Flip Chip Technology Market - Growth, Trends, Covid-19 Impact, and Forecasts (2023 - 2028)

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Report description:

The flip chip technology market is expected to register a CAGR of 5.91% over the forecast period. Being a technologically driven market, manufacturers are mainly focusing on innovations and on new technologies for the bumping process, which, in turn, is increasing the demand for raw materials required for manufacturing.

Key Highlights
This leads to rapid growth in this industry among raw material suppliers. Its primary advantages over other packaging methods, namely, reliability, size, flexibility, performance, and cost, are the factors driving the growth of the flip-chip market. The availability of flip-chip raw materials, equipment, and services is further expected to drive the market lucratively during the forecast period.
Moreover, the growth of the market is attributed to its numerous advantages, such as smaller size, higher- performance, and enhanced I/O flexibility over its competitive methodologies. The demand for flip-chip is expected to rise in mobile and wireless, consumer applications, and other high-performance applications such as networks, servers, and data centers. In terms of 3D integration and more than the Moore approach, the flip-chip is one of the key driving factors and helps enable sophisticated SoC (system on chip).
Due to the strong growth in MMIC (monolithic microwave IC), the market is growing, as MMICs are devices that operate at microwave frequencies (300 MHz to 300 GHz). These devices typically perform functions such as microwave mixing, power amplification, low-noise amplification, and high-frequency switching.
Fan-out wafer-level packaging and embedded die are some of the fastest emerging technologies for the flip-chip market. Also, some of the prominent vendors are increasing their investment in these technologies, thereby expanding their scope.
For instance, in March 2021, Samsung Electronics partnered with Marvell to jointly develop a novel system-on-a-chip to offer enhanced 5G network performance. The newly launched chip finds usage in Samsung's massive MIMO and is anticipated to see its

presence among Tier One operators by Q2 2021. Similarly, Mediatek, Inc., in November 2020, inked an acquisition deal of approximately USD 85 million to purchase the power management chip assets of Intel Enpirion.
COVID-19 has severely affected the market growth. This is due to the shifting of consumer purchasing behavior towards essential goods such as groceries from luxury goods such as consumer electronics and vehicles. The supply chain was also affected, thus slowing down the market growth.

Flip Chip Technology Market Trends

The Military and Defense Industry to Drive the Market Growth

Modern military and defense environments require proven, reliable, and scalable technologies. Sensors are a critical part of the technologies, as these provide solutions to the whole defense ecosystem, including complex controls, measurements, monitoring, and execution.
For military requirements, the need to cool components down to 50 K has led to the development of a technology based on indium micropumps. The sensor content of military systems continues to grow, thereby driving requirements for flip chip technology in military computing platforms.
For any radar, packaging and assembly are the keys to a successful implementation. As radar applications proliferate, cost becomes critical. For millimeter-wave automotive and UAV, cost and packaging are being addressed. Single-chip radars and multi-channel T/R modules are becoming feasible.
For example, a SiGe transmit-receive phased-array chip for automotive radar applications at 76 to 84 GHz has been developed. The chip uses a controlled collapse chip connection (C4) bumping process and is flip-chipped onto a low-cost printed circuit board, achieving 50 dB isolation between the transmit and receive chains. This work represents state-of-the-art complexity for a high-performance FMCW radar at millimeter-wave frequencies, with simultaneous transmit and receive operation.
Due to the increasing complexities and higher performance, pin count, power, and cost requirements of military applications, the packaging industry is moving toward high-performance packages, such as flip-chip or wafer-level fan-out packaging, for military and defense by deploying GPS and radar applications. The use of flip-chip technology for this type of application has proven itself, in many applications, to be a reliable packaging technology to achieve high-density electronics.
Recently, Qorvo, a leading provider of innovative RF solutions, was awarded a three-year contract further to advance the development of copper-pillar-on-GaN flip-chip technology. This Department of Defense (DoD) program will create a high-yield domestic foundry to mature the copper flip assembly process, which enables vertical die stacking in space-constrained phased array radar systems and other defense electronics.

China Occupies the Significant Market Share

The packaging industry in China is expected to register potential growth during the forecast period. There is a strong demand for IC components, which has expanded the deployment of advanced packaging solutions that offer higher levels of integration and higher numbers of I/O connections.
The Chinese government's initiative of "Made in China 2025" aims to make its semiconductor industry reach USD 305 billion in output by 2030 and meet 80% of domestic demand. China is ramping up its chip industry amid a brewing tech war. The United States-China trade war and the threat that Chinese firms could be cut off from American technology(as major firms like Huawei) are boosting China's push for its semiconductor industry.
The flip-chip market includes bumping and assembly, and there is enormous ramping of bumping capacity by Chinese players, particularly in the 12" Cu pillar. More than 90% of advanced packaging players have 300 mm wafer bumping capability. In 2019,

Chinese electronics company Jiangsu Changjiang Electronics Technology (JCET) started high-volume wafer bumping. The company has moved into volume production with its new 12-inch wafer bumping line. Production volumes are already being shipped to China-based JCET customers, with several additional device manufacturers qualifying the line for shipments.
Due to the COVID-19 pandemic, all the manufacturing industries and bases are affected in China due to the long-lasting shutdown in the country, thereby affecting the flip-chip technology market. Moreover, the Chinese testing and packaging companies continue to gain processing capacity for high-end packaging technologies (e.g., flip-chip and bumping) and more advanced (e.g., fan-in, fan-out, 2.5D interposer, and SiP).
Owing to the progress in both technology development and merger and acquisitions, Chinese service providers, such as JCET, TSHT, and TFME, are projected to rise above the industry's average in their revenue performances this year with double-digit growth rates.

Flip Chip Technology Market Competitor Analysis

The flip chip technology market is fragmented due to the growing number of end users in automotive, industrial, and consumer electronics. The market is expected to grow at a fair steady rate over the forecast period. The existing players in the market are striving to maintain a competitive edge by catering to newer technologies, such as 5G telecommunication, high-performance data centers, compact electronic devices, etc. Some of the recent developments in the market are -

November 2021 - Amkor Technology Inc. (NASDAQ: AMKR), a leading provider of semiconductor packaging and test services, planned to build a state-of-the-art smart factory in Bac Ninh, Vietnam. The first phase of the new factory would focus on providing advanced system in package (SiP) assembly and test solutions to the leading global semiconductor and electronic manufacturing companies.

Additional Benefits:

The market estimate (ME) sheet in Excel format
3 months of analyst support

Table of Contents:

1 INTRODUCTION
1.1 Study Assumptions and Market Definition
1.2 Scope of the Study

2 RESEARCH METHODOLOGY

3 EXECUTIVE SUMMARY

4 MARKET INSIGHTS
4.1 Market Overview
4.2 Industry Attractiveness - Porter's Five Forces Analysis
4.2.1 Bargaining Power of Suppliers
4.2.2 Bargaining Power of Buyers
4.2.3 Threat of New Entrants
4.2.4 Threat of Substitute Products

4.2.5 Intensity of Competitive Rivalry
4.3 Industry Value Chain Analysis

5 MARKET DYNAMICS
5.1 Market Drivers
5.1.1 Increasing Demand for Wearable Devices
5.1.2 Strong Growth in MMIC (Monolithic Microwave IC) Applications
5.2 Market Challenge
5.2.1 Higher Costs Associated with the Technology

6 TECHNOLOGY SNAPSHOT?

7 MARKET SEGMENTATION
7.1 By Wafer Bumping Process
7.1.1 Copper Pillar
7.1.2 Tin-Lead Eutectic Solder
7.1.3 Lead Free Solder
7.1.4 Gold Stud Bumping
7.2 By Packaging Technology
7.2.1 BGA (2.1D/2.5D/3D)
7.2.2 CSP
7.3 By Product (Only Qualitative Analysis)
7.3.1 Memory
7.3.2 Light Emitting Diode
7.3.3 CMOS Image Sensor
7.3.4 SoC
7.3.5 GPU
7.3.6 CPU
7.4 By End User
7.4.1 Military and Defense
7.4.2 Medical and Healthcare
7.4.3 Industrial Sector
7.4.4 Automotive
7.4.5 Consumer Electronics
7.4.6 Telecommunications
7.5 By Geography
7.5.1 China
7.5.2 Taiwan
7.5.3 United States
7.5.4 South Korea
7.5.5 Malaysia
7.5.6 Singapore
7.5.7 Japan

8 COMPETITIVE LANDSCAPE
8.1 Company Profiles*
8.1.1 Amkor Technology Inc.

8.1.2 UTAC Holdings Ltd
8.1.3 Taiwan Semiconductor Manufacturing Company Limited
8.1.4 Chipbond Technology Corporation
8.1.5 TF AMD Microlectronics Sdn Bhd
8.1.6 Jiangsu Changjiang Electronics Technology Co. Ltd
8.1.7 Powertech Technology Inc.
8.1.8 ASE Industrial Holding Ltd (Siliconware Precision Industries Co. Ltd)

9 INVESTMENT ANALYSIS

10 FUTURE OF THE MARKET

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