894.6nm 0.2mW GaAs SM Low-Power VCSEL Die

Product Description

A Vertical-Cavity Surface-Emitting Laser (VCSEL) is a type of semiconductor laser whose laser beam emits perpendicularly from the top surface.Developed based on Gallium Arsenide (GaAs) semiconductor material, it is distinct from LEDs (Light-Emitting Diodes) and LDs (Laser Diodes). Its structure consists of mirror layers, an active region, and metal contact layers. The two emission mirrors are P-type and N-type Distributed Bragg Reflectors (DBR). The active region is composed of quantum wells. An

ohmic contact is formed by depositing a metal contact layer on the surface of the P-type DBR, with a circular emission aperture fabricated on the P-type DBR for laser output.

Product features

Stable single-mode optical output；Ultra-low power consumption design；Precise wavelength locking performance ； Wide operating temperature range；High efficiency based on GaAs substrate

Part Number

MP-VSC-894.6-0.2-DIE1-SM

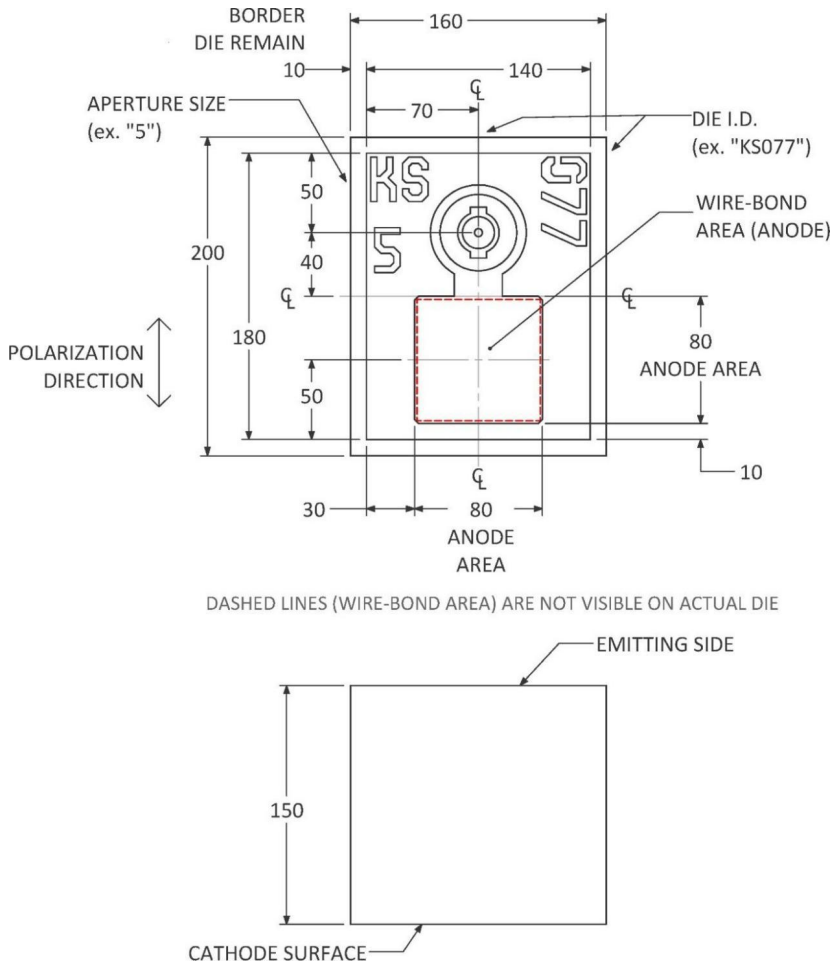
Application area

Atomic Clock | Quantum Sensing | Precision Spectroscopy | Scientific Research Instruments | Industrial Sensing | Aerospace Applications

Core parameters

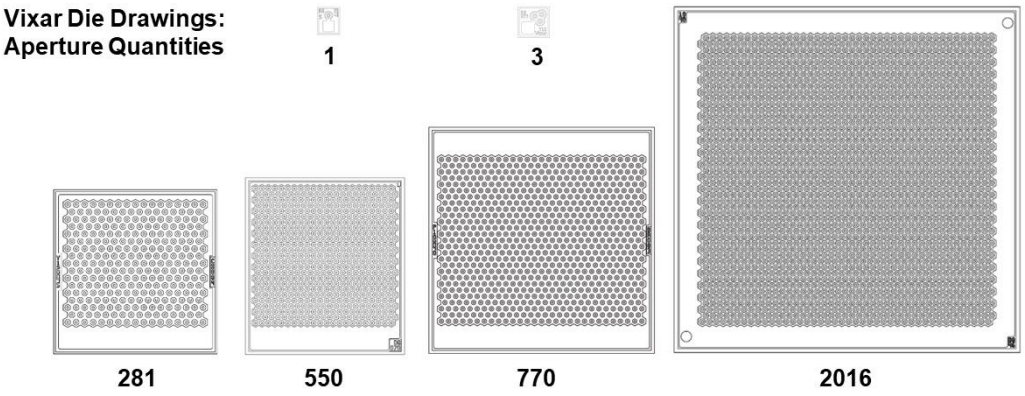
Center Wavelength
894.6nm

Dimension Drawing



General Parameters

Vixar Mold Drawing: Number of Hole Diameters



We currently have the following standard parts available for sample and mass production

Standard portfolio – low-power chips

model	Wavelength	Mold details	Suggest Max. Peak power CW, 100% DC	Note
Single-mode				
V00145	795nm	0.16 mm x 0.20 mm single bore	0.15mW	Line width < 100MHz, +/- 0.5nm polarization stabilized
V00140	895nm	0.16 mm x 0.20 mm single bore	0.2mW	Line width < 100MHz, +/- 0.5nm polarization stabilized
Multimodal				
V00146	680nm	0.22 mm x 0.22 mm single bore	7mW	Visible light, increased efficiency, non-Gaussian beam shape polarization stability

Standard portfolio – High power chip – 850 nm

model	Mold details	Suggest Max. Peak power CW, 100% DC	Suggest Max. Peak power 100 µs, 1% DC	Suggest Max. Peak power 5 ns, 0.1% DC
V00151	0.52 mm x 0.52 mm 100 apertures	0.5W	1W	5W
V00027	0.87 mm x 0.87 mm 281 apertures	2W	6W	13W
V00124	0.90 mm x 1.00 mm 550 bore sizes	3W	9W	35W
V00029	1.26 mm x 1.26 mm 770 bore diameters	4W	12W	36W
V00133	1.99 mm x 1.99 mm 1672 bore size	6W	20W	78W

Standard portfolio – High power chip – 940 nm

model	Mold details	Suggest Max. Peak power CW, 100% DC	Suggest Max. Peak power 100 µs, 1% DC	Suggest Max. Peak power 5 ns, 0.1% DC
V00059	0.87 mm x 0.87 mm	2W	6W	13W

	281 apertures			
V00081	0.90 mm x 1.00 mm 550 bore sizes	3W	8W	35W
V00156	0.90 mm x 1.00 mm 550 Bore Multi-Junction (3J)	4W	12W	110W
V00063	1.26 mm x 1.26 mm 770 bore diameters	4W	11W	36W
V00132	1.99 mm x 1.99 mm 1672 bore size	6W	20W	76W

VCSEL low-power chip GaAs 894.6nm Max. rating

T_a = 80°C

Parameters	symbol		value
Operating/soldering temperature DC = 100%	T_S	Min. value Max. value	-20°C 110°C
Storage temperature	T_{stg}	Min. value Max. value	-40°C 125°C
forward current (maintain single-mode)	I_f	Max. value	1.5 mA

DC operation; DC = 100%; T_S= 75°C			
forward current DC operation; DC = 100%; T_S = 75°C	I_f	Max. value	3 mA
Reverse voltage	Not suitable for reverse operation		
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 1A)	V_{ESD}	Max. value	250 V

Note: Beyond jue to Max. Stress in the rated range can cause permanent damage to the equipment.

VCSEL low-power chip GaAs 894.6nm features

T_a = 80°C, I_F = 1.4 mA; DC = 100% - Group 3

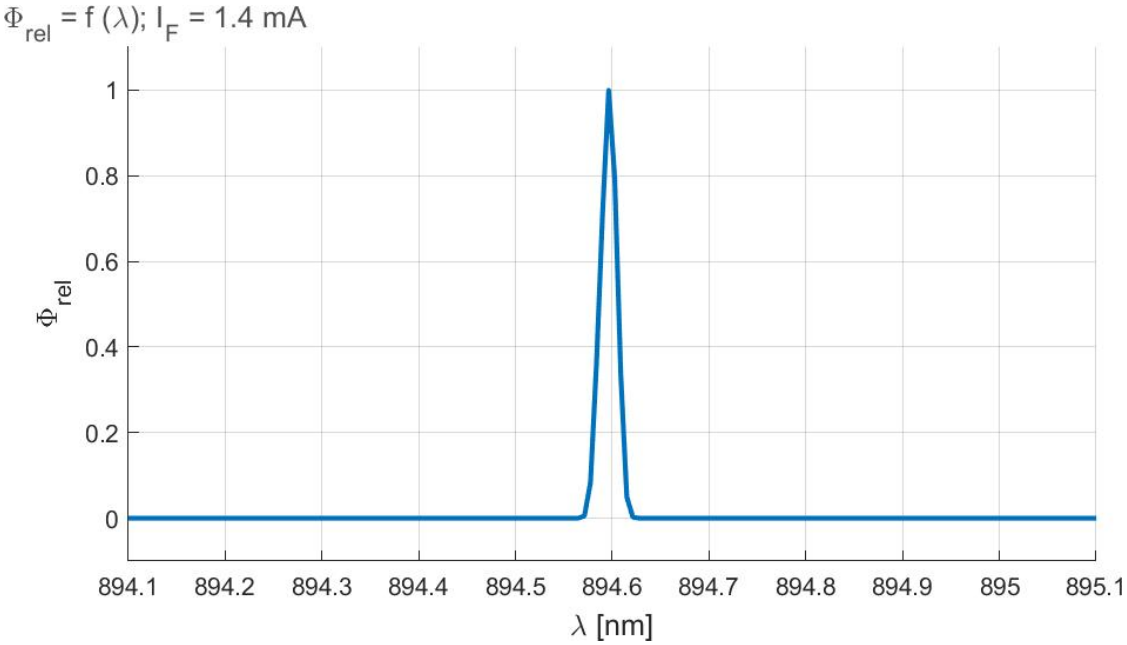
Parameters	symbol		value
Forward current	V_F	Typical values	1.78 V
Output power	Φ	Typical values	0.3 mW
Threshold current	I_{th}	Typical values	0.61 mA
Slope performance	SE	Typical values	0.37 W / A
Single-mode suppression ratio	SMSR	Min. value	20 dB

Polarization extinction ratio5)	PER	Min. value	15 dB
Peak wavelength	λ_{peak-v}	Min. value Typical values Max. value	894.1 nm 894.6 nm 895.1 nm
Spectral line width	Λlinewidth	Max. value	100 MHz
FM modulation bandwidth	F_m	Min. value	4.6 GHz
Wavelength temperature coefficient	TCλ	Typical values	0.06 nm / K
Half-peak full-width field of view (50% of Φmax)	ϕ_x ϕ_Y	Typical values Typical values	12° 12°
$1/e^2$ field of view	ϕ_x ϕ_Y	Typical values Typical values	20° 20°

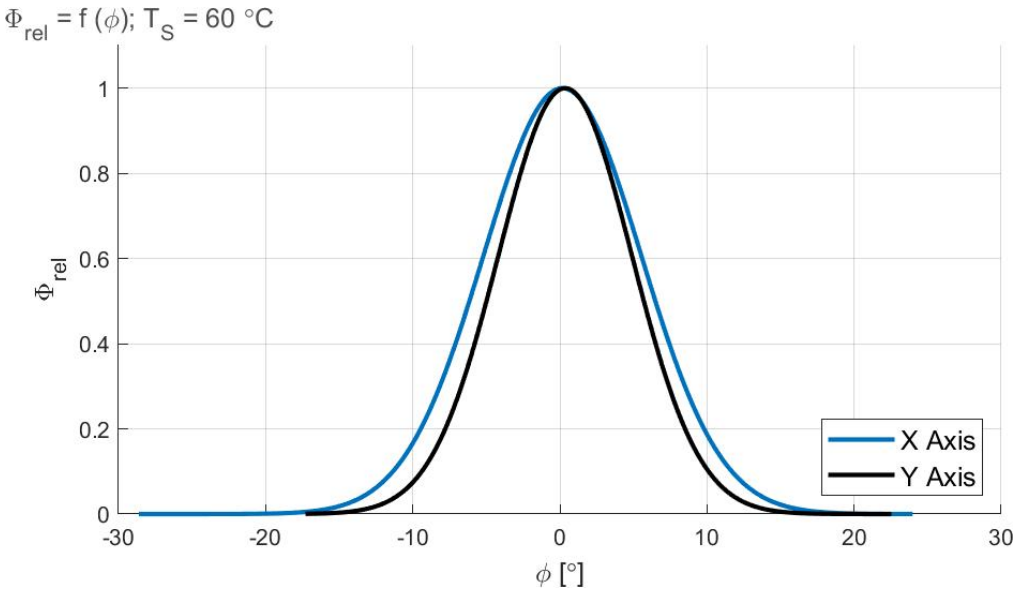
Note: Wavelength, output power varies depending on the operating temperature and voltage.

Curve plot

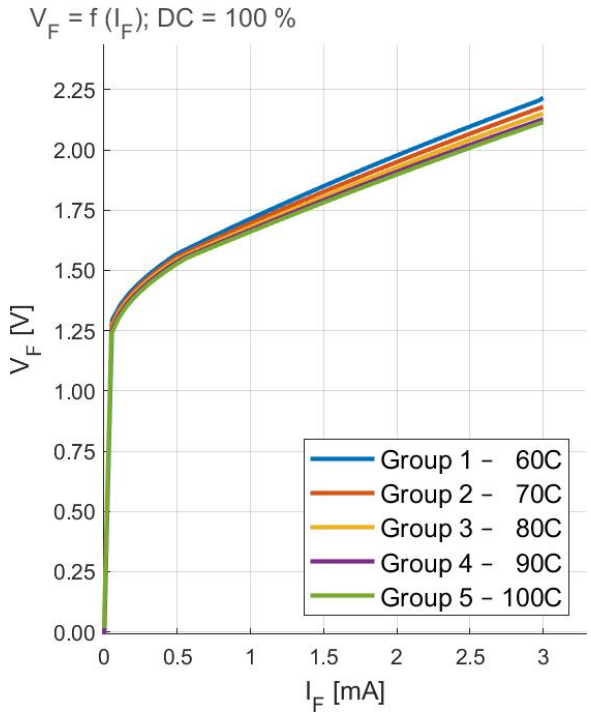
Relative spectral emission 1).



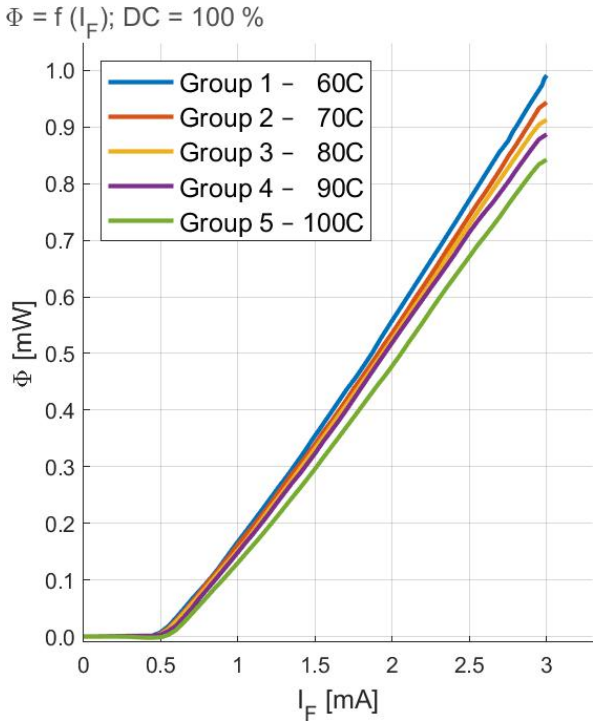
Radiation characteristics 1).



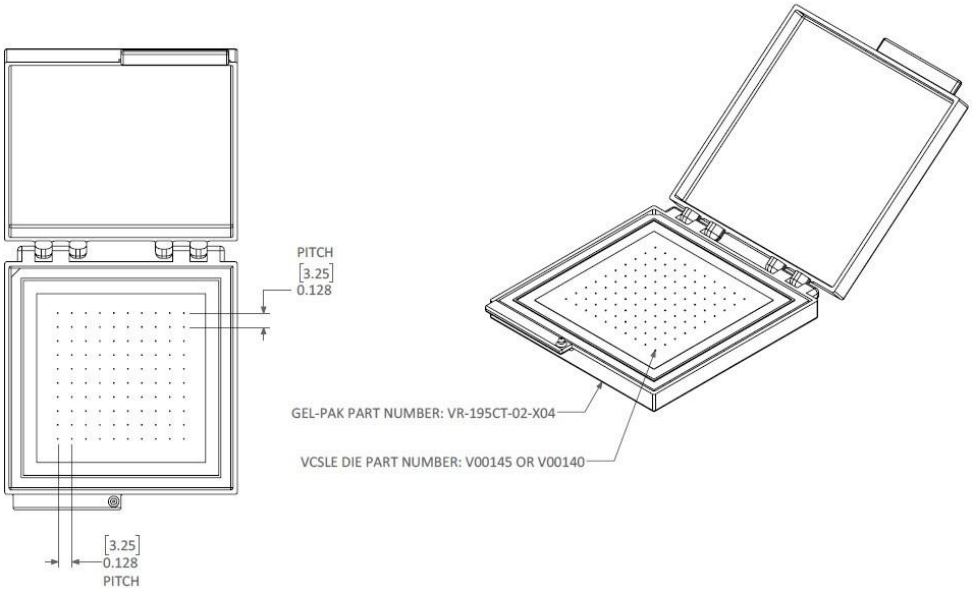
Forward current 1) 2).



Optical output power 1) 2).



Packaging



Notes:

Depending on the mode of operation, these devices emit highly concentrated visible and non-visible light, which can be harmful to the human eye. Products containing these devices must follow the safety precautions given in IEC 60825-1.

Among other substances, the subassemblies of the device contain metal-filled materials, including silver. Metal-filled materials may be subjected to aggressive properties

environmental impact of the substance. Therefore, we recommend that customers minimize the exposure of equipment to corrosive substances during storage, production and use. When

When tested using the above tests, devices showing visible discoloration did not show fault limits for the specified test duration

performance deviation.

The corresponding fault limits are described in the IEC60810.

terminology

1) Typical values: Due to the special conditions of the semiconductor device manufacturing process, typical data or computational associations of technical parameters can only reflect statistics. These do not necessarily correspond to the actual parameters of each product, which may differ from the typical values and calculation of the relevant or typical characteristic lines. These typical values data will be changed without notice due to technical improvements.

2) Test temperature: TA = 85°C ± 2°C

3) Dimensional tolerance: Unless otherwise specified in the drawing, the tolerance is specified in ±0.1 and the size is specified in mm.

4) Wavelength: Continuous wavelength measurement with a resolution ± 0.1 nm.

5) Polarization: Under mold stress conditions caused by mounting or encapsulation, the polarization extinction ratio decreases.

Ordering information

Description	Working mode	Order code
Group 1 - Die; 2222; 895; S; 1M; S5, S6, S7; 0.2mW; 0.16X0.20mm	T_a = 60±10°C; I_F = 1.4 mA; DC = 100%, 894.6nm	V00140 Group: 1
Group 2 - Die; 2222; 895; S; 1M; S5, S6, S7; 0.2mW; 0.16X0.20mm	T_a = 70±10°C; I_F = 1.4 mA; DC = 100%, 894.6nm	V00140 Group: 2
Group 3 - Die; 2222; 895; S; 1M; S5, S6, S7; 0.2mW; 0.16X0.20mm	T_a = 80±10°C; I_F = 1.4 mA; DC = 100%, 894.6nm	V00140 Group: 3
Group 4 - Die; 2222; 895; S; 1M; S5, S6, S7; 0.2mW; 0.16X0.20mm	T_a = 90±10°C; I_F = 1.4 mA; DC = 100%, 894.6nm	V00140 Group: 4
Group 5 - Die; 2222; 895; S; 1M; S5, S6, S7; 0.2mW; 0.16X0.20mm	T_a = 100±10°C; I_F = 1.4 mA; DC = 100%, 894.6nm	V00140 Group: 5