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Terahertz Technologies - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2030)

https://marketpublishers.com/r/T43E7C0BA2EAEN.html
Date: July 2024
Pages: 177
Price: US$ 4,750.00 (Single User License)
ID: T43E7C0BA2EAEN

Abstracts

The Terahertz Technologies Market size is estimated at USD 0.71 billion in 2024, and is expected to reach USD 2.32 billion by 2029, growing at a CAGR of 21.82% during the forecast period (2024-2029).

Terahertz technology is an emerging and growing field with the potential for developing applications ranging from passenger scanning at an airport to large digital data transfers. The adoption of terahertz systems in the semiconductor industry is one factor contributing to the growth of the terahertz technology industry.

Key Highlights

Terahertz-based technologies are now entering the commercial markets in various industries, such as security, non-destructive testing, automotive, and telecommunication. This further creates an opportunity for the market. Researchers have developed a terahertz (Terahertz) transmitter capable of transmitting digital data at a rate ten times or faster than that offered by fifth-generation mobile networks (5G). The terahertz band is a new and vast frequency resource expected to be used for future ultrahigh-speed wireless communications, driving the market's growth.

The implementation of the 5G network and 6G network necessitates the use of high-bandwidth oriented fiber optical cables integrated with optical transceivers to ensure secure and dependable data transfers. Consequently, the expanding optical communication infrastructure in low and middle-income countries is expected to drive the optical communication and networking equipment market in the future.

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Due to higher bandwidth and frequency, Terahertz technology has greater prospective applications for short-distance communication services. The increasing investments in the enhancement of wireless communication systems and the 5G market might also help develop the market. Furthermore, the existing technologies for inspecting agricultural products are time-consuming and complex, and there is an inclination to develop a safe, rapid, and non-destructive inspection technology.

Insufficient knowledge and awareness about terahertz technology's applications hinder this market's growth. Since terahertz imaging is still a relatively new technology, replacing the existing technologies currently dominating the market is difficult.

During COVID-19, the terahertz technology market witnessed growth, with its major applications in healthcare, biomedical, and security. Furthermore, in the post-pandemic period, various organizations and vendors are expected to invest in R&D of the terahertz technology solution that can be applied in multiple end-user applications, thereby driving the growth of the market studied.

Terahertz Technology Market Trends

Telecommunications End User Segment is Expected to Witness Significant Growth in the Market

The terahertz band (0.3 Terahertz to 10 Terahertz) is the successive frontier in wireless communications for its capability to unlock significantly broader segments of unused bandwidth. Though radio channels above 100 GHz are slightly known, several high-speed terahertz communication links have been demonstrated recently.

Nowadays, the industry is preoccupied with mmWave frequency bands (30 to 300 GHz) to deliver multi-gigabit-per-second (Gbps) data rates for 5G mobile devices. However, like mmWave communications, terahertz bands can be used as mobile backhaul for transferring significant bandwidth signals between base stations.

A terahertz communication system processing a multi-GHz channel is likely to demand more significant computational capacity in the digital domain, where the baseband subsystem contains tasks like physical layer (PHY) channel coding. Similarly, the analog domain requires improvements in analog-to-digital (ADC) and digital-to-analog (DAC) parts to capture higher-frequency signals efficiently. Moreover, 6G Communications will become one of the largest technology investments, which can widely serve the exponential growth with connected machines in 2030.

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The growing 5G subscriptions worldwide in 2022 are expected to create new opportunities for the 6G network and are expected to gain popularity among consumers in coming years due to its high-speed network capability, which will fuel the market growth. For instance, according to Ericsson, 5G subscriptions are forecast to increase globally from 2019 to 2028, from over 12 million to over 4.5 billion subscriptions, respectively.

Many countries are launching projects to develop 6G telecommunications, which is expected to boost market growth. For instance, in October 2023, Ericsson launched the 'India 6G program' with the creation of an India 6G Research Team at its Chennai Research & Development Center. India's research team, along with Ericsson research teams in the United States and Sweden, will work together to develop the technology that will help to bring a cyber–physical continuum, where networks will provide immersive communications, critical services, and omnipresent IoT while maintaining the integrity of the delivered data.

In February 2024, China Mobile, the largest telecom operator in China, stated that it launched the first satellite to test 6G architecture in space. Further, in February 2023, South Korea announced a plan to launch a 6G network service in 2028, two years prior to its original schedule. The country aims to secure an early dominance of future wireless frequencies. South Korea launched a five-year state project to spend around 220 billion won (USD 193 million) on developing core technologies for 6G telecommunication while stepping up joint research and cooperation with the United States. The country aims to achieve the world's first commercialization of 6G mobile telecommunication in 2028.

North America is Expected to Hold Significant Market Share

The United States is a key market for terahertz technologies, primarily owing to the growing homeland security issues, investments in defense, and R&D. In addition, the stringent government regulations regarding the safety and production of aerospace technologies in the United States and the growing automotive and aerospace industries are driving the market for Terahertz technologies in the regional market.

According to the data provided by the Aerospace Industry Association, in 2023, the American A&D industry generated over USD 952 billion in total sales, which is up

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6.7%over 2021 levels, and of this, USD 537 billion was generated through direct industry output, and USD 415 billion was generated through indirect output, demonstrating the value of the domestic A&D supply chain. In total, the industry generated USD 418 billion in economic value or 1.65% of the total nominal GDP of the United States, which is up nearly 7.0% above 2021. Such heightened growth from the aircraft industry is a significant driver for the growth of inspection systems based on terahertz technology.

The increase in helicopters and commercial aircraft production in the United States is expected to drive the market—the aerospace industry of the US exports more than 60% of all aerospace production.

Canada is expected to witness significant growth in demand for the technology due to increased demand for security screening equipment across various public places. For instance, Canadian airlines screen passengers before they board flights bound for the country. Air Canada's union, the Canadian Union of Public Employees (CUPE), announced additional pre-flight screening by making flight attendants responsible for the screening.

New screening lanes were added near the airport's B Pier to reduce the wait time for domestic departures. The new lanes were open, representing a 30% increase in screening capacity. PBS-B is an interim solution, while the airport and Canadian Air Transport Security Agency (CATSA) look at long-term solutions for consolidating domestic screening into one location in the future.

The Canadian government is investing in airport infrastructure to provide passengers and residents with better mobility, safety, and security. For instance, in February 2024, Montreal Metropolitan Airport (YHU) received a USD 90-million investment from the Canada Infrastructure Bank (CIB) for a new passenger terminal. The investment is expected to enable the development of a new domestic airport terminal to enhance mobility options for Canadians traveling to and from Montreal while supporting economic opportunities in the Montreal region. Investments like these are likely to add opportunities for evolving technologies that are expected to promote the proper functioning of airport infrastructures, including terahertz scanners.

Terahertz Technology Industry Overview

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The terahertz technology market is fragmented, with the presence of major players like Luna Innovations, Teravil Ltd, TeraView Limited, Toptica Photonics AG, and HUBNER GmbH & Co. KG. Market players are utilizing various strategies to increase their product portfolio and gain sustainable competitive advantages, such as partnerships, innovation, expansion, and acquisitions.

December 2023 - Luna Innovations announced that it received a USD 50 million investment from White Hat Capital Partners. Through this investment, the company would focus on capitalizing on the inflection point for adopting fiber optic sensing solutions, increasing manufacturing capacity to meet the demand from strategic partnerships, and enhancing its investments in innovations.

December 2023 - TeraView Limited hosted a delegation from Malaysia at its headquarters in the United Kingdom. The visit promises to pave the way for future partnerships and opportunities in applying terahertz technology. The visit aimed to explore potential collaborations between TeraView and critical stakeholders in Malaysia’s technology and research sectors.

Additional Benefits:

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