

Application Specific Integrated Circuit Market – Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Product Type (Full Custom, Semi-custom, Programmable), By Application (Telecommunication, Industrial, Automotive, Consumer Electronics, Others), By Region, By Competition, 2018-2028

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Abstracts

Global Application Specific Integrated Circuit Market was valued at USD 16.8 Billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 6.4% through 2028. The Global Application Specific Integrated Circuit (ASIC) Market is witnessing a substantial surge, propelled by the increasing demand for customized and specialized electronic devices. ASICs, tailored to specific applications, offer unparalleled efficiency, speed, and power optimization, making them indispensable in a myriad of sectors, from telecommunications and automotive to healthcare and consumer electronics. The market's growth is further fueled by the rapid advancements in technology, driving the need for complex, high-performance chips. ASICs empower businesses to design integrated circuits precisely crafted for unique functions, enhancing overall system performance and reducing power consumption. Their role in enabling innovative solutions such as Internet of Things (IoT) devices and artificial intelligence applications amplifies their demand. Moreover, ASICs cater to the escalating demand for miniaturized, energy-efficient electronics, making them pivotal components in the modern digital landscape. As industries increasingly rely on specialized electronic solutions for enhanced functionality and competitive advantages, the Global ASIC Market is poised for continuous expansion, offering tailored semiconductor solutions that drive innovation and efficiency across diverse sectors.

Key Market Drivers

Innovations in Customization and Specialization

Innovations in customization and specialization are driving transformative changes in the Global Application Specific Integrated Circuit (ASIC) Market. As industries demand increasingly specific functionalities, the market has responded with a surge in customized ASIC solutions tailored to meet unique requirements. These innovations empower businesses to optimize their operations and enhance the performance of their electronic devices significantly. Customization in ASICs allows companies to collaborate closely with manufacturers, designing chips precisely suited to their applications. This level of tailored integration leads to improved efficiency, reduced power consumption, and enhanced overall performance. Moreover, the advent of specialized ASICs, engineered for dedicated tasks such as artificial intelligence, machine learning, and IoT applications, has opened new avenues of innovation.

These specialized chips outperform general-purpose processors in specific tasks, offering unparalleled speed and efficiency. For instance, in the realm of AI, ASICs designed for neural network processing deliver remarkable computational power, revolutionizing machine learning algorithms and enabling sophisticated AI applications. Furthermore, ASICs tailored for IoT devices provide low-power, high-performance solutions, ensuring seamless connectivity and data processing in the increasingly interconnected world. The ability to customize and specialize ASICs is not merely a market trend but a fundamental shift that empowers industries to push the boundaries of innovation. It enables businesses to create cutting-edge products that were once deemed technologically unattainable, fueling advancements across sectors. This drive towards customization and specialization propels the Global ASIC Market, fostering collaboration between businesses and manufacturers, accelerating research and development efforts, and ultimately reshaping the technological landscape. As industries continue to embrace these innovations, the ASIC Market is poised for sustained growth, offering tailored solutions that underpin the next generation of electronic devices and systems.

Proliferation of Advanced Technologies

The proliferation of advanced technologies is serving as a catalyst for the unprecedented growth of the Global Application Specific Integrated Circuit (ASIC) Market. In an era dominated by rapid digitalization, ASICs have emerged as indispensable components, enabling the seamless integration of cutting-edge

technologies into various applications. The advent of artificial intelligence (AI) and machine learning has necessitated specialized processing capabilities, propelling the demand for ASICs designed specifically for these tasks. ASICs optimized for AI applications deliver unparalleled computational power, enabling the development of sophisticated algorithms and enhancing the efficiency of AI-driven systems across industries, from autonomous vehicles to healthcare diagnostics. Additionally, the rise of the Internet of Things (IoT) has ushered in an era where billions of connected devices require efficient data processing and communication. Specialized ASICs for IoT applications offer low-power solutions, enabling real-time data processing and enhancing the functionality of smart devices, from wearable gadgets to smart home appliances.

Moreover, the growing significance of 5G technology is driving the demand for ASICs in telecommunications infrastructure, enabling high-speed data transmission and low-latency communication essential for the 5G network rollout. The ASIC Market is also benefiting from advancements in semiconductor manufacturing processes, leading to the development of smaller, more power-efficient chips capable of handling complex tasks. These technological advancements are not only expanding the applications of ASICs but also enhancing their performance, reliability, and energy efficiency. As businesses across sectors increasingly rely on these specialized chips to power their innovations, the Global ASIC Market is experiencing exponential growth. Companies are investing in ASIC research and development to stay ahead in the competitive landscape, driving innovation and shaping the future of electronic devices and systems. The proliferation of advanced technologies, coupled with the versatility and efficiency of ASICs, is reshaping industries and driving the market towards a future where customized, high-performance integrated circuits are at the heart of technological progress.

Integration with Industry 4.0 and IoT Initiatives

The integration with Industry 4.0 and IoT initiatives is steering the Global Application Specific Integrated Circuit (ASIC) Market into a new era of innovation and efficiency. In the realm of Industry 4.0, characterized by the fusion of digital technologies with industrial processes, ASICs play a pivotal role by providing customized solutions tailored to specific manufacturing requirements. These specialized chips optimize automation, enhance precision, and reduce operational costs, making them indispensable for smart factories and advanced manufacturing systems. Simultaneously, in the vast landscape of the Internet of Things (IoT), where billions of interconnected devices communicate and exchange data, ASICs are fundamental

building blocks. They enable the development of energy-efficient and compact devices, from wearable gadgets to smart sensors, by providing tailored computing capabilities for diverse IoT applications. ASICs designed for IoT devices ensure seamless connectivity, real-time data processing, and extended battery life, addressing the critical needs of IoT ecosystems. This integration empowers industries to harness the full potential of IoT initiatives, enabling predictive maintenance, efficient supply chain management, and data-driven decision-making. Moreover, as IoT technologies continue to evolve, ASICs are at the forefront of innovation, adapting to the increasing complexity of IoT applications. The synergy between Industry 4.0, IoT, and ASICs creates a dynamic ecosystem where smart manufacturing processes are seamlessly connected to intelligent IoT devices, leading to unparalleled operational efficiency and productivity gains. Businesses are capitalizing on this integration, investing in specialized ASIC development to align their operations with Industry 4.0 standards and IoT advancements. As a result, the Global ASIC Market is experiencing a surge in demand, driven by the transformative impact of Industry 4.0 and IoT initiatives on modern enterprises. This integration not only enhances industrial processes and IoT capabilities but also propels the ASIC Market into a pivotal role within the global technological landscape, shaping the future of smart industries and connected ecosystems.

Demand from Consumer Electronics Sector

The Global Application Specific Integrated Circuit (ASIC) Market is experiencing a significant boost due to the escalating demand from the consumer electronics sector. In an era where technological innovation is a driving force behind consumer preferences, ASICs have emerged as a linchpin technology, enabling the creation of smaller, faster, and more power-efficient electronic devices. The consumer electronics sector, encompassing smartphones, tablets, smart TVs, gaming consoles, and wearable devices, relies heavily on ASICs to deliver cutting-edge performance and unique functionalities. ASICs provide tailored solutions for specific tasks within these devices, optimizing their efficiency and enhancing user experiences. For instance, ASICs embedded in smartphones enable complex tasks such as facial recognition, augmented reality, and high-definition video processing, all in real-time. In wearable devices, ASICs facilitate features like health monitoring, GPS tracking, and seamless connectivity, essential for the modern consumer seeking multifaceted functionalities in compact designs. The demand for ASICs in consumer electronics is further fueled by the trend toward miniaturization, where manufacturers seek smaller, more energy-efficient components without compromising performance. ASICs perfectly align with this demand, offering customized solutions that integrate multiple functions into a single chip, conserving space and energy. Moreover, the relentless pace of innovation in the

consumer electronics sector, including the development of 5G-enabled devices, foldable screens, and advanced artificial intelligence applications, necessitates ASICs tailored to these specific requirements. As consumer expectations for smarter, faster, and more feature-rich electronics continue to rise, ASICs have become indispensable for manufacturers striving to stay ahead of the competition. This surge in demand from the consumer electronics sector is reshaping the ASIC market, prompting semiconductor companies to invest heavily in research and development, ensuring their ASIC offerings meet the evolving needs of consumer electronics manufacturers. As a result, the Global ASIC Market is witnessing robust growth, driven by the symbiotic relationship between ASIC innovation and the demands of the consumer electronics industry, ultimately shaping the future of portable, intelligent devices that define the modern digital lifestyle.

Rapid Advancements in AI and Machine Learning

The Global Application Specific Integrated Circuit (ASIC) Market is being propelled to new heights by rapid advancements in Artificial Intelligence (AI) and Machine Learning (ML). In an age where intelligent systems are revolutionizing industries, ASICs have emerged as essential components, enabling the seamless integration of AI and ML capabilities into various applications. These specialized chips are designed to accelerate specific algorithms, making them ideal for AI and ML tasks that demand high computational power. From natural language processing and image recognition to autonomous driving and predictive analytics, ASICs are at the forefront of enabling real-time, data-intensive computations crucial for AI and ML applications. The demand for ASICs in this context is twofold: first, they enhance the efficiency and speed of AI and ML algorithms, ensuring quicker and more accurate decision-making processes. Second, ASICs significantly reduce power consumption, a critical factor for mobile devices and edge computing applications, where energy efficiency is paramount. As industries increasingly rely on AI and ML to gain insights, automate processes, and enhance user experiences, the need for specialized ASICs tailored to these technologies becomes imperative. Semiconductor companies are investing heavily in developing ASICs optimized for AI and ML workloads, leading to innovations like neuromorphic computing, enabling chips to mimic the human brain's neural networks. These advancements not only cater to the growing demands of sectors such as healthcare, finance, autonomous vehicles, and IoT but also foster innovation by enabling the development of new AI and ML applications that were previously impractical. The synergy between ASICs and AI/ML technologies is reshaping how businesses operate, enhancing efficiency, and driving the evolution of smart systems. As AI and ML continue to permeate diverse sectors, the Global ASIC Market stands at the forefront of this transformative wave, offering specialized solutions that are not just

meeting industry demands but also shaping the future landscape of intelligent computing.

Key Market Challenges

Interoperability and Standardization

The Global Application Specific Integrated Circuit (ASIC) Market grapples with challenges related to interoperability and standardization. With diverse applications and industries adopting ASICs for specialized functions, ensuring seamless integration and communication across different ASIC devices poses a significant hurdle. Manufacturers often employ varying communication protocols and technologies, leading to compatibility issues. The absence of universal standards results in complexities during the integration process, hindering the creation of cohesive and interconnected electronic systems. This challenge impedes the market's potential for widespread adoption and growth, compelling industry players to address interoperability concerns through collaborative efforts and standardized protocols.

Security Vulnerabilities and Privacy Concerns

Security vulnerabilities and privacy concerns are pivotal challenges faced by the Global ASIC Market. ASICs, being fundamental components in various electronic devices, are susceptible to cyber threats and data breaches. Malicious actors can exploit vulnerabilities, compromising user privacy and device functionality. Inadequate security measures can lead to unauthorized access, putting sensitive data at risk. Addressing these concerns demands robust security protocols, regular firmware updates, and user education on safe practices. Building trust through enhanced security features is vital, ensuring consumers have confidence in adopting ASIC-driven solutions without compromising their privacy and data security.

Data Management and Analytics Complexity

Managing vast datasets generated by ASIC-enabled devices presents a complex challenge. These devices produce substantial volumes of data, necessitating sophisticated analytics tools for meaningful insights. Businesses and consumers face hurdles in effectively analyzing this data to make informed decisions. Ensuring data accuracy, reliability, and compliance with regulations adds another layer of complexity. Simplifying data management processes and developing user-friendly analytics tools are imperative. Streamlining these complexities is essential for enabling businesses and

individuals to derive actionable insights from ASIC-generated data, enhancing the overall utility and value of these devices.

Energy Efficiency and Sustainability

Energy efficiency and sustainability are critical challenges in the Global ASIC Market. Many ASIC devices operate in energy-sensitive environments, where power consumption directly impacts efficiency and environmental sustainability. Consumers demand energy-efficient devices that optimize power usage, minimizing the need for frequent replacements and reducing electronic waste. Implementing energy-efficient designs, promoting renewable energy sources, and encouraging responsible disposal practices are essential steps to address these challenges. Striking a balance between functionality and energy efficiency is crucial for sustainable ASIC adoption, ensuring devices are environmentally friendly throughout their lifecycle.

Regulatory Compliance and Legal Frameworks

Navigating diverse regulatory frameworks and ensuring compliance with international laws is a significant challenge for the Global ASIC Market. ASIC devices often operate globally, requiring manufacturers to adhere to varying regulations related to data protection, cybersecurity, and consumer rights. Keeping pace with evolving legal requirements and standards necessitates continuous efforts from industry players. Non-compliance can lead to legal liabilities, hindering market growth. Establishing a harmonized global approach to ASIC regulations and promoting industry self-regulation are vital to fostering a conducive environment for ASIC innovation while ensuring consumer protection and legal compliance. Industry collaboration and proactive engagement with regulatory bodies are essential to overcome these challenges, creating a favorable ecosystem for the Global ASIC Market to thrive.

Key Market Trends

Rapid Evolution of Application Specific Integrated Circuits (ASICs)

The Global Application Specific Integrated Circuit (ASIC) Market is experiencing a rapid evolution driven by technological advancements and increasing demand for specialized computing solutions. ASICs, custom-designed integrated circuits tailored for specific applications, are gaining prominence in diverse sectors. From high-performance computing and artificial intelligence to telecommunications and automotive electronics, ASICs offer optimized solutions for complex tasks, enabling enhanced performance and

energy efficiency. This trend is reshaping the semiconductor industry, with companies investing in research and development to create cutting-edge ASICs. The demand for customized chips is escalating, particularly in sectors where standard processors are inadequate to meet specific requirements. ASICs are being utilized in AI accelerators, enabling faster processing of deep learning algorithms and empowering applications like image recognition and natural language processing. In telecommunications, ASICs enhance data processing speed and network efficiency, ensuring seamless communication experiences. The automotive industry benefits from ASICs in advanced driver-assistance systems (ADAS) and autonomous driving technology, enabling real-time data processing and decision-making. The rapid evolution of ASICs signifies a shift toward specialized, high-performance computing solutions, driving innovation and market growth. As industries continue to demand efficient and tailored computing solutions, the Global ASIC Market is poised to expand further, shaping the future of application-specific integrated circuits and their widespread integration into various sectors.

Focus on Energy Efficiency and Miniaturization

Energy efficiency and miniaturization have become central themes in the Global Application Specific Integrated Circuit (ASIC) Market. As technological devices become more compact and power-efficient, the demand for ASICs designed for low power consumption and small form factors has surged. Miniaturized ASICs find applications in wearable devices, IoT sensors, and mobile devices, where space constraints and energy efficiency are critical. These specialized chips enable devices to perform complex functions while conserving battery life, a key consideration for portable electronics. Moreover, energy-efficient ASICs contribute to sustainability efforts by reducing power consumption, aligning with the global push toward eco-friendly technologies. In addition to wearables and mobile devices, energy-efficient ASICs are vital in IoT devices that operate on battery power, ensuring prolonged device lifespan and minimal environmental impact. Semiconductor companies are investing in research and development to create ASICs that offer high performance within strict energy constraints, addressing the growing market demand for energy-efficient computing solutions. The emphasis on energy efficiency and miniaturization reflects the industry's commitment to creating advanced ASICs that not only enhance device performance but also contribute to a greener and more sustainable future.

Enhanced Security Features and Hardware-Level Encryption

Security features and hardware-level encryption are becoming paramount in the Global

Application Specific Integrated Circuit (ASIC) Market. With the rising prevalence of cyber threats and data breaches, ensuring robust security measures is imperative. ASICs with integrated hardware-level encryption capabilities provide secure data processing and storage solutions, safeguarding sensitive information from unauthorized access and tampering. These chips are instrumental in applications where data security is critical, such as in financial transactions, healthcare systems, and government networks. The implementation of advanced encryption algorithms directly into ASIC hardware enhances security, reducing vulnerabilities associated with software-based encryption methods. As data privacy concerns continue to escalate, businesses and consumers alike demand secure computing solutions. ASIC manufacturers are focusing on developing chips with enhanced security features, including secure boot processes, secure key storage, and cryptographic accelerators, to address these concerns. Furthermore, the integration of hardware-based security modules, such as Trusted Platform Modules (TPMs), in ASICs enhances device integrity and ensures secure communication between connected devices. The emphasis on security features and hardware-level encryption signifies a proactive approach to addressing cybersecurity challenges, instilling confidence in consumers and businesses adopting ASIC-based solutions. By prioritizing security, the Global ASIC Market is fostering a secure environment for digital transactions, sensitive data processing, and connected systems, driving market growth and innovation.

Integration with 5G Technology and High-Speed Data Networks

Integration with 5G technology and high-speed data networks is a pivotal trend shaping the Global Application Specific Integrated Circuit (ASIC) Market. The rollout of 5G networks has ushered in a new era of connectivity, offering unprecedented data transfer speeds and low latency. ASICs optimized for 5G applications play a crucial role in enabling seamless communication, high-speed data processing, and low-latency interactions. These specialized chips are utilized in 5G base stations, smartphones, IoT devices, and networking equipment, facilitating the rapid exchange of vast amounts of data. ASICs designed for 5G networks enhance network efficiency, enabling faster data transmission and reducing response times, which is particularly vital for applications like autonomous vehicles, remote healthcare, and real-time industrial automation. The integration of ASICs with 5G technology ensures that devices can handle the increased data throughput and low-latency requirements, empowering a wide range of applications and services. Semiconductor companies are investing in developing ASICs tailored for 5G connectivity, driving innovation in the telecommunications sector. As 5G networks continue to expand globally, the demand for specialized ASICs that can harness the full potential of this technology is on the rise. The integration of ASICs with

5G technology paves the way for transformative applications, enabling a connected world where high-speed data transmission and real-time communication are the norm, fostering the growth of the Global ASIC Market.

Robust Research and Development Initiatives in AI Hardware

Robust research and development initiatives in AI hardware are propelling the Global Application Specific Integrated Circuit (ASIC) Market forward. The intersection of AI and specialized hardware, particularly ASICs designed for AI tasks, has opened new avenues for innovation. AI-driven applications, ranging from machine learning and natural language processing to computer vision and neural network inference, require high computational power and specialized hardware accelerators. ASICs optimized for AI workloads offer significant advantages, including faster processing speeds, energy efficiency, and cost-effectiveness. Research and development efforts are focused on creating ASICs that can handle complex AI algorithms and neural networks, enabling real-time AI inference at the edge, in devices such as smartphones, smart cameras, and IoT sensors. These advancements in AI hardware have far-reaching implications, enhancing AI-driven applications across diverse sectors, including healthcare, automotive, finance, and robotics. As AI technologies become increasingly integrated into various aspects of daily life and business operations, the demand for efficient and powerful AI hardware solutions continues to rise. Semiconductor companies are investing in AI-specific ASIC designs, leveraging innovations such as neuromorphic computing and tensor processing units (TPUs) to meet the evolving demands of AI-driven applications. The synergy between AI algorithms and specialized ASICs is driving the development of intelligent systems, enabling autonomous decision-making, predictive analytics, and personalized user experiences. The robust research and development initiatives in AI hardware underscore the industry's commitment to advancing the capabilities of ASICs, positioning them as essential components in the AI ecosystem and driving the growth of the Global ASIC Market.

Segmental Insights

Product Type Insights

The programmable Application Specific Integrated Circuit (ASIC) segment emerged as the dominant product type in the Global ASIC Market, a trend expected to endure through the forecast period. Programmable ASICs provide a versatile solution, allowing manufacturers to configure the chip's functionality even after production, offering a balance between customization and flexibility. This adaptability makes them highly

sought after in various applications, including telecommunications, automotive, consumer electronics, and industrial sectors. Businesses prefer programmable ASICs as they enable rapid prototyping, quicker time-to-market, and cost-effective solutions for complex applications. As technological advancements continue, the demand for programmable ASICs is further fueled by the growing need for customized chips in emerging technologies like 5G, artificial intelligence, and IoT devices. Additionally, the ability to reprogram these chips for different functions gives manufacturers a competitive edge in responding to market demands swiftly. The flexibility offered by programmable ASICs in accommodating evolving industry requirements, coupled with their cost-efficiency and quick deployment, ensures their dominance in the global market. As industries continue to innovate and adapt to changing market needs, programmable ASICs are anticipated to maintain their dominance, providing a vital technological backbone for a wide array of applications.

Application Insights

The telecommunication sector emerged as the dominant application segment in the Global Application Specific Integrated Circuit (ASIC) Market, a trend expected to persist throughout the forecast period. The telecommunications industry's reliance on high-performance and specialized integrated circuits, particularly for 5G infrastructure, network equipment, and communication devices, drove the substantial growth in ASIC adoption. ASICs tailored for telecommunication applications offer optimized solutions, ensuring the efficient processing of vast amounts of data in real-time, vital for high-speed data transmission, low latency, and seamless connectivity, all of which are paramount in 5G networks. The demand for ASICs in telecommunication is fueled by the rapid global expansion of 5G technology, facilitating the development of advanced communication systems, IoT devices, and smart city initiatives. Additionally, the telecommunication sector's continuous innovation and the need for customized chips to support the evolving landscape of wireless communication technologies solidify its dominance in the ASIC market. As telecommunication networks evolve further, integrating ASICs designed specifically for 5G and beyond, their significance in enabling lightning-fast data transfer and enhancing overall network efficiency will ensure the continued dominance of the telecommunication segment in the Global ASIC Market.

Regional Insights

The Asia-Pacific region emerged as the dominant force in the Global Application Specific Integrated Circuit (ASIC) Market, a trend expected to persist during the forecast period. Several factors contribute to Asia-Pacific's market supremacy, including the

presence of key manufacturing hubs in countries like China, Taiwan, South Korea, and Japan. These countries have established themselves as global leaders in semiconductor production, benefiting from robust infrastructure, skilled labor, and technological expertise. Moreover, the region's burgeoning consumer electronics industry, increasing demand for advanced automotive electronics, and rapid adoption of IoT devices have significantly boosted the demand for ASICs. Additionally, the proactive initiatives by governments in promoting innovation and research in semiconductor technologies have further propelled the market growth. The Asia-Pacific region's dominance is also attributed to the escalating investments in research and development, fostering a conducive environment for technological advancements and product innovations. Furthermore, the region's robust ecosystem, comprising semiconductor foundries, design houses, and equipment suppliers, has created a competitive advantage, attracting businesses from around the globe. As the demand for specialized and customized integrated circuits continues to rise, coupled with the region's technological prowess and manufacturing capabilities, Asia-Pacific is poised to maintain its dominance in the Global ASIC Market, driving innovation and shaping the future of the semiconductor industry.

Key Market Players

Intel Corporation

Xilinx, Inc.

NVIDIA Corporation

Texas Instruments Incorporated

Broadcom Inc.

Qualcomm Incorporated

Samsung Electronics Co., Ltd.

Advanced Micro Devices, Inc.

STMicroelectronics N.V.

Analog Devices, Inc.

Infineon Technologies AG

ON Semiconductor Corporation

Report Scope:

In this report, the Global Application Specific Integrated Circuit Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Application Specific Integrated Circuit Market, By Product Type:

Full Custom

Semi-custom

Programmable

Application Specific Integrated Circuit Market, By Application:

Telecommunication

Industrial

Automotive

Consumer Electronics

Others

Application Specific Integrated Circuit Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Belgium

Asia-Pacific

China

India

Japan

Australia

South Korea

Indonesia

Vietnam

South America

Brazil

Argentina

Colombia

Chile

Peru

Middle East & Africa

South Africa

Saudi Arabia

UAE

Turkey

Israel

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Application Specific Integrated Circuit Market.

Available Customizations:

Global Application Specific Integrated Circuit market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Formulation of the Scope
- 2.4. Assumptions and Limitations
- 2.5. Sources of Research
 - 2.5.1. Secondary Research
 - 2.5.2. Primary Research
- 2.6. Approach for the Market Study
 - 2.6.1. The Bottom-Up Approach
 - 2.6.2. The Top-Down Approach
- 2.7. Methodology Followed for Calculation of Market Size & Market Shares
- 2.8. Forecasting Methodology
 - 2.8.1. Data Triangulation & Validation

3. EXECUTIVE SUMMARY

4. IMPACT OF COVID-19 ON GLOBAL APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET

5. VOICE OF CUSTOMER

6. GLOBAL APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OVERVIEW

7. GLOBAL APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OUTLOOK

7.1. Market Size & Forecast

7.1.1. By Value

7.2. Market Share & Forecast

7.2.1. By Product Type (Full Custom, Semi-custom, Programmable)

7.2.2. By Application (Telecommunication, Industrial, Automotive, Consumer Electronics, Others)

7.2.3. By Region (North America, Europe, South America, Middle East & Africa, Asia Pacific)

7.3. By Company (2022)

7.4. Market Map

8. NORTH AMERICA APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OUTLOOK

8.1. Market Size & Forecast

8.1.1. By Value

8.2. Market Share & Forecast

8.2.1. By Product Type

8.2.2. By Application

8.2.3. By Country

8.3. North America: Country Analysis

8.3.1. United States Application Specific Integrated Circuit Market Outlook

8.3.1.1. Market Size & Forecast

8.3.1.1.1. By Value

8.3.1.2. Market Share & Forecast

8.3.1.2.1. By Product Type

8.3.1.2.2. By Application

8.3.2. Canada Application Specific Integrated Circuit Market Outlook

8.3.2.1. Market Size & Forecast

8.3.2.1.1. By Value

8.3.2.2. Market Share & Forecast

8.3.2.2.1. By Product Type

8.3.2.2.2. By Application

8.3.3. Mexico Application Specific Integrated Circuit Market Outlook

8.3.3.1. Market Size & Forecast

8.3.3.1.1. By Value

8.3.3.2. Market Share & Forecast

8.3.3.2.1. By Product Type

8.3.3.2.2. By Application

9. EUROPE APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OUTLOOK

9.1. Market Size & Forecast

9.1.1. By Value

9.2. Market Share & Forecast

9.2.1. By Product Type

9.2.2. By Application

9.2.3. By Country

9.3. Europe: Country Analysis

9.3.1. Germany Application Specific Integrated Circuit Market Outlook

9.3.1.1. Market Size & Forecast

9.3.1.1.1. By Value

9.3.1.2. Market Share & Forecast

9.3.1.2.1. By Product Type

9.3.1.2.2. By Application

9.3.2. France Application Specific Integrated Circuit Market Outlook

9.3.2.1. Market Size & Forecast

9.3.2.1.1. By Value

9.3.2.2. Market Share & Forecast

9.3.2.2.1. By Product Type

9.3.2.2.2. By Application

9.3.3. United Kingdom Application Specific Integrated Circuit Market Outlook

9.3.3.1. Market Size & Forecast

9.3.3.1.1. By Value

9.3.3.2. Market Share & Forecast

9.3.3.2.1. By Product Type

9.3.3.2.2. By Application

9.3.4. Italy Application Specific Integrated Circuit Market Outlook

9.3.4.1. Market Size & Forecast

9.3.4.1.1. By Value

9.3.4.2. Market Share & Forecast

9.3.4.2.1. By Product Type

9.3.4.2.2. By Application

9.3.5. Spain Application Specific Integrated Circuit Market Outlook

9.3.5.1. Market Size & Forecast

9.3.5.1.1. By Value

- 9.3.5.2. Market Share & Forecast
 - 9.3.5.2.1. By Product Type
 - 9.3.5.2.2. By Application
- 9.3.6. Belgium Application Specific Integrated Circuit Market Outlook
 - 9.3.6.1. Market Size & Forecast
 - 9.3.6.1.1. By Value
 - 9.3.6.2. Market Share & Forecast
 - 9.3.6.2.1. By Product Type
 - 9.3.6.2.2. By Application

10. SOUTH AMERICA APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OUTLOOK

- 10.1. Market Size & Forecast
 - 10.1.1. By Value
- 10.2. Market Share & Forecast
 - 10.2.1. By Product Type
 - 10.2.2. By Application
 - 10.2.3. By Country
- 10.3. South America: Country Analysis
 - 10.3.1. Brazil Application Specific Integrated Circuit Market Outlook
 - 10.3.1.1. Market Size & Forecast
 - 10.3.1.1.1. By Value
 - 10.3.1.2. Market Share & Forecast
 - 10.3.1.2.1. By Product Type
 - 10.3.1.2.2. By Application
 - 10.3.2. Colombia Application Specific Integrated Circuit Market Outlook
 - 10.3.2.1. Market Size & Forecast
 - 10.3.2.1.1. By Value
 - 10.3.2.2. Market Share & Forecast
 - 10.3.2.2.1. By Product Type
 - 10.3.2.2.2. By Application
 - 10.3.3. Argentina Application Specific Integrated Circuit Market Outlook
 - 10.3.3.1. Market Size & Forecast
 - 10.3.3.1.1. By Value
 - 10.3.3.2. Market Share & Forecast
 - 10.3.3.2.1. By Product Type
 - 10.3.3.2.2. By Application
 - 10.3.4. Chile Application Specific Integrated Circuit Market Outlook

- 10.3.4.1. Market Size & Forecast
 - 10.3.4.1.1. By Value
- 10.3.4.2. Market Share & Forecast
 - 10.3.4.2.1. By Product Type
 - 10.3.4.2.2. By Application
- 10.3.5. Peru Application Specific Integrated Circuit Market Outlook
 - 10.3.5.1. Market Size & Forecast
 - 10.3.5.1.1. By Value
 - 10.3.5.2. Market Share & Forecast
 - 10.3.5.2.1. By Product Type
 - 10.3.5.2.2. By Application

11. MIDDLE EAST & AFRICA APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OUTLOOK

- 11.1. Market Size & Forecast
 - 11.1.1. By Value
- 11.2. Market Share & Forecast
 - 11.2.1. By Product Type
 - 11.2.2. By Application
 - 11.2.3. By Country
- 11.3. Middle East & Africa: Country Analysis
 - 11.3.1. Saudi Arabia Application Specific Integrated Circuit Market Outlook
 - 11.3.1.1. Market Size & Forecast
 - 11.3.1.1.1. By Value
 - 11.3.1.2. Market Share & Forecast
 - 11.3.1.2.1. By Product Type
 - 11.3.1.2.2. By Application
 - 11.3.2. UAE Application Specific Integrated Circuit Market Outlook
 - 11.3.2.1. Market Size & Forecast
 - 11.3.2.1.1. By Value
 - 11.3.2.2. Market Share & Forecast
 - 11.3.2.2.1. By Product Type
 - 11.3.2.2.2. By Application
 - 11.3.3. South Africa Application Specific Integrated Circuit Market Outlook
 - 11.3.3.1. Market Size & Forecast
 - 11.3.3.1.1. By Value
 - 11.3.3.2. Market Share & Forecast
 - 11.3.3.2.1. By Product Type

- 11.3.3.2.2. By Application
- 11.3.4. Turkey Application Specific Integrated Circuit Market Outlook
 - 11.3.4.1. Market Size & Forecast
 - 11.3.4.1.1. By Value
 - 11.3.4.2. Market Share & Forecast
 - 11.3.4.2.1. By Product Type
 - 11.3.4.2.2. By Application
- 11.3.5. Israel Application Specific Integrated Circuit Market Outlook
 - 11.3.5.1. Market Size & Forecast
 - 11.3.5.1.1. By Value
 - 11.3.5.2. Market Share & Forecast
 - 11.3.5.2.1. By Product Type
 - 11.3.5.2.2. By Application

12. ASIA PACIFIC APPLICATION SPECIFIC INTEGRATED CIRCUIT MARKET OUTLOOK

- 12.1. Market Size & Forecast
 - 12.1.1. By Product Type
 - 12.1.2. By Application
 - 12.1.3. By Country
- 12.2. Asia-Pacific: Country Analysis
 - 12.2.1. China Application Specific Integrated Circuit Market Outlook
 - 12.2.1.1. Market Size & Forecast
 - 12.2.1.1.1. By Value
 - 12.2.1.2. Market Share & Forecast
 - 12.2.1.2.1. By Product Type
 - 12.2.1.2.2. By Application
 - 12.2.2. India Application Specific Integrated Circuit Market Outlook
 - 12.2.2.1. Market Size & Forecast
 - 12.2.2.1.1. By Value
 - 12.2.2.2. Market Share & Forecast
 - 12.2.2.2.1. By Product Type
 - 12.2.2.2.2. By Application
 - 12.2.3. Japan Application Specific Integrated Circuit Market Outlook
 - 12.2.3.1. Market Size & Forecast
 - 12.2.3.1.1. By Value
 - 12.2.3.2. Market Share & Forecast
 - 12.2.3.2.1. By Product Type

- 12.2.3.2.2. By Application
- 12.2.4. South Korea Application Specific Integrated Circuit Market Outlook
 - 12.2.4.1. Market Size & Forecast
 - 12.2.4.1.1. By Value
 - 12.2.4.2. Market Share & Forecast
 - 12.2.4.2.1. By Product Type
 - 12.2.4.2.2. By Application
- 12.2.5. Australia Application Specific Integrated Circuit Market Outlook
 - 12.2.5.1. Market Size & Forecast
 - 12.2.5.1.1. By Value
 - 12.2.5.2. Market Share & Forecast
 - 12.2.5.2.1. By Product Type
 - 12.2.5.2.2. By Application
- 12.2.6. Indonesia Application Specific Integrated Circuit Market Outlook
 - 12.2.6.1. Market Size & Forecast
 - 12.2.6.1.1. By Value
 - 12.2.6.2. Market Share & Forecast
 - 12.2.6.2.1. By Product Type
 - 12.2.6.2.2. By Application
- 12.2.7. Vietnam Application Specific Integrated Circuit Market Outlook
 - 12.2.7.1. Market Size & Forecast
 - 12.2.7.1.1. By Value
 - 12.2.7.2. Market Share & Forecast
 - 12.2.7.2.1. By Product Type
 - 12.2.7.2.2. By Application

13. MARKET DYNAMICS

- 13.1. Drivers
- 13.2. Challenges

14. MARKET TRENDS AND DEVELOPMENTS

15. COMPANY PROFILES

- 15.1. Intel Corporation
 - 15.1.1. Business Overview
 - 15.1.2. Key Revenue and Financials

- 15.1.3. Recent Developments
- 15.1.4. Key Personnel/Key Contact Person
- 15.1.5. Key Product/Services Offered
- 15.2. Xilinx, Inc.
 - 15.2.1. Business Overview
 - 15.2.2. Key Revenue and Financials
 - 15.2.3. Recent Developments
 - 15.2.4. Key Personnel/Key Contact Person
 - 15.2.5. Key Product/Services Offered
- 15.3. NVIDIA Corporation
 - 15.3.1. Business Overview
 - 15.3.2. Key Revenue and Financials
 - 15.3.3. Recent Developments
 - 15.3.4. Key Personnel/Key Contact Person
 - 15.3.5. Key Product/Services Offered
- 15.4. Texas Instruments Incorporated
 - 15.4.1. Business Overview
 - 15.4.2. Key Revenue and Financials
 - 15.4.3. Recent Developments
 - 15.4.4. Key Personnel/Key Contact Person
 - 15.4.5. Key Product/Services Offered
- 15.5. Broadcom Inc.
 - 15.5.1. Business Overview
 - 15.5.2. Key Revenue and Financials
 - 15.5.3. Recent Developments
 - 15.5.4. Key Personnel/Key Contact Person
 - 15.5.5. Key Product/Services Offered
- 15.6. Qualcomm Incorporated
 - 15.6.1. Business Overview
 - 15.6.2. Key Revenue and Financials
 - 15.6.3. Recent Developments
 - 15.6.4. Key Personnel/Key Contact Person
 - 15.6.5. Key Product/Services Offered
- 15.7. Samsung Electronics Co., Ltd.
 - 15.7.1. Business Overview
 - 15.7.2. Key Revenue and Financials
 - 15.7.3. Recent Developments
 - 15.7.4. Key Personnel/Key Contact Person
 - 15.7.5. Key Product/Services Offered

15.8. Advanced Micro Devices, Inc.

15.8.1. Business Overview

15.8.2. Key Revenue and Financials

15.8.3. Recent Developments

15.8.4. Key Personnel/Key Contact Person

15.8.5. Key Product/Services Offered

15.9. STMicroelectronics N.V.

15.9.1. Business Overview

15.9.2. Key Revenue and Financials

15.9.3. Recent Developments

15.9.4. Key Personnel/Key Contact Person

15.9.5. Key Product/Services Offered

15.10. Analog Devices, Inc.

15.10.1. Business Overview

15.10.2. Key Revenue and Financials

15.10.3. Recent Developments

15.10.4. Key Personnel/Key Contact Person

15.10.5. Key Product/Services Offered

15.11. Infineon Technologies AG

15.11.1. Business Overview

15.11.2. Key Revenue and Financials

15.11.3. Recent Developments

15.11.4. Key Personnel/Key Contact Person

15.11.5. Key Product/Services Offered

15.12. ON Semiconductor Corporation

15.12.1. Business Overview

15.12.2. Key Revenue and Financials

15.12.3. Recent Developments

15.12.4. Key Personnel/Key Contact Person

15.12.5. Key Product/Services Offered

16. STRATEGIC RECOMMENDATIONS**17. ABOUT US & DISCLAIMER**

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