From 35nW to 30W
- New UV Sensors



NEW PM300 Dual Channel Power Meter



SEE OUR ENTIRE POWER METER LINE ON PAGES 946-961

LED Array Light Source

The LIU series of LED light sources includes red, blue, green, and white LED arrays conveniently mounted in a 1.5" outer diameter housing that can be used for a variety of lighting applications. The housing can be readily secured in most optical mounts used in camera illumination units. Additional mounting options include two threaded holes on the rear of the housings, one M4 and one #8-32, as well as grooves running the length of the housing that allow the LED unit to be mounted in a 30mm cage system. Each LED unit has a 4-pin power receptacle (M8 Straight Socket) on the rear of the housing and is shipped without a power cord. The LIU Series of LED arrays can be powered by an LIU-PS power supply. The 4-pin power receptacle allows for two channel control of the LED light source. When operating with 100mA of current, the red, green, and blue LED arrays have an output intensity of more than $600\mu\text{W}/\text{cm}^2$, and the white LED array has an output intensity of more than $1700\mu\text{W}/\text{cm}^2$, when measured at a distance of 100mm from the LED array along the central axis.

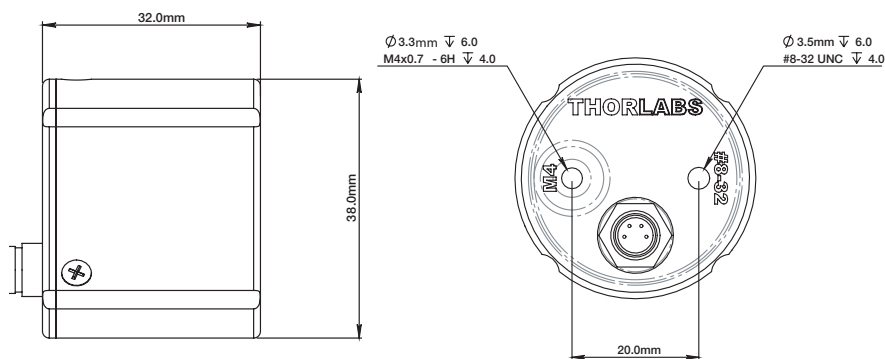
Features

- 20 High Brightness LEDs
- Longer Lifetime Than Traditional Light Sources
- LED Array Output can be Modulated
- Fits Many Commercial Camera Illumination Units
- Compatible With the 30mm Cage System



LIU Light Sources
Power Cord Not Included

The AD38 double bored mounting ring holds an LIU series LED array in place with a single #8-32 setscrew. The outside of the ring is $\varnothing 2"$ so that it can hold any one of many optomechanical parts suitable for $\varnothing 2"$ components.



Pin Description

- 1 LED +ve
- 2 Channel One Controller Input
- 3 Coded Input
- 4 Channel Two Controller Input



LIU-PS



LIU002 With AD38
Mounting Ring Secured
in a KS2 Mount on a
TR Series Post



AD38

Mounting Ring
Used With LED
Arrays Listed

ITEM#	COLOR	INTENSITY*	MAXIMUM VOLTAGE (CURRENT)	APPROXIMATE CENTRAL WAVELENGTH
LIU001	Red	$600\mu\text{W}/\text{cm}^2$	24V (120mA)	630nm
LIU002	Green	$600\mu\text{W}/\text{cm}^2$	24V (120mA)	525nm
LIU003	Blue	$600\mu\text{W}/\text{cm}^2$	24V (120mA)	470nm
LIU004	White	$1700\mu\text{W}/\text{cm}^2$	24V (120mA)	N/A

*When measured at a distance of 100mm from the LED along the control axis

ITEM#	\$	£	€	RMB	DESCRIPTION
LIU001	\$ 120.00	£ 75.60	€ 111.60	¥ 1,146.00	Red LED Array, 1.5" Outer Diameter
LIU002	\$ 120.00	£ 75.60	€ 111.60	¥ 1,146.00	Green LED Array, 1.5" Outer Diameter
LIU003	\$ 120.00	£ 75.60	€ 111.60	¥ 1,146.00	Blue LED Array, 1.5" Outer Diameter
LIU004	\$ 125.00	£ 78.80	€ 116.30	¥ 1,193.80	White LED Array, 1.5" Outer Diameter
AD38	\$ 16.00	£ 10.10	€ 14.90	¥ 152.80	LED Mounting Ring
LIU-PS	\$ 35.00	£ 22.10	€ 32.60	¥ 334.30	Power Supply for LED Array

Light Emitting Diode Drivers Selection Guide

Pages 525-528

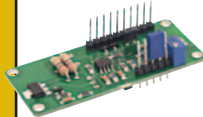


The LEDD1 LED Driver is a very compact single channel controller designed to provide drive currents up to 700mA. It is compatible with Thorlabs' extensive range of collimated and mounted high-power LED packages. A switch is used to easily change between continuous and pulsed operating modes.

700mA Benchtop Constant Current Driver

- Easy-to-Use Benchtop Driver
- Adjustable Brightness
- 0-10kHz Modulation
- Standard Thorlabs T-Cube Design

See Page 525

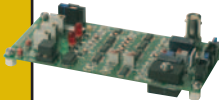


The LD1255R is a RoHS Compliant, low-noise, highly stable, constant-current driver that supports laser pin configurations A and D. The on board potentiometer allows for current control up to 250mA.

250mA, 3.3V Constant Current Driver

- 3.3V Compliance Voltage
- Low Current Noise
- On-Board Potentiometer for Current Control
- Output Monitor Signal

See Page 526

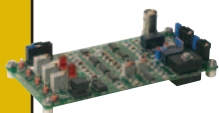


The IP250-BV driver is optimized for use with diodes that have higher operating voltages up to 8V. It supports laser pin configurations B or C, has a maximum injection current of 250mA, and can operate in either constant current or constant power modes via on board jumpers.

250mA, 8V Constant Current/Power Driver

- Constant Current and Constant Power Operation
- Designed for Diodes With Forward Voltage, up to 8V
- 0-50kHz Modulation

See Page 526



The IP500 is a universal driver that is capable of supporting all pin configurations in either a constant current or constant power mode. The driver has been optimized for a maximum injection current of 500mA. Current and power are adjusted using a potentiometer.

500mA, 3V Constant Current/Power Driver

- Constant Current and Constant Power Operation
- Configurable Current and Power Limits
- On-Board Status Indicators

See Page 527

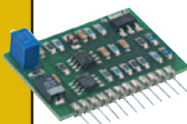


The LD3000R is a higher power, 2.5A version of the LD1255R. This RoHS compliant driver utilizes high current components and an aluminum housing to provide the additional heat sinking necessary to provide a high-power driver in a relatively small package.

2.5A, 8V Constant Current Driver

- Low Noise, Stable Operation
- Supports up to 8V Compliance Voltage
- On-Board, 12-Turn Current Control

See Page 527

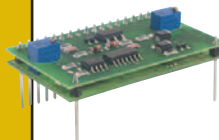


The LED1100 is a very compact, constant-power laser diode module that can be embedded into custom designs. It supports pin configurations A and B and has a maximum injection current of 250mA. The output power is adjusted using a 12-turn potentiometer.

250mA, 9V Constant Power Driver

- On-Board, 12-Point Turn Adjuster
- Supports Compliance Voltage up to 3V
- Output Current monitor

See Page 528



The LD2000R is a RoHS compliant, low-noise, stable current source that is compatible with pin configuration A. On board potentiometers or an external voltage source can be used to control the output power and current limit. LD2000R supports laser diodes with drive currents up to 100mA and photodiode currents from 20 μ A to 125 μ A.

100mA, 5.5V Constant Power Driver with Modulation

- Low Noise, Ultra-Stable Control
- Supports Compliance Voltage up to 5.5V
- Compact Design

See Page 528

700mA, 7V Benchtop LED Driver



LEDD1
Benchtop LED
Driver With Cable
Included

Features

- Easy-to-Use LED Driver
- Constant Current and Pulsed Mode Operation
- Adjustable Brightness
- Pulse Width and Frequency Controllable via External 0 to 5V Signal
- Simple Manual Controls
- Compact T-Cube Footprint



Pin Description

- 1 LED +ve
- 2 LED -ve
- 3 N/C
- 4 N/C

Specifications

- Output Current: 700mA
- Maximum Flash Frequency: 10kHz
- Minimum Strobe Pulse Width: 50µs
- Strobe Turn-On/Turn-Off Time: <25µs
- Power Supply: 9-32VDC / 1A
- Operating Temperature: 0 to +40°C
- Storage Temperature: -40 to +70°C
- Size: 60 x 60 x 47mm (2.4" x 2.4" x 1.8")



TPS001
Power Supply for
LEDD1 T-Cube



TPS008



TCH002

Optical Power
Meters



See Page 946

The LEDD1 is a variable intensity LED driver for the most recent generation of high power, low compliance voltage LEDs available on the market (such as those manufactured by Philips/Lumiled). Combined with the Thorlabs LED collimator assembly or Koehler Illuminator, the LEDD1 makes a cost-effective light source for microscopy (including fluorescence microscopy). The brightness can be adjusted via a potentiometer, which regulates the current flowing to the LED up to a maximum of 700 mA. The ON / OFF

switching is also realized by this potentiometer. The power output of the LED can be controlled by one of two selectable modes: continuous (CW) and externally modulated (PULSED). The CW mode is ideal for imaging with CCD cameras or photodiodes. Operation in PULSED mode is controlled from user-generated 0 to 5V signals. These signals could be used to strobe the LED, to control average power using pulse width modulation.

ITEM#	\$	£	€	RMB	DESCRIPTION
LEDD1	\$ 249.00	£ 156.90	€ 231,60	¥ 2,378.00	T-Cube LED Driver
TPS001	\$ 25.50	£ 16.10	€ 23,70	¥ 243.50	Power Supply Unit for a Single T-Cube
TPS008	\$ 187.00	£ 117.80	€ 173,90	¥ 1,785.90	Power Supply Unit for up to 8 T-Cubes
TCH002	\$ 765.00	£ 482.00	€ 711,50	¥ 7,305.80	T-Cube™ Controller Hub and Power Supply Unit

Light Emitting Diode Technologies

LEDs

LED Drivers

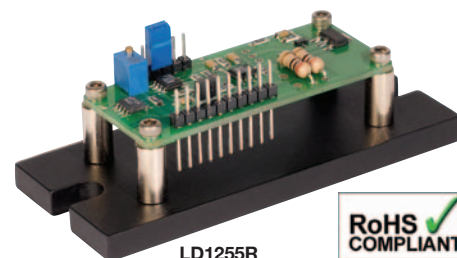
LED Mounts and Accessories

250mA, 3.3V Precision Constant Current Diode Driver

The LD1255R is a low-noise, ultra-stable, constant current diode driver. This 250mA driver supports both LEDs as well as diode lasers. The design can also provide power feedback from the photodiode (if applicable) and supports pin configurations A and D, as shown below.

This second-generation diode driver measures 2.45" x 1.00" and includes on-board Zener and Schottky diode protection as well as a disable pin. The op-amp and voltage reference design enables more precise current control.

A power cable assembly (LD1255-CAB) is available to connect the LD1255R driver to Thorlabs' PS-12DC-US power supply ($\pm 12\text{VDC}$).



LD1255R
Mounted on an LD1255P
(Power Supply Not Included)

Specifications

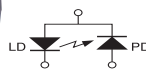
- **Drive Current:** 0.2 - 250mA
- **Current Noise:** $<1\mu\text{A}_{\text{RMS}}$
- **Output Current Drift:** $2\mu\text{A}/^\circ\text{C}$
- **Current Control Input:** 0-5V (50mA/V)
- **Compliance Voltage:** 3.3V
- **Current Monitor:** 10 mV/mA
- **Photodiode Monitor:** 1V/mA
- **Power Requirements:** ± 8 to $\pm 12\text{VDC}$, 300mA
- **Signal Bandwidth:** 1.2kHz

LD1255R Features

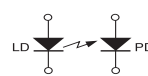
- Low Current Noise
- Low Temperature Drift
- On-Board 12-Turn Current Control
- External Input for Current Control
- Monitor Outputs for Diode and Photodiode Current
- Disable Pin
- Slow-Start Circuit for Diode Protection
- Constant Power Mode from 20-125 μA



PS-12DC-US



Pin Style A



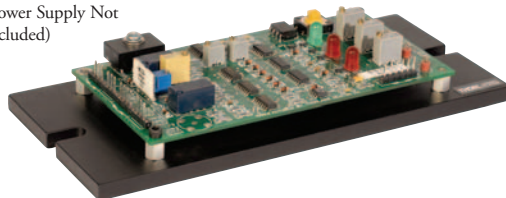
Pin Style D

ITEM #	\$	£	€	RMB	DESCRIPTION
LD1255R	\$ 119.00	£ 75.00	€ 110,70	¥ 1,136.50	250mA Precision Constant Current Diode Driver
LD1255P	\$ 15.00	£ 9.50	€ 14,00	¥ 143.30	Mounting Plate for LD1255R
LD1255-CAB	\$ 14.00	£ 8.80	€ 13,00	¥ 133.70	LD1255R Power Cable Assembly
PS-12DC-US	\$ 38.00	£ 23.90	€ 35,30	¥ 362.90	$\pm 12\text{VDC}$ Power Supply 100/120VAC
PS-12DC-EU	\$ 59.80	£ 37.70	€ 55,60	¥ 571.10	$\pm 12\text{VDC}$ Power Supply 220/240VAC

250mA, 8V Constant Current/Power Diode Driver

IP250-BV

Mounted on an IP500P
(Power Supply Not Included)



The IP250-BV is a medium power, board-level diode controller optimized for diodes with higher operating voltages. The driver is in the form of a PCB assembly with provisions for mounting into other higher-level assemblies. The IP250-BV can be operated with either LEDs or laser diodes. If using with a photodiode, the driver can accommodate only common cathode (cathode-grounded) pin-out configurations and allows control of the laser by means of either constant current or constant power modes.

The driver has a maximum injection current of 250mA, and can support diodes requiring compliance voltages up to 8V. The driver's operating modes are easily set using on-board jumpers. It

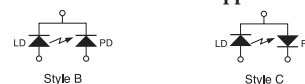
Features

- 250mA Diode Driver
- 8V Compliance Voltage
- Optimized for LEDs and Lasers with V_{op} Greater than 5V
- Input Power $\pm 12\text{VDC}$ @ 275mA
- Control Range: 0 to $\pm 250\text{mA}(\text{CC})$, $5\mu\text{A}$ to $2\text{mA}(\text{CP})$
- 0 to 10V Analog Modulation Bandwidth: DC to 50kHz

automatically shuts itself down when the diode connections are open or reversed, and the diode's inputs are shorted during idle operation to protect the device.

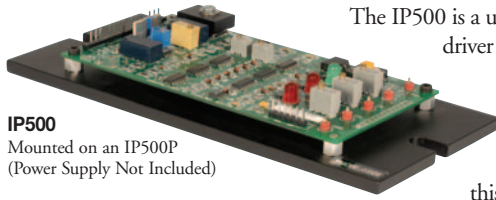
The end-user must provide DC power and the proper connections between the unit and the laser diode and is responsible for the proper limit settings needed for their particular laser diode and application.

Diode Pin Codes Supported



ITEM #	\$	£	€	RMB	DESCRIPTION
IP250-BV	\$ 299.00	£ 188.40	€ 278,10	¥ 2,855.50	250mA Constant Current/Power Diode Driver
IP500P	\$ 22.00	£ 13.90	€ 20,50	¥ 210.10	Mounting Plate for IP205-BV and IP500

500mA, 3V Constant Current/Power Driver



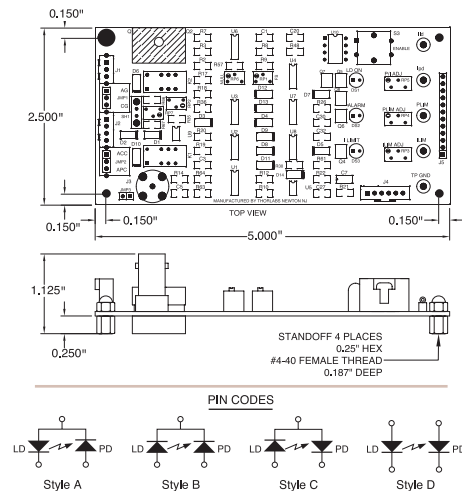
IP500
Mounted on an IP500P
(Power Supply Not Included)

The IP500 is a universal 500mA board-level driver capable of supporting all pin configurations in either constant current or constant power mode. Designed for use within higher-level assemblies, this versatile device can easily and safely control all LED and laser diode and photodiode pin configurations.

The driver accepts photodiode feedback currents of up to 2.0mA. Pin configurations and operating modes are easily set using on-board jumpers. Three indicators display whether the device is enabled, operating at current limit, or in an alarm shutdown condition. There is also no need to power down the entire unit, because a separate enable switch turns the diode on and off. Connections are provided for remote interlocks and remote monitoring. Wire harnesses for all required connections are provided with the unit.

Features

- Supports All LED and LD/PD Pin Configurations
- Constant Current and Constant Power Operation
- User Configurable Current and Power Limits
- Diode Inputs Shorted During Idle Operation to Protect the Device
- Auto Alarm Shutdown When Diode Connection is Open or Reversed
- Includes Input & Output Wires
- Test Points for Diode Current, Monitor Photodiode Current, Current Limit, and Power Limit Set-Point



Specifications

- **Input Power:** $\pm 5\text{VDC}$ @ 600mA
- **Constant Current Mode**
- **Control Range:** 0 to $\pm 500\text{mA}$
- **Setting Accuracy:** $\pm 0.5\text{mA}$
- **Compliance Voltage:** $> 3.0\text{VDC}$
- **Ripple & Noise (10Hz-10MHz):** $< 10\mu\text{A RMS}$
- **Short-Time Fluctuations ($< 1\text{s}$, $< 10\text{Hz}$):** $< 50\mu\text{A}$
- **Temperature Coefficient:** $< 100\text{ppm}/^\circ\text{C}$
- **Drift (30 min, $< 10\text{Hz}$):** $< 100\mu\text{A}$
- **Limit Adjust Range:** 0 to $> 500\text{mA}$
- **Limit Accuracy:** $\pm 2.5\text{mA}$

Constant Power Mode

- **Control Range Photodiode Current:** $5\mu\text{A}$ to 2mA
- **Setting Accuracy:** $\pm 2\mu\text{A}$
- **Drift (30 min, $< 10\text{Hz}$):** $< 1\mu\text{A}$
- **Limit Adjust Range:** 0 to $> 2.5\text{mA}$
- **Limit Accuracy:** $\pm 2\mu\text{A}$

Analog Modulation/Control Voltage

- **Input Resistance:** $10\text{k}\Omega$
- **Bandwidth:** DC to 50kHz
- **Transfer Function (ACC Mode):** 50mA/V
- **Input Range:** 0-10V

ITEM #	\$	£	€	RMB	DESCRIPTION
IP500	\$ 299.00	£ 188.40	€ 278.10	¥ 2,855.50	500mA Universal Diode Driver
IP500P	\$ 22.00	£ 13.90	€ 20.50	¥ 210.10	Mounting Plate for IP205-BV and IP500

2.5A, 7.7V Constant Current Driver

The LD3000R is a higher-power version of our popular LD1255R ultra stable, low-noise, diode driver. The LD3000R utilizes high-current components and an aluminum housing that provides additional heat sinking to enable a highly stable diode driver in a relatively small package. This device can operate both LEDs and laser diodes.



Power Supply
Not Included

LD3000R Features

- Low-Noise, Stable Constant Current Sources
- On-Board 12-Turn Current Control
- External Input for Current Control
- Monitor Outputs for Current and Photodiode Current
- Slow-Start Circuit for Diode Protection

Specifications

- **Drive Current:** 20mA-2.5A
- **Operating Mode:** Constant Current
- **Current Control Input:** 0-5V (500mA/V)
- **Compliance Voltage:** 7.7V
- **Laser Current Monitor:** 1V/A
- **Photodiode Monitor:** 1V/mA
- Onboard Zener and Schottky Diode Protection
- **Power Requirements:** ± 8 to $\pm 12\text{VDC}$ 2.7A

ITEM #	\$	£	€	RMB	DESCRIPTION
LD3000R	\$ 168.00	£ 105.80	€ 156.20	¥ 1,604.40	2.5A Precision Constant Current Driver

Light Emitting Diode Technologies

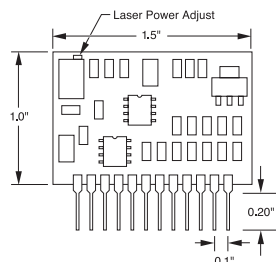
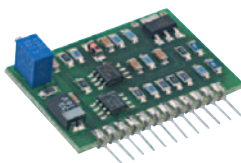
LEDs

LED Drivers

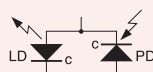
LED Mounts and Accessories

250mA, 8.7V Constant Power Driver

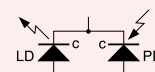
LD1100



The LD1100 Diode Driver is a constant-power driver module, driving LEDs or lasers up to 250mA. It features an onboard 12-turn trim pot for continuous output adjustment, pin-programmable feedback gain, ON/OFF control input, and a current monitor output for observing the drive current. With dimensions of only 1" x 1.5", the LD1100 is a compact module that can be embedded into a custom design. All input and output signals are provided on a 12-pin SIP connector, which allows simple integration into a printed circuit design.



PIN STYLE A
EK1101 is pre-wired
for this pin-out



PIN STYLE B
EK1102 is pre-wired
for this pin-out

Supports LED/Laser Pin Configurations:

- Common Anode - Photodiode Cathode
- Common Cathode - Photodiode Cathode

EK1102



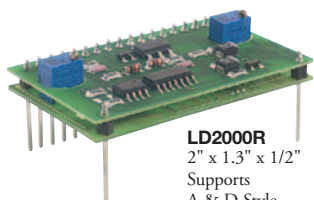
The **EK1100 Series Evaluation Kits** are ready-to-use, pre-assembled **LD1100 Diode Drivers** with an evaluation PCB (EB1100), cable with socket (S8060), and a power supply cable (9V battery clip). Some soldering is necessary. Simply attach the laser and battery, set the gain-setting jumper, and operate the diode.

EK1102 Features

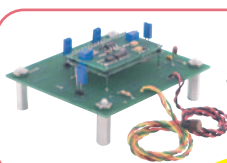
- APC – Automatic Power Control, CW Operation
- 0-250mA Drive Current
- Pin Programmable Feedback Gain
- Supports Monitor Photodiode Currents from 5μA to 5mA
- 12-Turn Power Adjustment
- Output Current Monitor
- External ON/OFF Control
- Compact 1" x 1.5" SIP Package
- Single Supply Operation 8-12V DC

ITEM #	\$	£	€	RMB	DESCRIPTION
LD1100	\$ 78.00	£ 49.10	€ 72.50	¥ 744.90	APC Diode Driver, 0-250mA
EK1101	\$ 99.50	£ 62.70	€ 92.50	¥ 950.20	Driver Kit Pre-Wired to Style A
EK1102	\$ 99.50	£ 62.70	€ 92.50	¥ 950.20	Driver Kit Pre-Wired to Style B
LDS2	\$ 81.40	£ 51.30	€ 75.70	¥ 777.40	9V DC Power Supply for EK1101, EK1102

100mA, 5.5V Constant Power with Modulation Driver



LD2000R
2" x 1.3" x 1/2"
Supports
A & D Style
Pin Codes



EK2000
Power Supply
Sold Separately

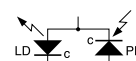


LD2000R Features

- Constant Power Mode from 20-125μA
- Laser Drive Currents from 0 to 100mA
- Low Noise/Ultra-Stable Control
- Onboard Trimpots Control Laser Power and Current Limit
- Slow Start for Diode Protection
- Compact 1.90" x 1.15" Design

PIN STYLE A

Supports common laser diode anode and photodiode cathode



LDS2
Power Supply
Sold Separately

The LD2000R is a low-noise, stable diode current source that can be operated with LED or laser diodes that have a common diode anode and monitor photodiode cathode. The driver operates in an automatic power control (APC) mode using the built-in monitor photodiode integrated into the LED for feedback. Onboard trimpots are provided for controlling the LED/ laser power and current limit, which can also be controlled via an external voltage source. The LD2000R supports LEDs and lasers with integrated photodiodes requiring drive currents up to 100mA and photodiode currents from 20μA to 125μA. The LD2000R also has an external input for support of applications having a style A pin configuration (common diode anode and photodiode cathode) requiring modulation of the output.

ITEM #	\$	£	€	RMB	DESCRIPTION
LD2000R	\$ 98.00	£ 61.70	€ 91.10	¥ 935.90	100mA APC Diode Driver, DC to 30kHz Modulation
EK2000	\$ 159.00	£ 100.20	€ 147.90	¥ 1,518.50	Evaluation Kit, Pre-Wired for Pin Style A and D
LDS2	\$ 81.40	£ 51.30	€ 75.70	¥ 777.40	9VDC Power Supply for EK2000 Evaluation Kit

LED Mounts & Accessories Selection Guide

Pages 529-533

Mounts for Unmounted LED



- Universal Mounts for T0-18 and T1-3/4 LEDs
- Threaded Mounts for 4.7mm and 5mm Unmounted LEDs
- Socket Mount
- Threaded Mounts Compatible With SM1 Series Lens Tubes

See Page 530

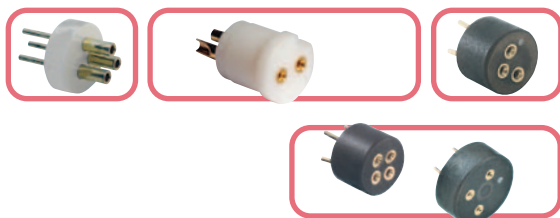
Mounting Adapters



- Slip Ring for Post-Mounting LEDs, LIU Series
- 2" LIU Series Mount
- Locking Setscrew Secures LEDs in Place

See Page 531

Electronic Accessories



- 2, 3, or 4 Terminal Sockets
- Gold-Plated B2Cu Contacts
- Compatible With Our Wide Selection of LEDs

See Page 532

ESD Accessories



- Heel Straps
- Fabric Wrist Straps
- Antistatic Table Mat
- Adjustable Metal Wrist Straps

See Page 532

Alignment Aids



- Detects Radiation as Low as 1 nW/cm^2
- IR, VIS, and UV Wavelength Ranges
- A Low-Cost Alternative to Beam Profilers

See Page 533

Light Emitting Diode Technologies

LEDs

LED Drivers

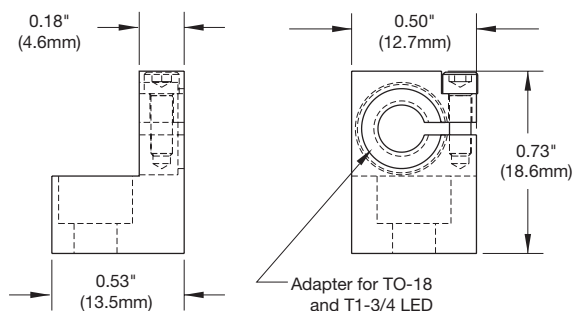
LED Mounts and Accessories

Universal LED Mount for 4.7mm and 5mm Packages



The LEDMF provides a quick and easy way to mount 4.7mm (TO-18) and 5mm (T1-3/4) unmounted LEDs. The mount features M4 and #8-32 holes for mounting onto a post.

The LEDMF comes with an adapter for mounting 4.7mm LEDs.



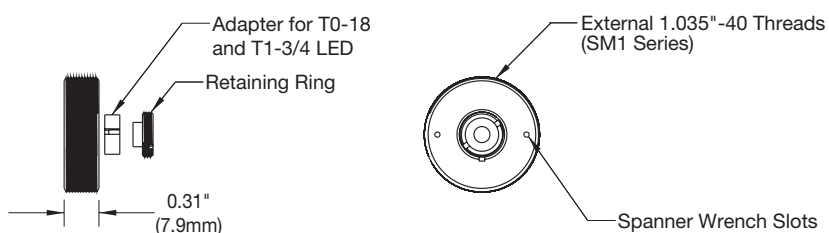
ITEM#	\$	£	€	RMB	DESCRIPTION
LEDMF*	\$ 24.00	£ 15.10	€ 22,30	¥ 229.20	Universal LED Mount, 4.7mm and 5mm Packages

*Imperial and metric versions are compatible.

Threaded LED Mount for 4.7mm and 5mm Packages



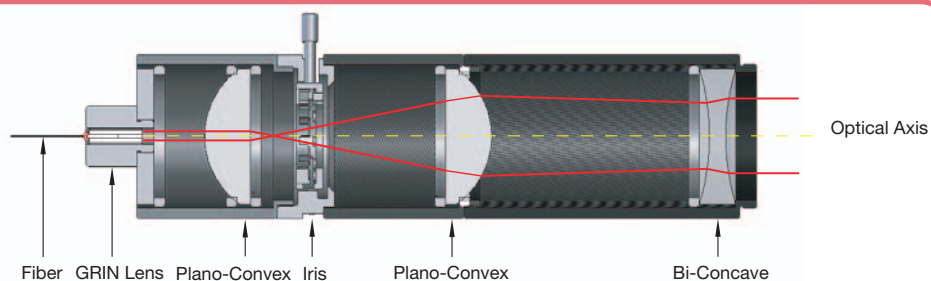
The S1LEDM LED mount fits our 4.7mm (TO-18) and 5mm (T1-3/4) unmounted LEDs into a housing that can be used with our SM1 series of lens tubes. The slip plate translator (see page 230) is an ideal accessory for incorporating this adapter into our cage systems. The coarse X-Y movements provide an easy method for positioning the LED where needed.



ITEM#	\$	£	€	RMB	DESCRIPTION
S1LEDM	\$ 26.00	£ 16.40	€ 24,20	¥ 248.30	SM1 Threaded Mount for LEDs

Optical Assemblies Made Easy Using Our Stackable Lens Tubes

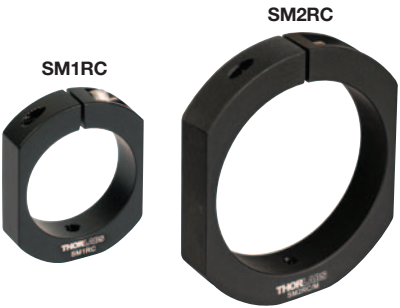
See Pages 153-164



Lens Tube Slip Rings

Features

- The SM1RC is Compatible With MBLED, MCLED, MGLED, MRMLD, and the MWLED, the SM2RC is Compatible With the LEDC Family of Collimated LEDs
- Slim Body Size to Conserve Space
- Flat Sides Facilitate Mounting Several Slip Rings Side by Side
- Locking Screw Secures LEDs in Slip Ring



These slip rings are designed to mount preassembled optical lens tube systems by passing a lens tube through the mounting ring and securing it with a setscrew. Their slim body design and flat sides help to conserve space in optical assemblies. A locking screw is conveniently located along the top surface for easy access. The SM series slip rings easily mount to any of our posts using the #8-32 (M4) mounting hole on the bottom of each slip ring.

SM1RC

LED and Post
Not Included

ITEM#	METRIC ITEM#	\$	£	€	RMB	DESCRIPTION
SM1RC	SM1RC/M	\$ 22.00	£ 13.90	€ 20,50	¥ 210.10	SM1 Series Slim Slip Ring
SM2RC	SM2RC/M	\$ 31.00	£ 19.50	€ 28,80	¥ 296.10	SM2 Series Slim Slip Ring

Ø2" LIU Series Mount



Features

- 2" Outer Diameter to Fit Standard Optic Mounts
- Compatible With SM2 Lens Tube Using an SM2RR Retaining Ring
- Nylon-Tipped Setscrew to Secure LIU LED in Place
- 1.5" (38mm) Inner Diameter Compatible With LIU Housing and Ø1.5" (38mm) Optics

The AD38 adapter allows our LIU series of LED light sources to be mounted in Ø2" lens tubes or optic mounts. The inner diameter accepts the LIU housing or Ø1.5" (38mm) optics and secures them with a nylon-tipped setscrew.



AD38

KS2, LED,
and Post Not
Included

ITEM#	\$	£	€	RMB	DESCRIPTION
AD38	\$ 16.00	£ 10.10	€ 14,90	¥ 152.80	External Ø2" LIU Series Mount

TOOLS
OF THE
TRADE

Expanding the Line
OPTICAL POWER AND ENERGY METERS

- Large Selection of Sensors and Displays
- Interchangeable Sensors With NIST Traceable Calibration Data
- Power Meters for Measurements from 35nW to 30W
- New UV Sensors



NEW PM300 Dual-Channel Power Meter

SEE OUR ENTIRE POWER METER LINE ON PAGES 946-961



Light Emitting Diode Technologies

LEDs

LED Drivers

LED Mounts and Accessories

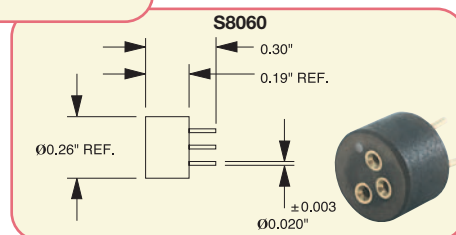
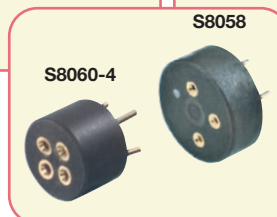
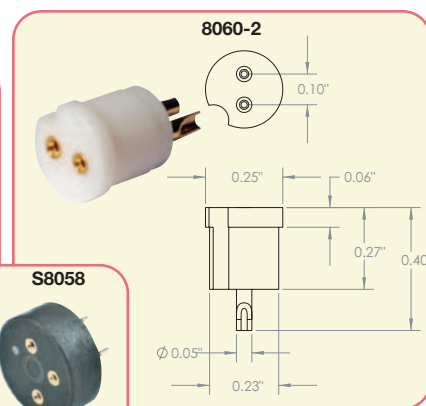
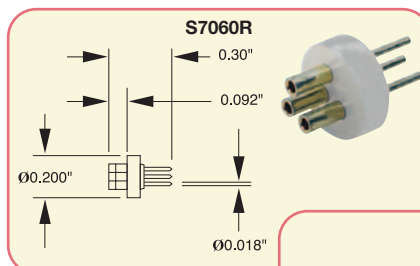
LED Socket

Thorlabs offers a range of LED sockets that provide compatibility with our wide selection of LED packages. The S8058, S8060, and S8060-4 are available with gold-plated BeCu contacts, and the S7060R meets RoHS compliance. Colors vary and include white, off white, black, and tan.

Specifications

- 2, 3, or 4 Terminal Socket
- Gold-Plated BeCu Contacts
- Operating Temperature: -55 to +175°C

ITEM #	\$	£	€	RMB	DESCRIPTION
S8060-2	\$ 1.90	£ 1.20	€ 1.80	¥ 18.10	2-Pin LED Socket
S7060R	\$ 4.21	£ 2.70	€ 3.90	¥ 40.20	3-Pin LED Socket
S8058	\$ 8.78	£ 5.50	€ 8.20	¥ 83.80	3-Pin LED Socket
S8060	\$ 5.82	£ 3.70	€ 5.40	¥ 55.60	3-Pin LED Socket
S8060-4	\$ 7.10	£ 4.50	€ 6.60	¥ 67.80	4-Pin LED Socket



Antistatic/ESD Products



ESD ANKLE STRAP



ESD WRIST STRAP

TABLE MAT
2' X 4'

The ESD05 Heel Grounder provides protection for people on the move by offering a ground via a proper flooring surface. Wearing the conductive ribbon inside the shoe or sock assures proper electrical contact with the user. A rugged surface-mounted 1MΩ resistor is standard and visible. The ESD05 Heel Grounder features a hook-and-loop closure with 35mm cup design. These devices should be worn on both feet to ensure consistent grounding. The WS02 fabric strap, available in one size, includes a 6-foot coiled cord and alligator clip. The ground cord has a built-in 1MΩ resistor for user safety, and the strap works with our Static Control Table Mat to protect against static discharge. Two premium expandable metal bands are offered as well. The flexibility of the strap provides durability and comfort, allowing for extended use. It includes an alligator clip, which fits over the installed banana jack on the ground cord (sold separately). Two sizes are available: medium (5.5") and large (6.5").

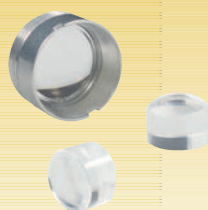
The Thorlabs' Static Control 2' x 4' Table Mats protect sensitive optoelectronic components from electrostatic discharge.

ITEM #	\$	£	€	RMB	DESCRIPTION
WS02	\$ 11.95	£ 7.50	€ 11.10	¥ 114.10	Grounding Wrist Strap With 6-Foot Coiled Cord, One Size
WS03	\$ 24.95	£ 15.70	€ 23.20	¥ 238.30	Metal Expansion Band ESD Wrist Strap, Large
WS04	\$ 24.95	£ 15.70	€ 23.20	¥ 238.30	Metal Expansion Band ESD Wrist Strap, Medium
WS05	\$ 12.00	£ 7.60	€ 11.20	¥ 114.60	12ft of Grounding Cord
ESD05	\$ 11.50	£ 7.20	€ 10.70	¥ 109.80	ESD Fabric Heel Grounder
TM2448	\$ 77.00	£ 48.50	€ 71.60	¥ 735.40	Static Control Table Mat 2' x 4' x 3/32"

*One size fits all.

Expanding the Line

Compact • AR Coated Surfaces



Aspheric lenses are an excellent alternative to bulky microscope objectives for many laser diode or fiber collimating applications. Thorlabs offers a mounted version of all of its molded glass aspheric lenses and an extensive line of adapters so that the aspheric lenses can be easily integrated into any optical setup.

See Pages 737-768



Diffraction Limited Performance

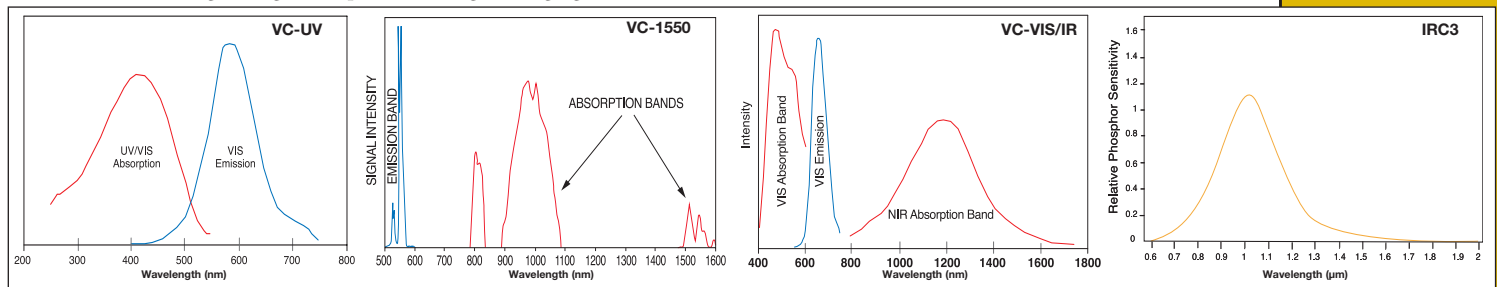
Molded Glass Aspheric Lenses

IR, VIS, and UV Viewing Cards

- Detects Radiation as Low as 1 nW/cm^2
- Always Ready for Use With No Optical Charging
- Free of Hazardous Reflections
- IR, VIS, and UV Wavelength Ranges
- A Low-Cost Alternative to Beam Profilers

Thorlabs' viewing cards, about the size of a credit card, contain a special sensor area that can easily locate IR, VIS, and UV light beams and their focal points. All are mounted on durable clear plastic, allowing for easy handling and carrying.

The VC-1550 is designed for wavelengths of 790-840nm, 870-1070nm, and 1550-1590nm. It features a sensor area of $1.8" \times 1.0"$. The VC-VIS/IR is enhanced for the IR absorption band of 800-1700nm, and the VC-UV covers the 250-525nm ultraviolet absorption band. Each of these cards is $3.3" \times 2.1"$ in size. The IRC3 is a smaller card with dimensions of $2.4" \times 1.79"$ and is designed for the 700-1400nm wavelength range. It requires room light charging and features a sensor area of $1.5" \times 0.75"$.



ITEM #	\$	£	€	RMB	WAVELENGTH (nm)	DESCRIPTION
VC-1550	\$ 72.00	£ 45.40	€ 67.00	¥ 687.60	1550	Viewing Card, Enhanced for S, C, and L Bands
VC-VIS/IR	\$ 72.00	£ 45.40	€ 67.00	¥ 687.60	400-640 and 800-1700	IR and Visible Viewing Card
VC-UV	\$ 72.00	£ 45.40	€ 67.00	¥ 687.60	250-525	UV Viewing Card
IRC3	\$ 113.00	£ 71.20	€ 105.10	¥ 1,079.20	700-1400	Phosphorous IR Viewing Card (Requires Room Light Charging)

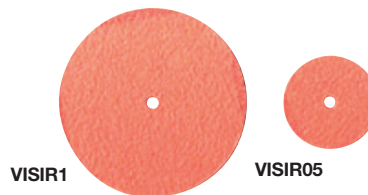
IR Alignment Disks

- SM1 and SM05 Compatible
- High Persistence, High Conversion Efficiency
- Ideal Alignment Aid
- Used With Our 1/2" and 1" Optical Component Holders
- 1mm Central Hole Allows Partial Beam Transmission

These IR alignment disks are ideally used as drop-in tools to simplify active alignment of IR and Visible setups. Available with either SM1 or RMS threading, or as $\varnothing 1/2"$ or $\varnothing 1"$ drop-in disks, these disks align beams to the optical axis of our mounts or lens tubes. The SM1A7 is a useful aid when aligning visible beams to the center of optical mounts. The SM1A8 is designed to simplify the alignment of infrared beams along the optic axis of our lens tubes. The RMSIR simplifies the alignment of infrared beams along the optical axis of an internally threaded RMS mount. The VISIR05 and VISIR1 are ideal alignment accessories for any of our $\varnothing 1/2"$ or $\varnothing 1"$ optical mounts. These drop-in disks are made of slow-fading phosphor that is active in the 800-1700nm range. The VDIR05 and VDIR1 are designed for wavelengths of 790-840nm, 870-1070nm, and 1550-1590nm. The central hole in the disks allows easy alignment of the beam or its retro-reflection along the mount's optical axis.



VISIR1 Shown With LMR1 Lens Tube and Post (Sold Separately)



IR Viewing and Alignment Disks With SM1 and RMS Thread



SM1A7 Alignment Disk With SM1 Thread

ITEM	SIZE	METRIC ITEM#	\$	£	€	RMB	DESCRIPTION
VISIR05	1/2"	VISIR05*	\$ 19.40	£ 12.20	€ 18.00	¥ 185.30	1/2" IR Alignment Disk, 400-640nm & 800-1700nm
VISIR1	1"	VISIR1*	\$ 29.60	£ 18.60	€ 27.50	¥ 282.70	1" IR Alignment Disk, 400-640nm & 800-1700nm
VDIR05	1/2"	VDIR05*	\$ 19.00	£ 12.00	€ 17.70	¥ 181.50	1/2" Enhanced Alignment Disk, 790-840nm, 870-1070nm, & 1550-1590nm
VDIR1	1"	VDIR1*	\$ 29.00	£ 18.30	€ 27.00	¥ 277.00	1" Enhanced Alignment Disk, 790-840nm, 870-1070nm, & 1550-1590nm
LMR05	1/2"	LMR05/M	\$ 14.25	£ 9.00	€ 13.30	¥ 136.10	Lens Mount for 1/2" Optics
LMR1	1"	LMR1/M	\$ 15.68	£ 9.90	€ 14.60	¥ 149.70	Lens Mount for 1" Optics
RMSIR	0.8"	RMSIR*	\$ 80.00	£ 50.40	€ 74.40	¥ 764.00	RMS IR Alignment Disk
SM1A7	1/2"	SM1A7*	\$ 24.00	£ 15.10	€ 22.30	¥ 229.20	Alignment Disk for Visible Light
SM1A8	1"	SM1A8*	\$ 76.50	£ 48.20	€ 71.10	¥ 730.60	IR/Viewing Alignment Disk for 800-1700nm