Boston Electronics Corporation
91 Boylston Street, Brookline, Massachusetts 02445 USA
(800)347-5445 or (617)566-3821 fax (617)731-0935
www.boselec.com boselec@boselec.com

Comments on our Infrared LEDs

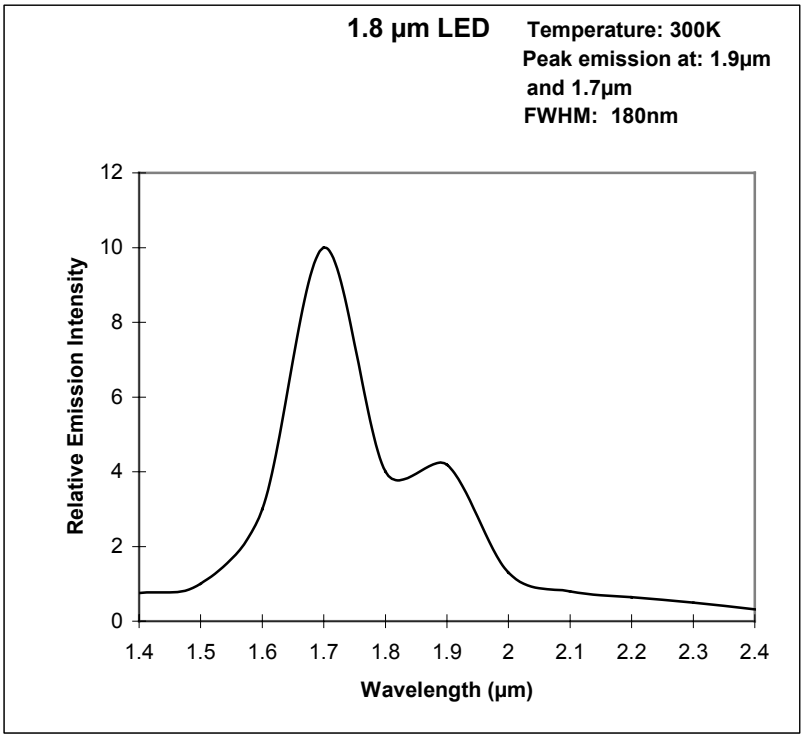
1. We have devices at 1.8 μm (1800 nm), 2.8 μm (2800 nm), 3.4 μm (3400 nm), 4.2 μm (4200 nm), 4.7 μm (4700 nm) and 5.5 μm (5500 nm).
2. The spectral bandwidth of ALL these devices is 0.3 μm (300 nm) or greater. Therefore the spectral brightness (watts per mm or watts per nm) is not great.
3. These devices CAN be operated CW. However, the optical OUTPUT POWER when operated CW is limited by the heating of the device. MAX CW POWER is typically 1% of the MAX PEAK PULSED POWER when operated at 0.25% duty cycle. Another way to say this is that the peak power when pulsed is typically 100 times greater than when CW.
4. The lens options provide only limited collimation accuracy due to their low optical accuracy and the fact that they are small and close to the emitting surface. The SAPPHIRE BALL lens option refers to a sapphire sphere which replaces the window at the aperture of a TO-18 package. The MICROLENS option refers to an arsenic triselenide immersion lens directly on the emitter surface. The microlens is understood to couple out more power but the collimation is not as good.
5. TE cooling improves power and causes the wavelength to shift slightly to shorter wavelengths. On a 2-stage TE-cooler, the POWER is approximately DOUBLED and the WAVELENGTH is approximately 0.1 μm (100 nm) SHORTER.
6. PbSe makes a good photodetector for the wavelengths 4.2 μm and shorter. PbS is generally a bit too slow to resolve the pulses well. For 4.7 μm and longer, MCT devices made by Vigo (available from us) are your best choice.

LED18-10
Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	1.8	µm	300K
Spectral bandwidth (FWHM)	0.36	µm	300K
Radiant output power (@300mA):	90	µW	2.5% duty cycle
Operating Currents	100-200	mA	pulsed*
	0.8-1.0	A	(peak current)**
Rise time	100	nS	
Temperature drift of band	2	nm/K	
Encapsulation	TO-18 (TO-5 opt.)		Lens / Window
Mesa diameter	1	mm	
Field of View	60	deg.	

Notes

- recommended detector is room temperature photovoltaic MCT detector model PDI-4 or TE-cooled photovoltaic MCT model PDI-2TE-4; or room temperature photoconductive MCT detector PCI-4 or TE-cooled photoconductive detector model PCI-2TE-4
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- the lead nearest to the tag of TO-header is the anode and marked with a red dot.
- the cathode is connected to the case
- * square pulses of 500µsec duration and 1 KHz repetition frequency
- ** square pulses of 50µsec duration and 500 Hz repetition frequency



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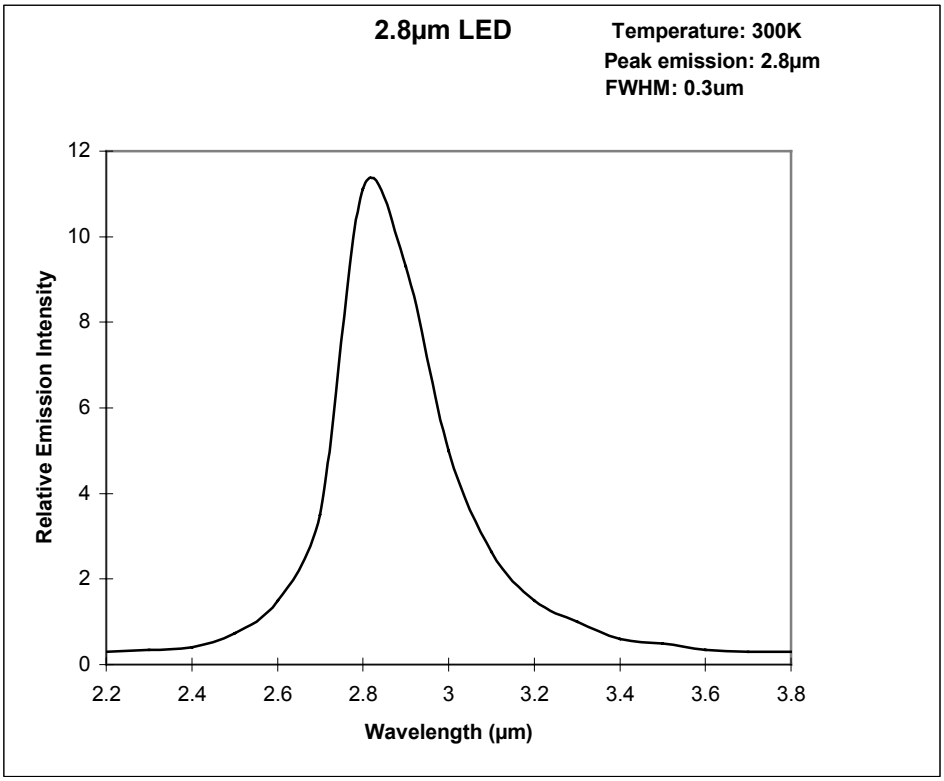
LED28-05
Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	2.8	µm	300K
Spectral bandwidth (FWHM)	0.3	µm	300K
Max.emission power			
@ I=100 mA	50	µW	CW mode
@ I=1-5 A	5	mW	pulsed* mode
Response time	100	nS	
Temperature drift of band	2	nm/K	
Encapsulation	TO-18 (TO-5,TO-8 opt.)		Sapphire window
Efficiency, % (not less)	0.05		
Field of View	60	deg.	

Notes

- recommended detector is room temperature photovoltaic MCT detector model PDI-4 or TE-cooled photovoltaic MCT model PDI-2TE-4; or room temperature photoconductive MCT detector PCI-4 or TE-cooled photoconductive detector model PCI-2TE-4
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- * I = 1.0 - 3.0 A, pulse width = 5µs @ f = 500Hz repetition rate



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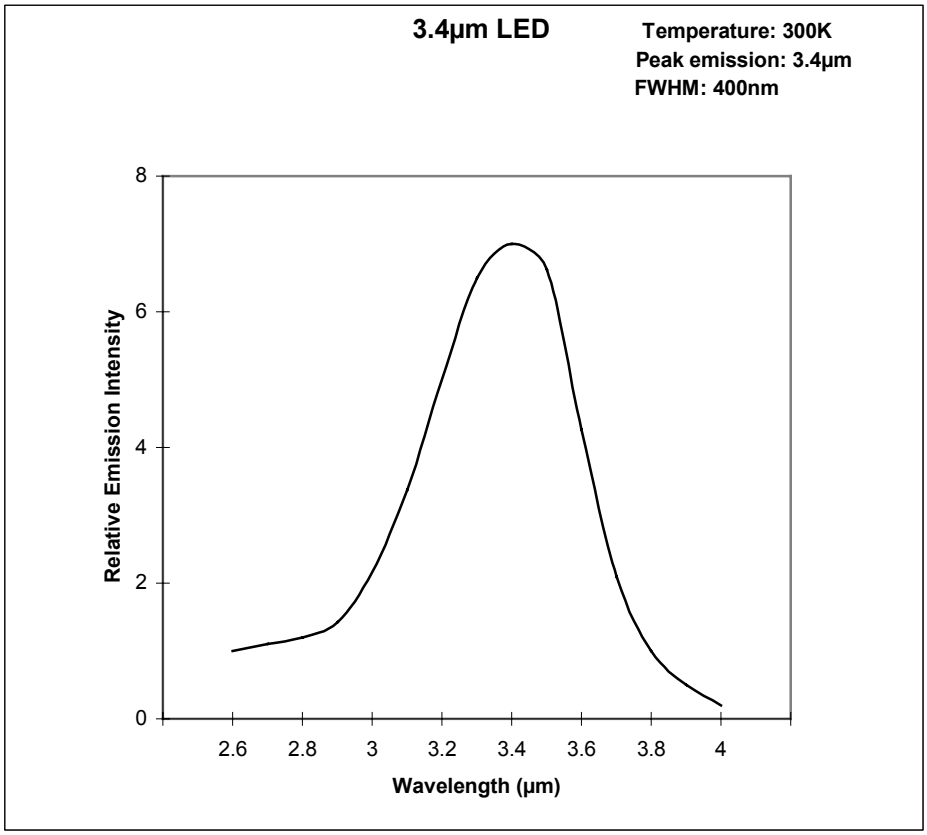
LED34-05
Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	3.4	µm	300K
Spectral bandwidth (FWHM)	0.4	µm	300K
Max.emission power	20	µW	2.5% Duty cycle, pulsed* mode
@ I=1-3 A	200	µW	0.25% duty cycle,pulsed* mode
Response time	100	nS	
Temperature drift of band	2	nm/K	
Encapsulation	TO-18 (TO-5,TO-8 opt.)		Sapphire window
Efficiency, % (not less)	0.03		
Field of View	60	deg.	

Notes:

- recommended detector is room temperature photovoltaic MCT detector model PDI-4 or TE-cooled photovoltaic MCT model PDI-2TE-4; or room temperature photoconductive MCT detector PCI-4 or TE-cooled photoconductive detector model PCI-2TE-4
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- * I = 1.0 - 3.0 A, pulse width = 5µs @ f = 500Hz repetition rate



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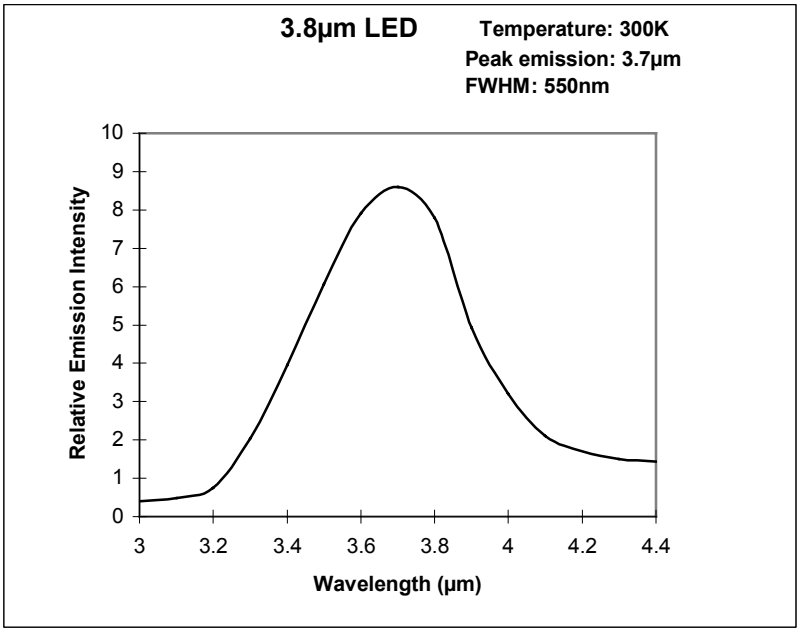
LED38
Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	3.8	µm	300K
Spectral bandwidth (FWHM)	0.4	µm	300K
Radiant output power	60	µW	2.5% duty cycle, 3A pulse current
Operating currents	500-600	mA*	Pulsed
	2.0-2.5	A**	Peak current
Rise time	200	nS	300K
Temperature drift of band	2	nm/K	
Encapsulation			TO18 (TO-5 / TO-8 opt.)
Lens/Window material			Sapphire window
Field of View	60	deg.	
Efficiency, % (not less)	0.04		
Application	Radiation absorbed by hydrocarbon (such as methane), Environmental monitoring, IR spectroscopy		

Notes:

- recommended detector is room temperature photovoltaic MCT detector model PDI-4 or TE-cooled photovoltaic MCT model PDI-2TE-4; or room temperature photoconductive MCT detector PCI-5 or TE-cooled photoconductive detector model PCI-2TE-4
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- Square pulses of 500µs duration and 1KHz repetition frequency
- Square pulses of 50µs duration and 500Hz repetition frequency



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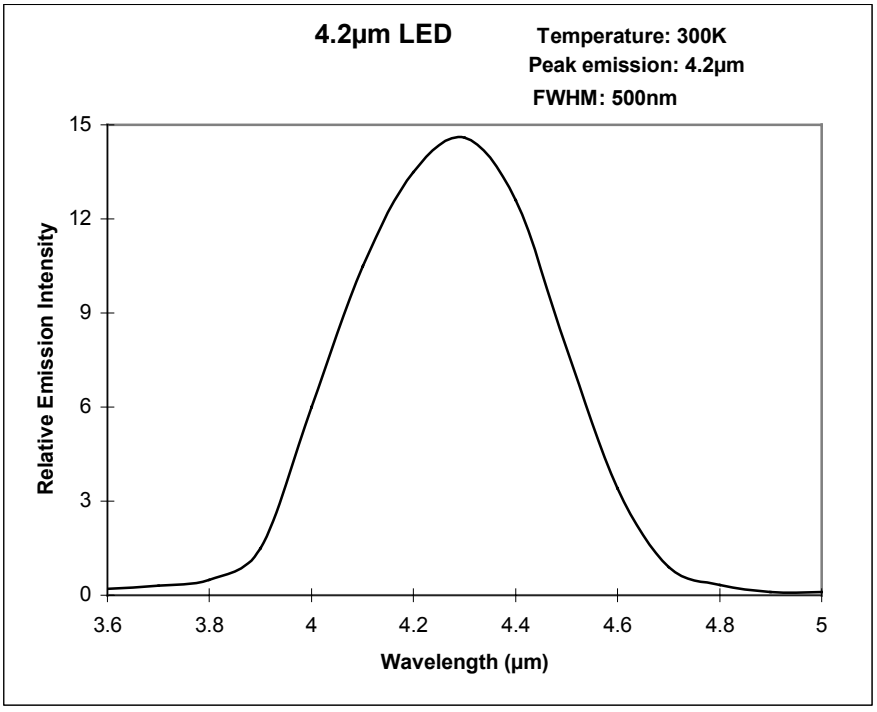
LED42-05
Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	4.3	µm	300K
Spectral bandwidth (FWHM)	0.5	µm	300K
Max.emission power			
@ I=100 mA	15	µW	CW mode
@ I=1-5 A	2	mW	pulsed* mode
Response time	100	nS	
Temperature drift of band	2	nm/K	
Encapsulation	TO-18		Sapphire lens
Efficiency, % (not less)	0.01		
Field of View	10	deg.	

Notes:

- recommended detector is room temperature photovoltaic MCT detector model PDI-5 or TE-cooled photovoltaic MCT model PDI-2TE-5; or room temperature photoconductive MCT detector PCI-5 or TE-cooled photoconductive detector model PCI-2TE-5
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- * I = 1.0 - 5.0 A, Pulse width = 5µs @ f=500Hz repetition rate (duty cycle = 0.25%)



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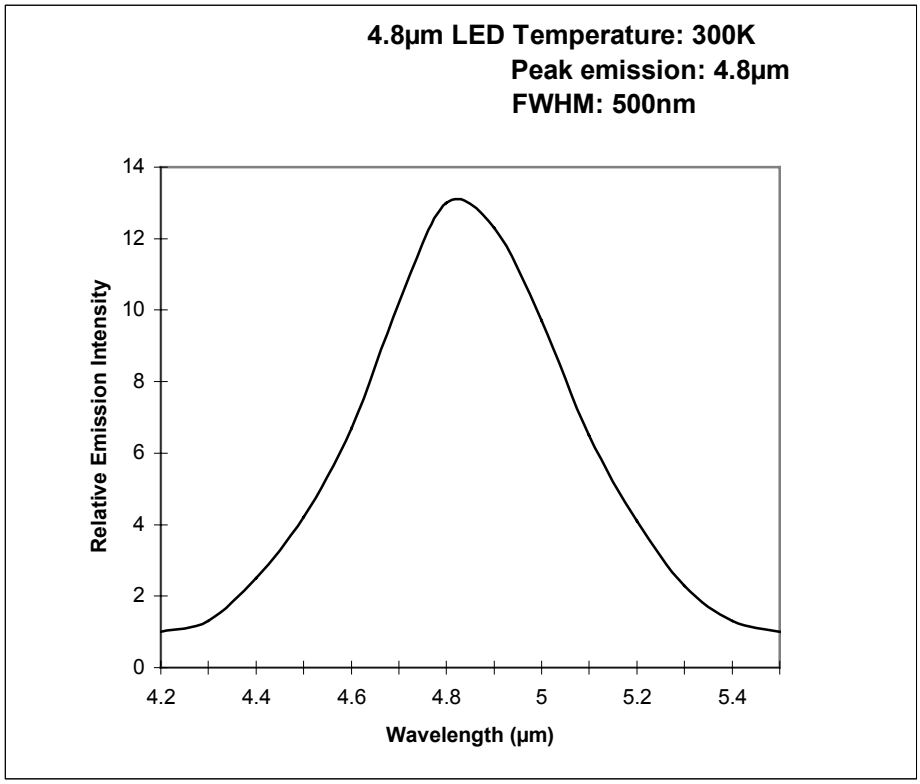
LED48-05
Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	4.8	µm	300K
Spectral bandwidth (FWHM)	0.5	µm	300K
Max.emission power			
@ I=100 mA	10	µW	CW mode
@ I=1-5 A	1	mW	pulsed* mode
Response time	100	nS	
Temperature drift of band	2	nm/K	
Encapsulation	TO-18 (TO-5,TO-8 opt.)		Sapphire window
Efficiency, % (not less)	0.01		
Field of View	60	deg.	

Notes:

- recommended detector is room temperature photovoltaic MCT detector model PDI-5 or TE-cooled photovoltaic MCT model PDI-2TE-5; or room temperature photoconductive MCT detector PCI-5 or TE-cooled photoconductive detector model PCI-2TE-5
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- * I = 1.0 - 3.0 A, pulse width = 5µs @ f = 500Hz repetition rate



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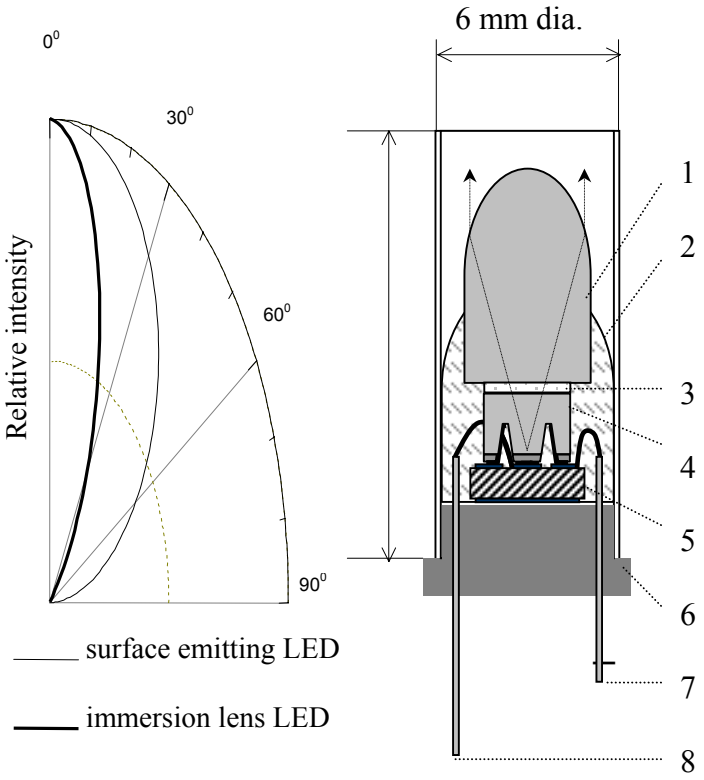
Construction of optically pumped light emitting diodes (OP LEDs)



1-Immersion lens
2-Epoxy
3-Narow gap “phosphor “
4-GaAs pump
5-Si submount,
6-TO-39 (TO-5) header
7-Cathode
8-Anode

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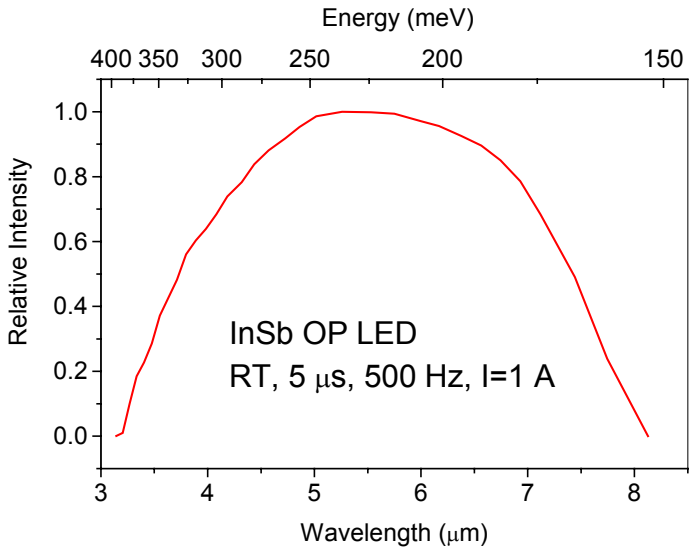
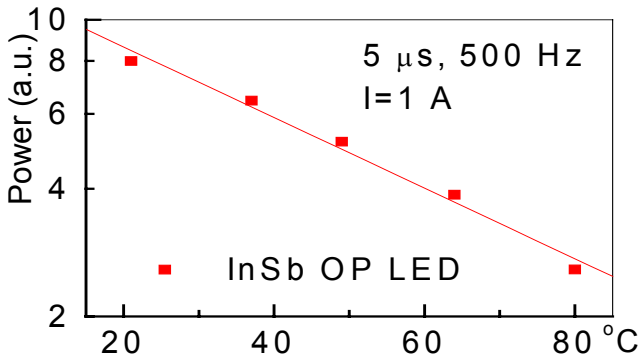
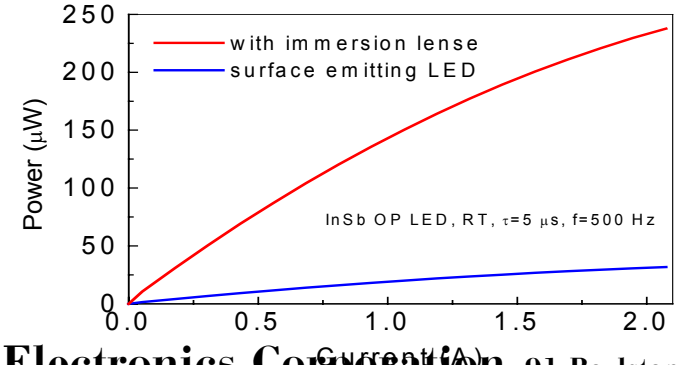
Room temperature emission spectra of InSb OP LED



Temperature dependence of InSb OP LED output power



Output Power of InSb OP LED



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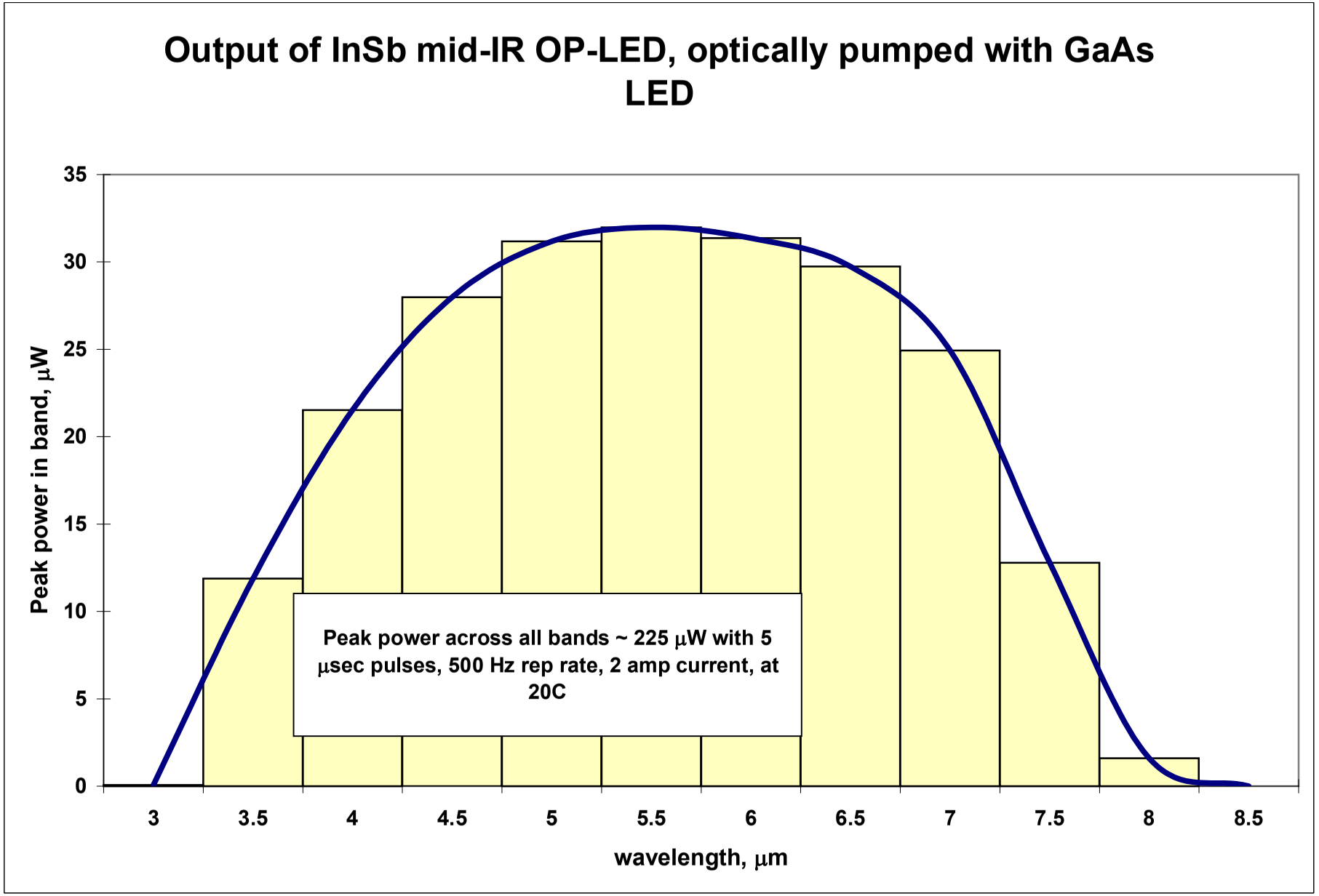
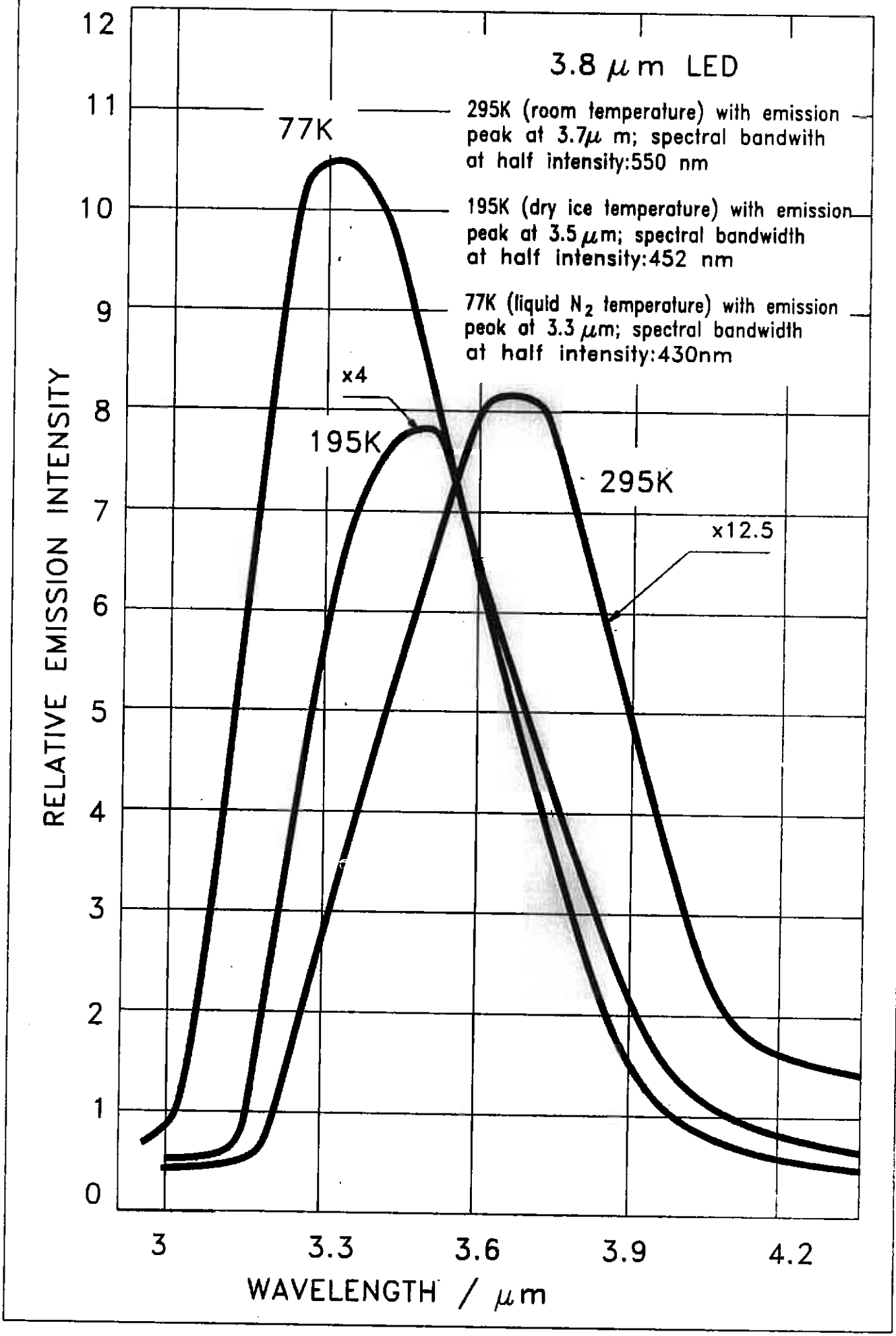
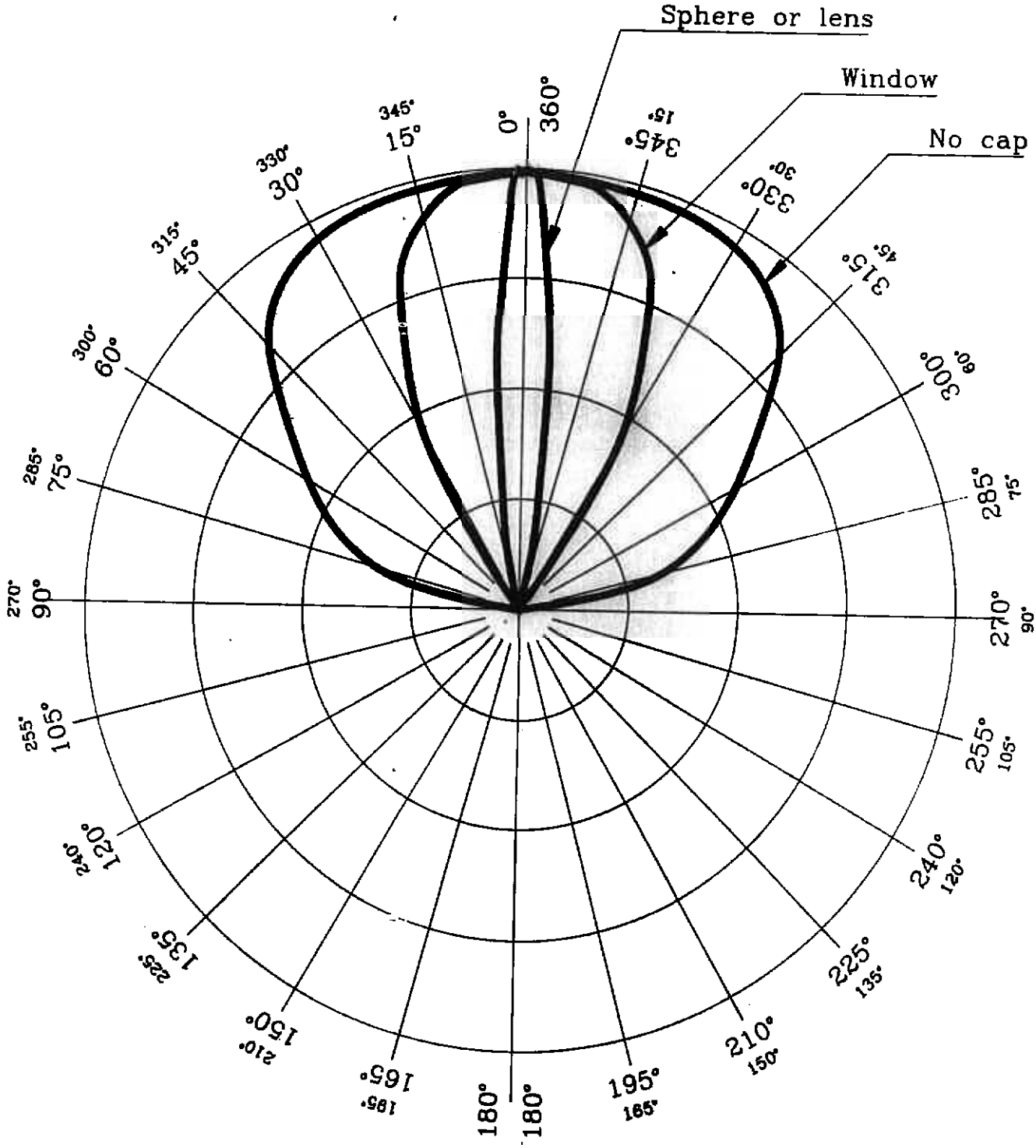
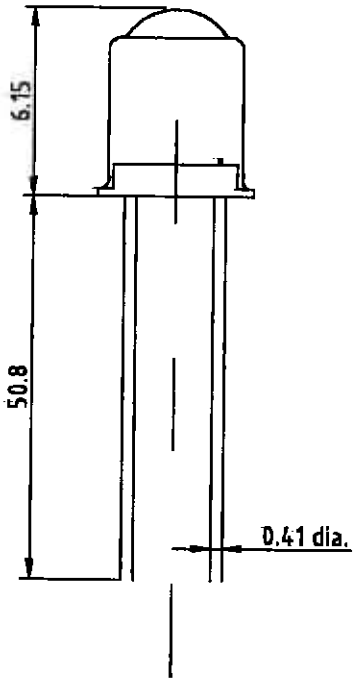
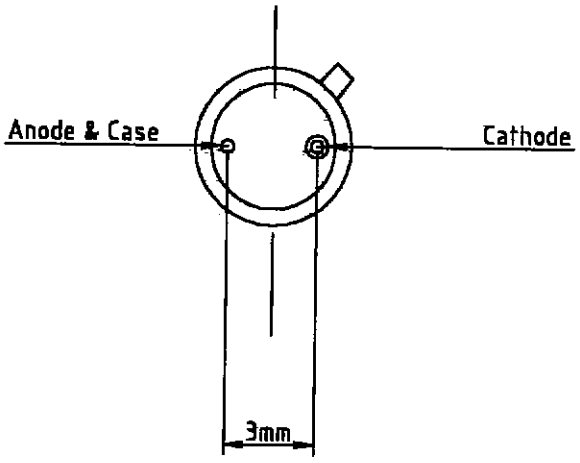

Output of InSb mid-IR OP-LED, optically pumped with GaAs LED
Peak power in band, μW
35
30
25
20
15
10
5
0
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
wavelength, μm
Peak power across all bands ~ 225 μW with 5 μsec pulses, 500 Hz rep rate, 2 amp current, at 20C


3.8 μm LED
295K (room temperature) with emission peak at 3.7μ m; spectral bandwith at half intensity:550 nm
195K (dry ice temperature) with emission peak at 3.5 μm; spectral bandwidth at half intensity:452 nm
77K (liquid N2 temperature) with emission peak at 3.3 μm; spectral bandwidth at half intensity:430nm
77K
195K
295K
x4
x12.5
RELATIVE EMISSION INTENSITY
0
1
2
3
4
5
6
7
8
9
10
11
12
3
3.3
3.6
3.9
4.2
WAVELENGTH / μm



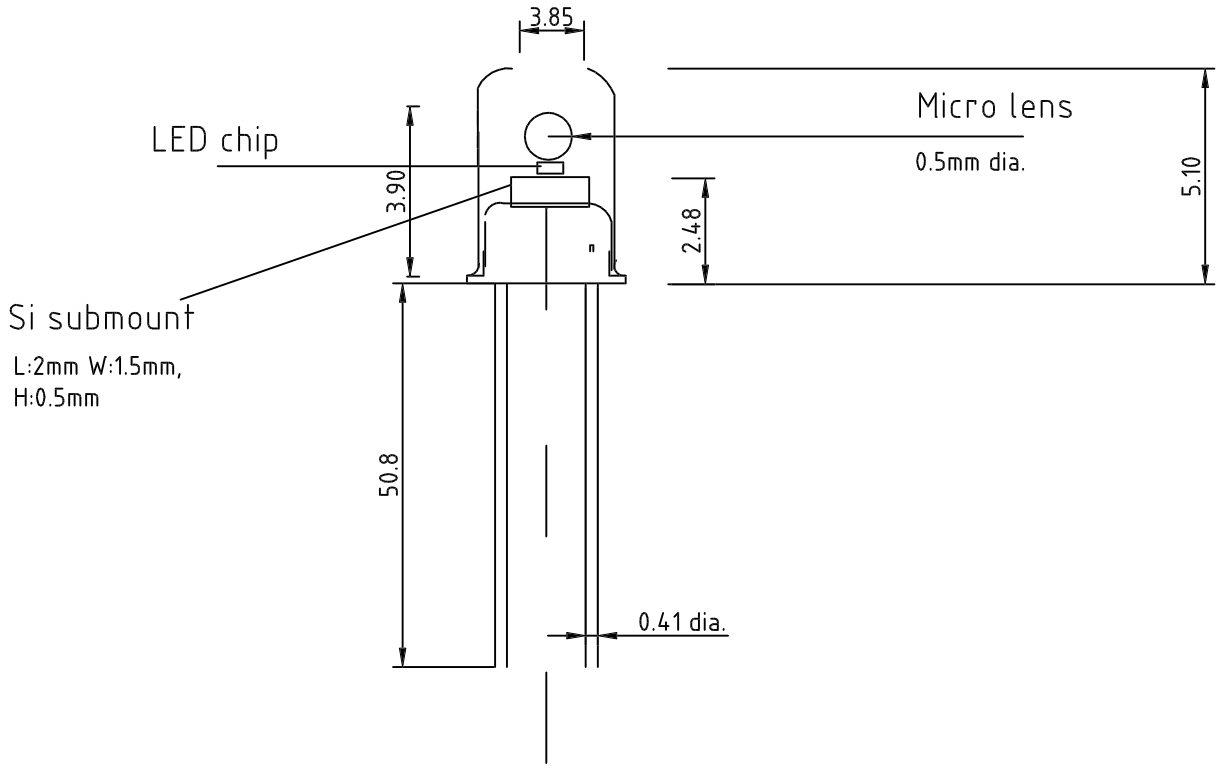
POLAR PLOT OF BEAM DIVERGENCE

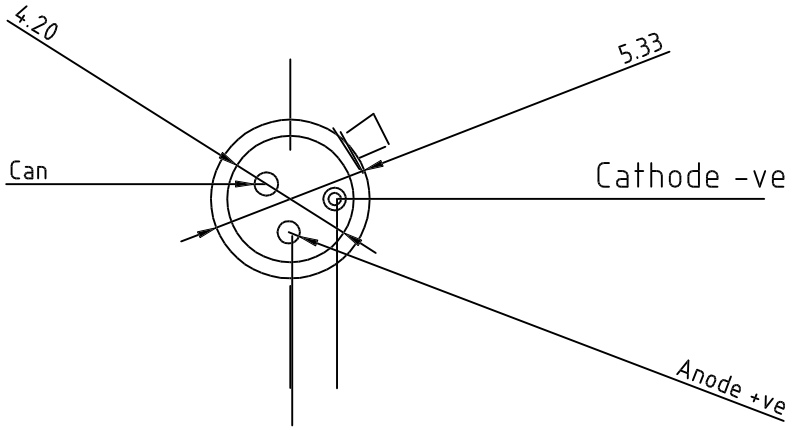




BOTTOM VIEW

ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED	MATERIAL Gold Plated	NO./SET	SCALE 4:1
TITLE TO-18 Header	DRAWN BY: A.A	DATE: 18 NOV. 99	FINISH
	CHECKED BY	COMPUTER REF. NO.:	DRAWING NO.: LMS TO-18
LASER MONITORING SYSTEMS	APPROVED BY:	GEN.TOL. +/-	MODS.

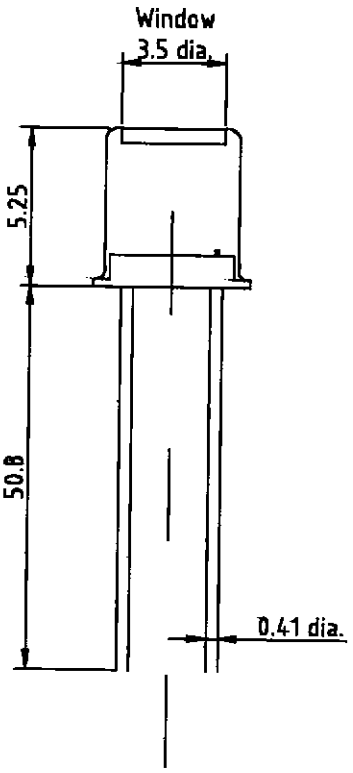


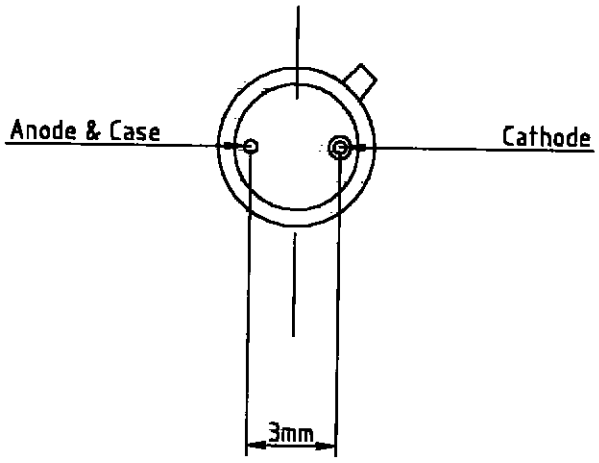


BOTTOM VIEW

Anode +Ve: Red
Cathode -Ve: Black
Short leg: Can

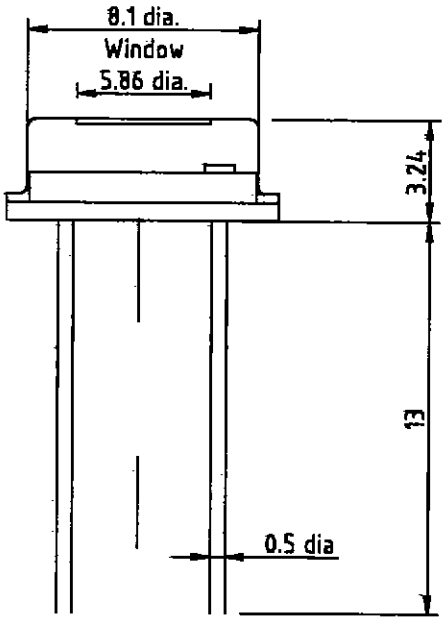
ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED	MATERIAL Gold Plated	NO./SET	SCALE 4:1
TITLE TO-18 Header LED-42-TO-18 with microimmersion lens	DRAWN BY: A.A	DATE: 18 NOV. 99	FINISH
	CHECKED BY	COMPUTER REF. NO.:	DRAWING NO.: LMS TO-18
LASER MONITORING SYSTEMS	APPROVED BY:	GEN.TOL. +/-	MODS.

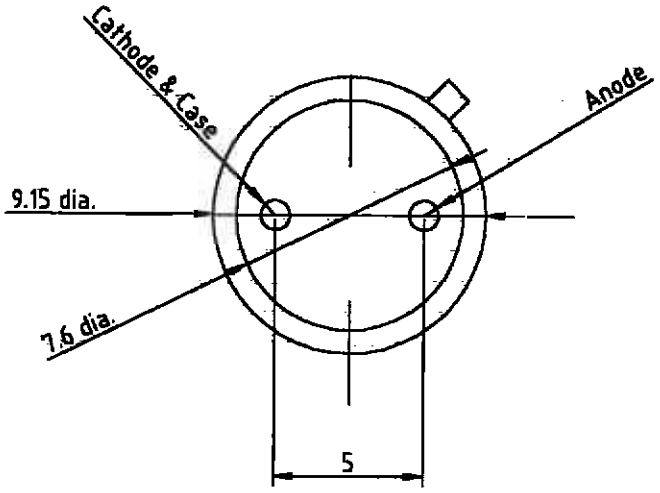




BOTTOM VIEW

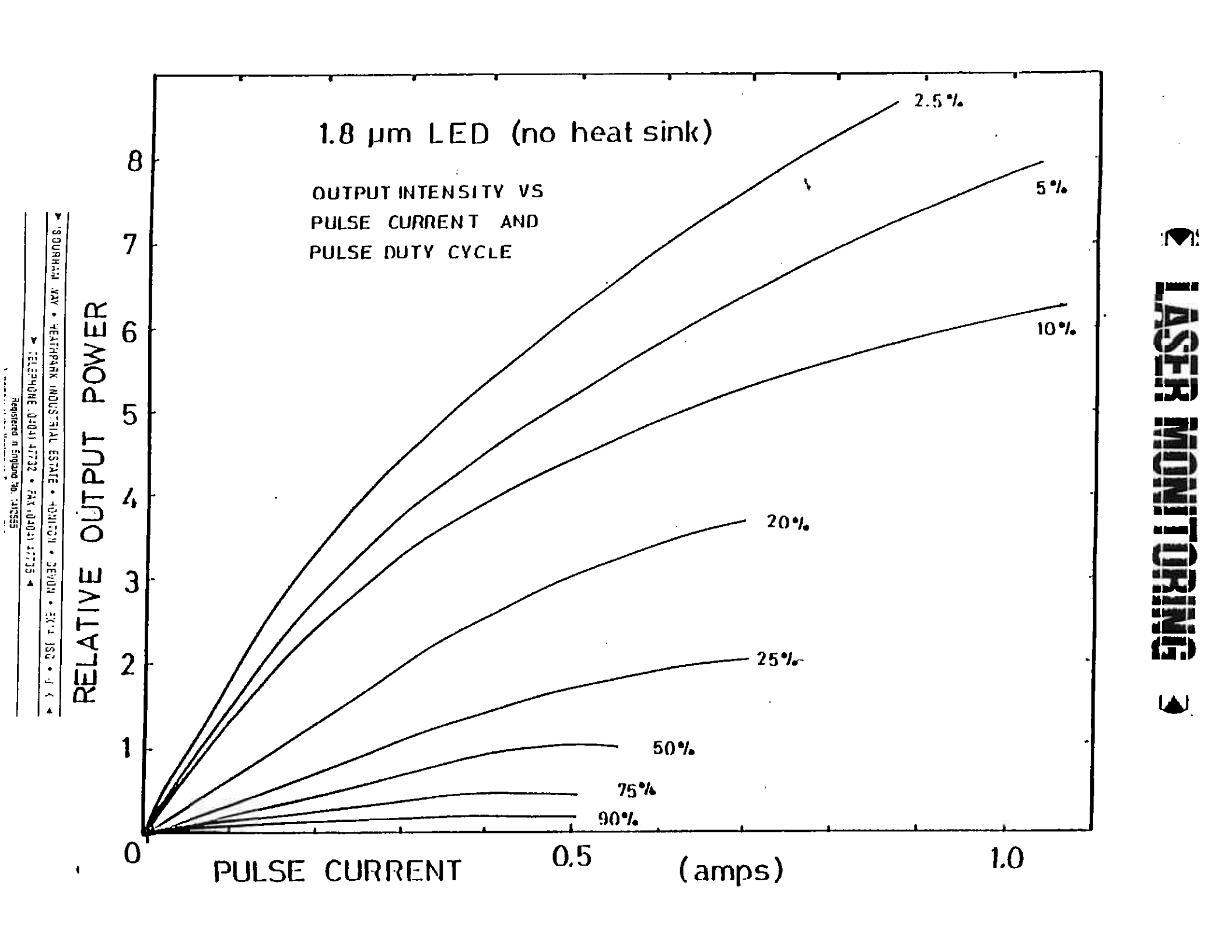
ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED	MATERIAL Gold Plated	NO./SET	SCALE 4:1
TITLE TO-18 Header with window cap	DRAWN BY: A.A	DATE: 18 NOV. '99	FINISH
LASER MONITORING SYSTEMS	CHECKED BY	COMPUTER REF. NO.:	DRAWING NO.: LMS TO-18
	APPROVED BY:	GEN.TOL. +/-	MODS.





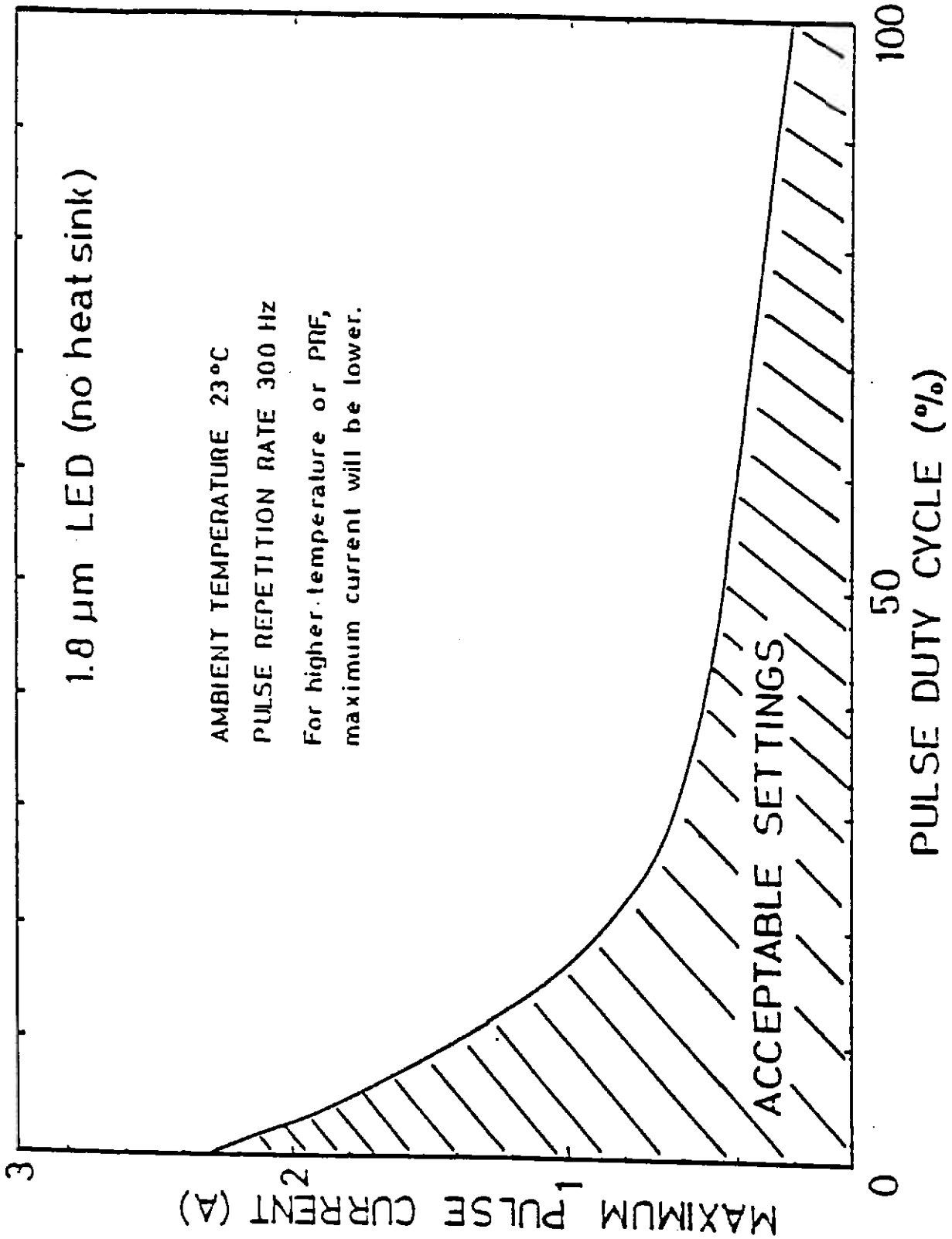
BOTTOM VIEW

ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED	MATERIAL Gold Plated	NO./SET	SCALE 4:1
TITLE TO-5 Header	DRAWN BY: A.A	DATE: 18 NOV. 99	FINISH
	CHECKED BY	COMPUTER REF. NO.:	DRAWING NO.: LMS-TO-5
LASER MONITORING SYSTEMS	APPROVED BY:	GEN.TOL. +/-	MODS.



LASER MONITORING

LASER MONITORING



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Registered in England No. 1407555

LED-PG
LED Pulse Generator

DESCRIPTION

The LED-PG pulse generator module is designed to supply the optimal pulse current, pulse width, and pulse repetition frequency (prf) for the LMS LEDs. There is a trade-off between these parameters; for example, too high a pulse current or prf will cause overheating and damage to the LED, while longer pulses allow lower band-width detectors and simpler signal detection circuitry to be used.

INSTRUCTIONS FOR USE

1. Connect the LED to the connector terminals attached to the pulse generator

CAUTION the leads on the LED must be soldered to the terminals with a particularly polarity; the BNC connector center "+" (anode) is to receive the electrically positive LED lead. LMS LEDs have differing polarities depending on the device type.

NOTE Some LED-PG pulse generators are supplied with a heat sink mount for the LED. Heat-sinking is advisable to avoid LED damage; consult LED specification sheets.

2. Connect a 12V DC power supply, capable of providing sufficient current, to the pin connections on the pulse generator enclosure marked +12V and GND.
3. Turn on the power supply. The output should be detectable using a detector and preamplifier having a rise time of <100µs and the appropriate spectral range for the LED emission, for example the PbSe detector and MPA-6 preamplifier combination available from LMS.

The LED-PG pulse generator is normally supplied with the following factory settings:

Pulse current	500mA
Repetition rate	1kHz
Duty cycle	10%

These settings are safe for all LMS LEDs operating without a heat sink at room temperature.

4. The pin labeled "monitor" can be used to monitor the LED drive on an oscilloscope. One-volt output from the monitor pin corresponds to one ampere to the LED.
5. Pulse settings can be changed by rotating one of the three multi-turn potentiometer screws labeled "pulse width", "repetition rate", and "current".

The setting ranges are listed under Specifications. Please consult LED specification sheets for an acceptable combination of pulse current, width, and repetition rate.

SPECIFICATIONS

Pulse Current	0-2.5amperes (peak)
Repetition Rate*	400Hz-50kHz
Pulse Width	10µS-750µS
Pulse Rise Time	5µS

* Repetition Rate is defined at 1/(time interval between lagging or leading edge of successive pulses).

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