

Part Number: K0-0940M-0000-00010
Die/Assy; 940; M; V12X40; 1W; 0.72mm X 0.72mm

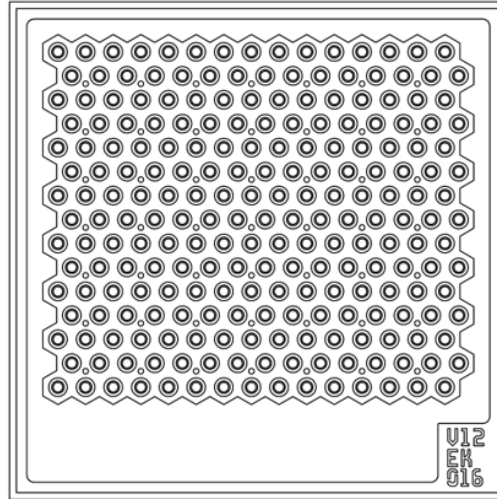


Figure 1 K0-0940M-0000-00010

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

Model: Multi Mode Array VCSEL
Center wavelength: 940nm
Optical power without diffuser: 1 Watt

Applications

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



COMPLIES WITH IEC 60825-1, 2nd 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°C to 100 °C	
Operating temperature (VCSEL)	0°C to 65 °C	
Maximum package SMT solder reflow temperature	260°C, 10 seconds	
Maximum pulsed current	5 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) = 25 °C, Test condition: 100μs pulse width & 1% duty cycle unless otherwise noted. Die performance parameters require the VCSEL die to have adequate heat sinking and proper thermal management.

Parameter	Symbol	Units	Without Diffuser			With Diffuser			Notes
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Threshold current	Ith	mA	--	200	--	--	200	--	
Differential resistance	Rs	Ω	--	0.4	--	--	0.4	--	
Operating voltage	Vf	V	--	1.9	--	--	1.9	--	at I = 1.5 A
Optical operating power	Lop	W	--	1.1	--	--	0.93	--	at I = 1.5 A
Slope efficiency	SE	W/A	--	0.85	--	--	0.6	--	at I = 1.5 A
Power conversion efficiency	PCE	%	--	40%	--	--	35%	--	at I = 1.5 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	20	25	28	N/A	N/A	N/A	For parts with diffuser, see diffuser angle table
Beam divergence	1/e ²	deg	25	30	33	N/A	N/A	N/A	
Operating peak wavelength	WLpeak	nm	930	940	950	930	940	950	
Wavelength-Temp tuning		nm/°C	--	0.066	--	--	0.066	--	
Rise time		ps	--	--	800	--	--	--	20%-80%, Note 2
Fall time		ps	--	--	1000	--	--	--	20%-80%, Note 2

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 2: 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

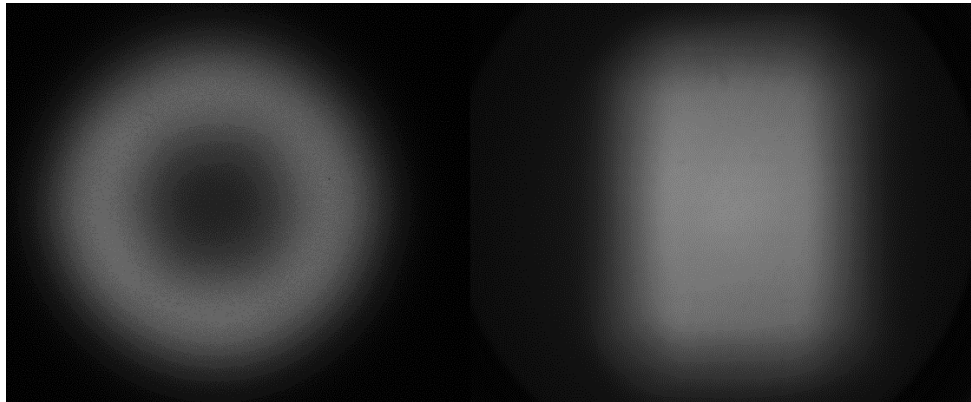


Figure 2 Left, Beam profile without diffuser. Right, Beam profile with rectangular diffuser.

Typical Performance

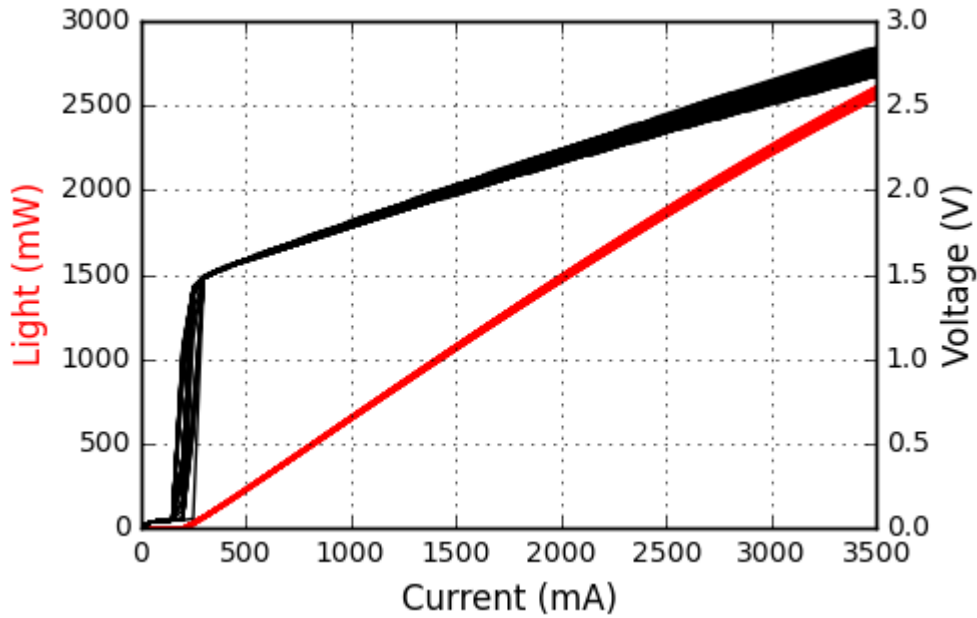
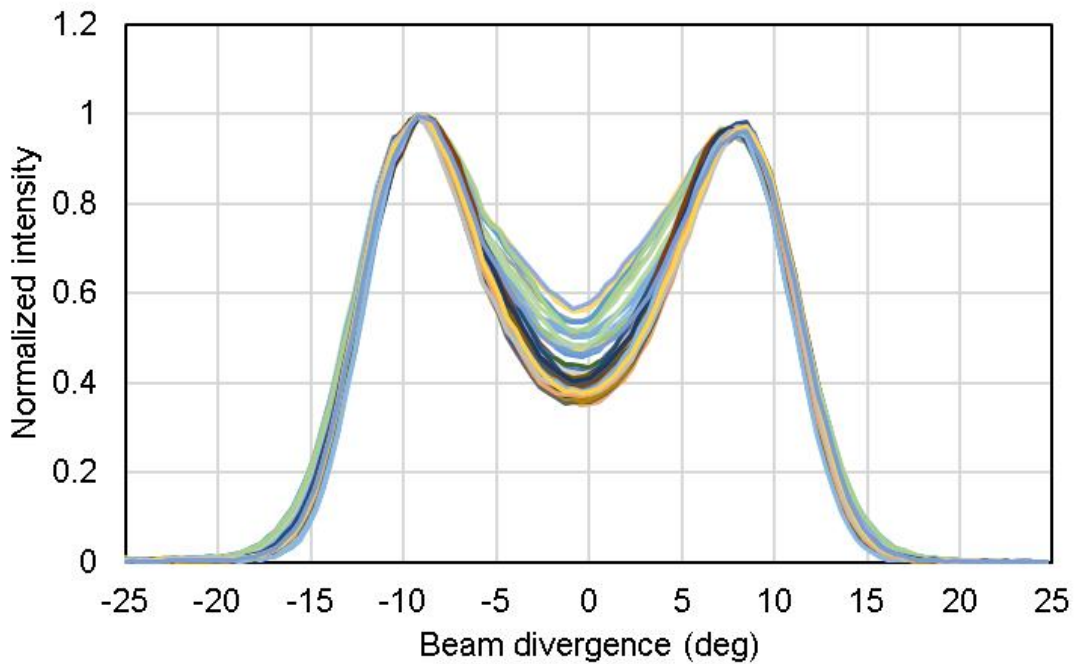


Figure 3 I-V data are a 2-point measurement, actual VCSEL forward voltage is lower. Operational mode: 100 μ S, 1% Duty Cycle at 40°C.

Beam Profile



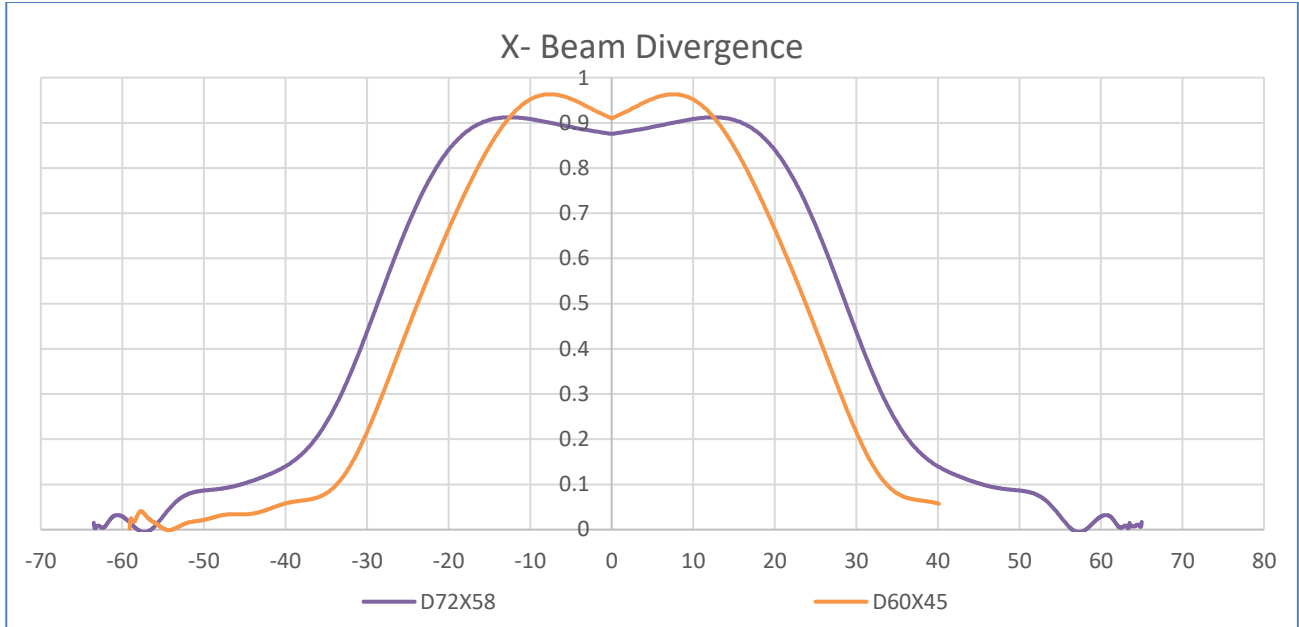


Figure 4 X-direction beam divergence with their respective diffuser at 25°C, 1.5A. Operational Mode: 100µS, 10% Duty Cycle.

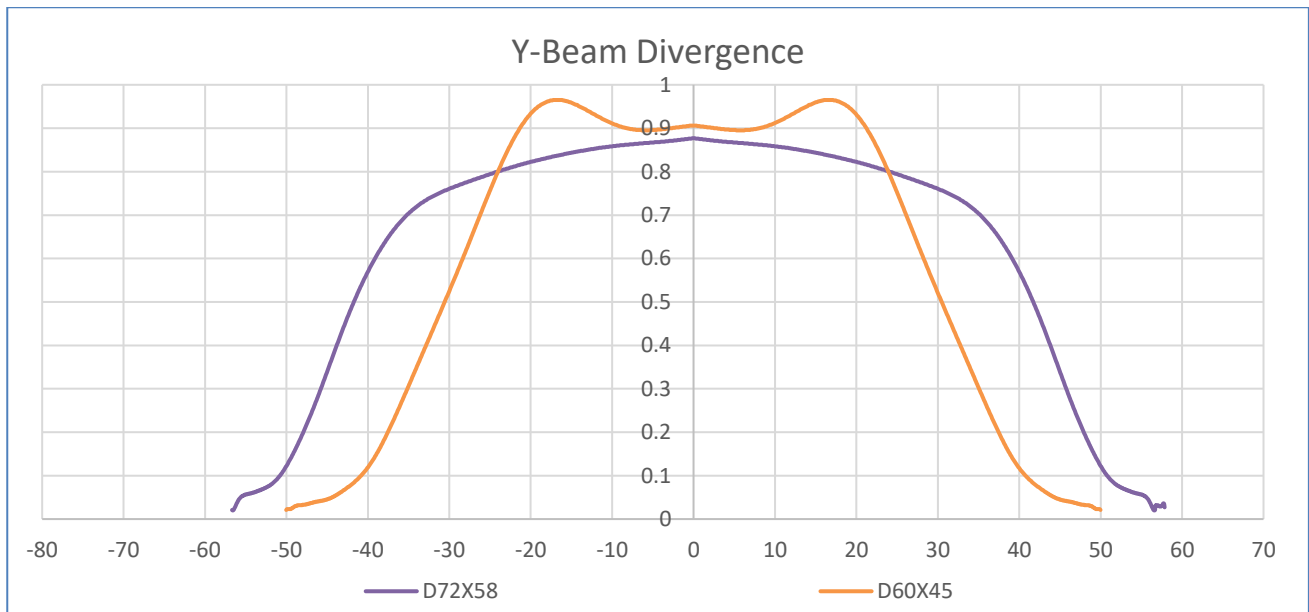
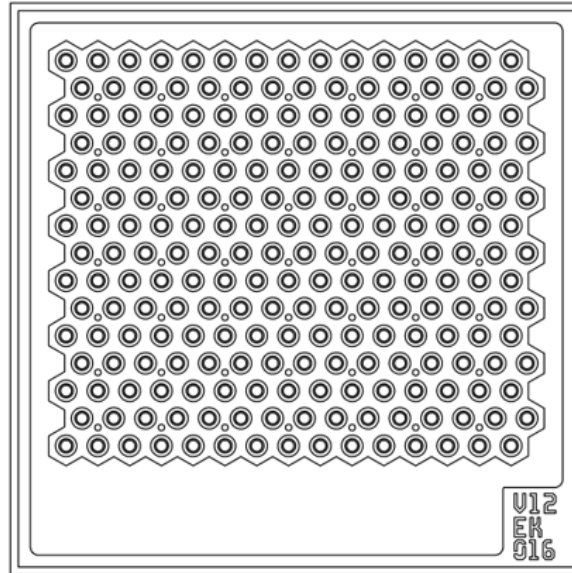


Figure 5 Y-direction beam divergence with their respective diffuser at 25°C, 1.5A. Operational Mode: 100µS, 10% Duty Cycle.

VCSEL Mechanical Specification



Parameter	Specification
Die size (x / y) final	0.72 mm X 0.72 mm
Number of Apertures	225
Die thickness	100µm

Ordering Information

Description	Part Number
Die; 940; MM; V12X40; 1W; 0.72mm X 0.72mm	K0-0940M-0000-00010
Assy; 940; M; 3B; V12X40; 1.0W; 072mm X 0.72mm; PLCC2835	I0-0940M-0000-KP04

Note: For options of this package with diffuser contact Vixar at sales@vixarinc.com

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