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PV88Q VCSEL Array Module Series
AEC-Q102 Qualified

VCSEL PV88Q Series
AEC-Q102 Qualified

Grade 1 qualified VCSEL illuminator

Operated in extremely harsh automotive conditions without active cooling

Features

Compact dimensions : 3.5 mm × 3.5 mm × 1.6 mm
Peak wavelength: λ_p = 940 nm
Environmental friendly ; RoHS compliance
High-end laser packaging
Operating temperature range of -40°C to 125°C
Multiple fields of view (FoV) from50x40, 60x45, 72x58, 86x68, 110x85, 120x90

Applications

Scene understanding with multi-object detection
Driver monitoring system and biological monitoring
3D depth assistance
DMS/IMS, ADAS, Gesture control
Presence detection

CE RoHS 2 COMPLIANT REACH COMPLIANT

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FEATURES

- Compact dimensions: 3.5 mm × 3.5 mm × 1.6mm
- Peak wavelength:λp = 850 and 940 nm
- Radiant power 2,1W to 3,4W
- Narrow spectral bandwidth (< 1nm typ.)
- FOV 50°x40° 60°x45°, 72°x58°, 60°x68°, 110°x85° and 120°x90°
- Environmental friendly ; RoHS compliance

APPLICATIONS

- 3D mapping (ToF) for drones and VR/AR
- Scene understanding with multi-object detection
- Presence detection
- Driver Monitoring system and biological monitoring
- DMS/IMS, ADAS , Gesture control
- Autonomous driving

PART NUMBER	WAVELENGTH (nm)	OPTICAL POWER (mW)	OPERATING CURRENT(A)	FOV (°)	DIMENSION (mm)
PV85QB5 V2	850	2100	3,0	100x85	
PV85Q64 V3	940	2400	3,5	60x45	
PV85QB4 V3	940	2400	3,5	100x85	
PV85QC4 V3	940	2400	3,5	120x90	3.5x3.2x1.3
PV85Q64 V5	940	3400	4,5	60x45	
PV85QB4 V5	940	3400	4,5	100x85	
PV85QC4 V5	940	3400	4,5	120x90	
PV88Q64 V5	940	2700	3,5	60x45	3.5x3.5x1.6
PV88QB4 V5	940	2700	3,5	110x85	

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Imagine being able to do a 3D scan of your foot with your smartphone and send the image to a manufacturer who then adapts a shoe perfectly to your foot. These and other ideas could soon become reality – with a technology called VCSEL.

VCSEL stands for vertical-cavity surface-emitting laser – this is a laser diode with a monolithic laser resonator which radiates the light vertically to the surface of the semiconductor chip, as opposed to edge-emitting laser diodes, where the light exits at the edge of the chip.
The technology can also be used as a VCSEL array – a composite of several hundreds of VCSELs – glued and bonded like a normal LED.
Decisive features of the surface emitter lasers (compared to edge emitting lasers) are the lower production costs and the better beam quality – however with a lower output power. The coupling efficiency in optical fibers is high due to the small footprint, the good beam quality and the good focusability.
As an SMT (surface-mountable component), a VCSEL combines characteristics of an LED with those of a laser and is easier to assemble than an EEL (edge emitting laser).
It offers coherent light with directed emission, the higher power density and simple packaging of an IRED, but has the spectral width of a line emitter, like EEL or DFB (distributed feedback laser diodes) technology.
The beam shape of a VCSEL is a circular spot, compared to the elliptical shape of FP-EEL (Fabry-Perot Edge Emitting Laser) and DFB. Unlike the temperature sensitive wavelength of an EEL, VCSEL suffer way less wavelength shift under the influence temperature changes.
The main advantages of the different IR technologies can be summarized as follows:
VCSEL: cost effective chip, narrow divergence, high efficiency
EEL: High performance, very high efficiency, high luminance
IRED: homogeneity of lighting, very cost effective chip, wide range of different models

The application focus for VCSEL technology has been on data communications for the last decade, but recently, a variety of applications have been discovered in various end markets.
VCSELs are used across a wide range of applications due to their advantages of compact size, low energy demand and high reliability. In general VCSELs are a good choice for all application fields where high-speed modulation is an advantage.

The favorable manufacturing cost ratio and high reliability have led to an increased use of VCSELs in mobile and consumer electronics. There are already first application examples in the consumer mobile device segment. 3D sensing is also being integrated with augmented reality (AR) and virtual reality (VR) – either for smart glasses or future smartphones and other mobile devices.
The rising use of electrical systems in automobiles is another factor fueling the growth of the global VCSEL market. In the automotive sector, the technology is expected to be used for applications such as gesture recognition, driver monitoring or sensors for (semi) autonomous driving.
Additional application fields include robotics, security and surveillance cameras, IR heating or machine vision for industrial applications.
Although the VCSEL technology offers many advantages compared to existing IR technologies, it is not automatically a universal solution for all segments but rather an extension of the IR Portfolio. Customers now have the choice to compare the technical features of IREDs, edge lasers and VCSEL based technologies to select the best suited solution for their specific application.

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Technology feature	Radar	Infrared	PIR	Ultrasonic	TOF/ VCSEL	Laser/ Lidar	IR camera
Range	High	low	low	low	low	Medium	low
Accuracy range	High	low	low	High	High	High	Medium
Accuracy angle	Medium	low	low	low	low	High	High
Radial movement	High	High	low	High	High	High	High
Tangential movement	low	High	High	low	High	High	low
Pattern adjustment field	Medium	Medium	High	High	High	Medium	Medium
Object separation	High	low	low	High	High	High	High
Environmental robustness	High	low	low	low	Medium	Medium	low
Material penetration	High	low	low	low	low	low	low
Design Flexibility	High	low	low	Medium	Medium	Medium	low
Cost	Medium	low	low	low	Medium	High	low

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LASER and VCSEL

Function and parameter

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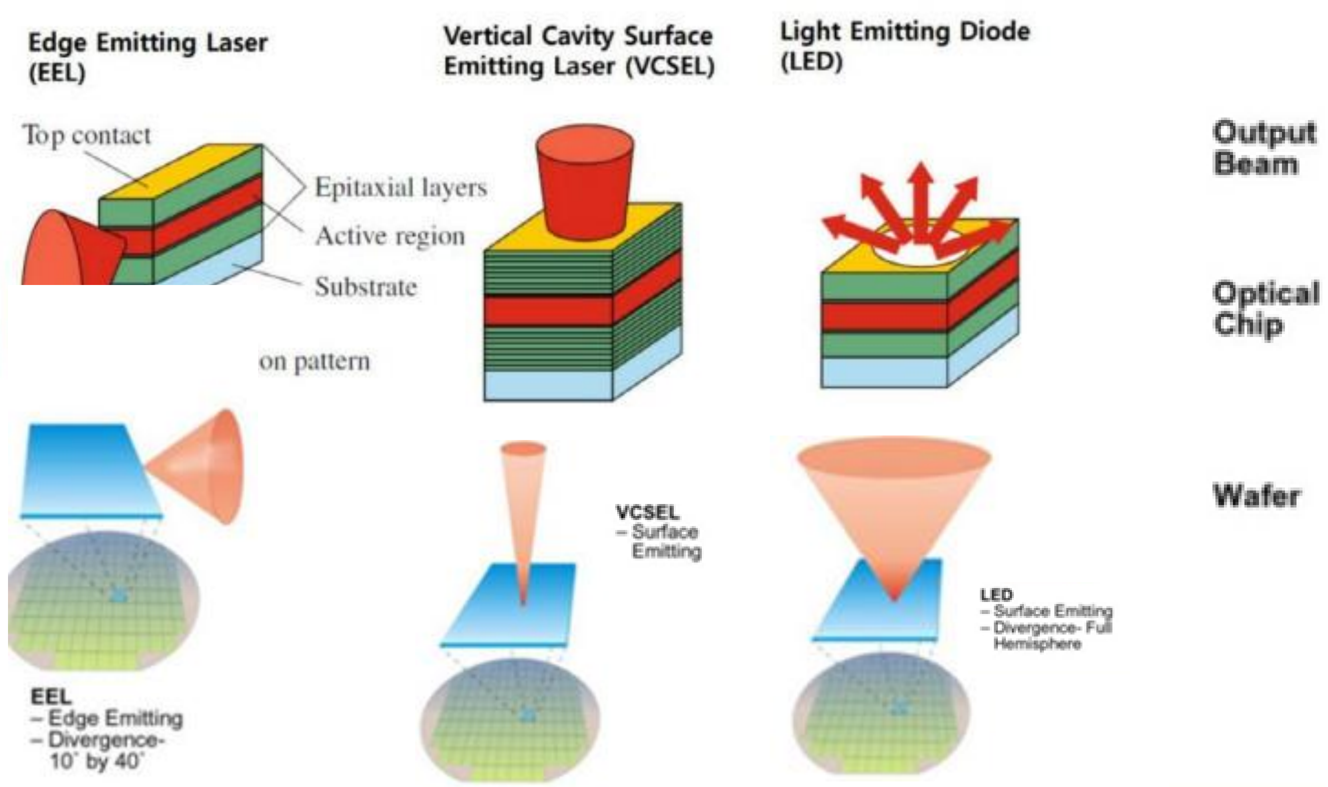
Function	VCSEL	EEL	LED
Power consumption (for 1mW optical power)	2-3mW	20mW	3-5mW
Beam quality/Easy for optical coupling	Good, low divergence	Fair, asymmetrical	Bad, very wide divergence
Transmission	10Gbps	1Gbps	0.1Gbps
Temperature stability	0.006nm/°C	0.25nm/°C	0.25nm/°C
Spectral width	1nm	1-2nm	20-30nm
Speckle Ex: 3D optical structure	low in Array	High	low



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