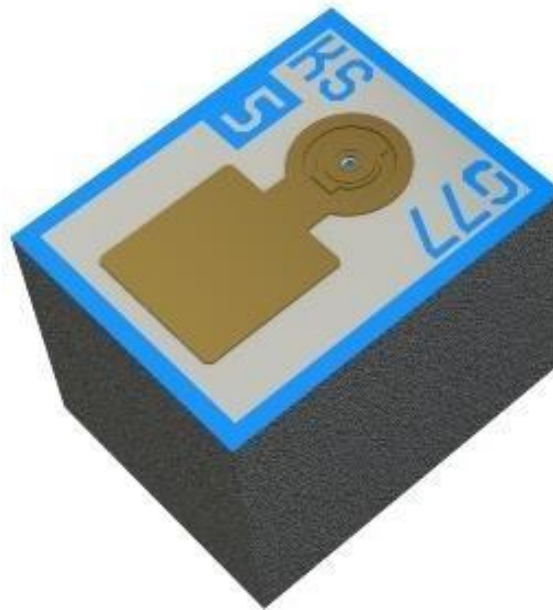


795nm 0.13mW GaAs SM Low-Power VCSEL

Die(Group 4)



- **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. Die parameters: 2222; 795 nm; Single-mode; 1 M; S5, S6, S7; 0.13 mW; chip size 0.16×0.20 mm

● Product features

Ultra-low power consumption ; High-temperature stability ; Single-mode lasing property; High-density integration capability; Fast response speed

● Part Number

MP-VCS-795-0.13-DIE4-SM

● Application area

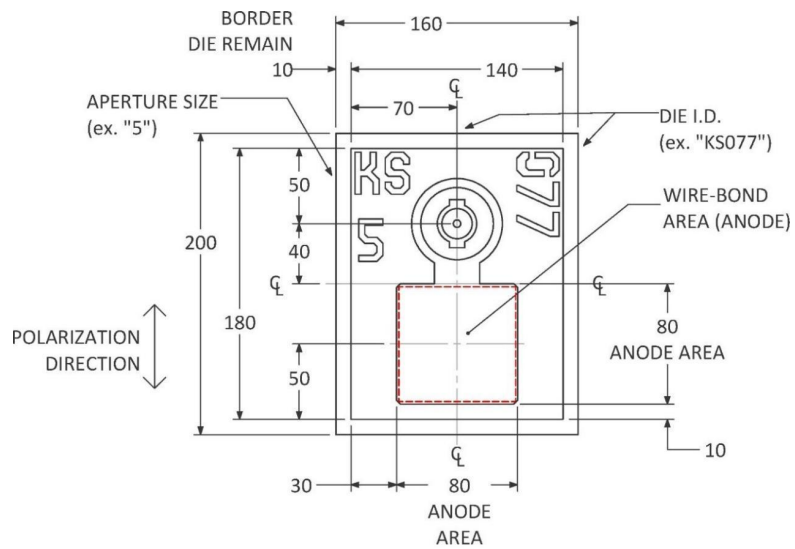
High-temperature electronic devices | Optical Interconnection | Biosensing | Consumer Electronics | Aerospace Applications

● Core parameters

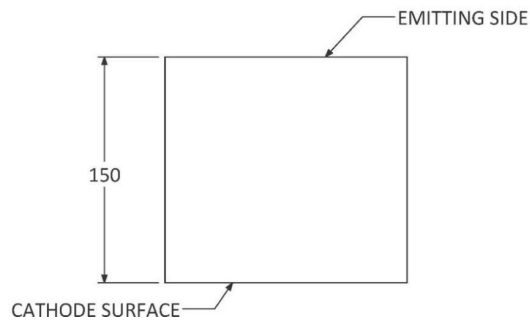
Center Wavelength
795nm



● Dimension Drawing



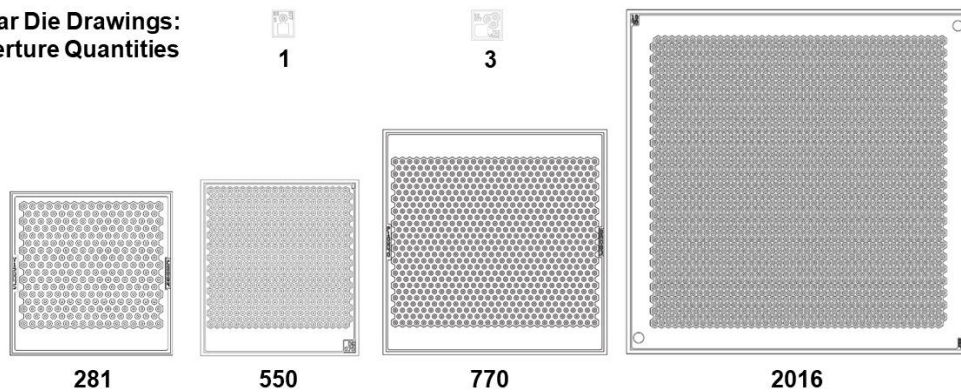
DASHED LINES (WIRE-BOND AREA) ARE NOT VISIBLE ON ACTUAL DIE



● General Parameters

Vixar Mold Drawing: Number of Hole Diameters

Vixar Die Drawings:
Aperture Quantities





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

Standard portfolio – low-power chips

Wavelength	Mold details	Suggest Max. Peak power CW, 100% DC	Note
Single-mode			
795nm	0.16 mm x 0.20 mm single bore	0.15mW	Line width < 100MHz, +/- 0.5nm polarization stabilized
895nm	0.16 mm x 0.20 mm single bore	0.2mW	Line width < 100MHz, +/- 0.5nm polarization stabilized
Multimodal			
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

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

Standard portfolio – High power chip – 940 nm

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



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

VCSEL low-power chip GaAs 795nm Max. rating

$T_a = 80^\circ\text{C}$

Parameters	symbol		value
Operating/soldering temperature DC = 100%	TS	Min. value	-20°C
		Max. value	110°C
Storage temperature	T _{stg}	Min. value	-40°C
		Max. value	125°C
Forward current (maintain single mode) DC operation; DC = 100%; T _s = 75°C	I _f	Max. value	1.5 mA



Forward current DC operation; DC = 100%; TS= 75°C	I_f	Max. value	3mA
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.

Characteristics:

$T_a = 80^\circ\text{C}$, $I_f = 1.4 \text{ mA}$; DC = 100% - Group 3

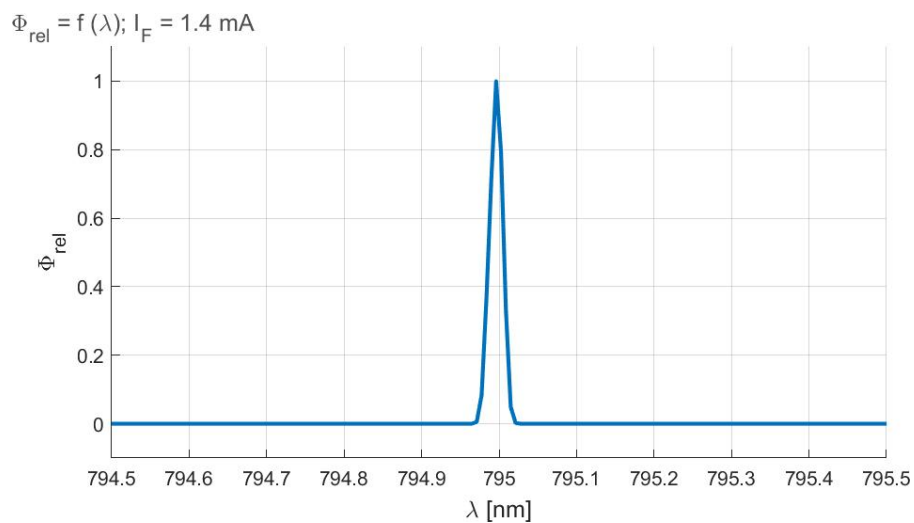
Parameters	symbol		value
Forward current	V_F	Typical values	1.8 V
Output power	Φ	Typical values	0.13 mW
Threshold current	I_{th}	Typical values	0.75 mA
Slope performance	SE	Typical values	0.21 W / A
Single-mode suppression ratio	SMSR	Min. value	20 dB
Polarization extinction ratio5)	PER	Min. value	15 dB
Peak wavelength	$\lambda_{\text{peak-v}}$	Min. value	794.5 nm



		Typical values	795 nm
		Max. value	795.5 nm
Spectral line width	Δlinewidth	Max. value	100 MHz
FM modulation bandwidth	F _m	Min. value	3.4 GHz
Wavelength temperature coefficient	TCλ	Typical values	0.055 nm / K
Half-peak full-width field of view (50% of Φ _{max})	Φ _x	Typical values	12°
	Φ _y	Typical values	12°
1/e ² field of view	Φ _x	Typical values	20°
	Φ _y	Typical values	20°

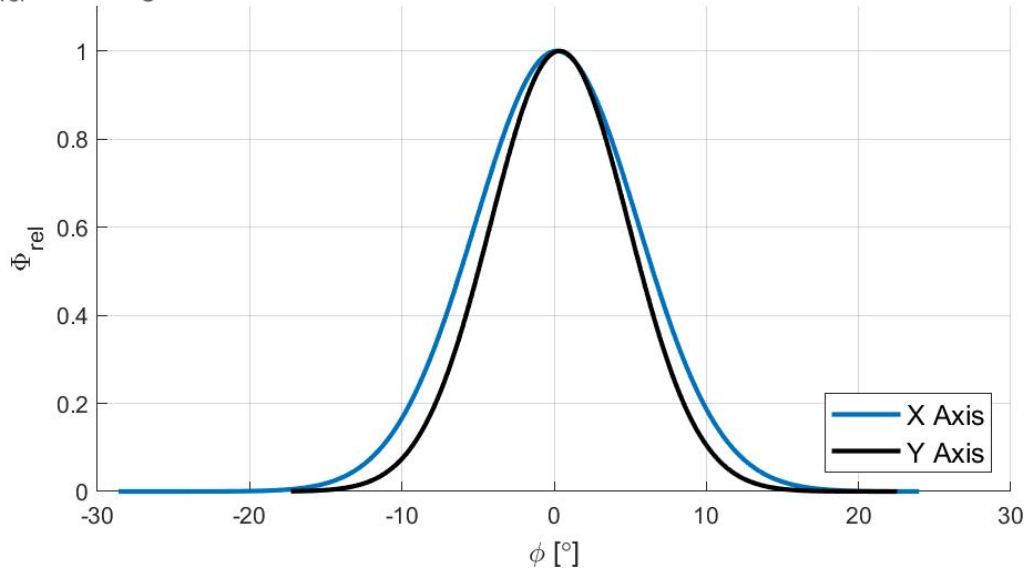
Note: Wavelength, output power varies depending on the operating temperature and voltage.

Relative Spectral Emission 1)



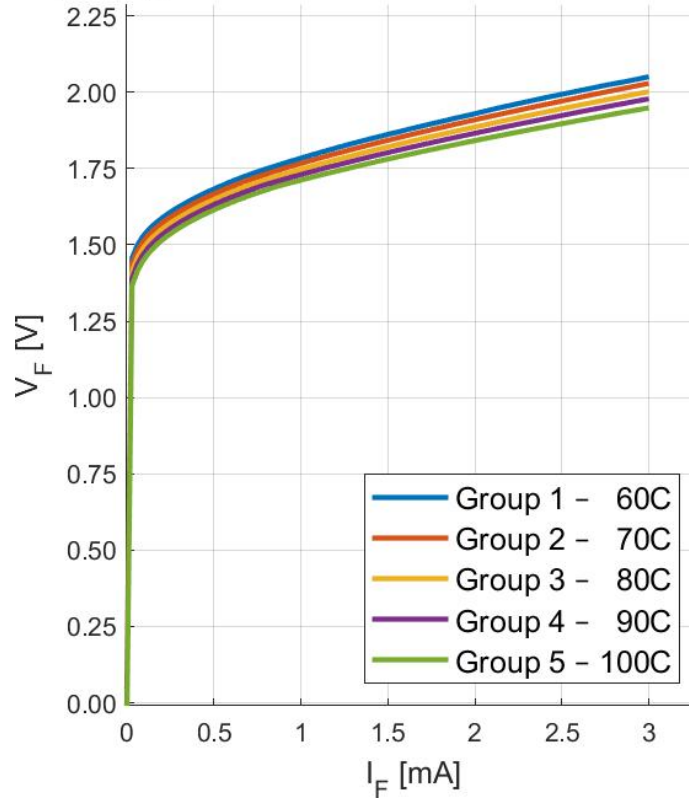
Emission characteristics 1)

$$\Phi_{rel} = f(\phi); T_S = 60\text{ }^\circ\text{C}$$

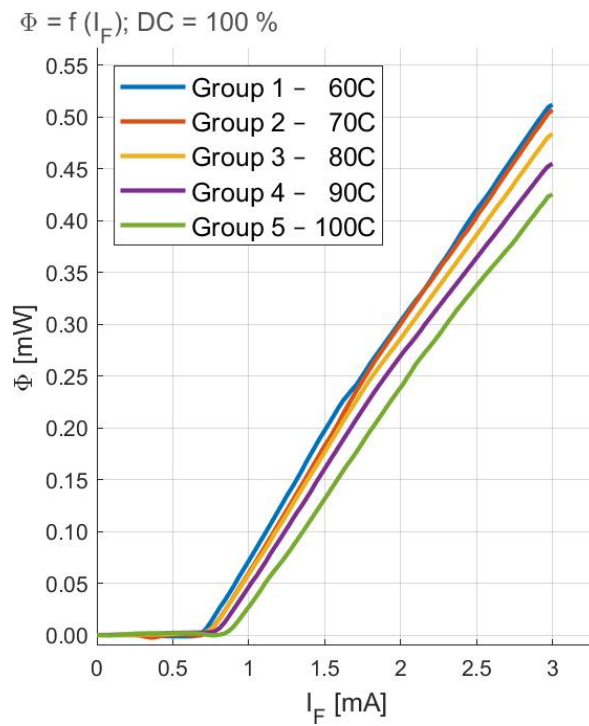


Forward current 1) 2)

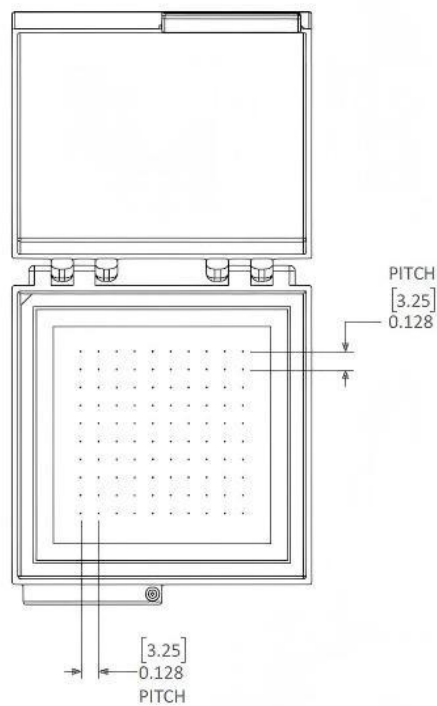
$$V_F = f(I_F); DC = 100\%$$



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 can be subject to environmental influences that contain aggressive substances. Therefore, we recommend that customers minimize the exposure of equipment to corrosive substances during storage, production and use. When tested using the above tests, devices that showed visible discoloration did not show performance deviations within the fault limits for the specified test duration.

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: $TA = 85^{\circ}\text{C} \pm 2^{\circ}\text{C}$



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; 795; S; 1M; S5,S6,S7; 0.13mW; 0.16X0.20mm	$T_a = 60 \pm 10^\circ\text{C}$; $I_F = 1.4 \text{ mA}$; DC = 100%, 795nm	V00145 Group: 1
Group 2 - Die; 2222; 795; S; 1M; S5,S6,S7; 0.13mW; 0.16X0.20	$T_a = 70 \pm 10^\circ\text{C}$; $I_F = 1.4 \text{ mA}$; DC = 100%, 795nm	V00145 Group: 2
Group 3 - Die; 2222; 795; S; 1M; S5,S6,S7; 0.13mW; 0.16X0.20mm	$T_a = 80 \pm 10^\circ\text{C}$; $I_F = 1.4 \text{ mA}$; DC = 100%, 795nm	V00145 Group: 3
Group 4 - Die; 2222; 795; S; 1M; S5,S6,S7; 0.13mW; 0.16X0.20mm	$T_a = 90 \pm 10^\circ\text{C}$; $I_F = 1.4 \text{ mA}$; DC = 100%, 795nm	V00145 Group: 4
Group 5 - Die; 2222; 795; S; 1M; S5,S6,S7; 0.13mW; 0.16X0.20mm	$T_a = 100 \pm 10^\circ\text{C}$; $I_F = 1.4 \text{ mA}$; DC = 100%, 795nm	V00145 Group: 5