VCSEL Market by Type (Single-mode and Multimode), Material (GaAs, InP, GaN), Wavelength, Application (Sensing, Data Communication, Industrial Heating & Printing, Emerging), Data Rate, Industry and Region - Global Forecast to 2028

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Report description:

The global VCSEL market is projected to grow from USD 1.6 billion in 2023, to USD 2.9 billion by 2028, at a CAGR of 13.6% between 2023 and 2028. One of the factors driving the growth of the VCSEL market high preference for adopting 3D sensing technologies, and integration of the Internet of Things (IoT) across buildings, utilities, manufacturing, logistics, retail, and healthcare.

VCSELs are made of gallium arsenide (GaAs) and indium phosphide (InP) with single-mode and multimode functionality. VCSELs are highly efficient and cost-effective for applications, such as data communication, industrial heating, and 3D sensing & gesture recognition. They are widely used in consumer electronics, data centers, automobiles, commercial & industrial applications, as well as healthcare and military industries.

"VCSEL for red wavelength is the second largest segment of VCSEL market during the forecast period"

Red VCSELs offer benefits, such as improved performance and low power consumption, and are used in applications that include laser printing, optical mouse, and low-cost, high-speed interconnects based on plastic optical fiber (POF). However, material design challenges make it more difficult to achieve the desired performance than at the well-developed wavelength of 850 nm. Ams-OSRAM (Austria) is one of the market players offering VCSELs in the red band segment.

"Emerging and other application segment is the fastest growing segment of VCSEL market during forecast period"

This segment includes VCSELs for emerging applications, such as LiDAR, driver monitoring/gesture recognition, 3D sensing in vehicles, security & night vision systems/cameras, pulse oximeter, and OCT. The growth in the emerging and other application segments is closely tied to the use of VCSELs in automotive LiDARs. For instance, in August 2020, automotive LiDAR specialist Ibeo Automotive Systems (Germany) announced that it would deploy VCSELs in LiDAR for 'Level 3' semi-autonomous driving in cars built by the automotive manufacturer Great Wall Motors (China). Hence, VCSEL-based solid-state LiDAR systems show great

potential as the next evolution in LiDAR technology, which can replace traditional bulky and expensive mechanical spinning and microelectromechanical systems (MEMs) that are currently in use. The size of VCSELs also makes it easier to integrate photonic and electronic components in a LiDAR system. These factors are projected to contribute to the high growth rate of emerging and other applications.

"Above 25 Gbps segment is the fastest growing segment of VCSEL market by 2028"

With the growing adoption of 5G network and smart city developments, data traffic is increasing at a significant rate. This is increasing the connectivity load on data centers, wherein a faster data transmission medium for a short distance is required. Hence, many hyperscale data center operators, such as Facebook (US), Apple (US), Microsoft (US), Amazon (US), and Google (US), as well as government institutions, are focusing on the adoption of high-speed transceivers and AOCs, which operate at 100G, 200G, and 400G data rates. These optical transceivers initially used edge-emitting lasers (EELs) that are now being quickly replaced by VCSELs. VCSELs capable of 25 Gbps data rate are the most widely deployed type due to their lower cost. However, it is expected that VCSELs with data rates above 25 Gbps will be adopted at a faster rate due to the increase in traffic on data communications worldwide.

"Automotive segment is the fastest growing application of VCSEL market by 2028"

Surge in the adoption of VCSELs in automobiles for driver monitoring and infotainment systems results in the high growth in the automotive segment for VCSEL market. VCSELs are finding increased applications in systems, such as advanced driver assistance systems (ADAS), due to the evolution of autonomous vehicles. . LiDAR is one of the latest technology used in automotive safety developments and solutions that are being used to make solid-state LiDARs using VCSELs. Thisevolution toward the adoption of autonomous vehicles in the long term is projected to drive the growth of the automotive segment.

"North America is the second fastest growing market for VCSEL market by 2028"

North America is one of the major markets for VCSELs due to applications, such as consumer electronics, data centers, and commercial & industrial segments. Lumentum (US), II-VI Incorporated (US), and Broadcom (US) are some of the major players operating in this region. Chipmakers and OEM buyers of VCSELs are expected to face the impacts of the recession and the resultant decrease in demand for consumer electronics such as laptops, PCs, and smartphones. These factors are likely to lead to a decline in the growth of the VCSEL market in 2023. The market is expected to register moderate growth in the next 2-3 years in North America.

Breakdown of the profiles of primary participants:

- By Company Type: Tier 1 - 40%, Tier 2 - 30%, and Tier 3 - 30%
- By Designation: C-level Executives - 40%, Directors - 40%, and Others - 20%
- By Region: North America - 40%, Europe - 30%, Asia Pacific - 20%, and RoW - 10%

The VCSEL market is dominated by a few globally established players such as Lumentum (US), Coherent Corporation (US), ams-OSRAM (Austria), TRUMPF (Germany), Broadcom (US), Leonardo Electronics (US), MKS Instruments (US), Santec (Japan), VERTILAS (Germany), Vertilite (China), Alight Technologies (Denmark), Inneos (US), IQE (UK), Thorlabs (UK), TT Electronics (UK), Ushio America (US), WIN Semiconductors (Taiwan), and Frankfurt Laser Company (Germany).

Research Coverage

The report segments the VCSEL market and forecasts its size, by value and volume, based on region (Asia Pacific, Europe, North America, and RoW), type (multi-mode, single mode), wavelength (red, NIR, SWIR), material (GaAs, InP, other), data rate, application, and industry (consumer electronics, data center, automotive, commercial & industrial, healthcare, and military). The report also provides a comprehensive review of market drivers, restraints, opportunities, and challenges in the VCSEL market. The report also covers qualitative aspects in addition to the quantitative aspects of these markets.

Key Benefits of Buying the Report:

The report will help the leaders/new entrants in this market with information on the closest approximations of the revenue numbers for the overall market and the sub-segments. This report will help stakeholders understand the competitive landscape and gain more insights to better position their businesses and plan suitable go-to-market strategies. The report also helps stakeholders understand the pulse of the VCSEL market and provides them information on key market drivers, restraints,

challenges, and opportunities.

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