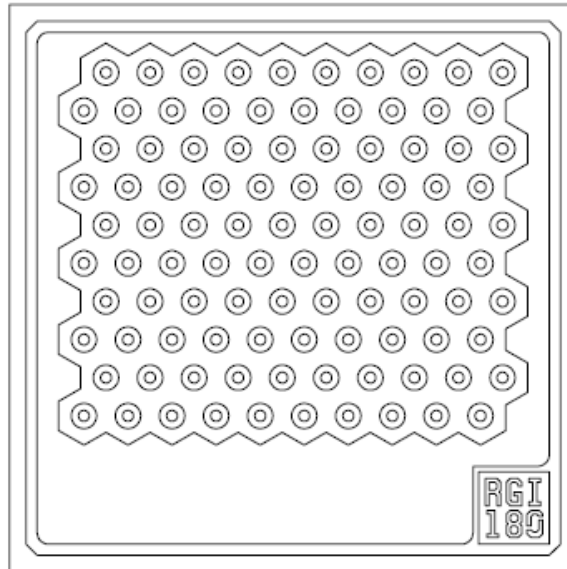


**Part Number: K0-0850M-0000-00007**  
**Desc: Die/Assy;850;MM; 3B; R10X40;0.5W;0.515mm X 0.515mm**



**Near Infra-Red Vertical Cavity Surface Emitting Laser (VCSEL)**

Model: Multi Mode Array VCSEL  
 Center wavelength: 850nm  
 Optical power without diffuser: 0.5 Watts

**Applications**

- Motion Control
- Time of Flight
- Automotive Sensing
- 3D Scanning
- Motion Control
- Time of Flight
- Gesture Recognition
- IR illumination for Security



COMPLIES WITH IEC 60825-1, 2<sup>nd</sup> Edition 2007.  
 COMPLIES WITH 21 CFR 1040.10 AND 1040-10.11 EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE NO.50 DATED 27 MAY 2001.

## Absolute Maximum Ratings

Parameter	Rating	Notes
Storage temperature	-40 to 100 °C	
Operating temperature (VCSEL)	-20 to 65 °C	85 °C with reduced efficiency
Maximum package SMT solder reflow temperature	260°C, 10 seconds	
Maximum pulsed current	1 A	≤ 200 μs pulse width, ≤ 10% duty cycle, Temp ≤ 40 °C, Note 1
Laser reverse voltage	5 V	Note 1
ESD damage threshold	±2kV	MIL_STD-883D, Method 3015.7 human body model, Note 1

Note 1 Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated for extended periods of time may affect device reliability.

## Electro-Optical Characteristics

VCSEL Operating Temp (Tv) = 40 °C, Test condition: 100μs pulse width & 10% duty cycle unless otherwise noted.

Die performance parameters require the VCSEL die to have adequate heat sinking and proper thermal management.

Parameter	Symbol	Unit s	Without Diffuser			With Diffuser			Notes
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Threshold current	Ith	mA	--	125	--	--	125	--	
Differential resistance	Rs	Ω	--	0.9	--	--	0.9	--	
Operating voltage	Vf	V	--	2.1	2.4	--	2.1	2.4	at I = 0.60 A
Optical operating power	Lop	W	--	500	--	--	425	--	at I = 0.60 A
Slope efficiency	SE	W/A	--	1	--	--	0.85	--	at I = 0.60 A
Power conversion efficiency	PCE	%	35	40	--	30	35	--	at I = 0.60 A
Leakage current	Ileak	nA	--	-1	-10	--	-1	-10	Vrb = -5 V
Breakdown voltage	Vrb	V	--	-10	-8	--	-10	-8	Irb = -1 μA
Beam divergence	FWHM	deg	--	17	--	N/A	N/A	N/A	For parts with diffusers, see diffuser angle table
Beam divergence	1/e <sup>2</sup>	deg	--	22	--	N/A	N/A	N/A	
Operating peak wavelength	WLpeak	nm	840	850	860	840	850	860	
Wavelength-Temp tuning		nm/°C	--	0.059	--	--	0.059	--	
Rise time		ps	--	--	800	--	--	800	20%-80%, Note 1
Fall time		ps	--	--	1000	--	--	1000	20%-80%, Note 1

Electro-Optical Characteristic require further evaluation. Values are based on limited sample size. Parameter's "With Diffuser" are based on estimated values. Actual performance requires further evaluation.

Note 1: Rise and Fall time will vary depending on driver board and electrical layout.

## Diffuser characteristics

Parameter	Symbol	Units	Diffuser Angle						Notes
			72X58			60X45			
			Min	Typ	Max	Min	Typ	Max	
FOV aligned to short length of diffuser	FOVS	deg	--	58	--	--	45	--	FWHM defined by manufacturer
FOV aligned to longer length of diffuser	FOVL	deg	--	72	--	--	60	--	FWHM defined by manufacturer
Diffuser Uniformity	U	%	--	80	-	--	80	-	Note 2
Diffuser Efficiency	%Eff	%	80	90	-	80	90	-	Total transmission efficiency without AR Coating

**Note 2:** The uniformity is measured by projecting the VCSEL with diffuser onto a flat surface and capturing a high-resolution image of the beam profile. Over all the pixels in the eFOV on the image, the mean and standard deviation is calculated. The uniformity is calculated by dividing the difference of the mean and standard deviation by the mean. This is represented as a percentage.

**Note 3:** For all other diffuser options contact Vixar at [sales@vixarinc.com](mailto:sales@vixarinc.com)

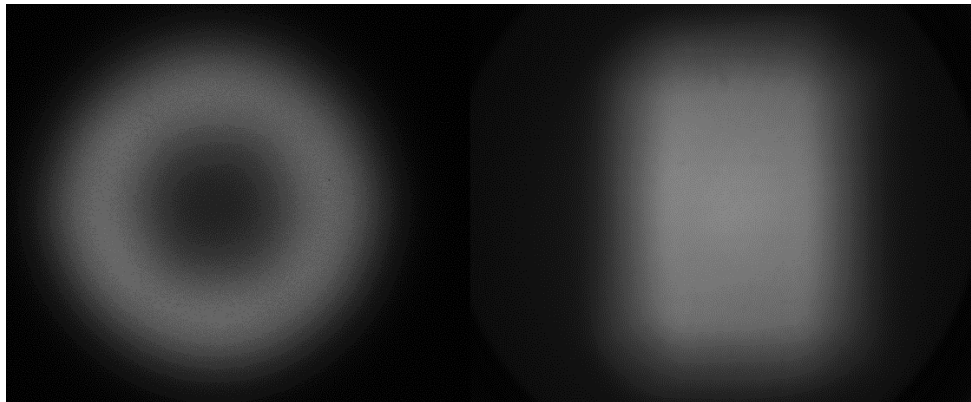


Figure 1 Left, Beam profile without diffuser. Right, Beam profile with rectangular diffuser.

**Typical Performance**

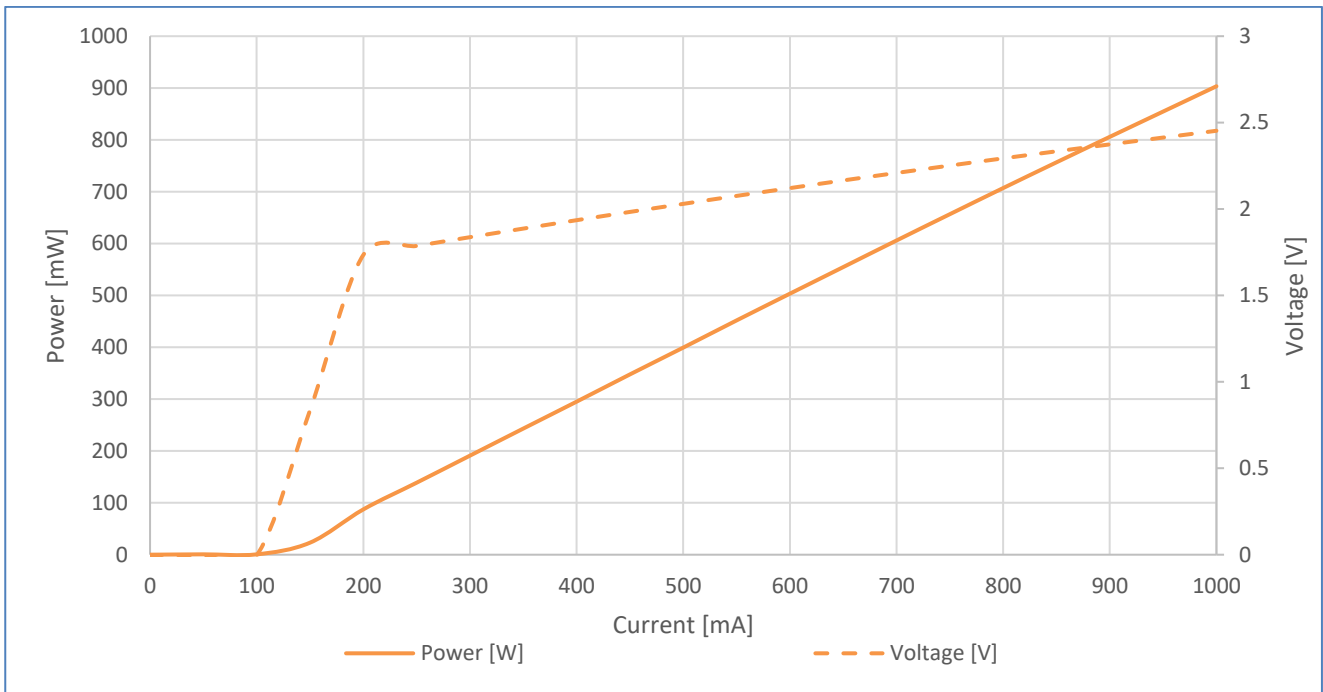


Figure 2 Typical 850nm 500mW L-I-V at Operational mode: 100µs pulse, 10% duty cycle 25°C. No Diffuser

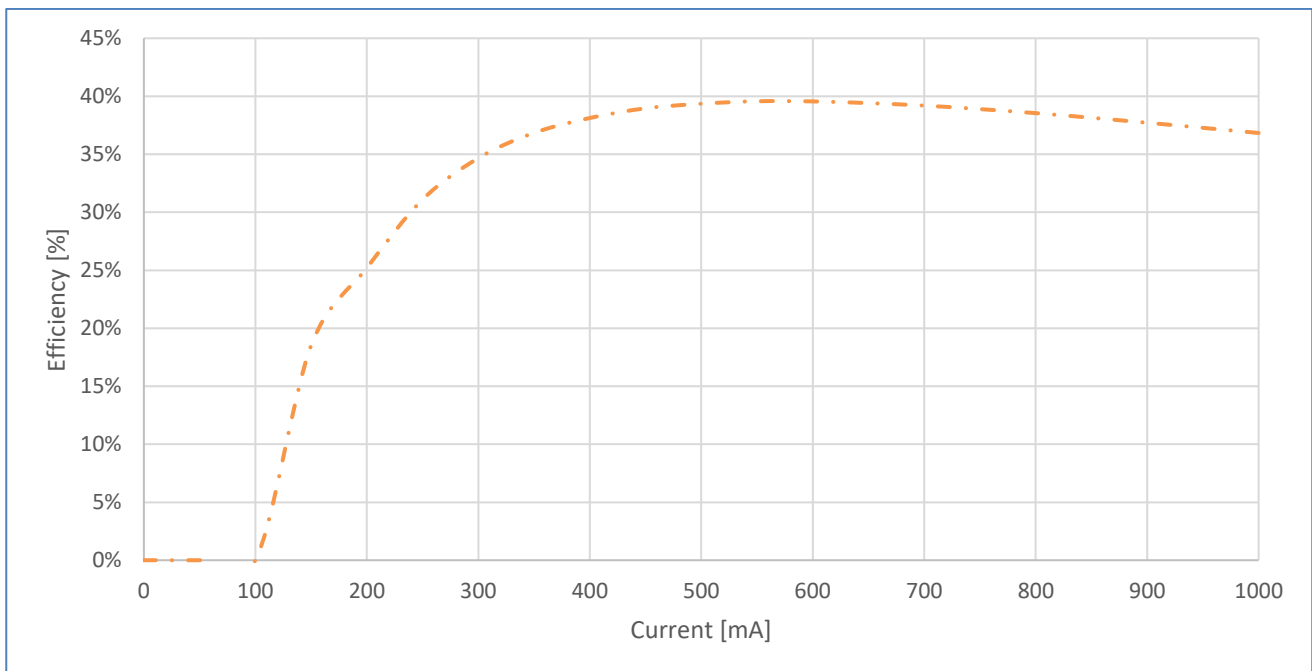


Figure 3 Typical 850nm 500mW Efficiency at Operational mode: 100µs pulse, 10% duty cycle 25°C. No Diffuser.

### Beam Profile of VCSEL

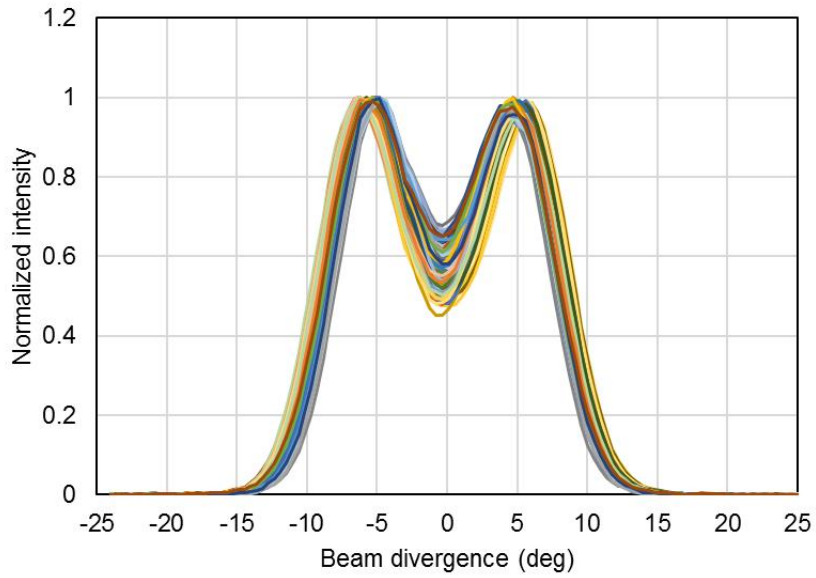


Figure 4 Beam divergence data for many VCSEL arrays are shown. Current Injection 600mA at Operational Mode: 100uS, 10% duty Cycle, 25°C

### Beam Profile with Diffuser

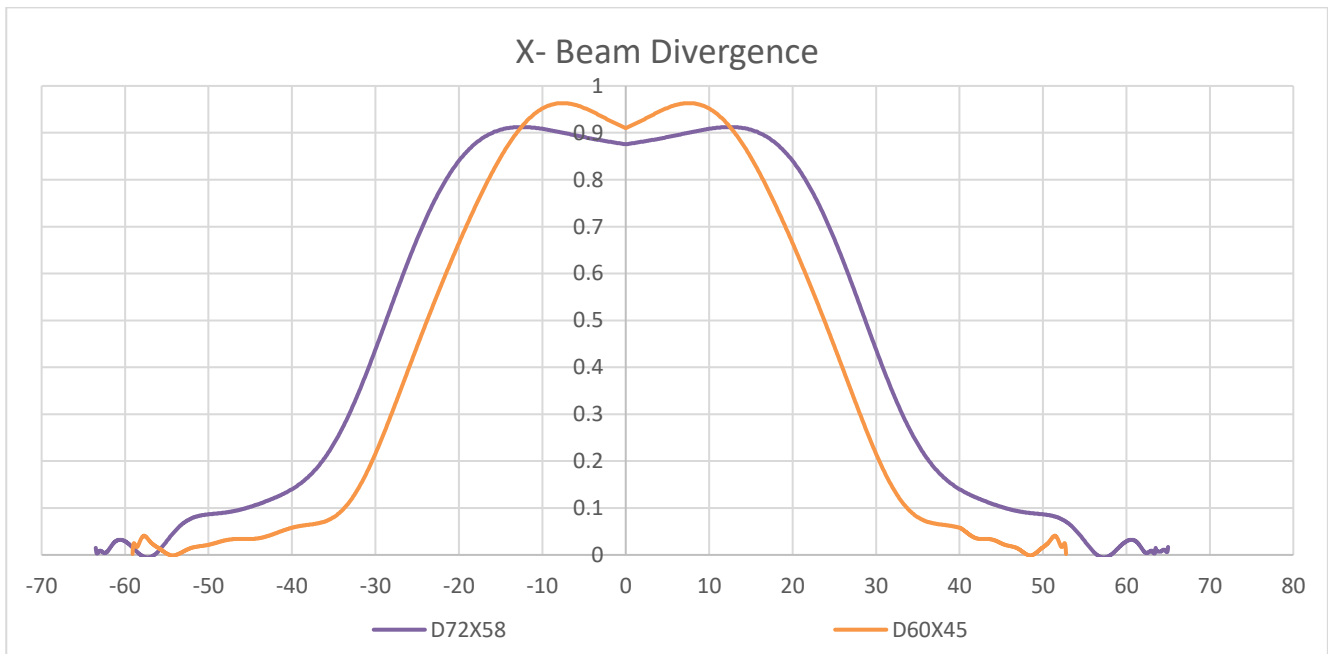


Figure 5 X-direction beam divergence with their respective diffuser at 25°C, 600mA. Operational mode: 100uS 10% DC.

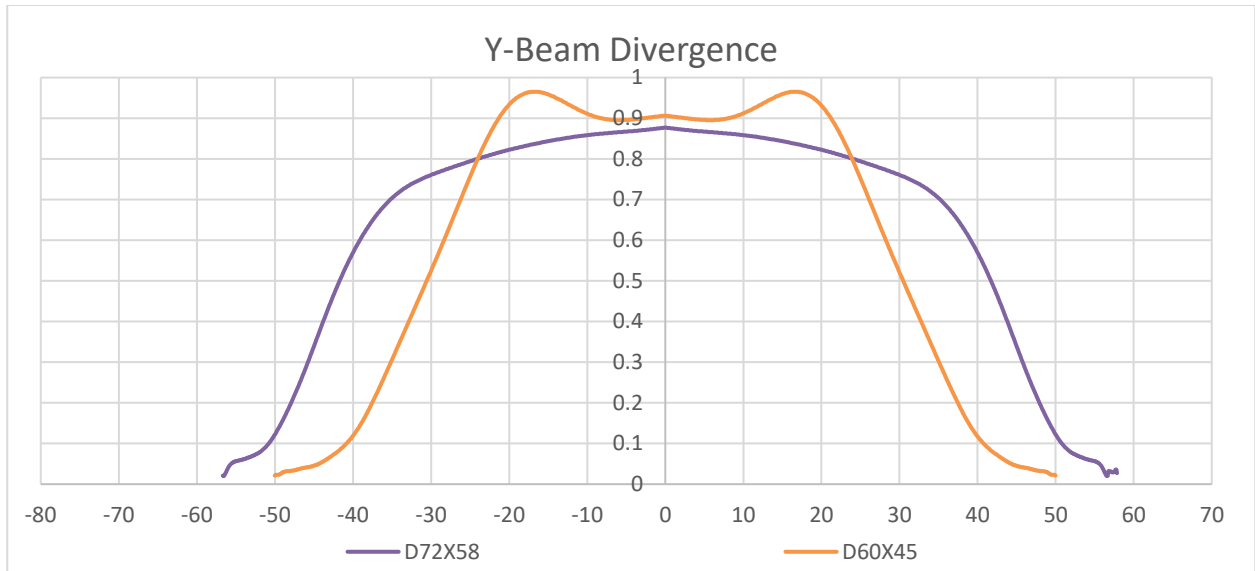
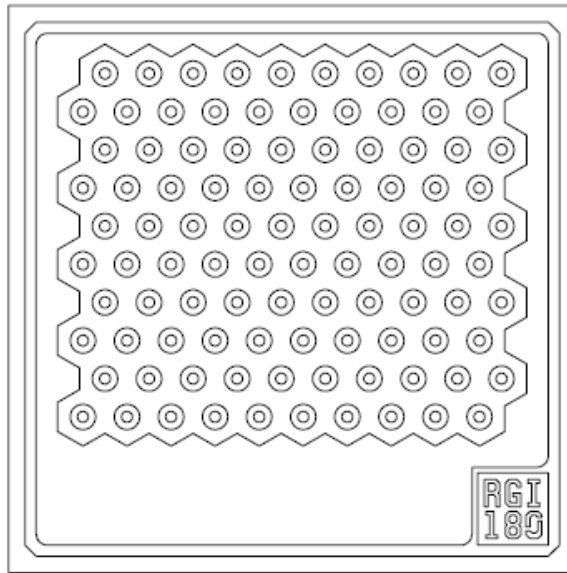


Figure 6 Y-direction beam divergence with their respective diffuser at 25°C, 600mA. Operational mode: 100µS 10% DC.

## VCSEL Mechanical Specifications



Parameter	Specification
Die size (x / y) final	0.515 mm X 0.515 mm
Number of Apertures	100
Die thickness	100µm

## Ordering Information

Description	Part Number
Die; 850; MM; R10X40; 0.5W; 0.515mm X 0.515mm	K0-0850M-0000-00007
Assm; 850; MM; 3B; R10X40; 0.5W; 0.515mm X 0.515mm; PLCC2835	I0-0850M-0000-00005

**Note:** For devices with diffusers contact Vixar at [sales@vixarinc.com](mailto:sales@vixarinc.com)

**Vixar**  
**OSRAM**

**Opto Semiconductors**

2950 Xenium Lane, Suite 104

Plymouth, MN 55441

763-746-8045

email: [info@vixarinc.com](mailto:info@vixarinc.com)

website: [www.vixarinc.com](http://www.vixarinc.com)

Copyright ©VIXAR Subsidiary of OSRAM