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 91 Boylston St, Brookline, MA 02445 USA
 (617)566-3821 or (800)347-5445 ** fax (617)731-0935
irsouce@boselec.com www.boselec.com

Specifications (T=22 °C)

Optically Immersed 3.0 μm LED in heat-sink optimized housing			LED30SC
Peak wavelength	λ	μm	2.95±0.07
Spectral width FWHM		μm	0.5±0.05
Current test conditions:	Pulse duration	τ	≤10
	Pulse period	T	≥1000
Voltage at drive current I=1 A	U _{pulse}	V	0.4 to 0.6
Pulsed power at I=1 A	P _{pulse}	μW	≥200
CW power at I=200 mA (attached to a heatsink)	P _{CW}	μW	≥40
Switching time	τ	ns	≤20

Package Detail

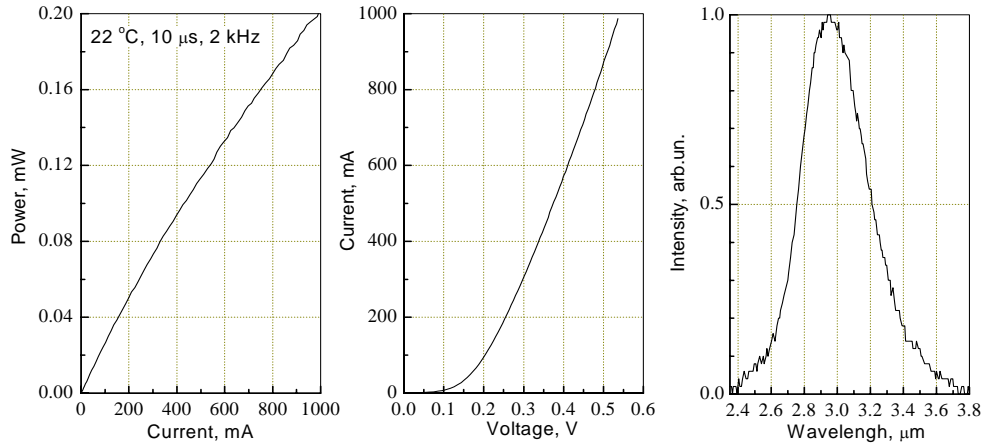
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5x0.5	Ø 3.2	≤40	±10	-25++60 (+80)	short wire or black point is negative

Package photo		<p>M5 thread on barrel/base</p>
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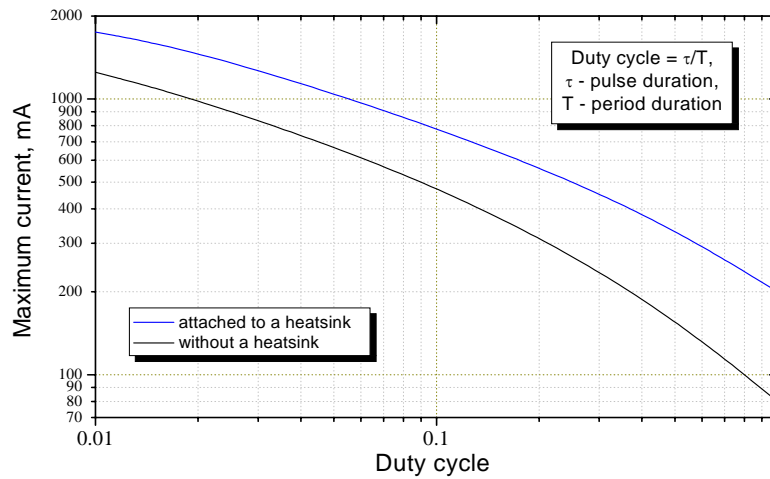
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.6, 4.2, 4.7 and 5.4 μm.

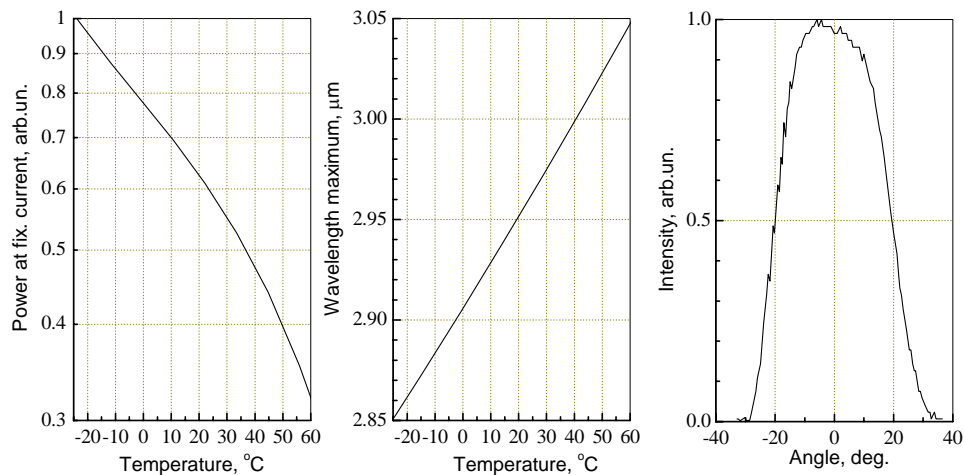
Current-voltage curve, current dependences of the output power; and emission spectrum at 22 °C.



Max current vs. operation conditions



Output power and emission spectra maximum vs. temperature and far-field pattern


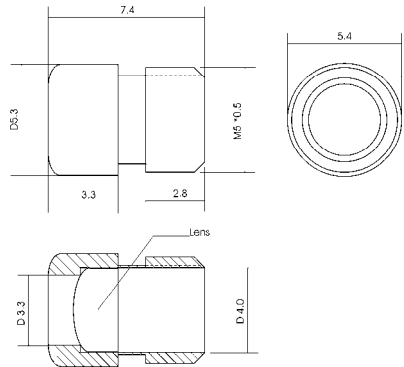




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Specifications (T=22 °C)			
Optically Immersed 3.4 μm LED in heat-sink optimized housing			LED34SC
Peak wavelength	λ	μm	3.4±0.05
Spectral width FWHM		μm	0.4±0.05
Current test conditions:	Pulse duration	τ	≤10
	Pulse period	T	≥1000
Voltage at drive current I=1 A	U _{pulse}	V	0.4 to 0.6
Pulsed power at I=1 A	P _{pulse}	μW	≥500
CW power at I=200 mA (attached to a heatsink)	P _{CW}	μW	≥175
Switching time	τ	ns	≤20

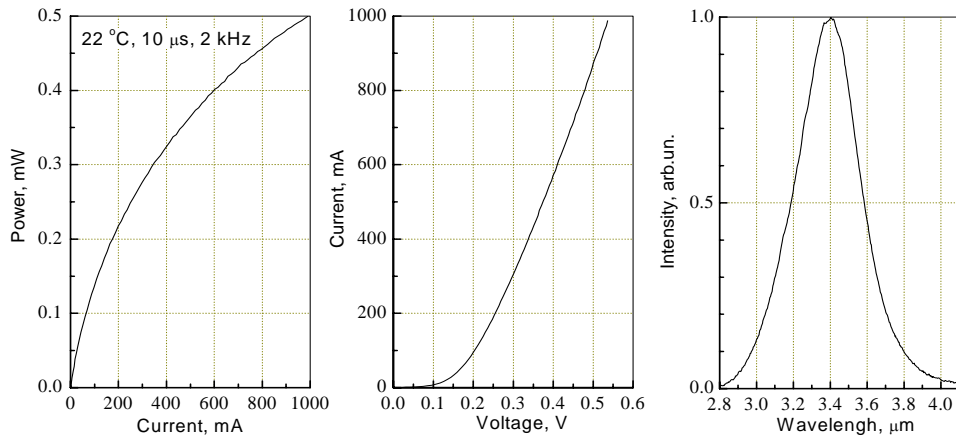
Package detail						
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5×0.5	Ø 3.2	≤40	±10	-25÷+60 (+80)	short wire or black point is negative

Package photo		 <p style="text-align: center;">M5 thread on base/barrel</p>
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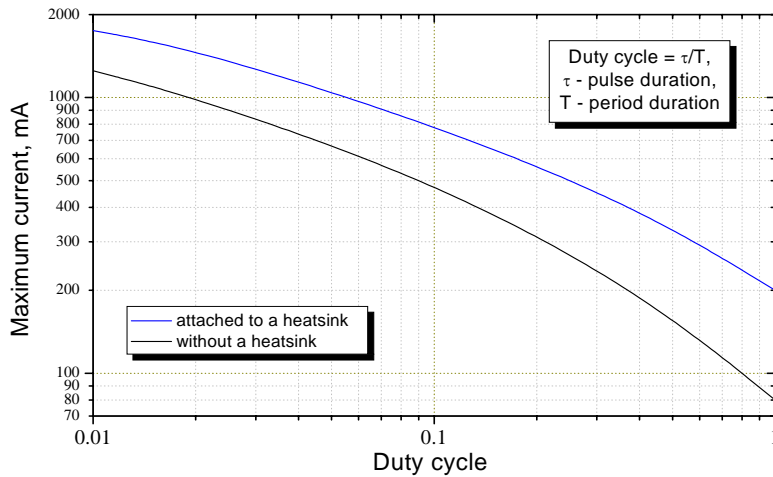
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.6, 4.2, 4.7 and 5.4 μm.

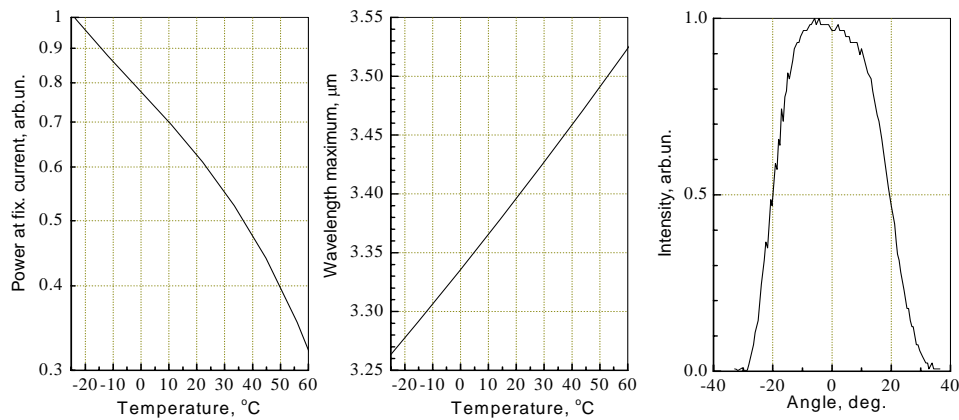
Current-voltage curve, current dependences of the output power and emission spectrum at 22 °C.



Maximal current vs. operation conditions



Output power and emission spectra maximum vs. temperature and far-field pattern





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Specifications (T=22 °C)

Optically Immersed 3.6 μm LED in heat-sink optimized housing			LED36SC
Peak wavelength	λ	μm	3.65±0.05
Spectral width FWHM		μm	0.5±0.05
Current test conditions:	Pulse duration	τ	≤10
	Pulse period	T	≥1000
Voltage at drive current I=1 A	U _{pulse}	V	0.4 to 0.6
Pulsed power at I=1 A	P _{pulse}	μW	≥250
CW power at I=200 mA (attached to a heatsink)	P _{CW}	μW	≥75
Switching time	τ	ns	≤20

Package Detail

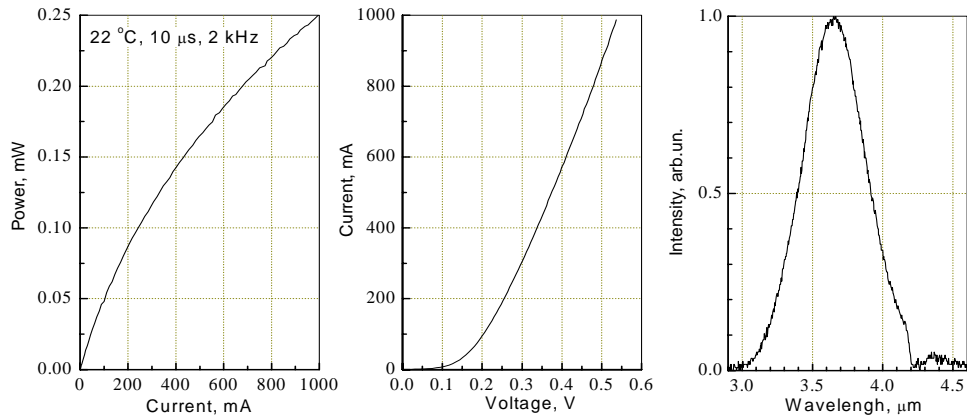
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5×0.5	Ø 3.2	≤40	±10	-25÷+60 (+80)	short wire or black point is negative

Package photo		<p>M5 thread on base/barrel</p>
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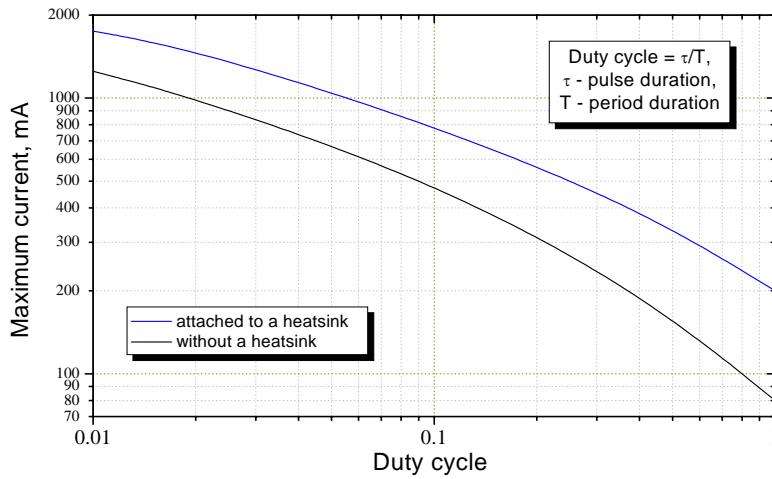
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.8, 4.2, 4.7 and 5.4 μm.

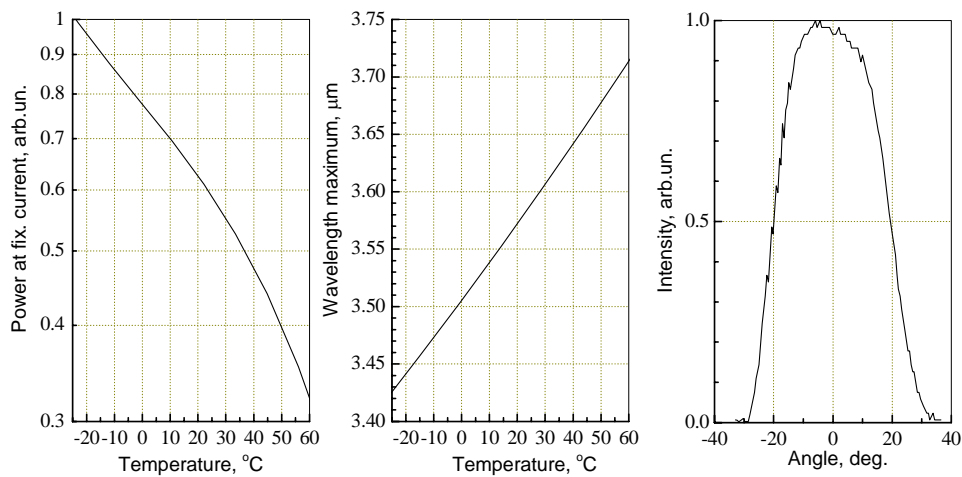
Current-voltage curve, current dependences of the output power and emission spectrum at 22 °C.



Maximal current vs. operation conditions



Output power and emission spectra maximum vs. temperature and far-field pattern





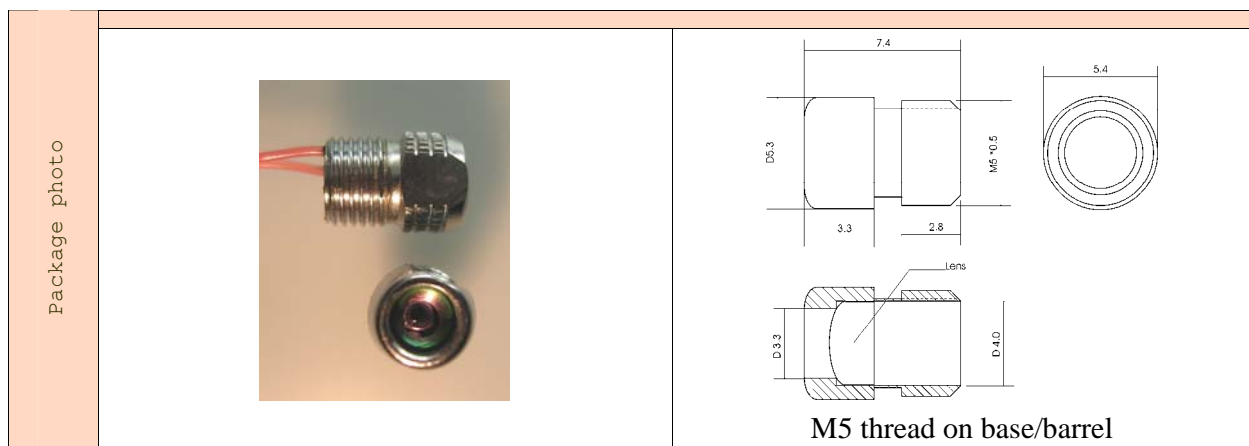
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Specifications (T=22 °C)

Optically Immersed 3.8 μm LED in heat-sink optimized housing			LED38SC
Peak wavelength	λ	μm	3.8±0.05
Spectral width FWHM		μm	0.5±0.05
Test conditions:	Pulse duration	τ	≤10
	Pulse period	T	≥1000
Voltage at drive current I=1 A	U _{pulse}	V	0.4 to 0.6
Pulsed power at I=1 A	P _{pulse}	μW	250 to 350
CW power at I=200 mA (attached to a heatsink)	P _{CW}	μW	75 to 100
Switching time	τ	ns	≤20

Package detail

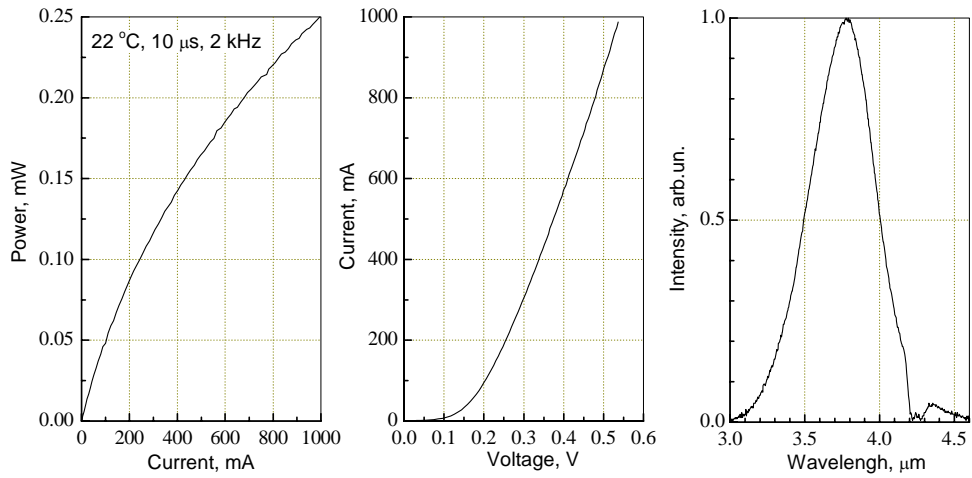
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5×0.5	∅ 3.2	≤40	±10	-25÷+60 (+80)	short wire or black point is negative



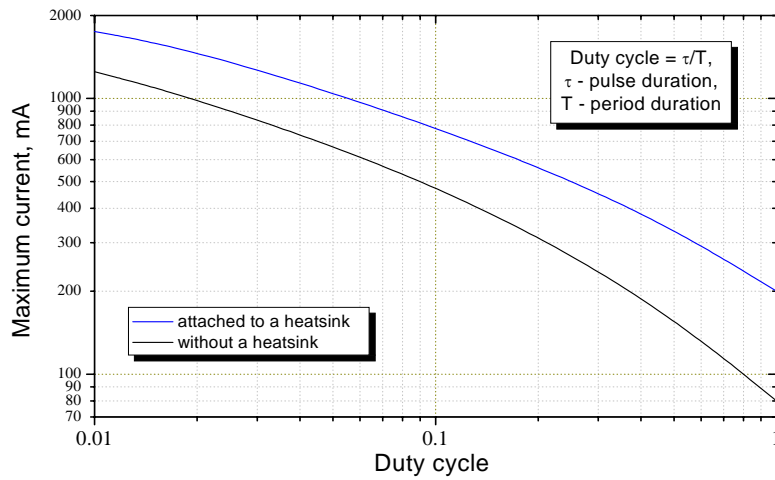
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.6, 4.2, 4.7 and 5.4 μm.

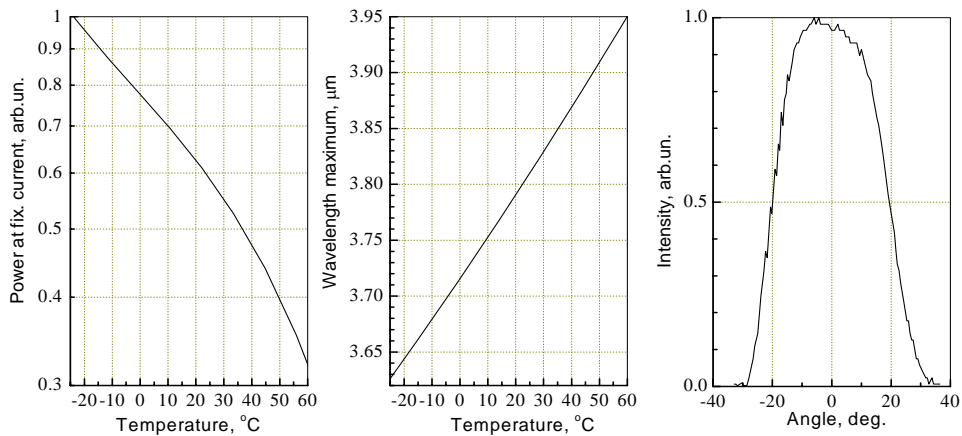
Current-voltage curve, current dependency of output power and emission spectrum at 22 °C.



Max current vs. operation conditions



Output power and emission spectra maximum vs. temperature; and far-field pattern





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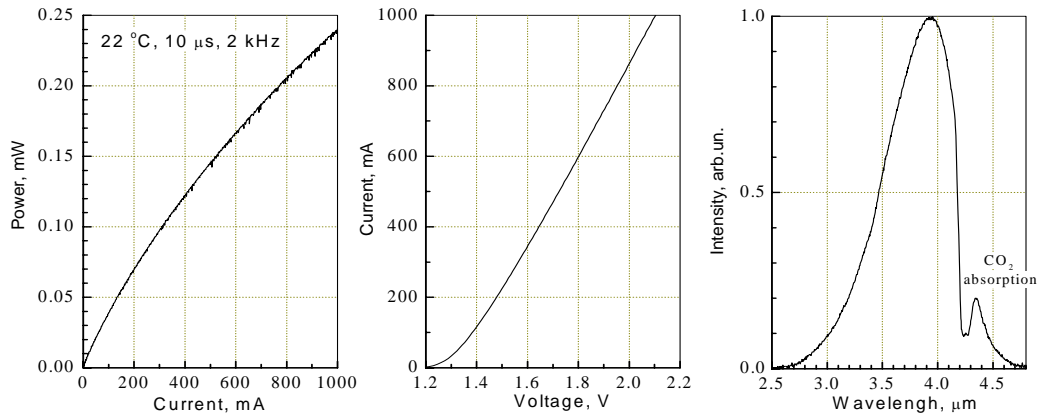
Specifications (T=24 °C)					
3.9 μm Optically Pumped LED				OPLED39IL	
Optically immersed					
Peak wavelength		λ	μm	3.9±0.1	
Spectral FWHM			μm	0.7 to 0.75	
Current test conditions:	Pulse duration	τ	μs	≤10	
	Pulse period	T		≥1000	
Pulse power at I=1000 mA		P _{pulse}	μW	250±40	
Package Detail					
Package	Active area	Far-field pattern FWHM	Far-field pattern deviation off normal	Operation (storage) conditions	Polarity
	mm	deg.	deg.	°C	
TO-39	Ø 3.2	≤40	±10	-25 to +45	short leg or key is negative

Type No.	OPLED39IL				
Package photo	 <p>also called "TO-5"</p>				

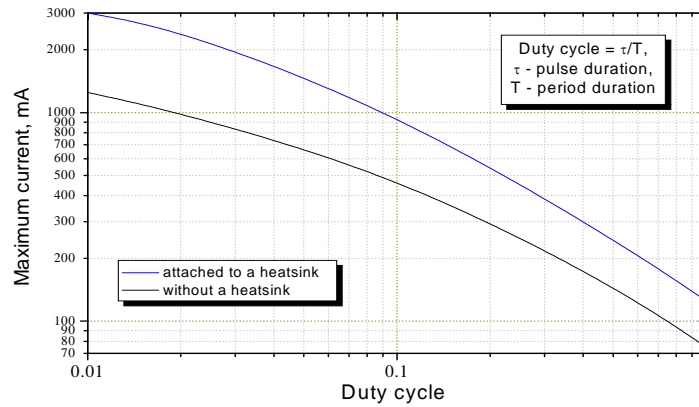
These LEDs represent an entirely NEW technology. They consist of engineered materials, made to fluoresce under near-IR illumination. Quite ordinary, inexpensive and robust GaAs LEDs in the 0.87 micron range are used to optically pump the engineered material.

The electrical characteristics of these devices are the electrical characteristics of the GaAs pump LEDs. The optical characteristics are those of the engineered material when irradiated by the near-IR pump device.

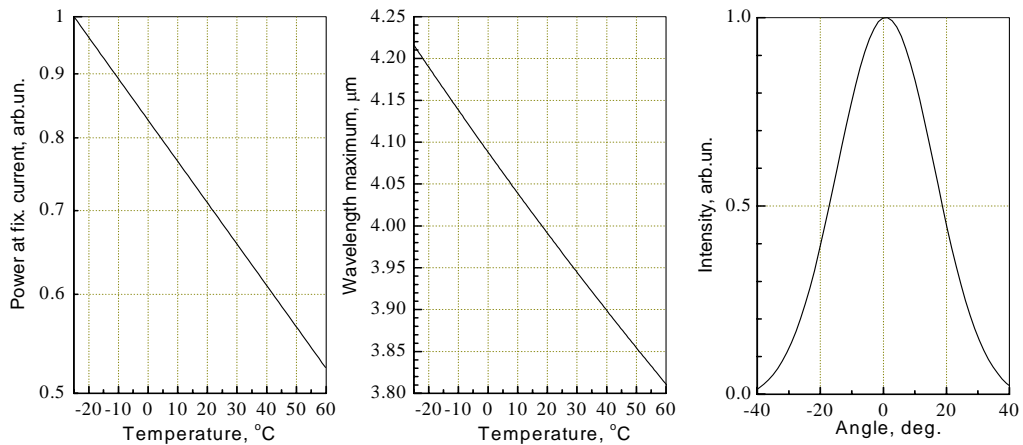
Current-voltage curve, current dependence of the output power; and emission spectrum at 22 °C.



Max current vs. operation conditions



Output power and emission spectra maximum vs. temperature and far-field pattern





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Specifications (T=22 °C)

Optically Immersed 4.2 μm LED in heat-sink optimized housing			LED42SC	
Peak wavelength	λ	μm	4.15±0.05	
Spectral width FWHM		μm	0.45±0.05	
Current test conditions:	Pulse duration	τ	≤10	
	Pulse period	T	≥1000	
Voltage at drive current I=1 A	U _{pulse}	V	0.5 to 0.6	
Pulsed power at I=1 A	P _{pulse}	μW	≥120	
CW power at I=200 mA (attached to a heatsink)	P _{cw}	μW	≥50	
Switching time	τ	ns	≤20	

Package detail

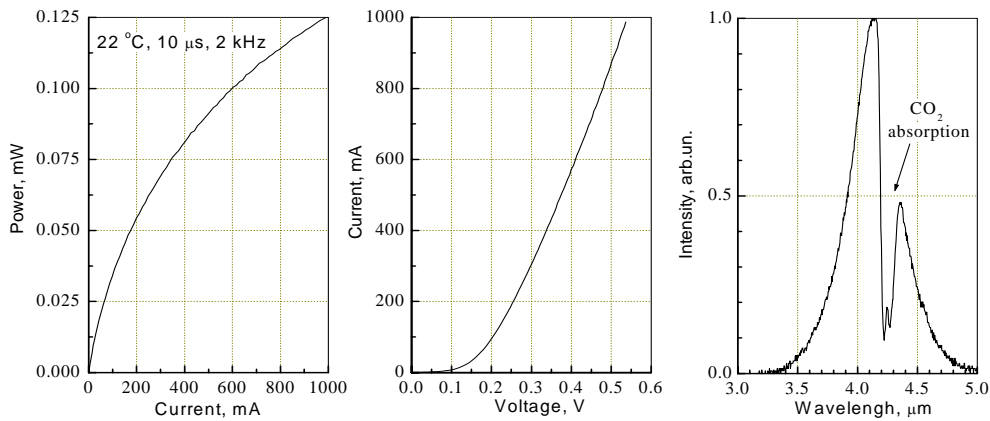
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5x0.5	Ø 3.2	≤40	±10	-25÷+60 (+80)	short wire or black point is negative

Package photo		<p>M5 thread on barrel</p>
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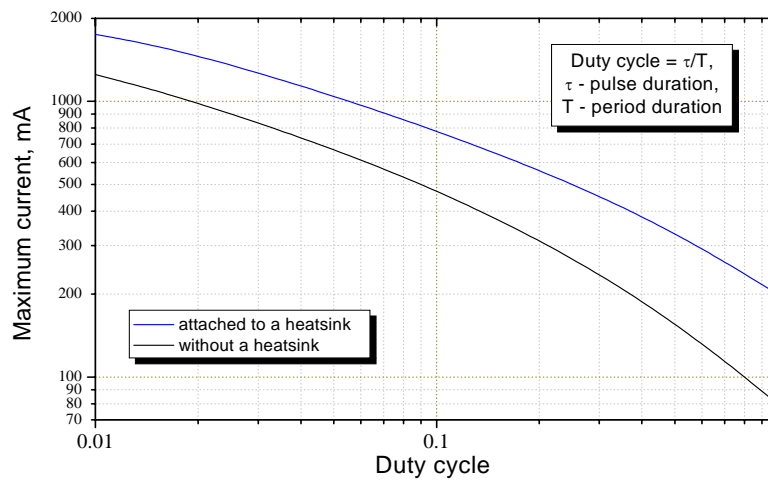
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.6, 4.2, 4.7 and 5.4 μm.

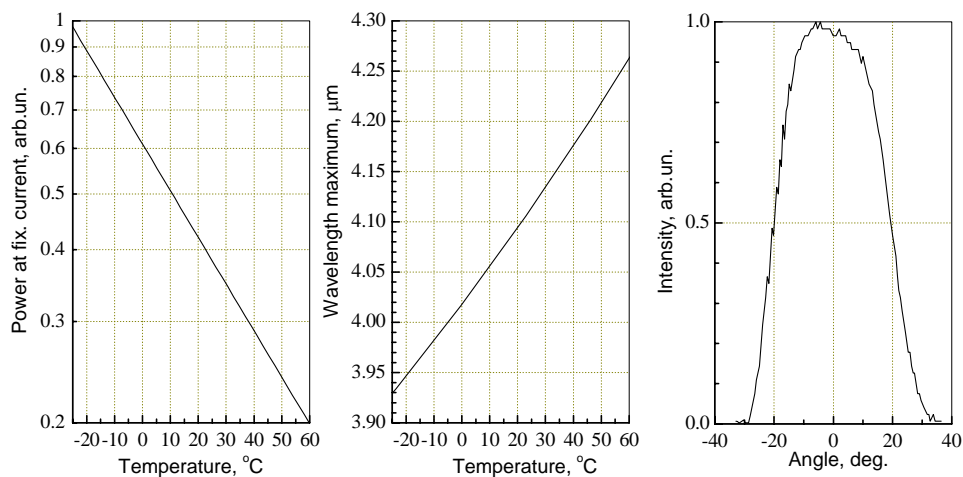
Current-voltage curve, current dependence of the output power; and emission spectrum at 22 °C.



Maximal current vs. operation conditions




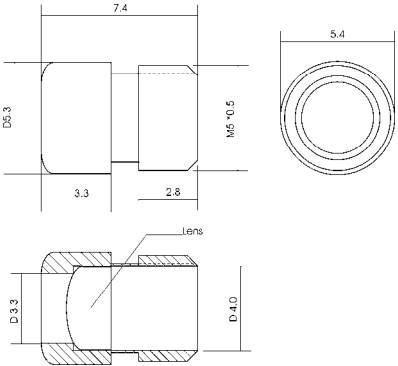
Output power and emission spectra maximum vs. temperature and far-field pattern





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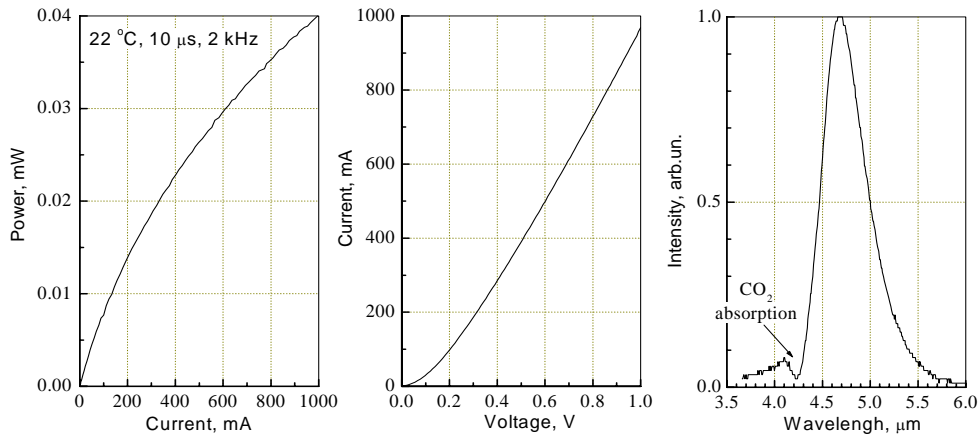
Specifications (T=22 °C)						
Optically Immersed 4.7 μm LED in heat-sink optimized housing				LED47SC		
Peak wavelength		λ	μm	4.7±0.1		
Spectral width FWHM			μm	0.55±0.05		
Current test conditions:	Pulse duration	τ	μs	≤10		
	Pulse period	T		≥1000		
Voltage at drive current I=1 A		U _{pulse}	V	0.9 to 1.1		
Pulsed power at I=1 A		P _{pulse}	μW	≥40		
CW power at I=200 mA (attached to a heatsink)		P _{CW}	μW	≥10		
Switching time		τ	ns	≤20		
Package detail						
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5×0.5	Ø 3.2	≤40	±10	-25÷+60 (+80)	short wire or black point is negative

Package photo		 <p>M5 thread</p>
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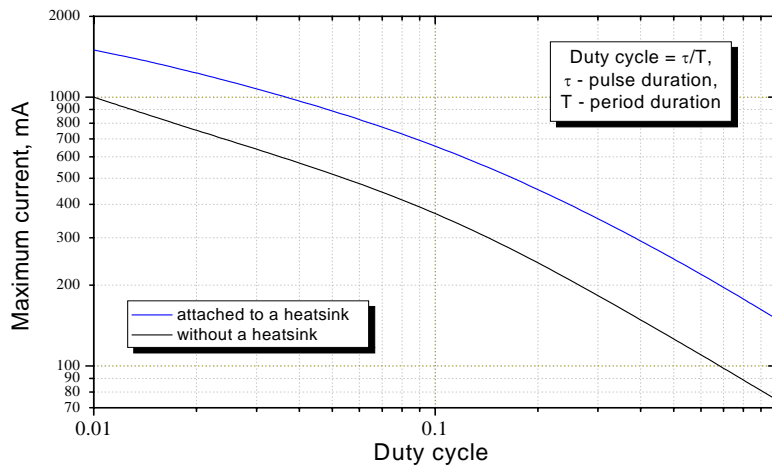
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.6, 3.8, 4.2, and 5.4 μm.

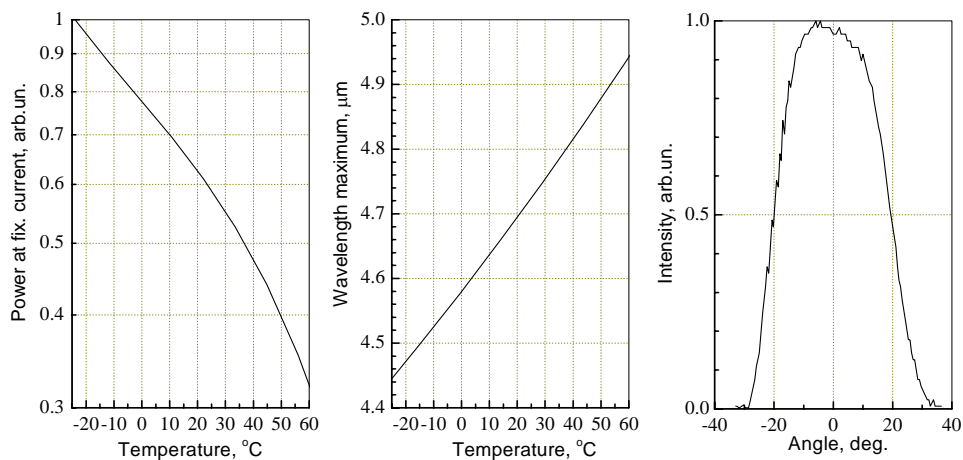
Current-voltage curve, current dependence of output power; and emission spectrum at 22 °C.



Max current vs. duty cycle



Output power and emission spectra maximum vs. temperature and far-field pattern





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Specifications (T=22 °C)			
Optically Immersed 5.4 μm LED in heat-sink optimized housing			LED54SC
Peak wavelength	λ	μm	5.4±0.1
Spectral width FWHM		μm	0.60±0.05
Current test conditions:	Pulse duration	τ	≤10
	Pulse period	T	≥1000
Voltage at drive current I=1 A	U _{pulse}	V	0.4 to 0.7
Pulsed power at I=1 A	P _{pulse}	μW	≥25
CW power at I=200 mA (attached to a heatsink)	P _{CW}	μW	≥5
Switching time	τ	ns	≤20

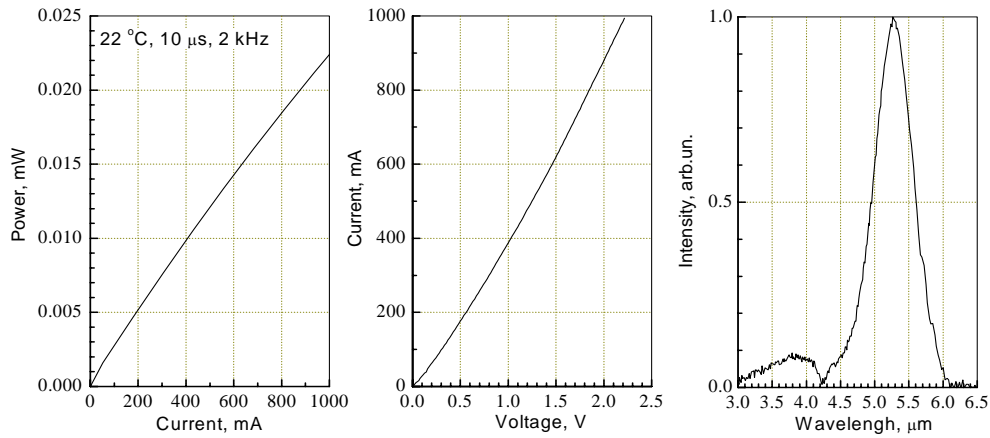
Package detail						
Package code	Thread	Emission size	Far-field pattern FWHM	Far-field pattern deviation	Operation (storage) conditions	Polarity
		mm	deg.	deg.	°C	
Screw	M5×0.5	∅ 3.2	≤40	±10	-25 to +60 (+80)	short wire or black point is negative

Package photo		<p style="text-align: center;">M5 thread on OD</p>
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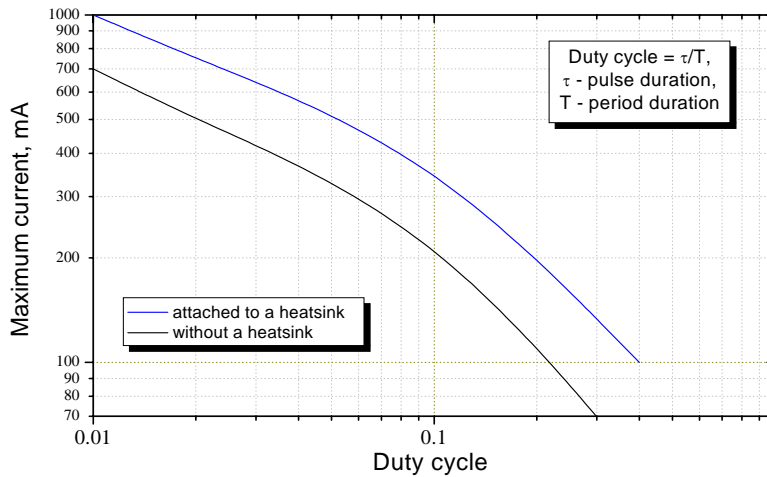
Available accessories include driver electronics and detectors.

Available wavelengths include 3.0, 3.4, 3.6, 4.2, 4.7 and 5.4 μm.

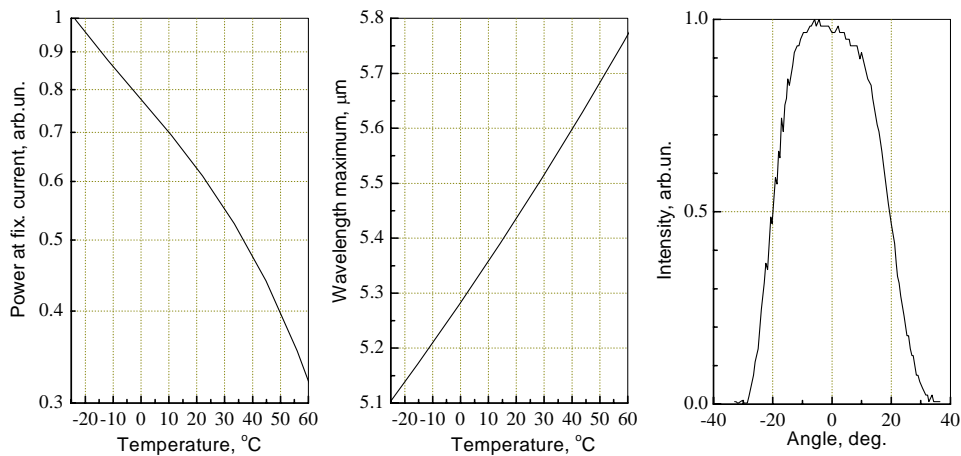
Current-voltage curve, current dependences of the output power and emission spectrum at 22 °C.



Maximal current vs. operation conditions



Output power and emission spectra maximum vs. temperature and far-field pattern



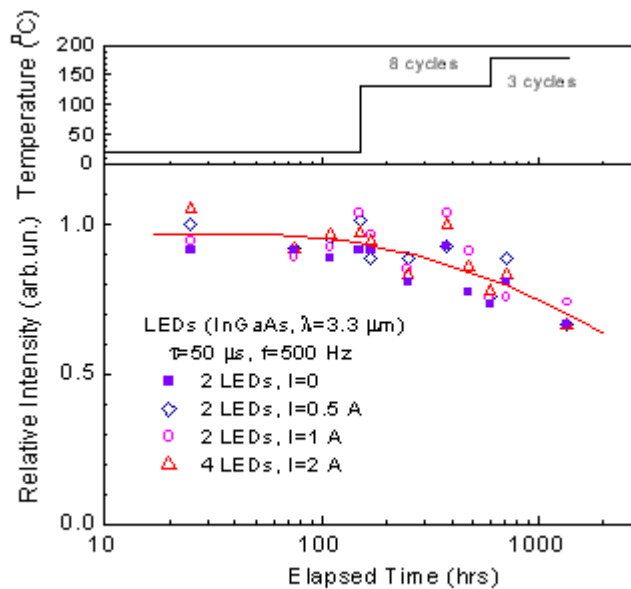
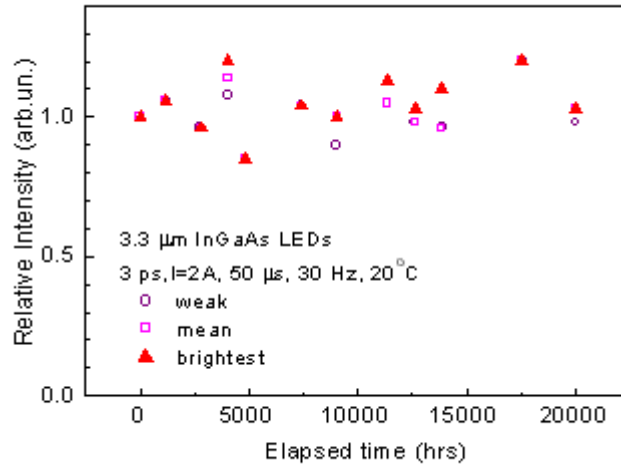
Lifetime Tests

Room temperature lifetime tests were performed with InGaAs homojunction diodes un-encapsulated and encapsulated at current pulses of 2A, duration 50 μ s and repetition rate of 30 Hz.

Lower figure presents data on the long-term variation of the properties of the uncoated InGaAs homojunction LEDs at high temperatures. The upper graph shows the times for which the LEDs under study operated at several ambient temperatures. The samples operated at currents $I = 0, 0.5, 1, 2$ A for 150 h at room temperature, 450 h at $T = 130^\circ\text{C}$, and 800 h at $T = 180^\circ\text{C}$. The LEDs were cooled to room temperature and heated again to $T = 130^\circ\text{C}$ eight times and to 180°C three times.

The lower graph shows the output power as a function of the working time. As can be seen, the output power decreased, on average, by 25% after 1400 h of operation. It is noteworthy that the operating current strength has no effect on the degradation of the LEDs. With increasing operating time, the reverse currents at a bias $U = 1$ V increased from 0.5–1 mA (0 h) to 3–4 mA (1400 h). On “cleaning” the sample surface by etching in CP-4, the reverse current returned to its initial values, and the output power tended to regain its initial value: $P(1400\text{ h}) = (0.85\text{--}0.9)P(0\text{ h})$.

This confirms that LED encapsulation or by protection with window should increase LED lifetime at elevated temperatures.



1. An electroluminescent IR LED is a product which requires care in use. IR LEDs are fabricated from narrow band heterostructures with energy gap from 0.25 to 0.4 eV. That's why the bias used to initiate current flow is low compared to the well known visible or NIR LEDs. Typical forward bias is $V \sim 0.1 - 1$ V only for mid-IR LEDs!

2. Be sure not to exceed I^*_{max} which is given in each LED specification and do not use test instrument that contain sources/batteries with voltage greater than $V_{cw, max}$ given in specification. For LED current restriction and further LED current measurement we recommend to use resistor (1-5 Ohms) connected in serial to LED. This is important to note that un-grounded devices (e.g. computers) can give $V=1-5$ V that is enough to destroy the LED!

3. It is highly desirable that the user has I-V meter for small currents ($10-100 \times 10^{-6}$ A). We guarantee the existence of the LED output as long as V-I characteristic shows saturation in the reverse bias ($10-100 \times 10^{-6}$ A).

4. We recommend activating pulse generator prior connecting LED to generator. On switching off the procedure is reversed: disconnect LED, switch off pulse generator. Long wires connecting LED with pulse generator may be the reason for LED failure because of unexpected voltage surges when switching on and off the LED supply.

5. Please test all elements and circuits before applying voltage to LED. Remember that ground (T0-18 or another holder) should be biased positively (if not specially designed). Usually the negative electrode is made shorter than the positive one.

6. The expected signal is not very big and it is important to test and eliminate noise in the detector circuits.

7. In some cases it is possible to increase pulse duration. I_{max} in such cases can be estimated using the following equation: $I_{max} = I^*_{max} / 20 \cdot \sqrt{f \cdot t}$, where f -is the frequency (Hz), t -is the pulse duration (s), I^*_{max} -is the maximum current (A) for $t=5$ us and $f=500$ Hz. The equation gives an order of magnitude and may be used for $t < 0.1$ ms only. Pulses with $t > 0.15$ ms should be considered as adequate to CW operation and I_{max} and V_{max} should be taken close to CW operation parameters. Please, note that long pulses can increase heat dissipation and the chip temperature. This effect decreases LED emission power and can be traced due to the LED resistance decrease during each pulse. CW power often decreases with time due to heatsink temperature increase.

8. Microimmersion LEDs are made with chalcogenide glass that have low melting temperature ($50-70^\circ\text{C}$). That's why, please, avoid any heater source close to the LED. Even sunlight concentrated onto the lens can melt glass the lens. That's why we recommend vertical position for the LEDs at the initial stage of the research work. We are working now to increase the glass melting temperature or/and to strengthen its position and shape.

9. Be patient in adjusting the optical system. It is only experience that allows fast work.